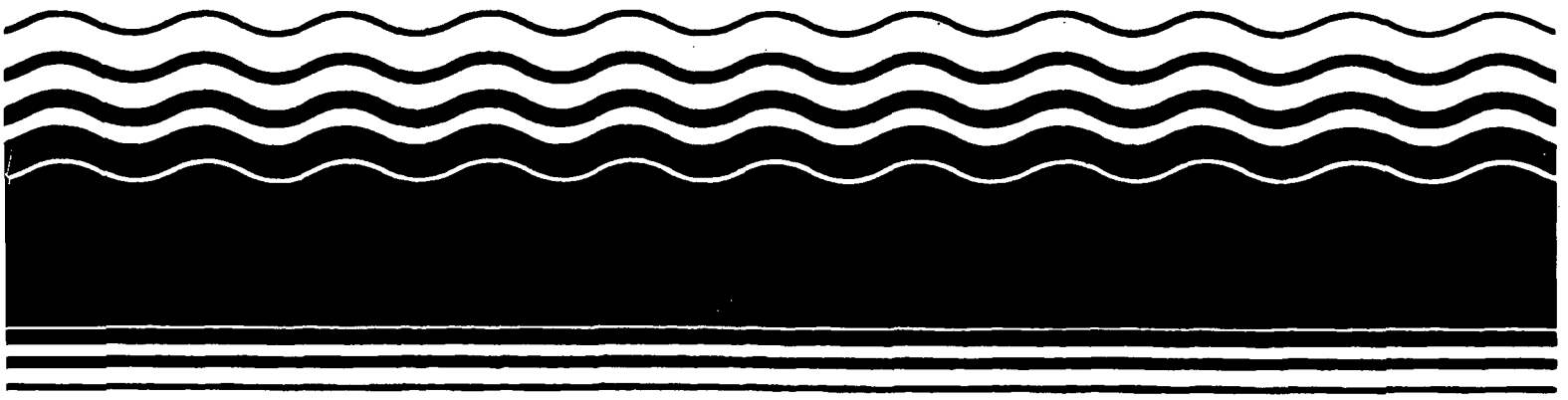
PB98-963116
EPA 541-R98-050
October 1998

EPA Superfund
Explanation of Significant Difference for the Record of Decision:

Arrowhead Associates
Scovill Corporation
Montross, VA
9/15/1998



EXPLANATION OF SIGNIFICANT DIFFERENCES
ARROWHEAD PLATING SITE - MONTROSS, VIRGINIA

I. INTRODUCTION

Site Name: Arrowhead Plating Superfund Site

Site Location: Montross, Virginia

Lead Agency: U.S. Environmental Protection Agency, Region III ("EPA" or the "Agency")

Support Agency: Virginia Department of Environmental Quality ("VADEQ")

A. Statement of Purpose

A Record of Decision ("ROD") for the Arrowhead Plating Superfund Site ("Site") was signed on September 30, 1991. The ROD delineates the remedial action selected to address contaminated groundwater and contaminated soils at the Site that act as secondary sources of contamination. Advances in the development of Permeable Reactive Subsurface Barriers ("PRSB"), an *in situ* ground water treatment technology, which have occurred subsequent to the signing of the aforementioned ROD, provide the basis for EPA's reconsideration of the remedy selected for the Site and its conclusion that PRSB is a more appropriate means of treating ground water at the Site than the previously selected pump and treat technology. The primary advantage of PRSB is gained by treating the ground water while it remains in the subsurface environment rather than extracting the water for above ground treatment required by pump and treat . This modification to the ground water remediation component of the remedy does not alter the remaining components of the selected remedy, including *in situ* soil vapor extraction of contaminated subsurface soil.

This Explanation of Significant Differences ("ESD") has been prepared to provide the public with an explanation of the nature of the modification to the ground water component of the selected remedy set forth in the ROD, to summarize the information that supports this modification, and to affirm that the revised remedy complies with the statutory requirements of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. § 9617(c), as amended ("CERCLA"). The modification described herein is "significant", as defined by 40 C.F.R. § 300.435(c)(2)(i) of the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), and, therefore, requires preparation of this ESD. This modification to the selected remedy does not fundamentally alter the basic features of the selected remedy with respect to scope, performance, or cost, but modifies only the mechanism by which the ground water component of the selected remedy is implemented. Therefore, a ROD

amendment is not required in this matter. This ESD is issued in accordance with Section 117(c) of CERCLA. This ESD is incorporated into the Administrative Record for the Site.

II. SUMMARY OF THE SITE HISTORY, SITE CONDITIONS, AND SELECTED REMEDY

The Arrowhead Plating Superfund Site is located approximately two miles southeast of the Town of Montross, Virginia. This town is located in Westmoreland County, which is a part of Virginia's Northern Neck region, situated between the Rappahannock and Potomac Rivers. The Site occupies approximately 30 acres of land on the east side of State Route 3 in Westmoreland County (Figure 1). The western portion of the Site consists of a one-story brick manufacturing building, a parking lot, and an 817-foot-deep well, which supplies drinking water to workers at the manufacturing facility. The eastern portion of the Site covers an area consisting of five former sludge settling ponds and a treated wastewater pond. Currently, two sewage water treatment ponds are located near the eastern edge of the property, and are used to treat sanitary wastewater generated by the facility. In addition, one chlorinated solvent tank and one acid tank are located along the northern edge of the facility. Both tanks are above-ground storage tanks and are presently empty.

Westmoreland Industrial Development Corporation purchased the property, now known as the Site, and constructed a manufacturing building thereon. The property was then leased to Scovill Inc. ("Scovill") in 1966. In 1972, Arrowhead Associates Inc. ("Arrowhead") purchased the business and facility assets, and subsequently subleased the property from Scovill. In 1983, Arrowhead reopened the business under a new name, A.R. Winarick Company.

From 1966 to 1979, the facility manufactured cosmetic cases using electroplating, lacquering and enameling processes. The majority of the cosmetic cases were either brass or zinc plated, with a small portion being silver plated. Copper, zinc, cyanide, and acid/alkali solutions were used in these plating operations. Additionally, a chlorinated solvent was used for degreasing of the cases prior to their being lacquered or enameled. Wastewater from the brass, zinc, and silver electroplating operations was sent to an on-site treatment system, located inside the manufacturing building, for oxidation and neutralization prior to being discharged to onsite settling ponds. Supernatant from these ponds was either reused by the facility or discharged to Scates Branch, a neighboring stream, pursuant to a National Pollutant Discharge Elimination System ("NPDES") permit. Chlorinated spent solvents, generated by the aforementioned degreasing process, were recovered through a distillation process. Still bottom wastes and small amounts of other spent materials were accumulated in drums that were periodically shipped off-site for management at another Scovill facility. In 1979, Arrowhead Associates ended manufacturing operations at the facility and switched to cosmetic-case filling operations. Additionally, use of the five sludge settling ponds and the treated wastewater pond ceased in 1979.

In July, 1986, Scovill and EPA Region III entered into an Administrative Order on Consent that required Scovill to conduct a two phase removal action at the Site. Phase I, conducted from December, 1986 to September, 1987, removed wastes, contaminated materials, and their containers/tanks from the Site, including, residual process wastes, drums, damaged tanks, interior piping, and deteriorated concrete inside the manufacturing building. During Phase II action, which began in November, 1987 and continued until November, 1988, approximately 395 cubic yards of contaminated soils were removed from the former drum storage areas and shipped off-site for disposal. Phase II action also consisted of treating and disposing of contaminated wastewater, sludge, and soil from the inactive settling ponds, which were filled in and graded in April of 1990. Erosion control measures were installed in October, 1990.

The removal actions successfully reduced the risks presented by contaminated vessels, manufacturing facilities, production residuals and much of the contaminated soil at the Site. Nevertheless, significant residual contamination of isolated soil and underlying ground water remained. The Site was proposed for inclusion on the National Priorities List ("NPL"), 40 C.F.R. Part 300, Appendix B, in June, 1988, and added in February, 1990.

In July, 1989, Scovill entered into an Administrative Order on Consent with the Virginia Department of Waste Management ("VADWM") for the purposes of conducting a Remedial Investigation/Feasibility Study ("RI/FS") to characterize the extent and nature of contamination remaining at the Site, identify risks presented to human health or the environment and to evaluate remedial alternatives to address those risks. The RI/FS Work Plan for the Site was approved by VADWM and EPA in February, 1990.

The RI/FS identified significant ground water contamination of the shallow, unconfined aquifer at the Site. The contamination plume extends offsite and into the Scates Branch and the South Fork of the Scates Branch where ground water discharges to the surface system (see Figure 2). The primary ground water contaminants include perchloroethane ("PCE"), 1,1,1-trichloroethane ("1,1,1-TCA"), and associated degradation products including 1,1-dichloroethene ("1,1-DCE"), and 1,2-dichloroethene ("1,2-DCE"). The unconfined aquifer extends as deep as 40 feet beneath the ground surface. The presence of a low permeability clay layer at the bottom of the shallow aquifer has prevented vertical migration of contaminants. In addition to contamination in the unconfined aquifer, the RI/FS identified some localized areas of soil contaminated with volatile organic compounds ("VOCs").

In July of 1991, EPA and the Commonwealth of Virginia (the "Commonwealth") published for public comment a Proposed Plan describing several remedial alternatives evaluated to address contamination at the Site. Public comments were received on the Proposed Plan and, in September of 1991, EPA issued a ROD which selected a remedy to be implemented at the Site. The selected remedy (Alternative 2a) required that contaminated groundwater be extracted from the aquifer underlying the Site and treated using a combination of air stripping and carbon adsorption (ground water pump and treat system), and that contaminated soils be treated by using soil vapor extraction. The ground water extraction and treatment would continue until the

ground water achieves Federal maximum contaminant levels ("MCLs"), 40 C.F.R. Part 141, or maximum contaminant level goals (see ROD for complete list of contaminants and performance goals). Treated ground water would be discharged to Scates Branch. A monitoring plan and system were to be implemented to ensure the effectiveness of the remedy, and institutional control measures were to be developed and implemented.

In June 1995, Scovill entered into a Consent Decree with the United States wherein Scovill agreed to implement the selected remedy. Pursuant to the EPA approved Remedial Design Work Plan, Scovill performed pre-design investigations at the Site which included additional field tests and environmental sampling to further define site conditions. In addition, treatability studies were conducted on water treatment technologies and *in situ* soil vapor extraction to provide data necessary to optimize the Remedial Design.

On December 2, 1997 Scovill submitted to the Agency a proposal to modify the ground water component of the selected remedy. Scovill presented new information about an innovative ground water technology called Permeable Reactive Subsurface Barriers ("PRSB"). PRSB is an *in situ* passive ground water treatment option, which should achieve the ground water remedial objectives while providing a cost-effective alternative to the traditional ground water pump and treat system selected in the 1991 ROD.

III. DESCRIPTION OF SIGNIFICANT DIFFERENCES AND THE BASES FOR THOSE DIFFERENCES

A. Description of the Modification

EPA is modifying the ground water component of the selected remedy set forth in the ROD to provide for the construction of PRSB across the migratory pathways of contaminated ground water at the Site. PRSB consist of trenches that are excavated and backfilled with reactive iron (Fe) filings. As ground water flows through the trenches, the contaminants in the water are degraded, adsorbed and/or precipitated, depending on the oxidation-reduction reaction that occurs when the chlorinated solvents come into contact with the metallic (zero-valent) iron in the absence of oxygen. The contaminants are broken down to relatively harmless end-products such as carbon dioxide, water, and hydrocarbons. Hydrocarbons, such as methane and ethane, may be further reduced by naturally-occurring bacteria. See Figure 3 for a conceptual diagram of a PRSB system.

PRSBs are, in effect, *in situ* reactors which achieve the same type of mass transfer reactions that are used in an above-ground system during pump and treat operations. Slow moving ground water passing through PRSBs can provide relatively long residence times within the *in situ* "reactor." The required residence time will be determined based on the contaminant concentrations moving into the reactive zone, the respective contaminant-specific degradation rate (i.e., the most resistant contaminant will be the basis of design), and the ground water flow rate. The specific location, thickness and/or number of reactive barriers will be determined

during the remedial design. The PRSB system will be constructed through the saturated portion of the aquifer as deep as the underlying clay layer. The final configuration of the PRSB system will be designed to ensure: 1) contaminated ground water exceeding performance standards passes through the PRSB system; and, 2) the residence time within the *in situ* reactor is sufficient to achieve the treatment goals.

B. Analysis of Modification

Significant advantages are realized by the PRSB because the contaminated ground water is not brought to the surface for treatment. EPA remains confident that the pump and treat system identified in the ROD could be safely implemented with minimal cross-media transfer of contaminants to air and surface water. Nevertheless, the PRSB technology provides for water treatment at depth, thus eliminating issues related to handling contaminated ground water, managing air emissions and treatment plant residuals, and maintaining a surface water discharge to Scates Branch which is safe for aquatic life. The performance goal, treating ground water to the point that the water will achieve drinking water standards, remains unchanged from the objective described in the ROD.

With the adoption of PRSB technology, applicable or relevant and appropriate requirements ("ARARs") solely related to the pump and treat technology of the original selected remedy will no longer be ARARs for this site. More specifically, in light of the fact that implementation of a PRSB system will not generate a point source discharge of treated water to the Scates Branch, all ARARs in the ROD solely related to point source discharges of treated water to the Scates Branch will no longer be ARARs for the site. Additionally, all ARARs in the ROD pertaining solely to residual/air emissions management will no longer be ARARs for this site due to the fact that PRSB technology will not utilize an air stripper as contemplated by the the pump and treat technology originally selected for this site. Finally, all ARARs solely related to RCRA requirements for the storage, management, treatment and/or disposal of filtered ground water contaminants generated by pump and treat technology will no longer be ARARs for this site given that PRSB technology does not generate such contaminants. However, to the extent that any of the aforementioned ARARs relate to portions of the selected remedy, other than pump and treat technology, they will remain as ARARs for this site in connection with the implementation of PRSB technology.

The selected remedy is expected to comply with all specific, location specific, and action-specific ARARS, and TBCs listed below.

Chemical-specific ARARs

1. Maximum Contaminant Levels ("MCLs") promulgated under the Safe Drinking Water Act, 42 U.S.C. §§ 300f to 300j-26, set forth in 40 C.F.R. Part 141, and MCLs set forth in 55 F.R. 30370 (July 25, 1990), 54 F.R. 22062 (May 22, 1989), and 53 F.R. 31516 (August 18, 1988), as set forth in Item #2 under **Groundwater Treatment Performance Standards,** Section IX of the

ROD.

Location-Specific ARARs

1. Any activity which impacts on wetlands in close proximity to or at the Site must comply with the Virginia Wetland Act, Virginia Code §§ 62.1-13.1 et seq.; Virginia Wetland Regulations (VR § 450-01-0051); Chesapeake Bay Preservation Act, Virginia Code §§ 10.1-2100 et seq.; Cheaspeak Bay Preservation Area Designation and Management Regulations; Federal Water Pollution Control Act, 33 U.S.C. § 1344 (f) (2) (commonly referred to as Section 404 of the Clean Water Act); 33 C.F.R. § 323.2 (c) and 33 C.F.R. § 323.2(e); and the Virginia Water Control Law, Virginia Code §§ 62.144.2 et seq.

Action-Specific ARARs

1. Groundwater monitoring in accordance with Section 10.5 of VADEQ (VR § 672-10-1) will be conducted to monitor the effectiveness of the PRSB system.

To-Be-Considered Materials

1. An air monitoring program will be conducted in compliance with the protocol established by theVirginia Department of Air Pollution Control as set forth in Item #1 under **Monitoring Performance Standards**, Section IX of the ROD, to monitor the effectiveness of the in-situ vapor extraction system.

2. Federal Executive Order 1190 related to Wetland Management (40 C.F.R. § 6.302).

3 Endangered species present on-site or potentially impacted by site activities must be given the protection afforded by the Virginia Board of Game and Inland Fisheries, Code of Virginia §§ 29.1-100 et seq.; Virginia Endangered Species Act, Code of Virginia §§ 29.1-563 et seq.; and the Federal Endangered Species Act, 16 U.S.C. § 1531.

The time necessary to design and construct the PRSB system is estimated to be 12 months. Ground water treatment will begin immediately following construction as the contaminated water will naturally pass though the reactive barrier placed in its path. The pump and treat remedy was estimated to require 20 months to design, construct and begin treatment operations. The PRSB system offers better short-term effectiveness than the pump and treatment remedy, as the contaminated ground water will not be brought to the surface, thereby limiting potential for exposure to contaminants, and the time to implement the remedy will be shorter.

The PRSB system compares favorably to the pump and treat system when considering reduction of toxicity and volume through treatment because more of the mass of contaminants will be destroyed by the oxidation-reduction reaction than the air stripping and carbon adsorption mass transfer technologies included in the original remedy.

The PRSB system is expected to have good long-term effectiveness, however, there is limited long-term field testing and monitoring available for the PRSB technology. Several ground water monitoring wells will be installed at locations including, but not limited to, upgradient of the barrier, within the reactive zone, downgradient of the barrier, and at each end of the barrier. Ground water monitoring for parameters indicative of treatment performance (e.g., loss of reactivity, decrease of permeability within the reactive zone, etc.) will be required in addition to chemical monitoring for regulatory compliance. Once contaminants are destroyed as they pass through the reactive barrier, the chemical degradation is permanent. The effectiveness of the reactive barrier may diminish over time, therefore, the PRSB system may require replacement. Long-term ground water monitoring will be used to determine if and when the PRSB requires replacement to maintain effectiveness. An effective PRSB system will be maintained until the concentration of contaminants in ground water meet the performance standards identified in the ROD.

The cost of utilizing a PRSB system over a 30-year period is estimated to range from approximately $905,800 to $1,941,000. The cost of utilizing the ground water pump and treat system is estimated to range from approximately $1,310,000 to $2,808,000 over a 30-year period.

EPA has made the determination that a modification to the ROD requiring the utilization of a PRSB system is warranted in that implementation of the modified remedy as described above should expedite the cleanup of the Site, provide a more cost-effective alternative to ground water pump and treat systems, ensure the protection of human health, safety and welfare, and the environment and reduce the potential for cross-media contamination.

IV. PUBLIC PARTICIPATION

This ESD and the information upon which it is based have been included in the Administrative Record File for the Site. The Administrative Record also includes the ROD and all documents that formed the basis for EPA's selection of the cleanup remedy for contaminated ground water at the site. The Administrative Record is available for public review at the locations listed below:

U.S. EPA, Region III
1650 Arch Street
Philadelphia, PA 19103-2029

Office of the County Administrator
Peach Grove Lane
Montross, Virginia

Questions or comments on EPA's action and requests to review the Administrative Record can be directed to:

Ronnie M. Davis
Remedial Project Manager
U.S. EPA, Region III
1650 Arch Street (3HS23)
Philadelphia, PA 19103-2029
(215) 814-3230

The Agency encourages the submission of written comments concerning this ESD between September 15, 1998 and September 29, 1998. Based upon review of these comments and the level of community interest, EPA and VADEQ will determine if a public meeting concerning this matter is warranted.

SUPPORT AGENCY REVIEW

In accordance with 40 C.F.R. § 300.435(c)(2), EPA has notified the VADEQ of the modification to the ground water component of the selected remedy described in this ESD. VADEQ's letter dated August 4, 1998 indicated their support of the modification of the remedy.

VI. AFFIRMATION OF STATUTORY DETERMINATION

Based upon the Agency's review of new information concerning the PRSB technology that was submitted by the PRPs at this Site, and in light of the nature and extent of the modification to the scope of the remedy that was selected for this Site as delineated in the ROD of September, 1991, EPA believes that the modified remedy remains protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to this remedial action, and is cost-effective. In addition, the revised remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable at this Site.

Abraham Ferdas, Director
Hazardous Site Cleanup Division

9/15/98
Date

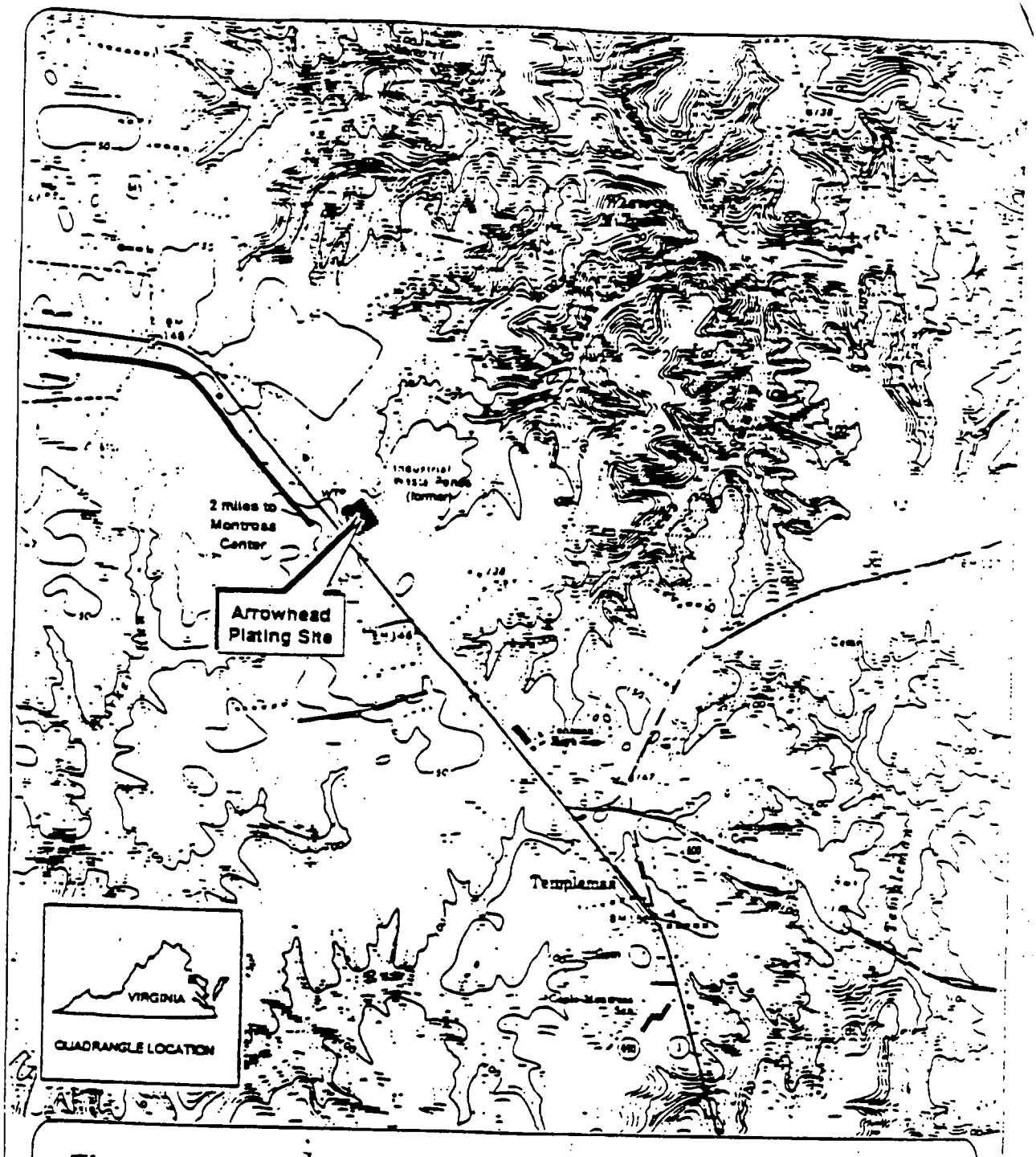
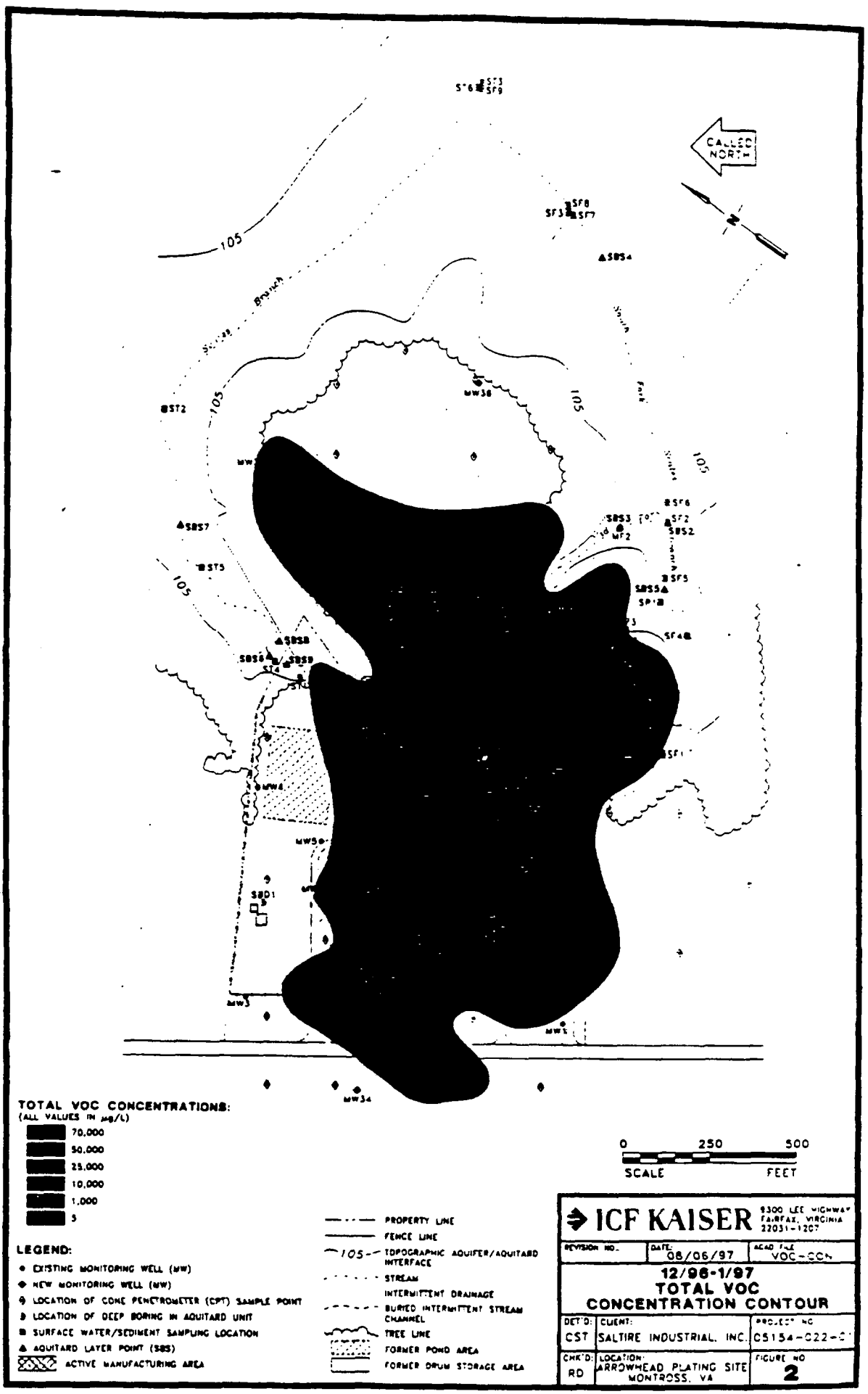


Figure 1 Site Location
Arrowhead Plating Site

Source: U.S. Department of the Interior, Geological Survey, Montross Quadrangle, Virginia, 7.5-minute topographic 1968, photorevised 1981.

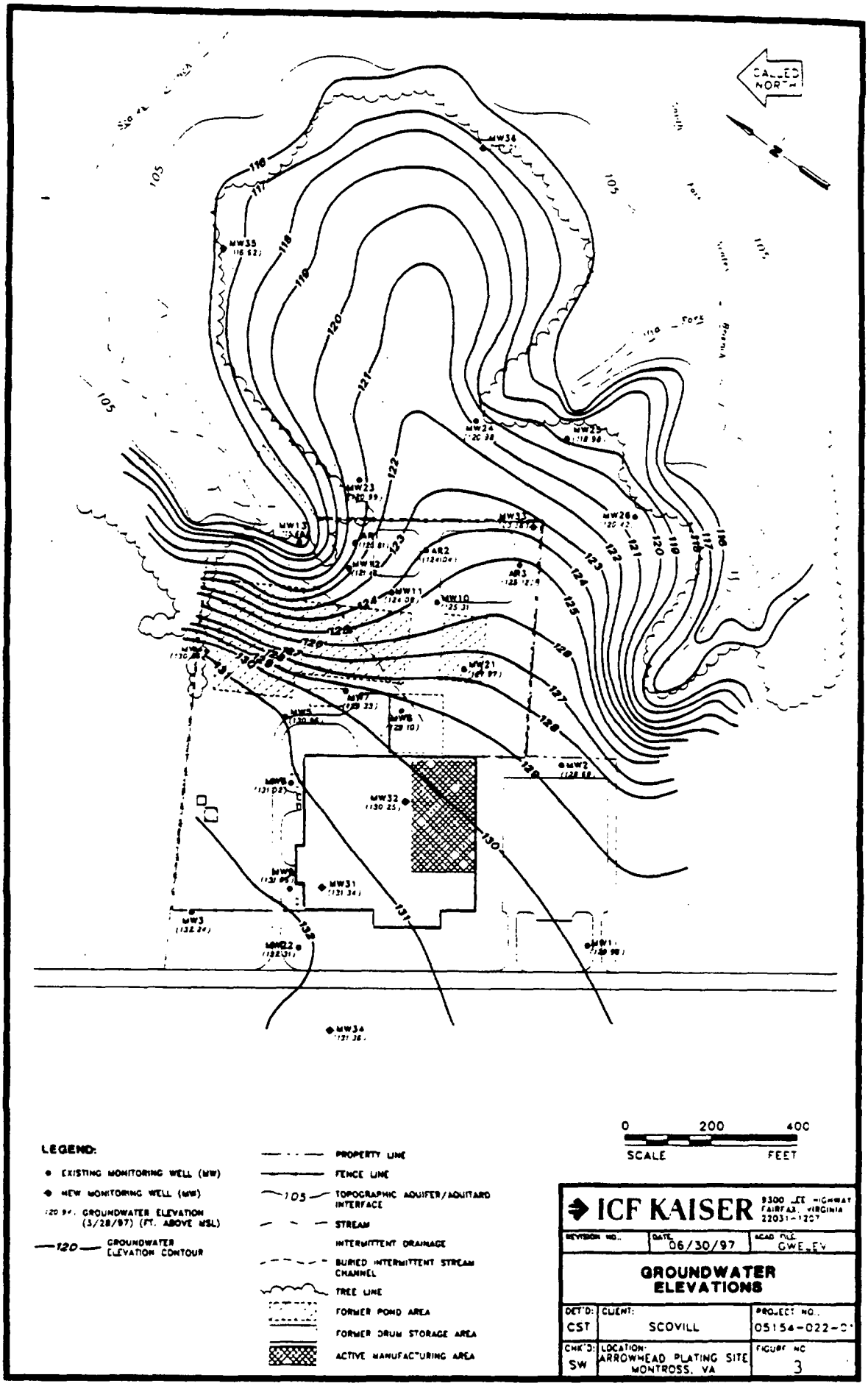


ICF KAISER
9300 LEE HIGHWAY
FAIRFAX, VIRGINIA
22031-1207

REVISION NO.	DATE: 08/06/97	ACAD FILE: VOC-CON

12/96-1/97
TOTAL VOC
CONCENTRATION CONTOUR

DET'D: CST	CLIENT: SALTIRE INDUSTRIAL, INC.	PROJECT NO: 05154-022-03
CHK'D: RD	LOCATION: ARROWHEAD PLATING SITE MONTROSS, VA	FIGURE NO: 2



ICF KAISER 9300 LEE HIGHWAY FAIRFAX, VIRGINIA 22031-1207

REVISION NO.	DATE 06/30/97	ACAD FILE GWE_EV

GROUNDWATER ELEVATIONS

DET'D: CST	CLIENT: SCOVILL	PROJECT NO.: 05154-022-01
CHK'D: SW	LOCATION: ARROWHEAD PLATING SITE MONTROSS, VA	FIGURE NO. 3

ZERO VALENT IRON CONTINUOUS PERMEABLE TREATMENT WALL PROCESS FLOW DIAGRAM

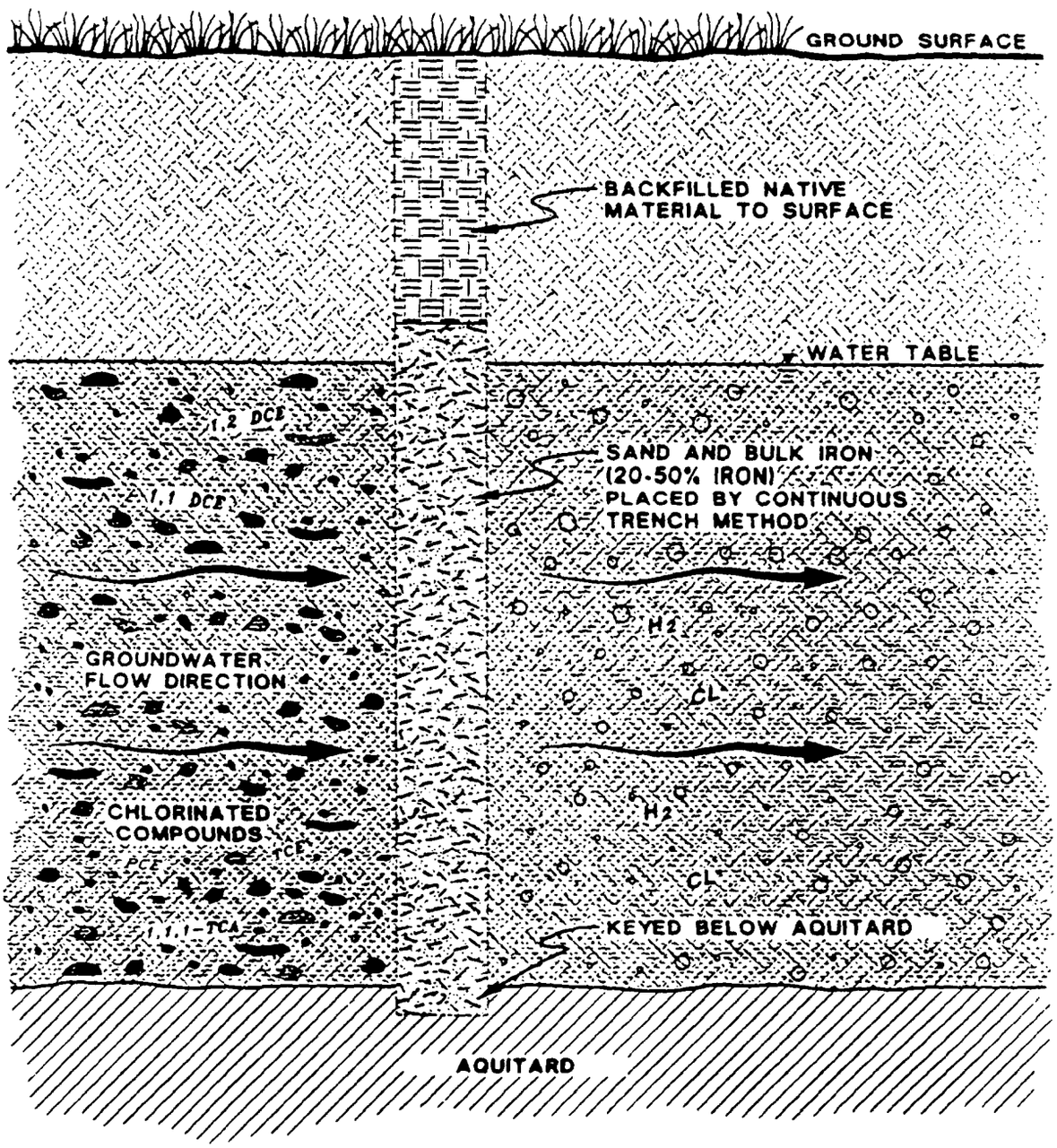


Figure 4

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11/25/97