Declaration for the Decision Document
WearEver Aluminum
Chillicothe, Ohio

Introduction

This Decision Document presents the selected remedial action for the WearEver Aluminum Site, in Chillicothe, Ohio. This document summarizes the site history, the Remedial Investigation (RI) and the Feasibility Study (FS) and the clean-up alternatives evaluated in the FS and presented in the Preferred Plan for the Site. The Decision Document presents Ohio EPA's selected alternative to clean-up the site contamination and the rationale and justification for that preference. The Decision Document also incorporates the responses to comments received during the public comment period on the Preferred Plan. Ohio EPA's Responsiveness Summary, detailing the comments received and Ohio EPA's responses, is attached to this document.

Community Participation

Documents pertaining to the investigation at the Site including the RI/FS and subsequent documents are public documents in the Ohio EPA files. Public documents pertaining to activities at WearEver Aluminum are available to the public at the Ohio EPA Southeast District Office in Logan, Ohio.

A document repository has been established in the Chillicothe and Ross County Public Library. The document repository contains copies of the RI/FS and the Preferred Plan. A copy of this Decision Document will be added to the repository. Copies of all final design documents and site reports will also be added to the repository after they are received and approved by the Ohio EPA.

Description of the Selected Remedy

The selected remedial action for the WearEver Aluminum Site addresses contamination in the surface soil, subsurface soil and groundwater. The contaminated surface soils will be consolidated and covered with a solid waste cap. The contaminated subsurface soils and groundwater will be treated with a soil vapor extraction (SVE) and air sparging (AS) system at the source areas.

Because the groundwater contamination migrates off-site to Mead Industrial Well 18, located along the Scioto River, the groundwater remedial alternative will include off-site monitoring as well as provisions of alternate water supplies for any future potable water users potentially affected by the VOCs in groundwater.

Groundwater Use Notification Agreements will be used to ensure that down gradient landowners will notify the potentially responsible parties (PRP') and Ohio EPA of any plans to use the groundwater or significantly modify current groundwater uses. These agreements will be monitored on a regular basis by the PRPs to ensure that the hydrodynamic control of the plume as currently exerted by Industrial Well 18 is maintained. This regular monitoring will also ensure that the PRPs and Ohio EPA are aware of any groundwater use changes and any changes in property ownership. Finally, groundwater monitoring will be conducted to evaluate the effectiveness of the SVE/AS at the source areas and to monitor both the on-site and off-site plume.

Barbara Brdicka (signature)

03/09/98

Barb Brdicka, Acting Chief
Division of Emergency and Remedial Response
Ohio Environmental Protection Agency

Date

OHIO ENVIRONMENTAL PROTECTION AGENCY

DECISION DOCUMENT
FOR THE

WEAREVER ALUMINUM SITE
CHILLICOTHE, OHIO

JANUARY 1998

TABLE OF CONTENTS

List of Tables

List of Figures

Attachments

1.0 SITE BACKGROUND

Site Location and History

The WearEver Aluminum Site is located at 1089 Eastern Avenue in Chillicothe, Ohio (Figure 1). Prior to its development as a manufacturing plant in 1948, the site was used for farming, then as a fairground and finally as a golf course. Aluminum Company of America (Alcoa) operated the Site until September, 1982. WearEver Realty Associates, Inc. took ownership of the Site at that time, and Wesray Products Corporation became responsible for operational control of the Site. WearEver-Proctor Silex took over operational control of the Site in June, 1985 and Anchor Hocking Corporation (a subsidiary of Newell Company) gained operational control of the Site in January, 1989 until operations were discontinued in late 1990. Ownership of the Site was transferred back to Alcoa by WearEver Realty Associates in 1994. The facility was used by a tenant for dry storage purposes until January, 1996, when the tenant vacated the premises. There are some formed aluminum pieces stored inside the former manufacturing building, but the facility is not occupied. A full-time security service is in use at the Site.

The principal operation at the Site was the production of aluminum-coated cookware and small household appliances. The Site operations involved stamping, cleaning, coating and painting sheet aluminum. Solvents were used to clean the cookware from 1948 to 1982. Beginning in 1982, an alkaline soap wash and rinse system was used to clean the cookware. From 1948 to 1968, cookware was coated using a "dry" aluminum anodizing process. In 1968, the manufacturing operation was converted from a "dry" process to a "wet" porcelain enameling process. The porcelain enameling process was discontinued in September, 1985. As a result of the manufacturing processes, industrial wastes were generated and these wastes were disposed of in various areas on the site.

The WearEver site has been the subject of various environmental investigations and closure assessments (Table 1) which identified some of the contaminated areas on-site. As a result of learning of this contamination, Ohio EPA invited four parties (past or present owners or operators) to negotiate Director's Final Findings and Orders (Orders) whereby the four parties would perform a remedial investigation and feasibility study. In May, 1993 the Orders were finalized. The four parties that signed the Orders with Ohio EPA are Alcoa, Hamilton Beach - Proctor Silex, Newell Company and WearEver Realty Associates.

Environmental Setting

The Site is located on the floodplain of the Scioto River. It is underlain by alluvial deposits of sands and gravels and glacial till to a depth of approximately 130 to 140 feet below the ground surface (ft-bgs). Shale bedrock, believed to be the Ohio Shale, underlies the alluvial and glacial deposits.

The unconsolidated deposits above bedrock can be divided into three units. Silty sands and gravels are present from the ground surface to a depth of approximately 15 ft-bgs. From 15 to 90 ft-bgs, sands and gravels are prevalent. Till composed of silt and sand is encountered at approximately 90 ft-bgs. Sand and gravels are intermixed within the silt beneath the till to the top of the shale bedrock.

The aquifer is capable of sustaining well yields in excess of 1,000 gallons per minute (gpm). The water table generally ranges between 20 and 35 ft-bgs. Regionally, groundwater in the Scioto Valley south of Chillicothe flows parallel with the Scioto River; however, groundwater flow in the vicinity of the Site is affected by three large industrial wells northeast of the Site. Groundwater beneath the Site flows toward these industrial wells which are situated along the Scioto River.

2.0 NATURE AND EXTENT OF CONTAMINATION

An investigation of soils and groundwater began in May, 1994 in accordance with the RI/FS Workplan which was approved by Ohio EPA in April, 1994. The investigation was conducted in phases because twenty five (25) different potential source areas (PSA) identified across the site needed to be evaluated (refer to Table 2 and Figure 2).

2.1 Soil and Sediment Investigations

Surface soil and subsurface soil samples were collected at many of the PSAs. Surface soil samples along the fence-line were collected to determine if metals were moving off-site with wind blown dust. Soils were also collected from underneath the building to determine if operations within the plant may have contaminated the soils and groundwater below the building.

Highlights of the sampling results are as follows:

- Surface and shallow soils in the sludge disposal areas (PSA 8-1, 8-2, 8-3, and 8-4), flocculent settling basin (PSA 5), blind ditch and culvert (PSA 15), the wastewater treatment plant (PSA 13) and the barren area are contaminated with metals, including lead and cadmium (Figure 3).
- The areal extent of sludge disposal was defined by using visual delineation methods.

- There were no indications of buried waste containers at the site.
- Surface soil samples collected along the fence-line showed that the metals do not seem to be moving off-site with the wind blown dust.
- VOCs are present in subsurface soils in the vicinity of the following PSAs: old oil barrel storage area (PSA 11); TCE/draw lubricant AST (PSA 20); leach pit (PSA 1), tee pee incinerator (PSA 9); and dump truck lagoon area (PSA 6) (Figure 4).
- Soils below the building are contaminated with VOCs.

Refer to Table 3 for maximum concentrations of metals in surface materials and Table 4 for maximum concentrations of VOCs in subsurface soils.

2.2 Groundwater Investigation

During the RI, thirty eight (38) new monitoring wells were installed on-site (see Figure 2 for locations). These monitoring wells were sampled during two to three different sampling events, along with eleven (11) monitoring wells that were installed before the RI, to characterize the nature and extent of groundwater contamination. The samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and metals. Off-site industrial wells along the Scioto River and off-site monitoring wells on the Union Spring property were also sampled to help determine the extent of the contamination. Residential wells were sampled to determine if they had been impacted by the site contamination.

Highlights of the sampling results are as follows:

- Based on water level data from on-site and off-site wells, a permeable aquifer exists from approximately 25 feet to 90 feet below grade.
- Groundwater on-site is contaminated with VOCs.
- VOCs are present in the shallow, intermediate and deep monitoring wells, with most of the higher concentrations in the shallow wells.
- The highest concentrations of VOCs are present at the following PSAs: old oil barrel storage area (PSA 11); TCE/draw lubricant AST (PSA 20); leach pit (PSA 1); tee pee incinerator (PSA 9); and dump truck lagoon area (PSA 6).The groundwater contamination extends off-site to an industrial well along the Scioto River (Figure 5). The VOCs detected at this industrial well are at low levels compared with levels found on-site.
- The sample results indicate that residential wells along Eastern Avenue have not been impacted by the site. One residence was receiving potable water directly from the industrial well along the Scioto River, and this water supply had low levels of VOCs. Upon discovery of this, Alcoa provided an activated carbon treatment system for this water supply until a new well was installed in May, 1996.

Refer to Table 5 for maximum concentrations of VOCs in Groundwater.

2.3 Risk Assessment

The risk assessment evaluated the current and potential future risks to human health and the environment from the constituents of concern at the site. The risk assessment included:

- Identification of Constituents of Concern
- Exposure Assessment
- Toxicity Assessment
- Risk Characterization

2.3.1 Identification of Constituents of Concern

Data collected from sampling soils and groundwater was used to identify Constituents of Concern (COC) to be evaluated in the risk assessment. The COCs for the site are listed below:

VOCs	Semi-VOCs	Inorganics
Acetone	Benzo(a)anthracene	Antimony
Benzene	Benzo(a)fluoranthene	Arsenic
Bromoform	Benzo(a)pyrene	Barium
Bromodichloromethane	Bis(2-ethylhexyl)phthalate	Beryllium
Chloroform		Cadmium
Chloromethane		Lead
Dibromochloromethane		Manganese
1,1 - Dichloroethene		
1,2 - Dichloroethene, cis		
1,2 - Dichloroethene, trans		
Methylene Chloride		
Tetrachloroethene		
1,1,1 - Trichloroethane		
1,1,2 - Trichloroethane		
Trichloroethene		
Vinyl Chloride		

2.3.2 Exposure Assessment

The exposure assessment discusses the mechanisms by which people might come in contact with COCs and the estimated intensity, frequency, and duration of contact between potential human receptors and the constituents. The exposure assessment consists of three basic steps: 1) characterization of the exposure setting (physical environment and potentially exposed receptors); 2) identification of exposure pathways (sources, points of release and exposure routes); 3) quantification of pathway specific exposures (exposure concentrations and intake assumptions).

The following potential receptors were considered for quantitative evaluation: on-site industrial worker; on-site construction worker; trespasser; and off-site resident. A potential future on-site residential receptor was also evaluated. Exposure routes for soils are incidental ingestion and dermal contact, as well as inhalation of dusts. Exposure routes for groundwater are ingestion and dermal contact. Additionally, inhalation of water vapors while showering was also evaluated.

2.3.3 Toxicity Assessment

The risks associated with exposure to COCs are a function of the adverse health effects characteristic of a specific constituent and the exposure dose. The toxicity assessment considers carcinogenic effects and non-carcinogenic effects of the COCs.

2.3.4 Risk Characterization

The risk characterization involves calculating estimates of carcinogenic (cancer causing) and non-carcinogenic risks from the COCs for the different exposure pathways. Cancer risk is defined as the probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen in addition to the probability of cancer risks from all other causes. As a benchmark in developing clean-up goals at contaminated sites, an acceptable range of excess lifetime cancer risk from one in one million (1×10^{-6}) to one in ten thousand (1×10^{-4}) has been established. The risk goal for risk remaining after this Site is cleaned up is 1×10^{-5} (i.e., a one in one hundred thousand excess lifetime cancer risk, above and beyond risks from other unrelated causes). At this Site, the carcinogenic risk for an on-site industrial worker is 2×10^{-5}

The non-carcinogenic risk was determined by adding the hazard quotients for each COC. The hazard quotient is a quantitative estimate of the hazard associated with individual non-carcinogens. The sum of the hazard quotients is the hazard index for a particular exposure pathway. The hazard indexes for each exposure pathway are added together to calculate a site hazard index. A total site hazard index of less than 1.0 indicates that adverse effects are unlikely even with sensitive members of the population. A hazard index of greater than 1.0 indicates that there may be a potential hazard at the site associated with the COCs. At this site, the hazard index exceeded 1.0 for an on-site industrial worker and a construction worker on a six month project. Lead is not considered to be a carcinogen, and there is not an accepted means for calculating a hazard quotient for lead. U.S.EPA has recommended using the Integrated Exposure Uptake/Biokinetic (IEUBK) Model to develop lead clean-up levels for residential sites. Using this model, a value of 400 mg/kg is derived as a clean-up value appropriate for chronic lead exposure to children in a residential setting. However, it is not appropriate for assessing on-site adult exposure at this Site. To resolve this issue, an equation was calculated to determine an acceptable lead level in soils for the most sensitive adult receptor, a pregnant woman. The blood lead level of the fetus in an exposed female worker is the critical parameter in the equation for calculating an acceptable soil lead level. The resulting soil lead concentration that yields an acceptable blood lead level for a pregnant woman is 2,000 mg/kg.

The risk estimates are presented in the Tables 6 and 7 and assume that no clean-up action is taken at the Site.

3.0 DESCRIPTION OF REMEDIATION ALTERNATIVES

The Feasibility Study (FS) was conducted to identify and screen technologies and alternatives for addressing the contaminated soil and groundwater at the Site. The FS evaluates methods to meet the remedial action objectives, which are to:

- Prevent exposure to elevated lead and selected other metals in surface material on-site;
- Control access to affected groundwater, both on-site and off-site, such that unacceptable exposure does not occur; and
- To ultimately achieve Maximum Contaminant Levels (MCLs) for trichloroethylene; cis-1,2 dichloroethylene; trans-1,2 dichloroethylene; tetrachloroethylene; 1,1,1 trichloroethane; and vinyl chloride found in the groundwater on-site. MCLs are standards promulgated under the Safe Drinking Water Act establishing a maximum allowable level of a contaminant in water which is delivered to any user of a public water system.

Remedial alternatives were evaluated for three different media: surface materials; subsurface soils; and groundwater. The No Action alternative is evaluated for each of the three media. This alternative consists of performing no remedial action work at the site and involves no cost. This action is used as a baseline against which the effectiveness of all other alternatives is compared.

3.1 Alternatives for Surface Materials

This section provides a description of the four alternatives considered for addressing metals contamination in the surface soils.

3.1.1 No Action

This alternative would allow site workers and other future site users to come in contact with surface soil and waste containing lead or other heavy metals and polynuclear aromatic hydrocarbons (PAHs). In accordance with the NCP, the no action alternative is retained as a baseline case for comparison against other alternatives. This alternative is not effective in addressing the identified human health risk to site workers as a result of lead and cadmium concentrations in the surface soils

3.1.2 On-Site Consolidation and Containment with Cover

This alternative involves excavating affected surface materials and consolidating the materials into the area of PSA 8-4 and part of PSA 8-3 (refer to Figure 6). Approximately 20,000 cubic yards of material would be relocated, assuming the average depth of contaminated materials is two feet. The estimate of two feet of contaminated material is based on analytical results. Confirmatory samples will be collected after the removal of the first two feet of surface materials to ensure that contaminants exceeding acceptable risk levels have been removed. If sample results indicate that residual concentrations exceed acceptable risk levels, then contaminated soils will be removed until remaining concentrations meet acceptable risk levels.

Three types of covers were evaluated in the FS Report: 1) a solid waste cap in compliance with OAC 3745-27-08(C)(16); 2) an asphalt cover; and 3) a soil cover.

1) Solid Waste Cap - The solid waste cap would consist of the following components:

- A barrier layer that is either:
  -a 24 inch re-compacted soil barrier layer with permeability equal to or less than 1×10^{-7} cm/sec, or
  - an 18 inch re-compacted soil barrier layer with permeability equal to or less than 1×10^{-6} cm/sec plus a flexible membrane liner (FML), or
  - a geosynthetic clay liner of equal or less permeability than the re-compacted soil barrier layer with an engineered subgrade plus a FML;

- A drainage layer that is either:
  - 12 inches of granular material, or
  - a drainage net with the equivalent performance capabilities as the granular material;

- A 30 inch thick frost protection layer placed on top of the drainage layer;

- A vegetative layer placed on top of the frost protection layer (soil from the frost protection layer may be used as part of the vegetative layer); and

- The cap system shall have a maximum projected erosion rate of 5 tons per acre per year; final elevations shall be as specified in the plan approval operational report or permit to install, or slopes shall be between 5 and 25 percent (or some greater slope based on stability analyses).

2) Soil Cover - After consolidation and grading, the waste materials would be covered with a woven geotextile fabric to stabilize the subgrade for the cover. The soil cover would be comprised of a soil layer that would consist of two feet of clean materials. The cover would be sloped to drain to a perimeter channel that would direct runoff away from the covered area and the manufacturing area. The containment area would be approximately 4.6 acres with a maximum height of 9 feet, which would allow for maximum side slopes of 5 percent. The majority of the 14,700 cubic yards of soil needed for the cover could be taken from the on-site borrow area on the east side of the site. Topsoil for the 6 inch vegetative layer would be borrowed from an off-site source.

3) Asphalt Cover - After consolidation and grading, the waste materials would be covered with a woven geotextile fabric to stabilize the subgrade for the cover. The asphalt cover would require flatter slopes to facilitate use of the paved area. If this area were to be used for vehicle parking, it may not be practicable to uniformly slope the cover to the edges. A subsurface storm water drainage system might be needed to direct storm water from the paved area and reduce icing conditions in cold weather. The asphalt cover would consist of 4 inches of asphaltic concrete pavement atop a subbase consisting of 6 inches of crushed aggregate. The asphalt pavement surface would be sealed to reduce rainwater infiltration and potential freeze damage.

Deed restrictions, fencing and physical monitoring will be used to set aside the covered area from future use. Based on a detailed cost evaluation, the total cost of consolidation and containment with a soil cover is estimated to be $1,091,400. The FS did not include a detailed cost evaluation for the asphalt cover or the solid waste cap, however, it is estimated that the total cost of an asphalt cover is approximately the same as the soil cover. The solid waste cap is estimated to be approximately twice as much as the soil cover.

3.1.3 Removal and Off-Site Disposal

This alternative involves the excavation and off-site disposal of surface materials contaminated with metals. The affected materials would be excavated using conventional earthmoving equipment. The excavated volume would be approximately 28,800 cubic yards to a depth of two feet. If a 20 percent contingency is included, the volume of excavated materials would be approximately 34,600 cubic yards. The excavated materials would be loaded into properly prepared transportation vehicles for delivery to permitted waste management facilities. The total cost of this alternative is estimated to be $5,688,100.

3.1.4 Physical Treatment by Stabilization and Consolidation

This alternative involves the physical treatment by stabilization of the estimated 28,800 cubic yards of affected surface materials. A total quantity of 34,600 cubic yards, which includes a 20 percent contingency, was assumed for purposes of the FS. The affected materials would be excavated using conventional construction equipment and the excavated materials would be processed through a treatment vessel in which the materials would be blended with a pre-set ratio of stabilizing agent. The materials would be blended with 5 percent calcined lime, 5 percent Portland cement, and sufficient water to hydrate the lime and cement.

The excavated and treated materials would be placed in PSA 8-4 and part of PSA 8-3. The treated material would be covered with a one foot layer of soil, the upper 6 inches would be off-site topsoil. The treated area would be fenced and a deed restriction and physical monitoring would be incorporated into this alternative. The total cost of this alternative is estimated to be $2,655,300.

3.2 Alternatives for Subsurface Soils

This section provides a description of the four alternatives considered for addressing VOC contamination in the subsurface soils.

3.2.1 No Action

This alternative would allow VOCs present in these soils to leach and disperse into groundwater. In accordance with the NCP, the no action alternative is retained as a baseline case for comparison against other alternatives.

3.2.2 Limited Action

This alternative would include the following: 1) Institutional controls to restrict the property deed to limit potential future intrusive activity; 2) Long-term physical monitoring to minimize future disruption and enforce the deed restriction; and 3) Long-term groundwater monitoring to assess the ongoing contribution of these PSAs to VOC concentrations in the groundwater. This monitoring would be in addition to any groundwater monitoring to assess off-site migration. The total cost of this alternative is estimated to be $309,600.

3.2.3 Containment with Cap and Groundwater Cutoff Wall

Under this alternative, a groundwater cutoff wall (slurry wall) would be installed around the area of VOC contaminated soils (Figure 4-3 of the FS). The wall would be approximately 4,900 feet in length, enclosing an area of approximately 33 acres. The cutoff wall would be keyed into the till layer immediately atop bedrock at an average depth of approximately 90 feet.

After installation of the cutoff wall, all permeable areas enclosed within this cutoff wall would be capped. Areas adjacent to the manufacturing building would be paved with asphalt, and the PSAs in the northern portion of the Site would be covered with a landfill capping system. For those areas in which asphalt paving is specified (approximately 6.5 acres), the ground surface would be fine graded, and, as necessary, a bedding layer of sand or geotextile would be placed. A FML would then be placed over the area and covered with a 12 inch graded sand protection/subbase layer. A 6 inch thick asphalt pavement would then be placed atop the sand. The surface asphalt would be sloped to drain outside the cutoff area. The re-paved area would then be returned for manufacturing use.

Approximately 12 acres in the northern portion of the enclosed area would be capped with a multi-layer, low-permeability system. Approximately 50,000 cubic yards of material would need to be placed as fill to establish the subgrade required for capping, assuming a minimum slope of three percent. This fill could be comprised of on-site borrow soil or surface material from areas outside the containment area. The cap would consist of a gas collection layer, a 24-inch compacted clay layer (1×10^{-7} cm/sec permeability), a 40-mil FML, a drainage layer for infiltration control, a barrier (soil) protection layer, and 6 inches of topsoil.

Groundwater removal would be a necessary component of this containment system to maintain hydraulic equilibrium and avoid groundwater level build-up inside the slurry wall. The pumping rate required to maintain a hydraulic head within the slurry wall enclosure that is lower than the level outside the wall is estimated to be on the order of 100 gpm. The cost estimate assumes that the extracted groundwater would be treated using aqueous-phase carbon adsorption and the treated groundwater would be discharged to the City of Chillicothe Wastewater Treatment Plant. The treatment system and discharge option would be further evaluated during remedial design. The total cost of this alternative is estimated to be $16,330,300.

3.2.4 Physical Treatment by Soil Vapor Extraction/Air Sparging (SVE/AS)

Under this alternative, a SVE/AS system would be installed in each of the areas where subsurface soils containing VOCs are potentially affecting groundwater. Each area would be treated until either remediation goals or limits of the technology's effectiveness are achieved. For purposes of estimating the costs for the FS, it was assumed that five areas, each 100,000 - 150,000 square feet, would be treated. Multiple areas would be treated each year, and treatment would be complete for the Site in less than three years. During pre-design investigations, the option of cycling treatment among the affected areas would be evaluated. To be most cost-effective and avoid specialty (i.e., horizontal) drilling techniques, the leach pit would require backfilling prior to SVE/AS treatment in this area.

The major components of the SVE/AS system would include the following: injection wells for air sparging; SVE wells; oil-free compressor; vacuum blower; air/water separator; air emissions controls and treatment processes; piping and valves; and instrumentation. The placement of air sparging and vapor extraction wells would take into account factors such as, depth to groundwater, hydraulic conductivity, contaminants, and extent of contamination.

Proper operation and monitoring of the air sparging process would be necessary to ensure that sparged VOCs are captured by the SVE system and that migration of groundwater contaminants is controlled. The following operating parameters would be monitored: sparging pressure; vacuum pressure; air flow rates; radius of influence; dissolved oxygen in groundwater; contaminant concentration in extracted air; continuity of blower and compressor operation; contaminant concentrations in downgradient groundwater; and groundwater levels and flow patterns.

A pilot SVE/AS study was performed at the Site in January, 1996. The results of the SVE/AS pilot testing performed in the old oil barrel storage area suggest that effective source treatment should reduce the concentrations of VOCs in downgradient groundwater monitoring wells by about 90 percent. This 90 percent reduction value was developed using best engineering judgement with knowledge of both the technology's performance history at other sites and site-specific considerations. For details regarding the methodology and results of the pilot study, please refer to the SVE/AS Pilot Test Report (March 1996).

Groundwater monitoring would be conducted both before and after the active SVE/AS treatment period to determine the final effectiveness of treatment. The total cost of this alternative is estimated to be $4,412,200.

3.3 Alternatives for Groundwater

This section provides a description of the six alternatives considered for addressing VOC contamination in groundwater.

- Identify alternative responses to the proposed groundwater use/change if determined to pose an unacceptable risk; and

- Work with the landowner and Ohio EPA to implement the alternative response that best suits the landowner's needs, minimizes risk, and is most cost-effective.

The total cost of this alternative is estimated to be $435,500.

3.3.3 Groundwater Extraction for Hydraulic Containment with Treatment and Reuse of Water

This alternative is a containment alternative in which containment is achieved by pumping groundwater and preventing further off-site migration of VOCs. The off-site groundwater that has already been affected by Site-related VOCs would continue to migrate to Industrial Well No. 18 and thereby gradually be removed from the aquifer. In this alternative, the extracted groundwater would be treated using the process option of aqueous-phase carbon adsorption. Pilot testing may be required prior to full scale design and construction to verify that encrustation does not foul the carbon. Also in this alternative, it is assumed that the treated effluent would be reused as an industrial water supply.

Based on preliminary hydrogeologic modeling, hydrodynamic control of the affected on-site groundwater can be achieved by pumping two wells located near the northern site boundary each at a rate of 500 gpm. Aquifer testing would be required prior to full scale design.

The FS Report provides the following time-frame estimates for achieving MCLs under this alternative: 3 years at Industrial Well No. 18; 7 years at Union Spring monitoring wells; and 40 - 105 years at on-site monitoring wells. The time-frames to achieve MCLs at Industrial Well No. 18 and Union Spring monitoring wells may be understated because on-site groundwater pumping would create a stagnant area in groundwater immediately downgradient of the Site, thereby decreasing groundwater flow velocity and increasing contaminant travel times. The total cost of this alternative is estimated to be $8,206,800.

3.3.4 Soil Vapor Extraction/Air Sparge at Downgradient Wall

Under this alternative, an SVE/AS system would be used to control off-site migration of contaminated groundwater. The SVE and air sparge wells would be located at the downgradient boundary of the site to remove VOCs present in groundwater before migrating off-site. The FS Report provides the following time-frame estimates for achieving MCLs after treatment is initiated: 3 years at Industrial Well No. 18; 44 years

3.3.1 No Action

This alternative does not include any measures to control the migration of contaminants in the groundwater. Natural degradation of the contaminants in the groundwater would occur over time. The FS Report provides the following time-frame estimates for achieving MCLs under this alternative: 34 years at Industrial Well No. 18; 87 years at the Union Spring monitoring wells; and 149 years at the on-site monitoring wells. The time-frames were calculated based solely on natural attenuation by desorption, and no source control is assumed.

In accordance with the NCP, the no action alternative is retained as a baseline case for comparison against other alternatives.

3.3.2 Limited Action

This alternative includes institutional controls and groundwater monitoring but does not include other active controls. Under the limited action alternative, the time-frames to achieve MCLs in groundwater are the same as those for the no action alternative. The limited action alternative would include the following components:

- Continued hydrodynamic control of the extent of groundwater contamination as currently exerted by Industrial Well No. 18;
- Natural attenuation, destruction, and capture by Well No. 18 of the aqueous VOC concentrations present in groundwater;
- Provision of alternate water supplies for any future potable water users potentially affected by the VOCs in groundwater;
- Institutional controls to restrict future potable water well development in the affected groundwater area; and
- Groundwater monitoring to track the degree and extent to which VOC concentrations in groundwater moderate over time as a result of any on-site (source control) remedial activity.

Under this alternative, contingencies are provided in the event that operation of any of the industrial wells along the Scioto River changes in such a way that the plume of VOC impacted groundwater changes in size or direction. Groundwater Use Notification Agreements proposed in the FS Report will be used to ensure that downgradient landowners will notify the PRPs and Ohio EPA of any plans to use the groundwater or significantly modify current groundwater uses. If a modification was proposed, the PRPs would take the following steps:

- Evaluate the proposed groundwater use/change and determine the potential human health and environmental risks (including the risk of contaminating previously uncontaminated groundwater);

at the Union Spring monitoring wells; and 149 years at on-site monitoring wells. The total cost of this alternative is estimated to be $5,981,700.

3.3.5 <u>In Situ Biological Treatment</u>

This alternative consists of anaerobic reductive dehalogenation to degrade chlorinated VOCs. The bioremediation system would be designed to create an in-situ anaerobic biological barrier zone to accelerate microbial dehalogenation of the chlorinated VOCs in groundwater. The barrier would be constructed along the northern property boundary across the entire width of the plume (approximately 1700 feet). The width of the treatment zone would be determined during remedial design, but is expected to be on the order of 100 feet. Groundwater would be pumped from an estimated nine downgradient extraction wells, amended with necessary nutrients, and then reinjected through an estimated seven upgradient wells screened in the shallow, intermediate, and deep zones of the aquifer (total of 21 reinjection wells). Through this treatment process, the on-site VOCs in groundwater would be contained and destroyed before migrating off-site. The FS Report estimates that the time-frames for achieving MCLs would be very similar to time-frames estimated for the SVE/AS Downgradient Wall. The total cost of this alternative is estimated to be $10,973,800.

3.3.6 <u>Source Area Treatment by Soil Vapor Extraction/Air Sparge</u>

This alternative is identical to the Physical Treatment by SVE/AS alternative evaluated for subsurface soils, but is considered here with respect to its potential as a groundwater remedy. As described under the Subsurface alternatives section, SVE/AS would treat the subsurface soil that is contributing VOCs to the groundwater. Downgradient groundwater VOC concentrations should be reduced by about 90 percent through this treatment over a period of 2 to 3 years. Taking into account this 90 percent reduction, the estimated time-frames for achieving MCLs after completing treatment are as follows: 3 years at Industrial Well No. 18; 47 years at the Union Spring monitoring wells; and about 106 years at the on-site monitoring wells. The total cost of this alternative is estimated to be $4,412,200.

4.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

In selecting the remedial alternative, Ohio EPA considers the following eight criteria:

1. Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection, and describes how risks are eliminated, reduced or controlled through treatment, engineering controls, and/or institutional controls.

2. Compliance with all State, Federal and Local laws and regulations addresses whether or not a remedy will meet all of the applicable State, Federal and Local environmental statutes.

3. Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once clean-up goals have been met.

4. Reduction of toxicity, mobility, or volume is the anticipated performance of the treatment technologies to yield a permanent solution. This includes the ability of the selected alternative to reduce the toxic characteristics of the chemicals of concern or remove the quantities of those chemicals to an acceptable risk concentration or regulatory limit and/or decrease the ability of the contaminants to migrate through the environment.

5. Short-term effectiveness involves the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until clean-up goals are achieved.

6. Implementability is the technical and administrative feasibility of a remedy, including the availability of goods and services needed to implement the chosen solution.

7. Cost includes capital and operation and maintenance costs.

8. Community acceptance is assessed in the Decision Document following review of the public comments received on the Remedial Investigation Report, the Feasibility Study and the Preferred Plan.

4.1 Evaluation of Remedial Alternatives for Surface Materials

Overall protection of human health and the environment

At this site, the Consolidation and Containment alternative, the Removal and Off-Site Disposal alternative and the Stabilization and Consolidation alternative are protective of human health and the environment. The No Action alternative is the only surface materials alternative that is not protective of human health and the environment.

Compliance with all State, Federal and Local laws and regulations

The Removal and Off-Site Disposal alternative as well as the Stabilization and Consolidation alternative must comply with RCRA regulations regarding identification, transportation, treatment and disposal of hazardous waste.

Regarding the containment on-site option, solid waste regulations in Ohio Administrative Code (OAC) 3745-27-08(C)(16) are applicable. Only one of the three cover options described in the Consolidation and Containment alternative complies with these solid waste regulations. The solid waste cap would comply with these regulations, but the soil cover and asphalt cover would not comply.

Long-term effectiveness and permanence

Each of the alternatives, except the No Action alternative, provides some degree of long-term effectiveness, and the residual risk associated with the three action alternatives are comparable. The Removal and Off-Site Disposal alternative permanently removes the contaminants from the surface materials. Neither the Consolidation and Containment alternative nor the Stabilization and Consolidation alternative are as effective in the long term as Removal and Off-Site Disposal because, they require long-term monitoring to ensure that the remedy is permanent.

Reduction of toxicity, mobility, or volume

The Stabilization and Consolidation alternative reduces the mobility of the contaminants, but does not reduce toxicity or volume. The Consolidation and Containment alternative and the Removal and Off-Site Disposal alternative do not reduce toxicity, mobility or volume by treatment.

Short-term effectiveness

The No Action alternative has minimal potential for adverse short-term impacts because workers would not handle affected soils during remediation activities. Potential short-term impacts associated with the other alternatives would need to be addressed through worker health and safety controls, air pollution controls and monitoring. The Stabilization and Consolidation alternative has greater potential for airborne releases at the Site because of the need to handle large quantities of stabilizing agents. Regarding the Removal and Off-Site Disposal alternative, off-site transportation has inherent risks of vehicular accidents and spills and environmental impacts related to noise and traffic. Transporting the surface materials from the Site would require nearly 2,500 truck loads of materials traveling local roadways to distant landfills. It is expected that all of the alternatives, except for Stabilization and Consolidation, could be completed in one construction season.

Under the No Action alternative, the conditions at the Site would remain the same indefinitely. However, under the remaining three alternatives, the conditions at the site would improve significantly within a relatively short time-frame (one to two construction seasons).

Implementability

Each of the alternatives is readily implementable, although the Stabilization and Consolidation alternative requires treatability testing to determine the optimum mixture of the stabilizing agent.

Cost

The net present value costs, including capital and 30 year O&M, for the alternatives are summarized as follows:

- No Action - $0;
- Consolidation and Containment with Soil Cover - $1,091,400;
- Consolidation and Containment with Asphalt Cover - $ 1,100,000;
- Consolidation and Containment with Solid Waste Cap - $ 2,000,000;
- Removal and Off-Site Disposal - $5,688,100;
- Stabilization and Consolidation - $2,655,300

Except for the No Action alternative, the lowest cost alternative is Consolidation and Containment. Refer to Table 8 for more detail on cost evaluation.

4.2 Evaluation of Remedial Alternatives for Subsurface Soils

Overall protection of human health and the environment

The No Action alternative and the Limited Action alternative do not address the continued migration of contaminants from subsurface soils to the groundwater; therefore, these two alternatives are not protective of the environment. Although, groundwater affected by this Site is not being used for potable purposes at this time, there is potential for this use to change. For this reason, the No Action alternative is not protective of human health while the Limited Action is protective because of the use of institutional controls. The Cap and Cutoff Wall alternative and the SVE/AS alternative are both protective of human health and the environment.

Compliance with all State, Federal and Local laws and regulations

All of the alternatives comply with Federal, State and Local laws and regulations; however, the No Action and Limited Action alternatives require significantly longer periods of time, if ever, to achieve MCLs, which are the groundwater clean-up goals.

Long-term effectiveness and permanence

Both the No Action alternative and the Limited Action alternative rely on natural degradation and volatilization to achieve clean-up goals. If the goals are eventually achieved, the alternatives are effective in the long-term and permanent. However, if the clean-up goals are not achieved, then these two alternatives would be ineffective in the long-term. The Cap and Cutoff Wall alternative is effective in the long-term because it significantly reduces migration of contaminants to groundwater. This alternative is permanent, but it requires continuous monitoring to ensure this permanence. The SVE/AS alternative is effective in the long-term and permanent because the contaminants are concentrated in a vapor-phase carbon system and the carbon is disposed of off-site (at either a hazardous waste landfill or a hazardous waste incinerator) or regenerated off-site in accordance with regulations.

Reduction of toxicity, mobility, or volume

The No Action, Limited Action and Cap and Cutoff Wall alternatives do not reduce toxicity, mobility or volume by treatment. The SVE/AS alternative reduces the mobility and volume of the contaminants.

Short-term effectiveness

The No Action and Limited Action alternatives have minimal potential for adverse short-term impacts because workers would not handle affected soils during remediation activities. Potential short-term impacts associated with the SVE/AS alternative would need to be addressed through worker health and safety controls, air pollution controls, and monitoring. It is expected that all of the alternatives, except the SVE/AS alternative, could be completed within two construction seasons. Installation and operation of the SVE/AS treatment system would take approximately three years.

Under the No Action and Limited Action alternatives, the conditions at the Site would remain the same for a long period of time. Due to the time required to achieve remedial response objectives the No Action and Limited Action alternatives would not be effective in the short-term. After completion of the remedy (approximately two construction seasons), the Cap and Cutoff Wall alternative would result in a significant decrease of contaminants migrating from soils to groundwater. Within an estimated three year time-frame, the SVE/AS alternative would remove a significant concentration of contaminants from the subsurface soils. This reduction of contaminants in the soils is expected to result in a 90 percent decrease in concentration of groundwater contaminants downgradient of the treated areas. With respect to time required to achieve remedial response objectives, the Cap and Cutoff Wall alternative and the SVE/AS alternative would be effective in the short-term.

Implementability

The No Action and Limited Action alternatives are the most easily implemented subsurface soils alternatives. The SVE/AS alternative is implementable, as demonstrated by the pilot study, although it is somewhat more difficult to monitor, and to determine the volume of soil that will be treated and to what extent it will be treated. The Cap and Cutoff Wall alternative is only marginally implementable because there are significant technical and logistical issues (e.g., building and utility conflicts, deep slurry wall construction) that would need to be resolved before this alternative could be constructed.

Cost

The net present value costs, including capital and 30-year O&M, for the alternative related to the subsurface soils are as follows:

- No Action - $0;
- Limited Action - $309,600;
- Cap and Cutoff Wall - $16,330,300; and
- SVE/AS - $4,412,200

The cost of the Cap and Cutoff Wall alternative is significantly higher than the other alternatives. The SVE/AS alternative costs more than the Limited Action alternative but significantly less than the Cap and Cutoff Wall alternative. Refer to Table 9 for more detail on cost evaluation.

4.3 Evaluation of Remedial Alternatives for Groundwater

Overall protection of human health and the environment

Although, groundwater affected by this Site is not being used for potable purposes at this time, there is potential for this use to change. For this reason, the No Action alternative is not protective of human health while the Limited Action may be protective due to the use of institutional controls. Neither the No Action nor the Limited Action alternatives would be protective of the environment. The Groundwater Extraction, SVE/AS at Downgradient Wall, Biological Treatment and SVE/AS at Source Areas would be protective of human health and the environment. However, the estimated time-frame for achieving the clean-up goals throughout the affected aquifer under these alternatives ranges from 40 years to 149 years.

Compliance with all State, Federal and Local laws and regulations

All of the alternatives comply with Federal, State and Local laws and regulations; however, the No Action and Limited Action alternatives require significantly longer periods of time to achieve clean-up goals off-site.

Long-term effectiveness and permanence

The No Action and Limited Action alternatives include no active steps to reduce VOC concentrations in groundwater and would only provide long-term effectiveness if used in combination with an active source control. The remaining alternatives all provide, to the limits of the technology, an equivalent degree of long-term effectiveness and permanence.

Reduction of toxicity, mobility, or volume

No Action and Limited Action alternatives do not reduce the toxicity, mobility or volume of the VOCs in groundwater. The Groundwater Extraction, Downgradient SVE/AS and Source Area SVE/AS reduce the volume of contaminants in groundwater by concentrating contaminants in a vapor-phase carbon system. The carbon would be either disposed off-site (at either a hazardous waste landfill or a hazardous waste incinerator) or regenerated off-site in accordance with regulations. In Situ Biological Treatment reduces the volume, mobility and toxicity of the contaminants by destroying them.

Short-term effectiveness

The Groundwater Extraction, Downgradient SVE/AS, Source Area SVE/AS and In Situ Biological Treatment alternatives have the potential for releases of VOCs to the atmosphere during the handling and treatment of affected waters. However, air pollution controls and monitoring would be used to control releases of VOCs.

The time required to complete groundwater remediation cannot be predicted with great precision at this time and depends on the type and extent of source control measures. For these reasons, it is difficult to differentiate between the alternatives based upon short-term effectiveness.

Implementability

The No Action and Limited Action alternatives are readily implementable. The Groundwater Extraction alternative is a proven technology that is also readily implementable. The two SVE/AS alternatives and the Biological Treatment alternative are more recent technologies that are more difficult to monitor and to determine the volume of soil and groundwater that will be treated and to what extent it will be treated.

Cost

The net present value costs, including capital and 30-year O&M, for each of the alternatives related to groundwater are summarized as follows:

- No Action - $0;
- Limited Action - $435,500;
- Groundwater Extraction - $8,206,800;
- Downgradient SVE/AS - $5,981,700;
- Source Area SVE/AS - $4,412,200; and
- In Situ Biological Treatment - $10,973,800.

The Limited Action alternative is far less costly than the aggressive groundwater treatment approaches. Source Area SVE/AS appears to be the most cost-effective treatment approach. The costs of the Groundwater Extraction and Biological Treatment alternatives are much higher, especially with respect to O&M costs. Refer to Table 10 for more detail on cost evaluation.

5.0 SELECTED REMEDY

The selected remedial action for the Site addresses contamination in the surface soils, subsurface soils and groundwater. The contaminated surface soils will be consolidated and covered with a solid waste cap. The contaminated subsurface soils and groundwater will be treated with an SVE/AS system at the source areas. The groundwater remedial alternative also consists of monitoring to ensure that groundwater contamination is controlled in the time-frame before clean-up values are achieved. This is currently accomplished as a result of pumping activity at Industrial

Well No. 18. The groundwater alternative includes provisions of alternate water supplies for any future potable water users potentially affected by the VOCs in groundwater.

5.1 Surface Soils Alternative

Ohio EPA's selected alternative for addressing metals contamination in surface materials is Consolidation and Containment. This alternative is protective of human health and the environment and implementable. The remedy is effective in both the short-term and long-term, but does require long-term monitoring to ensure that the remedy is permanent. At $1,091,400, the Consolidation and Containment alternative is the lowest cost alternative, other than the No Action alternative.

This alternative will involve consolidating and containing materials that exceed 2000 mg/kg of lead in order to address an unacceptable risk to industrial workers. Analytical results have demonstrated that other metals which are COCs are co-located with lead. A residual risk assessment was conducted to determine potential risks associated with the Site once remedial measures have been completed to achieve the lead clean-up goal of 2000 mg/kg. The residual risk assessment demonstrated that residual carcinogenic risk for an industrial worker would be 1×10^{-5} while the carcinogenic risk would be 3×10^{-6} for a construction worker and 6×10^{-7} for a trespasser (refer to Tables 11 and 12). The majority of this residual risk is due to arsenic, but this arsenic is largely attributable to background levels. The residual risk assessment demonstrated that the hazard index would be less than 1.0.

Although Alcoa's intended use of this property is industrial or commercial, the residual risks associated with future residential use of this Site were calculated (refer to Tables 13 and 14). The residual concentrations of lead would exceed protective levels (400 mg/kg) for a child living on the Site. Additionally, the carcinogenic risk would be 7×10^{-5} and the non-carcinogenic risk would exceed a Hazard Index of 1.0 for a child living on the Site. Due to these unacceptable risks to potential future on-site residents, deed restrictions must be in place to ensure that this property is not used as a residential area unless the unacceptable residual risk is addressed.

After removing surface materials containing lead above the clean-up level, samples will be collected to confirm that the remaining material meets the lead clean-up level. Moreover, the sample results will be used to verify the assumptions made in the residual risk assessment. If the post -remediation data evaluation determines that those residual risk assessment assumptions are not valid, a residual risk assessment will be performed using the post-remediation data. This risk assessment will be used to determine if further action is necessary to address risks associated with the additional metals.

Section 3.1 of this Decision Document describes three types of covers: 1) a solid waste cap in compliance with OAC 3745-27-08(C)(16); 2) an asphalt cover; and 3) a soil cover. Solid waste regulations in Ohio Administrative Code (OAC) 3745-27-08(C)(16) are applicable. Because the solid waste cap is the only one of the three cover options that complies with the applicable solid waste regulations, the solid waste cap has been selected as the cover. In order to select a soil cover or an asphalt cover an exemption from solid waste regulation OAC 3745-27-08(C)(16), which requires a solid waste cap, would be necessary.

The performance standards for the surface soils alternative are as follows:

- To consolidate and contain surface soils that exceed the 2000 ppm clean-up level for lead established in the RI Report.
- To consolidate and contain surface soils that exceed a hazard index of 1.0 and/or a 1×10^{-5} carcinogenic risk goal for other metals COCs.

5.2 Subsurface Soils Alternative

Ohio EPA's selected alternative for subsurface soils is the SVE/AS alternative. This remedy is protective of human health and the environment, complies with State, Federal and Local laws and regulations, and reduces the mobility and volume of the contamination. The SVE/AS alternative is effective in the long-term and is permanent because it removes contaminants from the Site. Within a three year time-frame, this alternative is expected to reduce contaminants in downgradient groundwater by 90 percent; therefore, this remedy is effective in the short-term. Potential short-term impacts associated with construction and operation of the SVE/AS system will be addressed through air pollution controls and monitoring. The SVE/AS alternative is implementable as demonstrated by the pilot study. At $4,412,200, the cost associated with this alternative is higher than the Limited Action alternative; however, the Limited Action alternative is not protective of the environment and does not reduce toxicity, mobility or volume of the contaminants. Moreover, the Limited Action relies on natural degradation and volatilization to address contamination which results in a much longer time-frame to achieve clean-up goals. The SVE/AS alternative costs significantly less than the Cap and Cutoff Wall alternative.

The performance standards for the subsurface soils alternative are as follows:

- To operate an SVE/AS system to the extent that any leaching of residual contaminants to groundwater does not result in exceeding the MCLs in groundwater; or
- To operate an SVE/AS system to the limits of this technology's effectiveness.

5.3 Groundwater Alternative

Ohio EPA's selected alternative for groundwater is a combination of the Source Area SVE/AS and the Limited Action alternatives. As stated above, SVE/AS at the source areas, at an estimated cost of $4,412,200, should result in a 90 percent reduction of VOCs in downgradient groundwater. Clean-up goals at the industrial well along the Scioto River are expected to be reached within three years with either the Groundwater Extraction alternative or the Source Area SVE/AS alternative (after completing treatment).

On the property adjacent to and northeast of the WearEver property, the Groundwater Extraction alternative is estimated to achieve clean-up goals in a shorter time-frame (7 years for Groundwater Extraction versus 47 years for SVE/AS) however, the cost is much higher. Moreover, the time-frames to achieve MCLs at Industrial Well No. 18 and the property adjacent to WearEver using Groundwater Extraction may be longer than estimated because on-site groundwater pumping would create a stagnant area in groundwater immediately downgradient of the Site, thereby decreasing groundwater flow velocity and increasing contaminant travel times of the off-site plume. Also, since the SVE/AS at source areas should reduce concentrations by approximately 90 percent, concentrations of contaminants in groundwater on the adjacent property would be much lower (90 percent lower) than they are now even though MCLs would not be achieved for an estimated 47 years. Finally, the on-site groundwater clean-up time-frames may be similar for both SVE/AS (approximately 100 years) and Groundwater Extraction (40 - 105 years).

The Limited Action alternative, which is estimated to cost $435,500, is necessary since there will be a long period of time before clean-up goals are achieved. The Limited Action alternative will include monitoring to ensure that groundwater contamination is controlled in the time-frame before clean-up values are achieved. This is currently accomplished as a result of pumping activity at Industrial Well No. 18.

The Limited Action alternative includes provisions of alternate water supplies for any future potable water users potentially affected by the VOCs in groundwater. Additionally, Groundwater Use Notification Agreements proposed in the FS Report will be used to ensure that downgradient landowners will notify the PRPs and Ohio EPA of any plans to use the groundwater or significantly modify current groundwater uses. If a modification were proposed, the PRPs would take the following steps:

- Work with Ohio EPA to evaluate the proposed groundwater use/change and determine the potential human health and environmental risks (including the risk of contaminating previously uncontaminated groundwater);

- Identify alternative responses to the proposed groundwater use/change if determined to pose an unacceptable risk; and
- Work with the landowner and Ohio EPA to implement the alternative response that best suits the landowner's needs, minimizes risk, and is most cost-effective.

The Groundwater Use Notification Agreements will be monitored on a regular basis by the PRPs to ensure that hydrodynamic control of the plume as currently exerted by Industrial Well No. 18 is maintained. This regular monitoring will also ensure that the PRPs and Ohio EPA are aware of any groundwater use changes and any changes in property ownership.

The Limited Action alternative will also include groundwater monitoring to evaluate the effectiveness of the SVE/AS at the source areas and to monitor both the on-site and off-site plume.

The performance standards for the groundwater alternative are as follows:

- To use SVE/AS to treat source areas and thereby ultimately achieve MCLs off-site and on-site.
- To maintain hydrodynamic control of the extent of groundwater contamination as currently exerted by Industrial Well No. 18.

Tables

Table 1. Summary of Previous Investigation Activities

Consultant or Regulatory Agency	Year	Description of Investigation	Documentation
Ohio EPA	1980-1982	Investigation of Sludge Pit	Laboratory analytical reports for Ohio EPA sampling events
SYSTECH	1982-1983	Closure activities at Dump Truck Lagoon	Closure letter to WearEver Aluminum dated 3/2/83
Ecology & Environment for U.S.EPA Region V	1985	Investigation of Leach Pit, Borrow Pit and sludge disposal areas	Report dated 12/3/85
ERM-Midwest	1988	Assessment of Leach Pit, Sludge Pit, Flocculent Settling Basin, Sludge Disposal Areas, Old Oil Barrel Storage Area, Product ASTs, Walnut Shell Dust ASTs, TCE/Draw AST and Transformer Bank	Report of Ground-Water Assessment by ERM-Midwest, Inc.
Triad Engineering, Inc.	1991	Closure Assessment of the Sludge Pit Area	Report by Triad Engineering and STS Consultants, LTD dated 1/17/92
STS Consultants, Inc.	1991	Closure Assessment of the Sludge Pit Area	Report by Triad Engineering and STS Consultants, LTD dated 1/17/92
Ohio EPA	1991	Investigation of sludge disposal areas, Old Oil Barrel Storage Area, Industrial Waste Water Treatment Plant, Walnut Shell Dust AST, TCE/Draw Lubricant AST	Laboratory analytical reports for the October 1991 sampling event

Table 2. Description of Potential Source Areas (PSAs)

PSA #	Description
1	Former Leach Pit
2	Former Sludge Pit
3	Former Wastewater Holding Basin
4	Former Wastewater Leach Basin & Borrow Pit
5	Former Flocculent Settling Basin
6	Former Dump Truck Lagoon
7	Former Dump Truck Overflow Basin
8-1 through 8-4	Former Sludge Disposal Areas
9	Former Tee Pee Hazardous Waste Solvent Incinerator
10	Former Wastewater Ditch
11	Former Old Oil Barrel Storage Area
12	Former Product AST
13	Former Industrial Wastewater Treatment Plant
14	Former Wastewater Lift Station
15	Former Blind Ditch and Culvert
16	Former Waste Benzene UST
17	Former Trichloroethene Tank UST or AST
18	Former Walnut Shell Dust AST
19	Former Blow Off Tank
20	Former TCE Product AST
21	Existing No. 6 Fuel Oil AST
22	Former Day Tank and Valve Pit
23	Former Acid Product ASTs
24	Existing Transformer Bank
25	Portions of the Industrial Stormwater Sewer System
26	Barren Area
	Degreasing Area within Building
	Western Fenceline

Table 3. Maximum Concentrations of Metals in Surface Soils (mg/kg)

Constituent of Concern	Background average concentration	Maximum Concentration	Location
Antimony	ND	145	PSA 8-3
Arsenic	12.7	38.3	PSA 4
Barium	46.4	8970	PSA 8-3
Beryllium	ND	1.3	PSA 4
Cadmium	ND	2540	PSA 8-3
Lead	11.9	71,900	PSA 8-4
Manganese	425.4	1170	PSA 8-1

ND - Not Detected

Table 4. Maximum Concentrations of VOCs in Subsurface Soils (mg/kg)

Constituents of Concern	Site-Specific Leach Based Levels*	Generic Leach Based Levels **	Maximum Concentration	Location
1,2 Dichloroethylene, cis trans	0.80 1.63	0.4 0.7	9.1	PSA 11
Tetrachloroethylene	0.19	0.06	0.18 J	PSA 25
1,1,1 Trichloroethane	6.21	2	1.7 J	PSA 20
Trichloroethylene	0.15	0.06	220	Underneath the building
Vinyl Chloride	0.03	0.01	ND	Not detected in soils

J - indicates an estimated concentration

* Leach based levels take into account the release of contaminants from the soils into the groundwater. These Site-specificleach based levels were developed in the RI, Appendix 6 (Table A6-7) and will be used at this site to identify subsurface soils which potentially will require remediation.

**Generic leach based levels taken from the Superfund Soil Screening Level guidance.

Table 5. Maximum Concentrations of VOCs in Groundwater (ug/l)

Constituent of Concern	MCL	On-Site Monitoring Wells	Off-Site Monitoring Wells	Industrial Well # 18 along Scioto River
Cis-1,2 dichloroethylene	70	3,730	860	49
Trans-1,2 dichloroethylene	100	151	650	ND
Tetrachloroethylene	5	5.6	98	ND
1,1,1 Trichloroethane	200	1,700	ND	ND
Trichloroethylene	5	13,000	500	ND
Vinyl Chloride	2	89	130	12

Table 6. Risk Assessment Summary - On-Site Industrial and Off-Site Residential

Receptor	Hazard Index	Carcinogenic Risk
Industrial Worker	1.1	2E - 05
Construction Worker- 6 month project	1.4	3E - 06
Construction Worker- Multiple short duration projects	1.6E - 01	3E - 06
Trespasser	5.3E - 03	3E - 08
Off-Site Adult Resident	6.1E - 02	1.5E - 06
Off-Site Child Resident	2.3E - 01	1.4E -06
Off-Site Adult Resident Exposed to Groundwater	7.9E - 02*	2E - 04*
Off-Site Child Resident Exposed to Groundwater	1.8E - 01*	1E - 04*

* There is no current exposure to contaminated groundwater from the site. However, a scenario was modeled for a change in groundwater direction due to a hypothetical upgradient industrial well. The numbers in this table indicate what the risk due to exposure to contaminated groundwater from the site would be under this scenario.

Table 7. Risk Assessment Summary - On-Site Residential

Receptor	Hazard Index	Carcinogenic Risk
Adult	9.5E + 01	4.4E - 03
Child	2.5E + 02	2.8E - 03

Table 8. Cost Evaluation Summary for Surface Materials Remedial Alternatives

Alternative	Capital Cost	O&M Cost *	Total Cost
No Action	0.0	0.0	0.0
Consolidation and Containment with Soil Cover	$ 844,400	$ 207,000	$ 1,091,400
Consolidation and Containment with Asphalt Cover	**	**	$ 1,100,000**
Consolidation and Containment with Solid Waste Cap	**	**	$ 2,000,000**
Removal and Off-Site Disposal	$ 5,668,100	0.0	$ 5,688,100
Physical Treatment by Stabilization and Consolidation	$ 2,448,300	$ 207,000	$ 2,655,300

* O&M cost is net present value based on 30 year period at a five percent discount rate. O&M costs include the costs of five year reviews, where appropriate.

**The FS did not include detailed cost estimates for the asphalt cover or the solid waste cap, however, it is estimated that the total cost of an asphalt cover is approximately the same as the soil cover. The solid waste cap is estimated to be approximately twice as much as the soil cover.

Table 9. Cost Evaluation Summary for Subsurface Soil Remedial Alternatives

Alternative	Capital Cost	O&M Cost *	Total Cost
No Action	0.0	0.0	0.0
Limited Action	$ 35,000	$ 274,600	$ 309,600
Containment with Cap and Groundwater Cutoff Wall	$ 13,773,800	$ 2,556,500	$ 16,330,300
Physical Treatment by SVE/AS	$ 4,401,000	$ 11,200	$ 4,412,200

* O&M cost is net present value based on 30 year period at a five percent discount rate. O&M costs include the costs of five year reviews, where appropriate.

Table 10. Cost Evaluation Summary for Groundwater Remedial Alternatives

Alternative	Capital Cost	O&M Cost *	Total Cost
No Action	0.0	0.0	0.0
Limited Action	$ 55,000	$ 380,500	$ 435,500
Groundwater Extraction for Hydraulic Containment with Treatment and Reuse of Water	$ 2,163,100	$ 6,043,700	$ 8,206,800
SVE/AS at Downgradient Wall	$ 861,100	$ 5,120,600	$ 5,981,700
In Situ Biological Treatment	$ 985,500	$ 9,988,300	$ 10,973,800
Source Area Treatment by SVE/AS	$ 4,401,00	$ 11,200	$ 4,412,200

* O&M cost is net present value based on 30 year period at a five percent discount rate. O&M costs include the costs of five year reviews, where appropriate.

Table 11. Residual Industrial Carcinogenic Risk

Exposure Pathway	Industrial Worker	Construction Worker	Trespasser
Ingestion of Soil	7.9×10^{-6}	3.1×10^{-6}	4.0×10^{-7}
Dermal Contact with Soil	4.5×10^{-6}	1.4×10^{-7}	1.9×10^{-7}
Inhalation of Dusts	8.1×10^{-8}	2.0×10^{-10}	2.6×10^{-10}
Total	1×10^{-5}	3×10^{-6}	6×10^{-7}

Table 12. Residual Industrial Non-Carcinogenic Risk

Exposure Pathway	Industrial Worker	Construction Worker	Trespasser
Ingestion of Soil	0.068	0.51	0.0086
Dermal Contact with Soil	0.042	0.09	0.0043
Inhalation of Dusts	0.011	0.00012	0.000091
Total	0.1	0.6	0.01

Table 13. Residual Residential Carcinogenic Risk

Exposure Pathway	Adult Resident	Child Resident
Ingestion of Soil	2.3×10^{-5}	5.4×10^{-5}
Dermal Contact with Soil	2.3×10^{-5}	1.3×10^{-5}
Total	5×10^{-5}	7×10^{-5}

Table 14. Residual Residential Non-Carcinogenic Risk

Exposure Pathway	Adult Resident	Child Resident
Ingestion of Soil	0.32	2.9
Dermal Contact with Soil	0.17	0.38
Total	0.5	3

Figures

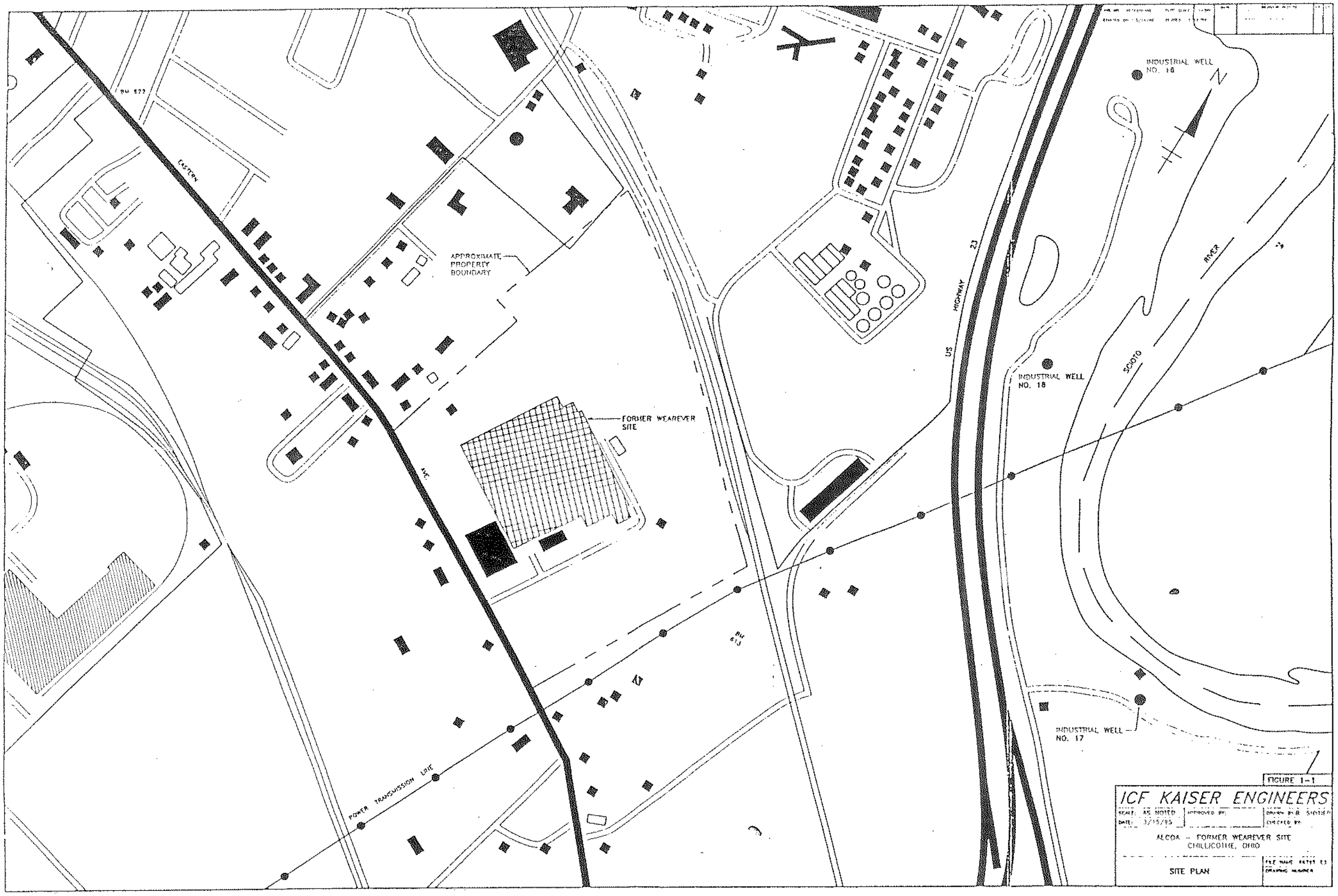

Figure 1 Site Location Map

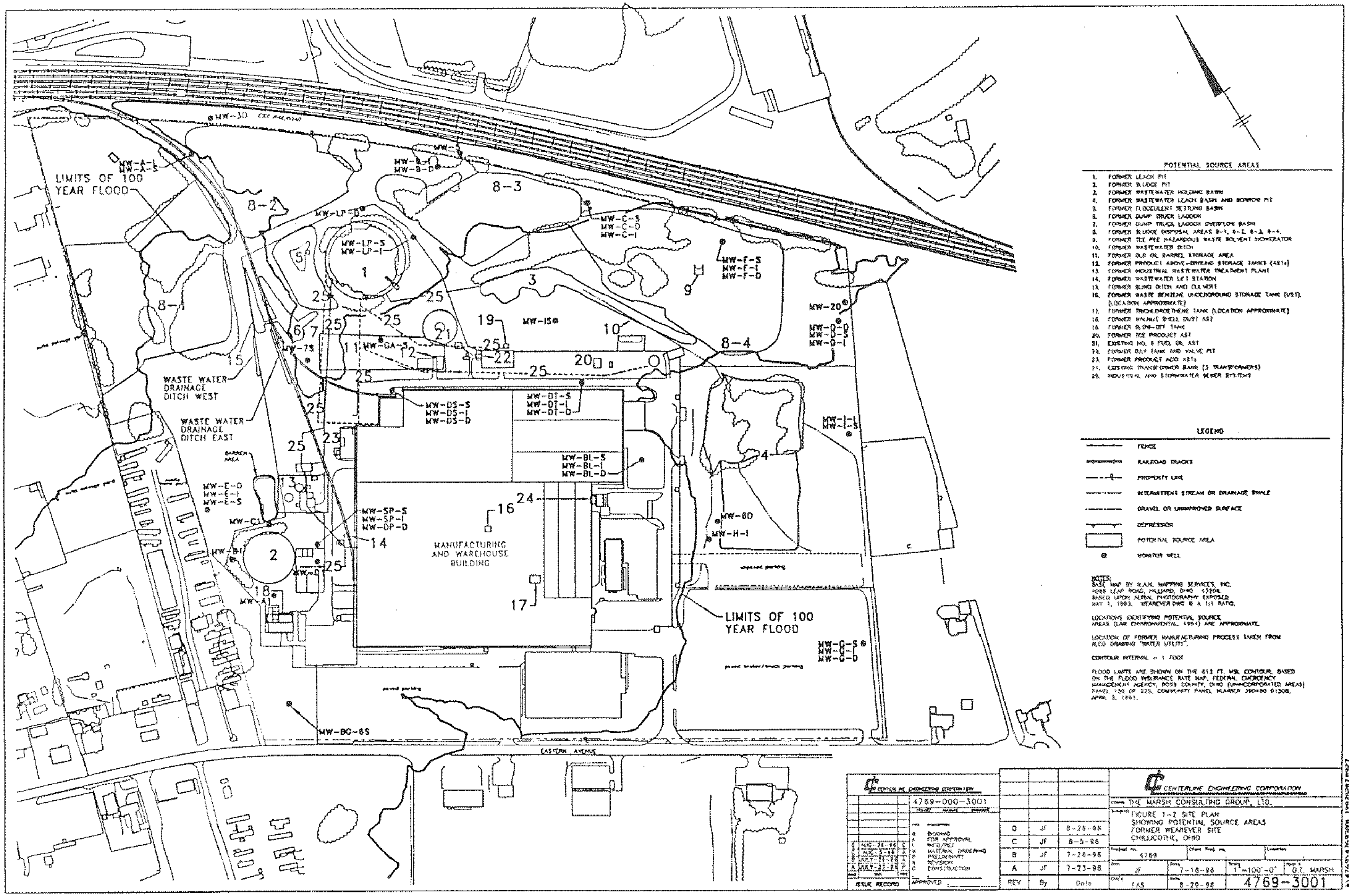

Figure 2 Potential Source Areas

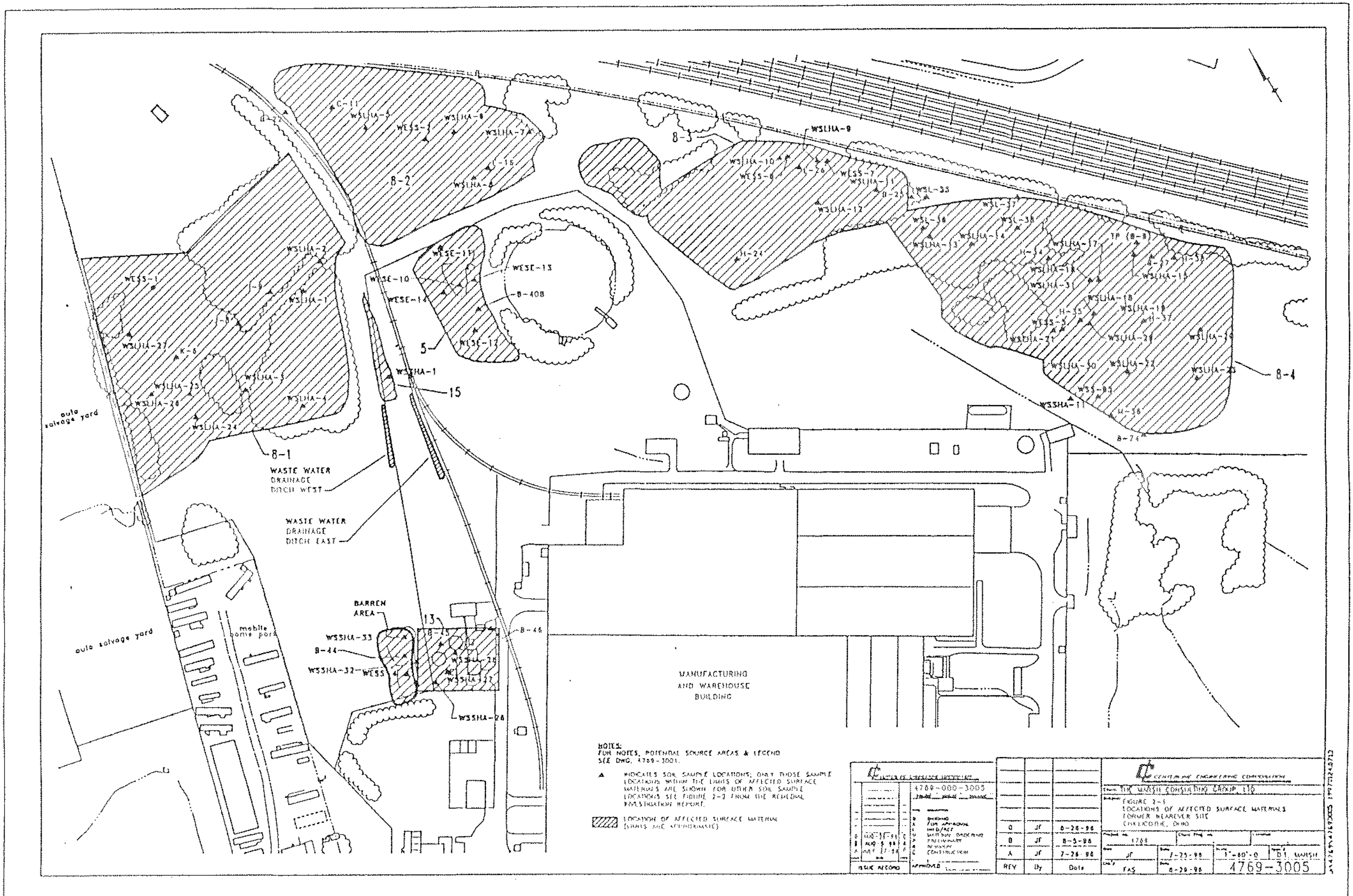

Figure 3 Metals Source Areas

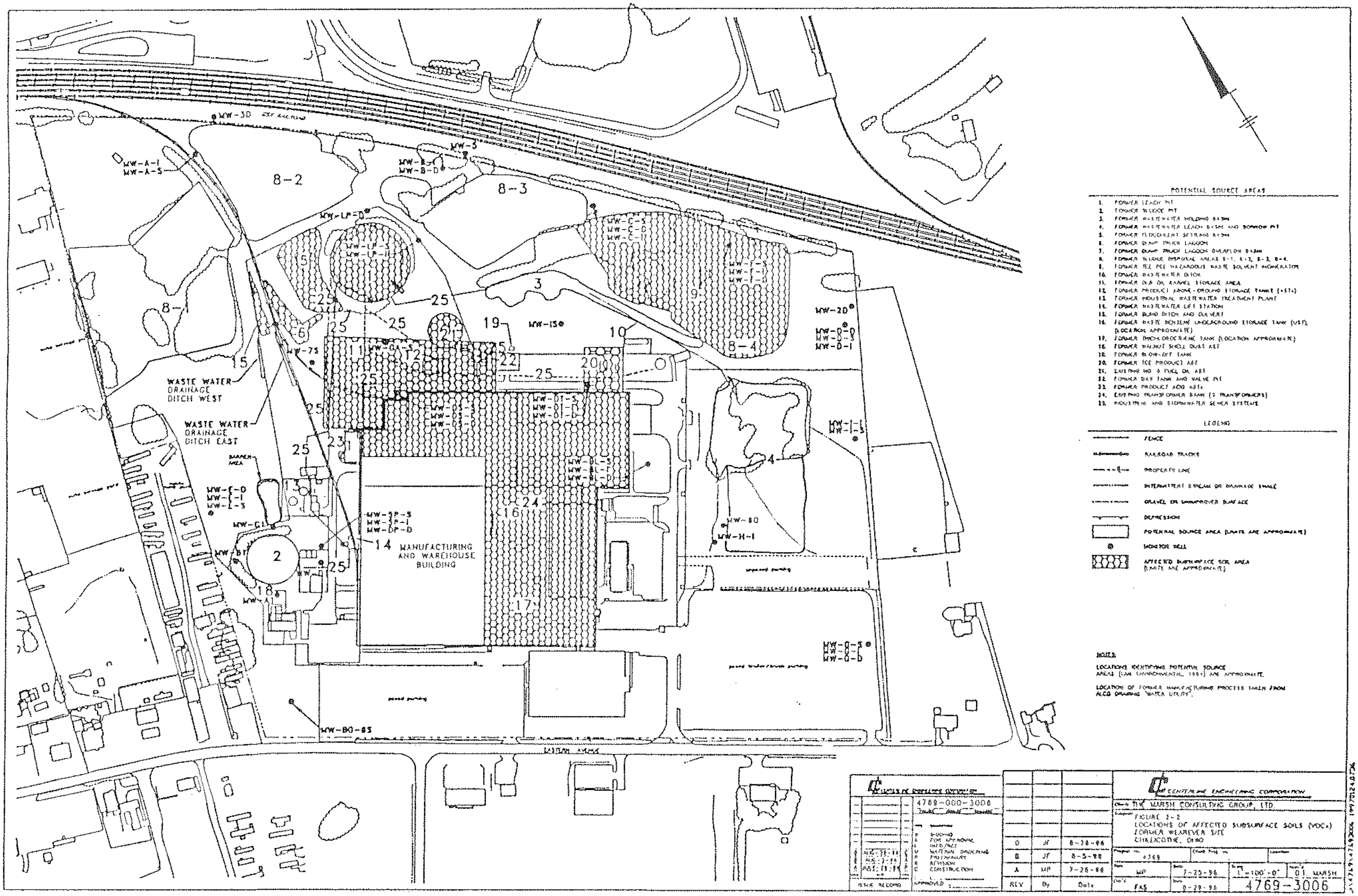

Figure 4 VOC Source Areas

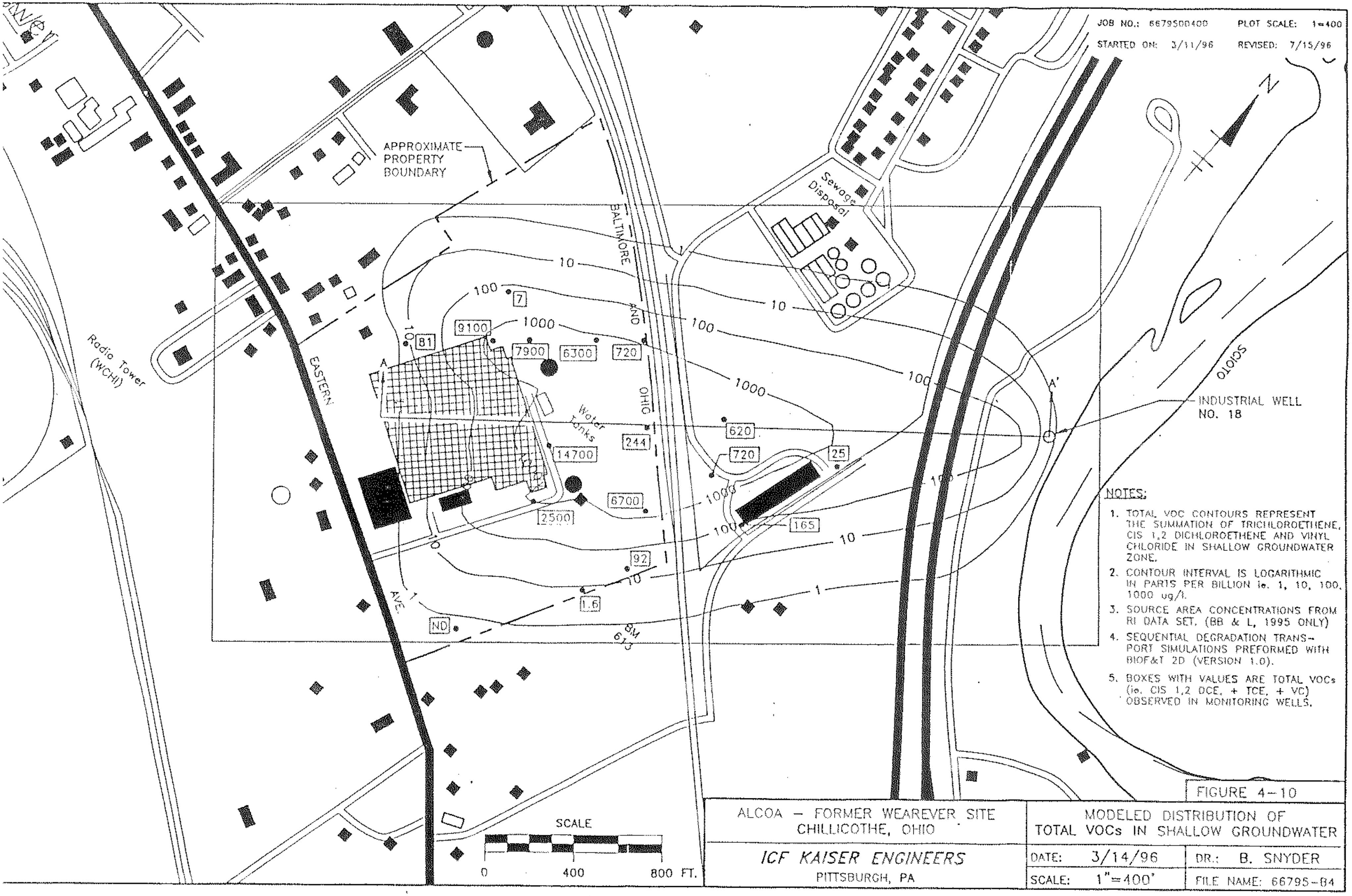

Figure 5 Modeled VOC Plume Map

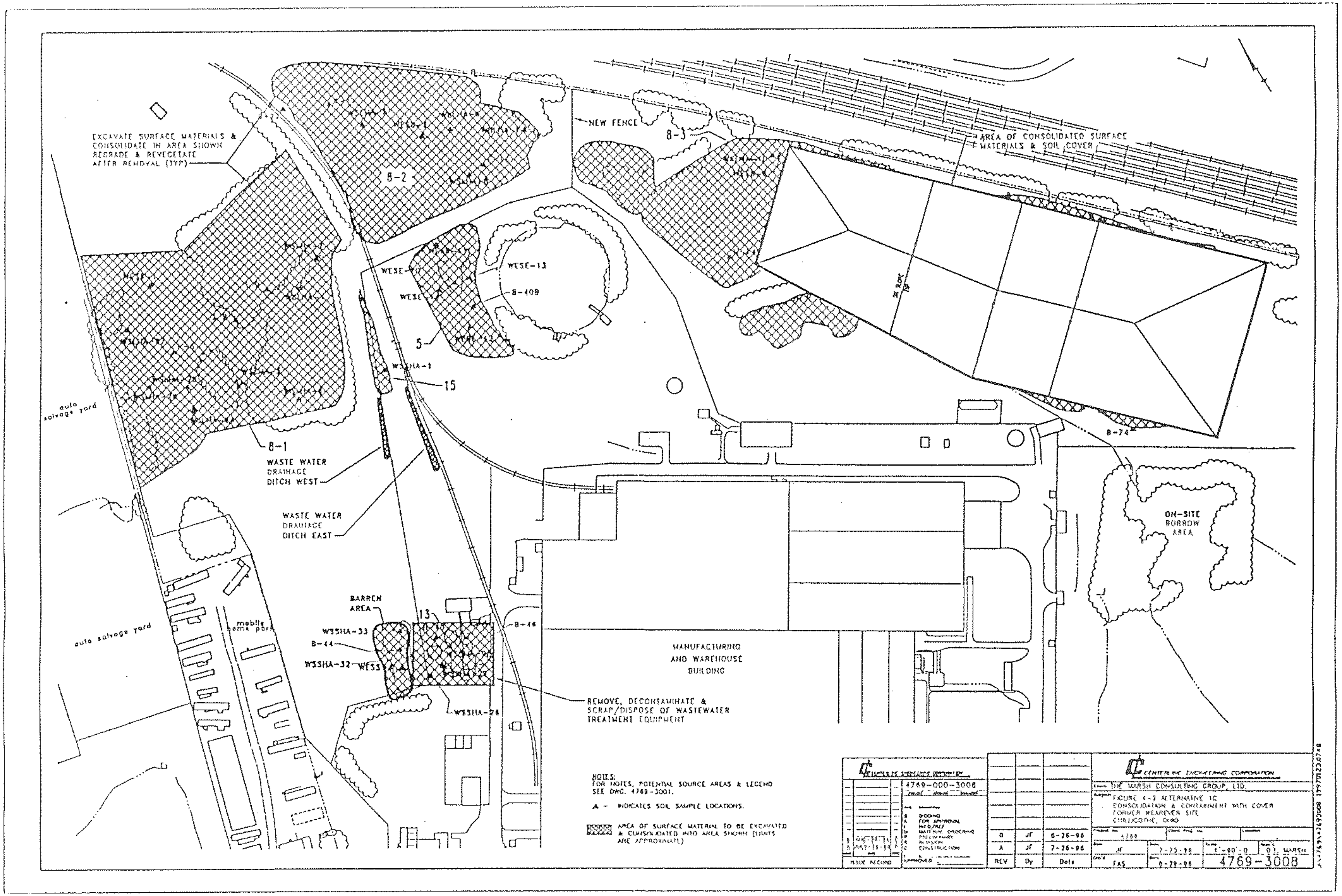

Figure 6 Consolidation and Containment Alternative for Surface Materials

Attachment A

Responsiveness Summary
for the

WearEver Aluminum Site
Chillicothe, Ohio

Responsiveness Summary

The Responsiveness Summary has been prepared to address each of the comments submitted in writtern or oral presentations on the preferred plan for a remedial action.

Comment from Public Hearing

Comment: Mr. Herald stated that he wants to be off well water to protect against the devaluation of his property. He stated that he would like to have either City water or County water.

Ohio EPA Response: Based on groundwater data collected during the investigation at the WearEver Aluminum Site, groundwater contamination from the Site moves towards Mead Industrial Well No. 18 (north-northeast), located along the Scioto River, rather than towards the residential properties located on Eastern Avenue (east-southeast). Please refer to Figure 5 of the Decision Document. Ohio EPA's clean-up plan for the Site requires groundwater monitoring both on-site and off-site. Monitoring wells along the eastern and southeastern boundary of the property will be sampled on a regular basis to determine if groundwater currently not contaminated becomes contaminated. These monitoring wells will serve as an early warning if the direction of groundwater flow changes for any reason, including any changes in the operation of Mead Industrial Well No. 18. If these monitoring wells become contaminated, action will be taken to ensure that residents are not exposed to contaminated groundwater. Action taken to ensure that residents are not exposed to contaminated groundwater may include treating the groundwater or supplying residents with an alternate drinking water source, such as city or county water.

Written Comments from Alcoa

Alcoa submitted written comments in the form of a table. Ohio EPA modified this table by adding two columns. The first column provides a number for each comment and the last column provides the Ohio EPA response to each comment.

Comment	Section Number/ Heading	Original Text	Proposed Revised Text	Ohio EPA Response
1	3.0 Site Location and History	WearEver-Procter	WearEver-Proctor	**This has been revised in the Decision Document.**
2		Some of the office space at the facility is currently being used.	There are some formed aluminum pieces stored inside the former manufacturing building, but facility is not occupied.	**This additional information has been included in the Decision Document.**
3	5.0 Summary of the Feasibility Study	acheive	achieve	**This has been corrected in the Decision Document.**
4	5.1 On-Site Consolidation and Containment with Cover	The total cost of this alternative is estimated to be $ 1,091,400.	The total cost of this alternative, assuming a soil cover is used, is estimated to be $ 1,091400.	**This clarification has been added to the Decision Document.**
5	5.2 Physical Treatment by Soil Vapor Extraction/ Air Sparging (SVE/AS)	Each area would be treated until remediation goals or limits...	Each area would be treated until either the remediation goals or limits...	**This clarification has been added to the Decision Document.**
6		...SVE/AS pilot testing performed in the old oil barrel storage area suggest that effective source treatment could reduce the concentrations of VOCs in downgradient groundwater monitoring wells by about 90 percent. For details regarding the methodology and results...	...SVE/AS pilot testing performed in the old oil barrel storage area suggest that effective source treatment should reduce the concentrations of VOCs in downgradient groundwater monitoring wells be about 90 percent. This 90 percent reduction value was developed using best engineering judgement with knowledge of both the technology's performance metrics and site-specific considerations. For details regarding the methodology and results...	**The Decision Document states that the 90 percent reduction value was developed using best engineering judgement with knowledge of both the technology's performance history at other sites and site-specific considerations.**

Comment	Section Number/ Heading	Original Text	Proposed Revised Text	**Ohio EPA Response**
7	5.3 Soil Vapor Extraction/ Air Sparge at Downgradient Wall	The FS Report provides the following time-frame estimates for achieving MCLs: 3 years at Industrial Well No. 18...	The FS Report provides the following time-frame estimates for achieving MCLs after treatmetn is initiated: 3 years at Industrial Well No. 18...	**This clarification has been added to the Decision Document.**
8	5.3 Source Area Treatment by Soil Vapor Extraction/ Air Sparge	Downgradient groundwater VOC concentratrions would be reduced by about 90 percent...	Downgradient groundwater VOC concentrations should be reduced by about 90 percent...	**This has been revised in the Decision Document.**
9		Taking into account this 90 percent reduction, the estimated time-frames for achieving MCLs are as follows: 3 years at Industrial Well No. 18; 47 years at the Union Spring monitoring wells; and between 106 years at the on-site monitoring wells.	Taking into account this 90 percent reduction, the estimated time-frames for achieving MCLs after completing treatment are as follows: 3 years at Industrial Well No. 18; 47 years at the Union Spring monitoring wells; and about 106 years at the on-site monitoring wells.	**This has been corrected in the Decision Document.**
10	6.2 Long-term effectiveness and permanence	The SVE/AS alternative is effective in the long-term and permanent because the contaminants are concentrated in a vapor-phase carbon system and the carbon is disposed of off-site at either a hazardous waste landfill or a hazardous waste incinerator.	The SVE/AS alternative is effective in the long-term and permanent because the contaminants are concentrated in a vapor-phase carbon system and the carbon is either disposed of off-site (at either a hazardous waste landfill or a hazardous waste incinerator) or regenerated off-site in accordance with applicable regulations.	**The discussion in the Decision Document includes the option of regenerating the carbon off-site.**

Comment	Section Number/ Heading	Original Text	Proposed Revised Text	Ohio EPA Response
11	6.3 Reduction of toxicity, mobility, or volume	The carbon would be disposed off-site at either a hazardous waste landfill or a hazardous waste incinerator removing them from the Site.	The carbon would be either disposed off-site (at either a hazardous waste landfill or a hazardous waste incinerator) or regenerated off-site in accordance with applicable regulations.	**The discussion in the Decision Document includes the option of regenerating the carbon off-site.**
12	6.3 Implementability	The two SVE/AS alternatives and the Biological Treatment alternative are more recent technologies that are more difficult to monitor and and to determine the volume of soil...	The two SVE/AS alternatives and the Biological Treatment alternative are more recent technologies that are more difficult to monitor and to determine the volume of soil...	**This has been corrected in the Decision Document.**
13	6.4 Preferred alternative for subsurface soils	To operate an SVE/AS system to the extent that any leaching of residual contaminants to groundwater does not result in exceeding the MCLs in groundwater.	To operate an SVE/AS system to the extent that any leaching of residual contaminants to groundwater does not result in exceeding the MCLs in groundwater; or	**This has been corrected in the Decision Document.**
14	6.4 Preferred alternative for groundwater	As stated above, SVE/AS at the source areas will result in a 90 percent reduction of VOCs in downgradient groundwater. Clean-up goals at the industrial well along the Scioto River are expected to be reached within three years with either the Groundwater Extraction alternative or the Source Area SVE/AS alternative.	As stated above, SVE/AS at the source areas will result in a 90 percent reduction of VOCs in downgradient groundwater. Clean-up goals at the industrial well along the Scioto River are expected to be reached within three years with either the Groundwater Extraction alternative or the Source Area SVE/AS alternative (after completing treatment).	**This clarification has been added to the Decision Document.**

Comment	Section Number/ Heading	Original Text	Proposed Revised Text	Ohio EPA Response
15		Also, since the SVE/AS at source areas will reduce concentrations by approximately 90 percent...	Also, since the SVE/AS at source areas should reduce concentrations by approximately 90 percent...	**This has been corrected in the Decision Document.**
16		The Limited Action alternative will ensure that the extent of groundwater contamination does not increase in the time-frame before clean-up values are achieved.	The Limited Action alternative will include monitoring to ensure that groundwater contamination is controlled in the time-frame before clean-up values are achieved.	**This has been clarified in the Decision Document.**
17		The Groundwater Use Notification Agreements will be monitored on a regular basis by the PRPs to ensure that the hydrodynamic control of the the plume as currently exerted...	The Groundwater Use Notification Agreements and off-site groundwater use will be monitored on a regular basis by the PRPs to ensure that the hydrodynamic control of the plume as currently exerted...	**This clarification has been added to the Decision Document.**
18	Table 2	17 - Former Trichloroethene Tank UST	17 - Former Trichloroethenene Tank UST or AST	**This has been corrected in the Decision Document.**
19	Table 4		Insert "Site-Specific Leach Based Levels" column with figures "0.80, 1.63, 0.19, 6.21,0.15, and 0.03"	**This column has been added to the table in the Decision Document.**
20		Leach Based Levels	Generic Leach Based Levels**	**The numbers identified as leach based levels in the Table 4 of the Preferred Plan have been identified as generic leach based levels in Table 4 of the Decision Document.**

Comment	Section Number/ Heading	Original Text	Proposed Revised Text	Ohio EPA Response
21		The leach based levels will be used at this site to identify...	The Site-specific leach based levels were developed in the RI, Appendix 6 (Table A6-7) and will be used at this site to identify...	**This has been added to the footnote to Table 4 in the Decision Document.**
22			Add new text "**Generic leach based levels taken from the Superfund Soil Screening Level guidance."	**This has been added as a footnote to Table 4 in the Decision Document.**
23		vinyl chloride	Vinyl chloride, ND, Not detected in soils.	**This has been added to Table 4 of the Decision Doument.**