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DECISION DOCUMENT FOR THE REMEDIATION OF

Glacier Clevite Heavywall Bearings Plant

Morgan County, Ohio

prepared by

THE OHIO ENVIRONMENTAL PROTECTION AGENCY

September 15, 2005

I certify this to be a true and accurate copy of the official document as filed in the records of the Ohio Environmental Protection Agency.

By: _____ Date 10-19-05

DECLARATION

SITE NAME AND LOCATION

Glacier Clevite Heavywall Bearings (GCHB)
McConnelsville, Ohio

STATEMENT OF BASIS AND PURPOSE

This Decision Document presents the selected remedial action for the Glacier Clevite Heavywall Bearings Site in McConnelsville, Ohio, chosen in accordance with the policies of the Ohio Environmental Protection Agency, statutes and regulations of the State of Ohio, and the National Contingency Plan, 40 CFR Part 300.

ASSESSMENT OF THE SITE

Actual and threatened releases of industrial solvents from historical operations and waste disposal at the Site, if not addressed by implementing the remedial action selected in the Decision Document, constitute a substantial threat to public health or safety and are causing or contributing to ground water pollution and soil contamination.

DESCRIPTION OF THE SELECTED REMEDY

- Soil vapor extraction (SVE) of VOC-impacted soil that represents a source for leaching of contaminants to ground water.
- Pumping and treatment of VOC-impacted ground water as a means of hydraulic gradient control and removal of contaminant mass from the saturated zone.
- Long-term monitoring to track contaminant removal and verify the continued hydraulic containment of the ground water plume.

STATUTORY DETERMINATIONS

The selected remedial action is protective of human health and the environment, complies with legally applicable state and federal requirements, is responsive to public participation and input and is cost-effective. The remedy utilizes permanent solutions and treatment technologies to the maximum extent practicable to reduce toxicity, mobility and volume of hazardous substances at the Site. The effectiveness of the remedy will be reviewed regularly.

Joseph P. Koncelik, Director

10/17/05
Date

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DECISION SUMMARY

for Glacier Clevite Heavywall Bearings (GCHB)
Morgan County, Ohio

1.0 SITE BACKGROUND

1.1 Site History

The GCHB Site is located at 5037 State Route 60, approximately two miles north of the corporate limits of the City of McConnelsville, and adjacent to the Muskingum River, as shown on Figure 1. The property upon which the GCHB Site is located is currently owned by the Morgan County Improvement Corporation, which purchased the property from Gould Electronics, Inc. (Gould) in February 2005.

The manufacturing facility was built in 1952, and several additions have expanded the plant area to approximately 160,000 square feet on a site covering approximately 24 acres. For the first several years of operation, the plant produced bearings for reciprocating aircraft engines. In the late 1950's and early 1960's, significant production of copper foil for use in the electronics industry led to the development of the Gould Foil Division in the northern portion of the facility. Since the mid-1960's, the bearings line has produced heavywall bearings for aircraft and locomotive engines and has supplied the power generation, energy transmission and marine equipment industries.

Gould owned and operated the GCHB plant from 1952 until 1981, when it sold the bearings manufacturing line to Clevite Industries, Inc. From 1981 to 1987, Clevite Industries leased the Site from Gould and operated the GCHB plant. In 1987, JP Industries, Inc. (JPI), through an asset purchase from Clevite Industries, assumed the lease and the operations. JPI was the signatory to the 1990 Administrative Order on Consent which directed the performance of a Remedial Investigation/Feasibility Study for the Site. In 1990, T&N Industries, Inc. (T&N) became the successor in interest to JPI. In 1998, T&N was acquired by Federal Mogul Corporation. Federal Mogul operated the facility until its sale to MIBA Bearings, LLC in 2001.

As governed by a 1995 private, multi-party settlement agreement, Federal Mogul and Gould have functioned as "Co-Respondents" since approximately 1998. On October 1, 2001, Federal Mogul and 156 of its subsidiaries each filed a petition for re-organization under Chapter 11 of the Bankruptcy Code. Bankruptcy proceedings are ongoing as of the date of this Decision Document.

As described above, the GCHB plant is co-located with the former Gould Electronics, Inc. Foil Division, which occupied the northern portion of the manufacturing building and property. Gould ceased operations at its facility in September 2003, and currently employs only support staff for performance of maintenance and other activities associated with facility shutdown. This Decision Document solely addresses the portions of the building and property related to GCHB manufacturing operations (currently MIBA Bearings), and

all contaminants previously released from these areas.

Contamination of the soils, river sediments and ground water at the facility was discovered in 1988. Because organic solvents had historically been used at the GCHB plant to degrease machined metal parts, water supply wells on the Site were sampled and analyzed. It was determined that all Site water supply wells except WSW-5 and WSW-8 had been contaminated with VOCs due to plant activities. This initial investigation led to JPI's subsequent entry into the Administrative Order on Consent (AOC) with the Ohio EPA in September 1990.

The investigations conducted at GCHB disclosed that storage and disposal of degreasing solvents from 1952 until approximately 1989 led to contamination of soil, ground water, and river sediments at the facility. An estimated 3,000 gallons of solvent were released from the facility in the past. Solvents used at the Site included tetrachloroethylene (PCE), trichloroethylene (TCE), 1,1,1-trichloroethane (1,1,1-TCA), and carbon tetrachloride.

Significant investigation findings include the following:

- Prior to 1976, waste PCE from dip tanks was reportedly dumped into the floor drain system. Discharges then flowed directly to the process wastewater treatment unit and eventually passed through sand filters to the soil surrounding the units, or flowed via bypass to the river during periods of heavy flow.

- For approximately two years beginning in late 1985, PCE usage in the plating area degreaser increased significantly, despite similar parts production for both years. Upon investigation, the degreaser was found to have a blocked water trap which allowed PCE to be discharged into non-contact cooling water. Through this route, an estimated 1,000 gallons of PCE may have been discharged to the Muskingum River via the GCHB plant outfall.

- Floor cleaning in the basement area of the facility formerly involved up to five gallons of PCE per week in the cleaning solution to remove heavy build-up of oil and grease. Though this practice was discontinued in 1986, discharge of the material to floor drains was reportedly common. In addition, the annular space around the outside of Water Supply Well One (WSW-1), located in the basement of the plant, was not adequately sealed prior to 1988. Thus, spent PCE was introduced into the sump around WSW-1 through floor cleaning operations, and entered the ground water via the outside of the well casing.

- PCE was used as a general purpose cleaner for items such as paint brushes. An area just outside the door to the boiler room reportedly received small quantities of waste PCE from the cleaning of paint brushes. The material was dumped and left to evaporate or soak into the ground. This practice was common from the 1960's until the mid 1980's.
- Solvents and paint wastes were disposed of through unconnected floor drains in the boiler room during various plant activities. These discharges occurred from approximately 1952 into the 1980's, resulting in heavily contaminated soils

underneath the boiler room.

1.2 Summary of the Remedial Investigation

The Remedial Investigation was conducted by JPI/T&N and included a number of tasks to identify the nature and extent of Site-related chemical contaminants. The investigation was conducted with oversight by Ohio EPA, and the final RI Report was approved on October 26, 1993. The tasks included sampling of soil, ground water, surface water, and river sediment. The data obtained from the investigation were used to conduct a baseline risk assessment and to determine the need to evaluate remedial alternatives. This Decision Document contains only a brief summary of the findings of the Remedial Investigation. Please refer to the Remedial Investigation Report for detailed information.

1.2.1 Soil Contamination

A total of 92 soil borings and 28 monitoring wells were installed at the Site during the RI. Thirteen of the soil borings were installed inside the GCHB and Gould buildings. These soil borings typically were installed to a depth of approximately nine feet below the building floor. The 79 borings installed outside the buildings generally extended to depths of about twenty feet below ground surface. Soil samples were collected from each boring to evaluate the vertical and horizontal extent of organic solvent and metal contamination.

The primary VOCs detected in soil at the Site included: tetrachloroethylene (PCE), trichloroethylene (TCE), dichloroethylene (DCE), and vinyl chloride (VC). The compounds TCE, cis-1,2-DCE, and VC are known decay products of PCE, the primary solvent used at GCHB; it is believed that these compounds originated from the natural degradation of PCE in the subsurface. During the RI, the greatest concentrations of VOCs were detected near the boiler room drains and wastewater treatment areas. PCE concentrations in these areas ranged from 10.5 milligrams per kilogram (mg/kg) to 84.35 mg/kg. During a pre-RI investigation in 1988, PCE was detected at a concentration of 2,200 mg/kg in a soil sample collected approximately six feet below the boiler room floor. During the same investigation, a sample collected at a depth of twenty feet in boring MW-12 contained PCE at a concentration of 2,000 mg/kg (Figures 3 and 4).

Subsurface samples for metals analysis were collected from a depth of three to five feet below ground surface. Several locations contained concentrations of copper, lead, and chromium that were elevated with respect to background concentrations. In addition, four surface samples were collected to detect metal contamination that may have originated from airborne plant emissions. The analytical results from the surface samples indicated only slightly elevated concentrations (with respect to background) of chromium, copper, lead, and tin. None of the samples contained metals at concentrations exceeding applicable cleanup standards for soil.

1.2.2 Ground Water Contamination

Twenty-eight monitoring wells were installed at the Site during the RI to determine the

nature and extent of ground water contamination at the Site. The saturated zone consists of sand or sand and gravel with some interbedded layers of silt. The ground water table is encountered at a depth of approximately 20 feet, with the saturated zone extending to bedrock at a depth of approximately 65 feet.

The primary VOCs detected in ground water during the RI included PCE, TCE, DCE, and VC. The greatest concentrations of total VOCs were detected in monitoring wells MW-7 (1,300 ug/l), MW-12 (6,100 ug/l), and MW-17 (6,900 ug/l). Higher levels had been detected at several wells during pre-RI investigations, including a detection of 67,000 ug/l of PCE at MW-7 in July 1989.

The RI determined that the horizontal area of VOC-contaminated ground water was approximately 425,000 square feet. Approximately 75 percent of this area contained VOC concentrations less than 100 ug/l. The more highly-contaminated area was roughly centered on the boiler room and wastewater treatment areas (Figures 5, 6, and 7).

Under natural conditions, the ground water at the Site generally would flow toward the Muskingum River. As observed during the RI, pumping of the plant water supply wells (mainly WSW-4) heavily influenced ground water flow at the Site. The RI determined that WSW-4 was effectively containing the contaminant plume on-Site and drawing the contaminated ground water toward the well. Off-Site migration of the plume is not expected to occur as long as WSW-4 continues to operate at an effective pumping rate.

1.2.3 Surface Water/Sediment Contamination

During the RI, Muskingum River sediments adjacent to the GCHB and Gould facilities were investigated for VOC and metal contamination. Elevated levels of PCE, trans-1,2-DCE, cis-1,2-DCE, and VC were detected in the vicinity of each outfall, as were copper, nickel and lead. Concentrations of PCE ranged to as high as 4,700 mg/kg, with concentrations of TCE and cis-1,2-DCE ranging to 140 mg/kg and 1,400 mg/kg, respectively. The horizontal extent of contamination was determined to be approximately 6,000 square feet at each outfall, for a total of 12,000 square feet. The vertical extent of contamination was not fully established during the RI. However, sediment sampling conducted during the RI and FS indicated that VOC and metal contaminants were present at some locations to depths of three feet or greater at the Gould outfall, and nine feet or greater at the GCHB outfall.

In addition to the river sediment investigation, surface water samples were collected during the RI to determine the presence of VOCs and metals in the Muskingum River. Low concentrations of VOCs (between 3 ug/l and 26 ug/l) were detected in several sample locations downstream of each outfall. Detections of metals, however, were limited to the immediate vicinity of each outfall.

1.3 Interim or Removal Actions Taken to Date

An interim remedial measure ground water system became operational at the Site in October 1988. The continued operation of the system subsequently became a requirement stipulated by the 1990 Administrative Order on Consent for performing the RI/FS. The

system consisted of an air stripper to treat a portion (approximately 40%) of the ground water extracted from plant supply well WSW-4. The remainder of the ground water became part of the non-contact cooling water utilized by the plant and eventually discharged through the plant's NPDES outfall.

Following the shutdown of the Gould operations in fall 2003, there was a need to reconfigure the operations of the plantwide water supply system in order to continue meeting the water demand for MIBA Bearings. Gould staff worked with engineers from Advanced Geoservices Corp. (AGC) to design the new configuration, which was installed and operational by March 2004. In February 2004, well WSW-4 began pumping continuously at a rate of 225 gallons per minute (gpm). The entire volume of water pumped from WSW-4 is treated through the air stripper and is subsequently discharged to Gould's outfall, unless plant demands exceed the capacity of wells WSW-5/8; in that case, an automated diverter valve re-directs the treated water to the water tower until the extra demand has been satisfied. Present planning involves a future increase in the pumping rate at WSW-4 to 260 gpm, with an eventual target pumping rate of 300 gpm.

Throughout its operational period, the average pumping rate of WSW-4 has ranged from approximately 150 gallons per minute (gpm) to as high as 600 gpm. Samples from WSW-4 have been collected and analyzed for VOCs periodically since 1988. This data shows that the VOC concentrations in ground water recovered by WSW-4 have continually decreased over time from 4,800 ug/l (1988) to an average less than 500 ug/l during the years 1997 through present. Between October 1988 and December 2004 (Table 1), WSW-4 has removed an estimated 13,854 pounds of VOC mass from the ground water system. It is noteworthy that this value is considerably higher than the FS-estimated 1,700 pounds of VOC mass residing in the vadose and saturated zones at the Site.

1.4 Additional Information Approved by Ohio EPA Subsequent to the Remedial Investigation

1.4.1 December 1997 Preferred Plan

In December 1997, Ohio EPA issued the original Preferred Plan for the GCHB Site. The preferred remedy consisted of the following components:

- Installation of a soil vapor extraction (SVE) system to remediate soil across an area of approximately 127,000 square feet;
- Continued operation of well WSW-4 at an increased pumping rate of 728 gpm, with additional air stripper capacity for treating the entire quantity of flow; and
- Dredging of river sediments impacted by VOCs and metals.

The Preferred Plan established 0.5 mg/kg as the preliminary remediation goal (PRG) for PCE in soil at the Site, while the PRG for PCE in ground water was established at 5 ug/l.

In response to the public notice and issuance of the December 1997 Preferred Plan, Gould submitted a detailed set of comments to Ohio EPA, expressing concerns about the Plan. While Gould had not been a party to the RI/FS order, the company recognized its status as property owner and thus had a substantial interest in future remedial actions at the Site. In fact, Gould informed Ohio EPA that it would be assuming the lead role from T&N during the remedial design and remedial action (RD/RA) phases.

With respect to the soil alternative selected in the 1997 Preferred Plan, Gould's comments specifically questioned the accuracy of the VOC mass distribution in the subsurface, as characterized by the FS Report. Gould also objected to modeling of impacted soil as a single porous zone in which SVE was predicted to be entirely effective.

With respect to ground water, Gould agreed in principal that continued pumping of WSW-4 would be the most appropriate remedy for removing VOC mass and preventing migration of the VOC plume off-Site. However, the company questioned the basis for predicting the time frame for ground water cleanup, and questioned whether the increased pumping rate would optimize mass removal, particularly if additional depression of the water table were to result in "trapping" of VOC mass in the vadose zone.

With respect to Muskingum River sediments, Gould did not specifically question the information in the 1997 Preferred Plan relating to the nature or extent of sediments impacted by metals and VOCs. However, the selection of dredging as the default means for addressing sediments drew strong objections from Gould, which believed that other remediation methods, including sediment capping, should be considered as potential alternatives, and should be determined in pre-design studies, as opposed to the Preferred Plan.

In response to some of the concerns expressed by Gould, Ohio EPA allowed the Respondents to perform an SVE pilot scale study at the Site, and subsequently to revise the calculations of the Site leaching model. In addition to these studies, Ohio EPA performed an ecological assessment of Muskingum River sediments during July and August of 2003. The results of these efforts are summarized below.

1.4.2 SVE Pilot Study

In June 2000, an SVE Pilot Study was implemented at the GCHB Site to obtain sufficient data for evaluating the implementability, effectiveness, and cost of a full-scale SVE system. The study also provided additional subsurface data that addressed data gaps remaining from the RI/FS process. The work was completed voluntarily by the Site Respondents and in accordance with an Ohio EPA-approved Work Plan. Ohio EPA personnel provided periodic oversight throughout the study.

1.4.2.1 Soil Investigation

In preparation for SVE testing, a focused soil sampling program was completed to address

the following RI data gaps:

- Outside the main GCHB building, limited soil samples had been collected from depths between 20 ft and the water table;

- Soil samples had not been collected from depths greater than 10 ft beneath the main GCHB building; and

- Soil samples collected from below the water table had not been submitted for laboratory analysis to address residual or adsorbed phase PCE in direct contact with ground water.

The soil sampling program consisted of 56 soil samples collected from eight SVE monitoring probe borings, two soil borings, one piezometer boring, and the SVE extraction well boring. Of the 56 samples, 36 samples were collected in the vadose zone and 20 samples were collected at or below the water table.

Continuous soil cores for lithology and chemical analysis were collected using direct-push technology. Samples were collected for laboratory analysis using Encore™ sampling containers, and were analyzed for TCL VOCs using EPA SW-846 Method 8260B.

Soil sampling confirmed that a unit of silty clay/clayey silt is present below the paved surfaces and GCHB facility floor to depths ranging from 5 to 10 feet. Unconsolidated deposits beneath the clay layer consist of sand that grades to a sand and gravel unit near the water table, which is encountered at depths of 20 to 25 feet.

The results of laboratory analysis indicated that PCE concentrations in the unsaturated sand and gravel zone are relatively consistent with the RI data, and PCE concentrations between the source areas (i.e. boiler room and former sand filter beds) are similar to those immediately beneath the source areas. Of particular interest was the determination that PCE concentrations in *saturated* soil samples were generally an order of magnitude higher than in samples from the unsaturated zone. Previous RI/FS activities had not provided chemical data for this zone or accounted for the associated mass during remedial alternative evaluation.

The original contouring of contaminated soil zones presented in the FS was performed using methods that were primarily qualitative. With the new soil sampling and analytical data, additional contouring was performed to better define the horizontal and vertical extent of PCE at concentrations greater than 0.5 mg/kg. The contouring focused on the two units within the vadose zone: the upper clay strata and the underlying sand strata.

Since the VOC concentrations in Site soil are mainly comprised of PCE, the revised contouring was conducted using concentrations of PCE only. PCE soil sampling data from the RI borings and SVE Pilot Study borings were compiled. The sample results for each boring were then separated into those from the clay strata and those from the sand strata. The maximum concentration of PCE at each location and within each respective strata

(clay or sand) were selected for contouring. The isoconcentration contours shown on Figures 3 and 4 were generated based upon the soil data and the knowledge of previous Site activities (i.e., areas of potential PCE releases). These contours more accurately reflect the true distribution of PCE-impacted soil, relative to figures that were presented in the FS.

1.4.2.2 Ground Water Sampling

Two rounds of ground water sampling were conducted at the Site prior to performance of the SVE Pilot Study. The sampling was performed to assess the concentrations of VOCs in ground water relative to historical results, and potentially to provide a design basis for a permanent ground water remediation system.

The results of the ground water sampling indicated that the horizontal and vertical extent of the plume was similar to conditions identified during the RI/FS (i.e. 1992 to 1994), except that the PCE concentrations in source areas had significantly decreased. For example, PCE concentrations at monitoring well MW-7 had decreased from 1,300 ug/l to 300 ug/l. In addition, natural degradation products of PCE (1,2-DCE, vinyl chloride) were detected in the source area samples.

Isoconcentration maps were produced for the October 1999 and April 2000 ground water sampling events - Figures 5 through 7 illustrate the April 2000 concentrations of total halogenated VOCs, PCE, and vinyl chloride, respectively.

1.4.2.3 SVE Pilot Test

The SVE pilot testing program involved independent tests on the shallow silty clay unit and the deeper sand unit. Testing on the shallow zone, which is encountered from ground surface to depths of 6 to 10 feet, involved the installation of a 2-inch diameter PVC extraction well screened from 2 to 4 feet bgs. The deeper zone was tested using a 2-inch diameter PVC extraction well screened from 12 to 17 feet bgs. Eight sets of nested monitoring probes were installed at depths ranging from 12 to 20 feet bgs, and were used to monitor subsurface vacuum distribution during the pilot test.

Testing was performed over an eight day period for each zone. Soil vapor was removed using a positive displacement blower, with extraction rates during the various test phases ranging from 6 scfm to 150 scfm, depending on the zone being tested. The soil vapor was treated using 1,000-pound canisters of granular activated carbon for VOC removal.

Several “success goals” were outlined in the SVE pilot test work plan. These goals were related to quantifiable parameters such as soil permeability, radius of influence, air flow rate, and mass removal rate, among others.

The pilot test for the sand unit indicated that all of the success goals were met, with an average VOC mass removal rate of 62 lbs/day from the single extraction well. Calculations indicated that approximately 6 extraction wells, with an effective radius of influence (ROI)

of 90 feet each, would be necessary to cover the 2.5 acre area of the sand unit with PCE concentrations above the 0.5 mg/kg remediation goal.

The pilot test for the shallow silty clay unit did not meet the success goal for air flow rate (achieved 18 scfm compared to goal of 20 scfm). However, the VOC mass removal rate of 9.5 lbs/day greatly exceeded the 1 lb/day success goal target. Calculations indicated that approximately 19 wells, with an effective ROI of 30 feet each, would be necessary to cover the 0.75 acre area of the clay unit with PCE concentrations above the 0.5 mg/kg PRG.

Based on these calculations, the total number of extraction wells necessary (i.e., 25 wells) to treat the 2.5 acre remediation area would be approximately one order of magnitude higher than the 3 extraction wells (with ROIs of 150 ft) that were used for the FS remedial alternative evaluation.

1.4.3 Leaching Model

With the information that was collected during the SVE Pilot Study, additional questions were raised with regard to mass distribution of VOCs in the subsurface. As a result, Ohio EPA requested that the Respondents develop a revised leaching model for the Site.

The following Ohio EPA-approved scope of work was included in the leaching study:

- Estimate the relative impact to ground water due to leaching (i.e. the resultant PCE ground water concentration) of the following zones:
  - unsaturated zone shallow clays only
  - unsaturated zone sand and gravel only
  - unsaturated zone hot spots in either the clay or sand and gravel units

- Calculate the ratio of total contaminant mass between the clay zone, sand and gravel zone, and unsaturated zone hot spots, using the isoconcentration contours that were developed from the SVE Pilot Study;

- Calculate, using VLEACH™ modeling software, the annual PCE mass flux from the unsaturated zone to ground water due to leaching (at recharge rates of 2-inches and 6-inches);
- Calculate the resultant PCE ground water concentration at pumping well WSW-4 using the annual average pumping rate of 250 gallons per minute and the total annual soil to ground water PCE mass flux calculations;

- Calculate annual ground water volume flowing beneath the soil area with PCE concentrations greater than 0.5 mg/kg, using Darcy's Law and non-pumping conditions; and

- Calculate the resultant PCE ground water concentration under non-pumping conditions within a 15 foot-thick mixing zone for select individual zones based upon the mass flux calculations.

The draft leaching study report was submitted to Ohio EPA in October 2001. Following a review of the report, Ohio EPA provided comments to Gould. Due to circumstances that were apparently related to the Federal-Mogul bankruptcy, a final report was never generated for the leaching study. Therefore, the comments were not formally addressed by Gould. However, the following key information can be drawn from the report:

- An estimated total PCE mass of 120 lbs was calculated to be present in the shallow clay unit at the Site;

- An estimated total PCE mass of 8,157 lbs was calculated to be present in the unsaturated sand unit;

- Under non-pumping conditions, the mass leaching from the shallow clay alone would not result in ground water exceeding MCLs, or exceeding the proposed surface water remedial goal for the Muskingum River. Based upon the leaching analysis, remediation of the clay unit would provide only a minor reduction in risks to human health and the environment;

- Over 98.5 percent of the PCE mass in the unsaturated zone is located within the unsaturated sand unit. Under non-pumping conditions, the mass of PCE leaching from the sand would result in ground water exceeding the PCE MCL (5 ug/l) by more than two orders of magnitude;

- Construction of a 4-well SVE system in the unsaturated sand strata could remove as much as 98% of the contaminant mass in that unit, with resultant non-pumping ground water concentrations for PCE ranging from 8.8 to 13.8 ug/l.

1.4.4 Ecological Risk Assessment - Muskingum River Sediment

In Ohio EPA's 1997 Preferred Plan for the GCHB facility, dredging and off-Site disposal was selected as the preferred remedy for addressing river sediments impacted by metals and VOCs. However, a determination of the extent of ecological impact caused by the sediments was to be performed during remedial design.
In 2001, additional discussions between Ohio EPA and Gould led to plans for performance of an ecological risk assessment for the river sediments, prior to the issuance of an Amended Preferred Plan. Both parties agreed that this information would be useful in the development of the amended Plan. Gould's consultant developed a work plan for the ecological assessment and submitted the draft work plan to Ohio EPA in August 2001. Ohio EPA prepared comments that were transmitted to Gould in January 2002, with the intent that the field work would be performed during summer 2002. However, due to circumstances that were again apparently related to the Federal Mogul bankruptcy, Gould chose not to proceed with implementation of the work.

As a result of Gould's decision, Ohio EPA performed the ecological risk assessment. Staff of the Division of Surface Water's Ecological Assessment Unit (DSW-EAU) completed the

assessment during the summer of 2003. The DSW-EAU staff developed a work plan that was similar in scope and methodology to that which had been previously submitted by Gould. Specific objectives of the evaluation were:

- Establish the present biological condition of the Muskingum River upstream, downstream, and adjacent to the Gould and GCHB outfalls by evaluating fish and macroinvertebrate communities; and

- Identify the relative levels of organic and inorganic contaminants in the surficial sediments of the Muskingum River upstream, downstream, and adjacent to these outfalls.

A total of 2.9 miles of the Muskingum River were assessed at several locations by Ohio EPA. Based upon the measured performance of the biological communities, the entire 2.9 miles were determined to be in partial attainment of the Warmwater Habitat aquatic life use. Fish community results, and macroinvertebrate ICI and Eckman Dredge results, did not show any significant differences between upstream, downstream, or outfall-specific sampling locations. The impounded condition of the Muskingum River within the study segment, along with excessive siltation of bottom substrates, was determined to be a primary factor for the impairment of biological communities. The impaired biological conditions were not judged to be associated with chemical constituents released under current conditions or from chemically contaminated sediments in the vicinity of the Gould or GCHB outfall locations. Elevated levels of copper, nickel, and lead were measured in sediments within the GCHB outfall mixing zone; however, the biology of the river was not negatively impacted. Particularly notable was the significant decrease in VOC concentrations in sediments within the mixing zones, between 1988 and the 2003 study.

2.0 SUMMARY OF SITE RISKS

A baseline risk assessment was conducted to evaluate current and potential future risks to human health and to ecological receptors associated with contaminants present at the Site. The results demonstrated that the existing concentration of VOCs in environmental media pose risks to human health at a level sufficient to trigger the need for remedial actions.

2.1 Risks to Human Health

The primary objectives of the Human Health Risk Assessment were to:

- Determine the constituents that pose a significant risk to receptors;
- Perform an exposure assessment to determine the pathways and media of concern;
- Determine toxicity levels of constituents in relevant media; and
- Determine the likelihood and magnitude of any expected impact or threat.

All pathways by which humans could be exposed to the Site contaminants were evaluated and quantified for both current and potential future exposure scenarios. The current use scenario was developed assuming that the GCHB (now MIBA) plant would be maintained as it exists, with current access controls and without potable use of contaminated ground water. The following receptors were identified and evaluated for the current use scenario:

- Groundskeeper
- Typical Worker
- Worker Checking Site Outfall
- Site Visitor
- Nearby Resident

The future use scenario was developed by assuming that the plant was no longer active or was demolished, that access controls did not exist, that the land use changed to residential or recreational, and that contaminated ground water was used as a potable water source. The following receptors were identified and evaluated for the future use scenario:

- Resident
- Recreational User

Potential risks associated with indoor air exposure, direct contact with soil, and ground water use were evaluated for the Site. Estimates of potential carcinogenic (cancer-causing) risk and non-carcinogenic hazards from exposure to VOCs in soils were calculated. Cancer risk is defined as the probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen, as compared with a person not exposed to the Site. For example, a 1 in 10,000 risk level means that if 10,000 people were

chronically exposed to the carcinogens at the site, there is a probability of one additional case of cancer. These risks refer only to the incremental risks created from the site. They do not include the risks of cancer from other non-site related factors to which people may be exposed. As a benchmark in developing clean-up goals at contaminated sites, an acceptable range of excess lifetime cancer risk from one in one million (1×10^{-6}) to one in ten thousand (1×10^{-4}) has been established. Ohio EPA uses a risk goal of one in one-hundred thousand (1×10^{-5}).

Non-carcinogenic hazards are generally expressed in terms of a hazard quotient or index, which combines the concentration of chemical exposures with the toxicity of the chemicals (quotient refers to the effects of an individual chemical whereas the index refers to the combined effects of all chemicals). A hazard index of 1 represents the maximum exposure at which no harmful effects are expected.

The risk estimates for the exposure scenarios assessed at the GCHB facility are summarized in Table 2. These estimates represent the current and potential future risks associated with the Site, assuming no remedial actions are taken.

Based on the risk evaluation for continued commercial or industrial use of the property, the maximum carcinogenic risk associated with the soils was calculated as 2.1 in one hundred thousand (2.1×10^{-5}). The maximum hazard index associated with soils was calculated as 0.024, which indicates that no harmful effects are expected.

In the potential future residential use scenario, where ground water is used for potable purposes, the maximum carcinogenic risk was calculated as 1.7 in one thousand (1.7×10^{-3}). The maximum hazard index was calculated as 54.1. Both of these values exceed the acceptable risk goals.

For the potential future recreational use scenario, the maximum values for carcinogenic risk (7.8×10^{-6}) and hazard index (0.14) were within the acceptable risk range for exposure to soil and surface water.

There is a significant risk to future ground water users at or near the Site, utilizing ground water for potable purposes. Therefore, remedial activities are needed to address the existing ground water contamination, as well as the sources of continued ground water contamination (i.e. Site soils).

2.2 Risks to Ecological Receptors

As discussed in Section 3.4.4, Ohio EPA performed an ecological assessment of Muskingum River sediments in summer 2003. The primary objective of the assessment was to establish the present biological condition of the Muskingum River upstream, downstream, and adjacent to the Gould and GCHB outfalls by evaluating fish and macroinvertebrate communities.

The impounded condition of the Muskingum River within the study segment, along with

excessive siltation of bottom substrates, was determined to be a primary factor for the impairment of biological communities. The impaired biological conditions were not judged to be associated with chemical constituents released under current conditions or from chemically contaminated sediments in the vicinity of the Gould or GCHB outfall locations. Particularly notable was the significant decrease in VOC concentrations in sediments within the mixing zones, between 1988 and the 2003 study. Based on the results of the assessment, there appears to be no adverse impact to ecological receptors associated with sediments at the facility.

3.0 FEASIBILITY STUDY

A Feasibility Study was conducted by T&N to define and analyze appropriate remedial alternatives. That study was conducted with oversight by Ohio EPA, and was approved on August 13, 1996. The Remedial Investigation and Feasibility Study typically form the primary basis for the selection of Ohio EPA's preferred remedial alternative. For the GCHB Site, Ohio EPA has also utilized information gathered since the Feasibility Study (e.g., SVE pilot testing, revised leaching calculations, and ecological assessment of river sediments) to further develop and refine various alternatives.

4.0 REMEDIAL ACTION OBJECTIVES

As part of this process, remedial action objectives (RAOs) were developed in accordance with the National Contingency Plan (NCP), 40 CFR Part 300, which was promulgated under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended, and U.S. EPA guidance. The RAOs are goals that a remedy should achieve in order to ensure the protection of human health and the environment. The goals are designed specifically to mitigate the potential adverse effects of site contaminants present in environmental media.

The RAOs were developed to ensure that remedial actions reduce human health risks to acceptable levels. The RAOs developed for the Site are identified below.

Remedial Action Objectives
Remediate soil to prevent the leaching and migration of contaminants at levels that exceed the ground water cleanup goal
Provide hydraulic containment of the ground water plume
Prevent potable use of contaminated ground water
Reduce ground water contaminant concentrations to meet MCLs

5.0 SUMMARY OF REMEDIAL ALTERNATIVES

A total of fifteen remedial alternatives were developed in the Feasibility Study to address the cleanup of soil, ground water, and river sediments. Those alternatives were developed based upon Site data that was available from the RI and additional data collected for the FS.

As indicated in Section 1.4, Ohio EPA allowed the Respondents to conduct additional focused studies in response to key issues that were raised concerning the 1997 Preferred Plan. This collection of data and resultant calculations have provided a better understanding of contaminant distribution, and have allowed for the development of modified alternatives that Ohio EPA believes are more appropriate for actual Site conditions. The modified alternatives are based primarily on the information collected through the SVE pilot testing and revised leaching calculations. However, some components of the alternatives are based upon on a weight-of-evidence evaluation of the past effectiveness, and estimated future effectiveness, of the ground water recovery system currently operating at the Site. The following sections describe the original alternatives that were evaluated for the 1997 Preferred Plan, and the additional alternatives that were developed for the Amended Preferred Plan.

5.1 Original FS Remedial Alternatives

5.1.1 - Soil

5.1.1.1 No Action - FS Soil Alternative #1 - No remedial action planned for the Site. The No Action alternative assumes that no potable or production ground water wells will be operating. Under this scenario, ground water is assumed to have returned to natural hydraulic flow and elevation conditions. This alternative is evaluated as a baseline scenario.

5.1.1.2 In Situ Isolation/Containment - FS Soil Alternative #2 - Isolation/containment is the process by which the area of concern is separated from the environment. The containment devices that were evaluated consisted of several variations of surficial caps. The capping process attempts to isolate the subsurface materials, such that rainwater infiltration is minimized, and any compounds are immobilized within the underlying soils. The potential area requiring capping under a capping-only scenario was estimated at approximately 127,000 square feet, based upon leaching scenarios and the development of a PRG of 0.5 mg/kg for PCE.

5.1.1.3 Soil Vapor Extraction(SVE) with Offgas Treatment - FS Soil Alternative #3 - Soil Vapor Extraction (SVE) is a method of inducing a vacuum on subsurface soil materials to enhance volatilization and capture of contaminants. The equipment typically used for SVE consists of vertical well points of 2-4 inch diameter PVC or stainless steel placed just above the water table in a sand filter pack. A vacuum pump is connected to the piping array, creating a subsurface vacuum that draws the volatilized contaminants into the piping. The contaminants, now in the vapor phase, are drawn to the surface for treatment. For FS

purposes, four methods of SVE offgas treatment were evaluated: (1) carbon adsorption with off-site regeneration; (2) carbon adsorption with on-site regeneration; (3) polymeric adsorption; and (4) catalytic oxidation. Soil alternatives #3A and #3B were variations of this alternative, in which contaminated areas covering 50,465 ft^2 and 127,000 ft^2, respectively, were evaluated for treatment.

5.1.2 Ground Water

5.1.2.1 No Action Alternative - FS Ground Water Alternative #1 - No remedial action planned for the Site. The No Action Alternative assumes that no potable or production ground water wells will be operating, with ground water having returned to natural hydraulic flow and elevation conditions. This alternative is evaluated as a baseline scenario.

5.1.2.2 Continued Operation of Interim Action Pumping System - FS Ground Water Alternative #2 - The existing ground water pumping and treatment system consists of WSW-4 used as a recovery well, with water treated using a six-unit countercurrent air stripping tower. Contaminants are stripped from the ground water and transferred to the air phase, with discharge of the contaminants regulated by an air permit. At the time of FS preparation, the "current" pumping rate from WSW-4 was 445 gpm. At present time, this pumping rate is approximately 250 gpm.

5.1.2.3 Increase Pumping Rate for the Interim Action Pumping System - FS Ground Water Alternative #3 - This alternative would specify an increase from the original 445 gpm (now 250 gpm) pumping rate for WSW-4 to a rate of 728 gpm. Because the increased flow rate would exceed the capacity of the existing air stripping unit, an additional treatment system would be installed to remove contaminants from the ground water. Treatment of the increased flow would be accomplished using one of two methods. Ground Water Alternatives #3A and #3B represent the evaluations of installing an additional air stripper or the installation of a direct treatment system, respectively, for the increased flow. The model calculations on which this alternative was developed assumed (incorrectly) that there was no additional PCE mass within the saturated zone, other than that dissolved within ground water.

5.1.2.4 Install Additional Recovery Well in Addition to Interim Action Pumping System - FS Ground Water Alternative #4 - Under this alternative, an additional recovery well would be placed near the existing monitoring well MW-12. The additional well would pump ground water at a rate of 50 gpm. As with Alternative #3, treatment of the increased flow would be accomplished using one of two methods. Ground Water Alternatives #4A and #4B represent the evaluations of installing an additional air stripper or the installation of a direct treatment system, respectively, for the increased flow. As with Alternative #3, this alternative was also based upon an incorrect assumption of no additional PCE mass within the saturated zone, other than that dissolved within ground water.

5.1.2.5 Air Sparging - FS Ground Water Alternative #5 - Air sparging entails the injection of air into ground water to volatilize chemicals for subsequent capture in the vapor phase. The air is usually injected via vertical or horizontal wells, and the installation is usually

coupled with an SVE system to provide a means of recovering contaminants. For the FS, a system configuration consisting of five sparge injection points was evaluated. The array would be located near the core of the PCE plume, with each injection point delivering approximately 100 cfm at a depth of approximately 70 feet below grade.

5.1.3 River Sediment

The FS evaluated three alternatives for addressing contaminated river sediments (No Action, Dredging, and Containment). With the results of the 2003 Ecological Assessment (Section 1.4.4) indicating no observed adverse effects related to these sediments, the remediation of sediments is no longer a remedial action objective. Therefore, these alternatives were not evaluated further.

5.2 Additional Remedial Alternatives

5.2.1 Soil

Based upon the additional soil data collection activities, and the revised calculations of contaminant leaching (Section 1.4.3), it was demonstrated that leaching of the unsaturated sand unit represents a significant contributor of contaminant mass to ground water. While the existence of contaminant mass below the water table also represents a source that will continue to impact ground water, the soil remediation alternatives were developed independently of this fact. Therefore, in the following descriptions of soil alternatives, the predicted ground water concentrations represent contamination that would be attributed to soil leaching *only*.

Pilot testing showed that soil vapor extraction is highly effective in the unsaturated sand unit, and leaching calculations were used to develop three SVE scenarios for remediation. These scenarios differ only in the number of extraction wells, the degree of removal of contaminants, and the predicted ground water concentrations following remediation, as discussed below.

5.2.1.1 Two-Well SVE System - Additional Soil Alternative #1 - Two SVE wells would be installed within the sand unit to target the areas with PCE concentrations greater than 10 mg/kg. Based upon the demonstrated effectiveness of SVE, this scenario predicts that all areas greater than 10 mg/kg would be remediated, with approximately 50% of areas greater than 1 mg/kg also remediated. There would be a predicted 93% reduction in the PCE mass flux to ground water, and under non-pumping conditions, this scenario indicates that ground water beneath the remediated area would have PCE concentrations ranging from 46 to 71 ug/l following remediation. Extracted soil vapor would be treated using granular activated carbon or, alternatively, would be discharged to the atmosphere if levels were within the de minimus range (<10 lbs VOCs per day).

5.2.1.2 Three-Well SVE System - Additional Soil Alternative #2 - Three SVE wells would be installed within the sand unit such that all areas greater than 10 mg/kg would be remediated, while 80% of areas greater than 1 mg/kg would also be remediated. There would be a predicted 96.5% reduction in the PCE mass flux to ground water, and under

non-pumping conditions, this scenario indicates that ground water beneath the remediated area would have PCE concentrations ranging from 23 to 36 ug/l following remediation. Extracted soil vapor would be treated using granular activated carbon or, alternatively, would be discharged to the atmosphere if levels were within the de minimus range (<10 lbs VOCs per day).

5.2.1.3 Four-Well SVE System - Additional Soil Alternative #3 - Four SVE wells would be installed within the sand unit such that all areas greater than 10 mg/kg would be remediated, 95% of areas greater than 1 mg/kg would be remediated, and a substantial portion of areas greater than 0.5 mg/kg would be remediated. There would be a predicted 97.9% reduction in the PCE mass flux to ground water, and under non-pumping conditions, this scenario indicates that ground water beneath the remediated area would have PCE concentrations ranging from 9 to 14 ug/l following remediation. Extracted soil vapor would be treated using granular activated carbon or, alternatively, would be discharged to the atmosphere if levels were within the de minimus range (<10 lbs VOCs per day).

5.2.2 Ground Water

As discussed in Section 5.1.2, the FS remedial alternatives for ground water were based on the assumption that there was no additional PCE mass (source material) within the saturated zone, other than that dissolved within ground water. Additional soil sampling indicated that there is significant PCE mass in the saturated zone, with average concentrations that are more than an order of magnitude higher than in the unsaturated zone (Section 1.4.2.1). Given this additional information, most pumping alternatives presented in the FS were deemed no longer valid for actual conditions, because the associated modeling did not account for the additional PCE mass.

In light of this data, Ohio EPA considered various options for developing revised remedial alternatives for ground water. One option considered was the development of a three-dimensional flow and transport model that could account for the various conditions and sources of contaminant mass at the Site, as well as provide estimated time frames for cleanup to MCLs under various scenarios. The development of such a model, however, likely would be an extensive and costly undertaking.

As an alternative to modeling, Ohio EPA considered a weight-of-evidence approach using available long-term monitoring data from the interim action pumping system at WSW-4. This evaluation took into account the remedial action objectives for ground water - namely, 1) Providing hydraulic containment of the ground water plume, 2) Preventing potable use of contaminated ground water, and 3) Reducing ground water contaminant concentrations to meet MCLs.

The pumping rate measured at WSW-4 from 1999 through 2003 averaged 316 gpm. In reviewing the potentiometric data from ground water sampling and other monitoring events performed during that time, the evidence indicates that well WSW-4 continues to maintain hydraulic containment of the VOC plume.

An estimated 13,854 pounds of VOCs have been removed from well WSW-4 between October 1988 and December 2004. Over the last five years of pumping, mass removal has averaged 445 pounds per year. Meanwhile, VOC concentrations in WSW-4 have decreased over time from 4,800 ug/l in 1988 to an average less than 350 ug/l over the years 2000-2004 (See Table 1). This data indicates that well WSW-4 continues to provide effective removal of contaminant mass from ground water, with a corresponding decrease in contaminant concentration within the plume.

The weight-of-evidence indicates that continued pumping of well WSW-4 or a suitable replacement (FS Ground Water Alternative #2) within its historical range of pumping rates should effectively meet the remedial action objectives for ground water at the GCHB Site. The nature of this alternative, relying on historical evidence as opposed to analytical calculations or modeling, does not allow for a prediction of cleanup time for the ground water plume. Based upon current conditions and historical trends, however, it is expected that cleanup of ground water to MCLs may require 20 to 30 years of continued pumping.

6.0 COMPARISON AND EVALUATION OF ALTERNATIVES

6.1 Evaluation Criteria

In selecting a remedy for a contaminated site, Ohio EPA considers the following eight evaluation criteria as outlined in U.S. EPA's NCP promulgated under CERCLA (40 CFR 300.430):

1. Overall protection of human health and the environment - Remedial alternatives shall be evaluated to determine whether they can adequately protect human health and the environment, in both the short- and long-term, from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site.

2. Compliance with all applicable or relevant and appropriate requirements (ARARs) - Remedial alternatives shall be evaluated to determine whether a remedy will meet all of the applicable or relevant and appropriate requirements of state and federal environmental laws.

3. Long-term effectiveness and permanence - Remedial alternatives shall be evaluated to determine the ability of a remedy to maintain reliable protection of human health and the environment over time once pollution has been abated and RAOs have been met. This includes assessment of the residual risks remaining from untreated wastes, and the adequacy and reliability of controls such as containment systems and institutional controls.

4. Reduction of toxicity, mobility, or volume through treatment - Remedial alternatives shall be evaluated to determine the degree to which recycling or treatment are employed to reduce toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the site.

5. Short-term effectiveness -Remedial alternatives shall be evaluated to determine the following: (1) Short-term risks that might be posed to the community during implementation of an alternative; (2) Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures; (3) Potential environmental impacts of the remedial action and the effectiveness and reliability of mitigative measures during implementation; and (4) Time until protection is achieved.

6. Implementability - Remedial alternatives shall be evaluated to determine the ease or difficulty of implementation and shall include the following as appropriate: (1) Technical difficulties and unknowns associated with the construction and operation of a technology, the reliability of the technology, ease of undertaking additional remedial actions, and the ability to monitor the effectiveness of the remedy; (2) Administrative feasibility, including activities needed to coordinate with other offices and agencies and the ability and time required to obtain any necessary approvals

and permits from other agencies (for off-site actions); and (3) Availability of services and materials, including the availability of adequate off-site treatment, storage capacity, and disposal capacity and services; the availability of necessary equipment and specialists, and provisions to ensure any necessary additional resources; the availability of services and materials; and the availability of prospective technologies.

7. Cost - Remedial alternatives shall evaluate costs and shall include the following: (1) Capital costs, including both direct and indirect costs; (2) Annual operation and maintenance costs (O&M); and (3) Net present value of capital and O&M costs. The cost estimates include only the direct costs of implementing an alternative at the site and do not include other costs, such as damage to human health or the environment associated with an alternative. The cost estimates are based on figures provided by the Feasibility Study or additional studies.

8. Community acceptance - Remedial alternatives shall be evaluated to determine which of their components interested persons in the community support, have reservations about, or oppose.

Evaluation Criteria 1 and 2 are threshold criteria required for acceptance of an alternative that has accomplished the goal of protecting human health and the environment and complied with the law. Any acceptable remedy must comply with both of these criteria. Evaluation Criteria 3 through 7 are the balancing criteria used to select the remedial alternatives. Evaluation Criteria 8, community acceptance, was determined, in part, by written responses received during the public comment period and statements offered at the public meeting.

6.2 Analysis of Evaluation Criteria

This section examines how each of the evaluation criteria is applied to each of the remedial alternatives identified in Section 5.0 and compares how the alternatives achieve the criteria. These analyses have been provided for each medium of concern, with the names of specific remedial alternatives shown in italics.

6.2.1 Soil

6.2.1.1 Overall Protection of Human Health and the Environment

The potential risks to human health posed by contaminated site soils are associated with future residential use of the property where ground water is used for potable purposes. The presence of soils as they currently exist would result in leaching of contaminants such that ground water exceeds the MCLs. To address this risk, soils must be remediated to the calculated cleanup level, or the leaching pathway must be eliminated.
Implementation of the *Four-Well SVE System* is estimated to remove 97.9% of the PCE mass within the unsaturated zone. In turn, this removal is predicted to result in ground water PCE concentrations (from a leaching source) to be just above the MCL (a projected range of 9 to 14 ug/l).

Implementation of the *Two-Well and Three-Well SVE Systems*, while also removing a large proportion of contaminant mass in the unsaturated zone, would result in higher ground water PCE concentrations ranging from 23 ug/l to 71 ug/l.

FS Soil Alternative #3, though also an SVE alternative, was developed using an incorrect characterization of contaminant distribution, as well as an over-estimation of the radius of influence for SVE wells. Therefore, the implementation of this alternative would not effectively meet RAOs for soil.

In Situ Isolation/Containment could effectively eliminate the leaching pathway, through isolation of subsurface contaminants from the infiltration of precipitation. Current practices for containment (e.g. multi-media caps) can be highly effective, but the alternative does not result in removal of contaminant mass from the environment.

The *No Action Alternative* would not be effective for protection of human health and the environment, because leaching of soil contaminants would result in ground water PCE concentrations predicted to range from 640 ug/l to 1000 ug/l under non-pumping conditions.

6.2.1.2 Compliance with ARARs

All SVE-based alternatives would comply with applicable requirements, with air pollution controls and/or a permit required for air releases from the SVE system. *In Situ Isolation/Containment* would require a RCRA Subtitle C (hazardous waste) cap, but would comply with applicable Federal and State regulatory requirements.

To be effective, any soil alternative must ultimately result in the removal of contaminants such that the leaching pathway does not result in ground water exceeding MCLs. The *No Action Alternative* does not provide a mechanism to achieve compliance with this requirement.

6.2.1.3 Long-Term Effectiveness and Permanence

All SVE-based alternatives would permanently reduce the mass and concentration of contaminants in soils, and would prove effective in the long-term to reduce leaching potential. The *Four Well SVE System* would provide the maximum effectiveness and permanence, because it would remove the largest quantities relative to the other SVE alternatives.

In Situ Isolation/Containment would provide an effective remedy, using a multi-media cap to minimize infiltration and prevent leaching of contaminants to ground water. Properly designed and maintained caps can be considered quasi-permanent with the appropriate long-term monitoring and maintenance. However, these caps do not result in the removal of contaminants from the subsurface, and therefore do not provide the same *degree* of permanence as an SVE remedy. They also would severely limit the options for re-use of the Site in the future.

6.2.1.4 Reduction of Toxicity, Mobility or Volume by Treatment

SVE-based alternatives result in a reduction of contaminant mass and concentration within the subsurface, and transfer the contaminant to activated carbon or to the atmosphere, if vapor concentrations are below regulated levels. This results in a reduction in the mobility and volume of contaminants in Site soils.

In Situ Isolation/Containment would not reduce toxicity, mobility or volume by treatment.

6.2.1.5 Short-Term Effectiveness

The *No Action Alternative* would have no short-term risks for Site workers, the general public, or the environment.

For the implementation of any SVE alternative, there would be additional remedial activities in the form of additional well installation, piping installation, and SVE system construction. These general construction activities would create short-term concerns related to the health and safety of remediation contractors and MIBA facility workers. These risks could be addressed through the appropriate controls for worker health and safety. Because the SVE remedies are projected to require a minimum of 5 years to achieve RAOs, there would be no immediate short-term benefits.

In Situ Isolation/Containment would also have associated short-term risks to remediation contractors and MIBA facility workers related to the general construction activities utilized during capping. These risks could be addressed through the appropriate controls for worker health and safety. Because of current limitations in accessing the contaminated soils that lie beneath the MIBA facility building, this remedy could not be implemented until a future time when the building is removed. As a result, the remedy lacks short-term effectiveness in meeting RAOs or protecting human health and the environment.

6.2.1.6 Implementability

The *No Action Alternative* is considered as a baseline for comparison with other alternatives and has no remedial elements to be implemented.

Pilot testing has shown that SVE alternatives can effectively remove contaminants from subsurface soils at the Site. Construction and operation of an SVE system would require an air discharge permit, or a permit exemption if contaminant levels are below de minimus amounts. This alternative is based on well-developed technology and numerous qualified vendors are available. Due to an extensive network of underground utilities at the Site, all SVE alternatives would require additional design considerations related to the limited accessibility for construction and installation of SVE wells, piping, and treatment system.

In Situ Isolation/Containment would require the construction of a RCRA Subtitle C cap over the areas where soils exceed the leaching-based cleanup level. Numerous qualified

vendors are available for the design and construction of a cap. However, the presence of the MIBA building prevents implementation of this alternative at the current time. A cap would also severely limit future uses of the property.

6.2.1.7 Cost

The estimated net present worth costs, including capital and long-term operation and maintenance, for each of the soil alternatives, are summarized as follows:

- No Action Alternative - $0
- Two-Well SVE System - Additional Soil Alternative #1 - $1,365,267 [1]
- Three-Well SVE System - Additional Soil Alternative #2 - $1,365,267 [1]
- Four-Well SVE System - Additional Soil Alternative #3 - $1,365,267 [1]
- In Situ Isolation/Containment - FS Soil Alternative #2 - $913,501 [2]

[1] Costs were obtained from AGC's February 23, 2003 *Opinion of Probable Cost for the Ohio EPA Proposed Remedy*. The document was used by Gould for support of the March 28, 2003 Proof of Claim against Federal Mogul (T&N Industries) in the U.S. Bankruptcy Court for the District of Delaware. While the *Opinion of Probable Cost* represented a six-well SVE remedy, it is estimated that the costs represented by a two-well, three-well, or four-well SVE remedy would result in less than a 5 percent reduction in total cost.

[2] Cost from 1996 Feasibility Study

6.2.2 Ground Water

As discussed in Section 5.1.2, the FS remedial alternatives for ground water were based on the assumption that there was no additional PCE mass (source material) within the saturated zone. However, the additional soil sampling performed in conjunction with SVE pilot testing indicated that there is significant PCE mass in the saturated zone, with average concentrations that are more than an order of magnitude higher than in the unsaturated zone (Section 1.4.2.1). Therefore, all but one pumping alternative presented in the FS were deemed invalid for actual conditions, because the associated modeling did not account for the additional PCE mass.

In Section 5.2.2, a weight-of-evidence approach was used to support *Continued Operation of the Interim Action System*. The operating history of the interim action ground water recovery at WSW-4 was evaluated, including its effectiveness for mass removal and hydraulic containment of the contaminant plume. The weight of evidence indicates that continued pumping of well WSW-4 or a suitable replacement within its historical range of pumping rates should effectively meet the RAOs for ground water. Given this determination, the evaluation of additional ground water alternatives was considered unnecessary.

The following sections provide a comparison of *Continued Operation of the Interim Action System* and the *No Action Alternative,* with respect to the NCP balancing criteria.

6.2.2.1 Overall Protection of Human Health and the Environment

The potential risks to human health posed by contaminated ground water at the Site is associated with future use of the property where ground water is used for potable purposes.

Continued Operation of the Interim Action System will remove an estimated 400-450 lbs/year of contaminant mass from ground water. When pumping within the historical range of pumping rates, this alternative is also predicted to maintain hydraulic containment of the VOC plume. These factors will continue to work toward achievement of the RAOs and provide increased protection of human health and the environment.

The *No Action Alternative* would not be effective for protection of human health and the environment, because of the continued presence of a VOC contaminant source within the saturated zone.

6.2.2.2 Compliance with ARARs

Continued Operation of the Interim Action System would comply with applicable requirements. The air stripper currently used for ground water treatment operates under a de minimus exemption for vapor released to the atmosphere. The ground water is discharged from the treatment system to the Muskingum River under an NPDES permit.

To be effective, any ground water alternative must ultimately result in the removal of contaminant mass such that ground water does not exceed MCLs. Because VOC contaminant mass would remain in the saturated zone, the *No Action Alternative* does not provide a mechanism to achieve compliance with this requirement.

6.2.2.3 Long-Term Effectiveness and Permanence

Continued Operation of the Interim Action System will provide long-term effectiveness in maintaining hydraulic containment of the VOC plume. The remedy provides permanent removal of contaminant mass from ground water, and would need to operate until RAOs are achieved.

The *No Action Alternative* does not provide long-term effectiveness or permanence.

6.2.2.4 Reduction of Toxicity, Mobility or Volume by Treatment

Continued Operation of the Interim Action System would reduce the volume of contaminants in ground water by transferring mass to the vapor phase in the air stripping process.

The *No Action Alternative* would not reduce toxicity, mobility or volume of contaminants.

6.2.2.5 Short-Term Effectiveness

The *No Action Alternative* would have no short-term risks for Site workers, the general

public, or the environment.

Because it is currently in operation, *Continued Operation of the Interim Action System* would have no short-term risks for Site workers, the general public, or the environment. Because this remedy involves continuation of an existing process, there would be no immediate increase in remediation effectiveness resulting from implementation.

6.2.2.6 Implementability

The *No Action Alternative* is considered as a baseline for comparison with other alternatives and has no remedial elements to be implemented.

Continued Operation of the Interim Action System would pose no issues with respect to implementability. Long-term operation of this system will continue to require regular operation and maintenance activities until RAOs are achieved.

6.2.2.7 Cost

The estimated costs, including capital and long-term operation and maintenance, for each of the ground water alternatives, are summarized as follows:

- No Action Alternative - $0
- Continued Operation of Interim Action System
  - Capital - $540,000[1]
  - Operation & Maintenance - 30 years @ $208,000/year - $6,240,000[2,3]

[1] Estimated cost includes design/construction of a replacement for WSW-4, which has experienced a decrease in efficiency and may be nearing the end of its useful service life.

[2] Estimated O&M cost of $208,000/year is Ohio EPA's estimate at current monetary value; the long-term cost for 30 years of O&M has not been adjusted to a value for net present worth.

[3] It is noted that an estimated O&M cost of $450,000/year was calculated in AGC's February 23, 2003 Opinion of Probable Cost for the Ohio EPA Proposed Remedy. That document was used by Gould for support of the March 28, 2003 Proof of Claim against Federal Mogul (T&N Industries) in the U.S. Bankruptcy Court for the District of Delaware.

6.3 Community Acceptance

Ohio EPA received comments from interested parties during the public comment period and at the public meeting held at the Kate Love Simpson Morgan County Library on July 7, 2005. Those comments and Ohio EPA's responses are included in the Responsiveness Summary.

7.0 SELECTED REMEDIAL ALTERNATIVE

The selected remedial alternative is the installation of an SVE system to address Site soils, and continued operation of the interim action system to address Site ground water.

7.1 Soil Remediation using SVE

Ohio EPA's selected alternative for addressing VOC contamination in Site soils, and the leaching of VOCs to ground water, is the installation of an SVE system. Under this alternative, four new SVE wells will be installed within the unsaturated sand unit at a spacing of approximately 90 feet. The locations of the wells will be selected based upon the targeting of the most impacted areas of soil under the boiler room and the wastewater treatment building. Locations will also depend on the limitations posed by the infrastructure of the existing facility, including underground and overhead utilities.

As an additional component of this remedy, Ohio EPA intends that the two pilot SVE wells (EW-1S and EW-1D) will be incorporated into the system, for a total of six SVE wells. Because both of the pilot wells proved highly effective for mass removal, it will be advantageous to utilize them as part of a full scale system. With the exception of EW-1S, which will likely operate at a flow rate of 20 cfm due to its completion in the shallow clay, the remaining wells will operate at estimated flow rates of 200 cfm each. Initially, VOC vapor will be treated using granular activated carbon. It is estimated that within the first 12 months of system operation, the vapor stream will meet de minimus levels and will thereafter be discharged directly to the atmosphere according to applicable regulations. This remedy is expected to require a minimum operation period of 5 years to achieve cleanup goals.

<u>Performance Standards</u>

- The soil vapor extraction system will be operated to provide effective remediation of all vadose soils within the sand unit containing PCE at concentrations greater than 1 mg/kg. Effectiveness in reaching target soils will be determined through measurements of subsurface vacuum following startup and during the system's period of operation.

- Vapor extraction will continue until the soil cleanup goal of 1 mg/kg is achieved, or Ohio EPA determines that the system's removal of VOCs is occurring at a rate so low that continued operation is not effective in achieving mass removal, such that the costs of operation far exceed the environmental benefit.

- Achievement of the 1 mg/kg cleanup goal will be verified through implementation of an Ohio EPA-approved soil sampling and analysis plan. Determination of successful remediation to the cleanup goal will utilize a statistical analysis of data and not simply a "not-to-exceed" criterion.
- Soil vapor extraction must not result in discharges of air contaminants that exceed de minimus levels as defined in OAC 3745-15-05. If these levels are exceeded,

appropriate treatment equipment must be installed and the emission must comply with all Ohio air pollution control regulations.

7.2 Ground Water Remediation by Continued Operation of the Interim Action System

Ohio EPA's selected alternative for addressing VOC impacted ground water is to continue operation of the interim action ground water recovery system. Continued pumping of well WSW-4 or a suitable replacement within its historical range of pumping rates should effectively meet the remedial action objectives for ground water at the GCHB Site. The nature of this alternative, relying on historical evidence as opposed to analytical calculations or modeling, does not allow for a prediction of cleanup time for the ground water plume. Based upon current conditions and historical trends, however, it is expected that cleanup of ground water to MCLs may require an additional 20 to 30 years of pumping.

In addition to operation of the recovery well, as described above, a deed restriction will be recorded to prevent potable use of Site ground water. Wells WSW-5 and WSW-8 will be exempted from this restriction since they are free from contamination and are currently in use for potable supply. The exemption, however, will be contingent upon long-term ground water monitoring to detect any impact from site-related contaminants.

<u>Performance Standards</u>

- The operation of the recovery well must ensure continued hydraulic containment of the ground water plume, as demonstrated through routine measurement of Site ground water levels.

- The treatment of ground water using air stripping must not result in discharges of air contaminants that exceed de minimus levels as defined in OAC 3745-15-05. If these levels are exceeded, appropriate treatment equipment must be installed and the emission must comply with all Ohio air pollution control regulations.

- The recovery well will be operated at a pumping rate estimated to range from 200 gpm to 400 gpm. The precise pumping rate will be determined during the Remedial Design phase, and will be based upon a balance of adequate hydraulic containment and optimization of mass removal. Pumping will continue until sampling indicates that all monitoring wells and the recovery well have achieved MCLs for at least four continuous quarters of sampling. When this condition has been reached, the Site Respondents shall submit a workplan that proposes a schedule for shutdown of the recovery well, as well as continued ground water monitoring to confirm that the remedial objectives have been achieved. This workplan shall be subject to approval by Ohio EPA.

- The deed restriction will be monitored and enforced to prevent potable use of contaminated ground water.

8.0 GLOSSARY

Aquifer - An underground geological formation capable of holding and

yielding water.

ARARs - Applicable or relevant and appropriate requirements. Those rules which strictly apply to remedial activities at the site, or those rules whose requirements would help achieve the remedial goals for the site.

Baseline Risk Assessment - An evaluation of the risks to humans and the environment posed by a site.

Carcinogen - A chemical that causes cancer.

CERCLA - Comprehensive Environmental Response, Compensation and Liability Act. A federal law that regulates cleanup of hazardous substances ~~sites~~ under the U.S. EPA Superfund Program.

Decision Document - A statement issued by the Ohio Environmental Protection Agency giving the Director's selected remedy for a site and the reasons for its selection.

Ecological Receptor - Animals or plant life exposed to chemicals released from a site.

Exposure Pathway - Route by which a chemical is transported from the site to a human or ecological receptor.

Feasibility Study - A study conducted to ensure that appropriate remedial alternatives are developed and evaluated such that relevant information concerning the remedial action options can be presented to a decision-maker and an appropriate remedy selected.

Hazardous Substance - A chemical that may cause harm to humans or the environment.

Hazardous Waste - A waste product, listed or defined by the RCRA, which may cause harm to humans or the environment.

Human Receptor - A person exposed to chemicals released from a site.

NCP - National Contingency Plan. A framework for remediation of hazardous substances specified in CERCLA.

O&M - Operation~~s~~ and Maintenance. Long-term measures taken at a site, after the initial remedial actions, to assure that a remedy remains protective of human health and the environment.

PCE -	Perchloroethylene. A common industrial solvent and cleaner, often used for dry cleaning.
Preferred Plan -	The plan that evaluates the remedial alternatives presented in the Feasibility Study and identifies the preferred remedial alternative selected by Ohio EPA to remediate the site in a manner that best satisfies the evaluation criteria.
RCRA -	Resource Conservation and Recovery Act. A federal law that regulates the handling of hazardous wastes.
Remedial Action Objectives (RAO) -	Specific goals of the remedy for reducing risks posed by the site.
Remedial Investigation -	A study conducted to collect information necessary to adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives.
Responsiveness Summary-	A summary of all comments received concerning the Preferred Plan and Ohio EPA's response to all issues raised in those comments.
Soil Vapor Extraction- (SVE)	Process in which a vacuum is applied to the soil via vertical or horizontal extraction wells, to pull gas-phase volatiles to the surface.
TCE -	Trichloroethylene. A common industrial solvent and cleaner.
Water Quality Criteria -	Chemical and thermal standards that define whether a body of surface water is unacceptably contaminated. These standards are intended to ensure that a body of water is safe for fishing, swimming and as a drinking water source.

9.0 RESPONSIVENESS SUMMARY

for Glacier Clevite Heavywall Bearing Facility
Morgan County, Ohio

(comments in italics, responses in plain text)

COMMENTS FROM GOULD ELECTRONICS, INC.

SOIL REMEDY

Section 3.4.3 *- Gould agrees that the contaminant mass residing in the unsaturated sand unit represents the only unsaturated unit that could potentially result in groundwater concentrations exceeding MCLs and the calculated amount of contaminant mass alone in the unsaturated shallow clay unit does not pose a risk of exceeding the groundwater MCLs. Gould further agrees that any remediation of the shallow clay unit will provide only a minor reduction in risks to human health and the environment.*

Ohio EPA Response - No response necessary.

Section 3.4.2.3 *- Gould agrees that implementation of a full-scale soil vapor extraction (SVE) system in the shallow clay unit is not practicable based on the small radius of influence, the low air flow rate achievable, and the engineering difficulties associated with the installation of a SVE system due to the access restrictions at the MIBA plant. Gould further agrees that SVE is an appropriate technology to implement in the unsaturated sand unit.*

Ohio EPA Response - No response necessary.

Section 3.4.2.1 *- Gould agrees that the focused soil sampling program completed as part of the SVE Pilot Study successfully demonstrated the flawed mass distribution model relied upon in the December 1997 Preferred Plan.*

Ohio EPA Response - No response necessary.

Section 8.1, 1st and 2nd Paragraphs *- These paragraphs describe the remedy as including four "new" SVE wells in the sand unit and also operating the existing Pilot Study deep extraction well in the sand unit. The justification for the number of wells seems disconnected from the Leaching Model Study which Ohio EPA seems to rely on during the alternative analysis section of the APP (Section 7.0). The "four well" scenario in the Leaching Model Study included the existing deep extraction well as one of the four wells. Ohio EPA seems to have missed this detail and have included one extra well than is needed based on the modeling.*

Ohio EPA Response - The 4-well SVE layout presented on Figure 4-3 of the Leaching Model Study used a radius of influence (ROI) of 100 ft for the SVE wells, whereas the SVE Pilot Study Report recommended a ROI = 90 ft. Therefore, Figure 4-3 may somewhat overstate the areas that would be remediated by a 4-location system.

Furthermore, because the boiler room area is one of the critical areas to remediate, it seems appropriate to locate an additional well that can extend the vacuum influence further beneath the facility. Such a well would preferably be located nearer the building in the vicinity of the water tower, as opposed to locating it further to the south as shown on Figure 4-3. By shifting the position of this well, along with utilizing the smaller ROI of 90 feet, approximately 3 additional SVE locations would be necessary to cover the targeted remediation area. This would be a grand total of 5 SVE locations, (with the pilot location having 2 wells) = a 6-well system.

Section 8.1 Performance Standards *- Gould believes confirmation of successfully achieving the 1.0 mg/kg performance standard in the unsaturated sand unit should be based on a statistical analysis of remediated soils and not on a "not-to-exceed" basis. Gould also believes that if the SVE system is applied to the shallow clay unit via the existing Pilot Study SVE shallow well, the duration of operation should be based on the degree of mass removal, not confirmation soil sampling, since the Leaching Model Study has already demonstrated the shallow clay, without remediation, does not pose a risk to human health and the environment. Furthermore, the duration of operation of the shallow clay SVE well should not be prolonged by iterative system modifications geared towards minor incremental increases in mass removal, since the rate of mass removal is expected to drop significantly after several months.*

Ohio EPA Response - Ohio EPA agrees that the determination of successful remediation to the 1.0 mg/kg standard in the unsaturated sand should be based on a statistical analysis of the remediated soils and not on a "not-to-exceed" basis. The details of this approach will be formalized during Remedial Design through the preparation of an approvable Performance Monitoring Plan. Additional text has been added to Section 7.1 of the Decision Document to reflect this anticipated approach.

Ohio EPA also agrees that the duration of operation of SVE applied to the shallow clay unit should be based upon the ongoing degree of mass removal from this unit and not upon comparison to the leach-based cleanup standard of 1.0 mg/kg being applied to the sand unit.

Soil Remedy General Comment #1 *- Gould agrees with Ohio EPA's decision to eliminate the "trigger" in the 1997 Preferred Plan that tied the decision-making process for expansion of the initial SVE system to the performance of the groundwater cleanup.*

Ohio EPA Response - No response necessary.

Soil Remedy General Comment #2 *- The focus of the soil remedy is to remediate the sand unit because of its hypothetical effect on groundwater quality. Operating the existing*

shallow SVE well is basically "icing on the cake" from a risk-based perspective. Therefore, Gould believes the design focus/optimization for the SVE skid system should be on the sand unit (low pressure/high air flow rate). Trade-offs in the sand unit SVE system design to accommodate remediation in the clay unit (high pressure/low air flow rate) are not justified if they will lower the effectiveness/efficiency of the system for the sand unit.

Ohio EPA Response - Ohio EPA agrees that minimal, if any, decrease in SVE efficiency for the sand unit can be justified in order to target the shallow clay unit. The technical feasibility of operating an SVE well in the shallow clay using equipment designed for the more permeable sand unit will need to be determined during the Remedial Design stage, with a final decision to be made at that time.

GROUNDWATER REMEDY

Section 8.2 *- Gould continues to agree in principal that continued pumping of WSW-4 is the most appropriate remedy for the groundwater. However, as Ohio EPA knows, Gould is in the middle of a long-term pumping test to evaluate the hydraulic containment and mass removal rate at various groundwater extraction rates. It is premature to set the extraction rate at a "....nominal rate of 300 gpm..." The final extraction rate should be selected as part of the remedial design phase, based on a balance of the following three factors: 1) maintaining hydraulic containment; 2) optimizing mass removal; and 3) meeting plant water demands.*

Ohio EPA Response - The text of Section 7.2 in the Decision Document has been revised to reflect Gould's comment. The text now reads as follows:

First paragraph - "Continued pumping of well WSW-4 or a suitable replacement within its historical range of pumping rates should effectively meet the remedial action objectives for ground water at the GCHB Site."

Third bullet item - "Recovery well WSW-4 or a suitable replacement will be operated at a pumping rate estimated to range from 200 gpm to 400 gpm. The precise pumping rate will be determined during the Remedial Design phase, and will be based upon a balance of adequate hydraulic containment and optimization of mass removal" (note that Ohio EPA does not consider the water demands of the existing plant to carry equal weight in developing an optimum system for ground water remediation).

RIVER SEDIMENTS REMEDY

Sections 3.4.4, 4.2 and 6.1.3 *- Gould agrees with Ohio EPA's conclusions that the property and existing sediments at the plant outfalls are not adversely impacting ecological receptors and no further remedial analysis or testing is warranted.*

Ohio EPA Response - No response necessary.

ADDITIONAL COMMENTS

Section 3.1, 1st Paragraph *- The property ownership needs to be revised to reflect the current owner is Morgan County Improvement Corporation (since February 2005).*

Ohio EPA Response - This text has been revised accordingly.

Section 3.1, 2nd Paragraph *- The text states that the APP "...solely addresses the southern portions of the building and property currently occupied and operated by MIBA Bearings..." The Consent Order (CO) and Remedial Investigation (RI) state the purpose of the investigation is to evaluate the nature, migration and extent of contamination resulting from releases from the JPI facility. However, the RI was not limited to this portion (i.e., southern portion) of the property. Twenty-seven of 92 soil borings (see RI Figure 4-2) and an additional 10 surface samples (see RI Figure 4-5) completed during the RI were on the Foil Division side (northern portion of the property). This data was well distributed across the northern portion of the property and included interior locations in the vicinity of two former PCE storage areas. All of the RI data from the property was incorporated into the Soil PCE Distribution, Concentration and Mass analysis in the Leaching Model (see Section 3.2). Most of the samples on the northern portion of the property did not detect COCs at levels which exceed the proposed soil cleanup goal. Therefore, Gould believes the APP should not be limited to covering only a portion of the property actually investigated under the Consent Order. The remedy should be deemed to address all portions of the Site that were investigated during the RI.*

Ohio EPA Response - The September 5, 1990 Administrative Order on Consent was entered for the purpose of evaluating the nature and extent of contamination at the GCHB facility (Remedial Investigation), and for developing and evaluating a program of appropriate remedial measures (Feasibility Study).

Ohio EPA acknowledges that the soil borings completed during the RI were distributed across the entire property, including the Gould Foil facility. The agency also acknowledges that all of the RI data was used to develop the mass distribution data for PCE that was utilized in the leaching model. However, neither the RI report nor the FS report have ever been purported to represent a NCP-compliant assessment of the Gould Foil facility. Such an evaluation would have necessarily targeted potential source areas and contaminants of concern specific to that facility only. It would have also included a thorough investigation of ground water through the installation of an appropriate number of monitoring wells on that portion of the property. A review of RI Figure 6-1 shows that the placement of Site monitoring wells was overwhelmingly focused on evaluation of conditions at the GCHB facility. For the technical and administrative reasons discussed above, the selected remedy cannot be construed to apply to the Gould Foil facility.

Section 4.1 *- The risk estimates in the BRA are based on data over 10 years old. In particular, the groundwater PCE exposure point concentration used in the risk assessment was 1,087 ug/l but recent PCE groundwater concentrations are consistently well below this value. In addition, Gould's previous comments on the December 1997 Preferred Plan identified multiple technical issues which have not been addressed/corrected. The APP should clarify the limitations of the BRA, such as the age of the data, and the likelihood that*

current risk estimates would be considerably lower due to the operation of the IRM, and potentially other factors.

Ohio EPA Response - Ohio EPA agrees that a re-calculation of current risk estimates might result in risk magnitudes that are lower than those calculated during the RI, in part due to a decrease in PCE concentrations measured in ground water. It is important to note, however, that the calculation of a cleanup level (1.0 mg/kg) for Site soils within the sand unit was based entirely upon leaching potential and the current MCL for PCE, and not upon a risk-based value.

Section 3.1, 4th Paragraph *- The APP incorrectly states that "...all Site water supply wells except WSW-5 had been contaminated..." However, water supply well WSW-8 has also historically been free from contamination. Gould believes this should be corrected in the APP.*

Ohio EPA Response - This text has been revised in the Decision Document.

Section 4.1, 2nd Paragraph *- The APP should clarify that restrictions on groundwater potable use will not include the entire Site, since WSW-5 and WSW-8 are used for potable use and are free from contamination.*

Ohio EPA Response - Text has been added to the Decision Document to reflect that wells WSW-5 and WSW-8 would be exempted from a potable use restriction for the Site, subject to a long-term ground water monitoring program to detect any potential impact from site-related contaminants.

COMMENTS FROM FEDERAL-MOGUL

1) Section 3.1

COMMENT: Section 3.1 gives an incomplete history of the Site. Gould Electronics, Inc. has owned the Site for over 50 years from 1952 to 2005. The Site is part of a larger piece of Gould property that includes both the Site (the former "Glacier Clevite Heavywall Bearing ('GCHB') Plant") and the Gould Foil Division plant, which Gould operated until September 2003. From 1952 until 1981, Gould also operated the GCHB Plant. From 1981 to 1987, Clevite Industries, Inc. leased the Site from Gould and operated the GCHB Plant. In 1987, JP Industries, Inc. ("JPI") assumed the lease and the operations. (In 1990, T&N Industries, Inc. ("T&N") became the successor in interest to JPI.) In 2001, MIBA Bearings, LLC assumed the lease and the operations from T&N. Thus, the total period over which Federal-Mogul and its predecessor companies (JPI & T&N) leased and operated the GCHB plant was the 14 years from 1987 - 2001. More importantly, most of the contamination is believed to have occurred prior to 1987. The Preferred Plan should note that the vast majority of the contamination occurred during the Gould ownership and operation of the Site.

Ohio EPA Response - Text has been added to the Decision Document to clarify some details of the ownership and operational history at the Site. The remaining text adequately describes significant investigation findings relative to the history of contamination at the Site.

On October 1, 2001, T&N and its parent company, Federal-Mogul Corporation, filed for reorganization under Chapter 11 of the Bankruptcy Code.

Ohio EPA Response - This information is noted in Section 1.1 of the Decision Document.

Under a 1995 private, multi-party settlement agreement that included T&N and Gould, Gould, T&N, and The Pullman Company (which acquired the successor to Clevite Industries) have shared "Response Costs" associated with the Site. The 1995 agreement settled litigation among those three companies as to the equitable, allocable share each party bore for the GCHB Site and other sites The 1995 agreement specified an allocation of costs among the 3 signatory companies, and this allocation assigns the vast majority of that cost to Gould. Under the 1995 agreement, Gould has been performing the work required by the 1990 Administrative Order on Consent.

Ohio EPA Response - Duly noted.

2) Section 3.4.1

In Section 3.4.1, the Preferred Plan states "While Gould had not been a party to the RI/FS order, the company recognized its status as property owner and thus had a substantial interest in future remedial actions at the Site. In fact, Gould informed Ohio EPA that it would be assuming the lead role from T&N during the remedial design and remedial action (RD/RA) phases."

COMMENT: As noted in the previous comment, Gould has been performing the work required by the 1990 Administrative Order on Consent as Gould's obligation under the 1995 settlement agreement. The Preferred Plan should be revised to reflect this.

Ohio EPA Response - Duly noted.

3) Section 3.4.3

In Section 3.4.3, the Preferred Plan states, regarding the draft leaching study, that "[d]ue to issues related to the Federal-Mogul bankruptcy, a final report was never generated for the leaching study . . ."

COMMENT: As noted in the previous comments, for years, pursuant to the 1995 settlement agreement, Gould has been performing the work required by the 1990 Administrative Order on Consent. Nothing about Federal-Mogul's bankruptcy required Gould to stop or scale back any effort under the Administrative Order on Consent. The Preferred Plan should be

revised to eliminate any implication that Gould's failure to respond to comments was necessitated by the Federal-Mogul bankruptcy.

A similar comment applies to a passage in section 3.4.4, which currently says that Gould chose not to perform an ecological risk assessment "due to circumstances related primarily to the Federal-Mogul bankruptcy."

> Ohio EPA Response - In the course of communication with Gould and/or its consultants, Ohio EPA concluded that the Federal-Mogul bankruptcy was, indeed, a primary factor which influenced Gould's course of action related to both the leaching study and the ecological risk assessment. However, we acknowledge that this conclusion was subjective in nature - the text relating to this issue has been revised to reflect that.

4) In various places in the document, the Preferred Plan refers to certain outfalls as "Gould" outfalls and other outfalls as "Federal-Mogul" outfalls.

COMMENT: All of the outfalls discussed in the Preferred Plan are on property that had been owned by Gould. A clearer designation would be to refer to the outfalls as "Gould Foil Division" outfalls and "GCHB" outfalls.

> Ohio EPA Response - Ohio EPA agrees. Related text has been revised accordingly.

5) Section 8.2

In Section 8.2, Ground Water Remediation by Continued Operation of the Interim Action System, it states:

"Ohio EPA's selected alternative for addressing VOC impacted ground water is to continue operation of the interim action ground water recovery system. Continued pumping of well WSW-4 at an approximate rate of 300 gpm should effectively meet the remedial action objectives for ground water at the GCHB Site. The nature of this alternative, relying on historical evidence as opposed to analytical calculations or modeling, does not allow for a prediction of cleanup time for the ground water plume. Based upon current conditions and historical trends, however, it is expected that cleanup of ground water to MCLs may require an additional 20 to 30 years of pumping."

COMMENT: The Preferred Plan's statement that cleanup of groundwater to MCLs may require an additional 20 to 30 years of pumping is overly conservative, given the progress that has already been made in reducing groundwater concentrations. The Interim Action System (groundwater pump and treat) has been operating successfully for 15 years. The Preferred Plan acknowledges that "VOC concentrations in WSW-4 have decreased over time from 4,800 ug/l in 1988 to an average less than 350 ug/l over the years 2000-2004 (See Table 1). This data indicates that well WSW-4 continues to provide effective removal of contaminant mass from ground water." In fact, this significant reduction in VOC concentrations was achieved without having treated the vadose source area, which the

Preferred Plan now proposes to do. The SVE pilot study indicates that four SVE wells installed within the sand unit would result in all areas with VOC concentrations greater than 10 mg/kg being remediated, 95% of areas greater than 1 mg/kg being remediated, and a substantial portion of areas greater than 0.5 mg/kg being remediated. There would be a predicted 97.9% reduction in the PCE mass flux to ground water, and under non-pumping conditions, this scenario indicates that ground water beneath the remediated area would have PCE concentrations ranging from 9 to 14 ug/l following remediation. Based on the significant reduction in PCE mass flux to ground water following the implementation of the SVE system, it is anticipated that there will be a further reduction in concentration of VOCs in groundwater. This should be taken into consideration when estimating the prediction of cleanup time for the groundwater plume.

Ohio EPA Response - Figure 2-11 of the SVE Pilot-Scale Study illustrates a graph of the concentrations of VOCs measured in WSW-4 from 1988 through 2000. This graph demonstrates an asymptotic trend for ground water contamination, and the projection of this trend to an MCL of 5 ug/l clearly indicates potential cleanup time frames in the 20-30 year range.

Furthermore, Section 5.2.1 of the Decision Document points out that the reduction of contaminant mass in the vadose zone (via SVE), and the calculation of resultant VOC concentrations in ground water, represent contamination that would be attributed to soil leaching only (emphasis added). The Decision Document points out that the presence of contaminant mass below the water table also represents a source that will continue to impact ground water, independent of vadose zone leaching.

COMMENT: In turn, because the Preferred Plan estimates a 20-30-year cleanup time period, the cost estimate for the groundwater remedy provided in the preferred plan is based on 30 years. This also appears to be overly conservative and therefore the total O&M cost estimate is likely higher than would be expected. A more reasonable estimate for the cleanup time period would be 15 years. Based on 15 years of operation, the O&M cost estimate for the groundwater remedy in the Preferred Plan would be reduced from $6,240,00 to $3,120,000.

Ohio EPA Response - See response for Comment No. 10

6) Section 8.1

In Section 8.1 of the Preferred Plan it states:

"It is estimated that within the first 12 months of [SVE] system operation, the vapor stream will meet de minimis levels and will thereafter be discharged directly to the atmosphere according to applicable regulations."

COMMENT: Once the vapor stream has reached de minimis levels, the frequency of O&M site visits and related activities should be reduced from the levels estimated for the first year. However, the AGC Opinion of Probable Cost, on which OEPA has based the cost

estimate for the SVE system, does not appear to factor this into its cost estimate. OEPA should revise the SVE system cost estimate to reflect this reduction in frequency. The AGC Opinion of Probable Cost for all 5 years of O&M of the SVE system, excluding the cost of carbon, is based on an annual cost estimate of $105,300. A more reasonable cost estimate for years 2 through 5 would be $75,000 per year . This would result in an approximate 28% reduction (or $106,825) in the AGC cost estimate for years 2 through 5.

Ohio EPA Response - See response for Comment No. 10

7) Section 7.2.1.7

The footnote in Section 7.2.1.7 of the Preferred Plan says:

Costs were obtained from AGC's February 23, 2003 Opinion of Probable Cost for the Ohio EPA Proposed Remedy. The document was used by Gould for support of the March 28, 2003 Proof of Claim against Federal Mogul (T&N Industries) in the U.S. Bankruptcy Court for the District of Delaware. While the Opinion of Probable Cost represented a six-well SVE remedy, it is estimated that the costs represented by a two-well, three-well, or four-well SVE remedy would result in less than a 5 percent reduction in total cost.

COMMENT: As the footnote indicates, the AGC Opinion of Probable Cost is based on the installation of six SVE wells in the unsaturated sand and gravel zone plus continued operation of the clay zone and the sand and gravel zone SVE wells. The Preferred Plan, on the other hand, proposes the installation of only four new SVE wells. The reduction in the number of wells from the number used in the cost assumptions will reduce the capital costs associated with this remedy. While we recognize that the capital costs will not drop by a full one-third due to the elimination of one-third of the planned wells, certain capital costs components - such as trenching and the wells themselves - will drop. The Preferred Plan should be revised to reflect the approximate 10% (or roughly $62,000) reduction in AGC's estimated capital costs for the SVE system.

Ohio EPA Response - See response for Comment No. 10

8) Section 7.2.2.7

Section 7.2.2.7 of the Preferred Plan presents cost estimates for the groundwater remedy.

COMMENT: The cost estimate for the groundwater remedy relies on the continued use of WSW-4 and the air stripper. The cost estimate in the Preferred Plan includes an estimate of $540,000 for capital costs but does not clearly explain the basis for this estimate. It should be noted that the estimated capital cost in the AGC Opinion of Probable Cost is based on removal of the existing IRM and installation of a new system. However, the Preferred Plan does not include the removal of the existing IRM, so the Opinion of Probable Cost does not accurately reflect the remedy that OEPA has selected. OEPA should revise the Preferred Plan to better document the capital cost estimate, clarifying that the estimate does not include costs for removal of the existing IRM.

Also, the Preferred Plan does not provide details for the basis of the O&M cost estimate for the groundwater remedy. OEPA should revise the Preferred Plan to provide these details.

Ohio EPA Response - See response for Comment No. 10

9) Section 3.4.2.1

In Section 3.4.2.1 of the Preferred Plan it states:

The results of laboratory analysis indicated that PCE concentrations in the unsaturated sand and gravel zone are relatively consistent with the RI data, and PCE concentrations between the source areas (i.e. boiler room and former sand filter beds) are similar to those immediately beneath the source areas. Of particular interest was the determination that PCE concentrations in saturated soil samples were generally an order of magnitude higher than in samples from the unsaturated zone. Not only did these samples exceed the PRG of 0.5 mg/kg, but previous RI/FS activities had not provided chemical data for this zone or accounted for the associated mass during remedial alternative evaluation.

COMMENT: One should exercise caution in interpreting sample concentrations in "saturated soil" samples. Without further information, it is not possible to tell to what degree the "saturated soil" concentration is due to contaminants actually adsorbed to the soil, as opposed to contaminants in the water. As a result, these "saturated soil" concentrations should not be compared to PRGs for soil. OEPA should revise the Preferred Plan to remove this reference.

Ohio EPA Response - The comparison of saturated soil concentrations to a PRG developed for unsaturated soils has been removed in the Decision Document text.

10) General comment regarding basis for estimated cost

COMMENT: As noted in the Preferred Plan, OEPA has relied on some of the cost estimate information from AGC's February 23, 2003 Opinion of Probable Cost for the Ohio EPA Proposed Remedy. These costs reflect AGC unit labor rates and expenses which are higher than what would be expected for comparable service providers located in the Ohio area. For example, prior AGC project management unit labor rates were as much as 30% higher than labor rates that would be expected for this level of service. Furthermore, the AGC travel expenses from the Philadelphia area would be higher then a local service provider. In those cases where the OEPA has relied on the AGC cost estimates, the Preferred Plan should acknowledge the conservatively high nature of these cost estimates and, preferably, reduce these cost estimates accordingly.

Ohio EPA Response - Ohio EPA agrees that there is uncertainty in the estimation of a cleanup time period for ground water, as well as in the calculation of capital costs and O&M costs for both the soil and ground water remedies. We acknowledge that the duration and long-term cost of the remedies is of importance to all Responsible Parties.

The cost estimates were included in the Preferred Plan and Decision Document for qualitative purposes only, and did not form the basis for selection of a particular remedy over another. Furthermore, the costs for remedy implementation are subject to change during Design, as well as during long-term O&M. Ohio EPA does not dispute the substance of Federal-Mogul's comments. However, the further refinement of estimated costs to the degree of accuracy being suggested by Federal-Mogul will not fundamentally alter remedy selection or implementation.

COMMENTS FROM MRS. DELLA BRATTON

See Attachment A

Ohio EPA Response

Ohio EPA appreciates Mrs. Bratton's interest and concern regarding environmental issues that affect Morgan County. We are happy to hear that Mrs. Bratton is encouraged by the preferred remedy as described in the Amended Preferred Plan and formally selected in this Decision Document for the GCHB facility.

We acknowledge that the Ohio Division of Wildlife played an important role in the evaluation of contaminant release(s) that threatened the Muskingum River in the 1970's, long before the discovery of soil and groundwater contamination at the Site. Ohio EPA is encouraged by the results of the 2003 ecological assessment, showing that current impairment of biological communities in the Muskingum River is not attributable to sediments in the vicinity of the Gould or GCHB outfalls.

ATTACHMENT A

O.E.P.A.
S.E.D.O.
2005 JUL 13 AM 11:43

July 11, 2005

Kevin C O'Hara
Ohio E. P. A.
Southeastern District Office
2195 Front Street
Logan, Ohio 43138

Subject: Public Hearing - Amended Plan Gould Site - Morgan County, Ohio
Held at Kate Love Simpson Library
July 7, 2005 @ 6:00 PM

Comments: Your presentation was one which made me proud. As you know I have been upset regarding this site and the Morgan County Landfill for years starting with my children (3) grandchildren (5) and great grandchildren (6). Finally, Gould has admitted to their negligence, lies and are accepting responsibility of their deeds. Finally after all these years; What A RAY of Sunshine!!

Now, if our Director has the balls to continue the process and demand immediate action; me and the future generations will survive. (Thank God)

I have enclosed files of interest regarding the site back-ground. I feel there has

been over a period of several years; deliberate intent to literally avoid and ignore any and all previous Director's Orders both for this site and the landfill.

I have given so many years of my life to demand enforcement of clean-up at both sites.

Therefore, I am requesting the Division of Wildlife's roll in this back ground of this site be included as the contamination was discovered long before 1988. Division of Wildlife's roll and law-suit had a great deal to do with establishing "The Ohio E.P.A Division. The way you explained the new technology for clean-up certainly did impress me and is done a great deal different from the Good-Ole-Days. However, at the time of our law-suit 1972 it was estimated it would take 100 years to clean up the water sources, waterway and environment and that was 33 years ago; so we estimated that pretty close didn't we? You must admit I have been a persistent ole lady but always loyal to the state of Ohio to help get the job done.

I will be 78 years old come August and believe-you-me it has been an incredible

journey so far. Only wish I could have turned in my time, but then again, feel good about myself. If I can help in the future feel free to call.

Thanks again for protecting our water-air and earth as they are the source of life. It has been a long time coming but, a good job well done and most definitely in the right direction.

I remain a concerned citizen

Della M. Bratton
776 E. St. Rt. 60 Ne
Mt Connelsville, Ohio 43756
740-962-5136

cc: Tom Speck, Director ODNR

TABLE 1. Estimated VOC Mass Removed from Well WSW-4

Year	Average Annual VOC (ppb)	Total Flow (gallons)	Annual VOC Mass Removed (lbs)	Cumulative VOC Mass Removed (lbs)
1988	3,620	18,812,160	570	570
1989	3,400	71,976,960	2,048	2,618
1990	2,710	71,976,960	1,633	4,251
1991	1,470	71,976,960	886	5,137
1992	651	71,976,960	392	5,529
1993	788	71,976,960	475	6,003
1994	383	308,037,000	988	6,991
1995	457	330,683,000	1,265	8,256
1996	615	246,953,000	1,271	9,527
1997	485	186,301,000	756	10,283
1998	495	202,607,000	839	11,123
1999	449	134,775,000	507	11,629
2000	350	187,445,000	549	12,178
2001	332	139,660,000	388	12,566
2002	340	187,710,000	534	13,101
2003	320	178,704,000	478	13,579
2004	349	104,808,697	275	13,854

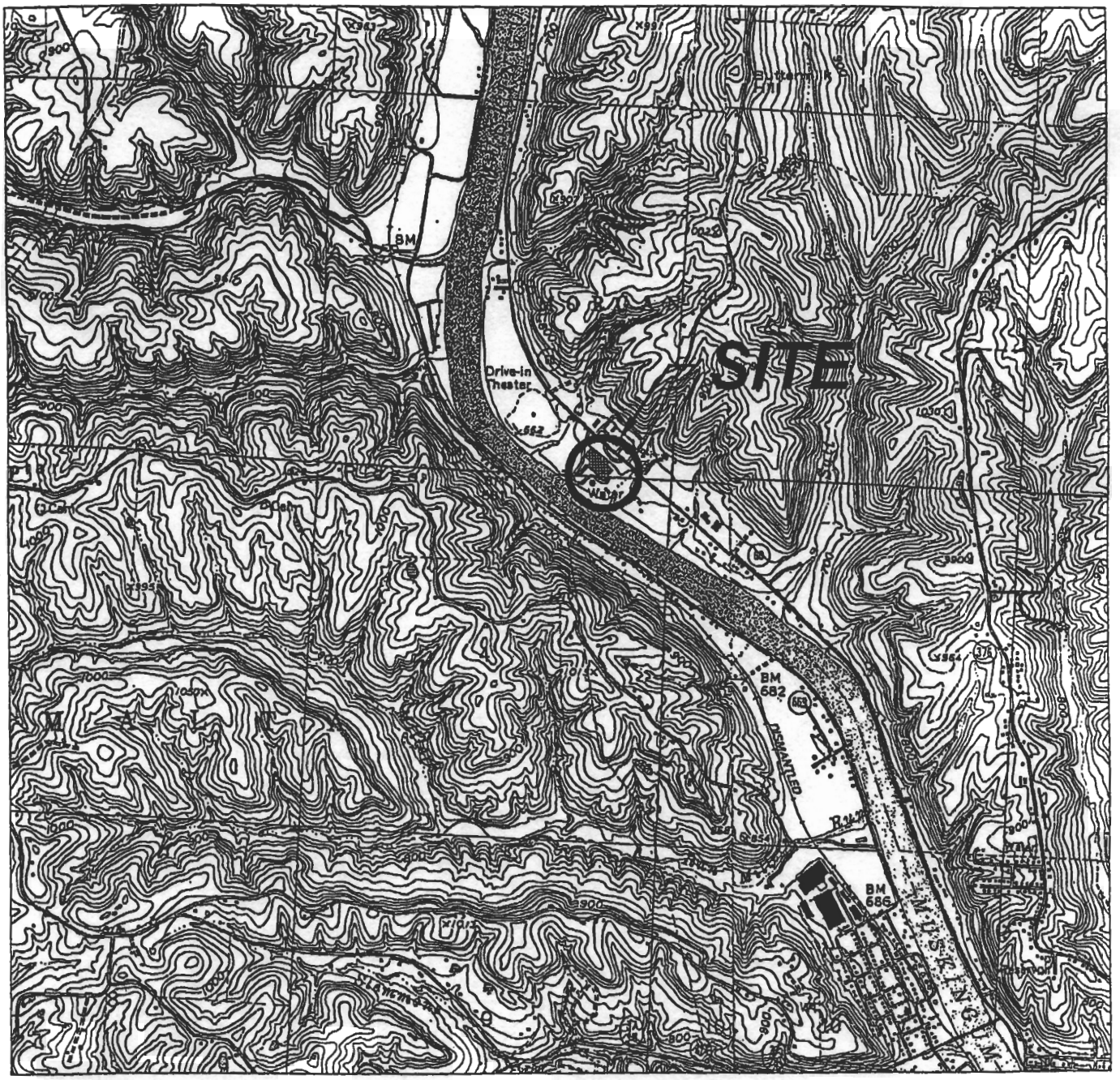
TABLE 2. Summary of Human Health Risks Associated with the GCHB Facility

Exposure Scenario	Noncancer Hazard Index (HI)	Excess Lifetime Cancer Risk (ELCR)[1]
Current Use: Groundskeeper	9.0E-03	1.5E-05
Current Use: Typical Worker	2.4E-02	2.1E-05
Current Use: Site Visitor	8.4E-03	1.6E-06
Current Use: Adult Resident	9.1E-03	2.1E-06
Current Use: Older Child Resident	1.2E-02	8.6E-07
Current Use: Younger Child Resident	1.5E-02	7.2E-07
Future Use: Adult Resident	17.1	1.7E-03
Future Use: Older Child Resident	24.2	7.5E-04
Future Use: Younger Child Resident	54.1	1.0E-03
Future Use: Adult Recreational	4.4E-02	7.8E-06
Future Use: Older Child Recreational	6.6E-02	3.6E-06
Future Use: Younger Child Recreational	1.4E-01	5.6E-06

[1] Note the following relationships:

1.E-03 = 1 in 1,000
1.E-04 = 1 in 10,000
1.E-05 = 1 in 100,000
1.E-06 = 1 in 1,000,000
1.E-07 = 1 in 10,000,000
Example: 3.2E-05 = 3.2 in 100,000

Revision	Description	Date	By



Basemap source:

U.S.G.S. 7.5 minute quadrangle maps of Rokeby Lock and McConnelsville Ohio, dated 1960 and photorevised 1984 and 1987 respectively.

GCHB/GOULD SITE

McCONNELSVILLE, OHIO

Note: Scale is approximate, due to stretching of digital image to fit the page.

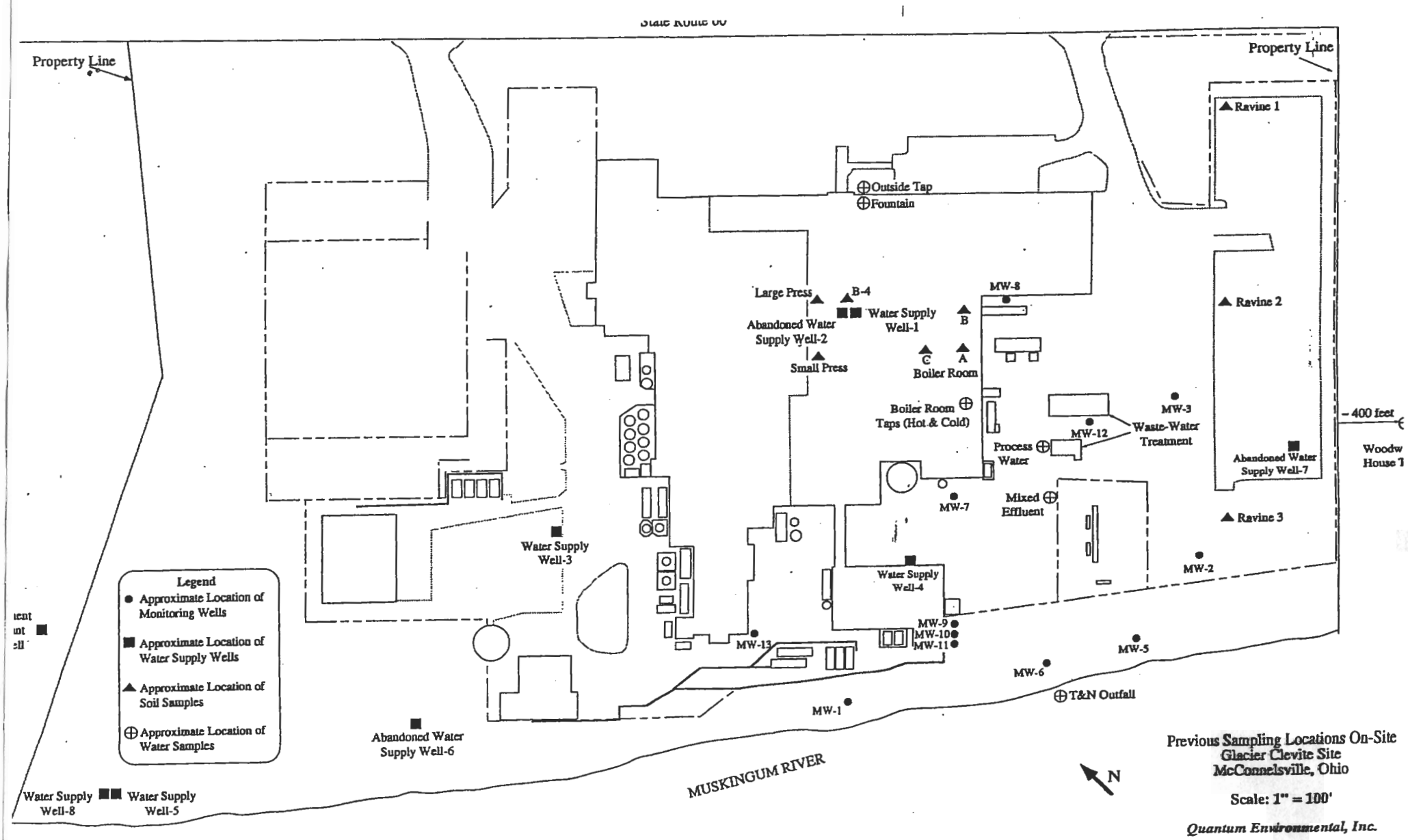
0 625 1250 2500

SCALE: FEET

Scale: 1"=2500'	SITE LOCATION MAP
Originated By: K.W.	
Drawn By: V.E.N.	
Checked By: B.B.B.	Advanced GeoServices Corp. Chadds Ford Business Campus, Rts. 202 & 1 Brandywine One, Suite 202 Chadds Ford, Pennsylvania 19317
Project Mgr: S.W.K.	
Dwg No. 99602-12	
Issued:	Project No. 99-602-03

J:\MCCONNELSVILLE\DRAWINGS\99603\99602-12

FIGURE 1



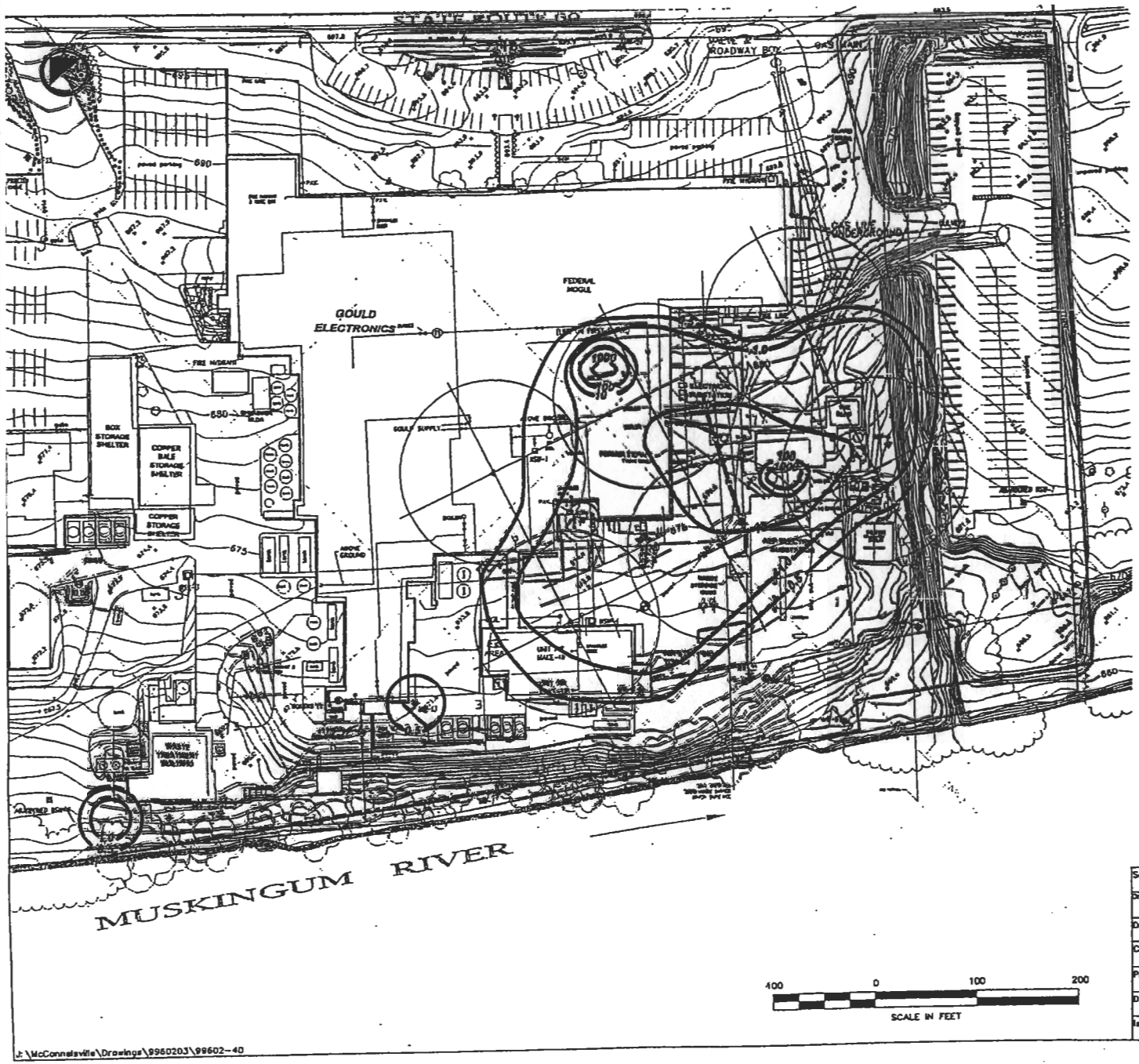
Previous Sampling Locations On-Site
Glacier Clevite Site
McConnelsville, Ohio

Scale: 1" = 100'

Quantum Environmental, Inc.

SITE FEATURES MAP

FIGURE 2



Revision	Description	Date	By

LEGEND

- TOPOGRAPHIC CONTOURS
- MONITORING WELLS (SHEET CONSTRUCTION)
- 10 PCE ISOCONCENTRATION CONTOURS (ppm)
- PROPOSED EXTRACTION WELL

NOTES:

1. BASE MAP COMPILED FROM AERIAL PHOTOGRAPHY EXPOSED 2/29/00, BY M.A.N. MAPPING SERVICES INC., HILLARD OHIO. CONTOUR INTERVALS ARE 1 FOOT.
2. MONITORING WELL LOCATIONS SURVEYED ON 3/13/98 AND IN 4/19/00 BY LINN ENGINEERING ((740) 452-7434).
3. RI TEST BORING LOCATIONS ARE APPROXIMATE AND WERE OBTAINED FROM FIGURE 4-1 OF THE QUANTUM ENVIRONMENTAL REMEDIAL INVESTIGATION REPORT DATED AUGUST 12, 1993.
4. THE LOCATION OF THE TEST BORINGS, FACILITY INFRASTRUCTURE WERE OBTAINED FROM DIFFERENT SOURCES. THE LEVEL OF ACCURACY AND HORIZONTAL DATUM FOR EACH SOURCE WERE DIFFERENT AND MINOR ADJUSTMENTS TO THE OUTLINES AND SOIL BORINGS WERE NECESSARY.
5. MONITORING PROBE, SOIL BORINGS, AND EXTRACTION WELLS (REMOVED DURING SVE PILOT SCALE STUDY) LOCATIONS SURVEYED ON 4/19/00 BY LINN ENGINEERING.

GCHB/GOULD SITE

McCONNELSVILLE, OHIO

PCE ISOCONCENTRATIONS IN SAND STRATA

Checked By: S.A.S.
Project Mgr: S.W.K.
Dwg No. 99602-40
Issued: NOV 30 2000

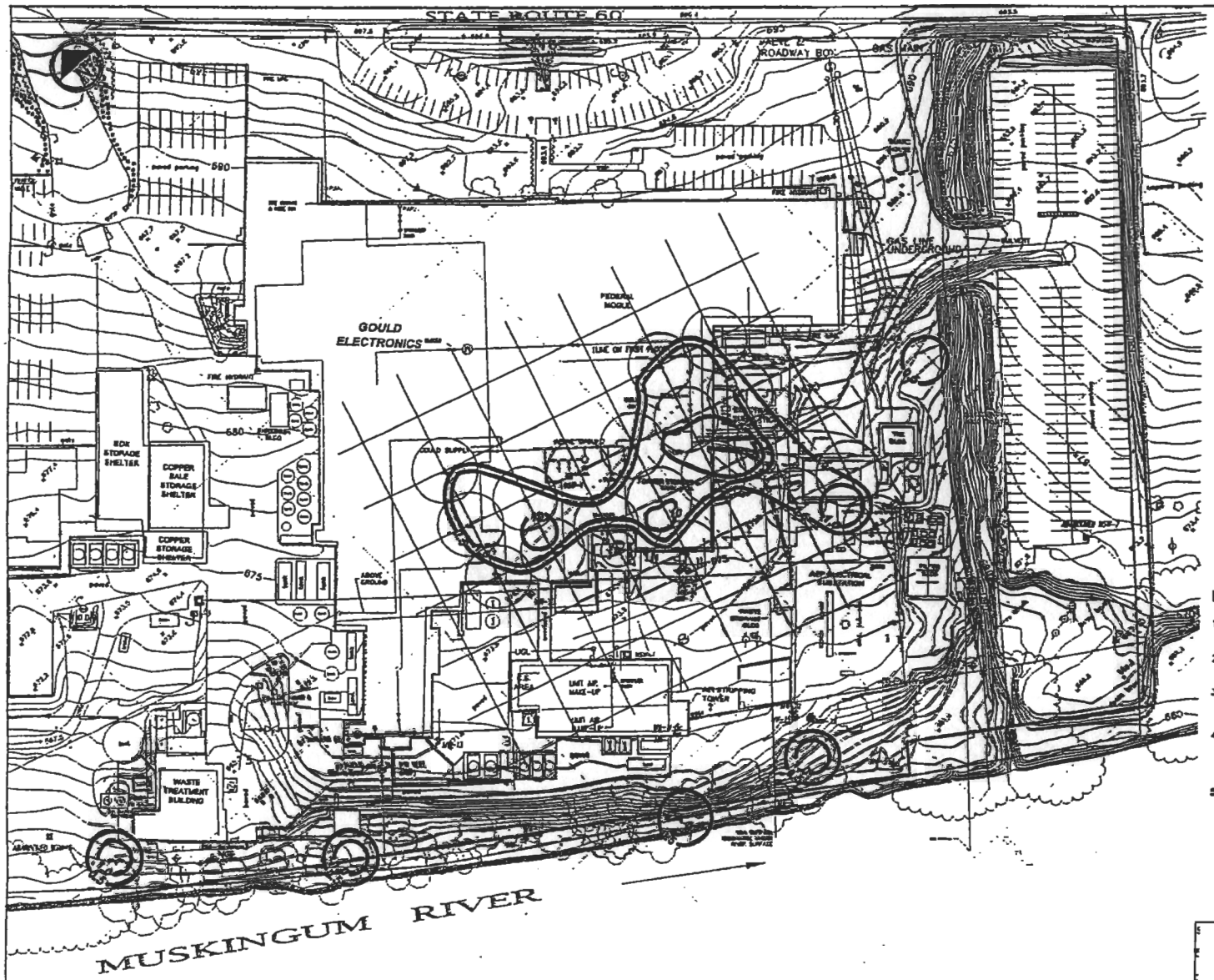
Advanced GeoServices Corp.
Chadds Ford Business Campus, Rts. 202 & 1
Brandywine One, Suite 202
Chadds Ford, Pennsylvania 19317

Project No. 99-602-03

FIGURE 3

J:\McConnelsville\Drawings\9960203\99602-40

Revision	Description	Date	By
1	Revised PCE Isoconcentration lines and extraction well placement	11/31/00	P.J.C.



LEGEND

- TOPOGRAPHIC CONTOURS
- MONITORING WELLS (STEEL CONSTRUCTION)
- 10 PCE ISOCONCENTRATION CONTOURS (ppm)
- PROPOSED EXTRACTION WELL

NOTES:

1. BASE MAP COMPILED FROM AERIAL PHOTOGRAPHY EXPOSED 2/28/00, BY M.A.N. MAPPING SERVICES INC., HILLARD OHIO. CONTOUR INTERVALS ARE 1 FOOT.
2. MONITORING WELL LOCATIONS SURVEYED ON 3/13/98 AND IN 4/19/00 BY LINN ENGINEERING ((740) 452-7434).
3. IN TEST BORING LOCATIONS ARE APPROXIMATE AND WERE OBTAINED FROM FIGURE 4-1 OF THE QUANTUM ENVIRONMENTAL REMEDIAL INVESTIGATION REPORT DATED AUGUST 12, 1993.
4. THE LOCATION OF THE TEST BORINGS, FACILITY INFRASTRUCTURE WERE OBTAINED FROM DIFFERENT SOURCES. THE LEVEL OF ACCURACY AND HORIZONTAL DATUM FOR EACH SOURCE WERE DIFFERENT AND MINOR ADJUSTMENTS TO THE UTILITIES AND SOIL BORINGS WHERE NECESSARY.
5. MONITORING PROBE, SOIL BORINGS, AND EXTRACTION WELLS (PERFORMED DURING SVE PILOT SCALE STUDY) LOCATIONS SURVEYED ON 4/19/00 BY LINN ENGINEERING.

GCHB/GOULD SITE

McCONNELSVILLE, OHIO

100 0 100 200

SCALE IN FEET

PCE ISOCONCENTRATIONS IN CLAY STRATA

Checked By: S.A.S.

Project Mgr: S.W.K.

Dwg No. 99602-40

Issued: [illegible]

Advanced GeoServices Corp.
Chadds Ford Business Campus, Rts. 202 & 1
Brandywine One, Suite 202
Chadds Ford, Pennsylvania 19317

Project No. 99-602-03

FIGURE 4

\\McConnelsville\Drawings\9950203\99602-40

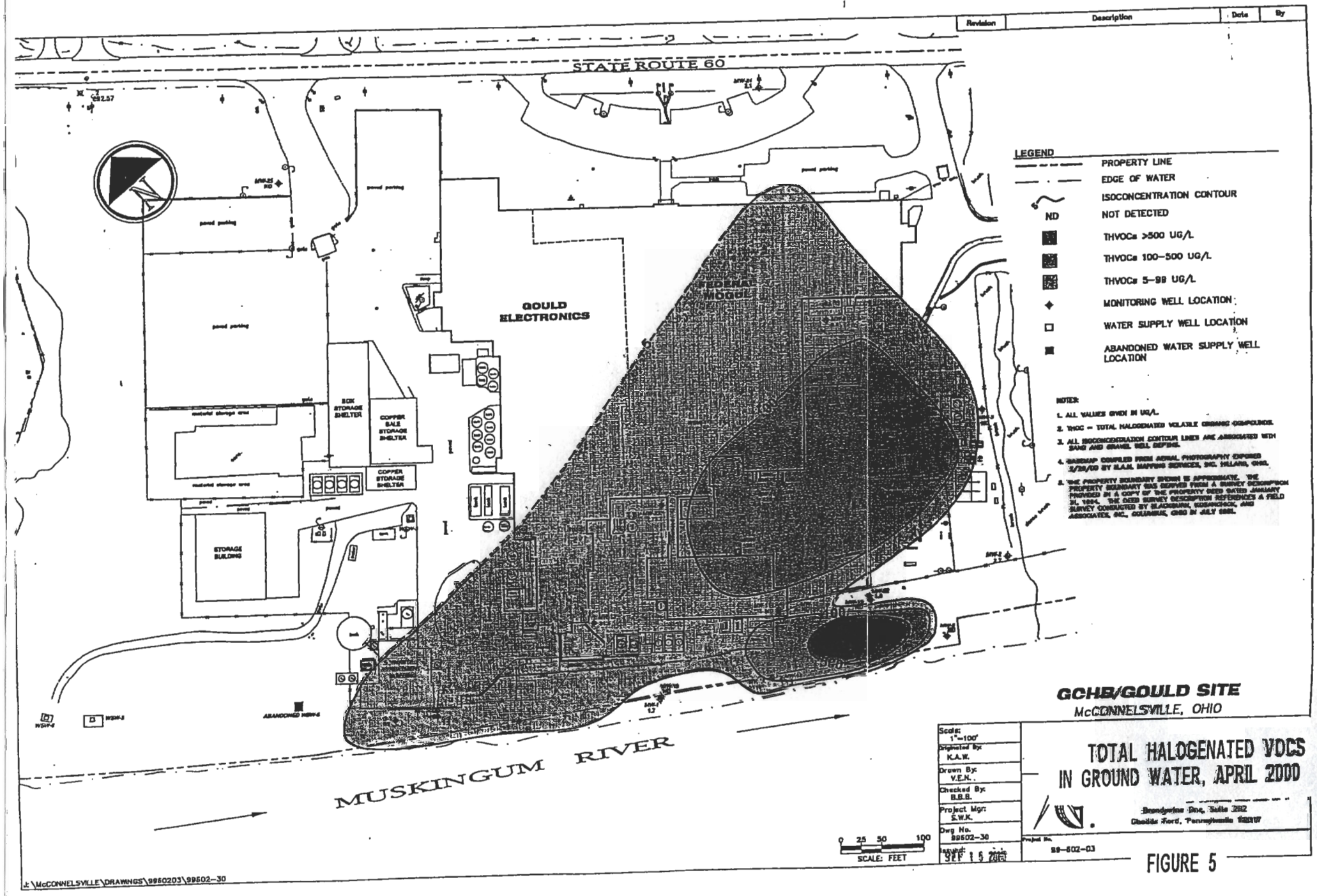

STATE ROUTE 60
GOULD ELECTRONICS
THERMAL MODULE
BOX STORAGE SHELTER
COPPER BALE STORAGE SHELTER
COPPER STORAGE SHELTER
STORAGE BUILDING
MUSKINGUM RIVER
LEGEND
PROPERTY LINE
EDGE OF WATER
ISOCONCENTRATION CONTOUR
ND NOT DETECTED
THVOCs >500 UG/L
THVOCs 100-500 UG/L
THVOCs 5-99 UG/L
MONITORING WELL LOCATION
WATER SUPPLY WELL LOCATION
ABANDONED WATER SUPPLY WELL LOCATION
NOTES:
1. ALL VALUES GIVEN IN UG/L.
2. THOC = TOTAL HALOGENATED VOLATILE ORGANIC COMPOUNDS.
3. ALL ISOCONCENTRATION CONTOUR LINES ARE ASSOCIATED WITH SAND AND GRAVEL WELL SCREENS.
4. BASEMAP COMPILED FROM AERIAL PHOTOGRAPHY EXPOSED 3/29/00 BY M.A.H. MAPPING SERVICES, INC. HILLARD, OHIO.
5. THE PROPERTY BOUNDARY SHOWN IS APPROXIMATE. THE PROPERTY BOUNDARY WAS DERIVED FROM A SURVEY DESCRIPTION PROVIDED IN A COPY OF THE PROPERTY DEED DATED JANUARY 31, 1994. THE DEED SURVEY DESCRIPTION REFERENCES A FIELD SURVEY CONDUCTED BY BLACKBURN, ROBANCHON, AND ASSOCIATES, INC., COLUMBUS, OHIO IN JULY 1991.
GCHB/GOULD SITE
McCONNELSVILLE, OHIO
Revision
Description
Date
By
Scale: 1"=100'
Designed By: K.A.W.
Drawn By: V.E.N.
Checked By: B.B.B.
Project Mgr: S.W.K.
Dwg No. 99502-30
Issued: SEP 15 2000
0 25 50 100
SCALE: FEET
TOTAL HALOGENATED VOCS IN GROUND WATER, APRIL 2000
Project No. 99-502-03
J:\McCONNELSVILLE\DRAWINGS\9950203\99502-30

FIGURE 5

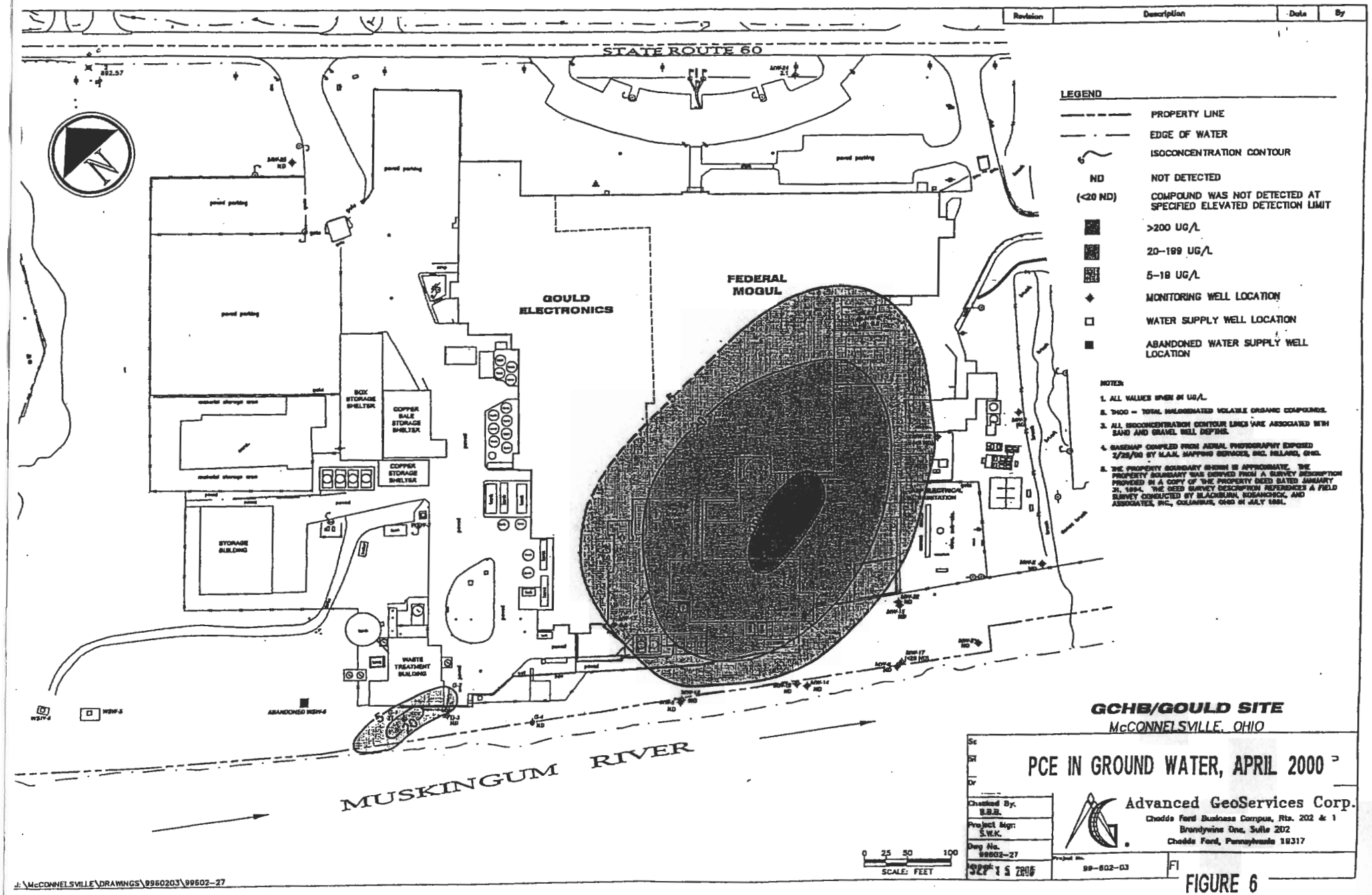
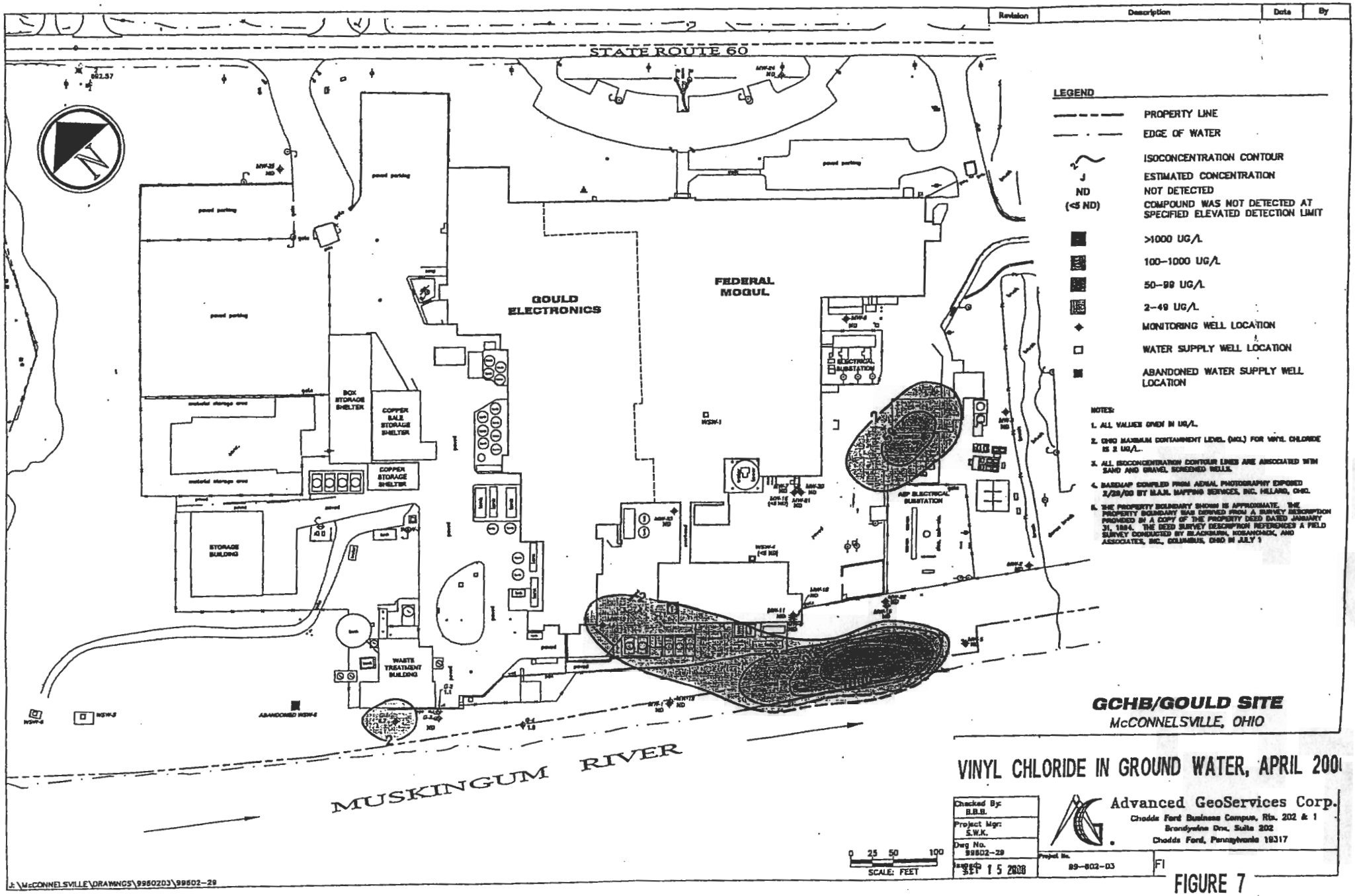

STATE ROUTE 60
GOULD ELECTRONICS
FEDERAL MOGUL
BOX STORAGE SHELTER
COPPER BALE STORAGE SHELTER
COPPER STORAGE SHELTER
STORAGE BUILDING
WASTE TREATMENT BUILDING
ELECTRICAL SUBSTATION
ABANDONED WSW-6
MUSKINGUM RIVER
LEGEND
PROPERTY LINE
EDGE OF WATER
ISOCONCENTRATION CONTOUR
ND NOT DETECTED
(<20 ND) COMPOUND WAS NOT DETECTED AT SPECIFIED ELEVATED DETECTION LIMIT
>200 UG/L
20–199 UG/L
5–19 UG/L
MONITORING WELL LOCATION
WATER SUPPLY WELL LOCATION
ABANDONED WATER SUPPLY WELL LOCATION
NOTES:
1. ALL VALUES SHOWN IN UG/L.
2. TVOC – TOTAL HALOGENATED VOLATILE ORGANIC COMPOUNDS.
3. ALL ISOCONCENTRATION CONTOUR LINES ARE ASSOCIATED WITH SAND AND GRAVEL WELL DEPTHS.
4. BASEMAP COMPILED FROM AERIAL PHOTOGRAPHY EXPOSED 2/28/00 BY M.A.N. MAPPING SERVICES, INC. HILLARD, OHIO.
5. THE PROPERTY BOUNDARY SHOWN IS APPROXIMATE. THE PROPERTY BOUNDARY WAS DERIVED FROM A SURVEY DESCRIPTION PROVIDED IN A COPY OF THE PROPERTY DEED DATED JANUARY 31, 1994. THE DEED SURVEY DESCRIPTION REFERENCES A FIELD SURVEY CONDUCTED BY BLACKBURN, BOSANCHICK, AND ASSOCIATES, INC., COLUMBUS, OHIO IN JULY 1991.
GCHB/GOULD SITE
McCONNELSVILLE, OHIO
PCE IN GROUND WATER, APRIL 2000
Advanced GeoServices Corp.
Chadds Ford Business Campus, Rts. 202 & 1
Brandywine One, Suite 202
Chadds Ford, Pennsylvania 19317
Checked By: B.B.B.
Project Mgr: S.W.K.
Dwg No. 99602-27
99-602-03
SCALE: FEET
0 25 50 100
J:\McCONNELSVILLE\DRAWINGS\9960203\99602-27

FIGURE 6


STATE ROUTE 60
GOULD ELECTRONICS
FEDERAL MOGUL
BOX STORAGE SHELTER
COPPER BALE STORAGE SHELTER
COPPER STORAGE SHELTER
STORAGE BUILDING
WASTE TREATMENT BUILDING
ELECTRICAL SUBSTATION
AEP ELECTRICAL SUBSTATION
ABANDONED WSW-2
MUSKINGUM RIVER
LEGEND
PROPERTY LINE
EDGE OF WATER
ISOCONCENTRATION CONTOUR
ESTIMATED CONCENTRATION
ND
NOT DETECTED
(<5 ND)
COMPOUND WAS NOT DETECTED AT SPECIFIED ELEVATED DETECTION LIMIT
>1000 UG/L
100–1000 UG/L
50–99 UG/L
2–49 UG/L
MONITORING WELL LOCATION
WATER SUPPLY WELL LOCATION
ABANDONED WATER SUPPLY WELL LOCATION
NOTES:
1. ALL VALUES GIVEN IN UG/L.
2. OHIO MAXIMUM CONTAMINENT LEVEL (MCL) FOR VINYL CHLORIDE IS 2 UG/L.
3. ALL ISOCONCENTRATION CONTOUR LINES ARE ASSOCIATED WITH SAND AND GRAVEL SCREENED WELLS.
4. BASEMAP COMPILED FROM AERIAL PHOTOGRAPHY EXPOSED 3/28/00 BY M.A.R. MAPPING SERVICES, INC. HILLARD, OHIO.
5. THE PROPERTY BOUNDARY SHOWN IS APPROXIMATE. THE PROPERTY BOUNDARY WAS DERIVED FROM A SURVEY DESCRIPTION PROVIDED IN A COPY OF THE PROPERTY DEED DATED JANUARY 31, 1984. THE DEED SURVEY DESCRIPTION REFERENCED A FIELD SURVEY CONDUCTED BY BLACKBURN, MOSKOWITZ, AND ASSOCIATES, INC., COLUMBUS, OHIO IN JULY 1
GCHB/GOULD SITE
McCONNELSVILLE, OHIO
VINYL CHLORIDE IN GROUND WATER, APRIL 200
Checked By: B.B.B.
Project Mgr: S.W.K.
Dwg No. 99502-29
Issued: SEP 15 2000
Advanced GeoServices Corp.
Chadds Ford Business Campus, Rts. 202 & 1
Brandywine Drive, Suite 202
Chadds Ford, Pennsylvania 19317
Project No. 99-502-03
FIGURE 7
0 25 50 100
SCALE: FEET
J:\McCONNELSVILLE\DRAWINGS\9950203\99502-29