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SUPERFUND PROGRAM RECORD OF DECISION AMENDMENT

ARROWHEAD PLATING SUPERFUND SITE
MONTROSS, WESTMORELAND COUNTY, VIRGINIA

SEPTEMBER 2001

DECLARATION

SUPERFUND PROGRAM RECORD OF DECISION AMENDMENT

Arrowhead Plating Superfund Site
Montross, Westmoreland County, Virginia

September 2001

DECLARATION

SITE NAME AND LOCATION

Arrowhead Plating Superfund Site
Montross, Westmoreland County, Virginia

STATEMENT OF BASIS AND PURPOSE

In September 1991, the EPA and the Virginia Department of Waste Management ("VDWM") issued a Record of Decision ("ROD") for the Arrowhead Plating Superfund Site. The ROD selected a remedy which called for the extraction and treatment of contaminated groundwater by using a combination of air stripping and carbon adsorption methods (i.e., a "pump and treat" system), and the treatment of contaminated soils by soil vapor extraction. The EPA subsequently approved a change to the groundwater component of the remedy in an Explanation of Significant Differences ("ESD") issued in September 1998, which consisted of the substitution of a Permeable Reactive Subsurface Barrier ("PRSB") system in lieu of the pump and treat system. In October 2000, the potentially responsible party implementing the remedy at the Site proposed that a Surface Cap be installed over the surface soil of the Site to improve the operation and cost-effectiveness of the PRSB system.

This ROD Amendment modifies the selected groundwater remedy to incorporate a Surface Cap system with the PRSB system on the Site. The amended remedial action has been selected in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 ("CERCLA"), 42 U.S.C. §§ 9601 et seq. and the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 C.F.R. §§ 300 et seq. This decision is based on the Administrative Record for this Site.

The Virginia Department of Environmental Quality has concurred with this amendment to the groundwater component of the remedy in a letter dated September 28, 2001 attached hereto.

ASSESSMENT OF THE SITE

Pursuant to duly delegated authority, I hereby determine pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606, that actual or threatened releases of hazardous substances from this Site, if not

addressed by implementing the response action selected in this Amendment to the ROD, may present an imminent and substantial endangerment to the public health, welfare or environment.

DESCRIPTION OF SELECTED REMEDY AMENDMENT

The amended groundwater remedy involves the installation of a Surface Cap system at the Site to improve the function and cost-effectiveness of the previously approved PRSB system. The PRSB system is a permeable barrier consisting of zero-valent iron filings in a biodegradable medium injected beneath the surface. The PRSB system essentially acts as a groundwater filter. As contaminated groundwater percolates through the PRSB, the contaminants are degraded by oxidation reduction reactions with the iron to produce relatively harmless products such as carbon dioxide, water, and biodegradable hydrocarbons.

The installation of an impermeable Surface Cap over the surface soil at the Site will improve the efficiency of the PRSB system by reducing the infiltration of precipitation into the subsurface. A reduction in surface infiltration will reduce the groundwater flow passing through the PRSB system. Diminished groundwater flow velocities will allow more time for oxidation reduction reactions to occur, resulting in the degradation of a greater mass of contaminants. Reduced groundwater flow velocities also will permit the use of a thinner PRSB to achieve the required reduction in contaminant concentrations. Accordingly, the installation of a Surface Cap in conjunction with a PRSB system will result in a more efficient and cost-effective groundwater remedy than either the pump and treat system originally selected in the 1991 ROD or the PRSB system installed without a surface cap as contemplated by the 1998 ESD.

STATUTORY DETERMINATIONS

The amended remedy is protective of human health and the environment and is cost-effective. EPA believes that the selected remedy will comply with all Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action. The selected remedy utilizes a permanent solution to the maximum extent practicable and satisfies the statutory preference for a remedy that employs treatment that reduces toxicity, mobility, or volume.

During the implementation of the selected remedy, groundwater contaminants could remain at concentrations above health-based levels. Accordingly, EPA will conduct a review within five (5) years after initiation of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Abraham Ferdas
Director, Hazardous Site Cleanup Division
EPA Region III

9/20/01
Date

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AMENDMENT TO THE RECORD OF DECISION
ARROWHEAD PLATING SUPERFUND SITE

I. INTRODUCTION

Site Name: Arrowhead Plating Superfund "Site"

Site Location: Montross, Westmoreland County, Virginia

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

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

Statement of Purpose

In July 1991, the EPA and the Commonwealth of Virginia published for public comment a Proposed Plan describing several remedial alternatives evaluated to address the contamination at the Arrowhead Plating Superfund "Site". After the receipt of public comments on the Proposed Plan, the EPA and the Virginia Department of Waste Management ("VDWM") issued a Record of Decision in September 1991 ("ROD" or "1991 ROD"). The ROD selected a remedy which called for the extraction and treatment of contaminated groundwater by using a combination of air stripping and carbon adsorption methods ("pump and treat system"), and the treatment of contaminated soils by soil vapor extraction. The ROD also required the implementation of a monitoring plan to ensure the effectiveness of the remedy and certain institutional control measures.

In June 1994, a potentially responsible party, Scovill, Inc. ("Scovill"), entered into a Consent Decree with the United States pursuant to which Scovill agreed to implement the remedy selected in the 1991 ROD. Scovill performed pre-design investigations at the Site which included additional field tests and environmental sampling to further define site conditions. Scovill also conducted treatability studies 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 a proposal to EPA to modify the groundwater component of the selected remedy by utilizing an innovative technology, the Permeable Reactive Subsurface Barrier ("PRSB"). See Figure 1. The PRSB is an in situ passive groundwater treatment technology. The EPA approved the use of the PRSB system at the Site in lieu of the pump and treat system in an Explanation of Significant Differences ("ESD" or "1998 ESD") issued on September 15, 1998.

Saltire Industrial, Inc., ("Saltire") subsequently succeeded Scovill as the party performing work at the Site pursuant to the Consent Decree. After the submission of the Preliminary (30%) PRSB Design Report, Saltire determined that the addition of a low-permeability Surface Cap to the Site would improve the efficiency of a PRSB system. Saltire subsequently proposed that the EPA and VDEQ consider the installation of a Surface Cap at the Site in October 2000.

This Amendment to the ROD involves the modification of the groundwater component of the selected remedy, as selected in the 1991 ROD and modified by the 1998 ESD, to incorporate the installation of a Surface Cap which will operate in conjunction with a PRSB system on the Site. This Amendment to the ROD is issued in accordance with Section 117(c) of the Comprehensive Environmental Response, Compensation and Liability Act, as amended, ("CERCLA"), 42 U.S.C. §9617(c), and 40 C.F.R. § 300.435(c)(2)(ii). This Amendment has been prepared to document the nature of the changes made to the selected remedy identified in the 1991 ROD as modified by the 1998 ESD; to summarize the information that led to the making of the changes; and to affirm that the amended remedy complies with the statutory requirements of Section 121 of CERCLA, 42 U.S.C. § 9621.

This Amendment fundamentally alters the groundwater component of the remedy originally selected in the 1991 ROD with respect to scope and cost. This Amendment does not address and/or otherwise relate to the contaminated soil component of the remedy selected in the 1991 ROD. The remedy for the contaminated soil selected in the 1991 ROD remains unchanged. The remedial response actions discussed in this Amendment, in conjunction with originally selected response actions for the contaminated soil, including the implementation of institutional controls, will comprehensively address the threats posed by the release or potential release of hazardous substances from this Site.

This Amendment is incorporated into the Administrative Record for the Site and specifically pertains to the groundwater component of the selected remedy. The Administrative Record File is available at the following locations:

U.S. EPA, Region III
6th Floor Docket Room
1650 Arch Street
Philadelphia, PA 19103
(215) 814-3157

Office of the Westmoreland County Administrator
Peach Grove Lane
Montross, VA 22520
(804) 493-0130

II. SITE DESCRIPTION

The Arrowhead Plating Superfund Site ("Site") is located approximately two miles southeast of the Town of Montross, Westmoreland County, Virginia. The Site is situated within Virginia's Northern Neck region between the Rappahannock and Potomac Rivers. The Site occupies approximately 30 acres of land on the east side of State Route 3. See Figure 2. The western portion of the Site consists of a one-story manufacturing building, a parking lot, and an

817 foot-deep well, which supplies drinking water to the manufacturing facility. The eastern portion of the Site covers an area consisting of five former sludge settling ponds and a treated wastewater pond. Two sewage water treatment ponds are located near the eastern edge of the property, which were 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. See Figure 3.

III. SITE HISTORY AND ENFORCEMENT ACTIVITY

A. Site History

The Site is owned by the Westmoreland Industrial Development Corporation, which leased the property to Scovill, Inc. ("Scovill") in 1966. In 1972, Arrowhead Associates Inc. ("Arrowhead") purchased the business and facility assets, and subleased the property from Scovill. Arrowhead reopened the business under a new name, A.R. Winarick Company, in 1983.

From 1966 to 1979, Scovill and Arrowhead used the facility at the Site to manufacture cosmetic cases using electroplating, lacquering and enameling processes. The majority of the cosmetic cases were either brass or zinc plated, although some cases were silver plated. Copper, zinc, cyanide, and acid/alkali solutions were used in the plating operations. Chlorinated solvents were used for degreasing the cases prior to the lacquering and enameling processes. Wastewater from the electroplating operations was sent to an on-site treatment system inside the manufacturing building for oxidation and neutralization prior to being discharged to on-site settling ponds. Supernatant from these ponds either was reused by the facility or was discharged to a nearby stream, the Scates Branch, pursuant to a National Pollutant Discharge Elimination System ("NPDES") permit. Spent chlorinated solvents were recovered through distillation. Still bottom wastes and small amounts of other spent materials were accumulated in drums and were periodically shipped off-site for management at another Scovill facility.

In 1979, Arrowhead ended cosmetic-case manufacturing operations at the facility and switched to cosmetic-case filling operations. Arrowhead's use of the five sludge settling ponds and the treated wastewater pond ceased in 1979.

B. Enforcement Activity

In July 1986, Scovill and the EPA entered an Administrative Order on Consent that required Scovill to conduct a two-phase removal action at the Site. In Phase I, conducted from December 1986 to September 1987, Scovill removed various contaminated materials from the Site, including: residual process wastes, drums, damaged tanks, interior piping and deteriorated concrete from the manufacturing building. During Phase II, which ran from November 1987 to November 1988, Scovill removed approximately 395 cubic yards of contaminated soils from the former drum storage areas for off-site disposal. Scovill also treated and disposed of contaminated wastewater, sludge, and soil from the inactive settling ponds. The settling ponds were filled and

graded in April 1990. Scovill installed erosion control measures at the Site in October 1990.

The removal action successfully reduced the risks presented by contaminated soils, on-site residual process wastes, and contaminated containers and manufacturing equipment at the Site. Nevertheless, significant residual contamination of isolated soil and underlying groundwater remained. Given the extent of contamination at the Site, the EPA proposed it for inclusion on the National Priorities List ("NPL"), 40 C.F.R. Part 300, Appendix B, in June 1988. The Site was added to the NPL in February 1990.

In July 1989, Scovill entered into an Administrative Order on Consent with the VDWM for the purposes of conducting a Remedial Investigation/Feasibility Study ("RI/FS") to characterize the extent and nature of contamination remaining at the Site, to 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 VDWM and EPA in February 1990.

The RI/FS identified significant groundwater contamination of the shallow, unconfined aquifer at the Site. The contamination plume extends into the Scates Branch and the South Fork of the Scates Branch, where groundwater discharges to the surface system. See Figure 4. The contamination plume also extends beyond the Site into adjacent farm land.

The primary contaminants of concern in the groundwater are tetrachloroethene (PCE), and trichloroethene (TCE). Other organic contaminants found in groundwater include: 1,1,1-trichloroethane (TCA), 1,1-dichloroethene, 1,2-dichloroethene (total), benzene, methlylene chloride, 1,2-dichloroethane, 1,1,2-trichloroethane, and vinyl chloride. Inorganics contaminants found in the groundwater are cadmium, copper, nickel, chromium, and zinc. 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 1991, the EPA and VDWM published a Proposed Plan describing several remedial alternatives evaluated to address the contamination at the Site. After public comment, the EPA and VDWM issued the ROD in September 1991. The ROD selected a remedy which addressed the groundwater contamination by utilizing a pump and treat system. The soil component of the selected remedy called for the installation of a soil vapor extraction system. The ROD also required the implementation of a monitoring plan to ensure the effectiveness of the remedy and the establishment of certain institutional control measures.

In June 1995, Scovill entered into a Consent Decree pursuant to which Scovill agreed to implement the selected remedy. Scovill performed pre-design investigations at the Site which included additional field tests and environmental sampling to further define site conditions. Scovill also conducted treatability studies on water treatment technologies and in situ soil vapor

extraction to provide data necessary to optimize the Remedial Design.

On December 2, 1997, Scovill proposed that the EPA modify the groundwater component of the selected remedy to incorporate a PRSB system. The EPA subsequently concluded that the implementation of a PRSB system would achieve the groundwater remedial objectives while providing a cost-effective alternative to the pump and treat system selected in the 1991 ROD. The EPA issued an ESD approving the use of the PRSB system in lieu of a pump and treat system at the Site in September 1998.

Following the submission of the Preliminary PRSB Design Report, Scovill's successor, Saltire, completed additional evaluations. Saltire determined that the addition of a low-permeability Surface Cap to the Site would improve the function and cost-effectiveness of the PRSB system. Saltire proposed that a Surface Cap system be added as part of the groundwater remedy in October 2000.

IV. SUMMARY OF 1991 ROD REMEDY AND THE 1998 ESD CHANGE

A. The 1991 ROD

The original remedy selected in the 1991 ROD consisted of the following major components:

- A groundwater extraction network to remove contaminated groundwater from the aquifer for treatment;
- Precipitation of inorganic contaminants from the extracted water;
- Treatment of organic contaminants in the extracted water by air stripping and carbon adsorption methods;
- Discharge of the treated water to the Scates Branch, a small stream originating onsite and flowing into Weavers Millpond and Pierce Creek;
- Defining the extent of contamination in the soils and in-situ vapor extraction of volatile organics in the contaminated soils;
- Capture and treatment using carbon adsorption of offgas from trains for soils and groundwater prior to discharge to the atmosphere;
- Implementation of an environmental monitoring plan to evaluate the effectiveness of the remedial action and to ensure the protection of environmental receptors in Scates Branch; and

- Implementation of appropriate institutional control measures prohibiting the use of contaminated groundwater to ensure protection of public health and the environment.

The groundwater component of the remedy selected in the 1991 ROD relied upon a pump and treat system intended to minimize the migration of contaminated groundwater from the Site and to extract it from the aquifer for treatment ex situ. The treatment process involved subjecting the extracted contaminated groundwater to precipitation, air stripping and carbon adsorption processes in above-ground treatment units. After treatment, the processed water would be discharged to the Scates Branch. The ROD contemplated that treatment would continue until the groundwater achieved Federal Maximum Contaminant Levels ("MCLs") or Maximum Contaminant Level Goals ("MCLGs"), 40 C.F.R. Part 141. In addition to the monitoring of the discharge to the Scates Branch, the pump and treat system would require air monitoring of emissions and the handling and off-site disposal of treatment residuals.

B. The 1998 ESD

In the 1998 ESD, EPA modified the scope and cost of the groundwater component of the remedy by approving the implementation of a PRSB system in lieu of the pump and treat system. The modified groundwater remedy consisted of the following elements:

- The installation of a PRSB system to transform dissolved VOCs into non-toxic products before groundwater enters the tributaries of Scates Branch;

- The implementation of an environmental monitoring plan to evaluate the effectiveness of the PRSB system and to ensure the protection of environmental receptors in Scates Branch; and

- The implementation of appropriate institutional control measures, prohibiting the use of contaminated surficial groundwater to ensure protection of public health and the environment.

The 1998 ESD contemplated that the PRSB would be installed by excavating a trench downgradient of VOC source areas and perpendicular to groundwater flow, which would be filled with tons of zero-valent iron filings mixed in a biodegradable matrix. The trench would extend to a depth ranging from 20 feet to 42 feet below the surface and would cover an area of 24,000 square feet. See Figure 5. The PRSB essentially acts as a groundwater filter. As contaminated groundwater percolates through the PRSB, the VOCs will react with the iron and will chemically degrade in oxidation reduction reactions. The end products of these reactions are relatively harmless compounds such as carbon dioxide, water and biodegradable hydrocarbons. The PRSB will reduce the VOCs in the groundwater to below the respective MCLs. Decontaminated groundwater emanating from the PRSB either will discharge into tributaries of the Scates Branch or will move downgradient of the PRSB system in the subsurface.

V. REASONS FOR ISSUING THIS ROD AMENDMENT

The 1991 ROD identified the remedial action selected to address contaminated groundwater and contaminated soils at the Site. After the ROD was issued, significant advances were made in the development of the PRSB technology, which provided a basis for EPA's reconsideration of the groundwater remedy selected for the Site.

In its 1998 ESD, the EPA concluded that a PRSB system is a more appropriate means of treating groundwater at the Site than the pump and treat system selected in the 1991 ROD. The EPA determined that a PRSB system is superior because contaminated groundwater is treated while it remains in the ground as opposed to being extracted to the surface for treatment above-ground in a pump and treat system. By treating contaminated groundwater in the subsurface, several technical issues are avoided, including: handling contaminated water; managing air emissions, handling treatment residuals, and the need to develop a non-hazardous surface discharge.

After the EPA approved the PRSB system in the 1998 ESD, Saltire continued to evaluate the Site. In October 2000, Saltire proposed to increase the functionality and cost-effectiveness of the PRSB system by adding a Surface Cap to the Site. The information from Saltire's additional evaluations provide the basis for EPA's reconsideration of the groundwater remedy selected for the Site.

At this time, the scope and cost of the groundwater component of the remedy, as amended, have so fundamentally changed from that contemplated in the 1991 ROD, so as to necessitate this ROD Amendment to document the EPA's rationale for the changes and to demonstrate that the amended groundwater remedy will meet the remedial objectives of the original ROD. The modifications to the groundwater component of the remedy will not alter the remaining components of the selected remedy, including the treatment of contaminated soils by soil vapor extraction.

The EPA's new preferred groundwater remedy will provide the same level of protection as the remedy EPA selected for the site in 1991, by effectively reducing the concentrations of contaminants in the groundwater to levels which are protective of human health and the environment in a time frame comparable to that which could be achieved through active pumping and treatment of the groundwater. In addition, the Agency's new preferred alternative will not result in cross-media transfer of contaminants or the generation of residual wastes, and will result in a more cost effective cleanup.

VI. DESCRIPTION OF THE AMENDED GROUNDWATER REMEDY

A. General Description of the Amended Groundwater Remedy

The amended groundwater remedy consists of the following components:

- Installation of a PRSB system to transform dissolved VOCs in the groundwater into non-toxic products before the groundwater discharges into the tributaries of the Scates Branch;
- Construction of a Surface Cap system to limit the surface water infiltration into the subsurface immediately upgradient of the PRSB;
- Implementation of an environmental monitoring plan to evaluate the effectiveness of the remedial action and to ensure the protection of environmental receptors in Scates Branches; and
- Implementation of institutional control measures to prohibit the use of contaminated groundwater from the Yorktown/Eastover unconfined aquifer to ensure protection of human health and the environment.

Remedial Action Objective

The 1991 ROD identified a primary goal of the response action as the restoration of the groundwater at the Site to beneficial use. The performance goal of treating groundwater to the point that the water will achieve drinking water standards remains unchanged from the objective described in the 1991 ROD. The amended groundwater remedy comports with this objective because it will actively remove VOCs from the groundwater at the Site. The amended remedy will prevent migration of contaminated groundwater from the Site that could result in contaminant concentrations in excess of MCLs and non-zero MCLGs. The selected remedy will achieve an incremental cancer risk ("ICR") of 10-6. In combination with the planned remedial actions for soil selected in the 1991 ROD (that are not being changed by this Amendment), this remedy will satisfy the remedial objectives for this Site and be effective in capturing and degrading contaminants in the groundwater, while protecting human health and the environment.

B. Description of the Components of the Amended Remedy and Pertinent Performance Standards

Construction of the PRSB System

The PRSB system consists of a reactive barrier installed perpendicular to the natural groundwater flow direction as shown in Figure 1. Instead of the trenching method of installation

proposed in 1998, the PRSB will be installed using vertical hydrofracturing. The reactive barrier will be approximately 1,165 feet long, and it will range in depth from approximately 15 feet down to a depth of 42 feet. See Figure 5. The thickness of the reactive barrier is dependent on the rate of groundwater flow, and with the installation of a Surface Cap, the anticipated thickness of the barrier will range from 3 to 4.5 inches. Contaminated groundwater passing through the PRSB will be treated to achieve total incremental cancer risk of 10-6 .

The PRSB will be installed with conventionally drilled wells installed along the barrier alignment as shown in Figure 6. A controlled vertical fracture will be initiated at the required azimuth orientation and depth in each well inside of a specialized fracture casing utilizing downhole fracture initiation tools. The iron filings will be blended and injected in a mix of highly viscous, food-grade quality gel (hydroxypropylguar). Multiple well heads will inject the iron-gel mixture to form a continuous PRSB. See Figure 7 and Figure 8. Approximately thirty nine resistivity receiver strings (denoted as PR1 through PR39) will be installed offset from the PRSB alignment as shown on Figure 9 to monitor the geometry of the PRSB during construction.

Groundwater Treatment Performance Standards

Simply meeting MCLs may not be protective when more than one contaminant is present. There are multiple carcinogenic contaminants at the Site. This combination of contaminants would result in an unacceptable risk if all contaminants were at and not below their respective MCLs. When multiple contaminants are present and the MCLs result in an incremental cancer risk greater than 10-4, the regulations require that the remediation goals be set within the target risk range of 10-4 to 10-6. See 40 C.F.R. § 300.430 (e)(2)(i)(A)(2) and (e)(2)(I)(D). The 1991 ROD also states "[t]he goal of the response action is to reduce the risks associated with exposures to contaminated drinking water at the Site to less than the acceptable levels, i.e., 10-6 lifetime incremental cancer risk and HI of 1.0." See 1991 ROD, "Remediation Goals", at p. 70.

The remediation goal is to achieve a total incremental cancer risk of 10-6. PRSB case studies demonstrate that PRSB technology can lower the concentration of PCE, TCE, TCA, and vinyl chloride to non-detect or near non-detect levels (i.e, well below MCLs and MCLGs). Groundwater will be monitored for full Target Compound List (TCL) VOCs and SVOCs, and Target Analyte List (TAL) inorganics to confirm that the remedy results in an incremental cancer risk of 10-6, HI of $\leq$ 1.0, and meets ARARs.

Construction of the Surface Cap

The Surface Cap will cover an area of approximately 4.5 acres, see Figure 5, and consist from top to bottom of 24 inches of vegetative cover, a drainage layer and a geosynthetic clay liner (GCL). The construction of the Cap will require the following: 1) the clearing and stripping of soil within the Cap system footprint and, if necessary, from a borrow area within the Site adjacent to the Cap system; the installation of GCL, 2) the deployment of drainage stone; 3) the placement

of soil for the vegetative cover; 4) the construction of ditches for internal drain, culverts and other surface water control management and erosion control measures; 5) the seeding and mulching of 5 acres; and 6) the repair or replacement of the existing chain link fencing around the footprint of the Cap system/easement/property line. See Figure 4.

Prior to the start of construction activities, the existing lagoons on the northeast of the property will be closed. The owner of this property, Mattatuck Electronics Technology, Inc. ("Mattatuck"), previously agreed to close the lagoons. Mattatuck submitted a lagoon closure plan dated April 19, 2000, to the Virginia Department of Health for review and approval. The plan was approved by the Virginia Department of Health on May 26, 2000. At the present time, EPA expects that either Mattatuck or Saltire will undertake the work necessary to close the lagoons. This work will be performed in accordance with Mattatuck's approved plan and it will comport with all Virginia State Board of Health standards and regulations.

The proposed Surface Cap design incorporated the proposed lagoon closure plan submitted by Mattatuck. Potential generation of gas from decomposition of the sludge in the lagoon will be vented through the Cap. A gas collection sand layer 12 inches thick and 10 feet wide will be placed immediately underneath the GCL along the crest of the Cap. Two vent pipes, installed through the Cap and connected to a 3-inch diameter perforated gas collection pipe placed within the sand layer, will vent any gas entrapped underneath the Cap.

A 7-foot soil surcharge will be placed over the large lagoon area after the lagoon has been backfilled with compacted fill and left in place for three months. The settlement rate data will be reviewed to verify that the anticipated long-term settlement is within the expected limits. The surcharge will then be removed and the Surface Cap system constructed.

Environmental Monitoring Plan

Groundwater and surface water monitoring will be implemented to assess the performance of the PRSB/Cap system remedy in degrading the chlorinated solvents in the groundwater at the Site to non-toxic end products. Groundwater wells will be installed upgradient and downgradient of the PRSB to monitor the reduction of VOCs across the reactive barrier system. The frequency of groundwater and surface water sampling will be detailed in the Performance Standard Verification Plan ("PSVP") to be reviewed and approved by EPA.. The full TCL and TAL will be analyzed in order to monitor the contaminants of concern identified in the 1991 ROD at pages 64-65, and Tables 2 and 14.

Approximately three existing and sixteen new monitoring wells be used for PRSB groundwater performance monitoring. Six new monitoring wells will be installed upgradient of the PRSB and ten new monitoring wells will be installed downgradient of the the PRSB.

Contingency Groundwater Remedy

Downgradient monitoring well data will be used to quantify the performance of the PRSB. If VOC concentrations in the groundwater downgradient of the PRSB do not meet the performance standards by achieving a total incremental cancer risk of 10-6or less, the PRSB design will be reevaluated and corrective measures will be implemented. These corrective measures will involve an evaluation of the Cap system performance, surface water management and the effectiveness of the drainage systems. If necessary, corrective measures shall require additional quantities of iron filings or other appropriate materials be installed in those sections of the PRSB deemed sufficient to satisfy the PRSB performance standards to be detailed in the PSVP. As appropriate, additional quantities of iron shall be installed in the original PRSB installation wells where possible, and an access roadway will be constructed along the PRSB alignment to protect the Cap system from damage by the additional iron injection work.

Institutional Controls

Institutional controls will be implemented to prohibit the use of contaminated groundwater from the Yorktown/Eastover aquifer. Contaminated groundwater will be treated by the PRSB before it enters the Scates Branch. However, that portion of the aquifer downgradient of the PRSB will remain contaminated until treated water from the PRSB system dilutes the contaminated water to below MCLs. The institutional controls will remain in effect until EPA, in consultation with VDEQ, determines that the restrictions are no longer necessary. See Figure 10.

Additional institutional controls will be implemented to maintain the physical integrity of the Surface Cap in accordance with 9 VAC 20-80-250 E.5.d.(3).

Five-Year Review

Long-term monitoring, and operation and maintenance of the PRSB/Cap system shall continue for an estimated 30 years or such other time period as EPA, in consultation with VDEQ, determines to be necessary, based on the statutory reviews of the remedial action which shall be conducted no less often than every five years from the initiation of the Remedial Action in accordance with the EPA guidance document, *Comprehensive Five-Year Review Guidance* [OSWER Directive 9355.7-03B-P (June 2001)]. Five-year statutory reviews under Section 121(c) of CERCLA, 42 U.S.C. § 9621(c), will be required as long as hazardous substances remain on-site to prevent unlimited use of the Site and to assure that the remedy continues to be protective of human health and the environment.

C. Estimated Costs

The cumulative estimated cost of implementing the amended groundwater remedy described above is:

Capital Cost:	$3,121,000
Annual O&M Cost:	$ 60,000
Present Worth Cost:	$3,866,000

D. Explanation of ARARs

Section 121(d) of CERCLA requires that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under Federal or State law, which are collectively referred to as "ARARs", unless such ARARs are waived under CERCLA§ 121(d)(4).

"Applicable" requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site.

"Relevant and appropriate" requirements are those requirements that, while not legally "applicable", address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the particular site. Only those State standards that are promulgated, are identified by the State in a timely manner, and are more stringent than Federal requirements may be ARARs. ARARs may relate to the substances addressed by the remedial action ("chemical-specific"), to the location of the site ("location-specific"), or the manner in which the remedial action is implemented ("action-specific").

In addition to applicable or relevant and appropriate requirements, the lead agency may, as appropriate, identify other advisories, criteria, or guidance to be considered for a particular release. The "to be considered" ('TBC") category consists of advisories, criteria, or guidance that were developed by EPA, other Federal agencies or states that may be useful in developing CERCLA remedies.

The identification of ARARs in this Amendment supersedes the discussion of ARARs in the 1991 ROD only with respect to the groundwater component of the remedy. ARARs relating to response actions discussed in the 1991 ROD but not addressed in this Amendment are not affected.

The following sections identify the ARARs and TBCs identified by EPA (after submission to the Commonwealth of Virginia for review and comment) relating to the remedy identified herein. On-site actions (i.e., within the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the response action) need comply only with the substantive aspects of ARARs, not with the corresponding administrative requirements (e.g., consultation, issuance of permits, documentation, record keeping and

enforcement).

Chemical-Specific ARARs

The Maximum Contaminant Levels ("MCLs") and non-zero Maximum Contaminant Level Goals ("MCLGs") for public drinking water supplies established under the Safe Drinking Water Act, 42 U.S.C. §§ 300f to 300j-26, are considered to be relevant and appropriate standards for groundwater cleanup under the Superfund program. The ARAR MCLs and MCLGs for inorganic and organic chemicals are set forth at 40 C.F.R. §§ 141.11-.12, 141.61-.62 and 40 C.F.R. §§ 141.50-.51, respectively. Virginia has identified MCLs and non-zero MCLGs in the Virginia Waterworks Regulations, 12 VAC 5-590-440, at Tables 2.3 and 2.4. The chemicals of concern are listed in Table 2 on page 21 of the 1991 ROD. The contaminant-specific cleanup levels are listed in Table 14 of the 1991 ROD. The full TCL VOCs and SVOCs and TAL will be monitored.

Location-Specific ARARs

The remedial alternatives based on the PRSB technology will not result in any point source discharge to surface waters in the vicinity of the Site. In addition to the lack of any point source discharge to surface waters, the PRSB system will not require the dredging or filling of any wetlands area.

Work at the Site will conform to the following performance criteria for erosion control and stormwater management established by Virginia's Chesapeake Bay Preservation Area Designation and Management Regulations, 9 VAC 10-20-120: the disturbance of land will be limited to that necessary for completion of the remedy; indigenous vegetation will be preserved to the maximum extent possible; and any nonpoint source pollution loading from runoff after the work is completed will not exceed pre-development nonpoint source pollution loading.

Action-Specific ARARs

The construction of the Surface Cap contemplated by the preferred remedial alternative will cover the former sanitary waste lagoons on the Site. Because the lagoons will be closed with some solid wastes remaining in situ, the Virginia Solid and Hazardous Waste Management Regulations pertaining to the installation and maintenance of a final cover over a sanitary landfill, 9 VAC 20-80-250E.1.b and 250F.1, are relevant and appropriate. Additionally, Virginia's regulations pertaining to the control of decomposition gases at sanitary landfills, specifically methane, set forth at 9 VAC 20-80-280A and 280E, are relevant and appropriate because the Surface Cap will incorporate a gas venting system.

It is anticipated that the construction of the Surface Cap may result in fugitive dust emissions during the movement of shallow soils at the Site. Although the EPA has determined that the soils to be utilized in the construction of the Cap are uncontaminated, this activity will be

subject to the emission standards for particulate matter at 40 C.F.R. §§ 50.6 and 50.7.

All work at the Site will be performed in accordance with the minimum standards for soil stabilization and sedimentation control as established by the Virginia Erosion and Sediment Control Regulations, at 4 VAC 5–30-40, and adopted in Westmoreland County's erosion and sedimentation control program.

Surface runoff from the Site during and after the work will be controlled to prevent nonpoint source pollutant loads from exceeding historical levels, consistent with the Virginia Stormwater Management Regulations at 4 VAC 3-20-60 and Westmoreland County's storm water management program. Stormwater drainage features will be constructed to provide non-erosive flow velocities consistent with the Virginia Stormwater Management Regulations at 4 VAC 3-20-60. Drainage features will use existing natural drainage channels to the maximum extent possible in accordance with 4 VAC 3-20-60.

To-Be-Considered Materials

In addition to ARARs, EPA may, as appropriate, identify other advisories, criteria, or guidance to be considered for a particular release. The "to be considered" materials consists of advisories, criteria, or guidance that were developed by EPA, other federal agencies or states that may be useful in developing CERCLA remedies.

The disposition of any wastes generated during groundwater monitoring will be conducted in accordance with Virginia's Investigative Derived Waste Policy.

VII. EVALUATION OF REMEDIAL ALTERNATIVES

The EPA has proposed three alternatives for the groundwater component of the remedy at the Site: 1) the pump and treat system selected in the 1991 ROD; 2) the PRSB system approved in the 1998 ESD ("PRSB-Only"); and 3) the PRSB system with a Surface Cap ("PRSB/Cap").

Alternative No. 1: Pump and Treat System

Capital Cost:	$ 1,810,000
Annual Cost:	$ 325,000
Present Worth Cost:	$ 5,843,000
Time to Implement:	1 year

The pump and treat system selected in the 1991 ROD was designed to minimize the migration of contaminated groundwater and to extract it from the aquifer at the Site for treatment at the surface. The preliminary estimate for the groundwater extraction network contemplated the installation of eight to ten extraction wells to create a total pumping rate of 30 gallons per minute.

Extracted groundwater would be directed to an above-ground treatment system comprised of a precipitation unit, an air stripping unit and a carbon adsorption unit. The treatment system would discharge decontaminated water to the Scates Branch. This remedy called for the implementation of procedures for monitoring the extracted groundwater, the processed water discharged to the Scates Branch, and the air emissions from the treatment system.

Alternative No. 2: PRSB-Only System

Capital Cost:	$4,154,000
Annual Operation and Maintenance (O&M):	$ 55,000
Present Worth Cost:	$4,837,000
Time to Implement:	6.5 months

The PRSB-Only system consists of a subsurface wall filled with zero-valent iron fillings and will be approximately 1,165 foot in length constructed downgradient of VOC source areas and perpendicular to groundwater flow. The PRSB will be constructed using a 1) a bench with a continuous trencher for approximately two-thirds of the PRSB length, 2) a biopolymer slurry wall trench, and 3) an azimuth controlled hydraulic fracturing technology would be used for a section of the PRSB in the southern area of the Site. See Figure 11 and Figure 12. The PRSB will extend to a depth ranging from 20 feet to 42 feet below the surface and will cover an area of 24,000 square feet. It is expected that the thickness of the PRSB will be greater than that required with Alternative No. 3. As contaminated groundwater passes through the PRSB, the VOCs will react with the iron and chemically degrade in oxidation reduction reactions. The end products of these reactions are relatively harmless compounds such as carbon dioxide, water and biodegradable hydrocarbons. The PRSB system will reduce the VOCs in the groundwater to below the respective MCLs at the Site compliance locations. The decontaminated groundwater emanating from the PRSB system either will discharge into tributaries of the Scates Branch or move downgradient of the PRSB system in the aquifer.

The PRSB-Only system includes an environmental monitoring plan to evaluate the effectiveness of the remedial action and to ensure the protection of environmental receptors in the Scates Branch. Groundwater wells will be installed upgradient and downgradient of the PRSB to monitor the reduction in VOC concentrations across the length of the PRSB system. This remedy also relies on institutional controls to prohibit the use of contaminated surficial groundwater to ensure protection of public health and the environment.

Alternative No. 3: PRSB/Cap System

Capital Cost:	$3,121,000
Annual Operation and Maintenance (O&M):	$ 60,000
Present Worth Cost:	$3,866,000
Time to Implement:	6.5 months

Alternative No. 3 provides for the construction of a PRSB system similar to that described in Alternative No. 2 with the addition of the placement of a Surface Cap over the Site. Alternative No. 3 will be constructed using an azimuth control hydraulic fracturing technology. Although Alternative No. 3 will entail additional work to construct the Surface Cap, it is anticipated that it will be less costly to implement than Alternative No. 2 because the Surface Cap will yield a cost savings by reducing the thickness of the PRSB needed to achieve the remedial objectives. The Surface Cap will consist of a 24-inch vegetative cover, a geotextile-geonet-geotextile composite (geocomposite), drainage layer, and a low permeability geosyntheitic clay liner (GCL). Cap performance modeling shows that the Surface Cap System will reduce the infiltration from 7 inches/year (exiting conditions) to about 0.9 inches/year.

Alternative No. 3 also contemplates the implementation of an environmental monitoring plan and installation of groundwater monitoring wells to evaluate the effectiveness of the remedial action and to ensure the protection of environmental receptors in the Scates Branch. Similarly, institutional controls will be implemented to prohibit the use of contaminated surficial groundwater to ensure protection of public health and the environment. Institutional Controls will also be implemented to ensure that the integrity of the Surface Cap is not compromised.

Nine Evaluative Criteria

EPA evaluated each of the Alternatives against the nine criteria required by the NCP, 40 C.F.R. § 300.430(e)(9), to select the option providing the best balance. The nine criteria are:

- Overall protection of human health and the environment;
- Compliance with ARARs;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility or volume through treatment;
- Short-term effectiveness;
- Implementability;
- Cost;
- Community Acceptance; and
- State Acceptance.

A. Overall Protection of Human Health and the Environment

This factor considers whether the remedy provides adequate protection and how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

All of the Alternatives are protective of human health and the environment. The performance goal for the groundwater remedy at the Site remains unchanged from the objective described in the 1991 ROD: contaminated groundwater will be treated until it achieves drinking water standards. Groundwater will be treated to MCLs and non-zero MCLGs. However, not all of the contaminants present in groundwater have MCLs. Those contaminants will be treated to less than the acceptable levels (10^{-4} - 10^{-6}) of lifetime incremental carcinogenic risk ("ICR") and a hazardous index of 1.

However, the EPA considers the PRSB technology proposed in Alternatives No. 2 and No. 3 to be superior to the pump and treatment system of Alternative No. 1 for this Site. Unlike the pump and treat system, the PRSB technology does not require groundwater to be extracted from the subsurface for treatment. The use of a PRSB system at the Site would eliminate the following tasks: 1) handling contaminated groundwater at the surface; 2) management of waste residues and air emissions from the treatment units; and 3) maintaining a non-hazardous surface water discharge to Scates Branch.

Alternative No. 3 will enhance the effectiveness of the PRSB system by adding a Surface Cap to reduce infiltration of precipitation, resulting in a reduction of groundwater hydraulic flow gradients across the PRSB. By reducing the rate of flow of groundwater across the PRSB, the contaminants are subjected to a longer period for the completion of oxidation reduction reactions, with a corresponding greater reduction in contaminant concentrations.

B. Compliance with ARARs

Any cleanup alternative selected by the EPA must comply with all applicable or relevant and appropriate federal and state environmental requirements ("ARARs"). Each of the remedial alternatives evaluated in this Proposed Plan would comply with the pertinent ARARs. The ARARs pertaining to the groundwater remedial Alternatives are addressed below.

Chemical-Specific ARARs

The Maximum Contaminant Levels ("MCLs") and non-zero Maximum Contaminant Level Goals ("MCLGs") for public drinking water supplies established under the Safe Drinking Water Act, 42 U.S.C. §§ 300f to 300j-26, are considered to be relevant and appropriate standards for groundwater cleanup under the Superfund program. The ARAR MCLs and non-zero MCLGs for inorganic and organic chemicals are set forth at 40 C.F.R. §§ 141.11-.12, 141.61-.62 and 40 C.F.R. §§ 141.50-.51, respectively. Additionally, Virginia MCLs and MCLGs set forth at 12 VAC 5-590-440, at Tables 2.3 and 2.4. Each Alternative will comply with these ARARs.

Location-Specific ARARs

Alternative No. 1 presents more complex compliance issues than the other Alternatives, because a pump and treat system generates waste residuals, air emissions and a discharge to surface waters. Accordingly, the ex situ pump and treat system implicates a wide range of ARARs which would not otherwise be considered with the operation of an in situ PRSB system. A complete description of the ARARs for the pump and treat system is set forth in the 1991 ROD. The remedial alternatives based on the PRSB technology will not result in any discharge to surface waters in the vicinity of the Site. In addition to the lack of any discharge to surface waters, the PRSB system will not require the dredging or filling of any wetlands area. These changes eliminate many of the ARARs considered in the 1991 ROD for the original groundwater remedy.

Work at the Site will conform to the following performance criteria for erosion control and stormwater management established by Virginia's Chesapeake Bay Preservation Area Designation and Management Regulations, 9 VAC 10-20-120: the disturbance of land will be limited to that necessary for completion of the remedy; indigenous vegetation will be preserved to the maximum extent possible; and any nonpoint source pollution loading from runoff after the work is completed will not exceed pre-development nonpoint source pollution loading.

Action-Specific ARARs

Alternative No. 1 presents more complex compliance issues than the other Alternatives, because a pump and treat system generates waste residuals, air emissions and a discharge to surface waters. Accordingly, the ex situ pump and treat system implicates a wide range of ARARs which would not otherwise be considered with the operation of an in situ PRSB system. A complete description of the ARARs for the pump and treat system is set forth in the 1991 ROD.

The construction of the Surface Cap contemplated by the preferred remedial alternative will cover the former sanitary waste lagoons on the Site. Because the lagoons will be closed with some solid wastes remaining in situ, the Virginia Solid and Hazardous Waste Management Regulations pertaining to the installation and maintenance of a final cover over a sanitary landfill, 9 VAC 20-80-250E.1.b and 250F.1, are relevant and appropriate. Given that the Surface Cap will incorporate a gas venting system, Virginia's regulations pertaining to the control of decomposition gases at sanitary landfills, specifically methane, set forth at 9 VAC 20-80-280A and 280E, are relevant and appropriate.

It is anticipated that the construction of the Surface Cap may result in fugitive dust emissions during the movement of shallow soils at the Site. Although the EPA has determined that the soils to be utilized in the construction of the Cap are uncontaminated, this activity will be subject to the emission standards for particulate matter at 40 C.F.R. §§ 50.6 and 50.7.

All work at the Site will be performed in accordance with the minimum standards for soil

stabilization and sedimentation control as established by the Virginia Erosion and Sediment Control Regulations, at 4 VAC 5–30-40, and adopted in Westmoreland County's erosion and sedimentation control program.

Surface runoff from the Site during and after the work will be controlled to prevent nonpoint source pollutant loads from exceeding historical levels, consistent with the Virginia Stormwater Management Regulations at 4 VAC 3-20-60 and Westmoreland County's storm water management program. Stormwater drainage features will be constructed to provide non-erosive flow velocities consistent with the Virginia Stormwater Management Regulations at 4 VAC 3-20-60. Drainage features will use existing natural drainage channels to the maximum extent possible in accordance with 4 VAC 3-20-60.

To-Be-Considered Materials

Under all of the Alternatives, the disposition of any wastes generated during groundwater monitoring will be conducted in accordance with Virginia's Investigative Derived Waste Policy.

Summary

Each of the three Alternatives evaluated would comply with their respective ARARs.

C. Long-Term Effectiveness for Meeting Remedial Action Objectives and Permanence

This criteria examines the ability of the remedy to maintain reliable protection of human health and the environment over time once the cleanup goals are achieved.

Alternative No. 1, the pump and treat system, has been successfully utilized at many other hazardous waste sites. Air stripping is an effective method of permanently removing VOCs from groundwater. However, maintaining the long-term effectiveness of the pump and treat system will be significantly more costly than a remedy based on PRSB technology, because of the greater operation and maintenance costs associated with a pump and treat system.

There is less field data available about the long-term effectiveness of PRSB technology, although EPA is confident that Alternatives No. 2 and No. 3 will permanently eliminate VOCs in the groundwater to below the applicable MCLs. Both PRSB systems will function effectively with little maintenance.

D. Reduction of Toxicity, Mobility and Volume

Section 121(b) of CERCLA, 42 U.S.C. § 9621(b), establishes a preference for remedial actions which include treatment that permanently and significantly reduces the toxicity, mobility, or volume of contaminants. All of the Alternatives would permanently and significantly reduce

the toxicity, mobility and volume of contaminants in the groundwater at the Site. However, EPA has concluded that a PRSB system is superior to the pump and treat system in terms of the reduction of toxicity and volume of contaminants, because in contrast to the groundwater pump and treat system, the PRSB is not adversely affected by the complex flow regimes and soil heterogenity seen at the Site. The PRSB technology will work in concert with the natural flow within the shallow aquifer to intercept and degrade the contaminants. In addition, in a PRSB system reductive dechlorination reduces toxicity as the compounds of concern are reduced to non-toxic constituents. In comparison, Alternative No. 1, the pump and treat system, merely transfers the contaminants from one phase (water) to another (air).

E. Short-Term Effectiveness

The short-term effectiveness of Alternative No. 1 is inferior to Alternatives No. 2 and No. 3. Implementation of the pump and treat system in Alternative No. 1 would entail potential exposures to contaminants during the handling of contaminated groundwater at the surface, the disposition and treatment of residual wastes and air emissions, and the monitoring of a point source discharge into the Scates Branch. The time required to implement Alternative No. 1 was estimated as one year in the 1991 ROD.

Alternative No. 2 provides for the installation of the PRSB-Only system that will treat contaminated groundwater below the surface. The final design of the PRSB system was completed in April, 2001. The time necessary to implement Alternative 2 is estimated to be 6.5 months. Alternative No. 2 would achieve good short-term effectiveness and there will be little potential for significant exposure to contaminants during the installation of the PRSB system. Potential for significant exposure to Site-related contaminants during the operation of the PRSB system is expected to be minimal.

Alternative No. 3, the PRSB/Cap system augments the PRSB system described in Alternative No. 2 with a 4.5 acre impermeable cap on surface soil at the Site. The final design of the PRSB/Cap system was completed in April, 2001. The time necessary to implement Alternative No. 3 is estimated to be 6.5 months. Alternative No. 3 will achieve good short-term effectiveness and there will be little potential for significant exposure to contaminants during the construction of the PRSB/Cap system. The potential for significant exposure to Site-related contaminants during the operation of the PRSB/Cap system is expected to be minimal.

F. Implementability

This evaluation criterion addresses the difficulties and unknowns associated with implementing the cleanup technologies associated with each Alternative, including the ability and time necessary to obtain required permits and approvals, the availability of services and materials, and the reliability and effectiveness of monitoring.

Alternative No. 1, the pump and treat system, has been successfully utilized at many

other hazardous waste sites. Air stripping is an effective method of permanently removing VOCs from groundwater.

Although the PRSB technology at the heart of Alternatives No. 2 and No. 3 has less of a field tested record than the pump and treat system, it has been used at other sites to successfully treat contaminated groundwater in-situ. The first PRSB system was constructed in 1991 as a field trial, followed by two other installations in early 1995. During the past five years a significant number of full scale and pilot systems have been installed. Moreover, both Alternatives No. 2 and No. 3 may be implemented more quickly than Alternative No. 1.

Alternative No. 3, the PRSB/Cap system, is a combination of proven technologies used to treat contaminated groundwater in-situ and to reduce the infiltration of groundwater to the subsurface. PRSB technology has been tested at several sites. The installation of the cap will involve well known construction methods. The necessary contractors and materials to install the cap are readily available.

Worker exposure and protective equipment requirements for construction activities can be readily achieved for each of the Alternatives, and appropriate measures to control dust will be employed.

G. Cost

This criterion examines the estimated capital, operation and maintenance, and net present worth costs. The present worth analysis is used to evaluate expenditures that occur over different time periods by discounting all future costs to a common base year, usually the current year. This analysis allows the cost of remedial action alternatives to be compared on the basis of a single figure representing the amount of money that, if invested in the basis year and disbursed as needed, would probably be sufficient to cover all costs associated with the remedial action over its planned life.

The total construction cost estimate for each Alternative considered the costs associated with mobilization, procurement and demobilization, site preparation and restoration, system construction, construction report, waste disposal, and license fees to calculate the total construction cost. Operation and maintenance costs were calculated for thirty years, as were compliance, monitoring and reporting costs. The Net Present Value for operation and maintenance, and compliance, monitoring, and reporting were calculated for each alternative assuming a 7% discount. Finally, the total remedy cost for each alternative was calculated by adding the (1) total construction cost, (2) the net present value for operation and maintenance costs, and (3) the net present value for compliance, monitoring, and reporting.

The present worth value for Alternative No. 1, the pump and treat system, is $5,843,000. The Alternatives based on PRSB technology are significantly less expensive. Alternative No. 2,

the PRSB-Only system, has a present worth value of $4,837,000. Alternative No. 3, the PRSB/Cap system, is even less expensive, with a present worth value of $3,866,000.

H. Community Acceptance

The EPA received public comments over a thirty-day period between July and August, 1991 and conducted a public meeting during that same period on the remedy reflected in the 1991 ROD, which included the pump and treat system (Alternative No. 1). There was little public participation in response to the proposed ROD remedy and the EPA did not receive objections to the groundwater component of the remedy.

In 1998, the EPA invited public comment on the modification of the groundwater remedy to implement a PRSB system rather than a pump and treat system at the Site. Again, the EPA did not receive any objections to this modification of the groundwater remedy.

On August 8, 2001, pursuant to Section 113(k)(2)(B)(i)-(v) of CERCLA, 42 U.S.C. § 9613(k)(2)(B)(i)-(v), the EPA released for public comment the Administrative Record including the proposed Amendment to the ROD setting forth EPA's preferred remedial amendment for the Arrowhead Plating Superfund Site. EPA made these documents available to the public in the Administrative Record located at the EPA Region III offices, Philadelphia, PA, and at the Office of the Westmoreland County Administrator, Peach Grove Lane, Montross, VA. The notice announcing the availability of the proposed Amendment to the ROD and public meeting was published in the Westmoreland News on August 8, 2001 and in the Northern Neck News on August 9, 2001.

A public comment period was held from August 8, 2001 to September 6, 2001. The EPA conducted a public meeting in Montross, Virginia on August 16, 2001 to discuss the proposed Amendment. Representatives from EPA answered questions about conditions at the Site and the remedial alternatives under consideration. EPA's responses to the comments received during the public comment period are included in the Responsiveness Summary, which is included in this ROD Amendment.

I. State Acceptance

The VDEQ has concurred with the selected Amendment to the ROD.

J. Summary of Evaluation of the Nine Criteria

In consideration of the foregoing criteria, the EPA has concluded that Alternative No. 3, a PRSB system installed in combination with a Surface Cap, will provide a more effective means of treating groundwater than the previously selected PRSB system alone. The primary advantage of utilizing a Surface Cap at the Site is that it will reduce the infiltration of precipitation into the

subsurface. Less surface infiltration will reduce the groundwater flow passing through the PRSB system. Diminished groundwater flow velocities will allow greater time for VOC reduction through oxidation reduction reactions, as well as permit the use of a thinner PRSB to achieve the required reductions in VOC concentrations. Accordingly, the installation of a Surface Cap will result in a more efficient and cost-effective PRSB system. According to Saltire's PRSB design analysis, if a Surface Cap is installed, then the thickness of the PRSB system at the Site need only be 3 to 4.5 inches thick, rather than 12 to 15 inches thick, in order to reduce VOC concentrations below the cleanup standards for the Site.

VIII. STATUTORY DETERMINATIONS

EPA's primary responsibility at Superfund sites is to select remedial actions that are protective of human health and the environment. Section 121 of CERCLA, 42 U.S.C. § 9621, also requires that the selected remedial action comply with ARARs, be cost-effective, and utilize permanent treatment technologies to the maximum extent practicable. Additionally, the statute includes a preference for remedies that permanently and significantly reduce the volume, toxicity or mobility of the hazardous substances. The following sections discuss how the selected remedy for the Site meets these statutory requirements.

A. Protection of Human Health and the Environment

The amended groundwater remedy protects human health and the environment by controlling exposure to contaminated groundwater through the in situ treatment of groundwater to reduce contaminant concentrations below health based clean up levels. Institutional Controls will be implemented to prevent the use of contaminated groundwater.

B. Compliance with and Attainment of Applicable or Relevant and Appropriate Requirements

The amended groundwater remedy will comply with all chemical-specific, location-specific and action-specific ARARs.

C. Cost-Effectiveness

The selected remedy provides the best overall protection in proportion to cost and it meets all other requirements of CERCLA. Section 300.430(f)(ii)(D) of the NCP requires EPA to evaluate cost-effectiveness by comparing all of the alternatives which meet the threshold criteria – overall protection of human health and the environment and compliance with ARARs – against three additional balancing criteria: long-term effectiveness and permanence; reduction of toxicity, mobility or volume through treatment; and short-term effectiveness. In EPA's judgment, the selected remedy (Alternative No. 3) is the most cost-effective of the remedial alternatives. The estimated present worth cost for the amended remedy is $3,866,000, and it is less expensive than the other remedial alternatives.

D. Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

Alternative No. 3 provides a permanent remedy by relying on PRSB technology to degrade contaminants in the groundwater to concentrations below health based levels. In addition to groundwater treatment, this Alternative provides for long-term environmental monitoring and institutional controls to provide the necessary level of protection of human health and the environment. EPA has determined that the selected remedy provides the best balance in terms of short-term effectiveness, long-term effectiveness, implementability, cost, reduction in toxicity, mobility, and volume, and community and state acceptance.

E. Preference for Treatment as a Principal Element

The selected remedy does employ treatment, via a PRSB, as a principle element. Because all of the alternatives offer a comparable level of protection of human health and the environment, the EPA has selected Alternative No. 3, which can be implemented quickly, will have no adverse effects on the nearby community, and will cost considerably less than the other alternatives.

IX. DOCUMENTATION OF SIGNIFICANT CHANGES

This Amendment to the Record of Decision does not incorporate any signficant changes to the proposed remedy described in the Proposed Plan issued on August 8, 2001.

X. RESPONSIVENESS SUMMARY

Comments received by EPA during the public comment period on the Proposed Plan for the Arrowhead Plating Superfund Site (Site) are summarized in this Responsiveness Summary. The comment period was open from August 8, 2001 to September 6, 2001.

Oral comments relating to the Proposed Plan were presented at a Public Meeting held in Montross, Virginia on August 16, 2001. Additionally, EPA received two pieces of correspondence from private citizens and one letter from the Montross-Westmoreland Sewer Authority during the public comment period.

The questions raised at the Public Meeting and the EPA's responses to these questions are summarized below.

QUESTION 1: A community member asked if the contaminated groundwater from the Site was discharging into the Nomini Creek.

EPA RESPONSE: No contaminated groundwater from the Site is discharging into the Nomini Creek. Groundwater from the Site discharges into the North Fork Scates Branch,

the Mid Fork, and the South Fork Scates Branch. The North Fork Branch is located northeast of the Site. The Mid Fork, a tributary of the South Fork Scates Branch, and South Fork Branch are located southeast of the Site. About 1,500 feet from the Site, the North Fork Scates Branch and the South Fork Scates Branch join to become Scates Branch. The Scates Branch flows northeast to the Weavers Millpond Lake. The Weaver Millpond Lake discharges to the east-flowing Pierce Creek, which discharges into Nomini Bay. Surface water samples have been collected between 1990 and 2000 to evaluate potential Site impacts on surface water quality. Samples were collected from North Fork Scates Branch, the Mid Fork, the Scates Branch and from Weavers Millpond Lake. Sample result identified volatile organic compound ("VOC") concentrations in excess of the criteria established in the Record of Decision ("ROD"). These exceedances, however, were limited to the immediate areas where the groundwater discharges to surface water. Downstream in the North Scates, Mid Fork, South Fork Branch, the Scates Branch, and Weaver Millpond Lake, VOC concentrations were well below the ROD criteria. There were no elevated levels of other contaminants in the streams and lake. Nomini Creek is located several miles east of the Site.

QUESTION 2: A community member asked if there are metals in the groundwater at the Site.

EPA RESPONSE: There are elevated concentrations of metals in the Yorktown/Eastover aquifer, the uppermost aquifer. However, the metals in the groundwater are limited in extent and are not mobile. Institutional controls, which will prohibit the use of water from the contaminated aquifer, will be implemented at the Site.

QUESTION 3: A community member asked if the Permeable Reactive Subsurface Barrier ("PRSB") has been used successfully at other sites.

EPA RESPONSE: Since 1991, thirty-five full scale and 17 pilot scale PRSBs have been constructed at site throughout the U.S and in other countries.

QUESTION 4: A community member asked if the ROD was signed in 1991, why has it taken so long to clean up the Site.

EPA RESPONSE: After the ROD was signed in September 1991, EPA began negotiating a Consent Decree with Scovill on May 29, 1992. A Consent Decree is a legal document, approved and issued by a judge, which in this case, formalizes an agreement reached between EPA, the Commonwealth of Virginia, and a potentially responsible party ("PRP") where PRP will perform all or part of a Superfund site cleanup. Scovill's parent company, First City Industries, was undergoing a reorganization in 1992 and 1993, which resulted in an extended period of negotiations. Scovill signed the Consent Decree in 1994, and the Consent Decree was approved and issued by a judge in September 1995.

Scovill submitted the remedial design work plan for the cleanup of the Site to EPA in September 1995. From 1996 to 1997, Scovill, whose name was changed to Saltire, performed

pre-remedial design field investigations at the Site. Scovill completed an aquifer study a pilot study and bench scale ion exchange study, and collected additional surface water samples in 1997. In December 1998, Saltire submitted a proposal to EPA to modify the groundwater component of the selected remedy from a groundwater pump and treat system to an innovative technology, the Permeable Reactive Subsurface Barrier ("PRSB"). EPA approved the use of the PRSB system in an Explanation of Significant Differences ("ESD") issued on September 15, 1998. In 1999, Saltire constructed the soil vapor extraction system, and began removing solvent from soil located under the manufacturing building using a soil vapor extraction system. After EPA approved the ESD, Saltire continued to evaluate the Site, and in October 2000, Saltire proposed increasing the functionality and cost-effectiveness of the PRSB system by adding a Surface Cap to the Site. The information from Saltire's additional evaluations provide the basis for EPA's reconsideration of the groundwater remedy selected for the Site.

QUESTION 5: A community member asked what is groundwater.

EPA RESPONSE: Groundwater is water found beneath the earth's surface in pores between materials like sand, soil, or gravel. In aquifers, groundwater occurs in sufficient quantities that it can be used for drinking water, irrigation, and other purposes.

QUESTION 6: A community member asked how fast groundwater moves.

EPA RESPONSE: Groundwater moves relatively slowly. At the Site, groundwater was probably contaminated in the 1980's; yet it has only moved approximately 500 yards.

QUESTION 7: A community member asked how the PRSB will be constructed, and how deep it will be.

EPA RESPONSE: The PRSB will be installed with injection wells. The iron filings are blended with a food-grade viscous gel and injected along the entire length of the well casing. Many wells are injected with the iron-gel mixture to form a continuous PRSB. The gel biodegrades into water and sugars, leaving in place a permeable iron reactive treatment wall. The PRSB will extend to a depth ranging from 20 feet to 42 feet below the surface.

QUESTION 8: One of the community members asked exactly how will the PRSB treat contaminated groundwater.

EPA RESPONSE: The PRSB System will be constructed perpendicular to the direction of groundwater movement. As contaminated groundwater passes through the PRSB, VOCs will react with the iron filings and chemically degrade in oxidation reduction reactions. The end products of these reactions are relatively harmless compounds such as carbon dioxide, water and biodegradable hydrocarbons.

QUESTION 9: A representative from the Montross-Westmoreland Sewer Authority

stated that two sewage ponds are located on the Site and asked if these ponds could be closed under the Superfund program.

EPA RESPONSE: At the Public Meeting, EPA stated that the ponds cannot be closed under the Superfund Program because the ponds did not receive hazardous waste, but sanitary waste from the Mattatuck operations. However, since the ponds have to be closed out in order to allow the selected remedy to be implemented, EPA will ensure that the sewage ponds are closed in accordance with state solid waste requirements.

QUESTION 10: The Virginia Department of Environmental Quality ("VDEQ") asked the Montross-Westmoreland Sewer Authority to accept and treat wastewater from the two sewage lagoons. The Sewer Authority declined to accept the wastewater because it has elevated concentrations of metals. A representative from the Montross-Westmoreland Sewer Authority asked if EPA will consider another ways of disposing of the wastewater.

EPA RESPONSE: Yes. The sewage ponds will have to be removed in order to construct the Cap component of the selected remedy. EPA is working with the VDEQ and the companies involved to arrange another way to dispose of the wastewater.

QUESTION 11: A community member said that a lot of people who live in the area use groundwater and asked if their wells were being affected by the contaminated groundwater at the Site.

EPA RESPONSE: No. EPA has no data suggesting that local drinking water wells have been affected by the contaminated groundwater at the Site. The vertical and horizontal extent of groundwater contamination was determined during the remedial investigation and the subsequent pre-remedial investigation. Contaminated groundwater is mainly confined to the Site. Groundwater moves east of the site and discharges to the North Fork Branch, the Mid Fork Branch and the South Fork Branch. Some contaminated groundwater has moved onto the adjacent farm land which is east of the Site. No contaminated groundwater is moving north, west or south of the Site. Moreover, only a few businesses are located to the north and south in the vicinity of the Site. To the extent that some homes are located north and south of the Site, these homes are further away from the Site. Farm land lies to the west of the Site.

QUESTION 12: A community member asked if groundwater from the site was contaminating her lake, which is located west of the Site.

EPA RESPONSE: No. Groundwater is moving east from the Site.

In addition to those questions asked and responded to at the August 16 meeting, additional written comments/questions were received during the Public Comment Period. The following discussion summaries the additional comments/questions received and EPA's responses.

QUESTION 13: A community member asked when the community might expect the final clean up to take place.

EPA RESPONSE: Construction will begin on the new PRSB and the cap immediately after removal of the waste water from the lagoons. Construction is expected to be completed by the fall of 2002.

QUESTION 14: A community member asked if there any roadblocks anticipated.

EPA RESPONSE: The removal of the wastewater from the two sewage wastewater ponds is a potential roadblock.

QUESTION 15: A community member said that she heard from a town employee that the company doesn't have money for the cleanup and she asked what will happen at the Site if this is true.

EPA RESPONSE: Saltire has entered into a Consent Decree with EPA in which it has committed to conduct the clean up of this Site. Since the remedy selected in this ROD Amendment is less expensive than the previously selected remedy, EPA believes Saltire will follow through on its commitment. If, for some reason, financial difficulties prevent Saltire from performing this work at a later date, EPA could use money from the Federal Superfund to complete the work. However, Saltire has assured EPA that it can finance the project.

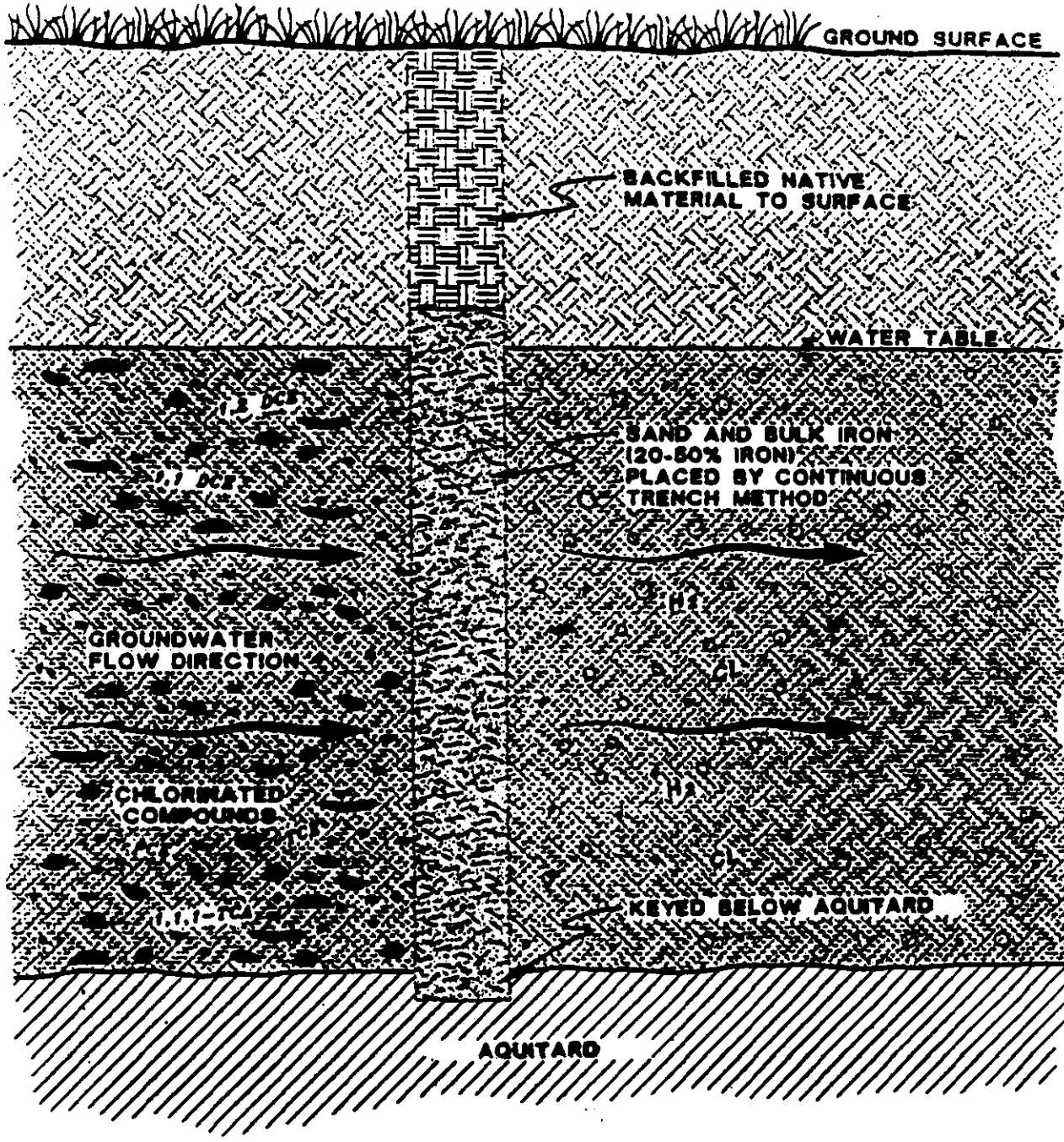
QUESTION 16: In a letter a community member asked is the "new system" proven by anyone other than the manufacturers of the system.

EPA RESPONSE: Since 1991, thirty-five full scale and 17 pilot scale PRSBs have been constructed at site throughout the U.S and in other countries.

QUESTION 17: A resident commented that EPA was trying to save the contractor money on the clean up rather than being concerned about the welfare of the people in Westmoreland County.

EPA RESPONSE: While it is true that the revised remedy is less costly than the original pump and treat remedy, as well as less expensive than a PRSB system standing alone, the revised remedy is as equally protective. The combination of a Cap and PRSB will provide a cost-effective approach for containing and treating contaminated groundwater before it leaves the Site. The revised remedy is protective of both human health and the environment.

ZERO VALENT IRON CONTINUOUS PERMEABLE TREATMENT WALL PROCESS FLOW DIAGRAM



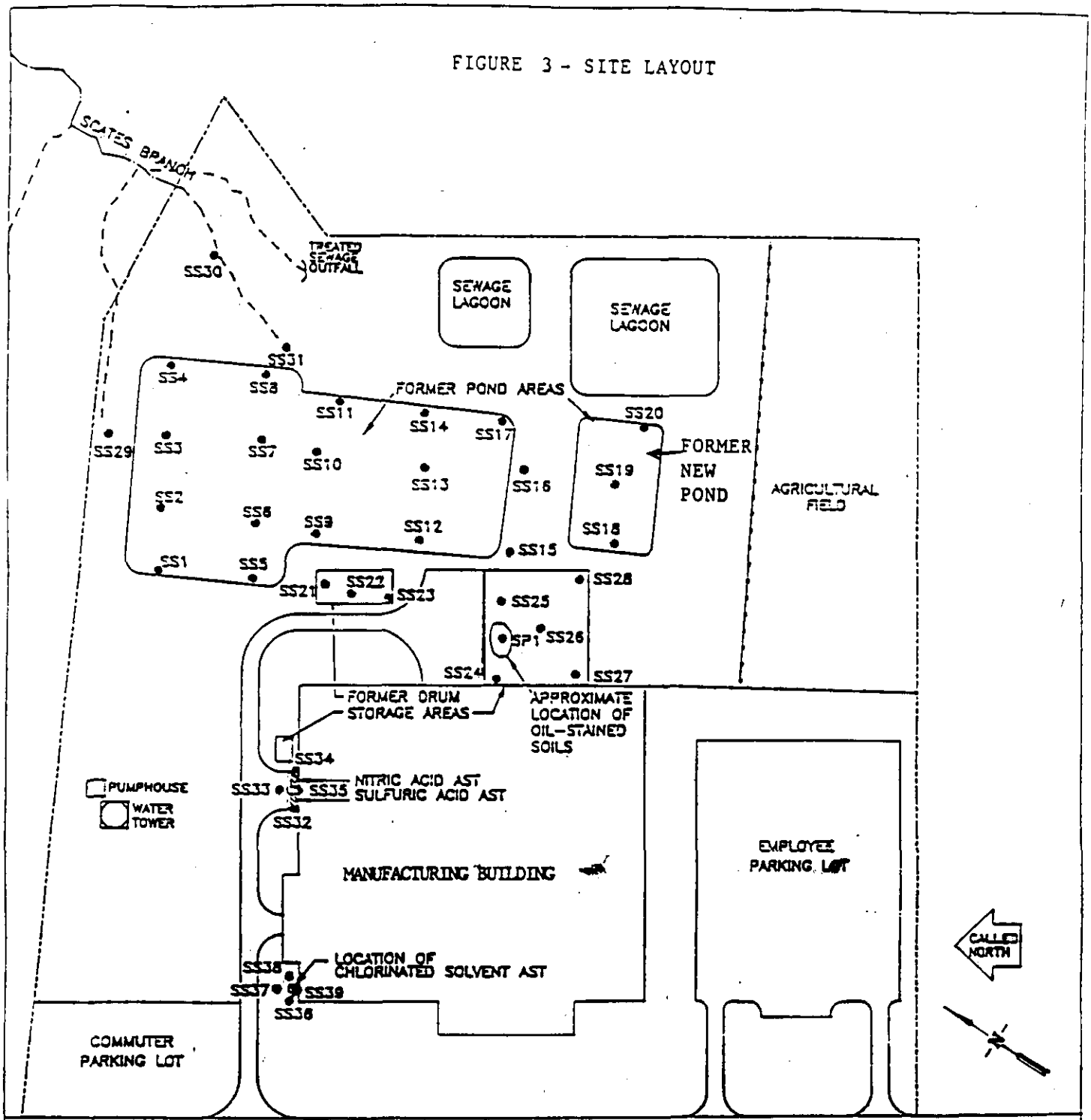
Figure

Site Location
Arrowhead Plating Site

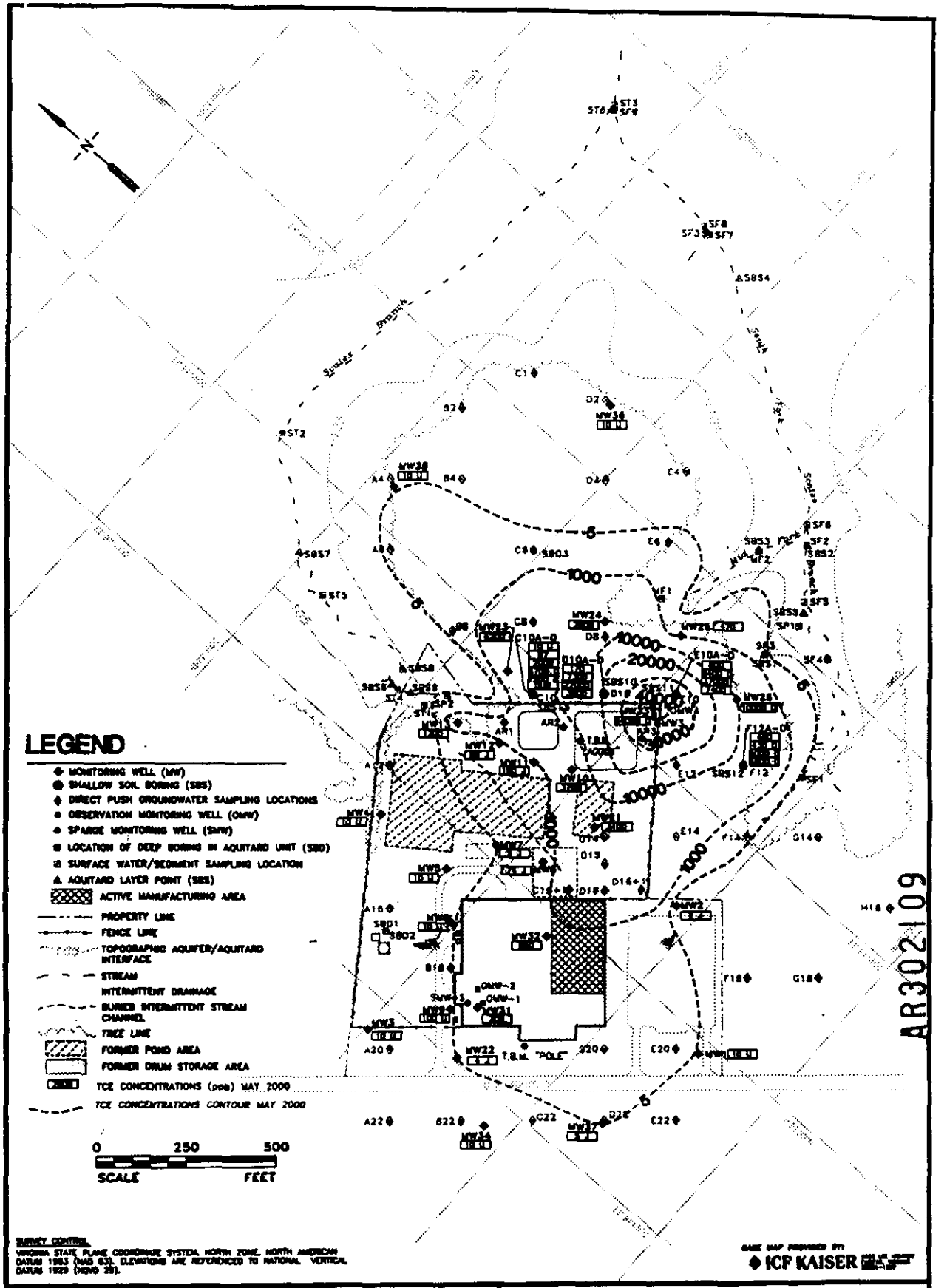
Figure 2

Source: U.S. Department of the Interior, Geological Survey, Monroeso Quadrangle, Virginia, 7.5-minute topographic 1968, photorevised 1987.

FIGURE 3 - SITE LAYOUT



AR302108



SURVEY CONTROL
VIRGINIA STATE PLANE COORDINATE SYSTEM, NORTH ZONE, NORTH AMERICAN DATUM 1983 (NAD 83). ELEVATIONS ARE REFERENCED TO NATIONAL VERTICAL DATUM 1929 (NGVD 29).

BASE MAP PROVIDED BY:
ICF KAISER

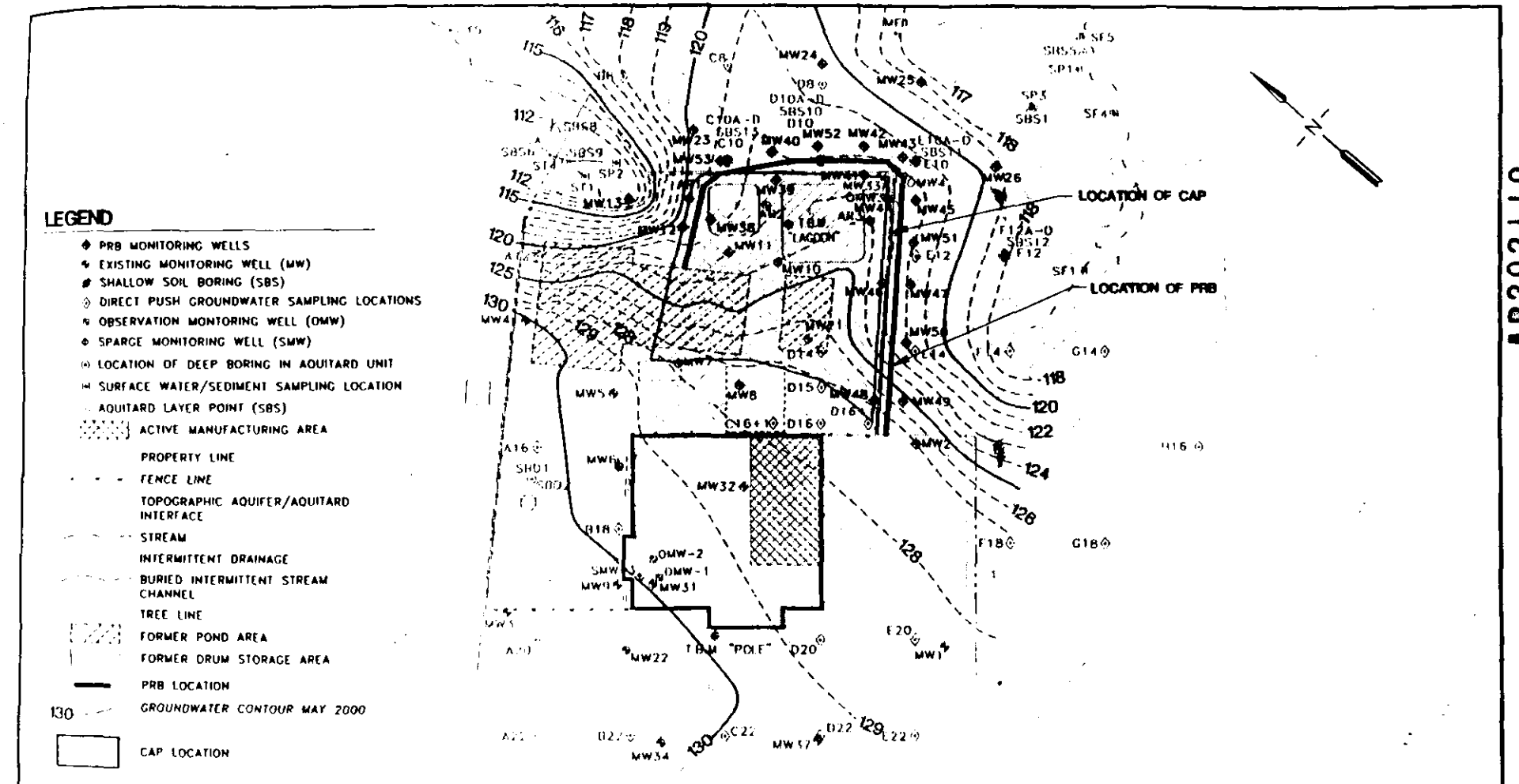
CLIENT/PROJECT
SALTIRE INDUSTRIAL, INC/
ARROWHEAD PLATING SITE
MONTROSS, VA

GOLDER SIERRA Atlanta, Georgia

TITLE
TCE CONCENTRATION CONTOUR MAP (MAY 2000)

DATE	DRAWN	CHECKED	REVISED
6/20/00	MAT	KIO	

SCALE	FILE NO.	JOB NO.	DWG NO.	SUBTITLE	REV. NO.	FIGURE
1:250	1100-C23.dwg	996-1100	1100-C23		A	4



NOTE: TOPOGRAPHIC SURVEYING SERVICES PROVIDED BY BALDWIN & GREGG, LTD NORFOLK, VA (DECEMBER 2000)

GOLDER SIERRA
Atlanta, Georgia

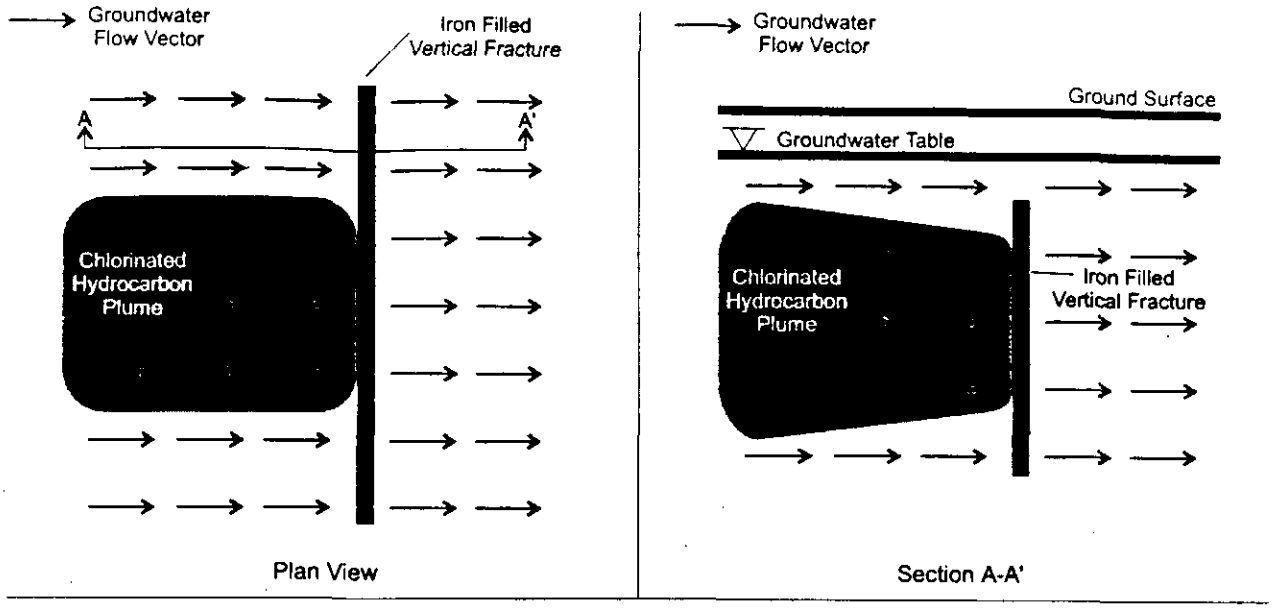
1100-C36
C
10/20/00
MAT

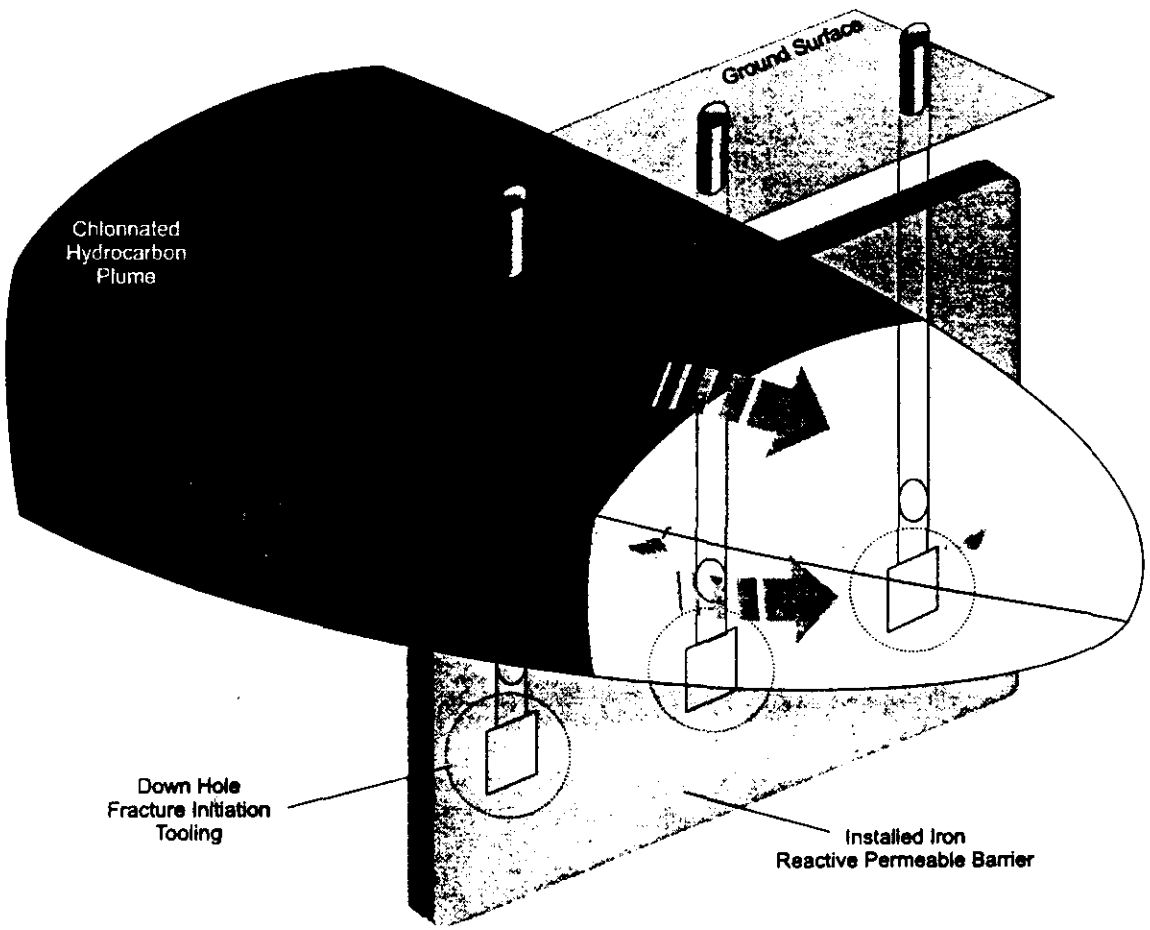
SALTIRE INDUSTRIAL, INC/
FORMER ARROWHEAD PLATING FACILITY
MONTROSS, VA

PRB ALIGNMENT, IMPERMEABLE CAP AND MONITORING WELLS LOCATION PLAN

5

AR302110





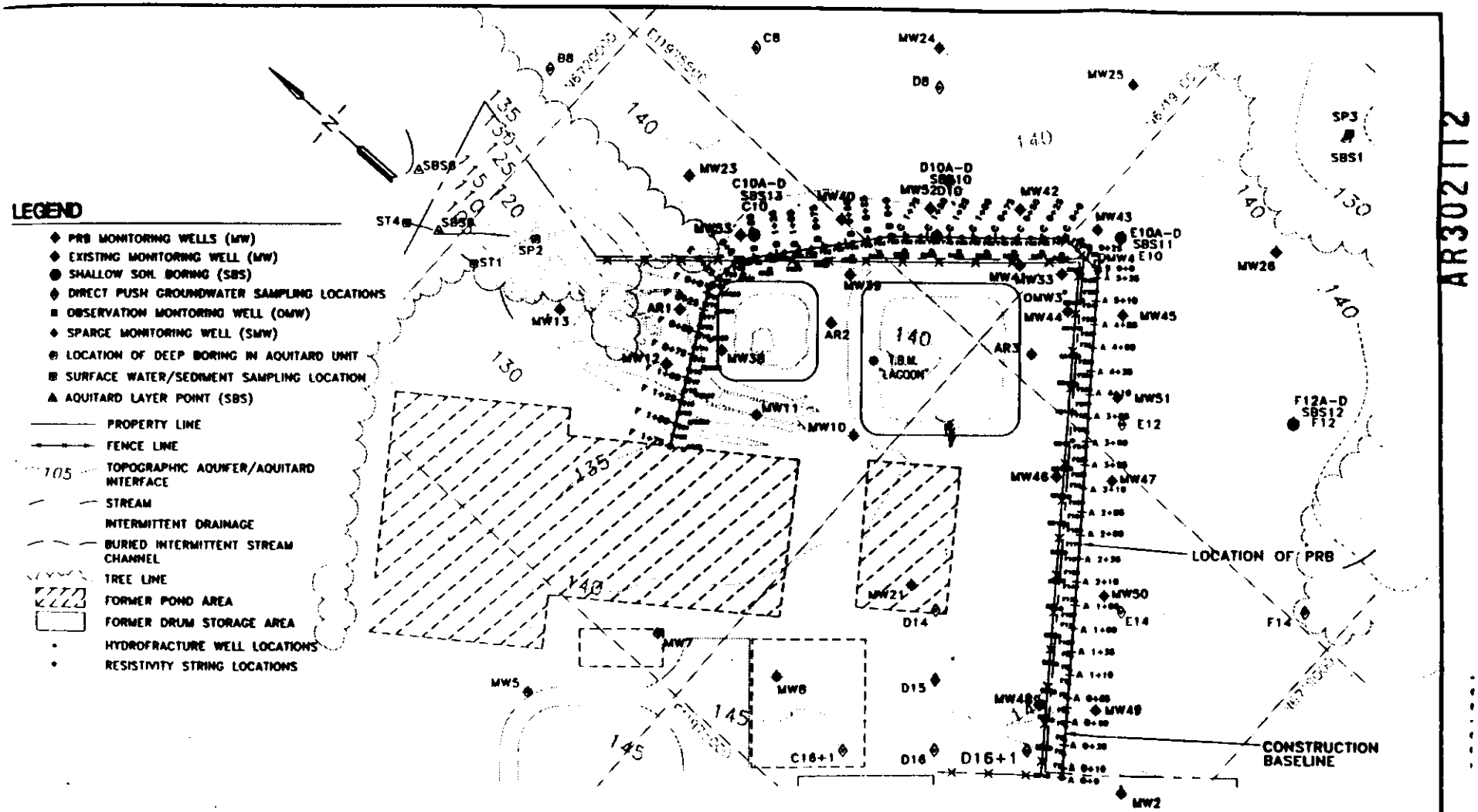
AR302111

GOLDER SIERRA Atlanta, Georgia

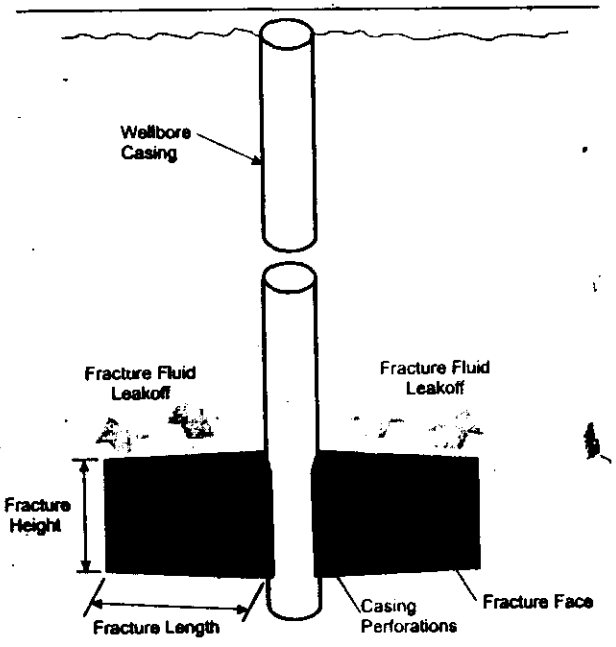
TITLE: VERTICALLY ORIENTATED HYDRAULIC FRACTURE PLACED IRON REACTIVE PERMEABLE BARRIER

CLIENT/PROJECT: Golder Sierra/Internal Document

DRAWN	BSL	DATE	7/31/00	JOB NO.	996-1100
CHECKED	RIO	SCALE	NTS	DWG NO.	REV. NO.
REVIEWED		FILE NO.	PR-D136.cdr	SUB TITLE	FIGURE NO


LEGEND
PRB MONITORING WELLS (MW)
EXISTING MONITORING WELL (MW)
SHALLOW SOIL BORING (SBS)
DIRECT PUSH GROUNDWATER SAMPLING LOCATIONS
OBSERVATION MONITORING WELL (OMW)
SPARGE MONITORING WELL (SMW)
LOCATION OF DEEP BORING IN AQUITARD UNIT
SURFACE WATER/SEDIMENT SAMPLING LOCATION
AQUITARD LAYER POINT (SBS)
PROPERTY LINE
FENCE LINE
TOPOGRAPHIC AQUIFER/AQUITARD INTERFACE
STREAM
INTERMITTENT DRAINAGE
BURIED INTERMITTENT STREAM CHANNEL
TREE LINE
FORMER POND AREA
FORMER DRUM STORAGE AREA
HYDROFRACTURE WELL LOCATIONS
RESISTIVITY STRING LOCATIONS
LOCATION OF PRB
CONSTRUCTION BASELINE
I.B.M. LAGOON
0 100 200
SCALE FEET
NOTE: TOPOGRAPHIC SURVEYING SERVICES PROVIDED BY: BALDWIN & GREGG, LTD NORFOLK, VA (DECEMBER 2000)
HOLDER SIERRA
Atlanta, Georgia
1100-C48F53
1/18/01
MAT
SALTIRE INDUSTRIAL, INC./ FORMER ARROWHEAD PLATING FACILITY MONTROSE, VA
PERMEABLE REACTIVE BARRIER (PRB) LOCATION PLAN
7

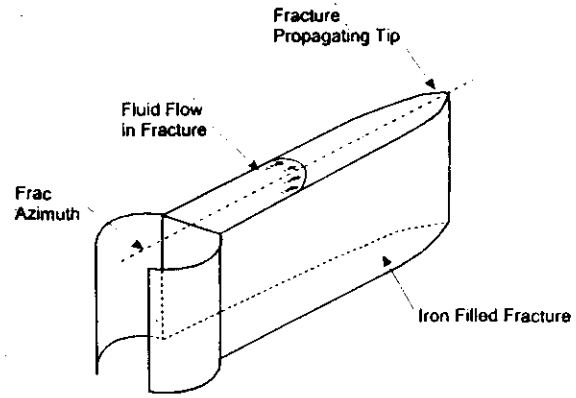
AR302112



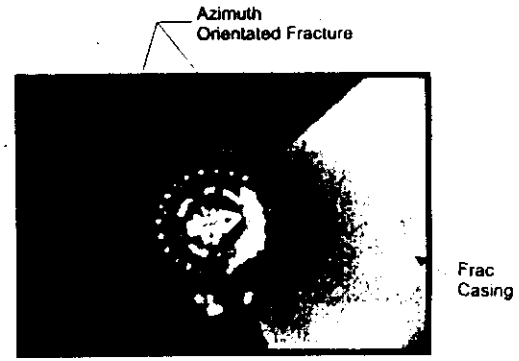
Hydraulic Fracture Propagating From
Wellbore Frac Casing

Uncrosslinked Fluid
(Mechanical Agitation Required for Iron Suspension)

Crosslinked Iron Gel Fluid



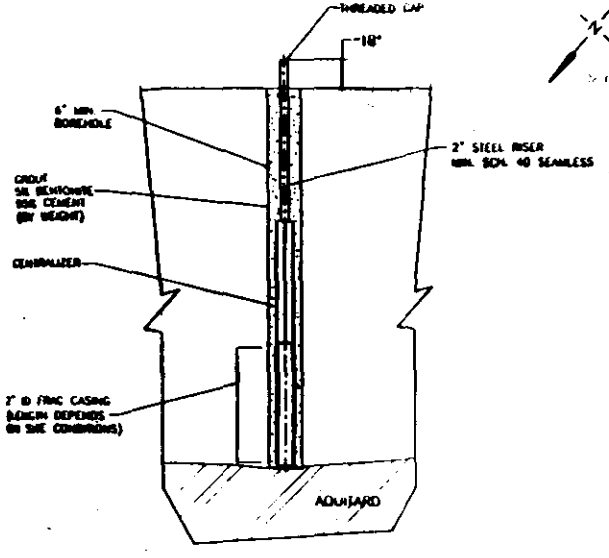
Fluid and Proppant Flow
In Vertical Hydraulic Fracture



Downhole Photograph of Azimuth
Orientated Vertical Fracture

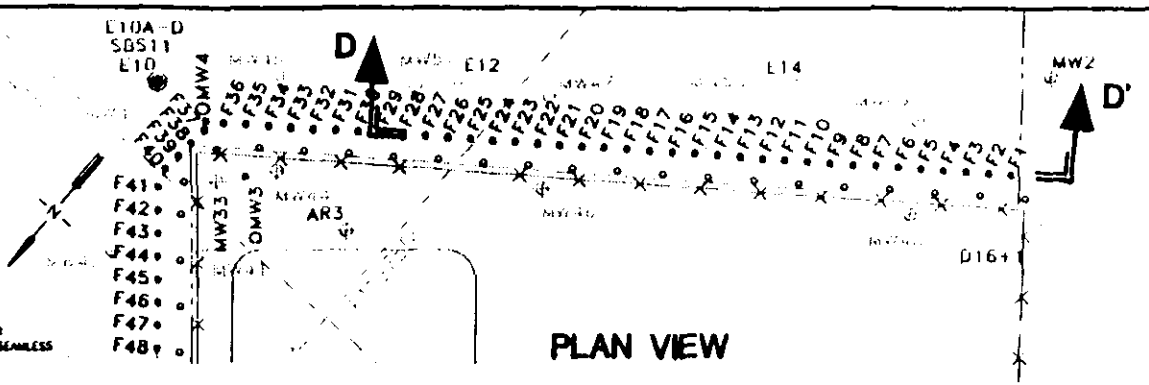
AR302113

GOLDER SIERRA Atlanta, Georgia	DWG NO. 1100-D48 REV. NO. JOB NO. 996-1100 DATE 1/30/01 DRAWN MAT SCALE NTS CHECKED RIO FILE NO. 1100-D48.cdr REVIEWED	CLIENT/PROJECT SALTIRE INDUSTRIES, INC./ FORMER ARROWHEAD PLATING FACILITY MONTROSS, VA TITLE HYDRAULIC FRACTURE FLUID AND PROPPANT TRANSPORT	FIGURE NO 8

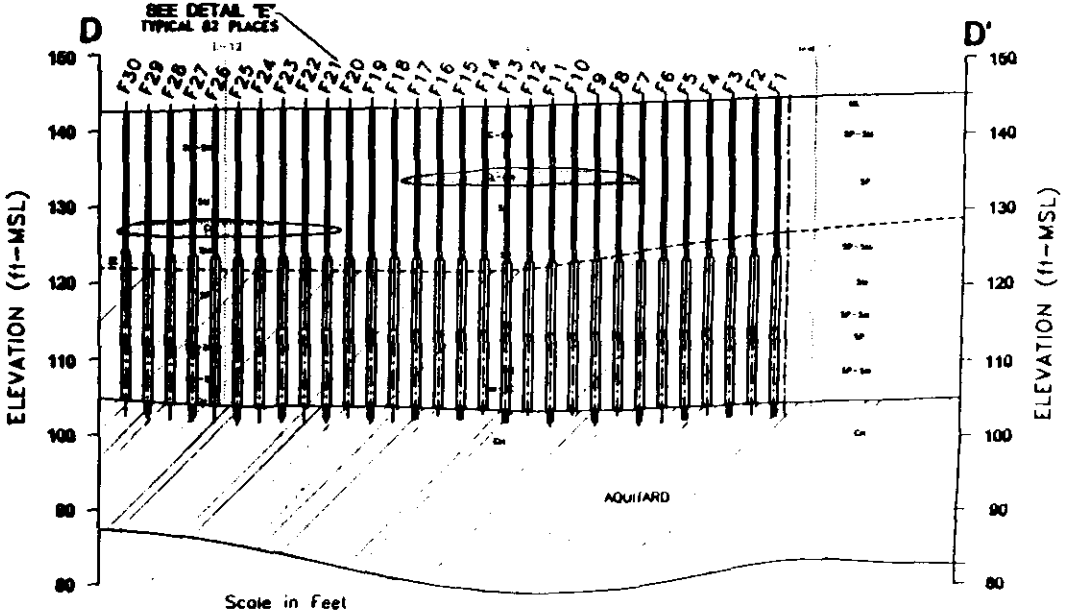


DETAIL "E" HYDROFRACTURE WELLS (F)

TYPICAL 82 PLACES
(NTS)



PLAN VIEW



CROSS SECTION D-D'

LEGEND

- GROUNDWATER LEVEL DATA (JUNE 1999)
- HYDROFRACTURE WELLS
- RESISTIVITY RECEIVER STRINGS
- MW46 MONITORING WELLS
- SPLIT SPOON SAMPLING
- FRAC CASING
- LOCATION OF PRB

GOLDER SIERRA
Atlanta, Georgia

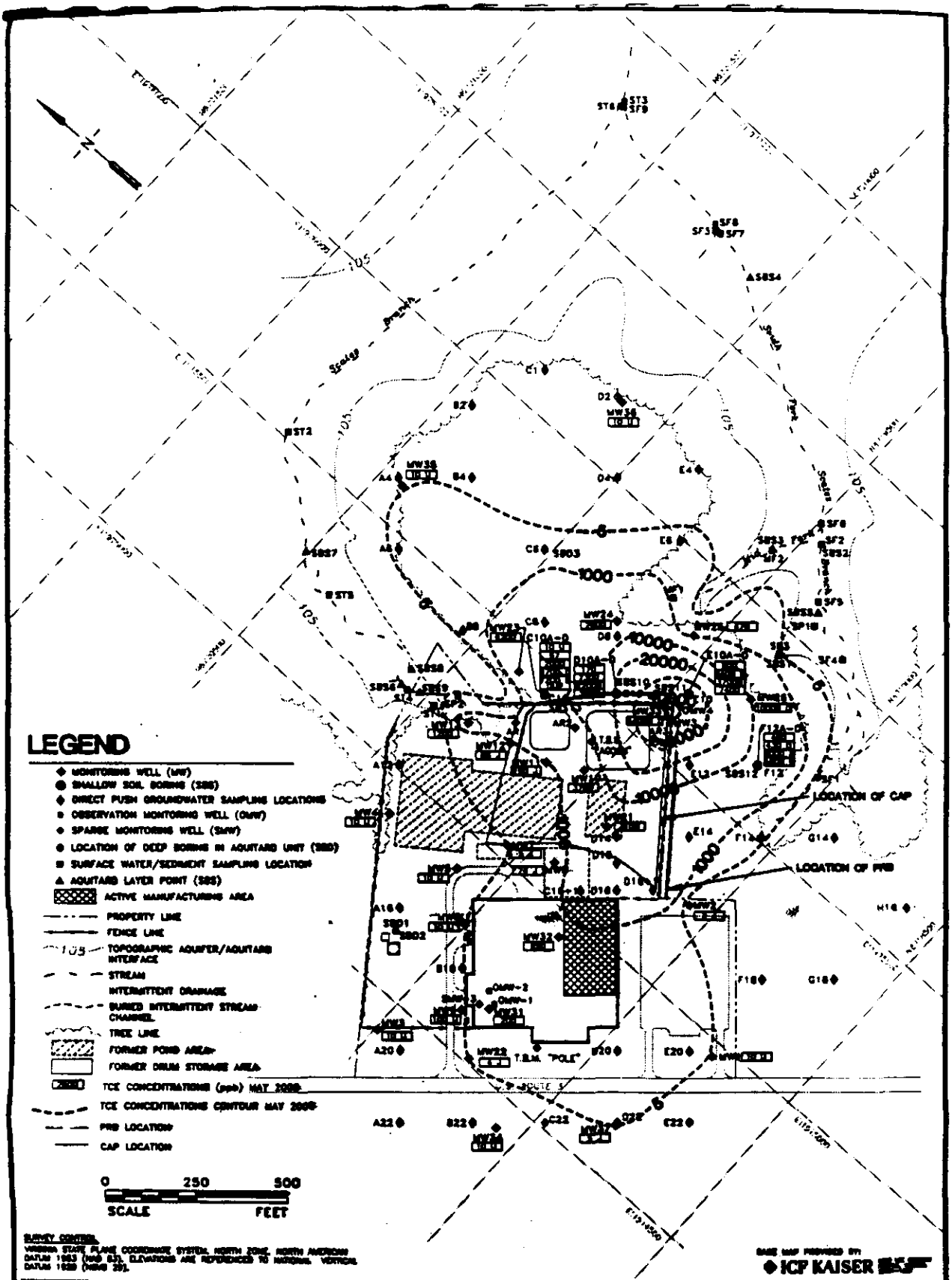
1100-C51F54
A
1/22/01
MAL
RIO

SALTIRE INDUSTRIES, INC.
FORMER ARROWHEAD PLATING FACILITY
MONTROSS, VA

HYDROFRACTURING WELL PLAN
AND INSTALLATION DETAIL

9

AR302174



CLIENT/PROJECT

SALTRE INDUSTRIAL, INC/
FORMER ARROWHEAD PLATING FACILITY
MONTROSS, VA

GOLDER SIERRA Atlanta, Georgia

TITLE

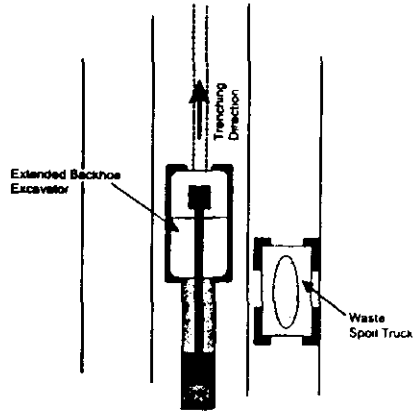
TCE CONCENTRATION CONTOUR MAP (MAY 2000)

DATE	DRAWN	CHECKED	REVIEWED
6/20/00	MAT	RIO	

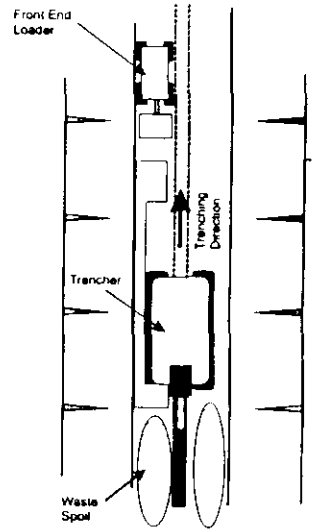
SCALE	FILE NO.	JOB NO.	DWG NO.	REVISION	REV. NO.	FIGURE
1:250	1100-C23.dwg	996-1100	1100-C23		C	11

AR302115

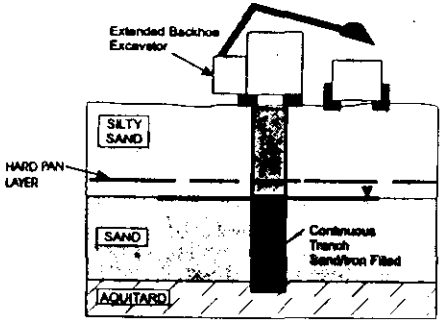
VARIOUS CONSTRUCTION TECHNIQUES



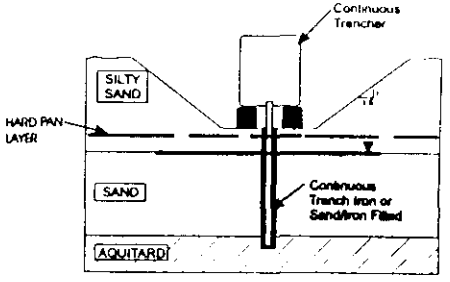
PLAN VIEW



PLAN VIEW



CROSS SECTION VIEW OF
CONTINUOUS SLURRY INSTALLATION



CROSS SECTION VIEW OF
CONTINUOUS TRENCHER INSTALLATION

GOLDER SIERRA
Atlanta, Georgia

DWG NO. 1100-D08	
REV. NO.	JOB NO. 996-1100
DATE 8/03/00	DRAWN MAT
SCALE	CHECKED RIO
FILE NO. 100-d08.cdr	REVIEWED

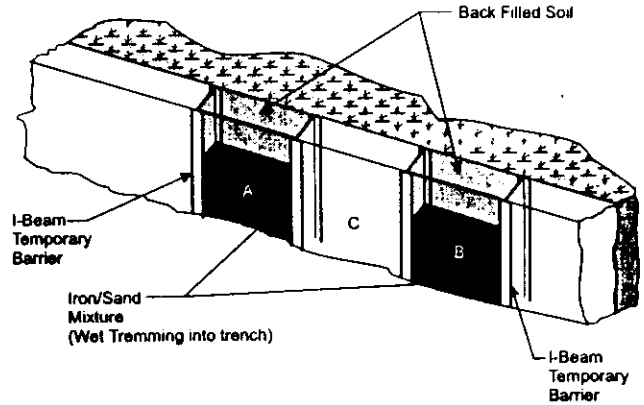
CLIENT/PROJECT
SALTIRE INDUSTRIAL, INC.
MONTROSS, VA

TITLE
SCHEMATIC AND CROSS-SECTION OF CONTINUOUS TRENCH PLACED REACTIVE WALL

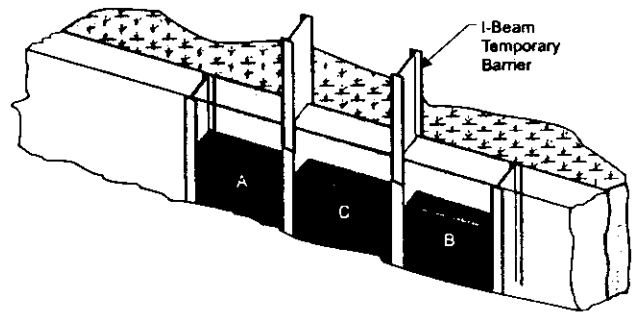
FIGURE NO. 11

Driving of Temporary I-Beam

Discrete Panel of
Trench Excavated



Interim Stage - Alternate Panel Construction



Finial Stage - Intermediate Panel Construction

AR302117

GOLDER SIERRA
Atlanta, Georgia

DWG NO. 1100-D10	
REV. NO.	JOB NO. 996-1100
DATE 7/26/00	DRAWN MAT
SCALE	CHECKED RIO
FILE NO. 1100-d10.cdr	REVIEWED

CLIENT/PROJECT
SALTIRE INDUSTRIAL, INC.
MONTROSS, VA

TITLE
SCHEMATIC AND CROSS-SECTION
OF CONTINUOUS SLURRY TRENCH
PLACED REACTIVE WALL

FIGURE NO. 12

COMMONWEALTH of VIRGINIA

James S. Gilmore, III
Governor

John Paul Woodley, Jr.
Secretary of Natural Resources

DEPARTMENT OF ENVIRONMENTAL QUALITY
Street address: 629 East Main Street, Richmond, Virginia 23219
Mailing address: P.O. Box 10009, Richmond, Virginia 23240
Fax (804) 698-4500 TDD (804) 698-4021
http://www.deq.state.va.us

Dennis H. Treacy
Director

(804) 698-4000
1-800-592-5482

September 28, 2001

Mr. Abraham Ferdas, Division Director
Hazardous Site Cleanup Division (3HS00)
U.S. Environmental Protection Agency, Region III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

RE: **Record of Decision Amendment for Operable Unit 2, Arrowhead Plating Site, Westmoreland County, Virginia**

Dear Mr. Ferdas:

The Virginia Department of Environmental Quality (VDEQ) staff has reviewed the Record of Decision Amendment for Operable Unit 2 of the Arrowhead Plating Facility, treatment of groundwater contamination. We concur with the selected remedial alternative as outlined in the document dated September 2001.

If you have any questions concerning this letter, please contact Thomas D. Modena, VDEQ Project Officer, at (804) 698-4183.

Sincerely,

Erica S. Dameron

Erica S. Dameron
Office Director
Office of Remediation Programs

cc: Ronnie M. Davis, EPA Region III
Karen Jackson Sismour, VDEQ
James J. Golden, PRO - VDEQ

AR302118