OhioEPA

MEMORANDUM

To: GVI

From: AS (Reviewer); Ohio EPA Legal Office.

Date: 9/9/15

These files were reviewed to determine whether records contained herein are confidential or otherwise exempt from the disclosure obligations of Ohio Revised Code (ORC) 149.43.

X **All files are public**

No records were removed based on this review.

___ **Some files are not public**

Records were removed or redacted for the reasons given below:

___ **Attorney- Client Privilege**, State ex rel. Leslie v. Ohio Hous. Fin. Agency, 105 Ohio St.3d 261, 265 (2005).

___ **Attorney Work Product**, Squire, Sanders & Dempsey, L.L.P. v. Givaudan Flavors Corp., 127 Ohio St.3d 161 (2010).

___ **Confidential Law Enforcement Investigatory Records**, ORC 149.43(A)(1)(h).

___ **Social Security Numbers**, State ex rel. Office of Montgomery County Pub. Defender v. Siroki, 108 Ohio St.3d 207 (2006).

___ **Release Otherwise Prohibited by Law**, (i.e. trade secret, infrastructure and security records, etc.), ORC 149.43(A)(1)(v).

___ **Other Specified Reason**: _____

___ **All files are confidential**

Should you have any questions regarding this issue, please contact Ohio EPA's Office of Legal Services.

(This memorandum is to remain visibly attached to this file.)

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BEFORE THE

OHIO ENVIRONMENTAL PROTECTION AGENCY

In the Matter of:	:	
	:	
Mahle Engine Components USA, Inc.	:	
17226 County Road 57	:	Director's Final
Caldwell, Ohio 43724	:	Findings and Orders
	:	For Remedial Design and
and	:	Remedial Action
	:	
Gould Electronics Inc.	:	
34929 Curtis Boulevard	:	
Eastlake, Ohio 44095-4001	:	
	:	
Respondents		

PREAMBLE

It is hereby agreed to by the Parties as follows:

I. JURISDICTION

1. These agreed Director's Final Findings and Orders ("Orders") are issued to Mahle Engine Components USA, Inc. ("Mahle") and Gould Electronics Inc. ("Gould"), (collectively, "Respondents"), to settle disputed claims pursuant to the authority vested in the Director of Ohio EPA under Ohio Revised Code ("ORC") §§ 3734.13, 3734.20, 6111.03, and 3745.01, and 42 U.S.C. § 9613(f).

II. PARTIES BOUND

2. These Orders shall apply to and be binding upon Respondents and their successors in interest liable under Ohio law.

3. No change in ownership or corporate status of the Respondents, or of the Facility

owned by Respondent Mahle, including, but not limited to, any transfer of assets or real or personal property, shall in any way alter Respondents' obligations under these Orders.

4. Respondents shall provide a copy of these Orders to all contractors, subcontractors, and consultants retained to conduct any substantial portion of the Work performed pursuant to these Orders. Respondents shall ensure that all contractors, subcontractors, and consultants retained to perform the Work pursuant to these Orders also comply with the applicable provisions of these Orders.

III. DEFINITIONS

5. Unless otherwise expressly provided herein, all terms used in these Orders or in any appendices shall have the same meaning as defined in ORC Chapters 3734 and 6111 and the rules promulgated thereunder. Whenever the terms listed below are used in these Orders or in any appendices, attached hereto and incorporated herein, the following definitions shall apply:

a. "Amended Decision Document" means the remedial action selected for the Site as set forth in the document attached to these Orders as Appendix A.

b. "CERCLA" means the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, 42 U.S.C. 9601 et seq.

c. "Contaminants" or "contamination" means (1) any "hazardous waste" under ORC § 3734.01(J); (2) any "industrial waste" under ORC § 6111.01(C); and (3) any "other wastes" under ORC § 6111.01(D).

d. "Day" means a calendar day unless expressly stated to be a business day. "Business day" shall mean a day other than a Saturday, Sunday, or state holiday. In computing any period of time under these Orders, where the last day would fall on a Saturday, Sunday, or state holiday, the period shall run until the close of the next business day.

e. "Facility" means the manufacturing facility located on the Subject Property.

f. "NCP" means the National Oil and Hazardous Substances Pollution Contingency Plan, codified at 40 C.F.R. Part 300 (1990), as amended.

g. "Ohio EPA" means the Ohio Environmental Protection Agency and its designated representatives.

h. "Orders" mean these Director's Final Findings and Orders and the Amended

Decision Document (Appendix A), RDRA Work Plan (Appendix B), Statement of Work (Appendix C), List of Relevant Guidance Documents (Appendix D) and Environmental Covenant (Appendix E) attached hereto and incorporated by reference herein.

i. "Paragraph" means a portion of these Orders identified by an arabic numeral or an uppercase or lowercase letter.

j. "Parties" means Respondents and the Ohio EPA.

k. "Remedial Action" ("RA") means those activities to be undertaken by Respondents to implement the Amended Decision Document pursuant to the Remedial Design and Remedial Action Work Plan.

l. "Remedial Design" ("RD") means those activities to be undertaken by Respondents to develop the final plans and specifications for the Remedial Action pursuant to the Remedial Design and Remedial Action Work Plan.

m. "Remedial Design and Remedial Action Work Plan" ("RD/RA Work Plan") means the document submitted by Respondents pursuant to the Performance of Work Section of these Orders, attached to these Orders as Appendix B.

n. "Respondents" means Mahle Engine Components USA, Inc. and Gould Electronics Inc.

o. "Response Costs" means all costs incurred by Ohio EPA to implement these Orders that are consistent with Ohio law and not inconsistent with the NCP, including, but not limited to, payroll costs, contractor costs, travel costs, direct costs, indirect costs, oversight costs, laboratory costs, and the costs of reviewing plans, reports, and other items pursuant to these Orders.

p. "Section" means a portion of these Orders identified by a Roman numeral.

q. "Site" means the Subject Property, where the treatment, storage, and/or disposal of hazardous waste, and/or the discharge to waters of the state of industrial waste or other wastes have occurred, including any other area where such hazardous wastes, industrial wastes, and/or other wastes have migrated or threaten to migrate.

r. "Statement of Work" ("SOW") means the statement of work for the implementation of the Remedial Design and Remedial Action at the Site, as set forth in Appendix C to these Orders. The SOW is not specific to the Site; the SOW was used as a conceptual outline to develop the approved RD/RA Work

Plan, attached to these Orders as Appendix B. Because of its general nature, not all elements of the SOW are necessarily applicable to the Site.

s. "Subject Property" means the property located at 17226 County Road 57 in Olive Township, approximately 0.75 mile south of the Village of Caldwell, in Noble County, Ohio [parcels 28-21135 (32.90 acres), 28-21134 (8.65 acres) and 29-29295 (0.01 acres)].

t. "Transferee" means any future owner of any interest in the Subject Property, including but not limited to, owners of an interest in fee simple, mortgagees, easement holders, and lessees.

u. "Work" means all activities Respondents are required to perform under these Orders.

IV. FINDINGS

6. All of the findings necessary for the issuance of these Orders pursuant to ORC §§ 3734.13, 3734.20, 6111.03 and 3745.01 have been made by the Director and are outlined below. Nothing in these Orders shall be considered to be an admission by Respondents of any matter of law or fact. Subject to the foregoing, the Director of Ohio EPA has determined the following:

a. The Subject Property is located at 17226 County Road 57 in Olive Township, approximately 0.75 mile south of the Village of Caldwell, in Noble County, Ohio. The Subject Property is owned by the Respondent Mahle, which acquired the assets of Dana Corporation and various Dana Corporation affiliates on March 9, 2007 (the "Acquisition"). Through the Acquisition, Mahle became the owner of the Subject Property, which consists of a facility used for the manufacture of small machined parts on approximately 41 acres.

b. The original manufacturing facility was constructed in 1952. The plant was originally owned and operated by Cleveland Graphite Bronze Company, which in 1969 became part of Gould Inc. Gould Inc. subsequently operated the facility until 1981, when Imperial Clevite Industries purchased the operations and the property. Clevite Industries acquired the facility through a merger with Imperial Clevite Industries in 1986. J.P. Industries, Inc. (JPI) purchased the Site in 1987. JPI was acquired by T&N PLC in August 1990. In the spring of 1998, T&N PLC was acquired by Federal Mogul Corporation. However, the Federal Trade Commission (FTC) required Federal Mogul to divest its interest in the facility, and under the FTC ruling it was sold to Dana Corporation in late 1998. The facility operated under the name Dana Glacier Vandervell Inc. ("GVI") until the Acquisition, at which point title and future operation of the Facility transferred to

Respondent Mahle. In addition, the rights and obligations of GVI under a certain Settlement Agreement dated July 5, 1995 among Gould, GVI and the other parties were assigned to Respondent Mahle. All interests in the facility, including the property, structures, and manufacturing operations, are currently owned by Respondent Mahle.

c. The facility has manufactured the same type of products since production began in 1952. Products include a variety of small machined parts, including bi-metal bushings and washers. Processes involved in the manufacturing of the parts include casting, milling, rolling, annealing, slitting, blank forming, coining, plating and finishing.

d. Historically, solvents have been used at the facility to clean and degrease equipment and structures. These solvents include trichloroethene (TCE), 1,1,1-trichloroethane (TCA), and trans-1,2-dichloroethene.

e. As a result of manufacturing operations, the facility generated industrial waste water which was treated and discharged into the local publicly owned treatment works (POTW). Prior to final discharge of this water, settled sludge was drawn off and discharged into sludge dewatering beds, also known as sand filter beds, with filtrate recycled to an on-Site treatment plant. Waste discharged to these units included electroplating waste as well as oil and grease from degreasing operations. Today, these wastes would be designated as F006 listed hazardous waste under the Resource Conservation and Recovery Act (RCRA). The filter beds had been in use since 1952. Prior to 1980, the waste generated from the filter beds and from other plant operations was disposed of on the Site by Gould and others.

f. In 1987, a Preliminary Site Investigation (PSI) determined that metal hydroxide sludge, corn cob deburring media waste, and lead-bearing sludge were disposed of at the Site, in the area known as the Western Disposal Area (WDA). Soil borings indicated the presence of lead in the soil, with concentrations as high as 100,000 mg/kg. Ground water samples indicated the presence of several chlorinated solvents at concentrations significantly higher than drinking water standards. There are no drinking water wells at the Site.

g. In April 1987, Ohio EPA conducted a RCRA inspection of the Site pursuant to ORC § 3734.07. Subsequently, GVI submitted a RCRA Closure Plan for the sand filter beds and for conducting a ground water monitoring program. The Closure Plan was approved by Ohio EPA on February 17, 1988. As part of the closure, GVI removed and properly disposed of 500 tons of soil from the area of the filter beds. GVI installed one upgradient and four downgradient monitoring wells to evaluate ground water conditions. GVI monitored the wells on a quarterly basis in 1988 and on a semi-annual basis from July 1989 to February

1991.

h. In late 1987, an additional investigation of a gasoline leak revealed further contamination at the Site. Ground water collected during this study indicated the presence of trans-1,2-dichloroethane, trichloroethene, toluene, and benzene, at concentrations significantly higher than drinking water standards.

i. On December 11, 1991, the Director of Ohio EPA issued agreed Director's Final Findings and Orders to Gould and GVI to complete a remedial investigation and feasibility study (RI/FS) to investigate the nature and extent of the contamination at the Site.

j. Activities performed during the RI and other investigations included the installation of 38 monitoring wells and the drilling of 91 soil borings. Tasks included sampling of surface and subsurface soil, wetland and stream sediments, surface water, and ground water. Ground water sampling events were conducted on several occasions during the RI/FS process, including February 1993, May 1993, September 1994, June 1995, and May 2000.

k. The Western Disposal Area (WDA) was historically used to dispose of pre-RCRA wastes generated in the production processes at the Facility. These wastes included plating and grinding sludge, corn cob deburring media, waste oil, solvents, and waste water treatment sludge from the sand filter beds. The WDA was used through 1979. In 1980 and 1981, the WDA was covered with 6 to 8 inches of soil and seeded. RI sampling within the WDA identified the presence of metals (primarily copper and lead), semivolatile organic compounds (SVOCs), and VOCs in soil.

l. The Soluble Oil (SO) Line, located beneath the Facility building, was historically used to transport spent solvents to a concrete holding tank for further treatment. The line is no longer in use. During RI activities, VOCs were detected in soil in the vicinity of the SO Line.

m. Plant Area Soils are those shallow (0-2 feet below ground surface) soils found in the general outdoor portions of the Site, including the former RCRA closure unit, the former UST area, the southwest loading dock area, and upland areas near the wetland. Based upon RI sampling data, lead represents the primary chemical of concern in the Plant Area Soils; VOCs were detected only occasionally.

n. The primary contaminants, their maximum concentrations, and their Preliminary Remediation Goals (PRGs) or Maximum Contaminant Levels (MCLs) in Site media are:

Soil/Sediment		
Contaminant	Maximum Concentration	PRG
Trichloroethene	210 mg/kg	0.048 mg/kg
Tetrachloroethene	92 mg/kg	0.27 mg/kg
Ethylbenzene	40 mg/kg	16 mg/kg
Toluene	61 mg/kg	7.7 mg/kg
Copper	140,000 mg/kg	3,036 mg/kg[1] 358 mg/kg[2]
Lead	52,000 mg/kg	1,600 mg/kg[1] 189 mg/kg[2]
Tin	3,300 mg/kg	2,536 mg/kg[1] 299 mg/kg[2]

[1] PRG based on ecological risk in upland soils.
[2] PRG based on ecological risk in wetland soils.

Ground Water		
Contaminant	Maximum Concentration[1]	PRG (MCL)
Trichloroethene	4,300 ug/l	5 ug/l
Cis-1,2 dichloroethene	4,400 ug/l	70 ug/l

Vinyl chloride	410 ug/l	2 ug/l
Benzene	720 ug/l	5 ug/l

[1]Concentration data from May 2000 FS ground water sampling event.

Additional PRGs are set forth in the Amended Decision Document.

o. Gould and GVI installed an interim ground water recovery and treatment system in January 1997. The system is currently operating at the Site. The system consists of three pumping wells (MW-7, MW-10, and MW-18) located in areas of highest VOC concentration and an activated carbon system to treat VOC-contaminated ground water.

p. On March 29, 1999, Ohio EPA approved the Respondents' RI Report. The RI included a Baseline Human Health Risk Assessment and Ecological Risk Assessment. The RI characterized the nature and extent of the contaminants released at the Site and the nature of potential risks to human health and safety and the environment. The RI revealed that the principal contaminants of concern are the metals antimony, arsenic, copper, lead and tin; and the VOCs trichloroethene, perchloroethene and benzene. The principal exposure pathways of concern at the Site include potential exposure of both human and ecological receptors to metals-contaminated soils and VOC-contaminated ground water, as detailed in the RI.

q. The Human Health Risk Assessment concluded that a theoretical current grounds worker and a theoretical future construction worker would be at risk from exposure to copper, antimony, and thallium in Site soils. For a theoretical future on-site child resident, risks could arise from exposure to antimony and thallium in Site soils, as well as potential ingestion of TCE, PCE, and benzene in ground water. For a theoretical future on-site adult resident, risks could arise from potential ingestion of TCE, PCE, and benzene in ground water.

r. The Ecological Risk Assessment identified various risks to potential biological receptors on-Site, including the muskrat, meadow vole, American robin, red-tailed hawk, American woodcock, and great blue heron. These risks are driven primarily by the concentrations of metals in soils - including copper, lead, tin, antimony, arsenic, beryllium, chromium, and zinc.

s. On August 15, 2001, Ohio EPA approved the FS Report. The FS Report evaluated potential remedial alternatives to address metals and VOC contamination in the Western Disposal Area and Site soils, metals contamination in wetland sediments, and VOC contamination in ground water.

t. On August 12, 2003, Ohio EPA released to the public the Preferred Plan for remediation of the Site. The Preferred Plan summarized the information presented in the RI and FS prepared by Gould and GVI, and identified and explained Ohio EPA's preferred alternative for the remedial action at the Site.

u. On October 2, 2003, Ohio EPA held a public meeting to discuss the Preferred Plan and to solicit public comments. The public comment period ended on October 9, 2003. Gould and GVI submitted public comments on the Preferred Plan. Based on those comments, some changes were made to the Preferred Plan before it was issued as the Decision Document.

v. On May 5, 2004, Ohio EPA issued a Decision Document, which selected the remedy for the Site.

w. On June 2 and 3, 2004, Gould and GVI appealed the Decision Document to the Environmental Review Appeals Commission. Gould and GVI subsequently met with Ohio EPA, discussed the issues identified by Gould and GVI and, on December 21, 2006, Ohio EPA, Gould and GVI entered into a Stipulation and Settlement Agreement that resolved the issues identified in the appeals of the Decision Document.

x. On October 10, 2006, Ohio EPA released to the public a draft Amended Decision Document for remediation of the Site. The draft Amended Decision Document included changes to the initial Decision Document.

y. On December 7, 2006, Ohio EPA held a public meeting to discuss the draft Amended Decision Document and to solicit public comments. The public comment period ended on December 15, 2006. On December 28, 2006, the Director of Ohio EPA issued an Amended Decision Document, which modified the remedy selected for the Site. The Amended Decision Document is attached hereto as Appendix A, and incorporated by reference herein.

z. By letter dated July 20, 2007, the Governor of Ohio designated the Director of Ohio EPA as the trustee for natural resources, pursuant to CERCLA section 107(f)(2)(B), 42 U.S.C. § 9607(f)(2)(B).

aa. Each Respondent is a "person" as defined in ORC §§ 3734.01(G) and 6111.01(I).

bb. The Site is a hazardous waste facility, solid waste facility or other location where hazardous waste was treated, stored or disposed, within the meaning of ORC section 3734.01(N). Gould and GVI generated contaminants at the Site. Gould and GVI directly or indirectly allowed and/or directed the placement and/or disposal of contaminants at the Site.

cc. Ohio EPA has incurred and continues to incur Response Costs associated with the Site.

dd. Because of their quantity, concentration, physical or chemical characteristics, some contaminants of concern ("COCs") found at the Site are "hazardous wastes" as defined under ORC § 3734.01(J).

ee. The COCs found at the Site are "industrial wastes" or "other wastes" as defined under ORC §§ 6111.01(C) and (D).

ff. The ground and surface waters at the Site are "waters of the state" as defined in ORC § 6111.01(H).

gg. Conditions at the Site constitute a substantial threat to public health or safety or are causing or contributing or threatening to cause or contribute to air or water pollution or soil contamination within the meaning of ORC § 3734.20(B).

hh. The migration and threatened migration of these contaminants to ground water and surface water at or from the Site constitutes a discharge of industrial wastes or other wastes into "waters of the state," as that term is defined in ORC § 6111.01(H). The Work required pursuant to these Orders will contribute to the prohibition or abatement of the discharge of contaminants to waters of the state.

ii. In issuing these Orders, the Director has given consideration to, and based his determination on, evidence relating to the technical feasibility and economic reasonableness of complying with these Orders, and to evidence relating to conditions calculated to result from compliance with these Orders, and their relation to the benefits to the people of the state to be derived from such compliance.

V. GENERAL PROVISIONS

7. Objectives of the Parties

The objectives of the Parties in entering into these Orders are to provide for the protection of public health and safety and the environment from the disposal, discharge, or release of contaminants at the Site through the design, construction, operation and maintenance of the remedy set forth in the Amended Decision Document, to reimburse Ohio EPA for response costs incurred in connection with the Site, and to resolve claims by the State of Ohio ("State") alleging injury to natural resources of the State through the establishment of an environmental covenant for the Site.

8. Commitment of Respondents

Respondents agree to perform the Work in accordance with these Orders including but not limited to the RD/RA Work Plan, and all standards, specifications, and schedules set forth in or developed pursuant to these Orders. Respondent Mahle also agrees to execute an environmental covenant affecting a designated portion of the Site as provided in the Land Use and Conveyance of Title Section of these Orders, and Respondents agree to reimburse Ohio EPA for all Response Costs as provided in the Reimbursement of Costs Section of these Orders.

9. Compliance With Law

a. All activities undertaken by Respondents pursuant to these Orders shall be performed in accordance with the requirements of all applicable federal, state and local laws and regulations.

b. Respondents shall perform the activities required pursuant to these Orders in a manner that is not inconsistent with the NCP. Ohio EPA has determined that activities conducted pursuant to these Orders, as approved by Ohio EPA, are necessary and consistent with the NCP.

c. Where any portion of the Work requires a permit or other authorization, Respondents shall submit applications in a timely manner and take all other actions reasonably necessary to obtain such permits or other authorization. These Orders are not, and shall not be construed to be, a permit or other authorization issued pursuant to any statute or regulation.

VI. PERFORMANCE OF WORK

10. Supervising Contractor

All Work performed pursuant to these Orders shall be under the direction and supervision of a contractor with expertise in hazardous waste site remediation. Prior to the initiation of the Work, Respondents shall notify Ohio EPA in writing of the name of the supervising contractor and any subcontractor then expected to be used in performing the Work under these Orders.

11. Remedial Design and Remedial Action

a. The approved RD/RA Work Plan is attached to these Orders as Appendix B.

b. The RD/RA Work Plan provides for the design, construction, operation and maintenance of the remedy as set forth in the Amended Decision Document.

c. The RD/RA Work Plan was developed in conformance with the SOW, Appendix C of these Orders, the NCP, and the guidance documents listed in Appendix D of these Orders, attached hereto and incorporated herein. If Ohio EPA determines that any additional or revised guidance documents affect the Work to be performed in implementing the RD/RA, Ohio EPA will notify Respondents, and the RD/RA Work Plan and other affected documents shall be modified accordingly, subject to the provisions of Section XV, Dispute Resolution.

d. Handling Inconsistencies. Should Respondents identify any inconsistency between any of the laws and regulations and guidance documents that Respondents are required to follow by these Orders, Respondents shall notify Ohio EPA in writing of each inconsistency and the effect of the inconsistencies upon the Work to be performed. Respondents shall also recommend, along with a supportable rationale justifying each recommendation, the requirement Respondents believe should be followed. Respondents shall implement the affected Work as directed by Ohio EPA, subject to the provisions of Section XV, Dispute Resolution.

e. RD/RA Work Plan Implementation. Respondents shall submit all plans, reports, or other deliverables required under the approved RD/RA Work Plan in accordance with the approved RD/RA schedule set forth therein, for review and approval pursuant to the Review of Submittals Section of these Orders.

12. Health and Safety Plan

Within thirty (30) days after the effective date of these Orders, Respondents shall submit to Ohio EPA for review and comment a health and safety plan developed in conformance with the guidance listed in Appendix D.

13. Operation and Maintenance Plan

The Operation and Maintenance (O&M) Plan, including a schedule for implementation, shall be submitted in accordance with the schedule set forth in the approved RD/RA Work Plan. Ohio EPA will review the O&M Plan pursuant to the procedures set forth in the Review of Submittals Section of these Orders. Subject to the provisions of Section XV, Dispute Resolution, upon approval of the O&M Plan by Ohio EPA, Respondents shall implement the O&M Plan. Respondents shall submit all plans, reports, or other deliverables required under the approved O&M Plan, in accordance with the approved O&M schedule set forth therein, for review and approval pursuant to the Review of Submittals Section of these Orders.

VII. ASSURANCE OF ABILITY TO COMPLETE WORK

14. Cost Estimates

a. Within sixty (60) days after Respondents' receipt of Ohio EPA's approval of the Final Design Report required under Section VI (PERFORMANCE OF WORK) of these Orders, Respondents shall submit to Ohio EPA a final detailed written estimate of the cost of the work associated with the long-term operation and maintenance ("O&M") and monitoring of the selected remedy identified in the Amended Decision Document, in current dollars ("Initial Cost Estimate") (estimated in the Amended Decision Document to be $2,010,640), including any adjustments for inflation based upon the Gross Domestic Product Implicit Price Deflator ("GDP/IPD") and any adjustments for discount rates based upon the Federal Reserve Bank's 30-year Treasury Bill rate for the most recent month for which data is available.

b. Beginning one year after the effective date of these Orders, and semi-annually thereafter, Respondents must submit to Ohio EPA an estimated cost of the remaining O&M and monitoring Work to be performed ("Current Revised Cost Estimate") based upon the procedures described in the preceding paragraph. Information relied upon in support of the Current Revised Cost Estimate must be provided with any request for reduction. If an adjustment is made to any such Current Revised Cost Estimate for inflation and/or discount rates, an explanation shall be provided.

c. The Current Revised Cost Estimate shall reflect any adjustments caused by the Respondents' agreement to perform any additional O&M and monitoring Work requested by Ohio EPA pursuant to Section IX (ADDITIONAL WORK) or by any other conditions that have increased the cost of the O&M and monitoring Work to be performed under these Orders (e.g., change in contractor).

d. Respondents shall submit the Initial Cost Estimate and all Current Revised Cost Estimates to Ohio EPA for review and approval, which approval shall not be unreasonably withheld. Ohio EPA will review each cost estimate and notify Respondents in writing of Ohio EPA's approval, disapproval, or combination thereof in accordance with Section XIV (REVIEW OF SUBMITTALS).

15. Performance Guarantee

a. In order to secure the full and final completion of the O&M and monitoring Work in accordance with these Orders, within sixty (60) days following the effective date of these Orders or within sixty (60) days following Ohio EPA's approval of the Initial Cost Estimate, whichever date is later, Respondents shall establish financial security for the benefit of Ohio EPA in an amount at least equal to the Initial Cost Estimate. Thereafter, Respondents shall maintain financial security in an amount at least equal to the Current Revised Cost Estimate ("Financial

Assurance"). Respondents may use one or more of the Financial Assurance mechanisms described in subparagraphs i. through iv., below.

Respondents shall submit draft Financial Assurance instruments and related documents to Ohio EPA, concurrently with Respondents' submission of the Initial Cost Estimate, for Ohio EPA's review and approval in accordance with Section XIV (REVIEW OF SUBMITTALS).

i. A trust fund administered by a trustee which is an entity that has the authority to act as a trustee and whose trust operations are regulated and examined by a Federal or State agency and that is acceptable to Ohio EPA. The trust agreement shall provide that the trustee shall make payments from the fund, (1) as Respondents shall direct in writing to pay invoices submitted by Respondents from the fund for Work expenditures made by approved contractors engaged by Respondents; Respondents must only direct payment of invoices for which Respondents have submitted a notification to Ohio EPA's Site Coordinator, in accordance with Section XIV (REVIEW OF SUBMITTALS) of these Orders, or (2) in the event of a failure of performance as described in this Section, to pay any other person whom Ohio EPA determines has performed or will perform the Work required by these Orders at the direction of Ohio EPA.

ii. A surety bond unconditionally guaranteeing performance of the Work or payment, at the direction of Ohio EPA, into a standby trust fund which meets the requirements of the trust fund described in subparagraph i. above. The surety company issuing the bond must be among those listed as acceptable sureties on Federal Bonds as set forth in Circular 570 of U.S. Department of the Treasury and under Title 31 U.S.C. §§ 9304-9308.

iii. One or more irrevocable letter(s) of credit, payable at the direction of Ohio EPA, into a standby trust fund which meets the requirements of the trust fund described in subparagraph i. above. The letter(s) of credit must be issued by one or more financial institution(s) (a) that has the authority to issue letters of credit, and (b) whose letter-of-credit operations are regulated and examined by a Federal or State agency. The letter(s) of credit must be irrevocable and issued for a period of at least one (1) year. The letter(s) of credit must provide that upon its expiration date, the letter(s) of credit will be automatically extended for a period of at least one (1) year unless, at least 120 days before the current expiration date, the issuing institution notifies the Respondents and Ohio EPA by certified mail of a decision not to extend the expiration date. Under the terms of the letter(s) of credit, the 120 days will begin on the date when the Respondents and Ohio EPA have received the notice, as evidenced by the return receipts.

iv. A policy of insurance that (a) provides Ohio EPA with rights as a beneficiary, which is acceptable to Ohio EPA; and (b) is issued by an insurance carrier that (i) has the authority to issue insurance policies in Ohio, and (ii) whose insurance operations are regulated and examined by a Federal or Ohio agency. The insurance policy shall be issued for a face amount at least equal to the Initial Cost Estimate or Current Revised Cost Estimate, whichever is the most current estimate, except for those costs covered by another Financial Assurance instrument, as permitted in subparagraphs i. through iii. above. The policy shall provide that the insurer shall make payments as the Respondents shall direct in writing (A) to reimburse Respondents for expenditures made by Respondents for Work performed in accordance with these Orders, or (B) to pay any other person whom Ohio EPA determines has performed or will perform the Work in accordance with these Orders, up to an amount equal to the face amount of the policy. The policy shall also provide that it may not be canceled, terminated or non-renewed and the policy shall remain in full force and effect in the event that (1) either of the Respondents is named as a debtor in a voluntary or involuntary proceeding under Title 11 (Bankruptcy) of the U.S. Code; or (2) Ohio EPA issues a Performance Failure Notice under this Section of these Orders.

b. All Financial Assurance instruments provided pursuant to this Section of these Orders shall be consistent with OAC rules 3745-55-43 (A) through (E) and 3745-55-51 (A) through (E) to the extent appropriate to the O&M and monitoring Work required by these Orders. The Financial Assurance instrument(s) provided pursuant to this Section (including, without limitation, the original versions of letters of credit and other negotiable instruments issued for Ohio EPA's benefit) shall be submitted by Respondents to the Ohio EPA Site Coordinator in accordance with Section XIV (REVIEW OF SUBMITTALS) of these Orders.

c. Whenever the Current Revised Cost Estimate exceeds the amount of Financial Assurance already provided pursuant to this Section by more than 5%, the Respondents shall, within sixty (60) days thereafter, obtain and present to Ohio EPA, for review and approval a revised form of Financial Assurance (and otherwise acceptable under this Section) that reflects such cost increase.

d. In the event that an institution involved in the management of funds provided to guarantee performance under this Section, or responsible for providing such performance guarantee, becomes unable to perform its obligations, or to provide the funds or financial resources for the Work as required by these Orders, Ohio EPA shall issue a written notification to Respondents of such incapacity. Thereafter, within sixty (60) days of receipt of such notification, Respondents shall either secure proper performance of the guarantee from the institution to

satisfy Ohio EPA, or submit to Ohio EPA for approval an alternative form of Financial Assurance that meets the requirements of this Section. Respondents' inability to post Financial Assurance shall in no way excuse performance of any other requirements of these Orders, including, without limitation, the Respondents' obligation to complete the O&M and monitoring Work in accordance with the terms hereof.

16. Performance Failure

a. Financial Assurance instruments provided pursuant to this Section shall provide Ohio EPA with immediate access to resources, whether in cash or in kind services, to continue and complete the O&M and monitoring Work in the event Ohio EPA determines that Respondents (i) have ceased implementation of any portion of the O&M and monitoring Work, (ii) are significantly or repeatedly deficient or late in their performance of the O&M and monitoring Work, or (iii) are implementing the O&M and monitoring Work in a manner which may cause an endangerment to human health and/or the environment. Upon making such determination, Ohio EPA may issue a written notice ("Performance Failure Notice") to both the Respondents and the Financial Assurance provider of Respondents' failure to perform. The Performance Failure Notice will specify the grounds upon which such a notice was issued and will provide the Respondents with a period of ten (10) days within which to remedy the circumstances giving rise to the issuance of such notice. Upon the expiration of the ten-day notice period, Respondents may invoke the procedures set forth in Section XV (DISPUTE RESOLUTION), to dispute Ohio EPA's determination that any of the circumstances described in clauses (i), (ii) or (iii) has occurred.

b. Failure by the Respondents to remedy the relevant Performance Failure to Ohio EPA's satisfaction before the expiration of the ten-day notice period specified in this paragraph shall trigger Ohio EPA's right to have immediate access to and benefit of the Financial Assurance provided pursuant to this Section, and Ohio EPA may, at any time after the expiration of the ten-day notice period, both order Respondents to cease performance of the Work and direct the Financial Assurance provider to immediately (i) deposit into a newly created trust fund approved by Ohio EPA, the remaining funds obligated under the Financial Assurance instrument or (ii) arrange for performance of the O&M and monitoring Work in accordance with these Orders.

c. If Ohio EPA has issued a Performance Failure Notice but is nevertheless unable after reasonable efforts to secure the resources (whether in cash or in-kind services) necessary to continue and complete the O&M and monitoring Work from the Financial Assurance instrument(s) posted by Respondents pursuant to this Section, then, upon receiving written notice from Ohio EPA, Respondents shall (in the event Respondents do not prevail in Dispute Resolution, if any, as

set forth in Section XV (DISPUTE RESOLUTION) of these Orders), secure the resources available under the Financial Assurance mechanism, or deposit into an account specified by Ohio EPA, in immediately available funds and without setoff, counterclaim, or condition of any kind, a cash amount equal to the Current Revised Cost Estimate.

d. If Respondents dispute an Ohio EPA determination under this paragraph that identifies an immediate or potential threat to human health and/or the environment that warrants immediate action, Ohio EPA will direct the Trustee of the trust account newly-created by Ohio EPA following the Performance Failure Notice to make any appropriate payments from such trust fund to address such threat. Otherwise, Ohio EPA will direct the Trustee to not make any payments from the newly-created trust fund, pending resolution of a dispute. If Respondents prevail in dispute resolution, all funds in the newly-created trust fund, including any interest that accrued on the funds, shall be returned to a Financial Assurance provider who has agreed to continue providing Financial Assurance to the Respondents.

17. Reduction of Amount of Financial Assurance

Concurrent with the submission of the Current Revised Cost Estimate, if the Respondents believe that the estimated cost to complete the remaining O&M and monitoring Work has decreased below the aggregate amount of the Financial Assurance mechanism or mechanisms selected by Respondents, the Respondents may, at the time of submittal of the Current Revised Cost Estimate, submit a written request to Ohio EPA to reduce the current amount of Financial Assurance to an amount no less than the Current Revised Cost Estimate. If Ohio EPA decides to accept such a proposal, Ohio EPA shall issue a notification to the Respondents of such decision in writing. After receiving Ohio EPA's written acceptance, which shall not be unreasonably withheld, Respondents may reduce the amount of the Financial Assurance in accordance with and to the extent permitted by such written acceptance.

18. Release of Financial Assurance

Respondents may petition Ohio EPA to allow the release or discontinuance of the Financial Assurance required hereunder. Respondents shall submit a written proposal for such release to Ohio EPA which shall specify the basis for the requested release (e.g., full and final completion of the O&M and monitoring Work, etc.). If Ohio EPA decides to accept such a proposal, Ohio EPA shall notify the Respondents and the provider of the Financial Assurance of such decision in writing. The provider of the Financial Assurance may be released from its obligations under the instrument only upon a written release from Ohio EPA.

VIII. LAND USE AND CONVEYANCE OF TITLE

19. Environmental Covenant

Within thirty (30) days after the effective date of these Orders, Respondent Mahle shall execute and file for recording, in the deed or official records of the Noble County Recorder's Office, on the title to the Subject Property owned by the Respondent Mahle, the environmental covenant that is attached hereto as Appendix E. Within thirty (30) days after filing with the Noble County Recorder's Office the executed environmental covenant, Respondent Mahle shall submit to Ohio EPA a file-stamped copy of the recorded environmental covenant. The terms and conditions of the environmental covenant are incorporated into these Orders and shall be binding upon Respondent Mahle. Upon the recording of the environmental covenant in accordance with this paragraph, the Director waives and releases any claims that the State of Ohio has or may have against Respondents alleging injury to natural resources arising from releases of hazardous substances at the Site prior to the effective date of these Orders.

20. Land Use Self-Reporting Requirement

Respondent Mahle shall not permit the Subject Property to be used in any manner that would violate the terms of the environmental covenant or adversely affect the integrity of any containment, treatment, or monitoring systems at the Site, and shall promptly notify Ohio EPA of any violation of the terms of the environmental covenant or any such adverse effect.

21. Notice of Transfer of Property

If Respondent Mahle conveys any interest in the Subject Property, each deed, title, or other instrument shall contain a notice stating that the Subject Property is subject to these Orders and the environmental covenant, and shall reference any monitoring, treatment or containment devices present on the Subject Property as a result of these Orders. Prior to each conveyance by Respondent Mahle of an interest in any portion of the Subject Property, including but not limited to easements, deeds, leases and mortgages, Respondent Mahle shall notify the Transferee of the existence of any containment, treatment, or monitoring systems, and shall provide copies of these Orders and the environmental covenant to the Transferee. Respondent Mahle shall notify Ohio EPA and Respondent Gould at least thirty (30) days in advance of each conveyance of an interest in any portion of the Subject Property owned by the Respondent Mahle. Respondent Mahle's notice shall include the name and address of the Transferee and a description of the provisions made for the continued access to and maintenance of any containment, treatment, and monitoring systems.

22. Confirmation of Conveyance

Within thirty (30) days after each conveyance of any fee simple interest in any portion of the Subject Property, Respondent Mahle shall submit to Ohio EPA and Respondent Gould, via certified mail, the following information:

a. A copy of the deed or other documentation evidencing the conveyance;

b. The name, address, and telephone number of the new property owner and the name, address, and telephone number of the contact person for the property owner;

c. A legal description of the property, or the portion of the property, being transferred;

d. A survey map of the property, or the portion of the property, being transferred;

e. The closing date of the transfer of ownership of the property, or portion of the property.

IX. ADDITIONAL WORK

23. Ohio EPA or Respondents may determine that in addition to the tasks defined in the approved RD/DA Work Plan, additional Work may be necessary to implement the final remedy set forth in the Amended Decision Document. Within sixty (60) days after receipt of written notice from Ohio EPA that such additional Work is necessary, unless otherwise specified in writing by Ohio EPA, Respondents shall submit a work plan for the performance of the additional Work and a revised RD/RA schedule. In addition, Respondents shall submit revisions for any other schedules impacted by the additional Work. To the extent Respondents dispute that additional Work is necessary, Respondents shall initiate the procedures for dispute resolution set forth in the Dispute Resolution Section of these Orders within thirty (30) days after receipt of Ohio EPA's notification of the need for additional Work. The work plan for additional Work shall conform to the applicable standards and requirements set forth in the documents attached to these Orders as Appendices C and D (SOW and relevant guidance documents). Upon approval by Ohio EPA of the work plan and schedule for additional Work pursuant to the Review of Submittals Section of these Orders, Respondents shall implement the approved work plan for additional Work in accordance with the revised schedules contained therein.

24. In the event that Respondents determine that additional Work is necessary, Respondents shall submit an initial letter to Ohio EPA to explain why the additional Work is necessary, what the additional Work is, and what impact, if any, the additional Work will have on the overall Work schedule. If Ohio EPA concurs with the request for additional Work, Respondents shall submit a work plan and schedule for the performance of additional Work. The work plan shall conform to the applicable

standards and requirements set forth in the documents attached to these Orders as Appendices C and D. Upon approval by Ohio EPA of the work plan and schedule for additional Work pursuant to the Review of Submittals Section of these Orders, Respondents shall implement the approved work plan for additional Work in accordance with the schedules contained therein.

25. In the event that additional Work is necessary to accomplish any task described in a previously approved work plan, the deadline for completing such task(s) shall be extended by mutual agreement between the Parties by the amount of time required to perform the additional Work, including the period of time required to plan and/or obtain approval from Ohio EPA for the performance of such Work.

26. This Section shall not apply to Ohio EPA's selection of a changed remedy for soils beneath the SO Line, Vapor Degreaser or loading dock upon removal of those structures in the future. If, pursuant to Section 7.2 of the Amended Decision Document, Ohio EPA selects a remedy other than incorporation of the remaining foundation and/or loading dock components into a RCRA multimedia cap, such selection shall be made by the Director as a separate final action subject to ORC § 3745.04.

X. SAMPLING AND DATA AVAILABILITY

27. Unless otherwise agreed to by the Site Coordinators, as identified pursuant to Section XII, each Party shall notify the other Parties not less than five (5) business days in advance of all sample collection activity related to the Work. Ohio EPA shall also have the right to take any additional samples it deems necessary. Upon request, the Parties shall allow split and/or duplicate samples to be taken by the other Parties.

28. Within ten (10) business days after receipt of a request by Ohio EPA, Respondents shall submit to Ohio EPA copies of all QA/QC-validated results Respondents have received of sampling and/or tests or other data, including raw data and original laboratory reports, generated by or on behalf of Respondents with respect to the Site and/or the implementation of these Orders. An electronic copy shall also be provided in a commonly available format approved by Ohio EPA. Respondents may submit to Ohio EPA any interpretive reports and written explanations concerning the raw data and original laboratory reports. Such interpretive reports and written explanations shall not be submitted in lieu of original laboratory reports and raw data. Should Respondents subsequently discover an error in any report or raw data, Respondents shall promptly notify Ohio EPA of such discovery and provide the correct information.

XI. ACCESS

29. Ohio EPA shall have access at all reasonable times to the Subject Property and

any other property to which access is required for the implementation of these Orders, to the extent access to the property is controlled by Respondents. Access under these Orders shall be for the purposes of conducting any activity related to these Orders including but not limited to the following:

a. Monitoring the Work;

b. Conducting sampling;

c. Inspecting and copying records, operating logs, and/or other documents related to the implementation of these Orders;

d. Monitoring compliance with use restrictions;

e. Conducting investigations and tests related to the implementation of these Orders; and

f. Verifying any data and/or other information submitted to Ohio EPA.

30. To the extent that the Subject Property or any other property to which access is required for the implementation of these Orders is owned or controlled by persons other than Respondents, Respondents shall use their reasonable best efforts to secure from such persons access for Respondents and Ohio EPA as may be necessary to effectuate these Orders. Copies of all access agreements obtained by Respondents shall be provided to Ohio EPA upon request. If any access required to implement these Orders is not obtained within thirty (30) days after the date Ohio EPA notifies Respondents in writing that additional access beyond that previously secured is necessary, Respondents shall promptly notify Ohio EPA in writing of the steps Respondents have taken to attempt to obtain access. Ohio EPA may, as it deems appropriate, assist Respondents in obtaining access.

31. Notwithstanding any provision of these Orders, the State of Ohio retains all of its access rights and authorities, including enforcement authorities related thereto, under any applicable statute or regulation including but not limited to ORC §§ 3734.20 and 6111.05.

XII. DESIGNATED SITE COORDINATORS

32. The name, address and telephone number of the designated Site Coordinator and Alternate Site Coordinator for each Party is as follows:

For Ohio EPA:

Kevin O'Hara, Site Coordinator

Brian Blair, Alternate Site Coordinator
Ohio EPA
Southeast District Office
2195 Front Street
Logan, Ohio 43138
(740) 385-8501

For Respondent Mahle:

Phil Lawrence, Site Coordinator
Mahle Industries, Incorporated
HEN – HR – Environment – Health & Safety (HNAE)
One MAHLE Drive
Morristown, Tennessee 37814
(423) 318-3164

Steven D. Kline, PE, Alternate Site Coordinator
GaiaTech Incorporated
200 North LaSalle, Suite 2600
Chicago, Illinois 60601
(312) 541-4200 x-226

For Respondent Gould:

James F. Cronmiller, Site Coordinator
34929 Curtis Boulevard
Eastlake, Ohio 44095-4001
(440) 953-5044

Patrick Cyr, Alternate Site Coordinator
Advanced GeoServices
1055 Andrew Drive, Suite A
West Chester, Pennsylvania 19380
(610) 840-9120

If a designated Site Coordinator or Alternate Site Coordinator is changed, the identity of the successor will be given to the other Parties at least seven (7) days before the changes occur, unless impracticable, but in no event later than the actual day the change is made.

33. To the maximum extent practicable, except as specifically provided in these Orders, communications between Respondents and Ohio EPA concerning the implementation of these Orders shall be made between the Site Coordinators. Respondents' Site Coordinators shall be available for communication with Ohio EPA regarding the

implementation of these Orders for the duration of these Orders. Each Site Coordinator shall be responsible for ensuring that all communications from the other Parties are appropriately disseminated and processed. Respondents' Site Coordinators or Alternate Site Coordinators shall be present on the Site or on call during all hours of Work at the Site.

34. Without limitation of any authority conferred on Ohio EPA by statute or regulation, the Ohio EPA Site Coordinator's authority includes but is not limited to the following:

a. Directing the type, quantity and location of samples to be collected by Respondents pursuant to an approved Work plan;

b. Collecting samples;

c. Observing, taking photographs, or otherwise recording information related to the implementation of these Orders, including the use of any mechanical or photographic device;

d. Directing that Work stop for a period not to exceed seventy-two (72) hours whenever the Ohio EPA Site Coordinator determines that activities at the Site may create or exacerbate a threat to public health or safety, or threaten to cause or contribute to air or water pollution or soil contamination. If the Chief of the Ohio EPA Division of Emergency and Remedial Response concurs with the determination of the Ohio EPA Site Coordinator, the 72-hour time limitation shall not apply. Elements of the Work not affected by the Work stoppage shall be completed according to schedules in the approved RD/RA Work Plan or approved additional Work work plan(s);

e. Conducting investigations and tests related to the implementation of these Orders;

f. Inspecting and copying records, operating logs and/or other documents related to the implementation of these Orders; and

g. Assessing Respondents' compliance with these Orders.

XIII. PROGRESS REPORTS AND NOTICE

35. Respondents shall submit a written progress report to Ohio EPA by the tenth (10^{th}) day of every month. The progress reports shall include:

a. A description of the Work performed during the reporting period including an estimate of the percentage of the RD/RA completed;

b. A list of all target and actual completion dates for each element of activity including project completion;

c. An explanation for any deviation from any applicable schedule;

d. Summaries of all findings and QA/QC-validated sampling results received during the reporting period;

e. Summaries of all significant changes made in the RD/RA during the reporting period, indicating consultation with Ohio EPA and date for approval by Ohio EPA of those changes, when necessary;

f. Summaries of all significant contacts with representatives of the local community, public interest groups or government agencies during the reporting period;

g. Summaries of all significant problems or potential problems encountered during the reporting period, including those which delay or threaten to delay completion of project milestones with respect to the approved work plan schedule or RD/RA schedule;

h. Summaries of actions taken and/or planned to rectify or prevent problems;

i. Changes in personnel during the reporting period;

j. Summary of projected Work to occur during the next reporting period;

k. Copies of daily reports, inspection reports, sampling data, and laboratory/ monitoring data, etc;

l. The quantity and disposition of any media treated, removed, or contained:

   i. Soil treated or removed should be reported by volume and soil contained must be reported by area;

   ii. Surface water load reduction - Load reduction must address all contaminants of concern;

   iii. Ground water treated, removed, or contained - Ground water treated must be reported by volume and ground water contained should be reported as an estimated area of the plume;

   iv. Leachate treated, removed or contained - Leachate treated, removed or contained must be reported by volume;

v. Sediments treated, removed or contained - Sediments treated or removed should be reported by volume and sediments contained must be reported by area;

vi. Waste and debris treated, removed, or contained - Waste and debris will be defined as regulated materials not otherwise covered in Roman number i through v above. Waste and debris treated or contained should be reported by either volume or area as appropriate.

m. The disposition of contaminated soil, sediments, and waste material that was treated on or off Site, or the disposal location for any quantity of contaminated ground water and/or surface water that was pumped and treated or disposed.

36. Progress reports (one copy only) and all other documents (two copies) required to be submitted pursuant to these Orders to Ohio EPA shall be sent to the Ohio EPA Site Coordinator at the address listed in Section XII, Designated Site Coordinators, of these Orders.

37. All written correspondence to Respondents shall be directed to the Respondents' Site Coordinators at the addresses listed in Section XII, Designated Site Coordinators, of these Orders.

XIV. REVIEW OF SUBMITTALS

38. Ohio EPA shall promptly review any work plan, report, or other item required to be submitted pursuant to these Orders. Upon review, Ohio EPA may in its sole discretion: (a) approve the submission; (b) approve the submission upon specified conditions; (c) approve the submission in part and disapprove the submission in part, specifying the deficiencies; (d) disapprove the submission, specifying the deficiencies; or (e) any appropriate combination of the above. The results of Ohio EPA's review shall be detailed in writing and provided to the Respondents.

39. In the event of Ohio EPA's approval or partial approval of any submission, Respondents shall proceed to take any action required by the submission as approved or partially approved by Ohio EPA.

40. In the event that Ohio EPA disapproves a submission, in whole or in part, or conditionally approves a submission, and notifies Respondents in writing of the deficiencies or conditions, Respondents shall within thirty (30) days, or such longer period of time as specified by Ohio EPA in writing, correct the deficiencies and incorporate the conditions, and submit a revised submission to Ohio EPA for approval. The revised submission shall incorporate all of the undisputed changes, additions,

and/or deletions specified by Ohio EPA in its disapproval, partial approval or conditional approval. Revised submissions shall be accompanied by a letter indicating how and where each of Ohio EPA's comments were incorporated into the submission. Any other changes made to the submission by Respondents shall also be identified in the letter. To the extent that Respondents dispute any changes, additions, deletions or conditions specified by Ohio EPA, Respondents shall initiate the procedures for dispute resolution set forth in the Dispute Resolution Section of these Orders, within thirty (30) days after receipt of Ohio EPA's disapproval, partial approval or conditional approval of a submission. Notwithstanding the disapproval, partial approval or conditional approval, Respondents shall proceed to take any action required by a non-deficient or unconditionally approved portion of the submission.

41. In the event that Ohio EPA disapproves a revised submission, in whole or in part, and notifies Respondents in writing of the deficiencies, Respondents shall within fifteen (15) business days, or such longer period of time as specified by Ohio EPA in writing, either: (i) correct the deficiencies and incorporate all changes, additions, and/or deletions, and submit the revised submission to Ohio EPA for approval; or (ii) initiate the dispute resolution process pursuant to Section XV, Dispute Resolution, of these Orders. If Respondents fail to submit a revised submission incorporating all changes, additions, and/or deletions within fifteen (15) business days, or such period of time as specified by Ohio EPA in writing, or alternatively, initiate the dispute resolution process pursuant to Section XV, Respondents shall be considered in breach and/or violation of these Orders.

42. All work plans, reports, or other items required to be submitted to Ohio EPA under these Orders shall, upon approval by Ohio EPA, be deemed to be incorporated in and made an enforceable part of these Orders. In the event that Ohio EPA approves a portion of a work plan, report, or other item, the approved portion shall be deemed to be incorporated in and made an enforceable part of these Orders.

XV. DISPUTE RESOLUTION

43. The Site Coordinators shall, whenever possible, operate by consensus. In the event of a dispute regarding a conditional approval or a partial or complete disapproval by Ohio EPA of a submission by Respondents, or a dispute regarding the Work required to be performed under these Orders, the Respondents shall have thirty (30) days from the date the dispute arises to invoke the dispute resolution procedures of this Section by notifying Ohio EPA in writing of the dispute. The written notice of dispute shall reference this Dispute Resolution section of these Orders. After Ohio EPA's receipt of such written notice, the Site Coordinators may, for the remainder of the thirty (30) day period, negotiate in good faith in an attempt to resolve the dispute. This thirty (30) day period may be extended by mutual agreement of the Parties; however, any such extension shall be confirmed in writing by Ohio EPA and any such negotiation period

shall not exceed sixty (60) days from the date of Ohio EPA's receipt of the written notice of dispute.

44. A dispute regarding a submission of Respondents shall be considered to have arisen when Respondents' Site Coordinators receive Ohio EPA's written conditional approval or disapproval in accordance with Section XIV, Review of Submittals. A dispute regarding the Work to be performed under these Orders shall be considered to have arisen when Ohio EPA's Site Coordinator communicates in writing to Respondents' Site Coordinators the position which gives rise to the dispute. If written notice is not provided within thirty (30) days after the date the dispute arises, the dispute resolution procedures may not be invoked for the disputed issue(s). Within thirty (30) days after Ohio EPA's receipt of the written notice of dispute, Respondents shall provide Ohio EPA with the rationale supporting the Respondents' position(s). If Ohio EPA concurs with the position(s) of Respondents, then the work plan, report or other item required to be submitted pursuant to these Orders shall be modified accordingly.

45. If Ohio EPA does not concur with Respondents, Ohio EPA's Site Coordinator shall notify the Respondents in writing that Ohio EPA does not concur. Upon receipt of such written notice, the Respondents shall have fifteen (15) business days after receipt of the non-concurrence notification from Ohio EPA to provide a written statement of the dispute to the Ohio EPA Southeast District Office Chief and request a formal resolution of the dispute. The Respondents' written statement instituting the formal dispute resolution procedure shall include the rationale supporting the position of the Respondents. If the Respondents do not provide such a statement, rationale and request within fifteen (15) business days after receipt of Ohio EPA's non-concurrence notification, Ohio EPA will adopt the written position of its Site Coordinator and the work plan, report, other item required to be submitted pursuant to these Orders, or any other item subject to the dispute resolution procedures of this Section shall be modified accordingly. If the Respondents provide such a statement, rationale and request within fifteen (15) business days after receipt of Ohio EPA's non-concurrence notification, the Ohio EPA Southeast District Office Chief shall review the written positions of the Parties and shall resolve the dispute based upon and consistent with these Orders, including the SOW, the Amended Decision Document, any applicable approved work plan, and applicable federal and state statutes and regulations.

46. This Section shall not apply to disputes regarding Ohio EPA's selection of a remedy for soils beneath the SO Line, Vapor Degreaser or loading dock upon removal of those structures in the future. If, pursuant to Section 7.2 of the Amended Decision Document, Ohio EPA selects a remedy other than incorporation of the remaining foundation and/or loading dock components into a RCRA multimedia cap, such selection shall be made by the Director as a final action subject to ORC § 3745.04.

47. The pendency of a dispute under this Section shall extend only the time period for completion of the tasks related to the matters in dispute, except that upon mutual

agreement of the Parties, any other time period may be extended as is deemed appropriate under the circumstances. Such agreement shall not be unreasonably withheld by Ohio EPA. Elements of the Work not affected by the dispute shall be completed in accordance with applicable schedules and time frames. The dispute resolution procedures under this section shall apply only to disputes regarding a conditional approval or a partial or complete disapproval by Ohio EPA of a submission by Respondents, and to disputes regarding the Work required to be performed and the Response Costs required to be reimbursed under these Orders.

XVI. UNAVOIDABLE DELAYS

48. Respondents shall cause all Work to be performed in accordance with applicable schedules and time frames unless any such performance is prevented or delayed by an event that constitutes an unavoidable delay. For purposes of these Orders, an "unavoidable delay" shall mean an event beyond the reasonable control of Respondents that prevents or delays performance of any obligation required by these Orders and that could not be overcome by due diligence on the part of Respondents. Increased cost of compliance shall not be considered an event beyond the reasonable control of Respondents.

49. Respondents shall notify Ohio EPA in writing within ten (10) business days after the occurrence of an event that Respondents contend is an unavoidable delay. Such written notification shall describe the anticipated length of the delay, the known or suspected cause or causes of the delay, the measures taken and to be taken by Respondents to minimize the delay, and the timetable under which these measures will be implemented. Respondents shall have the burden of demonstrating that the event constitutes an unavoidable delay.

50. If Ohio EPA does not agree that the delay has been caused by an unavoidable delay, Ohio EPA will notify the Respondents in writing. If Ohio EPA agrees that the delay is attributable to an unavoidable delay, Ohio EPA will notify Respondents in writing of the length of the extension for the performance of the obligations affected by the unavoidable delay.

XVII. REIMBURSEMENT OF COSTS

51. Respondents shall reimburse Ohio EPA for all Response Costs incurred both prior to and after the effective date of these Orders.

52. Within thirty (30) days after the effective date of these Orders, Respondents shall remit a check to the Ohio EPA for $86,451.51 for all Response Costs incurred prior to December 10, 2007.

53. For Response Costs incurred after December 10, 2007 and before January 1, 2010, Ohio EPA will submit to Work Respondent, in 2010, an itemized invoice of its Response Costs for that time period. For Response Costs incurred after January 1, 2010, Ohio EPA will submit to Respondents on an annual basis an itemized invoice of its Response Costs for the previous year. Within forty-five (45) days of receipt of such itemized invoice, Respondents shall remit payment for all of Ohio EPA's undisputed Response Costs for the applicable time period and invoke dispute resolution with respect to any claimed Response Costs disputed by Respondents. Section XV, Dispute Resolution, of these Orders shall apply should a dispute arise between the parties under this Section of these Orders regarding the completeness or accuracy of a statement for Response Costs, whether Response Costs claimed are outside the definition of Response Costs in these Orders, or whether Response Costs claimed are inconsistent with the NCP, but shall not apply to disputes regarding the recoverability of costs of Ohio EPA legal counsel as Response Costs.

54. Respondents shall remit payments to Ohio EPA pursuant to this Section as follows:

a. Payment shall be made by certified check payable to "Treasurer, State of Ohio" and shall be forwarded to Fiscal Officer, Ohio EPA, P.O. Box 1049, Columbus, Ohio 43216-1049.

b. A copy of the transmittal letter and check shall be sent to the Fiscal Officer, DERR, Ohio EPA, P.O. Box 1049, Columbus, Ohio 43216-1049, ATTN: Steve Snyder or his successor, and to DERR's Site Coordinator.

XVIII. ACCESS TO INFORMATION

55. Upon request, Respondents shall provide, and/or shall use their reasonable best efforts to have their contractors or agents provide, to Ohio EPA within fourteen (14) days, access to or copies of all documents and information within their or their contractors' or agents' possession or control relating to events or conditions at the Site including, but not limited to manifests, reports, correspondence, or other documents or information related to the Work; provided, however, that requests for documents created prior to the effective date of these Orders shall be provided as promptly as is reasonably practical under the circumstances, which may exceed fourteen (14) days.

56. Respondents may assert a claim that documents or other information submitted to Ohio EPA pursuant to these Orders are confidential under the provisions of OAC 3745-50-30(A) or ORC § 6111.05(A). If no such claim of confidentiality accompanies the documents or other information when the documents are submitted to Ohio EPA, the documents may be made available to the public without notice to such Respondent.

57. Any Respondent may assert that certain documents or other information are privileged under the attorney-client privilege, the work-product doctrine or other right of non-disclosure recognized by state law. If any Respondent makes such an assertion, such Respondent shall identify the date, subject, author and known recipients of the privileged document or information, the privilege being asserted by such Respondent and the grounds upon which the assertion is made.

58. No claim of confidentiality shall be made with respect to any data generated pursuant to these Orders, including but not limited to all sampling, analytical, and monitoring data.

59. Respondents shall preserve for the duration of these Orders and for a minimum of ten (10) years after termination of these Orders, one (1) complete set of: (a) all documents submitted to Ohio EPA by Respondents pursuant to these Orders; and (b) all other final unprivileged records and documents produced pursuant to these Orders that are within their possession or control, or within the possession or control of their contractors or agents, notwithstanding any document retention policy to the contrary. Respondents may preserve such documents by microfiche, or other electronic or photographic device. At the conclusion of this document retention period, Respondents shall notify Ohio EPA at least sixty (60) days prior to the destruction of these documents or other information; and upon request, shall deliver such documents and other information to Ohio EPA.

XIX. PERIODIC REVIEW

60. Respondents shall collect and provide such information as is reasonably requested by Ohio EPA in order to permit Ohio EPA to conduct reviews as to the effectiveness of the Remedial Action as described in section 121(c) of CERCLA and any applicable regulations.

61. If Ohio EPA determines that information received, in whole or in part, during a review conducted pursuant to this Section of these Orders indicates that the Remedial Action selected in the Amended Decision Document is not protective of public health and safety and the environment, nothing herein shall limit Ohio EPA's authority under state or federal law to assert claims for further remedial action against any parties, including Respondents.

XX. MODIFICATIONS

62. These Orders may be modified only by agreement of the Parties. Modifications shall be in writing, signed by the authorized representatives of the Respondents and by the Director, and shall be effective on the date entered in the Journal of the Director of Ohio EPA.

XXI. INDEMNITY

63. Respondents agree to indemnify, save, and hold harmless Ohio EPA from any and all claims or causes of action arising from, or related to, the implementation of these Orders or to events or conditions at the Site, including any acts or omissions of Respondents. Said indemnification shall not apply to acts or omissions of the State of Ohio, its employees, agents or assigns at, on, upon, or related to the Site if said acts are negligent, performed outside the scope of employment or official responsibilities, or performed with malicious purpose, in bad faith, or in a wanton or reckless manner. Ohio EPA shall not be considered a party to and shall not be held liable under any contract entered into by Respondents in carrying out the activities pursuant to these Orders. Ohio EPA agrees to provide notice to Respondents within thirty (30) days after receipt of any claim that may be the subject of indemnity as provided in this Section, and to cooperate with Respondents in the defense of any such claim or action against Ohio EPA.

XXII. OTHER CLAIMS

64. Nothing in these Orders shall constitute or be construed as a release from any claim, cause of action, or demand in law or equity against any person, firm, partnership, or corporation not a Party to these Orders. The Parties specifically disclaim any intent to create rights in or for persons not parties to these Orders.

XXIII. RESERVATION OF RIGHTS

65. Ohio EPA reserves the right to seek legal and/or equitable relief to enforce the terms and conditions of these Orders, including penalties against Respondents for noncompliance with these Orders. Respondents reserve any rights they may have to seek legal or equitable relief to enforce the terms and conditions of these Orders or raise any legal or equitable defense, claim or counterclaim in any action brought by or on behalf of Ohio EPA to enforce the terms and conditions of these Orders.

66. Ohio EPA reserves the right to terminate these Orders and/or perform all or any portion of the Work or any other measures in the event that the requirements of these Orders are not wholly complied with within the time frames required by these Orders. In the event that Ohio EPA elects to perform all or any portion of the Work, Respondents shall not be obligated under these Orders to reimburse Ohio EPA for the costs of such Work. Rather, Ohio EPA reserves the right to seek to recover such costs in a separate proceeding, and Respondents reserve the right to raise any defenses they may have to such a claim under applicable law.

67. Ohio EPA reserves the right to take any action under applicable law against Respondents if conditions at the Site, previously unknown to the State, are discovered

after the effective date of these Orders, or information is received, after the effective date of these Orders and these previously unknown conditions or this previously unknown information shows that the remedy for the Site as set forth in the Amended Decision Document is not protective of public health or safety or the environment.

68. Subject to the Contribution and Agreement Not To Refer Section of these Orders, Ohio EPA reserves the right to take any action under applicable law, including but not limited to any enforcement action, or action to recover costs, pursuant to ORC Chapters 3734, 3745, or 6111, or any available legal authority as a result of past, present, or future violations of state or federal laws or regulations or the common law, and/or as a result of events or conditions arising from, or related to, the Site that were not a basis for these Orders.

69. Issuance of these Orders without a provision that explicitly contemplates recovery of costs of Ohio EPA legal counsel as Response Costs does not constitute a waiver of any rights that Ohio EPA may have under applicable law to recover these costs and/or to claim these costs are recoverable Response Costs under either state or federal law. In any action by Ohio EPA to enforce any provision of these Orders or seek recovery of Response Costs, Respondents may raise at any time the question of whether Ohio EPA is entitled to recover from Respondents costs for Ohio EPA legal counsel. While Respondents do not agree that such a right of recovery exists, it is hereby agreed by Respondents and Ohio EPA that it is premature at this time to decide the existence of such a right among themselves and that the appropriate point at which to adjudicate the existence of such a right is at the time, if ever, that a proceeding to enforce these Orders or seek recovery of Response Costs is commenced.

70. Respondents reserve all rights, claims, demands and causes of action they may have against any and all persons and entities who are not Parties to these Orders. Respondents reserve rights of contribution against any other parties, including without limitation the State of Ohio, who may be liable for actual or threatened releases of contaminants at the Site.

XXIV. CONTRIBUTION AND AGREEMENT NOT TO REFER

71. With respect to matters addressed in these Orders, the Parties hereto agree that these Orders constitute an administrative settlement for purposes of CERCLA sections 113(f)(2) and 113(f)(3)(B), 42 U.S.C. § 9613(f)(2) and § 9613(f)(3)(B), pursuant to which Respondents have resolved their liability to the State, and that Respondents are entitled to contribution protection and contribution rights as of the effective date of these Orders as to any liable persons who are not parties to these Orders, as provided by CERCLA sections 113(f)(2) and (f)(3)(B), 42 U.S.C. § 9613(f)(2) and (f)(3)(B), provided that Respondents comply with these Orders. The "matters addressed" in these Orders are injuries to natural resources, all investigative and remedial actions taken or to be taken and all response costs incurred or to be incurred by Ohio EPA or any other person with

respect to the Site, including without limitation the Work and Response Costs under these Orders.

72. During the implementation of these Orders, and provided Respondents are in compliance with these Orders, Ohio EPA agrees not to refer to the Ohio Attorney General's Office for enforcement, or take administrative enforcement action against, Respondents or their present or future agents, successors, subsidiaries or assigns, for Work required under these Orders or for recovery of natural resource damages at the Site. Upon termination of these Orders pursuant to the Termination section of these Orders, Ohio EPA agrees to not refer Respondents to the Ohio Attorney General's Office for enforcement, or take administrative enforcement action against Respondents or their present or future agents, successors, subsidiaries or assigns for Work required under these Orders or for recovery of natural resource damages at the Site.

XXV. TERMINATION

73. Respondents' obligations under these Orders shall terminate upon Ohio EPA's approval in writing of Respondents' written certification to Ohio EPA that all Work required to be performed under these Orders including payment of Response Costs has been completed. The Respondents' certification shall contain the following attestation: "We certify that to the best of our knowledge the information contained in or accompanying this certification is true, accurate, and complete." This certification shall be submitted by Respondents to Ohio EPA and shall be signed by responsible officials of Respondents. Ohio EPA's approval shall not be unreasonably withheld. The termination of Respondents' obligations under these Orders shall not terminate the Parties' rights and obligations under the Reservation of Rights, Access to Information, Periodic Review, Indemnity, Other Claims, Land Use and Conveyance of Title, and Contribution and Agreement Not to Refer sections of these Orders; and any Operation and Maintenance Plan developed by Respondents and approved by Ohio EPA pursuant to these Orders.

XXVI. WAIVER AND AGREEMENT

74. In order to resolve disputed claims, without admission of fact, violation, or liability, Respondents consent to the issuance of these Orders, and agree to comply with these Orders.

75. Subject to Section XXIII, Reservation of Rights, Respondents hereby waive the right to appeal or to otherwise seek administrative or judicial review of the issuance, terms and conditions, and service of these Orders either in law or equity.

76. Notwithstanding the limitations herein on Respondents' right to appeal or seek administrative or judicial review, Ohio EPA and Respondents agree that if these Orders

are appealed by any other party to the Environmental Review Appeals Commission, or any court, Respondents retain the right to intervene and participate in such appeal. In such event, Respondents shall continue to comply with these Orders notwithstanding such appeal and intervention unless these Orders are stayed, vacated or modified.

XXVII. EFFECTIVE DATE

77. The effective date of these Orders shall be the date these Orders are entered in the Journal of the Director of Ohio EPA.

XXVIII. SIGNATORY AUTHORITY

78. Each undersigned representative of a Party to these Orders certifies that he or she is fully authorized to enter into these Orders and to legally bind such Party to these Orders.

IT IS SO ORDERED AND AGREED:

OHIO ENVIRONMENTAL PROTECTION AGENCY

Chris Korleski, Director
Ohio Environmental Protection Agency

OCT 2 2 2009
Date

IT IS SO AGREED:

Mahle Engine Components USA, Inc.

BY:
Name

9-23-09
Date

PRESIDENT
Title

Gould Electronics Inc.

BY:

Thomas N. Ruh
Name

Sept. 11, 2009
Date

Chief Administrative Officer
Title

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APPENDIX A
Amended Decision Document

APPENDIX B
RD/RA Work Plan

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List of Relevant Guidance Documents

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AMENDED DECISION DOCUMENT FOR THE REMEDIATION OF

Glacier Vandervell, Inc. (GVI)

Noble County, Ohio

prepared by

THE OHIO ENVIRONMENTAL PROTECTION AGENCY

December 18, 2006

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

By: Tonya Jackson Date: 12-28-06

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

By: ________________ Date: ____________

DECLARATION

SITE NAME AND LOCATION

Glacier Vandervell, Inc (GVI)
Caldwell, Ohio

STATEMENT OF BASIS AND PURPOSE

This Amended Decision Document presents the selected remedial action for the Glacier Vandervell Site in Caldwell, 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.

PROCEDURAL SUMMARY

On October 2, 2003, Ohio EPA held a public meeting to discuss the initial Preferred Plan and to solicit public comments. Based on the written comments received by Ohio EPA, some changes were made to the remedy identified in the initial Preferred Plan. On May 5, 2004, Ohio EPA issued the initial Decision Document, which selected the remedy for the Site.

On June 2 and 3, 2004, Glacier Vandervell, Inc. (GVI) and Gould Electronics appealed the initial Decision Document to the Environmental Review Appeals Commission (ERAC). GVI and Gould subsequently met with Ohio EPA and discussed the issues identified in the ERAC appeal. DERR-SEDO staff and Ohio EPA-Legal staff worked with Respondents GVI and Gould and resolved the issues. A draft Amended Decision Document, which included certain changes to the initial Decision Document, was issued on October 3, 2006. On December 7, 2006, Ohio EPA held a public meeting to discuss the draft Amended Decision Document and to solicit public comments. No comments were received, and the Amended Decision Document in final form is presented herein.

ASSESSMENT OF THE SITE

Actual and threatened releases of industrial solvents and heavy metals from historical operations and waste disposal at the Site, if not addressed by implementing the remedial action selected in the Amended 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

- Excavation and consolidation of wetland sediments, Western Disposal Area soils, and Plant Area soils - construction of an impervious cap over these soils in the Western Disposal Area. The cap will meet the standards provided in Subtitle C of the Resource Conservation and Recovery Act (RCRA).

- Monitoring of Duck Creek sediments to detect potential increases in site-related contaminants arising from construction of the final remedy.

- Use of activity and use limitations, and engineering controls to address SO Line soils, Vapor Degreaser soils, and soils beneath the loading dock area. The selected alternative will utilize the facility structure and loading dock as temporary engineering controls to prevent infiltration of precipitation and leaching of VOCs to groundwater. If the facility structure and/or loading dock are removed at a future time, Ohio EPA may require a Focused Feasibility Study to evaluate capping and other remediation technologies or actions that are expected to achieve RAOs. Absent Ohio EPA approval of another remediation technology, the second phase of the remedy will be implemented to cap the underlying soils, in accordance with RCRA Subtitle C hazardous waste facility standards.

- Reduction of groundwater contamination in primary source areas, through expanded groundwater recovery and treatment.

- Implementation of an expanded groundwater monitoring plan to assess natural attenuation processes, and to provide sufficient monitoring to ensure the protection of potential off-site receptors.

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

12/28/06
Date

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DECISION SUMMARY

for Glacier Vandervell, Inc. (GVI)
Noble County, Ohio

1.0 SITE BACKGROUND

1.1 Site Description and History

GVI is located at 17226 County Road 57 in Olive Township, Noble County, Ohio, approximately 0.75 mile south of the Village of Caldwell, as shown on Figure 1. The Site lies on a 41-acre parcel of land and is an active industrial property with manufacturing occurring within the plant building. Industrial properties lie to the north and south of the Site. A small residential community lies across Route 821 to the east of the Site. Approximately 10 homes are located in a development about 2,000 feet southeast of the Site. Duck Creek borders the Site on the west and is paralleled by Interstate 77. A limited number of residential dwellings are located approximately 0.2 mile west of the Site across Duck Creek and Interstate 77.

Paved parking areas are present on the north, northeast and southeast sides of the facility building, and asphalt loading docks and roadways exist on the north and south sides of the building. Other areas lying north and east of the facility are covered with lawn (primarily bluegrass and other turf species). The area west of the plant (i.e., Western Disposal Area) is covered primarily with herbaceous vegetation, with a few shrubs and sparse trees. Three sparsely vegetated zones are located within this area. An emergent wetland is present in the northern/northwestern portion of the Site. Wetland vegetation consists of cattails, scrub/shrub vegetation and trees. A site map illustrating the various areas and facility features is presented on Figure 2.

The original manufacturing facility was constructed in 1952. Several additions have expanded the facility to approximately 210,000 square feet. The plant was originally owned and operated by Cleveland Graphite Bronze Company, which in 1969 became part of Gould, Inc. (Gould). Gould subsequently operated the facility until 1981, when Imperial Clevite Industries purchased the operations and the property. Clevite Industries acquired the facility through a merger with Imperial Clevite Industries in 1986. J.P. Industries, Inc. (JPI) purchased the Site in 1987. JPI was acquired by T&N PLC in August 1990. In the spring of 1998, T&N PLC was acquired by Federal Mogul Corporation. However, the Federal Trade Commission (FTC) required Federal Mogul to divest its interest in the facility, and under the FTC ruling it was sold to Dana Corporation. The Caldwell facility continues to operate under the name Dana Glacier Vandervell Inc.(GVI). All interests in the facility, including the property, structures, and manufacturing operations, are currently owned by Dana Corporation.

The GVI facility has manufactured the same type of products since production began in 1952. Products include a variety of small machined parts, including bimetal bushings and washers. Processes involved in the manufacturing of the parts include casting, milling, rolling, annealing, slitting, blank forming, coining, plating and finishing.

Historically, solvents have been used at the facility to clean and degrease equipment and structures. These solvents include trichloroethene (TCE), 1,1,1-trichloroethane, and trans-1,2-dichloroethene. Areas of the Site that would have been associated with these contaminants include soils beneath the plant (soluble oil line and vapor degreaser areas), the loading dock area, Western Disposal Area, and waste water treatment area.

As a result of manufacturing operations, the facility generated industrial waste water which was treated and discharged into the local publicly owned treatment works (POTW). Prior to final discharge of this water, settled sludge was drawn off and discharged into sludge dewatering beds, also known as sand filter beds, with filtrate recycled to an on-Site treatment plant. The filter beds were used for sludge dewatering since 1952. Waste discharged to these units included electroplating waste as well as oil and grease from degreasing operations. These wastes are designated as F006 listed hazardous waste under the Resource Conservation and Recovery Act (RCRA). Prior to 1980, the waste generated from the filter beds and from other plant operations was disposed of on the Site by Gould and others.

Several environmental investigations have been conducted at the Site to investigate past releases and waste management practices. A chronological review of these investigations is provided below.

- In 1987, a Preliminary Site Investigation (PSI) determined that metal hydroxide sludge, corn cob deburring media waste, and lead-bearing sludge were disposed of at the Site. Additionally, chlorinated solvents may have been spilled or leaked from the loading dock area or from an old railroad siding. Indications were that trichloroethene (TCE) and 1,1,1-trichloroethane may have been stored on the loading dock. Soil borings indicated the presence of lead in the soil, with concentrations as high as 100,000 ppm. Groundwater samples indicated the presence of several chlorinated solvents at concentrations significantly higher than drinking water standards.

- In April 1987, Ohio EPA conducted a RCRA inspection of the Site pursuant to Ohio Revised Code (ORC) Section 3734.04. Subsequently, Clayton Environmental Consultants (Clayton) prepared a RCRA Closure Plan for the sand filter beds and for conducting a groundwater monitoring program. The Closure Plan was approved on February 17, 1988. As part of the closure, 500 tons of soil were removed from the area of the filter beds. Clayton installed one upgradient and four downgradient monitoring wells to evaluate groundwater conditions. Wells were monitored on a quarterly basis in 1988 and on a semiannual basis from July 1989 to February 1991.

- In June 1987, Environmental Management Control (EMC) excavated and removed a gasoline underground storage tank (UST) in the area southwest of the facility. In an attempt to remove any remaining product from the subsurface, Groundwater Technology, Inc. (GTI) installed a recovery well and scavenger pump. However, very little product was recovered due to the low yield of the water-bearing zone.

- During the fall of 1987, Dames and Moore conducted a soil gas investigation to determine the general extent of soil contamination. The investigation determined that the area to the west of the southwest loading dock and an additional area approximately 300 feet west of the north wall of the plant had elevated soil gas levels of volatile organic compounds (VOCs). Clayton conducted a second investigation of the former UST area in October 1988. Groundwater contamination was identified in the area of the former UST and surficial staining was observed in the nearby drainage culvert.

- In December 1990, Kemron Environmental Services (Kemron) installed five groundwater monitoring wells and four soil borings in an area north of the facility. VOC contamination was identified in the four borings and some of the monitoring wells.

- On three occasions from 1989 to 1991, Quantum Environmental (Quantum) sampled the monitoring wells associated with the closed filter beds. Quantum proposed corrective measures in a Groundwater Quality Assessment Plan dated October 14, 1991.

- Ohio EPA issued a Consent Order on December 11, 1991. On April 27, 1992, Site Respondents Gould and Glacier Vandervell, Inc. submitted a proposed Remedial Investigation Work Plan. The Site Respondents implemented field work for the Remedial Investigation (RI) in July 1992. This work included sampling and analysis of soil, groundwater, and Duck Creek surface water and sediments. Subsequently, the Site Respondents conducted additional field work for the RI at the request of Ohio EPA. The additional sampling focused on the evaluation of contamination underlying the facility, in Duck Creek, and areas northwest and south of the facility.

- The Site Respondents installed an interim groundwater recovery and treatment system in January 1997, which is currently operating at the Site. The system consists of three pumping wells (MW-7, MW-10, and MW-18) located in the area of highest VOC concentration and an activated carbon system to treat VOC-contaminated groundwater.

- The Site Respondents submitted the RI Report to Ohio EPA on December 11, 1998. Ohio EPA issued final approval on March 29, 1999.

- In accordance with the Consent Order, monthly progress reports are submitted by the Site Respondents to Ohio EPA to document activities related to the Site.

1.2 Summary of the Remedial Investigation

The Remedial Investigation, performed by the Site Respondents with Ohio EPA oversight, included a number of tasks to identify the nature and extent of Site-related chemical contaminants. The tasks included sampling of surface and subsurface soil, sediments, surface water, and groundwater.

The RI field work was completed in three phases. From July 1992 through May 1993, field work for the "initial RI" was conducted. At the request of Ohio EPA, two supplemental RIs were conducted to further evaluate the presence and extent of contamination underlying the plant, in Duck Creek, and in areas located to the northwest and south of the plant. From September 1994 through December 1994, field work for the first supplemental RI was conducted. In June 1995, field work for the second supplemental RI was conducted. At the time of the RI, a Resource Conservation and Recovery Act (RCRA) investigation had been ongoing at the Site since 1987. Although most of the RCRA-related work was completed by June 1992, additional work was required to fulfill the RCRA requirements. Therefore, this remaining work was conducted concurrently with the RI work, and a final RCRA report was postponed until the RI work was completed. The RCRA report was then included as a stand-alone document as Appendix 1A of the RI report.

Investigative activities performed during the RI, supplemental RIs, and the RCRA investigation included the installation of 38 monitoring wells and the drilling of 91 soil borings. The data obtained from the investigation were used to conduct a Baseline Risk Assessment (BRA) and to determine the need to evaluate remedial alternatives. This Amended Decision Document contains only a brief summary of the findings of the Remedial Investigation and Feasibility Study. Please refer to the Remedial Investigation and Feasibility Study reports for additional information.

The nature and extent of contamination in each environmental medium and the contaminants of concern attributable to the Site are described below. Figures 3 and 4 show the extent of metals impact in the WDA and Plant Area Soils, respectively. Figure 5 illustrates the extent of VOC impact to soils Site-wide.

1.2.1 Soil Contamination

1.2.1.1 Western Disposal Area Soils

The Western Disposal Area (WDA) was historically used to dispose of wastes generated in the production processes at the Site. These wastes included plating and grinding sludge, corn cob deburring media, waste oil, solvents, and waste water treatment sludge from the sand filter beds.

The RI found that elevated concentrations of heavy metals were present in the WDA soils. The metals consisted primarily of copper and lead and were most prevalent at the 0-2 feet below-ground-surface (bgs) sampling interval. The maximum concentration of copper was

140,000 milligrams per kilogram (mg/kg), compared to a Site background concentration of 34.5 mg/kg. The maximum concentration of lead was 52,000 mg/kg, compared to a background concentration of 22.5 mg/kg. Antimony was detected twice in the WDA at concentrations of 73 and 240 mg/kg , with a background concentration of less than 30 mg/kg. Arsenic was detected once at a concentration of 24 mg/kg, exceeding the background concentration of 18 mg/kg.

In the WDA, twenty-nine soil samples were submitted for VOC analysis during the RI. Ten VOCs were detected in samples from two borings, at depths ranging from ground surface to 22 feet bgs. TCE was the primary compound detected, at a maximum concentration of 2.9 mg/kg.

1.2.1.2 Plant Area Soils

Plant Area Soils are those shallow (0-2 feet below ground surface) soils found in the general outdoor portions of the facility, including the former RCRA closure unit, the former UST area, the southwest loading dock area, and upland areas near the wetland. Lead represents the primary chemical of concern in the Plant Area Soils. The distribution of lead was identified during Pre-RI investigations, which indicated elevated concentrations in surface soils to the north and south of the western side of the building. The origin of the lead is presumed to be primarily from airborne distribution from the casting operations at the facility. The maximum isoconcentration line for lead based on contouring of soil data was 2,500 mg/kg and was located to the north of the plant building. Elevated concentrations of copper were detected in one RI boring outside the southwest loading dock. VOCs were detected only occasionally in Plant Area Soils, and were primarily limited to detections of toluene, xylenes, and TCE in the vicinity of the former gasoline UST and the southwest loading dock area.

1.2.1.3 Soluble Oil Line/Vapor Degreaser Soils

The Soluble Oil (SO) Line, located beneath the facility building, was historically used to transport spent solvents to a concrete holding tank for further treatment. The line is no longer in use. The VOCs TCE and/or PCE were detected in twelve (12) RI borings drilled to investigate potential contamination from the SO Line. TCE and PCE were detected at maximum concentrations of 210 mg/kg and 92 mg/kg, respectively, in soil from 8 to 12 feet below ground surface. One RI boring drilled near Vapor Degreaser #1 contained TCE at 1.5 mg/kg and PCE at 2.5 mg/kg in soil at 5 feet below ground surface. Based upon the RI data, the SO Line area appears to be the largest and most significant area of VOC-contaminated soil at the Site. It is also likely that this area is a significant past and/or current contributor to VOC contamination in groundwater.

1.2.2 Ground Water Contamination

Groundwater at the Site is found in both unconfined alluvial deposits and in bedrock, and is typically encountered between 10 and 15 feet bgs. The alluvium is composed primarily

of clay, silt, and fine sand, and has a low hydraulic conductivity. The bedrock is composed of shale, with the upper portions characterized as soft, weathered, and clayey, and also demonstrates low hydraulic conductivity. It is likely that groundwater flow within the bedrock is controlled by joint and fracture density and orientation.

During the RI and other Site investigations, nested monitoring wells were installed to screen the alluvium, the alluvium/bedrock interface, and the bedrock. Potentiometric data suggest that these units are in hydraulic communication. The letters "a" , "b", and "a/b" are used as qualifiers in the identification of monitoring wells to denote wells screened within alluvium, bedrock, or at the interface, respectively.

1.2.2.1 Alluvium

Groundwater sampling of alluvium wells and alluvium/bedrock interface wells was performed on various occasions during the RI, and again in May 2000 prior to preparation of the FS report. Based upon the recent FS sampling, the following VOCs were detected in alluvium groundwater at concentrations exceeding USEPA Maximum Contaminant Levels (MCLs) or Action Levels:

- TCE (MCL = 5 ug/l)
- Cis- 1,2 dichloroethene (MCL = 70 ug/l)
- PCE (MCL = 5 ug/l)
- Vinyl Chloride (MCL = 2 ug/l)
- Benzene (MCL = 5 ug/l)

Concentrations of TCE ranged to as high as 190 ug/l, while cis-1,2-DCE ranged to as high as 240 ug/l. The other contaminants were present in lesser concentration and/or extent, but nonetheless exceeded the respective MCLs. Similar to the RI findings, VOC concentrations were highest in wells near or downgradient of the former sand filter beds and SO Line areas. Comparing the RI data from 1993 and 1994 to the 2000 FS data, total VOC concentrations in the alluvium decreased, on average, approximately 89%. Of the VOC contaminants in groundwater, TCE and cis-1, 2-DCE appear to be the most dominant (i.e. highest concentration) overall. Comparing the RI data to the FS data for these individual compounds reveals an average decrease in concentration of approximately 86% for TCE and 74% for cis-1, 2-DCE. Figures 6 and 7 illustrate the 2000 FS sampling data showing the extent and concentration of TCE and cis-1,2-DCE, respectively, in groundwater within the alluvium at the Site.

During RI sampling in 1994, benzene was detected in three alluvium wells, and concentrations exceeded the MCL of 5 ug/l at MW-9 and MW-15. During FS sampling, benzene was detected in two of the alluvium wells; however, only the concentration in MW-9 (720 ug/l) was above the MCL. Semi-volatile organic compounds (SVOCs) were detected in two alluvium wells - MW-5 and MW-9; however, the compounds detected do not have established MCLs.

Groundwater flow within the alluvium is generally to the west-northwest toward the wetland area, and southwest toward Duck Creek. A comparison of the 2000 FS data to the 1994 RI data indicate that the areal extent of the VOC plume within the alluvium has not changed appreciably over time. Based upon this comparison, as well as the above-noted decrease in plume concentrations, the alluvium VOC plume would not be expected to migrate beyond the current areas of impact.

1.2.2.2 Bedrock

Based upon the 2000 FS sampling, the following VOCs were detected in bedrock groundwater at concentrations exceeding USEPA MCLs or Action Levels:

- TCE (MCL = 5 ug/l)
- Cis- 1,2 dichloroethene (MCL = 70 ug/l)
- PCE (MCL = 5 ug/l)
- Vinyl Chloride (MCL = 2 ug/l)
- Benzene (MCL = 5 ug/l)
- 1,1 Dichloroethene (MCL = 7 ug/l)

VOC concentrations in bedrock groundwater were highest in wells located near or downgradient of the southwest loading dock, former sand filter beds, and SO Line areas. Compared to alluvium, contaminants were present in significantly greater concentrations in the bedrock, with concentrations of TCE, cis-1,2-DCE, and vinyl chloride ranging to as high as 4,300 ug/l, 4,400 ug/l, and 410 ug/l, respectively.

Comparing the 1994 RI data to the 2000 FS data, total VOC concentrations in bedrock decreased, on average, approximately 57%. Of the VOC contaminants in the groundwater, TCE and cis-1,2-DCE appear to be the most dominant overall. A comparison of the RI data to the FS data for wells in the most contaminated zone reveals an average decrease in concentration of approximately 53% for TCE and 34% for cis-1, 2-DCE. Figures 8 and 9 illustrate the FS sampling data, showing the extent and concentration of TCE and cis-1,2-DCE, respectively, within bedrock at the Site.

During FS sampling, benzene was detected in seven of the bedrock wells; however, only concentrations in two of the wells - MW-7 (9.7 ug/l) and MW-10 (160 ug/l) - were above the MCL. Both wells are downgradient from the former gasoline UST area. One SVOC, bis(2-ethylhexyl) phthalate, was detected in three bedrock wells - MW-6, MW-7, and MW-11; however, this compound does not have an established MCL.

Like the alluvium, groundwater flow within the bedrock is generally to the west and southwest, toward the wetland area and Duck Creek. Findings of the RI estimated a horizontal hydraulic conductivity of 1.23 ft/day for bedrock, with a horizontal flow velocity estimated at 0.58 ft/day (211 ft/year). A comparison of the 2000 FS data to the 1994 RI data indicate that the areal extent of the VOC plume within bedrock has not changed appreciably in that time, with the exception of a slight plume extension down gradient of

the former filter beds in the vicinity of well MW-22. Based upon this comparison, as well as the above-noted decrease in average plume concentrations, the bedrock VOC plume would not be expected to migrate or expand appreciably beyond the current areas of impact.

1.2.3 Surface Water/Sediment Contamination

The Site is located within the Ohio River Drainage Basin. The primary surface water feature is Duck Creek (West Fork), which borders the Site on the west and regionally flows from north to south. Surface water from the Site drains to Duck Creek, which has an average width of approximately 35 feet, and also drains to the wetland area.

During the RI, seven sediment and surface water samples were collected from Duck Creek at 200-foot intervals along the Site boundary. All sediment samples were analyzed for VOCs, copper, lead, and tin to detect any impact from the Site. The surface water samples were analyzed for VOCs, metals, and hardness. One sediment sample and one surface water sample were analyzed for the priority pollutant metals.

No VOCs were detected in either the sediment or surface water samples collected from Duck Creek.

Arsenic, beryllium, cadmium, chromium, copper, lead, nickel and zinc were each detected in at least one sediment sample. Concentrations of arsenic, cadmium and nickel exceeded the USEPA Ecotox Thresholds for sediment, while all other metals were below the Ecotox Thresholds (Ecotox thresholds are critical concentrations of contaminants above which wildlife may be harmed). As part of the FS, additional Duck Creek sediment sampling was performed for analysis of arsenic, cadmium, and nickel to better characterize the extent of metals impacts and to establish a background concentration. The sampling results indicated only minor exceedances (less than 2x) of the background concentrations for arsenic and nickel. Cadmium did not exceed background levels.

Chromium, copper, mercury and zinc were detected in Duck Creek surface water samples collected during the RI. All concentrations were below the USEPA Region 9 Preliminary Risk Goals (PRGs; see Section 2.1 below) for drinking water, which were used for screening in the Baseline Human Health Risk Assessment (BHHRA). The concentrations were also compared to the Ohio EPA surface water quality criteria for the Ohio River Drainage Basin. None of the concentrations exceeded the applicable water quality criteria. Therefore, surface water did not warrant further evaluation in the FS.

1.2.4 Wetland Sediment Contamination

A six-acre emergent wetland is located in the northern/northwestern portion of the Site, as shown on Figure 2. Approximately three acres of the wetland are covered by cattail vegetation. Surface water from the northwestern portion of the property, including the WDA, flows toward and into the wetland.

A field delineation and wetland functionality assessment was conducted at the Site in July 1999 by representatives of Advanced Geoservices Corp. (AGC) as part of the FS Work Plan preparation. The assessment utilized the Hydrogeomorphic (HGM) scheme to classify the wetland. Based upon this assessment, the area was classified as a slope wetland, implying unidirectional movement of water downslope, albeit at a very slow rate. The assessment also found that the wetland area, as a whole, appears to primarily retain surface water. Therefore, primary ecological receptors of concern are wetland-associated communities. PRGs based on these receptors are therefore more appropriate than benchmarks based on stream benthic fauna. As determined during FS preparation, the muskrat is considered to be a representative species for the cattail and open-water wetland areas, while the meadow vole is the representative species for the non-cattail wetland areas.

During the RI and supplemental RI investigations, a total of 14 surface soil samples were collected in and around the wetland area and were analyzed to determine metals concentrations. The primary metals detected above background concentrations were copper, lead, and tin. Copper concentrations ranged to a maximum of 3,500 mg/kg, lead ranged to a maximum of 3,800 mg/kg, and tin ranged to a maximum of 3,300 mg/kg. Thirteen of the wetland area samples contained concentrations of copper, lead, and/or tin which exceeded the respective Ecological Risk-Based Concentrations (ERBC) of these contaminants for the muskrat. Two of the samples exceeded the respective ERBCs for the meadow vole. Figure 10 illustrates the locations of the wetland sediment samples and the approximate area of wetland sediment requiring removal to meet the ERBCs for these receptors.

1.2.5 Impacts to Biological Resources

To date there has been no observed, documented impact to Site biological resources. However, as indicated in Section 2.2, the Ecological Risk Assessment identified various risks to biological receptors on-Site, including the muskrat, meadow vole, American robin, red-tailed hawk, American woodcock, and great blue heron. It is also important to note that any impacts to biological resources are expected to be long-term and chronic in nature and, therefore, more difficult to observe.

1.3 Interim or Removal Actions Taken to Date

An interim remedial measure (IRM) was installed in January 1997 and is currently operating at the Site. The IRM consists of pumping groundwater from three monitoring wells installed into shallow bedrock and located in the areas of highest VOC contamination. The wells being utilized for the IRM are the shallow bedrock wells MW-7, MW-10, and MW-18. Groundwater is pumped from the wells using submersible pneumatic pumps and is routed through a carbon treatment system to remove VOCs. The treated water is then combined with the plant waste water stream, which is subsequently discharged to the POTW.

From the 1997 startup of the groundwater removal system through the end of 2001, a total of approximately 586,000 gallons of groundwater had been pumped from the shallow bedrock unit, with a total mass removal of approximately 13 lbs of VOCs. The combined output of the wells averaged approximately 0.2 gpm during this period. The decrease in VOC concentrations in the bedrock aquifer, as noted in Section 1.2.2.2, may be attributable to the groundwater pumping activities.

2.0 SUMMARY OF SITE RISKS

A baseline risk assessment (BRA) was conducted to evaluate current and potential risks to human health and to ecological receptors associated with contaminants present at the Site. The results demonstrated that the existing concentration of contaminants in environmental media pose risks to human and ecological receptors at a level sufficient to trigger the need for remedial actions. A detailed discussion of the analyses and methods used to determine risk can be found in the Remedial Investigation Report.

2.1 Risks to Human Health

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

- Identify constituents that pose a significant risk to receptors (Data Evaluation)
- Identify the pathways and media of concern (Exposure Assessment)
- Determine toxicity levels of constituents in relevant media (Toxicity Assessment)
- Determine the likelihood and magnitude of any expected impact or threat (Risk Characterization)

2.1.1 Data Evaluation

For the purposes of the BRA, a chemical was classified as a chemical of potential concern (COPC) if it was detected in at least 5% of samples in a particular medium and if its maximum concentration was greater than one-tenth of the USEPA Region 9 PRG based upon residential use. A chemical was also retained as a COPC if a PRG was not available for the chemical.

2.1.2 Exposure Assessment

All pathways by which humans could be exposed to COPCs were evaluated and quantified for both current and future exposure scenarios.

The following receptors were identified and evaluated for the current use scenario:

- Grounds workers
- Construction workers
- Off-Site residents
- School-aged trespassers
- Children using Duck Creek for recreation
- Office employees

Future site scenarios evaluated in the risk assessment included continued industrial use of the property and residential use. Exposure scenarios for continued industrial use are similar to those under current use unless groundwater is used for drinking water. Hence, risks under a continued industrial use scenario are expected to be the same as for current use.

Under future land use, homes or other buildings may be constructed on-Site. The following population is associated with this scenario:

- Future construction workers
- Future adult residents
- Future child residents

2.1.3 Toxicity Assessment

Following the evaluation of current and future receptors and exposure pathways, the concentrations of COPCs in each medium were estimated from sampling results and mathematical modeling, and the potential human exposure levels were calculated. The estimate of human exposure (intake) was calculated as the average amount of a chemical taken into the body per unit of body weight per day (mg/kg/day).

The toxicity of each COPC was assessed by identifying the adverse health effects associated with exposure to each contaminant. Toxicity values for many frequently occurring chemicals have been developed by the USEPA for use in risk assessments. Separate toxicity values for carcinogenic (cancer-causing) and non-carcinogenic health effects have been developed. The "slope factor" represents the excess cancer risk per unit intake of a chemical over a lifetime (mg/kg/day). For non-cancer risk, a "reference dose" represents the acceptable chemical intake level (mg/kg/day) that is not expected to result in adverse health effects.

2.1.4 Risk Characterization

Risk characterization was conducted following the evaluation of all exposure and toxicity information. Both carcinogenic and non-carcinogenic risks were characterized. Lead risk is addressed separately and is described in the following sections.

Excess lifetime cancer risk (ELCR) is defined as the probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen(s) present at the Site, *in addition* to the probability of cancer risks from all other causes. ELCRs were calculated by multiplying projected intakes by chemical-specific slope factors (CSF). For pathways involving multiple chemicals, Total ELCRs were calculated by summing individual ELCRs.

As a benchmark in developing clean-up goals at contaminated sites, an acceptable ELCR range from one in one million (1 in 1,000,000) to one in ten thousand (1 in 10,000) has been established, with one in one million being the "point of departure". The point of

departure represents the starting point and the initial goal for all remedial objectives. This risk goal can be "departed from" with good reason. Such reasons include, but are not limited to, technical infeasibility, engineering impracticality, and high cost. However, cost is not a primary consideration for making this determination.

The Hazard Quotient (HQ) was used to determine the severity of non-cancerous hazards posed by the Site. The HQ is calculated as the ratio of projected intake levels to acceptable intake levels (reference dose) for each COPC. If the HQ is less than or equal to 1, then the estimated exposure to a substance is judged to be below the threshold that can result in a toxic effect. If the HQ is greater than 1, there exists a potential for toxic non-cancerous effects.

To assess the overall potential for non-cancerous effects posed by multiple chemicals, a hazard index (HI) was calculated by summing the individual HQs for each pathway.

A summary of estimated ELCRs and HIs for all pathways is presented in Table 1 and is discussed in the following sections. These estimates represent the current and future risks associated with the Site assuming no remedial actions are taken.

2.1.4.1 Current Land Use

For the current land use scenario, hazard indices exceed the target level (e.g., greater than one) for grounds workers exposed to Site-wide soil 0-2 feet bgs. The primary risk drivers are potential dermal contact with and ingestion of antimony and copper. Hazard indices associated with construction workers, office workers, off-Site residents, and school-aged trespassers/recreational users are below the target level.

For grounds workers (ELCR = 2 in 100,000) the driver of cancer risk is for potential dermal contact and ingestion of arsenic in Site-wide soil 0-2 feet bgs. For trespassers and recreational users (ELCR = 5 in 1,000,000) the drivers of cancer risk are potential ingestion of arsenic in WDA soil and Duck Creek sediment and potential dermal contact with arsenic in Duck Creek sediment. The ELCRs for these receptors exceed the point of departure, but are within the acceptable risk range.

For the current or continued commercial/industrial use scenario, a blood lead concentration of 16.9 ug/dl (micrograms per deciliter or micrograms per 100 cubic centimeters) is predicted for women workers of childbearing age due to continuous exposure to Site-wide soil 0-2 feet bgs, exceeding the USEPA target level of 10 ug/dl. The primary contributor to this predicted blood lead concentration is soil in the WDA.

2.1.4.2 Future Land Use

Under future land use scenarios, including the possibility of residential use, hazard indices exceed the target level for construction workers and on-Site adult and child residents exposed to Site-wide soil 0-10 feet bgs. The primary risk driver for soil is potential dermal contact with antimony and thallium; however, antimony has been detected only twice and

thallium only once in Site soils. For potential groundwater ingestion, hazard indices also exceed the target level for on-Site adult and child residents; the primary risk drivers for groundwater ingestion are benzene, TCE, and PCE.

All ELCRs are within the acceptable risk range except when considering the potential use of groundwater. For on-Site adult and child residents without groundwater use, risks exceed the point of departure, but are within the acceptable range (1 in 100,000 and 2 in 100,000, respectively). The primary risk driver for this case is potential dermal contact with, and ingestion of, arsenic in soil. For future on-Site adult and child residents, the ELCRs (7 in 10,000 and 4 in 10,000, respectively) associated with the ingestion of groundwater are unacceptable. The primary cancer risk drivers in groundwater are benzene, TCE, PCE, and arsenic. The BRA disclosed that potable use of groundwater is clearly the controlling factor for risk in the future use scenario (other than lead, discussed below).

For future residential use, an average blood lead concentration of 103 ug/dl is predicted for children aged 6 months to 7 years if continuously exposed to WDA soils 0-2 feet bgs. This exceeds the Center for Disease Control (CDC) Level of Concern of 10 ug/dl. For the stained soil/drainage culvert area, a blood lead concentration of 41.3 ug/dl was predicted for children aged 6 months to 7 years. This level also exceeds the 10 ug/dl Level of Concern. Excluding the WDA and stained soil/drainage culvert areas, which could be considered Site hot spots, the predicted blood lead concentration for the remaining Site-wide soils was 2.0 ug/dl for children aged 6 months to 7 years. This level is below the 10 ug/dl Level of Concern.

2.2 Risks to Ecological Receptors

An Ecological Risk Assessment (ERA) was performed for the Site to estimate the potential for adverse impacts to ecological receptors as a result of past disposal practices.

The ERA was based upon the following components:

- Site Characterization and Potential Receptors
- Selection of Chemicals, Species, and Endpoints for Risk Assessment
- Exposure Assessment
- Toxicity Assessment
- Risk Characterization

The complete documentation of these components and the evaluation process can be found in Section 9.0 of the RI Report. The following paragraphs summarize the risks associated with various receptors in various ecological environments present on Site.

For the upland soils (i.e., 0-2 feet bgs in the WDA) concentrations of antimony, arsenic, copper, and lead exceeded Ecological Risk-Based Concentrations (ERBCs) for the meadow vole. Beryllium, chromium, copper, lead, tin, and zinc concentrations also exceeded ERBCs for the American robin in upland soils, and concentrations of lead

exceeded the ERBC for the red-tailed hawk. Exceedances of the ERBCs are influenced primarily by elevated contaminant concentrations in soils of the WDA.

For wetland area sediments in cattail areas, concentrations of copper, lead, and tin exceeded ERBCs for the muskrat. Lead and tin concentrations exceeded ERBCs for the American woodcock and great blue heron. Ecotox Thresholds (taken as a Site-specific benchmark for the green frog) were exceeded for copper and lead by factors of over 20.

For Duck Creek surface water, copper and zinc concentrations exceeded Ecotox Thresholds. In Duck Creek sediment, arsenic concentrations exceeded the ERBC for the muskrat; arsenic, cadmium, and nickel concentrations exceeded Ecotox Thresholds.

3.0 FEASIBILITY STUDY

A Feasibility Study was conducted by the Site Respondents in order to define and analyze appropriate remediation alternatives. The Feasibility Study was conducted with oversight by Ohio EPA, and was approved on August 15, 2001. The Remedial Investigation and Feasibility Study were the basis for Ohio EPA's selected alternative.

3.1 Development of Preliminary Remediation Goals

PRGs are target cleanup concentrations for each contaminant in a given medium. The Site Respondents evaluated whether PRGs developed by USEPA Region 9 could be used as target cleanup concentrations for the contaminants and media found at the Site. Region 9's PRGs were evaluated because Region 5 has not developed PRGs. Region 9's PRGs are generic, risk-based concentrations for direct contact exposures. Region 9's PRGs may not address conditions and/or indirect exposure pathways existing at a particular site. Therefore, the Site Respondents also evaluated PRGs based on applicable or relevant and appropriate requirements (ARARs), ecological benchmarks for representative species, and background concentrations at the Site before establishing final cleanup concentrations. The final cleanup concentrations are based upon established risk goals for exposure pathways that have been identified at the Site.

PRGs for all affected media at the Site were developed in the FS Work Plan. The following is a summary of this process. Table 2 provides a summary of the PRGs for each contaminant in each medium.

3.1.1 Site Soils PRGs

Ohio EPA required the Respondents to propose VOC and SVOC leach-based PRGs for soils beneath the Plant Area, the WDA, the former UST area, the RCRA unit, and for soils at the edge of the wetlands. Ohio EPA also required the Respondents to propose PRGs for metals for the WDA and the Plant Area. During the development of the PRG values for metals, Ohio EPA agreed that leach-based PRGs for metals in soils are not required because the RI concluded that metals have not been detected in Site groundwater. Therefore, the PRGs selected for metals will be the lowest risk-based concentrations which are considered protective of both human receptors and ecological receptors, unless those concentrations are lower than Site background levels. If Site background levels are higher than the concentrations which are considered protective of both human and ecological receptors, the background levels will be selected as the PRGs. Similarly, the final PRGs selected for VOC and SVOC contaminants for which leach-based values are available, as well as risk-based values for human and ecological receptors, are the lowest of those values, unless those values are lower than Site background levels.

Concentrations provided in *Ohio EPA Derived Leach-Based Soil Values Technical Guidance Document* dated July 1996 were proposed as the leach-based PRGs for VOC and SVOC contaminants detected in Site soils. For those organic contaminants that do not have leach-based PRGs listed in the above-referenced document, the Ohio EPA

approved use of a Weight-of-Evidence method for determining whether leach-based PRGs are necessary. The Weight-of-Evidence method was used to conclude that, if a contaminant was detected in soil but not groundwater, it had been demonstrated that the contaminant was not leaching; therefore, a leach-based PRG was not necessary for that contaminant. Leach-based PRGs were found to be necessary for four contaminants (bis(2-ethylhexyl)phthalate, di-n-octylphthalate, dichlorodifluoromethane, dichloromethane) that did not have PRGs established in the above-referenced Ohio EPA guidance. Leach-based PRGs are necessary for those contaminants because they were detected in groundwater. Ohio EPA approved the use of the Pennsylvania Act 2 soil-to-groundwater pathway concentrations as leach-based PRGs for those contaminants.

3.1.2 Groundwater PRGs

As directed by Ohio EPA, PRGs for Site groundwater are the USEPA MCLs or Action Levels for each contaminant.

3.1.3 Duck Creek Sediment PRGs

Of the metals detected in Duck Creek Sediments during RI sampling (arsenic, beryllium, cadmium, chromium, copper, lead, nickel, and zinc), only concentrations of arsenic, cadmium, and nickel exceeded the Ecotox Thresholds. In order to determine the background concentrations of these metals in Duck Creek sediment, additional sampling was performed for the FS. The PRG was then established as the higher of the background concentration or the respective Ecotox Threshold.

3.1.4 Wetland Area Sediment PRGs

Based on the wetland assessment, PRGs based on target ecological receptors are most appropriate for establishing cleanup levels in the cattail and non-cattail portions of the wetlands. During the FS approval process (as detailed in Appendix G of the FS Report), the muskrat and meadow vole were determined to be representative species for the cattail and non-cattail wetland habitats, respectively. Therefore, the PRGs for contaminants in these sediments are the ERBCs for the muskrat and meadow vole.

4.0 REMEDIAL ACTION OBJECTIVES

As part of the remedial investigation/feasibility study (RI/FS) process, remedial action objectives (RAOs) were developed in accordance with the National Contingency Plan, 40 CFR Part 300 (NCP) which was promulgated under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended , and USEPA guidance. The intent of the remedial action objectives is to set 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. For environmental media, remediation levels were developed for a range of potential residual carcinogenic risk levels (i.e., 1 in 100,000, 1 in 1,000,000 etc.) and using a non-cancer hazard index of 1.0 for potentially exposed receptors, including:

- Grounds workers
- Construction workers
- Off-Site residents
- School-aged trespassers
- Children using Duck Creek for recreation
- Office employees
- Future construction workers
- Future adult residents
- Future child residents

Table 1 identifies the exposure pathways and media affecting each of these receptors, and summarizes the risk levels associated with each pathway. Carcinogenic risks are estimated as the unitless probability of an individual developing cancer over a lifetime as the result of exposure to the potential carcinogens related to the Site. Note that for any individual in the exposed population, this risk is in excess of the risk imparted to that individual by factors not related to the Site. (See Section 8.0 of the RI report for further discussion of Site-specific risks).

The remediation levels for human health were developed to ensure that remedial actions reduce the projected risk to humans to acceptable levels. The USEPA, through the NCP, defines acceptable Site remediation goals for known or suspected carcinogens to be concentration levels that represent an upper bound excess lifetime cancer risk, above that of the background, to an individual between 1 in 10,000 and 1 in 1,000,000 using information on the relationship between dose and response, with the 1 in 1,000,000 risk level as the point of departure. Likewise, noncarcinogenic risks are also to be reduced to an acceptable level. In a similar manner, ecological resources (e.g. wetlands, waters of the state, indicator (modeled) species) will also be protected.

The RAOs developed for the Site are as follows:

- Remediate or contain soil to prevent the migration of contaminants into groundwater;

- Remediate or contain upland soils to prevent the direct contact, ingestion, or inhalation of contaminants at levels which exceed human health or ecological risk-based levels;

- Remediate wetland sediment to prevent the direct contact or ingestion of contaminants at levels which exceed ecological risk-based levels;

- Prevent further expansion or off-Site migration of the groundwater contaminant plume and reduce contaminant concentrations in groundwater to achieve established cleanup goals;

- Monitor Duck Creek surface water and sediment to ensure that Site-related contaminants remain at levels below human health or ecological risk-based levels.

5.0 SUMMARY OF REMEDIAL ALTERNATIVES

A total of seventeen alternatives to address five separate media of concern were considered in the Feasibility Study (FS). A brief description of each medium and the major components of each remedial alternative are summarized in the following sections. More detailed information about these alternatives can be found in the Feasibility Study.

5.1 Western Disposal Area (WDA) and Plant Area Soils

The WDA soils contain elevated concentrations of lead, copper, and antimony which exceed PRGs. Although isolated detections of TCE above its PRG are present in the WDA, it is not considered the primary contaminant in this area. The Plant Area soils contain elevated lead concentrations which exceed the PRG. The following remedial alternatives were evaluated for the WDA and Plant Area soils.

5.1.1 No Action - FS Alternative 1 WDA/PA

- No remedial action planned for the WDA/Plant Area Soils; evaluated as a baseline scenario.

5.1.2 Institutional Controls - FS Alternative 2 WDA/PA

- Install security fence around the WDA;
- Add activity and use limitations to prevent future construction or other activities in the WDA, and convert current deed restrictions for the Site to activity and use limitations, in a recorded environmental covenant in accordance with ORC §5301.80 et seq.

5.1.3 On-Site Containment - FS Alternative 3 WDA/PA

- Remove/excavate Plant Area soils which exceed the PRGs for metals and/or VOCs, and stained soils south of plant;
- Sample WDA soils to determine removal/capping limits for metals and TCE contamination;
- Transport and consolidate excavated soils and WDA soils within the WDA; grade soils to construct an optimized containment cell footprint in preparation for capping;
- Cap the WDA and other soils with a RCRA Subtitle C Hazardous Waste Facility Cap; install fence to secure the capped area; maintain cap per regulations;
- Restore excavated plant areas;
- Add activity and use limitations to prevent ion of future construction or other

destructive activity in the WDA; convert current deed restrictions for the Site to activity and use limitations, in a recorded environmental covenant in accordance with ORC §5301.80 et seq.

5.1.4 Removal, On-Site Treatment, Off-Site Disposal - FS Alternative 5 WDA/PA

- Sample WDA soils to determine removal limits for metals and TCE contamination exceeding PRGs;
- Remove/excavate WDA and Plant Area soils exceeding PRGs for metals; excavate stained soils south of plant; restore excavated areas;
- For soils exceeding PRGs for metals, ex situ stabilization to non-hazardous levels as measured by Toxicity Characteristic Leaching Procedure (TCLP) analysis;
- Dispose of stabilized WDA soils and stained soils off-Site at a Subtitle C landfill, provided that Land Disposal Restriction (LDR) values are met;
- Dispose of Plant Area soils at a Subtitle D landfill provided LDR values are met;
- Convert current deed restrictions for the Site to activity and use limitations, in a recorded environmental covenant in accordance with ORC §5301.80 et seq.

5.2 Duck Creek Sediment

Sampling of Duck Creek sediment performed for the FS indicated that the mean concentrations of arsenic, cadmium, and nickel do not exceed the established PRGs. While some individual samples contained slightly elevated concentrations of arsenic and nickel, these values are not significantly greater than the corresponding PRGs. The following remedial alternatives were evaluated for Duck Creek sediment.

5.2.1 No Action - FS Alternative 1 DC

- No remedial action planned for Duck Creek sediment; evaluated as a baseline scenario.

5.2.2 Long-Term Monitoring - FS Alternative 2 DC

- Semi-annual sediment sampling for years 0-2, annual sampling for years 3-5;
- Semi-annual surface water sampling for years 0-2,annual sampling for years 3-5;
- Decision for further monitoring based on results of first five years of sediment and surface water sampling.

5.3 Wetland Sediments

Wetland area sediments contain elevated concentrations of copper, lead, and tin. The wetland contains both cattail and non-cattail areas. The PRGs for these areas were selected based upon the muskrat and meadow vole, respectively, as the target (indicator) species. The following remedial alternatives were evaluated for the wetland sediments.

5.3.1 No Action - FS Alternative 1 Wetland

- No remedial action planned for wetland sediments; evaluated as a baseline scenario.

5.3.2 Removal, On-Site Disposal within WDA - FS Alternative 3 Wetland

- Sample wetland sediment to determine removal limits;
- Excavate, dewater, and transport sediments for consolidation within the WDA;
- Restore and re-establish vegetation in excavated areas.

5.3.3 Removal, Off-Site Disposal - FS Alternative 4 Wetland

- Sample wetland sediment to determine removal limits;
- Excavate, dewater, and transport sediments to an off-Site landfill;
- Restore and reestablish vegetation in excavated areas.

5.4 Soluble Oil (SO) Line and Vapor Degreaser Soils

These soils are located beneath the GVI facility building and contain elevated concentrations of VOCs (primarily TCE, PCE). The PRGs were established using leach-based soil concentrations.

The Feasibility Study identified and screened several potential in situ remedial technologies for addressing the SO Line and Vapor Degreaser Soils, as described below.

Methane injection and co-metabolism is a process intended to promote and accelerate the aerobic degradation of VOCs via co-metabolic microbial processes. The process is innovative, and current technical literature has documented successful applications of this technology at some sites under favorable conditions. However, the injection of gas into the low-permeability soil might not prove successful at this site. The process also presents significant safety issues, involving the injection of an explosive gas beneath an operating facility. Based upon these limitations, this technology was not retained for further evaluation.

Soil vapor extraction (SVE) was also screened for potential application to these soils. Through the use of vacuum-extraction wells installed within or near an impacted soil area, SVE can remove VOC-laden soil vapor and promote additional volatilization of VOCs from the soil to the vapor phase. SVE is generally limited, however, by the ability of the soil to allow air flow through the pore space - a property known as intrinsic permeability. The RI indicated that soil permeability for the Site soils is in the range of 2.0×10^{-6} to 2.7×10^{-7} cm/sec, which indicates conditions that would severely restrict the flow of air. Based upon a review of USEPA guidance, this range of permeability was considered unfavorable for effective application of SVE. In addition, the added difficulties of installing and constructing an effective system within the confines of the active manufacturing areas were considered. Based upon these issues, SVE was not retained for further evaluation.

The third technology identified and screened in the FS was the application of a hydrogen-release compound to stimulate anaerobic microbial activity which, in turn, can produce reductive dechlorination and breakdown of VOCs. The compound is typically injected under pressure as a slurry or semi-viscous liquid. With the low permeability soils present beneath the facility, the effective delivery of this compound into the target areas would likely require an extensive array of injection points. The installation of such an array would prove difficult or non-attainable, given the areas involved and the potential impact to the manufacturing line and other facility operations. There would also be a potential for the injection process and the resulting hydraulic head to provide a driving force capable of mobilizing additional VOCs from the soil medium to the underlying groundwater. Because of the difficulties presented, this alternative was not retained for further evaluation.

As described above, three in situ technologies were evaluated for addressing the SO Line and Vapor Degreaser Soils. Unfavorable soil characteristics, safety concerns, and general accessibility issues posed by the active facility resulted in these alternatives being eliminated from further evaluation. An additional alternative for addressing SO Line and Vapor Degreaser Soils was developed and evaluated by Ohio EPA during the process of preparing the Preferred Plan and initial Decision Document. The alternative consists of the excavation and off-Site disposal of soils that exceed the leaching-based PRGs. The alternative was included to provide an active remedial option for addressing these soils.

The following alternatives were retained for additional evaluation. Each alternative is described in more detail in Section 6.

5.4.1 No Action - FS Alternative 1 SO/VD

- No remedial action planned for SO Line and Vapor Degreaser Soils; evaluated as a baseline scenario.

5.4.2 Institutional Controls - FS Alternative 2 SO/VD

- Convert current deed restrictions for the Site to activity and use limitations, in a recorded environmental covenant in accordance with ORC §5301.80 et seq.;

- Add activity and use limitations regarding the performance of a Focused Feasibility Study (FFS) when the building is removed;

- Monitor groundwater for potential future impact from contaminated soils.

5.4.3 Excavation and Off-Site Disposal - Alternative 3 SO/VD

- Convert current deed restrictions for the Site to activity and use limitations, in a recorded environmental covenant in accordance with ORC §5301.80 et seq.;

- Utilize the GVI facility building and loading dock as temporary control measures to prevent exposure and leaching of VOCs from soil at the SO Line, Vapor Degreaser, and loading dock areas;

- Upon future removal of the facility building and/or loading dock, excavate and remove soils that exceed leaching-based PRGs; alternatively, evaluate and potentially implement other remediation technologies or actions that will achieve the RAO's and equally protect the environment.

- Dispose of the excavated soils at a Subtitle C landfill, provided that Land Disposal Restriction (LDR) values are met.

5.4.4 On-Site Containment - Amended Alternative 4 SO/VD

- Convert current deed restrictions for the Site to activity and use limitations, in a recorded environmental covenant in accordance with ORC §5301.80 et seq.;

- Utilize the GVI facility building and loading dock as control measures to prevent exposure and leaching of VOCs from soil at the SO Line, Vapor Degreaser, and loading dock areas;

- Upon future removal of the facility building and/or loading dock, conduct a Focused Feasibility Study to evaluate other remediation technologies or actions that are expected to achieve the RAOs for any soils that continue to exceed PRGs; absent Ohio EPA approval of another remediation technology, the second phase of the remedy will be implemented to cap soils in place using a multimedia cap that meets RCRA Subtitle C hazardous waste facility cap performance standards. It will be permissible to incorporate the remaining components of the facility foundation and/or loading dock into the cap, provided that the resulting cap meets applicable standards for protection of human health and the environment.

5.5 Groundwater

Groundwater, present in both alluvium and bedrock at the Site, contains concentrations of VOCs above PRGs. The following remedial alternatives were evaluated for groundwater.

5.5.1 No Action - FS Alternative 1 GW

- No remedial action planned; evaluated as a baseline scenario.
- Discontinue operation of interim groundwater recovery and treatment system;
- Enforce current deed restrictions.

5.5.2 Continued Operation of Interim System - FS Alternative 2 GW

- Continue pumping from on-Site wells, as well as monthly operation, maintenance, and performance sampling of treatment system;
- Sample select monitoring wells on an annual basis;
- Install and operate additional recovery pumps in existing wells, for additional removal efficiency, if necessary;
- Periodically evaluate effectiveness of pumping system to determine long-term benefits and determine if natural attenuation is sufficient to attain long-term goals;
- Convert current deed restrictions for the Site to activity and use limitations, in a recorded environmental covenant in accordance with ORC §5301.80 et seq.

5.5.3 Enhanced Monitoring with Interim System - FS Alternative 3GW

- Implement expanded groundwater natural attenuation monitoring plan, to determine the rate at which contaminants are undergoing biodegradation;
- Continue operation, maintenance, and performance monitoring of current interim system;
- Convert current deed restrictions for the Site to activity and use limitations, in a recorded environmental covenant in accordance with ORC §5301.80 et seq.

5.5.4 Enhanced Monitoring with Expanded System - FS Alternative 3a GW

- Implement expanded groundwater natural attenuation monitoring plan;
- Install additional groundwater pumping components (e.g., additional wells) as determined during the design phase;
- Continue operation, maintenance, and monitoring of the expanded pumping system;
- Discontinue pumping system operation after an acceptable time frame;

- Convert current deed restrictions for the Site to activity and use limitations, in a recorded environmental covenant in accordance with ORC §5301.80 et seq.

5.5.5 Enhanced Monitoring with Phytoremediation, Interim System - FS Alternative 4 GW

- Install a plot of poplar (or other appropriate) trees downgradient of the contaminant plume. The trees would be utilized for the high rates of groundwater uptake through the root systems, and would serve as additional protection to Duck Creek from potential seepage of VOC-impacted groundwater.
- Implement expanded groundwater natural attenuation monitoring plan;
- Continue operation, maintenance, and monitoring of the current pumping system;
- Discontinue pumping system operation after an acceptable time frame;
- Convert current deed restrictions for the Site to activity and use limitations, in a recorded environmental covenant in accordance with ORC §5301.80 et seq.

5.5.6 Enhanced Monitoring with In-Situ Enhancements, Interim System - FS Alternative 5 GW

- Injection of Hydrogen Release Compound (HRC™), or similar, to enhance anaerobic degradation of chlorinated VOCs;
- Implement expanded groundwater natural attenuation monitoring plan;
- Continue operation, maintenance, and monitoring of the current pumping system;
- Discontinue pumping system operation after an acceptable time frame;
- Convert current deed restrictions for the Site to activity and use limitations, in a recorded environmental covenant in accordance with ORC §5301.80 et seq.

6.0 COMPARISON AND EVALUATION OF ALTERNATIVES

6.1 Evaluation Criteria

In selecting the remedy for this Site, Ohio EPA considered the following eight criteria as outlined in U.S. EPA's National Contingency Plan (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 ARARs - Remedial alternatives shall be evaluated to determine whether a remedy will meet all of the applicable or relevant and appropriate requirements under State and Federal and Local 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 is 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.

8. Community acceptance - Remedial alternatives shall be evaluated to determine which of their components interested persons in the community either support (accept), 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 for picking the best 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 Analyses of Evaluation Criteria

This section looks at how each of the evaluation criteria is applied to each of the remedial alternatives found in Section 5.0 and compares how the alternatives achieve the criteria.

6.2.1 Western Disposal Area (WDA) and Plant Area Soils

6.2.1.1 Overall Protection of Human Health and the Environment

This criteria can be met by the *On-Site Containment,* and the *Removal, On-Site Treatment and Off-Site Disposal* alternatives. Both of these alternatives would serve to prevent direct contact with contaminants by human and ecological receptors. The *Institutional Controls* alternative would minimize direct human contact with contaminants in the WDA, but would not reduce the lead risks for women workers with potential exposure to Plant Area soils. The *Institutional Controls* alternative also would not prevent exposure of the ecological receptors to metals found in the WDA and Plant Area soils. The *No Action* alternative does not meet this criteria, as it would not prevent human or ecological receptor contact with soils contaminated with metals above PRGs.

6.2.1.2 Compliance with Applicable Requirements

The *On-Site Containment alternative and the Removal, On-Site Treatment and Off-Site Disposal* alternatives would comply with applicable Federal and State regulatory requirements. *On-Site Containment* would require a RCRA Subtitle C hazardous waste facility cap; consolidation of the soils within the WDA would not trigger LDRs or treatment, storage or disposal facility requirements, based on U.S. EPA's "area of contamination" policy, see 55 Federal Register 8758-8760 (March 8, 1990). *Removal, On-Site Treatment and Off-Site Disposal* would require disposal of contaminated soil in a Subtitle C facility - TCLP requirements would apply to the WDA and Plant Area soils for off-Site disposal, in order to meet LDRs.

For *Institutional Controls* and *No Action*, activity and use limitations which govern future property use or activities within the areas of contamination must meet Ohio EPA environmental covenant requirements. However, these alternatives would not meet requirements for closure of waste disposal units.

6.2.1.3 Long-Term Effectiveness and Permanence

The *Removal, On-Site Treatment, and Off-Site Disposal* alternative permanently removes the contaminated materials from the Site, and does not require long term monitoring or maintenance to ensure effectiveness. *On-Site Containment* would provide an effective remedy, making use of a multi-media cap to prevent direct contact with contaminants and minimizing infiltration and the potential for contaminant leaching to groundwater. Properly designed and maintained caps have been used as a permanent remedy on a wide variety of sites, but require the appropriate long-term monitoring and maintenance. For consolidation and capping of soils within the WDA, adequate design and construction would be required to provide long-term erosion protection during flood events. *Institutional Controls,* through access restrictions and activity and use limitations, would aid in restricting human exposure to contaminants, but would require an effective regulatory mechanism for ensuring compliance over the long term. Proper maintenance of the fencing preventing access to the WDA would be required. This alternative, however, would not prevent exposure of ecological receptors to WDA contaminants. The *No Action* alternative provides no long-term effectiveness or permanence.

6.2.1.4 Reduction of Toxicity, Mobility or Volume by Treatment

Removal, On-Site Treatment, and Off-Site Disposal will serve to reduce the mobility of contaminants through a soil stabilization process. Stabilization is a process which chemically binds, encapsulates, or otherwise alters contaminants to a more stable form which reduces the likelihood of contaminant release to the environment. There is no evidence, however, that this process would reduce the toxicity of the contaminants; there would also be an associated increase in volume of the soil materials. Neither *On-Site Containment* nor *Institutional Controls* would 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 *Institutional Controls*, there would be some short-term risk for workers installing fencing around the WDA, involving potential contact with surface soils containing metals above PRGs. Due to the limited time frame required for installation of fencing, this alternative can quickly achieve short-term effectiveness in terms of preventing access and direct contact with WDA soils.

The estimated time frame for implementation of *On-Site Containment* is 4 to 6 months. During this time, excavation and consolidation of soils would create the potential for fugitive dust emissions, thus increasing short-term human health risks. In addition, the disturbance of soils and increased exposure to precipitation and flooding would create the potential for off-Site releases of contaminants. Potential short-term impacts associated with this alternative could be addressed through the appropriate controls for worker health and safety, water and sediment pollution, and air pollution.

The *Removal, On-Site Treatment, and Off-Site Disposal* alternative could be implemented in less than one year, yet has a greater level of short-term health risk than *On-Site Containment*, due to the additional handling required for mixing of soils and stabilizing agents. These activities create a greater potential for airborne as well as water-borne releases of contaminants. Off-Site transportation also has inherent risks of vehicular accidents and spills, as well as other safety risks related to noise and increased traffic volume. Potential short-term impacts associated with this alternative could be addressed through the appropriate controls for worker health and safety, water and sediment pollution, and air pollution.

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. However, it does include the continuation of existing deed restrictions, and will require that these restrictions be effectively enforced. *Institutional Controls* will also require the enforcement of access restrictions and activity and use limitations and, in addition, will require the installation of fencing around the WDA to prevent physical access and direct contact with contaminated soils. The installation of fencing can easily be implemented from a construction standpoint.

On-Site Containment would require the construction of a RCRA Subtitle C hazardous waste facility cap over the consolidated WDA and Plant Area soils. This alternative is easily implemented. Numerous qualified vendors are available for design and construction of the cap. The potential for flooding and wetlands protection will require special engineering consideration, including a hydraulic analysis of the flood plain, but should be adequately addressed by the appropriate design and erosion protection.

Removal, On-Site Treatment and Off-Site Disposal would require the performance of a treatability study to determine the effectiveness and optimum mixture for the stabilizing

reagents. Ex situ stabilization is a proven technology for metals-contaminated soils, and is typically performed using a pugmill or other commercially available, ancillary equipment. There are many qualified vendors capable of implementing this process option, and the implementation time would likely be less than one year.

6.2.1.7 Cost

The net present worth costs (see Table 3), including capital and long-term operation and maintenance, for each of the four alternatives for WDA and Plant Area soils, are summarized as follows:

- No Action - $0;
- Institutional Controls - $372,000
- On-Site Containment - $1,316,900
- Removal, On-Site Treatment, Off-Site Disposal - $2,657,900

6.2.2 Duck Creek Sediment

6.2.2.1 Overall Protection of Human Health and the Environment

Neither the *Long-Term Monitoring* nor the *No Action* alternatives would change the current conditions of Duck Creek sediment, in which concentrations of arsenic and nickel slightly exceed the PRGs. *Long-Term Monitoring* would serve to identify any future increases in contaminant concentrations in sediment and surface water, thus allowing assessment of potentially adverse effects, and implementation of additional measures, if necessary.

6.2.2.2 Compliance with Applicable Requirements

Neither *Long-Term Monitoring* nor *No Action* would include performance of remedial activities that would involve compliance with ARARs.

6.2.2.3 Long-Term Effectiveness and Permanence

Long-Term Monitoring would provide for some degree of long-term effectiveness and permanence, in that it would serve to identify future increases in contaminant concentrations, and allow for the assessment and remediation of potentially adverse effects. The *No Action* alternative would not satisfy this criteria.

6.2.2.4 Reduction of Toxicity, Mobility or Volume by Treatment

Neither the *Long-Term Monitoring* nor the *No Action* alternatives have treatment components; therefore, there are no associated reductions of toxicity, mobility, or volume of contaminants.

6.2.2.5 Short-Term Effectiveness

For *Long-Term Monitoring*, current conditions would be maintained. Sediment and surface water sampling would require only normal safety considerations. *No Action* would also provide short-term effectiveness, since the current concentrations of metals in sediment do not appear to be adversely affecting human or ecological receptors.

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. *Long-Term Monitoring* can be readily implemented, and has no special administrative or technical requirements. Only routine safety considerations would be required during collection of sediment and surface water samples.

6.2.2.7 Cost

The net present worth costs (see Table 4), including capital and long-term operation and maintenance, for each of the two alternatives for Duck Creek Sediment, are summarized as follows:

- No Action - $0;
- Long-Term Monitoring - $39,600

6.2.3 Wetland Sediment

6.2.3.1 Overall Protection of Human Health and the Environment

Both the *Removal and On-Site Disposal* and the *Removal and Off-Site Disposal* alternatives would meet this criteria equally well. Through removal activities, both alternatives meet the remedial objective of preventing direct contact exposure of ecological receptors to sediments contaminated with metals above the PRGs. PRGs were based upon ecological risk-based concentrations (ERBCs) modeled for the muskrat in cattail areas and the meadow vole in non-cattail areas. There are no current risks to human health posed by the contaminants in the wetland sediment.

The *No Action* alternative would not affect human health risks, since minimal human health risks currently exist. However, this alternative would allow continued exposure of ecological receptors to contaminated sediments and vegetation. This exposure is predicted to cause chronic, adverse effects on indicator species (muskrat and meadow vole) populations over time.

6.2.3.2 Compliance with Applicable Requirements

Both of the *Removal* alternatives would result in large scale disruption and damage to the existing wetlands. Since the wetlands appear to meet the definition of Category 2

wetlands, under OAC 3745-1-54, proper restoration would be required. The activities fall under Nationwide Permit (NWP) No. 38, Cleanup of Hazardous and Toxic Waste, of Section 404 of the Clean Water Act. Prior to performance of either remedial alternative, a Section 404 permit from the Army Corps of Engineers and a Section 401 certification from Ohio EPA would be required. The *No Action* alternative would not include performance of remedial activities that would involve compliance with ARARs.

6.2.3.3 Long-Term Effectiveness and Permanence

Both of the *Removal* alternatives would meet this criteria equally well by assuring the removal of wetland sediments with metals concentrations exceeding the PRGs for ecological receptors. In conjunction with the on-Site containment or off-Site disposal of the WDA soils, there will also be a permanent elimination of the WDA as a source of metals contamination to the wetland area.

The *No Action* alternative does not include the performance of remedial activities. There may be a long-term decrease in the average contaminant concentrations in the wetland sediments, due to the deposition of clean sediments from upgradient drainage areas. However, the overall mass, toxicity, and mobility of the contaminants would not be expected to change significantly in the short- or long-term, with continuing exposure of ecological receptors to metals concentrations exceeding the PRGs.

6.2.3.4 Reduction of Toxicity, Mobility or Volume by Treatment

Removal and Off-Site Disposal might require ex situ stabilization in order to meet requirements at the disposal facility. Soil stabilization is a process which chemically binds, encapsulates, or otherwise alters contaminants to a more stable form which reduces mobility and the likelihood of contaminant release to the environment. This process may or may not reduce toxicity of the contaminants, and the stabilization process would likely produce an increased volume of soil materials. Neither the *Removal and On-Site Disposal* nor *No Action* alternatives would reduce toxicity, mobility or volume by treatment.

6.2.3.5 Short-Term Effectiveness

The *No Action* alternative would have no short-term risks for Site workers or the general public. Risks to ecological receptors would remain, however. Both of the *Removal* alternatives would result in significant disruption and damage to the existing wetland habitat. However, it is expected that the cattail areas in particular would quickly revegetate and the ecological balance in those areas would recover. The *Removal* alternatives would not be expected to create health and safety risks other than those associated with the use of construction equipment and the coordination of activities at an active industrial facility. Because the excavated materials would be moist or wet, dust generation would be minimal and would not create a significant risk of airborne contaminant migration. It is estimated that sediment removal and wetland restoration activities could be completed within a 3 to 6 month time frame.

6.2.3.6 Implementability

Both of the *Removal* alternatives will require pre-design sampling of the wetland area to establish the appropriate removal limits. Excavation activities may require specialized amphibious or low ground pressure excavation equipment. Silt fence or silt curtains may also be required to prevent the movement of suspended sediments into non-excavation areas. Although wetland sediment excavation may present some technical challenges, these alternatives can be readily implemented by qualified, experienced contractors.

Removal and On-Site Disposal would require the construction of a RCRA Subtitle C hazardous waste facility cap over the consolidated WDA and Plant Area soils, with adequate area to incorporate the excavated wetland sediments. Numerous qualified vendors are available for design and construction of the cap. Additional activities that might be required include the dewatering or stabilization of sediments prior to placement and incorporation into the WDA containment area. *Removal and Off-Site Disposal* would also require sufficient dewatering or stabilization of sediments to meet the requirements of the off-Site disposal facility, as well as to enable transport off-Site.

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

6.2.3.7 Cost

The net present worth costs (see Table 5), including capital and long-term operation and maintenance, for each of the three alternatives for wetland sediments, are summarized as follows:

- No Action - $0;
- Removal and On-Site Disposal - $539,000
- Removal and Off-Site Disposal - $654,500

6.2.4 Soluble Oil (SO) Line and Vapor Degreaser Soils

6.2.4.1 Overall Protection of Human Health and the Environment

This criteria can be met by the *On-Site Containment* and the *Excavation and Off-Site Disposal* alternatives. The *On-Site Containment* alternative would serve to prevent direct contact with contaminants by human and ecological receptors, and would prevent leaching of contaminants to groundwater. The *Excavation and Off-Site Disposal* alternative would result in permanent removal of the impacted soils and placement in a permitted Subtitle C landfill, which would provide the appropriate protection of human health and the environment.

In their current condition, the SO Line and Vapor Degreaser soils pose a minimal risk for direct exposure to human or ecological receptors. In addition, the existing building and dock structures serve to reduce leaching potential, provided they are not removed and/or

significantly altered. During a construction scenario beneath the building (e.g., to replace or install a utility) short-term exposure to workers would occur. However, an evaluation of this scenario using soil data from 0-12 feet bgs showed that this potential exposure would not exceed acceptable levels (i.e., Hazard Index less than 1, ELCR less than 1 in 1,000,000). Theoretical risks from vapor emissions into the building were also shown to be below applicable thresholds.

The risks associated with direct contact with soils primarily would affect potential future residents at the Site. However, the property is presently deed-restricted to prohibit residential, non-industrial, and non-commercial use. The use of *Institutional Controls,* through an environmental covenant, could also notify prospective buyers of the presence, nature, and extent of soil contamination beneath the facility building. The *No Action* alternative would assume continued enforcement of the current deed restrictions, but would not provide the environmental covenant.

The RI concluded that groundwater beneath the facility exists only in the bedrock unit and does not rise into the impacted soil unit, thereby eliminating the exposure pathway for leaching to groundwater. Ohio EPA believes that this data is inconclusive and that leaching of soil contaminants to groundwater continues to represent a viable exposure pathway. A deed restriction currently in place prohibits the potable use of groundwater at the Site. Under the *No Action* and *Institutional Controls* alternatives, this deed restriction would continue to be enforced and human health related to ingestion of groundwater would remain protected. However, neither of these alternatives addresses the leaching pathway in the event that the facility is demolished or the soils are otherwise exposed. The *Excavation and Off-Site Disposal* alternative would provide for removal and proper disposal of the soils to prevent leaching under this scenario. The *On-Site Containment* alternative would prevent leaching through the construction of a multi-media cap over the contaminated soils.

6.2.4.2 Compliance with Applicable Requirements

The *On-Site Containment* and *Excavation and Off-Site Disposal* alternatives would comply with applicable Federal and State regulatory requirements. *On-Site Containment* would require a multimedia cap that satisfies performance standards for a RCRA Subtitle C hazardous waste facility cap. *Excavation and Off-Site Disposal* would require disposal of contaminated soil in a Subtitle C facility - TCLP requirements would apply to the soil for off-Site disposal, in order to meet LDRs.

Neither the *No Action* nor *Institutional Controls* alternatives require performance of remedial activities. Therefore, compliance with applicable State and Federal environmental laws would not be an issue.

6.2.4.3 Long-Term Effectiveness and Permanence

As discussed above, Ohio EPA believes that the leaching of soil contaminants to groundwater will continue to represent a potential exposure pathway. The *No Action*

alternative would be expected to prevent the future potable use of groundwater through enforcement of the current deed restriction. The long-term effectiveness and permanence of this alternatives would depend upon a reliable mechanism for enforcement. The *Institutional Control* alternative would be expected to prevent the future potable use of groundwater through enforcement of activity and use limitations, in a recorded in an environmental covenant in accordance with ORC §5301.80 et seq.

As long as the facility building and the loading dock remain intact, there would be limited potential for future direct contact or exposure to VOC-contaminated soils, as well as limited leaching potential. In the event of facility demolition, however, only the *On-Site Containment* and *Excavation and Off-Site Disposal* alternatives would permanently address the leaching pathway via soil capping or soil removal, respectively. Neither the *Institutional Controls* nor *No Action* alternatives would provide an equally effective long-term remedy.

6.2.4.4 Reduction of Toxicity, Mobility or Volume by Treatment

The *No Action, Institutional Controls, On-Site Containment* and *Excavation and Off-Site Disposal* alternatives do not include treatment components; therefore, there are no associated reductions of toxicity, mobility, or volume of contaminants by treatment.

6.2.4.5 Short-Term Effectiveness

Neither the *No Action* nor *Institutional Controls* alternatives would result in short-term risks associated with implementation.

The estimated time frame for implementation of the *On-Site Containment* alternative is 2 to 3 months. The potential for minor excavation and consolidation of the SO Line/Vapor Degreaser Soils beneath a multi-media cap could create fugitive dust emissions, thus increasing short-term human health risks. In addition, the disturbance of soils and increased exposure to precipitation could lead to off-Site releases of contaminants. The potential short-term impacts associated with this alternative could be addressed effectively through the appropriate controls for worker health and safety, water and sediment pollution, and air pollution.

The estimated time frame for implementation of the *Excavation and Off-Site Disposal* alternative is 2 to 3 months. This alternative has a greater level of short-term health risk than *On-Site Containment* due to the larger scale of excavation and worker exposure to contaminated soils. The activity also creates a greater potential for airborne as well as water-borne releases of contaminants. Off-Site transportation has inherent risks of vehicular accidents and spills, as well as other safety risks related to noise and increased traffic volume. Potential short-term impacts associated with this alternative could be addressed through the appropriate controls for worker health and safety, water and sediment pollution, and air pollution.

6.2.4.6 Implementability

The *No Action* alternative is considered as a baseline for comparison with other alternatives, and has no remedial elements to be implemented. VOC-contaminated soils would remain in place beneath the facility building and loading dock area. This alternative would rely on the long-term enforcement of the existing deed restriction, which prevents non-industrial or non-commercial use of the property and prevents potable use of groundwater.

Institutional Controls would also rely on the long-term enforcement of the existing deed restrictions, converted to an environmental covenant in accordance with ORC §5301.80 et seq., but would add activity and use limitations related to the presence, nature, and extent of contaminated soils in the SO Line, Vapor Degreaser, and loading dock areas. These activity and use limitations could be readily implemented. This alternative, as originally contemplated in the FS, would incorporate an additional requirement for a future evaluation of remedial alternatives for SO Line, Vapor Degreaser, and loading dock soils in the event of facility demolition. However, this requirement could not be implemented through an environmental covenant; rather, an operation and maintenance (O&M) plan would be a more appropriate mechanism. An O&M plan would be necessary to ensure the performance of, and financial assurance for, the study and remedy implementation.

On-Site Containment would require the construction of a multimedia cap that meets RCRA Subtitle C hazardous waste facility cap performance standards, over the SO Line and Vapor Degreaser soils. It will be permissible to incorporate the remaining components of the facility foundation and/or loading dock into the cap, provided that the resulting cap meets applicable standards for protection of human health and the environment. This alternative is easily implemented, with numerous qualified vendors available for design and construction of the cap.

Excavation and Off-Site Disposal is readily implementable, and would utilize common equipment for excavating, loading, and transporting soils to an off-Site disposal facility. Once the facility structure was removed, this alternative would require limited preparation and planning efforts prior to implementation.

6.2.4.7 Cost

The net present worth costs (see Table 6), including capital and long-term operation and maintenance, for each of the alternatives for SO Line and Vapor Degreaser Soils, are summarized as follows:

- No Action - $0;
- Institutional Controls - $9,300 (does not include cost for evaluation of a contingent remedy or future remedy implementation);
- On-Site Containment - $337,416
- Excavation and Off-Site Disposal - $5,914,000 (estimate for management, engineering, design, characterization, excavation, transportation, and disposal).

6.2.5 Groundwater

6.2.5.1 Overall Protection of Human Health and the Environment

The groundwater contaminant plume at the Site currently exceeds PRGs for several VOCs. While natural attenuation appears to be limiting the migration of contaminants, there is the potential that the VOC plume could further migrate to downgradient receptors, including Duck Creek surface water, wetland waters, and off-Site human and ecological receptors. As presented in Section 5.5, six remedial alternatives were evaluated for addressing groundwater contamination at the Site. With the exception of the *No Action* alternative, each of these alternatives includes continued enforcement of the current deed restriction, converted to an environmental covenant in accordance with ORC §5301.80 et seq., to prevent potable use of Site groundwater.

The *No Action* alternative relies only on the enforcement of the potable use restriction, and would include discontinuing the operation of the interim pump-and-treat system. While on-Site human health risks would be minimized through the potable use restriction, there would no longer be an active mechanism for plume containment or source reduction, and there would not be continued monitoring of the nature and extent of the plume. This alternative would not meet PRGs or provide protection to the environment.

The *Continued Operation of Interim System* and *Enhanced Monitoring with Interim System* alternatives would both rely on the existing pump-and-treat system to provide some hydraulic containment near the primary VOC source areas (SO Line, RCRA sand filter beds, UST areas). Both would utilize groundwater monitoring of sufficient frequency and scope to track the areal distribution of contaminants and the contaminant levels in individual wells. For the *Enhanced Monitoring with Interim System* alternative, the measurement and/or analysis of MNA parameters would be added to the sampling program. The installation of additional monitoring wells might also by required to collect data in the appropriate locations for accurately measuring natural attenuation processes. This alternative would provide a means to track contaminant levels and also would provide data that might be used to calculate degradation rates and projections for future plume concentration, extent, etc. Both alternatives would provide some degree of containment and monitoring. However, neither alternative would be expected to provide additional protection to off-Site human or ecological receptors, other than the monitoring of plume extent.

The alternatives for *Enhanced Monitoring with Expanded System* and *Enhanced Monitoring with Phytoremediation and Interim System* would each provide added removal of contaminants and additional protection to prevent or limit off-Site migration of contaminants to human or ecological receptors. The *Expanded System* would provide added source area removal through expansion of the recovery well network, while *Phytoremediation* would provide additional uptake of contaminated groundwater in areas with potential discharge to Duck Creek. However, the *Phytoremediation* component would provide a less effective mechanism during the winter season due to the dormant state of the trees.

The alternative for *Enhanced Monitoring with In-Situ Enhancements and Interim System* incorporates the addition or injection of compounds (e.g. HRC™) which can enhance the biodegradation rates for chlorinated compounds in groundwater. Under favorable conditions, the enhanced rates of biodegradation can be much more effective at source reduction than groundwater pumping, particularly in low permeability units where diffusion often becomes the limiting factor for contaminant removal through pumping. If effective, this alternative can provide added protection through source removal, reduction of contaminant plume concentrations, and the reduction in potential risks to off-Site human or ecological receptors. This alternative is the most likely to meet groundwater PRGs.

6.2.5.2 Compliance with Applicable Requirements

Of the six alternatives evaluated for groundwater, only two would require additional steps to be taken for compliance with applicable regulations. For the *Enhanced Monitoring with Expanded System* alternative, additional system components (e.g., recovery wells, piping, treatment) would be installed in accordance with State and Federal regulatory requirements, and the existing permit would be modified to include the new components. This alternative would satisfy the applicable RCRA groundwater requirements. The alternative for *Enhanced Monitoring with In-Situ Enhancements and Interim System* would utilize the injection of HRC™ or similar compounds, and thus would require conformance with State regulations regarding injection into Class V wells.

6.2.5.3 Long-Term Effectiveness and Permanence

Alternatives which provide source control and removal, as well as long-term groundwater monitoring, would provide some degree of long-term effectiveness and permanence. The alternatives for *Continued Operation of Interim System, Enhanced Monitoring with Interim System, Enhanced Monitoring with Phytoremediation and Interim System, Enhanced Monitoring with Expanded System,* and *Enhanced Monitoring with In Situ Enhancements and Interim System* each would provide long-term groundwater monitoring to track the areal extent and concentrations within the VOC plume. Each of these five alternatives would continue the operation of the existing pump-and-treat system or an expanded system. While groundwater pumping serves to remove contaminants near source areas, the low conductivity of the alluvium and bedrock results in low pumping rates as well as a limited zone of capture around each recovery well. For the *Enhanced Monitoring with In Situ Enhancements and Interim System* alternative, the injection of HRC™ or similar compounds has the potential to achieve a relatively rapid reduction of contaminants in source areas through enhanced biodegradation. If the delivery process were to be proven effective, this alternative could provide a much higher degree of long-term effectiveness and permanence than other alternatives.

6.2.5.4 Reduction of Toxicity, Mobility or Volume by Treatment

With the exception of the *No Action* alternative, all groundwater alternatives result in some degree of reduction of toxicity, mobility, or volume by treatment. The five alternatives for utilizing the existing or an expanded pump-and-treat system would reduce toxicity and

mobility by removing contaminated groundwater in source areas. A reduction in volume would also be provided by the concentration of contaminants within the activated carbon of the adsorption system. The carbon would either be disposed of or treated off-Site (via hazardous waste landfill or hazardous waste incinerator) or regenerated off-Site in accordance with applicable regulations.

The alternative for *Enhanced Monitoring with In Situ Enhancement and Interim System*, if effective, would provide additional reduction in toxicity, mobility, and volume through enhanced biodegradation and the resulting breakdown of VOCs to otherwise harmless by-products.

6.2.5.5 Short-Term Effectiveness

All groundwater alternatives rely upon the existing deed restriction to prevent potable use of groundwater at the Site; with the exception of the *No Action* alternative, each of the groundwater alternatives would convert the existing deed restrictions to activity and use limitations in accordance with ORC §5301.80 et seq. The *No Action* alternative requires no remedial activities, and would pose no short-term risks to the community, on-Site workers, or the environment. The *Continued Operation of Interim System* and *Enhanced Monitoring with Interim System* alternatives include future groundwater sampling to monitor the VOC plume, but the sampling activities would not require special health or safety considerations beyond those normally involved.

The alternative for *Enhanced Monitoring with Expanded System* would require additional remedial activities in the form of additional well installation, piping installation, and treatment system modification. These activities would create short-term concerns related to the health and safety of remediation contractors and GVI facility workers during implementation. The alternative for *Enhanced Monitoring with Phytoremediation and Interim System* would present a short-term impact to existing habitat related to clearing of trees and brush in preparation for planting of the poplar trees. The construction component of this alternative would also create short-term concerns related to health and safety of contractors and GVI workers during implementation. The alternative for *Enhanced Monitoring with In Situ Enhancements and Interim System* would require pilot and bench scale studies to determine the appropriate parameters for injection of compounds to enhance biodegradation. Implementation of this alternative would require additional remedial activities, including injection point installation, which would have health and safety issues for contractors as well as GVI workers. However, these concerns would be manageable through an effective worker health and safety program.

6.2.5.6 Implementability

The *No Action* alternative for groundwater represents a baseline for comparison, and involves no implementation other than discontinuing operation of the interim system.

Under the *Continued Operation of Interim System* and *Enhanced Monitoring with Interim System* alternatives, the current conditions at the Site would be maintained. Operation and

maintenance of the pump-and-treat system would continue on a monthly basis. Potential future malfunctions could be repaired and replacement parts would be readily available. Activated carbon adsorption is a proven technology, and the performance of these systems is predictable and requires minimal oversight. MNA is a passive process which requires no additional remedial activities for implementation. The Feasibility Study indicated that MNA processes are currently occurring at the Site, though the long-term degradation rates for chlorinated compounds are uncertain. Both the current and expanded sampling programs could be readily implemented.

The *Enhanced Monitoring with Expanded System* alternative would involve installation of additional wells, pumps, and treatment capacity to provide localized containment and removal of contaminant hot spots. Vendors, equipment, and materials to implement this alternative would be readily available. However, the ability of newly installed wells to remove adequate quantities of water is uncertain, due to the low hydraulic conductivity of the alluvium and bedrock units.

The alternative for *Enhanced Monitoring with Phytoremediation and Interim System* would involve planting of poplar trees to provide an enhancement to MNA and as an additional protection against VOC migration (via groundwater seepage) to Duck Creek. The vendors, equipment, and materials required to implement the alternative would be readily available. The clearing of existing trees and vegetation in the designated phytoremediation area would be easily accomplished. Planning considerations for this alternative would include determination of the specific spacing and number of trees to be utilized, as well as coordination with remedial activities occurring in the adjacent WDA. Continued operation of the interim pump-and-treat system would be relatively easy to implement, as discussed above.

The alternative for *Enhanced Monitoring with In-Situ Enhancements and Interim System* would utilize a series of injection points for delivering compounds to enhance biodegradation of chlorinated VOCs. Pilot and bench scale studies would be required to determine the appropriate number of injection points, quantity and type of enhancement materials to achieve the remedial objectives. Due to the low conductivity of alluvium and bedrock materials, delivery and dispersion of the materials may be impeded and may require multiple rounds of injection. Proper pilot and design studies may be able to overcome these difficulties. Hydrogen Release Compound (HRC) is a proprietary polylactate ester that is available as an injectable, moderately fluid liquid or as an implantable hard gel. The use of this product or similar products is a proven technology for enhancing the biodegradation of chlorinated VOCs. Vendors, equipment, and materials for implementation of this alternative would be readily available.

6.2.5.7 Cost

The net present worth costs (see Table 7), including capital and long-term operation and maintenance, for each of the alternatives for groundwater, are summarized as follows:

- No Action - $0;
- Continued Operation of Interim System - $1,091,500;

- Enhanced Monitoring with Interim System - $1,264,800;
- Enhanced Monitoring with Expanded System - $1,330,200
- Enhanced Monitoring with Phytoremediation and Interim System - $1,355,600
- Enhanced Monitoring with In-Situ Enhancements and Interim System - $1,525,400

6.3 Community Acceptance

On December 7, 2006, Ohio EPA held a public meeting at the Noble County Health Department. At the meeting, Ohio EPA described the components of the amended remedy and answered questions from interested parties in attendance. Ohio EPA solicited comments at the meeting and during the public comment period, which ended on December 15, 2006. No comments were received.

7.0 SELECTED REMEDIAL ALTERNATIVE

The selected remedial alternative addresses contamination in surface and subsurface soils, wetland sediments, Duck Creek sediments, and groundwater.

The WDA and Plant Area soils, as well as wetland sediments, will be consolidated and covered in the WDA using a RCRA Subtitle C hazardous waste facility cap. This action includes the components of FS *Alternative 3 WDA/PA* and FS *Alternative 3 Wetland*. Using a modified application of *Alternative 2 DC*, Duck Creek sediments will be the focus of monitoring to detect potential increases in Site-related contaminants arising from construction of the final remedy in the WDA.

In addressing the impacted soils of the SO Line, Vapor Degreaser, and loading dock areas, an important factor is the presence of the Dana-Glacier Vandervell manufacturing line that currently operates at the facility. This operation and the associated equipment severely limit the access to impacted areas of soil beneath the structure. In selecting an appropriate remedy for these soils, Ohio EPA has recognized the importance of minimizing both short-term and long-term impact to the manufacturing operations as well as addressing the leaching potential from contaminated soils.

Soils of the SO Line, Vapor Degreaser, and loading dock areas will be addressed using Amended Alternative 4 SO/VD to provide a phased remedy. The initial phase will utilize the facility structure and loading dock as temporary engineering controls to prevent infiltration of precipitation and potential leaching of contaminants to groundwater. An operation and maintenance (O&M) plan will be implemented to monitor and maintain the effectiveness of these controls while the facility is actively used for industrial or commercial purposes. When the facility building and/or loading dock areas are removed in the future, the second phase of the remedy will require construction of a multimedia cap that meets RCRA Subtitle C hazardous waste facility cap performance standards, over any soils where remaining contamination exceeds the leach-based cleanup level. Given the extended time frame that may be involved, it is conceivable that a technology for effective in situ treatment or remediation of the SO/VD soils could be developed prior to the "triggering" of the second phase. At such time, Ohio EPA may require the Respondents to conduct a Focused Feasibility Study to evaluate capping and other remediation technologies or actions that may achieve the RAOs. Due to the phased nature of this remedy, the Respondents will be required to provide an adequate level of financial assurance for future implementation of the second phase.

Groundwater contamination will be addressed using *Alternative 3a GW*. The remedy will utilize an expanded groundwater recovery system to provide for additional source control or removal. USEPA's OSWER Directive 9200.4-17P, "Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites", emphasizes the importance of source controls to ensure timely attainment of remediation objectives. For this Site, Ohio EPA considers the expansion of the groundwater recovery system in key areas of the plume to be an appropriate level of effort for affecting source reduction. The remedy will also include an expanded groundwater monitoring plan to

measure natural attenuation parameters, and will require the enforcement of existing deed restrictions, converted to activity and use limitations in a recorded environmental covenant in accordance with ORC § 5301.80 et seq., preventing potable use of on-Site groundwater. In the event that they become exposed and/or subject to leaching, the SO Line soils, Vapor Degreaser soils, and additional soils beneath the loading dock will be addressed as contaminant source areas through either a cap or other equally-effective technology to prevent leaching.

The estimated costs for the selected remedial alternative are as follows:

Component of Selected Remedial Alternative	Estimated Cost
WDA/Plant Area Soils	**$1,316,900**
Duck Creek Sediments	**$39,600**
Wetland Sediments	**$539,000**
SO Line/Vapor Degreaser Soils	**$337,416**
Groundwater	**$1,330,200**
Total Cost	**$3,563,116**

Brief descriptions of the remedial alternatives selected for each medium are presented below.

7.1 Surface Soils

Ohio EPA's selected alternative for addressing metals and VOC contamination in surface soils is On-Site Containment. Under this alternative, Plant Area soils and additional areas of isolated soil contamination which exceed PRGs for metals and VOCs will be consolidated within the WDA. WDA soils will be sampled and analyzed for metals and TCE to determine removal and capping limits. Soil removal will not extend beneath the existing enclosed accessway in the rear of the manufacturing facility or beneath the southeast loading dock area (see Figure 11). All soils consolidated within the WDA will be graded to the appropriate contours, and a RCRA Subtitle C Hazardous Waste Facility Cap will be constructed over the soils. Excavated plant areas will be properly restored and a security fence will be installed to secure the capped area. Activity and use limitations will be imposed to prevent future construction or other destructive activities on the capped area.

Performance Standards

- Excavate, consolidate, and contain, through capping, WDA and Plant Area soils that exceed either human or ecological PRGs for metals and TCE, and to provide confirmatory sampling to document achievement of this standard. Confirmatory sampling of the Plant Area soils and the WDA will be performed consistent with the methodology and findings of the risk assessment and the basis for establishing the

PRGs. Sampling of the Plant Area soils outside of the WDA and the wetlands will focus on the areas specifically identified as "areas of [metals or VOCs] impacted soil" on Figures 4 and 5.

- Minimize impact to the existing wetland area, using appropriate engineering methods and construction practices.

- Construct a RCRA Subtitle C Hazardous Waste Facility Cap which will meet the appropriate regulatory standards of design and construction, including a 24-inch layer of compacted clay with maximum permeability of 1×10^{-7} cm/sec (or equivalent geosynthetic clay liner), and a flexible membrane barrier with a minimum 40-mil thickness. Ensure that all components of cap design and installation are approvable by Ohio EPA.

- Implement a long-term O&M program which will preserve the integrity of the cap, such that the cap will successfully pass regularly scheduled inspections during the O&M period.

7.2 Subsurface Soils

As discussed above, Ohio EPA's remedial alternative for subsurface soils has been selected with the goal of minimizing impact to ongoing manufacturing operations at the Site while addressing the leaching pathway. The selected alternative will utilize the facility structure and loading dock as temporary engineering controls to prevent infiltration of precipitation and leaching of VOCs from the SO Line, Vapor Degreaser, and loading dock soils to groundwater. An operation and maintenance (O&M) plan will be implemented to ensure the continued protectiveness of the remedy. The O&M plan will stipulate that, if the facility building and/or loading dock are removed at a future time, Ohio EPA may require a Focused Feasibility Study to evaluate capping and other remediation technologies or actions that are expected to achieve RAOs. Absent Ohio EPA approval of another remediation technology, the second phase of the remedy will be implemented to require construction of a multimedia cap over the underlying soils that continue to exceed the leach-based cleanup level (PRGs), in accordance with RCRA Subtitle C hazardous waste facility cap performance standards. It will be permissible to incorporate the remaining components of the facility foundation and/or loading dock into the cap, provided that the resulting cap meets applicable standards for protection of human health and the environment.

<u>Performance Standards</u>

- Utilize the facility building and loading dock areas as engineering controls for preventing exposure of soils where contaminants exceed the PRGs for leaching to groundwater.

- Implement an O&M program for providing periodic inspection and evaluation of the engineering controls, reporting, and taking appropriate corrective action, when needed.

- In the event of removal of the facility building or loading dock, conduct a Focused Feasibility Study to fully evaluate capping and other remediation technologies or actions that are expected to achieve RAOs.

- Unless Ohio EPA modifies the remedy in accordance with applicable policies and laws based on the results of the Focused Feasibility Study, construct a multimedia cap that meets the performance standards for a RCRA Subtitle C Hazardous Waste Facility Cap, over all soils where contaminant concentrations exceed the PRGs for leaching to ground water. The cap must include a 24-inch layer of compacted clay with maximum permeability of $1x10^{-7}$ cm/sec (or equivalent geosynthetic clay liner) and a flexible membrane barrier with a minimum 40-mil thickness. Incorporation of the remaining components of the facility foundation and/or loading dock into any such cap will be permissible, provided that the cap meets RCRA Subtitle C Hazardous Waste Facility Cap performance standards and is protective of human health and the environment. All components of cap design and installation must be approved by Ohio EPA. It will be permissible to incorporate the remaining components of the facility foundation and/or loading dock into the cap, provided that the resulting cap meets applicable standards for protection of human health and the environment.

- Record at the Noble County Recorder's Office an environmental covenant that serves to notify prospective buyers of the property of the presence of soil contamination beneath the facility building and loading dock areas.

7.3 Wetland Sediments

Ohio EPA's selected alternative for wetland sediments is Removal and On-Site Disposal in the WDA. Under this alternative, wetland area sediments impacted by copper, lead, and tin will be sampled to establish removal limits based upon the ERBCs for the muskrat and meadow vole as representative ecological receptors. Sediments will be excavated, transported to the WDA, and consolidated with Plant Area and WDA soils. The consolidated materials will be contained using a RCRA Subtitle C Hazardous Waste Facility Cap as described in Section 7.1. Excavated wetland areas will be restored and seeded to re-establish vegetative growth.

Performance Standards

- Excavate and remove wetland sediments containing copper, lead, and tin that exceed the ERBCs for the muskrat and meadow vole (as documented in the Feasibility Study), and to provide confirmatory sampling to document achievement of this standard. Geostatistical modeling of the pre-design investigation sampling

results, as defined in the Feasibility Study, will be used to define the excavation limits relative to the PRGs.

- Restore basic surface water features in excavated areas to pre-remediation conditions.

- Restore and seed excavated areas to re-establish vegetation.

7.4 Duck Creek Sediments

Ohio EPA's selected alternative for Duck Creek sediments is a monitoring-based approach. This alternative will include the sampling of surface water and sediments from the portion of Duck Creek adjacent to the Site, as well as from background locations. The sampling program will be conducted according to the following performance standards and decision-making criteria.

Performance Standards

- Sample surface water and sediments in Duck Creek on a semiannual basis for one year, and on an annual basis for the following two years. The first semi-annual events will be performed within one month prior to commencement of excavation and consolidation of soils and sediments in the WDA. The second semi-annual event will be performed within one month following completion of capping and earth-moving activities in the WDA. The remaining annual events will be performed during October of the two subsequent years.

- For the four anticipated sampling events, analyze all samples for antimony, arsenic, cadmium, copper, lead, nickel, and tin.

- Provide sampling summary reports, including analytical and statistical data, to Ohio EPA within 90 days of sampling.

- If metals concentrations adjacent to the Site remain at levels less than the higher of two times the background concentrations or the eco-tox thresholds, additional sampling (beyond three years) will not be required.

7.5 Groundwater

Ohio EPA's selected alternative for VOC-contaminated groundwater at the Site includes an Expanded Groundwater Recovery System (Alternative 3a GW), consisting of additional recovery wells, to provide additional removal and treatment of contaminants near the core of the groundwater plume. Coupled with this anticipated increase in mass removal will be an Enhanced Monitoring program that will not only assess contaminant concentrations within the plume, but will also measure key parameters necessary to determine the effectiveness and rate of the natural attenuation process.

Performance Standards

- Optimize the removal rate of contaminated groundwater near the higher-concentration areas of the plume. It is expected that this can be effected through the installation of six (6) additional groundwater recovery wells of a design that is optimized for the Site-specific hydrogeology and plume configuration.

- Implement an expanded groundwater monitoring program of sufficient scope to assess natural attenuation at the Site. This monitoring will provide analytical data showing the extent and concentration of VOC contaminants within the groundwater plume, as well as additional chemical or hydraulic data relevant to determining plume characteristics. The groundwater monitoring program will be implemented in accordance with the scope and frequency detailed in Table 8.

- Provide effective long-term monitoring and enforcement of the current deed restriction, converted to activity and use limitations in a recorded environmental covenant in accordance with ORC § 5301.80 et seq., that prevents potable use of Site groundwater.

- Ensure that groundwater along any portion of the downgradient property line continuously meets MCLs for any Site-related contaminant of concern.

- Achieve MCLs for Site-wide groundwater, as measured by any and all on-Site or off-Site monitoring wells, within 30 years.

- Evaluate the efficacy of long-term groundwater recovery activities in accordance with the following methods and decision-making criteria:

  1) Using both historical data and baseline groundwater monitoring data to be collected prior to operation of the expanded recovery system, refine the data trends that were initially developed in the Feasibility Study.

  2) Monitor the groundwater at the established frequency (Table 8). Compare the contaminant concentrations to those predicted by the data trends, and continue to refine the predictions based on the accumulated data.

  3) Compare the quantity of VOCs collected by the recovery system to the estimated decrease of mass within the plume; if possible, separate the effects of groundwater recovery from the effects of natural attenuation.

  4) When the data trends indicate that the groundwater will achieve the performance standards of the Amended Decision Document through natural attenuation alone, or that groundwater recovery and treatment is not meaningfully reducing the length of time required to meet the performance standards, consideration will be given to shutting down all, or perhaps portions, of the system.

  5) Groundwater monitoring will continue at the specified frequency (Table 8), comparing the results against the refined predictions for natural attenuation processes.

8.0 GLOSSARY

Aquifer -	An underground geological formation capable of holding and yielding water.
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 governs cleanup of hazardous materials sites under the Superfund Program.
CFR -	Code of Federal Regulations.
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.
Environmental Covenant -	A servitude arising under an environmental response project that imposes activity and use limitations and that meets the requirements established in section 5301.82 of the Revised Code.
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. The framework for remediation of hazardous materials sites specified in CERCLA.
O&M -	Operations and Maintenance. Those 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.
Preferred Plan -	The plan chosen by the 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 -	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 the Ohio EPA's response to all issues raised in those comments.
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.
TCE -	Trichloroethylene. A common industrial solvent and cleaner.
PCE -	Perchloroethylene. A common industrial solvent and cleaner, often used for dry cleaning.

TABLE 1. Summary of Hazard Indices and Excess Lifetime Cancer Risks (cont)

FUTURE RISK ESTIMATES				
Population	Exposure Media	Exposure Pathway	Hazard Index	ELCR[1]
Construction Workers	Site-Wide 0-10' Soil	Inhalation of Fugitive Dusts	1.1E-03	6.E-11
		Inhalation of VOCs	1.1E-03	6.E-10
		Dermal Contact	2.2E-01	4.E-07
		Soil Ingestion	1.8E+00	1.E-06
		Population Totals:	2.1E+00	1.E-06
On-Site Adult Residents	Site-Wide 0-10' Soil	Inhalation of Fugitive Dusts	9.3E-03	1.E-08
		Inhalation of VOCs	9.5E-03	1.E-07
		Dermal Contact	6.3E-02	2.E-06
		Soil Ingestion	5.3E-01	7.E-06
		Groundwater Ingestion	1.9E+01	6.E-04
		Population Totals:	1.9E+01	7.E-04
On-Site Child Residents	Site-Wide 0-10' Soil	Inhalation of Fugitive Dusts	2.6E-02	9.E-09
		Inhalation of VOCs	2.6E-02	9.E-08
		Dermal Contact	1.2E-01	1.E-06
		Soil Ingestion	5.0E+00	2.E-05
		Groundwater Ingestion	4.4E+01	4.E-04
	Wetlands Sediment	Dermal Contact	3.3E-03	0.E+00
		Sediment Ingestion	1.6E-02	0.E+00
	Duck Creek Surface Water	Dermal Contact	5.3E-06	NA
		Water Ingestion	1.3E-05	NA
	Duck Creek Sediment	Dermal Contact	2.0E-02	1.E-06
		Sediment Ingestion	3.1E-02	2.E-06
		Population Totals:	4.9E+01	4.E-04

Cancer risk exceeds point of departure but within risk range

Hazard index or cancer risk exceeds risk range

NA — Carcinogenic risk data Not Available

[1] Note the following relationships:

1.E-5 = 1 in 100,000
1.E-6 = 1 in 1,000,000
1.E-7 = 1 in 10,000,000
1.E-8 = 1 in 100,000,000
1.E-9 = 1 in 1,000,000,000
1.E-10 = 1 in 10,000,000,000
1.E-11 = 1 in 100,000,000,000
Example, 3.2E-5 = 3.2 in 100,000

TABLE 2. PRGs for Media of Concern

Constituent	Group	WDA/Plant Area Soils (mg/kg)	Duck Creek Sediment (mg/kg)	Cattail Wetland Sediment (mg/kg)	Non-Cattail Wetland Sediment (mg/kg)	Groundwater (ug/l)
Antimony	Metal	30	---	---	---	---
Arsenic	Metal	18	11	---	---	50
Cadmium	Metal	---	1.2	---	---	---
Copper	Metal	3,036	---	358	3036	1300
Lead	Metal	1,600	---	189	1600	15
Nickel	Metal	---	33	---	---	100
Tin	Metal	---	---	299	2536	---
Benzo(a)pyrene	SVOC	0.05	---	---	---	---
Benzo(b)fluoranthene	SVOC	0.52	---	---	---	---
Benzo(ghi)perylene	SVOC	96	---	---	---	---
Benzo(k)fluoranthene	SVOC	5	---	---	---	---
Bis(2-ethylhexyl)phthalate	SVOC	34	---	---	---	---
Di-n-butyl phthalate	SVOC	17,033	---	---	---	---
Di-n-octyl phthalate	SVOC	3,407	---	---	---	---
Fluoranthene	SVOC	5,451	---	---	---	---
Naphthalene	SVOC	3	---	---	---	---
Pentachlorophenol	SVOC	---	---	---	---	1
Phenanthrene	SVOC	954	---	---	---	---
Pyrene	SVOC	3,885	---	---	---	---
1,1,1-trichloroethane	VOC	1.3	---	---	---	---
1,3-dichlorobenzene	VOC	133	---	---	---	---
1,4-dichlorobenzene	VOC	---	---	---	---	75
Benzene	VOC	0.015	---	---	---	5
Bromodichloromethane	VOC	---	---	---	---	100
Chloroform	VOC	---	---	---	---	100
Chloromethane	VOC	2.49	---	---	---	---
cis-1,2-dichloroethene	VOC	0.12	---	---	---	70
Dichlorodifluoromethane	VOC	100	---	---	---	---
Dichloromethane	VOC	0.5	---	---	---	---
Ethylbenzene	VOC	16	---	---	---	700
Methylene Chloride	VOC	---	---	---	---	5
Tetrachloroethene	VOC	0.27	---	---	---	5
Toluene	VOC	7.7	---	---	---	1000
Trans-1,2-dichloroethene	VOC	---	---	---	---	100
Trichloroethene	VOC	0.048	---	---	---	5
Vinyl chloride	VOC	---	---	---	---	2
Xylenes, total	VOC	190	---	---	---	10000
1,1-dichloroethene	VOC	---	---	---	---	7
1,2-dichloroethane	VOC	---	---	---	---	5

Notes:
--- Not Applicable, PRG Not Established
SVOC - Semivolatile Organic Compound
VOC - Volatile Organic Compound
mg/kg - milligrams per kilogram
ug/l - micrograms per liter

TABLE 3. Cost Evaluation - WDA and Plant Area Soils Remedial Alternatives

Alternative	Capital Cost	O&M Cost per Year	Total Present Worth Cost
No Action	$0	$0	$0
Institutional Controls	$72,600	$18,500	$372,100
On-Site Containment	$973,300	$25,100	$1,316,900
Removal, On-Site Treatment, Off-Site Disposal	$2,863,139	$0	$2,657,851

TABLE 4. Cost Evaluation - Duck Creek Sediment Remedial Alternatives

Alternative	Capital Cost	O&M Cost per Year	Total Present Worth Cost
No Action	$0	$0	$0
Long-Term Monitoring	$0	$7,000-$13,000	$39,600

TABLE 5. Cost Evaluation - Wetland Sediment Remedial Alternatives

Alternative	Capital Cost	O&M Cost per Year	Total Present Worth Cost
No Action	$0	$0	$0
Removal and On-Site Disposal within the WDA	$561,700	$10,000	$539,000
Removal and Off-Site Disposal	$686,200	$10,000	$654,500

TABLE 6. Cost Evaluation - SO Line and Vapor Degreaser Soils Remedial Alternatives

Alternative	Capital Cost	O&M Cost per Year	Total Present Worth Cost
No Action	$0	$0	$0
Institutional Controls	$10,000	$0	$9,300
On-Site Containment	$337,416	$0	$337,416
Excavation and Off-Site Disposal	$6,500,000	$0	$5,914,000[1]

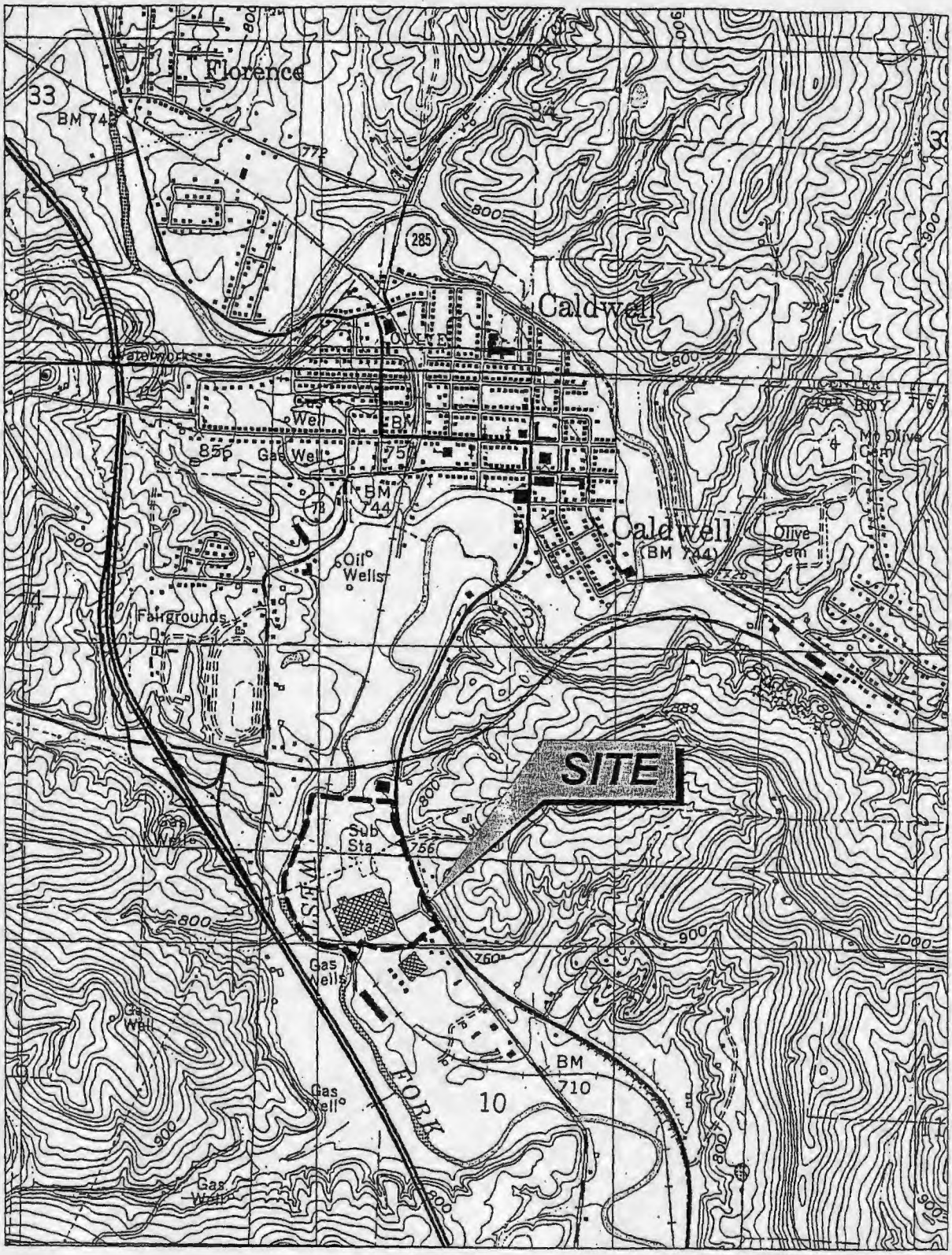
[1] Assumes minimum 10-yr time frame prior to implementation

TABLE 7. Cost Evaluation - Groundwater Remedial Alternatives

Alternative	Capital Cost	O&M Cost per Year	Total Present Worth Cost
No Action	$0	$0	$0
Continued Operation of Interim System	$0	$62,500-$77,500	$1,091,500
Enhanced Monitoring with Interim System	$0	$67,500-$127,500	$1,264,800
Enhanced Monitoring with Expanded System	$70,400	$67,500-$127,500	$1,330,200
Enhanced Monitoring with Phytoremediation and Interim System	$62,300	$69,500-$129,500	$1,355,600
Enhanced Monitoring with In-Situ Enhancements and Interim System	$214,000	$67,500-$177,800	$1,525,400

TABLE 8. Groundwater Monitoring Scope and Frequency

Well Group			Monitoring Type	Monitoring Frequency
Long-Term Plume Assessment Wells			Analytical - VOCs and MNA parameters	• Two baseline sampling events prior to system startup. • Years 1 and 2 - Quarterly • Years 3 to 10 - Annually • Years 11 to 30 - Every Five Years
MW-6 (b:700)	MW-13 (a:720)	MW-21(b:690)		
MW-6 (b:677)	MW-13 (b:694)	MW-22 (a:709)		
MW-7 (b:708)	MW-16 (a:713)	MW-22 (b:694)		
MW-7 (b:696)	MW-16 (b:687)	MW-24 (a:713)		
MW-7 (b:655)	MW-18 (a:721)	MW-24 (b:702)		
MW-10 (b:698)	MW-18 (b:707)	MW-30 (b)		
MW-10 (b:673)	MW-18 (b:674)	MW-32 (a)		
MW-11 (b:695)	MW-21 (a:712)	MW-33 (a)		
MW-12 (b:694)				
Up-Gradient and Down-Gradient Property Line Wells			Analytical - VOCs and MNA parameters	• Two baseline sampling events prior to system startup. • Years 1 to 10 - Annually • Years 11 to 30 - Every Five Years
MW-3 (a:698)	MW-4 (b:658)	MW-9 (b:694)		
MW-3 (b:664)	MW-5 (a:700)	MW-27 (a:722)		
MW-4 (a:703)	MW-5 (b:660)	MW-27 (b:683)		
MW-4 (a:688)	MW-9 (a:720)	MW-31 (a:698)		
Groundwater Control Wells			Groundwater elevation measurement	• Years 1 to 5 - Quarterly • Long-term frequency to be determined at 5 yr. review.
MW-6 (b:700)	MW-10 (b:673)	RW-1		
MW-6 (b:677)	MW-11 (b:695)	RW-2		
MW-7 (b:708)	MW-12 (b:694)	RW-3		
MW-7 (b:696)	MW-13 (a:720)	RW-4		
MW-7 (b:655)	MW-13 (b:694)	RW-5		
MW-10 (b:698)	piezometers (20)	RW-6		
No Further Sampling			No further sampling anticipated *MW-14, MW-15, MW-20, and MW-25 to be permanently abandoned	Not Applicable
MW-1 (a:698)	MW-13 (b:691)	MW-20 (a/b:707)*		
MW-1 (b:655)	MW-14 (a/b:713)*	MW-23 (a/b:708)		
MW-2 (a:697)	MW-15 (a/b:718)*	MW-25(a/b:715)*		
MW-2 (b:664)	MW-16 (b:616)	MW-26 (b:688)		
MW-8 (a:718)	MW-17 (a:718)	MW-28 (a:722)		
MW-8 (b:696)	MW-17 (b:694)	MW-28 (b:712)		
MW-9 (a:720)	MW-19 (a/b:705)	MW-29 (a:718)		



Note:
Basemap Source from U.S.G.S. 7.5 minute quadrangles of Caldwell North and South Ohio, dated 1994.

APPROXIMATE LIMIT OF INVESTIGATION

GLACIER VANDERVELL, INC.
CALDWELL, OHIO

Scale: N.T.S.	SITE TOPOGRAPHIC MAP
Originated By: A.P.C.	
Drawn By: V.E.N.	
Checked By:	
Project Mgr: P.A.H.	Figure 1. Site Location Map
Dwg No. 95177-01	
Issued:	

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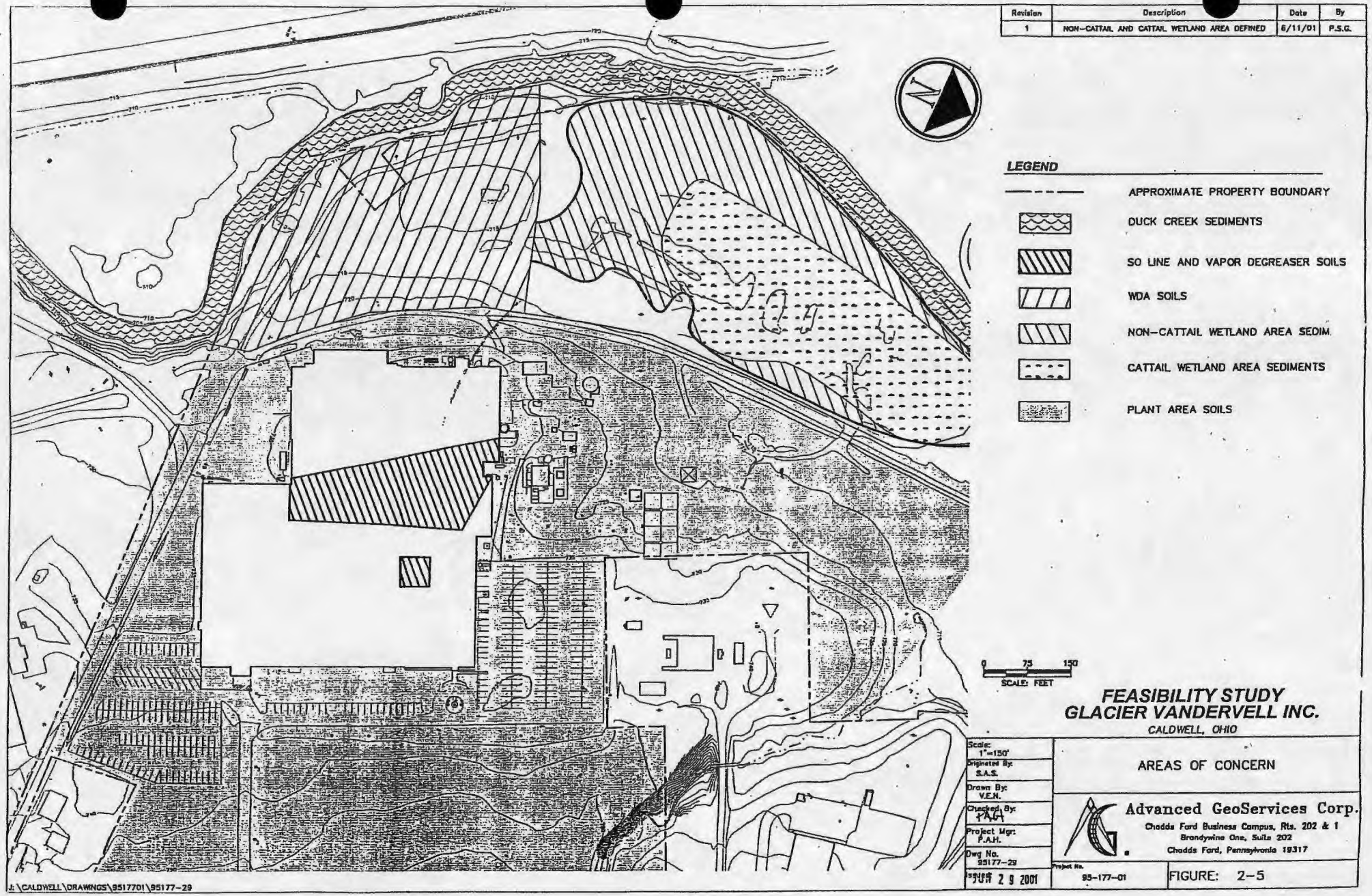


Figure 2. Site Features Map

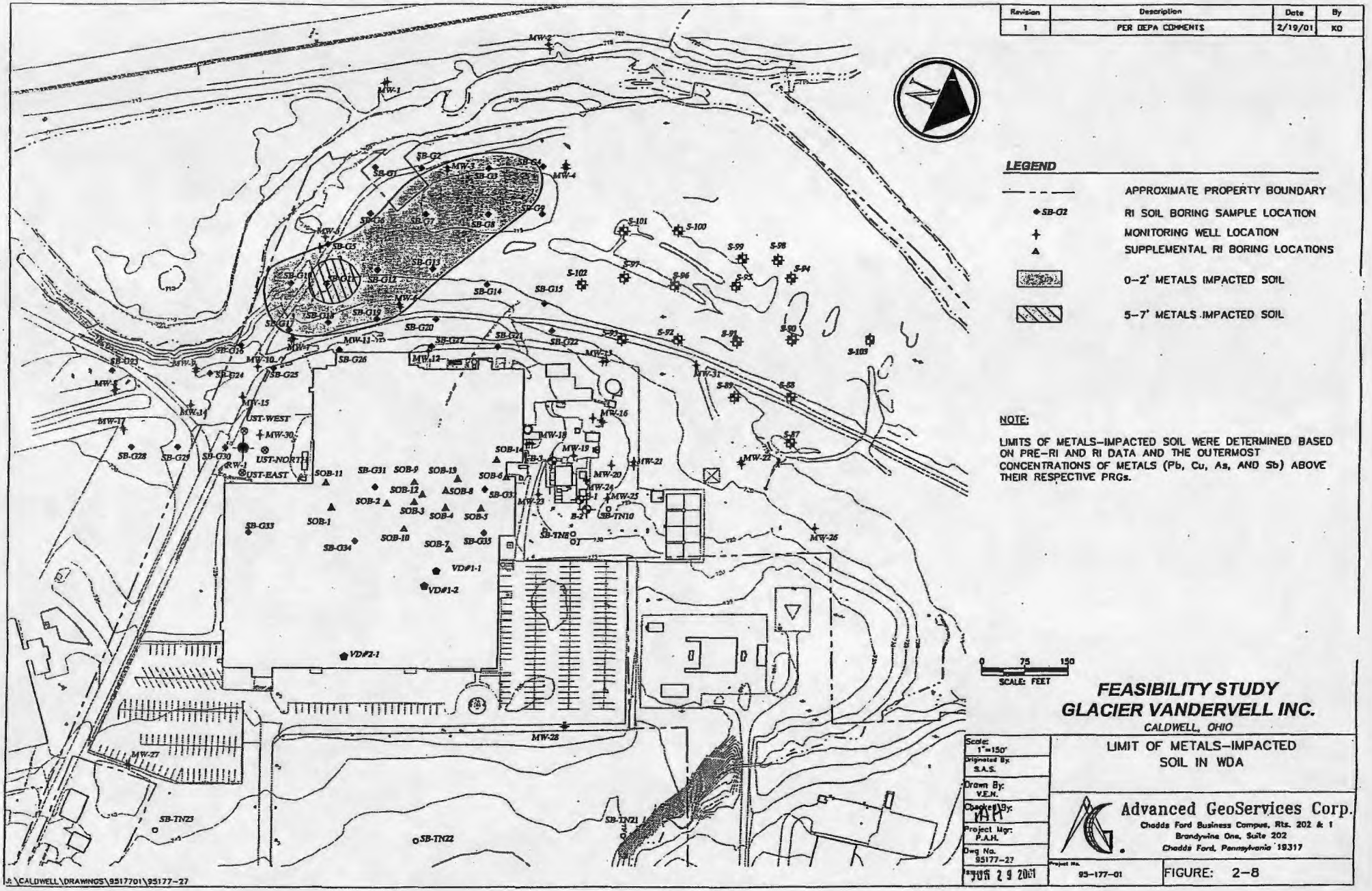


Figure 3. Metals in Soil - WDA

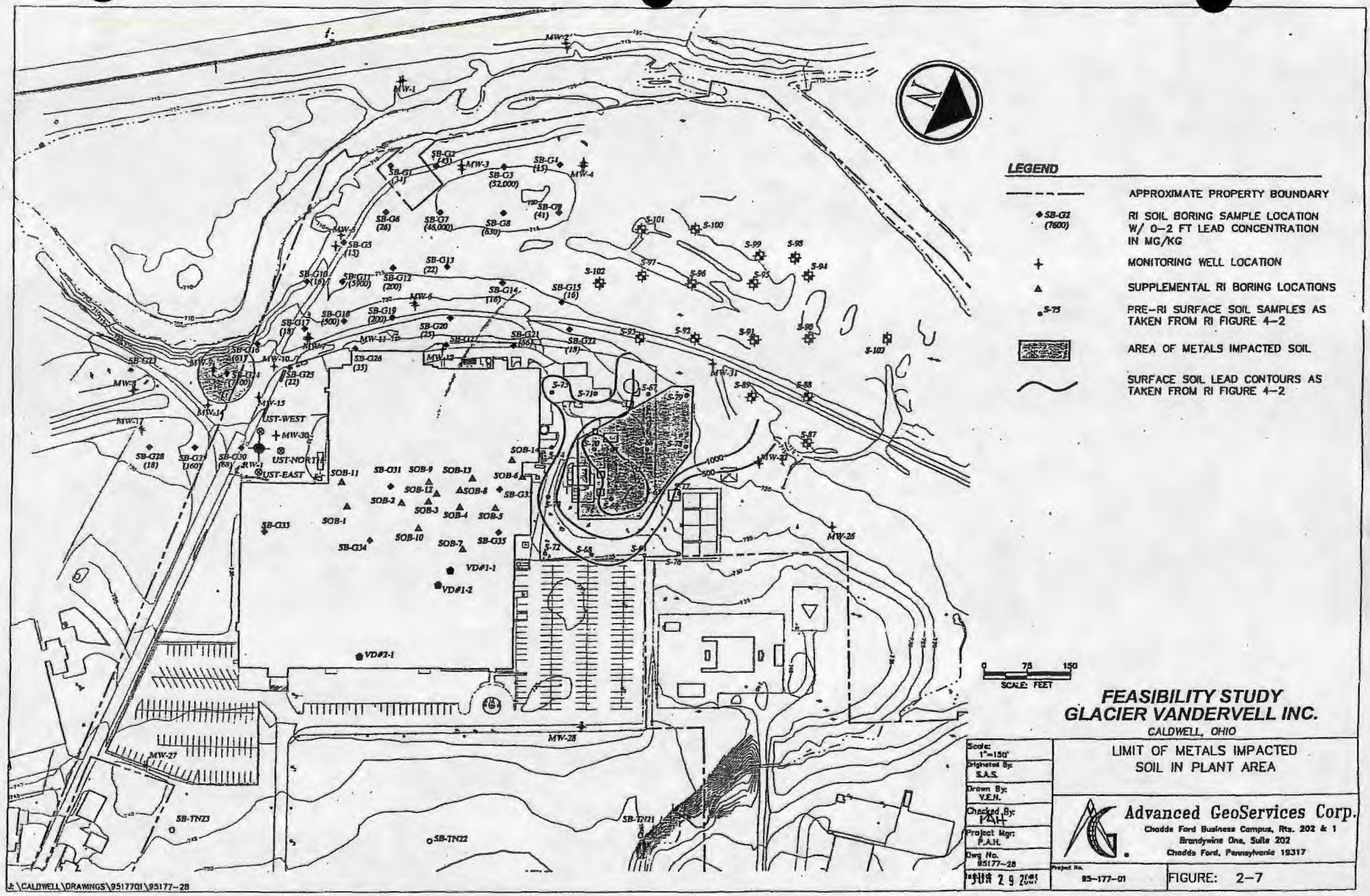


Figure 4. Metals in Soil - Plant Area

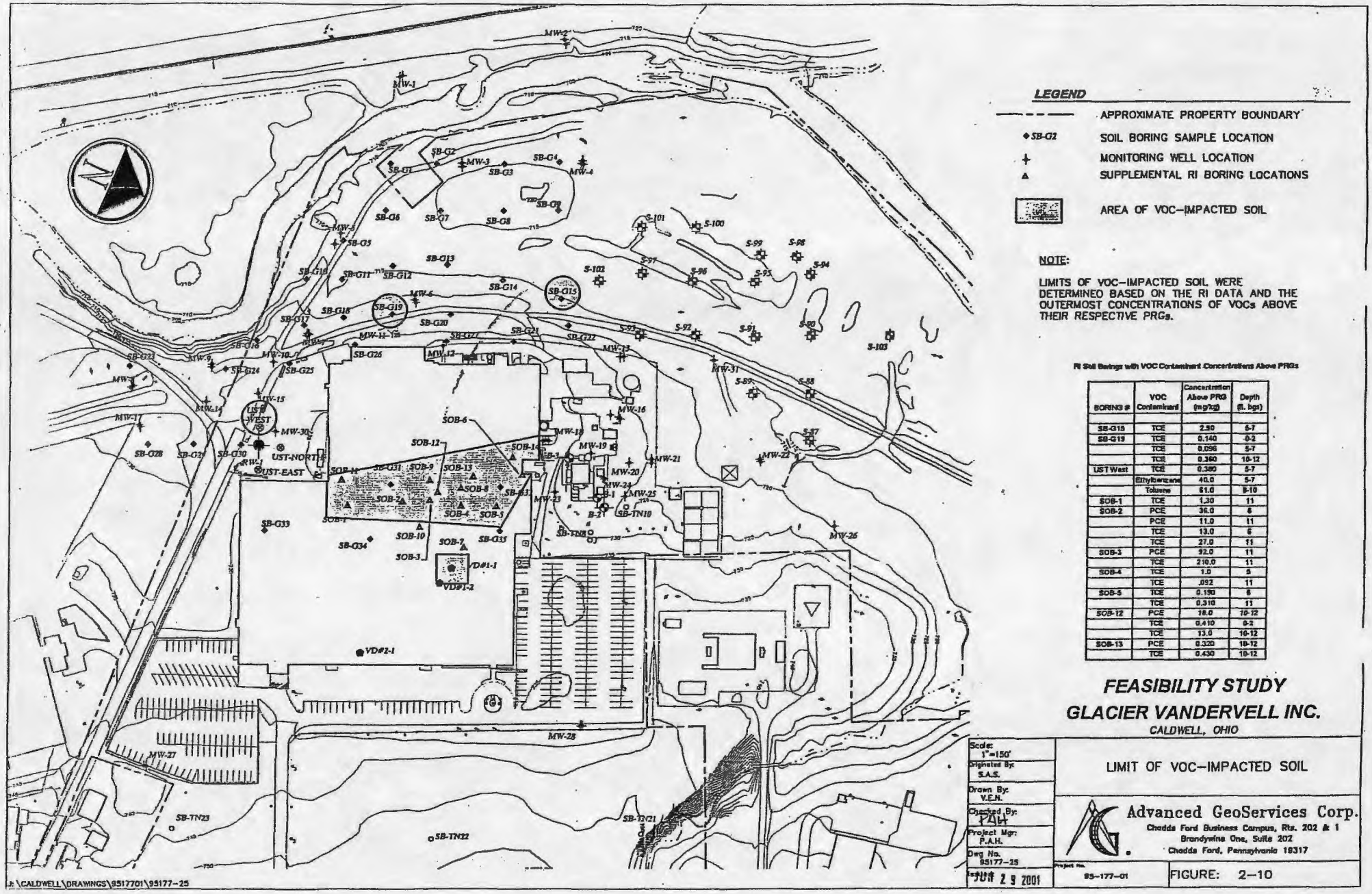


Figure 5. VOCs in Site Soil

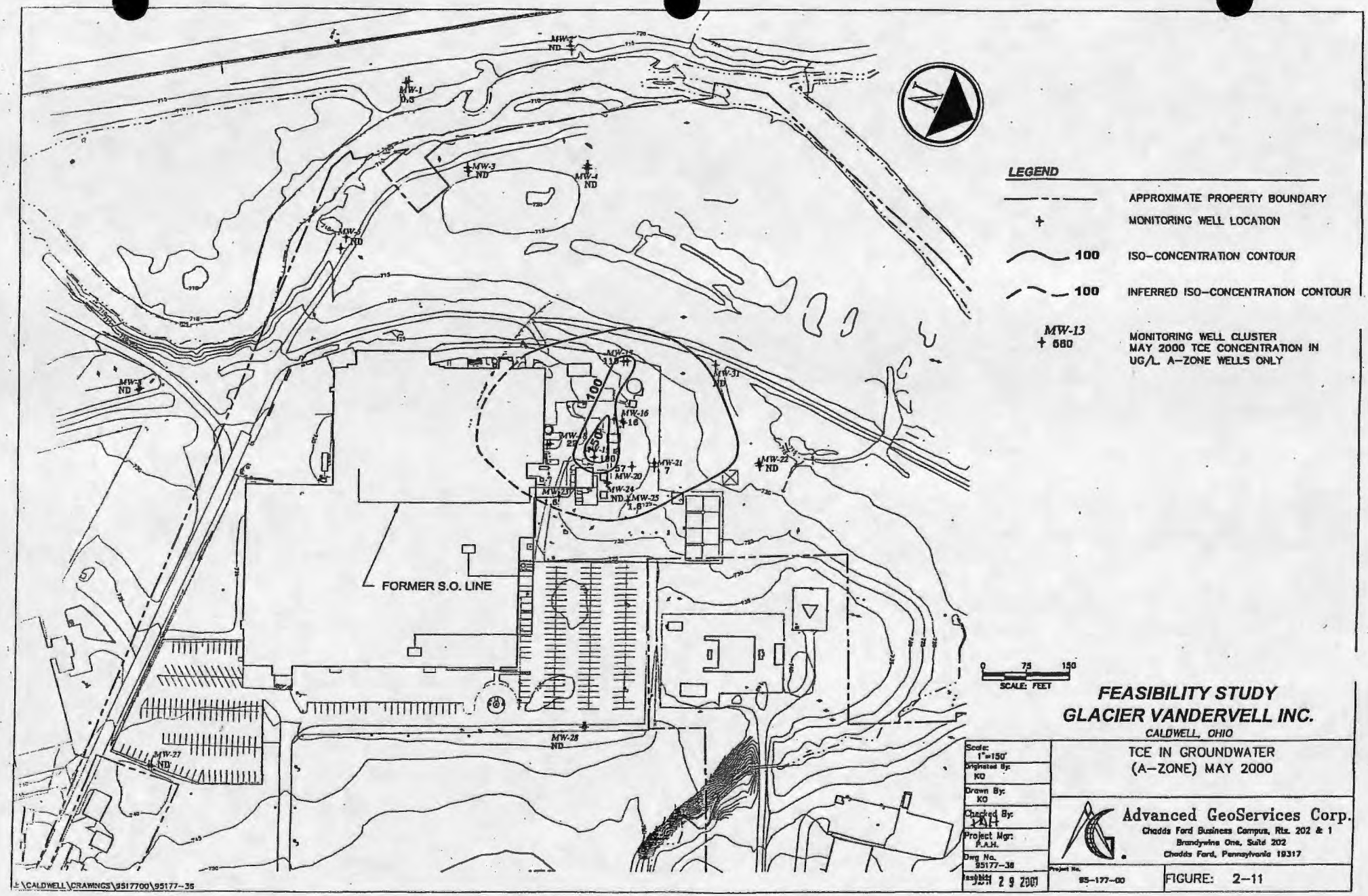


Figure 6. TCE in Groundwater - Alluvium

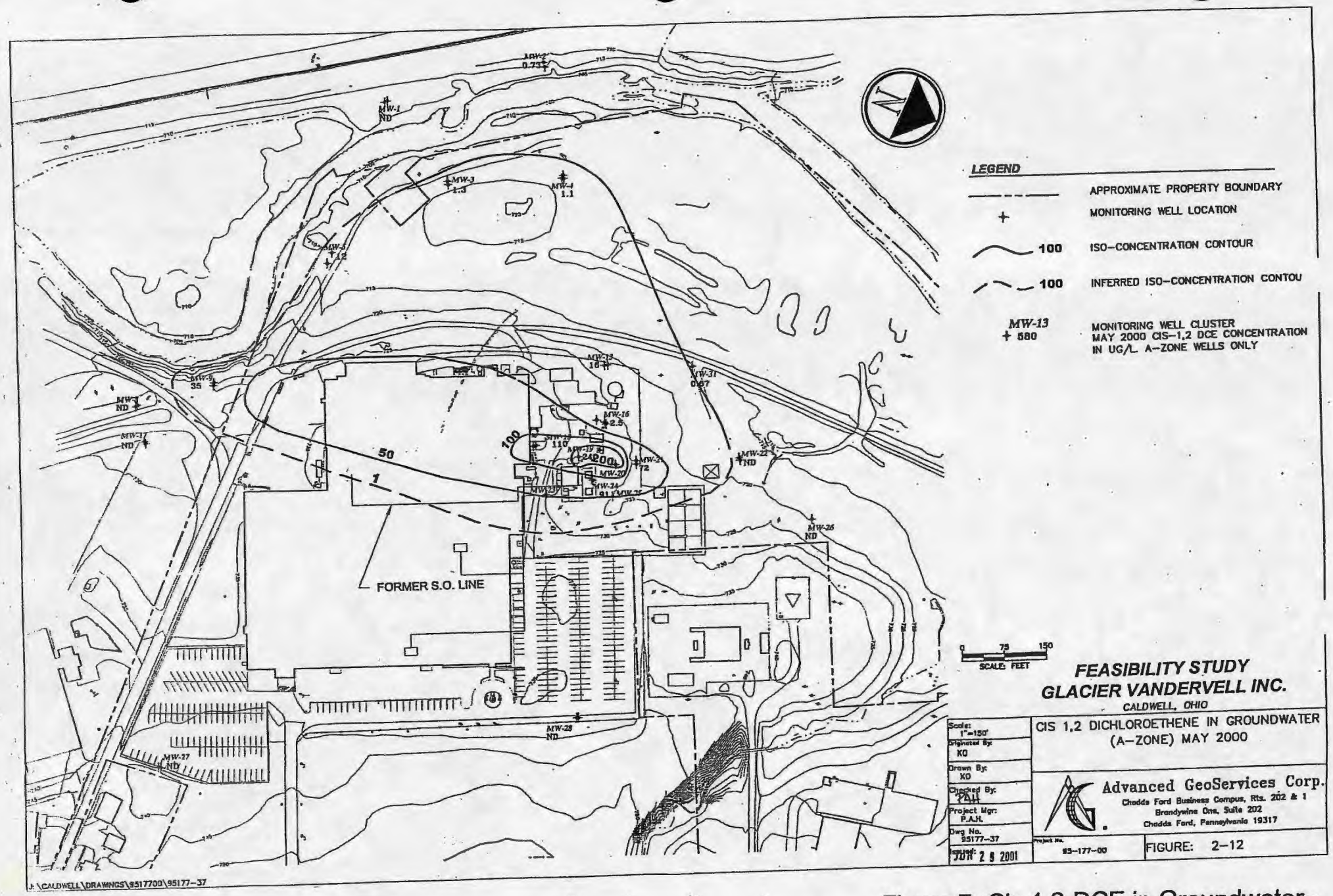


Figure 7. Cis 1,2-DCE in Groundwater - Alluvium

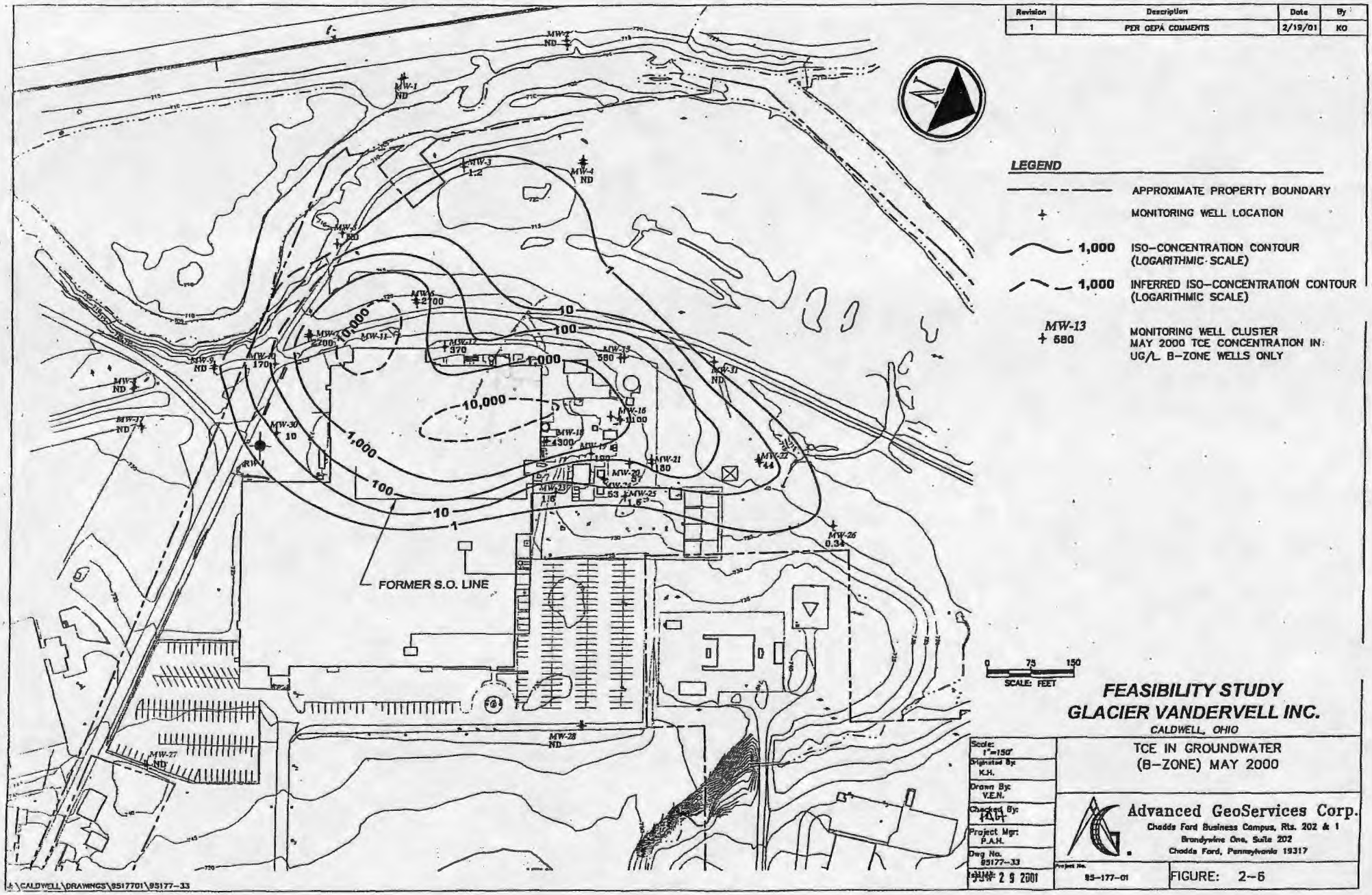


Figure 8. TCE in Groundwater - Bedrock

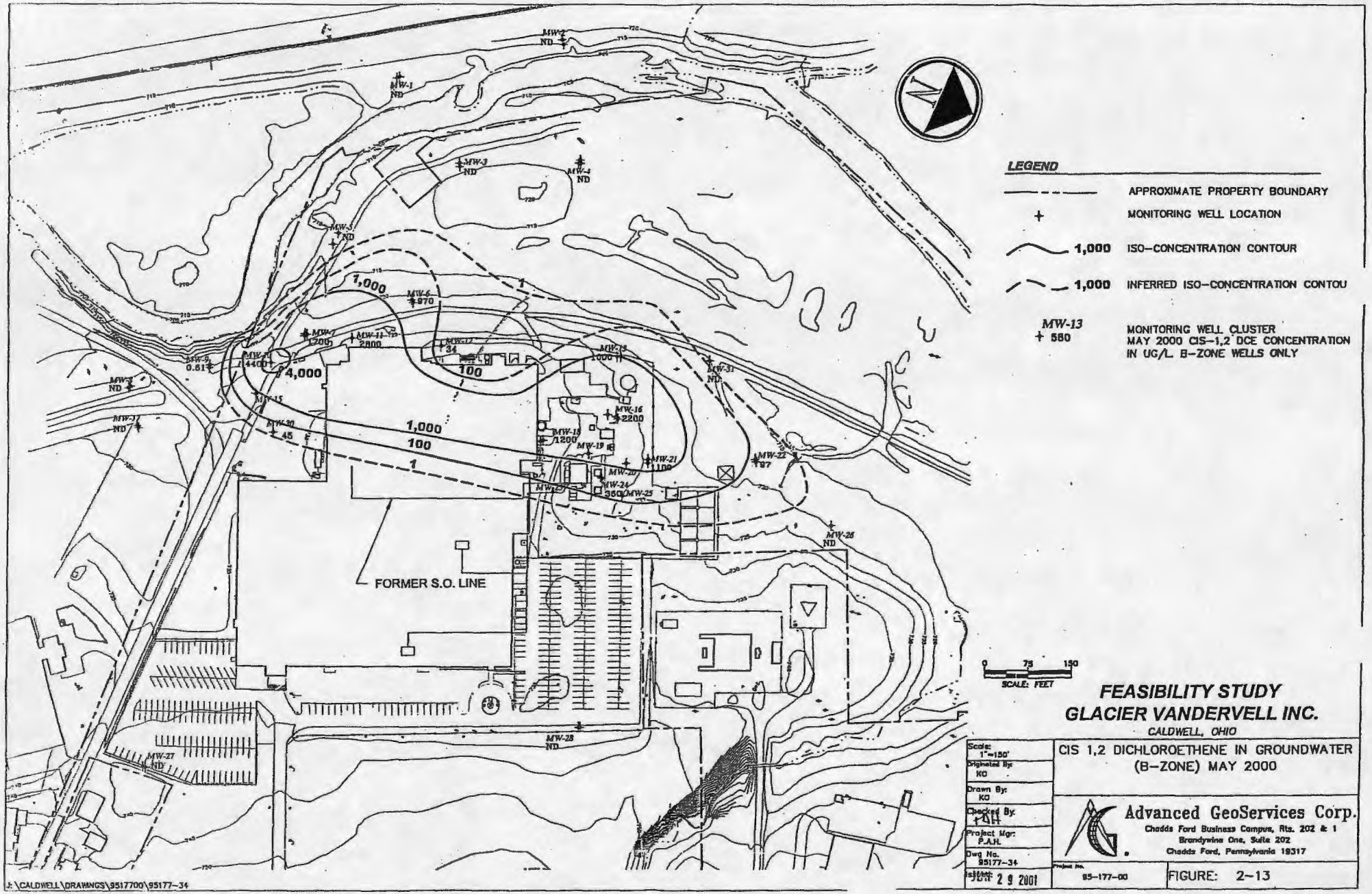


Figure 9. Cis 1,2-DCE in Groundwater - Bedrock

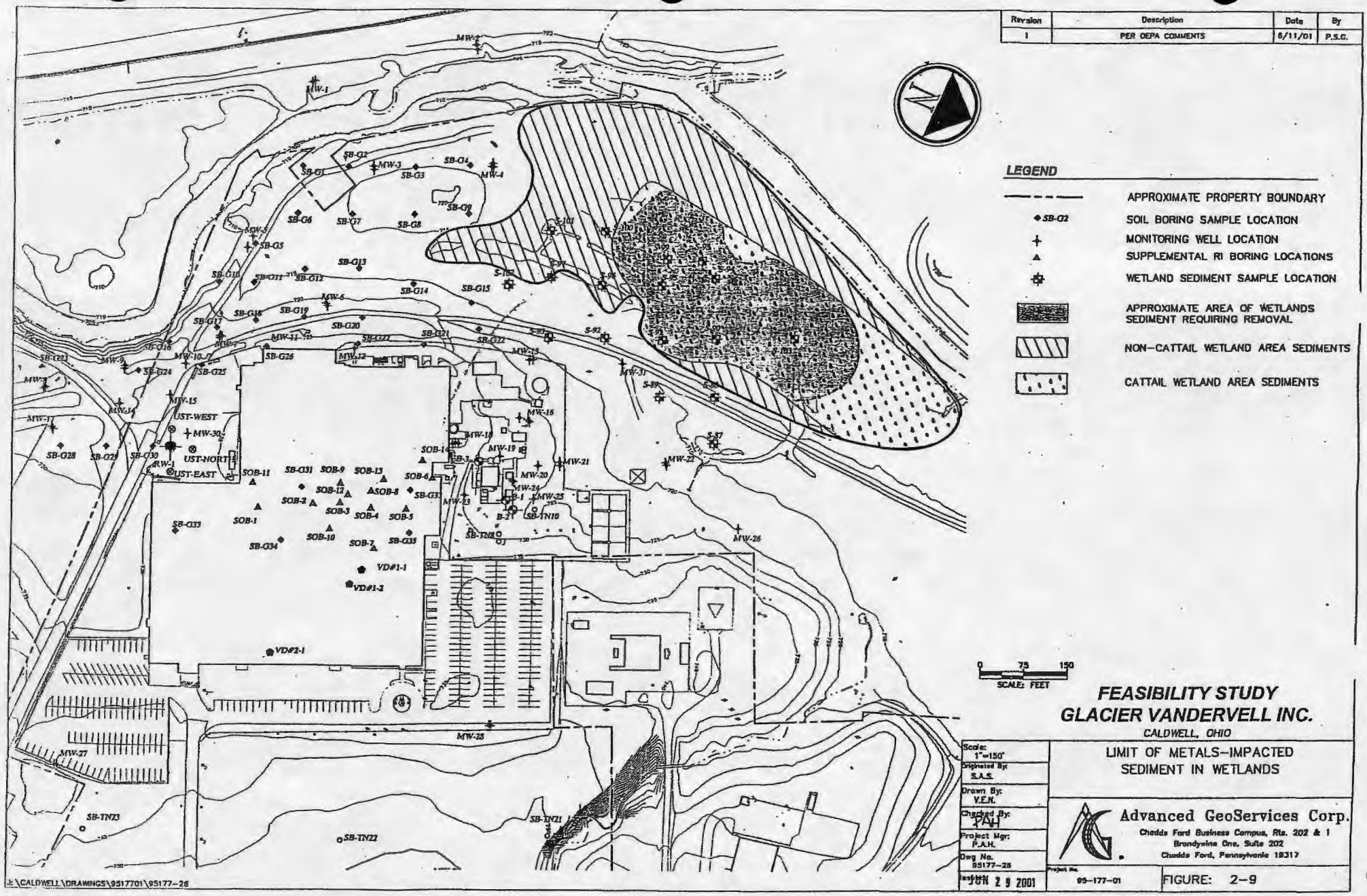
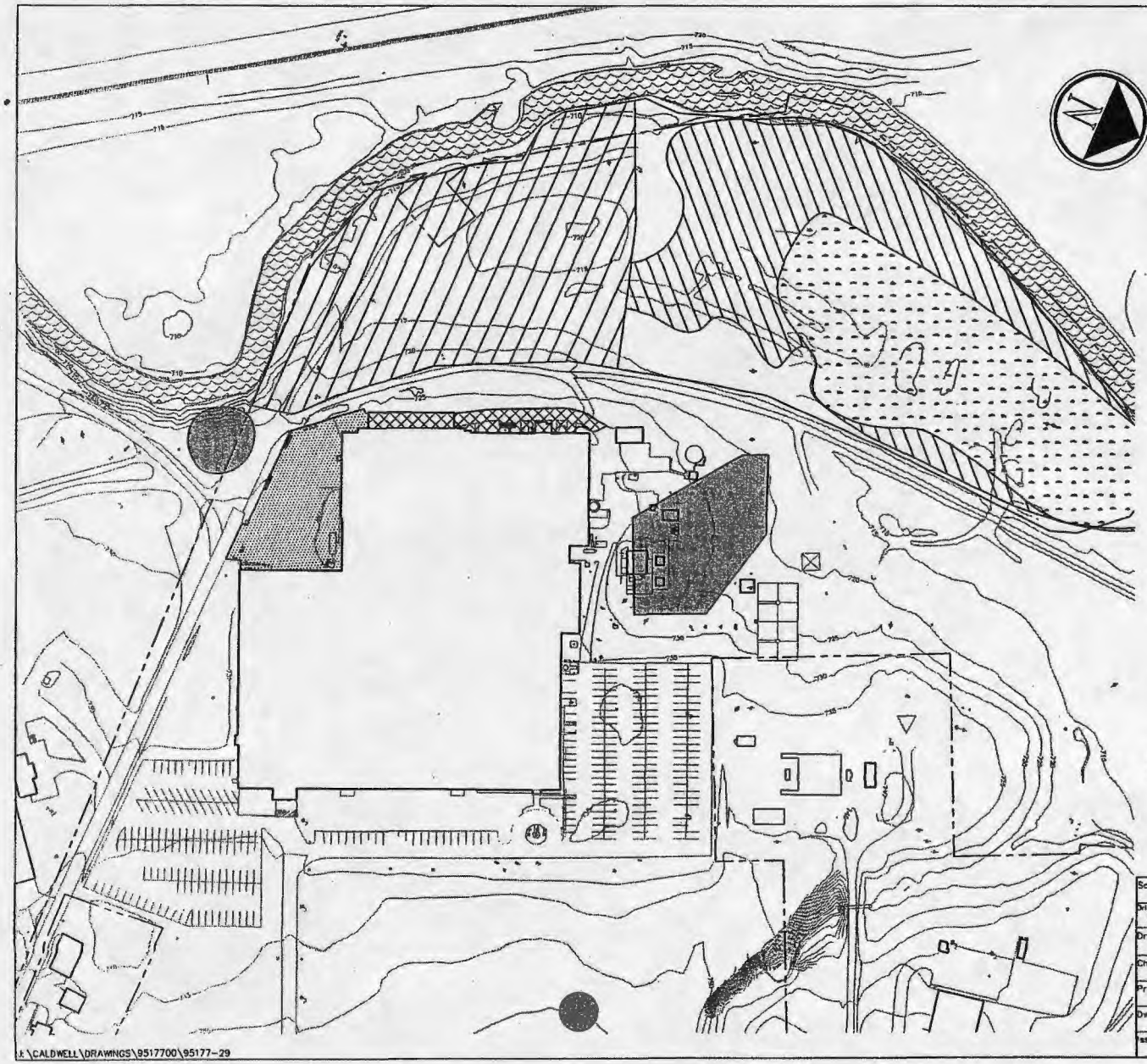


Figure 10. Metals in Wetland Sediment



Revision	Description	Date	By

LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- DUCK CREEK
- WDA SOILS
- NON-CATTAIL WETLAND AREA SEDIMENTS
- CATTAIL WETLAND AREA SEDIMENTS
- PLANT AREA SOILS
- SOUTHEAST LOADING DOCK AREA
- EXISTING ACCESSWAY (PORTIONS ENCLOSED)

0 75 150
SCALE: FEET

DRAFT

REMEDIAL DESIGN WORK PLAN
GLACIER VANDERVELL, INC.
CALDWELL, OHIO

Scale: 1"=150'	AREAS OF REMEDIATION FOR SURFACE SOILS AND AND WETLAND SEDIMENTS
Originated By: P.J.C.	
Drawn By: S.M.F.	
Checked By: P.J.C.	
Project Mgr: P.J.C.	
Dwg. No. 95177-29	
Issued:	Project No. 95-177-03 — FIGURE: 11

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