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November 1994

EPA Superfund Record of Decision:

Interstate Lead Company, Leeds, AL, 10/13/1994

RECORD OF DECISION

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

FOR

OPERABLE UNIT TWO

AND

AMENDMENT TO RECORD OF DECISION

FOR

OPERABLE UNIT ONE

INTERSTATE LEAD COMPANY (ILCO) SUPERFUND SITE

LEEDS, JEFFERSON COUNTY, ALABAMA

PREPARED BY

U. S. ENVIRONMENTAL PROTECTION AGENCY

REGION IV

ATLANTA, GEORGIA

DECLARATION
of the
RECORD OF DECISION
for
OPERABLE UNIT TWO
and
AMENDED RECORD OF DECISION
for
OPERABLE UNIT ONE

SITE NAME AND LOCATION

Interstate Lead Company (ILCO) Superfund Site
Leeds, Jefferson County, Alabama

STATEMENT OF BASIS AND PURPOSE

This decision document (Record of Decision) presents the selected remedial action for Operable Unit Two of the ILCO Superfund Site in Leeds, Alabama and documents fundamental changes to EPA's previous September 1991 Record of Decision for Operable Unit One. The selected remedial action was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended, and to the extent practicable, the National Contingency Plan (NCP) 40 CFR Part 300.

This decision is based on the administrative record for the ILCO Superfund Site.

The State of Alabama has concurred with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the ILCO Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare or the environment.

DESCRIPTION OF SELECTED REMEDY

The ILCO Site is divided into three operable units. Operable unit one was defined in the Record of Decision that was signed by EPA on September 30, 1991. Operable unit one includes soil, sediment, and ground water contamination at the seven satellite sites located in and around the City of Leeds. Operable unit two, which is enumerated by this Record of Decision, includes soil and ground water contamination at the ILCO Main Facility. Operable unit three will address the surface water and sediment contamination attributable to the ILCO Main Facility. The selected remedy for operable unit two and the modified remedy for operable unit one call for the design and implementation of response measures which will protect human health and the environment.

The major components of the selected remedy for operable unit two include:

- Conduct a Site-specific field-scale treatability study to determine the effectiveness of the acid leaching process on the types of soil at the ILCO Site during the design phase;

- If the treatability study concerning the acid leaching of contaminated soil and other waste fails to meet the required performance standards in a cost-effective and timely manner, Alternative S-3, Solidification/ Stabilization, will be implemented;

- Excavate contaminated soil, treat soil to established performance standards onsite by acid leaching, if determined to be effective during the treatability study, otherwise treat soil to established performance standards onsite by solidification/stabilization;

- If acid leaching is implemented, backfill excavated areas onsite with treated (i.e., clean) soil. If solidification/stabilization is implemented, dispose of treated (i.e., stabilized) soil in an onsite engineered containment cell and backfill excavated areas with clean fill. Grade and revegetate excavated areas once backfilled;

- Decontaminate/treat debris using specific best demonstrated available technologies (BDAT) based on the type of debris and the type of contaminants present in the debris; recycle decontaminated debris that can be recycled and dispose of decontaminated debris that cannot be recycled offsite in a non-hazardous landfill; debris which cannot be decontaminated will be disposed offsite in a permitted hazardous waste landfill; decontaminate any remaining buildings and/or structures onsite;

- Package and ship slag that can be recycled to an offsite permitted facility for recovery of lead using a secondary smelter; non-recyclable slag will be solidified/stabilized and disposed offsite in a permitted hazardous waste landfill, if acid leaching is implemented; if solidification/stabilization is implemented, non-recyclable slag will be solidified/stabilized to pass the Toxicity Characteristic Leaching Procedure (TCLP) test and disposed in the onsite containment cell;

- Package and ship battery casing components and battery chips that can be recycled to an offsite permitted facility for recovery of lead using a secondary smelter; non-recyclable components that fail TCLP will be disposed offsite in a permitted hazardous waste landfill and non-hazardous, non-recyclable components will be disposed offsite in a non-hazardous landfill, if acid leaching is implemented; if solidification/stabilization is implemented, non-recyclable components will be solidified/stabilized to pass TCLP, if necessary, and disposed in the onsite containment cell;

- Send roll-off boxes of baghouse dust (K069) offsite to a RCRA permitted Treatment, Storage, and Disposal (TSD) facility. Teatment and disposal of the baghouse dust shall comply with all pertinent ARARs, including Land Disposal Restrictions (LDRs);

- Monitor air emissions from OU-2 during remedial action activities;

- Conduct additional ground water investigations on operable unit two during the design phase to fill data gaps and determine the technical practicability of restoring the ground water aquifer to its beneficial use;

- Pump contaminated ground water from the shallow, intermediate, and deep zones of the aquifer, where technically practicable, using a ground water extraction system of trenches and wells;

- Treat the ground water contaminated with inorganics to established performance standards via precipitation/flocculation using the existing onsite water treatment plant (with necessary renovation), if available;

- Segregate ground water in the shallow extraction system from the intermediate and deep ground water for treatment of both free phase and dissolved phase hydrocarbons. Shallow ground water will pass through an organics treatment system before entering the treatment train for inorganics shared with ground water extracted from the intermediate and deep zones;

- Discharge treated ground water effluent, meeting applicable requirements, to the unnamed tributary adjacent to the ILCO Main Facility; and

- Implement institutional controls, as necessary, for both ground water usage and land usage at OU-2.

The major components of the amended remedy for operable unit one include:

- Excavate contaminated soil with lead concentrations exceeding 300 mg/kg;

- Excavate and dewater sediments at the Gulf/BP Service Station with lead concentrations exceeding 50 mg/kg;

- Transport all contaminated soil and dewatered sediment to the ILCO Main Facility for treatment by acid leaching (or solidification/stabilization if acid leaching does not meet performance standards during the treatability study);

- Remove slag, battery casings, and other contaminated debris from the satellite sites and transport to the ILCO Main Facility;

- Package and ship slag that can be recycled to an offsite permitted facility for recovery of lead using a secondary smelter; non-recyclable slag will be solidified/stabilized and disposed offsite in a permitted hazardous waste landfill, if acid leaching is implemented; if solidification/stabilization is implemented, non-recyclable slag will be solidified/stabilized to pass TCLP and disposed in the onsite containment cell at the ILCO Main Facility;

- Package and ship battery casing components and battery chips that can be recycled to an offsite permitted facility for recovery of lead using a secondary smelter; non-recyclable components that fail TCLP will be disposed offsite in a permitted hazardous waste landfill and non-hazardous, non-recyclable components will be disposed offsite in a non-hazardous landfill, if acid leaching is implemented; if solidification/stabilization is implemented, non-recyclable components will be solidified/stabilized to pass TCLP, if necessary, and disposed in the onsite containment cell at the ILCO Main Facility;

- Decontaminate/treat debris using specific best demonstrated available technologies (BDAT) based on the type of debris and the type of contaminants present in the debris; recycle decontaminated debris that can be recycled and dispose of decontaminated debris that cannot be recycled offsite in a non-hazardous landfill; debris which cannot be decontaminated will be disposed offsite in a permitted hazardous waste landfill; decontaminate any remaining buildings and/or structures onsite;

- Backfill excavated areas at the ILCO Parking Lot with treated (i.e., clean) soil from the acid leaching process (or clean fill if solidification/stabilization is implemented instead of acid leaching);

- Backfill excavated areas at the other satellite sites, excluding the City of Leeds Municipal Landfill, with clean fill;

- Revegetate excavated areas once backfilled;

- Temporarily relocate Connell Property residents and Acmar Church of God congregation, if necessary; and

- Monitor air emissions from the satellite sites during remedial action activities.

EPA is not amending the selected OU-1 soil (source) remedy for the City of Leeds Municipal Landfill or any of the selected OU-1 ground water remedies.

STATUTORY DETERMINATIONS

The selected remedy and the contingency measures for OU-2 and the modified remedy for OU-1 are protective of human health and the environment, comply with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action (unless such requirements are waived), and are cost-effective. The selected remedy for OU-2 and the modified remedy for OU-1 satisfy the preference for treatment that reduces toxicity, mobility, or volume as a principal element. Finally, it is determined that the selected remedy for OU-2 and the modified remedy for OU-1 utilize a permanent solution and alternative treatment technology to the maximum extent practicable. A review will be conducted within five years from commencement of the remedial action for ground water and for soil, if the contingent remedy is implemented, at OU-2 and for ground water at OU-1 to ensure that the remedy continues to provide adequate protection of human health and the environment.

Patrick M Tobin

for John H. Hankinson, Jr, Regional Administrator

10-13-94

Date

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Decision Summary
for the
Record of Decision
for
Operable Unit Two

Interstate Lead Company (ILCO) Site
Leeds, Alabama

1.0 SITE LOCATION AND DESCRIPTION

The Interstate Lead Company (ILCO) Superfund Site is located approximately 15 miles east of Birmingham, in Leeds, Jefferson County, Alabama (see Figure 1-1, Site Location Map). The ILCO Site consists of the ILCO Main Facility and seven satellite sites located in and around the City of Leeds, where lead-contaminated wastes from the ILCO Main Facility were disposed.

The ILCO Main Facility is located at 1247 Borden Avenue on the southwestern side of the City of Leeds. The ILCO Main Facility (including the ILCO Parking Lot across the street) occupies approximately 11.5 acres of real property, most of which is owned by ILCO with a portion owned by Interstate Trucking Company, Inc., an affiliated company. The ILCO Main Facility is bordered by an abandoned foundry and a wooded area to the south, an unnamed tributary to Dry Creek to the west, Borden Avenue and the ILCO Parking Lot to the north, and another business to the east (see Figure 1-2, Site Layout). The area is primarily industrial with a few residences within a half-mile radius.

The satellite sites include the ILCO Parking Lot, located across the street from the ILCO Main Facility; the Gulf/BP Service Station, located in the center of Leeds on U.S. Highway 78; J&L Fabricators, located east of Leeds on U.S. Highway 78; Fleming's Patio, located west of Leeds on Alaska Avenue; the Connell Property, located east of Leeds in St. Clair County; the Acmar Church of God, located off Acmar Road in Moody, Alabama; and the City of Leeds Municipal Landfill, located off Dunavant Road at the end of Peach Street.

ILCO operated a secondary lead smelting and lead battery recycling business from 1970 to 1992 at the ILCO Main Facility. In March 1992, ILCO ceased operating pursuant to an order of a state court of Alabama. ILCO manufactured refined lead alloys through the smelting and refining of lead-bearing scrap materials. The primary materials reclaimed by ILCO were discarded lead-acid automobile and industrial batteries. The used batteries were cracked and the lead plates and lead oxides were smelted in a blast furnace. Furnace slag was produced as a by-product and is regulated under the Resource Conservation and Recovery Act (RCRA) as a characteristic hazardous waste due to its lead content. Wastewater treatment sludge and baghouse dust were also generated. Wastewater treatment sludge is a RCRA regulated hazardous waste and baghouse dust is a RCRA listed hazardous waste (K069). ILCO stored furnace slag,

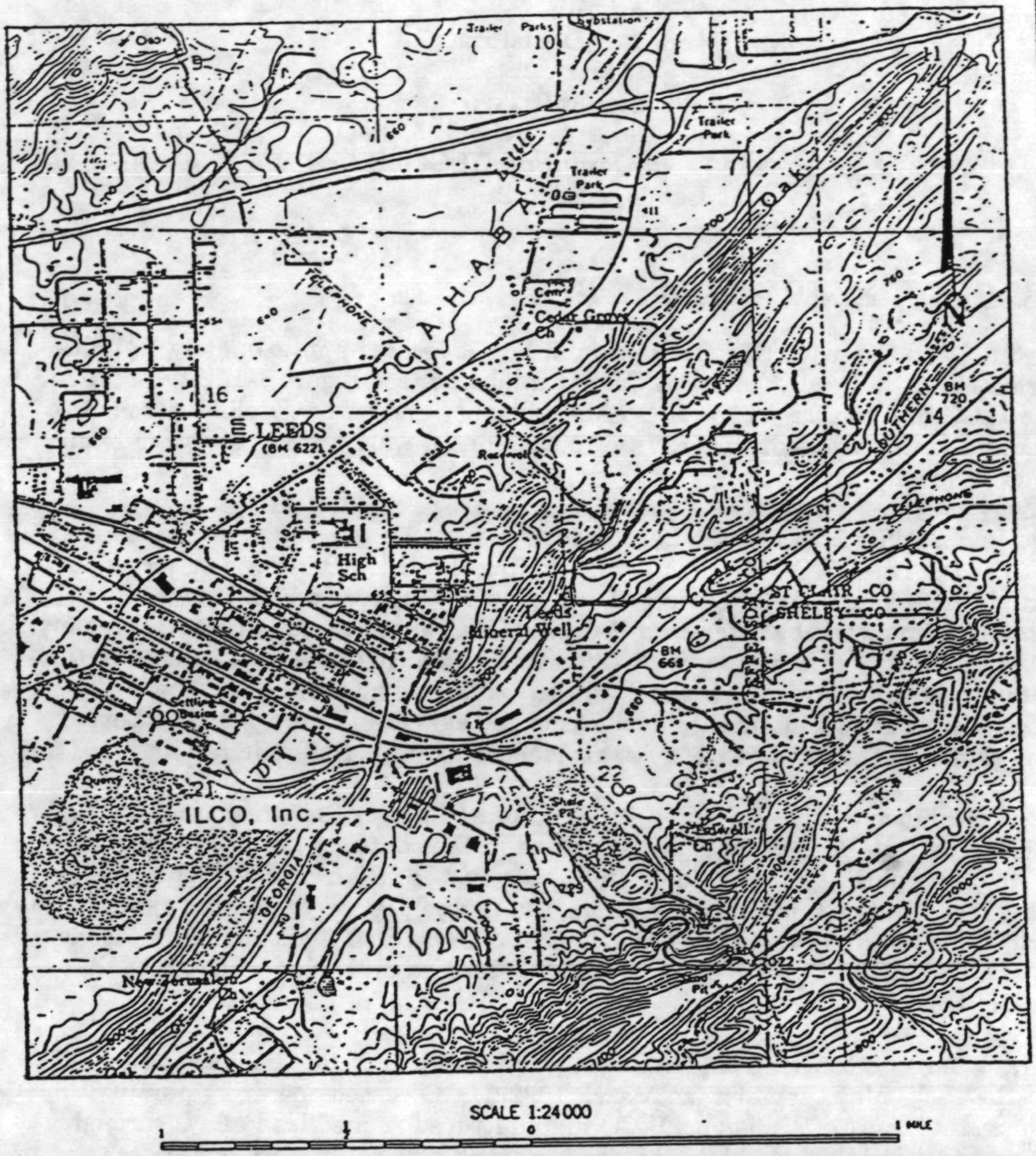

FIGURE 1-1
SITE LOCATION MAP
ILCO SUPERFUND SITE
LEEDS, ALABAMA

FROM: DAMES AND MOORE

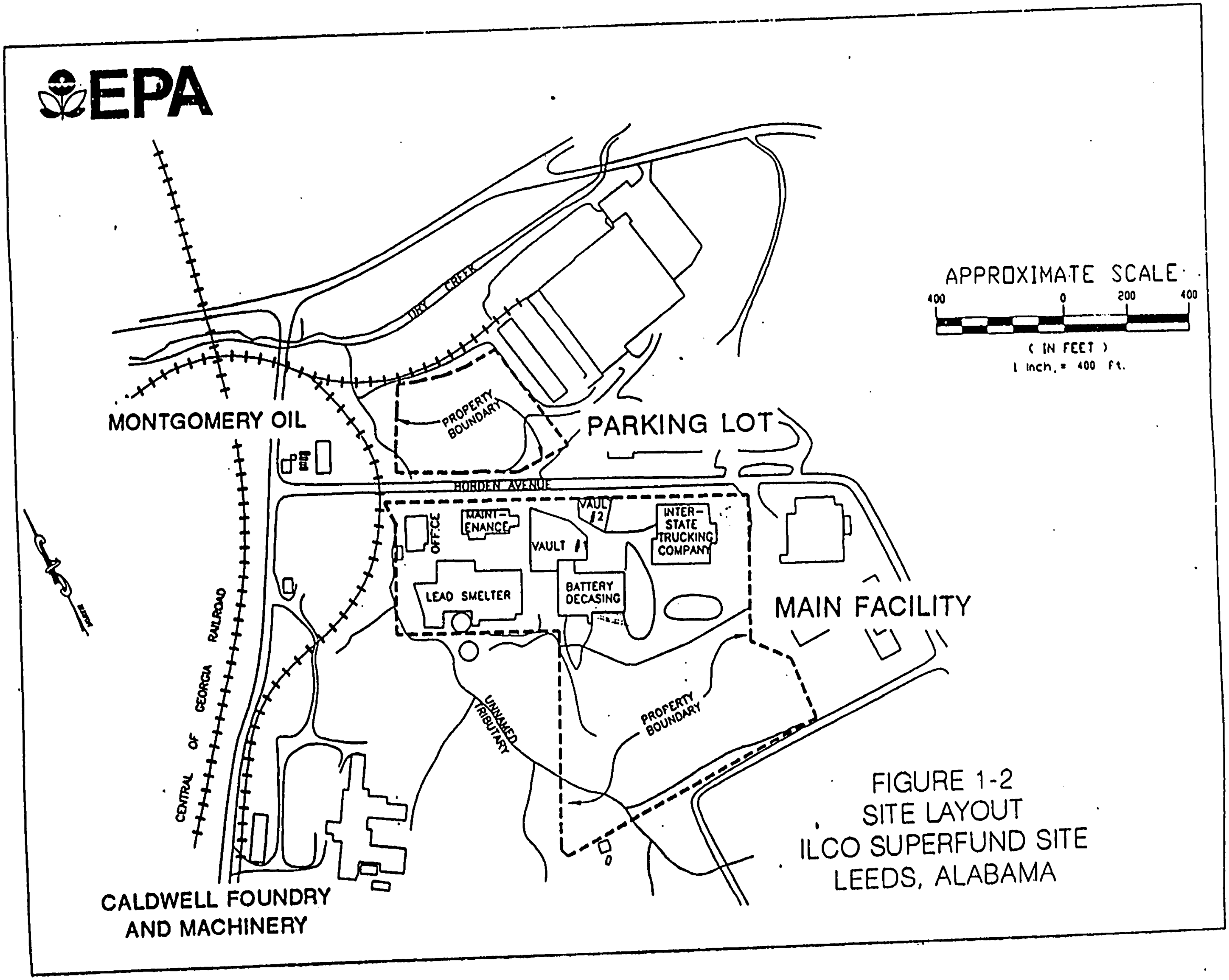

FIGURE 1-2
SITE LAYOUT
ILCO SUPERFUND SITE
LEEDS, ALABAMA

battery chips, and wastewater treatment sludge in piles on the ILCO Main Facility. Furnace slag generated by ILCO was used as fill material at the ILCO Main Facility and at the satellite sites. Wastewater treatment sludge and battery casings were also disposed of at the ILCO Main Facility and at some of the satellite sites.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

In May 1984, EPA and the Alabama Department of Environmental Management (ADEM) conducted a joint inspection of the ILCO Main Facility, which was found to be in violation of the interim status standards set forth in RCRA.

In March 1985, the United States brought suit against ILCO and its principal, Diego Maffei, seeking injunctive relief, penalties, and damages for violations of the Clean Water Act and RCRA. The government also sought to recover response costs pursuant to CERCLA for a removal action taken by EPA at the Acmar Church of God satellite site. The complaint also included a count for corrective action at the ILCO Main Facility. The case was brought in the United States District Court for the Northern District of Alabama (District Court Case). The State of Alabama intervened in the litigation asserting violations of Alabama's Water Pollution Control Act and Hazardous Waste Management and Minimization Act.

There was a partial settlement of the District Court Case in August 1988. A partial consent decree was entered requiring ILCO to conduct all necessary corrective actions and remediation of contaminated sediment in the surrounding waterways.

The outstanding issues were tried in July and August 1988. On December 10, 1990, the district court issued an Order and Findings of Fact and Conclusions of Law holding that the defendants had violated the Clean Water Act and RCRA and that injunctive relief and penalties were appropriate. The court also found that the defendants were liable for all response costs incurred by the United States in connection with the removal action at the Acmar Church of God satellite site.

In its December 10, 1990 Order, the district court did not enter a judgment but ordered the parties to endeavor to reach an agreement as to the relief which should be provided. The parties were unable to come to such an agreement, and each submitted a proposed final judgment. On October 8, 1991, the court entered a judgment. The district court granted injunctive relief and assessed a penalty of two million dollars against ILCO, in favor of the United States, for violations of RCRA and the Clean Water Act. In addition, the district court entered judgment in favor of the United States against ILCO and Diego Maffei, in the amount of $845,033.40, as reimbursement for response costs for the removal action at the Acmar Church of God satellite site. The district court also awarded a penalty in the amount of $1.5 million in favor of the State of Alabama.

On appeal, the Eleventh Circuit Court issued a decision in favor of the United States and the State of Alabama on every issue and affirmed the district court's award of civil penalties and response costs.

In June 1986, the ILCO Site (including the ILCO Main Facility and the seven satellite sites) was placed on the National Priorities List (NPL) of uncontrolled hazardous waste sites.

EPA conducted a Remedial Investigation/Feasibility Study (RI/FS) of the satellite sites (Operable Unit One), which was completed in July 1991. A proposed plan was issued shortly after completion of the RI/FS. After a public comment period, a Record of Decision (ROD) was signed on September 30, 1991, which set forth the selected remedy for the satellite sites.

When ILCO ceased operations in March 1992, EPA initiated a removal action to mitigate the imminent threat associated with the abandoned ILCO Main Facility. During the removal action at the ILCO Main Facility, approximately 5368 tons of lead contaminated slag, found stored in different areas around the facility, were removed to a permitted hazardous waste landfill. Approximately 200,000 gallons of lead contaminated sludge found in the onsite wastewater treatment system was removed, stabilized, and stockpiled onsite with contaminated soils excavated from the facility. Acid from several impoundments was collected and treated in the onsite wastewater treatment system, in addition to approximately 15,000,000 gallons of wastewater. The battery cracking building, the furnace building, and the small slag vault were demolished and decontaminated due to extensive lead contamination. The contents of the small slag vault were removed and stockpiled onsite with the contaminated soils. Waste encountered during the demolition of the furnace building included lead waste, baghouse dust, and a sulfur residue from the emissions system. The lead waste was stockpiled inside a building onsite. The baghouse dust was placed into two roll-off boxes, covered, labeled K069, and also stored inside a building onsite. The sulfur residue found inside the duct pipe was placed on the contaminated soil stockpile. During the demolition of the battery cracking building, process soils from the battery cracking operation were removed and stockpiled inside a building onsite. The process soils consisted of a mixture of battery chips and contaminated soils.

EPA conducted a RI/FS of the ILCO Main Facility (Operable Unit Two), which was completed in June 1994.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Leeds Public Library at 802 Parkway Drive, S.E. in Leeds, Alabama is the local information repository for the ILCO Site. The proposed plan for Operable Unit Two and notice of the proposed modifications to the ROD for Operable Unit One was issued and a public comment period was established from July 11, 1994 to September 9, 1994. A public meeting on the proposed plan was held on July 21, 1994.

The administrative record for the ILCO Site is available to the public at both the information repository maintained at the Leeds Public Library and at the EPA Region IV Library at 345 Courtland Street in Atlanta, Georgia. The notice of availability for the proposed plan for Operable Unit Two was published in The Birmingham News on July 13, 1994 and July 18, 1994 and in The Leeds News on July 14, 1994 and July 21, 1994. A 30-day extension to the public comment period was requested and granted by EPA. The 30-day extension notice was published in The Birmingham News on July 22, 1994 and July 28, 1994 and in The Leeds News on August 4, 1994 and August 11, 1994. Responses to the significant comments received during the public comment period are included in the Responsiveness Summary, which is part of this ROD and designated Appendix A.

This decision document presents the selected remedial action for OU-2 of the ILCO Site, chosen in accordance with CERCLA, as amended, and to the extent practicable, the NCP. The decision for OU-2 is based on the administrative record. The requirements under Section 117 of CERCLA/SARA for public and state participation have been met for this operable unit.

4.0 SCOPE AND ROLE OF OPERABLE UNITS

The problems at the ILCO Site are complex. As a result, EPA has divided the work into three manageable components called "operable units" in order to simplify remedial planning and response activities associated with the disposal and discharge of contaminated media from the Site as follows:

Operable Unit One (OU-1): The seven satellite sites located in and around the City of Leeds. Contaminated soil, ground water and sediment at the seven satellite sites are addressed in OU-1, excluding ground water at the ILCO Parking Lot satellite site. Ground water contamination at the ILCO Parking Lot will be addressed in Operable Unit Two.

Operable Unit Two (OU-2): The ILCO Main Facility. Contaminated soil at the ILCO Main Facility and contaminated ground water at the ILCO Main Facility and ILCO Parking Lot are addressed in OU-2.

Operable Unit Three (OU-3): The Unnamed Tributary and Dry Creek. Contaminated surface water, sediment, fish, and other aquatic organisms will be addressed in OU-3.

This ROD is for OU-2 of the ILCO Site and documents the selected remedy for contaminated soil and ground water at the ILCO Main Facility. This ROD also amends the soil remedy previously selected as part of the ROD for OU-1 issued on September 30, 1991. Based on the results and recommendations of a biological assessment performed by EPA at the ILCO Site, EPA separated the unnamed tributary and Dry Creek into another operable unit (OU-3) for further investigation of the surface water, sediment, fish, and other aquatic organisms. This additional investigation began in July 1994 and is currently scheduled to be completed by Fall 1995.

5.0 SUMMARY OF SITE CHARACTERISTICS

5.1. Landforms

The ILCO Site is located in the Appalachian Valley and Ridge Physiographic Province, within the Cahaba Valley. The area is characterized by series of linear, sub-parallel ridges, developed on the underlying structurally deformed rock sequences, and separated by valleys of varying widths. Topographic relief in the area is moderate to high, with rapid changes of several hundred feet common.

5.2 Surface Water

Three significant surface water bodies are present in the Leeds area. These are the Cahaba River, located to the north of the City of Leeds; the Little Cahaba River, which runs through Leeds; and Dry Creek, a stream that runs near the ILCO Main Facility and ILCO Parking Lot and flows into the Little Cahaba River in the vicinity of the wastewater treatment plant. The general orientation of the major streams and rivers is parallel to the major topographic structures.

A smaller surface water body, identified as the unnamed tributary to Dry Creek, flows north, generally along the western boundary of the ILCO Main Facility, crosses Borden Avenue, and ultimately drains into Dry Creek. The unnamed tributary has in the past received run-off water from the ILCO Main Facility that was highly contaminated with lead. Even though ILCO conducted a soil and sediment removal from the tributary in August 1990, the stream is still contaminated. Surface water and sediment contamination associated with the ILCO Main Facility is being addressed under OU-3.

5.3 Geology

5.3.1 Regional Geology

The suite of rocks in the Cahaba Valley is typical of the Valley and Ridge and consists of sandstones and shales, commonly interbedded, as well as limestone and dolomitic limestone. The regional structure is typically characterized by northeast-southwest trending layers of rock, which are locally steeply inclined and frequently folded and faulted. The larger structures generally dip to the southeast at angles up to 45 degrees and are intensely fractured and jointed.

5.3.2 Site-Specific Geology and Soils

The ILCO Main Facility is underlain by a veneer of unconsolidated material, consisting of weathered light-brown to dark-gray, sandy, silty, clayey alluvium that generally ranges from 5 to 20 feet thick. The Floyd Shale lies directly beneath the alluvium along the southeast border of the property; the contact between the Floyd Shale and the Hartselle Sandstone is in the same area. The Hartselle Sandstone is overlain by alluvium in the southeastern portion of the property and in the area previously occupied by the battery cracking building. The remainder of the ILCO Main Facility is underlain by the Pride Mountain Formation, which extends to the northwest in the vicinity of Dry Creek.

5.4 Ground Water

5.4.1 Regional Hydrogeology

Generally, ground water is available, in some quantity, in four different horizons or formations in the Leeds area. These zones are not necessarily, in themselves, major regional aquifers, but rather represent hydrogeological conditions or situations in which a completed well may produce water more significantly than in others, such as massive shale formations, etc. The more shallow zones are usually unconfined, with the lower units sometimes occurring under confined conditions, depending on the geology of the overlying material. Because of the degree of fracturing observed in the area, it is conceivable that all zones may, to a certain extent, be interconnected in some areas. These zones include the following:

Surficial Aquifer - Consists of a thin layer of unconsolidated alluvial deposits that covers most of the valley. The maximum thickness is 20 feet. It is separated from the shallow aquifer system by a silty clay at some locations and is a very poor source of water to wells. Water occurs under unconfined conditions.

Shallow Aquifer - Consists of weathered to consolidated material in the upper part of the bedrock and is generally no more than 30 feet thick. It is separated from the underlying rock in some areas by a dense, dark-gray clay and is a very limited source of water to wells. Water occurs under unconfined conditions.

Fort Payne Chert Aquifer - Provides some of the water supply to the City of Leeds. City wells are installed to depths of 150-300 feet and located approximately one-half mile to the northeast of the ILCO Main Facility and the ILCO Parking Lot. The Fort Payne Chert Aquifer behaves similarly to a confined aquifer because of the lower permeability of the overlying formations. However, these lower permeability formations do not prevent the movement of contaminants into the Fort Payne Chert Aquifer.

Ordovician Undifferentiated Aquifer - Consists of 1,000 feet of crystalline limestone. Two springs in this formation provide part of the water supply to the City of Leeds. The Weems Spring is located off Cemetery Road approximately 5 miles southeast of the Acmar Church of God satellite site in Moody, Alabama, north of Leeds. The Rowan Spring is located in Leeds at the intersection of Highway 119 and President Road.

5.4.2 Site Hydrogeology

5.4.2.1 General Conditions

Ground water at the ILCO Main Facility occurs in the unconsolidated alluvium and underlying weathered zone of shales and generally occurs in unconfined conditions in the area. Water levels range from 4 feet to almost 50 feet below land surface. At the ILCO Main Facility, ground water tends to flow toward Dry Creek and its unnamed tributary to the north and northwest of the area with infiltration into the underlying weathered shallow aquifer, which is in the Floyd Shale, the Hartselle Sandstone, and the Pride Mountain Formation. Data and information from monitoring well GM-2B, a deep well, indicates that water-bearing zones occur in joints and fractures deep in the shales under partially confined conditions.

5.4.2.2 Ground Water Movement Patterns

Based on water elevations and data interpretations, ground water is moving generally to the northwest in the shallow and intermediate ground water zones, with small localized differences in direction. The pattern of movement in the deep zone is more difficult to determine, based on ground water elevations alone. Based on measured water levels, it appears to be moving north or even to the northeast, perhaps under the influence of a large, pumping municipal water supply well used by the City of Leeds and located approximately one-half mile away. The contaminant pattern, however, indicates that it is moving in a direction much like ground water in the shallow and intermediate ground water systems.

The possibility exists that a strong influence on flow patterns and contaminant distribution in the deep zone is being exerted by a fault identified at the ILCO Main Facility. This is further supported by the potential for impact on the local ground water system by the Lehigh quarry, west of the ILCO Main Facility and south of Leeds. Several facts are pertinent. One, the quarry is de-watered at a rate of approximately 1,000 gallons per minute, based on statements by the quarry superintendent. Also, it is possible that the quarry is located on or closely within the influence of the fault identified at the ILCO Main Facility. The tremendous ground water withdrawal, which has depressed the water table by approximately 200 feet in the vicinity of the quarry, could be de-watering the fault as far away as the ILCO Main Facility. This scenario is further corroborated by the strong vertical downward gradient observed in the monitoring wells along the spur adjacent to Dry Creek, where heads measured in the deep wells are approximately 60 feet lower than in the shallow and intermediate wells. Further investigation is warranted to conclusively define ground water movement patterns in the deep ground water system.

5.4.2.3 Ground Water Gradients

Average ground water gradients across OU-2 were determined for each of the three ground water zones from measured water levels. These gradients were determined across the known affected portions of the aquifer in the regions of the aquifer for which remediation is anticipated. Based on these measurements, gradients of 0.016, 0.034 and 0.045 were calculated for the shallow, intermediate and deep zones, respectively.

6.0 SUMMARY OF SITE RISKS

Over 20 years of battery recycling operations at the ILCO Main Facility resulted in elevated concentrations of lead and other chemicals in nearby environmental media, including soil and ground water underlying the ILCO Main Facility and adjacent ILCO Parking Lot. A large quantity of the source materials at the ILCO Main Facility were removed during the 1992-1993 emergency removal action. The OU-2 RI was performed from 1993 to 1994 to determine the nature and extent of remaining contamination. The Baseline Risk Assessment (BRA) was primarily based on the OU-2 RI findings and was performed in order to examine the potential human health risks associated with lead and other chemical concentrations in environmental media at OU-2.

6.1 SELECTION OF CHEMICALS OF POTENTIAL CONCERN

The first task of the BRA was to summarize the data collected for surface and subsurface soil, sediment, surface water, and ground water during the OU-2 RI. This was supplemented to some degree by data from other investigations (e.g., the removal action and the OU-1 RI). From these data, chemicals of potential concern were selected for detailed evaluation in the BRA. Lead was selected as a chemical of potential concern based on ILCO Main Facility operations and investigations. Primarily based on a comparison to background data and an evaluation of essential nutrients, additional metals were also identified as chemicals of potential concern (i.e., were identified as potentially toxic chemicals present above naturally occurring levels). A small number of organic chemicals detected in ground water were also identified as chemicals of potential concern. The chemicals of potential concern other than lead are listed in Table 6-1.

6.2 HUMAN TOXICITY ASSESSMENT

The next step of the BRA, the human toxicity assessment, was performed in order to identify numerical toxicity criteria with which to assess human health exposures. For lead, criteria based on EPA-derived cleanup levels for soil and ground water were identified and presented. For chemicals of potential concern other than lead, quantitative dose-response data were compiled from EPA's Integrated Risk Information

System (IRIS), Health Effects Assessment Summary Tables (HEASTs), and the Environmental Criteria and Assessment Office (ECAO). The quantitative dose-response data for the chemicals of potential concern other than lead are given in Table 6-1.

TABLE 6-1

ORAL TOXICITY CRITERIA FOR THE CHEMICALS OF POTENTIAL CONCERN OTHER THAN LEAD

Chemical	Chronic Oral Reference Dose (RfD) (mg/kg-day)	Uncertainty Factor (a)	Target Organ/ Critical Effect (b)	RfD Source	Oral Slope Factor $(mg/kg\text{-}day)^{-1}$	Weight-of-Evidence Class (c)	Slope Factor Source
Inorganic Chemicals							
Aluminum	----	----	----	HEAST	----	----	----
Antimony	4E-04	1,000	Blood Chemistry	IRIS	----	----	----
Arsenic	3E-04	3	Skin	IRIS	1.75E+00	A	IRIS
Barium	7E-02	3	Increased BP	IRIS	----	----	----
Beryllium	5E-03	100	None Observed	IRIS	4.3E+00	B2	IRIS
Cadmium	5E-04	10	Kidney	IRIS	----	----	IRIS
	1E-03	10	Kidney	IRIS	----	----	IRIS
Chromium III	1E+00	1,000	Liver	IRIS	----	----	----
Chromium VI	5E-03	500	CNS	IRIS	----	----	IRIS
Cobalt	6E-02	----	Blood Chemistry	ECAO	----	----	----
Copper	3.7E-02	1	GI Irritation	HEAST	----	----	----
Manganese	5E-03	1	CNS	IRIS	----	D	IRIS
	1.4E-01	1	CNS	IRIS			
Mercury	3E-04	1,000	Kidney	HEAST	----	D	IRIS
Nickel	2E-02	300	<Body Weight	IRIS	----	----	IRIS
Selenium	5E-03	3	Selenosis	IRIS	----	D	IRIS
Silver	5E-03	3	Argyria	IRIS	----	----	----
Thallium	8E-05	3,000	Liver	IRIS	----	D	IRIS
Tin	6E-01	100	Liver/Kidney	HEAST	----	----	----
Titanium	----	----	----	----	----	----	----
Vanadium	7E-03	100	Kidney	HEAST	----	----	----
Yttrium	----	----	----	----	----	----	----
Zinc	3E-01	3	Blood Chemistry	IRIS	----	----	----
Organic Chemicals							
Benzene	----	----	----	IRIS	2.9E-02	A	IRIS
Ethyl benzene	1E-01	1,000	Liver/Kidney	IRIS	----	----	IRIS
Isopropyl benzene	4E-02	3,000	Kidney	IRIS	----	----	----
n-Propylbenzene	----	----	----	----	----	----	----
1,2,4-Trimethylbenzene	5E-04	10,000	CNS	ECAO	----	----	----
1,3,5-Trimethylbenzene	4E-04	10,000	CNS	ECAO	----	----	----
<m- and/or p->Xylenes	2E+00	100	CNS	HEAST	----	D	IRIS

(a) Uncertainty factors presented are the products of specific uncertainty factors and modifying factors. Uncertainty factors used to develop reference doses generally consist of multiples of 10, with each factor representing a specific area of uncertainty in the data available. The standard uncertainty factors include:
- a 10-fold factor to account for the variation in sensitivity among the members of the human population;
- a 10-fold factor to account for the uncertainty in extrapolating animal data to the case of humans;
- a 10-fold factor to account for the uncertainty in extrapolating from less-than-chronic NOAELs to chronic NOAELs;
- a 10-fold factor to account for the uncertainty in extrapolating from LOAELs to NOAELs;

Modifying factors are applied at the discretion of the reviewer to cover other uncertainties in the data and range from 1-10.

(b) A target organ or critical effect is the organ/effect most sensitive to the chemical exposure. RfDs are based on toxic effects in the target organ or critical effects. If an RfD is based on a study in which a target organ or critical effect was not identified, the organ/effect listed is one known to be impacted by the chemical.

(c) USEPA weight-of-evidence classification scheme for carcinogens:
A = Human Carcinogen, sufficient evidence from human epidemiological studies;
B2 = Probable Human Carcinogen, inadequate evidence from human epidemiological studies and adequate evidence from animal studies; and
D = Not classified as to human carcinogenicity.

NOTE: IRIS = Integrated Risk Information System - February 1994
HEAST = Health Effects Assessment Summary Tables - Annual 1993
ECAO = Environmental Criteria and Assessment Office, provisional guidance
---- = No Information Available
CNS = Central Nervous System
< = Decreased
BP = Blood Pressure
GI = Gastrointestinal

6.3 HUMAN EXPOSURE ASSESSMENT

A human exposure assessment was also performed to determine the potential human exposure pathways at OU-2 under current and future land use conditions. The ILCO Main Facility is not active, therefore, only a trespasser exposure was evaluated for current conditions, while under future land use conditions, both a commercial/industrial use scenario and a residential use scenario were considered. For each complete exposure pathway, the chemical concentrations assumed to be contacted (i.e., the exposure point concentrations) were derived. These values were either the 95% upper confidence limit of the arithmetic mean concentration or the maximum detected concentration, whichever was less. The exposure point concentrations for lead were used in a direct comparison to the lead criteria identified in the toxicity assessment. The exposure point concentrations for other chemicals of potential concern were combined with reasonable maximum estimates of the extent, frequency, and duration of exposure in order to calculate chemical doses. Exposure parameters for the human exposure pathways at OU-2 under current and future land use conditions are given in Tables 6-2 through 6-7.

6.4 HUMAN RISK CHARACTERIZATION

Using the human exposure and toxicity information, potential human health risks for each chemical of potential concern and selected exposure pathway were evaluated. For lead, the potential for human health risks, described in terms of the potential for blood lead levels of concern resulting from exposure, was assessed by comparing lead exposure point concentrations to relevant cleanup criteria.

Table 6-8 gives a comparison of lead concentrations in environmental media at OU-2 to the relevant lead cleanup criteria established for OU-2.

For the chemicals of potential concern other than lead, upper-bound excess lifetime cancer risks for carcinogenic chemicals and hazard quotient and hazard index values for noncarcinogenic chemicals were estimated. The upper-bound excess lifetime cancer risks were compared to USEPA's risk range for health protectiveness at Superfund Sites of $1x10^{-6}$ to $1x10^{-4}$. This range is representative of risks that must be considered in the selection of remedial alternatives. The noncarcinogenic hazard quotients and hazard indices were compared to a value of one, since hazard quotients/indices greater than one indicate a potential for adverse health effects. Tables 6-9, 6-10, and 6-11 present risk estimates for human exposure pathways quantitatively evaluated under current land use conditions, future commercial/ industrial land use conditions, and future residential land use conditions, respectively. As shown in the tables, predominant chemicals (chemicals associated with cancer risks greater than $1x10^{-6}$ or hazard quotients greater than one) included the following: arsenic and beryllium in soil and antimony, arsenic, beryllium, cadmium, cobalt, manganese, nickel, zinc, benzene, 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene in ground water.

TABLE 6-2
EXPOSURE PARAMETERS FOR INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH CHEMICALS IN SURFACE SOIL

CURRENT LAND-USE CONDITIONS

Parameters	**Trespasser**
Age Period	8-13 Years of Age
Exposure Frequency (days/year or events/year)	80
Exposure Duration (years)	6
Ingestion Exposure Parameters:	
Soil Ingestion Rate (mg/day)	100
Fraction Ingested (dimensionless)	1
Direct Contact Exposure Parameters:	
Skin Surface Area Available for Contact (cm^2)	5,900
Soil-to-Skin Adherence Factor (mg/cm^2-event)	1.0
Dermal Absorption Factor (dimensionless)	
Inorganic Chemicals	0.001
Body Weight (kg)	37
Lifetime (years)	70

TABLE 6-3
EXPOSURE PARAMETERS FOR INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH CHEMICALS IN SURFACE SOIL

FUTURE LAND-USE CONDITIONS: COMMERCIAL/INDUSTRIAL SCENARIO

Parameters	**Regular Worker**
Age Period	Adult
Exposure Frequency (days/year or events/year)	250
Exposure Duration (years)	25
Ingestion Exposure Parameters:	
Soil Ingestion Rate (mg/day)	50
Fraction Ingested (dimensionless)	1
Direct Contact Exposure Parameters:	
Skin Surface Area Available for Contact (cm^2)	3,500
Soil-to-Skin Adherence Factor (mg/cm^2-event)	1.0
Dermal Absorption Factor (dimensionless)	
Inorganic Chemicals	0.001
Body Weight (kg)	70
Lifetime (years)	70

TABLE 6-4
EXPOSURE PARAMETERS FOR INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH CHEMICALS IN SUBSURFACE SOIL

FUTURE LAND-USE CONDITIONS: COMMERCIAL INDUSTRIAL SCENARIO

Parameters	**Excavation Worker**
Age Period	Adult
Exposure Frequency (days/year or events/year)	7
Exposure Duration (years)	1
Ingestion Exposure Parameters:	
Soil Ingestion Rate (mg/day)	480
Fraction Ingested (dimensionless)	1
Direct Contact Exposure Parameters:	
Skin Surface Area Available for Contact (cm^2)	3,500
Soil-to-Skin Adherence Factor (mg/cm^2-event)	1.0
Dermal Absorption Factor (dimensionless)	
Inorganic Chemicals	0.001
Body Weight (kg)	70
Lifetime (years)	70

TABLE 6-5
EXPOSURE PARAMETERS FOR INGESTION OF CHEMICALS IN GROUNDWATER

FUTURE LAND-USE CONDITIONS: COMMERCIAL/INDUSTRIAL SCENARIO

Parameters	**Regular Worker**
Age Period	Adult
Exposure Frequency (days/year)	250
Exposure Duration (years)	25
Water Ingestion Rate (liters/day)	1
Body Weight (kg)	70
Lifetime (years)	70

TABLE 6-6
EXPOSURE PARAMETERS FOR INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH CHEMICALS IN SURFACE SOIL

FUTURE LAND-USE CONDITIONS: RESIDENTIAL SCENARIO

Parameters	Child Resident	Adult Resident
Age Period	1-6 Years of Age	Adult
Exposure Frequency (days/year or events/year)	350	350
Exposure Duration (years)	6	30
Ingestion Exposure Parameters:		
Soil/Sediment Ingestion Rate (mg/day)	200	100
Fraction Ingested (dimensionless)	1	1
Direct Contact Exposure Parameters:		
Skin/Surface Area Available for Contact (cm^2)	3,100	5,900
Soil/Sediment-to-Skin Adherence Factor (mg/cm^2-event)	1.0	1.0
Dermal Absorption Factor (dimensionless) Inorganic Chemicals	0.001	0.001
Body Weight (kg)	16	70
Lifetime (years)	70	70

TABLE 6-7
EXPOSURE PARAMETERS FOR INCIDENTAL INGESTION OF CHEMICALS IN GROUNDWATER

FUTURE LAND-USE CONDITIONS: RESIDENTIAL SCENARIO

Parameters	Child Resident	Adult Resident
Age Period	1-6 Years of Age	Adult
Exposure Frequency (days/year)	350	350
Exposure Duration (years)	6	30
Water Ingestion Rate (liters/day)	1	2
Body Weight (kg)	16	70
Lifetime (years)	70	70

TABLE 6-8
COMPARISON OF LEAD CONCENTRATIONS IN ENVIRONMENTAL MEDIA AT THE ILCO OU-2 SITE TO RELEVANT CRITERIA

ILCO OU-2 ENVIRONMENTAL CONCENTRATIONS		Cleanup Levels	Conclusions
Environmental Medium	RME Exposure Point Concentration or Range of Concentrations		
SOIL: On site (Main Facility) Surface Soil	4,200 mg/kg	1000 mg/kg for normal pH soils or 150 mg/kg for low pH soils	Contact with site soils (i.e., via ingestion) could contribute to or result in an unacceptable health risk or adversely affect ground water quality. The 150 mg/kg cleanup level for low pH soils is based upon protection of ground water, while the 1000 mg/kg cleanup level for normal pH soils is based upon protection of human health due to direct contact with the soils and protection of ground water. The 1000 mg/kg cleanup level is based upon a future commercial/industrial land-use of the site.
On site (Main Facility) Subsurface Soil	1,700 mg/kg		
Soil Under Concrete Only	4-190,000 mg/kg		
Soil in Stockpile	30,000-44,000 mg/kg		
GROUND WATER: On site (Main Facility and Parking Lot) Ground water	150 ug/L	15 ug/L	Use of site ground water for drinking water could contribute to or result in an unacceptable health risk.

Table 6-9
Summary of Quantitative Risk Estimates for Potentially Complete Human Exposure Pathways Under Current Land Use Conditions

Exposure Medium Exposure Point Receptor Exposure Route	Upper Bound Excess Lifetime Cancer Risk[a]	Predominant Chemicals[b]	Hazard Index for Noncarcinogenic Effects[c]	Predominant Chemicals[d]
Surface Soil:				
On Site (Main Facility):				
Trespasser:				
Incidental Ingestion	$2x10^{-6}$	Arsenic	<1 ($1x10^{-1}$)	——
Dermal Contact	$2x10^{-6}$	Beryllium	<1 ($4x10^{-2}$)	——

Note: [a]The Upper bound individual excess lifetime cancer risk represents the probability, over background risks, than an individual over a 70 year lifetime as a result of the exposure conditions evaluated.
[b]The predominant chemicals are those which were associated with cancer risks greater than $1x10^{-6}$.
[c]The hazard index indicates whether or not exposure to mixtures of noncarcinogenic chemicals may result in adverse health effects. A hazard index less than one indicates that adverse human health effects are unlikely to occur. A hazard index greater than one indicates that adverse human health may potentially, but not necessarily, occur.
[d]The predominant chemicals are those which were associated with hazard quotients greater than 1.

Table 6-10
Summary of Quantitative Risk Estimates for Additional Potentially Complete Human Exposure Pathways Under Future Land Use Conditions

[Commercial/Industrial Scenario]

Exposure Medium Exposure Point Receptor Exposure Route	Upper Bound Excess Lifetime Cancer Risk[a]	Predominant Chemicals[b]	Hazard Index for Noncarcinogenic Effects[c]	Predominant Chemicals[d]
Surface Soil:				
On Site (Main Facility):				
Worker:				
Incidental Ingestion	$7x10^{-6}$	Arsenic	<1 ($8x10^{-2}$)	—
Dermal Contact	$8x10^{-6}$	Beryllium	<1 ($4x10^{-2}$)	—
Subsurface Soil:				
On Site (Main Facility):				
Excavation Worker:				
Incidental Ingestion	$1x10^{-7}$	—	<1($2x10^{-2}$)	—
Dermal Contact	$9x10^{-9}$	—	<1($1X10^{-3}$)	—
Groundwater:				
On Site (Main Facility and Parking Lot):				
Worker:				
Ingestion	$3x10^{-4}$	Arsenic, beryllium, benzene	>1($9x10^{1}$)	Manganese, cadmium, 1,2,4- and 1,3,5-trimethybenzene

Note: [a]The Upper bound individual excess lifetime cancer risk represents the probability, over background risks, than an individual may develop cancer over a 70 year lifetime as a result of the exposure conditions evaluated.
[b]The predominant chemicals are those which were associated with cancer risks greater than $1x10^{-6}$.
[c]The hazard index indicates whether or not exposure to mixtures of noncarcinogenic chemicals may result in adverse health effects. A hazard index less than one indicates that adverse human health effects are unlikely to occur. A hazard index greater than one indicates that adverse human health may potentially, but not necessarily, occur.
[d]The predominant chemicals are those which were associated with hazard quotients greater than 1.

Table 6-11
Summary of Quantitative Risk Estimates for Additional Potentially Complete Human Exposure Pathways Under Future Land Use Conditions

[Residential Scenario]

Exposure Medium Exposure Point Receptor Exposure Route	Upper Bound Excess Lifetime Cancer Risk[a]	Predominant Chemicals[b]	Hazard Index for Noncarcinogenic Effects[c]	Predominant Chemicals[d]
Surface Soil:				
On Site (Main Facility):				
Child Resident:				
Incidental Ingestion	$4x10^{-5}$	Arsenic, Beryllium	>1 ($2x10^{0}$)	Antimony, Arsenic
Dermal Contact	$1x10^{-5}$	Beryllium	<1 ($2x10^{-1}$)	——
Adult Resident:				
Incidental Ingestion	$2x10^{-5}$	Arsenic, Beryllium	<1 ($2x10^{-1}$)	——
Dermal Contact	$2x10^{-5}$	Arsenic, Beryllium	<1 ($9X10^{-2}$)	——
Groundwater:				
On Site (Main Facility and Parking Lot):				
Child Resident:				
Ingestion	$4x10^{-4}$	Arsenic, Beryllium, Benzene	>1 (600)	Antimony, Arsenic, Cadmium, Cobalt, Manganese, Nickel, Zinc, 1,2,4- and 1,3,5-Trimethylbenzene
Adult Resident:				
Ingestion	$9x10^{-4}$	Arsenic, Beryllium, Benzene	>1 (300)	Antimony, Arsenic, Cadmium, Manganese, Nickel, Zinc, 1,2,4- and 1,3,5-Trimethylbenzene

Note: [a]The Upper bound individual excess lifetime cancer risk represents the probability, over background risks, that an individual may develop cancer over a 70 year lifetime as a result of the exposure conditions evaluated.
[b]The predominant chemicals are those which were associated with cancer risks greater than $1x10^{-6}$.
[c]The hazard index indicates whether or not exposure to mixtures of noncarcinogenic chemicals may result in adverse health effects. A hazard index less than one indicates that adverse human health effects are unlikely to occur. A hazard index greater than one indicates that adverse human health may potentially, but not necessarily, occur.
[d]The predominant chemicals are those which were associated with hazard quotients greater than 1.

6.5 RISK-BASED REMEDIATION GOALS

In accordance with EPA guidance, the BRA also included risk-based remediation goals for the chemicals and pathways evaluated in the human health risk assessment that were associated with upper-bound excess lifetime cancer risks greater than 1×10^{-6} or for which hazard indices were greater than one. These goals incorporate the exposure scenarios and exposure assumptions that were developed in the BRA. Remediation goals for lead were not developed in the BRA since EPA-derived cleanup levels for this chemical were already available (and used in this assessment). Table 6-8 summarizes the lead cleanup levels developed by EPA for soil and ground water at OU-2. Concentrations of lead in soil and ground water were compared to the cleanup levels to determine if they could potentially result in adverse effects on human health.

Predominant chemicals (chemicals associated with cancer risks greater than 1×10^{-6} or hazard quotients greater than 1) in environmental media of OU-2 were identified by exposure pathway in Tables 6-9, 6-10, and 6-11. The development of risk-based remediation goals focused on exposures to these chemicals, through the ingestion route only. Although cancer risks exceeding 1×10^{-6} were associated with some pathways involving dermal contact with soil, the risk-based remediation goals derived in the risk assessment did not incorporate exposures through this route. This is due to the great uncertainties associated with assessing this route of exposure, including uncertainties associated with the use of default dermal absorption fractions and adjusted oral toxicity criteria. Additionally, ingestion is assumed to be the dominant pathway of exposure to ground water and soil.

Table 6-12 presents the risk-based remediation goals for contaminants of concern other than lead developed in the BRA for relevant exposure media and receptors. For carcinogenic chemicals, risk-based remediation goals were developed using a target risk level of 1×10^{-6}, an EPA benchmark. To derive risk-based remediation goals for 1×10^{-5} and 1×10^{-4} (other EPA benchmarks), the goals can be adjusted upward by a factor of 10 or 100 (1 or 2 orders of magnitude), respectively. For noncarcinogenic chemicals, risk-based remediation goals were calculated to correspond to a target hazard quotient of one. Goals corresponding to alternate target hazard quotients (i.e., 10) can be derived by scaling the goals appropriately (i.e., by a factor of 10, or one order of magnitude). For chemicals which exhibit both carcinogenic and noncarcinogenic effects (e.g., arsenic), risk-based remediation goals presented are based on carcinogenic effects, which are more stringent than goals based on noncarcinogenic effects.

6.6 ENVIRONMENTAL RISK

An ecological risk assessment (ERA) was conducted for OU-2 to evaluate the probability and magnitude of adverse affects to ecological receptors associated with actual or potential exposure to chemicals in soil associated with past activities at the ILCO Main Facility. The ERA used sampling data collected during the OU-2 RI and focused primarily on surface soil data collected at or near the ILCO Main Facility.

TABLE 6-12
SUMMARY OF HUMAN HEALTH RISK-BASED CLEANUP LEVELS
FOR CHEMICALS OF CONCERN OTHER THAN LEAD

Route of Exposure and Exposure Medium Chemical of Concern	Cleanup Levels	Conclusions
Incidental Ingestion of Surface Soil		Contact with site soils (i.e. via ingestion) could contribute to or result in an unacceptable health risk.
Arsenic	13 ppm	
Ingestion of Groundwater		Use of site ground water for drinking water could contribute to or result in an unacceptable health risk.
Antimony	6 ppb	
Arsenic	50 ppb	
Beryllium	4 ppb	
Cadmium	5 ppb	
Manganese	510 ppb	
Nickel	100 ppb	
Benzene	5 ppb	
1,2,4-Trimethylbenzene	51 ppb	
1,3,5-Trimethylbenzene	41 ppb	

Note: The cleanup level for Arsenic in soil is based upon the average background level of arsenic in soil at OU-2. The cleanup levels for Manganese, 1,2,4-Trimethylbenzene, and 1,2,3-Trimelthylbenzene in ground water are based upon a future commercial/industrial land-use of OU-2. The cleanup levels for the remaining COC's in ground water are the Maximum Contaminant Levels (MCLs) of these COC's in ground water usable for drinking water.

The following chemicals were identified as chemicals of potential concern in surface soil at the ILCO Main Facility: Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Nickel, Thallium, Vanadium, and Zinc. The identification of chemicals of potential concern for surface soil was based on a comparison to offsite concentrations and identification of essential plant and animal nutrients.

The ERA for OU-2 included an evaluation of impacts to terrestrial receptors (plants and earthworms). Impacts to terrestrial receptors were evaluated using risk quotients representing a comparison of surface soil exposure point concentrations to chemical concentrations levels from the scientific literature below which adverse effects are not likely to occur.

The ERA evaluation indicates that adverse impacts to terrestrial plants could occur from exposure to antimony, lead, and zinc in surface soils, with lead being the chemical of most concern. Adverse impacts to soil invertebrates may occur from exposure to lead and zinc in surface soil. However, the likely magnitude of the risks associated with invertebrate exposure to these chemicals in soil is not high, as indicated by the close proximity of the toxicity reference value (TRV) ratios to one. Furthermore, additional lead toxicity data collected at OU-2 suggested that earthworms may be able to tolerate soil levels above the estimated no-effect concentrations. Therefore, based on the results of the biological assessment and the ERA performed, EPA has determined that there is not a significant environmental risk posed by surface soil at OU-2. Remediating the soilto established soil cleanup levels should alleviate any environmental risk currently posed by the soil. Any environmental risk posed by the surface water and sediment adjacent to the ILCO Main Facility will be assessed under OU-3.

7.0 DESCRIPTION OF ALTERNATIVES

The site-specific remedial alternatives represent a range of distinct waste-management strategies addressing the human health and environmental concerns. Although the selected remedial alternative will be further refined as necessary during the predesign and design phases of the remedial action, the following analysis reflects the fundamental components of the various alternatives evaluated during the Feasibility Study for OU-2.

SOIL ALTERNATIVES

ALTERNATIVE S-1: NO ACTION FOR SOIL

The no-action alternative for soil involves no further remedial actions for any of the wastes or contaminated soil at OU-2. The purpose of including the no-action alternative is to provide a baseline for comparison of the other remedial alternatives. The no-action alternative would entail limited activities, including:

- The posting of warning signs along the fence line of the ILCO Main Facility to indicate the presence of hazardous and/or toxic wastes.

- 5-year reviews as required by CERCLA. The purpose of these reviews would be to evaluate the effectiveness of the no-action alternative. The 5-year reviews would include limited sampling and analysis activities to identify trends in the distribution and magnitude of contamination in all currently or potentially affected OU-2 media.

The purpose of these activities would be to limit exposure to Site-related contaminants with a minimal commitment of funds or onsite activities.

ALTERNATIVE S-2: CONTAINMENT OF SOIL

Alternative S-2 involves containment of the contaminated media by capping to reduce the potential for exposure to contaminated soil and waste and infiltration of water. The alternative also includes removal of material (e.g., debris, slag, battery casings, and baghouse dust) not applicable for onsite containment. This alternative considers existing Site conditions, such as location of existing concrete and asphalt paving, and utilizes these conditions as a portion of an effective barrier to exposure in addition to the construction of a RCRA cap over consolidated materials. Alternative S-2 includes institutional controls, monitoring, and an operations and maintenance program to evaluate long-term protectiveness and performance of the alternative. General activities for the different media are outlined below.

Soil: Excavate contaminated soil not contained under concrete and dispose of onsite under a multi-media RCRA cap. Place cap over concrete slabs covering contaminated soil in former smelter area.

Debris: Decontaminate/treat debris using specific best demonstrated available technologies (BDAT) based on the type of debris and the type of contaminants present in the debris; recycle decontaminated debris that can be recycled and dispose of non-recyclable decontaminated debris offsite in a non-hazardous landfill; debris which cannot be decontaminated will be disposed offsite in a permitted hazardous waste landfill;

Slag/Lead: Package and ship slag that can be recycled to offsite permitted facility for recovery of lead using a secondary smelter. If slag cannot be recycled, solidy/stabilize and dispose of the slag offsite in a permitted hazardous waste landfill.

Battery Casings/ Chips: Package and ship battery casing components and battery chips that can be recycled to an offsite permitted facility for recovery of lead using a secondary smelter. Dispose of non-recyclable components that fail TCLP offsite in a permitted hazardous waste landfill and dispose of non-hazardous, non-recyclable components offsite in a non-hazardous landfill.

Baghouse Dust: Send roll-off boxes of baghouse dust (K069) offsite to a RCRA permitted Treatment, Storage, and Disposal (TSD) facility. Treatment and disposal of the baghouse dust shall complay with all pertinent ARARs, including Land Disposal Restrictions (LDRs);

ALTERNATIVE S-3: SOLIDIFICATION/STABILIZATION

Alternative S-3 for remediation of soil and debris involves: solidification/stabilization of soils; onsite disposal of treated material in an engineered containment cell; decontamination of debris; offsite treatment of slag and battery casings/chips for recovery of lead, if recyclable, otherwise offsite disposal; and offsite treatment and disposal of baghouse dust (K069). The alternative includes institutional controls, monitoring, and an operations and maintenance program to ensure long-term protectiveness and performance of the alternative. General treatment methods for the different media are outlined below:

Soil: Excavate contaminated soil; treat soil failing TCLP onsite by solidification/stabilization, and dispose of all soil (treated and untreated) onsite in an engineered containment cell with a multi-media bottom liner (including leachate collection) and multi-media RCRA Subtitle D cap.

Debris: Decontaminate/treat debris using specific best demonstrated available technologies (BDAT) based on the type of debris and the type of contaminants present in the debris; recycle decontaminated debris that can be recycled and dispose of non-recyclable decontaminated debris offsite in a non-hazardous landfill; debris which cannot be decontaminated will be disposed offsite in a hazardous waste landfill;

Slag/Lead: Package and ship slag that can be recycled to offsite facility for recovery of lead using a secondary smelter. If slag cannot be recycled, solidifty/stabilize the slag to pass TCLP and dispose of the slag in the onsite containment cell.

Battery Casings/ Chips: Package and ship battery casing components and battery chips that can be recycled to an offsite facility for recovery of lead using a secondary smelter. Solidify/stabilize to pass TCLP, if necessary, and dispose of non-recyclable components in the onsite containment cell.

Baghouse Dust: Send roll-off boxes of baghouse dust (K069) offsite to a RCRA permitted Treatment, Storage, and Disposal (TSD) facility. Treatment and disposal of the baghouse dust shall complay with all pertinent ARARs, including LDRs;

In general, the solidification/stabilization process consists of media size reduction with metal and large debris removal, followed by a mixing process. Contaminated media and portland cement and/or lime are mixed with other binders such as fly ash or silicate reagents to solidify/stabilize the media. This forms a monolithic mass of high structural integrity, which binds the contaminant within the matrix.

ALTERNATIVE S-4: ACID LEACHING

Alternative S-4 for soil and debris involves: acid leaching of lead-contaminated soil; onsite backfilling of treated soil; decontamination of debris; secondary smelting of slag and battery casings/chips, if recyclable, otherwise offsite disposal; and offsite treatment and disposal of K069 baghouse dust. This alternative does not include such activities as institutional controls, monitoring, or operations and maintenance since no contamination or treated residuals would be present once treatment is complete. General treatment methods for the different media are outlined below.

Soil: Excavate contaminated soil, treat all soil onsite by acid leaching, and backfill excavated areas onsite with treated (i.e., clean) soil.

Debris: Decontaminate/treat debris using specific best demonstrated available technologies (BDAT) based on the type of debris and the type of contaminants present in the debris; recycle decontaminated debris that can be recycled and dispose of non-recyclable decontaminated debris offsite in a non-hazardous landfill; debris which cannot be decontaminated will be disposed offsite in a permitted hazardous waste landfill;

Slag/Lead: Package and ship slag that can be recycled to offsite permitted facility for recovery of lead using a secondary smelter. If slag cannot be recycled, solidify/stabilize the slag and dispose offsite in a permitted hazardous waste landfill.

Battery Casings/ Chips: Package and ship battery casing components and battery chips that can be recycled to an offsite permitted facility for recovery of lead using a secondary smelter. Dispose of non-recyclable components that fail TCLP offsite in a permitted hazardous waste landfill and dispose of non-hazardous, non-recyclable components offsite in a non-hazardous landfill.

Baghouse Dust: Send roll-off boxes of baghouse dust (K069) offsite to a RCRA permitted Treatment, Storage, and Disposal (TSD) facility. Treatment and disposal of the baghouse dust shall comply with all pertinent ARARs, including LDRs;

In general, the acid leaching process begins with a soil washing/separation process to remove clean soil fractions from the media to be treated. The fines are not treated by this process but are bypassed to acid leaching for treatment. Only the larger fractions are actually washed in this step. Once the clean soil fractions have been removed and washed, the contaminated soil fractions (generally the fines) undergo additional size reduction to allow maximum surface contact during acid leaching. The contaminated media are then introduced into the appropriate leaching solution and agitated to ensure thorough surface area contact between soil and leaching solution. The slurry is then separated into clean soil and leachate, which is reused until it is no longer capable of removing metals from the media. The spent leachate is then processed to remove the metals, which are then ready for recycling at a secondary smelter. The used leaching solution is also recycled back into the leaching process.

GROUND WATER ALTERNATIVES

ALTERNATIVE GW-1: NO ACTION FOR GROUND WATER

The no-action alternative for ground water is included to serve as a baseline against which other alternatives are compared. The only activity involved in the no-action alternative is the posting of warning signs and the 5-year review which is mandated by CERCLA whenever contaminated or untreated waste remains onsite.

The no-action alternative involves no further remedial actions for ground water at OU-2. The no-action alternative would entail limited activities, including:

- The posting of warning signs along the fence line of the ILCO Main Facility to indicate the presence of hazardous or toxic wastes.

- 5-year reviews as required by CERCLA. The purpose of these reviews would be to evaluate the effectiveness of the no-action alternative. The 5-year reviews would include limited ground water sampling and analysis activities to identify trends in the distribution and magnitude of contamination in the ground water.

The purpose of these activities would be to limit exposure to Site-related contaminants with a minimal commitment of funds or onsite activities.

ALTERNATIVE GW-2: CONTAINMENT OF GROUND WATER

Alternative GW-2 uses a containment system to prevent the ground water contamination from migrating any further offsite. A ground water extraction system would pump water from the shallow, intermediate, and deep zones of the aquifer creating a hydraulic barrier along the downgradient margin of the contamination, thereby preventing further migration.

Alternative GW-2 is designed to take full advantage of the existing water treatment facility at the ILCO Main Facility. However, an alternative treatment system may be used if the existing system is not available. The components of Alternative GW-2 include an extraction system of trenches and wells, a ground water treatment plant, an effluent discharge to the Unnamed Tributary adjacent to the ILCO Main Facility, and institutional controls.

The ground water treatment components of Alternative GW-2 consist of oil/water separation, carbon adsorption, chemical precipitation, and flocculation/clarification. Both free phase and dissolved hydrocarbons would be removed through physical separation and carbon adsorption. Inorganics would be removed from solution in the form of insoluble solid precipitates. The solids formed are then separated from the wastewater by settling, clarification, and/or polishing processes.

Institutional Controls

Appropriate institutional controls, such as deed restrictions, may be required with respect to the ILCO Main Facility and all properties within a reasonable distance downgradient of the ground water contamination. These controls would prohibit the drilling of new water supply wells and the use of ground water for potable supply.

Monitoring would be performed on selected onsite monitoring wells and wells outside the area of restricted use to monitor the movement of the ground water contamination. This will provide data as to any potential threat to water supply wells located north of the ILCO Main Facility.

Monitoring activities, as stated above, would be used to track migration of the contamination. Monitoring would include annual ground water sampling and analyses of a selected group of wells.

The selection of wells to be monitored would be completed during the remedial design phase.

ALTERNATIVE GW-3: PRECIPITATION/FLOCCULATION

The purpose of the ground water remediation system in Alternative GW-3 is to restore ground water quality within the aquifer underlying OU-2 by remediating ground water to cleanup concentrations. The ground water extraction system would pump from the shallow, intermediate, and deep zones of the aquifer. Extracted ground water would be treated and subsequently discharged to the Unnamed Tributary adjacent to the ILCO Main Facility.

Alternative GW-3 is also designed to take full advantage of the existing water treatment facility at the ILCO Main Facility. However, an alternative treatment system may be used if the existing system is not available. The components of Alternative GW-3 include an extraction system of trenches and wells, a ground water treatment plant, and an effluent discharge system.

The treatment system in this alternative is the same as the one for Alternative GW-2, but the volume of ground water to be extracted and treated in this alternative is greater than in Alternative GW-2.

Institutional Controls

The institutional controls for Alternative GW-3 are the same as proposed in Alternative GW-2.

ALTERNATIVE GW-4: ION EXCHANGE

The purpose of the ground water remediation system in Alternative GW-4 is to restore ground water quality within the aquifer underlying OU-2 by remediating ground water to cleanup concentrations. Alternative GW-4 is a pump-and-treat system in which the ion exchange process is used to remove toxic inorganics from the aqueous phase in exchange with relatively harmless ions held by the ion exchange material. The components of Alternative GW-4 include an extraction system, a ground water treatment plant, and effluent discharge to surface water. Extracted ground water would be treated and subsequently discharged to the Unnamed Tributary adjacent to the ILCO Main Facility.

The ground water treatment components of Alternative GW-4 consist of oil/water separation, carbon adsorption, and ion exchange. Both free phase and dissolved hydrocarbons would be removed through physical separation and carbon adsorption. Inorganics would be removed from solution by exchanging hazardous cations with nonhazardous cations through a medium of resin beds specifically designed for the inorganic of concern.

Institutional Controls

The institutional controls for Alternative GW-4 are the same as proposed in Alternative GW-2.

8.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

The remedial action alternatives selected for OU-2 were formulated to provide a range of discrete options to attain the remedial action objectives established for OU-2. These alternatives generally satisfy NCP requirements regarding the development of alternatives, including treatment to address principal threats and a range of treatment options that vary in the degree of treatment as well as the type and quantity of treated residuals or untreated waste requiring long-term management.

This section documents the comparative analysis conducted to evaluate the relative performance of each alternative in relation to each of the evaluation criteria. The purpose is to identify the relative advantages and disadvantages of each alternative. The key tradeoffs that must be balanced in the selection of remedy can then be identified. As stated in the NCP [40 CFR 300.430 (f)], the evaluation criteria are arranged in a hierarchial manner that are then used to select a remedy for a site based on the following categories:

***Threshold Criteria*:**

Overall Protection of Human Health and the Environment
Compliance with ARARs

Primary Balancing Criteria:

Long-Term Effectiveness and Permanence
Reduction of Toxicity, Mobility, or Volume
Short-Term Effectiveness
Implementability
Cost

Modifying Criteria:

State Acceptance
Community Acceptance

COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES FOR SOILS

Overall Protection of Human Health and Environment

Alternative S-1 (No Action) would not provide protection of human health or the environment. Contaminants would not be isolated from direct contact by the public and would continue to leach into the ground water. Alternative S-2 (Containment) would isolate the contaminants through capping, but protectiveness is contingent upon long-term maintenance of the engineering controls that will be used to isolate the contaminated materials from the environment. Alternative S-2 thus accomplishes the remedial action objective for soil by preventing further exposures but does not represent a permanent remedy for OU-2.

Alternative S-3 (Solidification/Stabilization) provides an additional level of protectiveness over Alternative S-2 by treating the waste prior to onsite disposal but is also dependent on a long-term maintenance program to maintain this protectiveness. Alternative S-4 (Acid Leaching) provides the highest level of protection of any of the remedial alternatives for soils, as all wastes and soil contamination above health-based levels are removed from OU-2.

Compliance with ARARs

Since both RCRA listed and characteristic waste are present at the ILCO Main Facility, all the alternatives involving handling, treatment, storage, and/or disposal of these materials must comply with the appropriate RCRA requirements, including, under certain circumstances, RCRA LDRs. Alternatives S-2, S-3, and S-4 all employ the same method for addressing the K069 baghouse dust — offsite treatment and disposal at a RCRA permitted TSD facility. Once the listed waste has been removed from OU-2, the characteristic waste need only be treated to below RCRA TCLP limits to comply with the LDRs. The S-2 (Containment) and S-3 (Stabilization) alternatives would be designed and implemented so as not to trigger the RCRA LDRs. The onsite treatment units used for stabilization and acid leaching of contaminated soils determined to be RCRA hazardous wastes would have to comply with RCRA requirements for treatment units. The requirements complicate, but do not preclude, the implementation of Alternative S-3 or S-4. Alternative S-2, involving consolidation and capping in place, would have the least onerous ARAR commitments. The most difficult to implement in compliance with ARARs would be S-3 because the onsite activities include both treatment and disposal. Alternatives S-2, S-3, and S-4 would be designed and implemented to meet all other ARARs. Alternative S-1, No Action, does not meet all identified ARARs.

Long-Term Effectiveness and Permanence

The lowest level of residual risk and the highest degree of permanence are associated with Alternative S-4 (Acid Leaching), which involves removal of all soil contamination above health-based levels. Contaminated soils are also treated in Alternative S-3 (Solidification/Stabilization), but the stabilized residuals are left onsite, and effectiveness depends on long-term maintenance of the cap and other engineering controls. Alternative S-3 provides a higher level of permanence than Alternative S-2, where no soil treatment is employed and residual risk levels are much higher. The no-action alternative is not considered to be either effective or permanent in addressing risks from OU-2.

Reduction of Toxicity, Mobility, or Volume

The no-action alternative (S-1) would not affect the toxicity, mobility, or volume of contaminated soils or wastes at OU-2. For contaminated soil, Alternative S-2 (Containment) achieves a reduction in mobility (but not in toxicity or volume) by isolating the contamination under a multi-media cap. Alternative S-3 (Solidification/ Stabilization) achieves an even greater reduction in mobility through binding of contaminants in a matrix highly resistant to leaching and disposal of stabilized soils in a RCRA-type containment cell. A drawback to stabilization is the increase in the volume of contaminated (albeit stabilized) material remaining onsite. Alternative S-4 (Acid Leaching) achieves the greatest reductions in toxicity, mobility, and volume through the removal of all contamination above health-based levels from onsite soil.

Alternatives S-2, S-3, and S-4 involve treatment of the slag that can be recycled at a secondary smelter, while the K069 baghouse dust is sent to a RCRA permitted TSD facility. Treatment of slag in a secondary smelter is consistent with technology-based treatment standards under RCRA and would result in a reduction of toxicity, mobility, and volume; the end result is pure lead that will be reused in manufacturing and smelter byproduct. Sending the baghouse dust to a RCRA permitted TSD facility for treatment and disposal in accordance with LDRs would result in a reduction in the volume of waste at OU-2.

Short-Term Effectiveness

Alternative S-1 (No Action), involving no onsite remediation activities, would result in no additional risks to the community or workers beyond those currently associated with OU-2. All other soil remediation alternatives (S-2, S-3, and S-4) involve excavation and processing of contaminated material. Differences in the short-term effectiveness of these more aggressive soil alternatives are not significant; potential impacts to the community, site workers, and the environment can be minimized through proper use of engineering controls, monitoring, and appropriate health and safety procedures.

Because Alternative S-2 (Containment) entails the excavation/handling of a smaller volume of contaminated material, it would be less likely to have an adverse impact to the community and/or workers.

Time required to achieve protectiveness has been estimated at 2 to 3 years for Alternatives S-2, S-3, and S-4. Although the time frames are similar, the levels of protectiveness obtained at the end of this 2- to 3-year period are not equivalent. Alternatives S-2 and S-3 attain the remedial action objectives through containment and solidification/stabilization technologies, but both leave waste onsite, and protectiveness is contingent upon maintenance of engineering control measures. Alternative S-4 involves a permanent solution for OU-2 that results in removal of all contamination above health-based levels; at the end of the 2- to 3-year construction period, protectiveness will be attained with no further need for engineering controls.

Implementability

Alternative S-1 (No Action) is the most easily implemented as it entails no remedial design or construction activities. Implementation of Alternative S-2 (Containment) would require coordination between EPA and the state because of the long-term O&M activities necessitated by leaving untreated waste at the Site. Site-specific treatability studies are required prior to implementation of Alternative S-4 (Acid Leaching). Bench-scale treatability studies have already been performed on OU-2 soil that would enhance the implementability of Alternative S-3 (Solidification/Stabilization); however, the landfill siting issue could require extensive predesign studies and administrative coordination prior to implementation of this alternative. Alternative S-4 (Acid Leaching) involves a relatively complex treatment train but is likely to be easier to implement than Alternative S-3 (Solidification/Stabilization) because it does not include an onsite disposal cell.

Cost

A summary of the present worth, capital, and O&M costs for each of the alternatives is presented in Table 8-1. Alternative S-1 is the least expensive, while Alternative S-4 is the most expensive.

TABLE 8-1

Summary of Present-Worth Costs for Soil and Ground Water Cleanup Alternatives

ALT. NO.	DESCRIPTION	CAPITAL COST	TOTAL O&M COST	TOTAL PRESENT WORTH COST
Soil Alternatives				
S-1	No Action for Soils	$13,000	$134,000	$147,000
S-2	Containment of Soils	$16,092,000	$1,286,000	$17,378,000
S-3	Stabilization	$27,215,000	$1,285,000	$28,500,000
S-4	Acid Leaching	$34,764,000	$0	$34,764,000
Ground Water Alternatives				
GW-1	No Action for Ground Water	$13,000	$148,000	$161,000
GW-2	Containment of Ground Water	$611,000	$7,015,000	$7,626,000
GW-3	Precipitation/Flocculation	$688,000	$6,739,000	$7,427,000
GW-4	Ion Exchange	$1,284,000	$7,805,000	$9,089,000

COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES FOR GROUND WATER

Concerns as to the technical practicability of capturing contaminated ground water will be investigated in detail during predesign ground water studies. Available data indicate that contaminants directly below the source area at OU-2 (i.e., the former battery cracking area) are mobile and, therefore, recoverable. As a result, the ground water alternatives presented in Section 7.0 of the ROD and the following comparative analysis of the ground water alternatives are based, at a mimimum, on the ground water below the source area at OU-2. If EPA determines from the results of the the predesign ground water studies that it is technically impracticable to remediate portions of the aquifer outside the source area because the contaminants are immobile and, therefore, not recoverable, then the no action alternative would be protective for those portions of the aquifer due to the absence of an exposure pathway. However, if EPA determines from the results of the predesign ground water studies that contaminants are mobile in any portion of the aquifer outside the source area, then the following comparative analysis of the ground water alternatives will also apply to those portions of the aquifer, as well as the source area at OU-2.

Overall Protection of Human Health and the Environment

Alternative GW-1 (No Action) would not provide for protection of human health or the environment in the areas of the aquifer where contaminants are mobile, as the ground water contamination would continue to migrate in the absence of remedial response measures. Alternative GW-2 (Containment) would be protective, but only if long-term maintenance, monitoring, and enforcement of institutional controls are performed. The uncertainty associated with these long-term actions reduces the overall protection of human health and environment that can be expected from Alternative GW-2.

Alternatives GW-3 (Precipitation/Flocculation) and GW-4 (Ion Exchange) would provide comparable levels of protection of human health and the environment, assuming that the proposed extraction systems are capable of capturing the contamination and restoring ground water quality at OU-2.

Compliance With ARARs

Alternative GW-1 (No Action) would not comply with ARARs in the areas of the aquifer where ground water restoration is technically practicable, nor is there justification at this time for an ARARs waiver. Alternative GW-2 (Containment) would not comply with State of Alabama ARARs for ground water restoration; the waivers necessary to select this alternative would require additional supporting data. Alternatives GW-3 (Precipitation/Flocculation) and GW-4 (Ion Exchange) would be designed to attain chemical-specific ARARs for ground water (which formed the basis of the OU-2 ground water cleanup goals); however, the ability of these actions to restore the aquifer to these levels has not been established due to complex hydrogeologic conditions. The ground water treatment systems for GW-2, GW-3, and GW-4 would be designed and operated to meet effluent guidelines and applicable water quality standards for discharge of treated ground water. There are no significant differences regarding compliance with ARARs for Alternatives GW-3 and GW-4.

Long-Term Effectiveness and Permanence

Because Alternative GW-1 (No Action) would not impact the existing risks at OU-2, it would be least effective in accomplishing the remedial action objectives. Alternative GW-2 (Containment) provides for long-term isolation of the contamination, with institutional controls to prevent exposure to contaminated ground water. Alternative GW-2 does not involve ground water remediation and relies heavily on engineering and institutional controls to remain effective; therefore, it may not represent a permanent remedy.

The lowest level of residual risk and highest degree of permanence would be associated with successful implementation of Alternatives GW-3 and GW-4 (assuming these actions are able to capture and extract contaminated ground water such that ground water cleanup goals are attained). These alternatives involve treatment of the contaminated ground water using carbon adsorption and either precipitation/ flocculation or ion exchange technology for the removal of organic and inorganic contaminants. Both alternatives result in cross-media transfer of risk, generating residuals that must be managed. Proper management of these residuals would be incorporated into the operation and maintenance plan for the treatment system. Final disposition of the residuals is likely to entail thermal destruction of organic residuals and the disposal of inorganic residuals in an appropriate RCRA disposal facility. These measures would reduce the level of residual to negligible levels.

Reduction of Toxicity, Mobility, or Volume

Alternative GW-1 (No Action) has no impact on either the toxicity, mobility, or volume of ground water contamination; Alternative GW-2 (Containment) would decrease the mobility of the contamination and would therefore have some impact on the volume of contamination (through treatment of water extracted to create the barriers) but would have little impact on the toxicity of contaminated ground water. Alternatives GW-3 and GW-4 are expected to accomplish significant reductions in mobility, toxicity, and volume through extraction and treatment of contaminated ground water.

Short-Term Effectiveness

Implementation of Alternative GW-1 (No Action) would result in no additional risk to the community or remedial construction workers. Alternatives GW-2, GW-3, and GW-4 utilize similar ground water extraction, treatment, and discharge systems, which would be designed, installed, and operated using procedures and safety precautions that minimize risk to the community. These more aggressive ground water alternatives are also comparable in the potential risk to remedial construction workers. Alternatives GW-2, GW-3, and GW-4 all involve treatment of contaminated ground water; however, potential exposures and risks would be controlled through use of personal protective equipment, monitoring, and rigid conformance with a Site-specific health and safety plan. Overall, the short-term effectiveness is more or less equivalent for Alternatives GW-2, GW-3, and GW-4. None of the alternatives are expected to involve measurable environmental impacts.

The time required to achieve protection is greater for Alternative GW-1 (No Action). Both containment (GW-2) and the aquifer restoration alternatives (GW-3 and GW-4) create hydraulic barriers that minimize further offsite migration of contaminated ground water; protectiveness would be achieved once the capture zones for the extraction systems have developed. Because start-up of the extraction system is dependent on completion of the treatment system, Alternatives GW-2 and GW-3, which use the existing treatment system at OU-2, would be protective sooner than Alternative GW-4, which entails construction of a new treatment facility. Protectiveness as measured by actual remediation of the ground water aquifer would be attained only through successful implementation of Alternative GW-3 or GW-4, both of which entail a more aggressive pump-and-treat strategy than that associated with Alternative GW-2. Although the actual remediation time cannot be quantified at this time, the overall time required to achieve protection would be similar for Alternatives GW-3 and GW-4 (i.e., the time is independent of the type of treatment system used).

Implementability

Alternative GW-1 (No Action) is most easily implemented. Alternatives GW-2 (Containment) and GW-3 (Precipitation/Flocculation) are easily implemented using the existing wastewater treatment system at OU-2 and can therefore be considered equivalent. Alternative GW-4 (Ion Exchange) may utilize some of the equipment currently onsite as equalization tanks; however, most equipment would have to be procured and is therefore not as easily implemented as GW-2 or GW-3. All of the treatment processes under consideration in Alternatives GW-2, GW-3, and GW-4 are highly reliable and proven treatment technologies.

The technical practability of attaining the ground water cleanup goals within a reasonable time frame in the shallow, intermediate, and deep zones at OU-2 cannot be determined at this time. Therefore, the technical practability of successfully implementing Alternatives GW-3 and GW-4 has more uncertainty than that associated with Alternatives GW-1 and GW-2. Additional ground water studies during the predesign phase are required to determine the technical practacability of Alternatives GW-3 and GW-4.

Cost

A summary of the present worth, capital, and O&M costs for each of the alternatives is presented in Table 8-1. Alternative GW-1, as expected, is the least expensive, followed by Alternative GW-2 and GW-3, which take advantage of the wastewater treatment system currently available at the ILCO Main Facility. The most expensive alternative is alternative GW-4. O&M costs for GW-3 and GW-4 were estimated at 20 years, while O&M costs for GW-1 and GW-2 were estimated at 30 years.

9.0 SUMMARY OF SELECTED SOIL AND GROUND WATER REMEDIES

Based upon consideration of the requirements of CERCLA, the NCP, the detailed analysis of alternatives and public and state comments, EPA has selected a soil and ground water remedy for OU-2. The total present worth cost of the selected soil and ground water remedies, Alternatives S-4 and GW-3, is estimated at $42,191,000.

A. Soil Remedy

A.1 The major components of the soil remedy to be implemented include:

Based on the comparative analysis performed on the soil alternatives in Section 8.0, EPA's preferred soil remedy for OU-2 is Alternative S-4, Acid Leaching. This alternative includes:

Conduct a Site-specific field-scale treatability study to determine the effectiveness of the acid leaching process on OU-2 soil during the design phase;

Excavate contaminated soil and treat soil onsite to established performance standards by acid leaching (excluding soil where the water treatment facility is located);

Transfer and treat contaminated soil and sludge from the large and small covered waste piles by acid leaching (Note: If sludge has previously been stabilized and, therefore, cannot be treated via acid leaching and fails TCLP, the sludge will be disposed offsite in a permitted hazardous waste landfill);

Transfer and treat contaminated soil contained in the Interstate Trucking Building by acid leaching;

Backfill excavated areas onsite with treated (i.e., clean) soil, grade, and revegetate areas once backfilled;

Dismantle existing surface structures not intended to remain; decontaminate/treat all debris onsite using specific best demonstrated available technologies (BDAT) based on the type of debris and the type of contaminants present in the debris; recycle decontaminated debris that can be recyled; dispose of decontaminated debris that cannot be recycled offsite in a non-hazardous landfill; decontamination/treatment must be performed in accordance with specified performance and design and operating standards for BDAT technologies; treaters of the debris must comply with the applicable residue analysis, notification, certification, recordkeeping, and other requirements; debris which cannot be decontaminated will be disposed offsite in a permitted hazardous waste landfill;

Decontaminate any remaining buildings and/or structures onsite;

Package and ship slag that can be recycled to an offsite permitted facility for recovery of lead using a secondary smelter. If slag cannot be recycled, stabilize and dispose of the slag offsite in a permitted hazardous waste landfill;

Package and ship battery casing components and battery chips that can be recycled to an offsite permitted facility for recovery of lead using a secondary smelter. Dispose of non-recyclable contaminated components that fail TCLP offsite in a permitted hazardous waste landfill and dispose of non-hazardous, non-recyclable components offsite in a non-hazardous landfill;

Send roll-off boxes of baghouse dust (K069) offsite to a RCRA permitted Treatment, Storage, and Disposal (TSD) facility. Treatment and disposal of the baghouse dust shall complay with all pertinent ARARs, including RCRA LDRs;

Monitor air emissions from OU-2 during remedial action activities. Air monitoring will be conducted to ensure that contaminant concentrations do not exceed levels considered to be safe for human health. If levels are exceeded, mitigative procedures such as dust suppression, vapor capture, or other EPA-approved methods will be employed to prevent harmful levels of air emissions from leaving OU-2; and

Appropriate institutional controls may be required with respect to the ILCO Main Facility to prohibit future residential land-use of the property.

Note: Contaminated soil in the vicinity of the onsite water treatment facility will not be addressed until after ground water treatment is complete in order to facilitate the potential use of the existing water treatment facility.

The cost of the selected soil remedy, acid leaching, is estimated to be $34,764,000.

Acid Leaching Treatability Study

A Site-specific field-scale treatability study to determine the effectiveness of the acid leaching technology on soil at the ILCO Site will be performed during the remedial design phase. The treatability study will be designed to accomplish the following objectives:

1. Determine if the acid leaching technology is amenable to removing or lowering lead and arsenic concentrations in soil at the ILCO Site to below established performance standards.

2. Determine if the acid leaching technology can be implemented at the ILCO Site for treatment of contaminated soil in a cost-effective and timely manner.

The cost-effectiveness of the acid leaching remedy will be evaluated by EPA, in consultation with the State, by 1) weighing the long-term benefits of the acid leaching technology (i.e., a clean site that may be re-developed) against the cost and 2) comparing the cost to implement the acid leaching remedy, with consideration of the long-term benefits, to the cost to implement the contingent remedy (solidification/stabilization). The timeliness of the implementation of the acid leaching remedy will be evaluated by EPA, in consultation with the State, by comparing the time to implement the acid leaching remedy, with consideration of the long-term benefits, to the time to implement the contingent remedy (solidification/stabilization).

Contingent Remedy

If EPA, in consultation with the State, determines from the results of the treatability study that the acid leaching technology cannot be implemented in a cost-effective and timely manner and/or will not meet the required performance standards as set forth in Paragraph A.2, solidification/stabilization will be implemented.

The major components of the contingent remedy, solidification/ stabilization, include:

- Excavate contaminated soil (excluding soil where the water treatment facility is located); treat soil failing TCLP onsite by solidification/stabilization, and dispose of all soil (treated and untreated) onsite in an engineered containment cell with a multi-media bottom liner (including leachate collection) and a RCRA Subtitle D multi-media cap;
- Transfer and treat contaminated soil and sludge from the large and small covered waste piles by solidification/stabilization;
- Transfer and treat contaminated soil contained in the Interstate Trucking Building by solidification/stabilization;
- Construct an engineered containment cell onsite. The engineered containment cell will be designed to meet existing minimum technological requirements for landfills. The engineered containment cell cap will be a RCRA Subtitle D cap constructed of five layers with a leachate collection system and multi-media bottom liner;
- Backfill excavated areas onsite with clean fill;
- Grade and revegetate excavated areas once backfilled;
- Dismantle existing surface structures not intended to remain; decontaminate/treat all debris onsite using specific best demonstrated available technologies (BDAT) based on the type of debris and the type of contaminants present in the debris;

recycle decontaminated debris that can be recycled; dispose of decontaminated debris that cannot be recycled offsite in a non-hazardous landfill; decontamination/treatment must be performed in accordance with specified performance and design and operating standards for BDAT technologies; treaters of the debris must comply with the applicable residue analysis, notification, certification, recordkeeping, and other requirements; debris which cannot be decontaminated will be disposed offsite in a permitted hazardous waste landfill;

Decontaminate any remaining buildings and/or structures onsite.

Package and ship slag that can be recycled to an offsite permitted facility for recovery of lead using a secondary smelter; non-recyclable slag will be solidified/stabilized to pass TCLP and disposed in the onsite containment cell;

Package and ship battery casing components and battery chips that can be recycled to an offsite permitted facility for recovery of lead using a secondary smelter; non-recyclable components will be solidifed/stabilized to pass TCLP, as necessary, and disposed in the onsite containment cell;

Send roll-off boxes of K069 baghouse dust offsite to a RCRA permitted Treatment, Storage, Disposal (TSD) facility. Treatment and disposal of the baghouse dust shall comply with all pertinent ARARs, including RCRA LDRs;

Monitor air emissions from OU-2 during remedial action activities. Air monitoring will be conducted to ensure that contaminant concentrations do not exceed levels considered to be safe for human health. If levels are exceeded, mitigative procedures such as dust suppression or vapor capture will be employed to prevent harmful levels of air emissions from leaving OU-2; and

Appropriate institutional controls, such as fencing and posted warning signs, may be required to limit access and inform the public of the dangers of exposure. Additional institutional controls may also be required with respect to the ILCO Main Facility to limit future use of the Site. Since waste will be left onsite, a long-term monitoring program will be implemented, including five-year reviews as required by CERCLA to evaluate the performance of the solidification/stabilization remedy.

Note: Contaminated soil in the vicinity of the onsite water treatment facility would not be addressed until after ground water treatment is complete in order to facilitate the potential use of the existing water treatment facility.

The cost of the contingent remedy, solidification/stabilization, is estimated to be $28,500,000.

The selected remedy and the contingent remedy for soil at OU-2 are consistent with the requirements of Section 121 of CERCLA and the National Contingency Plan. Both the selected remedy and the contingent remedy are believed to be protective of human health and the environment, will attain all Federal and State ARARs, will reduce the mobility, toxicity, or volume of contaminated soil at OU-2, and will utilize permanent solutions and alternative treatment technologies to the maximum extent practicable.

A.2. Performance Standards for Soils

Acid Leaching

The Performance Standards for the soil component of the selected remedy include, but are not limited to, the following excavation and treatment standards:

Contaminated soil and related materials shall be excavated from the areas of contamination. Excavation shall continue until the remaining soil achieves the following maximum lead concentration levels (performance standards). A sampling program will be conducted to determine the actual volumes of surface and subsurface soil requiring remedial action. Testing methods approved by EPA shall be used to determine if the maximum allowable lead concentrations have been achieved in the soil remaining in the ground. All soil exceeding the following performance standards will be treated by the acid leaching technology.

Medium	Performance Standard for Lead
Soil with Low pH (pH < 5)	150 ppm
Soil with Normal pH (pH > 5)	1000 ppm

Testing methods approved by EPA shall be used to determine if the maximum allowable lead concentration of 1000 ppm has been achieved in all treated soil. The soil from the low pH area will be neutralized to a normal pH level during the acid leaching treatment process; therefore, all soil, including the soil from the low pH area, will be treated to the performance standard (1000 ppm) established for lead in normal pH soil.

Testing, using EPA-approved methods, shall also be performed to determine if the maximum allowable arsenic concentration has been achieved in the soil remaining in the ground, as well as all the treated soil, as follows:

Medium	Performance Standard for Arsenic
Surface Soil	13 ppm

During the field-scale treatability study to be performed at OU-2, the established cleanup levels (performance standards) for both lead and arsenic will be used to determine the effectiveness of the acid leaching technology. Soil will need to be treated to a standard of 1000 ppm lead and 13 ppm arsenic to be considered "clean" soil. The 1000 ppm standard for lead is based upon protection of human health for a future commercial/industrial land-use of OU-2 and is also protective of ground water. The 13 ppm standard for arsenic is based upon the average background level for arsenic in surface soil at OU-2.

Solidification/Stabilization

The Performance Standards for the soil component of the contingent remedy include, but are not limited to, the following excavation and treatment standards:

Contaminated soil and related materials shall be excavated from the areas of contamination. Excavation shall continue until the remaining soil achieves the following maximum lead and arsenic concentration levels (performance standards). A sampling program will be conducted to determine the actual volumes of surface soil and subsurface soil requiring remedial action. Testing methods approved by EPA shall be used to determine if the maximum allowable lead and arsenic concentrations have been achieved in the soil remaining in the ground. All soil exceeding the following performance standards will be treated by the solidification/stabilization technology.

Medium	Performance Standard
Lead:	
Soil with Low pH (pH < 5)	150 ppm
Soil with Normal pH (pH > 5)	1000 ppm
Arsenic:	
Surface Soil	13 ppm

Testing, using EPA-approved methods, will be performed to ensure that the solidification/stabilization process effectively immobilizes the contaminants of concern at the Site. The solidification/stabilization process will be effective if the treated soil from the Site achieves the following requirements:

1. The boiling point of the contaminants to be stabilized must be higher than the boiling point of water. The temperature of the process should not exceed 130 degrees F.

2. The TCLP leachate from solidified/stabilized soils will be required to, at a minimum, yield a leachate that does not exceed the established performance standards (cleanup levels) for the contaminants of concern at the Site.

3. Total Waste Analysis (TWA) will be utilized and compared to the original analysis of waste using the same extraction procedures. A 90 percent reduction in concentration or mobility of the contaminated soil and other waste after treatment is the treatment target. (This target is consistent with Superfund's guidelines for effective treatment, which recommend a treatment range of 90 to 99 percent reduction in the concentration or mobility of the contaminants of concern). However, the 90 percent reduction in contaminant concentration or mobility is a general guidance and may be varied within a reasonable range considering the effectiveness of the technology and the performance standards (cleanup levels) established for the Site. Although this policy represents EPA's strong belief that TWA should be used to demonstrate effectiveness of immobilization, successful achievement of other leachability tests may also be required in addition to TWA to evaluate the protectiveness of the treatment.

4. In addition, the solidification/stabilization mixture will be required to achieve a minimum of 50 psi compressive strength and must demonstrate a permeability of $1X10^{-6}$ or less.

Soils and other waste from the Site requiring treatment by solidification/stabilization which do not comply with these standards will be disposed offsite in a permitted hazardous waste landfill. During the early stages of the Remedial Design, the treatment standards will be used to determine the effectiveness of the solidification/ stabilization technology. Treatment and disposal actions shall comply with all pertinent applicable or relevant and appropriate requirements (ARARs).

B. GROUND WATER REMEDY

Based on the comparative analysis performed on the ground water alternatives in Section 8.0, EPA's preferred ground water remedy for OU-2 is Alternative GW-3, treatment of ground water using a precipitation/flocculation pump and treat system. The objective of the selected ground water remedy is to restore ground water to its beneficial use, which is a potential drinking water source. Based on information obtained during the remedial investigation, and the analysis of all remedial alternatives, EPA believes that the selected remedy may be able to achieve this objective. However, the ability to achieve the established performance standards at all points throughout the area of contamination cannot be determined until predesign ground water studies are conducted. Therefore, the selected ground water remedy will be refined, as necessary, during the predesign phase.

If EPA determines from the results of the predesign ground water studies that portions of the ground water aquifer outside of the source area at OU-2 cannot be restored to its beneficial use due to the contaminants not being mobile and, therefore, not recoverable, the following measures involving long-term management may occur as a modification to the existing ground water remedy:

a. Chemical-specific ARARs will be waived for the cleanup of those portions of the aquifer based on the technical impracticability of achieving further contaminant reduction;

b. Institutional controls will be provided/maintained to restrict access to those portions of the aquifer which cannot be restored and remain above performance standards; and

c. Monitoring of specified wells will be conducted for an indefinite period of time as designated by EPA.

If ground water restoration is shown to be technically impracticable in certain portions of the aquifer, ground water restoration will occur only in those areas where contaminants are recoverable. Where restoration is possible, the ground water extraction system will pump from the shallow, intermediate, and deep zones of the aquifer. Extracted ground water will be treated and subsequently discharged to the unnamed tributary adjacent to the ILCO Main Facility. The estimated cost of the selected ground water remedy is $7,427,000.

B.1. <u>The major components of the ground water remedy to be implemented include:</u>

- Conduct additional ground water investigations on OU-2 to fill necessary data gaps and determine the technical practicability of restoring the ground water aquifer to its beneficial use;

The following activities will be implemented for all portions of the contaminated aquifer where restoration is determined by EPA to be technically practicable based on the results of the predesign ground water studies:

- Pump contaminated ground water from the shallow, intermediate, and deep zones of the aquifer using a ground water extraction system of trenches and wells;

- Treat the ground water contaminated with inorganics via precipitation/flocculation technology using the existing onsite water treatment plant, if available; if the existing treatment system is not available, an alternative system may be used;

- Segregate ground water from the shallow extraction system from the intermediate and deep ground water for treatment of both free phase and dissolved phase hydrocarbons. Shallow ground water will pass through an organics treatment system before entering the treatment train for inorganics shared with ground water extracted from the intermediate and deep zones;

- Discharge treated effluent, meeting applicable requirements, to the Unnamed Tributary adjacent to the ILCO Main Facility; and

- Implement institutional controls for ground water, as necessary.

The ground water treatment components of the selected ground water remedy consist of oil/water separation, carbon adsorption, chemical precipitation, and flocculation/clarification. Both free phase and dissolved hydrocarbons would be removed through physical separation and carbon adsorption. Inorganics would be removed from solution in the form of insoluble solid precipitates. The solids formed are then separated from the wastewater by settling, clarification, and/or polishing processes.

Predesign Ground Water Studies

The purpose of the predesign studies is to enable EPA to determine the areas and zones of the aquifer where restoration is technically practicable. The studies shall determine the mobility and recoverability of the inorganic contaminants, as well as determine the areal extent of organic contamination at OU-2.

Additional data shall be collected, as necessary, to determine 1) the influence of local geology (i.e., fractures, faults, and formations) and nearby ground water withdrawals on the migration potential of ground water contamination from OU-2 and 2) the potential impacts on ground water from residual soil contamination.

A field-scale pump and treat investigation utilizing the existing monitoring wells and treatment system, as appropriate, shall be implemented as part of the predesign studies.

This pump and treat investigation shall be centered around the source area (i.e., former battery cracking area) at OU-2. This field-scale pump and treat investigation, as well as an in-depth investigation of the remaining portions of the contaminated aquifer, will be used by EPA, in consultation with the State of Alabama, to determine the technical practicability of restoring the ground water aquifer to its beneficial use.

Institutional Controls

Appropriate institutional controls, such as deed restrictions, may be required with respect to the ILCO Main Facility and all properties within a reasonable distance downgradient of the ground water contamination. These controls will prohibit the drilling of new water supply wells and the use of ground water for potable supply.

Monitoring will be performed on selected onsite monitoring wells and wells outside the area of restricted use to monitor the movement of the ground water contamination. This will provide data as to any potential threat to water supply wells located north of the ILCO Main Facility.

Monitoring activities, as stated above, will be used to track migration of the contamination. Monitoring will include annual ground water sampling and analyses of a selected group of wells.

Selection of wells to be monitored will be completed during the remedial design phase.

B.2. <u>Performance Standards for Ground Water</u>

a. Treatment Standards

If EPA determines from the results of the predesign ground water studies that it is technically practicable to restore all or portions of the contaminated aquifer at OU-2, ground water shall be treated until the following maximum concentration levels (performance standards) are attained in the aquifer (or portions of the aquifer), at the wells to be designated by EPA as compliance points. It may become apparent during the implementation or operation of the treatment system that levels of contamination in the ground water have ceased to decline and are remaining constant at levels higher than the performance standards. In such a case, the system's performance may be re-evaluated by EPA, in consultation with the State of Alabama.

Contaminant of Concern	Performance Standard
Antimony	6.0 ppb
Arsenic	50.0 ppb
Beryllium	4.0 ppb
Cadmium	5.0 ppb
Lead	15.0 ppb
Manganese	510.0 ppb
Nickel	100.0 ppb
Benzene	5.0 ppb
1,2,4-Trimethylbenzene	51.0 ppb
1,3,5-Trimethylbenzene	41.0 ppb

b. Discharge Standards

Discharges from the ground water treatment system shall comply with all ARARs, including, but not limited to, substantive requirements of the NPDES permitting program under the Clean Water Act, 33 U.S.C. 1251 et seq., and all effluent limits established by EPA.

c. Operation Standards

The operation of any ground water treatment system shall be conducted in accordance with all Performance Standards and applicable federal and state requirements.

C. Compliance Monitoring

Ground water monitoring shall be conducted at OU-2. After demonstration of compliance with all Performance Standards, OU-2 ground water shall be monitored for at least five years. If ground water monitoring indicates that the Performance Standards set forth in Paragraph B.2 are being exceeded at any time after monitoring and/or pumping has been discontinued, extraction and treatment of the ground water will recommence, if technically practicable, until the Performance Standards are once again achieved.

Monitoring will not be required as part of the selected soil remedy (acid leaching) because no waste above established performance standards will be left onsite. However, if acid leaching does not meet performance standards during the treatability study and solidification/stabilization is implemented, soil monitoring will be required for at least five years. If monitoring of the treated soil under the solidification/stabilization remedy indicates that Performance Standards set forth in Paragraph A.2 have been exceeded, the effectiveness of the soil remedy component will be re-evaluated by EPA, in consultation with the State of Alabama.

Air emissions during the cleanup will also be monitored to ensure the safety of workers and residents near OU-2. Air monitoring will be conducted to ensure that contaminant concentrations do not exceed levels considered to be safe for human health. If levels are exceeded, mitigative procedures such as dust suppression, vapor capture, or other EPA-approved methods will be employed to prevent harmful levels of air emissions from leaving OU-2.

10.0 STATE ACCEPTANCE

The State of Alabama, as represented by the Alabama Department of Environmental Management (ADEM), has been the support agency during the Remedial Investigation/ Feasibility Study process for the ILCO Site. In accordance with 40 CFR 300.430, as the support agency, ADEM has participated in this process. The State of Alabama, as represented by ADEM, has concurred with the selected remedy.

11.0 COMMUNITY ACCEPTANCE

Based upon comments expressed at the proposed plan public meeting and written and oral comments received during the public comment period, the reaction of the Leeds community to the selected remedy at the ILCO Site has been favorable.

12.0 STATUTORY DETERMINATION

EPA's primary responsibility at Superfund Sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes additional statutory requirements and preferences. These specify that, when complete, the selected remedy must also meet all Federal and State ARARs, be cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. CERCLA also includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous substances as their principal element. A review will be conducted within five years from commencement of the remedial action for ground water and for soil, if the contingent remedy is implemented, to ensure that the remedy continues to provide adequate protection of human health and the environment. The following sections discuss how the selected and contingent remedy for soil at OU-2 and the selected remedy for ground water at OU-2 meets these statutory requirements.

12.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Both the selected remedy and the contingent remedy for soil and the selected remedy for ground water is protective of human health and the environment. The selected soil remedy, acid leaching, provides the highest level of protection of any of the remedial alternatives for soil, since all wastes and soil contamination greater than established cleanup levels will be permanently removed from OU-2. The selected ground water remedy, a pump-and-treat system using precipitation/flocculation, is also protective of human health and the environment.

Actual or threatened releases of hazardous substances from OU-2, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

12.2 ATTAINMENT OF THE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

The selected remedy must comply with the substantive requirements of federal and state laws and regulations which have been determined to constitute applicable or relevant and appropriate requirements (ARARs).

Applicable requirements are those cleanup standards, control standards, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a Superfund site.

Relevant and appropriate requirements are those cleanup standards, control standards, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a Superfund site, address problems or situations sufficiently similar (relevant) to those encountered and that are well-suited (appropriate) to circumstances at the particular site.

Chemical Specific ARARs

Chemical-specific ARARs are specific numerical quantity restrictions on individually-listed chemicals in specific media. Table 12-1 lists chemical specific ARARs for OU-2 of the ILCO Site.

Safe Drinking Water Act, MCLs and MCLGs; Alabama's Primary Drinking Water Standards. Maximum contaminant levels (MCLs) and Maximum Contaminant Level Goals (MCLGs) promulgated under the authority of the Safe Drinking Water Act (SDWA) are specifically identified in Section 121 of CERCLA as well as the NCP as remedial action objectives for ground waters that are current or potential sources of drinking water supply. The ground water underlying the ILCO Main Facility is classified as a Class II-A ground water (i.e., potential source of drinking water) under EPA's Guidelines for Ground-Water Classification. MCLs and non-zero MCLGs are therefore relevant and appropriate as remedial action objectives for ground water cleanup for OU-2. Alabama's primary drinking water standards are also relevant and appropriate because they set standards for potential sources of drinking water.

TABLE 12-1
CHEMICAL SPECIFIC ARARS
ILCO SUPERFUND SITE

	CITATION	EXPLANATION
R & A	Safe Drinking Water Act, MCLs and MCLGs 42 U.S.C. §300 40 C.F.R. Part 141 Alabama Primary Drinking Water Standards Ala. Admin. Code. 335–7–2	Maximum contaminant levels (MCLs) and maximum contaminant level goals (MCLGs) promulgated under the Safe Drinking Water Act and Alabama's Primary Drinking Water Standards set standards for potential sources of drinking water.
R & A	Clean Water Act, Ambient Water Quality Criteria, 33 U.S.C. §1251 et. seq. 40 C.F.R. Part 131 Alabama Water Quality Standards Ala. Admin. Code 335–6–10	Federal Ambient Water Criteria are developed as guidance for the states to develop ambient surface water quality standards that will be fully protective of human health and the environment. Alabama's Water Quality Standards set forth numerical and narrative standards for ambient ground water and surface water in the State of Alabama.
A	Clean Water Act National Pollution Discharge Elimination System Regulations 33 U.S.C. §1251 et. seq 40 C.F.R. Parts 121, 125, 129, 133, and 136 Alabama Pollution Discharge Elimination System Regulations Ala. Admin. Code 335–6–6	NPDES requirements regulate the discharge of any pollutant or combination of pollutants to waters of the United States from any point source.
A	Resource Conservation and Recovery Act 42 U.S.C §6901 et. seq. 40 C.F.R Part 268 Alabama Hazardous Waste Regulations Ala. Admin. Code 335–14	Land disposal restrictions establish treatment standards which must be met before hazardous wastes may be land disposed.

Clean Water Act, Ambient Water Quality Criteria; Alabama Water Quality Standards. Ambient Water Quality Criteria (AWQC) are specifically identified in Section 121 of CERCLA as remedial action objectives. AWQC are developed as guidance for the states to develop ambient surface water quality standards that will be fully protective of human health and the environment. AWQC are relevant and appropriate to the selected remedy and the discharge of the treated effluent from the Site must not result in ambient surface water concentrations that exceed those chemical-specific AWQC. Alabama's Water Quality Standards are relevant and appropraite as they set forth numerical and narrative standards for ambient ground water and surface water in the State of Alabama.

Clean Water Act, National Pollution Discharge Elimination System (NPDES); Alabama Department of Environmental Management Water Quality Program; National Pollution Discharge Elimination System Regulations. NPDES requirements regulate the discharge of any pollutant or combination of pollutants to waters of the United States from any point source. The substantive requirements of the NPDES permitting program are applicable to the selected remedy because the discharge of treated ground water to the unnamed tributary will constitute a point source discharge to waters of the United States.

Resource Conservation and Recovery Act (RCRA); Alabama Department of Environmental Management Hazardous Waste Regulations; Land Disposal Restrictions. Land disposal restrictions establish treatment standards which must be met before hazardous wastes may be land disposed. Land disposal restrictions are applicable. Both acid leaching and solidification/stabilization involve treatment of contaminated soils and on-site disposal. Therefore, the land disposal restrictions must be met before treated soils may be redeposited.

Location-Specific ARARs

Location-specific ARARs are restrictions placed upon the concentration of hazardous substances or the conduct of activities on the basis of location. Table 12-2 lists location specific ARARs for OU-2 of the ILCO Site.

TABLE 12-2
LOCATION SPECIFIC ARARS
ILCO SUPERFUND SITE

	CITATION	EXPLANATION
R & A	Alabama Water Use Classification Regulations Ala. Admin. Code 335-6-11	Identifies surface water utilization classifications for the State of Alabama.

Alabama's Water Use Classification for Interstate Waters Regulations. Dry Creek and the unnamed tributary are classified as fish and wildlife streams and therefore, Alabama's Water Use Classification for Interstate Waters regulations are applicable.

Action-Specific ARARs

Action-specific ARARs are technology or activity based requirements or limitations or actions taken with respect to cleanup. Table 12-3 lists location specific ARARs for OU-2 of the ILCO Site.

TABLE 12-3
ACTION SPECIFIC ARARS
ILCO SUPERFUND SITE

	CITATION	EXPLANATION
A	Resource Conservation and Recovery Act 42 U.S.C §6901 et. seq. 40 C.F.R. Part 258 Alabama Solid Waste Regulations Ala. Admin. Code 335–13	These regulations set forth the criteria for municipal solid waste landfills.
A	Resource Conservation and Recovery Act 42 U.S.C §6901 et. seq. 40 C.F.R Parts 261, 262, and 264 Alabama Hazardous Waste Regulations Ala. Admin. Code 335–14	These regulations address the treatment, storage, and disposal of hazardous waste including the following: the definition of those solid wastes which are subject to regulation as hazardous, decontamination of debris, storage of hazardous waste, and treatment of hazardous waste.

Resource Conservation and Recovery Act (RCRA) Hazardous Waste Regulations; Alabama Department of Environmental Management (ADEM) Hazardous Waste Regulations. The selected remedy involves the treatment, storage, and disposal of hazardous waste. The selected remedy provides for the decontamination and disposal of debris and the recycling or disposal of slag and battery components. Disposal of debris that cannot be decontaminated, and slag and battery components that cannot be recycled if the acid leaching remedy is implemented, will be disposed in an offsite permitted hazardous waste landfill. Regulations which define those solid wastes which are subject to regulation as hazardous are applicable. Regulations which address decontamination of debris are also applicable. The selected remedy for soil, acid leaching, and the contingent remedy for soil, solidification/stabilization, both involve treatment of hazardous wastes and the selected ground water remedy involves the treatment of contaminated ground water. Hazardous waste regulations which address the management of hazardous wastes, including treatment and storage, are therefore applicable.

Resource Conservation and Recovery Act (RCRA) Solid Waste Regulations; Alabama Department of Environmental Management (ADEM) Solid Waste Regulations. If the contingent soil remedy, solidification/stabilization, is implemented, Subtitle D of RCRA is applicable and the containment cell must meet the substantive requirements of Subtitle D.

Department of Transportation (DOT) Regulations and Occupational Safety and Health Administration (OSHA) Regulations. While DOT and OSHA regulations do not fall within the technical definition of ARARs because they are not environmentally based, they are nonetheless directly applicable to the extent they address activities associated with the cleanup such as the transportation of hazardous materials and health and safety requirements for workers at the Site.

12.3 COST EFFECTIVENESS

EPA believes the selected remedy for both soil and ground water for OU-2 will eliminate the risks to human health and the environment at an estimated cost of $42,191,000.

Selected Soil Remedy

Although more costly than the other alternatives, the selected soil remedy provides the best balance of evaluation criteria. The selected soil remedy has several advantages:

1. The soil contamination can typically be monitored during the cleanup process to determine when cleanup levels have been met.

2. No waste streams are generated - only clean soil and concentrated metal product ready for recycling at a secondary smelter.

3. The treated (i.e., clean) soil is reusable onsite.

4. No waste is left onsite; therefore, long-term operation and maintenance is not required.

5. The site may be reused in the future.

Contingent Soil Remedy

The contingent soil remedy, solidification/stabilization is protective of human health and the environment, cost-effective, and meets all requirements (ARARs).

Ground Water Remedy

Based on the information available, the selected ground water remedy provides the best balance of evaluation criteria and is the least expensive of the ground water alternatives (except the no action alternative). The selected ground water remedy is fully protective, cost-effective, and meets all requirements (ARARs), unless such requirements are waived.

12.4 UTILIZATION OF PERMANENT SOLUTIONS TO THE MAXIMUM EXTENT PRACTICABLE

EPA has determined that the selected remedy for both soil and ground water represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner at OU-2. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that the selected remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, or volume achieved through treatment, short-term effectiveness, implementability, and cost, while also considering the statutory preference for treatment as a principal element and considering state and community acceptance.

12.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

By treating the contaminated soil and other material by acid leaching and the contaminated ground water by a pump and treat system utilizing precipitation/flocculation, the selected remedy addresses the principal threats posed by OU-2 through the use of treatment technologies. Therefore, the statutory preference for remedies that employ treatment as a principal element is satisfied.

13.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for OU-2 was released for public comment in July 1994. The Proposed Plan identified Alternative S-4, acid leaching, as the preferred alternative for soil at OU-2 and Alternative GW-3, a pump and treat system using precipitation/flocculation, as the preferred alternative for ground water at OU-2. EPA reviewed all written and verbal comments submitted during the public comment period. The only significant change made based on the comments received and re-evaluation by EPA of the proposed remedial action was a decision to raise the cleanup level (performance standard) for lead in normal pH soil at OU-2 from 500 ppm to 1000 ppm and the cleanup level for arsenic in surface soil at OU-2 from 3.3 ppm to 13 ppm. As a result of the comments received during the Proposed Plan comment period and new guidance currently being drafted on determining lead cleanup levels for an industrial site, EPA reevaluated the applicability of the 500 ppm cleanup level for lead in normal pH soil at OU-2. EPA's reevaluation of the 500 ppm lead cleanup level was based primarily upon EPA's 1989 Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites, which states that "lead in soil and dust appears to be responsible for blood levels in children increasing above background levels when the concentration in the soil or dust exceeds 500 to 1000 ppm. Site-specific conditions may warrant the use of soil cleanup levels below the 500 ppm level or somewhat above the 1000 ppm level". A cleanup level for lead in soil in the 500 to 1000 ppm range is considered to be protective of human health in a residential setting. EPA originally proposed a cleanup level of 500 ppm for lead in normal pH soil at OU-2. However, since the ILCO Main Facility is located in an area zoned for industrial land-use and 500 ppm is normally the cleanup level selected for residential sites, EPA, in consultation with the State of Alabama, determined that 1000 ppm is a more applicable cleanup level for lead in normal pH soil at OU-2. This revised cleanup level is supported by the assumption of a future commercial/industrial land-use of the Site. The 1000 ppm cleanup level for lead in normal pH soil is also protective of ground water. Appropriate institutional controls may be required to prevent future residential land-use of the Site.

In addition to re-evaluating the lead cleanup level in normal pH soil at OU-2, EPA also re-evaluated the cleanup level for arsenic in surface soil at OU-2. EPA originally proposed a cleanup level of 3.3 ppm for arsenic in surface soil based upon a future commercial/ industrial land-use of OU-2. However, it is EPA's policy not to set cleanup levels below background levels for any contaminant of concern at a site. Upon re-evaluation of the cleanup level for arsenic, EPA determined that the cleanup level of 3.3 ppm was less than the average background level of 13 ppm for arsenic in surface soil at OU-2. Therefore, EPA determined that a cleanup level of 13 ppm is a more applicable cleanup level for arsenic in surface soil at OU-2 based upon Site-specific average background levels.

As a result of raising the cleanup level for lead in normal pH soil from 500 ppm to 1000 ppm, the volume of contaminated soil to be excavated and treated decreased slightly (by approximately 3500 cy). This decrease in the volume to be excavated and treated resulted in a slight decrease in the total cost of both the acid leaching and the solidification/stabilization soil alternatives. The cost for the acid leaching alternative, based upon the 500 ppm cleanup level, was $35,551,000. The revised cost for the acid leaching alternative, based upon the 1000 ppm cleanup level, is $34,764,000. The cost for the solidification/stabilization alternative, based on the 500 ppm cleanup level, was $29,034,000. The revised cost for the solidification/stabilization alternative, based on the 1000 ppm cleanup level, is $28,500,000. As a result, the total present worth cost of the selected soil and ground water remedies for OU-2 decreased from $42,978,000 to $42,191,000.

Decision Summary
for the
Amendment to the Record of Decision
for
Operable Unit One

Interstate Lead Company (ILCO) Site
Leeds, Alabama

1.0 INTRODUCTION

The Record of Decision (ROD) for Operable Unit One (OU-1) of the Interstate Lead Company (ILCO) Superfund Site in Leeds, Alabama was signed on September 30, 1991. This amendment to the ROD for OU-1 presents the modified selected remedy for OU-1. This amended remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended, and to the extent practicable, the National Contingency Plan (NCP). This ROD amendment is based on the administrative record for the ILCO Site and will become a part of the administrative record file for OU-1. The administrative record for the ILCO Site is available to the public at both the information repository maintained at the Leeds Public Library at 802 Parkway Drive, S.E. in Leeds, Alabama and at the EPA Region IV Library at 345 Courtland Street in Atlanta, Georgia.

Based upon new developments, EPA re-evaluated the previously selected remedy for soil contamination for OU-1. For consistency with the remedy selected for OU-2 and long-term permanence, EPA is amending the selected remedy for OU-1 to use acid leaching instead of solidification/stabilization for treatment of the excavated soils from the satellite sites (if acid leaching meets performance standards during the Site-specific treatability study to be conducted). The OU-1 remedy is also being amended to change the location that the contaminated material from the satellite sites will be taken for treatment. At the time that the ROD for OU-1 was signed (September 1991), the ILCO Main Facility was still operating and, therefore, the contaminated material from the satellite sites could not be taken to the Main Facility for treatment. Now that the ILCO Main Facility is no longer operating and is also being addressed under Superfund, the contaminated material from the satellite sites will be taken to the ILCO Main Facility for treatment along with the waste from OU-2.

2.0 Description of the Previously Selected Remedy and Modified Remedy for OU-1

PREVIOUSLY SELECTED REMEDY FOR OU-1

The major components of the previously selected soil (source) remedy at each satellite site in OU-1 include:

A. The ILCO Parking Lot and Fleming's Patio

- Excavation of soil with lead concentrations exceeding 300 ppm;
- Transportation of the excavated soil from the Fleming's Patio satellite site to the ILCO Parking Lot where a centrally located treatment unit will be located;
- Replacing the treated soil back into the excavated areas (which includes transporting the applicable treated material back to Fleming's Patio for placement into the excavated areas);
- Removal of battery casings and other debris;
- Solidification of battery casing material that can be sufficiently crushed and replacing the solidified material onsite. Offsite disposal of other debris;
- Revegetation of excavated areas;
- Institutional controls, consisting of access and deed restrictions, and long-term ground water monitoring; and
- Semi-annual sampling and analysis of existing monitoring wells for the primary metals associated with automotive batteries.

B. The Gulf Service Station, J & L Fabricators, The Connell Property, and the Acmar Church of God

- Excavation of soil with lead concentrations exceeding 300 ppm;
- Transportation of the excavated soil to the ILCO Parking Lot satellite site where a centrally located treatment unit will be located;
- Treatment of contaminated soil with a successfully demonstrated solidification/stabilization process;

- Placement of the solidified material into the ILCO Parking Lot satellite site or replacement of the solidified material back into its original excavation area if there are space limitations in the parking lot. (If treated wastes are placed at the parking lot, then the satellite sites from which the material originated would not need five-year reviews, Subtitle D closure, or deed restrictions. Instead, these subsites can be backfilled with clean fill and revegetated.);

- Revegetation of excavated areas;

- Removal of sediments exceeding 50 ppm lead at the Gulf/BP Service Station satellite site, dewatering, and transporting the sediments to the ILCO Parking Lot for treatment along with the contaminated soil; and

- Temporary relocation of the Connell property residents and the Acmar Church of God congregation, if necessary.

C. The City of Leeds Municipal Landfill

- Construction of a multilayer compacted clay and geomembrane cap that would cover area with soil exceeding 300 ppm of lead; and

- Institutional controls consisting of access and deed restrictions to protect the integrity of the cap system and long-term ground water monitoring.

The major components of the previously selected ground water remedy at each satellite site in OU-1 include:

A. Gulf Service Station and Acmar Church of God

- No ground water remediation activities will be conducted at these satellite sites since no contamination above risk-based standards was detected; and

- Long-term ground water monitoring will be conducted.

B. J & L Fabricators, Fleming's Patio, and the Connell Property

- No ground water remediation activities will be conducted at these satellite sites. Contaminants will naturally attenuate or lessen with time; and

- Long-term ground water monitoring will be conducted.

C. The City of Leeds Municipal Landfill

- Extraction of contaminated ground water

- Treatment of contaminated ground water onsite with a mobile chemical/physical treatment unit;

- Discharge of the ground water onsite into the adjacent drainageway (surface outfall); and

- Ground water monitoring during and after extraction is complete.

MODIFIED REMEDY FOR OU-1

The major components of the modified soil (source) remedy at each satellite site, excluding the City of Leeds Municipal Landfill, in OU-1 include:

- Excavate contaminated soil with lead concentrations exceeding 300 ppm (The 300 ppm cleanup level for the satellite sites is based upon protection of human health in a residential setting and protection of ground water);

- Excavate and dewater sediments at the Gulf/BP Service Station satellite site with lead concentrations exceeding 50 ppm;

- Transport all contaminated soil and dewatered sediment to the ILCO Main Facility for treatment along with OU-2 soil by acid leaching (or solidification/stabilization if acid leaching does not meet performance standards during the treatability study);

- Remove slag, battery casings, and other debris from the satellite sites;

- Transport all slag, battery casings, and other debris to the ILCO Main Facility;

- Package and ship slag that can be recycled to an offsite permitted facility for recovery of lead using a secondary smelter; non-recyclable slag will be solidified/ stabilized and disposed offsite in a permitted hazardous waste landfill, if acid leaching is implemented; if solidification/ stabilization is implemented, non-recyclable slag will be solidified/stabilized to pass TCLP and disposed in the onsite containment cell at the ILCO Main Facility;

- Package and ship battery casing components and battery chips that can be recycled to an offsite permitted facility for recovery of lead using a secondary smelter; non-recyclable components that fail TCLP will be disposed offsite in a permitted hazardous waste landfill and non-hazardous, non-recyclable components will be disposed offsite in a non-hazardous landfill, if acid leaching is implemented; if solidification/stabilization is implemented, non-recyclable components will be solidified/stabilized to pass TCLP, as necessary, and disposed in the onsite containment cell at the ILCO Main Facility;

- Decontaminate/treat debris using specific best demonstrated available technologies (BDAT) based on the type of debris and the type of contaminants present in the debris; recycle decontaminated debris that can be recycled and dispose of decontaminated debris that cannot be recycled offsite in a non-hazardous landfill; decontamination/treatment must be performed in accordance with specified performance and design and operating standards for BDAT technologies; treaters of the debris must comply with the applicable residue analysis, notification, certification, recordkeeping, and other requirements; debris which cannot be decontaminated will be disposed offsite in a permitted hazardous waste landfill; decontaminate any remaining buildings and/or structures onsite;

- Backfill excavated areas at the ILCO Parking Lot with treated (i.e., clean) soil from the acid leaching process (or clean fill if solidification/stabilization is implemented instead of acid leaching);

- Backfill excavated areas at the other satellite sites, excluding the City of Leeds Municipal Landfill, with clean fill;

- Revegetate excavated areas once backfilled; and

- Temporarily relocate Connell Property residents and Acmar Church of God congregation, if necessary.

EPA is not amending the selected OU-1 soil (source) remedy for the City of Leeds Municipal Landfill or any of the selected OU-1 ground water remedies. Therefore, the description for these remedies are the same as presented above under the desription of the previously selected remedy for OU-1.

For more detailed information, please see the ROD for OU-1 and the ROD for OU-2.

3.0 SUMMARY OF THE COMPARATIVE ANALYSIS FOR THE PREVIOUSLY SELECTED REMEDY VERSUS THE MODIFIED REMEDY FOR OU-1

This section documents the comparative analysis conducted to evaluate the relative performance of the previously selected remedy and the modified remedy for OU-1 in relation to each of the evaluation criteria. The purpose is to identify the relative advantages and disadvantages of each alternative. The key tradeoffs that must be balanced in the selection of the remedy can then be identified. The following comparative analysis does not include the City of Leeds Landfill satellite site.

Overall Protection of Human Health and Environment

Solidification/stabilization provides protectiveness by treating the waste prior to onsite disposal but is also dependent on a long-term maintenance program to maintain this protectiveness. The solidification/stabilization alternative is not considered to be a permanent remedy for OU-1 because these residuals remain a viable if somewhat unlikely source of future exposure and risk. Acid leaching provides the highest level of protection of any of the remedial alternatives for soil, as all wastes and soil contamination above established performance standards (cleanup levels) will be permanently removed from the satellite sites.

Compliance with ARARs

The solidification/stabilization alternative will be designed and implemented so as not to trigger the RCRA Land Disposal Restrictions. The onsite treatment units used for solidification/stabilization and acid leaching of contaminated soils determined to be RCRA hazardous wastes will have to comply with RCRA requirements for treatment units. The requirements complicate, but do not preclude, the implementation of both alternatives. Solidification/stabilization would be the more difficult to implement in compliance with ARARs because the onsite activities include both treatment and disposal. Both alternatives would be designed and implemented to meet all other ARARs.

Long-Term Effectiveness and Permanence

The lowest level of residual risk and the highest degree of permanence is associated with acid leaching, which involves removal of all soil contamination above established performance standards (cleanup levels). Stabilization/solidification also treats contaminated soils, but the stabilized residuals are left onsite, and effectiveness depends on long-term maintenance of the cap and other engineering controls.

Reduction of Toxicity, Mobility, or Volume

Solidification/stabilization achieves a reduction in mobility through binding of contaminants in a matrix highly resistant to leaching and disposal of the stabilized soils in a RCRA Subtitle D containment cell. A drawback to stabilization is the increase in the volume of contaminated (albeit stabilized) material remaining onsite. Acid leaching achieves the greatest reductions in toxicity, mobility, and volume through the removal of all waste above established performance standards (cleanup levels) from OU-1.

Short-Term Effectiveness

Both soil remediation alternatives, solidification/stabilization and acid leaching, involve excavation and processing of contaminated material. Differences in the short-term effectiveness of these soil alternatives are not significant; potential impacts to the community, site workers, and the environment can be minimized through proper use of engineering controls, monitoring, and appropriate health and safety procedures.

Time required to achieve protectiveness has been estimated at 2 to 3 years for both alternatives. Although the time frames are similar, the levels of protectiveness obtained at the end of this 2- to 3-year period are not equivalent. Solidification/stabilization attains the remedial action objectives through stabilization technologies, but protectiveness is contingent upon maintenance of engineering control measures. Acid leaching involves a permanent solution that results in removal of all contamination above health-based levels; at the end of the 2- to 3-year construction period, protectiveness will be attained with no further need for engineering controls.

Implementability

A Site-specific treatability study is required prior to implementation of acid leaching. Bench-scale treatability studies have already been performed on OU-1 and OU-2 soil that would enhance the implementability of solidification/stabilization; however, the landfill siting issue could require extensive predesign studies and administrative coordination prior to implementation of the solidification/stabilization alternative. Acid leaching involves a relatively complex treatment train but is likely to be easier to implement than solidification/stabilization because it does not include an onsite disposal cell.

Cost

A summary of the total estimated present worth cost for the previously selected remedy, solidification/stabilization, is presented in Table 3-1 and a summary of the total estimated present worth cost for the modified remedy, acid leaching, is presented in Table 3-2.

4.0 STATUTORY DETERMINATION

EPA's primary responsibility at Superfund Sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes additional statutory requirements and preferences. These specify that, when complete, the selected remedy must also meet all Federal and State ARARs, be cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. CERCLA also includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous substances as their principal element. A review will be conducted within five years from commencement of the remedial action for ground water to ensure that the remedy continues to provide adequate protection of human health and the environment. The following sections discuss how the modified remedy for OU-1 meets these statutory requirements.

TABLE 3-1
Total Estimated Cost of Selected Soil Remedy for OU-1

Satellite Site	Description of Remedy	Total Estimated Cost	
ILCO Parking Lot	Solidificaion	$12,780,000	
Fleming's Patio	Solidification	$ 4,700,000	
Gulf Service Station	Solidification	$ 1,230,000	
J&L Fabricators	Solidification	$ 3,250,000	
Connell Property	Solidification	$ 2,710,000	
Acmar Church of God	Solidification	$ 1,980,000	
City of Leeds Municipal Landfill	Multilayer Cap	$ 1,520,000	
		Total:	$28,170,000

Note: The total cost shown above does not include the cost for the selected ground water remedy for OU-1. The total ground water cleanup cost for OU-1 is $839,000. Therefore, the total cost for soil and ground water cleanup for OU-1 is $29,009,000.

TABLE 3-2
Total Estimated Cost of EPA's Modified Soil Remedy for OU-1

Satellite Site	Description of Remedy	Total Estimated Cost	
ILCO Parking Lot	Acid Leaching	$13,032,000	
Fleming's Patio	Acid Leaching	$ 6,600,000	
Gulf Service Station	Acid Leaching	$ 1,140,000	
J&L Fabricators	Acid Leaching	$ 3,791,000	
Connell Property	Acid Leaching	$ 3,074,000	
Acmar Church of God	Acid Leaching	$ 2,189,000	
City of Leeds Municipal Landfill	Multilayer Cap	$ 1,520,000*	
		Total:	$31,346,000

* No change to soil remedy for City of Leeds Municipal Landfill

Note: The total cost shown above does not include the cost for the selected ground water remedy for OU-1. The total ground water cleanup cost for OU-1 is $839,000. Therefore, the total modified cost for soil and ground water for OU-1 is $32,185,000.

4.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The modified remedy is protective of human health and the environment. The modified remedy, acid leaching, provides a higher level of protection for soil than the previously selected remedy, solidification/stabilization, as all wastes and soil contamination greater than established cleanup levels are permanently removed from OU-1.

4.2 ATTAINMENT OF THE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

Remedial actions performed under CERCLA must comply with all applicable or relevant and appropriate requirements (ARARs). Both alternatives considered for OU-1 were evaluated on the basis of the degree to which they complied with these requirements. The modified remedy and the previously selected remedy for OU-1 will both meet or exceed all Federal and State ARARs listed in Tables 12-1, 12-2, and 12-3 (unless such requirements are waived), located in Section 12.0 of the ROD for OU-2.

4.3 COST EFFECTIVENESS

EPA believes the modified remedy for OU-1 will eliminate the risks to human health and the environment for both the soil and ground water at an estimated cost of $32,185,000. Although more costly than the previously selected remedy, the modified remedy provides the best balance of evaluation criteria. The modified remedy has several advantages:

1. The soil contamination can typically be monitored during the cleanup process to determine when cleanup levels have been met.

2. No waste streams are generated - only clean soil and concentrated metal product ready for recycling at a secondary smelter.

3. The treated (i.e., clean) soil is reusable onsite.

4. No waste is left onsite; therefore, long-term operation and maintenance is not required.

5. The site may be reused in the future.

4.4 UTILIZATION OF PERMANENT SOLUTIONS TO THE MAXIMUM EXTENT PRACTICABLE

The modified remedy for OU-1 represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner at OU-1. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that the modified remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, or volume achieved through treatment, short-term effectiveness, implementability, and cost, while also considering the statutory preference for treatment as a principal element and considering state and community acceptance.

4.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

By treating the contaminated soil and other waste by acid leaching, the modified remedy for OU-1 addresses the principal threats through the use of treatment technologies. Therefore, the statutory preference for remedies that employ treatment as a principal element is satisfied.

APPENDIX A

RESPONSIVENESS SUMMARY

Responsiveness Summary
ILCO Superfund Site
Record of Decision

<u>Comment #1:</u>

A cleanup plan of the ILCO Site should be implemented in the most expedient manner which will result in decontamination of all effected soil and ground water and return the same to usable condition, thus ensuring that the City of Leeds and her citizens can plan for the twenty-first century with a sense of hope, pride and confidence.

<u>EPA's Response:</u>

The selected soil and ground water remedies for remediation of the ILCO Site will restore the Site to a usable condition by treating all contaminated soil, waste, and ground water that are contaminated at levels greater than the established performance standards. The selected soil remedy, acid leaching, will leave no waste onsite. However, acid leaching is an innovative technology and, as such, there is a possibility that this technology may not be effective. In such event, a contingent soil remedy, solidification/stabilization, will be implemented for treatment of the contaminated soils. The remedial action at the Site will be implemented as expeditiously as possible.

<u>Comment #2:</u>

A patented vitrification process used to immobilize lead-contaminated soils in bricks would provide beneficial effects with regard to the ILCO Site with a tremendous cost savings over the proposed soil remedy for the Site. Therefore, this technology should be implemented at the ILCO Site instead of the proposed remedy, acid leaching.

<u>EPA's Response:</u>

The information presented by Advanced Recycle Technology on their patented vitrification process was insufficient to determine the applicability of this technology for treating waste at the ILCO Site. During the review process the following observations and concerns were noted:

- While the Advanced Recycle Technology treatment process contains proprietary elements, it is similar to both ex-situ vitrification and stabilization process options which were considered in the ILCO Focused Feasibility Study.

- No information was provided as to the number of sites at which this technology has been applied, which brings into question the effectiveness and implementability of the technology.

- Due to the lack of details provided regarding Advanced Recycle Technology's vitrification process, it is likely that permitting requirements for air emissions could represent a significant complication associated with implementability.

- If the addition of clay or another material was required to make bricks from the waste material, an increase in the volume of waste would result.

- Following treatment the contaminated materials may no longer be a RCRA hazardous waste; however, the bricks would still contain a CERCLA waste and would require long term monitoring and maintenance.

- The cost data which was provided was not applicable for evaluation at the ILCO Site since no kiln exists at the ILCO Site. The cost would likely be similar to other vitrification costs of between $150/yd and $250/yd, which would represent a total project cost of approximately $40,000,000.

Therefore, acid leaching is considered to be a superior solution based on the available information.

<u>Comment #3:</u>

Hayes Targets has two facilities operating at the end of Borden Street next to the old ILCO plant. Employees at Hayes Targets went through the first phase of the cleanup and was inundated with the dust that came in while EPA was conducting the removal action and stockpiling the soil. Hayes Targets recommends that EPA select either Alternative S-1, No Action, or Alternative S-2, Containment, for soil.

<u>EPA's Response:</u>

The ROD for OU-2 states that air monitoring will be conducted during remediation activities to ensure that contaminant concentrations in dust emissions do not exceed levels considered to be safe for human health. If levels are exceeded, mitigative procedures such as dust suppression or vapor capture will be employed to prevent harmful levels of air emissions from leaving OU-2.

Comment #4:

What is the relative cost of no action for soil and ground water contamination at the ILCO Site in terms of impact on the community, environmental degradation, and water hazard and is that cost greater than the projected cost due to no implementation?

EPA's Response:

The no action alternative for soil and ground water contamination at the ILCO Site is included to serve as a baseline against which other alternatives are compared. The no action alternative does not meet all nine evaluation criteria set forth in the NCP and does not provide protection of human health or the environment. If the no action alternative was selected, contaminants would not be isolated from the public and would continue to leach into the ground water at the Site. In the absence of remedial response actions, contaminated ground water could continue to migrate offsite and eventually impact city supply wells located approximately one-half of a mile from the ILCO Main Facility.

Comment #5:

Who would be doing the recycling component of the acid leaching and will there be any money generated from the recycling and, if so, has any recovery of cost been computed in the estimation of the total cost to implement the acid leaching remedy?

EPA's Response:

Lead recovered from the acid leaching process will be sent off to a secondary smelter for recycling. Some money may be generated as a result of recycling the recovered lead; however, EPA did not include any recovery of cost for the recycling component in the acid leaching cost estimate.

Comment #6:

Has acid leaching been implemented successfully in Region 4? If not, in what other EPA regions has it been done and what were the cost overruns that ran with it in comparison to what the original estimate was? What's the downside of actually doing a combination of treatment at the ILCO site, such as capping the ILCO Main Facility and sending the soil and other material in the stockpile off to a RCRA landfill for disposal, and either solidifying the contaminated soils from the satellite sites or treating the contaminated soils from the satellite sites by acid leaching.

EPA's Response:

The acid leaching technology has not previously been implemented in Region 4. It is currently being implemented in Region 5 at the Twin Cities Army Ammunition Plant in Minneapolis, Minnesota. The acid leaching process, combined with a soil washing process, has been successful thus far at that particular Site on lead-contaminated soil. EPA Region 4 is not aware of the differences in the actual cost for implementation versus the estimated cost at that particular Site. A treatability study will be conducted at the ILCO Site during the design phase to determine if the acid leaching process is amenable to the types of soil at the ILCO Site. The treatability study will also be used by EPA, in consultation with the State of Alabama, to evaluate the cost-effectiveness of the acid leaching technology with respect to the ILCO Site. In evaluating the cost-effectiveness of the remedy, EPA will weigh the long-term benefits of acid leaching against the cost to implement the remedy at the ILCO Site. EPA will also compare the cost of the acid leaching remedy, with long-term benefits taken into consideration, to the cost of the contingent remedy, solidification/ stabilization. If EPA determines from the results of the treatability study that acid leaching cannot be implemented in a cost-effective and timely manner and/or will not meet the required soil performance standards, solidification/stabilization, will be implemented.

Capping the ILCO Main Facility would leave untreated waste onsite. Capping or containment of the contaminated soil at the ILCO Main Facility would essentially cut off infiltration which would reduce the potential for further ground water contamination; however, it would not eliminate the source completely (i.e., the low pH water and material). Therefore, the threat to the ground water would continue, with two city supply wells located within one half of a mile from the ILCO Main Facility. Removing the source of ground water contamination rather than leaving it in place is a more protective remedy. In addition, there is also a preference in the current Superfund law for treating waste as opposed to just containing the waste onsite.

Comment #7:

Does EPA know if the ground water flow is from the ILCO Main Facility towards the city wells at this time?

EPA's Response:

The ground water system is very complex at the ILCO Site. Data from the RI indicates that the gradient from the Site is towards the city supply wells. Monitoring wells at the ILCO Main Facility respond to pumping at the city supply wells. Therefore, there is a hydraulic connection between the Site and the city wells. While the exact flow path and flow times to reach the wells is not known at this time, the connection does exist. Therefore, the best action to take to be protective of human health is to prevent ground water contamination from migrating offsite through a pump and treat extraction system. Due to the complex geology in the area, which is highly fractured, faulted, folded, and uplifted, there are still a lot of uncertainties which will be investigated during predesign ground water studies for OU-2.

Comment #8:

Does the Gulf/BP Service Station satellite site located across the street from the Leeds Elementary School have a 12 inch cap of clay on top of it? When will the Gulf/BP Service Station site be cleaned up?

EPA's Response:

EPA is not aware of a 12 inch clay cap at the Gulf/BP Service Station satellite site. The Gulf/BP Service Station site will be remediated as part of the remedy for OU-1 of the ILCO Site. Remediation of the Gulf/BP Service Station site will be implemented as expeditiously as possible.

Comment #9:

The Little Cahaba and the Dry Creek both run into Lake Purdy. Is EPA going to take fish samples from Lake Purdy, which supplies water to the City of Birmingham?

EPA's Response:

EPA is not currently planning to take fish samples from Lake Purdy as it is not located in close proximity to the ILCO Main Facility. However, EPA is conducting a study of Dry Creek, which is located adjacent to the ILCO Main Facility property. Fish samples will be taken from Dry Creek as part of this study. EPA will track lead contamination from the ILCO Main Facility downstream in Dry Creek until lead contamination is no longer considered to be a threat to human health or the environment.

Comment #10:

There is northwest directed fracture zones and the Cahaba Valley fault moving toward the northwest towards the drinking water source for the City of Leeds. Has EPA considered stopping the pumping of water out of the Lehigh Quarry and does EPA think that stopping the pumping at the quarry would have a significant effect in reducing the migration rate of contamination from the ILCO Main Facility?

EPA's Response:

EPA does not feel that stopping the pumping of water out of the Lehigh Quarry would be a positive influence on the system at this time. The pumping from the quarry may have a strong influence on the migration of ground water in the area. The quarry is currently dewatered to an elevation around 370 feet, which is approximately 200 feet below the water level present at the ILCO Main Facility. Therefore, the quarry is having a major influence on ground water flow in the area. However, there is not sufficient data to determine the exact influence of the quarry on ground water flow at the ILCO Main Facility at this time. This influence will be investigated as part of the predesign ground water studies to be conducted at OU-2.

Comment #11:

Is the pumping rate at the quarry pulling the water in the same direction as the city supply wells?

EPA's Response:

The interconnections of the faults and fractures in the area are not known at this time. However, there is a strong vertical gradient, which may be caused by the pumping from the quarry. Since no lead has been detected in the city supply wells to date, EPA believes that the fracturing system and the pumping from the quarry may be preventing migration from reaching the city wells. Additional data will be gathered during predesign ground water studies to examine this possibility further.

Comment #12:

Have there been any reports of people in the Leeds area being affected by lead?

EPA's Response:

The Agency for Toxic Substances and Disease Registry (ATSDR) took blood samples from children in the Leeds area several years ago in relation to the ILCO Site, but elevated levels of lead were not significant at that time.

Comment #13:

What are the health effects of lead on people in the Leeds community? Who is at risk more, a child or an adult?

EPA's Response:

Elevated lead levels in the blood and effects on the central nervous system may result from continual elevated lead exposure. Children are more at risk from lead exposure than adults. Significantly more lead is taken up into the blood in children from ingestion of lead than in adults. Therefore, higher lead levels occur in the blood of children than in the blood of adults from the same exposure. The Alabama Department of Public Health (ADPH) indicated that it will be conducting a study in the near future on health effects related to the ILCO Site. If the ADPH determines from their study that health problems related to the ILCO Site exist in the community, they will make recommendations to ATSDR for appropriate actions.

Comment #14:

What's the concern with the central nervous system?

EPA's Response:

There is concern about the central nervous system not developing properly, such as decreased learning skills.

Comment #15:

Are there any motor skills involved in a health impact to the central nervous system?

EPA's Response:

Yes, there could be motor skills involved. The motor skills involved would probably be affected at higher lead levels than the learning skills. However, there could be effects on all parts of the central nervous system if the exposure was high enough or long enough.

Comment #16:

Was the risk assessment done on the corrective actions that will be taking place as opposed to just the Site as is and its impact?

EPA's Response:

By definition, the risk assessment is a baseline risk assessment which considers the site in its present condition (i.e., nothing is done to clean up the Site). Therefore, the risk assessment is done to determine if the site as it is now currently poses a risk to human health and the environment.

Comment #17:

Are our children that are in the elementary school across the street from the Gulf/BP Service Station at risk?

EPA's Response:

EPA does not feel that the children are at risk just by attending the elementary school located across the street from the Gulf/BP Service Station site. There is no Site-related risk involved unless the children ingest significant amounts of soil or sediment from the contaminated areas on the Gulf/BP Service Station site. The remedial action at the Gulf/BP Service Station site will be implemented as expeditiously as possible to alleviate any risk associated with that site.

Comment #18:

The parking lot at ILCO is in the flood plain, so you could have some sediment problems there. Is this being addressed?

EPA's Response:

Surface water and sediment contamination associated with the ILCO Main Facility and the ILCO Parking Lot is being addressed under Operable Unit Three for the ILCO Site.

Comment #19:

Did you look at air pathways in your health based risk assessment and are you going to look at those pathways in relationship to past deposition of material on adjacent lands?

EPA's Response:

The baseline risk assessment, by its nature, looks forward into what exposures and resultant risks could occur if nothing is done to remediate a site. The baseline risk assessment considered the air exposure pathway and there may be some risk from inhaling lead-contaminated dust particles, but the air pathway was really insignificant compared to the ingestion pathway. Assessment of past emissions and potential past exposures falls under the authority and expertise of ATSDR or ADPH.

Comment #20:

Have the former ILCO employees been tested for lead?

EPA's Response:

EPA is not the appropriate agency for testing employees. EPA is not aware if ILCO had a standard of testing employees on a regular basis while the facility was operating or if such testing was required or done by the Occupational Safety and Health Administration (OSHA). The ADPH may address this issue as part of their study on the ILCO Site.

Comment #21:

What pathways did EPA identify in the baseline risk assessment as the potential receptors?

EPA's Response:

The primary route of exposure evaluated in the Baseline Risk Assessment for both soil and ground water at the ILCO Site was ingestion. There may also be lesser contributions from absorbing the lead through the skin or inhaling lead-contaminated dust particles. However, ingestion is the most important route for getting lead into the blood.

Comment #22:

Will the satellite sites be closed while they are being cleaned up?

EPA's Response:

The necessity of closing the satellite sites during remedial action activities will be evaluated during the design phase of the remedial action. It may be necessary to close the sites during this time in order to be protective of human health. During the design phase, EPA will work very closely with the satellite site owners to minimize any inconvenience and problems for them. However, we will certainly have to look at protection of human health as the primary concern.

Comments Submitted by the Steering Committee for the Potentially Responsible Parties (PRPs) at the ILCO Site

PRP Steering Committee Comment #1:

EPA has proposed acid leaching for soil (containing slag, matte, and battery fragments at OU-2 and six OU-1 satellite areas) and for concrete and other debris. The PRP Steering Committee is proposing an alternative remedy, consisting of excavation, stabilization/fixation, and capping at the ILCO Main Facility. The advantages of the Steering Committee's proposal include the following:

- **Stabilization/fixation and capping involves proven technologies that have been adopted by EPA at numerous lead-contaminated sites throughout Region IV and the rest of the nation. In contrast, acid leaching is an experimental technology that requires significant development prior to full-scale utilization at secondary lead smelter sites. For materials other than soil, acid leaching is not yet even in the development stage, has failed at one site (the United Scrap Lead site in Ohio) with battery cases, and may be infeasible and result in the generation of dangerous hydrogen sulfide gases. Acid leaching also may involve difficult material separation processes (also unproven and which will generate lead dust) and, in all cases, involves complicated treatment systems. Based on information from prospective vendors, the Steering Committee also believes that separation of battery cases, slag, matte, and other debris (by an unproven technology) would be required and the separated material (if feasible) would need to be managed in a separate manner. The Steering Committee's proposal requires far less time for process development and design. Due to the length of time required for development, design and implementation of an acid leaching remedy, and due to the experimental nature of the remedy, the Steering Committee does not believe this technique will gain the support of local residents who have expressed a desire for expeditious implementation of a remedy. The cost for an acid leaching remedy will exceed the cost of stabilization/fixation by more than $52 million.**

EPA's Response:

Acid leaching will be used for treatment of contaminated soil, sludge, and sediment only. All other wastes and debris will be separated from the soil and treated by other EPA approved methods.

Stabilization/fixation and capping do involve proven technologies that have been adopted by EPA at numerous lead-contaminated sites. However, stabilization/fixation and capping would leave waste onsite that would require long-term maintenance.

Acid leaching is an innovative technology that has not been widely used by EPA at other lead-contaminated sites. However, it is a permanent remedy that will leave no waste onsite. Other benefits of the acid leaching remedy include: 1) soil contamination can typically be monitored during the cleanup process to determine when cleanup levels have been met; 2) no waste streams are generated - only clean soil and concentrated metal product ready for recycling at a secondary smelter; and 3) the treated (i.e., clean) soil is reusable onsite. In addition, the acid leaching remedy satisfies the statutory preference for utilizing permanent solutions and innovative treatment technologies to the maximum extent practicable.

A Site-specific field-scale treatability study on the acid leaching technology will be conducted prior to implementation of the remedy at the ILCO Site to determine (1) if acid leaching is amenable to the types of soil at the ILCO Site, (2) if acid leaching can accomplish established performance standards (clean-up levels) for soil at the ILCO Site, and (3) if acid leaching can be implemented at the ILCO Site in a cost-effective and timely manner. Material handling processes for separating other wastes from the soil will also be investigated as part of the treatability study. The separated materials and other contaminated waste and debris will be treated by other EPA-approved methods. In addition, material handling and separation will also be required for the contingent remedy, solidification/stabilization, if implemented.

The citizens of Leeds have expressed a desire for expeditious implementation of a remedy; however, they have also expressed a desire to have the Site returned to a usable condition for re-development.

EPA's initial cost estimates indicate that the cost of acid leaching will exceed the cost of solidification/stabilization by approximately six million dollars. However, EPA, in consultation with the State of Alabama, will evaluate the cost-effectiveness and timeliness of the acid leaching remedy based upon the results of the treatability study. If the results of the treatability study indicate that acid leaching cannot be implemented in a cost effective and timely manner, the contingent remedy, solidification/stabilization, will be implemented.

<u>PRP Steering Committee Comment #2:</u>

The PRP Steering Committee urges EPA to recalculate site specific cleanup levels for soil in light of the analytical data collected during the remedial investigations and EPA's recent guidance for selecting lead cleanup levels in soil. Site-specific soil excavation to a concentration not less than 1,000 mg Pb/kg is a compromise level more stringent than necessary to protect human health and the environment. The Steering Committee also urges EPA to consider pH control of soil by chemical treatment as a means of minimizing potential leaching of inorganic constituents from the soil to the subsurface. Chemical treatment/pH adjustment of soils is a proven technique selected by EPA at other Superfund/lead battery reclamation sites.

EPA's Response:

EPA re-evaluated the proposed cleanup levels for lead and arsenic in soil at OU-2. Based upon this re-evaluation, as documented in Section 13.0 of the ROD for OU-2, EPA, in consultation with the State of Alabama, determined that 1000 ppm is a protective cleanup level for lead in normal pH soil at OU-2, an area zoned for industrial land-use. Therefore, EPA raised the cleanup level for lead in normal pH soil at OU-2 to 1000 ppm. EPA also determined that 13 ppm is a protective cleanup level for arsenic in surface soil at OU-2, since 13 ppm is the average background level for arsenic in surface soil at OU-2. The proposed cleanup level of 3.3 ppm for arsenic in surface soil at OU-2 is less than the average background level for arsenic in soil. It is EPA's policy not to set cleanup levels lower than average background levels. Therefore, EPA raised the cleanup level for arsenic in surface soil at OU-2 to 13 ppm, based upon Site-specific background levels.

While chemical treatment/pH adjustment of soils has been selected by EPA at other Superfund battery reclamation sites, excavation and treatment of the soil to cleanup levels protective of ground water and human health is a preferred method of treatment for soil at the ILCO Site.

PRP Steering Committee Comment #3:

EPA should also consider several other proven technologies (i.e., treatment of debris by surface washing, followed by consolidation with other onsite materials and capping) as part of the proposed remedy at the ILCO Site. This technique is proven, readily implementable, and has been selected by EPA at other lead battery reclamation sites.

EPA's Response:

Proven technologies, such as decontamination of debris by EPA-approved methods, is part of the selected remedy at the ILCO Site.

PRP Steering Committee Comment #4:

EPA did not take into account its land disposal restrictions (LDRs) for K069 baghouse dust. The LDRs mandate thermal recovery by secondary lead smelting.

EPA's Response:

EPA did take into consideration its LDRs for K069 baghouse dust by stating that the baghouse dust will be sent offsite to a RCRA permitted treatment, storage, and disposal (TSD) facility for treatment and disposal. The treatment and disposal of the baghouse dust must comply with all pertinent ARARs, including LDRs.

PRP Steering Committee Comment #5:

EPA has proposed offsite reclamation of slag and matte from the onsite vault at an offsite secondary lead smelter. Because reclamation of blast furnace slag is not known to be feasible, the Steering Committee believes that stabilization/fixation (the common industry practice for secondary lead smelter slag) should be selected as an alternate remedy. Following stabilization/fixation, the slag would be capped at the ILCO Main Facility.

EPA's Response:

Slag and matte that can be recycled will be sent to a secondary lead smelter for recovery of lead. Slag and matte that cannot be recycled will be stabilized and disposed offsite in a permitted hazardous waste landfill, if the acid leaching remedy is implemented. If the contingent remedy, solidification/stabilization, is implemented, the slag and matte will be stabilized and disposed in the onsite containment cell at the ILCO Main Facility.

PRP Steering Committee Comment #6:

A final decision on ground water remediation should be based on a more complete understanding of the actual geologic conditions at the Site. Geologic data from the immediate area and from the published literature differ somewhat from the interpretations in the Remedial Investigation (RI).

EPA's Response:

A more complete understanding of the Site-specific geologic conditions is necessary. Therefore, one of the objectives of the predesign ground water studies to be conducted as part of the selected ground water remedy is to obtain a better understanding of geologic conditions at the Site.

PRP Steering Committee Comment #7:

Hydrogeologic data are necessary to demonstrate whether there are preferential flowpaths along which target compounds could migrate, and which could serve in

the design of a remediation system, if necessary. This analysis was not performed during the Remedial Investigation/Feasibility Study (RI/FS).

EPA's Response:

Additional hydrogeologic data is necessary. Therefore, another objective of the predesign ground water studies to be conducted as part of the selected ground water remedy is to collect and analyze additional hydrogeologic data for the Site.

PRP Steering Committee Comment #8:

Sampling and analysis are necessary to determine (a) whether target compounds are present in the dissolved state in ground water: (b) whether those compounds have the potential to migrate; and (c) whether residual compounds in soil continue to impact ground water, or whether the removal action already conducted has eliminated further impact. These data were not determined in the RI/FS.

EPA's Response:

Predesign ground water studies to be conducted as part of the selected ground water remedy will involve additional sampling and analysis to determine if contaminants are mobile in the ground water and have the potential to migrate offsite. Soil partitioning tests and soil leaching models have indicated that residual soil contamination is a continuing threat to ground water. However, because there is a concern as to the mobility of target compounds in ground water, the predesign ground water studies will also include an investigation of the potential impacts on ground water from residual soil contamination.

PRP Steering Committee Comment #9:

If the target compounds are in a dissolved state, further testing is necessary to determine whether they can be recovered from the ground water using standard pump and treat extraction systems. This was not determined in the Focused Feasibility Study (FFS).

EPA's Response:

The technical practicability of recovering contaminants from the ground water using a pump and treat extraction system will be investigated in detail during the predesign ground water studies to be conducted at OU-2.

PRP Steering Committee Comment #10:

The FFS did not examine potential treatment technologies for the actual ground water. Instead, it used a hypothetical liquid that was assumed to contain target compounds. The results might have no application to actual Site conditions. The

PRP Steering Committee urges EPA to reevaluate the feasibility of remediation using data from an actual ground water extract.

EPA's Response:

The FFS examined potential treatment technologies for ground water at OU-2 based upon data from the remedial investigation. Additional data from Site-specific predesign ground water studies, as well as data from the RI, will be evaluated by EPA, in consultation with the State of Alabama, to determine the technical practicability of remediating ground water at OU-2.

PRP Steering Committee Comment #11:

The Baseline Risk Assessment should be revised to reflect legal and institutional constraints that exist at the Site. The only potential exposure pathway identified in the baseline risk assessment was the scenario that future site development would include residences that contain private domestic supply wells screened in the contaminated zones. Jefferson County law does not allow new domestic supply wells, and the area is currently zoned for industrial use. Therefore, the scenario that serves as the basis for EPA's proposed plan is extremely unlikely and should be revisited.

EPA's Response:

The Baseline Risk Assessment (BRA), by definition, does not allow for institutional controls to be assumed in assessing risk at a site. The BRA evaluated all potential current and future exposure pathways for both soil and ground water at the ILCO Site. A future residential scenario for ground water (i.e., residents drinking from private supply wells screened in the contaminated zone) was only one of the exposure pathways evaluated under the BRA. The scenario that serves as the basis for EPA's proposed soil remedy at the ILCO Site is a future commercial/industrial land-use of the Site. Ground water at the Site is a potential drinking water source and is a resource that should be protected and restored, if technically practicable, to its beneficial use.

PRP Steering Committee Comment #12:

The evaluation of ground water extraction potential in the FFS relied on a computer model which was not developed for hydrogeologic environments similar to that at the ILCO Site. The assumptions applied in developing the proposed remedy were those for a hydrogeologic system very different than that at the ILCO Site, and they might not be accurate. Also, the fate and transport modelling in the Remedial Investigation did not adequately address the state and form of lead compounds and their consequent mobility potential. It also did not define

migration pathways in the subsurface. The computer models of ground water and target compound behavior should be revised so that they are based on actual geochemical conditions rather than on assumptions.

<u>EPA's Response:</u>

The evaluation of ground water extraction potential in the FFS was based upon available data from the RI. Site-specific predesign ground water studies will be conducted at OU-2 to fill any data gaps. Additional data from the predesign ground water studies, as well as the RI data, will be used to determine the technical practicability of ground water extraction and remediation at OU-2.

APPENDIX B

STATE OF ALABAMA CONCURRENCE LETTER

ILCO SUPERFUND SITE

RECORD OF DECISION

ADEM
ALABAMA
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Jim Folsom
Governor

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October 13, 1994

Mr. John H. Hankinson, Jr.
Regional Administrator
U.S. Environmental Protection Agency
345 Courtland Street, NE
Atlanta, GA 30365

Dear Mr. Hankinson:

Re: Interstate Lead Company (ILCO)
Leeds, Alabama

The Alabama Department of Environmental Management has reviewed the draft Record of Decision (ROD) for Operable Unit 2 and the amended ROD for Operable Unit 1 at the referenced facility. After review by our staff, and in consultation with EPA staff, we agree with the approach recommended in these documents. ADEM concurs with the draft Record of Decision (ROD) for Operable Unit 2 and the amended ROD for Operable Unit 1 at ILCO.

Should your staff have questions or comments, please contact Mr. David Thompson at 205-213-1300.

Sincerely,

James W. Warr
Director

JWW/JLB/ssg

pc: Kimberly Q. Lanteman, RPM
David Thompson, SAC