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EPA

Superfund Record of Decision:

American Anodco, MI

50272-101

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12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460			13. Type of Report & Period Covered 800/800 14.

15. Supplementary Notes

PB94-964117

16. Abstract (Limit: 200 words)

The 8-acre American Anodco site is an aluminum processing site for the automotive industry located in Ionia Township, Ionia County, Michigan. Land use in the area is predominantly light industrial with the nearest residences one-eighth of a mile upgradient of the site. American Anodco cleans, brightens, anodizes, and seals aluminum parts for automobiles. Beginning in 1962, the facility discharged process wastewater and chemicals from their anodizing process to an onsite seepage lagoon under a State permit. From 1965 to 1978, American Anodco began reclaiming the acids instead of discharging wastewater into the lagoon. In 1978, American Anodco tried to obtain another permit to discharge wastewater to the lagoon, and this led to an investigation of the lagoon's impact on ground water by American Anodco and the State. In 1986 and 1987, American Anodco began to phase out the seepage lagoon and discharge wastewater to a public sewer system. Also in 1987, the lagoon sludge was removed and disposed of in an offsite landfill, and the excavation area was backfilled with clean soil. Soil sampling confirmed that the sludge removal has decreased onsite contaminant levels over time and EPA feels no additional remedial action is needed to be protective of human health and the environment. Therefore, there are no contaminants of concern affecting this site.

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - American Anodco, MI
First Remedial Action - Final
Contaminated Medium: None
Key Contaminants: None

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 32
	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)

The selected remedial action for this site is no further action, with ground water monitoring for two years. Previous removals have decreased contaminant levels at the site and the presence of these compounds no longer pose a risk to human health and the environment. There are no present worth or O&M costs associated with this no action remedy.

PERFORMANCE STANDARDS OR GOALS:

Not applicable.

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

American Anodco, Inc., Ionia, Michigan.

STATEMENT OF BASIS

This decision document presents the selected remedial action for the American Anodco site, in Ionia, Michigan, which was 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 is consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) to the extent practicable. This decision is based upon the contents of the Administrative Record for the site.

The State of Michigan does not concur with this Record of Decision.

DESCRIPTION OF THE SELECTED REMEDY

U.S. EPA (EPA) has selected the "No Action" Alternative, with groundwater monitoring.

DECLARATION

EPA has determined that conditions at the site due to contamination by inorganic chemicals pose no current or potential threat to human health or the environment. While the American Anodco site does appear to exhibit trace amounts of inorganic contamination which result in slightly elevated calculations of potential future risk from exposure to the groundwater, EPA has also determined that the presence of these compounds does not appear to pose an unacceptable risk to human health or the environment since the levels are below Maximum Contaminant Levels (MCLs). Accordingly, no further remedial action will be undertaken. However, monitoring of the the inorganic contaminants in the groundwater will continue for a period of twenty-four months.

EPA has determined that no remedial action is necessary at this site. EPA has determined that its response at this site is complete. Therefore, the site now qualifies for inclusion on the Construction Completion List. As this is a decision for "No Action", the statutory requirements of CERCLA Section 121 for remedial actions are not applicable and no statutory five year review will be undertaken.

9/27/93
DATE

David A. Ullrich
for Valdas V. Adamkus
Regional Administrator

VIII. STATUTORY AUTHORITY FINDING

EPA has determined that conditions at the site due to contamination by inorganic compounds pose no current or potential threat to human health or the environment. While the Anodco site does appear to exhibit trace amounts of inorganic contamination which result in slightly elevated calculations of potential future risk, EPA has also determined that the presence of these compounds does not appear to pose an unacceptable risk to human health or the environment, because all chemicals are below MCLs. The MCL for arsenic is 50 parts per billion. However, the state's standard for arsenic is 0.02 parts per billion, pursuant to Michigan Act 307 Type B standards. U.S. EPA has taken the position that the State ARAR is not triggered if there is no risk, and that the MCL is protective of human health and the environment. Accordingly, no further remedial action will be undertaken. EPA will, however, require that groundwater monitoring continue for a period of 24 months. If after twenty-four months U.S. EPA determines that the remedy is no longer protective, alternatives for addressing the increased risk will be evaluated. At a minimum, if monitoring has shown that contaminant concentrations have increased, groundwater monitoring will continue beyond the twenty-four month period. In addition, alternatives such as deed restrictions, additional groundwater monitoring, and/or groundwater treatment will be evaluated as ways to eliminate any unacceptable risk posed by the site.

As this is a decision for "No Action", the statutory requirements of CERCLA Section 121 for remedial actions are not applicable and no statutory five year review will be undertaken.

STATE OF MICHIGAN

NATURAL RESOURCES COMMISSION
JERRY C. BARTNIK
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JOHN ENGLER, Governor
DEPARTMENT OF NATURAL RESOURCES
Stevens T. Mason Building, P.O. Box 30028, Lansing, MI 48909
ROLAND HARMES, Director

September 29, 1993

Mr. Valdas V. Adamkus, R-19J
Administrator, Region 5
U.S. Environmental Protection Agency
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Dear Mr. Adamkus:

The Michigan Department of Natural Resources (MDNR), on behalf of the State of Michigan, has reviewed the Record of Decision (ROD) received September 24, 1993, for the American Anodco Superfund site located in the city of Ionia, Ionia County, Michigan. The U.S. Environmental Protection Agency's (EPA) selected alternative is no action with groundwater monitoring. Conceptually, we support most aspects of the selected remedy; however, for reasons described below we cannot concur with the ROD.

The selected remedy is not consistent with Rule 299.5705(6) of the Michigan Environmental Response Act (MERA), 1982 PA 307, as amended. Although we have proposed legislation which would allow us to waive Rule 705(6) in circumstances such as exist at this site, the amendment has not yet been enacted. Thus, we recommended in our Proposed Plan comment letter of September 14, 1993, that the EPA waive this rule to implement the proposed remedy. The EPA chose not to waive Rule 299.5705(6), and instead the EPA maintains that state Applicable or Relevant and Appropriate Requirements (ARARs) are not triggered if contaminant concentrations in groundwater are below maximum contaminant levels and the site poses no other risk. However, no basis for the EPA to disregard state ARARs is given in either the Comprehensive Environmental Response, Compensation and Liability Act, 1980 PL 96-510, or in the National Contingency Plan.

Concentrations of arsenic, boron and manganese in groundwater at the site exceed the MERA drinking water criteria. Consequently, the MERA Rule 299.5719 requires that land-use restrictions be imposed until such time as the concentrations of contaminants in the aquifer fall within the MERA criteria. The selected remedy imposes no land-use restrictions and requires only two years of continued groundwater monitoring.

Although a cursory review of site conditions suggests that active groundwater remediation might be impracticable, it is important that the evaluation of alternatives includes site-specific information on the technical feasibility and cost effectiveness of active groundwater remedial action to comply with the MERA Rule 299.5717(3)(l). This could consist of evaluating as simple a system as pumping from a single extraction well and treating the extracted water. No such evaluation has been provided.

The ROD includes no provision for further monitoring of the site's impact upon Prairie Creek. The remedial investigation showed that groundwater discharges to the creek and that concentrations of arsenic, zinc and nickel exceed the MERA groundwater/surface water interface (GSI) criteria in the groundwater. The data from a 1984 study performed by Ecology and Environment, Inc., indicate that lead concentrations in sediments were higher downstream than they were upstream from the site. We recommend that monitoring or modeling of concentrations of site contaminants at the GSI be performed in compliance with the MERA Rule 299.5713.

We have some concerns with the EPA's evaluation of the baseline risk assessment. We would prefer that the EPA not allow exceedances of their acceptable risk range as they have done for this site. We realize that the site's known point sources have been removed, the groundwater contaminant concentrations are continually decreasing and the active extraction of contamination appears difficult. However, the EPA should acknowledge the risks that exist at the site and require land-use restrictions and monitoring, which would continue until the risks become acceptable. Such an approach would necessitate a five-year review.

If you have questions or comments, you may contact Mr. Bruce Van Otteren, Superfund Section, Environmental Response Division, at 517-373-8427, or you may contact me.

Sincerely,

Russell J. Harding
Deputy Director
517-373-7917

cc: Ms. Jodi Traub, EPA
Ms. Mary Pat Tyson, EPA
Mr. Tim Prendiville, EPA
Mr. Alan J. Howard, MDNR
Mr. William Bradford, MDNR
Mr. Mitch Adelman, MDNR
Mr. Bruce Van Otteren, MDNR / American Anodco File (I6)

AMERICAN ANODCO, INC.

IONIA, MICHIGAN

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

September 1993

DECISION SUMMARY

I. SITE DESCRIPTION

American Anodco, Inc. (Anodco) is located at 28 N. Beardsley Avenue approximately one mile east of Ionia, Michigan. The property occupies a portion of the SW 1/4 of section 16, and the NW 1/4 of section 21, Ionia Township (T7N, R6W), Ionia County. American Anodco, Inc. is an eight acre site bounded by Beardsley Avenue to the west, Prarie Creek to the north and east, and Main Street to the south. The area surrounding American Anodco is largely used for light industrial businesses. The nearest residents are located upgradient of the site, approximately 1/8 of a mile to the east. The nearest downgradient residents are west of Prairie Creek, approximately 900 feet from the site. The site is shown in Figures 1 and 2.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

American Anodco, Inc. cleans, brightens, anodizes and seals aluminum parts for the automotive industry. Beginning in 1962, the facility discharged process wastewater and chemicals from their anodizing process to an on-site seepage lagoon under an Order of Determination (permit) from the State of Michigan. In 1965, instead of discharging to the lagoon, American Anodco began reclaiming phosphoric acid and nitric acid, and reclaiming nickel acetate and sulfuric acid in 1978.

In 1978, Anodco began taking steps to obtain an upgraded groundwater discharge permit from the State of Michigan to discharge process water to the lagoon. As part of this application, Anodco conducted a hydrogeologic investigation to assess the impact of the lagoon on groundwater. These studies indicated elevated levels of inorganic chemicals, such as aluminum, chromium, copper, and lead, in the groundwater.

In 1984, the site was ranked by U.S. EPA under the Hazard Ranking System, and the site was then proposed to the National Priorities List (NPL) on June 10, 1986 and finalized on the list on March 31, 1989. Two hydrogeologic studies were performed at the site in 1982 and 1986. Both studies found only elevated phosphate levels downgradient of the lagoon with no impact on drinking water supplies.

In 1986 American Anodco began taking steps to phase out the seepage lagoon and discharge process wastewater to a new public sewer. The company began discharging process wastewater to the public sewer system in 1987. Also in 1987, the lagoon sludge was removed and disposed of in an off-site landfill, and the excavation was backfilled with clean soil. At the time of removal, samples of the lagoon sludge were collected and analyzed for EP toxicity. None of the samples taken exhibited leachable chemicals. Prior to backfilling with clean soil, samples were taken again and analyzed for EP toxic metals and organics, and again passed.

In July 1987, U.S. EPA contacted American Anodco and informed Anodco that U.S. EPA considered it to be a potentially responsible party ("PRP") with respect to the Beardsley Avenue facility. U.S. EPA also offered American Anodco the opportunity to conduct a Remedial Investigation/ Feasibility Study (RI/FS) at their facility to assess the environmental impact of the former lagoon. The RI/FS work plan was approved by U.S. EPA in September 1987. On

October 27, 1987, an Administrative Order on Consent for the RI/FS, U.S. EPA Docket #V-W-87-C-026, was executed between the sole PRP, American Anodco, Inc., and U.S. EPA. In August 1989 the RI Report was submitted to U.S. EPA. In February 1990, U.S. EPA requested that additional groundwater investigations be performed to more fully characterize groundwater conditions. In April of 1993 a Final RI Addendum, presenting the findings of the additional work, was completed. The key findings of the studies are summarized below.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

Community Interest with the site was minimal throughout the RI/FS process. In July of 1988, a fact sheet was sent out informing the public about the Superfund process and describing the activities planned for the RI/FS. U.S. EPA held an availability session at the Ionia Council Chamber on August 2, 1988, to discuss the RI/FS process and the site.

U.S. EPA released the Final RI Report and Addendum to the public on May 3, 1993, for public comment. These documents were made available to the public in both the administrative record, maintained at the U.S. EPA Docket Room in Region V and at the Ionia Public Library. These documents were also made available in the information repository maintained at the Ionia Public Library. The notice of availability of these two documents was published in the Grand Rapids Press, and the Ionia Sentinel on July 20, 1993.

The Proposed Plan was released to the public for comment on July 18, 1993. The notice published on July 20, 1993, in the Grand Rapids Press and the Ionia Sentinel announced the beginning of the 30-day public comment period. The public comment period concluded August 18, 1993. The Proposed Plan, and the published notice provided the public with the opportunity to request a Public Meeting to discuss the Remedial Investigation (RI) findings and the proposed alternative.

The public participation requirements of CERCLA sections 113 (k) (2) (B) (i-v) and 117 have been met in the remedy selection process. This decision document presents the selected remedial action for the Anodco site, in Michigan, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the NCP. The decision for this site is based on the administrative record.

IV. SCOPE & ROLE OF RESPONSE ACTION

This Record of Decision (ROD) addresses the final remedy for the site. U.S. EPA recommends that no further remedial action be taken at the Anodco site for the following reasons. Soil samples collected beneath the former lagoon were not EP toxic. Although the site has impacted site groundwater resulting in elevated levels of arsenic and other inorganic contaminants, the contaminant concentrations have decreased over time and the levels detected have been below Federal Safe Drinking Water Standards Maximum Contaminant Levels (MCLs), the levels which U.S. EPA defines as being protective of human health and the environment. Because contaminant levels are below MCLs, U.S. EPA has determined that exposure to site related contaminants do not pose an unacceptable risk to human health or the environment and that remedial action under Superfund is not warranted. U.S. EPA does believe that continued monitoring is warranted to ensure that contaminant levels do not increase. No five year review will be undertaken, but U.S. EPA will continue to require monitoring of the groundwater for

a period of twenty-four months. If after twenty-four months U.S. EPA determines that contaminant levels are increasing, or have exceeded MCLs, alternatives for addressing the increased risk will be evaluated. At a minimum, if monitoring has shown that contaminant concentrations have increased, groundwater monitoring will continue beyond the twenty-four month period. In addition, alternatives such as deed restrictions, additional groundwater monitoring, and/or groundwater treatment will be evaluated as ways to eliminate any unacceptable risk posed by the site.

V. SITE CHARACTERISTICS

Pursuant to the authorities under CERCLA, as amended, and the National Oil and Hazardous Substance Pollution Contingency Plan (NCP), an RI was conducted at the site. The RI was conducted in three phases. Phases I and II began in January 1988 and were completed in March 1989, Phase III was completed in April 1993. The RI also included a Risk Assessment to evaluate the level of risk to human health and the environment. This section summarizes the analysis presented in the RI report:

A) Site Topography

The topography of the American Anodco site is generally flat with a gentle slope toward the southeast. Along the northern boundary of the site, the topography drops approximately 20 feet to the floodplain of Prairie Creek, which is a tributary of the Grand River.

B) Site Geology

The Anodco site is located on glacial outwash in the valley of the glacial Grand River. The geology of this area is characterized by approximately 100 feet of unconsolidated glacial deposits consisting of sand, clay, gravel, and mixtures of these materials. The deposits overlie the Pennsylvanian Age bedrock of the Saginaw and Grand River Formations. Generally, these formations include interbeds of shale, limestone, sandstone, and some gypsum.

Based upon the soil samples collected during drilling operations, geologic materials at the site consist of interbedded sands and gravels with thin, discontinuous silt seams. Figure 3 is a geologic cross-section illustrating the geologic setting at the site.

C) Site Surface Water Hydrology

Prairie Creek is the only surface water body near the Anodco site. The surface hydrology around the Anodco site is controlled by this water body. Prairie Creek is a tributary to the Grand River. The Grand River flows across the lower portion of Michigan and eventually discharges to Lake Michigan. The groundwater flow pattern at the Anodco site is clearly influenced by Prairie Creek. The creek flows from the north to the south along the boundary of the American Anodco Property, approximately 600 feet east of the former lagoon area.

D) Site Hydrogeology

Groundwater was encountered at depths ranging from approximately 16 to 30 feet below the ground surface in an unconfined aquifer. Groundwater flows north to northeast across the former lagoon area toward the creek. Vertical gradients within the aquifer were neglible, indicating predominantly horizontal flow within the aquifer. The groundwater flow velocity in the lagoon area was estimated at 180 feet/year, or 0.5 feet/day.

The rate of groundwater flow across the former lagoon area to Prairie Creek was estimated using the minimum, maximum and average hydraulic conductivities (8.3×10^{-4}, 6.3×10^{-2} and 2.1×10^{-2} cm/sec, respectively), the horizontal gradient across the former lagoon area to the creek (0.0005 feet/foot), and by assuming that the zone of flow across the former lagoon area is 400 feet wide and 50 feet thick. These calculations resulted in a range in estimated flow to Prairie Creek of 0.0003 to 0.02 cubic feet per second (cfs), with an average estimated flow of 0.0007 cfs.

To evaluate the significance of a possible groundwater discharge from the former lagoon area to Prairie Creek, the estimated groundwater discharges were compared to worst case creek flow using 95% lowest creek flow for the lowest flow month. According to the MDNR, July and August are the lowest flow months with a 95% low flow of 18 cfs. A comparison of the estimated groundwater flow to the creek's low flow reveals that, under worst-case conditions, groundwater flow from the former lagoon area will account for 0.0015% to 0.11% of the Creek's flow. Use of the average conductivity results in a contribution of less than 0.04%. This coupled with the groundwater quality data indicates that groundwater flow from the former lagoon area will not have any significant impact on Prairie Creek.

EXTENT OF CONTAMINATION

1) Soils

In June, 1988, soil samples were collected below the former lagoon to check for residual contaminants that could potentially threaten future groundwater quality in the area. Samples were collected by drilling two soil borings (SB-101 and SB-102) through the fill material and into the underlying soils.

For comparison purposes, one background soil sample was also collected from an area remote from the lagoon near the west property boundary. The samples were analyzed for EP toxicity metals (Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, and Silver) and ortho-phosphate (as phosphorus).

The background soil sample (NS-1) was collected from a location approximately 25 feet west of OW-13. The sample was collected at a depth of four feet with a stainless steel hand auger. It was submitted to the U.S. EPA CLP laboratory (CAL) for analysis of EP toxicity metals and total ortho-phosphate.

The results of the EP toxicity tests conducted on two soil samples from beneath the former lagoon show that the remaining soils are not EP toxic.

The concentration of ortho-phosphate in these samples was found to be about 200 mg/kg, which is higher than the background soil concentration of <0.05 mg/kg. The phosphate contained in soils at the Anodco site is probably bound to metal ions, and metal phosphate in groundwater since removal of the lagoon. The leachable phosphate had already migrated through the groundwater system, and the phosphate remaining in the soil is relatively insoluble. Therefore, a future groundwater impact due to phosphate in the sub-lagoon soils is not expected.

2) Groundwater

Since 1988, three phases of groundwater sampling, and analysis has taken place at the site. Phase I sampling was conducted in June 1988, and Phase II took place in July 1989. In those two phases 17 monitoring wells were installed and sampled. Figure 2 shows the locations of all monitoring wells located at the site. In June 1991, four additional monitoring wells were installed to further characterize groundwater conditions. As part of the well installation procedures, vertical profile sampling was used to set the well screens at depths where maximum concentrations of contaminants were detected. In April 1992, all of the monitoring wells were re-sampled as Phase III. In September 1992, OW-6 was re-sampled for 1,1,1-TCA based upon an unusually high reading for the contaminant in the previous round of sampling.

Several inorganic contaminants were detected during the groundwater investigations. Tables 1 and 2 list the results of the sampling from Phase III of the groundwater investigations for both inorganic and organic contaminants. None of the contaminants detected were above MCLs, however, several were above background concentrations, indicating that the former lagoon has had some effect on groundwater quality. There appear to be plumes of arsenic, manganese and boron on-site. Arsenic was detected in wells OW-4, OW-5, OW-6, OW-7, OW-8, OW-9, OW-10D, OW-15D, OW-15S above background concentrations. Manganese was detected above background levels in wells OW-1, OW-3 through 12, OW-14, OW-15D, OW-15S, OW-16, OW-17, PWC-1, and PWC-2. Boron was detected above background in all on-site wells except for OW-13, OW-14, OW-15S, and OW-15D. Other contaminants found above background in the 1992 sampling were magnesium, nickel, zinc, and ammonia.

Nickel concentrations have decreased significantly since the removal of the lagoon. The highest level detected in 1988 was 105 ppb. In 1992 the highest level detected was 71.7 ppb, in the same well. This level is below MCLs, and all other federal standards for protection of human health and the environment.

Zinc concentrations, although above background, may be attributed to the type of casings used in the wells where zinc was detected. In most cases where zinc was detected galvanized steel riser pipes were used. In wells where PVC was used zinc concentrations were in line with background levels.

In 1988 ammonia was detected at 2.3 parts per million (ppm), exceeding criteria and standards for some purposes. The U.S. EPA Water Quality Criteria for Human Health is 0.5 ppm. Calculations using the data from 1988 showed that ammonia concentrations, once they reached Prairie Creek, would not exceed, and in fact be far below any standard set for surface water. In 1993 the highest detected concentration of ammonia in the groundwater was 0.88 ppm which again would not significantly impact surface water quality in the creek.

As evidenced from Table 3 the average concentrations of inorganics in the groundwater have been decreasing over time. Specifically, the average concentration for arsenic went from 10.9 parts per billion (ppb) in 1988 down to 7.1 ppb in 1992. At well OW-06, where the highest level of arsenic on site was detected at 27.3 ppb in 1988, in 1992 it was detected at 25.1 ppb. The average concentration of boron decreased from 517 ppb to 381 ppb.

Of the organic chemicals analyzed for only 1,1,1-trichlorethane (TCA) was detected above its MCL of 200 ppb at 270 ppb. This detection was at only one well and not congruent with previous sampling results. Subsequent sampling of that well for TCA confirmed that the 270 ppb was an anomoly. The analysis found only 3 ppb, consistent with previous results from that and the other on-site wells.

3) Surface Water and Sediments

In June of 1984 as part of the NPL listing process samples were taken from the surface water and sediments of Prairie Creek at three locations; one upstream, one down stream, and one mid-stream adjacent to the site property. The samples were analyzed for 24 inorganic parameters including arsenic. Table 4 summarizes the results from those samples. The results indicate that there is little measured difference between the upstream sample and both the downstream and adjacent samples, and that the site has had little to no effect on the creek. As discussed in Section V(D) above, the amount of groundwater contributed to Prairie Creek, even under worst case conditions, is minimal, further supporting the concept that the site has had no effect on surface water and sediment quality.

VI. RISK ASSESSMENT

The analytical data collected during the RI indicated the presence of contaminants in the groundwater. Even though all contaminants were detected below MCLs, indicating there are no unacceptable risks posed to human health or the environment a baseline risk assessment was performed, pursuant to the NCP, based upon potential future conditions at the site. The baseline risk assessment determines actual or potential risks or toxic effects the chemical contaminants at the site pose under current and future land use assumptions. The risk assessment assumes no corrective action will take place and that no site use restrictions or institutional controls such as fencing, groundwater use restrictions or construction restrictions will be imposed. The baseline risk assessment included the following specific assumptions:

- Contaminated aquifers may be used as a drinking water source;
- The site may be used for residential development;
- Access restrictions such as fencing will not preclude potential trespassers from getting into the site; and
- No groundwater use restrictions will be enforced.

The only media of potential concern for human exposure was identified as groundwater because of the prior removal of contaminated soils and sludges from the seepage lagoon. A list of contaminants found at the site was developed to determine the contaminants of concern for the site. Those contaminants that were reported very infrequently and at low concentrations were

eliminated from further consideration as contaminants of concern. All carcinogenic contaminants were included as contaminants of concern. The compounds selected as contaminants of concern for the baseline risk assessment include:

Ammonia
Arsenic
Boron
Nickel
Nitrate

Analytical data gathered from the on-site wells sampled indicated no exceedances in groundwater of Federal MCLs for inorganic constituents. Only 1-1-1 Trichloroethane (TCA) exceeded the MCL; however, since this was a one time occurence over a three year period, the presence of TCA is questionable and TCA was not selected as a contaminant of concern. Additional sampling has shown the one exceedance of the the MCL to be an anomoly.

Current risks for the receptor group was based on concentrations of contaminants actually found during monitoring in and around the site. For example, current risks to residents use concentrations found in the groundwater taken from on-site wells.

Potential future risks for residents are based on the conservative assumptions that future concentrations of contaminants in residential wells will be equal to the highest concentration of contaminants found in groundwater directly under the site, and that a residence could be built directly on the site, potentially exposing adults and children to contaminants in the soil through direct contact (See Section 5.0 and Appendix E of the 1993 RI Addendum Report for a complete discussion of the assumptions and formulas used in the Baseline Risk Assessment)

For each exposure pathway evaluated, carcinogenic and noncarcinogenic health risks were characterized for each risk scenario.

Reference doses (RfDs) have been developed by U.S. EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting non-carcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. Rfds are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse non-carcinogenic effects to occur.

Potential concern for non-carcinogenic effects of a single contaminant in a single medium is expressed as 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). 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. Any Hazard Index

value greater than 1.0 suggests that a non-carcinogen potentially presents an unacceptable health risk.

The hazard index for the worst case scenario, using maximum contaminant concentration, is 3.0, with the HI for arsenic alone at 2.3. Using average site related contaminant concentrations the HI is 0.8.

Cancer potency factors (CPFs) have been developed by U.S. EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans).

Two CPFs were used for arsenic. The second, least conservative CPF, includes a downward modifying factor of 10 (the modified CPF). Because the tumors upon which the CPF was based are benign skin tumors, U.S. EPA's Risk Assessment forum considers that risk estimates for arsenic can be modified downward by an order of magnitude relative to risk estimates associated with most other carcinogens. Skin cancers have a high cure rate in the United States because of ease of detection and efficacy of treatment.

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor for each contaminant of concern. 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 U.S. EPA generally attempts to reduce the excess lifetime cancer risk posed by a Superfund site to a range of $1x10^{-4}$ to $1x10^{-6}$ (1 in 10,000 to 1 in 1 million), with an emphasis on the lower end of the scale ($1x10^{-6}$). The following are the calculated carcinogenic risks from exposure to contaminated groundwater using the average and maximum contaminant concentrations, and both the unmodified and modified CPF:

Scenario	Cancer Risk
Average Concentrations/unmodified CPF	$1x10^{-4}$
Maximum Concentrations/unmodified CPF	$5x10^{-4}$
Average Concentrations/modified CPF	$1x10^{-5}$
Maximum Concentrations/modified CPF	$5x10^{-5}$

Under each scenario arsenic is the sole chemical contributing to the risk.

Based upon the calculations described above there does not appear to be an unacceptable carcinogenic risk posed by the site. When using the the worst case scenario and the

unmodified CPF the risk is $5x10^{-4}$, just outside the acceptable carcinogenic risk range of $1x10^{-4}$ to $1x10^{-6}$. However, using the modified CPF the risk falls within the range at $5x10^{-5}$.

The HI calculated for the site was 3.0 with the HI for arsenic alone at 2.3. The maximum concentration of arsenic detected at the site was 25 ppb. The MCL for arsenic is 50 ppb. OSWER Directive 9355.0-30, "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisons", states:

> "Chemical specific standards that define acceptable risk levels (e.g., non-zero MCLGs, MCLs) also may be used to determine whether an exposure is associated with an unacceptable risk to human health or the environment and whether remedial action under Section 104 or 106 is warranted. For ground water actions, MCLs and non-zero MCLGs will generally be used to gauge whether remedial action is warranted."

Therefore, because the concentration of arsenic, or any other site related chemical, has repeatedly been found to be below MCLs, U.S. EPA believes that there are no unacceptable risks, non-carcinogenic or carcinogenic, posed by the site.

VII. EXPLANATION OF SIGNIFICANT CHANGES

Based upon public comments on the proposed plan U.S. EPA has removed the requirement for monitoring of Prairie Creek to assess what impact the site has had on the surface water and sediments. A review of the existing site data has shown that there were samples taken from both the surface water and sediments of Prairie Creek by a U.S. EPA contractor in connection with the NPL listing process. These samples were taken around June of 1984, from three sampling locations; one upstream, one downstream, and one midstream adjacent to the site. Although arsenic was detected in the samples from the sediments, it was detected at each of the locations, indicating an elevated arsenic concentration in the entire area, and not attributable to site operations. Accordingly, U.S. EPA feels no need to monitor the creek, based upon available data.

VIII. STATUTORY AUTHORITY FINDING

EPA has determined that conditions at the site due to contamination by inorganic compounds pose no current or potential threat to human health or the environment. While the Anodco site does appear to exhibit trace amounts of inorganic contamination which result in slightly elevated calculations of potential future risk, EPA has also determined that the presence of these compounds does not appear to pose an unacceptable risk to human health or the environment, because all chemicals are below MCLs. The MCL for arsenic is 50 parts per billion. However, the state's standard for arsenic is 0.02 parts per billion, pursuant to Michigan Act 307 Type B standards. U.S. EPA has taken the position that the State ARAR is not triggered if there is no risk, and that the MCL is protective of human health and the environment. Accordingly, no further remedial action will be undertaken. EPA will, however, require that groundwater monitoring continue for a period of 24 months. If after twenty-four months U.S. EPA determines that the remedy is no longer protective, alternatives for addressing the increased risk will be evaluated. At a minimum, if monitoring has shown that contaminant concentrations have increased, groundwater monitoring will continue beyond the twenty-four month period. In addition, alternatives such as deed restrictions, additional groundwater monitoring, and/or groundwater treatment will be evaluated as ways to eliminate any unacceptable risk posed by the site.

As this is a decision for "No Action", the statutory requirements of CERCLA Section 121 for remedial actions are not applicable and no five year review will be undertaken.

Responsiveness Summary

This Responsiveness Summary has been prepared to meet the requirements of Sections 113(k)(2)(B)(iv) and 117(b) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (CERCLA), which requires the United States Environmental Protection Agency (EPA) to respond "...to each of the significant comments, criticisms, and new data submitted in written or oral presentations" on a proposed plan for a remedial action. The Responsiveness Summary addresses concerns expressed by the public, potentially responsible parties (PRPs), and governmental bodies in written and oral comments received by EPA and the State regarding the proposed remedy for the American Andoco Inc. site.

A. Overview

1. Background/Proposed Plan

American Anodco, Inc. is an eight acre site, located on Beardsley Avenue approximately one mile east of Ionia, Michigan. The site is bounded by Beardsley Avenue to the west, Prarie Creek to the north and east, and Main Street to the south. The area surrounding the site is largely used for light industrial businesses. The company cleans, brightens, anodizes and seals aluminum parts for the automotive industry. Beginning in 1962, the company discharged process wastewater and chemicals from their operations to an on-site seepage lagoon. In 1965, instead of discharging them to the lagoon, the company began reclaiming phosphoric and nitric acid, nickel acetate and sulfuric acid in 1978.

Between 1978 and 1986 the company installed and sampled several ground water monitoring wells under the supervision of the MDNR. These studies indicated elevated levels of inorganic chemicals in the groundwater.

In 1986 the company began taking steps to phase out the seepage lagoon and discharge process wastewater to a new public sewer. The company began discharging process wastewater to the public sewer system in 1987. Also in 1987, the lagoon sludge was removed and diposed of in an off-site landfill, and the excavation was backfilled. In the late 1980's the company built a plant extension over the former lagoon area.

The U.S. EPA became involved with this site in 1984 when it scored the site under the Hazard Ranking System. Based upon that score, the site was proposed to the National Priorities List

(NPL) on June 10, 1986 and finalized on March 31, 1989.

Sampling and testing of the groundwater was performed during the Remedial Investigation (RI) to determined the nature and extent of contamination. The RI found that although the former lagoon area impacted groundwater quality onsite, the levels of chemicals found in the groundwater are not above acceptable standards, and therefore pose no threat to human health or the environment.

The proposed plan for the site suggested that no action be taken, but that monitoring of the groundwater and Prairie Creek be performed to ensure that contaminant levels remain at acceptable levels.

2. Public Comment Period

A public comment period on the proposed plan for this Site was held from July 20, 1993 to August 18, 1991. In the proposed plan and the advertisement in the local newspaper, an opportunity was extended to the public for a public meeting. Only one person requested that a meeting be held. Based upon the lack of public interest in the site it was decided not to hold a meeting. The one person requesting the meeting was contacted, informed of the Agency's decision, and her comments and questions were solicited at that time.

Four parties commented on the proposed plan during the public comment period; the MDNR, the potentially responsible party, and two private citizens.

B. Community Involvement

The level of public interest regarding this Site has been minimal since the listing of the Site on the National Priorities List (NPL). The two private citizens who commented on the proposed plan had opposing views on the selected remedy; one being for the no action remedy and the other being opposed to merely studying the problem rather than taking action.

C. Summary of Significant Comments

The public comments regarding the American Anodco Site are organized into the following categories:

- Summary of comments from the PRPs regarding the proposed plan;
- Summary of Comments from the local community regarding the proposed plan;
- Summary of comments from MDNR and local government officials regarding the proposed plan.

Many of the comments below have been paraphrased in order to effectively summarize them in this document. The reader is referred to the Administrative Record for this Site, located at the Ionia Public Library, which contains copies of all written comments submitted to EPA.

Comments from the Potentially Responsible Parties ("PRP")

Comment 1:

The PRP concurs with the conclusion that there is no unacceptable risk associated with this site, and that no remedial action is necessary.

Response 1

U.S. EPA acknowledges the comment.

Comment 2:

The PRP disagrees that there is not sufficient data to adequately assess what impact the site has had on Prairie Creek, and further disagrees that additional sampling of the surface water and sediment of the Creek is necessary. They cite several reasons for their disagreement. First, they state that the RI Addendum, which was approved by U.S. EPA, concluded that even under worst-case conditions groundwater flow from the former lagoon area would not have any significant impact on the creek. Second, they cited samples taken by a U.S. EPA contractor from the surface water and sediments of Prairie Creek, which demonstrated no impact from the site. Lastly, they state that the Michigan Department of Public Health has concluded that the creek will not be impacted by groundwater flow from the site.

Response 2:

U.S. EPA has reviewed the data referred to by the commentor and agrees. The data collected by Ecology and Environment, a U.S. EPA contractor, do show that the site has not impacted the quality of the surface water and sediments of Prairie Creek. Therfore, U.S. EPA will not require that the creek be monitored at this time.

Comment 3:

The PRP disagrees with a comment made by MDNR in a letter to U.S. EPA which stated that all wells downgradient of the former lagoon area should be monitored. They argue that extensive monitoring of the site has been performed since 1982 and it has demonstrated that the site poses no unacceptable risks. They believe that only the outermost downgradient wells should be required to be monitored to ensure that contaminants are decreasing over time

and are not migrating off-site.

Response 3:

U.S. EPA disagrees with the commentor. In order to assess whether contaminant levels are increasing over time more wells than those proposed will need to be monitored. The impact of the site on on-site as well as off-site groundwater is a concern of both the MDNR and U.S. EPA. Monitoring the wells farthest downgradient from the former lagoon area will only indicate if contaminants may potentially migrate off-site. It will not give a complete picture of the groundwater quality on the American Anodco property or tell us if the contaminant levels in on-site groundwater has exceeded acceptable levels. Monitoring additional wells, near the former lagoon area will indicate if on-site groundwater conditions are degrading over time and if additional action is required to reduce and/or prevent exposure to those levels. In addition, monitoring the wells furthest downgradient will indicate whether site-related contaminants may potentially migrate off-site. The actual number and locations of monitoring wells that will be sampled will be determined by U.S. EPA.

Comment 4:

The PRP disagrees with the MDNR's position that the alternatives presented in the draft feasibility study fail to comply with Rule 299.5717(3)(1) of the Michigan Administrative Code (Rule 717(3) because it does not provide all of the information required by the rule. The PRP states that the Rule 717(3) does not require that all the factors listed in the rule be provided in every instance; only as appropriate. They state that U.S. EPA appropriately determined that an evaluation of an alternative involving active remediation of the groundwater was not necessary. They further argue that Rule 717(3) is a procedural rule and therefore is not required to be met for a remedial action at a Superfund site.

Response 4:

U.S. EPA acknowledges the comment.

Comment 5:

The PRP disagrees with MDNR's position that Rule 299.5705(6) of the Michigan Administrative Code (Rule 705(3)) should be considered an ARAR at this site and therefore some remediation of the groundwater which removes the contaminants from the aquifer must be implemented.

Response 5:

U.S. EPA acknowledges the comment. In accordance with the April 22, 1991 U.S. EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9355.0-30, U.S. EPA has determined that because the contaminant levels in the groundwater do not exceed federal safe drinking water standards, there is no unacceptable risk at this site and, therefore, ARARs are not triggered. Subsequently, Rule 299.5705(6) does not apply to this site and remediation of the aquifer is not required.

Comment 6:

The PRP disagrees with MDNR's position that Michigan's Act 307 Type A/B standard of 1 µg/L should be considered. They first cite the fact that the alternatives considered in the draft feasibility study were developed to comply with the Type C requirements (rather than Type A of Type B) by eliminating site-specific pathways of exposure based upon reasonably foreseeable areas of the site and natural resources in question. Second, they cite information provided by the Michigan Department of Public Health ("MDPH") which indicate that many public water supply wells routinely contain arsenic levels comparable to those found at the American Anodco site and much higher than the Type A/B standard of 1 µg/L. Lastly they state that the Michigan has high naturally occurring arsenic levels in groundwater in many areas of the state. They cite an MDPH memo which states, "it is unlikely, however, that the goal of reducing the maximum observed arsenic concentration in groundwater to below 5 µg/L ... can be achieved.

Response 6:

U.S. EPA acknowledges the comment. At this time U.S. EPA is not setting a cleanup standard for the site, because we have determined that there is not an unacceptable risk posed by the site, and, therefore, remediation is not necessary. In reaching our conclusions concerning the risk posed by the site, MCL's were used as the standard, in accordance with the April 22, 1991 U.S. EPA Office of Solid Waste and Emergency Response ("OSWER") Directive 9355.0-30. U.S. EPA will continue to monitor the groundwater and assess the risk posed by the site. As part of the assessment MCLs and/or the risk assessment process will be used to determine if additional action, beyond the limited groundwater monitoring, will be required in the future.

<u>Comments from the General Public</u>:

Comment 7:

One commentor states that the action already taken by EPA, MDNR, and American Anodco has been appropriate and has solved any contamination problem that existed.

Response 7:

U.S. EPA acknowledges the comment.

Comment 8:

One commentor states that U.S. EPA is using the citizens as guinea pigs to determine if there are "safe" levels of contamination. They question why they must wait for further study and monitoring of the site, and why the previous study was not sufficient to allow us to come to any decision. They state that the EPA should act, and not conduct ongoing studies when there is a possible threat to the health and lives of the citizens.

Response 8:

U.S. EPA disagrees with the commentor. Adequate studies have been performed at the site to determine what action needs to be taken. The studies have shown that the site does not pose an unacceptable risk to the public and therefore we have selected to take no action here. We do acknowledge that the site has impacted groundwater quality in the vicinity of the former lagoon area, and we are proposing to continue to monitor the groundwater to ensure that contaminant levels remain at protective levels, i.e., below MCLs. If levels increase, above protective levels, U.S. EPA will evaluate and propose additional actions to ensure that human health and the environment are protected.

<u>Comments from the State of Michigan</u>:

Comment 9:

The Michigan Department of Natural Resources ("MDNR") conceptually supports the recommended alternative of no action, with monitoring of the site. They recognize that the current language of the Michigan Environmental Response Act (MERA), 1982 PA 307, as amended, R299.5705(6) may not be consistent with such a remedy. However, MDNR has already proposed legislation to modify the rule to allow for such conditions as exist at this site, where it could be technically difficult to remove low level contamination from an aquifer. Therefore, they can understand the EPA may wish to waive this rule. MDNR must still require deed restrictions be imposed until such time as aquifer contaminant concentrations fall within MERA criteria. Regarding the need for deed restrictions, it should be noted that site concentrations of arsenic in groundwater exceed MERA drinking water criteria, and approach the MCL, which is an interim value, and not yet considered final.

They suggest that at first, review of the site conditions might

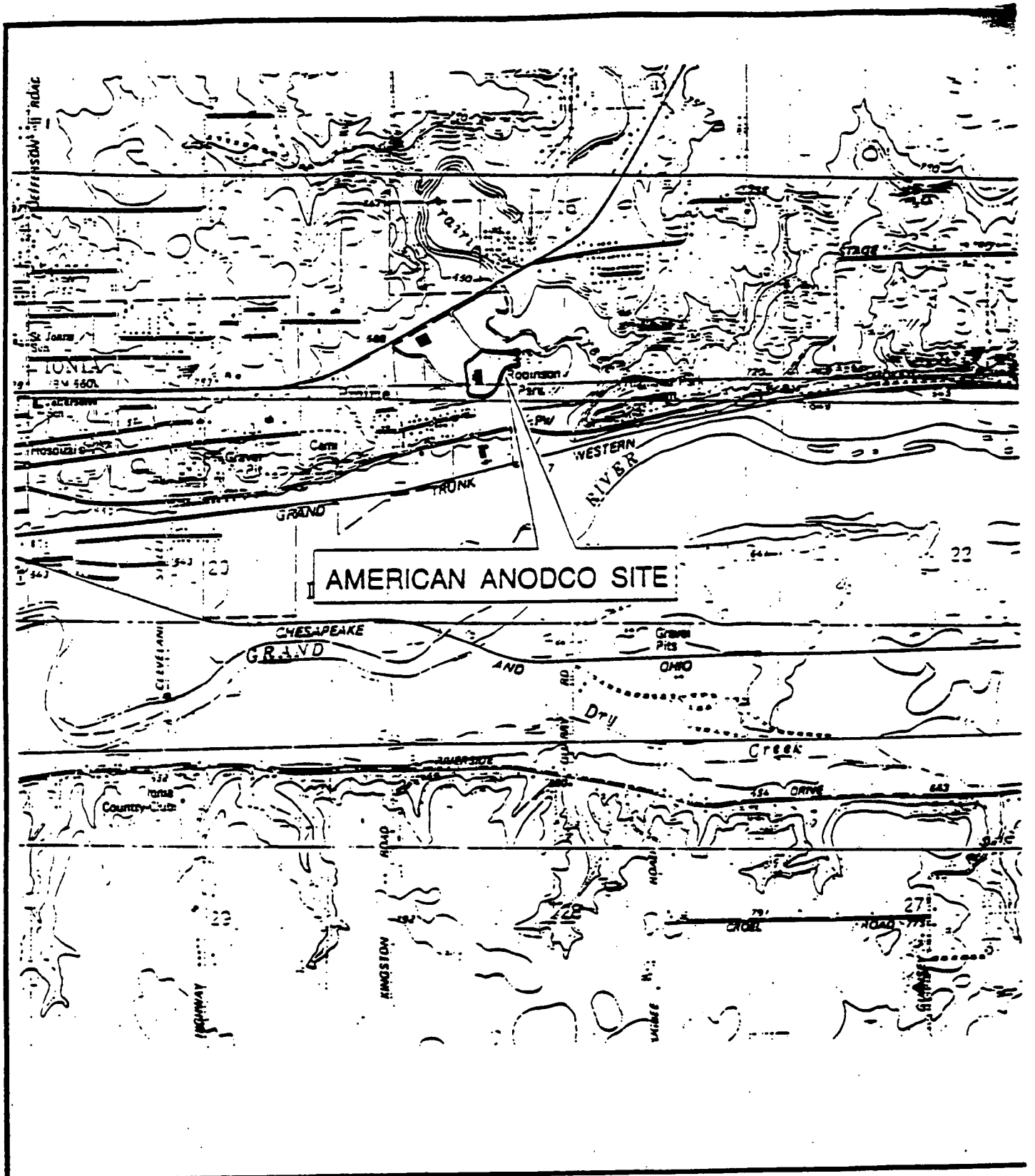
indicate that active groundwater remediation might be impracticable. However, it is important in their evaluation of the alternatives that they be provided site specific information on the technical feasibility and cost-effectiveness of active groundwater remediation as required by MERA Rule 299.5717(1). This could consist of evaluating as simple a system as pumping from a single extraction well and treating the extracted water.

MDNR has some concerns with U.S. EPA's evaluation of the baseline risk assessment. They do not like to see U.S. EPA allow exceedances of the acceptable risk range. They realize that at this site the point source has been removed, and the groundwater contaminant concentrations are continually decreasing, and active extraction of contamination appears difficult. However, they would prefer that U.S. EPA acknowledge the risks that exist at the site, and require deed restrictions, and monitoring which continues until the risks become acceptable. Such a plan would of course include five year reviews.

Response 9:

U.S. EPA disagrees with the commentor. In accordance with the April 22, 1991 U.S. EPA Office of Solid Waste and Emergency Response ("OSWER") Directive 9355.0-30, "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions", U.S. EPA has determined, based upon a chemical specific standard that defines acceptable risk levels (i.e., MCLs), that this site does not pose a risk to human health and the environment. Therefore ARARs are not triggered and Michigan Act 307 and its associated rules need not be met by the selected remedy. The Agency does recognize that the risk assessment did calculate a risk from ingestion of the site groundwater, due solely to the low levels of arsenic detected there. However this risk is not inconsistent with risks posed by other drinking water sources in Michigan which have similar levels of arsenic. Because it has been determined that there is currently no unacceptable risk posed by the site, U.S. EPA does not believe it is necessary to impose deed restrictions on the property. The site will continue to be monitored, for a period of at least two years, to demonstrate that contaminant concentrations will not increase over time. If that monitoring indicates that concentrations are increasing, additional actions to address the increasing risk will be evaluated. However, because this is a no action remedy, five-year reviews will not be required.

APPENDIX 1: Figures



SCALE

0 1000 2000 3000 FEET

Taken from the Ionia, Michigan, U.S.G.S 7.5 series topographic quadrangle map, 1978.

Site boundary as shown in Aerial Photographic Analysis of the American Anodco Site, Ionia, MI. U.S. EPA, October 1986 (p.6)

QUADRANGLE LOCATION

FIGURE 1

SITE LOCATION MAP
AMERICAN ANODCO, INC.
IONIA, MICHIGAN

ABB ENVIRONMENTAL SERVICES, INC.

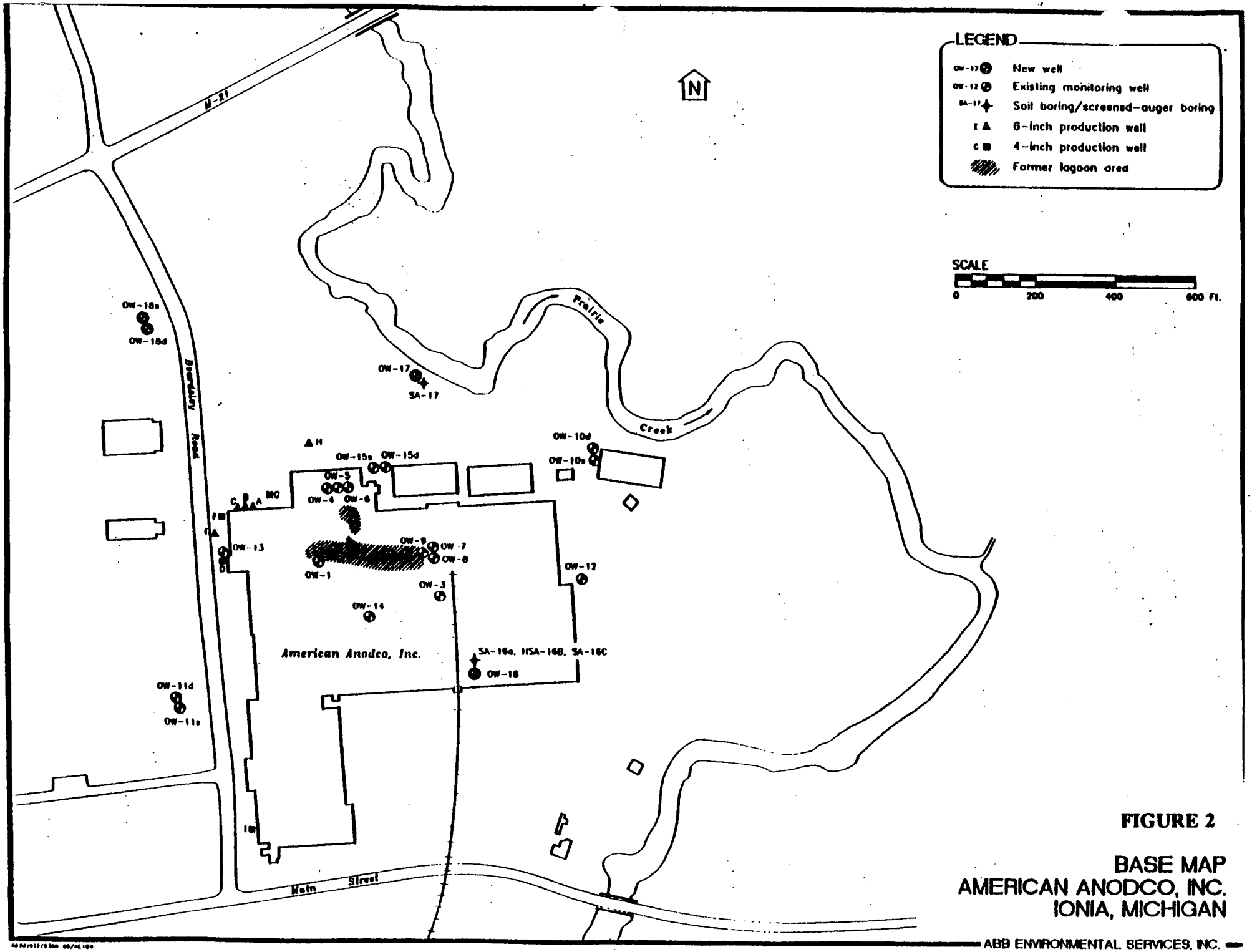
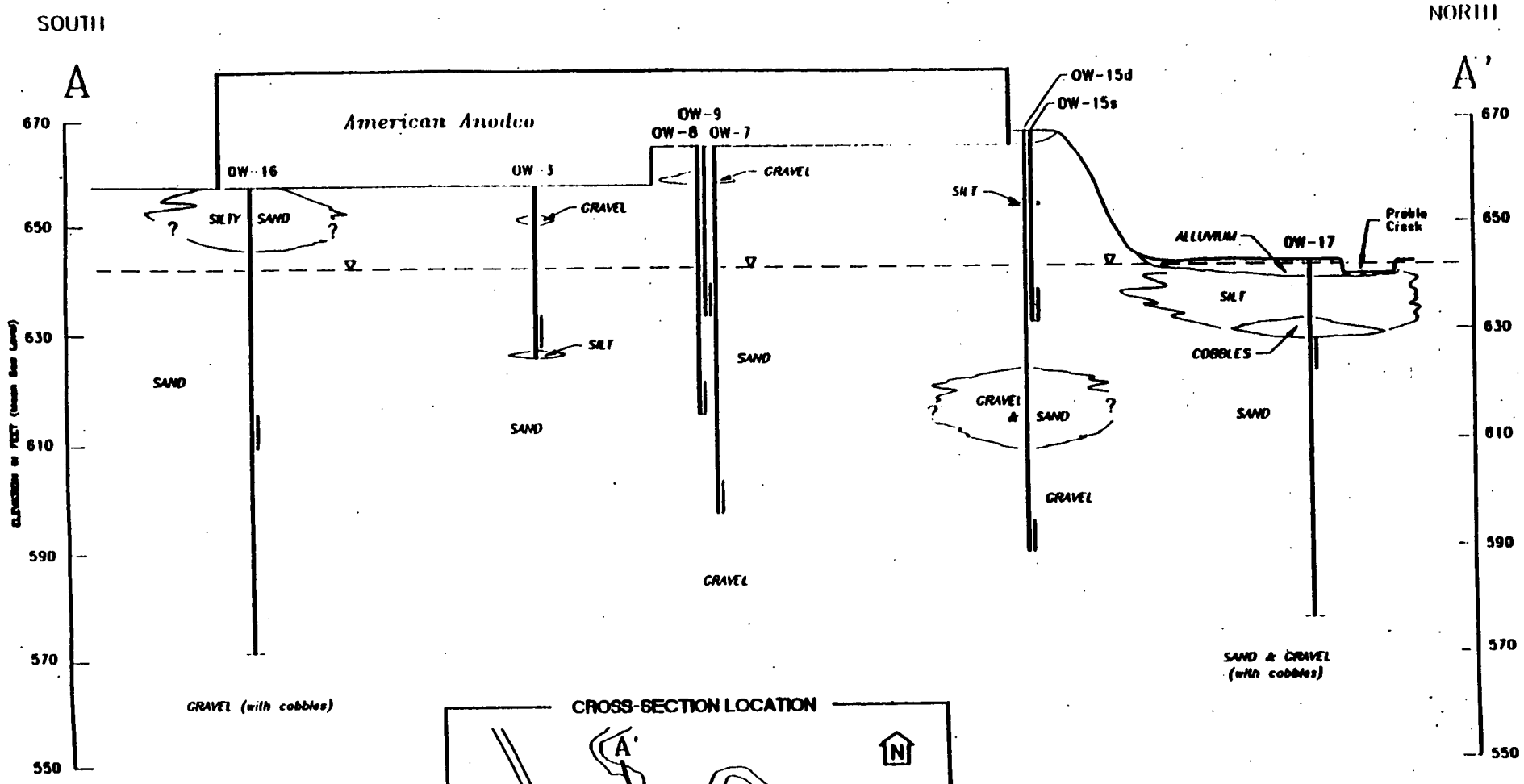
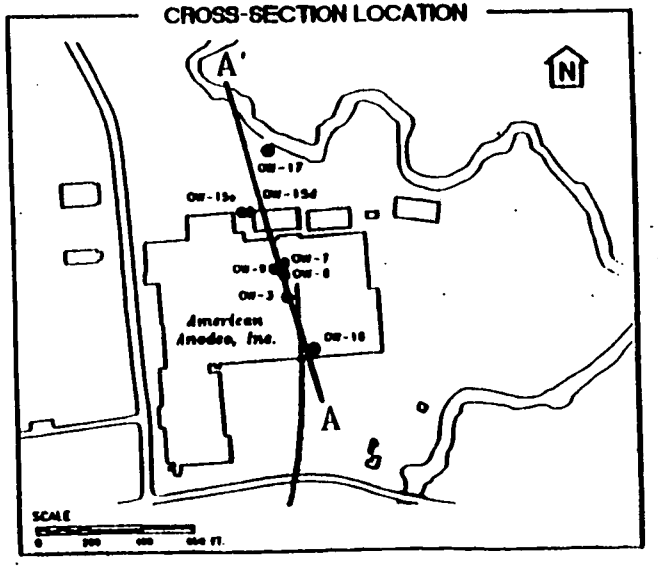


FIGURE 2

BASE MAP
AMERICAN ANODCO, INC.
IONIA, MICHIGAN

ABB ENVIRONMENTAL SERVICES, INC.





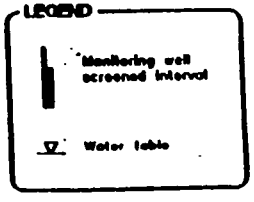


FIGURE 3

GEOLOGIC CROSS SECTION A-A'
AMERICAN ANODCO, INC.
IONIA, MICHIGAN

APPENDIX 2: Tables

TABLE 1

SUMMARY OF RESULTS FOR INORGANIC ANALYSIS

AMERICAN ANODIZE, INC.

Ionia, Michigan

April 1992

UNITS	Aluminum µg/L	Antimony µg/L	Arsenic µg/L	Barium µg/L	Calcium µg/L	Chromium µg/L	Cobalt µg/L	Copper µg/L	Iron µg/L	Magnesium µg/L	Manganese µg/L	Nickel µg/L	Potassium µg/L	Silver µg/L	Sodium µg/L	Vanadium µg/L	Zinc µg/L	Boron µg/L	Cyanide µg/L	Ammonia mg/L	Chloride mg/L	Nitrate + Nitrite mg/L	Phosphorus mg/L	Sulfate mg/L
OW-01	-	-	-	-	70,000	9 B	-	-	-	20,300	55.2	15.8 B	2,560 B	-	26,000 B	-	-	142	-	-	120	-	3.6 B	19 B
OW-03	-	-	-	36.5 B	90,300	-	-	-	-	28,600	21.7	-	2,000 B	-	14,100 B	-	1,010	285	-	-	18	0.5 B	-	29 B
OW-04	-	-	12.3	-	120,000	-	-	-	-	31,600	285	9.6 B	7,050	-	36,200 B	-	292	212	-	0.68	140	0.01 B	18 B	46 B
OW-05	-	-	6.7 BJ	-	136,000	-	-	-	-	32,100	204	22.8 B	7,050	-	41,600 B	-	-	319	-	0.23	93	0.65 B	21.01 B	41 B
OW-06	-	-	25.1	-	164,000	-	4.1 B	-	5,130	35,800	419	38.1 B	4,690 B	-	46,200 B	-	335	681	-	-	71	-	18 B	88 B
OW-07	-	-	9.6 BJ	-	121,000	-	4.8 B	-	-	35,600	298	9.4 B	4,500 B	-	45,500 B	-	-	159	6.7	-	120	-	8.41 B	71 B
OW-08	-	-	14.2	-	104,000	-	5.8 B	-	109	29,100	220	30.3 B	2,000 B	-	15,600 B	-	266	320	-	-	44	3 B	18 B	66 B
OW-09	-	-	9.3 BJ	-	130,000	-	-	-	-	40,500	104	71.7	6,100	-	31,900 B	3.5 B	124	769	-	-	26	13.01 B	17.01 B	36 B
OW-10D	-	-	4.3 BJ	-	311,000	-	-	-	2,710	64,900	60.4	-	4,360 B	-	96,000 B	-	-	1,560	-	0.47	150	0.38 B	-	610 B
OW-10S	-	-	-	63.2 B	104,000	-	-	-	-	32,300	9.4 B	-	5,090	-	20,300 B	-	-	307	-	-	36	0.33 B	-	87 B
OW-12	-	-	-	49 B	80,100	-	-	-	-	21,100	31.5	-	-	-	-	-	-	24.1 B	-	-	-	1.4 B	-	16 B
OW-13	-	-	-	-	82,000	-	-	-	-	21,300	-	-	1,730 B	-	30,400 B	-	-	-	-	-	110	3.2 B	-	15 B
OW-13 (Dup)	-	22.1 B	-	-	82,400	-	-	-	-	21,000	4.7 B	-	1,840 B	-	68,900 B	-	-	-	-	-	110	3.5 B	-	15 B
OW-14	-	-	-	49.6 B	107,000	-	-	-	-	34,900	103	-	1,540 B	-	9,930 B	-	-	-	-	-	53	-	-	43 B
OW-15D	-	-	20.5	-	140,000	-	4.5 B	-	-	43,500	760	13.7 B	5,140	-	60,600 B	-	-	1,000	-	0.1	130	-	22 B	150 B
OW-15S	-	-	17.2	-	155,000	11.8	4.5 B	-	125	44,300	2,090	35.5 B	4,020 B	-	46,000 B	-	-	-	-	-	74	4.8 B	19 B	110 B
OW-15S (Dup)	-	-	16.9	-	150,000	-	5.1 B	-	-	45,600	2,970	25.2 B	4,190 B	-	49,300 B	-	-	1,040	-	-	74	4.6 B	18 B	110 B
OW-16	-	-	-	77.8 B	130,000	-	-	-	-	42,900	1,350	6 B	25,200	-	36,800 B	-	-	390	-	0.24	98	2.5 B	-	41 B
OW-16 (Dup)	-	-	-	82.5 B	130,000	-	5.3 B	-	-	42,600	1,350	-	25,600	-	37,500 B	-	-	399	-	0.17	99	2.2 B	-	41 B
OW-17	-	30.2 B	-	9.5 B	97,700	-	-	-	-	24,300	186	-	1,800 B	-	26,900 B	-	-	102 B	-	0.49	46	-	5.2 B	71 B
FWC-1	-	-	3.2 BJ	30.3 B	154,000	-	-	-	-	38,000	106	16.5 B	3,280 B	-	112,000 B	-	-	181	-	-	240	4.1 B	7.2 B	96 B
FWC-2	-	-	4.5 B	30.6 B	155,000	-	-	-	216	33,000	173	-	2,970 B	-	65,600 B	-	-	171	-	0.12	120	0.91 B	3.3 B	140 B
OFF-SITE WELLS																								
OW-11D	-	25.1 B	-	-	110,000	-	-	-	1,160	39,500	32.1	-	2,800 B	6.1 B	47,100 B	3.8 B	-	-	-	0.11	140	-	-	55 B
OW-11S	-	-	-	41.3 B	97,500	12.3	-	-	-	24,300	-	9.4 B	3,220 B	-	52,100 B	-	-	-	-	-	51	6.2 B	-	28 B
OW-18D	-	-	-	47.9 B	124,000	-	-	-	-	32,800	-	-	-	-	53,500 B	-	-	-	-	-	140	2.6 B	-	99 B
OW-18S	-	-	-	38.2 B	81,300	-	-	-	-	21,000	-	-	-	-	42,000 B	-	-	-	-	-	69	1.9 B	-	13 B
MNHR ACT 307 CRITERIA[7]																								
Health-Based	NA	3	1.8[8]	2,000	NA	100 (Cr6+) 2,000 (Cr3+)	NA	1,300	NA	NA	700	100	NA	40	150,000	NA	1,000	600	100	NA	NA	10 (NO3) 1 (NO2)	NA	NA
Aesthetic	50 - 200	NA	NA	NA	NA	NA	NA	NA	300	NA	50	NA	NA	100	NA	NA	5,000	NA	NA	NA	250	NA	NA	250
GSI[5]	NA	NA	11[10]	NA	NA	1.7 (Cr6+) 7.7 (Cr3+)	NA	18	NA	NA	NA	57	NA	0.1	NA	NA	81	NA	3.6	NA	NA	NA	NA	NA
FEDERAL MAXIMUM CONTAMINANT LEVEL FOR DRINKING WATER[6]																								
MCL	-	206 (u)	50 (*)	2,000	-	100	-		300 (s)	-	50 (s)	100 (p)	-	-		- (l)	5,000 (s)	- (l)	200 (p)	-	250 (s)	10	-	500/250 (p)

NOTES:

1. Analyses undetected in all samples are not listed.
2. Dashed lines indicate that the analyte was undetected.
3. J - Estimated value. One or more laboratory quality control parameters were outside control limits.
4. B - The result is a value greater than or equal to the instrument detection limit, but less than the contract required detection limit (CRDL).
5. GSI - Groundwater Surface Water Interface.
6. NA - not available.
7. MDNR Act 307 Criteria source: "MERA Operational Memorandum #8, Revision 1 - Type B Criteria Rules", MDNR, March 16, 1992
8. Regulatory guidance source: "Drinking Water Regulations and Health Advisories", Office of Water, USEPA, November 1992.
9. Acceptable MDL. In 1.0 mg/l and is under criteria.
10. (s) = Secondary Maximum Contaminant Level, for aesthetics
11. (p) = Proposed regulatory guidance level.
12. (l) = Listed for regulation.
13. (*) = MCL under regulatory review
14. National Toxics Rule value of 1.4 µg/l is exceeded 11 µg/l.

TABLE 2

SUMMARY OF RESULTS FOR ORGANIC ANALYSIS
AMERICAN ANODCO, INC.
Ionia, Michigan
April 1992

UNITS	Chloroform µg/L	1,1,1-Trichloroethane µg/L	Trichloroethene µg/L	Tetrachloroethene µg/L	Toluene µg/L
OW-01	-	-	-	-	-
OW-03	-	-	-	-	-
OW-04	-	-	1 J	-	-
OW-05	-	-	-	-	-
OW-06	-	270	-	2 J	-
OW-06 (9/92)	-	3 J	-	2 J	-
OW-07	-	-	-	-	-
OW-08	-	-	-	-	-
OW-09	1 J	-	-	-	-
OW-10D	-	-	-	-	-
OW-10S	-	-	-	-	-
OW-12	-	-	-	-	-
OW-13	-	-	-	-	-
OW-13 (Dup)	-	-	-	-	-
OW-14	-	-	-	-	-
OW-15D	-	-	-	-	-
OW-15S	-	-	-	-	-
OW-15S (Dup)	-	-	-	-	-
OW-16	-	-	-	-	-
OW-16 (Dup)	-	-	-	-	-
OW-17	-	-	-	-	-
PWC-1	-	-	-	-	-
PWC-2	-	-	-	-	-
OFF-SITE WELLS					
OW-11D	-	-	-	-	-
OW-11S	-	-	-	-	1 J
OW-18D	-	2 J	-	-	-
OW-18S	-	1 J	-	-	-
MDNR ACT 307 CRITERIA					
Health-Based	6	200	3	0.7	1,000
Aesthetic	NA	NA	NA	NA	800
GSI	43	120	94	16	110
FEDERAL MAXIMUM CONTAMINANT LEVEL FOR DRINKING WATER[7]					
MCL	100 (T)	200	5	5	1,000

Notes:

1. Analytes undetected in all samples are not listed.
2. Dashed lines indicate that the analyte was undetected.
3. J – Estimated value. Concentration exceeded the instrument detection limit but was less than the USEPA Contract Required Detection Limit.
4. GSI – Groundwater/Surfacewater Interface.
5. NA – Not available.
6. MDNR Act 307 Criteria Source: "MERA Operational Memorandum #8, Revision 1 – Type B Criteria Rules", MDNR, March 16, 1992.
7. Source: "Drinking Water Regulations and Health Advisories", Office of Water, USEPA, November 1992.

TABLE 3

COMPARISON OF RANGES AND AVERAGE VALUES FOR ON-SITE WELLS
AMERICAN ANODCO, INC.
Ionia, Michigan

		1988/1989 ON-SITE WELLS				1992 ON-SITE WELLS			
	Units	No. of Samples	RANGE		AVERAGE	No. of Samples	RANGE		AVERAGE
Aluminum	ug/L	14	28.3 U -	60	29.3	22	ND -	ND	ND
Antimony	ug/L	0	not analyzed			22	22 U -	38.2	13.1
Arsenic	ug/L	28	1.4 U -	28	10.9	22	2 U -	25.1	7.1
Barium	ug/L	0	not analyzed			22	1 U -	82.5	21.8
Calcium	ug/L	14	71.120 -	141.200	114.062	22	69.100 -	311.000	124.277
Chromium	ug/L	14	2.1 U -	3	1.3	22	8 U -	11.8	4.6
Cobalt	ug/L	0	not analyzed			22	4 U -	5.8	2.9
Copper	ug/L	14	2.9 U -	6	2.1	22	ND -	ND	ND
Iron	ug/L	0	not analyzed			22	39 U -	5.520	433
Magnesium	ug/L	14	19.890 -	51.850	31.951	22	20.200 -	64.900	34.745
Manganese	ug/L	0	not analyzed			22	3 U -	2.970	528
Nickel	ug/L	14	17 U -	105	24.0	22	6 U -	71.7	14.8
Potassium	ug/L	14	819 -	14.050	4.272	22	1.060 U -	25.400	5.632
Silver	ug/L	0	not analyzed			22	5 U -	2.5	2.5
Sodium	ug/L	14	2.690 -	72.780	38.861	22	2.700 U -	112.000	44.563
Vanadium	ug/L	0	not analyzed			22	3 U -	3.5	1.6
Zinc	ug/L	14	6 -	3.105	304	22	43.4 U -	1.030	99.3
Boron	ug/L	14	100 U -	2.130	517	22	5 U -	1.560	381
Cyanide	ug/L	14	10 U -	12	5.5	22	0.1 U -	6.7	2.8
Ammonia	mg/L	28	0.1 U -	2.3	0.400	22	0.1 U -	0.88	0.2
Chloride	mg/L	14	3.9 -	162	79.6	22	1 U -	240	90
Nitrate + Nitrite	mg/L	0	not analyzed			22	0.01 U -	13.01	2.4
Nitrate	mg/L	14	0.5 U -	9.8	3.1	0	not analyzed		
Total Phosphorus as P	mg/L	0	not analyzed			13	3.3 -	22	13.4
o-Phosphate as P	mg/L	14	0.05 U -	9.54	0.70	0	not analyzed		
Sulfate	mg/L	14	33.3 -	230	103	22	1.5 -	610	89

Notes:

1. U - undetected value. The value shown is the instrument detection limit.
2. ND - Not detected.
3. Average calculations were performed by using one-half the detection limit for non-detected values. For compounds not detected in any samples, no average was calculated and the average is shown as ND.

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TABLE 4

Summary of Prairie Creek Surface Water and Sediment Results				
Surface Water µg/L	[illegible]	[illegible]	[illegible]	[illegible]
Arsenic	<10	<10	<10	<10
Iron	484	650	1120	640
Manganese	59	77	63	65
Zinc	11	30.9	26.4	36
Sediment mg/kg				
Aluminum	1410	1750	1465	1350
Arsenic	3.4	4.2	3.8	3.8
Barium	24.5	33.8	27.0	26.4
Cadmium	12	0.06	<0.05	0.15
Chromium	2.7	3.3	2.8	2.7
Copper	4.4	4.8	4.4	4.6
Iron	4175	5450	4900	4550
Lead	0.8	0.7	4.7	4.1
Manganese	304	315.5	262.5	241
Nickel	<2.0	2.6	3.8	<2.0
Selenium	<0.1	0.2	0.2	0.15
Zinc	11.1	12.3	13.5	11.5