80574

I. 2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

DATE:

SUBJECT: **Request for Concurrence on the Enforcement Action Memorandum for the Engineering/Cost Analysis for the Circle Smelting Site, Beckemeyer, Illinois**

FROM William E. Muno, Director
Superfund Division P. Karl for

TO: Valdas V. Adamkus
Regional Administrator

By this memorandum, I am recommending that you authorize the non-time critical removal action for the Circle Smelting Corporation Site located in the Village of Beckemeyer, Illinois by executing the attached Action Memorandum (AM).

This AM was prepared in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. Section 9601 et seq. , as Public Law 99-499, the National Contingency Plan, 40 CFR Part 300, and Agency policy. The AM has been reviewed and it is concluded that it is both legally and technically sufficient. As such, I believe that approval of this AM is a proper exercise of your delegated authority.

Please feel free to contact me if you have any questions. 6/07/96.

Attachments

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

SR-6J

MEMORANDUM

DATE:

SUBJECT: **ENFORCEMENT ACTION MEMORANDUM Request for a Non-Time-Critical Removal Action at the Circle Smelting Site, Village of Beckemeyer, Clinton County, Illinois (Site ID # WJ)**

FROM: Tim Prendiville, Remedial Project Manager
Remedial Section # 1

THRU: William E. Muno, Director
Superfund Division Division

TO: Valdas V. Adamkus
Regional Administrator

I. PURPOSE

The purpose of this memorandum is to document the selection of the non-time-critical response action selected in the Engineering Evaluation/Cost Analysis (EE/CA) for the Circle Smelting Corporation plant site, estimated to approximately cost $9,446,000, to abate an imminent and substantial threat to public health and the environment posed by the presence of superficial soils, sediments and smelter waste materials, which include slag, cinders, dust and debris, that are highly contaminated with lead. These superficial soils are present throughout the Village of Beckemeyer along with highly contaminated smelter waste materials at the Circle Smelting property. Sediments highly contaminated with lead exist in the unnamed creeks adjacent to the Circle Smelting property. The proposed removal action is considered a non-time-critical removal action and is intended to address only those areas that potentially pose the greatest risks to human health and the environment. The Circle Smelting Corporation (CSC) site has been designated a Superfund Accelerated Cleanup Model (SACM) site. SACM is intended to provide the United States Environmental Protection Agency (U.S. EPA) with greater flexibility to clean up National Priority List (NPL)-caliber sites more efficiently.

II. SITE CONDITIONS AND BACKGROUND

CERCLIS ID# ILD 050 231 976

A. Physical Location

The Village of Beckemeyer has a population of approximately 1,070 residents and occupies approximately one square mile. The CSC plant is located on a 28-acre parcel of land situated along Old Illinois State Highway 50 adjacent to the northeast corner of the Village of Beckemeyer, Clinton County, Illinois. A hardwoods wetland exists immediately to the north and to the west of the CSC plant. The CSC plant drains through two unnamed drainage pathways toward the wetland and ultimately to Beaver Creek. The CSC site location map is provided in Figure 1.

B. Site Description and Background

The CSC plant was originally constructed as a primary zinc smelter about 1904 and was later converted into a secondary zinc smelter around 1920. The CSC plant ceased operations in late November 1994. Beginning in the 1920's, lead-contaminated smelter waste materials, including slag, cinders, dust and debris, from the plant's smelters were disposed of throughout the 28-acre site. Lead-contaminated smelter waste materials were also used extensively within the Village of Beckemeyer as a surface cover material for walking paths, driveways, and alleys. Currently, it is estimated that approximately 10,000 cubic yards of lead-contaminated smelter waste materials and lead-contaminated soils (referred to as "contaminated material") are present and wholly or partially exposed throughout the Village of Beckemeyer. Smelter waste materials characterization results indicate heavy metal contamination of lead, zinc, cadmium, copper and arsenic. Contaminant concentrations from samples collected at various locations throughout the Village from pathways and alleys can be found in Attachment A.

The CSC plant is presently owned and was operated by Circle Smelting Corporation, an Illinois corporation. Federated Metals Corporation, a division of ASARCO, Inc., a Delaware Corporation, is a past owner and former operator of the CSC plant. The secondary zinc smelting process employed by Circle Smelting Corporation and Federated Metals Corporation generated air emissions that contained lead.

The State of Illinois' involvement at the CSC site began in the late 1970's when the Illinois Geological Survey conducted an extensive investigation of several smelters within central Illinois. As part of this investigation,

numerous on-site samples were collected to determine if local groundwater within the Village of Beckemeyer had been impacted by past waste disposal activities. While the well logs of this work are no longer available, this report gives a description of the hydrogeologic conditions that exist at the CSC site. The report states that the only aquifer of significance at the CSC site is a sand unit that occurs at depths of six to ten feet.

In 1986, the Illinois Environmental Protection Agency (IEPA) became involved at the CSC site when a fire broke out at the facility which resulted in the evacuation of a number of local residents. This incident led to negotiations in which owners and operators agreed to undertake a cleanup of the surface of the facility and conduct a remedial investigation of the CSC site and surrounding areas. The cleanup occurred under the oversight of the IEPA, but when both parties could not agree upon the extent of the remedial investigation, the CSC site was referred to the site assessment program for entry into CERCLIS.

The Preliminary Assessment was conducted in 1987 and the Screening Site Inspection was completed in 1988, both of which were conducted by IEPA. The IEPA conducted an Expanded Site Inspection in March 1992 and collected 35 soil and sediment samples from the facility and nearby areas.

On March 29, 1993, U.S. EPA Emergency Response personnel and the Technical Assistance Team (TAT) conducted a site assessment of the Village of Beckemeyer. Several areas of contaminated material or areas of potential contaminated material, as indicated by stressed vegetation, were identified and sampled for analysis. A total of fourteen (14) samples were collected and analyzed indicating the presence of high levels of lead contamination. Total lead levels were found to be as high as 31,000 ppm and toxic characteristic leachate procedure (TCLP) lead levels were as high as 210 ppm.

During the week of May 17, 1993, the U.S. EPA Region V ecologists with assistance from the U.S. EPA Environmental Response Team and TAT conducted an ecological assessment of the wetland and tributary area around the CSC site. The ecological assessment has determined that the CSC site poses a significant threat to the environment. This conclusion is based on the following facts: surface water sediments receiving run-off are contaminated to levels that greatly exceed ecological benchmark values; the metals are bioavailable; field observations indicate clear evidence of metal toxicity to plants in the emergent wetland receiving run-off; and contaminants have migrated downstream beyond

drainage ditches to Beaver Creek and the ecologically significant bottomland hardwood swamp. Refer to the "Final Draft-Report Field Investigation Circle Smelting Site", August 1993 located in the Administrative Record.

Soil sampling conducted on July 30, 1993, by U.S. EPA determined that elevated levels of lead contamination from the smelter waste materials extended to approximately twenty-four (24) inches below the surface of the contaminated material.

During the week of October 4, 1993, the U.S. EPA Remedial Project Manager collected approximately 177 samples of soils and smelter waste materials along the route of the new water main and from residential areas. The analytical results showed that approximately 20% of the samples collected revealed lead concentrations in excess of 500 ppm and ranged up to 5,100 ppm. This information indicated that widespread contamination had resulted through human activities or natural migration of smelter waste material. Excavation of the contaminated material during the new water main replacement project would have increased the potential for exposure to workers installing the new water main and the residents of Beckemeyer. The principal routes of exposure would be from surface water runoff and air particulate migration and direct exposure to contaminated materials during installation of the new water main.

On March 17, 1994, an Action Memorandum was signed by the Director of Waste Management Division authorizing a time-critical-removal action at the CSC site. This memorandum recommended a time-critical removal action to address the potential release of contaminants within the Village during the new water main replacement project, namely, development and implementation of a Health and Safety Plan to cover removal activities as well as prevent exposure to workers and local residents from the contaminated material; development and implementation of a sampling and analytical program designed to identify potentially contaminated material along the water distribution route; provision of dust suppression measures for excavated contaminated material to ensure that contaminated dust did not migrate; removal of contaminated material potentially encountered during excavation and trenching, and proper handling, storage, consolidation, and/or disposal of the stabilized material, along with backfilling of excavations with appropriate material; and the provision of adequate cover protection to stabilize contaminated material to prevent exposure to the elements.

On March 22, 1994, a Unilateral Administrative Order (UAO) was issued by the U.S. EPA to Circle Smelting Corporation,

Federated Metals Corporation, and ASARCO, Inc. This UAO required the Potentially Responsible Parties (PRPs) to remove lead-contaminated soils in the path of the Village's new water main. Work began on May 1, 1994, when the PRPs retained a suitable excavation contractor. Excavation along the new water main route concluded on August 21, 1994, with removal of over 2500 cubic yards of lead-contaminated smelter waste materials that were in the path of the new water main. The Village's water main contractor is now in the process of connecting residences to the new water main.

In April 1994, the Site Assessment Team recommended that the Regional Decision Team (RDT) consider the CSC site as a SACM site. The RDT approved the recommendation and an Engineering Evaluation and Cost Analysis (EE/CA) was conducted to evaluate the various options involved in the removal action in the Village, the CSC site and the adjacent wetland (See Attachment C). The final EE/CA is dated May 1996, and two public comment periods were open from June 5, 1994 to August 5, 1994 and from November 26, 1995 to January 10, 1996. A public meeting was held on June 15, 1994. The EE/CA evaluated five alternatives: No Action; Excavation of Residential Soils with Offsite Disposal, Natural Attenuation of Sediments, and Erosion and Institutional Controls for Onsite Soils/Materials; Excavation of Residential Soils and Sediments with Offsite Disposal and Institutional Controls for Onsite Soils/Materials; Excavation of Residential Soils with Onsite Disposal, Natural Attenuation of Sediments, and Containment of Soil/Materials with a Soil Cap; and Excavation of Residential Soils and Sediment with Onsite Disposal and Containment of Soil/Materials with a Soil Cap. The EE/CA determined that the last alternative most effectively met the long-term remedial action objectives of protecting human health and the environment.

In July 1995 U.S. EPA conducted a sampling event in order to collect site-specific data, such as; lead-based paint, water, and in-house dust, to be used in the development of a risk evaluation addendum. The risk evaluation addendum was prepared by U.S. EPA toxicologist to satisfy the deficiencies of the previous risk evaluation presented in the EE/CA. A second public comment period was granted due to the development of the addendum and the Update # 3 of the Administrative Record, where relative information used in the decision making process was missing.

C. Current Site Conditions

The CSC site is unchanged and still presents a formidable source of lead contamination from smelter waste materials that can migrate from the CSC plant via the wind and stormwater runoff. The hardwood wetland and drainage areas are still contaminated with elevated levels of lead and other metals and pose a threat to the ecology of the wetland environment.

The U.S. EPA conducted an EE/CA at the CSC site in order to evaluate possible options involved in a non-time-critical removal action in the Village of Beckemeyer, the CSC plant, and the adjacent wetland. More information regarding the EE/CA is provided in the EE/CA section of this Action Memorandum. A first draft EE/CA report was prepared by U.S. EPA and proposed to the community via a public meeting, which was held on June 15, 1994. This first draft EE/CA report contained the recommended non-time-critical removal action for the CSC site as well as more information related to the investigation performed at the CSC site. A public comment period was established to provide the community with the opportunity to comment on the first draft EE/CA report and the proposed non-time-critical removal action alternative. The U.S. EPA responsiveness summary to the comments received on the first draft EE/CA report is provided in Attachment B. A second draft EE/CA report was prepared by U.S. EPA and proposed to the community via a second comment period (November 26, 1995 to January 10, 1996). This second draft EE/CA Report contained the recommended non-time-critical removal action modified after the first public comment period and also contained an addendum to the risk evaluation section of the first draft EE/CA Report to satisfy deficiencies found in it. The U.S. EPA responsiveness summary to the comments received on the second draft EE/CA Report are also provided in Attachment B.

D. State and Federal Authorities' Role

On May 14, 1993, the U.S. EPA and the IEPA made a presentation to the U.S. EPA Regional Decision Team (RDT) to request approval of a plan to survey areas in the community which may pose a potential health risk, to initiate a process to involve the PRPs in the response to the CSC site, and to develop an EE/CA for the purpose of determining the nature and extent of contamination and developing the appropriate non-time-critical removal action to be conducted. The RDT approved this request and gave the U.S. EPA site assessment team the lead role in its development. An EE/CA has been prepared by the U.S. EPA with the input

and assistance of the IEPA to develop and evaluate a series of non-time-critical action alternatives. A Risk Evaluation Addendum has been prepared by the U.S. EPA in order to satisfy deficiencies found in the previous submittal.

III. THREAT TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

Conditions present in the Village of Beckemeyer, the CSC site and the surrounding areas constitute an imminent and substantial threat to human health and the environment, based upon considerations as set forth in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Section 300.415(b)(2), specifically:

- Actual or potential exposure to nearby populations, animals or the food chain from hazardous substances or pollutants or contaminants: CSC plant site investigations conducted by the IEPA, the U.S. EPA and the TAT identified high levels of lead in samples collected from locations within the village limits of Beckemeyer. Total lead concentration in Beckemeyer range from background (4.7 to 647 mg/kg) levels to as high as 50,000 mg/kg in smelter waste materials and sediments and soils containing smelter waste materials. Lead is a highly toxic and ubiquitous chemical. Lead presents a major health threat to fetuses, infants and young children due to the damage it causes to the central nervous system. Low level exposure during early childhood results in reduced growth, attention span deficits, learning disabilities, language disabilities, decreased IQ and disruptive behavior; the damage is permanent. Fetal exposure may result in preterm birth, reduced birth weight and decreased IQ. Low-level lead exposure in adults may result in increases in blood pressure. High-level exposure to lead can cause severe damage to the brain and kidneys of adults and children, and may result in convulsions and death. High doses may also affect reproduction, causing abortion or damage to the male reproductive system. The U.S. EPA has placed lead in weight-of-evidence Group B2, indicating that it is also a probable human carcinogen. The general human population is exposed to lead primarily through the oral route of exposure, with some contribution from inhalation. The adverse effects of lead are the same regardless of whether it enters the body through inhalation or ingestion. The close proximity of residences to the high levels of lead in smelter waste materials and soils and sediments contaminated with

smelter waste materials allows for potential direct contact and exposure to lead-contaminated dust. The Preliminary Remediation Goals (PRGs) for lead developed for the CSC site by U.S. EPA are 500 mg/kg for residential areas and 1,500 mg/kg for industrial areas. U.S. EPA evaluated the lead exposure in the Village of Beckemeyer based on site-specific considerations, the application of appropriate guidance (OSWER Directive #9355.4-12, Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities), the Integrated Exposure Uptake Biokinetic Model for Lead in Children, version 0.99d and the preponderance of literature describing the health effects of lead. Refer to the health responses in Attachment B and C and the Risk Evaluation Addendum for further explanation.

- High levels of hazardous substances or pollutants or contaminants, largely at or near the surface, in smelter waste materials, sediments and soils containing smelter waste materials that may migrate: The CSC site investigations have documented high levels of lead in smelter waste materials which have been deposited throughout the Village of Beckemeyer. The smelter waste materials are easily pulverized, which allows them to migrate easily. Increased migration of contaminants is likely from airborne dust or stormwater runoff.

- Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released: During the spring and autumn, substantial rainfall occurs which may contribute to surface runoff from smelter waste materials and sediments and soils containing smelter waste materials in residential areas and on the CSC plant. During the summer months, extreme heat causes the surface soils to dry up to a powder which is released in the form of airborne dust. Presently there are no provisions on the CSC plant or in the Village of Beckemeyer to mitigate this potential source of airborne contamination.

IV. ENDANGERMENT DETERMINATION

The CSC site conditions which offer no containment of smelter waste materials, soils, and sediments which are highly contaminated with lead, the nature of the hazardous substances on the CSC site, the potential exposure pathways to nearby populations as described in Sections II and III above, and the actual or threatened releases of hazardous substances from the CSC site, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to human health, or the environment.

V. PROPOSED ACTIONS AND ESTIMATED COST

A. Proposed Actions

1. Description of the Proposed Action

The purpose of this non-time-critical removal action is to mitigate the imminent and substantial threats posed to human health or the environment from smelter waste materials, soils and sediments at the CSC site and that have the potential to migrate from the CSC plant. This action also mitigates the threats posed by the smelter waste materials placed in the driveways and alleys of residential areas of the Village of Beckemeyer, both where those materials are currently deposited and if those materials migrate due to their friability. The proposed non-time-critical removal action (Alternative 5) is described in detail in the final EE/CA Report. The proposed non-time-critical removal action includes the following actions:

* excavation of contaminated material from the residential areas of the Village of Beckemeyer and the replacement of this material with clean fill;

* removal of soils contaminated with lead from smelter waste materials in the residential area south of the smelter affected by wind-deposition and the replacement of these soils with clean fill;

* removal, by dredging, of contaminated sediments from the drainage ways north of the CSC plant site;

* excavation of soils contaminated with lead from the CSC plant site and disposal in the designated on-site area for capping;

* placement of the removed contaminated sediments from the drainage ways and the removed contaminated smelter waste materials and soils from the residential areas of the Village of Beckemeyer for disposal in the designated area on the CSC plant site for capping;

* final cover of the consolidated lead-contaminated smelter waste materials, soils and sediments with a clay/topsoil/gravel cap on the smelter property.

* Development and implementation of a health and safety plan for the non-time-critical removal

action.

2. Contribution to Remedial Performance

Implementation of the proposed non-time-critical removal action will be effective in reducing the potential exposure of nearby human populations to hazardous substances and in eliminating the threat of continued release to the environment posed by smelter waste materials and sediments and soils containing smelter waste materials, all of which are highly contaminated with lead and other metals due to the deposition of smelter waste materials. This action is recommended because it will result in the removal of residential sources of lead contamination and will prevent the possible migration of lead contamination from the CSC plant and through the air and stormwater runoff. The selected non-time-critical removal action constitutes a permanent solution which ensures the overall protection of human health and the environment by reducing the exposure to lead- contaminated smelter waste material, soils and sediments from the CSC site.

3. Description of Alternative Technology

Discussion of various technologies is addressed in the attached EE/CA Executive Summary (Attachment C).

4. Engineering Evaluation and Cost Analysis (EE/CA)

An EE/CA was conducted by U.S. EPA (refer to EE/CA Approval Memorandum (Attachment D) to evaluate the various non-time-critical removal action options in the Village of Beckemeyer, the CSC plant and the adjacent wetland. When determining the best technologies for the CSC site, the EE/CA must consider the criteria of effectiveness, implementability, cost, and public acceptance. A detailed description and discussion of the various options which were considered is contained in the attached EE/CA Executive Summary.

5. Relevant and Appropriate Requirements (ARARs)

Federal ARARs determined to be practicable for CSC site are: Clean Water Act; Safe Drinking Water Act; Land Disposal Restrictions; CERCLA-wastes; Capping; CAMU Policy; Surface Water Controls; Disposal or Decontamination of Equipment, Structures and/or Soils; Clean Air Act; Archaeological and Historic Preservation Act; and Endangered Species Act. The State ARAR

determined to be practicable for the CSC site is the Illinois Water Pollution Control Act. Other documents and guidances are classified as to be considered (TBC) documents and are described, as well as the ARARS, in Attachment E of this Action Memorandum.

6. Project Schedule

It is estimated that this project can be completed in 240 working days from the time that the contractor is mobilized in the field.

7. Post Removal Site Control

The Federal Remedial Project Manager has begun planning for provisions of post-removal site control, consistent with provisions of Section 300.415(k) of the NCP.

The non-time-critical removal action described in this Action Memorandum directly addresses actual or threatened releases of hazardous substances, pollutants or contaminants at the facility which may pose an imminent and substantial endangerment to human health and the environment. This non-time-critical removal action does not impose a burden on the affected property disproportionate to the extent to which that property contributes to the conditions being addressed.

B. Estimated Costs

The estimated costs of the recommended action are summarized in the table located in Attachment F. Costs have been broken down into two categories, extramural costs and intramural costs. Intramural cost associated with U.S. EPA oversight will initially be funded as part of this non-time-critical removal action.

Extramural Costs:

Regional Allowance Costs:	
Total cost of the non-time-critical removal action	$9,446,000.
Other Extramural Costs Not Funded From the Regional Allowance	
Total TAT	$208,000.
Subtotal, Extramural Costs	**$9,654,000.**
Extramural Costs Contingency (20%)	$1,931,000.
TOTAL EXTRAMURAL COSTS:	**$11,585,000.**

Intramural Cost:

U.S. EPA Direct Costs	$16,500.
U.S. EPA Indirect Costs	$29,150.
TOTAL INTRAMURAL COSTS	**$45,650.**
TOTAL NON-TIME-CRITICAL REMOVAL PROJECT CEILING	**$11,630,650.**

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Delayed action will increase the likelihood of release due to wind-driven lead-contaminated dust from the CSC plantand further erosion of lead-contaminated smelter waste materials to the nearby drainage ways. There is also the continued risk of exposure to lead-contaminated smelter waste materials and sediments and soils containing smelter waste materials to the approximately 1,070 residents of the Village of Beckemeyer from the smelter waste materials placed within the Village.

VII. OUTSTANDING POLICY ISSUES

The CSC site SACM project is a fully supported Federal Lead project with the IEPA as an active member of the SACM team. The CSC site project is considered to be a pilot project by U.S. EPA Region V in which the IEPA has direct input into the decision-making process continuing into the actual removal action.

VIII. ENFORCEMENT

See Enforcement Confidential Memorandum in Attachment G.

IX. RECOMMENDATION

This decision document represents the selected non-time-critical removal action for the CSC site, located in and adjacent to Beckemeyer, Illinois, developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended, and is not inconsistent with the NCP. This decision is based on the Administrative Record (Attachment I) for the CSC site. Conditions at the CSC site meet the NCP section 300.415(b)(2) criteria for a removal and I recommend your approval of the approval of the proposed non-time-critical

removal action. The total of project ceiling will be $11,630,650.

You may indicate your decision by signing below:

Valdas V. Adamkus, Regional Administrator — DATE: 6/07/96

APPROVE: Richard C Karl for WEM — DATE: 5-28-96
Director, Superfund Division

DISAPPROVE: _____ — DATE:
Director, Waste Management Division

FIGURES AND ATTACHMENTS:

FIGURE 1	Site and Location Map
ATTACHMENT A	Site Analytical Data
ATTACHMENT B	Responsiveness Summary (first and second comment period)
ATTACHMENT C	EE/CA Executive Summary
ATTACHMENT D	EE/CA Approval Memorandum
ATTACHMENT E	ARARs List
ATTACHMENT F	Description of Costs
ATTACHMENT G	Enforcement Confidential Memorandum
ATTACHMENT H	Administrative Record Index

CC: Don Henne,
Regional Environmental Officer
U.S. Department of the Interior
Custom House, Room 217
200 Chestnut Street
Philadelphia, PA 19106-2904

Gary King, Deputy Manager
Division of Land Pollution Control
Illinois Environmental Protection Agency
220 Churchill Road
Springfield, IL 62706

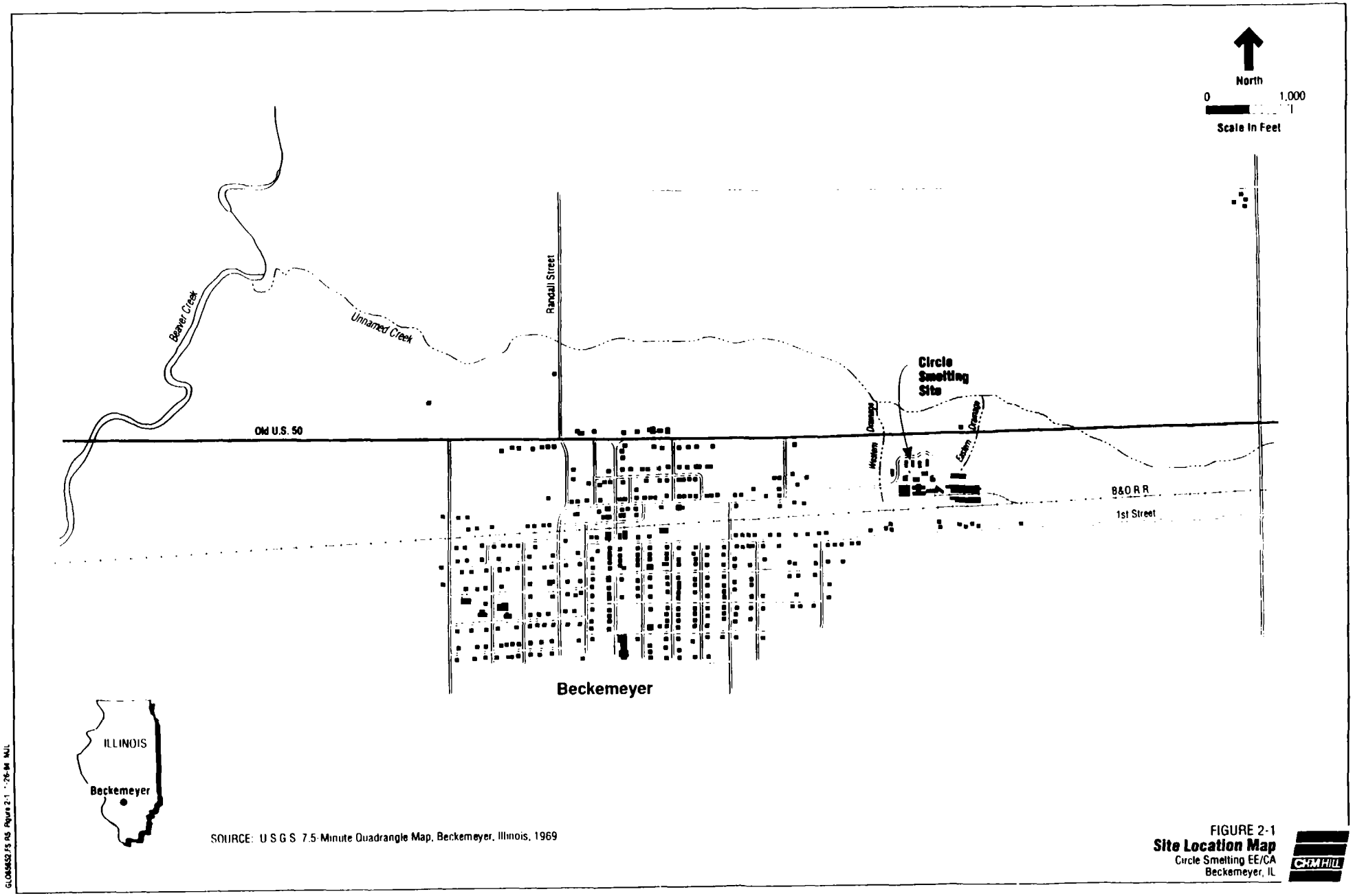
BCC PAGE

NOT RELEVANT TO THE SELECTION OF THE REMOVAL ACTION

(REDACTED 1 PAGE)

FIGURE 1

SITE AND LOCATION MAP



SOURCE: U S G S 7.5-Minute Quadrangle Map, Beckemeyer, Illinois, 1969

FIGURE 2-1
Site Location Map
Circle Smelting EE/CA
Beckemeyer, IL

CH2M HILL

GL058652.FS RS Figure 2-1 - 26-94 MJL

ATTACHMENT A

SITE ANALYTICAL DATA

						EP TOXICITY				
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	MATRIX	LOCATION	SAMPLER	Silver (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)
07/11/86	X202		Soil	Plant	IEPA				0.16	0.01 K
07/11/86	X204		Soil	Plant	IEPA				0.24	0.01 K
07/11/86	X203		Soil	Plant	IEPA				0.02	0.01 K
07/11/86	X101	X101 a	Soil	Plant	IEPA				0.98	0.01 K
07/11/86	X201		Soil	Plant	IEPA				0.18	0.01 K
07/11/86	X102	X102 a	Soil	Plant	IEPA				0.2	0.01 K
07/21/86	X101	X101 b	Soil	Residential	IEPA					
07/21/86	X102	X102 b	Soil	Residential	IEPA					
07/21/86	X501		Dust	Residential	IEPA					
09/25/86	X101	X101 c	Soil	Residential	IEPA				0.311	
09/25/86	X102	X102 c	Soil	Residential	IEPA					
09/25/86	X103	X103 a	Soil	Residential	IEPA					
09/25/86	X104	X104 a	Soil	Residential	IEPA					
09/25/86	X105	X105 a	Soil	Residential	IEPA				0.311	
09/25/86	X106	X106 a	Soil	Residential	IEPA				<0.02 u	
09/25/86	X107	X107 a	Soil	Residential	IEPA					
09/25/86	X108	X108 a	Soil	Residential	IEPA					
09/25/86	X109	X109 a	Soil	Residential	IEPA				0.025	
09/25/86	X110	X110 a	Soil	Wetlands	IEPA	<0.1 u	<0.25 Ru	1.47	0.603	<0.1 u
09/25/86	X111	X111 a	Soil	Residential	IEPA					
09/25/86	X112	X112 a	Soil	Wetlands	IEPA				0.25	
09/25/86	X113	X113 a	Soil	Wetlands	IEPA					
09/25/86	X114	X114 a	Soil	Plant	IEPA				0.071	
09/25/86	X115	X115 a	Soil	Plant	IEPA	<0.1 u	<0.25 Ru	<1.0 u	<0.02 u	<0.1 u
09/25/86	X116	X116 a	Soil	Wetlands	IEPA	<0.1 u	<0.25 Ru	<1.0 u	<0.02 u	<0.1 u
07/26/88	S101		Sediment	Plant	IEPA					
07/26/88	S301		Sediment	Wetlands	IEPA					
07/26/88	S202		Sediment	Plant	IEPA					
07/26/88	S302		Sediment	Wetlands	IEPA					
07/26/88	X101	X101 d	Soil	Residential	IEPA					
07/26/88	X102	X102 d	Soil	Plant	IEPA					
07/26/88	X103	X103 b	Soil	Plant	IEPA					
07/26/88	X104	X104 b	Soil	Residential	IEPA					
07/26/88	X105	X105 b	Soil	Residential	IEPA					
03/01/92	X301		Soil	Wetlands	IEPA					
03/01/92	X302		Soil	Plant	IEPA					
03/01/92	X303		Soil	Wetlands	IEPA					
03/01/92	X304		Soil	Wetlands	IEPA					

			EP TOXICITY cont'd						TOTAL	
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Mercury (mg/L)	Lead (mg/L)	Selenium (mg/L)	Zinc (mg/L)	Initial pH	Final pH	Aluminum (mg/kg)	Barium (mg/kg)
07/11/86	X202			2.4			8.5	6.4		
07/11/86	X204			3800			9.2	5		
07/11/86	X203			1.55			9.4	6.3		
07/11/86	X101	X101 a		7.5			8.3	6.1		
07/11/86	X201			1.5			6.9	6.2		
07/11/86	X102	X102 a		15.25			7.3	5		
07/21/86	X101	X101 b								
07/21/86	X102	X102 b								
07/21/86	X501									
09/25/86	X101	X101 c		0.691		377 R			5340	<80.6 u
09/25/86	X102	X102 c								
09/25/86	X103	X103 a								
09/25/86	X104	X104 a								
09/25/86	X105	X105 a		0.101		243 R				
09/25/86	X106	X106 a		<.1 u		20 R				
09/25/86	X107	X107 a								
09/25/86	X108	X108 a								
09/25/86	X109	X109 a		484		52.8 R				
09/25/86	X110	X110 a	<0.2 u	7.54	<0.2 Ru	752 R			8060	221
09/25/86	X111	X111 a								
09/25/86	X112	X112 a		0.309		30.2 R				
09/25/86	X113	X113 a								
09/25/86	X114	X114 a		0.206		97.2 R				
09/25/86	X115	X115 a	<0.2 u	<0.1 u	<0.2 Ru	23.1 R			4420	88.8
09/25/86	X116	X116 a	<0.2 u	<0.1 u	<0.2 Ru	38.1 R			4200	72.8
07/26/88	S101								23000	330
07/26/88	S301								19000	190
07/26/88	S202								12000	230
07/26/88	S302								11000	140
07/26/88	X101	X101 d							10000	130
07/26/88	X102	X102 d							9700	140
07/26/88	X103	X103 b							12000	160
07/26/88	X104	X104 b							10000	170
07/26/88	X105	X105 b							9500	190
03/01/92	X301								17700	191
03/01/92	X302								12000	230
03/01/92	X303								11000	140
03/01/92	X304								16600	186

			TOTAL cont'd							
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Beryllium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Cobalt (mg/kg)	Iron (mg/kg)	Manganese (mg/kg)	Nickel (mg/kg)
07/11/86	X202									
07/11/86	X204									
07/11/86	X203									
07/11/86	X101	X101 a								
07/11/86	X201									
07/11/86	X102	X102 a		8	22.5					
07/21/86	X101	X101 b								
07/21/86	X102	X102 b								
07/21/86	X501									
09/25/86	X101	X101 c	2	15.4	12	493	<10 u*	8620 *	1050 *	249
09/25/86	X102	X102 c		16.4						
09/25/86	X103	X103 a		9.8						
09/25/86	X104	X104 a		<4.0 u						
09/25/86	X105	X105 a		5						
09/25/86	X106	X106 a		<4.0 u						
09/25/86	X107	X107 a		5.2						
09/25/86	X108	X108 a		<4.0 u						
09/25/86	X109	X109 a		<4.0 u						
09/25/86	X110	X110 a	<2.0 u	19.6	19.6	636	17.4 *	15300 *	3920 *	564
09/25/86	X111	X111 a		<4.0 u						
09/25/86	X112	X112 a		<4.0 u						
09/25/86	X113	X113 a		<4.0 u						
09/25/86	X114	X114 a		6.4						
09/25/86	X115	X115 a	<2.0 u	<4.0 u	<8.0 u	93.2	<10.0 u*	7260 *	426 *	37.6
09/25/86	X116	X116 a	<2.0 u	<4.0 u	<8.0 u	163	<10.0 u*	6480 *	361 *	60.4
07/26/88	S101		0.18 u	7.9	28	190	46	34000	2600	280
07/26/88	S301		0.18 u	4.7	24	180	22	29000	1900	180
07/26/88	S202		0.19 u	22	32	3800	30	37000	1700	1000
07/26/88	S302		0.24 u	12	37	3600	22	37000	1100	1400
07/26/88	X101	X101 d	0.2 u	1 u	13	71	9.2 []	12000	710	35
07/26/88	X102	X102 d	0.19 u	0.97	14	160	13	13000	1100	74
07/26/88	X103	X103 b	0.2 u	54	71	5800	26	34000	1300	3200
07/26/88	X104	X104 b	0.2 u	1.9	24	880	12	17000	920	450
07/26/88	X105	X105 b	0.18 u	4.9	22	490	14	22000	1000	310
03/01/92	X301		0.7		23	15.8	7.1	16800	663	12.8
03/01/92	X302			22	32	3800	30	37000	1700	1000
03/01/92	X303			12	37	3600	22	37000	1100	1400
03/01/92	X304		0.9	5.8	29.4	1140	24.2	21600	1470	362

DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	TOTAL cont'd Lead (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)	Silver (mg/kg)	Arsenic (mg/kg)	Selenium (mg/kg)	Antimony (mg/kg)
07/11/86	X202								
07/11/86	X204								
07/11/86	X203								
07/11/86	X101	X101 a							
07/11/86	X201								
07/11/86	X102	X102 a	2525						
07/21/86	X101	X101 b	990		10000				
07/21/86	X102	X102 b	140		2200				
07/21/86	X501		1500		17000				
09/25/86	X101	X101 c *	770	12.6 *	18500	<0.002 u	2.12 *	<0.005 Ru	<0.012 u
09/25/86	X102	X102 c	493		15400				
09/25/86	X103	X103 a	461		12300				
09/25/86	X104	X104 a	144		4120				
09/25/86	X105	X105 a	342		10500				
09/25/86	X106	X106 a	269		2370				
09/25/86	X107	X107 a	629		3220				
09/25/86	X108	X108 a	663		2640				
09/25/86	X109	X109 a	663		3270				
09/25/86	X110	X110 a *	180	28.4 *	29500	<2.0 u	6.93 *	<5.0 Ru	16.8
09/25/86	X111	X111 a	60.6		990				
09/25/86	X112	X112 a	333		2360				
09/25/86	X113	X113 a	182		895				
09/25/86	X114	X114 a	584		6900				
09/25/86	X115	X115 a *	1010	17.4 *	1540	<2.0 u	6.56 *	<5.0 Ru	<0.012 u
09/25/86	X116	X116 a *	300	14.6 *	2550	<2.0 u	6.63 *	<5.0 Ru	<0.012 u
07/26/88	S101		390	63	6600	1.3 u	0.31 []	0.37 u	8.1 u
07/26/88	S301		550	72	5800	1.2 u	0.28 []	0.35 u	7.9 u
07/26/88	S202		9370	35	61000	1.4 u	20	0.39 u	8.7 u
07/26/88	S302		6100	30	42000	1.7 u	30	1.6	11 u
07/26/88	X101	X101 d	200	26	640	5	1.5 []	0.5 []	9.1 u
07/26/88	X102	X102 d	300	31	3500	4.6	1.9	0.58 []	8.4 u
07/26/88	X103	X103 b	8300	25	72000	5.8	31	1.5	8.9 u
07/26/88	X104	X104 b	1600	30	11000	1.4 u	9.6	1.5	9 u
07/26/88	X105	X105 b	940	27	8400	1.8 []	2.2	0.75 []	8 u
03/01/92	X301		33.4	41.6	95.4		16	1.3	
03/01/92	X302		9370	35	61000		20		
03/01/92	X303		6100	30	42000		30	1.6	
03/01/92	X304		2290	48.8	13700		30.5	1.4	

				TOTAL cont'd						
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Thallium (mg/kg)	Calcium (mg/kg)	Magnesium (mg/kg)	Potassium (mg/kg)	Sodium (mg/kg)	Sulfate (mg/kg)	Sulfide (mg/kg)	Mercury (mg/kg)
07/11/86	X202									
07/11/86	X204									
07/11/86	X203									
07/11/86	X101	X101 a								
07/11/86	X201									
07/11/86	X102	X102 a								
07/21/86	X101	X101 b								
07/21/86	X102	X102 b								
07/21/86	X501									
09/25/86	X101	X101 c	<0.002 u							
09/25/86	X102	X102 c								
09/25/86	X103	X103 a								
09/25/86	X104	X104 a								
09/25/86	X105	X105 a								
09/25/86	X106	X106 a								
09/25/86	X107	X107 a								
09/25/86	X108	X108 a								
09/25/86	X109	X109 a								
09/25/86	X110	X110 a	<2.0 u							
09/25/86	X111	X111 a								
09/25/86	X112	X112 a								
09/25/86	X113	X113 a								
09/25/86	X114	X114 a								
09/25/86	X115	X115 a	<2.0 u							
09/25/86	X116	X116 a	<2.0 u							
07/26/88	S101		0.9 u	2800	3100	2300	110 []	1.3	6.5 u	0.034 u
07/26/88	S301		1 u	2800	2400	1900	110 []	100	6.3 u	0.038 u
07/26/88	S202		1.1 u	38000	2500	650 []	500 []	1200	7.2 u	0.69
07/26/88	S302		1.2 u	4900	1200	510 []	310 []	310	7.8	0.25
07/26/88	X101	X101 d	0.93 u	2400	1300	1000 []	110 u	190	6.3 u	0.038 u
07/26/88	X102	X102 d	0.95 u	1900	1200	1100	100 u	100	5.9 u	0.044
07/26/88	X103	X103 b	0.94 u	3200	2100	650 []	300 []	310	6 u	0.3
07/26/88	X104	X104 b	0.85 u	4400	1200	980 []	260 []	2600	5.8 u	0.13
07/26/88	X105	X105 b	1 u	4200	1400	1000	250 []	180	6.1 u	0.16
03/01/92	X301		0.5	2540	1610	2200	260			
03/01/92	X302			38000	2500	650	500			0.7
03/01/92	X303			4900	1200	510	310			0.3
03/01/92	X304			3740	2590	1580	330			9.1

				TCLP Metals						
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Cyanide (mg/kg)	Arsenic mg/L	Barium mg/L	Cadmium mg/L	Chromium mg/L	Lead mg/L	Mercury mg/L	Selenium mg/L
07/11/86	X202									
07/11/86	X204									
07/11/86	X203									
07/11/86	X101	X101 a								
07/11/86	X201									
07/11/86	X102	X102 a								
07/21/86	X101	X101 b								
07/21/86	X102	X102 b								
07/21/86	X501									
09/25/86	X101	X101 c								
09/25/86	X102	X102 c								
09/25/86	X103	X103 a								
09/25/86	X104	X104 a								
09/25/86	X105	X105 a								
09/25/86	X106	X106 a								
09/25/86	X107	X107 a								
09/25/86	X108	X108 a								
09/25/86	X109	X109 a								
09/25/86	X110	X110 a								
09/25/86	X111	X111 a								
09/25/86	X112	X112 a								
09/25/86	X113	X113 a								
09/25/86	X114	X114 a								
09/25/86	X115	X115 a								
09/25/86	X116	X116 a								
07/26/88	S101		0.33 u							
07/26/88	S301		0.31 u							
07/26/88	S202		0.36 u							
07/26/88	S302		0.39 u							
07/26/88	X101	X101 d	0.31 u							
07/26/88	X102	X102 d	0.44							
07/26/88	X103	X103 b	0.3 u							
07/26/88	X104	X104 b	0.39 u							
07/26/88	X105	X105 b	0.67							
03/01/92	X301									
03/01/92	X302									
03/01/92	X303									
03/01/92	X304									

DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Silver mg/L
07/11/86	X202		
07/11/86	X204		
07/11/86	X203		
07/11/86	X101	X101 a	
07/11/86	X201		
07/11/86	X102	X102 a	
07/21/86	X101	X101 b	
07/21/86	X102	X102 b	
07/21/86	X501		
09/25/86	X101	X101 c	
09/25/86	X102	X102 c	
09/25/86	X103	X103 a	
09/25/86	X104	X104 a	
09/25/86	X105	X105 a	
09/25/86	X106	X106 a	
09/25/86	X107	X107 a	
09/25/86	X108	X108 a	
09/25/86	X109	X109 a	
09/25/86	X110	X110 a	
09/25/86	X111	X111 a	
09/25/86	X112	X112 a	
09/25/86	X113	X113 a	
09/25/86	X114	X114 a	
09/25/86	X115	X115 a	
09/25/86	X116	X116 a	
07/26/88	S101		
07/26/88	S301		
07/26/88	S202		
07/26/88	S302		
07/26/88	X101	X101 d	
07/26/88	X102	X102 d	
07/26/88	X103	X103 b	
07/26/88	X104	X104 b	
07/26/88	X105	X105 b	
03/01/92	X301		
03/01/92	X302		
03/01/92	X303		
03/01/92	X304		

			TCLP cont'd	
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Copper mg/L	Zinc mg/L
07/11/86	X202			
07/11/86	X204			
07/11/86	X203			
07/11/86	X101	X101 a		
07/11/86	X201			
07/11/86	X102	X102 a		
07/21/86	X101	X101 b		
07/21/86	X102	X102 b		
07/21/86	X501			
09/25/86	X101	X101 c		
09/25/86	X102	X102 c		
09/25/86	X103	X103 a		
09/25/86	X104	X104 a		
09/25/86	X105	X105 a		
09/25/86	X106	X106 a		
09/25/86	X107	X107 a		
09/25/86	X108	X108 a		
09/25/86	X109	X109 a		
09/25/86	X110	X110 a		
09/25/86	X111	X111 a		
09/25/86	X112	X112 a		
09/25/86	X113	X113 a		
09/25/86	X114	X114 a		
09/25/86	X115	X115 a		
09/25/86	X116	X116 a		
07/26/88	S101			
07/26/88	S301			
07/26/88	S202			
07/26/88	S302			
07/26/88	X101	X101 d		
07/26/88	X102	X102 d		
07/26/88	X103	X103 b		
07/26/88	X104	X104 b		
07/26/88	X105	X105 b		
03/01/92	X301			
03/01/92	X302			
03/01/92	X303			
03/01/92	X304			

						EP TOXICITY				
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	MATRIX	LOCATION	SAMPLER	Silver (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)
03/01/92	X305		Soil	Wetlands	IEPA					
03/01/92	X306		Soil	Wetlands	IEPA					
03/01/92	X307		Soil	Wetlands	IEPA					
03/01/92	X308		Soil	Wetlands	IEPA					
03/01/92	X309		Soil	Wetlands	IEPA					
03/01/92	X310		Soil	Wetlands	IEPA					
03/01/92	X101	X101 e	Soil	Residential	IEPA					
03/01/92	X102	X102 e	Soil	Residential	IEPA					
03/01/92	X103	X103 c	Soil	Residential	IEPA					
03/01/92	X104	X104 c	Soil	Residential	IEPA					
03/01/92	X105	X105 c	Soil	Residential	IEPA					
03/01/92	X106	X106 b	Soil	Residential	IEPA					
03/01/92	X107	X107 b	Soil	Residential	IEPA					
03/01/92	X108	X108 b	Soil	Residential	IEPA					
03/01/92	X109	X109 b	Soil	Residential	IEPA					
03/01/92	X110	X110 b	Soil	Residential	IEPA					
03/01/92	X111	X111 b	Soil	Residential	IEPA					
03/01/92	X112	X112 b	Soil	Residential	IEPA					
03/01/92	X113	X113 b	Soil	Residential	IEPA					
03/01/92	X114	X114 b	Soil	Residential	IEPA					
03/01/92	X115	X115 b	Soil	Residential	IEPA					
03/01/92	X116	X116 b	Soil	Residential	IEPA					
03/01/92	X117		Soil	Residential	IEPA					
03/01/92	X118		Soil	Residential	IEPA					
03/01/92	X119		Soil	Residential	IEPA					
03/01/92	X120		Soil	Residential	IEPA					
03/01/92	X121		Soil	Residential	IEPA					
03/01/92	X122		Soil	Residential	IEPA					
03/01/92	X123		Soil	Residential	IEPA					
03/01/92	X124		Soil	Residential	IEPA					
01/11/93	S-1	S-1 a	Soil	Wetlands						
01/11/93	S-2	S-2 a	Soil	Wetlands						
01/11/93	S-3	S-3 a	Soil	Wetlands	EPA					
01/11/93	S-4	S-4 a	Soil	Wetlands	EPA					
01/11/93	S-5	S-5 a	Soil	Wetlands	EPA					
01/11/93	S-6	S-6 a	Soil	Wetlands	EPA					
01/11/93	S-7	S-7 a	Soil	Wetlands	EPA					
01/11/93	S-8	S-8 a	Soil	Wetlands	EPA					

			EP TOXICITY cont'd						TOTAL	
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Mercury (mg/L)	Lead (mg/L)	Selenium (mg/L)	Zinc (mg/L)	Initial pH	Final pH	Aluminum (mg/kg)	Barium (mg/kg)
03/01/92	X305								16300	218
03/01/92	X306								11500	190
03/01/92	X307								14300	140
03/01/92	X308								9520	227
03/01/92	X309								6390	113
03/01/92	X310								6180	105
03/01/92	X101	X101 e							16200	156
03/01/92	X102	X102 e							13900	152
03/01/92	X103	X103 c							13900	130
03/01/92	X104	X104 c							16900	391
03/01/92	X105	X105 c							12200	166
03/01/92	X106	X106 b							11300	168
03/01/92	X107	X107 b							11700	303
03/01/92	X108	X108 b							18100	244
03/01/92	X109	X109 b							18400	209
03/01/92	X110	X110 b							12100	248
03/01/92	X111	X111 b							19700	208
03/01/92	X112	X112 b							21400	412
03/01/92	X113	X113 b							14300	428
03/01/92	X114	X114 b							17000	187
03/01/92	X115	X115 b							14000	307
03/01/92	X116	X116 b							15500	276
03/01/92	X117								20300	221
03/01/92	X118								15400	236
03/01/92	X119								12100	173
03/01/92	X120								19600	369
03/01/92	X121								16600	329
03/01/92	X122								15600	297
03/01/92	X123								13500	244
03/01/92	X124								13400	201
01/11/93	S-1	S-1 a								
01/11/93	S-2	S-2 a							8000	130
01/11/93	S-3	S-3 a								
01/11/93	S-4	S-4 a							11000	160
01/11/93	S-5	S-5 a							13000	160
01/11/93	S-6	S-6 a								
01/11/93	S-7	S-7 a								
01/11/93	S-8	S-8 a							14000	160

			TOTAL cont'd							
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Beryllium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Cobalt (mg/kg)	Iron (mg/kg)	Manganese (mg/kg)	Nickel (mg/kg)
03/01/92	X305		1	16	53.1	2460	15.1	30400	422	1570
03/01/92	X306		0.7	2.5	23.1	218	11.6	16900	644	91
03/01/92	X307		0.7	3.2	21.7	189	7.6	16300	556	73
03/01/92	X308		0.7	1.8	14	55.1	21.1	22200	1340	40.6
03/01/92	X309		1.5	0.7	22	27.6	5.8	13900	437	15.6
03/01/92	X310		0.4	0.7	5.7	7.8	5.4	10300	488	9.1
03/01/92	X101	X101 e	0.7		21.3	10.1	7.4	16200	575	11.7
03/01/92	X102	X102 e	0.8	0	22.1	16.2	596	17600	601	11.8
03/01/92	X103	X103 c	0.6	1.1	22.4	311	11.7	13800	800	125
03/01/92	X104	X104 c	0.9	1.3	23.3	67.7	60	24900	4740	67.5
03/01/92	X105	X105 c	0.6	1.2	22.7	72.8	5.3	13100	699	43.3
03/01/92	X106	X106 b	0.5	1	16	88.2	8.1	11900	943	47.9
03/01/92	X107	X107 b	0.8	1.9	23	144	7.2	28000	685	42.7
03/01/92	X108	X108 b	0.9	1.6	29.3	156	10.6	20900	869	75.3
03/01/92	X109	X109 b	0.9	0.8	26.4	74.2	6.7	22400	517	31.6
03/01/92	X110	X110 b	1.1	4.5	25.4	955	12.9	49600	444	84.4
03/01/92	X111	X111 b	0.8	1.2	27.5	67.6	5.9	18800	432	44.2
03/01/92	X112	X112 b	1.4	0.6	33	52.9	9.3	31900	394	34
03/01/92	X113	X113 b	2.1	4.8	22.9	2330	16.9	57100	570	130
03/01/92	X114	X114 b	0.8	0.8	25.9	102	6.6	21900	628	41.7
03/01/92	X115	X115 b	0.4	2.4	25.9	164	9.3	18600	1300	39.7
03/01/92	X116	X116 b	0.8	2.8	34.4	170	8	22000	861	89.7
03/01/92	X117		0.8	1.7	33	115	6	18900	340	52.1
03/01/92	X118		0.9	1.5	27.4	184	7	32900	513	116
03/01/92	X119		0.6	0.8	20.6	181	5.2	14000	874	65.3
03/01/92	X120		1		25	16	38.5	35200	3290	25.8
03/01/92	X121		0.9	1.6	39.5	179	7.5	21000	566	103
03/01/92	X122		1	5.8	66.6	3600	19.8	36600	577	2020
03/01/92	X123		0.6	0.8	20	85.2	4.4	12500	692	35.9
03/01/92	X124		0.6	0.8	19.9	107	9.1	14400	1180	27.4
01/11/93	S-1	S-1 a				38		9100		12
01/11/93	S-2	S-2 a	0.5	2 u	13	160	5.9	10000	500	65
01/11/93	S-3	S-3 a				470		15000		160
01/11/93	S-4	S-4 a	0.7	2 u	17	100	4.6	10000	340	27
01/11/93	S-5	S-5 a	1	10	48	2400	19	25000	900	960
01/11/93	S-6	S-6 a				200		13000		74
01/11/93	S-7	S-7 a				180		17000		37
01/11/93	S-8	S-8 a	0.9	2 u	18	76	5.3	14000	460	28

			TOTAL cont'd						
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Lead (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)	Silver (mg/kg)	Arsenic (mg/kg)	Selenium (mg/kg)	Antimony (mg/kg)
03/01/92	X305		5594	43.5	28400	4.9	56.4	4.4	10.6
03/01/92	X306		480	38.7	2420		13.2	0.8	
03/01/92	X307		512	34.7	2300		10.4	0.6	
03/01/92	X308		187	43.3	1200		22.5	0.3	
03/01/92	X309		69	28.6	428		7.2	0.5	
03/01/92	X310		13.3	18.5	52.5		4.1	0.2	
03/01/92	X101	X101 e	24.5	39.9	55.3		6.6	0.5	
03/01/92	X102	X102 e	67	40.7	89.9		9.1	1.2	3.3
03/01/92	X103	X103 c	806	31.2	1380		10.6	0.5	3.4
03/01/92	X104	X104 c	157	59.1	1030		23.9	0.5	
03/01/92	X105	X105 c	382	32.7	887		7.3	0.5	
03/01/92	X106	X106 b	232	29.8	944		7.9	0.8	
03/01/92	X107	X107 b	580	39.2	1500		25.1	1.1	
03/01/92	X108	X108 b	534	43.6	1910		11.7	1.2	
03/01/92	X109	X109 b	182	41.2	614		10.2	0.9	
03/01/92	X110	X110 b	9470	32	17700	5	33.4	0.3	36.1
03/01/92	X111	X111 b	196	40	658		7.6	0.8	
03/01/92	X112	X112 b	76.6	44.4	425	0.6	8.5	0.9	
03/01/92	X113	X113 b	14000	43.1	20500	9.2	18	0.2	46.7
03/01/92	X114	X114 b	302	39	760		8.6	1	
03/01/92	X115	X115 b	387	36.2	2450	0.8	9	1	
03/01/92	X116	X116 b	402	38.9	2700		9	1	
03/01/92	X117		419	37.8	1470		7.4	1.1	
03/01/92	X118		305	31.9	1240	0.9	13.2	1.4	
03/01/92	X119		516	31.4	808		12.2	0.9	
03/01/92	X120		61	60.7	108		18	2.3	
03/01/92	X121		589	34.2	2250		9.5	1.4	3.5
03/01/92	X122		3420	34.4	24200	5	38	1.8	52.2
03/01/92	X123		162	28.9	1330		6.2	0.5	
03/01/92	X124		260	33.1	603		14.6	0.3	
01/11/93	S-1	S-1 a	37		170				
01/11/93	S-2	S-2 a	280	16	1600	1.2 u			
01/11/93	S-3	S-3 a	790		4100				
01/11/93	S-4	S-4 a	100	19	420	1.2 u			
01/11/93	S-5	S-5 a	4100	25	20000	2.7			
01/11/93	S-6	S-6 a	330		2100				
01/11/93	S-7	S-7 a	170		1100				
01/11/93	S-8	S-8 a	130	22	580	1.2 u			

				TOTAL cont'd						
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Thallium (mg/kg)	Calcium (mg/kg)	Magnesium (mg/kg)	Potassium (mg/kg)	Sodium (mg/kg)	Sulfate (mg/kg)	Sulfide (mg/kg)	Mercury (mg/kg)
03/01/92	X305			4690	2000	1790	412			0.2
03/01/92	X306			2250	1410	1220	191			0
03/01/92	X307			3190	1700	1590	210			0
03/01/92	X308			3140	1790	970	173			0
03/01/92	X309			2190	1060	734	213			0
03/01/92	X310		0.4	39800	8300	600	228			0
03/01/92	X101	X101 e		3350	1670	1420	236			
03/01/92	X102	X102 e		2980	1350	1530	195			0
03/01/92	X103	X103 c		1080	1420	1210	133			0.1
03/01/92	X104	X104 c		3010	2260	2090	160			0
03/01/92	X105	X105 c		3580	1510	2170	175			0
03/01/92	X106	X106 b		1310	1080	1250	113			0
03/01/92	X107	X107 b		9370	1730	2190	250			0
03/01/92	X108	X108 b		6270	2560	2800	262			0.1
03/01/92	X109	X109 b	0.5	6250	1790	2020	189			0.5
03/01/92	X110	X110 b		5110	1170	1270	506			0.1
03/01/92	X111	X111 b		4290	2280	2640	166			0
03/01/92	X112	X112 b		6570	2490	1640	485			0
03/01/92	X113	X113 b		6730	953	1710	1570			0
03/01/92	X114	X114 b		3500	2140	2750	160			0
03/01/92	X115	X115 b		8120	1680	2570	230			0.1
03/01/92	X116	X116 b		8690	1780	2770	263			0.1
03/01/92	X117			5540	2400	3370	205			0.1
03/01/92	X118			6980	1890	2205	238			0
03/01/92	X119			2360	1360	1860	122			0
03/01/92	X120			2670	2660	1620	502			
03/01/92	X121			4100	1640	2870	273			0.1
03/01/92	X122			12100	2250	2400	590			0.1
03/01/92	X123			4250	1580	2800	145			0
03/01/92	X124			2830	1780	2510	92.4			0
01/11/93	S-1	S-1 a								
01/11/93	S-2	S-2 a		2500	1300	1000 u	200 u			
01/11/93	S-3	S-3 a								
01/11/93	S-4	S-4 a		41000	5600	1800	550			
01/11/93	S-5	S-5 a		5900	2000	1300	450			
01/11/93	S-6	S-6 a								
01/11/93	S-7	S-7 a								
01/11/93	S-8	S-8 a		3200	2000	1700	210			

				TCLP Metals						
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Cyanide (mg/kg)	Arsenic mg/L	Barium mg/L	Cadmium mg/L	Chromium mg/L	Lead mg/L	Mercury mg/L	Selenium mg/L
03/01/92	X305									
03/01/92	X306									
03/01/92	X307									
03/01/92	X308									
03/01/92	X309									
03/01/92	X310									
03/01/92	X101	X101 e								
03/01/92	X102	X102 e								
03/01/92	X103	X103 c								
03/01/92	X104	X104 c								
03/01/92	X105	X105 c								
03/01/92	X106	X106 b								
03/01/92	X107	X107 b								
03/01/92	X108	X108 b								
03/01/92	X109	X109 b								
03/01/92	X110	X110 b								
03/01/92	X111	X111 b								
03/01/92	X112	X112 b								
03/01/92	X113	X113 b								
03/01/92	X114	X114 b								
03/01/92	X115	X115 b								
03/01/92	X116	X116 b								
03/01/92	X117									
03/01/92	X118									
03/01/92	X119									
03/01/92	X120									
03/01/92	X121									
03/01/92	X122									
03/01/92	X123									
03/01/92	X124									
01/11/93	S-1	S-1 a								
01/11/93	S-2	S-2 a								
01/11/93	S-3	S-3 a								
01/11/93	S-4	S-4 a								
01/11/93	S-5	S-5 a								
01/11/93	S-6	S-6 a								
01/11/93	S-7	S-7 a								
01/11/93	S-8	S-8 a								

DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Silver mg/L
03/01/92	X305		
03/01/92	X306		
03/01/92	X307		
03/01/92	X308		
03/01/92	X309		
03/01/92	X310		
03/01/92	X101	X101 e	
03/01/92	X102	X102 e	
03/01/92	X103	X103 c	
03/01/92	X104	X104 c	
03/01/92	X105	X105 c	
03/01/92	X106	X106 b	
03/01/92	X107	X107 b	
03/01/92	X108	X108 b	
03/01/92	X109	X109 b	
03/01/92	X110	X110 b	
03/01/92	X111	X111 b	
03/01/92	X112	X112 b	
03/01/92	X113	X113 b	
03/01/92	X114	X114 b	
03/01/92	X115	X115 b	
03/01/92	X116	X116 b	
03/01/92	X117		
03/01/92	X118		
03/01/92	X119		
03/01/92	X120		
03/01/92	X121		
03/01/92	X122		
03/01/92	X123		
03/01/92	X124		
01/11/93	S-1	S-1 a	
01/11/93	S-2	S-2 a	
01/11/93	S-3	S-3 a	
01/11/93	S-4	S-4 a	
01/11/93	S-5	S-5 a	
01/11/93	S-6	S-6 a	
01/11/93	S-7	S-7 a	
01/11/93	S-8	S-8 a	

			TCLP cont'd	
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Copper mg/L	Zinc mg/L
03/01/92	X305			
03/01/92	X306			
03/01/92	X307			
03/01/92	X308			
03/01/92	X309			
03/01/92	X310			
03/01/92	X101	X101 e		
03/01/92	X102	X102 e		
03/01/92	X103	X103 c		
03/01/92	X104	X104 c		
03/01/92	X105	X105 c		
03/01/92	X106	X106 b		
03/01/92	X107	X107 b		
03/01/92	X108	X108 b		
03/01/92	X109	X109 b		
03/01/92	X110	X110 b		
03/01/92	X111	X111 b		
03/01/92	X112	X112 b		
03/01/92	X113	X113 b		
03/01/92	X114	X114 b		
03/01/92	X115	X115 b		
03/01/92	X116	X116 b		
03/01/92	X117			
03/01/92	X118			
03/01/92	X119			
03/01/92	X120			
03/01/92	X121			
03/01/92	X122			
03/01/92	X123			
03/01/92	X124			
01/11/93	S-1	S-1 a		
01/11/93	S-2	S-2 a		
01/11/93	S-3	S-3 a		
01/11/93	S-4	S-4 a		
01/11/93	S-5	S-5 a		
01/11/93	S-6	S-6 a		
01/11/93	S-7	S-7 a		
01/11/93	S-8	S-8 a		

						EP TOXICITY				
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	MATRIX	LOCATION	SAMPLER	Silver (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)
01/11/93	R101		Soil	Residential	EPA					
01/11/93	R102		Soil	Residential	EPA					
03/29/93	S-1	S-1 b	Soil	Residential	E&E/EPA					
03/29/93	S-2	S-2 b	Soil	Residential	E&E/EPA					
03/29/93	S-3	S-3 b	Soil	Residential	E&E/EPA					
03/29/93	S-4	S-4 b	Soil	Residential	E&E/EPA					
03/29/93	S-5	S-5 b	Soil	Residential	E&E/EPA					
03/29/93	S-6	S-6 b	Soil	Residential	E&E/EPA					
03/29/93	S-7	S-7 b	Soil	Residential	E&E/EPA					
03/29/93	S-8	S-8 b	Soil	Residential	E&E/EPA					
03/29/93	S-9	S-9 a	Soil	Residential	E&E/EPA					
03/29/93	S-10 DUP	S-10 a	Soil	Residential	E&E/EPA					
03/29/93	S-11	S-11 a	Soil	Residential	E&E/EPA					
03/29/93	S-12	S-12 a	Soil	Residential	E&E/EPA					
03/29/93	S-13	S-13 a	Soil	Residential	E&E/EPA					
03/29/93	S-14		Soil	Residential	E&E/EPA					
03/29/93	S-1	S-1 c	Soil	Residential	E&E/EPA					
03/29/93	S-3	S-3 c	Soil	Residential	E&E/EPA					
03/29/93	S-5	S-5 c	Soil	Residential	E&E/EPA					
03/29/93	S-7	S-7 c	Soil	Residential	E&E/EPA					
03/29/93	S-9	S-9 b	Soil	Residential	E&E/EPA					
03/29/93	S-11	S-11 b	Soil	Residential	E&E/EPA					
03/29/93	S-13	S-13 b	Soil	Residential	E&E/EPA					
03/29/93	Blank		Soil		E&E/EPA					
03/29/93	S-1	S-1 d	Soil	Plant	EPA					
03/29/93	S-2	S-2 c	Soil	Plant	EPA					
03/29/93	S-3	S-3 d	Soil	Plant	EPA					
03/29/93	S-4	S-4 c	Soil	Plant	EPA					
03/29/93	S-5	S-5 d	Soil	Plant	EPA					
03/29/93	S-6	S-6 c	Soil	Plant	EPA					
03/29/93	S-7	S-7 d	Soil	Plant	EPA					
03/29/93	S-8	S-8 c	Soil	Plant	EPA					
03/29/93	S-9	S-9 c	Soil	Plant	EPA					
03/29/93	S-10	S-10 b	Soil	Plant	EPA					
03/29/93	S-11	S-11 c	Soil	Plant	EPA					
03/29/93	S-12	S-12 b	Soil	Plant	EPA					
05/17/93	FP1-ON		Soil	Wetlands	EPA					
05/17/93	FP1-OS		Soil	Wetlands	EPA					

			EP TOXICITY cont'd						TOTAL	
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Mercury (mg/L)	Lead (mg/L)	Selenium (mg/L)	Zinc (mg/L)	Initial pH	Final pH	Aluminum (mg/kg)	Barium (mg/kg)
01/11/93	R101									
01/11/93	R102								11000	340
03/29/93	S-1	S-1 b								380
03/29/93	S-2	S-2 b								220
03/29/93	S-3	S-3 b								820
03/29/93	S-4	S-4 b								120
03/29/93	S-5	S-5 b								240
03/29/93	S-6	S-6 b								150
03/29/93	S-7	S-7 b								110
03/29/93	S-8	S-8 b								200
03/29/93	S-9	S-9 a								270
03/29/93	S-10 DUP	S-10 a								270
03/29/93	S-11	S-11 a								180
03/29/93	S-12	S-12 a								160
03/29/93	S-13	S-13 a								70
03/29/93	S-14									160
03/29/93	S-1	S-1 c								
03/29/93	S-3	S-3 c								
03/29/93	S-5	S-5 c								
03/29/93	S-7	S-7 c								
03/29/93	S-9	S-9 b								
03/29/93	S-11	S-11 b								
03/29/93	S-13	S-13 b								
03/29/93	Blank									
03/29/93	S-1	S-1 d								
03/29/93	S-2	S-2 c								
03/29/93	S-3	S-3 d								
03/29/93	S-4	S-4 c								
03/29/93	S-5	S-5 d								
03/29/93	S-6	S-6 c								
03/29/93	S-7	S-7 d								
03/29/93	S-8	S-8 c								
03/29/93	S-9	S-9 c								
03/29/93	S-10	S-10 b								
03/29/93	S-11	S-11 c								
03/29/93	S-12	S-12 b								
05/17/93	FP1-ON								6550	91.6
05/17/93	FP1-OS								10700	141

			TOTAL cont'd							
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Beryllium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Cobalt (mg/kg)	Iron (mg/kg)	Manganese (mg/kg)	Nickel (mg/kg)
01/11/93	R101					1000		19000		65
01/11/93	R102		2.6	11	18	7300	17	82000	750	130
03/29/93	S-1	S-1 b		8.8	47	5500				
03/29/93	S-2	S-2 b		5.8	10	4600				
03/29/93	S-3	S-3 b		<0.75	8.6	1200				
03/29/93	S-4	S-4 b		2.3	22	3700				
03/29/93	S-5	S-5 b		<0.65	30	1400				
03/29/93	S-6	S-6 b		4.5	52	5400				
03/29/93	S-7	S-7 b		2.1	7.2	2400				
03/29/93	S-8	S-8 b		2.4	9.5	650				
03/29/93	S-9	S-9 a		5.3	6.8	3500				
03/29/93	S-10 DUP	S-10 a		4.6	9.5	3700				
03/29/93	S-11	S-11 a		6.1	30	7600				
03/29/93	S-12	S-12 a		1.7	14	1100				
03/29/93	S-13	S-13 a		0.99	16	53				
03/29/93	S-14			6.1	15	2000				
03/29/93	S-1	S-1 c								
03/29/93	S-3	S-3 c								
03/29/93	S-5	S-5 c								
03/29/93	S-7	S-7 c								
03/29/93	S-9	S-9 b								
03/29/93	S-11	S-11 b								
03/29/93	S-13	S-13 b								
03/29/93	Blank									
03/29/93	S-1	S-1 d		30		6505		49239		
03/29/93	S-2	S-2 c		30.1		12200		58779		
03/29/93	S-3	S-3 d		58.8		8902		60589		
03/29/93	S-4	S-4 c		36		9418		52239		
03/29/93	S-5	S-5 d		127.7		6067		28849		
03/29/93	S-6	S-6 c		8.6		403		11371		
03/29/93	S-7	S-7 d		2.5		123		16829		
03/29/93	S-8	S-8 c		14.9		779		14672		
03/29/93	S-9	S-9 c		18.5		2868		22942		
03/29/93	S-10	S-10 b		117.1		3287		21019		
03/29/93	S-11	S-11 c		13		7731		15013		
03/29/93	S-12	S-12 b		63.8		3098		27096		
05/17/93	FP1-ON		0.14	1.7	8	189	4.1	9190	412	72
05/17/93	FP1-OS		0.19	1.5	11.7	192	4.5	12100	484	76

			TOTAL cont'd						
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Lead (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)	Silver (mg/kg)	Arsenic (mg/kg)	Selenium (mg/kg)	Antimony (mg/kg)
01/11/93	R101		7100		7100				
01/11/93	R102		50000	36	57000	27			
03/29/93	S-1	S-1 b	4800		25000	7.4	61	<1.4	
03/29/93	S-2	S-2 b	6600		10000	5.1	35	<1.3	
03/29/93	S-3	S-3 b	8700		5000	4.9	39	<1.4	
03/29/93	S-4	S-4 b	6600		24000	4.7	78	<1.2	
03/29/93	S-5	S-5 b	1200		5400	<1.3	16	<1.3	
03/29/93	S-6	S-6 b	4300		39000	5.5	60	<1.2	
03/29/93	S-7	S-7 b	25000		29000	9.3	53	<1.2	
03/29/93	S-8	S-8 b	7700		15000	5.4	240	<1.3	
03/29/93	S-9	S-9 a	31000		38000	13	330	<1.2	
03/29/93	S-10 DUP	S-10 a	29000		32000	14	360	<1.2	
03/29/93	S-11	S-11 a	8000		24000	5.1	170	<1.4	
03/29/93	S-12	S-12 a	1400		4900	<1.3	33	<1.3	
03/29/93	S-13	S-13 a	120		1600	<1.3	6.2	<1.2	
03/29/93	S-14		1900		19000	<1.2	23	<1.3	
03/29/93	S-1	S-1 c							
03/29/93	S-3	S-3 c							
03/29/93	S-5	S-5 c							
03/29/93	S-7	S-7 c							
03/29/93	S-9	S-9 b							
03/29/93	S-11	S-11 b							
03/29/93	S-13	S-13 b							
03/29/93	Blank								
03/29/93	S-1	S-1 d	10723		58943				
03/29/93	S-2	S-2 c	19348		119482				
03/29/93	S-3	S-3 d	18170		134024				
03/29/93	S-4	S-4 c	10065		121431				
03/29/93	S-5	S-5 d	7247		117968				
03/29/93	S-6	S-6 c	597		14878				
03/29/93	S-7	S-7 d	239		6144				
03/29/93	S-8	S-8 c	2183		13831				
03/29/93	S-9	S-9 c	3941		40731				
03/29/93	S-10	S-10 b	13679		159384				
03/29/93	S-11	S-11 c	1266		591437				
03/29/93	S-12	S-12 b	6010		354736				
05/17/93	FP1-ON		325	16.6	2130	1.1	5.7	0.92	5
05/17/93	FP1-OS		336	20.7	2140	1.5	7.9	1.2	7

				TOTAL cont'd						
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Thallium (mg/kg)	Calcium (mg/kg)	Magnesium (mg/kg)	Potassium (mg/kg)	Sodium (mg/kg)	Sulfate (mg/kg)	Sulfide (mg/kg)	Mercury (mg/kg)
01/11/93	R101									
01/11/93	R102			4500	640	1000	710			
03/29/93	S-1	S-1 b								0.03
03/29/93	S-2	S-2 b								<0.03
03/29/93	S-3	S-3 b								0.07
03/29/93	S-4	S-4 b								<0.02
03/29/93	S-5	S-5 b								<0.03
03/29/93	S-6	S-6 b								0.04
03/29/93	S-7	S-7 b								0.06
03/29/93	S-8	S-8 b								<0.03
03/29/93	S-9	S-9 a								0.03
03/29/93	S-10 DUP	S-10 a								0.04
03/29/93	S-11	S-11 a								0.31
03/29/93	S-12	S-12 a								0.03
03/29/93	S-13	S-13 a								<0.03
03/29/93	S-14									0.05
03/29/93	S-1	S-1 c								
03/29/93	S-3	S-3 c								
03/29/93	S-5	S-5 c								
03/29/93	S-7	S-7 c								
03/29/93	S-9	S-9 b								
03/29/93	S-11	S-11 b								
03/29/93	S-13	S-13 b								
03/29/93	Blank									
03/29/93	S-1	S-1 d								
03/29/93	S-2	S-2 c								
03/29/93	S-3	S-3 d								
03/29/93	S-4	S-4 c								
03/29/93	S-5	S-5 d								
03/29/93	S-6	S-6 c								
03/29/93	S-7	S-7 d								
03/29/93	S-8	S-8 c								
03/29/93	S-9	S-9 c								
03/29/93	S-10	S-10 b								
03/29/93	S-11	S-11 c								
03/29/93	S-12	S-12 b								
05/17/93	FP1-ON		0.75	3490	1130	714	47.2			0.16
05/17/93	FP1-OS		1	5040	1720	1160	86.6			0.14

				TCLP Metals						
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Cyanide (mg/kg)	Arsenic mg/L	Barium mg/L	Cadmium mg/L	Chromium mg/L	Lead mg/L	Mercury mg/L	Selenium mg/L
01/11/93	R101									
01/11/93	R102									
03/29/93	S-1	S-1 b								
03/29/93	S-2	S-2 b								
03/29/93	S-3	S-3 b								
03/29/93	S-4	S-4 b								
03/29/93	S-5	S-5 b								
03/29/93	S-6	S-6 b								
03/29/93	S-7	S-7 b								
03/29/93	S-8	S-8 b								
03/29/93	S-9	S-9 a								
03/29/93	S-10 DUP	S-10 a								
03/29/93	S-11	S-11 a								
03/29/93	S-12	S-12 a								
03/29/93	S-13	S-13 a								
03/29/93	S-14									
03/29/93	S-1	S-1 c		<0.1	1.3	0.078	<0.01	9.5	<0.0002	<0.1
03/29/93	S-3	S-3 c		<0.1	1.5	0.007	<0.01	15	<0.0002	<0.1
03/29/93	S-5	S-5 c		<0.1	1.2	0.011	<0.01	2.9	<0.0002	<0.1
03/29/93	S-7	S-7 c		<0.1	0.78	0.022	<0.01	200	<0.0002	<0.1
03/29/93	S-9	S-9 b		<0.1	1.1	0.038	<0.01	210	<0.0002	<0.1
03/29/93	S-11	S-11 b		<0.5	1.1	0.13	<0.05	32	<0.0002	<0.5
03/29/93	S-13	S-13 b		<0.5	0.79	0.027	<0.05	<0.25	<0.0002	<0.5
03/29/93	Blank			<0.1	<0.05	<0.005	<0.01	<0.05	<0.0002	<0.1
03/29/93	S-1	S-1 d								
03/29/93	S-2	S-2 c								
03/29/93	S-3	S-3 d								
03/29/93	S-4	S-4 c								
03/29/93	S-5	S-5 d								
03/29/93	S-6	S-6 c								
03/29/93	S-7	S-7 d								
03/29/93	S-8	S-8 c								
03/29/93	S-9	S-9 c								
03/29/93	S-10	S-10 b								
03/29/93	S-11	S-11 c								
03/29/93	S-12	S-12 b								
05/17/93	FP1-ON									
05/17/93	FP1-OS									

DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Silver mg/L
01/11/93	R101		
01/11/93	R102		
03/29/93	S-1	S-1 b	
03/29/93	S-2	S-2 b	
03/29/93	S-3	S-3 b	
03/29/93	S-4	S-4 b	
03/29/93	S-5	S-5 b	
03/29/93	S-6	S-6 b	
03/29/93	S-7	S-7 b	
03/29/93	S-8	S-8 b	
03/29/93	S-9	S-9 a	
03/29/93	S-10 DUP	S-10 a	
03/29/93	S-11	S-11 a	
03/29/93	S-12	S-12 a	
03/29/93	S-13	S-13 a	
03/29/93	S-14		
03/29/93	S-1	S-1 c	<0.01
03/29/93	S-3	S-3 c	<0.01
03/29/93	S-5	S-5 c	<0.01
03/29/93	S-7	S-7 c	<0.01
03/29/93	S-9	S-9 b	<0.01
03/29/93	S-11	S-11 b	<0.05
03/29/93	S-13	S-13 b	<0.05
03/29/93	Blank		<0.01
03/29/93	S-1	S-1 d	
03/29/93	S-2	S-2 c	
03/29/93	S-3	S-3 d	
03/29/93	S-4	S-4 c	
03/29/93	S-5	S-5 d	
03/29/93	S-6	S-6 c	
03/29/93	S-7	S-7 d	
03/29/93	S-8	S-8 c	
03/29/93	S-9	S-9 c	
03/29/93	S-10	S-10 b	
03/29/93	S-11	S-11 c	
03/29/93	S-12	S-12 b	
05/17/93	FP1-ON		
05/17/93	FP1-OS		

			TCLP cont'd	
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Copper mg/L	Zinc mg/L
01/11/93	R101			
01/11/93	R102			
03/29/93	S-1	S-1 b		
03/29/93	S-2	S-2 b		
03/29/93	S-3	S-3 b		
03/29/93	S-4	S-4 b		
03/29/93	S-5	S-5 b		
03/29/93	S-6	S-6 b		
03/29/93	S-7	S-7 b		
03/29/93	S-8	S-8 b		
03/29/93	S-9	S-9 a		
03/29/93	S-10 DUP	S-10 a		
03/29/93	S-11	S-11 a		
03/29/93	S-12	S-12 a		
03/29/93	S-13	S-13 a		
03/29/93	S-14			
03/29/93	S-1	S-1 c	6	260
03/29/93	S-3	S-3 c	0.34	25
03/29/93	S-5	S-5 c	2.4	63
03/29/93	S-7	S-7 c	4.5	83
03/29/93	S-9	S-9 b	3.4	180
03/29/93	S-11	S-11 b	24	320
03/29/93	S-13	S-13 b	<0.125	20
03/29/93	Blank		<0.025	0.02
03/29/93	S-1	S-1 d		
03/29/93	S-2	S-2 c		
03/29/93	S-3	S-3 d		
03/29/93	S-4	S-4 c		
03/29/93	S-5	S-5 d		
03/29/93	S-6	S-6 c		
03/29/93	S-7	S-7 d		
03/29/93	S-8	S-8 c		
03/29/93	S-9	S-9 c		
03/29/93	S-10	S-10 b		
03/29/93	S-11	S-11 c		
03/29/93	S-12	S-12 b		
05/17/93	FP1-ON			
05/17/93	FP1-OS			

						EP TOXICITY				
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	MATRIX	LOCATION	SAMPLER	Silver (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)
05/17/93	FP1-100N		Soil	Wetlands	EPA					
05/17/93	FP1-50N		Soil	Wetlands	EPA					
05/17/93	FP2-50N		Soil	Wetlands	EPA					
05/17/93	FP3-0W		Soil	Wetlands	EPA					
05/17/93	G-8		Soil	Wetlands	EPA					
05/17/93	P1		Soil	Wetlands	EPA					
05/17/93	W-1B		Soil	Wetlands	EPA					
05/17/93	W-1D		Soil	Wetlands	EPA					
05/17/93	W-1E		Soil	Wetlands	EPA					
05/17/93	W-3A		Soil	Wetlands	EPA					
05/17/93	W-3B		Soil	Wetlands	EPA					
05/17/93	W-4C		Soil	Wetlands	EPA					
05/17/93	W-5A		Soil	Wetlands	EPA					
05/17/93	??		Soil	Wetlands	EPA					
05/17/93	A10-1		Soil	Residential	EPA					
05/17/93	A2-2		Soil	Residential	EPA					
05/17/93	A3-3		Soil	Residential	EPA					
05/17/93	A5-5		Soil	Residential	EPA					
05/17/93	A6-6		Soil	Residential	EPA					
05/17/93	A7-7		Soil	Residential	EPA					
05/17/93	A8-8		Soil	Residential	EPA					
05/17/93	A9-9		Soil	Residential	EPA					
05/17/93	A11-1		Soil	Residential	EPA					
05/17/93	A1-1		Soil	Residential	EPA					
05/17/93	FP1-0ND		Soil	Wetlands	EPA					
05/17/93	W-LBD		Soil	Wetlands	EPA					
05/17/93	W-LDD		Soil	Wetlands	EPA					
05/17/93	TR1		Soil	Wetlands	EPA					
05/17/93	TR2		Soil	Wetlands	EPA					
05/17/93	TR3		Soil	Wetlands	EPA					
05/17/93	TR4		Soil	Wetlands	EPA					
05/17/93	TR5		Soil	Wetlands	EPA					
05/17/93	TR6		Soil	Wetlands	EPA					
05/17/93	SD-1		Sediment	Wetlands	EPA					
05/17/93	SD-2		Sediment	Wetlands	EPA					
05/17/93	SD-3		Sediment	Wetlands	EPA					
05/17/93	SD-4		Sediment	Wetlands	EPA					
05/17/93	SD-5		Sediment	Wetlands	EPA					

			EP TOXICITY cont'd						TOTAL	
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Mercury (mg/L)	Lead (mg/L)	Selenium (mg/L)	Zinc (mg/L)	Initial pH	Final pH	Aluminum (mg/kg)	Barium (mg/kg)
05/17/93	FP1-10ON								10500	126
05/17/93	FP1-5ON								6850	99.9
05/17/93	FP2-5ON								8780	155
05/17/93	FP3-0W								7780	149
05/17/93	G-8								13900	163
05/17/93	P1								6800	116
05/17/93	W-1B								7510	67.4
05/17/93	W-1D								9480	143
05/17/93	W-1E								6310	112
05/17/93	W-3A								5740	93.8
05/17/93	W-3B								7530	86.1
05/17/93	W-4C								9370	93.4
05/17/93	W-5A								6140	117
05/17/93	??								9150	126
05/17/93	A10-1								5860	138
05/17/93	A2-2								5510	76.1
05/17/93	A3-3								6420	139
05/17/93	A5-5								5090	104
05/17/93	A6-6								8050	367
05/17/93	A7-7								9940	147
05/17/93	A8-8								6910	187
05/17/93	A9-9								6890	88.5
05/17/93	A11-1								9310	134
05/17/93	A1-1								8530	136
05/17/93	FP1-0ND								6310	100
05/17/93	W-LBD								8450	65
05/17/93	W-LDD								6380	126
05/17/93	TR1								10611	168
05/17/93	TR2								13852	231
05/17/93	TR3								10667	150
05/17/93	TR4								10412	194
05/17/93	TR5								4882	239
05/17/93	TR6								13989	213
05/17/93	SD-1								8833	137
05/17/93	SD-2								10614	209
05/17/93	SD-3								9801	236
05/17/93	SD-4								13307	183
05/17/93	SD-5								12170	206

			TOTAL cont'd							
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Beryllium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Cobalt (mg/kg)	Iron (mg/kg)	Manganese (mg/kg)	Nickel (mg/kg)
05/17/93	FP1-10ON		0.15	1.1	12.6	144	5.1	11400	608	58
05/17/93	FP1-5ON		0.15	1.6	8.6	197	3.9	8770	395	80.3
05/17/93	FP2-5ON		0.16	5.5	8.5	17.7	5.1	10800	875	10
05/17/93	FP3-0W		0.28	0.51	8.5	57.4	5.6	10600	745	24.8
05/17/93	G-8		0.15	0.51	14.2	46.4	6.5	14800	672	19
05/17/93	P1		0.14	2.9	11.1	393	5.2	10300	427	156
05/17/93	W-1B		0.13	1.8	11.6	126	6.2	10200	429	73.6
05/17/93	W-1D		0.26	5.7	11.2	16.5	2.7	10600	554	95.7
05/17/93	W-1E		0.17	0.88	10.1	48	3.4	7550	360	28.8
05/17/93	W-3A		0.18	4.3	27.8	1620	14	20000	591	1500
05/17/93	W-3B		0.15	2.4	17.1	979	9	12100	151	441
05/17/93	W-4C		0.21	12.2	13.8	245	4.7	10500	446	150
05/17/93	W-5A		0.16	5.4	27.1	1570	13	15000	589	1360
05/17/93	??		0.28	1	11.1	138	5.5	11200	765	54
05/17/93	A10-1		0.17	1.3	9.8	150	3.4	9430	398	32.3
05/17/93	A2-2		0.13	0.46	21.9	49.6	4.6	8320	290	35.1
05/17/93	A3-3		0.15	1.8	14.2	418	6.3	14900	718	140
05/17/93	A5-5		0.15	0.52	10.4	47.9	4.1	8440	331	22.3
05/17/93	A6-6		0.18	0.54	13.4	66.4	18.3	17500	2600	37.5
05/17/93	A7-7		0.17	0.43	14.2	47	4.8	18200	235	18.1
05/17/93	A8-8		0.44	0.39	11.5	67.4	9.1	17300	718	68.4
05/17/93	A9-9		0.15	0.4	9.8	12.7	4.7	11600	413	10.8
05/17/93	A11-1		0.46	0.4	12.8	55.2	5.9	18600	291	13
05/17/93	A1-1		0.17	0.7	12	90.5	5.9	12700	650	35.2
05/17/93	FP1-0ND		0.15	1.9	9.3	231	5.6	9710	420	80.6
05/17/93	W-LBD		0.25	2.3	13.2	145	4.5	9760	309	93.6
05/17/93	W-LDD		0.26	5.5	6	152	2.2	7840	511	78.6
05/17/93	TR1		0.95	52.6	40.49	3334	21.3	30676	1276	1471
05/17/93	TR2		0.63	9.5	18.46	31.2	11.3	11861	601	1234
05/17/93	TR3		0.55	1.3	15.17	35.9	7.9	9369	353	23.8
05/17/93	TR4		0.58	4.5	15.73	27.4	12.5	10747	549	1005
05/17/93	TR5		0.79	3.8	20.76	19.1	14.9	10402	955	69.9
05/17/93	TR6		0.78	3.4	19.98	15	13.7	10278	783	57.4
05/17/93	SD-1		0.8	0.9	13.18	36	10.7	9406	250	17.4
05/17/93	SD-2		0.89	8.5	29.31	24.6	16.6	16079	704	939.5
05/17/93	SD-3		0.71	2.2	13.39	9.8	8.8	12511	629	32.1
05/17/93	SD-4		0.59	5.3	16.09	27.9	14.2	11534	590	179.8
05/17/93	SD-5		0.67	2.6	17.5	8.6	54.7	5084	664	31.7

			TOTAL cont'd						
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Lead (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)	Silver (mg/kg)	Arsenic (mg/kg)	Selenium (mg/kg)	Antimony (mg/kg)
05/17/93	FP1-100N		257	20.4	1460	1.1	5.1	1	5.3
05/17/93	FP1-50N		338	14.7	2210	1.1	5.5	0.93	5
05/17/93	FP2-50N		30	19.3	162	1.2	4.2	1.1	5.8
05/17/93	FP3-0W		97	18	585	1.1	6.5	1.1	5.3
05/17/93	G-8		76.7	28.8	485	1.1	5	1	5.3
05/17/93	P1		615	17.7	3810	0.91	8.9	0.82	5.2
05/17/93	W-1B		254	22	2930	0.99	6.2	0.82	4.6
05/17/93	W-1D		257	17.9	6720	2	5.6	1.6	9.4
05/17/93	W-1E		83.9	14.9	1670	1.2	3.2	1	5.6
05/17/93	W-3A		2510	25	15400	2.4	38.4	0.97	82.9
05/17/93	W-3B		1450	20.6	5500	1.3	19.9	0.81	55
05/17/93	W-4C		411	20.4	8440	1.5	6.7	1.3	7.1
05/17/93	W-5A		2600	19.7	16700	2.8	39.8	0.99	63.7
05/17/93	??		251	20.2	1480	1.1	5.9	1.1	5.2
05/17/93	A10-1		600	17.3	1990	1.2	7.5	1	8.1
05/17/93	A2-2		102	15.9	536	1	8.3	0.85	4.8
05/17/93	A3-3		509	18.6	1760	1.1	6.3	0.93	12.6
05/17/93	A5-5		147	17.8	549	1	4.9	0.85	4.8
05/17/93	A6-6		250	26.5	576	1	12.9	0.89	4.8
05/17/93	A7-7		179	26.7	466	0.97	7.1	0.91	4.6
05/17/93	A8-8		132	24.1	597	0.86	8.5	0.72	4.1
05/17/93	A9-9		32.5	19.9	66.1	0.89	4.5	0.75	4.2
05/17/93	A11-1		201	30.2	444	0.9	10.5	0.76	4.2
05/17/93	A1-1		298	22	948	1.3	4.8	0.99	5.9
05/17/93	FP1-0ND		377	16.7	2340	1	6.1	0.93	4.9
05/17/93	W-LBD		262	21.2	4250	0.93	5.2	0.82	7.9
05/17/93	W-LDD		228	14.3	6170	2	4.6	1.7	9.2
05/17/93	TR1		7162	36.6	8059	6.1	45.5	2	10.8
05/17/93	TR2		767	40.9	1842	1.6	8.6	2 U	2 U
05/17/93	TR3		88	33.9	682	1 U	5.1	1.7 U	1.7 U
05/17/93	TR4		623	29.3	3272	1.1 U	9.9	1.9 U	1.9 U
05/17/93	TR5		335	43.8	1677	1.3	7.4	1.7 U	1.7 U
05/17/93	TR6		292	43	16.1	1.1 U	6.9	1.8 U	1.8 U
05/17/93	SD-1		76	42	253	1.2 U	6.5		1.9 U
05/17/93	SD-2		3580	38.6	3427	2.8	39		2.2
05/17/93	SD-3		154	37.9	328	1.3	6.1		1.7 U
05/17/93	SD-4		426	43.8	1844	1.9	10.8		2 U
05/17/93	SD-5		122	41.3	10	1.3	6.3		1.7 U

				TOTAL cont'd						
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Thallium (mg/kg)	Calcium (mg/kg)	Magnesium (mg/kg)	Potassium (mg/kg)	Sodium (mg/kg)	Sulfate (mg/kg)	Sulfide (mg/kg)	Mercury (mg/kg)
05/17/93	FP1-10ON		0.83	3490	1600	1150	50.9			0.17
05/17/93	FP1-5ON		0.76	2930	1180	631	40.2			0.2
05/17/93	FP2-5ON		0.86	4990	1740	977	51.2			0.12
05/17/93	FP3-0W		0.86	4530	1500	1010	38.3			0.11
05/17/93	G-8		0.83	2960	2040	1220	109			0.13
05/17/93	P1		0.67	3060	1190	688	65.5			0.17
05/17/93	W-1B		0.67	991	971	589	45.2			0.13
05/17/93	W-1D		1.3	11200	2640	1100	195			0.18
05/17/93	W-1E		0.84	9550	2070	816	54.3			0.08
05/17/93	W-3A		0.79	28900	2930	397	284			0.23
05/17/93	W-3B		0.66	989	747	560	42.3			0.79
05/17/93	W-4C		1.1	6410	2400	862	166			0.11
05/17/93	W-5A		0.81	25500	2500	496	551			0.26
05/17/93	??		0.86	4400	1630	1110	70.3			0.13
05/17/93	A10-1		0.85	11600	1630	928	59.3			0.1
05/17/93	A2-2		0.69	3140	1060	617	38.6			0.08
05/17/93	A3-3		0.76	54000	7240	821	175			0.09
05/17/93	A5-5		0.7	3790	949	888	46.4			0.09
05/17/93	A6-6		0.73	36900	3150	1360	141			0.07
05/17/93	A7-7		0.74	6770	2130	1650	139			0.12
05/17/93	A8-8		0.59	47000	3810	1180	210			0.1
05/17/93	A9-9		0.61	42800	4110	951	67.4			0.07
05/17/93	A11-1		0.62	2780	1560	946	63.5			0.09
05/17/93	A1-1		0.81	4500	1640	756	157			0.1
05/17/93	FP1-0ND		0.76	3540	1110	688	54.8			0.2
05/17/93	W-LBD		0.67	1070	1040	649	25.7			0.06
05/17/93	W-LDD		1.4	10300	1980	801	164			0.22
05/17/93	TR1			2456	1099	1584	240			0.38
05/17/93	TR2			3747	1796	1712	161			0.18
05/17/93	TR3			1744	1357	1682	137			0.07
05/17/93	TR4			1806	1244	1319	151			0.17
05/17/93	TR5			1809	1626	2300	165			0.13
05/17/93	TR6			1986	1358	1974	185			0.14
05/17/93	SD-1			1735	1240	1427	229			0.13
05/17/93	SD-2			1774	1260	1975	303			0.49
05/17/93	SD-3			1587	1181	1022	180			0.11
05/17/93	SD-4			2026	1704	1730	166			0.14
05/17/93	SD-5			2026	1452	1359	158			0.11

				TCLP Metals						
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Cyanide (mg/kg)	Arsenic mg/L	Barium mg/L	Cadmium mg/L	Chromium mg/L	Lead mg/L	Mercury mg/L	Selenium mg/L
05/17/93	FP1-100N									
05/17/93	FP1-50N									
05/17/93	FP2-50N									
05/17/93	FP3-0W									
05/17/93	G-8									
05/17/93	P1									
05/17/93	W-1B									
05/17/93	W-1D									
05/17/93	W-1E									
05/17/93	W-3A									
05/17/93	W-3B									
05/17/93	W-4C									
05/17/93	W-5A									
05/17/93	??									
05/17/93	A10-1									
05/17/93	A2-2									
05/17/93	A3-3									
05/17/93	A5-5									
05/17/93	A6-6									
05/17/93	A7-7									
05/17/93	A8-8									
05/17/93	A9-9									
05/17/93	A11-1									
05/17/93	A1-1									
05/17/93	FP1-0ND									
05/17/93	W-LBD									
05/17/93	W-LDD									
05/17/93	TR1									
05/17/93	TR2									
05/17/93	TR3									
05/17/93	TR4									
05/17/93	TR5									
05/17/93	TR6									
05/17/93	SD-1									
05/17/93	SD-2									
05/17/93	SD-3									
05/17/93	SD-4									
05/17/93	SD-5									

DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Silver mg/L
05/17/93	FP1-100N		
05/17/93	FP1-50N		
05/17/93	FP2-50N		
05/17/93	FP3-0W		
05/17/93	G-8		
05/17/93	P1		
05/17/93	W-1B		
05/17/93	W-1D		
05/17/93	W-1E		
05/17/93	W-3A		
05/17/93	W-3B		
05/17/93	W-4C		
05/17/93	W-5A		
05/17/93	??		
05/17/93	A10-1		
05/17/93	A2-2		
05/17/93	A3-3		
05/17/93	A5-5		
05/17/93	A6-6		
05/17/93	A7-7		
05/17/93	A8-8		
05/17/93	A9-9		
05/17/93	A11-1		
05/17/93	A1-1		
05/17/93	FP1-0ND		
05/17/93	W-LBD		
05/17/93	W-LDD		
05/17/93	TR1		
05/17/93	TR2		
05/17/93	TR3		
05/17/93	TR4		
05/17/93	TR5		
05/17/93	TR6		
05/17/93	SD-1		
05/17/93	SD-2		
05/17/93	SD-3		
05/17/93	SD-4		
05/17/93	SD-5		

			TCLP cont'd	
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Copper mg/L	Zinc mg/L
05/17/93	FP1-100N			
05/17/93	FP1-50N			
05/17/93	FP2-50N			
05/17/93	FP3-0W			
05/17/93	G-8			
05/17/93	P1			
05/17/93	W-1B			
05/17/93	W-1D			
05/17/93	W-1E			
05/17/93	W-3A			
05/17/93	W-3B			
05/17/93	W-4C			
05/17/93	W-5A			
05/17/93	??			
05/17/93	A10-1			
05/17/93	A2-2			
05/17/93	A3-3			
05/17/93	A5-5			
05/17/93	A6-6			
05/17/93	A7-7			
05/17/93	A8-8			
05/17/93	A9-9			
05/17/93	A11-1			
05/17/93	A1-1			
05/17/93	FP1-0ND			
05/17/93	W-LBD			
05/17/93	W-LDD			
05/17/93	TR1			
05/17/93	TR2			
05/17/93	TR3			
05/17/93	TR4			
05/17/93	TR5			
05/17/93	TR6			
05/17/93	SD-1			
05/17/93	SD-2			
05/17/93	SD-3			
05/17/93	SD-4			
05/17/93	SD-5			

						EP TOXICITY				
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	MATRIX	LOCATION	SAMPLER	Silver (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)
05/17/93	SD-6		Sediment	Wetlands	EPA					
07/30/93	SB1A		Soil	Residential	EPA					
07/30/93	SB1B		Soil	Residential	EPA					
07/30/93	SB1C		Soil	Residential	EPA					
07/30/93	SB2A		Soil	Residential	EPA					
07/30/93	SB2B		Soil	Residential	EPA					
07/30/93	SB2C		Soil	Residential	EPA					
07/30/93	SB3A		Soil	Wetlands	EPA					
07/30/93	SB3B		Soil	Wetlands	EPA					
07/30/93	SB4A		Soil	Wetlands	EPA					
07/30/93	SB4B		Soil	Wetlands	EPA					
10/04/93	S2	S2 d	Soil	Residential	EPA					
10/04/93	S2 DUPL	S2 e	Soil	Residential	EPA					
10/04/93	S2 MS	S2 f	Soil	Residential	EPA					
10/04/93	S4	S4 d	Soil	Residential	EPA					
10/04/93	S10	S10 c	Soil	Residential	EPA					
10/04/93	S10A*	S10 d	Soil	Residential	EPA					
10/04/93	S11	S11 d	Soil	Residential	EPA					
10/04/93	S13	S13 c	Soil	Residential	EPA					
10/04/93	S16		Soil	Residential	EPA					
10/04/93	S21		Soil	Residential	EPA					
10/04/93	S28		Soil	Residential	EPA					
10/04/93	S29		Soil	Residential	EPA					
10/04/93	S33		Soil	Residential	EPA					
10/04/93	S34		Soil	Residential	EPA					
10/04/93	S36		Soil	Residential	EPA					
10/04/93	S44		Soil	Residential	EPA					
10/04/93	S51		Soil	Residential	EPA					
10/04/93	S54		Soil	Residential	EPA					
10/04/93	S59		Soil	Residential	EPA					
10/04/93	S62		Soil	Residential	EPA					
10/04/93	S75		Soil	Residential	EPA					
10/04/93	S78		Soil	Residential	EPA					
10/04/93	S99		Soil	Residential	EPA					
10/04/93	S103		Soil	Residential	EPA					
10/04/93	S110		Soil	Residential	EPA					
10/04/93	S110A*		Soil	Residential	EPA					
10/04/93	S120		Soil	Residential	EPA					

			EP TOXICITY cont'd						TOTAL	
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Mercury (mg/L)	Lead (mg/L)	Selenium (mg/L)	Zinc (mg/L)	Initial pH	Final pH	Aluminum (mg/kg)	Barium (mg/kg)
05/17/93	SD-6								13153	272
07/30/93	SB1A									
07/30/93	SB1B									
07/30/93	SB1C									
07/30/93	SB2A									
07/30/93	SB2B									
07/30/93	SB2C									
07/30/93	SB3A									
07/30/93	SB3B									
07/30/93	SB4A									
07/30/93	SB4B									
10/04/93	S2	S2 d								
10/04/93	S2 DUPL	S2 e								
10/04/93	S2 MS	S2 f								
10/04/93	S4	S4 d								
10/04/93	S10	S10 c								
10/04/93	S10A*	S10 d								
10/04/93	S11	S11 d								
10/04/93	S13	S13 c								
10/04/93	S16									
10/04/93	S21									
10/04/93	S28									
10/04/93	S29									
10/04/93	S33									
10/04/93	S34									
10/04/93	S36									
10/04/93	S44									
10/04/93	S51									
10/04/93	S54									
10/04/93	S59									
10/04/93	S62									
10/04/93	S75									
10/04/93	S78									
10/04/93	S99									
10/04/93	S103									
10/04/93	S110									
10/04/93	S110A*									
10/04/93	S120									

			TOTAL cont'd							
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Beryllium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Cobalt (mg/kg)	Iron (mg/kg)	Manganese (mg/kg)	Nickel (mg/kg)
05/17/93	SD-6		0.86	1.8	17.29	19.3	13.8	4820	914	14.6
07/30/93	SB1A			1.32		56				
07/30/93	SB1B			2.01		55.6				
07/30/93	SB1C			<1.24		12.2				
07/30/93	SB2A			<1.27		200				
07/30/93	SB2B			<1.3		55				
07/30/93	SB2C			<1.29		17.1				
07/30/93	SB3A			<1.24		209				
07/30/93	SB3B			<1.22		86.6				
07/30/93	SB4A			1.73		603				
07/30/93	SB4B			1.47		517				
10/04/93	S2	S2 d								
10/04/93	S2 DUPL	S2 e								
10/04/93	S2 MS	S2 f								
10/04/93	S4	S4 d								
10/04/93	S10	S10 c								
10/04/93	S10A*	S10 d								
10/04/93	S11	S11 d								
10/04/93	S13	S13 c								
10/04/93	S16									
10/04/93	S21									
10/04/93	S28									
10/04/93	S29									
10/04/93	S33									
10/04/93	S34									
10/04/93	S36									
10/04/93	S44									
10/04/93	S51									
10/04/93	S54									
10/04/93	S59									
10/04/93	S62									
10/04/93	S75									
10/04/93	S78									
10/04/93	S99									
10/04/93	S103									
10/04/93	S110									
10/04/93	S110A*									
10/04/93	S120									

			TOTAL cont'd						
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Lead (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)	Silver (mg/kg)	Arsenic (mg/kg)	Selenium (mg/kg)	Antimony (mg/kg)
05/17/93	SD-6		35	45.4	122	1.2 U	7.3		2 U
07/30/93	SB1A		300		1060		12.1		
07/30/93	SB1B		96.9		1970		6.65		
07/30/93	SB1C		13.5		52.7		7.82		
07/30/93	SB2A		1160		691		11.8		
07/30/93	SB2B		246		214		10.5		
07/30/93	SB2C		<19.3		103		7.64		
07/30/93	SB3A		367		1370		9.49		
07/30/93	SB3B		135		1370		8.34		
07/30/93	SB4A		951		2720		12.4		
07/30/93	SB4B		1390		2450		15.6		
10/04/93	S2	S2 d	278						
10/04/93	S2 DUPL	S2 e	319						
10/04/93	S2 MS	S2 f	97%						
10/04/93	S4	S4 d	370						
10/04/93	S10	S10 c	154						
10/04/93	S10A*	S10 d	128						
10/04/93	S11	S11 d	116						
10/04/93	S13	S13 c	54.4						
10/04/93	S16		96.2						
10/04/93	S21		21.3						
10/04/93	S28		181						
10/04/93	S29		427						
10/04/93	S33		3680						
10/04/93	S34		4350						
10/04/93	S36		1190						
10/04/93	S44		119						
10/04/93	S51		78.1						
10/04/93	S54		79.3						
10/04/93	S59		114						
10/04/93	S62		65.5						
10/04/93	S75		ND						
10/04/93	S78		113						
10/04/93	S99		358						
10/04/93	S103		145						
10/04/93	S110		34.1						
10/04/93	S110A*		34.2						
10/04/93	S120		146						

				TOTAL cont'd						
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Thallium (mg/kg)	Calcium (mg/kg)	Magnesium (mg/kg)	Potassium (mg/kg)	Sodium (mg/kg)	Sulfate (mg/kg)	Sulfide (mg/kg)	Mercury (mg/kg)
05/17/93	SD-6			1880	1861	2773	201			*0.08 U*
07/30/93	SB1A									
07/30/93	SB1B									
07/30/93	SB1C									
07/30/93	SB2A									
07/30/93	SB2B									
07/30/93	SB2C									
07/30/93	SB3A									
07/30/93	SB3B									
07/30/93	SB4A									
07/30/93	SB4B									
10/04/93	S2	S2 d								
10/04/93	S2 DUPL	S2 e								
10/04/93	S2 MS	S2 f								
10/04/93	S4	S4 d								
10/04/93	S10	S10 c								
10/04/93	S10A*	S10 d								
10/04/93	S11	S11 d								
10/04/93	S13	S13 c								
10/04/93	S16									
10/04/93	S21									
10/04/93	S28									
10/04/93	S29									
10/04/93	S33									
10/04/93	S34									
10/04/93	S36									
10/04/93	S44									
10/04/93	S51									
10/04/93	S54									
10/04/93	S59									
10/04/93	S62									
10/04/93	S75									
10/04/93	S78									
10/04/93	S99									
10/04/93	S103									
10/04/93	S110									
10/04/93	S110A*									
10/04/93	S120									

				TCLP Metals						
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Cyanide (mg/kg)	Arsenic mg/L	Barium mg/L	Cadmium mg/L	Chromium mg/L	Lead mg/L	Mercury mg/L	Selenium mg/L
05/17/93	SD-6									
07/30/93	SB1A									
07/30/93	SB1B									
07/30/93	SB1C									
07/30/93	SB2A									
07/30/93	SB2B									
07/30/93	SB2C									
07/30/93	SB3A									
07/30/93	SB3B									
07/30/93	SB4A									
07/30/93	SB4B									
10/04/93	S2	S2 d								
10/04/93	S2 DUPL	S2 e								
10/04/93	S2 MS	S2 f								
10/04/93	S4	S4 d								
10/04/93	S10	S10 c								
10/04/93	S10A*	S10 d								
10/04/93	S11	S11 d								
10/04/93	S13	S13 c								
10/04/93	S16									
10/04/93	S21									
10/04/93	S28									
10/04/93	S29									
10/04/93	S33									
10/04/93	S34									
10/04/93	S36									
10/04/93	S44									
10/04/93	S51									
10/04/93	S54									
10/04/93	S59									
10/04/93	S62									
10/04/93	S75									
10/04/93	S78									
10/04/93	S99									
10/04/93	S103									
10/04/93	S110									
10/04/93	S110A*									
10/04/93	S120									

DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Silver mg/L
05/17/93	SD-6		
07/30/93	SB1A		
07/30/93	SB1B		
07/30/93	SB1C		
07/30/93	SB2A		
07/30/93	SB2B		
07/30/93	SB2C		
07/30/93	SB3A		
07/30/93	SB3B		
07/30/93	SB4A		
07/30/93	SB4B		
10/04/93	S2	S2 d	
10/04/93	S2 DUPL	S2 e	
10/04/93	S2 MS	S2 f	
10/04/93	S4	S4 d	
10/04/93	S10	S10 c	
10/04/93	S10A*	S10 d	
10/04/93	S11	S11 d	
10/04/93	S13	S13 c	
10/04/93	S16		
10/04/93	S21		
10/04/93	S28		
10/04/93	S29		
10/04/93	S33		
10/04/93	S34		
10/04/93	S36		
10/04/93	S44		
10/04/93	S51		
10/04/93	S54		
10/04/93	S59		
10/04/93	S62		
10/04/93	S75		
10/04/93	S78		
10/04/93	S99		
10/04/93	S103		
10/04/93	S110		
10/04/93	S110A*		
10/04/93	S120		

			TCLP cont'd	
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Copper mg/L	Zinc mg/L
05/17/93	SD-6			
07/30/93	SB1A			
07/30/93	SB1B			
07/30/93	SB1C			
07/30/93	SB2A			
07/30/93	SB2B			
07/30/93	SB2C			
07/30/93	SB3A			
07/30/93	SB3B			
07/30/93	SB4A			
07/30/93	SB4B			
10/04/93	S2	S2 d		
10/04/93	S2 DUPL	S2 e		
10/04/93	S2 MS	S2 f		
10/04/93	S4	S4 d		
10/04/93	S10	S10 c		
10/04/93	S10A*	S10 d		
10/04/93	S11	S11 d		
10/04/93	S13	S13 c		
10/04/93	S16			
10/04/93	S21			
10/04/93	S28			
10/04/93	S29			
10/04/93	S33			
10/04/93	S34			
10/04/93	S36			
10/04/93	S44			
10/04/93	S51			
10/04/93	S54			
10/04/93	S59			
10/04/93	S62			
10/04/93	S75			
10/04/93	S78			
10/04/93	S99			
10/04/93	S103			
10/04/93	S110			
10/04/93	S110A*			
10/04/93	S120			

						EP TOXICITY				
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	MATRIX	LOCATION	SAMPLER	Silver (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)
10/04/93	S120 DUPL		Soil	Residential	EPA					
10/04/93	S120 MS		Soil	Residential	EPA					
10/04/93	S135		Soil	Residential	EPA					
10/04/93	S152		Soil	Residential	EPA					
10/04/93	S157		Soil	Residential	EPA					
10/04/93	S162		Soil	Residential	EPA					

			EP TOXICITY cont'd						TOTAL	
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Mercury (mg/L)	Lead (mg/L)	Selenium (mg/L)	Zinc (mg/L)	Initial pH	Final pH	Aluminum (mg/kg)	Barium (mg/kg)
10/04/93	S120 DUPL									
10/04/93	S120 MS									
10/04/93	S135									
10/04/93	S152									
10/04/93	S157									
10/04/93	S162									

			TOTAL cont'd							
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Beryllium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Cobalt (mg/kg)	Iron (mg/kg)	Manganese (mg/kg)	Nickel (mg/kg)
10/04/93	S120 DUPL									
10/04/93	S120 MS									
10/04/93	S135									
10/04/93	S152									
10/04/93	S157									
10/04/93	S162									

			TOTAL cont'd						
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Lead (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)	Silver (mg/kg)	Arsenic (mg/kg)	Selenium (mg/kg)	Antimony (mg/kg)
10/04/93	S120 DUPL		139						
10/04/93	S120 MS		75%						
10/04/93	S135		103						
10/04/93	S152		11.7						
10/04/93	S157		2080						
10/04/93	S162		243						

				TOTAL cont'd						
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Thallium (mg/kg)	Calcium (mg/kg)	Magnesium (mg/kg)	Potassium (mg/kg)	Sodium (mg/kg)	Sulfate (mg/kg)	Sulfide (mg/kg)	Mercury (mg/kg)
10/04/93	S120 DUPL									
10/04/93	S120 MS									
10/04/93	S135									
10/04/93	S152									
10/04/93	S157									
10/04/93	S162									

				TCLP Metals						
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Cyanide (mg/kg)	Arsenic mg/L	Barium mg/L	Cadmium mg/L	Chromium mg/L	Lead mg/L	Mercury mg/L	Selenium mg/L
10/04/93	S120 DUPL									
10/04/93	S120 MS									
10/04/93	S135									
10/04/93	S152									
10/04/93	S157									
10/04/93	S162									

DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Silver mg/L
10/04/93	S120 DUPL		
10/04/93	S120 MS		
10/04/93	S135		
10/04/93	S152		
10/04/93	S157		
10/04/93	S162		

			TCLP cont'd	
DATE COLLECTED	ORIGINAL NUMBER	NEW SAMPLE NUMBER	Copper mg/L	Zinc mg/L
10/04/93	S120 DUPL			
10/04/93	S120 MS			
10/04/93	S135			
10/04/93	S152			
10/04/93	S157			
10/04/93	S162			

ATTACHMENT B

RESPONSIVENESS SUMMARY
(first and second comment periods)

CIRCLE SMELTING CORPORATION SITE
BECKEMEYER, ILLINOIS
RESPONSIVENESS SUMMARY

I. RESPONSIVENESS SUMMARY OVERVIEW

In accordance with Section 117 of CERCLA, 42 U.S.C. Section 9617, the United States Environmental Protection Agency (U.S. EPA) held a public comment period from June 5, 1994 to August 5, 1994, to allow interested parties to comment on the Engineering Evaluation/Cost Analysis (EE/CA), dated April 29, 1994, for the Circle Smelting Corporation site. An additional public comment period was granted (November 22, 1995 to December 22, 1995), to allow interested parties to comment on additional information added to the Administrative Record (Update # 3) and on the Risk Evaluation Addendum. The EE/CA provides a description and discussion of the proposed Superfund Accelerated Cleanup Model (SACM) removal actions at the Circle Smelting Corporation site and the surrounding areas.

The purpose of this responsiveness summary is to document the Agency's responses to questions, concerns, and comments received during the comment periods and during the public hearing. These comments and concerns were evaluated prior to selection of the SACM removal action for the site. A complete copy of the EE/CA, Administrative Record, and other pertinent information is available at the Case-Halsted Public Library, Carlyle, Illinois.

II. BACKGROUND ON COMMUNITY INVOLVEMENT

Community Relations Plan Summary

The Community Relations Plan (CRP) for the Circle Smelting Corporation site was prepared by the U.S. EPA, which is responsible for community relations and removal activities at the site under the SACM. The Village of Beckemeyer is located along Old U.S. Highway 50 in central Clinton County, Illinois. The Village has a population of approximately 1,070 people and is predominantly residential with a limited number of small commercial concerns. The community's interest in the U.S. EPA's investigation appears to be limited to the impact of the investigation on the Village's new water system. According to information available to U.S. EPA, the new water system has been installed. In general, there is very little concern about potential health risks caused by the Circle Smelting Corporation Site or the presence of smelter waste materials in the community.

The U.S. EPA's community relations objectives are to:

- keep the community informed about the site investigation and its impact on the installation of the new water main,

- allow the community to have input into the decisions made to address the potential lead contamination problem at the Circle Smelting Corporation Site and in the Village of Beckemeyer.

Throughout the site investigation, the U.S. EPA's remedial project manager and community relations coordinator responded to telephone inquires from those interested in the site. News releases were issued during the study and will be issued at the conclusion of site investigations to provide site-related information. Display advertisements were placed in local newspapers. The U.S. EPA produced a fact sheet in February 1994 that answered the most frequently asked questions during the community interviews. Another fact sheet is planned for April 1995 describing U.S. EPA's recommended approach to addressing soil and sediments contaminated with smelter waste materials at the site and in Beckemeyer.

An availability session was held in August 1993 to discuss U.S. EPA's investigation and the adverse health effects of exposure to lead. A public meeting was held in June 1994 to allow public input on U.S. EPA's proposed action for addressing contaminated soil and sediments at the Circle Smelting Corporation Site and in Village of Beckemeyer.

Community Concerns/Issues

Issues identified at the June 15, 1994, public meeting are reflected in the transcript of that meeting and the replies are provided in the general portion of this responsiveness summary.

The responsiveness summary has been divided into the following categories:

1. GENERAL COMMENTS
2. TECHNICAL COMMENTS
3. LEGAL COMMENTS
4. HEALTH COMMENTS
5. COMMENTS ON RISK EVALUATION ADDENDUM 1 (RESIDENTIAL)
6. COMMENTS ON RISK EVALUATION ADDENDUM 2 (INDUSTRIAL)
7. ECOLGICAL ASSESSEMENT COMMENTS
8. Comments from the Illinois Dartment of Public Health

The comments are paraphrased in order to effectively summarize them in this document. The reader can obtain the comments from

the public and the written comments in their entirety by reviewing the administrative record, which is available at the Case-Halsted Public Library, Carlyle, Illinois and the offices of U.S. EPA, Region 5 located at 77 W. Jackson Blvd, Chicago, Illinois, 7th floor.

GENERAL

G1. A commenter asked if surrounding communities also have smelter slag and whether U.S. EPA will be cleaning up slag in those the communities.

U.S. EPA Response: During the site sampling and investigatory process, there was some information given to the U.S. EPA that suggests that smelter slag was taken to nearby communities. There is no definitive information concerning that situation. If definitive information becomes available, the U.S. EPA would consider checking for contamination in nearby communities.

G2. A commenter stated that very few people live on the banks of the nearby creek and asked who was going to pay for a cleanup of the creek.

U.S. EPA Response: The Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), which is also known as the Superfund Law, is an environmental law that specifies that U.S. EPA shall seek and identify Potentially Responsible Parties (PRPs). This law also specifies that identified PRPs will be asked to pay for the entire cleanup (including the smelting plant, affected residential areas and the creek). However, if the PRPs are unable or unwilling to pay for all or part of the cleanup, then U.S. EPA may conduct the cleanup. In the case where the PRPs are unwilling to pay for the cleanup, U.S. EPA may seek to recover the cost of the cleanup.

G3. Two commenters asked if the U.S. EPA would provide the Village of Beckemeyer with a letter stating that the Village has been cleaned up.

U.S. EPA Response: The U.S. EPA will keep Village officials and residents updated during any cleanup in and around the Village. When the U.S. EPA has completed the cleanup, U.S. EPA will then provide Village officials and residents with a description of the extent and nature of the cleanup in writing.

G4. A commenter asked about the use of tilling to reduce the surface levels of lead in soil.

U.S. EPA Response: The U.S. EPA considered the use of tilling in an area south of the smelter site because it appeared to be an inexpensive way of reducing the levels of lead in the soil. Upon further review of the available literature, the U.S. EPA has determined that the use of tilling in this area may not achieve the desired results and thus, this method has been removed from the EE/CA. Subsequent to the public meeting, U.S. EPA had the opportunity to carefully review and consider the following information which led to the reconsideration of the efficacy of tilling at the Circle Smelting Corporation (CSC) Site:

a. A report entitled, "Urban Soil Lead Abatement Demonstration Project, Volume IV: Cincinnati Report", dated July 1993. This report states that some tilling was attempted as the appropriate method of abatement. The preliminary testing suggested that mixing was not thorough and the method was discontinued. A complete copy of this report has been placed in the administrative record;

b. During the public meeting, a resident of Beckemeyer explained that his property has high levels of lead in the soil and that he has tilled the property to reduce surface levels of lead. Subsequent to the public meeting, Samuel Borries, On-Scene Coordinator, inspected this property and determined, by the use of a device known as XRF, that the surface lead levels may be excessively high despite the fact that the soil has been tilled. Anthony Holoska, U.S. EPA Remedial Project Manager of the CSC plant site at that time, has also inspected that property and collected a sample of the surficial soil (refer to appendix A and the "Review of Region 5 Data for Circle Smelting" sampling results, dated

March 8, 1995, which has been placed in the Administrative Record);

c. Tilling does not meet any of the Superfund objectives of reducing mobility, volume and toxicity of contaminants. In particular, tilling would increase the volume of contaminated soils. Based on the known levels of lead contamination south of the CSC Site, the above information raised significant doubts as to whether tilling would be effective in reducing the soil lead levels to below 500 ppm, which is the clean-up level for this removal project.

G5. A commenter asked about the maintenance of a landfill cap and how long the cap would have to be maintained.

U.S. EPA Response: A landfill cap as proposed by the EE/CA will need periodic and perpetual maintenance to prevent it from deteriorating. It would be the goal of the U.S. EPA to establish a maintenance fund to pay for the required maintenance. U.S. EPA would request that such a fund be paid for by the PRPs. If the PRPs will not provide such funding, then CERCLA allows the Hazardous Substances Fund to be used.

G6. A commenter asked if it is hazardous to their health to eat vegetables grown in lead-contaminated soils.

U.S. EPA Response: Most of the vegetables do take up lead from the soil, including root vegetables and tomatoes. Root vegetables also have soil that adheres to the surface; these vegetables should be scraped or peeled. Leafy vegetables contain soil dust, which may be difficult to remove unless they are thoroughly washed. We usually advise residents not to garden in lead-contaminated soil. Refer to the Illinois Department of Health contact person for more information.

G7. A commenter stated that an identical list of chemicals should not have been developed for residential areas and plant site.

U.S. EPA Response: In order to establish a co-relationship between the contamination existing at the site and the contamination present in the residential areas, U.S. EPA developed an identical list of chemicals present at the plant site so that the source of the contamination can be identified.

TECHNICAL

T1. A commenter stated that the proposed non-time-critical removal action in the EE/CA has 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.

U.S. EPA Response: The purpose of the EE/CA was to evaluate non-time-critical removal actions that can be implemented at the site and will reduce the risk to human health and the environment in the present. This EE/CA has been developed using the Superfund Accelerated Cleanup Model (SACM) approach as well as considering the use of presumptive remedies applicable to the site. U.S. EPA believes that, by using the above-mentioned approach, the cleanup will be faster and more cost effective. Refer to "The Superfund Accelerated Cleanup Model" information sheet; "Presumptive Remedy Guidance" and "Non-time-Critical Removal Action Guidance" for more information. The proposed non-time-critical removal action has been reviewed for consistency with non-time-critical removal actions as well as remedial actions conducted in U.S. EPA, Region 5. In accordance with the SACM approach (policy), a preliminary risk evaluation is required in order to determine the existing risk to human health and the environment. U.S. EPA conducted a preliminary risk evaluation for human health based on lead (the chemical of concern) and a preliminary risk evaluation for the environment based on arsenic, zinc and lead (the chemicals of ecological concern). In order to support and clarify the preliminary risk evaluation U.S. EPA

conducted an additional sampling at the Village of Beckemeyer in June 1995. During this sampling event, U.S. EPA collected site-specific data, such as, residential soil samples; in-house dust samples; lead-based paint samples and water samples. U.S. EPA concluded, based on the test results, that a high risk for human health (particularly children) and the environment exists at those areas identified in the EE/CA due to the elevated concentrations of lead in the soil and sediments (for ecological information refer to the Final Report Field Investigation Report, August 1993). According to the preliminary risk evaluation and the risk evaluation addendum, preliminary remediation goals (PRGs) are used to determine the cleanup level for chemical and ecological concerns which warrant the reduction of risk to human health and the environment (refer to Table 3-1 in the EE/CA and risk evaluation addendum). The U.S. EPA has been estimating a significant volume of contaminated materials (approximately 74,000 cubic yards) to be addressed in the proposed non-time-critical removal action. Due to the significant amount of contaminated soil and sediments, U.S. EPA believes that the proposed non-time-critical removal action is the most appropriate way to reduce the risk to human health and the environment. There is no reason to believe that the chosen non-time-critical alternative will pose an obstacle to any future site cleanups. The type of cap required by the EE/CA allows data to be gathered for a remedial action and does not foreclose any remedial action. The EE/CA was developed to address the present risk to human health and the environment associated with the site, however, any additional investigation and baseline risk assessment conducted in the future may reflect the need for additional remedial action at the CSC site. Implementation of this EE/CA will not impede any future remedial action which may be needed. However, the selected non-time-critical removal action is considered a permanent source control remedy for CSC site.

T2. A commenter stated that the data used to characterize the site is insufficient.

U.S. EPA Response: During the site characterization phase, approximately 1000 samples were collected by U.S. EPA, Illinois EPA (IEPA)and PRPs.

July 26, 1988- 9 soil samples were collected by IEPA for site screening purposes. The samples were analyzed by analytical methods.

Oct. 4, 1993- 177 soil samples were collected by U.S. EPA environmental support team for site characterization. The samples were analyzed by analytical methods.

Mar. 29, 1993- 14 samples were collected by U.S.EPA for site characterization. The samples were analyzed by analytical methods.

July 30, 1993- 10 samples were collected by U.S. EPA for site characterization. The samples were analyzed by analytical methods.

June - Aug 1994- Approximately 1,400 samples were collected by PRP's contractor ENTACT, Inc., during the time-critical removal action. The samples were analyzed on-site by XRF device.

June 18, 1995- 38 soil samples, 9 in-house dust samples, 4 lead-based paint samples and 20 water samples were collected by U.S. EPA for site characterization. All samples were analyzed by analytical methods, except the lead-based paint sample, those were analyzed on-site by a XRF device.

Based on the above information, both agencies believe that an adequate number of samples were collected. Of course, during any cleanup action, further sampling, particularly in the residential areas, would be necessary to remove all contaminated soils and sediments.

T3. A commenter stated that the data used the characterize the site are not supported by adequate quality assurance documentation.

U.S. EPA Response: All samples were collected using accepted quality assurance protocols. The sampling collection was performed in accordance with the approved Standard Operating Procedure (SOP) for Portable X-Ray Fluorescence Analysis for Field Analytical Support Projects (FASPs). Most of the data sets contained quality assurance and quality control samples and validation data packages. All data used for the risk evaluation addendum is level III QA/QC validated. Refer to the risk evaluation addendum (sampling protocols). Thus, the U.S. EPA is confident in the quality of the data. Language clarification will be shown in the final EE/CA Report.

T4. A commenter stated that the sampling technique used for data in the EE/CA is not documented and sampling representativeness for this site is suspect.

U.S. EPA Response: The sampling technique used by U.S. EPA and IEPA is consistent with the approved SOP for Portable X-Ray Fluorescence Analysis for FASPs. This guidance describes the requirements needed to collect significant samples that can characterize the extent and nature of the contamination. Except where noted, samples collected for the EE/CA were surface soil. Those samples were typically scraped off the surface of a one-foot square grid (according to the guidance). Due to the fact that the sampling collection was performed using the sampling technique described in the U.S. EPA approved SOP, U.S. EPA and IEPA believe that the samples collected are representative. A copy of the approved SOP has been placed in the Administrative Record.

The sampling protocol used for the risk evaluation addendum has been placed in the Administrative Record. It was prepared using the Quality Assurance Project Plan for EPA Region V support of the ATSDR Multistate Lead Exposure Study, 1991 and the Urban Soil Lead Abatment Demostration Project: Vol. IV; Cincinnati Report.

Based on all the facts described above, both agencies believed that the quality of the

samples collected and used to characterized the site and to develop the risk evaluation is acceptable and supported by adequate quality assurance documentation.

T5. A commenter stated that the excavation of all areas that "contain cinders" is not warranted and that the mapped area presented in the EE/CA for cinder and soil removal does not contain obvious cinders. Furthermore, the commenter stated that in many locations crushed limestone has been mistaken for "cinders".

U.S. EPA Response: U.S. EPA found that the lead-contaminated cinders may break down into small particules that can be hazardous to human health and the environment. Samples of these cinders were collected and analyzed by U.S. EPA, showing that the cinders contain high concentrations of lead. Furthermore, lead is a potential carcinogen and therefore, U.S. EPA is attempting to lower the potential exposure of Village residents to lead by implementing this non-time-critical removal action. Thus, U.S. EPA believes that the collection of cinders is warranted. If crushed limestone has been mistaken for cinders, pre-removal sampling will reveal that error. Any such crushed limestone will not need to be removed unless it contains lead above the cleanup level of 500 ppm as stated in the EE/CA.

T6. A commenter stated that the total metal content and leachate potential of various cinder type have not been assessed.

U.S. EPA Response: All samples collected during the EE/CA were tested by total metal analysis and total contaminant leachate procedure (TCLP). Please refer to Appendix A of the EE/CA. A pre-removal sampling will reveal any discrepancies that may alter the decision to remove the material from the identified areas.

T7. A commenter stated that, in many areas, the volume of soil to be removed has been overestimated.

U.S. EPA Response: The EE/CA made an estimate of the volume of contaminated materials. There may be some cinders that are not contaminated with lead.

Those materials that are not lead-contaminated will be defined during the sampling that precedes any soil removals. The volume of contaminated materials calculated was an estimate and was not intended to define all contaminated soil locations. Moreover, all areas will be sampled during the pre-design stage to determine the conditions of the areas. If some areas previously identified as contaminated areas are not contaminated, then there is no need to address those areas. For the commenter's clarification, the Illinois background level for lead in soil is 346 ppm. Please refer to Table 2 of Appendix B in the EE/CA Report.

T8. A commenter stated that the area south of the smelter has been largely purchased by ASARCO and thus would not remain residential.

U.S. EPA Response: The U.S. EPA is committed to cleaning up the area south of the smelter regardless of the current owner of the land. U.S. EPA considers the area south of the smelter as a residential area, even if ASARCO has purchased it, in view of the future land use scenario.

T9. A commenter stated that the area east of the auto wrecking/junkyard is not a residential area but is used for industrial activities and therefore, tilling and importing soil is completly inappropriate for this location, The commenter also stated that other sources of lead and metals which exist on site, would have to be cleaned-up or removed before any interim or permanent action could be implemented.

U.S. EPA Response: Upon further review, U.S. EPA agrees that tilling of the soils is not an appropriate and effective way of reducing exposure to lead-contaminated soils in this situation. Refer to General Comment G4. The alternative recommended in this EE/CA only address areas that were directed affected by the smelter plant as a principal source. All other possible sources and further investigation will be addressed under a focused remedial investigation, if necessary.

T10. A commenter stated that a large area south of the plant has been purchased by ASARCO and there would not be residences on these properties and therefore removing the residences, isolating by fencing and revegetating the area is a more appropriate interim measure.

U.S. EPA Response: The risk evaluation conducted at the site is focused on site specific problems(i.e., soil contamination). This risk evaluation and its addendum identified lead as the contaminant of concern in the affected media (soil), its concentration, as well as, its associated risk to human health. The risk associated with lead at the site is considered significant therefore, an action is justified. Moreover, the risk evaluation and its addendum identified the exposure pathways as an obvious threat to human health and the environment, these pathways are associated with the actual land use as well as future land use of the areas. U.S. EPA considered residential scenario as the most appropriate scenario for all affected areas, except the smelter plant area. The fact that ASARCO purchased residential areas south of the smelter plant does not implicate that these areas will not be considered as residential areas. That assumption is not valid and does not have basis to support or justify that those areas will not be recreational/ residential areas in the future. The areas south of the smelter represent a potential threat to human health and the environment as demostrated and supported by the EE/CA and will be considered as a residential areas. The removal action recommended by U.S. EPA in the EE/CA satifies the criterias of implemtability, cost and effectiveness as required in the non-time-critical removal guidance. U.S. EPA and IEPA believe that fencing and revegetation of those areas does not satisfy each one of the short- and long-term aspect of these three broad criteria.

T11. A commenter stated that educational and institutional controls are more appropriate than soil tilling or a removal action.

U.S. EPA Response: Applying educational and institutional controls to the CSC Site will not accomplish the main requirement under the Superfund Law (CERCLA) of protecting the human health and the environment. CERCLA states that the selected removal action for a site should: be effective; be implementable; be cost effective; provide overall protection to human health and the environment; provide compliance with applicable or relevant and appropriate requirements (ARARs); provide reduction of toxicity, mobility or volume; and have State and community acceptance. Therefore, educational and institutional controls at the CSC plant site may not be considered as an adequate and complete method of protecting human health and the environment.

T12. A commenter stated that the majority of excavation of the unnamed tributary to Beaver Creek is based on little data below the input of the eastern and western drainages. The commenter stated that the sediment removal proposed in the EE/CA is not warranted because there is lack of environmental damage, available information from other sites suggest dredging action would not be beneficial and there would be considerable environmental disturbances as the result of the dredging activity.

U.S. EPA Response: The purpose of sampling in the creek was to quantify that an environmental threat existed. As in any removal effort, additional sampling during the dredging activity will be necessary to define the extent of the removal. The ecological study conducted by the U.S. EPA does suggest that environmental damage has occurred. Refer to the Final Report Field Investigation Circle Smelting Site, August 1993. The U.S. EPA believes that dredging is a very effective and permanent method for removing contaminated sediments from a waterway. Without the removal of the contaminated sediments, over time, these sediments will travel further downstream and adversely affect the ecological balance of more areas. Dredging, of course, does disturb the waterway to some extent, but with proper techniques and engineering controls, the extent of the disturbance is minimized. In addition, while dredging may have a short-term negative

impact, the long-term impact is a significant reduction of environmental harm and recovery of the ecosystem from the harm which has already occurred.

T13. A commenter stated that groundwater impacts from lead in the drainage ways are unlikely due to low mobility in subsurface aqueous environments. This commenter also stated that there is poor human access to the drainage ways and that the highest metal concentrations in the drainage ways are near the smelter property.

U.S. EPA Response: It is the primary goal of the U.S. EPA to protect and enhance the ecosystems in the drainage ways and their adjacent wetland areas, thus human access to the drainage ways is not a primary concern. The fact that the highest metal concentrations are near the smelter adds further importance to implementing a non-time-critical removal now to prevent the further migration of high levels of contamination down the drainage ways and into Beaver Creek. The Final Report Field Investigation Report, August 1993, points out that the lead levels in the eastern wetland (coming from the site) may pose risks to vermivorous birds and the lead levels in the western floodplain wetland may pose a risk to woodcocks. In summary, mitigating the damage in drainage ways by removing contaminated sediments prevents the contamination from reaching other ecosystems that may affect the wildlife in the area.

T14. A commenter stated that capping and containment on the plant site could interfere with necessary future investigations or remedial action relative to groundwater, surface water or subsurface soils.

U.S. EPA Response: It is the belief of the U.S. EPA that any capping and containment in and around the drainage ways would not seriously impair the U.S. EPA's ability to do future surface and groundwater investigations. A purpose of the proposed non-time-critical removal action is to reduce the risk to the environment, especially to potentially affected wildlife. A groundwater investigation may be addressed in a future Remedial Investigation.

T15. A commenter stated that a clay cap on the plant site could alter the subsurface environment and result in the increased mobility of arsenic metal in the saturated zone beneath the cap.

U.S. EPA Response: The installation of a soil cover/clay cap will reduce the infiltration of contaminants to the groundwater. Heavy metals (i.e., lead, arsenic) have a very low mobility in soil and covering the contaminated area will significantly reduce the mobility of those contaminants.

T16. A commenter stated that available site wells should be evaluated for their usefulness and not eliminated as stated in the EE/CA.

U.S. EPA Response: The U.S. EPA believes that available site wells should be evaluated for their usefulness but that effort is not a part of this non-time-critical removal action. The existing wells may be evaluated during a future Remedial Investigation in order to determine if they are useful for a groundwater characterization. U.S. EPA may not eliminate the existing wells at that time if they are appropriate for investigation purposes. The final EE/CA Report has been corrected to reflect that not all the existing monitoring wells will be eliminated. If some existing monitoring wells interfere with the implementation of the cap, then those monitoring wells must be abandoned. Leaving those monitoring wells open may cause the capped contaminated soils, sediments and/or smelter waste materials to contaminate the groundwater.

T17. A commenter stated that interim measures included in the proposed alternative are inappropriate. The commenter suggested that the more appropriate interim measures should include implementation of a site dust control program, drainage runoff/sediment controls and access restrictions.

U.S. EPA Response: The proposed alternative will utilize all three interim measures. The proposed alternative will provide runoff controls for surface water as described in the EE/CA. The

access restrictions, such as a perimeter fence, will be used at the CSC plant site in order to prevent contact with hazardous substances. Refer to page 4-12. With respect to the dust control program, the proposed alternative will provide a dust control program during the implementation of the proposed alternative in order to protect residents and workers of contaminated dust. Post-removal sampling will be conducted at the creek in order to ensure that all contaminated sediment is removed. Erosion controls will ensure that the risk of contaminating the creek will be eliminated.

T18. A commenter does not agree that there is absent or stressed vegetation in the former pond area.

U.S. EPA Response: During the warm weather months there are obvious visual indications that there is absent or stressed vegetation in the former pond area. Refer to the Final Report for the Time Critical Removal Action, conducted by ENTACT, for ASARCO Incorporated pursuant to a Unilateral Administrative Order issued by U.S. EPA on March 22, 1994, for a physical description of the site.

T19. A commenter stated that a cleanup level of 500 ppm is lower than many other industrial sites around the country and thus a cleanup standard of 500 ppm is not appropriate.

U.S. EPA Response: In the case of the CSC Site, the 500 ppm cleanup standard for lead is appropriate for residential areas. The 500 ppm cleanup level for lead has been determined by, among other things, the Integrated Exposure Uptake Biokinetic (IEUBK) Model. Lead does not have a U.S. EPA verified toxicity value; however, a preliminary remediation goal can be developed through the use of the IEUBK Model. The U.S. EPA ran the IEUBK Model with the data collected during the EE/CA and considered other relevant factors before choosing the PRG for lead of 500 ppm. At this level there is no significant risk for the human health. Refer to the health comments for more detailed information. Capping the contaminated soils and sediments on-site immobilizes the soil and sediments above 500

ppm and prevents their migration into adjacent residential areas and the downstream drainage ways and wetland areas. The cleanup level is based on the IEUBK Model run, current guidance, site-specific data and the preponderance of literature on the health effects of lead.

With respect to the industrial scenario, the risk evaluation addendum explains how U.S. EPA generated the 1,300 ppm for the smelter plant (based upon public comment on the Addendum U.S. EPA has revised the industrial cleanup number to 1500 ppm). The addendum provides the methodology used as well as the assumptions and considerations adpted to generate the cleanup number for the smelter plant. Refer to the risk evaluation addendum 2 for more information.

T20. A commenter stated that hydraulic dredging is not appropriate for an intermittent stream.

U.S. EPA Response: Based on the technologies available for this kind of removal action, hydraulic dredging has been demonstrated be a viable means for removing contaminated sediments from a stream.

T21. A commenter expressed concern that the field XRF equipment can lead to misleading results.

U.S. EPA Response: The U.S. EPA has expertise in the use of field XRF equipment. The device has a lot of value because it can provide quick and on-the-spot readings for lead in soil; however, it also has its limitations. Within the scope of those limitations, the U.S. EPA has found the field XRF a valuable and reliable device. Further evidence of the value of the field XRF can be found in the Final Report for the Time Critical Removal Action, conducted by ENTACT, for ASARCO Incorporated pursuant to a Unilateral Administrative Order issued by U.S. EPA on March 22, 1994. For commenter clarification the cleanup level for residential areas has been determined based on the analytical results and not merely on-site XRF results. The approximately 1,000 samples results from

XRF analysis provided by the PRP's contractor ENTACT were considered as a background information to show that residential areas were directly affected by the smelter waste material. The risk evaluation and its addendum was based on analytical data and not on on-site data. Refer to the risk evaluation and its addendum for more information.

T22. A commenter stated that the quality of the data is suspected and details on sampling procedures and data validation are not presented.

U.S. EPA Response: The sample preparation method used during the investigation was conducted in accordance with the approved SOP for portable X-Ray Fluorescence (XRF) Analysis for field analytical support projects. Therefore, the U.S. EPA believes that the quality and sample preparation for this kind of analysis was appropriate and thus, the results are accurate and acceptable. Please refer to the SOP for more information.

T23. A commenter has asked what are the "green moss areas"?

U.S. EPA Response: The green moss areas are those areas in the residential areas of Beckemeyer where green moss will grow but grass will not. Testing of the soils in those areas has revealed high levels of lead and zinc. U.S. EPA does not intend to define all "green moss areas" like a contaminated areas. The green moss areas have helped visually delineate the possible contaminated areas of the Village.

T24. A commenter has noted that a review of the data shows that most of the TCLP failures are for lead and that TCLP over-predicts lead mobility.

U.S. EPA Response: The U.S. EPA collected TCLP samples at the site to determine the appropriate RCRA disposal requirements if off-site disposal should be deemed appropriate. TCLP samples are collected in order to determine the presence of RCRA wastes that are hazardous waste by measuring their characteristics. Some of those characteristics are

ignitability, corrosivity, reactivity and toxicity (refer to "CERCLA compliance with the RCRA toxicity characteristics (TC) rule: part II, October 1990"). There is no correlation between the TCLP sampling and the contaminant mobility that can predict the mobility of the metals in a media, since the TCLP method is used for disposal purposes only.

T25. The commenter stated that institutional controls as interim measures would be protective of human health and are more appropriate in light of the fact that the consequences of removal and capping are not known.

U.S. EPA Response: Using only institutional controls (i.e., a fence, monitoring, dust suppression) will not be enough to reduce the risk to human health and the environment. As explained in previous responses, the removal of highly contaminated soils, particularly in the residential areas, and the subsequent capping of those soils is a highly effective method of protecting human health and the environment.

T26. A commenter stated that the 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.

U.S. EPA Response: The Ontario Provincial Sediment Guidelines were developed for surface waters throughout Ontario, not just in the Great Lakes. The guidelines for heavy metals are based on calculations using 100 species of benthic invertebrates. Included in this list are species which occur in Illinois streams and wetlands. Refer to the final Report Field Investigation-Draft.

T27. A commenter stated that guidelines such as the Ontario Sediment Guidelines are not chemical specific ARARS and should not be listed or used as such.

U.S. EPA Response: The Ontario Sediments Guidelines are not classified as an ARAR. These guidelines is classified as a to be considered (TBC) document. Please refer to Table 3-2 of the EE/CA Report. The guidelines were used as the

main reference to establish or develop the remediation levels for sediments.

T28. A commenter stated that the Lake Carlyle Wildlife refuge is not located on the site and, thus, it is unlikely that mussel or bald eagle sightings are relevant.

U.S. EPA Response: The EE/CA states that any such reports will require verification and consideration in the implementation of any removal action. The Lake Carlyle Wildlife refuge is near the site and thus, pending verification, it is appropriate to include it in the EE/CA as a possible area where impacts of the removal would be felt.

T29. A commenter stated that there is no evidence of "significant threats to human health and welfare" from cinders at the smelter property or residential soil, roads, alleys and walkways.

U.S. EPA Response: The U.S. EPA believes that the Integrated Exposure Uptake Biokinetic (IEUBK) Model, in conjunction with site-specific data and the preponderance of literature concerning the health effects of lead, accurately assesses the human health risks associated with the high levels of lead in the residential soils and at the smelter site. Samples collected during the development of the EE/CA show a high concentration of lead present in soils, sediments, dust, slag and cinders. Please refer to Attachment A of the EE/CA Report and the risk evaluation addendum. The lead detected at the CSC plant site and in residential area soil and sediments that exceed background (346 ppm) varies from 390 ppm to 19,348 ppm at the plant site and from 358 ppm to 50,000 ppm in residential areas. The cleanup level for lead established by U.S. EPA and supported as the minimum risk for the human health, according to the IEUBK Model, site-specific data and extensive literature, is 500 ppm. The cleanup level for lead in sediments according to the TBC document Ontario Sediment Guidance is 250 ppm. According to the Final Report of the Field Investigation, August 1993, the concentration range for lead present in the sediment samples lies between 35 ppm to 3,580

ppm. Since the levels of lead present in the residential areas and the plant site exceed the cleanup levels for soil and sediments, there is an indication of significant threats to human health and the environment. An analysis of potential exposure pathways indicates that the general human population is exposed to lead primarily through the oral route of exposure, with some contribution from inhalation. The close proximity of residences to the high levels of lead in smelter waste materials and soils and sediments contaminated with smelter waste materials allows for potential direct contact and exposure to lead-contaminated dust. The smelter waste materials located at the CSC site and the Village of Beckemeyer are easily pulverized, which allows them to migrate easily. Increased migration of contaminants is likely from airborne dust or stormwater runoff. During the spring and autumn, substantial rainfall occurs which may contribute to surface runoff from smelter waste materials and sediments and soils containing smelter waste materials in residential areas and on the CSC plant site. During the summer months, extreme heat causes the surface soils to dry up to a powder which is released in the form of airborne dust. Presently there are no provisions on the CSC plant site or in the Village of Beckemeyer to mitigate this potential source of airborne contamination. U.S. EPA believes that this information demonstrates that a risk does indeed exist to the residents of the Village of Beckemeyer along with the environment located near the CSC plant site. The Preliminary Remediation Goals (PRGs) for lead developed for the CSC plant site by U.S. EPA is 500 mg/kg. U.S. EPA evaluated the lead exposure in the Village of Beckemeyer based on site-specific considerations, the application of appropriate guidance (OSWER Directive #9355.4-12, Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities) and the preponderance of literature describing the health effects of lead.

T30. A commenter stated that a field review of the pond area show little or no vegetation stress.

U.S. EPA Response: While there are some pond areas with vegetation, there are other areas devoid of vegetation that also have the characteristic cinder-like material that is present on the smelter site.

T31. A commenter stated that the alternatives only consider removal with no consideration for an appropriately more cautious and less extreme option that would be protective.

U.S. EPA Response: The EE/CA evaluates non-time-critical removal actions that can be effective and permanent. The proposed non-time-critical removal action is the one that U.S. EPA considers the most effective and permanent action to provide adequate protection for human health and the environment. If further remedial action is required at the site, U.S. EPA will address that in the future.

T32. A commenter stated that like for like replacement for walks and other walking surfaces is a typical practice that should be used.

U.S. EPA Response: The U.S. EPA agrees that like for like replacement of concrete sidewalks and other walkways should be used during any removal action. The EE/CA stated that the soil in sidewalk areas would be placed in lifts, compacted, and finished to 8 inches of previous grades. Four inches of aggregate base would also be placed beneath 4 inches of concrete placed to match existing concrete sidewalks in town. The materials removed from alleys and driveways would be replaced with clean fill to 9 inches below grade, then 9 inches of aggregate base and then an asphalt cover.

T33. A commenter stated that evaluation criteria on pages 5-1,5-2 and 5-3 are not consistent with that of the reference document, Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA, (EPA 1993).

U.S. EPA Response: A review of the EE/CA evaluation criteria indicates that it is consistent with all of the pertinent aspects of the above-referenced 1993 guidance document. There are no known conflicts between the EE/CA preferred

alterative and any further needed site investigations such as groundwater monitoring.

T34. A commenter stated that traffic and construction hazards to community residents are not referenced in Table 5-2.

U.S. EPA Response: While traffic and construction hazards could pose a problem to the community, the U.S. EPA believes that any such impacts would be mitigated by conducting the project in a sequential manner, thus minimizing the impact to the community.

T35. A commenter provided a series of three editorial comments which add to the clarity of the document and correct an error in the designation of Figure 4-1.

U.S. EPA Response: The U.S. EPA acknowledges the need for added clarification of these items and the correction of Figure 4-1. Such corrections and clarifications have been made in the final EE/CA.

T36. A commenter provided information concerning a 1982 Illinois State Water Survey report which indicates that the migration of metals in the subsurface is slow due to the nature of the soils.

U.S. EPA Response: The U.S. EPA has reviewed the above-referenced report and agrees that the likelihood of subsurface migration is low. Additionally, that report states that it is impossible to attain reasonable pumping rates from the local aquifer. Due to these apparent hydrogeologic conditions and the general absence of the use of the groundwater for a potable water supply, the U.S. EPA has chosen to defer an investigation of the groundwater to a later date.

T37. A commenter noted that in 1987 and 1988, the Illinois Environmental Protection Agency conducted sampling of airborne contamination. The test results generally show that there were low levels of airborne lead.

U.S. EPA Response: The sampling in 1987 and 1988 does not prove or disprove that airborne lead is a problem in Beckemeyer. There are conditions that may affect those test results, such as sampling

technique, wind direction and weather conditions. As a result, there is no clear basis for U.S. EPA judge the accuracy of the test results for the airborne sampling.

T38. A commenter stated that the Circle Smelting Site EE/CA appears to recommend immediate action without the benefit of remedial investigation, a feasibility study, or a risk assessment.

U.S. EPA Response: The CSC Site has been classified as a Superfund Accelerated Cleanup Model (SACM) site, which means that it is a site where an early action can be performed prior to being listed on the National Priority List (NPL). The U.S. EPA recognized the need for a removal action at the site, based on the existing risk at the site (Refer to Section 3 of the EE/CA Report) to human health and the environment. The streamlined risk assessment conducted at the site was conducted in accordance with the non-time-critical removal guidance. In order to expedite the cleanup to contaminated sites, (e.g., the CSC plant site) the U.S. EPA is encouraged to use the SACM approach since several advantages for the PRPs and communities have been demonstrated, such as less cost investment and accelerated cleanup. This SACM approach is an opportunity for the PRPs to perform the work needed at a site in an inexpensive way; however, the PRPs are free to refuse to do the required work. If the PRPs refuse to perform the required work, then the site will be listed on the NPL and will be addressed as a Superfund site, which will include an extensive and more expensive remedial investigation study and feasibility study. Please refer to "The Superfund Accelerated Cleanup Model" information sheet, which has been placed in the Administrative Record, for more information.

T39. A commenter stated that there is no justification or reference for the list of metals classified as metals of primary ecological concern.

U.S. EPA Response: The EE/CA has been corrected to reflect the change in the list of metals classified as metals of primary ecological concern.

According to the sediments sampling results and the Ontario Guidance, three metals are considered a threat to the environment since they exceed the maximum severe effect level. Those metals are arsenic, lead and zinc. Proper clarification is in the final version of the EE/CA Report.

T40. A commenter stated that site-specific information, such as blood lead data, the special characteristics of smelter waste, and community acceptance information are not considered in the EE/CA.

U.S. EPA Response: U.S. EPA, IEPA, and the Illinois Department of Health (IDH) worked together during the development of this EE/CA. The IDH provided data related to the blood lead analysis to the U.S. EPA and the community. The U.S. EPA had considered this data in the development of this EE/CA. The smelter waste material was properly characterized, by conducting chemical analyses in order to determine those chemicals that are hazardous and create a threat to human health and the environment (refer to Attachment A). The U.S. EPA considered community acceptance as well as State acceptance as evaluation criteria during the development of this EE/CA in accordance with the guidance for non-time-critical removals.

T41. A commenter stated that the EE/CA cites a U.S. Geological Survey reference relative to the 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.

U.S. EPA Response: The cited study (Gibb and Cartwright, 1982) was mentioned in the EE/CA as part of the investigatory history section. However, U.S. EPA did not use that information to make any decision, since groundwater investigation was not part of this action. Any groundwater investigation may be addressed in a future Remedial Investigation as set forth above.

T42. A commenter stated that no sediment criteria values were presented for cadmium and that the report does not identify cadmium as an ecological concern based on the preliminary

risk evaluation.

U.S. EPA Response: Cadmium is present in the sediments, however, it does not represent an ecological risk since its concentration is below the severe effect level (10 ppm) as stated in the Ontario Guideline and the Final Draft-Report Field Investigation Report, August 1993.

T43. A commenter stated that the arsenic occupational PRG level mentioned in Table 3-1 (0.37) is different than the one calculated in the Appendix B (3.27).

U.S. EPA Response: The error has been noted and the proper correction will be shown in the final EE/CA Report. The arsenic occupational PRG level is 3.27 ppm.

T44. A commenter stated that the reference to samples S-9a and S10a in Figure 3-1 is missing.

U.S. EPA Response: The error has been noted and the proper correction will be shown in the final EE/CA Report.

T45. A commenter stated that a reference and justification should be provided for selection criterion of 10 percent of samples exceeding Illinois EPA background.

U.S. EPA Response: The identification of inorganic chemical of potential concern was made by comparison of the site inorganic analytical data to IEPA background soil data. This comparison was developed with a computer database called Integrated Risk Information System (IRIS). This computer database was created by U.S. EPA, Cincinnati. The computer database indicates a potential concern when 10 percent of the analytical results for a given chemical are greater than the upper end concentration of the background range.

T46. A commenter stated that chromium is not a chemical of concern (COC).

U.S. EPA Response: Chromium was present in the samples, however, its concentration does not exceed

the IEPA background levels. Therefore is not a COC. Appropriate correction will be shown in the final EE/CA Report.

T47. A commenter stated that the hazard quotients of individual chemicals were not added in the equation used to calculate PRG values.

U.S. EPA Response: The methodology and development of a risk-based soil PRG for the Circle Smelting Site are described in Appendix B of the EE/CA. The equation used to develop those PRG values defines the hazard quotient as the estimated daily intake of a contaminant over the toxicity information of a chemical (i.e., RfD or oral reference dose). When more than one chemical or more than one exposure route is possible, the hazard quotients for each chemical or exposure route are summed to determine the hazard index. When the hazard index is greater than one, then there is a potential for health concern. The equation on page 10 of Appendix B indicates that the hazard quotients were added to calculate PRG values.

T48. A commenter stated that the use of a stringent risk level of 10E-6 to set levels for permanent remediation is over-kill before the full remedial investigation/feasibility study is completed.

U.S. EPA Response: The U.S. EPA uses the general 10E-4 to 10E-6 risk range (as stated in the NCP) as the target range within which U.S. EPA strives to manage risk. A risk of 10E-6 is used as a point of departure. A risk management decision on whether to deviate from that point of departure is made based on site-specific information, i.e., geographic location, exposure pathways, human population, and environmental concerns. The 10E-6 risk stipulated in the EE/CA was based on the maximum protection to human health and the environment as required in the non-time-critical removal guidance, because site-specific circumstances do not warrant moving off of the point of departure.

T49. A commenter stated that "chemicals that cause or induce cancer" is a broad statement and should be clarify.

U.S. EPA Response: Clarification of this statement will be shown in the final EE/CA Report.

T50. A commenter stated that no threshold level for toxic effect has been established for lead.

U.S. EPA Response: The threshold level for toxic effect for lead is established as 500 ppm (PRG). Clarification of this omission will be shown in the final EE/CA Report.

T51. A commenter stated that the Step 2. Identification of Exposure Pathways is incomplete, since intermittent streams and associated wetlands are not considered as an exposure source.

U.S. EPA Response: Intermittent streams and associated wetlands are considered as exposure source. Correction in the final EE/CA Report will reflect this fact.

T52. A commenter stated that the EE/CA report refuses to disclose the rationale behind recommending an alternative until after the final decision document is published.

U.S. EPA Response: The rationale used to select the proposed alternative is described in Section 5 of the EE/CA Report. Proper correction in the Executive Summary section to clarify this issue will be made in the final EE/CA Report.

T53. A commenter stated that the EE/CA implementation is a fund-lead project.

U.S. EPA Response: Clarification of this section will be made in the final EE/CA Report.

T54. A commenter stated that OSHA requirements are not an ARAR.

U.S. EPA Response: OSHA requirements are not an ARAR and correction will be made in the final EE/CA Report.

T55. A commenter stated that the statement that cobalt cannot be evaluated by "traditional or nontraditional" risk assessment

methodology is inaccurate.

U.S. EPA Response: The statement will be clarified in the final EE/CA Report indicating that the presence of cobalt is not significant, based on background information.

T56. A commenter stated that the proposed actions are extremely costly and that others equally protective measures could be much more easily implemented at a fraction of cost and less incovenience to the community.

U.S. EPA Response: U.S. EPA conducted this EE/CA as per the guidance for non-time-critical removal actions. This guidance suggests to use SACM approach. This approach allows U.S. EPA to explore new ways to use removal authorities under the NCP to achieve prompt risk reduction. An integrated removal and remedial site management strategy under SACM was adopted in this site. Under this approach and based on the analysis of the nature and extent of contamination, U.S. EPA identified and assessed a limited number of alternatives appropriate for reducing threat to human health and the environment. Defined alternatives were evaluated against the short- and long- term aspects of three broad criteria: effectivennes, implementability and costs. Refer to the guidance for more information.

T57. A commenter stated that selective sampling of cinders for analysis from alleys, walkways and driveways would overestimate risks.

U.S. EPA Response: The principal purpose for sampling alleys, walkways and driveways was to identify areas contaminated with smelter waste (i.e., cinders, slag). Sampling locations were selected based on information available at that time, such as, residents, maps, visual inspection of the areas, State reports; as suggested on the guidance. U.S. EPA believes that the sampling locations were appropriated for this site. Refer to Section 2.4 of the Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA.

T58. A commenter stated that various types of cinders which have been used as fill have not been adequately characterized

because their bioavailability and their potential risk have not been assessed.

U.S. EPA Response: The cinders' bioavailability and potential risk have been detailed in the risk evaluation addendum.

T59. A commenter stated that dredging using hydraulic techniques is expensive, and may not be practical for relative small drainage ways. The commenter also stated that a simple backhoe work would be more appropriate, faster, more cost effective and less environmentally intrusive.

U.S. EPA Response: U.S. EPA evaluated a limited number of alternatives for the sediment contamination, such as, hydraulic dredging; natural attenuation and backhoe. Those alternatives are discussed on section 4 of the EE/CA. U.S. EPA evaluated each one of these technique using broad criteria: effectiveness, implementability and cost; as suggested on Section 2.6 of the Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA. After the evaluation, U.S. EPA has determined that hydraulic dredging technique satisfies those criteria and represent the more appropriated and permanent solution to overcome the threat to human health and the environment.

T60. A commenter stated that the groundwater impact from lead are unlikely because of its low mobility in the subsurface aqueous environment.

U.S. EPA Response: U.S. EPA had not reached any conclusion with respect to the groundwater since it is not addressed in this EE/CA. However, U.S. EPA does show in this EE/CA that the surface water (Beaver Creek) is affected by the smelter plant since elevated concentration of lead has been found in the sediments of the unnamed tributary, which discharge on the creek. Refer to figure 3-2 on the EE/CA and the Final Report Field Investigation Report, August 1993. Any groundwater issues will be addressed in future investigations.

T61. A commenter stated that the maximum potential for downstream transport of sediments was probably realized last year when

record high rains and floods occurred. The commenter stated that immediate treats for downstream transport in excess of what had already occurred is minimal.

U.S. EPA Response: U.S. EPA recognized that natural events (i.e., raining, flooding, snowing) may alter site conditions (especially areas such as creeks, tributaries, river); however, a pre-removal sampling will determined the existing conditions of the site.

T62. A commenter stated that a proper site specific study is required to ascertain the appropriate remedial action for bottom sediments.

U.S. EPA Response: This site is under removal authority where specific studies are not required; however, an ecological assessement (Draft-Final Report Field Investigation, August 1993) was conducted by U.S. EPA where an aquatic evaluation was conducted (Section 2.2). The study shows that there are ecological risks associated with the site and action is warranted(Section 5.0).

LEGAL

L1. A commenter stated that the EE/CA states that the CAMU policy will not be used at this site and this commenter suggested that U.S. EPA reconsider the use of 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.S. EPA response: U.S. EPA's response to this comment is two-fold. First, the EE/CA sets forth the criteria by which to judge 5 different removal options for this site. Remedial options are not yet being considered since U.S. EPA's first concern is to abate the immediate threat to human health and the environment at this site due to lead contamination levels. Second, use of the CAMU policy at this site would provide no changes in the removal options analyzed and the regulatory requirements which apply to them. This is because "placement" is not occurring at this site when disposal is occurring onsite. The RCRA Land Disposal Restrictions (LDRs) only apply when hazardous waste is

"placed" at a disposal site. Placement does not occur when hazardous waste is moved within an area of contamination as occurs in Alternatives 4 and 5 of the EE/CA. The definition of an area of contamination is broad enough to encompass the CSC Plant site, the Village of Beckemeyer, and the drainage ways which were discussed in the EE/CA. Since the LDRs do not apply to Alternatives 4 and 5 of the EE/CA, a CAMU would serve no purpose. Therefore, the CAMU policy is not applicable.

L2. A commenter stated that cinder and soil removal is contrary to U.S. EPA's "Revised Interim Soil Lead Guidance for CERCLA site and RCRA Corrective Action Facilities" dated July 14, 1994.

U.S. EPA's response: U.S. EPA believes that soil removal is consistent with the above-referenced guidance. The guidance recommends a screening level of 400 ppm on page 1. Above this level, various remedial options must be considered. Options include abatement (soil removal) and intervention. Generally, soil removal provides a more permanent remedy than intervention. The guidance and CERCLA have a preference for permanent remedies. This preference would favor soil removal over intervention. The guidance merely recommends that U.S. EPA review whether soil removal or intervention is more appropriate at a particular site. See page 13 of the guidance. As discussed in greater detail in the Detailed Evaluation and Comparative Analysis of Alternative Section of the EE/CA Report, soil excavation is the preferred alternative at this site because the excavation of contaminated soil and replacement with clean fill in the residential area constitutes a final remedy. Further, the proposed alternative satisfactorily meets the evaluation criteria as stated in the guidance for non-time-critical removal actions.

U.S. EPA has considered all relevant guidance in choosing the appropriate removal action for this site. The

guidance cited above was finalized in the middle of the comment period on the EE/CA for this site, so it has been evaluated with the comments to the EE/CA. First, it should be noted that the guidance cited above does not apply to this site because the risk assessment necessary for a removal action at this site was completed prior to the issuance of this guidance. The guidance states that "[t]his 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." Since all data to determine the type of removal action necessary for this site were gathered prior to the issuance of the guidance, the guidance is not directly applicable to this site. Second, as referenced above, the guidance applies to remedial actions. U.S. EPA is currently undertaking a removal action.

While the guidance is not directly applicable to this removal action, U.S. EPA does believe that its approach is consistent with the guidance. The guidance recommends an investigation of soil and lead concentrations at the site. Since the soil lead level is greater than 400 ppm at this site, the guidance then suggests that probable land use and exposure scenarios should be developed. After that, site-specific data should be gathered. The IEUBK model should be run with as much accurate site-specific data as is available. Here, since soil samples are the only data available, default values were used for the other types of data (dust, paint, water and air). Based on the information available to the U.S. EPA at the time the EE/CA was published in draft form, U.S. EPA's evaluation of the removal alternatives is consistent with the above-referenced guidance. Further data may be gathered before a remedial action is taken at this site. U.S. EPA believes that it is necessary

to move forward because of the necessity for a response to the current threat to human health and environment which exists at the site. The data at this site supports the removal alternative chosen as is explained in the EE/CA and this responsiveness summary.

HEALTH

Preparation of a Focused RI/FS to obtain site specific data

H1. The discussion states that "the model has been shown to be very conservative and overpredicts soil and blood lead relationships".

U.S. EPA Response: No evidence was presented to support this statement. The U.S. EPA IEUBK Model for Lead in Children was developed to calculate a best estimate of the geometric mean blood lead concentration and a probability distribution of blood lead levels for a typical child aged 6 to 84 months of age, assuming multimedia residential exposures to lead. The model uses average exposures, rather than upperbound estimates. The resulting probability distribution of blood lead levels represents the plausible range of blood lead levels, given variations in exposure activities and human physiological variation. The results of a single blood lead measurement reflect a current set of behavioral activities and the nutritional status for that person. Thus, the Model predicts the potential blood lead distribution of a child, while the blood lead measurement indicates the current state at any point in time. The Model is neither overly conservative nor it is overpredictive when residential exposure is well characterized. Additional information with respect to the IEUBK Model can be found in "U.S. EPA. Technical Support Document and User's Guide for Lead: A PC Software Application of the Uptake/Biokinetic Model Version 0.05." ECAO First Draft, January 1991, which has been placed in the

Administrative Record.

H2. The discussion suggests that cinder types should be characterized for a number of parameters, including bioavailability.

U.S. EPA Response: The crushed cinder material observed in driveways and walkways resembled fine dust. This material is expected to behave much like smelter dust and completely dissolve, once subjected to the extreme acid conditions in the stomach. The discussion does not indicate what type of study is suggested. At present, U.S. EPA, is funding a pig feeding study of Superfund soils; however, such research is time-consuming and costly. Because the bioavailability of smelter dust and crushed cinder material is likely to be similar, and because U.S. EPA's use of the IEUBK Model and extensive literature review indicated a significant risk to children in Beckemeyer, Illinois, U.S. EPA feels it is appropriate to abate that threat while such studies are ongoing, rather than wait for more data.

H3. One commenter has criticized the manner in which the U.S. EPA Lead Model was used in this report and, in particular, the use of the "outdated" version 0.5 of the IEUBK Model in her comments in section 1.0, insisting that version 0.61 should have been used instead. She further asserts that version 0.99d of the IEUBK Model cannot be used as it has not been validated. Dr. Tsuji then presents her parameter modifications for the use of the Model, again version 0.61, in developing PRGs for the Beckemeyer Village exposure, in her recommendations, in section 2.0.

U.S. EPA Response: U.S. EPA approved the use of the IEUBK Model, version 0.99d, in March 1994. The transmittal letter from Henry Longest is has been placed in the Administrative Record.

The commenter also fails to acknowledge or reference the new OSWER Directive #9355.4-12, which supports the use of the IEUBK Model, version 0.99d, to evaluate lead contamination at Superfund sites, and which was issued as a package

with the cited (U.S. EPA 1994a) Toxic Substances Control Act Section 403 document. The former document was included in the commenter's package as Attachment 5, even though it was not used by the commenter.

To prevent further misunderstanding, the following history of the IEUBK Model for Lead in Children is offered. Versions 0.5 and 0.6 of the IEUBK Model are identical as far as the essential operation is concerned. Both versions use the same equations, default parameters and code. Version 0.5 limits the number of input data points to twelve, while version 0.6 allows input of large data sets using a batch mode enhancement. The choice of Model version is dependent on the input data. There is no updated version 0.61 of the IEUBK Model. The package labeled 0.61 indicates the inclusion of a statistical package, designed to handle large data sets which may be evaluated using the IEUBK Model, version 0.6. The statistical package, 0.61, was used primarily by three developers of the Model to check the operation of the Model and in some validation-type exercises, but was never distributed to the Regions for use at Superfund sites. The version 0.61 statistical package is part of the version 0.99d Model package. The IEUBK Model was reviewed by the U.S. Science Advisory Board in late 1991. In responding to these comments, U.S. EPA revised the 0.5/0.6 version of the Model. While the earlier versions used a "non-integrated approach" (saturable absorption coefficients are calculated for each medium and used to calculate media-specific uptakes which are summed to yield total uptakes), the new version 0.99d uses an "integrated" approach (intakes from all media are considered in the calculation of the saturable absorption coefficients for each medium). The IEUBK Model for Lead in Children, version 0.99d, is the most reliable Model developed to date, having undergone extensive development,

verification and refinement.

In response to application of the model in the U.S. EPA report: version 0.5 of the IEUBK Model was used in this evaluation for two reasons: 1) The evaluation was prepared before version 0.99d was available to the contractors for use and 2) the data provided for the evaluation was limited and did not require the batch mode input enhancement of version 0.6. The comments also criticize the explanation on page 12, Appendix B, that the Model was run "in reverse". This explanation was given to indicate that 500 ppm was not initially selected, as the commenter suggests, but rather the level of concern and cut-point were selected and a range of soil levels was evaluated. A review by a U.S. EPA toxicologist determined that these range-finding runs of the Model were not included in the report. U.S. EPA agrees that these Model runs need to be added to the report and that the text should be revised to explain that several range-finding runs of the Model were used to identify the soil lead level associated with the level of concern and cut-point identified by U.S. EPA as a basis for cleanup at Superfund sites. Use of the RANGE SELECTION MENU in the Model and Options 1 (media), 2 (start and end lead levels), 4 (number of runs for range) and 3 (multiple run analysis) facilitate this analysis. Using this approach, version 0.5 of the Model predicts that a soil lead concentration of about 30 ppm is required if the U.S. EPA criteria are not to be exceeded.

In the section 1.0 comments on Appendix B and the section 2.0, "Site-specific Recommendations", the entire battery of exposure values used in the Model runs for the Village of Beckemeyer were dismissed by the commenter and alternate values were proposed and used in a new Model run.

The use of version 0.6 of the IEUBK

Model with the 0.61 statistical package does not offer any advantage over the use of version 0.5, given the limited site-specific data available. U.S. EPA agrees that given the date of the EE/CA (April 29, 1994), the use of version 0.99d of the IEUBK Model is more appropriate. U.S. EPA would be happy to update the lead evaluation, using version 0.99d, should a new Model run be required.

The Model run in U.S. EPA EE/CA Report used an indoor dust lead to outdoor soil lead ratio of 0.40 (actually the background default value of 200 ug Pb/g for indoor dust was used inadvertently). The new guidance manual suggests a default of 0.70 for this ratio when using version 0.99d. This value is significantly greater than the value of 0.10 suggested by the commenter (which is actually significantly less than background). No measurements of indoor dust lead level were conducted for this site. Therefore, U.S. EPA suggests the use of site-specific considerations: the source of lead contamination is friable cinder waste which crumbles easily; no data is available on the lead concentration of a 100 micron sieve sample; the cinder material is located in walkways, driveways and alleys; the material is more likely to be crushed and/or ground into small particles and dust due to its location; the small particles and dust are likely to stick to shoes and pets and be transported into the house; and indoor lead dust is thought to provide the major exposure to lead. Therefore, U.S. EPA believes a value of 0.70 would be appropriate in a new run of the Model using version 0.99d. The Model run in U.S. EPA report used a soil and dust absorption rate of 30%. This is the value suggested in the guidance manual, given a lack of data on bioavailability. The commenter has suggested the use of a 20% absorption rate for this site. U.S. EPA does not believe that large particles of cinder material would stick to the hands and

shoes as easily as the small particles and cinder dust; therefore, U.S. EPA believes that the latter would be more likely to be ingested. In addition, the bioavailability of large particles and small particles are likely to be more similar than different in the acid reflux conditions of the stomach. Mini pig feeding-studies conducted by U.S. EPA (Weis, Region 8) seem to indicate that the soil at some mining sites is more bioavailable than previously believed. No characterization of the cinder material has been done. U.S. EPA therefore believes that a value of 30% for gut absorption would be appropriate in a new run of the Model using version 0.99d.

The Model run in the U.S. EPA EE/CA Report used the version 0.5/0.6 default Geometric Standard Deviation (GSD) of 1.42. The default GSD value has been changed to 1.6 in version 0.99d of the IEUBK Model. The Technical Review Workgroup for Lead carefully considered the data from a number of mining and smelter sites in choosing a default value for the GSD. The value chosen (1.6) is considerably less than the maximum value of 1.79 seen at one site (U.S. EPA noted that Dr. Tsuji chose to ignore this value), and consistent with values used in the risk analysis at other locations (1.69 for Midvale, 1.53 for the Baltimore data from the Tri-City Lead Soil Demonstration Project and 1.60 for the Butte study). U.S. EPA does not believe that the new GSD value 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. The variability represented in the GSD value reflects differences in individual child behavior and biological (biokinetic) processes, as well as repeat sampling variability, sample location variability and analytical error. U.S. EPA discourages the changing of the GSD value unless good empirical site-specific data from a

well-conducted blood study is available; the arbitrary changes in the GSD suggested by the commenter are completely inappropriate. U.S. EPA therefore, agrees that a GSD value of 1.6 would be appropriate in a new run of the Model using version 0.99d. The Model run in the EPA report used the version 0.5/0.6 default values for soil and dust ingestion rates and for the soil ingestion as a percent of the total soil and dust ingestion. The commenter suggests that the soil ingestion rate should be reduced, based on methodology used in the cited Tacoma risk assessment. Since little site-specific information (no house dust measurements) is available for the Beckemeyer site, U.S. EPA cannot evaluate whether the two sites are similar. The commenter suggests that since the elevated oncentrations of lead are confined primarily to walkways, alleys and driveways, the lead ingestion rate (exposure) should be lower. This has not been the experience in Region 5, where high blood lead levels have been found in children where residential lead contamination was limited to chip material in driveways and alleys. U.S. EPA believes that the commenter's suggested ingestion rate is not protective, given the limited site data and very limited blood lead testing done in this community (the data from 28 volunteers are insufficient to accurately predict the distribution, much less define the 95th percentile value). U.S. EPA therefore believes that the default soil and dust ingestionratio and rates would be appropriate in a new run of the Model using version 0.99d.

U.S. EPA found the comments on the IEUBK Model and its use to develop PRGs for the site in section 2.3.2.2 to be conflicting. The discussion appears to be a combination of everything that might be used to suggest a soil cleanup level of 5000 ppm, whether or not it is relevant to the Beckemeyer site. First, U.S. EPA does not agree with

the values of 3,260 to 4,685 ppm generated by minimizing all the default parameters in the Model. Second, the discussion includes some comments from the Tri-City Soil Lead Demonstration Project, which suggest that remediation of outdoor soil had little or no impact on lowering lead levels of children; however, the commenter fails to indicate that the soil lead levels in many locations in the three cities in this study were very low, that no attempt was made to identify or address the multiple sources of lead contamination, that recontamination and/or continuing exposure may have accounted for less reduction in blood lead levels than was expected, and that the existing lead body burden in the children and the short follow-up time of the study may not have allowed for a full evaluation of the effects of the remediation. U.S. EPA suggests that the commenter's review the data showing a significant blood lead reduction (up to 8 ug/dL) after soil lead cleanup at the Bunker Hill Superfund site in Kellogg (von Lindern, presentation at the 1994 International Lead Abatement and Remediation Conference). Third, the commenter repeatedly refers to the 5,000 ppm trigger level proposed under the TSCA Section 403 rule for soil abatement, without differentiating between urban soil lead cleanup and Superfund soil lead cleanup. The July 14, 1994 OSWER Directive #9355.4-12, Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, which the commenter chose not to acknowledge, discusses the relationship between theOSWER Soil Lead Directive and the TSCA Section 403 Guidance. The guidance points out that the manner in which different U.S. EPA programs address lead differs in the type of sites to which the guidance applies and the types of standards which are appropriate for these sites. The guidance further stresses that it is the U.S. EPA's recommendation that CERCLA sites be evaluated using the OSWER Interim Soil

Lead Directive. U.S. EPA therefore believes that the commenter's numerous references to the TSCA Section 403 Guidance are inappropriate for use at the Beckemeyer site.

To summarize, U.S. EPA believes that the evaluation of lead exposure in the Village of Beckemeyer was based on site-specific considerations and the application of appropriate guidance. U.S. EPA believes that the application of the IEUBK Model, version 0.5, with the discussed default input values, was appropriate at the time, but U.S. EPA recommends that a new evaluation be done, using version 0.99d of the IEUBK Model for Lead in Children. U.S. EPA believes that if a new evaluation is conducted with the values U.S. EPA has discussed above, then an even lower soil lead cleanup level (approximately 400 ppm) would result.

H4. One commenter has indicated that the use of the IEUBK Model, version 0.5, with the assumptions used in U.S. EPA report may be appropriate here. However, she suggests the type of exposure and the exposed population should be considered before applying remedies based on default assumptions of child exposure.

U.S. EPA Response: U.S. EPA agrees that the lead contamination in the adjacent area south of the smelter is likely to be more widespread than the contamination in the Village of Beckemeyer, and that the presence of fine particulate dust and poor groundcover may constitute a greater risk to children in this area, as well as provide a source of continuing contamination to the surrounding area. Therefore, a more stringent cleanup may be warranted for this area. This would require additional data collection and a new evaluation of the area using the IEUBK Model for Lead in Children, version 0.99d. However, U.S. EPA believes that the proposed non-time-critical removal

action would effectively reduce the risk for human health and the environment. Any additional studies may be addressed in a Remedial Investigation in the future.

H5. One commenter has suggested that the use the U.S. EPA IEUBK Model is not appropriate for estimating blood lead levels in adults. She has suggested that the California Department of Toxic Substances Control spreadsheet model (California Lead Model) be used instead, and has applied this spreadsheet methodology to evaluate adult worker exposure at the plant site.

U.S. EPA Response: U.S. EPA agrees that the IEUBK Model for Lead in Children does not contain any biokinetic data for children above the age of seven, and should not be used to assess lead exposure in adults. However, U.S. EPA has some concerns over the use of the California spreadsheet (since it is not really a model as it does not model anything) and the parameter values the commenter uses in her application of the spreadsheet. The IEUBK Model "integrates exposure from lead in air, water, soil, dust, diet, and paint with pharmacokinetic modeling to predicts blood lead levels in children (i.e., children 6 to 84 months old), a particularly sensitive population." The IEUBK Model "simulates lead uptake, distribution within the body, and elimination of lead from the body." The California spreadsheet, in contrast, estimates blood lead concentration by adding the exposures via five pathways: dietary intake, drinking water intake, soil and dust ingestion, inhalation intake and dermal contact intake. Because the California spreadsheet does not "model" lead in body, but merely predicts the total exposure of a body, it is not as useful at predicting lead exposure as the IEUBK Model.

First, the use of a blood lead level of 25 ug/dL as the level of concern would not be acceptable in California, nor is it acceptable to U.S. EPA. The blood

lead level of concern for both adults and children and the point of departure specified in the State of California Environmental Protection Agency 1992 document is an 0.01 risk of exceeding ten micrograms per deciliter (99% must be < 10 ug/dL). The use of the California spreadsheet to achieve a 5% risk of exceeding 25 ug/dL has not been demostrated to be protective for post-menopausal women or adult males, much less for women at risk to pregnancy. Even the application labeled "Women of Child-Bearing Age", which calculates a soil lead concentration based a 5% risk of exceeding 10 ug/dL would not be consistent with the California application of the spreadsheet. U.S. EPA also noted that while the air concentration was adjusted to be consistent with the IEUBK Model air concentration value, the soil ingestion rate of 25 mg/day used was not consistent with the commercial /industrial value of 50 mg/day used by U.S. EPA for non-dusty industrial exposure and was considerably lower than the 55 mg/day default value in the California spreadsheet. Therefore, U.S. EPA views this evaluation of the adult worker exposure at the smelter property to be completely unacceptable.

U.S. EPA has suggested the use of a simple equation for assessing adult worker exposures at Superfund sites. Basically, the "Target Blood Lead Level for Adults due to Soil + Dust" can be equated to the "Absorption for Adults" x "Soil + Dust Lead Concentration" x "Adult Ingestion Rate" x "Inverse Clearance Factor". U.S. EPA first reviewed this equation using a level of concern of 15 ug/dL based on observation of hypertension in white males. This cutpoint has been criticized as not being protective for female workers at risk to pregnancy (most female workers), and U.S. EPA has done a more in-depth review of the parameter inputs based on physiological changes during pregnancy. These include consideration of the

evidence for remobilization of bone lead stores during pregnancy, and the relative iron deficiency and two-fold increase in calcium absorption seen in pregnant women which suggest an increase in lead absorption as well. When all factors are taken into consideration, a soil lead screening below 1000 ppm has been suggested to protect the female worker at risk to pregnancy. In the U.S. EPA EE/CA Report, a cleanup level of 500 ppm was recommended; however, U.S. EPA would consider expanding the worker evaluation to include discussion of other factors and models for adult lead exposure. The U.S. EPA Adult Lead workgroup is currently evaluating the model described by Bowers et al. (Risk Analysis 14: 183-1889, 1994) as an interim approach.

H6. One commenter has suggested that the calculation of risk-based PRGs based on early exposure is inconsistent with U.S. EPA risk assessment guidance. She has also commented that the approach used in the U.S. EPA report is too conservative because lifetime reference doses were used to evaluate short-term exposure for a young child in deriving PRGs for noncarcinogenic contaminants. A number of other comments on the methodology used for assessing risk from other metal contamination were included in her comment report.

U.S. EPA Response: The U.S. EPA believes the commenter is applying guidelines for conducting a full-blown Baseline Risk Assessment, as part of the Remedial Investigation report for a Superfund site, to the Engineering Evaluation and Cost Analysis (EE/CA) Report. The two documents differ in that the EE/CA does not usually contain a complete risk assessment, presenting instead a summary of chemicals which may present a risk at the site and an evaluation of the major concerns at the site which warrant action. U.S. EPA agrees that the major health risks at the site are associated with exposure to lead contaminants, and that other contaminants may have only minimal impact on the risk calculation.

However, no action has been proposed on the basis of the presence of non-lead contaminants alone, and their inclusion in the Report lends credence to the conclusion that lead contamination at the site is associated with the Circle Smelting plant. The use of short-term exposure scenarios and chronic reference doses (which are appropriate when sub-chronic toxicity values are not available) is consistent with the methodology for evaluating the need to take immediate action at a site (i.e., evaluating the health impacts of short-term exposures). U.S. EPA has seen the use of very short-term exposure (3 months) to evaluate the need to proceed with removal actions at other sites, and this has been deemed completely appropriate. However, U.S. EPA will include a review of any revised documents by a Regional toxicologist to ensure that the evaluations are consistent with U.S. EPA policy.

COMMENTS ON RISK EVALUATION ADDENDUM 1 (RESIDENTIAL SOILS)

1) The commenters note that the average lead level for the two rooms sampled by the Illinois Department of Public Health was incorrectly given as 276 ug/g, with a corresponding average dust to soil lead ratio of 0.37.

The commenters next indicate that the rationale for selecting the higher ratio of 0.5 based on samples taken at this residence was faulty, indicating that the low level of lead in the targeted soil samples (1,200 ppm) might underestimate the lead level in fill material for some other yards where levels as high as 50,000 ppm lead were detected. The commenters have also suggested that "the indoor/outdoor (dust/soil) concentration ratio should be calculated based on comparisons to concentrations in the fill material".

U.S. EPA Response: U.S. EPA agrees that the average lead dust level for the two rooms should be 439 ug/g, and thanks the commenters for this correction. She value of 0.37 given for the average house dust/soil lead ratio was correct.

U.S. EPA thanks the commenters for their

additional observation. The use of data from a single set of samples taken at a single residence is not likely to provide values that are representative of the entire town area, and U.S. EPA did conduct additional sampling and expand the evaluation when the data became available. The initial sampling, however, did demonstrate that the cinder material is indeed mobile, and that the very low dust/soil lead ratios suggested as being appropriate for some other NPL sites were not appropriate for Beckemeyer. No indication of a lowered transport of soil to the indoor environment can be shown for Beckemeyer, no matter how the data is analyzed.

U.S. EPA would like to indicate that while the targeted soil sample taken from a bare area where a former driveway was located contains somewhat low levels of lead, no measurements which exceeded the 1,200 ppm level were obtained at this property in any sampling event. However it is appropriate to examine the lead levels in both house dust and outdoor soil at this location as the soil levels exceed U.S. EPA's level of concern. U.S. EPA believes that it is inappropriate to compare lead levels in the house dust at this location with higher soil lead levels in properties across town. No accompanying indoor dust lead data is available for those properties where the highest soil lead concentrations were found.

U.S. EPA has previously stated (Addendum 1, p. 7, para. 1) that it is most likely that in those residences where children are in regular contact with hot spot soils, these soils will be tracked into the home and will affect the indoor dust lead levels. Pets may also contribute to the movement of outdoor soil lead to the indoor environment.

2) 2.0 Assumptions Used in the Further Evaluation. The commenters suggest that the use of the term "tailings" is inappropriate to describe the contaminant material which consists of cinder waste, slag, and broken retorts from the zinc smelter.

U.S. EPA Response: U.S. EPA agrees that the term "cinders" used in the Engineering Evaluation and

Cost Analysis (EE/CA) report is more appropriate.

3) The commenters suggest that reduction of the exposure frequency based on the presence of only isolated areas of lead-containing fill materials improves the risk evaluation. They further suggest that assuming that 100% of the daily soil ingestion occurs in hot spot areas or that 100% of the yard consists of fill material is overly conservative and unrealistic, and that the assumption becomes more implausible when combined with other assumptions such as an indoor dust to soil lead concentration ratio of 1.0. The commenters further suggest that the assumption of 100% exposure to hot spots should be removed from Table 7 and the text.

U.S. EPA Response: U.S. EPA did not assume that 100% of the yard consists of fill material in their evaluations. U.S. EPA, however, does believe that in those residences where children are in regular contact with hot spot soils, those soils will constitute their primary outdoor soil lead exposure. In addition, those hot spot soils will be tracked into the home and will affect indoor dust levels. To reflect this relationship, we assume that the soil usually contacted by a child and the soil transported into the home will have similiar lead concentrations. U.S. EPA also consided that if every part of the child's residential yard was considered to be "safe", picnic areas, small pools and other play equipment might inadvertently be placed in a hot spot area. In such cases, the child's significant outdoor exposure would be to the hot spot area. For this child, the assumption of 100% exposure to the hot spot would be neither conservative nor unrealistic. For this reason, this exposure frequency is included in the assessment.

4) The commenters made a number of comments on the analysis of the indoor to outdoor soil lead analysis conducted by U.S. EPA.

(a) In para. 1, p.3, the commenters state "samples from bare areas were assumed to have smelter waste

whereas grassy areas were assumed to have background lead concentrations". The commenters then request that certain additional samples be eliminated from what they view as a calculation of the dust to soil lead concentration ratio for the Beckemeyer village site. However, the comment does raise the question as to whether the exposure to the non-targeted grassy areas should even be considered in the calculation of the Indoor to Outdoor Soil Lead Concentration ratio.

(b) In para. 2, p. 3, the commenters critize the removal of two samples (RH5 and RH9), which the laboratory advised EPA did not contain any dust, from the analysis. The analysis of these samples was performed on unsieved debris, which may have had some weight, but did not have any material which passed through a 100 mesh sieve.

(c) The commenters state that U.S. EPA assumed that play areas would be located on areas with fill material, that the Environmental Sampling Project Report (E&E,1995) does not indicate that play areas are located on such areas, and that the play area used in a 3:1:1 analysis sould be considered as background area as there was no evidence that the play area contains waste material.

(d) The commenters lastly recalculated the dust to soil lead concentration ratios and recommended that this new set of ratios be used as the basis for the development of a cleanup goal.

U.S. EPA Response: U.S. EPA believes that the commenters somehow missed the point of the limited analysis on the relationship between indoor dust and outdoor soil lead concentrations presented in this section of the Addundum. The intent of this analysis was clearly stated on page 7, para. 4: "EPA was aware that it is likely that this sampling event did not result in the collection of samples of the most lead contaminated soil or the least contaminated soil in each yard. We additionally recognized that such a small number of samples were inadequate to completely characterize the lead movement from outdoor sources to indoor dust. However, this analysis did demonstrate that the lead soil dust in the outdoor environment is highly mobile, and that indoor concentrations

could reflect outdoor lead levels, especially if outdoor play is concentrated in small areas of the yard."

An additional sampling round was prompted by the comments of August 4, 1994 from Kleinfelder: "The indoor dust concentration of lead at Sandy, Utah....was estimated by the EPA to be 15 percent of outdoor soil based on sampling data." .....Therefore, "For the residential areas of Beckemeyer, the indoor dust concentration was conservatively assumed (by Kleinfelder) to be 10 percent of the outdoor concentration in alleys and walkways". The commenters review of 10-12-95 suggest that "Given the levels of lead in house dust measured in the high levels in the fill material (sic), the ratio of lead in fill material to house dust is likely to be far lower than 0.5." U.S. EPA's resampling and further analysis of the available site-specific data give no indication of a lowered transport of soil to the indoors in Beckemeyer.

(a) Actually, U.S. EPA did not strictly describe the grassy areas as background areas and the bare areas as contaminated with smelter wastes, as suggested by the commenters. As described in the Addendem, para. 2, p. 7, "EPA examined the lead levels in the soil and in the grassy, play and bare areas....in the September sampling. These samples reflected the lead concentration in both targeted and nontargeted areas of the yard." U.S. EPA attempted to examine the effect of exposure to both the bare (more easily mobile) soils and the grassed areas (where the soil may presently be less mobile) in the calculation of the dust lead/soil lead concentration ratio, for the purpose of estimating the impact to hot spots, even though the data from the site was limited. The analysis suggests that the ratio is very variable, and probably most reflects differences in yard use as

well as lead concentrations in the yards. As the commenters have pointed-out, the data is too weak to support a dust lead/soil lead transfer ratio.

The additional suggestion that some of the samples should be removed is academic; the ratios calculated in this part of the analysis were not used in the derivation of the lead soil cleanup levels (refer to Table 7 in the Addendum). The values in Table 7 were chosen to reflect a range of uncertainty around the EPA default value of 0.7, given the variability seen in the above described evaluation. The analysis illustrates U.S. EPA's position (p. 7, para. 1) that "the ratio between dust lead concentrations and soil levels will be quite variable among houses, reflecting the different patterns of yard use and play activities of the residents". U. S. EPA further explained (p. 8, para. 2) that this consideration was included in their analysis by "including a sensitivity analysis to reflect the sensitivity of the calculated target soil lead cleanup concentration to the dust to soil ratio".

(b) A closer look at the "dust loading" ratio reported by *ecology & environment, inc.* in their Environmental Sampling Project Report of September 12, 1995, shows that the dust loading values reported in the Table are based on the Total Mass of the housedust sample, not on the "dust fraction". If the dust loading values had been calculated based on the sievable fraction, the lead loadings for RH5 and RH9 would have been nearly zero, as the samples did not contain a sievable fraction. Animal hairs and carpet fibers from the new carpet reportedly comprised the entire sample. All other reported lead dust sample concentrations are based on the sieved portion.

U.S. EPA does agree that housecleaning may not greatly affect the dust lead

concentration. We have also observed that lead in house dust is redeposited in a ratio which reflects the relative concentrations in the sourcees of the house dust; thus, the lead concentration in dust remains relatively constant as long as the sources remain constant.

(c) U.S. EPA did not assume that play areas would be located on areas with fill material. U.S. EPA did assume that a child's play areas could be concentrated in any part of the yard, and that some yards may lend themselves to particular patterns of play for a small child. The Environmental Sampling Project Report does indicate, in fact, that one of the two play areas tested (RH10, RH10A) contains some of the highest lead soil concentrations detected in this sampling event. As more families move into the village of Beckemeyer, it can be expected that some play areas will be located in yard locations which contain even higher lead soil concentrations.

Regarding the statement that the play areas should be considered as background areas along with the grassy areas in sample RH7, U.S. EPA reminds the commenters that the play areas represents a targeted area where child exposure is certain as compared to the non-targeted area where an average exposure must be assumed. The inclusion of the play area in the analysis of this sample resulted in the assumpton of some targeted exposure to the bare area and to the play area, with the balance of the exposure resulting from the grassy areas.

(d)The recalculated dust to soil lead concentration ratios proposed by the commenters as changes to Table 6 are at least as subjective as the U.S. EPA calculated ratios. Both sets of calculations support the conclusion of U.S. EPA: "we assume that the soil usually contacted by a child and the

soil transported into the home will have similiar lead concentrations" and that "the ratio between dust lead concentrations and soil levels will be quite variable among houses, reflecting the different patterns of yard use and play activities of the residents". Also, U.S. EPA "additionally recognized that such a small number of samples were inadequate to completely characterize the movement from outdoor sources to indoor dust" at this site."

The reviewers comments appear to be in agreement with the final approach used by U.S. EPA and reflected in the analysis shown in Table 7. This analysis did not utilize a single dust to soil lead concentration ratio, but included a range of ratios, all of which might be reasonable and appropriate under some yard use and play conditions.

5) The commenters critized certain GSD values used by U.S. EPA in the analysis shown in Table 7 of the Addendum. The commenters state that "specifically, in Table 7, target cleanup levels for less frequent exposure are lower and more conservative than for more frequent exposure to fill material. These results imply that children who are exposed to hot spots only a portion of the time need more protection than children exposed all the time to the hot spot areas."

U.S. EPA Response: U.S. EPA acknowledges that the Beckemeyer site presents a difficult analytical problem because of the complication of scattered hot spots in the residential yards. The use of the Model in the standard form would be the only way to assure that those children whose swing sets might be located on the hot spot would be protected. It would have been reasonable for U.S. EPA to apply the IEUBK Model in this manner, using the GSD value of 1.6 in this analysis as there is no real case for adjusting the GSD value down from the default value, and the presence of the hot spots presents an additional source of variability not expressed in the default value of 1.6. It should be

remembered that the GSD value of 1.6 was derived for use in a scenario where the child (group of children similiarly exposed) is assumed to have 100% of his exposure to soil containing approximately 500 ppm of lead and not much individual variability in exposure. Alternately, this scenario would be applicable to a child/all children at a single residence whose play set was located in an area where the soil lead concentration was 500 ppm or greater.

However, U.S. EPA tried to think of ways to deal responsibly with the hot spots, and to allow for the inclusion of some children who might have lesser exposures in the analysis. In order to include such a sensitivity analysis into the methodology, U.S. EPA used values for the GSD below the default value of 1.6 for children who might derive most of their exposure from hot spots, as well as, higher GSD values to account for the added source of variability in assessing lesser exposure to the hot spots.

It appears that the data presented in Table 7 correctly reflects the requirement for a lower lead soil cleanup value as the projected frequency of exposure to hot spot areas increases. For example, in the column which reflects a "Dust Lead Concentration/Soil Lead Concentration Ratio" of 0.7 (the IEUBK Model default value), the "Target Soil Lead Cleanup Concentration (ug/g)" using the default Model GSD of 1.60, decreases from 540 at a hot spot exposure frequency of 50% to 415 at a hot spot exposure frequency of 75% to 350 at a hot spot exposure frequency of 100%. (The latter value reflects the stardard use of the IEUBK Model). Within any assumed exposure frequency scenario, the target soil lead cleanup concentrations decrease as the GSD increases; for example, at an assumed exposure frequency of 75% and the default dust lead/soil lead ratio of 0.7, the target concentrations (ug/g) decrease from 600 using a GSD of 1.40 to

415 with a GSD at 1.60 and 290 with a GSD of 1.80. Thus, the results do not imply that the children who are exposed to hot spots only a portion of the time need more protection than children exposed all the time to the hot spots.

The commenters also refer to lower GSD values calculated by another Region for two of their sites, based on site-specific data for those sites. There is no reason to believe that those GSD values are applicable to Beckemeyer, or even that the calculations of those GSD values is acceptable.

6) The commenters indicate that the Addendum did not provide a reference for the statement "EPA was aware that ingestion of home-grown vegetables can be one of the most significant exposure pathways for lead for the child". The commenters then cite numerous studies to support the arguement that consumption of locally grown vegetables does not affect blood lead levels of children, as well as one study which indicates no positive correlation between lead concentrations in various leafy vegetables and corresponding levels in garden soils. The conclusion of the reviewers is that actual data from sites does not indicate that target soil lead cleanup levels need to be reduced for families which consume home-grown vegetables grown in those soils.

U.S. EPA Response: No single reference was given to support U.S. EPA's concern over ingestion of home-grown vegetables as a potential significant source of lead exposure to the child. That is because the sources are many. The U.S. EPA Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children, section 2.3.2.2. contains a discussion of other important dietary lead sources, such as home-grown produce grown in soils with high lead concentrations and edible leafy portions of vegetables contaminated by airborne lead particles, which may become important sources of exposure to the child. The Agency for Toxic Substances and Disease Registery Toxicological Profile for Lead, 1992, section 5 "Potential for Human Exposure", indicates that "some of the more important lead exposures occur as a result of.....consumption of produce

from family gardens..."

U.S. EPA reviewed the data on ingestion of home-grown vegetables from several Superfund sites, including data from the Sharon Steel/Midvale and the Jasper County, Missouri sites. U.S. EPA does not agree with the conclusions the commenters have drawn from the Midvale report, nor do the Midvale reports themselves (Bornschein et al., Appendix A, May 1990; Final Report, July 1990) support these conclusions. The calculation of the health-based soil action levels for residential soils for the Midvale site included an assumed input to the dietary intake for home grown vegetables of 0.70 ug lead/g wet weight for 14.2% of the total daily vegetable consumption by children. The failure to find the required number of children with elevated blood lead levels does not prove that consumption of home-grown vegetables has no effect on the blood lead levels of children. The evaluation included a number of assumptions, including the high ingestion rate, which may not reflect the true ingestion exposure of the children. In section 11.9 of the final report of the Midvale site (Bornschein, July 1990), the authors state: " Crops grown in gardens with (lead) contaminated soil can themselves become contaminated either via lead contaminants adhering to the outer surface of crops or via uptake of lead into the plant. .... Data analyses were undertaken to determine if the presence of vegetable or flower gardens or the ingestion of root crops from the gardens were associated with elevated blood lead levels.....None of the blood lead differences (observed in children whose families had vegetable gardens, whose parents had flower gardens or whose parents reporting eating root crops from the garden versus those who did not) were statistically significant". It should be noted that the "average level of lead in soil in these gardens was 295 ppm", a level below U.S. EPA's level of

concern. No verification of the quantities of home-grown vegetables eaten by the children was provided. Similiarly, much uncertainty surrounds the evaluation of the exposure of children to lead-contaminated home-vegetables at many Superfund sites.

The commenters further appear to suggest that there is no positive correlation between lead concentrations in home-grown vegetables and lead contamination levels in garden soils, based on the analysis of four vegetables at the Tacoma, Washington site. Given the large amount of data collected by the National Food Processors Associations, the U.S. Department of Agriculture, and others regarding the concentration of lead in purchased fruits and vegetables, U.S. EPA strongly disagrees with the comment. Dietary lead intake from ingestion of purchased food products is believed to have decreased significantly (U.S. FDA Market Basket studies, ongoing) and to be relatively constant since 1990, especially in children under the age of seven; no similiar decrease in lead intake from the ingestion of home-grown vegetables and fruits grown in lead contaminated garden soils has been demonstrated.

U.S. EPA believes that ingestion of home grown vegetables provides an additional source of lead exposure to children at all sites where garden lead soil levels are elevated; however, the methodology for assessing the effect of this exposure does not appear to be straight-forward. In addition, the kitchen preparation method may greatly impact the lead intake from ingestion of lead-contaminated home-grown vegetables.

U.S. EPA agrees that a more indepth evaluation of all available data needs to be undertaken, and the methodology for incorporating this pathway into the exposure needs to be more rigorously defined. Therefore, in this risk evaluation, U.S. EPA has **not** included

the ingestion of home-grown vegetables pathway in the calculation of the Target Soil Lead Cleanup Concentrations for the Beckemeyer residential area, as was done at some other Superfund sites, including the Midvale site. The inclusion of the additional potential exposure from ingestion of home-grown vegetables remains a to-be-considered when determining a final soil cleanup level for Beckemeyer.

7) The commenters cite a number of animal studies which present a range of values for the absolute bioavailability of ingested lead from soil and dust. Having presented this range of values, the commenters further suggest that U.S. EPA should consider including in their assessment a value for absolute bioavailibility from another Superfund smelter site, which reflects the lower range of bioavailability values seen in the cited animal studies.

U.S. EPA Response: U.S. EPA finds the suggestion that only a lower bioavailability for cinder-derived material in the residential areas of Beckemeyer be considered in the risk assessment rather unbalanced, given that the commenters have cited a wide range of values for bioavailability (from below 10% in rabbit and rat studies to 44.7% in swine studies). U.S. EPA would certainly argue that the anatomical and physiological determinants of GI absorption point to the use of immature swine as a more appropriate and useful model to assess lead absorption in children, and thus the higher bioavailability of 44.7% is a more appropriate value to use in the sensitivity analysis. U.S. EPA notes that the commenters do not recommend inclusion of this value in their sensitivity analysis.

U.S. EPA further notes that the commenters have suggested that the value from another Superfund site (Bartlesville) as being more appropriate than the default bioavailability value of 30% used in the analysis. This value is suggested to be more appropriate, even when no similiarity between the

material at the two sites has been demonstrated.

U.S. EPA's understanding of lead bioavailability has developed from EPA's long-standing and continuing interest in studies of bioavailability in both humans and animals. Careful consideration went into the selection of the IEUBK Model default value of 30% for the ingestion of soils and dusts. Selection of a site-specific bioavailability other than the default value is not a trivial thing, and should not be based on "gut-feelings". U.S. EPA rejects the suggestion that the bioavailability should be altered in this evaluation.

8) 5.0 Use of the EPA Lead Model Version 0.99d. The commenters contend that the IEUBK Model was not fully validated against actual blood lead data prior to its release and has yet to be fully validated. They further discuss a number of Superfund sites where blood lead levels predicted using the IEUBK Model did not agree with measured blood lead levels. The commenters acknowledge that the EPA Lead Model is the only regulatory tool available for calculating soil cleanup levels, other than conducting a site-specific blood lead/environmental lead study.

U.S. EPA Response: U.S. EPA does not understand the commenters statements that version 0.99d of the IEUBK Model has not been validated prior to its release and that it has not been fully validated. Version 0.99d represents the latest enhancement to a long-developing methodology to assess lead in children. The latest version has not only undergone a more extensive verification and review, including some outside review, than any other earlier version of the Model, but also it is a more physiologically plausible model as it provides for integration of the exposure from all lead sources. The Model has been extensively validated at all developmental steps, is undergoing additional validation at present and will continue to be validated with new data sets as they become available.

Validation is not an endpoint, but an on-going process. The IEUBK Model, version 0.99d, may well be one of the most validated and best prediction models currently available in the field for risk assessment.

It may be that the IEUBK Model predictions do not meet the anticipations of the reviewers, as they seem to focus on the ability of the Model to predict an identical mean and distribution of children's blood lead levels in a community at any given point in time. This expectation is usually translated as a requirement to provide a point-to-point match for each blood lead level measured in the community. While the overall match is extremely good for the IEUBK Model predictions, the expectation that a blood lead level measured in a child (given all the factors which affect that measurement) and the blood lead level predicted by the Model (which is also influenced by inputs which contain uncertainty) is unrealistic. In addition, the blood lead level reflects the child's exposure at a point in time, while the Model predicts the potential blood lead level in the child if the child behaves in a probable, but likely, manner. The two scenarios may not match at any chosen point in time.

Regarding the references to several Region VIII sites where the use of the IEUBK Model apparently "overpredicts" blood lead levels, U.S. EPA wishs to make it clear that no outside review has been conducted of the methodology used in either the collection of the data for these blood lead studies or the application of the IEUBK Model at these sites. In any case, the use of the IEUBK Model at the Circle Smelting site in Beckemeyer, Illinois is <u>not</u> dependent on whether the IEUBK Model was used correctly or makes "accurate" predictions at other Superfund sites.

U.S. EPA agrees that the IEUBK Model is

an appropriate regulatory tool for use at the Beckemeyer site, and emphasizes that it is particularly appropriate for use at this site due to the inability of conducting a blood lead study which would reflect the lead exposure to successive populations in this changing community. U.S. EPA also wishes to point-out that blood lead/environmental lead studes do not provide a calculation of soil lead cleanup levels.

9) The commenters offer a revised Table 7: Target Soil Lead Cleanup Concentrations. The recommendations made in this table result in a target soil lead cleanup concentration of 1430 ppm.

U.S. EPA Response: U.S. EPA rejects the version of Table 7 provided in this section of the comment package for all the reasons stated in the aguments above. The elimination of the higher "Dust Lead Concentration/Soil Lead Concentration" ratios (which includes the IEUBK Model default value of 0.7), elimination of the higher "Frequency of Exposure to Hot Spots" scenario of 1.00 (which reflects the standard form of use of the IEUBK Model and is appropriate in those yards which are situated in such a manner that play areas may be located over hot spots), and the inclusion of a totally unjustified lower value for the "Soil/Dust Absorption" (Bioavailability) results in an array which is neither appropriate to the Beckemeyer village site nor reflects a responsible approach to the development of a soil lead cleanup level for the site.

U.S. EPA believes that this further review and set of comments reaffirms EPA's belief that the value of 500 ppm chosen as the soil lead remediation goal fo the areas with elevated soil lead levels (hot spot) in the residential areas of the Circle Smelting site, Beckemeyer, Illinois, is justifiable and appropriate.

COMMENTS ON RISK EVALUATION ADDENDUM 2 (INDUSTRIAL SOILS)

1) The commenters have suggested that the GSD of 1.9 used in this Addendum to calculate a target cleanup level for the sensitive subpoulation of women of child-bearing age at the Beckemeyer site is overly conservative, due to the homogeneity of the population. The commenters then discuss a number of other Superfund sites at which a lower GSD was either measured or derived. The commenters recommend that a GSD value of 1.4 to 1.6 would be a more likely and conservative value.

U.S. EPA Response: In the approach for assessing adult occupational exposure to lead at the Circle Smelting site, U.S. EPA used a value of 1.9, which is considerably lower than the range of values (2.1-2.6) estimated from the NHANES III survey data. This value was based on U.S. EPA's agreement that the values from the NHANES III survey may be overly-conservative for a rural site such as the Beckemeyer site. Given the lack of site-specific data for the site, the value initially calculated for use with the California Gulch methodology was adopted for use at this site.

The U.S. EPA Adult Lead Workgroup has recently conducted a review of the data used in the California Gulch assessment for the purpose of suggesting input parameter values which may be used when site-specific data is not available. The Workgroup consensus has been to adopt the value of 1.8 used in the final California Gulch asessment as the default value. The rationale behind the adoption of this value follows.

The GSD_i is considered to be a measure of the inter-individual variability in PbB in a population whose members are exposed to the same environmental lead levels. Ideally, the value(s) for GSD_i used in the methodology should be estimated in the population of concern at the site. This requires data on PbB and exposure in a representative sample of sufficient size to yield

statistically meaningful estimates of GSD in subsamples stratified by exposure level. In the absence of high quality data for the site, the GSD_i may be extrapolated from estimates for other surrogate populations. In making such extrapolations, factors that might contribute to higher or lower variability in the surrogate population than among similarly exposed individuals in the population of concern should be evaluated. These factors include variability in exposure (level and pathways), socioeconomic and ethnic characteristics, degree of urbanization and geographical location. Such extrapolations, therefore, are site specific.

In cases where site-specific extrapolations from surrogate populations are not feasible, the values of 1.8 and 2.1 μg/dl represent plausible values for the GSD_i that would be expected to be applicable for most sites. The high end value is extrapolated from the U.S. population GSD for adult women obtained from phase 1 of NHANES III which has been estimated to be within the range 2.1-2.6 μg/dl (TRW, 1995). The low end generic GSD_i value can be extrapolated from PbB data collected at NPL sites, providing that the data are of adequate quality and can be stratified by exposure level. At the present time, the Workgroup recommends 1.8 μg/dl be used as a default value for the low end of a plausible range which might be applicable for use at Superfund sites. This value is based on an evaluation of data from Leadville, CO (TRW, 1995). U.S. EPA believes that it might be difficult to show empirically that a value other than 1.8 is more appropriate for the Beckemeyer site. U.S. EPA would therefore consider revising their assessment to include the lower value of 1.8 for input in the calculation.

2) The commenters noted that the input value for PbB_{GM} should

be 3.87 not 3.28 as shown in the equation on page 19 of Addendum 2. The commenters have also suggested that the value of 10 ug/dL may be an overly- conservative goal for protection of the fetus of a pregnant worker. They suggest the use of a more abitrary goal of 1% of the workers not to exceed a blood lead level of 30 ug/dL, based on the OSHA standard.

U.S. EPA Response: The value of 3.28 was a typographical error in an earlier draft. U.S. EPA thought that this error had been corrected in the distributed document. A quick calculation will verify that the value used in the equation in this Addendum was 3.87.

In chosing 10 ug/dL as the blood lead target level for the fetus of a pregnant woman in the worker assessment, U.S. EPA considered consistency with existing guidance from both its own Agency and from CDC. They also considered the recommendation of 10 ug/dL by the Committee on Measuring Lead Exposure in Infants, Children and Other Sensitive Populations of the National Research Council in 1993, as cited in the Addendum, as a reasonable concentration of concern for the protection of the fetus. This Committee represents the views of a group comprised of physicians, academia, government and industry consultants. The recommendation should not be dismissed lightly in favor of an arbitrary cut-point on a standard from OSHA which is currently under review.

3) The commenters noted that the biokinetic slope factor (BKSF) of 0.4 ug/dL blood lead per ug/day lead uptake used in the adult assessment is higher than the value of 0.375 calculated by Bowers et al. They indicate that a lower value for the biokinetic slope factor should be used at the Beckemeyer site or a value for the oral absorption fraction should be lowered.

U.S. EPA Response: The Adult Lead Workgroup has reviewed the input value of 0.4 used in the California Gulch assessment. They have recommended that a method default value of 0.4 ug/dL blood lead per ug Pb

absorbed/day be retained for the BKSF parameter based on data reported by Pocock et al (1983) on the relationship between tap water levels and blood lead level in adult males, and on estimates of the bioavailability of dietary lead in adults.

Pocock et al. analyzed data on first draw water lead concentrations and blood lead level in a population of 941 adult males. A linear model imposed on the data yielded a slope of 0.06 (ug/dL per ug/L first draw water) for water lead concentrations equal to or less than 100 ug/L. Pocock et al. also obtained data on lead concentrations in flushed water (and "random daytime") samples, in addition to first draw samples. The following assumptions were applied to the Pocock data to estimate a BKSF:

The Pb concentration of flushed water was 25% of the concentration of first draw water. Daily water intake consisted of 30% first draw and 70% flushed water. A daily water ingestion rate of 1.4 L/day was used. Absorption of ingested tap water lead was 20%.

Based on the above assumptions, a BKSF of 0.4 ug/dL per ug/day is estimated. The above estimate of BKSF is based on the approach described by Bowers et al. (1994), who used different assumptions to estimate a BKSF of 0.375 ug/dl per ug/day from the same data set. Bowers et al. assumed a daily tap water intake of 2 L/day and 8% absorption of lead ingested in tap water, and did not make any adjustments for a mixture of first draw and flushed water in the Pocock study. In addition, the parameters used in the Bowers approach were estimated to one significant figure; thus the calculated value of 0.375 represents an estimated BKSF of 0.4 ug/dL per ug/day.

The Adult Lead Workgroup has also reviewed the data from several other investigators, including Sherlock, Rabinowitz and Chamberlain and from

simulations performed on biokinetic models of lead in adult humans from O'Flaherty (1993) and Leggett (1993). The model predictions of pool clearance using the two models is consistent with the experimental data of Rabinowitz et al. (1974,1976) and Chamberlain et al. (1978), and correspond to slope factors of 0.3 - 0.5 ug/dL per ug/day, using an oral absorption factor of 20%.

The conclusions are similiar to those drawn in the Technical Review Workgroup for Lead review report on the California Gulch risk assessment methodology, which provided the basis of the value in this assessment. U.S. EPA does not believe it is prudent to make further adjustments to the BKSF in this assessment.

4) The commenters indicate that they believe that the ingestion rate of 50 mg/day is a conservative estimate when used in the model for secretaries.

U.S. EPA Response: U.S. EPA agrees that there is a clear distinction between activity patterns that contribute to the soil (and soil-derived dust) ingestion for indoor vs outdoor workers. The value of 50 mg/day, used by U.S. EPA in this assessment, is reasonable and consistent with current guidance on exposure for workers who spend the majority of their 8-hour work day indoors (Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure, U.S. EPA 1993). The 50 mg/day Central Tendency value is recommended for non-contact indoor occupational exposure scenarios. Values such as 100 mg/day for non-contact intensive indoor activities and 480 mg/day for contact intensive activities may be appropriate for some site-specific exposures scenarios.

The guidance value of 50 mg/day appears to be the most appropriate imput value to consider for this exposure scenario, and U.S. EPA does not see any reason to

modify it for this assessment.

5) The commenters indicate they do not see an apparent reason for considering an equal concentration of lead in soil and dust, and suggest that the value should be lower.

U.S. EPA Response: The value of 1.0 used by U.S. EPA for this parameter was based on the rationale that the worker ingestion rates used by U.S. EPA do not distinguish between adult ingestion of soil and ingestion of dust, and no data is available to determine this proportion for most workplace scenarios.

The Adult Lead Workgroup has reviewed the equations used in the California Gulch assessment. A consensus was reached that a single parameter, IR_s, that represents the combined ingestion of soil from all sources, including soil in dust, is preferred. This approach is consistent with the approach used for the assessment of all other soil contaminants at Superfund sites. The recommendation to adopt a single parameter for IR eliminates the need for the "mass fraction of soil to dust" parameter, K_{sd}.

The value used in this assessment is consistent with the proposed elimination of the separate ingestion rates for soil and dust in the California Gulch equation.

6) The commenters have stated that a multiplier of 8/16 should be included in the exposure factor in addition to the exposure frequency of 250 days/year, to account for the ingestion exposure which actually takes place in the workplace.

U.S. EPA Response: The Superfund guidance documents on default exposure values for use in Superfund risk assessments indicate that the worker exposure values are appropriate for a 8-hour work day. The recommendation to reduce the workplace exposure (to a 4-hour exposure) is incorrect as the value is appropriate

for the time period being considered in this assessment. If a residential exposure were to be considered in addition to the worker exposure for the same individuals, it would be appropriate to reduce the residential exposure on those days when the workers was in the workplace.

7) The commenters have raised a number of questions regarding the oral absorption value of 12% (0.12) used by U.S. EPA in the adult assessment. They critized the use of the combined dietary absorption fraction of 10% in conjunction with an uncertainty factor of 2 and a relative absorption of 60% for lead absorbed from soil/dust compared to dietary sources, which results in the absolute oral absorption value of 12% for lead from soil and dust. They suggest that U.S. EPA use a value of 4.8%, derived by using a dietary absorption factor of 8% from Bowers et al. and a relative absorption from soil of 60%.

U.S. EPA Response: The value of 4.8% suggested by the commenters appears to be somewhat aribitrary. Regarding the reference to the 8% absorption value used by Bowers et al. (1994), Bowers used a value of 8% for the ingestion of lead from soil and dust (absolute absorption) in their calculations, as well as for the the dietary absorption value; this assumption is equivalent to an assumption of 100% for the relative absorption of lead in soil and dust compared with lead from dietary sources. This absolute absorption was used in conjunction with the BKSF of 0.375. U.S. EPA has already pointed-out that Bowers et al. used an upperbound water ingestion rate (2L/day) in the calculation of their BKSF instead of the mean water ingestion value of 1.4L/day, and additionally, that the derived value of 0.375 becomes 0.4, when corrected for significant digits. Thus, the Bowers et al. set of values for the BKSF and AF can be expected to bias the outcome to a higher lead in soil value.

The Adult Review Workgroup has recommended the use of a default value of 0.12, the value used by U.S. EPA in

this assessment, based on the assumption that the absorption factor for soluble lead (e.g. water soluble lead salts) is 0.20 (20%) and that the relative bioavailability of lead in soil is 0.6 (60%). The default value of 0.20 for the AF in adults represents a weight of evidence determination based on experimental estimates of the bioavailability of ingested lead in adult humans and consideration of two major sources of variability that are likely to be present in populations. The first variable is the effect of food ingestion on lead bioavailability; the second is the effect of lead intake on lead bioavailability. The Workgroup has not evaluated the effect of bioavailability during pregnancy, which is more difficult to measure given the complexity of lead kinetics during pregnancy (e.g., increased flux of bone lead to blood lead, the transfer of maternal lead stores to the developing fetus, etc.). However, researchers continue to report increases in blood lead levels during pregnancy in animal studies which is mainly due to increased absorption (or reduced elimination) of oral lead (O'Flaherty et al., 1996).

The bioavailibility of ingested soluble lead in adults has been found to vary from less than 10% when ingested with a meal to 60-80% when ingested after a fast (Blake, 1976; Blake et al., 1983; Blake and Mann, 1983; Graziano et al., 1995; Heard and Chamberlain, 1982; James et al., 1985; Rabinowitz et al., 1976, 1980). The general consensus is that constituents of food in the gastrointestinal tract decrease absorption of ingested lead, although the exact mechanisms by which this occur are not entirely understood. Lead intake in a population (including workers) would be expected to occur at various times with respect to meals. Therefore, the central tendency for lead absorption would be expected to reflect, in part, meal patterns within the population and to have a value between

the experimentially determined estimate of fasted and non-fasted individuals. No consideration of this uncertainty is reflected in the calculation proposed by the commenters.

The second reason for concern in adopting values for AF less than 0.2 comes from the uncertainty about the relationship between lead intake and lead absorption. Several studies have shown that the relationship between environmental lead levels (e.g., drinking water lead concentration) and blood lead is not linear and suggest the possibility that fractional absorption of ingested lead decreases as lead intake increases. Data from Pocock et al. (1983) and Sherlock et al. (1982, 1984) suggest that if water concentrations are less than 100 ug/L, the water lead/blood lead relationship is approximately linear (this represents a lead intake of approximately 70 ug/day using the assumptions in the derivization of the BKSF from the Pocock data). In the various expermental assessments of lead bioavailability cited in the previous paragraph, the ingested lead levels varied among the studies, but all were in the range of 100-300 ug. If the relationship between lead intake and lead absorption is non-linear, lower dosages might have yielded higher estimates of lead bioavailibility, For this reason, AF values less than 0.2 may not be adequately protective in exposure scenarios in which lead intakes are less than 100-300 ug/day. Again this uncertainty appears not to have been considered in the calculation proposed by the commenters.

A number of studies have assessed the relative bioavailibility of lead in soil. Weis et al. (1994) estimated a relative bioavailibility of lead in soil from Leadville, CO of 0.6 to 0.8 using immature swine; Ruby et al. (1996) reported a range of 0.09 to 0.4 for the relative bioavailability of lead from a

variety of soils from mining and smelter sites using Sprague-Dawley rats; Maddaloni et al. (1996) reported an average estimate of absolute lead absorption of 26% from an ongoing study in which 6 fasted humans were administered a single dose of lead-contaminated soil, which suggests a relative bioavailability of 0.5 for lead in soil.

Based on the evidence presented above, the Adult Lead Workgroup considered the default AF value of 0.12, dervived from the default value of 0.2 for the bioavailability of soluble lead coupled with the default value 0.6 for the relative bioavailability of lead in soil, to be a plausible point estimate for the absorbed fraction of ingested soil lead for use in adult assessments in which site-specific data on lead bioavailability are not available. U.S. EPA believes that the value of 0.12 used in this assessment is a reasonable and supportable value, and should not be replaced by the rather arbitraty value proposed by the commenters.

8) Effect on the Target Cleanup Level for Soil on the Plant Site. Using the proposed changes to the parameter values discussed above, the commenters have calculated a target soil concentration of 16,000 ppm.

U.S. EPA Response: For all the reasons presented in the arguements above, U.S. EPA rejects the changes proposed by the commenters to the input values used in the calculation of a Target Soil Lead Cleanup Concentration for the Circle Smelting site, Beckemeyer, IL. In the discussions presented above, U.S. EPA did acknowledge that it might appropriate to reduce the value for the GSD from 1.9 to the default of 1.8 suggested by the Adult Lead Workgroup. This change would increase the PbB_{GM}target value to 4.22 and increase the Risk-Based Soil Remediation Goal for lead to 1536 ppm for the onsite property.

ILLINOIS DEPARTMENT OF PUBLIC HEALTH COMMENTS

Although U.S. EPA was informed that this set of comments was not meant to constitute a response to the record by the IDPH on the revised Risk Evaluation for the Circle Smelting Corporation site, U.S. EPA believes that the thoughtful and extensive set of comments prepared by that agency warrant response.

1) The commenter stated that floor plans were not provided for every home. Screening lead paint was not completed in every home. Interior surface dust samples were not collected in the selected homes.

U.S. EPA Response: U.S. EPA personnel had problems trying to get access to the selected homes. Some homeowners denied the access to their properties and others allowed U.S. EPA crew to collect only soil samples.

2) The commenter asked about the selection of the soil action levels for the other media (i.e., paint, water, dust).

U.S. EPA Response: The action levels selected for this site are consistent with those found in Quality Assurance Project Plan for EPA Region V Support of the ATSDR Multistate Lead Exposure Study; 1991, and Urban Soil Lead Abatment Demostration Project: Vol. IV; Cincinnati Report.

3) The commenter stated that the following Sampling Protocols' statement: "Note the detection limits of one-tenth the action levels noted may not be achieved if the minimum sample amounts discussed in the Sampling Protocols section are not collected." is confusing.

U.S. EPA Response: The intent of the statement is to note that if the size, or amount, of sampled material delivered to the laboratory for analysis is not sufficient, the laboratory may not be able to achieve the required detection limits.

4) The commenter stated that sampling based on "visual indication" of "possible affected areas" is too subjective for most protocols.

U.S. EPA Response: Homes with bare areas in the front and back yards, homes with play areas (swing sets, toys) indicating the presence of children, areas with an excessive green

moss and homes near highly contaminated areas (according to the available data) were the indicators used to select the homes to be sampled. U.S. EPA did use sampling location maps to orientate about areas containing lead levels above the PRGs.

5) The commenter asked about the method used to recruit residents and to select homes.

U.S. EPA Response: U.S. EPA mailed to all residents a letter notifying them that U.S. EPA planed to conduct a sampling exercise in the Village and that some of them would be contacted and their participation requested. The letter also explained the procedures to be used. The Project Managers went to the Village and evaluated possible locations and potential homes to be sampled. The U.S. EPA crew consulted the sampling location maps and data collected during the time critical removal to help identify the areas to be sampled. After the areas and homes were selected, the U.S. EPA Project Manager (PM) , the U.S. EPA Community Involvement Coordinator (CIC) and the U.S. EPA TAT went back to the Village to obtain access agreements from homeowners. During these interviews, the U.S. EPA PM explained to the residents the reason for the exercise and that the results will be mailed to them. Also, all participants were provided with instructions about the procedures to be used during the sampling. The crew obtained agreements at approximately 20 homes. In July 1995, the U.S. EPA Project Manager and the U.S. EPA TAT team initiated the sampling exercise; however, some of the residents, who had previously agreed to sampling of their property, denied access at that time.

6) The commenter stated that PGT instruments were not used in the sampling event.

U.S. EPA Response: At the time that the sampling was to take place neither the XRF Princeton Gamma-Tech XK-2 or XK-3 were available for use. However, an XRF Spectrace 9000 was used. This instrument is used by U.S. EPA and is considered acceptable for field work. U.S. EPA had approved the Standard Operation Procedure (SOP) for this device; please refer to SOP "Spectrace 9000 Field Portable XRF Operating Procedure". All calibrations required were conducted by a certified TAT person. Please refer to Appendix A of the EE/CA addendum.

7) The commenter stated that there are not any decontamination procedures in the sampling protocols.

U.S. EPA Response: The U.S. EPA TAT crew decontaminated the equipment every time a sample was collected. There was no risk of cross contamination associated with unclean equipment. The equipment was washed with deionized water every time the collection of a composite sample was finished. The last sentence of section 2 "Sample collection" on page 3 of the Sampling Protocols should read as follow: --Clean the corer after collecting each composite sample and prior to reinsertion of the corer into the soil of the next sampling area.--

8) The commenter stated that it is not appropriate to use compressed air to clean filters.

U.S. EPA Response: U.S. EPA did not use the personal air monitoring pump. U.S. EPA used the "dustbuster" and replaced the filter after collection of each in-house dust sample.

9) The commenter asked why housedust samples from floor and

window areas was mixed when the standards for housedust are delineated by floor, window sill and window troughs?

U.S. EPA Response: The commeter is mistaken in his belief that U.S. EPA has standardized the collection methods for environmental sampling of residences for lead risk assessment at CERCLA sites. The commenter is referring to the HUD methodology for evaluating lead contamination from paint as the primary source at non-NPL sites. Data collection from CERCLA sites is not presently standardized, however, U.S. EPA is currently preparing a Sampling Guidance manual for use in the evaluation of lead exposure at CERCLA sites. We agree that the collection and separate analysis of component housedust samples is preferred, as it provides additional data for source evaluation. However, the omission does not present a problem at this site because the major source of lead contamination in the community is comtaminated fill material, not leaded paint.

10) The commenter stated that dust samples collected at the Beckemeyer Elementary School cannot be use for this exercise since them were not collected according to the sampling protocol.

U.S. EPA Response: The dust samples collected in the Beckemeyer Elementary School were not used in this addendum, as the primary purpose of this sampling event was to collect data for evaluation of residential exposure. The school dust samples were collected from areas where the dust generally collects over long periods of time (e.g., the top of book shelves) and thus might be useful in determining historical exposure.

11) The commenter stated that the three foot sampling selection

for lead-based paint sampling is not valid, because the lead regulations throughout the nation have removed any height limitation since housedust can be affected by lead chips and dust falling from building components located above an area of concern.

U.S. EPA Response: Again, the commenter is referring to the HUD protocols for assessing lead exposure from lead-based paint at non-NPL sites. The collection procedures for sampling at CERCLA sites has not been standardized, and many different sampling protocols are currently being used.

12) The commenter stated that the number of houses tested for lead-based paint are not acceptable for assessing lead hazard risk.

U.S. EPA Response: The purpose of the sampling exercise was not to assess lead-based paint hazard risks at Beckemeyer. The purpose for taking the lead-based paint samples was toobtain site-specific data which could be used to further characterize any additional sources of lead exposure in the homes sampled. Lead-based paint was found to be an insignifficant source of indoor dust lead in these homes.

13) The commenter stated that the number of readings taken in the homes did not correspond to the number required in the sampling protocols.

U.S. EPA Response: U.S. EPA took three readings from the same location for each sampling location. Results in the analytical report reflect the arithmetic mean of those reading. U.S. EPA collected at least fifteen readings at each home, whenever it was possible.

14) The commenter stated that there is no description of the painted surfaces used as sampling locations.

U.S. EPA Response: Section 2.3 Sampling Location Descriptions provides the information about the XRF locations. With respect to the description of the conditions of the painted surfaces, U.S. EPA has described the paint surface conditions as intact, based on the visual inspection conducted

by the U.S. EPA Project Manager during the sampling event.

15) The commenter asked if one foot per story is an appropriate criteria for taking soil samples?

U.S. EPA Response: The protocols used in this sampling event were adopted from protocols used at other CERCLA sites. U.S. EPA has not currently developed a standardized methodology for collecting environmental samples at CERCLA sites; however, the critreia used in this sampling are <u>not</u> illogical or unacceptable.

16) The commenter asked for clarification with respect to the approach adopted in this site in terms of risk evaluation.

U.S. EPA Response: Circle Smelting Corporation site is considered by U.S. EPA as a SACM site. This means that the site falls under the removal authority. According to the definition of removal, this site is considered a non-time critical removal. Because this site a non-time critical removal, a full baseline risk assessment is not required. A risk evaluation is the more appropriate , and less time-consuming, way to determine the risk associated with the site. The guidance for conducting a non-time critical removal, provides procedures to be followed during the risk evaluation. The risk evaluation uses the more limited data collected during the preliminary site inspections, time critical removal and site assessment to define conditions of the site and to determine if it poses a threat to human health and the environment. In contrast to the traditional baseline risk assessment which may be required for more complex sites with multiple contaminants and multiple pathways of exposure, the risk evaluation does not require an extensive data collection and anaylsis to determine if there is a risk associated with contamination at the site. Please refer to the non-time critical removal action guidance for

more information.

17) The commenter stated that U.S. EPA did not consult with the Agency of Toxic Substances and Disease Registry (ATSDR) during the development of this risk evaluation addendum.

U.S. EPA Response: It is customary for ATSDR to prepare a health advisory for U.S. EPA for removal and SACM sites. However, ATSDR does not usually participate in the preparation of the final risk evaluations or risk assessments for NPL sites, nor do they participate in the risk management decisions at the sites. U.S. EPA does count on ATSDR for supporting documentation in the form of toxicological reports, study reports, and other information, and used the resources provided by ATSDR in their evaluation. Please refer to Administrative Record Update # 4 for references.

18) The commenter stated the human health risks are not described quantitatively, so the term "risk evaluation" is more applicable than "risk assessment".

U.S. EPA Response: U.S. EPA has labeled the entire exercise performed in the addendum a "risk evaluation", but has used the terms interchangeably, lacking a clear distinction between terms. The "risk evaluation" does contain quantitative information and is based on the use of the IEUBK Model. The IEUBK Model for Lead in Children is perhaps the most quantitative and least subjective approach available for assessing the adverse health effects of lead exposure in children as it is coupled to blood lead level, which is a well-documented biological index of health effects. This methodology was used to evaluate the potential for adverse health effects from lead exposure to children in Beckemeyer, Ilinois. The assessment performed in the addendum also included an extensive analysis of uncertainty.

19) The commenter asked if the rational used to develop the industrial clean-up number is different from the rational

used to develop the residential clean-up number.

U.S. EPA Response: Different models were used in the derivation of the two clean-up numbers. The recommended residential clean-up number was determined based on the results provided by the IUEBK model. The IUEBK model is a computer program capable of predicting exposure levels for lead to children based on site-specific data. The model uses data from soil, dust, air, water and diet as inputs. There are assumptions associated with the site that should be considered during the use of the model. The IEUBK Model only contains data for children under the age of seven; therefore this model cannot be used to assess risk or develop clean-up numbers for an adult population. The recommended industrial clean-up number was determined based on a different scenario, a pregnant woman working at the site. The model used to predict the industrial clean-up number was based on the Bower's Model. U.S. EPA did use two different models to develop those clean-up number, so different rational was used in each one. Please refer to the IUEBK model guidance and the Baseline Human Health Risk Assessment for the California Gulch Superfund Site for more information.

20) The commenter asked the reason why U.S. EPA prepared the risk evaluation addendum and not the U.S. EPA contractor.

U.S. EPA Response: The previous risk evaluation addendum performed by the contracter was incomplete. U.S. EPA decided to rework the risk evaluation using in-house resources to ensure that the risk evaluation addendum addresses all the deficiencies of the previous risk evaluation. The U.S. EPA staff who developed the addendum is very familiar with the IUEBK Model and the history of the site. U.S. EPA Region V used the updated IUEBK model version 0.99d, which is specified in the OSWER Directive of July 14, 1994, in this evaluation.

21) The commenter stated that it is illogical to address community areas which have been filled with smelter waste material since these areas will continued be contaminated with metal-laden emissions and residues from vehicles.

U.S. EPA Response: In this action. U.S. EPA intends to address only the lead contamination associated with the smelter facility. U.S. EPA believes that the smelter waste is the primary source of lead contamination in the community, and by addressing this source, the health risks from lead exposure for the population of Beckemeyer will be significant reduced. U.S. EPA has long ago addressed the release of lead emissions from vehicles, and leaded-gas is no longer a source of significant lead contamination in the environment. While, U.S. EPA is aware of the possibility of secondary heavy metal contamination from a number of diffuse sources in an urban environment, the contribution from the sources cited are not likely to be significant when compared with the exposure to contaminated fill materials. U.S. EPA will continue to work with State and local agencies to provide information on reduction of lead exposure from other, non-NPL sources.

22) The commenter stated that testing of exterior paint is an appropriate practice if soil/backfill samples are collected near a home's foundation.

U.S. EPA Response: U.S. EPA did test exterior paint in the residences.

23) The commenter stated that the Published IEPA data (August 1994) provides an accurate background information with respect to the lead in the soil, which ranges from 4.7 to 647 ppm.

U.S. EPA Response: U.S. EPA thanks the commenter for the information on the publication of the Illinois background data. The value of 346 ppm lead in soil referred to in the report was used for comparison with background only in 1993, when the residential properties were initially

sampled. U.S. EPA used a background lead level of 160 ug/g soil in the development of the risk evaluation. This value was the arithmetic mean of ten samples which were equal or less than the Illinois value of 346 ppm. If the range of values in the IEPA data set is 4.7 to 647 ppm, the inclusion of some higher concentration values might be appropriate in the calculation of the Beckemeyer background lead level. U.S. EPA is not certain if this is the suggestion of the commenter. Raising the Beckemeyer background level would lower the Target Soil Lead Cleanup values for some scenarios. It should be noted that most of the soil samples collected during the development of this EE/CA have a lead concentration above 650 ppm, which exceeds the published upper range of IEPA background concentrations for lead. Please refer to the analytical data.

24) The commenter asked if default values for housedust were used in the risk evaluation presented in the EE/CA.

U.S. EPA Response: In the EE/CA risk evaluation performed by CH2M Hill, the IUEBK model inputs for house dust were incorrect. The assumption of a background lead level for soil-derived house dust is not appropriate. The addendum corrects this situation by using site-specific data.

25) The commenter stated that the residence used in the Initial Evaluation section does not have a young child residing there or visiting regularly and even though the housedust is contaminated with lead, this is not a health concern for the two senior citizens who live there.

U.S. EPA Response: U.S. EPA's goal is to protect all generations of children, including those currently living in Beckemeyer and those who will live in Beckemeyer. The use of children as the population with the greatest sensitivity to lead exposure is reasonable and appropriate in the risk evaluation. Therefore, at the Circle Smelting Corporation site, U.S. EPA

conducted its risk evaluation based on young children who are more likely to have greater exposure to soil contamination and exhibit adverse health effects from this exposure. The fact that the house in question is presently only inhabited by senior citizens does not eliminate the possibility that a young child may reside in that house in the near future. There is a potential health risk for that child. The approach used in this assessment is consistent with the U.S. EPA approach at all NPL sites to evaluate the potential health impact of contaminant exposures on children.

Even though the current population in Beckemeyer is best described as an aging population at present, families with young children are beginning to move into the community. IDPH, themselves, in a letter dated October 1994 (Appendix C of the Addendum) to the residents of this particular residence stated that the concentration of lead in the housedust are not appropriate for children.

26) The commenter stated that there are so many violations of the sampling protocols that the value of the risk evaluation performed to determine the risk associated with the site or the clean-up level of 500 ppm for residential areas is questionable.

U.S. EPA Response: U.S. EPA does not believe that there are violations to the sampling protocols which made the data unusable for the type of risk evaluation performed. While a complete site assessment is always preferable, such a data collection was never planned for the Beckemeyer site. Although U.S. EPA was unable to sample all 20 houses as planned, the data collected and subsequent analysis of that data did allow U.S. EPA staff to have a better understanding of the nature and movement of the lead contaminantion at the site and to use real data in developing site-specific assumptions for the site. It also allowed a better evaluation of the

uncertainites of the exposure to isolated areas of contamination, so that the IUEBK Model could be used to develop predictions using a range of exposure scenarios for children.

27) The commenter asked for the analytical results of a sampling event conducted in October 1993.

U.S. EPA Response: The analytical results for the sampling event conducted on October 1993 are available in the Administrative Record. Those results were not available at the time the first EE/CA draft was presented. Since those results were not available, U.S. EPA did not consider them in the development of the EE/CA. U.S. EPA did not use that data in developing the risk evaluation addendum. The data is considered by U.S. EPA as site-specific background data.

28) The commenter expressed a concern that it is likely that the available soil information has been compromised since so much was removed or disturbed during the installation of the water lines throughout the village.

U.S. EPA Response: Any contaminated soil encountered during the installation of the water lines was removed for storage on the Smelter site. However, it is possible some contaminated soil could have been covered during construction activities. The recommended confirmatory sampling will provide an accurate condition of the affected areas.

29) The commenter stated that it appears as if there has been a lot of misconception in Beckemeyer because of the construction of the new and long-awaited water distribution system and collecting water samples probably further confounded the issues for the residents.

U.S. EPA Response: The purpose for water samples collection was explained to each one of the participants. The purpose for collecting drinking water samples was to obtain site-specific data to be used in the development of the risk evaluation

not to evaluate the new water distribution system. The letter mailed to each one of the residents of Beckemeyer explains the purpose of the sampling event and therefore, prevents misconception with respect to the purpose of the sampling event.

30) The commenter stated that the IDPH blood screening study should be considered.

U.S. EPA Response: U.S. EPA did consider the IDPH blood screening study useful in defining the current health conditions in Beckemeyer in 1993. However, U.S. EPA considers that there is a difference between a blood lead screening study and a full-blown blood lead study, in which blood lead data is coupled with full exposure data including environmental sampling and behavioral questionaires. If the latter data set is robust enough (i.e., includes a large data base on the population of concern - in this case, children under the age of seven), it can often be used to develop site-specific inputs for use in the IEUBK Model. Both types of blood lead studies suffer from the disadvantage that they represent the blood lead levels in children at a single point in time.

While all blood lead data is useful, U.S. EPA further recognizes that the population in Beckemeyer represents a changing community, and todays demographics may not be representative of the population in the near future. U.S. EPA believes that, in this case, the use of the IEUBK Model to predict the effects of lead exposures on this population is useful.

31) The commenter stated that lead paint exposure is the most problematic lead source for young children in the U.S. and a significant source of exposure in Beckemeyer, and expressed the concern that the model does not recognize lead paint as a major contributor to elevated blood lead levels.

U.S. EPA Response: U.S. EPA agrees that leaded-paint is

probably the major source of exposure to children living in a typical urban area. However, U.S. EPA has found that where an overwhelming source of lead contamination is present, as is found at some CERCLA sites, the site source so overwhelms the exposure from leaded-paint that no reduction is exposure can be achieved without reduction of the site source contribution. U.S. EPA does attempt to identify all sources of lead exposure at NPL lead sites, and believes that the most effective management of these sites is acheived by working with State and other local agencies to attain a total reduction in exposure. Thus, U.S. EPA's primary concern in this EE/CA is to address the lead contamination associated with the smelter waste materials as the primary pathway of exposure for the children of Beckemeyer. U.S. EPA, in cooperation with IDPH, will address the leaded-paint exposure issues at a later time.

In addition, exposure from leaded-paint was not considered in the application of the IEUBK Model in developing cleanup levels for lead at the site, because the lower cleanup level that would be required to conpensate for other sources of lead exposure not considered either directly or indirectly in the Model would represent a less efficient and less cost-effective way of reducing the overall lead exposure at Beckemeyer.

32) The commenter stated that the average lead concentration for housedust collected from the two rooms should be 439 ppm not 276 ppm as given in the addendum.

U.S. EPA Response: U.S. EPA agrees that the average lead dust level for the two rooms should have been given as 439 ug/g and thanks the commenter for this correction.

33) The commenter stated that is not a good science to assume a building has no leaded coatings without testing surfaces.

U.S. EPA Response: The assumption that the houses in

question had no leaded coatings were based on visual inspections and the finding of inside paneled walls and varnished woodwork in many of the rooms that were sampled. U.S. EPA did test houses that do not have visual indicators. Refer to the Appendix A of the Risk Evaluation Addendum.

34) The commenter asked to defer the CSC site from federal lead to state lead.

U.S. EPA Response: U.S. EPA and IEPA did discuss the deferral issue with the potential responsible parties (Asarco and the Village of Beckemeyer). U.S. EPA and IEPA met with Asarco on July 17, 1995; where both agencies told Asarco that the site will continue under federal lead and the state agency will work as a support agency. On September 14, 1995 U.S. EPA and IEPA met with the Village representatives and the deferral issue was discussed. There was a clear understanding that both agencies are agreed to maintain the status of the site as it is and have been communicated to the Potential Responsible Parties.

35) The commenter stated that U.S. EPA did not use OSWER Directive 9355.4-12 during the development of the EE/CA.

U.S. EPA Response: A quick review of the documents will show that OSWER Directive # 9355.4-12, "Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities", was issued on July 14, 1994; the EE/CA was completed in April 1994. U.S. EPA did use OSWER Directive 9355.4-12 as the justification to use the IEUBK Model, version 0.99d, in the development of the Risk Evaluation Addendum. Please refer to the references section in the addendum and Administrative Record Update # 4.

36) The commenter stated that U.S. EPA did not consider future land use as a remedy selection criteria.

U.S. EPA Response: The National Contingency Plan (NCP) does not require future land use as a remedy

selection criteria (Refer to NCP section 435). However, U.S. EPA did consider the land use during the risk evaluation (refer to Addendum 2 of the Risk Evaluation Addendum Report). U.S. EPA determined that by cleaning the site using the industrial clean-up level, the site will be able to be used for industrial purposes, but considering the limitations stated by the implementation of the remedy.

37) The commenter stated that the revised draft EE/CA is not updated and there is new information that may be considered before provide the final EE/CA Report.

U.S. EPA Response: The final EE/CA will reflect the actual status of the Site. Also, the Administrative Record has been updated to reflect all new information regarding the Site. Please refer to the final EE/CA Report and Administrative record Update # 5 for clarification. The Action Memo contains two Responsiveness Summaries which address all previous comments received during both public comment periods.

38) The commenter stated that the new information received (i.e., sampling data, supplementary comments) may alter the remedy selection.

U.S. EPA Response: The data collected by U.S. EPA during its last sampling event (July 1995) was used to develop the risk evaluation addendum that supports the U.S. EPA 500 ppm clean-up level for lead in residential areas and a clean-up level for lead in the range of 1500 ppm in industrial areas. The selected remedy was not affected by addendum's findings, there was not new information that may alter the selected remedy.

39) The commenter stated that U.S. EPA is violating the 1994 lead in soil guidance by using overly-conservative PRGs.

U.S. EPA Response: U.S. EPA did consider the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, OSWER Directive 9355.4-12

(July 1994) during the development of the Risk Evaluation Addendum in order to determine the appropriate PRGs for the site. In addition to the guidance, the IUEBK Model, version 0.99d and site-specific data were used to develop the PRGs for the site. The PRG of 500 ppm of lead for residential areas was determined based on site-specific data as well as consideration of any appropriate guidances, policies and directives. Therefore U.S. EPA does not believe that procedures used to generate the PRGs for the site violated any guidances, policies or directives.

40) The commenter stated that U.S. EPA does not properly consider cost effectiveness as required by U.S. EPA guidance for non-time critical removal actions because U.S. EPA does not perform any type of cost/benefit analysis justifying the selected alternative over the others.

U.S. EPA Response: All the alternatives were evaluated according to the three broadest criteria of Effectiveness, Implementability and Cost as suggested on the Non-time Critical Removal Actions guidance. The cost criteria suggests that a sensitive analysis of the present worth calculations may be conducted. The NCP states that it is intended that remedies would be selected based on the protectiveness afforded by the alternative and cost would be only used to select from among protective alternatives. The EE/CA provides a detailed analysis of the alternatives based on the above mentioned criteria and U.S. EPA decided that the selected alternative is the more protective to human health and the environment. The NCP also states that the remedy selection process requires that alternatives must be demonstrated to be protective and ARAR-compliant in order to be eligible for consideration in the balancing process by which the remedy is selected. So that, the interim actions suggested by potential responsible parties do not meet the protectiveness requirement under the statue, even

though is the less costly.

41) The commenter stated that it does not make much sense to eliminate data from homes that are well maintained and have low lead dust concentrations.

U.S. EPA Response: A closer examination of the "dust load" data reported by *ecology & environment, inc* in their Environmental Sampling Project Report of September 12, 1995, shows that the dust loading values reported in the Table are based on the Total Mass of the housedust sample, <u>not</u> on the "dust fraction". If the dust lead values had been calculated based on the sievable fraction, the lead loadings for samples RH5 and RH9 would have been nearly **zero**, as the samples did not contain a sievable fraction. Animal hairs and carpet fibers from the new carpet reportedly comprised the entire sample. <u>All other</u> reported lead dust sample concentrations are based on the sieved portion.

U.S. EPA does agree that housecleaning may not greatly affect the dust lead concentration. We have observed that lead in house dust is redeposited in a ratio which reflects the relative concentrations in the sources of the house dust; thus, the lead concentration in the "dust fraction" remains relatively constant as long as the sources remain constant.

42) The commenter asked how decisions were reached before the use of models.

U.S. EPA Response: Missing data or the inability to collect data has always required the use of assumptions in the final analysis. Data collection is costly and time consuming and is never completely satisfactory, and some allowances must usually be made when using any data set. Models provide an important and useful tool in this regard, as they must provide reasonably accurate predictions to even be considered, they define the

range of plausible values that need be considered, they provide for "best judgement" estimates to be used as defaults when data collection is not possible, and inputs can be varied to provide an uncertainty analysis. While it requires some effort to use any model correctly, it is usually worth while to do so.

43) The commenter questioned U.S. EPA's concern over the added exposure to children from the ingestion of home-grown vegetables. They stated that they had not yet encountered a child with an elevated blood lead level with no other source (of lead exposure) but home-grown vegetables.

U.S. EPA Response: No single reference is provided to support U.S. EPA's concern over ingestion of home-grown vegetables as a potential significant source of lead exposure to the child. That is because the sources are many. The U.S. EPA Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children, section 2.3.2.2., contains a discussion of other important dietary lead sources, such as home-grown produce grown in soils with high lead concentrations and edible leafy portions of vegetables contaminated by airborne lead particles, which may become important sources of exposure to the child. The Agency for Toxic Substances and Disease Registery Toxicological Profile for Lead, 1992, section 5 "Potential for Human Exposure", indicates that "some of the more important lead exposures occur as a result of.....consumption of produce from family gardens..."

U.S. EPA reviewed the data on ingestion of home-grown vegetables from several Superfund sites, including data from the Sharon Steel/Midvale and the Jasper County, Missouri sites. U.S. EPA does not agree with the conclusions the commenters have drawn from the Midvale report, nor do the Midvale reports themselves (Bornschein et al., Appendix

A, May 1990; Final Report, July 1990) support these conclusions. The calculation of the health-based soil action levels for residential soils for the Midvale site included an assumed input to the dietary intake for home grown vegetables of 0.70 ug lead/g wet weight for 14.2% of the total daily vegetable consumption by children. The failure to find the required number of children with elevated blood lead levels does not prove that consumption of home-grown vegetables has no effect on the blood lead levels of children. The evaluation included a number of assumptions, including the high ingestion rate, which may not reflect the true ingestion exposure of the children. In section 11.9 of the final report of the Midvale site (Bornschein, July 1990), the authors state: " Crops grown in gardens with (lead) contaminated soil can themselves become contaminated either via lead contaminants adhering to the outer surface of crops or via uptake of lead into the plant.

Data analyses were undertaken to determine if the presence of vegetable or flower gardens or the ingestion of root crops from the gardens were associated with elevated blood lead levels. None of the blood lead differences (observed in children whose families had vegetable gardens, whose parents had flower gardens or whose parents reporting eating root crops from the garden versus those who did not) were statistically significant". It should be noted that the "average level of lead in soil in these gardens was 295 ppm", a level below U.S. EPA's level of concern. No verification of the quantities of home-grown vegetables eaten by the children was provided. Similiarly, much uncertainty surrounds the evaluation of the exposure of children to lead-contaminated home-vegetables at many Superfund sites.

U.S. EPA is not certain why the

commenter would want to consider the effects of exposure to lead in home-grown vegetables as a sole-source exposure or how this could even be done, given the multiple sources of lead exposure in the environment. All potential sources of exposure to lead in children should be identified and addressed in some manner, and that to exclude any source would be irresponsible.

U.S. EPA believes that ingestion of home grown vegetables provides an additional source of lead exposure to children at all sites where garden lead soil levels are elevated; however, the methodology for assessing the effect of this exposure does not appear to be straight-forward. U.S. EPA agrees that the kitchen preparation method may greatly impact the lead intake from ingestion of lead-contaminated home-grown vegetables.

44) The commenter makes reference to the model's predicted blood lead level for an average 18-month old child. The commenter further states that one of the worst assumptions in the risk evaluation is the assumption that the entire population in Beckemeyer is 18-months old.

U.S. EPA Response: An input age for a child must be attached to the environmental data when it is used in an IEUBK Model run. The model then calculates a distribution curve for the blood lead levels of the children, based on the range specified by the user. The input range generally used in CERCLA risk assessments is 0-84 months; this is the range used in this assessment and is part of the horizontal axis label on all the graphs provided. We suggest that the commenter consult the examples in the Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children (USEPA 1994), or consult a Regional toxicokogist if there are still questions regarding the use of the IEUBK Model.

U.S. EPA does wish to emphasize that it

is appropriate to consider children aged 0-84 months in any risk evaluation for lead, as children in this age range represent the most sensitive sub-population and are likely to experience the greatest adverse health impact from exposure to lead.

45) The commenter states that the model should incorporate the widely accepted gastrointestinal absorption value of 50% for children. The cleanup could then be raised to the Illinois' Childdhood Lead Poisoning Prevention action level of 1000 ppm. The commenter further suggests that the model should be adjusted to reflect a soil clean up level of 5,000 ppm, based on the accepted absorption rate of 10% for adults.

U.S. EPA Response: The default gastrointestinal absorption factors in the IEUBK Model, version .99d, are 50% for drinking water and dietary sources, but only 30% for soil and dust absorption; these values were used in the risk evaluation. U.S. EPA has not reviewed the methodology or assumptions used to develop the 1000 ppm level stated as the Illinois action level. U.S. EPA does know that almost every other state in the country has lowered their action levels for lead in soil in residential areas to a value in the 200-500 ppm range.

U.S. EPA does not understand the commenter's suggestion that the absorption value be adjusted in the model to give a soil lead cleanup value of 5000 ppm for protection of adults residing in Beckemeyer. The IEUBK Model only contains physiological data applicable for children up to the age of seven years of age. The IEUBK model cannot be used to assess lead exposure in adults. In addition, U.S. EPA has previously stated that the focus of any risk assessment and development of any reduction strategy is the most sensitive sub-population, usually referred to by U.S. EPA as the "population of concern". The child under the age of seven is the most sensitive sub-population for

adverse health effects from lead exposure and is the target population in the residential exposure scenario. Another methodology was used to evaluate the potential lead exposure to adults at the Smelter site; this methodology used the fetus of a pregnant woman (which is appliable to all women of child-bearing age) as the most sensitive sub-population.

46) The commenter offered assistance by conducting additional blood lead screenings in Beckemeyer.

U.S. EPA Response: U.S. EPA acknowledges this valuable offer of future assistance from the the Illinois Department of Public Health. While U.S. EPA efforts are restricted to addressing environmental sources of lead under CERCLA, the Agency recognizes that a complete reduction in lead exposure can only be achieved by identifying and addressing all sources of lead in a child's environment, including the home. Implementating a complete reduction program, which includes education, monitoring for lead paint and blood lead screening in children, can only be achieved with the support of State and local agencies.

RESPONSE TO COMMENTS ON THE ECOLOGICAL ASSESSMENT

1) One commenter recommends the following: 1) natural attenuation of sediments in place of dredging, and further investigation of 2) the necessity for bank stabilization and 3) the effectiveness of concrete spray for erosion control. They also commented that "there seems to be no obvious advantage of hydraulic dredging over mechanical dredging".

The commenter also criticizes the proposed use of the Ontario Sediment Quality Guidelines for remediation [*sic*] of sediments at the Circle Smelting site. The commenter makes the following points: 1) the Guidelines are not criteria [the intended meaning appears to be that the Guidelines are not standards]; and the application of the Guidelines to the Circle Smelting site is uncertain and inappropriate because of 2) confounding factors (the interactions of multiple contaminants and other physical or biological limitations were not evaluated in the development of the Guidelines), 3) site-specific factors (physical and biological) that constrain extrapolation of the Guidelines (primarily developed for lakes); and 4) a lack of correlation between sediment contaminant levels and bioassay results at the Circle Smelter site.

U.S. EPA's Response

1. Natural Attenuation of Sediments

The commentor's argument rests on two points:

a) "Since sediment samples 2, 3, and 4 often experienced elevated metal concentrations relative to sample [sic] 1 and 5, there is no consistent correlation between the bioassay results and sediment metal concentrations. ... Considering the inconclusive nature of the sediment toxicity data, sediment removal is not justified..."

b) "Data available suggest that, given adequate elimination of contaminant input to the unnamed creek, natural attenuation could be a relatively rapid process. Data presented in *Engineering Evaluation and Cost Analysis* show relatively rapid attenuation of contaminant concentrations in the existing creek sediments. This reduction suggests that significant dilution and sedimentation processes are occurring between the site and Beaver Creek."

The commenter emphasizes the inconsistencies of the *Hyalella* and *Chironomus* sediment bioassays (also discussed in the Field Investigation Report), but ignores the most striking consistency of the two tests - the extremely low survival of both species, 0 and 8%, respectively, exposed to sediment sample 2 (SD-2), the nearest downstream sediment sample to the site. SD-2 has the maximum concentrations of As, Cd, Cr, Pb, Ni and Zn of the samples included in the bioassays. Of these contaminants, As, Pb, Ni and Zn exceed the severe effects levels (SEL) of the Ontario Sediment Quality Guidelines (Persaud, et al. 1993) at SD-2 (Cd approaches the SEL as well), and are therefore likely responsible for the lethality of the sediments at that location. The fact that Cu concentration is highest at SD-1 (upstream of the site), where *Hyalella* survival is highest, is of little relevance since Cu did not approach the SEL in any of the bioassay samples. *Hyalella* also experienced complete mortality when exposed to SD-4 sediments, the only sample besides SD-2 with contaminant concentrations that exceed the SELs (Pb, Ni and Zn, but by much lesser margins than in SD-2). As discussed in the Field Investigation Report, *Hyalella* is more sensitive than *Chironomus* to metal toxicity, which probably explains the more consistent response of the former to SD-4 sediment.

The inconsistencies in the bioassay results for the remaining sediment samples (with lower contaminant concentrations) do not negate the primary finding of the study that the unnamed creek sediments near the site are extremely toxic to benthic organisms. The determination to dredge creek sediments above Randall Street is well supported by this finding.

The commenter does not explain which data in the EE/CA demonstrate "relatively rapid attenuation" of creek sediment contamination, or specify which type of attenuation (temporal or spatial) is demonstrated. Two sets of sediment data are reported in the Summary of Analytical Data (Appendix A of the EE/CA): one set from 7/26/88 (samples S101 and S301 from the eastern drainage and below the confluence with the unnamed creek, respectively, and samples S202 and S302 from the western drainage), and one set from 5/17/93 (samples SD-1 through SD-4 from the unnamed creek located upstream of the site (1), downstream of the western drainage (2), downstream of Randall Street (3), and upstream of the confluence with Beaver Creek (4); and samples SD-5 and SD-6 from Beaver Creek located up- and downstream of the confluence with the unnamed creek, respectively).

None of the aforementioned samples are even approximately co-located, so they do not provide evidence regarding temporal changes in sediment contaminant concentrations. However, other samples labeled as "wetland soil" in Appendix A are treated as "drainage area sediment" samples elsewhere in the report (EE/CA, Figure 3-2). Although of doubtful validity, temporal comparisons may be investigated by treating these samples as representative of creek sediments. A cluster of samples occurs along unnamed creek downstream of Randall Street: X306 (3/1/92), S-2a and S-3a (1/11/93), and SD-3 (5/17/93). There are decreasing concentrations of As, Cu, Ni, Pb and Zn between 1992 and 1993 for samples X306, S2-a and SD-3, which might be interpreted as evidence of rapid temporal attenuation, except that the sample with the highest concentrations of the cluster (S-3a) was collected in 1993. The Randall Street cluster is therefore an example of spatial variability, but not of temporal attenuation of sediment contamination. Another cluster, along the western drainage near the confluence with unnamed creek: S302 (7/26/88), X305 (3/1/92), and S-5a (1/11/93), shows temporal decreases in Cu, Ni, Pb and Zn concentrations. However, the levels of these contaminants in 1993 are still more than an order of magnitude greater than the SELs, which demonstrates the rather obvious fact that the western drainage is a contaminant source and will remain so for the foreseeable future without intervention. Wetland soil sample TR2 (5/17/93) has significantly lower concentrations of As, Cu, Pb and Zn compared with the western branch cluster, but is not comparable with the cluster because it was taken from the opposite bank of the unnamed creek.

The data show spatial attenuation between the western drainage (S202/302) and the unnamed creek (SD-2) for some contaminants (e.g., Cu, Pb and Zn) but not for others (e.g., As and Ni), and between the unnamed creek near the site (SD-2) and below Randall Street (SD-3); however, neither gradient supports the contention that natural attenuation is "relatively rapid" and "may be adequately protective of the stream system".

Despite the reductions in sediment concentrations of some contaminants between the western drainage and the unnamed creek (SD-2), Ni and Pb levels at the latter location are an order of magnitude greater than the SELs, Zn is 4 times greater than the SEL, and As and Cd levels are approximately equal to the respective SELs. While the Ontario sediment quality guidelines are not cleanup goals, the exceedances indicate that natural

attenuation is neither rapid nor likely to be adequately protective in the near reach of the unnamed creek.

The concentration gradients between unnamed creek sediment samples near the site (SD-2) and below Randall Street (SD-3) may be the data that, according to The commenter, demonstrate relatively rapid attenuation. Alternative explanations are that downstream contaminant transport is slow, or that the reach below Randall Street is a poor depositional zone. In any case, a decline in contaminant concentration with distance from the source is not unexpected. The gradients between SD-2 and SD-3 are part of the rationale for restricting dredging to the unnamed creek upstream of Randall Street. They do not provide any relevant information regarding the toxicity or persistence of upstream contamination, and do not modify the concern that the unnamed creek sediments near the site are sources of contamination to downstream habitats.

U.S. EPA agrees that the Ontario Sediment Quality Guidelines (Persaud, et al. 1993) are not regulatory standards and the actual toxicity of contaminants at the site depend on site specific factors. Based upon site specific factors U.S. EPA believes that the guidelines should be considered as To-Be-Considered.

U.S. EPA does not agree with the claim that "Site bioassay information indicates there is no correlation between toxicity and chemical concentrations in site sediment." (p. 8). While it is true that the bioassay results for the samples of lower contaminant concentration are inconsistent, the results for the sample with the highest concentration are unambiguous.

Survival of both *Hyalella* and *Chironomus* is extremely low, 0 and 8%, respectively, when exposed to sediment sample 2 (SD-2), the nearest downstream sediment sample to the site. SD-2 has the maximum concentrations of As, Cd, Cr, Pb, Ni and Zn of the samples included in the bioassays. Despite the uncertainties related both to the methodology for developing the Ontario Sediment Quality Guidelines and to the application of these guidelines at any particular site, the guidelines are, in this case, useful for interpreting the bioassay results. Of the contaminants at SD-2, As, Pb, Ni and Zn exceed the severe effects levels (SEL) of the Ontario Sediment Quality Guidelines (Cd approaches the SEL as well), and are therefore likely responsible for the lethality of the sediments at that location.

Hyalella also experienced complete mortality when exposed to SD-4 sediments, the *only* sample besides SD-2 with contaminant concentrations that exceed the SELs (Pb, Ni and Zn, but by lesser margins than in SD-2). As discussed in the Field Investigation Report, *Hyalella* is more sensitive than *Chironomus* to metal toxicity, which probably explains the more consistent response of the former to SD-4 sediment.

The inconsistencies in the bioassay results for the remaining sediment samples (with lower contaminant concentrations) do not negate the primary finding of the study that the unnamed creek sediments near the site are extremely toxic to benthic organisms. The determination to dredge creek sediments above Randall Street is well supported by this finding.

The Ontario Guidelines are used in the EE/CA to set Final Recommended Preliminary Remediation Goals (PRG) for sediments for only two contaminants: Pb (250 mg/kg) and Zn (850 mg/kg) (EE/CA, Table 3-1). The concentrations at SD-2 for Pb and Zn are 3580 and 3427 mg/kg, respectively, and at SD-4 are 426 and 1844 mg/kg, respectively. The next lowest concentrations, at a sample point for which bioassay results are equivocal for both species, are at SD-3: Pb (154 mg/kg) and Zn (328 mg/kg). These should be the PRG, based on the site-specific bioassay results for *Hyalella*, that is, based on the finding that the toxic effects of contaminant levels at SD-3 to the more sensitive of the bioassay species can no longer be differentiated from background effects. The alternative, use of the Ontario Sediment Guidelines, is less stringent (and less protective) but should only be used with the concurrence of all parties concerned.

2. Bank Stabilization

The commenter argues that the necessity of bank stabilization cannot be established because the vertical distribution of contaminants along the bank of unnamed creek has not been determined. This is an extent-of-contamination question that should be addressed by the Engineering Design Investigation.

3. Concrete Spray Effectiveness

The commenter criticizes the concrete spray option for bank stabilization on two points: a) long-term structural stability and b) elimination of riparian habitat.

3.a. The long-term structural stability of concrete spray should be addressed in the Engineering Design Investigation.

3.b. The elimination of riparian habitat by concrete spray in the area of the former pond and drainage areas from the site is not a significant concern because there is presently little or no viable riparian habitat in these areas due to the high levels of sediment contamination. The substitution of loss of riparian habitat due to erosion control measures in the source area for loss of riparian habitat due to sediment contamination is acceptable because the former improves (or at least maintains) the downstream riparian habitats while the latter is likely to result in continued degradation of downstream habitats.

4. Hydraulic Dredging

The commenter raises two concerns with hydraulic dredging: a) "temporary destruction of aquatic habitat, including removal of macrophyte beds and benthic organisms", that may require years for recovery, and b) no obvious advantage of hydraulic over mechanical dredging "given the small size of the dredge operation and flow conditions in the creek".

4.a. The response to 3.b applies here as well. Temporary loss of benthic habitat is acceptable if it results in protection of downstream habitat. An additional consideration is that the benthic functions of this section of the unnamed creek will remain severely impaired for the foreseeable future in the absence of intervention.

4.b. The obvious advantage of hydraulic dredging compared with other forms of dredging is that it requires less destruction of riparian tree cover for access.

ATTACHMENT C

EE/CA EXECUTIVE SUMMARY

Executive Summary

Introduction

This Engineering Evaluation and Cost Analysis (EE/CA) Report presents the results of developing and evaluating non-time critical removal action alternatives for the Circle Smelting site in Beckemeyer, Illinois. The United States Environmental Protection Agency (U.S. EPA) will use this report in its evaluation of response action alternatives for the site in accordance with the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), otherwise known as the Superfund Law. The U.S. EPA recommends removal action Alternative 5. An action memorandum will be provided in order to describe the final decision to be conducted at the Circle Smelting Corporation Site.

Site Description and History

The Circle Smelting Corporation facility occupies a 28-acre parcel just east of the Village of Beckemeyer, Illinois, along Old U.S. Highway 50. The parcel is bounded by Old U.S. Highway 50 to the north, the B&O railroad to the south, a saw mill to the west, and vacant farm land to the east (see Figure 2-1). Surface water runoff from the site flows to either an eastern or western drainage ditch. Both drainage ditches flow north under Old U.S. Highway 50 and enter an unnamed intermittent creek. The intermittent creek discharges into Beaver Creek.

Primary zinc smelting began on the property in 1904 and continued until the 1920s when the facility was converted for secondary zinc smelting operations. Smelter waste includes cinders from the coal combustion in the smelting process, and clinker waste materials and various forms of slag with high levels of heavy metals (herein called cinders) that were generated and stockpiled onsite over its 90 plus years of operation. Collectively, these materials are referred to as "cinders" in this report because site background is not detailed enough to accurately determine the nature of all waste materials. Also onsite are numerous retort casings that contain residual cinder material with elevated metals concentrations. Circle Smelting purchased the facility in 1965 and continued active secondary smelting operations at a much lower rate of production until 1995. As of today, the facility is no longer in operation.

Other areas contaminated by smelting operations include areas in the Village of Beckemeyer where the cinder material was used as fill or walkway surfacing material, and as driveway paving material. The drainage ways north of the smelter have received contaminated runoff, and a residential area immediately south of the site has elevated metal concentrations that may have been caused by air deposition of materials released from the site as dust or fugitive stack emissions. It is possible based on site operations history, that lead or other toxic/heavy

metals were distributed to other nearby areas through carryover on truck wheels and possible spills of materials entering or exiting the site.

Analytical Data Summary

Investigative History

The investigative history includes 12 sampling events by state and federal agencies since the 1970s. The majority have followed a fire at the plant in 1986 that forced the evacuation of several residents south of the plant. Most of the sampling events have focused on metals concentrations in the cinders, soils, and sediments. The latest sampling event (July 1995) has focused on metal concentrations in soils, water, paint and in-house dust.

Chemicals of Potential Concern

Chemicals of potential concern in soils and sediments include antimony, arsenic, cadmium, copper, lead, mercury, nickel, silver, and zinc. Organic analyses performed on soils and surface water did not find site-related organic contaminants. Groundwater was not sampled as part of either Illinois Environmental Protection Agency's (IEPA's) or U.S. EPA's site investigation activities to date.

Almost all samples collected at the facility had metals in concentrations above background levels, identified by the IEPA. Total lead concentrations in Beckemeyer range from background levels to as high as 50,000 mg/kg in cinders and soils. Site contaminants have been detected as far downstream as the confluence of the unnamed intermittent creek with Beaver Creek.

Risk Evaluation

A risk evaluation and an addendum to the risk evaluation were conducted to develop and support preliminary remediation goals (PRGs) for the chemicals of concern (COCs). Lead is the primary metal of concern because of the lasting detrimental effects it can have on infants and children. A PRG for lead of 500 ppm for residential areas and a PRG for lead of 1,500 ppm for the industrial area has been recommended by U.S. EPA based on the risk evaluation, its addendum, and Agency's guidance and policies. An ecological risk evaluation was also conducted for the site by U.S. EPA. This evaluation was based on sediment data collected from the site and Agency's guidelines. This evaluation identified ecological effects from elevated concentration of arsenic, lead and zinc.

Response Action Objectives

Objectives of the Response Action are:

- to reduce exposure to contaminant concentrations above the PRGs in the Village of Beckemeyer;
- to limit health risks from the drainage ways and smelter property; and
- to reduce the threat to the environment posed by contaminated sediments in the drainage ways

Development of Removal Action Alternatives

Screening of Technology

Several of the U.S. EPA's information database directories of remediation technologies were queried to ascertain technologies appropriate for remediating soils contaminated with lead and other heavy metals. The reasonable technologies were screened based on their relative effectiveness, implementability, and cost. Costs are estimated by an order of magnitude using a +50/-30-percent range.

Description of Alternatives

In addition to the required No Action Alternative, the technologies that passed the screening process were grouped into four additional alternatives using engineering judgement. A brief description of each alternative in order of increasing cost and complexity follows. Figures ES-1 through ES-3 illustrate the areas addressed by each alternative.

Alternative 1—No Action

As required under CERCLA, the No Action Alternative is included as a baseline to compare other alternatives against. No response action would be conducted and no corresponding reduction in current or future risks would result. The cost of the No Action Alternative is zero dollars.

Alternative 2—Excavation of Residential Soils with Offsite Disposal, Natural Attenuation of Sediments, and Erosion and Institutional Controls for Onsite Soils/Materials

This alternative entails physically removing the materials from the residential area of the Village of Beckemeyer with contaminant concentrations above PRGs and transporting them to a special waste landfill for disposal. This alternative has been developed based on the

assumed distribution of contaminants as determined by investigations to date. Actual implementation may require further, statistically based sampling protocols. The materials excavated will be first tested to determine if treatment is required before transportation. The Circle Smelting Facility (smelter property) will be fenced, and institutional controls will be used to limit site access. Erosion control measures will be applied to the east and west drainage ditches leading from the smelter property and the segment of the unnamed intermittent creek north of the smelter property. These measures are intended to eliminate continued release of site contaminants to the forested floodplain wetland ecological system at Beaver Creek and the disturbed emergent wetland near the site. Soils in the residential areas south of the plant affected by lead through air deposition will be disposed of offsite. More extensive remedial alternatives for the plant site and the drainage ways are deferred to a future Remedial Investigation/Feasibility Study (RI/FS). Monitoring the degree of natural attenuation of contaminant levels in the wetland sediments also deferred to the RI/FS.

The present worth cost estimate of Alternative 2 is $3,065,520.

Alternative 3—Excavation of Residential Soils and Sediment with Offsite Disposal and Institutional Controls for Onsite Soil/Materials

Alternative 3 is the same as Alternative 2 except that the upper 6 inches of sediment (limit of the technique) will be removed with either a hydraulic dredge or traditional dredging methods from the drainage ways to Randall Street. The technique will involve building a temporary access road parallel to the southern tree line in the agricultural land along that reach followed by restoring riparian vegetation and bank stabilization, where necessary. The dredging equipment would be transported between the trees along a segment of the creek dredged. The equipment would move further down and repeat the process. The sediment slurry generated during hydraulic dredging would be dewatered for transportation to a special waste landfill, and the water would be returned to the intermittent creek.

The present worth cost estimate of Alternative 3, assuming hydraulic dredging, is $3,620,960.

Alternative 4—Excavation of Residential Soils with Onsite Disposal, Natural Attenuation of Sediments, and Containment of Onsite Soil/Materials with a Soil Cap

Alternative 4 is the same as Alternative 2 with the exception that the soil excavated from the residential areas will be placed on the smelter property and capped. This variation is provided to eliminate employee exposure at the active facility. The smelter property soils and excavated materials with contaminant concentrations exceeding PRGs will be consolidated into the northern half of the property. One foot of clay material will be placed over the area to be capped. Topsoil will be placed over the cap, and gravel will be placed over the traffic areas of the operational facility. In addition, the former pond area north of the smelter property will also be capped with clay and topsoil. As in the previous alternatives, erosion of the drainage ways and a segment of the unnamed creek will be controlled.

The present worth cost estimate of the capital and operation and maintenance costs for Alternative 4 is $9,661,900.

Alternative 5—Excavation of Soils and Sediments with Onsite Disposal and Containment of Onsite Soils/Materials with a Soil Cap

The recommended Alternative 5 includes excavation of contaminated material from the residential areas of the Village of Beckemeyer; the removal, by dredging, of contaminated sediments from the drainage ways north of the smelter site; placement of these removed waste materials for disposal on the smelter property; and final cover of the consolidated waste material with a clay/topsoil/gravel cap on the smelter property.

Contaminated soil and other waste material from the residential areas in the Village of Beckemeyer exceeding PRGs will be excavated following a statistically applied sampling program. The waste material will be tested to determine if stabilization is required before disposal. The excavated material will then be placed on the smelter property.

The visible cinders and upper 6 inches of sediment from the drainage ways and unnamed creek will be excavated using hydraulic dredging techniques. The sediment slurry generated from this excavation procedure will be dewatered. Sediments will be tested, stabilized if appropriate, and placed on the smelting property for disposal. Following dredging, the access road will be restored and creek banks stabilized, where necessary.

Waste materials excavated from the residential areas of Beckemeyer and the drainage ways will be consolidated on the northern half of the smelter property (following stabilization, as appropriate). One foot of clay material followed by topsoil will be placed over the area to be capped. Traffic areas will be gravel covered. The drainage ways leading from the smelter property will be stabilized for erosion control to eliminate continued release of metals from the smelter property to the wetlands downstream.

Soils in the residential areas south of the plant affected by lead through air deposition will be removed and placed on the smelter property. More extensive remedial measures for the plant site and the drainage ways are deferred to a future RI/FS, including monitoring of the degree of natural attenuation of contaminant levels in the wetland sediments.

The present worth cost estimate of the capital and operation and maintenance costs for this alternative is $10,099,680.

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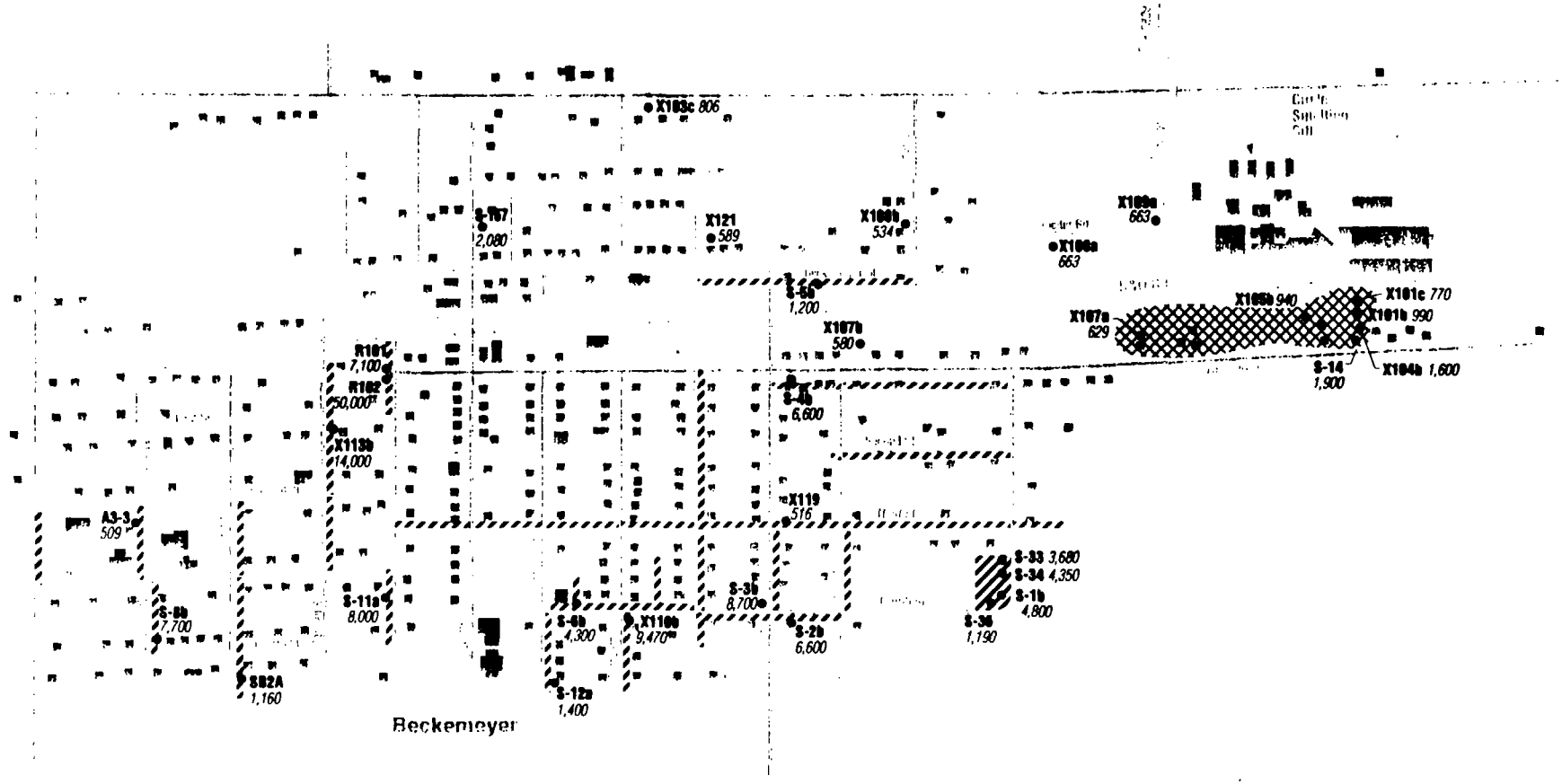


LEGEND

Residential Sidewalks and Alleys where Cinders Exceeding PRGs are Present

Residential Soils Affected by Deposition Exceeding PRGs

Residential Sample Location with otal Lead Concentrartion (mg/kg) Above PRG

SOURCE: U.S.G.S. 7.5-Minute Quadrangle Map, Beckemeyer, Illinois, 1969.

North

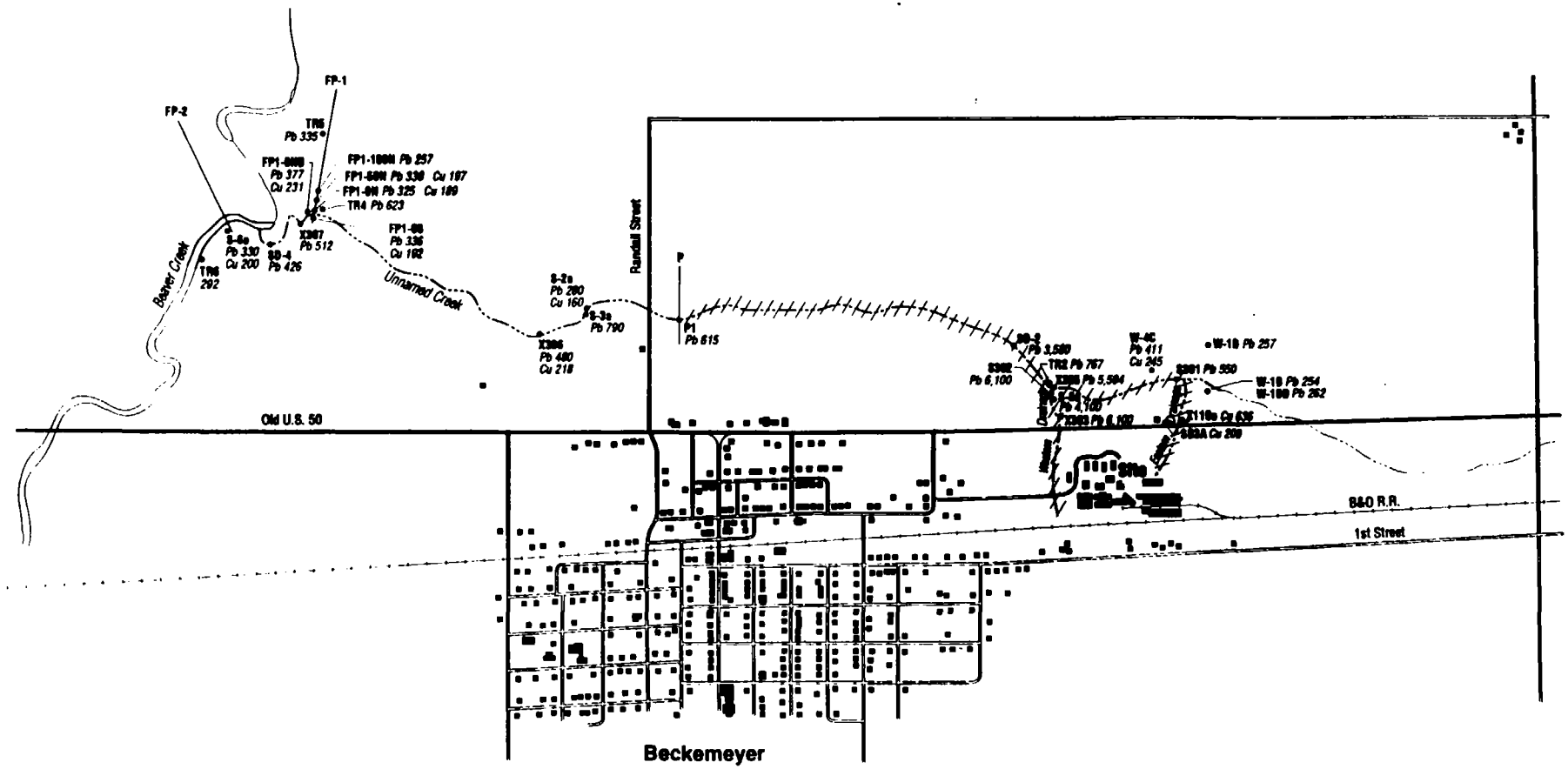
0 500

Scale in Feet

FIGURE ES-1

Residential Areas Exceeding PRGs (Alternatives 2, 3, 4 and 5)

Circle Smelting EE/CA
Beckemeyer, IL



LEGEND

- Drainageway Sample Location with Total Lead Concentrations (mg/kg) and Total Copper Concentrations (mg/kg) Above PRGs
- Unnamed Drainageways
- Railroad
- Extent of Sediment to be Removed

North

0 1,000

Scale in Feet

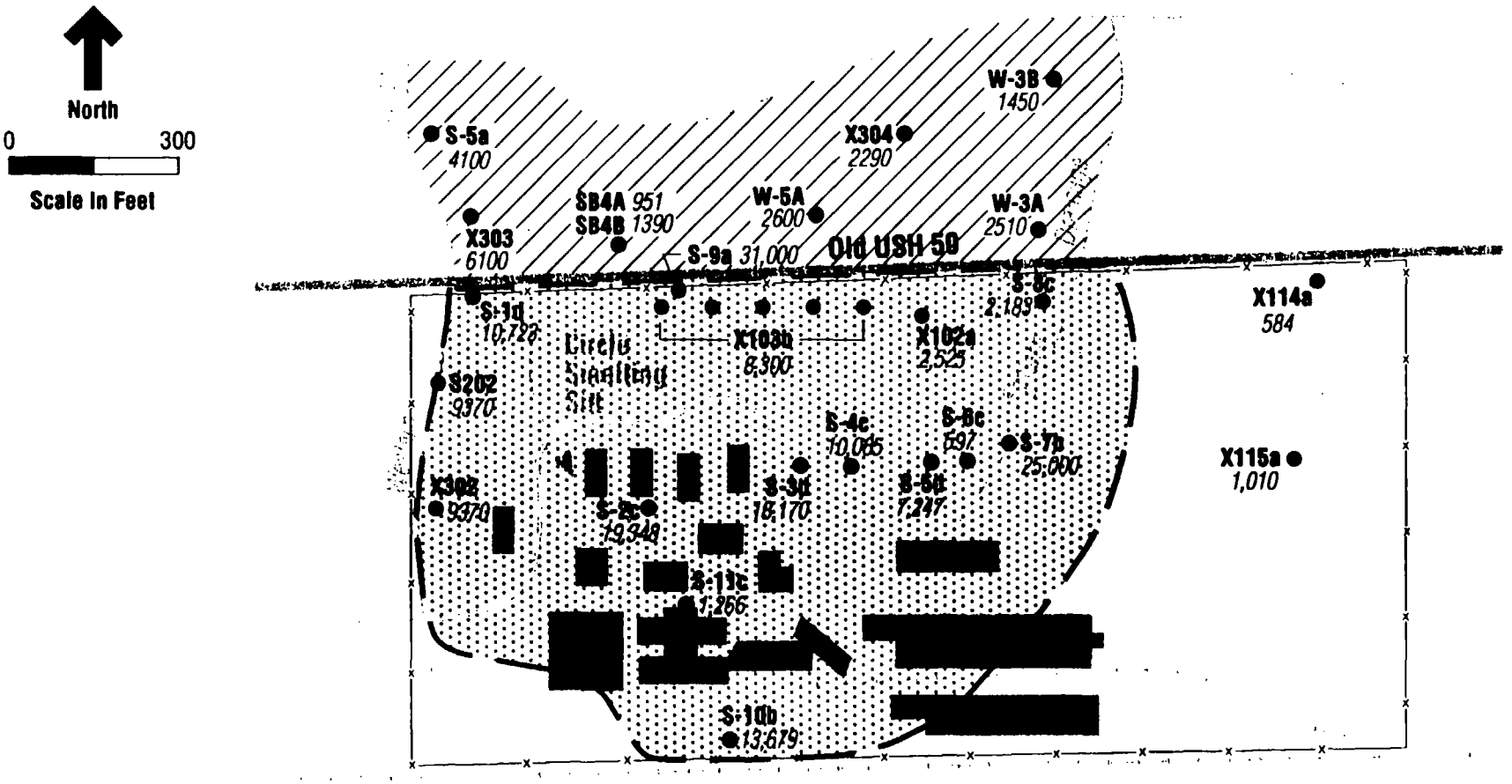
SOURCE: U.S.G.S. 7.5-Minute Quadrangle Map, Beckemeyer, Illinois, 1969.

FIGURE ES-2

Drainage Area Sediment Exceeding Soil PRGs (Alternatives 3 and 5)

Circle Smelting EE/CA
Beckemeyer, IL

CH2MHILL



LEGEND

- Plant Area with Cinders or Soils Exceeding PRGs
- Former Pond Area
- Plant Sample Location with Total Lead Concentration (mg/kg) Above PRG
- Estimated 1500 mg/kg Total Lead Contour
- Circle Smelting Property Boundary
- Railroad

FIGURE ES-3

Plant Site and Former Pond Area of Cinders and Soil Above PRGs

Circle Smelting EE/CA
Beckemeyer, IL

CH2M HILL

ATTACHMENT D

EE/CA APPROVAL MEMORANDUM

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V

DATE: JUL 26 1993

SUBJECT: Regional Decision Team (RDT) Strategy Approval
Circle Smelting Site, Beckemeyer, Illinois

FROM: Jodi Traub, Acting Associate Division Director
Office of Superfund

TO: File

The attached memorandum documents the May 14, 1993 strategy approval by the Region V Regional Decision Team (RDT) for the Circle Smelting site in Beckemeyer, Illinois for the Superfund Accelerated Cleanup Model (SACM) pilot.

Attachment

cc: R. Karl, OSF
B. Bowden, OSF
J. Carlson, ORC
S. Pastor, OPA
W. Harris, ESD
T. Ayers, IEPA
B. Messenger, OSF
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T. Holoska, OSF
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D. Balloti, OSF

Attachment

United States Environmental Protection Agency
Region V
Strategy Approval
for the
Circle Smelting Site
Beckemeyer, Illinois

This document describes the strategy for the Circle Smelting site that was approved by the Regional Decision Team (RDT) on May 14, 1993.

Background

The Circle Smelting Corporation Site is located on a 28 acre parcel of land situated on Illinois State Highway 50 in Beckemeyer, Illinois. The Village of Beckemeyer is located in Clinton County (see attached map) and has 1070 residents. The facility was originally constructed as a primary zinc smelter about 1904 and was later converted into a secondary zinc smelter around 1920. As a secondary zinc smelter, it recovered zinc from scrap metals. The site has undergone several ownership changes. In 1965, Circle Smelting Corporation acquired the facility from Federated Metals (a wholly owned subsidiary of ASARCO). Federated Metals operated the facility from approximately 1930 until 1965. According to the current owners, Circle Smelting is still operating as a secondary smelter producing zinc bricks for its operation in Chicago and also manufactures a zinc-based fertilizer additive product. As of July, 1992, the plant employed approximately 24 workers.

Site Conditions

The description that follows is derived from the CERCLA site assessment activities performed by the IEPA in 1988 (Screening Site Inspection) and 1992 (Expanded Site Inspection) leading to the preparation of the Hazard Ranking System (HRS) package for this site. The site is considered NPL caliber.

The principal contaminants found at this site by sampling are heavy metals. Sampling on-site, in residential soils and in the stream sediment has indicated high levels of zinc, cadmium, copper, lead, nickel, and arsenic. The principal routes of exposure are surface water migration from the site and direct exposure to waste materials. Three source areas have been identified as part of the field work necessary for HRS documentation. These include: a metal rich slag pile; an area of contaminated soils in a stream bed of an intermittent drainageway receiving surface runoff from the site; and an area of contaminated soil associated with the airborne distribution of heavy metals from the blast furnace stacks.

The slag pile received wastes from smelter operations from at least the 1920's and consists of a 17 acre waste pile as high as 15 feet. This pile contains high levels of heavy metals. These heavy metals leach into surface water that flow into nearby wetlands.

An area of contaminated creek sediment exists in the two drainage pathways which received runoff from the slag pile. Elevated levels of heavy metals have already been identified in the approximately 5000 linear feet of stream bed.

The third source area consists of approximately 480 acres of residential and agricultural property surrounding the site which received heavy metal precipitates via fugitive stack emissions from smelting furnace operations. Shallow soil sampling in the community of Beckemeyer have shown elevated levels of heavy metals.

Two additional sources are related to the site but were not evaluated for HRS scoring purposes. This included the four retort furnaces which were also located on the smelting property and used to smelt the zinc materials. Another source which will need additional evaluation are the metal rich slag materials which were removed from the slag pile and used to construct sidewalks, alleys, and driveways in residential areas.

Regional Decision Team Approved Strategy

The Site Assessment Team proposed the following response strategy to the RDT regarding the Circle Smelting site. All actions, whether short-term or long-term, will be based on risk assessment. The recommendations are as follows:

1) Complete the survey of areas within the community which may be utilized by the children (schools, playgrounds, parks, etc.) for potential health risks caused by metal contaminated soils. This action will be taken to ensure that the children, who are at the greatest risk from lead exposure, are protected. If health risks are acute based on evaluation by ATSDR and IDPH, then a time critical removal of the contaminated areas could occur.

2) Initiate the process to involve the PRPs in the response at the Site. 104(e) and General Notice letters will be sent to the primary PRPs (Circle Smelting and ASARCO).

U.S. EPA will negotiate with the PRPs to fund an Engineering Evaluation/ Cost Analysis (EE/CA) for a non-time critical removal to address four main concerns. Should a settlement not be reached, U.S. EPA may fund the EE/CA which could cost up to $207,000 and would be completed within six months. The areas to be addressed areas follows:

Attachm

Table 5-1
Components of the Removal Action Alternatives
Circle Smelting Site
EE/CA
Beckemeyer, IL

Alternative 1—No Action

- No action

Alternative 2—Excavation and Tilling of Residential Soils with Offsite Disposal, Natural Attenuation of Sediments, and Institutional Control for Onsite Soils/Materials

- Excavation of exposed soil and cinders from the residential area and transportation to an offsite disposal facility
- Tilling of soil in area of deposition south of the plant
- Erection of a perimeter fence at the plant site, and erosion control
- Erosion control at former pond bottom
- Additional data collection in the drainageways
- Evaluation of stream sediment concentrations over time

Alternative 3—Excavation and Tilling of Residential Soils and Sediment with Offsite Disposal and Institutional Controls for Onsite Soils/Materials

- Excavation of exposed residential soil and cinders and transportation to an offsite disposal facility
- Tilling of soil in area of deposition south of plant
- Excavation of drainageway sediments and transportation to an offsite disposal facility
- Erecting a fence around the perimeter of plant site property and erosion control
- Erosion control at former pond bottom

Alternative 4—Excavation and Tilling of Residential Soils with Onsite Disposal, Natural Attenuation of Sediments and Containment of Onsite Soils/Materials with Soil Cap

- Excavation of exposed soil and cinders from the residential area and transportation to the plant site for disposal
- Tilling the soil in area of deposition south of the plant
- Emplacement of soil cover over consolidated site media and residential media at plant site, and erosion control
- Additional data collection from the drainageways
- Evaluation of stream sediment concentrations over time

Alternative 5—Excavation of Residential Soils and Sediment with Onsite Disposal, and Containment of Onsite Soils/Materials with Soil Cap

- Excavation of exposed residential soils and cinders and transportation to the plant site for disposal
- Tilling of soils in area of deposition south of plant
- Excavation of drainageway sediments and transportation to the plant site for disposal
- Consolidation and placing a soil cover over affected media from the residential area, drainageways, and plant site, and erosion control
- Emplacement of soil cover over former pond bottom and erosion control

The slag pile received wastes from smelter operations from at least the 1920's and consists of a 17 acre waste pile as high as 15 feet. This pile contains high levels of heavy metals. These heavy metals leach into surface water that flow into nearby wetlands.

An area of contaminated creek sediment exists in the two drainage pathways which received runoff from the slag pile. Elevated levels of heavy metals have already been identified in the approximately 5000 linear feet of stream bed.

The third source area consists of approximately 480 acres of residential and agricultural property surrounding the site which received heavy metal precipitates via fugitive stack emissions from smelting furnace operations. Shallow soil sampling in the community of Beckemeyer have shown elevated levels of heavy metals.

Two additional sources are related to the site but were not evaluated for HRS scoring purposes. This included the four retort furnaces which were also located on the smelting property and used to smelt the zinc materials. Another source which will need additional evaluation are the metal rich slag materials which were removed from the slag pile and used to construct sidewalks, alleys, and driveways in residential areas.

State Involvement at the Site

The State of Illinois' involvement at Circle Smelting began in the late 1970's when the Illinois Geological Survey conducted an extensive investigation of several smelters within Central Illinois. As a part of this investigation, numerous on-site samples were collected to determine if local groundwaters within Beckemeyer had been impacted by past waste disposal activities.

In 1986, the Division of Land Pollution Control became involved at the site when a fire broke out at the facility which resulted in the evacuation of a number of local residents. This incident led to negotiations in which the company agreed to undertake a surficial cleanup of the facility and conduct a remedial investigation of the site and surrounding area. The surficial cleanup occurred under the oversight of the state, but when both parties could not agree upon the extent of the RI, the site was referred to site assessment program for entry onto CERCLIS.

All CERCLA site assessment investigations to date have been conducted by the IEPA under the Cooperative Agreement. The Preliminary Assessment was conducted in 1987 and the Screening Site Inspection was completed in 1988. It was then put on hold awaiting the revised HRS since the Site did not score using the original HRS.

In addition, Community Relations, PRP and Technical Support Section staff have all begun activities regarding this site. A brief description of each follows:

Community Relations-Sue Pastor
(These actions are contingent on Federal Lead at this site)

Circle Smelting is relatively close to Granite City's NL Taracorp site, consequently, the differences between these two sites must be explained to the community before work begins. Although it is presently believed that direct contact with lead in the soils is limited by the presence of vegetation, we plan to immediately determine where children congregate in town (school yards, playgrounds, parks, tot lots, etc.) to ensure that children are protected. When discussing lead, children's safety is always a primary concern among citizens and we plan to tackle that concern first.

Contact with the IEPA Community Relations Coordinator has been made. Community Relations work begun by IEPA can be used to start a mailing list and develop some contacts in Beckemeyer. A site visit is planned for the week of May 17. During that time, we plan to meet with the new mayor to explain the site and the work that needs to be done as well as seek his input and concerns; establish a U.S. EPA information repository; identify a potential public meeting location, and possibly talk with a few people who live near the site to start a mini community relations plan.

When field work is about to begin, regular community relations activities will be planned (a public meeting, fact sheet, advertisement, etc.). Lines of communication will remain open via the toll free number and additional fact sheets, meetings, etc. as necessary.

PRP Identification - Joe Malek

Preliminary information suggests that the current owner-operator, Circle Smelting Incorporated, an Illinois corporation, is a privately owned company whose principal stockholders are of advanced age having been with the company since 1946.

ASARCO Incorporated appears to be the major PRP at this site. During ASARCO's approximate 35 years of ownership and occupancy of the site, most of the contaminated slag was produced, accumulated and eventually distributed off-site. ASARCO is a multi-national company holding extensive mining interests. Sales for 1992 were almost two billion dollars. ASARCO is a defendant in this Region and other Regions in CERCLA and RCRA enforcement cases. Recently, a 28 million dollar jury verdict entered in Denver as a result of a class action suit filed by neighbors who sought a community cleanup from cadmium and arsenic contamination from a smelting operation. In conclusion, ASARCO appears to have both the ability to and responsibility for undertaking most of the cost of the remediation effort.

a) Determine extent of contamination and removal of contaminated material in residential areas, including walkways, driveways, alleys, etc.

b) Address the waste pile on site (containment, removal and treatment).

c) Address any off-site downstream considerations particularly in regard to ecological considerations.

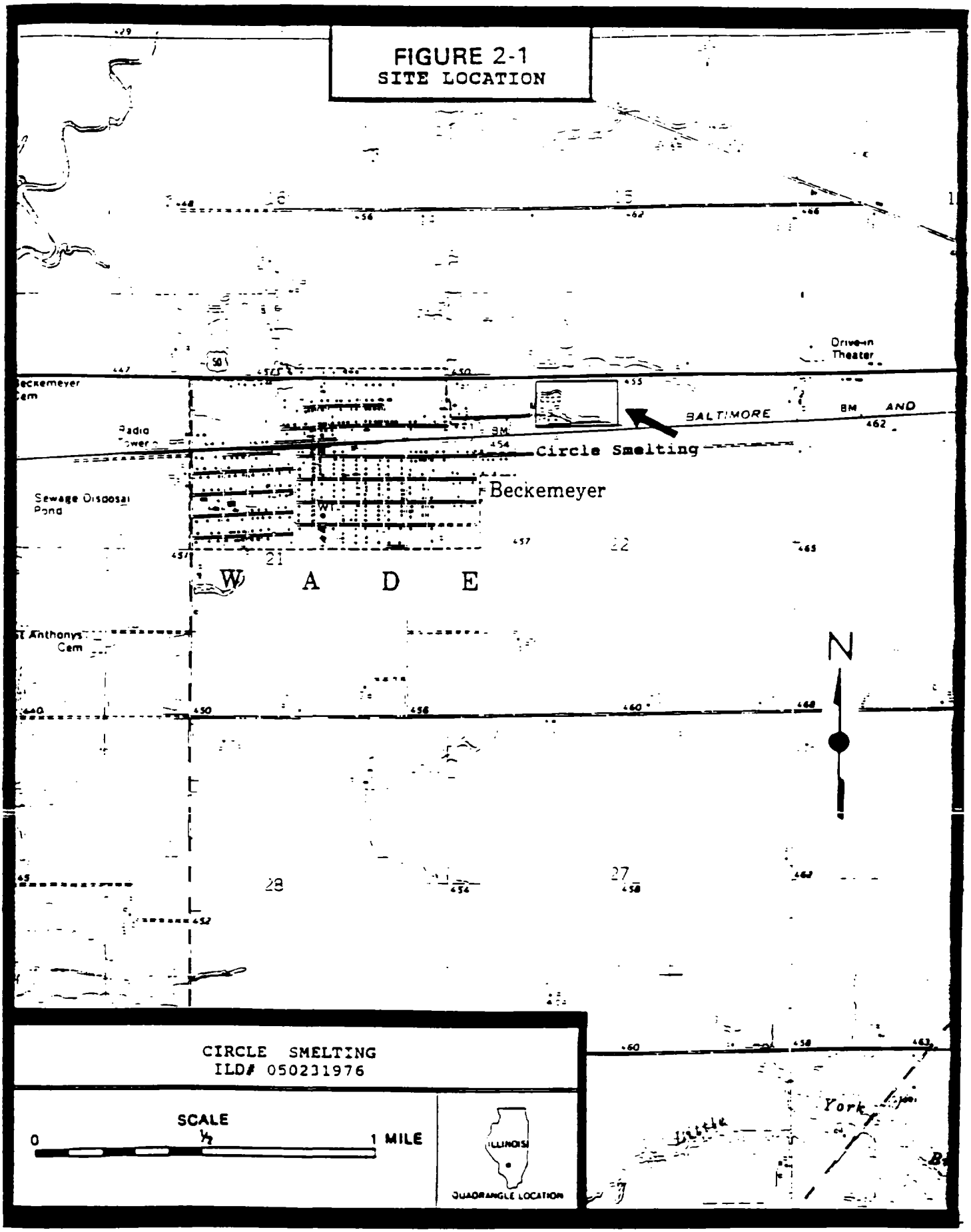
d) Determine where contaminated materials were placed in any other communities in Clinton County.

Both Items a and d would utilize strong Community Relations involvement.

The cost of the remedial/removal response actions will depend on the methods chosen by the EE/CA and cannot be determined at this time. The EE/CA would also help to determine if any of the above-stated concerns would be better addressed under RI/FS and long-term remediation actions.

3) Any longer term remediation would need to be evaluated by an RI/FS which could consider any groundwater contamination and more extensive remediation of the surface water. This could be negotiated with a PRP.

We ask the concurrence of the RDT so we can begin to address the conditions at Circle Smelting and in Beckemeyer, Illinois. Any questions or concerns regarding this briefing memo should be directed to Alan Altur, Site Assessment Team Leader at 6-0390.

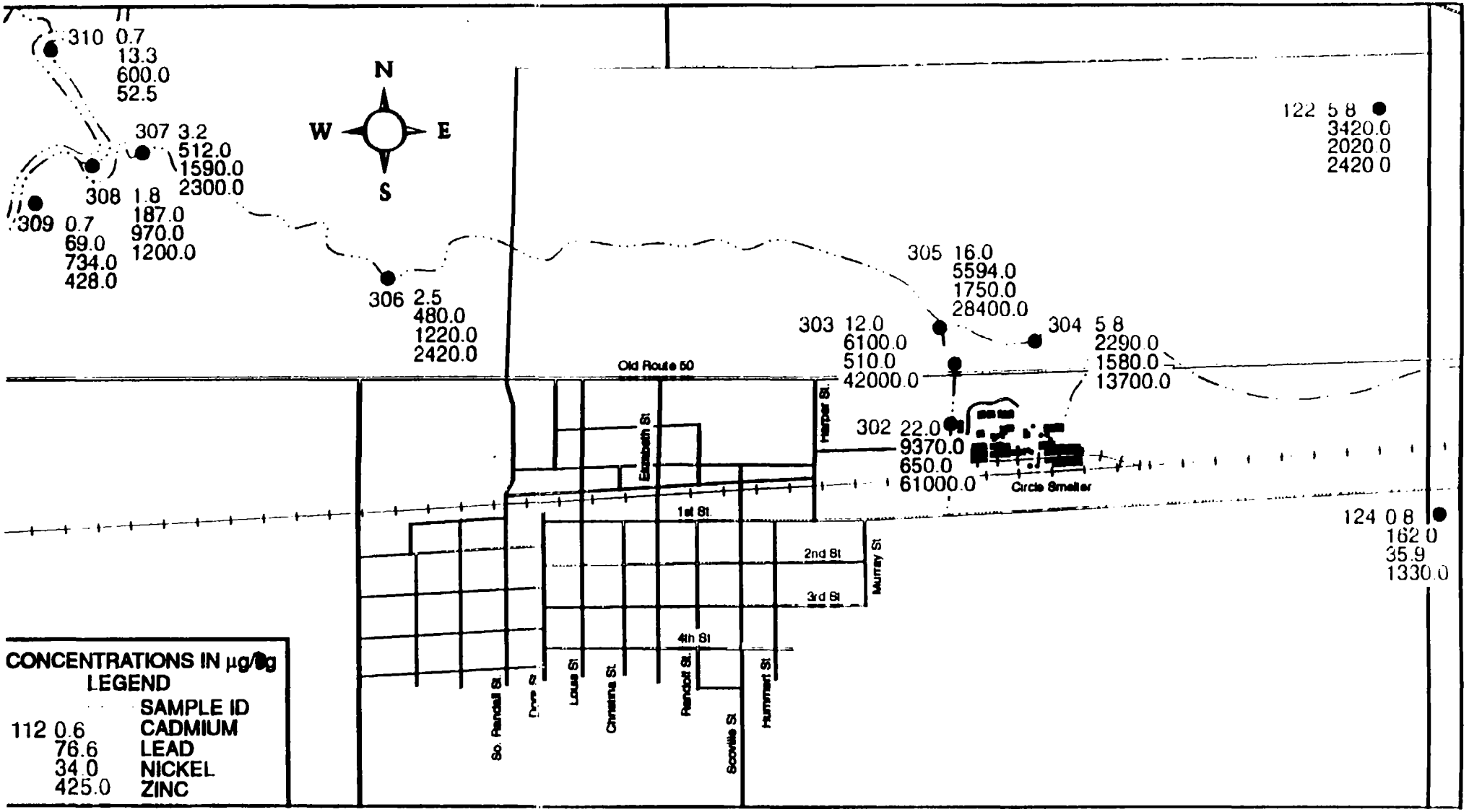


SOURCE: USGS, Beckemeyer, IL Quadrangle 7.5 Minute Series, 1969

CERCLA Expanded Site Inspection Soil Sample Survey
Beckemeyer and Surrounding Area
March, 1992

INORGANICS	X102 Background	X101	X103	X104	X105	X106	X107	X108	X109	X110	X111	X112
Aluminum	13900.0	16200.0	13900.0	16900.0	12200.0	11300.0	11700.0	18100.0	18400.0	12100.0	19700.0	21400.0
Antimony	3.3 R	R	5.4 R	-- R	-- R	-- R	-- R	-- R	-- R	36.1 R	-- R	-- R
Arsenic	9.1 J	6.6 J	10.8 J	23.9 J	7.3 J	7.9 J	25.1 J	11.7 J	10.2 J	33.4 J	7.6 J	8.5 J
Barium	152.0	158.0	130.0	391.0	166.0	168.0	303.0	244.0	209.0	248.0	208.0	412.0
Beryllium	0.8	0.7	0.8	0.9	0.8	0.5	0.8	0.9	0.9	1.1	0.8	1.4
Cadmium	--	--	1.1	1.3	1.2	1.0	1.9	1.6	0.8	4.5	1.2	0.8
Calcium	2960.0	3350.0	1080.0	3010.0	3580.0	1310.0	93700	62700	62500	51100	42900	65700
Chromium	22.1	21.3	22.4	29.3	22.7	18.0	23.0	29.3	28.4	25.4	27.5	33.0
Cobalt	5.96 ← 5.0	7.4	11.7	60.0	5.3	8.1	7.2	10.6	6.7	12.9	5.9	9.3
Copper	10.2	10.1	311.0	67.7	72.8	88.2	144.0	156.0	74.2	956.0	67.8	52.9
Iron	17600.0	16200.0	3800.0	24900.0	13100.0	11900.0	28000.0	20900.0	22400.0	49600.0	18800.0	31900.0
Lead	67.0	24.5	806.0	157.0	382.0	232.0	580.0	534.0	182.0	9470.0	196.0	78.6
Magnesium	1350.0	1670.0	1420.0	2260.0	1510.0	1080.0	1730.0	2560.0	1790.0	1170.0	2280.0	2490.0
Manganese	601.0 J	575.0 J	800.0 J	4740.0 J	699.0 J	943.0 J	685.0 J	869.0 J	517.0 J	444.0 J	432.0 J	394.0 J
Mercury	0.0	--	0.1	0.0	0.0	0.0	0.0	0.1	0.5	0.1	0.0	0.0
Nickel	11.8	11.7	125.0	67.5	43.3	47.9	42.7	75.3	31.6	84.4	44.2	34.0
Potassium	1530.0	1420.0	1210.0	2090.0	2170.0	1250.0	2190.0	2800.0	2020.0	1270.0	2640.0	1640.0
Selenium	1.2 J	0.5 J	0.5 J	0.5 J	0.5 J	0.8 J	1.1 J	1.2 J	0.9 J	0.3 J	0.8 J	0.9 J
Silver	--	--	--	--	--	--	--	--	--	5.0	--	0.6
Sodium	195.0	236.0	133.0	160.0	175.0	113.0	250.0	262.0	189.0	506.0	166.0	485.0
Thallium	-- R	-- R	-- R	-- R	-- R	-- R	-- R	-- R	0.5 R	-- R	-- R	-- R
Vanadium	40.7	39.9	31.2	59.1	32.7	29.8	39.2	43.6	41.2	32.0	40.0	44.4
Zinc	89.9	--	1380.0	1030.0	887.0	944.0	1500.0	1910.0	614.0	17700.0	658.0	425.0
Cyanide	--	--	--	--	--	--	--	--	--	--	--	--

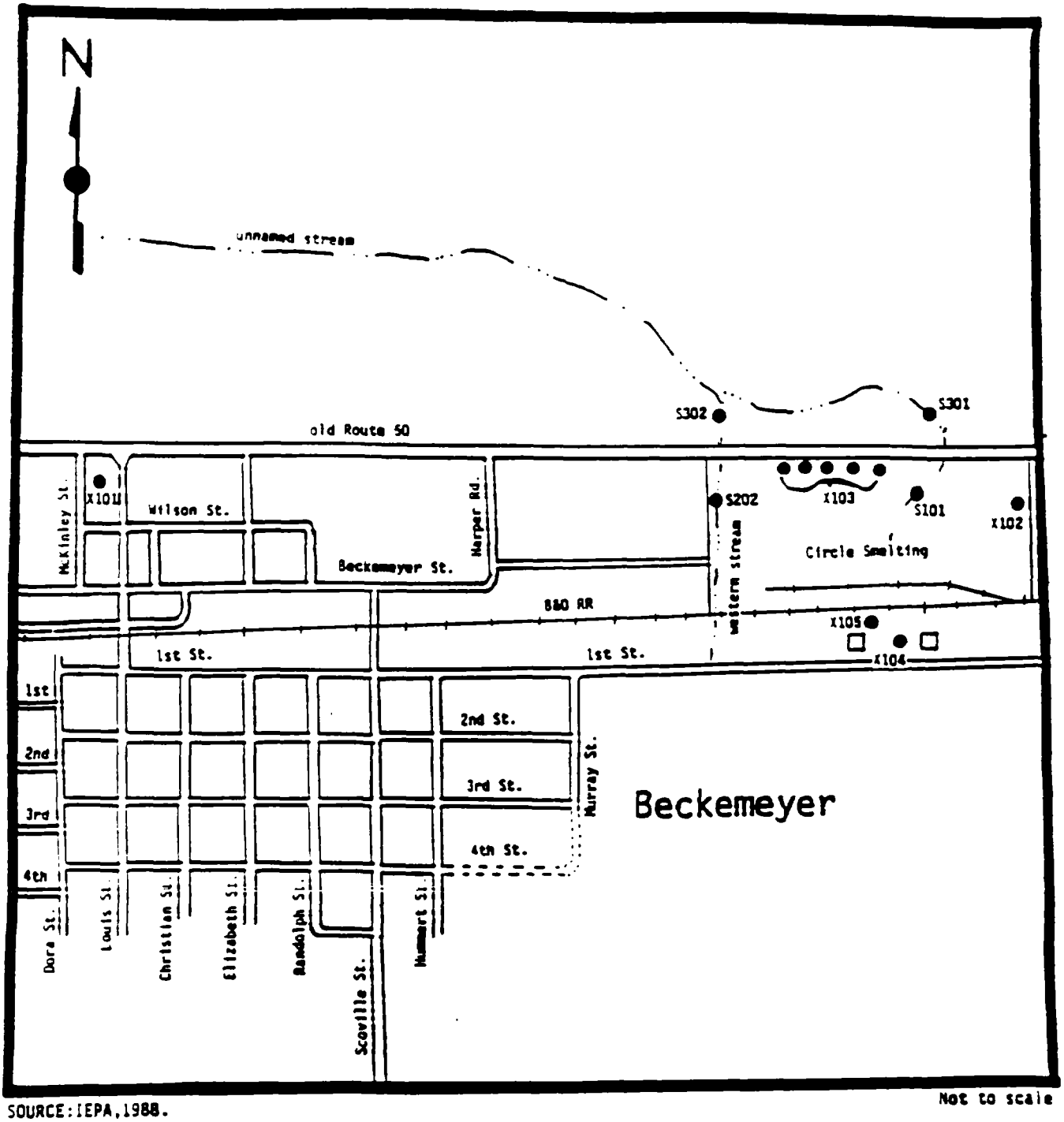
(8)



SELECTED METALS CONCENTRATIONS IN STREAM SEDIMENT AND BACKGROUND SAMPLES

IEPA 1992

EST.



SOURCE: IEPA, 1988.

Not to scale

FIGURE 3-2 SAMPLING LOCATIONS

IEPA SSI 1988

Circle Smelting Corp.
[illegible]

INORGANIC ANALYSIS
SUMMARY

ALL CONCENTRATIONS IN parts per million (ppm)

SAMPLING POINT	S101 7-26-88	S301 7-26-88	S202 7-26-88	S302 7-26-88	I101 7-26-88	I102 7-26-88	I103 7-26-88	I104 7-26-88	[illegible] 7-26-88
PARAMETER									
ALUMINUM	[illegible]	[illegible]3000.0	[illegible]	[illegible]	[illegible]	9700.0	12000.0	10000.0	3500.[illegible]
ANTIMONY									
ARSENIC	[0.31]	[0.28]	20.0	30.0	[1.5]	[illegible]	21.0	3.6	[illegible]
BARIUM	330.0	190.0	230.0	140.0	130.0	140.0	160.0	170.0	[illegible]
BERYLLIUM									
CADMIUM	[illegible]	4.7	22.0	12.0		0.97	54.0	1.9	[illegible]
CALCIUM	3600.0	2800.0	28000.0	4900.0	2400.0	1900.0	3200.0	4400.0	[illegible]
CHROMIUM	25.0	24.0	32.0	37.0	13.0	14.0	71.0	24.0	[illegible]
COBALT	46.0	22.0	30.0	22.0	[9.2]	13.0	26.0	12.0	14.[illegible]
COPPER	190.0	190.0	2800.0	3600.0	71.0	160.0	5800.0	880.0	[illegible]
IRON	34000.0	29000.0	37000.0	37000.0	12000.0	13000.0	34000.0	17000.0	[illegible]
LEAD	330.0	550.0	3370.0	5100.0	200.0	300.0	9300.0	1600.0	[illegible]
MAGNESIUM	2100.0	2400.0	2500.0	1200.0	1300.0	1200.0	2100.0	1200.0	[illegible]
MANGANESE	1600.0	1900.0	1700.0	1100.0	710.0	1100.0	1300.0	920.0	[illegible]
MERCURY			0.69	0.25		0.044	0.30	0.13	[illegible]
NICKEL	230.0	180.0	1000.0	1400.0	25.0	74.0	3200.0	450.0	[illegible]
POTASSIUM	2300.0	1900.0	[650.0]	[510.0]	[1000.0]	1100.0	[650.0]	[980.0]	1000.[illegible]
SELENIUM				1.6	[0.50]	[0.58]	1.5	1.5	[illegible]
SILVER					5.0	4.6	5.8		[illegible]
SODIUM	[110.0]	[110.0]	[500.0]	[310.0]			[300.0]	[250.0]	[illegible]
THALLIUM									
TIN									
VANADIUM	63.0	72.0	35.0	30.0	26.0	31.0	25.0	30.0	[illegible]
ZINC	5600.0	5800.0	51000.0	42000.0	640.0	3500.0	72000.0	11000.0	5400.[illegible]
CYANIDE						0.44			[illegible]
SULFATE	[illegible]	100.0	1200.0	310.0	130.0	100.0	310.0	2500.0	[illegible]
SULFIDE				[illegible]					
pH (lab/field)									
CONDUCTIVITY [illegible]									

ATTACHMENT E

ARARs LIST

Table 3-2
Applicable or Relevant and Appropriate Requirements and to be Considered Documents
Circle Smelting Site
EE/CA
Beckemeyer, IL

ARAR	Comments	Compound Concentrations		Citation	Classification
Chemical-Specific ARARs					
Office of Emergency and Remedial Response/Office of Waste Programs Enforcement	Directive sets forth an interim soil cleanup level for total lead, considered to be protective for direct contact at residential settings	Lead	500 to 1,000 mg/kg	OSWER Directive 9355.4-02 1989	To be considered
Clean Water Act	Prohibits the discharge of any pollutant from any point source to navigable waters	Metals-bearing cinder mixtures	N/A	CWA § 301	Applicable
Safe Drinking Water Act	Maximum contaminant level Maximum contaminant level Maximum contaminant level Secondary mcl	Lead Arsenic Cadmium Zinc	15 µg/L 50 µg/L 5 µg/L 5000 µg/L	SDWA § 300 g-1; 40 CFR 141.61	Relevant and Appropriate Relevant and Appropriate Relevant and Appropriate Relevant and Appropriate
Clean Water Act	Criteria for Aquatic Life Protection Federal Water Quality Criteria	Lead Arsenic Cadmium Zinc	3.2 µg/L 190 µg/L 110 µg/L	45 CFR 79318	Relevant and Appropriate
Illinois Water Pollution Control	Criteria for in-stream water quality	Lead Arsenic Zinc Chromium (total) Copper Nickel Silver	100 µg/L 190 µg/L 1 µg/L Calculate Calculate 1.0 mg/L 5.0 µg/L	Illinois Administrative code (IAC) 35 § 302.208	Application and Relevant
Illinois Water Pollution Control	Illinois effluent standards would apply if hydraulic dredging were implemented	Arsenic Cadmium Chromium (total) Copper Lead Nickel Silver Zinc	0.25 mg/L 0.15 mg/L 1.0 mg/L 0.5 mg/L 1.0 mg/L 0.1 mg/L 0.2 mg/L 1.0 mg/L	35 IAC 304.124	Applicable

Table 3-2
Applicable or Relevant and Appropriate Requirements and to be Considered Documents
Circle Smelting Site
EE/CA
Beckemeyer, IL

ARAR	Comments	Compound Concentrations		Citation	Classification
Construction and Operating Permit—Illinois Water Pollution Control	A permit from IEPA would be required to construct and operate a disposal facility, such as a settling system for hydraulically-dredged sediments/solids	N/A	N/A	35 IAC 309.202 and .203	Applicable
Ontario Sediment Guidelines	Concentrations of compounds in sediment that may have a severe effect on ecological; guidelines accepted for the Great Lakes region	Lead Arsenic Zinc	250 mg/kg 33 mg/kg 850 mg/kg		To be considered
Background soil concentrations	Concentrations of compounds measured by IEPA across State of Illinois to determine range and mean or median concentrations, based on site investigation files.	Lead Arsenic Cadmium Zinc	25.1 (4.7–346) mg/kg 7.1 (0.4–24) mg/kg 0.65 (0.1–8.2) mg/kg 114 (2.8–798) mg/kg	Summary statistics for Back-ground Inorganic Soil Data for IL—Correspondence with IEPA 12/30/93	To be considered
Action level for residential environment	Protection against direct contact—soil	Lead	500 mg/kg	ROD—EPA Region V—Arcanum Iron and Metal Site, Ohio	To be considered agency policy
Action level for residential environmental	Protection against ingestion—soil	Lead	500 mg/kg	ROD—EPA Region V—United Scrap Lead, Ohio	To be considered agency policy
Soil Concentration Range to Limit Blood Lead Levels in Children	Concentration of compound in soil identified to be protective against increased blood lead levels	Lead	500–1,000 mg/kg	Center for Disease Control, 1985	To be considered
Action-Specific					
Land Disposal Restrictions	Prohibited wastes, exhibiting a characteristic under 40 CFR Part 261, Subpart C cannot be land-disposed unless treated to eliminate characteristic properties.	Lead (TCLP) Arsenic (TCLP) Cadmium (TCLP)	5.0 mg/L 5.0 mg/L 1.0 mg/L	40 CFR 268.9 (c)	Applicable

Table 3-2
Applicable or Relevant and Appropriate Requirements and to be Considered Documents
Circle Smelting Site
EE/CA
Beckemeyer, IL

ARAR	Comments	Compound Concentrations		Citation	Classification
CERCLA-wastes	CERCLA wastes may only be transferred to facilities that are in compliance with RCRA, TSCA, or other applicable federal and state requirements.	N/A	N/A	CERCLA § 121 (d)(3)	Applicable
Capping	If a final remedy, cap must meet requirements specified in RCRA; including design and operating requirements	N/A	N/A	40 CFR 264.278 40 CFR 264.310 40 CFR 264.117 40 CFR 264.258	Applicable
Corrective Action Management Unit (CAMU) Policy	EPA may designate portion of site as CAMU, allowing placement of RCRA waste without triggering LDRs	Lead (TCLP) Arsenic (TCLP) Cadmium (TCLP)	5.0 mg/L 5.0 mg/L 1.0 mg/L	RCRA §7003 40 CFR 260	Relevant and appropriate
Surface Water Controls	For waste piles, land treatment, or landfills, if a final remedy, owners of these remediation hazardous waste management facilities must comply with RCRA-specified design and operating requirements to control surface water infiltration to prevent migration of wastes out of the unit, prevent flow onto the treatment zone, and control leachate generation and migration.	N/A	N/A	40 CFR 264.251 (M) 40 CFR 264.273 40 CFR 264.301	Applicable
Disposal or Decontamination of Equipment, Structures and/or Soils	Owner/operator may become generator of remediation hazardous waste,and all materials must be properly disposed of, or decontaminated.	N/A	N/A	40 CFR 264.114	Applicable
OSHA Occupational Exposure Standards	No worker shall be exposed to concentrations greater than applicable standards	Lead Arsenic Cadmium dust Inert/nuisance dust Total dust	0.15 mg/m^3 0.5 mg/m^3 0.2 mg/m^3 5 mg/m^3 15 mg/m^3	29 CFR 1910.1000 29 CFR 1910.1018 (c) 29 CFR 1910.1025 (c)	Applicable Applicable Applicable Applicable Applicable

Table 3-2
Applicable or Relevant and Appropriate Requirements and to be Considered Documents
Circle Smelting Site
EE/CA
Beckemeyer, IL

ARAR	Comments	Compound Concentrations		Citation	Classification
Dredging and Fill Material Permitting	Permits from U.S. Army COE may be required for the discharge of dredged or fill materials into navigable waters	N/A	N/A	CWA § 404	Applicable
Discharge of Any Pollutant Into Navigable Waters	Discharge of any pollutant into navigable waters, except by permit, is illegal.	N/A	N/A	CWA § 301	Applicable
National Ambient Air Quality Standards	No person shall cause or contribute to concentrations of specific compounds in the ambient air exceeding NAAQ standards.	Lead Particulate matter (PM-10)	1.5 µg/m[31] 150 µg/m[32]	CAA § 112; 35 IAC 243.126 CAA § 112; 35 IAC 243.120	Applicable Applicable
Significant Archaeological or Historical Data—Archaeological and Historic Preservation Act	**If significant scientific, prehistorical, historic, or archaeological data are found, they must be preserved in an appropriate manner.**	**N/A**	**N/A**	**40 CFR § 6.301 (c)**	**Applicable**
Significant Structures or Objects Eligible for National Register of Historic Places—National Historic Preservation Act	If any district, site, building, structure, or object which is included in or eligible for the National Register of Historic Places, is located in the area affected by the removal action, consultation with the State Historic Preservation Officer is required, and efforts should be undertaken to avoid impacts on these areas.	N/A	N/A	40 CFR § 6.301 (b)	Applicable
Critical habitat upon which endangered species or threatened species depend	A determination must be made to identify threatened or endangered species within the drainageways.			Endangered Species Act 16 USC 1531	Applicable

[1]Per quarterly average
[2]Per 24-hour average
[3]Per 8-hour, time-weighted average

ATTACHMENT F

DESCRIPTION OF COSTS

Table 5-6
Summary of Cost Estimate
Alt. 5 - Excavation of Residential Soils & Sediment with Onsite Disposal and Containment of Onsite Soil/Materials with a Soil Cap

Line Item	Description	Subcategory Subtotal	Category Subtotal
General Construction Capital Costs			
	Site Preparation	$27,000	
	Plant Decontamination Facilities	$74,000	
	Subtotal		$101,000
Residential Area Capital Costs			
	Handling of Materials		
	-Soil & Cinders	$589,000	
	-Deposition Area Soils South of Plant	$160,000	
	Sampling	$23,000	
	Subtotal		$772,000
Drainageways Capital Costs			
	Site Modifications	$20,000	
	Handling of Materials	$300,000	
	Subtotal		$320,000
Plant Site Capital Costs			
	Site Work		
	- Plant Area	$389,000	
	- Former Pond Bottom Area	$26,000	
	- General	$40,000	
	Handling of Materials		
	- Plant Area Cap Construction	$605,000	
	- Pond Bottom Area Cap Construction	$442,000	
	- Soil Consolidation Plant Area	$514,000	
	- Soil Consolidation Plant Drainage Channels	$73,000	
	Confirmation Sampling	$2,000	
	Subtotal		$2,091,000
TOTAL MOB, DEMOB, CONTINGENCIES			
	Mobilization/Demobilization @ 10%	$386,000	
	Field Detail Allowance @ 5%	$193,000	
	Bid Contingency @ 20%	$773,000	
	Scope Contingency @ 25%	$966,000	
	Subtotal		$2,318,000
TOTAL OTHER COSTS			
	Administrative @ 5%	$280,000	
	Services During Construction @ 5%	$280,000	
	Permits & Legal @ 5%	$280,000	
	Engineering Design Cost @ 10%	$560,000	
	Subtotal		$1,400,000
TOTAL CAPITAL COST			
	Subtotal		$7,002,000
OPERATIONS & MAINTENANCE COST			
	Average Annual O & M	$159,000	
	Maintenance Materials & Labor	$111,000	
	Subtotal		$270,000
TOTAL OPERATIONS & MAINTENANCE (15 Year Life)			
	Subtotal		$2,444,000
TOTAL PRESENT WORTH			***$9,446,000***

ATTACHMENT G

ENFORCEMENT CONFIDENTIAL ADDENDUM

CIRCLE SMELTING CORPORATION SITE
BECKMEYER, ILLINOIS
MAY 1996

ENFORCEMENT CONFIDENTIAL
NOT SUBJECT TO DISCOVERY

(REDACTED 2 PAGES)

ATTACHMENT H

ADMINISTRATIVE RECORD INDEX

AR

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMOVAL ACTION

ADMINISTRATIVE RECORD
FOR
CIRCLE SMELTING CORPORATION
BECKEMEYER, ILLINOIS

April 1, 1994

DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
00/00/00	CLEA, Inc.	U.S. EPA	Work Plan Introduction	7
06/22/87	Dunn, G.,	U.S. EPA	Narrative Summary	48
10/17/88	IEPA	U.S. EPA	CERLA Screening Site Inspection Report	180
10/31/90	Rodden, D., Henry, Meisen-heimer & Gende, Inc.	Warnecke, A., Village of Beckemeyer	Letter re: Potable Water Flow and Pressure	4
08/11/92	Pitzer, J., IDPH	Warnecke, A., Village of Beckemeyer	Letter re: the Village's Water System	1
08/13/92	Warnecke, A., Village of Beckemeyer	Gauss, M., Illinois Dept. of Commerce & Community Affairs	Letter Re: Grant Funds	2
05/12/93	Long, T. IDPH	Muroya, M. U.S. EPA	Memo Re: Public Health Consultation	3
05/22/93	Ecology & Environment	U.S. EPA	Site Assessment	50
07/12/93	Kuiken, R.	U.S. EPA	Statement of Need: Requirement for Replacement of Water System	1
07/23/93	U.S. EPA	U.S. EPA	Analytical Sampling Package, With Master List	170

08/19/93	Dachtler, F., Ecology & Environment	Nordine, J., Ecology & Environment	Inorganic Metals Data Quality Assurance Review	18
01/05/94	Ecology & Environment	U.S. EPA	Letter Report	148
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