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Office of
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Remedial Response

EPA/ROD/R05-92/214
September 1992
PB93-964121

EPA

Superfund Record of Decision:

Alsco Anaconda, OH

NOTICE

The appendices listed in the index that are not found in this document have been removed at the request of the issuing agency. They contain material which supplement, but adds no further applicable information to the content of the document. All supplemental material is, however, contained in the administrative record for this site.

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REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R05-92/214	2.	3. Recipient's Accession No.

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SUPERFUND RECORD OF DECISION
Alsco Anaconda, OH
Second Remedial Action - Final

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15. Supplementary Notes
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16. Abstract (Limit: 200 words)

The 4.8-acre Alsco Anaconda site is located in Gnadenhutten, Tuscarawas County, Ohio, within the 50- and 100-year floodplains of the Tuscarawas River. It consists of four source areas which contained F019 waste (waste water treatment sludge) generated by the adjacent aluminum products manufacturing facility. Land use in the general area of the site is mixed industrial, recreational, residential. Several municipal, industrial, and residential wells are located within a 1.5 mile radius of the site; however, contaminated site ground water flows towards and into the Tuscarawas River where it discharges at concentrations below any regulatory levels. Site ground water is not used as drinking water. Aluminum products have been produced at a neighboring manufacturing facility since 1945 when it was incorporated as Alsco, Inc. From 1965 through 1978, contamination at the Alsco Anaconda site occurred when waste water and waste water treatment sludge (F019) from the aluminum plant were disposed of in an unlined settling basin (which consisted of tow impoundments) and a sludge pit. The F019 waste contained hazardous constituents such as cyanide and chromium. As a result of overflow form the settling basin and plant waste water treatment discharge, sludge

(See Attached Page)

17. Document Analysis a. Descriptors
Record of Decision - Alsco Anaconda, OH
Second Remedial Action - Final
Contaminated Medium: gw
Key Contaminants: Organics, metals (chromium, lead)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 62
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse* OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

Abstract (Continued)

also became located in a wooded area between the settling basin and the river. The total volume of sludge and contaminated soil excavated from the source areas to date is approximately 45,000 tons. A 1989 ROD addressed the Source Material Operable Unit, which involved the excavation and offsite treatment and disposal of the contaminated sludge and soil, incineration of a small amount of material containing high levels of PCBs, and backfilling and revegetating excavated areas of the site. Most of this work has been completed during 1992. This ROD addressed the contaminated ground water which constitutes the second operable unit at the site. The primary contaminants of concern affecting the ground water include organics such as cyanide, fluoride, and bis (2-ethylhexyl) phthalate; and metals including, chromium, and lead.

The selected remedial action for this site includes natural flushing and attenuation of contaminants from the contaminated aquifer, and allowing ground water to discharge onsite to the Tuscarawas River; installing onsite ground water monitoring wells; installing and sampling background wells; sampling Tuscarawas River sediment and benthic organisms; and implementing institutional controls including deed restrictions to prevent installation of drinking water wells onsite until remedial action levels for ground water have been achieved. The estimated present worth cost for this remedial action is $504,600, which includes a present worth O&M cost of $455,400.

PERFORMANCE STANDARDS OR GOALS: Chemical-specific ground water clean-up levels which are SDWA MCLs or proposed MCLs include the following: chromium 0.1 mg/l; cyanide 0.2 mg/l; fluoride 4.0 mg/l; and bis (2-ethylhexyl) phthalate 0.004 mg/l. Lead is to reach an action level of 0.015 mg/l. Clean-up below background levels will not be required.

RECORD OF DECISION

SITE NAME AND LOCATION

ALSCO ANACONDA SITE
GNADENHUTTEN, OHIO

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the second operable unit at the Alsco Anaconda Site in Gnadenhutten, Ohio, chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record for this Site. The attached index (see Appendix B) identifies the items which comprise the administrative record upon which the selection of the remedial action is based.

The State of Ohio has been consulted and concurs with the selected remedial action.

ASSESSMENT OF THE SITE

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

DESCRIPTION OF SELECTED REMEDY

This operable unit is the second of two that are planned for this Site. The first operable unit was a source control operable unit. The second operable unit involves contaminated ground water and sediments at the Site. The major components of the selected remedial action for the ground water operable unit (GWOU) of the Alsco Anaconda Site include:

* Natural flushing and attenuation of contaminants in the aquifer allowing ground water to discharge to the Tuscarawas River.

* Sampling and laboratory analysis of the ground water from monitoring wells.

* Installation of background wells, and sampling of those wells.

* Institutional controls, including deed restrictions, that prevent installation of drinking water wells within the Site boundaries until remedial action levels for ground water have been achieved.

* Sampling of Tuscarawas River sediments and benthic organisms.

USE OF NATURAL FLUSHING AND ATTENUATION/GROUND WATER AND TUSCARAWAS RIVER SEDIMENT MONITORING IN LIEU OF TREATMENT

The United States Environmental Protection Agency (U.S. EPA) has determined that by monitoring the ground water, and restricting its use until the levels of contaminants in the water are below maximum contaminant levels (MCLs), background levels, and/or other health-based standards, cancer risks and other risks to human health associated with contacting the ground water can be minimized.

Natural attenuation is a viable remedy for contamination found at the Site, since the sludge and contaminated soils, which contributed contaminants to the ground water and river sediments, are being removed during the Source Material Operable Unit (SMOU) remedial action, which is nearing completion. The ground water and sediment contamination will be monitored and evaluated to assure that the contamination diminishes over time.

The U.S. EPA uses an acceptable excess cancer risk range of one in ten thousand to one in one million, with one in one million being the preferred point of departure for potential carcinogens. The U.S. EPA has determined that the excess risk posed by Site ground water for combined residential and recreational use at this Site, prior to implementation of any remedy, is six in ten thousand for an adult. This level exceeds the acceptable risk range. However, the U.S. EPA and the Ohio Environmental Protection Agency (OEPA) believe that natural attenuation of the ground water will reduce the risk to an acceptable level over time; restriction of ground water use until cleanup levels are met will be protective of human health and the environment. If, based upon monitoring results over time, the U.S. EPA and OEPA determine that the cleanup levels are not achievable, then the Site remedy will be revisited and other remedial actions evaluated.

STATUTORY DETERMINATIONS

Consistent with CERCLA and, to the extent practicable, the NCP, 40 C.F.R. Part 300, the selected remedial action is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. The remedy utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The remedy fails to satisfy the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element because treatment of the ground water was not found to be practicable. Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted within five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Valdas V. Adamkus
Regional Administrator
U.S. EPA Region V

9/30/92
Date

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
ALSCO ANACONDA SITE
GNADENHUTTEN, OHIO

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SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
ALSCO ANACONDA SITE
GROUND WATER OPERABLE UNIT
GNADENHUTTEN, OHIO

I. SITE NAME, LOCATION, AND DESCRIPTION

The 4.8 acre Alsco Anaconda National Priorities List (NPL) Site is located approximately 49 miles south of Akron, Ohio within the Gnadenhutten village limits. Gnadenhutten, a community of about 1,320 residents, is located within Clay Township in Tuscarawas County. The Alsco Anaconda Site is bounded by the Penn-Central Railroad right-of-way, the Amerimark manufacturing building and parking lot, Anaconda Drive (County Road 39), and the Tuscarawas River on the northwest, northeast, southeast, and southwest, respectively (see Figures 1 and 2). Most of the Site is located within the floodplain of the Tuscarawas River.

The Site contained four source areas, including the northern and southern impoundments (also known as the settling basin), the sludge pit, and the wooded area located between the impoundments and the river (see Figure 2). The contaminated sludges and soils from these areas are being removed during the remedial action undertaken in 1992. The only structures located within the Site boundaries are fences and permitted wastewater outfalls for the adjacent manufacturing facility.

The Site is topographically higher on the eastern side near the Amerimark plant. Here, the Site consists of fill that was placed to provide a flat driveway for the plant. West of the former source areas, the land surface slopes gently to the bank of the Tuscarawas River.

The Amerimark plant occupies the 19 acres of land adjacent to the Site. The nearest residences are located across Anaconda Drive and Walnut Street from the Amerimark facility.

Land and water resources in the general area are used by both individuals and local industries. Natural resource development activities in the area include farming, mining of coal, clay, sand and gravel, and drilling of oil and gas wells. The Tuscarawas River is used for recreational purposes as well as for industrial and agricultural water supplies.

Subsurface materials in the Tuscarawas River valley consist of unconsolidated fluvial silt and sand deposits, along with glacial outwash sands, silts, and gravels. This valley fill overlies relatively flat-lying sedimentary bedrock, mostly shale and sandstone with minor beds of limestone and coal, generally occurring greater than 160 feet below the Site surface. The surficial deposits of sand and gravel, and bedrock formations of shale, limestone, and coal are mined locally as economic resources. Within a two mile radius of the Site, there are several sand and gravel pits in the valley, with clay and coal strip mines in the valley sides.

The unconsolidated alluvial valley deposits form extensive aquifers which are the principal water supplies for municipalities in the valley. Ground water flow in the valley is generally southwestward. The Gnadenhutten municipal well field is located approximately 4,000 feet northeast (upgradient) of the Alsco Anaconda Site. Several wells, including municipal, residential, and plant wells are located within a 1.5 mile radius of the Site (see Figure 3).

Contamination at the Site was found in the form of sludge in the source areas, in the soils beneath the sludges, in ground water, and in sediments. The soil and sludges are being addressed under the first operable unit. The contaminants found in the ground water include antimony, beryllium, total chromium, cyanide, fluoride, lead, and bis (2-ethylhexyl) phthalate at levels above the maximum contaminant levels (MCLs) established under the Safe Drinking Water Act (SDWA). However, no one is currently drinking this water. The sediments of the Tuscarawas River in the vicinity of the Site contain elevated levels of chromium. Polychlorinated biphenyls (PCBs) were found in 2 of 41 sediment samples.

II. SITE HISTORY AND ENFORCEMENT ACTIVITY

The Alsco plant was established by Harry (Red) Sugar in 1940. The facility has manufactured aluminum products since 1945 when it was incorporated as Alsco, Inc. In 1969 Alsco, Inc. merged with Harvard Industries. The plant was then acquired by the Anaconda Company in August 1971. The Anaconda Company was acquired by the ARCO Chemical Company, a division of the Atlantic Richfield Company (ARCO), in January 1977. In December of 1986, ARCO sold the plant to Horsehead Industries; however, ARCO retained ownership of a 4.8 acre portion of the property, most of which was used for sludge disposal. This 4.8-acre area constitutes the Alsco Anaconda NPL Site.

Prior to 1965, neutralized process wastewater was discharged directly to the Tuscarawas River. A settling basin was completed in 1965 at the request of the State of Ohio Department of Health. During the period from 1965 to 1978, the unlined settling basin and sludge pit were used for disposal of wastewater and wastewater treatment sludge. This sludge is a process waste which is included in the Resource Conservation and Recovery Act (RCRA) list of hazardous wastes. The sludge is listed under the waste code "F019" because wastewater treatment sludges from the chemical conversion coating of aluminum contain chromium and cyanide. As a result of effluent overflow from the settling basin and plant wastewater discharge, sludge is also located in the wooded area (formerly known as the "swamp" area) adjacent to the settling basin. The total volume of sludge and soil at the Site was originally estimated in the 1989 Record of Decision (ROD) for the source material operable unit (SMOU) to be approximately 8,850 tons. The current estimate is that 33,000 tons of material, including debris, will require removal.

Since 1978, no solid wastes have been placed in the settlement basin or sludge pit; wastewater treatment sludges have been mechanically dewatered at the plant and shipped to an off-site facility for disposal. However, the treated wastewater discharge route included the impoundments until October 1980, when the effluent discharge was rerouted around the impoundments to the wooded area, which drained to the river. In October 1986, the outflow from the wastewater treatment plant was rerouted away from the wooded area directly to a permitted outfall at the river. No standing water was present in the wooded area within one month of the diversion of the outfall. The treated process wastewater has been discharged to the Tuscarawas River through a National Pollutant Discharge Elimination System (NPDES) permitted outfall since 1976.

Based on reports filed by ARCO, the United States Environmental Protection Agency (U.S. EPA) conducted a preliminary assessment of the Site in 1983. Because of a concern that water resources might become contaminated from sludge leachate, the Site was proposed for inclusion on the NPL in October 1984. The Site was formally placed on the NPL in June 1986.

In November of 1984, ARCO retained International Technologies Corporation (IT) to perform a Remedial Investigation/ Feasibility Study (RI/FS). In March 1985, RI activities began at the Site. An Administrative Order by Consent was issued in January 1987 among U.S. EPA, the Ohio Environmental Protection Agency (OEPA), and ARCO for conducting the RI/FS.

The RI was conducted at the Site from March 1985 through January 1989. During the study, samples of sludge, underlying soil, ground water, and Tuscarawas River sediments were collected at and near the Site. An investigation was also conducted to determine if drums containing waste were buried at the Site. Sections of the draft RI pertaining to ground water and sediments were not approved by U.S. EPA and OEPA. Consequently, U.S. EPA split the Site into the SMOU and the ground water operable unit (GWOU), and requested that a separate focused FS be completed for the SMOU, as enough information was available to study cleanup alternatives for the contaminated sludge and soil at the Site. A Focused FS (FFS) developed for the SMOU, presenting an array of alternatives to address the contaminated sludge and soil, was completed in June 1989. The ROD for the SMOU was signed on September 9, 1989.

In a letter dated June 14, 1989, U.S. EPA requested that ARCO submit a supplemental RI work plan for the additional investigations to complete the RI/FS for the GWOU. The primary goals of the supplemental RI were to evaluate the nature and extent of affected ground water, to prepare a Baseline Risk Assessment for the GWOU, and to evaluate potential remedial alternatives. The work plan and related planning documents were finalized on January 31, 1991. The supplemental RI was conducted by ARCO's consultant, ERM-Southwest, between April and July of 1991. The supplemental RI report was completed in January 1992. The Baseline Risk Assessment was approved in June 1992. The FFS and the Proposed Plan for the GWOU were completed and made available to the public on August 19, 1992. The supplemental RI work was performed by ARCO under the existing Administrative Order on Consent.

Pursuant to its authority under Section 122(e) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), U.S. EPA sent a special notice letter to ARCO on June 26, 1989, notifying the company of its potential liability for CERCLA response costs and responsibility for conducting the design and implementation of the U.S. EPA's preferred alternative for the Alsco Anaconda Site. As a result of this notice letter, ARCO informed U.S. EPA that Harvard Industries might also be a potentially responsible party (PRP) as a former owner and operator. Pursuant to its authority under Section 122(e)(2)(C) of CERCLA, U.S. EPA notified Harvard Industries of its potential liability as an additional PRP and invited Harvard to enter into negotiations with U.S. EPA and ARCO.

Negotiations with both companies were unsuccessful, and on December 28, 1989, U.S. EPA issued Unilateral Administrative Orders to both ARCO and Harvard Industries for the design and implementation of the remedy for the SMOU. ARCO has written the required Site documents, and is conducting the remedial action. Harvard has filed a complaint against ARCO to compel binding arbitration to determine allocation of financial responsibility. Harvard has not conducted any Site remedial work to date. On April 11, 1991, a petition for involuntary bankruptcy reorganization of Harvard under Chapter 11 was filed in U.S. Bankruptcy Court. On May 2, 1991, Harvard filed a petition for voluntary reorganization.

The U.S. EPA is the lead agency responsible for managing the investigation of the Alsco Anaconda Site being conducted by ARCO. OEPA is the support agency for the Site cleanup.

III. COMMUNITY RELATIONS HISTORY

The U.S. EPA conducted community relations activities throughout the RI/FFS for the SMOU to provide interested citizens and officials information about progress at the Site.

The U.S. EPA distributed a summary fact sheet providing background information on the Alsco Anaconda Site and the Administrative Order among U.S. EPA, OEPA, and ARCO in February 1987. A public comment period for the order was held February 4, 1987 through March 5, 1987.

Summary fact sheets describing the results of the RI were distributed in May 1989. A fact sheet about the FFS and Proposed Plan was released in June 1989. The RI and FFS reports and Proposed Plan for the SMOU were released to the public in June 1989. These documents were made available to the public for review and copying in the administrative record maintained at the U.S. EPA offices in Region V and in the information repository at the Gnadenhutten Public Library. Consistent with Section 113 of CERCLA, the administrative record includes all documents such as work plans, data analyses, public comments, transcripts, and other relevant information used in developing remedial alternatives for the Site.

The notice of availability of Site-related documents, which also announced the public comment period and public meeting, was published in the Dover-New Philadelphia Times-Reporter on June 26, 1989 and July 7, 1989. A public comment period was held from June 26, 1989 to July 25, 1989. A public meeting was held in Gnadenhutten on July 11, 1989. At this meeting, representatives from the U.S. EPA and OEPA answered questions about problems at the Site and the remedial alternatives under consideration. A response to the comments received during the comment period was included in the Responsiveness Summary, which was Appendix A of the SMOU ROD.

Fact sheets updating the community and interested persons on progress at the Site were sent out in June of 1991 and April of 1992. The April fact sheet discussed the results of the supplemental RI for the GWOU.

Following completion of the RI/FFS for the GWOU, the U.S. EPA published a Proposed Plan for remedial action on August 19, 1992. A fact sheet about the FFS and the Proposed Plan was also published and mailed to interested parties at that time. The notice of availability of Site-related documents, which also announced the public comment period and public meeting, was published in the Dover-New Philadelphia Times-Reporter on August 19, 1992. The RI/FFS Report, Proposed Plan for remedial action, the fact sheet, and other additions to the administrative record have been placed in the information repository.

To encourage public participation in the remedy selection process consistent with Section 117 of CERCLA, the U.S. EPA set a 30-day public comment period from August 19, 1992, through September 19, 1992, for the Proposed Plan. A formal public hearing was held on September 9, 1992, in Gnadenhutten, Ohio to accept verbal public comments on the Proposed Plan. Interested parties were given the opportunity to provide comments on the alternatives presented in the Proposed Plan and elaborated upon in the FFS. No verbal comments on the proposed remedy were made during the public hearing; no written comments on the remedy for the GWOU of the Alsco Anaconda Site were received during the public comment period. ARCO raised a few concerns about the remedy informally during monthly project meetings, and submitted the comments in writing after the public comment period had ended. The attached Responsiveness Summary (see Appendix A) addresses those concerns.

The remedy for the GWOU was chosen in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The decision for this Site is based on the administrative record. An index of the administrative record is attached as Appendix B.

IV. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

This ROD addresses the second of two planned activities at the Site. In accordance with 40 CFR 300.68 (c), the remedial action has been divided into two "operable units", or components of work: contamination caused by the source material (SMOU) and contamination of the ground water and sediments (GWOU). This ROD addresses the contaminated ground water and sediments at the Site.

A Proposed Plan and ROD for the SMOU were completed in 1989. The response action called for under the SMOU ROD is currently underway; the removal of the source materials will remove the principal direct contact threat to humans and is expected to stop the future release of contaminants to the ground water and sediments.

The second operable unit deals with the existing contamination of ground water and sediments, and considers possible remedies for addressing these media. The threats associated with contaminated ground water include the possibility of human consumption of the water if the Site were ever to be developed residentially. The threats associated with contaminated sediments include reduction in species diversity of benthic organisms (organisms which live in sediments), and transmittal of contaminants up the food chain. The role of the response action for this operable unit is to reduce the risk to human health and the environment posed by the Site. The second operable unit will be the final response action for this Site.

V. SUMMARY OF SITE CHARACTERISTICS

The original RI was conducted from March 1985 through January 1989. Analyses for the U.S. EPA Hazardous Substance List compounds were conducted in all environmental media. The sludge, underlying soil, and ground water on-site were sampled.

Sample results indicated that there were PCBs in the wooded area sludge, and arsenic in the settling basin sludge, at levels of public health concern for direct contact exposure. Subsequent work led to the establishment of cleanup levels for 14 indicator compounds to ensure a thorough cleanup of the SMOU to levels suitable for future residential development. These compounds included: arsenic, barium, cadmium, chromium +3, chromium +6, copper, cyanide, fluoride, lead, manganese, mercury, PCBs, silver, and zinc. These contaminants are being removed under the SMOU remedial action to health-based or background levels, or to levels found in U.S. EPA guidance documents; the levels were determined to be protective of ground water as well. The compounds were selected as indicator compounds based on the following factors: presence of the compound in soil, toxicity, concentration, solubility (potential mobility in ground water), prevalence, persistence, availability of chemical-specific agency risk assessment data, and a concentration-toxicity screening procedure.

Unconsolidated sand and gravel deposits underlie the Site, comprising an aquifer that is the primary source of both public and private drinking water in the area. However, there are no drinking water wells between the Site and the Tuscarawas River, which the Site ground water flows into. Under a theoretical ground water drinking use scenario, sample results from the original RI indicated that chromium, cyanide, fluoride, nitrate, selenium, and tetrachloroethylene in the upper forty feet of the aquifer were at levels of public health concern. The results were judged to be unreliable due to excessive screen lengths in the monitoring wells. At the end of the original RI, the extent of ground water contamination remained unclear. Therefore, a supplemental RI was conducted in order to better determine the horizontal and vertical extent of contaminated ground water, the discharge points of the water, and the actual routes by which exposure to the ground water might occur. The supplemental RI was completed in January 1992. Wells with discrete screen lengths were installed and sampled during the supplemental RI. Information on the Site's impact to the biota inhabiting the Tuscarawas River sediments was also gathered.

The supplemental RI report made the following conclusions about the ground water and sediment contamination at the Alsco Anaconda Site:

--The horizontal extent of the ground water which has contamination levels above MCLs under the SDWA appears to be limited primarily to the perimeter of the northern and southern impoundments and the sludge pit. Some ground water contamination was found in areas which appeared to be upgradient, but where additional sludge was found during the SMOU remedial action. The affected ground water appears to be restricted to the upper 15-20 feet of the sand and gravel aquifer. The only contaminant found above an MCL in either the intermediate or deep wells was bis (2-ethylhexyl) phthalate, found above the proposed MCL in the intermediate depth well.

--The following contaminants were found at levels of public health concern (see Table 1). Antimony was found at a maximum level of 0.0187 mg/L, whereas the proposed MCL was 0.005 mg/L (the MCL will be raised to 0.006 mg/L effective January 1994). Beryllium was found at a maximum level of 0.008 mg/L, whereas the proposed MCL was 0.001 mg/L (the MCL will be raised to 0.004 mg/L effective January 1994). Total chromium was found at a maximum level of 0.478 mg/L, whereas the MCL is 0.1 mg/L. Total cyanide was found at a maximum level of 2.43 mg/L, whereas the proposed MCL is 0.2 mg/L. Fluoride was found at a maximum level of 6.1 mg/L, whereas the MCL is 4.0 mg/L. Lead was found at a maximum level of 0.0806 mg/L, whereas the MCL was 0.005 mg/L (an action level of 0.015 mg/L has recently replaced the MCL). Bis (2-ethylhexyl) phthalate was found at a maximum level of 0.021 mg/L, whereas the proposed MCL is 0.004 mg/L. There is currently no known use of the contaminated ground water, other than as non-contact cooling water for the Amerimark facility. Workers are not in contact with this cooling water.

--Evaluation of historical and current data indicates that ground water generally flows towards and into the Tuscarawas River. The potential for flow under the river was investigated; it was determined that this was not occurring.

--Dilution calculations for the inorganic and organic constituents detected at the Site suggest that those contaminants which reach the river are diluted below analytical detection limits immediately upon discharge to the Tuscarawas River. Levels are below any regulatory criteria (see Table 2).

During the original RI, sediment samples (near Site, upstream and downstream, as shown on Figure 4) were taken in the

Tuscarawas River to determine the levels of PCBs and chromium (known Site-specific contaminants) in the sediments of the river. It was suspected that these contaminants would be located in the sediments due to past waste discharges to the river, overland runoff from the sludge, and from ground water discharge to the river. Average chromium concentrations in the sediments were 17 mg/kg upstream of the Site, 40 mg/kg adjacent to the Site, and 59 mg/kg downstream of the Site. PCBs were found in 2 of 41 samples at an average concentration of 0.29 mg/kg. Table 3 contains the sampling results.

It was unclear as to whether there had been any Site impact upon the river sediment biota from the elevated levels of contaminants in the sediments; therefore, further investigation was done as part of the supplemental RI. Samples of benthic organisms were taken from the Tuscarawas River. The results indicate that species diversity may decrease downstream of the Site. This alteration in the benthic community structure may be attributable to past Site operations. However, adverse sampling conditions (high river level, etc.) may have affected the results.

VI. SUMMARY OF SITE RISKS

A Baseline Risk Assessment was conducted based on the supplemental RI data to estimate the exposure to the contaminants in the Site ground water. Contaminants of concern in the ground water include the following: antimony, beryllium, total chromium, total cyanide, fluoride, lead, and bis (2-ethylhexyl) phthalate. Each of these constituents was found in ground water at levels exceeding either its final or proposed MCL (see Table 1). Carcinogenic, or cancer-causing, constituents found in the ground water include arsenic, beryllium, bis (2-ethylhexyl) phthalate, and 1,4-dichlorobenzene. The full list of contaminants found in Site ground water and evaluated for their carcinogenic and/or non-carcinogenic effects can be found in Table 4.

Risks from Site ground water were evaluated for two general exposure scenarios: residential and recreational. The residential scenario assumes that the most affected portion of the shallow aquifer at the Site will serve in the future as a domestic water source. This scenario evaluated the use of Site ground water for drinking and showering/bathing. The assumed routes of exposure to constituents in the affected water were ingestion, dermal contact, and vapor inhalation. No one is currently living on the Site or consuming the ground water. Thus, this scenario represents a conservative approach in calculating potential future risks.

The recreational scenario evaluated risk from incidental oral and dermal exposure to ground water constituents in the

Tuscarawas River through boating and swimming. Ingestion of fish which have potentially bioconcentrated constituents from ground water discharges to the river was also evaluated. This assumed recreational exposure is possible under both current and future land use scenarios.

The determination of carcinogenic risk is based upon calculating how much of an increased risk to humans a chemical present at a site poses over the average or "background" level of risk. For the general population, the background risk of developing some form of cancer in one's lifetime is about one chance in three, or 33 percent. The U.S. EPA uses a range of increased cancer risk of between one in ten thousand to one in one million as the level at which it requires that action be taken to reduce risk. The specific level which is used is dependent upon circumstances specific to a site. Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., $1X10^{-6}$ or 1E-6). An excess lifetime cancer risk of $1X10^{-6}$ indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site.

The determination of noncarcinogenic risk of a single contaminant in a single medium is based upon the calculation of a term called the Hazard Quotient (HQ), the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose. Noncarcinogenic risks include such risks as the potential to cause liver damage and reproductive abnormalities. By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. If the HI for a risk pathway is less than 1, noncarcinogenic risk is not expected at a site. If it is greater than 1, there is a potential for the occurrence of noncarcinogenic health risks. If the HI is greater than 1, compounds in the mixture are segregated by critical effect and separate HIs are derived for each effect.

The results of the human health risk assessment for the Site indicate that the total potential increased cancer risk from the exposure of recreational users of the river to contaminants from the Site is below one in ten million (see Table 5). All cumulative HIs are below 1.0 for the various toxicological categories (see Table 6). These risks are within U.S. EPA's acceptable range.

For the residential scenario, risk values were presented for residential use only, and for the combination of the two scenarios (residential and recreational), assuming that the same individual could be exposed both in the residence (by ground water consumption) and during recreational activities (by contact with the river) if he lived on-site. Risk estimates for the residential scenario do exceed the threshold values for significant risk. A HI of 1.0 for noncarcinogenic risk was exceeded in several toxicological categories (see Table 7). The acceptable cancer risk range was also exceeded. For children age 0-6, the excess carcinogenic risk was calculated to be four in ten thousand. For adults, the excess risk was found to be six in ten thousand (see Table 8). Table 9 shows the risk levels from the residential and recreational scenarios combined. The Baseline Risk Assessment explains in detail how these calculations were done.

The Ohio Department of Natural Resources Division of Natural Areas and Preserves, Natural Heritage Program was contacted during the original RI in order to address concerns regarding sensitive biota or habitats. The Heritage Program had no records for rare or endangered species within a two-mile radius of the Site, and was unaware of any unique ecological sites in the vicinity of the study area. There are no existing or proposed state nature preserves or scenic rivers in Tuscarawas County. A wetlands assessment was also conducted by the U.S. Army Corps of Engineers. It was determined that Site soils were not hydric and, therefore, the Site was not considered to be a wetland. However, during the SMOU remedial action, the overburden has been removed and hydric soils have been revealed indicating that at some point in the past this area may have been a wetland.

The Baseline Risk Assessment qualitatively evaluated ecological risks. Risks to benthic organisms living in the sediments of the Tuscarawas River, as well as to terrestrial organisms (i.e., plants) living on-site, were addressed. Ecological risk was evaluated on the basis of a literature review concerning bioconcentration/bioaccumulation for on-site and benthic organisms. The report concluded that terrestrial plant uptake of contaminated ground water is not expected to occur. In addition, predicted constituent levels from ground water discharges to the river were evaluated for toxicity and availability to aquatic organisms; estimated river concentrations are several orders of magnitude lower than aquatic toxicity criteria (see Table 2). Benthic organisms were collected and identified in a field study. Their diversity appears to diminish from upstream to downstream of the Site. The results indicate that adverse effects on benthic organisms may have resulted from past Site operations, which appear to have contributed to elevated levels of chromium, and, to a lesser extent, PCBs, in the river sediments near the Site.

These results, however, may have been affected by adverse sampling conditions, such as high river levels, etc.

Actual or threatened releases of hazardous substances from this 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.

VII. DESCRIPTION OF ALTERNATIVES

An array of alternatives for addressing ground water and sediment contamination at the Alsco Anaconda Site was developed. The remedial alternatives considered were evaluated based on their ability to be protective of human health and the environment, attain compliance with Federal and State environmental regulations, be cost-effective, and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The remedial alternatives considered for this Site are briefly described below.

--Alternative 1: No Action - Natural Attenuation

--Alternative 2: Natural Flushing and Attenuation/Ground Water and Sediment Monitoring

--Alternative 3: Ground Water Extraction and Treatment/Ground Water and Sediment Monitoring

--Alternative 4: Hydraulic Barrier with Ground Water Extraction and Treatment/Ground Water and Sediment Monitoring

Alternative 1 - No Action - Natural Attenuation

Estimated Capital Cost: $0
Estimated Total Present Worth Operations and Maintenance (O&M) Costs: $0
Estimated Net Present-Worth Costs: $0
Estimated Implementation Timeframe: None

Alternative 1, No Action, is a scenario in which no further action of any kind will be initiated for the GWOU. It is believed, based on extensive calculations (see Appendix B of the GWOU FFS), that the ground water contamination will naturally attenuate or diminish over time. Three of the contaminants which were most frequently found in the ground water above MCLs (cyanide, chromium, and fluoride), and which contribute heavily to the Site risk, are expected to attenuate in 2 years or less.

Calculations were performed only on selected contaminants. Calculations were not done for all contaminants which exceeded MCLs because input values needed in the calculations were not available (for beryllium, e.g.) for some of those contaminants. Attenuation calculations were done for 2 contaminants, chlorobenzene and thallium, which were each detected in ground water only once. Calculations were done on these contaminants despite the fact that they were not detected frequently due to the need to determine the time of attenuation of contaminants from each class of compounds found in Site ground water (organics, inorganics, etc.) in order to get a better general picture of when Site contaminants from each class would attenuate. Depending on which hydraulic conductivity input values are used (see "Compliance with ARARs" section for more details on the hydraulic conductivity values), chlorobenzene and thallium may attenuate in as little as 15 years or as long as 53 years.

According to calculations, lead and bis (2-ethylhexyl) phthalate are the two contaminants which will take the longest to attenuate; lead could take approximately 150 to 500 years to attenuate. Lead is, however, commonly found in the environment. It is unknown how long it may take for bis (2-ethylhexyl) phthalate to attenuate. However, this contaminant was found in some of the sludge excavated during the remedial action, removing a source of this constituent. This contaminant is ubiquitous.

Based on calculations performed as part of the Supplemental RI and Baseline Risk Assessment, all contaminants are diluted well below analytical detection limits at the point at which the ground water enters the river, even during periods of low river flow. Under this alternative, there will be no further assessment of the benthic community or of the impacts the contaminated sediments may be having on both the organisms which are present and the related food chain.

Sludge and affected soils will be removed to health-based, background, or guidance levels and to levels which assure ground water protection as part of the SMOU remediation; therefore, the only contaminants which will remain on-site are those currently within the saturated zone of the aquifer and the river sediments. With completion of the removal of the source materials in the fall of 1992, further contaminant impacts on ground water should be eliminated. Impacts on sediments via surface runoff will also be terminated. The sediment contaminants are expected to either become buried through deposition of new, cleaner sediment upon the old, or they may be scoured during extreme flood events. The ground water and sediments will be allowed to "clean themselves up" over time.

Under this alternative, however, there will be no monitoring or further assessment of the Site over time. The length of time it will take for the Site ground water to reach the cleanup levels described below can only be estimated through calculations. This alternative does not provide for installation of background wells which would allow contaminant levels in Site ground water to be compared to levels naturally occurring in the area. This remedy does not include in and of itself any protective measures (e.g., institutional controls) to ensure that the ground water is not consumed prior to achievement of cleanup levels. There will be no way to determine if the river sediments are continuing to provide elevated levels of contaminants to the benthic community, potentially damaging the organisms which inhabit the sediments.

The cleanup levels will be determined as follows:

--Concentrations of Site-related contaminants that also appear in background wells shall be reduced to their respective background concentrations, unless one of the following conditions results in a higher cleanup concentration. In no case shall contaminant concentrations be required to be reduced to levels below background concentrations.

--Site-related contaminants with an existing MCL shall be reduced to a concentration at or below the MCL.

--Concentrations of carcinogenic Site-related contaminants shall be reduced to levels that pose a cumulative carcinogenic risk no greater than $1X10^{-6}$.

--Concentrations of noncarcinogenic Site-related contaminants shall be reduced to levels that pose a cumulative HI no greater than one for any specific toxicological group.

Institutional controls are currently in place as part of the remedy of the SMOU. If the no action alternative were chosen as the preferred alternative for the GWOU, the institutional controls currently in place would be in place for perpetuity. For all other alternatives considered for this operable unit, institutional controls would be a component of the remedy and would be in place until the ground water had met and maintained the cleanup levels for a period of time to be determined during remedial design.

Alternative 1 will not meet all applicable or relevant and appropriate requirements (ARARs) for the GWOU. Ground water monitoring requirements under 40 CFR 264.97 will not be met. Without ground water monitoring, there is no way to determine whether cleanup levels will be met.

Alternative 2 - Natural Flushing and Attenuation/Ground Water and Tuscarawas River Sediment Monitoring

Estimated Capital Cost: $49,200
Estimated Total Present Worth O&M Costs: $455,400
Estimated Net Present-Worth Costs: $504,600
Estimated Implementation Timeframe: 6 months

This response action is based on the natural flushing and attenuation of contaminants in the aquifer allowing ground water to discharge to the Tuscarawas River, as described in Alternative 1. An additional component is the periodic sampling of ground water from monitoring wells for laboratory analysis. Possible locations of monitoring wells are shown in Figure 5. Optimum well locations will be determined during remedial design. The Amerimark facility's active production well, PW-5, may also be sampled as part of the monitoring program. For cost purposes, the assumption was made that sampling will be done quarterly for the first two years, and semi-annually thereafter, for a total of thirty years. The actual monitoring frequency may be adjusted by U.S. EPA, in consultation with OEPA. This alternative calls for the installation of background wells so that contaminant levels may be compared to naturally-occurring background levels. These background wells will also be sampled regularly.

The contaminants to be analyzed for include, but are not limited to, those listed in Table 4. The final list will be determined during the remedial design phase. The data gathered from the monitoring wells will allow the development of a database to monitor the chemical conditions of the aquifer over time. The data will also allow measurement of the degree of attenuation of the contaminants and overall timeframes for compliance with MCLs and health-based guidelines for ground water, and whether contaminants are below background levels. Monitoring will be discontinued when cleanup levels defined under Alternative 1 have been met and maintained for a period to be determined during remedial design. If contaminant levels increase over time (e.g., over the next ten years) as determined by an Agency-approved method (such as a statistical method), U.S. EPA, in consultation with OEPA, may reevaluate the remedy; an alternate remedy such as an active treatment technology may be considered.

Sampling of the Tuscarawas River sediments and benthic organisms will also be conducted. For cost purposes, this sampling is assumed to occur during years 1, 2, 4, 6, 8, and 10. Again, this frequency may be adjusted by the U.S. EPA, in consultation with OEPA. When sampling the sediments for PCBs and chromium, the depth of the contaminants, as well as the concentration, will be analyzed and determined. The benthic population will be sampled to determine if there is an increase/decrease in the diversity or quantity of organisms.

If the benthic community has not improved (i.e., the diversity and quantity of the organisms has not increased over time), then U.S. EPA, in consultation with OEPA, will determine whether an active remedial technology for the sediments is implementable, and whether the technology should be employed. The sampling program for the sediments and benthic organisms will be fully defined during the remedial design phase.

Institutional controls (e.g., deed restrictions) which restrict use of the Site ground water will be in place until the ground water has met and maintained the cleanup levels defined under Alternative 1 for a period of time to be determined during remedial design.

Alternative 2 will meet ARARS for the GWOU. Ground water monitoring requirements under 40 CFR 264.97 will be met. MCLs promulgated under the SDWA and health-based levels derived using the Integrated Risk Information System (IRIS) or the Risk Assessment Guidance for Superfund (RAGS), (IRIS and RAGS are "To-Be-Considered" requirements, or TBCs), are expected to be met over time. Calculations performed in the FFS estimate that all ground water contaminants evaluated except lead and bis (2-ethylhexyl) phthalate will be attenuated within 15 to 53 years.

Alternative 3 - Ground Water Extraction and Treatment/Ground Water and Tuscarawas River Sediment Monitoring

Estimated Capital Cost: $1,793,520
Estimated Total Present Worth O&M Costs: $5,989,900
Estimated Net Present-Worth Costs: $7,783,420
Estimated Implementation Timeframe: 2 years

This alternative includes all aspects of Alternative 2 (monitoring, institutional controls, etc.). In addition, the ground water will be extracted and treated. Pumping and treating of ground water is the only currently available active technology for this Site for removing contaminants from ground water. This response action will involve the installation of large-diameter extraction wells; the construction of pipelines and a treatment facility; and the actual treatment of the extracted ground water.

The current conditions of the ground water, in terms of both hydraulics and chemistry, present challenges to ground water extraction and treatment. The aquifer is extraordinarily transmissive, which suggests that extremely large volumes of water must be pumped in order to create a cone of influence large enough to capture the affected ground water; very large volumes of clean water would need to be pumped through the affected areas in order to flush or desorb the contaminants. However, pumping the ground water is expected to decrease the time required for contamination to reach the cleanup levels defined under Alternative 1.

Under this alternative, lead will attenuate in less time than it would take under Alternative 2. However, there is very little difference in the time it will take chromium, cyanide, and fluoride to attenuate under this alternative as compared to Alternative 2 (2 years for Alternative 2 versus 1 year for Alternative 3). Bis (2-ethylhexyl) phthalate is not expected to attenuate under either alternative. However, as mentioned earlier, source material containing this constituent is being removed.

Alternative 3 will meet ARARS identified for the GWOU. Ground water monitoring requirements under 40 CFR 264.97 will be met. MCLs promulgated under the SDWA and health-based levels derived using IRIS or RAGS are expected to be met over time. Calculations performed in the FFS estimate that all ground water contaminants evaluated except bis (2-ethylhexyl) phthalate will be attenuated within 15 to 52 years.

The treatment system will be built to comply with 40 CFR 264 (general facility standards). Following extraction and treatment, ground water discharge will comply with NPDES permit equivalent levels. Any treatment residuals generated from the treatment of ground water which contain chromium and/or cyanide will be subject to RCRA Land Disposal Restrictions (LDR) treatment standards for RCRA F019 listed waste before final disposal. If activated carbon is used in a filter system, the spent or used carbon containing cyanide or chromium will be regenerated in a unit which is in compliance with 40 CFR Part 264 Subpart X. Shipment of treatment residuals off-site will be done in compliance with all Federal and State regulations.

Alternative 4 - Hydraulic Barrier with Ground Water Extraction and Treatment/Ground Water and Tuscarawas River Sediment Monitoring

With Slurry Wall--
Estimated Capital Cost: $2,936,520
Estimated Total Present Worth O&M Costs: $5,989,400
Estimated Net Present-Worth Costs: $8,925,920
Estimated Implementation Timeframe: 2 years

With Injection Wells--
Estimated Capital Cost: $1,998,720
Estimated Total Present Worth O&M Costs: $6,911,800
Estimated Net Present-Worth Costs: $8,910,520
Estimated Implementation Timeframe: 2 years

This response action adds an additional component to the extraction and treatment of ground water described in Alternative 3. A hydraulic barrier will also be constructed between the former source areas and the Tuscarawas River to prevent migration of any contaminants into the river. This barrier will also help to limit the amount of river water pulled into the aquifer, thereby minimizing the amount of water that will have to be treated by the system. The barrier could consist of a slurry wall, or of a series of injection wells. Ground water extraction and treatment will be performed to control ground water flow and to remove contaminants from the aquifer. This alternative is not expected to decrease the amount of time it takes for contaminants to attenuate from those timeframes calculated under Alternative 3.

Alternative 4 will meet ARARS identified for the GWOU. Ground water monitoring requirements under 40 CFR 264.97 will be met. MCLs promulgated under the SDWA and health-based levels derived using IRIS or RAGS are expected to be met over time. Calculations performed in the FFS estimate that all ground water contaminants evaluated except bis (2-ethylhexyl) phthalate will be attenuated within 15 to 52 years.

The treatment system will be built to comply with 40 CFR 264 (general facility standards). Following extraction and treatment, ground water discharge will comply with NPDES permit equivalent levels. Any treatment residuals generated from the treatment of ground water which contain chromium and/or cyanide will be subject to RCRA LDR treatment standards for RCRA F019 listed waste before final disposal. If activated carbon is used in a filter system, the spent or used carbon containing cyanide or chromium will be regenerated in a unit which is in compliance with 40 CFR Part 264 Subpart X. Shipment of treatment residuals off-site will be done in compliance with all Federal and State regulations.

VIII. <u>SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES</u>

A. <u>The Nine Evaluation Criteria</u>

The GWOU FFS examined the four remedial alternatives in detail, and evaluated them according to technical feasibility, environmental protectiveness, and public health protectiveness. The alternatives were evaluated according to the following nine criteria, which are used by the U.S. EPA to provide the rationale for the selection of the chosen remedial action for a site.

THRESHOLD CRITERIA

The following two criteria are threshold criteria which must be met by each alternative.

- **Overall Protection of Human Health and the Environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

- **Compliance with ARARs** addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements (ARARs) of other Federal and State environmental statutes and/or provide grounds for invoking a waiver.

PRIMARY BALANCING CRITERIA

The five criteria listed below represent the primary balancing criteria upon which the analysis is based.

- **Long-term effectiveness and permanence** refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup levels have been met.

- **Reduction of toxicity, mobility, or volume through treatment** is the anticipated performance of the treatment technologies that may be employed in a remedy.

- **Short-term effectiveness** refers to the speed with which the remedy achieves protection, as well as the remedy's potential to create adverse impacts on human health and the environment that may result during the construction and implementation period.

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

- **Cost** includes capital and operation and maintenance costs.

MODIFYING CRITERIA

The following two criteria are modifying criteria.

- **State Acceptance** indicates whether, based on its review of the RI/FFS, Proposed Plan, and ROD, the State concurs with, opposes, or has no comment on the selected remedy.

- **Community Acceptance** indicates whether, based on comments received on the RI/FFS and Proposed Plan, the community appears to accept the selected remedy.

B. Comparative Analysis of Remedial Alternatives

Each of the alternatives was evaluated using these nine criteria. The regulatory basis for these criteria comes from the NCP and Section 121 of CERCLA (Cleanup Standards). Section 121(b)(1) states that, "Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over remedial actions not involving such treatment. The off-site transport and disposal of hazardous substances or contaminant materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available." Section 121 of CERCLA also requires that the selected remedy be protective of human health and the environment, be cost-effective, and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

This section discusses the relative advantages and disadvantages of the remedial alternatives against the nine evaluation criteria.

Overall Protection of Human Health and the Environment

Based on the results of the Supplemental RI and the Baseline Risk Assessment of the GWOU, the only direct human exposure pathway which poses unacceptable risk is consumption of ground water if the Site is developed and water supply wells are installed. (Risks posed to humans via the recreational scenario were within the acceptable risk range.) In addition, contaminated sediments potentially pose a threat to the riverine community.

All remedial alternatives except Alternative 1, No Action, provide protection of human health and the environment. Alternative 1 does not allow for any kind of monitoring or assessment of the Site over time; thus, there is no provision for addressing the Site if, in fact, the contaminants in the ground water and sediments do not attenuate over time. Since it is not protective, Alternative 1 will no longer be considered a viable alternative, and will not be evaluated further.

Alternative 2, Natural Flushing and Attenuation with Ground Water and Sediment Monitoring, does not utilize a treatment technology for ensuring overall protection of human health and the environment. However, this alternative does involve monitoring the ground water and sediments to confirm that attenuation is occurring and it provides the opportunity to reevaluate the remedy if attenuation does not occur. It also includes institutional controls to prevent human exposure to the contaminated ground water. This alternative is protective of human health and the environment.

Both Alternatives 3 and 4 involve the use of an active remedy which employs currently available technology. An additional component of the remedy involves monitoring the aquifer and sediments in order to ensure the remedy is working. Without any kind of monitoring, there is no way to determine if the Site has achieved cleanup levels. Again, institutional controls will be in place until the cleanup levels are met. These alternatives are protective of human health and the environment.

Currently, there is no direct pathway for human exposure. The only potential pathways which may result during the implementation of Alternatives 2, 3, and 4 are temporary and related to potential exposure of construction or monitoring personnel during implementation of the remedial alternative.

However, the possibility does exist that the aquatic population is being exposed to harmful concentrations of the contaminants present in the sediment. The studies which were performed during the original RI and the supplemental RI ascertained the presence of contaminated sediments and the apparent impacts to the benthic community from the contaminants. However, it was unclear if the benthic community was recovering from exposure to the contaminants or if it was continuing to be impacted. The possibility of removing the contaminated sediments has been evaluated (see FFS); it has been determined that the dredging process could pose significant risks to the riverine system. Unless it can be determined that the benthic population is continuing to be impacted by the presence of the contaminants which remain in the sediments, dredging will not be considered as a remedial technology. By monitoring the sediments and the affected organisms (Alternatives 2, 3, and 4), it can be confirmed that the levels of contaminants which are present will be attenuated over time, and that benthic organism populations are recovering.

<u>**Compliance with ARARs**</u>

A summary of the ARARs evaluated for the alternatives is provided as Table 10. Major ARARs are discussed below.

Alternatives 2, 3, and 4 will meet ground water monitoring requirements under 40 CFR 264.97. Alternatives 2, 3, and 4 are expected to attain ground water MCLs under the SDWA, compliance with Federal and State Water Quality Discharge Standards, and compliance with all health-based criteria and guidelines over time, as discussed below.

Calculations in the FFS, Appendix B, estimate that under Alternative 2, all ground water contaminants for which calculations were performed, except lead and bis (2-ethylhexyl) phthalate, will attenuate within 53 years. These calculations were performed using the hydraulic conductivity (the amount of ground water flowing through a given area of the aquifer during a given time period) obtained through studies which were performed during the supplemental RI. If a different hydraulic conductivity value is used, one obtained from an aquifer pump test which was performed on this aquifer in 1972, then the calculations estimate that all of the contaminants evaluated, except lead and bis (2-ethylhexyl) phthalate, will attenuate within 15 years.

Alternatives 3 and 4, which involve active remediation, will result in attainment of ARARs more rapidly than Alternative 2. The calculations which were performed estimate that all ground water contaminants evaluated, except bis (2-ethylhexyl) phthalate, will attenuate within 52 years. If the hydraulic conductivity value from the pump test is used, it is estimated that all of the contaminants, except bis (2-ethylhexyl) phthalate, will attenuate in the same amount of time regardless of the alternative chosen--15 years. The basic difference between active (Alternatives 3 and 4) and passive remediation (Alternative 2) is that the attenuation timeframe for lead would be reduced under the active remediation Alternatives, 3 and 4.

The two hydraulic conductivity values which were used to perform the calculations were obtained by two different methods. This is the reason for two such disparate sets of calculations and cleanup timeframes. The calculations provide an estimate regarding the amount of time it may take for the aquifer to attain the cleanup levels. The Agencies consider a hydraulic conductivity value obtained by performing a pump test to be more representative of actual conditions than the method used during the supplemental RI. Therefore, it is believed that the calculations performed using the higher hydraulic conductivity value are probably a more accurate reflection of the way the aquifer will react under the various alternatives. However, because it is impossible to know exactly how long remediation will take, a monitoring component is a part of Alternatives 2, 3, and 4.

The treatment system described as part of Alternatives 3 and 4 will be built to comply with 40 CFR 264 (general facility standards). Both alternatives involve pumping the water from the ground, treating it to remove the contaminants, and then discharging the water to the river. Following extraction and treatment, ground water discharge will comply with NPDES permit equivalent levels. Any treatment residuals generated from the treatment of ground water which contain chromium and/or cyanide will be subject to RCRA LDR treatment standards for RCRA F019 listed waste before final disposal. If activated carbon is used in the filter system, the spent or used carbon containing cyanide or chromium will be regenerated in a unit which is in compliance with 40 CFR Part 264 Subpart X. Shipment of treatment residuals off-site will be done in compliance with all Federal and State regulations.

Long-Term Effectiveness and Permanence

Alternatives 2, 3, and 4 provide approximately the same degree of long-term effectiveness and permanence. Alternative 2, although it does not employ an active remedy, provides for monitoring the ground water and sediments to confirm that the remedy is effective. If the remedy does not prove to be effective, the Site remedy may be reevaluated and an alternate remedy considered. In order to evaluate the effectiveness of the remedy, at least every 5 years (until cleanup levels are met) the accumulated data will be evaluated through an Agency-approved method (such as a statistical method) in order to determine if there has been an increase or decrease in the contaminant levels over time. After reviewing the data, U.S. EPA will determine whether the selected remedy will continue or if an alternative will be assessed.

Alternatives 3 and 4 employ active remedies with a monitoring component. By monitoring the ground water, it can be determined that the remedy is working.

All of the alternatives should result in a concentration decrease in ground water contaminants over time. The source materials will be gone due to the SMOU remedial action, and those contaminants found in the aquifer should decrease to levels protective of human health and the environment.

Reduction of Toxicity, Mobility or Volume

Alternative 2 will not provide for a reduction of toxicity, mobility or volume of contaminants through treatment. The remedy proposed under this alternative is a passive one, allowing the contaminants found in the aquifer and sediments to attenuate naturally. However, the remedy of the SMOU, which consisted of removing the source of the ground water and sediment contaminants, has employed a removal and treatment system. Even though Alternative 2 does not employ a treatment technology, there should be a reduction in the volume of the contaminants.

Alternatives 3 and 4 both involve the reduction of toxicity, mobility or volume of ground water contaminants through treatment. Under these alternatives, the ground water will be extracted, treated and then discharged. These alternatives should result in a decrease in the concentrations of contaminants in ground water. The estimated remediation time under Alternatives 3 and 4 is more rapid than under Alternative 2.

None of the alternatives being examined will employ an active technology for the remediation of the sediments. However, it has been determined that dredging of the sediments at this time, the only viable active treatment technology for sediments, would probably result in greater damage to the riverine system than leaving the sediments in place. Through monitoring of the sediments and benthic populations, it can be determined if treatment of the sediments is warranted. The sediment and benthic study will be conducted over a 10 year period, unless the timeframe is adjusted by the Agencies. Since a source of continuing sediment contamination is being removed, the sediment and benthic community should both improve in quality over time. The monitoring will allow a qualitative and quantitative assessment to be made. If the benthic community has not improved (i.e., the diversity and quantity of the organisms has not increased over time), then U.S. EPA, in consultation with OEPA, will determine if there is an implementable, active technology available for remediation of the sediments and whether this technology will be employed.

Short-Term Effectiveness

The monitoring activities planned under each of the remedial alternatives present very low risks to Site personnel by the creation of temporary exposure pathways during well construction and sampling activities. Alternatives 3 and 4 will take longer to implement than Alternative 2 because construction activities (treatment plant construction, slurry wall construction, etc.) are executed as part of the remedies. Precautionary measures under all alternatives will include protection of workers from direct contact with contaminated ground water and sediments.

Institutional controls will be in place under each alternative to prevent consumption of the ground water before cleanup levels have been met.

Implementability

All of the remedial actions can be implemented using established technology. Alternative 2 is easily implemented since it requires minimal design and minor well construction and ground water analyses. Alternatives 3 and 4 are more difficult to implement and would require detailed extraction/treatment system design. Construction and maintenance of a hydraulic barrier (Alternative 4) may be extremely difficult in the gravelly and highly transmissive aquifer beneath the Site, making this alternative the most difficult to implement.

Cost

Capital and annual operation and maintenance costs increase from Alternatives 1 to 4 due to the increase in complexity of each alternative. Capital costs range from zero in Alternative 1 to $2,936,520 in Alternative 4 (with a slurry wall). Estimated net present worth costs range from zero in Alternative 1 to $8,925,920 in Alternative 4 (with a slurry wall). Costs are described under each alternative in section VII. Tables 11, 12, and 13 contain detailed cost estimates for each of the alternatives except the no action alternative.

State Acceptance

The State concurs with this ROD. A letter from OEPA indicating this support can be found as Appendix C.

Community Acceptance

The only comments received regarding the proposed remedy were from a PRP, ARCO, which did not raise objections to the proposed remedy. The community appears to accept the remedy as proposed.

IX. THE SELECTED REMEDY

In summary, the selected alternative, Alternative 2, provides the best balance among the alternatives with respect to the criteria used to evaluate remedies. U.S. EPA and OEPA have determined that by monitoring the ground water, and restricting its use, risks to human health associated with contacting the ground water can be minimized. Although numerical cleanup levels for all contaminants have not yet been determined, at a minimum, ground water shall be monitored until the following cleanup standards have been met. Concentrations of Site-related contaminants that also appear in background wells shall be reduced to their respective background concentrations, unless one of the following conditions results in a higher cleanup concentration. In no case shall contaminant concentrations be required to be reduced to levels below background concentrations. Site-related contaminants with an existing MCL shall be reduced to a concentration at or below the MCL. Carcinogenic Site-related contaminants shall be reduced to levels that pose a cumulative carcinogenic risk of no greater than $1X10^{-6}$. Concentrations of noncarcinogenic Site-related contaminants shall be reduced to levels that pose a cumulative HI no greater than one for any specific toxicological category. To determine whether the acceptable risk levels have been achieved, the residential use scenario, as outlined in the Baseline Risk Assessment for the GWOU, will be used.

The preferred alternative will allow the contaminated ground water and sediments time to "clean themselves up", since the source of the contamination (the sludge and contaminated soil, which have been contributing contaminants to the ground water and sediments for many years) is being removed during the SMOU remedial action. The ground water and sediment contamination will be monitored to ensure that it diminishes over time. If contamination does not lessen, or if it increases over time, the remedy will be revisited and an alternative remedy (such as ground water extraction and treatment) will be reevaluated.

The Agencies believe this remedy is the most cost-effective. It is also protective of human health and the environment. Restrictions on ground water use will be in effect until the cleanup levels have been reached and maintained. Institutional controls including deed restrictions will prohibit consumption of contaminated ground water. The levels of ground water contaminants reaching the Tuscarawas River are extremely low, and do not exceed any regulatory criteria. These levels are expected to decrease further in the future, since the source material will be gone.

Based on the information available at this time, U.S. EPA and OEPA believe the preferred alternative would be protective of human health and the environment, would comply with ARARs, and would be cost-effective.

This alternative will not satisfy the preference for treatment as a principal element. However, the Agencies do not believe the cleanup of the aquifer will be significantly improved through an active treatment system, to the point of justifying the greatly increased expense. The removal of the source material will eliminate the source of ground water contamination. Alternatives 3 and 4 will lead to reduction of the ground water contamination levels more rapidly than Alternative 2. However, the estimated timeframe for the aquifer to attenuate, or flush itself clean of contaminants as described in Alternative 2, is not significantly greater than if a treatment system were utilized. The two contaminants which take the longest time to attenuate are lead and bis (2-ethylhexyl) phthalate. Lead will be cleaned up faster under Alternatives 3 and 4. Bis (2-ethylhexyl) phthalate, however, will not attenuate under any of the alternatives. Lead may be present due to naturally occurring background contamination. Bis (2-ethylhexyl) phthalate has been found in some of the sludge during the remedial action; removal of the source may lead to a decrease in the levels of bis (2-ethylhexyl) phthalate in the Site ground water.

If the monitoring results of the ground water and sediments do not demonstrate that the contaminants are being flushed from the aquifer over time, that the sediment contamination levels are decreasing, and that the benthic populations are recovering, then the U.S. EPA, in consultation with OEPA, will revisit the Site remedy and other remedial alternatives will be reevaluated. In order to determine if the contaminants are being flushed from the aquifer, the accumulated data from the ground water monitoring program will be evaluated. The data will be examined 1) to determine if there has been a decrease in contaminants over time and 2) to determine if the aquifer will, in fact, flush itself clean within the approximate timeframes that the FFS calculations estimated. The benthic data will also be examined to evaluate whether the benthic population is showing an increase/decrease in diversity. In addition, the extent of the sediment contamination will be assessed in order to determine if there is another source of the contaminants or whether the contamination is being either buried or flushed from the system over time.

X. STATUTORY DETERMINATIONS SUMMARY

1. Protection of Human Health and the Environment

The selected remedy provides a sufficient degree of overall protection of human health and the environment, by permitting the contaminated ground water to "clean itself up" while preventing exposure through the use of institutional controls until cleanup levels have been met and maintained. Benthic populations will be monitored to determine whether the diversity of benthic organisms living in the sediments near the Site increases following removal of the source materials.

Any short term risks associated with implementation of the selected remedy will be minimized by the use of good construction practices.

2. Attainment of ARARs

The selected remedy will attain all Federal and State ARARs as described in Section VIII and Table 10 of this ROD. The chemical-specific, action-specific, and location-specific ARARs and TBCs (other criteria, advisories, guidance and proposed standards that are not legally binding, but that may provide useful information or recommended procedures) for the selected remedy are as follows:

Chemical-specific ARARs

MCLS promulgated under the SDWA (40 CFR Part 141)

40 CFR 264 Subpart F including 40 CFR 264.92 (ground water protection standards) and 40 CFR 264.97 (general ground water monitoring requirements)

Section 303 and 304 of Clean Water Act regarding water quality standards and Federal water quality criteria

Section 3745-1-07 of the Ohio Administrative Code regarding State water quality standards

Action-specific ARARs

29 CFR 1910 regarding general industry standards for occupational safety and health

40 CFR Part 264.100 regarding development of a corrective action program following release to ground water from a waste unit

40 CFR Part 264.117 which outlines post-closure care and site security

Section 3745-54-92 of the Ohio Administrative Code regarding ground water protection standards

Section 6111.04 of the Ohio Revised Code which prohibits pollution of waters of the State

Location-specific ARARs

40 CFR Part 6 Appendix A/Executive Order 11988 regarding construction in floodplains

To-Be-Considered Criteria

Ground Water Classification Guidelines published by the U.S. EPA Office of Ground Water

IRIS, which provides information utilized in risk calculations and development of cleanup goals

RAGS, which provides direction in preparing health-based and environmental risk assessment

3. Cost-Effectiveness

The selected remedy provides overall cost-effectiveness. The alternative provides protectiveness through the use of institutional controls, and, at the same time, allows the aquifer to "clean itself up" at a cost millions less ($504,600 versus $7,783,420) than the active remedies. This alternative allows the Agencies time to discern whether source material removal has effectively solved the ground water problem, and, at the same time, allows for the option of selecting an alternative remedy in the future if this is not the case.

4. Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

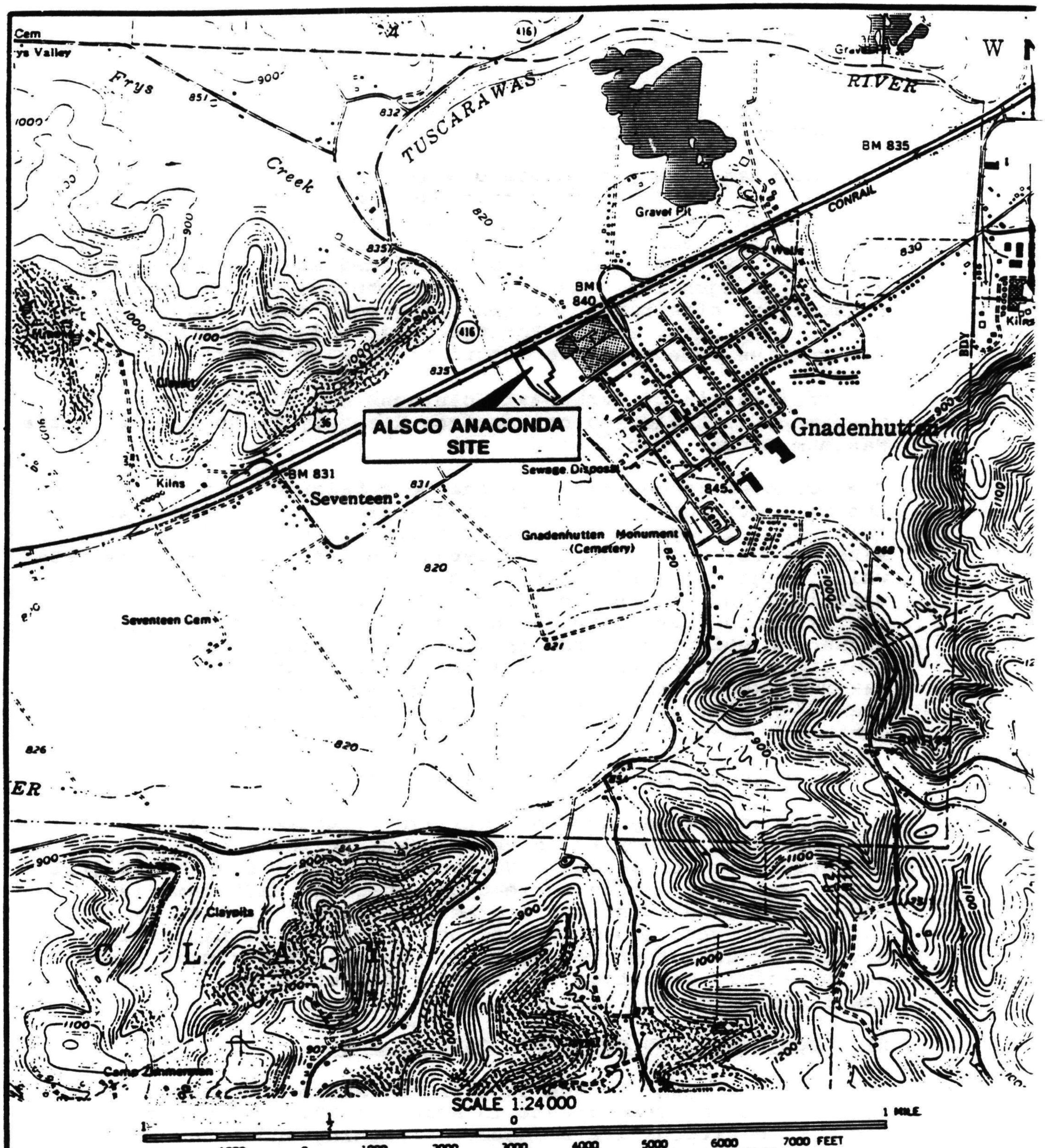
The selected remedy provides the best balance with respect to the nine evaluation criteria as described in Section VIII of this ROD. Treatment technologies are not utilized in this alternative; however, this alternative provides protectiveness while being cost-effective. The removal of the source materials and the ensuing decrease in the ground water contamination levels which should follow will result in a permanent solution to the ground water problem. It is a statutory requirement to utilize permanent solutions to the maximum extent practicable; the combined remedy for both operable units at the Alsco Anaconda Site fulfills this statutory requirement.

5. Preference for Treatment as a Principal Element

The selected remedy does not utilize treatment as a principal element, and, therefore, does not satisfy the statutory preference for treatment. However, the principal threat (the source material) is being removed under the SMOU remedial action. Ground water and sediment treatment is not, at this point, cost-effective and does not provide a significantly greater amount of protection. If the selected remedy proves unsuccessful, an active treatment alternative may be reevaluated in the future.

XI. DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the GWOU of the Alsco Anaconda Site was released for public comment in August 1992. The Proposed Plan identified Alternative 2, Natural Flushing and Attenuation/ Ground Water and Tuscarawas River Sediment Monitoring, as the preferred alternative. U.S. EPA received no comments during the public comment period. Therefore, it was determined that no significant changes to the remedy, as it was originally identified in the Proposed Plan, were necessary.



SOURCE: USGS GNADENHUTTEN 7.5 MINUTE QUADRANGLE, 1962; REVISED 1985

POOR QUALITY ORIGINAL

ERM-Southwest, inc.

NEW ORLEANS, LOUISIANA HOUSTON, TEXAS

DATE 6-27-91 W.O.NO. 15-48A007

FIGURE 1

LOCATION MAP

ALSCO ANACONDA SITE
GNADENHUTTEN, OHIO

313805 R572

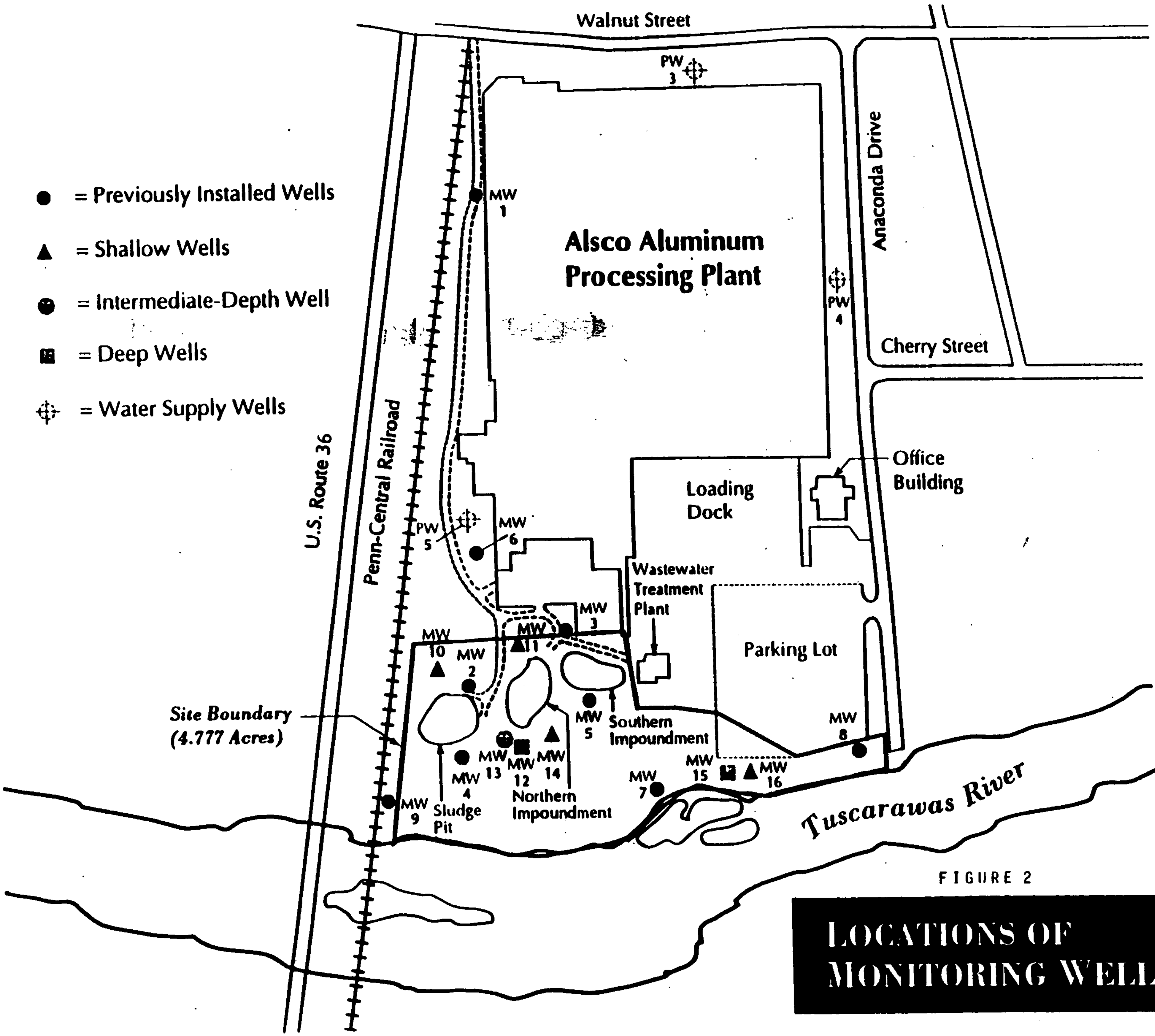
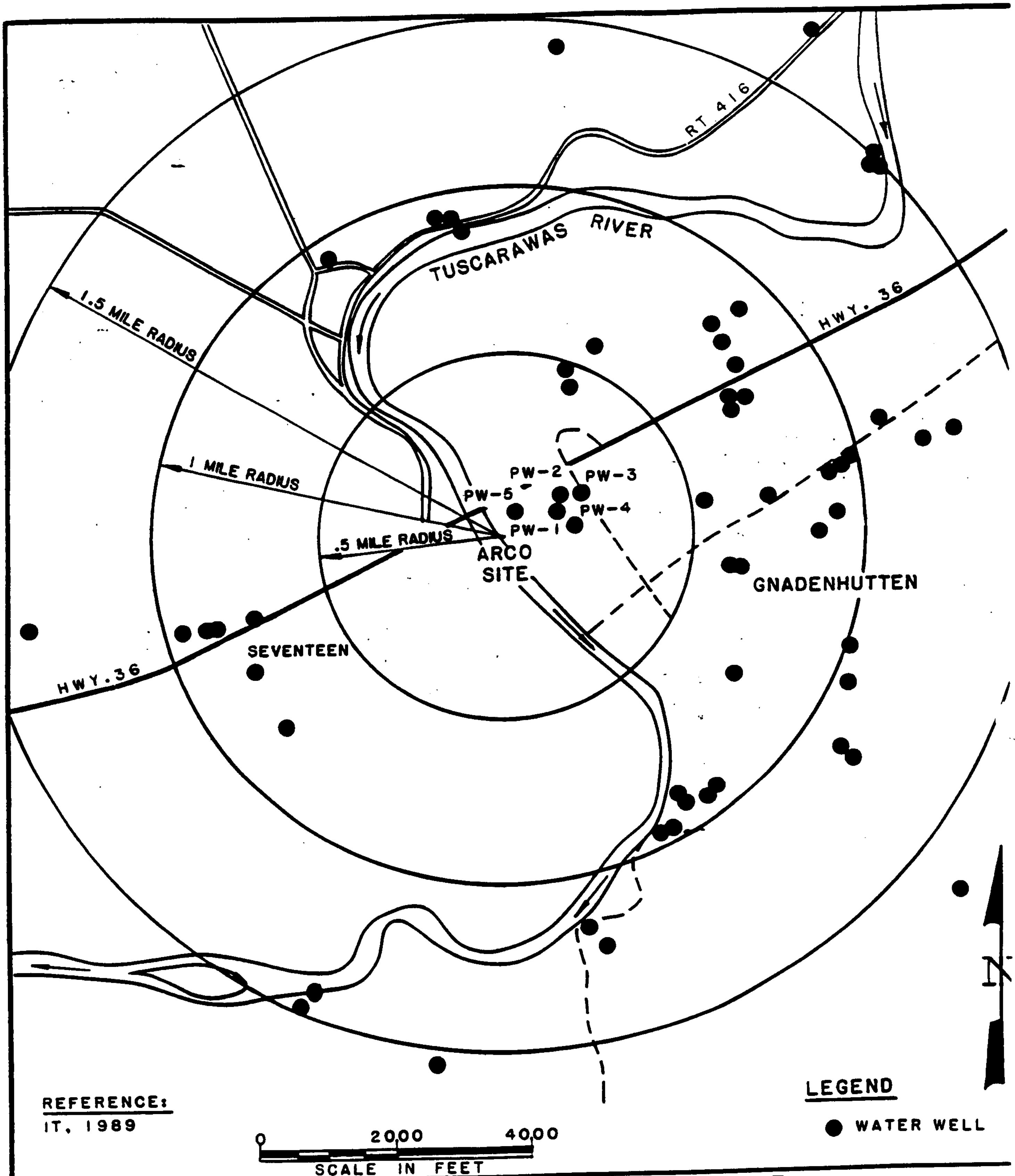


FIGURE 2

LOCATIONS OF MONITORING WELLS



ERM-Southwest, inc.
NEW ORLEANS, LOUISIANA HOUSTON, TEXAS

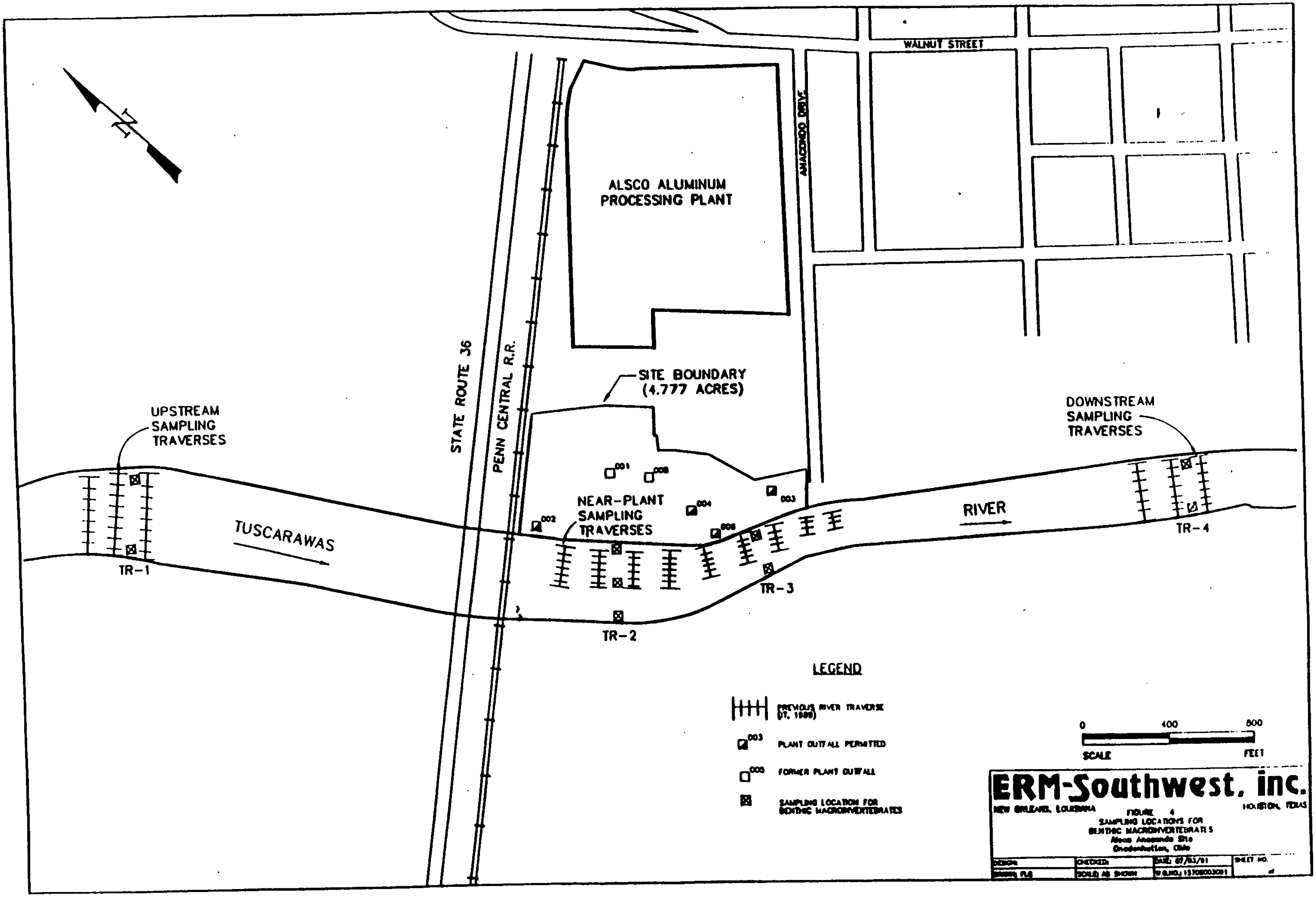
DATE 10-7-91 W.O.NO. 15-70

FIGURE 3

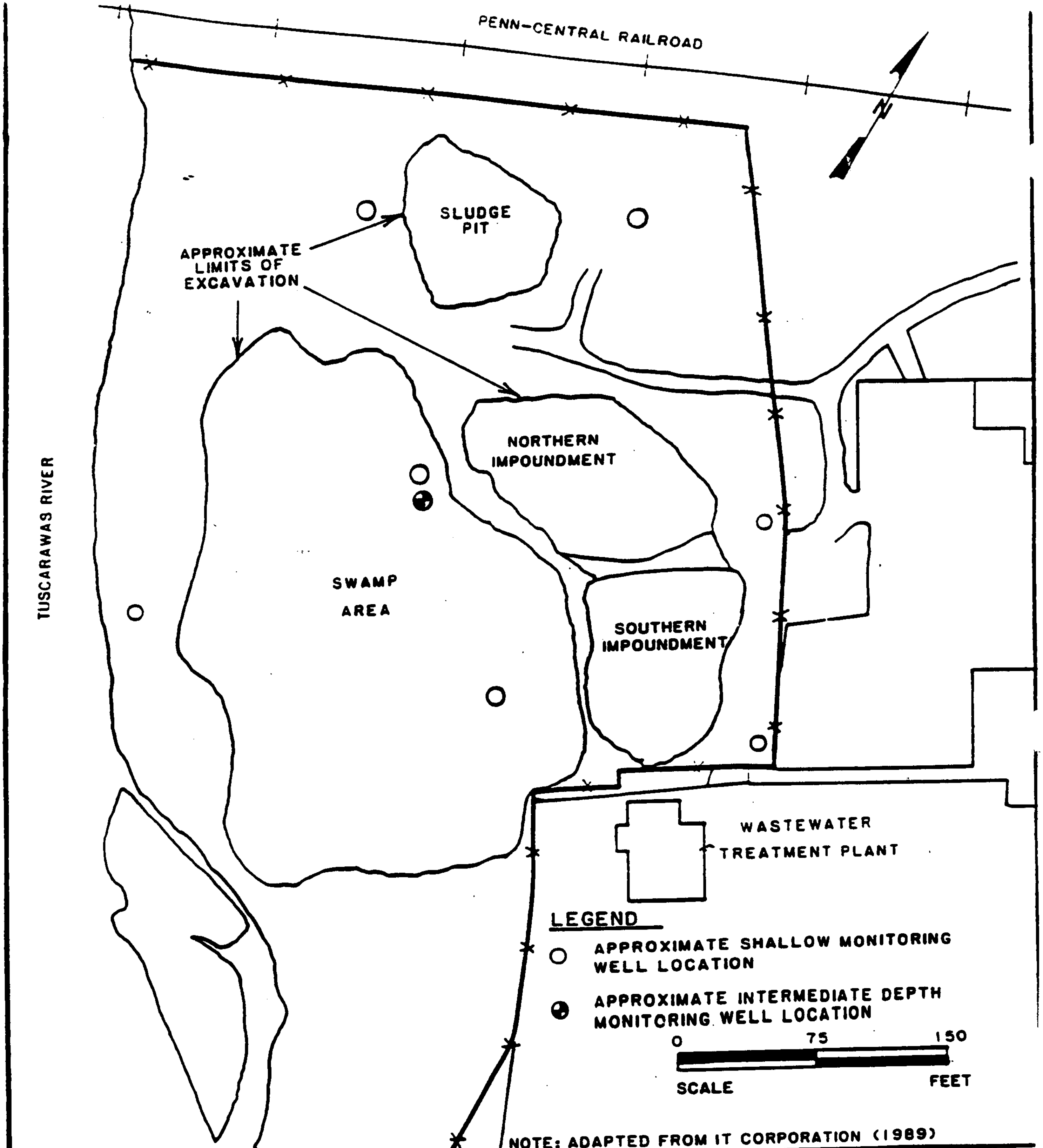
REGIONAL MAP SHOWING WATER WELL LOCATIONS

ALSCO ANACONDA SITE
GNADENHUTTEN, OHIO

313805



WALNUT STREET
ANACONDA DRIVE
ALSCO ALUMINUM PROCESSING PLANT
STATE ROUTE 36
PENN CENTRAL R.R.
SITE BOUNDARY (4.777 ACRES)
UPSTREAM SAMPLING TRAVERSES
DOWNSTREAM SAMPLING TRAVERSES
NEAR-PLANT SAMPLING TRAVERSES
001
008
002
004
006
003
TUSCARAWAS
RIVER
TR-1
TR-2
TR-3
TR-4
LEGEND
PREVIOUS RIVER TRAVERSE
PLANT OUTFALL PERMITTED
FORMER PLANT OUTFALL
SAMPLING LOCATION FOR
0
400
800
SCALE
FEET
ERM-Southwest, inc.
NEW ORLEANS, LOUISIANA
HOUSTON, TEXAS
FIGURE 4
SAMPLING LOCATIONS FOR
BENTHIC MACROINVERTEBRATES
SCALE: AS SHOWN
SHEET NO.



ERM-Southwest, inc.
NEW ORLEANS, LOUISIANA HOUSTON, TEXAS

DATE 8-22-91 | W.O.NO. 15-70

FIGURE 5
APPROXIMATE MONITORING WELL LOCATIONS
GROUND WATER OPERABLE UNIT
ALSCO ANACONDA SITE
GNADENHUTTEN, OHIO

TABLE 1

CONSTITUENT GROUND WATER CONCENTRATIONS COMPARED TO MCLs

Alsco Anaconda Site
Gnadenhutten, Ohio

Constituent	Range of Concentrations Detected (mg/L) (a)	Mean Concentration (mg/L) (b)	MCL (mg/L)	Status (c)	MCL Exceedences (g)	Lifetime Health Advisory (mg/L)
Aluminum	0.108–23.2	5.51	0.05 TO 0.2	F, SMCL	E	---
Antimony	NA	0.019*	0.01/0.005	P	E	0.003
Arsenic	0.0056–0.028	0.010	0.05	R		0.003 (d)
Barium	0.0322–0.905	0.257	2	F		2
Beryllium	NA	0.008*	0.001	P	E	0.0008 (d)
Calcium	43.6–423	151	---			---
Chromium (total)	0.0414–0.478	0.087	0.1	F	E	0.1
Cobalt	0.0056–0.0431	0.011	---			---
Copper	0.0033–0.258	0.041	1.3	P		---
Iron	0.215–87.9	18.3	0.3	F, SMCL	E	---
Lead	0.0079–0.0806	0.013	0.005	F	E	---
Magnesium	11.4–280	65.7	---			---
Manganese	0.221–12.4	3.20	0.05	F, SMCL	E	---
Mercury	0.00039–0.0012	0.0002	0.002	F		0.002
Nickel	0.010–0.0748	0.015	0.1	P		0.1
Potassium	1.84–21.8	6.20	---			---
Silver	NA	0.011*	0.1	F, SMCL	E	0.1
Sodium	15.1–182	62.2	---			20 (e)
Thallium	NA	0.002*	0.002/0.001	P		0.0004
Vanadium	0.011–0.0814	0.019	---			0.02
Zinc	0.0164–0.359	0.087	5	F, SMCL		2
Total cyanide	0.0056–2.43	0.356	0.2	P	E	0.2
Fluoride	0.3–6.1	1.66	4	F, R	E	---
Nitrate	0.9–9.6	2.96	10 (as N)	F		---
Nitrite	NA	0.05*	1 (as N)	F		---
bis (2-Ethylhexyl) phthalate	0.006–0.021	0.008	0.004	P	E	---
Chlorobenzene	NA	0.009*	0.1	F		0.1
1,2-Dichlorobenzene	NA	0.190*	0.6	F (f)		0.6
1,4-Dichlorobenzene	NA	0.008*	0.075	F		0.075
Xylenes	NA	0.003*	10	F		10

NOTES:

All values are for unfiltered samples.

(a) ND values are excluded from this range and field duplicate sample results were averaged to obtain a single value.

(b) The mean concentration was calculated as the arithmetic mean. One half the sample quantitation limit was used for ND values except for constituents which had only one detected value. The one detected value is listed in this column for those constituents (Sb, Be, Ag, Tl, nitrite, and all organics except the phthalate).

(c) Status refers to regulatory status:
F = Final D = Draft P = Proposed R = Under Review SMCL = Secondary MCL

(d) This level represents 10^{-4} cancer risk

(e) Level is the Drinking Water Equivalence Level (DWEL) in the absence of a Lifetime Health Advisory level (guidance only for sodium).

(f) Value for 0-Dichlorobenzene from source listed below.

(g) E = Exceedence; detected ground water concentration exceeds MCL.

* Maximum value is reported since only one sample contained this constituent at a level greater than the detection limit.

Source: U.S. EPA, Office of Water, Drinking Water Regulations and Health Advisories, April 1991.

AQ[illegible]-082

TABLE 2

RIVERINE CONCENTRATIONS COMPARED TO AMBIENT WATER QUALTIY CRITERIA

Alsco Anaconda Site
Gnadenhutten, Ohio

Indicator Constituent	Riverine (a) Concentration (mg/L)	Human Health Criteria: Criteria For Water & Organism Ingestion (mg/L)	Human Health Criteria: Criteria For Organism Ingestion (mg/L)	Fresh Water Criteria for Protection of Organisms: Acute (mg/L)	Fresh Water Criteria for Protection of Organisms: Chronic (mg/L)
Antimony	9.54E−07	1.46E−01	4.50E−02	9.00E+00	1.60E+00
Arsenic	1.43E−06	2.20E−06	1.75E−05	3.60E−01	1.90E−01
Barium	4.62E−05	1.00E+00	NA	NA	NA
Beryllium	4.08E−07	3.70E−06	6.41E−05	1.30E−01	5.30E−03
Chromium (+6)	2.44E−06 (b)	5.00E−02	NA	1.60E−02	1.10E−02
Chromium (Total)	2.44E−05	1.70E+02	3.43E+03	9.80E−01	1.20E−01
Cobalt	2.20E−06	NA	NA	NA	NA
Copper	1.32E−05	5.00E−02	NA	1.80E−02	1.20E−02
Flouride	3.11E−04	NA	NA	NA	NA
Lead	4.11E−06	5.00E−02	NA	8.20E−02	3.20E−02
Manganese	6.32E−04	5.00E−02	1.00E−01	NA	NA
Mercury	6.12E−08	1.44E−04	1.46E−04	2.40E−03	1.20E−05
Nickel	3.83E−06	1.34E−01	1.00E−01	1.80E+00	9.60E−02
Silver	5.61E−07	5.00E−02	NA	4.10E−03	1.20E−04
Thallium	1.02E−07	1.30E−02	4.80E−02	1.40E+00	4.00E−02
Vanadium	4.15E−06	NA	NA	NA	NA
Zinc	1.83E−05	5.00E+00	NA	3.20E−01	4.70E−02
Total cyanide	1.24E−04	2.00E−01	NA	2.20E−02	5.20E−03
Nitrate	4.90E−04	1.00E−01	NA	NA	NA
1,2−Dichlorobenzene	9.69E−06	4.00E−01	2.60E+00	1.12E+00	7.63E−01
1,4−Dichlorobenzene	4.08E−07	4.00E−01	2.60E+00	1.12E+00	7.63E−01
Bis(2−ethylhexyl)phthalate	1.07E−06	NA	NA	NA	NA
Chlorobenzene	4.59E−07	NA	4.88E−01	2.50E−01	5.00E−02
Xylenes	1.53E−07	NA	NA	NA	NA

NOTES:

Sources: IRIS. U.S. EPA Health Effects Assessment Summary Tables for 1991. U.S. EPA Quality Criteria for Water, May, 1986. U.S. EPA Drinking Water Regulations and Health Advisories, April 1991.

NA = Not Available

(a) Riverine concentration applies to the point where the ground water meets the river. Riverine concentration = maximum concentration x dilution factor

(b) For lack of species−specific information, one tenth of the total chromium was assumed to be in the hexavalent state. The maximum Cr (+6) value listed was calculated as 1/10 * max concentration of total Cr.

TABLE 3

Summary of Chromium and Polychlorinated Biphenyls Results For the November 1986 River Sediment Samples [a]

Alsco Anaconda Site
Gnadenhutten, Ohio

SAMPLE IDENTIFICATION	TOTAL CHROMIUM (mg/kg) [b]	POLYCHLORINATED BIPHENYLS (mg/kg)
Upstream:		0.16U [c]
RS-2-1	38	0.16U
RS-2-2	70	0.16U
RS-2-3	78	0.16U
RS-2-4	67	0.16U
RS-2-5	83	0.16U
RS-2-6	61	0.16U
RS-2-7	82	0.16U
RS-2-8	74	0.16U
RS-2-9	57	0.16U
		0.16U
Adjacent to Plant:		0.16U
RS-4-2	78	0.16U
RS-5-2	120	0.16U
RS-6-2	82	0.16U
RS-7-1	120	0.16U
RS-7-2	60	0.16U
RS-7-3	69	0.16U
RS-7-4	69	0.16U
RS-7-5	81	0.16U
RS-7-6	58	0.16U
RS-7-7	56	0.16U
RS-8-2	120	0.47 [d]
RS-9-2	100	0.16U
RS-10-1	180	0.16U
RS-10-2	83	0.16U
RS-10-3	85	0.16U
RS-10-4	29	0.16U
RS-10-5	32	0.16U
RS-11-2	46	0.11 [e]
RS-12-2	55	
Downstream:		0.16U
RS-14-1	120	0.16U
RS-14-2	65	0.16U
RS-14-3	71	0.16U
RS-14-3	67	0.16U
RS-14-5	45	0.16U
RS-14-6	51	0.16U
RS-14-7	49	0.16U
RS-14-8	100	
Composite RS-1,2,3 Traverses	17	0.16U
Composite RS-4,5,6 Traverses	38	0.16U
Composite RS-7,8,9 Traverses	48	0.16U
Composite RS-10,11,12 Traverses	33	0.16U
Composite RS-13,14,15 Traverses	59	0.16U

NOTES:

(a) Samples were collected from November 11, 1986 to November 14, 1986.
(b) "mg/kg" equals milligrams per kilogram or parts per million.
(c) "U" indicates that the compound was analyzed, but not detected. The corresponding number represents the method detection limit for the sample.
(d) The source aroclors for the indicated polychlorinated biphenyls were Aroclor 1248 and 1254.
(e) The source aroclor for the indicated polychlorinated biphenyls was Aroclor 1248.

TABLE 4

FINAL CONSTITUENTS OF CONCERN

Alsco Anaconda Site
Gnadenhutten, Ohio

1,2-Dichlorobenzene
1,4-Dichlorobenzene
Antimony
Arsenic
Barium
Beryllium
bis(2-ethylhexyl)phthalate
Chlorobenzene
Chromium (+6)
Cobalt
Copper
Fluoride
Lead
Manganese
Mercury
Nickel
Nitrate
Silver
Thallium
Total Chromium
Total Cyanide
Vanadium
Xylenes
Zinc

TABLE 5

RECREATIONAL SCENARIO – SUMMARY OF CARCINOGENIC RISK

Alsco Anaconda Site
Gnadenhutten, Ohio

Constituent	Age Group	Route of Exposure	Intake (mg/kg/day)	Cancer Slope Factor (mg/kg/day)-1	Risk
Arsenic	0-6	Oral	2.0E-11	1.75	3.6E-11
	0-6	Dermal	9.3E-13	1.94	1.8E-12
	0-6	Fish Ingestion	3.9E-08	1.75	6.9E-08
	Adult	Oral	1.7E-11	1.75	3.1E-11
	Adult	Dermal	2.0E-12	1.94	3.9E-12
	Adult	Fish Ingestion	3.4E-08	1.75	5.9E-08
Beryllium	0-6	Oral	5.8E-12	4.3	2.5E-11
	0-6	Dermal	2.6E-13	86.0	2.3E-11
	0-6	Fish Ingestion	2.3E-09	4.3	9.9E-09
	Adult	Oral	5.0E-12	4.3	2.1E-11
	Adult	Dermal	5.7E-13	86.0	4.9E-11
	Adult	Fish Ingestion	2.0E-09	4.3	8.5E-09
Bis(2-ethylhexyl)phthalate	0-6	Oral	3.6E-12	0.014	5.1E-14
	0-6	Dermal	3.0E-15	0.016	4.6E-17
	0-6	Fish Ingestion	NA	0.014	NA
	Adult	Oral	3.1E-12	0.014	4.4E-14
	Adult	Dermal	6.4E-15	0.016	1.0E-16
	Adult	Fish Ingestion	NA	0.014	NA
				Child Total =	8E-08
				Adult Total =	7E-08

NOTE:

NA = Bioconcentration factor not available.

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TABLE 6

RECREATIONAL SCENARIO – SUMMARY OF NONCARCINOGENIC HAZARD INDICES

Alsco Anaconda Site
Gnadenhutten, Ohio

		Total HI 0–6 Ages	Total HI Adult
Central Nervous System	Arsenic Cyanide Manganese Mercury Thallium Vanadium Xylenes 1,4–Dichlorobenzene Chlorobenzene Bis(2–ethylhexyl)phthalate	0.08	0.02
Cardiovascular	Arsenic Barium Nitrates Xylenes	0.0005	0.0001
Blood	Nitrates Zinc Copper	0.02	0.004
Renal	Chromium (+6) Chromium (Total) Mercury Thallium Vanadium 1,2–Dichlorobenzene Xylenes	0.14	0.03
Hepatic	Arsenic Beryllium Chromium (+6) Chromium (Total) Manganese Xylenes	0.08	0.02
Gastrointestinal	Arsenic Antimony Copper Vanadium Zinc	0.02	0.004
Immunological	Zinc	0.0003	0.00005
Dermatological	Arsenic Beryllium Chromium (+6) Chromium (Total) Cobalt Nickel Silver Thallium	0.07	0.01
Reproductive	Manganese	0.01	0.003
Developmental	Barium Copper Flouride	0.02	0.004
Genetic	Antimony Beryllium	0.00002	0.000004

NOTES:

NA = Bioconcentration factor not available
NO = Does not bioaccumulate/bioconcentrate

TABLE 7

RESIDENTIAL SCENARIO – SUMMARY OF NONCARCINOGENIC HAZARD INDICES

Alsco Anaconda Site
Gnadenhutten, Ohio

		Total HI 0–6 Ages	Total HI Adult
Central Nervous System	Arsenic Cyanide Manganese Mercury Thallium Vanadium Xylenes 1,4–Dichlorobenzene Chlorobenzene Bis(2–ethylhexyl)phthalate	15.9	6.8
Cardiovascular	Arsenic Barium Nitrates Xylenes	3.0	1.3
Blood	Nitrates Zinc Copper	0.6	0.3
Renal	Chromium (+6) Chromium (Total) Mercury Thallium Vanadium 1,2–Dichlorobenzene Xylenes	2.3	1.1
Hepatic	Arsenic Beryllium Chromium (+6) Chromium (Total) Manganese Xylenes	9.1	3.8
Gastrointestinal	Arsenic Antimony Copper Zinc Vanadium	4.2	1.8
Immunological	Zinc	0.1	0.04
Dermatological	Arsenic Beryllium Chromium (+6) Chromium (Total) Cobalt Nickel Silver Thallium	3.8	2.1
Reproductive	Manganese	6.7	2.8
Developmental	Barium Copper Flouride	7.4	3.1
Genetic	Antimony Beryllium	1.4	0.6

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TABLE 8

RESIDENTIAL SCENARIO – SUMMARY OF CARCINOGENIC RISK

Alsco Anaconda Site
Gnadenhutten, Ohio

Constituent	Age Group	Route of Exposure	Intake (mg/kg/day)	Cancer Slope Factor (mg/kg/day)−1	Risk
Arsenic	0–6	Oral	1.53E–04	1.75	2.7E–04
	0–6	Dermal	1.15E–07	1.94	2.2E–07
	Adult	Oral	2.63E–04	1.75	4.6E–04
	Adult	Dermal	1.51E–07	1.94	2.9E–07
Beryllium	0–6	Oral	2.19E–05	4.3	9.4E–05
	0–6	Dermal	1.65E–08	86.0	1.4E–06
	Adult	Oral	3.76E–05	4.3	1.6E–04
	Adult	Dermal	2.15E–08	86.0	1.9E–06
Bis(2–ethylhexyl)–phthalate	0–6	Oral	9.86E–05	0.014	1.4E–06
	0–6	Dermal	1.34E–09	0.016	2.1E–11
	Adult	Oral	1.69E–04	0.014	2.4E–06
	Adult	Dermal	1.75E–09	0.016	2.7E–11
1,4–Dichlorobenzene	0–6	Oral	NA	NA	NA
	0–6	Dermal	NA	NA	NA
	0–6	Inhalation	6.04E–06	0.024	1.4E–07
	Adult	Oral	NA	NA	NA
	Adult	Dermal	NA	NA	NA
	Adult	Inhalation	9.85E–05	0.024	2.4E–06
				Child total =	4E–04
				Adult total =	6E–04

NOTE:

NA = Not Applicable

TABLE 9

Summary of Total Site Risk
Alsco Anaconda Site
Gnadenhutten, Ohio

	Child 0 – 6	Adult
Carcinogenic Risk	4E–04	6E–04
Noncarcinogenic Hazard Indices:		
Central Nervous System	16.0	6.8
Cardiovascular	3.0	1.3
Blood	0.6	0.3
Renal	2.4	1.0
Hepatic	9.2	3.8
Gastrointestinal	4.2	1.7
Immunological	0.1	0.04
Dermatological	3.9	2.1
Reproductive	6.7	2.8
Developmental	7.4	3.1
Genetic	1.4	0.6

NOTE:

Risk values and Hazard Indices are the sum of values for the residential and recreational scenarios.

Table 10
SUMMARY OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
Ground Water Operable Unit
Alsco Anaconda Site, Gnadenhutten, Ohio

Type of ARAR	Applicable or Relevant and Appropriate Requirements (ARARs) and Other Advisories	Alternative 1 No Action - Natural Attenuation	Alternative 2 Natural Flushing and Attenuation Ground Water and Sediment Monitoring	Alternative 3 Ground Water Extraction/ Treatment/Discharge/Ground Water and Sediment Monitoring	Alternative 4 Hydraulic Barrier and Ground Water Extraction Treatment/Discharge/Ground Water & Sediment Monitoring
C	Resource Conservation and Recovery Act (RCRA) 40 CFR 264 Subpart F	Does not comply with 40 CFR 264 Subpart F	Complies with 40 CFR 264 Subpart F	Complies with 40 CFR 264 Subpart F	Complies with 40 CFR 264 Subpart F
A	40 CFR Part 262	NA	NA	Complies with 40 CFR Part 262	Complies with 40 CFR Part 262
A	40 CFR Part 263	NA	NA	Complies with 40 CFR Part 263	Complies with 40 CFR Part 263
A	40 CFR Part 264	NA	NA	Complies with 40 CFR Part 264	Complies with 40 CFR Part 264
A	40 CFR Part 264.100	Does not comply with 40 CFR Part 264.100	Complies with 40 CFR 264.100	Complies with 40 CFR 264.100	Complies with 40 CFR 264.100
A	40 CFR Part 264.117	Does not comply with 40 CFR Part 264.117	Complies with 40 CFR 264.117	Complies with 40 CFR 264.117	Complies with 40 CFR 264.117
L	40 CFR Part 264.18(b)	NA	NA	Complies with 40 CFR Part 264.18(b)	Complies with 40 CFR Part 264.18(b)
A	40 CFR Part 264 Subpart E	NA	NA	Complies with 40 CFR Part 264 Subpart E	Complies with 40 CFR Part 264 Subpart E
A	40 CFR Part 264 Subpart X	NA	NA	Complies with 40 CFR Subpart X	Complies with 40 CFR Subpart X
A	40 CFR Part 268	NA	NA	Complies with 40 CFR Part 268	Complies with 40 CFR Part 268
L	40 CFR Part 6 Appendix A/ Executive Order 11988	NA	Complies with 40 CFR Part 6 Appendix A/Exec. Order 11988	Complies with 40 CFR Part 6 Appendix A/Exec. Order 11988	Complies with 40 CFR Part 6 Appendix A/Exec. Order 11988
C	Safe Drinking Water Act	MCLs are achieved after natural attenuation	MCLs are achieved after natural attenuation	MCLs are achieved in treated ground water	MCLs are achieved in treated ground water
C	Section 303 and 304 Clean Water Act	Complies with Clean Water Act Sections 303 and 304	Complies with Clean Water Act Sections 303 and 304	Complies with Clean Water Act Sections 303 and 304	Complies with Clean Water Act Sections 303 and 304
A	Section 402 Clean Water Act (National Pollutant Discharge Elimination System)	NA	NA	Complies with Clean Water Act, Section 402	Complies with Clean Water Act, Section 402
A	Occupational Health and Safety Act 29 CFR 1910	NA	Complies with 29 CFR 1910	Complies with 29 CFR 1910	Complies with 29 CFR 1910

Table 10
SUMMARY OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
Ground Water Operable Unit
Alsco Anaconda Site, Gnadenhutten, Ohio

Type of ARAR	Applicable or Relevant and Appropriate Requirements (ARARs) and Other Advisories	Alternative 1 No Action - Natural Attenuation	Alternative 2 Natural Flushing and Attenuation Ground Water and Sediment Monitoring	Alternative 3 Ground Water Extraction/ Treatment/Discharge/Ground Water and Sediment Monitoring	Alternative 4 Hydraulic Barrier and Ground Water Extraction Treatment/Discharge/Ground Water & Sediment Monitoring
A	Ohio Administrative Code: Ground Water Protection Section 3745-54-92	Does not comply with Section 3745-54-92	Complies with Section 3745-54-92	Complies with Section 3745-54-92	Complies with Section 3745-54-92
A	Ohio Revised Code: Acts of Pollution Prohibited Section 6111.04	Does not comply with Section 6111.04	Complies with Section 6111.04	Complies with Section 6111.04	Complies with Section 6111.04
C	Ohio Administrative Code: State Water Quality Standards Section 3745-1-07	Complies with Section Section 3745-1-07	Complies with Section 3745-1-07	Must comply with Section 3745-1-07	Must comply with Section 3745-1-07
A	Ohio Revised Code: Approval of Plans for Disposal of Waste, Section 6111.45	NA	NA	Complies with Section 6111.45	Complies with Section 6111.45

ALSCO ANACONDA TES X/TABLE4-1.wk1

A= Action-specific
C= Chemical-specific
L= Location-specific

TABLE 11

Cost Estimate for Alternative 2
Ground Water and Sediment Monitoring

CAPITAL COSTS

Item	Unit Cost	Units	Cost ($)
I. Sampling and Analysis Plan Preparation			
A. Labor	60 / hour	150	9,000
B. Expenses (computer usage, copying, mailing costs, etc.)	2,000 /LS	1	2,000
II. Shallow Monitoring Well Installation (2-inch PVC wells installed to an average depth of 40 feet)	2,000 /well	7	14,000
III. Deep Monitoring Well Installation (2-inch PVC well installed to an assumed depth of 100 feet)	10,000 /well	1	10,000
IV. Background Well Installation (2-inch PVC wells installed to an average depth of 40 feet)	2,000 /well	3	6,000
SUBTOTAL			41,000
CONTINGENCY AND OVERHEAD (20%)			8,200
TOTAL CAPITAL COST			49,200

OPERATION AND MAINTENANCE (O & M) COSTS

Item	Unit Cost	Units	Cost ($)
I. Annual O & M Costs, Years 1 and 2			
A. Sampling and Analysis of Groundwater on a Quarterly Basis (9 samples/quarter; cost includes labor and equipment for sample collection)	950 /sample (a)	36	34,200
B. Quarterly Reports of Chemical Analysis Results For Groundwater Samples	125 /report	4	500
C. Sampling and Analysis of Background Wells (1 sample/ well/year; cost includes labor, equipment, and reporting of results)	975 /sample (a)	3	2,925
D. Sampling and Analysis of Sediments on an Annual Basis (12 samples/year; cost includes labor and equipment for sample collection)	300 /sample (b)	12	3,600
E. Collection of Macroinvertebrate Samples (6 samples/year, including 3 backup samples; cost includes labor and equipment for sample collection)	200 /sample	6	1,200
F. Biological Analysis of 3 Macroinvertebrate Samples	80 /hour	80	6,400
G. Brief Report Summarizing the Results of the Macroinvertebrate and Sediment Sampling and Analysis	80 /hour	60	4,800
SUBTOTAL			53,625
CONTINGENCY AND OVERHEAD (20%)			10,725
ANNUAL O & M COSTS, YEARS 1 AND 2			64,350

TABLE 1 1(cont'd)

Item	Unit Cost	Units	Cost ($)
PRESENT WORTH O & M COST, YEARS 1 AND 2 ($64,350/year for years 1 and 2 @ a 5% discount rate)			119,700

Item	Unit Cost	Units	Cost ($)
II. Annual O & M Costs, Years 4, 6, 8, and 10			
A. Sampling and Analysis of Groundwater on a Semi-Annual Basis (9 samples/half year; cost includes labor and equipment for sample collection)	950 /sample (a)	18	17,100
B. Semi-Annual Reports of Chemical Analysis Results For Groundwater Samples	125 /report	2	250
C. Sampling and Analysis of Sediments on an Annual Basis (12 samples/year; cost includes labor and equipment for sample collection)	300 /sample (b)	12	3,600
D. Collection of Macroinvertebrate Samples (6 samples/year, including 3 backup samples; cost includes labor and equipment for sample collection)	175 /sample	6	1,050
E. Biological Analysis of 3 Macroinvertebrate Samples	80 /hour	80	6,400
F. Brief Report Summarizing the Results of the Macroinvertebrate and Sediment Sampling and Analysis	80 /hour	60	4,800
SUBTOTAL			33,200
CONTINGENCY AND OVERHEAD (20%)			6,640
ANNUAL O & M COSTS, YEARS 4, 6, 8, and 10			39,840
PRESENT WORTH O & M COST, YEARS 4, 6, 8, and 10 ($39,840/year for years 4, 6, 8, and 10 @ a 5% discount rate)			113,900
III. Annual O & M Costs, Years 3, 5, 7, 9, and 11 through 30			
A. Sampling and Analysis of Groundwater on a Semi-Annual Basis (9 samples/half year; cost includes labor and equipment for sample collection)	950 /sample (a)	18	17,100
B. Semi-Annual Reports of Chemical Analysis Results For Groundwater Samples	125 /report	2	250
SUBTOTAL			17,350
CONTINGENCY AND OVERHEAD (20%)			3,470
ANNUAL O & M COSTS, YEARS 3, 5, 7, 9, and 11 THROUGH 30			20,820
PRESENT WORTH O & M COST, YEARS 3, 5, 7, 9, and 11 THROUGH 30 ($20,820/year for years 3, 5, 7, 9, and 11 through 30 @ a 5% discount rate)			221,800

TABLE 1 1 (cont'd)

Item	Cost ($)
TOTAL PRESENT WORTH O & M COST, YEARS 1 THROUGH 30	455,400
NET PRESENT WORTH COST FOR ALTERNATIVE 2 (Total capital cost + Total present worth O & M cost)	504,600

(a) Analysis for TCL volatile organic compounds, TAL metals, cyanide, and fluoride.
(b) Analysis for PCBs and total chromium.

LS=lump sum

TABLE 12

Cost Estimate for Alternative 3
Ground Water Extraction/Treatment/Discharge

CAPITAL COSTS

Item	Unit Cost	Units	Cost ($)
I. Sampling and Analysis Plan Preparation			
A. Labor	60 / hour	150	9,000
B. Expenses (computer usage, copying, mailing costs, etc.)	2,000 /LS	1	2,000
II. Shallow Monitoring Well Installation (2-inch PVC wells installed to an average depth of 40 feet)	2,000 /well	7	14,000
III. Deep Monitoring well Installation (2-inch PVC well installed to an assumed depth of 100 feet)	10,000 /well	1	10,000
IV. Background Well Installation (2-inch PVC wells installed to an average depth of 40 feet)	2,000 /well	3	6,000
V. Recovery Well Installation (12-inch PVC wells installed to an average depth of 40 feet)	8,000 /well	5	40,000
VI. Recovery Well Equipment (pumps, piping, etc.)	10,000 /LS	1	10,000
VII. Groundwater Treatment System Design and Installation (assumed 500 gpm capacity)	1,400,000 /LS	1	1,400,000
VIII. Preparation of NPDES Permit for Discharge of Treated Waters to the Tuscarawas River	60 /hour	60	3,600
SUBTOTAL			1,494,600
CONTINGENCY AND OVERHEAD (20%)			298,920
TOTAL CAPITAL COST			1,793,520

OPERATION AND MAINTENANCE (O & M) COSTS

Item	Unit Cost	Units	Cost ($)
I. Annual O & M Costs, Years 1 and 2			
A. Sampling and Analysis of Groundwater on a Quarterly Basis (9 samples/quarter; cost includes labor and equipment for sample collection)	950 /sample (a)	36	34,200
B. Quarterly Reports of Chemical Analysis Results For Groundwater Samples	125 /report	4	500
C. Sampling and Analysis of Background Wells (1 sample/well/year; cost includes labor, equipment, and reporting of results)	975 /sample (a)	3	2,925
D. Sampling and Analysis of Sediments on an Annual Basis (12 samples/year; cost includes labor and equipment for sample collection)	300 /sample (b)	12	3,600

TABLE 1 2 (cont'd)

Item	Unit Cost	Units	Cost ($)
E. Collection of Macroinvertebrate Samples (6 samples/year, including 3 backup samples; cost includes labor and equipment for sample collection)	200 /sample	6	1,200
F. Biological Analysis of 3 Macroinvertebrate Samples	80 /hour	80	6,400
G. Brief Report Summarizing the Results of the Macroinvertebrate and Sediment Sampling and Analysis	80 /hour	60	4,800
H. Operation and Maintenance of Groundwater Extraction and Treatment System	300,000 /year	1	300,000
SUBTOTAL			353,625
CONTINGENCY AND OVERHEAD (20%)			70,725
ANNUAL O & M COSTS, YEARS 1 AND 2			424,350
PRESENT WORTH O & M COST, YEARS 1 AND 2 ($424,350/year for years 1 and 2 @ a 5% discount rate)			789,000
II. Annual O & M Costs, Years 4, 6, 8, and 10			
A. Sampling and Analysis of Groundwater on a Semi-Annual Basis (9 samples/half year; cost includes labor and equipment for sample collection)	950 /sample (a)	18	17,100
B. Semi-Annual Reports of Chemical Analysis Results For Groundwater Samples	125 /report	2	250
C. Sampling and Analysis of Sediments on an Annual Basis (12 samples/year; cost includes labor and equipment for sample collection)	300 /sample (b)	12	3,600
D. Collection of Macroinvertebrate Samples (6 samples/year, including 3 backup samples; cost includes labor and equipment for sample collection)	200 /sample	6	1,200
E. Biological Analysis of 3 Macroinvertebrate Samples	80 /hour	80	6,400
F. Brief Report Summarizing the Results of the Macroinvertebrate and Sediment Sampling and Analysis	80 /hour	60	4,800
G. Operation and Maintenance of Groundwater Extraction and Treatment System	300,000 /year	1	300,000
SUBTOTAL			333,350
CONTINGENCY AND OVERHEAD (20%)			66,670
ANNUAL O & M COSTS, YEARS 4, 6, 8, and 10			400,020
PRESENT WORTH O & M COST, YEARS 4, 6, 8, and 10 ($400,020/year for years 4, 6, 8, and 10 @ a 5% discount rate)			1,143,900

TABLE 1 2 (cont'd)

Item	Unit Cost		Units	Cost ($)
III. Annual O & M Costs, Years 3, 5, 7, 9, and 11 through 30				
A. Sampling and Analysis of Groundwater on a Semi-Annual Basis (9 samples/half year; cost includes labor and equipment for sample collection)	950	/sample (a)	18	17,100
B. Semi-Annual Reports of Chemical Analysis Results For Groundwater Samples	125	/report	2	250
C. Operation and Maintenance of Groundwater Extraction and Treatment System	300,000	/year	1	300,000
SUBTOTAL				317,350
CONTINGENCY AND OVERHEAD (20%)				63,470
ANNUAL O & M COSTS, YEARS 3, 5, 7, 9, and 11 THROUGH 30				380,820
PRESENT WORTH O & M COST, YEARS 3, 5, 7, 9, and 11 THROUGH 30 ($380,820/year for years 3, 5, 7, 9, and 11 through 30 @ a 5% discount rate)				4,057,000
TOTAL PRESENT WORTH O & M COST, YEARS 1 THROUGH 30				5,989,900
NET PRESENT WORTH COST FOR ALTERNATIVE 3 (Total capital cost + Total present worth O & M cost)				7,783,420

(a) Analysis for TCL volatile organic compounds, TAL metals, cyanide, and flouride.

(b) Analysis for PCBs and total chromium

LS=lump sum

TABLE 13

Cost Estimate for Alternative 4
Hydraulic Barrier and Ground Water Extraction/Treatment/Discharge

CAPITAL COSTS

Item	Unit Cost	Units	Cost ($)
I. Sampling and Analysis Plan Preparation			
A. Labor	60 / hour	150	9,000
B. Expenses (computer usage, copying, mailing costs, etc.)	2,000 /LS	1	2,000
II. Shallow Monitoring Well Installation (2-inch PVC wells installed to an average depth of 40 feet)	2,000 /well	7	14,000
III. Deep Monitoring Well Installation (2-inch PVC well installed to an assumed depth of 100 feet)	10,000 /well	1	10,000
IV. Background Well Installation (2-inch PVC wells installed to an average depth of 40 feet)	2,000 /well	3	6,000
V. Recovery Well Installation (12-inch PVC wells installed to an average depth of 40 feet)	8,000 /well	5	40,000
VI. Recovery Well Equipment (pumps, piping, etc.)	10,000 /LS	1	10,000
VII. Groundwater Treatment System Design and Installation (assumed 500 gpm capacity)	1,400,000 /LS	1	1,400,000
VIII. Preparation of NPDES Permit for Discharge of Treated Waters to the Tuscarawas River	60 /hour	60	3,600
IX. Slurry Wall Installation	30 /sq. ft.	31,750	952,500
X. Injection Well Installation			
A. Injection Wells (12-inch PVC wells installed to an average depth of 40 feet)	8,000 /well	5	40,000
B. Design and Installation of Injection Well Water Supply System (system would use the Tuscarawas River as a water source and provide for treatment of the River water prior to injection)	125,000 /LS	1	125,000
C. Installation of Piezometers to Monitor Groundwater Elevations and Help Determine Optimal Injection Rates (1-inch PVC piezometers installed to an average depth of 40 feet)	1,500 /piez.	4	6,000
SUBTOTAL WITH SLURRY WALL // INJECTION WELLS		2,447,100 //	1,665,600
CONTINGENCY AND OVERHEAD (20%) WITH SLURRY WALL // INJECTION WELLS		489,420 //	333,120
TOTAL CAPITAL COST WITH SLURRY WALL			2,936,520
TOTAL CAPITAL COST WITH INJECTION WELLS			1,998,720

TABLE 1 3 (cont'd)

OPERATION AND MAINTENANCE (O & M) COSTS

Item	Unit Cost	Units	Cost ($)
I. Annual O & M Cost, Years 1 and 2			
A. Sampling and Analysis of Groundwater on a Quarterly Basis (9 samples/quarter; cost includes labor and equipment for sample collection)	950 /sample (a)	36	34,200
B. Quarterly Reports of Chemical Analysis Results For Groundwater Samples	125 /report	4	500
C. Sampling and Analysis of Background Wells (1 sample/ well/year; cost includes labor, equipment, and reporting of results)	975 /sample (a)	3	2,925
D. Sampling and Analysis of Sediments on an Annual Basis (12 samples/year; cost includes labor and equipment for sample collection)	300 /sample (b)	12	3,600
E. Collection of Macroinvertebrate Samples (6 samples/year; cost includes labor and equipment for sample collection)	200 /sample	6	1,200
F. Biological Analysis of 3 Macroinvertebrate Samples	80 /hour	80	6,400
G. Brief Report Summarizing the Results of the Macroinvertebrate and Sediment Sampling and Analysis	80 /hour	60	4,800
H. Operation and Maintenance of Injection Well System	50,000 /year	1	50,000
I. Operation and Maintenance of Groundwater Extraction and Treatment System	300,000 /year	1	300,000
SUBTOTAL WITH SLURRY WALL // INJECTION WELLS		353,625 //	403,625
CONTINGENCY AND OVERHEAD (20%) WITH SLURRY WALL // INJECTION WELLS		70,725 //	80,725
ANNUAL O & M COSTS, YEARS 1 AND 2 WITH SLURRY WALL			424,350
ANNUAL O & M COSTS, YEARS 1 AND 2 WITH INJECTION WELLS			484,350
PRESENT WORTH O & M COST, YEARS 1 AND 2 WITH SLURRY WALL ($424,350/year for years 1 and 2 @ a 5% discount rate)			789,000
PRESENT WORTH O & M COST, YEARS 1 AND 2 WITH INJECTION WELLS ($484,350/year for years 1 and 2 @ a 5% discount rate)			900,600
II. Annual O & M Costs, Years 4, 6, 8, and 10			
A. Sampling and Analysis of Groundwater on a Semi-Annual Basis (9 samples/half year; cost includes labor and equipment for sample collection)	950 /sample (a)	18	17,100
B. Semi-Annual Reports of Chemical Analysis Results For Groundwater Samples	125 /report	2	250
C. Sampling and Analysis of Sediments on an Annual Basis (6 samples/half year; cost includes labor and equipment for sample collection)	300 /sample (b)	12	3,600

TABLE 1 3 (cont'd)

Item	Unit Cost	Units		Cost ($)
D. Collection of Macroinvertebrate Samples (6 samples/year, including 3 backup samples; cost includes labor and equipment for sample collection)	175 /sample	6		1,050
E. Biological Analysis of 3 Macroinvertebrate Samples	80 /hour	80		6,400
F. Brief Report Summarizing the Results of the Macroinvertibrate and Sediment Sampling and Analysis	80 /hour	60		4,800
G. Operation and Maintenance of Injection Well System	50,000 /year	1		50,000
H. Operation and Maintenance of Groundwater Extraction and Treatment System	300,000 /year	1		300,000
SUBTOTAL WITH SLURRY WALL // INJECTION WELLS		333,200	//	383,200
CONTINGENCY AND OVERHEAD (20%) WITH SLURRY WALL // INJECTION WELLS		66,640	//	76,640
ANNUAL O & M COSTS, YEARS 4, 6, 8, and 10 WITH SLURRY WALL				399,840
ANNUAL O & M COSTS, YEARS 4, 6, 8, and 10 WITH INJECTION WELLS				459,840
PRESENT WORTH O & M COST, YEARS 4, 6, 8, & 10 WITH SLURRY WALL ($399,840/year for years 4, 6, 8, and 10 @ a 5% discount rate)				1,143,400
PRESENT WORTH O & M COST, YEARS 4, 6, 8, & 10 WITH INJECTION WELLS ($459,840/year for years 4, 6, 8, and 10 @ a 5% discount rate)				1,315,000
III. Annual O & M Cost, Years 3, 5, 7, 9, and 11 through 30				
A. Sampling and Analysis of Groundwater on a Semi-Annual Basis (9 samples/half year; cost includes labor and equipment for sample collection)	950 /sample (a)	18		17,100
B. Semi-Annual Reports of Chemical Analysis Results For Groundwater Samples	125 /report	2		250
C. Operation and Maintenance of Injection Well System	50,000 /year	1		50,000
D. Operation and Maintenance of Groundwater Extraction and Treatment System	300,000 /year	1		300,000
SUBTOTAL WITH SLURRY WALL // INJECTION WELLS		317,350	//	367,350
CONTINGENCY AND OVERHEAD (20%) WITH SLURRY WALL // INJECTION WELLS		63,470	//	73,470
ANNUAL O & M COSTS, YEARS 3, 5, 7, 9, and 11 THROUGH 30 WITH SLURRY WALL				380,820
ANNUAL O & M COSTS, YEARS 3, 5, 7, 9, and 11 THROUGH 30 WITH INJECTION WELLS				440,820

TABLE 13 (cont'd)

Item	Cost ($)
PRESENT WORTH O & M COST, YEARS 3, 5, 7, 9, and 11 THROUGH 30 WITH SLURRY WALL ($380,820/year for years 3, 5, 7, 9, and 11 through 30 @ a 5% discount rate)	4,057,000
PRESENT WORTH O & M COST, YEARS 3, 5, 7, 9, and 11 THROUGH 30 WITH INJECTION WELLS ($440,820/year for years 3, 5, 7, 9, and 11 through 30 @ a 5% discount rate)	4,696,200
TOTAL PRESENT WORTH O & M COST, YEARS 1 THROUGH 30 WITH SLURRY WALL	5,989,400
TOTAL PRESENT WORTH O & M COST, YEARS 1 THROUGH 30 WITH INJECTION WELLS	6,911,800
NET PRESENT WORTH COST FOR ALTERNATIVE 4 WITH SLURRY WALL (Total capital cost + Total present worth O & M cost)	8,925,920
NET PRESENT WORTH COST FOR ALTERNATIVE 4 WITH INJECTION WELLS (Total capital cost + Total present worth O & M cost)	8,910,520

(a) Analysis for TCL volatile organic compounds, TAL metals, cyanide, and fluoride.

(b) Analysis for PCBs and total chromium.

State of Ohio Environmental Protection Agency

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George V. Voinovich
Governor

Donald R. Schregardus
Director

September 29, 1992

Mr. Valdus V. Adamkus
Regional Administrator
United States Environmental Protection Agency
Region V
77 West Jackson Boulevard
Chicago, IL 60604-3590

Dear Mr. ~~Adamkus~~ Val:

The Ohio Environmental Protection Agency (Ohio EPA) has received and reviewed the September 28, 1992 final Record of Decision (ROD) for the Ground Water Operable Unit (GWOU) at the Alsco Anaconda Superfund site in Gnadenhutten, Tuscarawas County, Ohio.

The ROD for the GWOU is the second of two RODs for the Alsco Anaconda site, the first of which addressed the Source Material Operable Unit (SMOU). Ohio EPA concurs with Alternative #2, the selected remedial alternative for the GWOU at this site. The selected alternative includes the following components:

* Natural flushing and attenuation of contaminants in the aquifer, allowing ground water to discharge to the Tuscarawas River;

* Sampling and laboratory analysis of the ground water from monitoring wells;

* Installation of background wells, and sampling of those wells;

* Institutional controls, including deed restrictions, that prevent installation of drinking water wells within the site boundaries until remedial action levels for ground water have been achieved; and

* Sampling of Tuscarawas River sediments and benthic organisms.

The estimated net present worth cost of the selected remedy is $504,600. The estimated total present worth of operation and maintenance costs are $455,400.

The ROD specifies that U.S. EPA, in consultation with Ohio EPA, will revisit the site remedy if monitoring results of the ground water and sediments do not demonstrate that the contaminants are being flushed from the aquifer over time; that the sediment contamination levels are decreasing; and that the benthic populations are recovering. Because the ROD does not set forth clear criteria by which to make those judgements, Ohio EPA believes that it is very important that a clear procedure and supporting rationale for interpreting the data collected over time and acting on those interpretations be developed in the RD/RA work plan and fully defined in the remedial design.

Ohio EPA believes that the selected remedy for the GWOU provides the best balance among the alternatives and that, in combination with the remedial action being taken for the SMOU, it provides the best response to the conditions at the Alsco Anaconda site.

Sincerely,

Jerry Joanna for

Donald R. Schregardus, Director
Ohio Environmental Protection Agency

DRS/mms

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