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October 17, 2003

Mr. Jeffrey L. Dyber, P.E.
NYSDEC
Bureau of Eastern Remedial Action
Division of Environmental Remediation
625 Broadway
Albany, New York 12233-7015

Re: Pall Corporation, 30 Sea Cliff Ave, Glen Cove, NY Site
IHWDS No. 1-30-053B
Final *In-Situ* Chemical Oxidation, Phase I Pilot Test Report

Dear Mr. Dyber,

Enclosed are two (2) copies of the final In-Situ Chemical Oxidation, Phase I Pilot Test Report for the above referenced facility. The revised report incorporates all comments received from the NYSDEC. We are in the process of finalizing the work plan addendum for the Phase II Pilot Test work and we will be forwarding the addendum to you shortly.

If you have any questions or comments, please do not hesitate to contact me at (631) 207-9005 extension 102.

Sincerely,
Enviro-Sciences, Inc.

Daniel J. Smith

Daniel J. Smith, P.E.
Vice President, Engineering & Remediation

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cc: M.A. Bartlett, Esq. / Pall
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K. Olson, Esq. / MT&E

IN-SITU CHEMICAL OXIDATION
PHASE I PILOT TEST REPORT

PALL CORPORATION
30 SEA CLIFF AVENUE
GLEN COVE, NEW YORK

NYSDEC Inactive Hazardous Waste Disposal Site No. 1-30-053B

Submitted to:

New York State Department of Environmental Conservation
Bureau of Eastern Remedial Action
Division of Environmental Remediation
625 Broadway
Albany, New York 12233-7015

Prepared by:

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October 17, 2003

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1. Enviro-Sciences, Inc., "*In-Situ* Chemical Oxidation Pilot Test Design, Pall Corporation, 30 Sea Cliff Avenue, Glen Cove, NY", July 31, 2002 (ESI, 7/2002)

2. Enviro-Sciences, Inc., "*In-Situ* Chemical Oxidation Pilot Test Work Plan, Pall Corporation, 30 Sea Cliff Avenue, Glen Cove, NY", October 31, 2001 (ESI,10/2001a)

3. Enviro-Sciences, Inc., "Feasibility Study Report, Pall Corporation, 30 Sea Cliff Avenue, Glen Cove, NY", October 15, 2001 (ESI, 10/2001b)

4. Enviro-Sciences, Inc., "Phase II Remedial Investigation Report, Pall Corporation, 30 Sea Cliff Avenue, Glen Cove, NY", July 13, 2000 (ESI, 7/2000)

IN-SITU CHEMICAL OXIDATION
PHASE I PILOT TEST REPORT

PALL CORPORATION
30 SEA CLIFF AVENUE
GLEN COVE, NEW YORK

1.0 INTRODUCTION

Based upon the findings of the Feasibility Study (FS), Pall Corporation recommended *In-Situ* Chemical Oxidation (ISCO) to be tested as a potential remedy to address groundwater contamination underlying the Pall Corporation (Pall) facility located at 30 Sea Cliff Avenue in Glen Cove, New York. The analysis described in the FS showed that potassium permanganate would be an appropriate oxidant to meet remedial objectives in a safe and cost-effective manner. Based upon these findings and successful bench-scale treatability studies, a phased pilot test was developed and implemented to demonstrate applicability in the "real world" field conditions of the site. This ISCO Phase I Pilot Test Report details the work completed during the initial phase of the NYSDEC approved pilot test program.

1.1 Scope and Objectives

This pilot test program was initiated to evaluate the effectiveness and feasibility of *ISCO* to address shallow and intermediate zone groundwater impacts. This report presents the results of the first phase of pilot testing. Specifically, the scope and objectives of the Phase I pilot test included the following:

- Design of the pilot test system including injection well locations, monitoring locations, and oxidant injection equipment setup;
- Installation of eighteen (18) new, shallow permanganate injection wells to evaluate the ability to inject the desired volume of permanganate and achieve adequate mixing in the shallow zone;
- Installation of eighteen (18) new, intermediate permanganate injection wells to evaluate the ability to inject the desired volume of permanganate and achieve adequate mixing in the intermediate zone;
- Installation of six (6) new monitoring well couplets (shallow and intermediate) to monitor permanganate injection events. In the future, the new monitoring wells will be used in conjunction with existing monitoring wells to provide a comprehensive injection monitoring network;

- Installation of a permanganate delivery / injection system including make-up tanks, mixers, pumps, and control systems;

- Completion of one (1) permanganate injection event at the Phase I, shallow and intermediate injection wells. During the injection event, parameters including optimum delivery rates, well fouling (if any), groundwater elevation changes, temperature changes, etc. were monitored at monitoring wells. The permanganate solution makeup procedures were evaluated to optimize the full-scale delivery system;

- Field monitoring during and following the permanganate injection event to determine the zone of influences, reaction rates, degree of reaction, contaminant reduction rates, estimates of the amount of unreacted reactants, etc. Monitoring included collection and analyses of groundwater samples, colorimetric analyses, etc.; and,

- Issuance of this Phase I Pilot Test Report documenting the findings of the study and identifying key design criteria and activities necessary for full-scale remediation to meet remedial objectives using this technology.

1.2 Overview of *In-Situ* Oxidation Using Permanganate

Permanganate ion (MnO_4^-) has been used as an oxidant to treat organic compounds in water and wastewater for many years. In recent years, it has been increasingly used *in-situ* to remediate groundwater contaminated with volatile organic compounds, primarily chlorinated organics. For this phase of the pilot test, potassium permanganate was used, although sodium permanganate can also be used effectively. Oxidation using permanganate has several major benefits over more traditional remediation methods such as pump and treat systems in that it removes significantly more contaminant mass via a destructive technology; it greatly reduces the time to complete remediation (often by a decade or more); and, it is more cost-effective than other remedies requiring complex air handling and/or water treatment systems.

Permanganate is a very effective oxidizer with high water solubility (approximately 60 to 65 grams per liter). The high solubility makes it highly mobile and relatively easy to inject into the subsurface. In addition, the high solubility allows the permanganate to achieve greater *in-situ* mixing and better contact with contaminants of concern.

For the primary contaminants of concern at the site including Tetrachloroethene (PCE), Trichloroethene (TCE), *cis*-1,2-Dichloroethene (12DCE), and Vinyl Chloride (VC), the generalized chemical reactions that drive remediation are presented below:

PCE: $4KMnO_4 + 3C_2Cl_4 + 4H_2O \rightarrow 6CO_2 + 4MnO_2 + 4K^+ + 12Cl^- + 8H^+$

TCE: $2KMnO_4 + C_2HCl_3 \rightarrow 2CO_2 + 2MnO_2 + 2K^+ + 3Cl^- + H^+$

DCE: $8KMnO_4 + 3C_2H_2Cl_2 \rightarrow 6CO_2 + 8MnO_2 + 8K^+ + 6Cl^- + 2OH^- + 2H_2O$

VC: $10KMnO_4 + 3C_2H_3Cl \rightarrow 6CO_2 + 10MnO_2 + 10K^+ + 3Cl^- + 7OH\text{-} + H_2O$

As indicated above, the volatile organic compounds and potassium permanganate are converted primarily to carbon dioxide (CO_2), manganese dioxide (MnO_2), water (H_2O), chloride ion (Cl^-), and potassium ion (K^+) at completion. Since dissolved manganese and chloride have secondary maximum contaminant levels (MCLs), the formation of these ions during the pilot test was also carefully monitored.

In addition to the primary contaminants of concern, several other chemicals were present at concentrations exceeding NYSDEC Class GA Groundwater Quality Standards. 1,1,1,-Trichloroethane (TCA) and 1,1-Dichloroethane (11DCA) were present at concentrations typically an order of magnitude or two below the chlorinated alkenes, but above their respective groundwater quality standards (typical detections were less than 100 µg/l). Chlorofluorocarbons (i.e., "1,1,2-trichloro-1,2,2-trifluoroethane") were detected at concentrations typically between 100 and 1,700 µg/l in the shallow wells and at concentrations under 100 µg/l in the intermediate groundwater zone. Although these compounds could potentially be degraded by permanganate injection, it was anticipated that degradation of the chlorinated alkanes and the chlorofluorocarbons would be less efficient because the reaction mechanism for these classes of chemicals would be through free radical formation, which is typically not the primary reaction mechanism associated with permanganate injection. Based upon the chemistry of permanganate reactions with VOCs and bench-scale treatability results, it was anticipated that degradation of chlorinated alkanes and chlorofluorocarbons could occur (through bioremediation and free radical reactions), although the remediation would take significantly longer than with the chlorinated alkenes.

Other oxidants such as Fenton's Reagent could more aggressively treat the chlorinated alkanes and potentially the chlorofluorocarbons; however, the use of Fenton's Reagent would likely result in more localized treatment (i.e., effective radius of influence would be smaller than with permanganate) and may require multiple injection events to address contaminants of concern. Fenton's Reagent should be considered for subsequent testing if localized treatment of the alkanes and/or chlorofluorocarbons that are not as effectively treated by permanganate is warranted.

2.0 PILOT TEST SYSTEM DESCRIPTION

The pilot test was designed to be completed in several phases that were selected to minimize site disruptions to occupants and to allow results from early phases to be interpreted to identify data gaps, optimize subsequent phases, and reduce total pilot test costs. This section of the report describes the overall pilot test system with a focus on the Phase I pilot test setup.

2.1 Overall Pilot Test System Layout

The test area was chosen based upon the results of the RI completed by Enviro-Sciences, Inc. on behalf of Pall Corporation. During the RI, it was concluded that the area of the highest concentrations of chlorinated VOCs in the shallow and intermediate groundwater zones is near the northern property line of the Pall site near well clusters at MW-5, MW-10, MW-2A, MW-11PS, and MW-12PS (see Figure 1). A complete description of the levels of contaminants, contaminant distribution, and geologic and hydrogeologic factors influencing this pilot test was provided in the RI and FS reports for the site. These documents are incorporated herein by reference.

The overall pilot test area is bounded on the north by the northern site property line; the south by MW-3P and the horizontal SVE well; the east by the eastern Pall property line; and, on the west by the MW-2A well clusters. This pilot test area was selected to address the areas of highest concentrations and because of the extensive monitoring well network available for collection of data to monitor the progress of the pilot test. The overall pilot test system layout and design is presented in Appendix A.

As indicated in the Appendix A, the pilot test was originally planned for completion in five phases. The first four phases were to focus on injection in horizontal lines of newly installed, dedicated, injection wells at varying distances from monitoring points and areas of elevated chlorinated VOC concentrations. The fifth phase was planned to test injection of $KMnO_4$ directly into existing monitoring wells to determine the effectiveness of using existing monitoring wells as future injection points. Based upon the data obtained during the Phase I Pilot Test, it is recommended the pilot test be modified by eliminating several phases, evaluating the use of a more aggressive oxidizer (e.g., Fenton's Reagent) to address chlorofluorocarbons, and changing the points of injection. These proposed modifications will be presented in an addendum to the Pilot Test Work Plan and Design documents and are offered to streamline the pilot test phase of this project and reduce costs, while allowing for the collection of data needed to complete the technology evaluation.

2.2 Phase I Pilot Test Layout

The Phase I pilot test layout is presented in Figure 2. The permanganate injection system consisted of four major components: (1) the KMnO4 Make-up Solution System, (2) The Injection Manifold System, (3) The Injection Well Network, and (4) the Monitoring Well Network.

All shallow permanganate injection wells were 4" diameter PVC wells screened from approximately 5 to 25 feet below grade surface. The intermediate injection wells were also 4" diameter PVC wells and were screened from approximately 35 to 55 feet below grade. The existing monitoring well clusters near the northern side of the Pall site were used for monitoring and data collection during the pilot test. In addition, six (6) new monitoring well couplets were installed as part of the pilot test (See Drawing Appendix A). As a minimum, there was at least one downgradient monitoring well couplet (shallow and intermediate) to monitor the oxidation reactions before (pre-injection baseline), during, and after each injection event. Monitoring well couplet locations were determined based upon modeling of the permanganate injection system to predict probable radii of influence and reaction rates. This information was provided in the Pilot Test Design submittal (ESI, 7/2002)

The permanganate makeup solution system was skid mounted and was set-up near the former metal shed storage area (see Figure 2). This location provided ready access to the water feed location and allowed the storage of KMnO4 bins within the secondary containment structure that was already present at the site. The injection manifold system was also skid mounted and was designed with quick-connect fittings so that it could be moved to any given area of injection. For the Phase I pilot test, it was located immediately to the south of pilot test injection well PT-16S. From this location, flex hoses were attached to the Phase I injection wells to allow simultaneous injections at up to five (5) injection wells. The following injection wells were used in the Phase I pilot test work:

Shallow Wells	*Intermediate Wells*
• PT-14S	• PT-14I
• PT-15S	• PT-15I
• PT-16S	• PT-16I
• PT-17S	• PT-17I
• PT-18S	• PT-18I

The monitoring well network for Phase I pilot testing included the following wells[1]:

Shallow Wells

- MW-11PS
- MW-12PS
- MW-10PS
- PTMW-1S
- PTMW-2S
- PTMW-3S
- PTMW-4S

Intermediate Wells

- MW-11PI
- MW-12PI
- MW-5PI
- MW-10PI
- PTMW-1I
- PTMW-2I
- PTMW-3I
- PTMW-4I

It should be noted that existing monitoring well MW-5PS was originally included in the work plan to be sampled. However, the well could not be located during the pilot test because an area of the parking lot had been damaged near the well location, and there was a significant layer of sediments from stormwater runoff ponded in the area where the well was located.

The detailed design drawings in Appendix A provide the engineering details of the system and the injection-phasing plan (e.g., piping and instrumentation diagram, elevations, equipment specifications, etc.). Power and water were supplied from the Pall building. All potassium permanganate was staged prior to injection in the existing chemical storage area at the site north of the pilot test area. This area was ideal for chemical storage during the pilot test because it was previously used for chemical storage and was designed specifically to prevent accidental releases of chemicals to the environment (i.e., secondary containment is provided, the floor coating is impervious, etc.).

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[1] *Several additional wells were also sampled during the first phase of the pilot test. However, these wells were not required to be sampled as per the NYSDEC approved work plans and design documents. These wells included shallow wells PTMW-5S and PTMW-6S and intermediate wells PTMW-5I and PTMW-6I. The results from these wells will be discussed in the text as appropriate. In addition, ESI completed sampling of several upgradient monitoring wells to establish background conditions at the site.*

3.0 PILOT TEST PROCEDURES

After installation of the pilot test injection wells and new monitoring points, the wells were developed by pumping until development parameters such as turbidity, temperature, pH, and conductivity stabilized. Development waters were disposed via the municipal sewer system in accordance with City of Glen Cove approvals. Well development logs are provided in Appendix B.

The NYSDEC, as well as August Thomsen, the Glen Cove Day Care Center, the EMS Garage, and the Glen Cove Water Department, were given ten working days notice prior to the start of fieldwork. At the request of the NYSDEC, initial pilot test activities (i.e., permanganate makeup, equipment tests, etc.) began on a weekend when buildings near the pilot test were minimally occupied.

3.1 Pre-test (Baseline) Sampling

Prior to the start of permanganate injection events, baseline groundwater samples were collected from the following monitoring wells.

Shallow Wells	*Intermediate Wells*	*Deep Wells*
• MW-2A	• MW-2AI	• MW-2AD
• MW-4PS	• MW-5PI	• MW-5PD
• MW-7P	• MW-6P	• MW-6PD **
• MW-10PS	• MW-10PI	• MW-10PD
• MW-11PS	• MW-11PI	• MW-11PD
• MW-12PS	• MW-12PI	• MW-12PD
• MW-13PS	• MW-13PI	• MW-14PCD **
• PTMW-1S	• PTMW-1I	• MW-15PCD **
• PTMW-2S	• PTMW-2I	
• PTMW-3S	• PTMW-3I	
• PTMW-4S	• PTMW-4I	
• PTMW-5S	• PTMW-5I	
• PTMW-6S	• PTMW-6I	

*** Note: Samples collected after KMnO4 Injection Events to update the site database– unrelated to pilot test work.*

All wells were sampled for VOCs, chlorofluorocarbons, total organic carbon (TOC), chlorides, and the following metals: iron (*Fe*), manganese (*Mn*), and chromium (*Cr*). Baseline sampling results are presented in Tables 1A, 1B, and 1C.

In addition to the analytical sampling, field monitoring was performed on wells related to pilot testing. The parameters evaluated were temperature, pH, conductivity, $KMnO_4$ (colorimetric method), Oxidation-Reduction Potential (ORP), wellhead VOCs (with a photoionization detector), dissolved oxygen and groundwater level measurements.

Data collected during the baseline sampling event was used as a basis of comparison for data generated during and following pilot testing. All analytical work was prepared and delivered in accordance with ASP Category B protocols.

A complete summary of the analytical work during the Phase I Pilot Test is provided in Table 2 for Shallow Wells and Table 3 for Intermediate Wells. Data collected from the deep wells is provided in Table 1C[2].

3.2 Treatability Study Results and Pilot Test Dosing Estimates

In order to evaluate the proper concentrations and dosing requirements for the permanganate injection pilot test, ESI completed a bench-scale treatability study in coordination with the Environmental Research Institute (ERI) at the University of Connecticut (UCONN). The complete text of the Treatability Study Report is provided in Appendix C. The significant findings of the bench-scale treatability study are summarized in Table 4.

As indicated in Table 4, the treatability study concluded that permanganate could effectively degrade PCE, TCE, cis-12DCE, VC, and 1,1,2-trichloro-1,2,2-trifluoroethane in the site soil and/or groundwater. The degradation of 1,1,2-trichloro-1,2,2-trifluoroethane in the control experiment was observed as well as in the permanganate injection test setup. 1,1,2-trichloro-1,2,2-trifluoroethane degradation is expected to occur, only at a slower rate than the other compounds of concern. One of the primary objectives of the pilot test was the evaluation of the effectiveness of $KMnO_4$ for 1,1,2-trichloro-1,2,2-trifluoroethane removal.

The soil oxidant demand was determined to be approximately 1 to 4 g/kg soil and increased with an increase in $KMnO_4$ concentration. This is representative of a relatively low soil demand factor thus making permanganate injection a very attractive remedy. A low *in-situ* $KMnO_4$ dosage concentration of 1 to 2 g/L (approximately 0.1% to 0.2% by weight) was evaluated in the first phase of the pilot test.

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[2] *Deep well data were only collected as part of the baseline sampling program and is therefore included in the baseline sampling summary table (Table 1).*

Based upon the size of the site and the $KMnO_4$ demand determined during the bench-scale treatability study, as much as 480,600 pounds of oxidant may be required for full-scale remediation of the area of concern. This first phase of the pilot test included injection of 39,600 pounds of potassium permanganate to achieve an *in-situ* dosage concentration of approximately 1 g/L (after accounting for a soil oxidant demand factor of 1g / kg within the anticipated area of influence of the Phase I injection events). Approximately 22,700 pounds were injected into five (5) intermediate injection wells during this phase of testing. The remaining 16,900 pounds were injected into the five, Phase I, shallow injection wells. A complete summary of the KMnO4 injection parameters for the Phase I pilot test is provided in Table 5.

As indicated in Table 5, the average concentration of $KMnO_4$ injected in the shallow wells was 2.3% and the average concentration in the intermediate wells was 2.2%. Approximately 80,000 gallons of make-up water were required for the shallow injections and 118,400 gallons for the intermediate injections during Phase I. Average flow rate into the five well, shallow network was 35.8 gallons/minute (approximately 7.1 gpm per well average). Intermediate well injection flow rates for the five well network of Phase I averaged approximately 82.2 gpm (average of about 16.4 gpm per well).

3.3 Permanganate Solution Make-up and Injection Sequence

The permanganate make-up and injection system consisted of a dry chemical feed system, a make-up tank with a mixer, a potassium permanganate injection system with feed rates that could be varied in the field, safety systems (e.g., relief valves, etc.), and monitoring instrumentation (e.g., pressure gauges, temperature gauges, flow meters, etc.).

An injection manifold was developed to allow injection in several wells simultaneously. The injection of permanganate was completed in phases so that monitoring data could be properly collected and catalogued. Injection began at Phase I near the MW-11P and MW-12P clusters. Injections were first performed in the intermediate wells (perpendicular to the groundwater flow direction) until the desired volume of the permanganate solution was introduced. The injection events then proceeded in the shallow wells. Monitoring was performed until essentially all permanganate had been reacted to completion (as determined by visual observations and colorimetric data).

3.4 Performance Monitoring and Sampling

The existing monitoring well network, as supplemented with the six (6) new monitoring well clusters, was utilized for pilot test performance monitoring. The parameters monitored and the frequency of monitoring performed is summarized in Table 6.

All analytical samples collected were collected in accordance with the procedures outlined in the existing Quality Assurance Project Plan (QuAPP) for the site. Laboratory data was presented following ASP Category B deliverables.

All field data was documented in a field logbook or on field data sheets developed for the project.

3.5 Termination of Field Pilot Tests

Field tests were terminated after the desired mass of permanganate had been added to the subsurface and sufficient data had been collected to meet pilot test objectives. Upon termination of pilot testing, the pilot test well network remained in place to the support additional phases of the pilot test.

4.0 DATA EVALUATION AND MONITORING

Data collected from the pilot test were entered into a database for preparation of the Phase I Pilot Test Report. Specifically, data pertaining to the following were catalogued:

- A summary of the work sequence and daily field activity;
- Permanganate injection dosing rates, injected concentrations, the mass of permanganate injected, etc.;
- Injection well monitoring to determine maximum possible injection rates and well performance;
- Field monitoring data (i.e., field screening parameter collection) obtained during and following permanganate injection events to measure degree of *in-situ* mixing and reaction effectiveness;
- Contaminant reduction data collected to evaluate the potential for the remedy to meet remedial objectives for the primary chlorinated VOCs of concern and chlorofluorocarbons; and,
- Groundwater table monitoring to evaluate potential mounding and to ensure that contamination was not spread during injection events.

The ability to remediate many chlorinated compounds using potassium permanganate is readily accepted in a perfect environment. However, the ability to remediate these same compounds under "real world" conditions with imperfect mixing, soil heterogeneity, and variable groundwater conditions was the focus of the first phase of the pilot test. The ability to achieve adequate *in-situ* mixing and measurement of the effectiveness of the desired reactions was determined during the pilot test by a combination of physical measurements (e.g., depth to water, flow rates, etc.), chemical measurements (oxidation-reduction potential, VOC analyses, etc.), visual observations (colorimetric indicators, ability of the wells to accept flow, etc.) and data interpretation (e.g., effective radius of influence of injection wells, contaminant reductions and rebound effects, etc.). Due to the comprehensive well network at the site, these parameters were monitored and evaluated at multiple locations to develop a comprehensive understanding of the *in-situ* performance of the permanganate injections.

The following parameters were monitored in the field and evaluated to determine the effectiveness of the pilot test and to gather data required for full-scale implementation.

- ***Depth to Water:*** Depth to water was monitored to evaluate potential mounding and as a relative indicator for the radius of influence for the injection wells.

- ***Groundwater Temperature:*** Monitoring was conducted to evaluate the heat of reaction and to protect the health and safety of workers and the neighboring community.

- ***Groundwater Conductivity:*** Monitoring was performed as a relative indicator of the metals in solution before, during and after injection events.

- ***Groundwater pH:*** pH data was recorded to assist in the evaluation of other parameters and to document site conditions as part of the Phase I Pilot Test.

- ***Dissolved Oxygen (DO) in Groundwater:*** DO data were collected to evaluate the effective radius of influence of the injection well network and as an indicator of oxidant mixing and consumption.

- ***ORP in Groundwater:*** ORP data were collected to determine the effectiveness of permanganate injection events and the impact of the events on the oxidizing / reducing environment *in-situ*.

- ***Permanganate in Groundwater (color):*** Data collected provided an indirect measurement of $KMnO_4$ in groundwater and served as an indicator of mixing of reactant in the water table and the radius of influence from the injection wells.

In addition, analytical data were collected before and after injection events to directly measure the potential to reduce contaminant concentrations by permanganate injection. Specifically, the following analytical data were collected and analyzed:

- ***VOCs and Chlorofluorocarbons in Groundwater:*** These parameters indicate effectiveness of the proposed remedy and the degree of completion of reaction, residual contaminant levels, etc. Essentially, these data provide the best indicator of the ability of the proposed remedy to meet remedial objectives.

- ***Metals in Groundwater:*** These parameters indicate potential bi-products of reaction, ion formation, etc.

- ***TOC in Groundwater:*** TOC is an indicator of soil and groundwater oxidant demand and as such is an input parameter for model verifications, extent of reaction indicators, etc.

- ***Chloride in Groundwater:*** This parameter indicates potential bi-products of reaction, degree of reaction completed, etc.

The data obtained during the pilot test and the implications are discussed in the following sections of the report.

Although it is acknowledged that it is not entirely possible to analyze intermediate groundwater performance without consideration of the adjacent shallow groundwater zone, these two zones behave very differently with regard to the injection of fluids and the ability to remediate the contaminants of concern in a cost-effective manner. For this reason, the shallow (from grade to approximately 30 feet below grade) and intermediate (from 30 to about 65 feet below grade) groundwater zones will be addressed separately in this report. Where it is appropriate to discuss the interrelations between the two zones, this report will present the appropriate data and discussion.

4.1 Intermediate Groundwater Injection Performance

Intermediate zone injections for the first phase of the pilot test were initiated on November 19, 2002, and were completed on November 25, 2002. The following sections present the intermediate groundwater zone data and conclusions.

4.1.1 Intermediate Injection Well Performance

The performance of the intermediate injection well network was primarily determined by the ability to deliver the desired quantity of $KMnO_4$ to the subsurface in a reasonable amount of time without causing contaminant migration or unacceptable mounding of groundwater. This aspect of the test focused on mechanical injection data such as flow rates and pressures and the groundwater parameters related to injection (e.g., depth to water, etc.). The ability of the injected reactants to reduce contaminant concentrations effectively is discussed elsewhere in this report.

Average flow rate into the five well, intermediate network was 82.2 gpm (average of about 16.4 gpm per well). In general, injection events at the intermediate wells proceeded as planned with generally uniform injection rates at all wells. The maximum anticipated design injection rate at the intermediate zone was approximately 15 gpm without causing potential and temporary "spread" of contaminants due to the local injection wave front. The field data verified the design models for injection in the intermediate zone and data collected indicate no evidence of any potential spreading of contaminants (see Section 4.1.3 for additional information on contaminant reduction effectiveness).

Mounding in the intermediate injection wells was not a significant concern, nor were there any other significant problems with the mechanical injection of the permanganate solution into the intermediate groundwater zone. However, problems with the individual well manifold flow meters were experienced because of fouling of the meters caused by solids from the makeup solution. The solids were present primarily from silica in the permanganate that is normal when "free flowing" permanganate is purchased. When individual wellhead flow meters were not operational, manual flow measurements were used (i.e., timed volume discharges to the groundwater) and total flow readings for the whole intermediate injection well network were not impacted. For full-scale operation, individual wellhead metering will have to be more thoroughly addressed.

The radius of influence from intermediate injection points was relatively uniform in the general direction of groundwater flow (toward the north), but was greater toward the middle of the injection line due to interwell effects as would be expected. In addition, it is also likely that there was a temporary influence against the natural groundwater flow direction immediately following injection events, but this could not be confirmed during the Phase I Pilot Test.

Based upon changes in field monitoring data and evaluation of pre-injection and post-injection analytical data, the radius of influence in the intermediate zone ranged from approximately 20 to 25 feet near the periphery of the injection line to over 50 feet near the center of the Phase I injection zone. This estimate is based upon visual observations (colorimetric changes) and review of field screening data indicating changes from baseline conditions (e.g., increases in water table elevation, dissolved oxygen changes, REDOX changes, etc.).

Additional information regarding the effective radius of influence is presented in the following sections.

4.1.2 Intermediate Permanganate Mixing & Reaction Effectiveness Monitoring

The effectiveness of *in-situ* mixing and reactions was measured by collecting and analyzing the data outlined in Section 4.0. The data obtained during the pilot test for these parameters are provided in Tables 7 and 8. In addition, analytical testing was also performed to measure the ability of the permanganate to reduce contaminant concentrations. The analytical data are presented and discussed in Section 4.1.3.

Intermediate well $KMnO_4$ injections were initiated on November 19, 2003, after two initial days of preparing the initial injection solution batch. Prior to injection of permanganate, a water injection test was performed on November 7, 2002, to check the system piping and components for leakage. A few minor leaks were evident during the water test and the equipment was repaired and re-tested successfully on November 7, 2002. During the water test, the injection wells were observed for mounding and other indications that the wells could not accept the design flow rates of 10 to 15 gallons per minute. All wells performed satisfactorily during the water injection test.

Prior to the start of permanganate injections, baseline data was collected from representative wells in the Phase I area to document baseline conditions in the intermediate wells prior to injection events. Baseline data was collected on November 18, 2003 and early on November 19, 2003, before injection system start-up. Baseline field monitoring included collection of the following data:

- Depth to Water
- Groundwater Temperature
- Groundwater Conductivity
- Groundwater pH
- Dissolved Oxygen (DO) in Groundwater
- ORP in Groundwater
- Permanganate (colorimetric)
- Groundwater Wellhead VOCs (using a PID)

The data collected during the field screening for the intermediate injection events are provided in Tables 7 and 8.

It should be noted that field monitoring for all parameters at all wells as originally outlined in the work plan was not possible because of the time required to collect data at certain wells. Therefore, informal screening at select wells was performed to determine if full sets of data needed to be collected from every well, every day. As is evident from the large data set summarized in the tables, an extensive amount of high quality data was collected and analyzed even after elimination of some of the data points originally identified for data collection. Whenever it was determined that data may be required to evaluate system performance, the data were collected and analyzed regardless of the time required to collect the data.

As indicated in Table 89 the background values for all intermediate wells in the Phase I area were typically in the ranges indicated below:

- **pH:** Average[3] pH of 7.86 (7.80 without PT-9I). Values ranged from 7.23 to 9.92 Standard pH Units with the exception of PT-9I, which had a localized pH of 11.27 at the start of testing. In general, intermediate wells near the east and north had slightly higher background pH readings.

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[3] *Logarithmic adjustment made for pH*

- **Conductivity:** Average conductivity of 0.49 mhos (0.32 without PT-9I). Values ranged from 0.05 to 0.58 mhos with the exception of PT-9I, which had a localized conductivity of 1.71 at the start of testing. In general, higher conductivity values were correlated with higher pH values.

- **ORP:** Average ORP of 39.88 (47.71 without PT-9I). Values ranged from -19 to 73 at the start of testing, with all locations except PTMW-6I and PT-9I exhibiting an ORP indicative of an oxidizing environment (i.e., positive) ORP value.

- **Temperature:** Average temperature of 17.74 degrees Celsius. Values ranged from 15.8 to 19.6 deg. C.

- **DTW:** Average depth to water of 3.67 feet. Values ranged from 3.24 to 4.43 feet.

- **Dissolved Oxygen:** Average DO of 0.65 mg/l. Values ranged from 0.39 to 1.68 mg/l. There was a general correlation between DO and ORP, with higher ORP present at the same locations of higher DO.

- **Wellhead VOCs:** The average wellhead VOC readings were 13.9 ppmv equivalence units (isobutylene calibration gas). However, there was wide variation from well to well. Values ranged from zero ppmv at several wellheads to 85.4 at well PT-13I. Breathing zone VOCs above the wellhead were generally non-detectable, so the localized wellhead VOC readings were not a health and safety concern.

At the onset of permanganate injections, the pH was relatively stable at most well locations. As indicated in Figure 3, there was no significant change in pH during permanganate injection events at the intermediate wells. The pH within the Phase I Pilot Test area remained relatively constant between 6.0 and 9.0 throughout testing with the notable exception of PT-9I where elevated pH levels (compared to other wells on-site). Permanganate degradation reactions typically occur independently of pH values in this range. Since a significant drop in pH was not evident during testing, it is probable that acidic byproducts or intermediates of the degradation reactions were either not present or short-lived. In general, pH monitoring indicated that pH should not be impacted significantly in the subsurface during intermediate zone permanganate injections, nor should it inhibit the desired degradation reactions.

Since metals may be added to the aquifer during permanganate injections because of their trace presence as impurities in the make-up solution, monitoring of conductivity in the groundwater was performed. Conductivity also is a good screening tool to assist in the analysis of metals behavior in the subsurface during and following permanganate injections. Conductivity readings increased slightly immediately following the start of permanganate injections on most days of testing (see Figure 4), but returned to (or close to) the previous baseline levels overnight when injections were suspended. This minor change in localized conductivities is not considered significant. The minimal changes in conductivity, coupled with the fact that the pH did not significantly drop during injection events, are good indications that metal mobilization was not significant during the intermediate injection events. This topic is discussed in more detail in Sections 4.1.3 and 4.2.3 of the report.

The oxidation-reduction potential (ORP) data for the groundwater system is probably the most difficult to interpret during permanganate injection because of the complex nature of the multiple chemical processes that are constantly occurring in the subsurface. In general, there is typically an increase in ORP immediately after permanganate injection as the oxidant enters the subsurface. However, the presence of free oxidant may be very short-lived in an effective permanganate injection design because the oxidant delivered should be readily consumed by the reactants as the degradation reactions progress. Further, the stimulation of biodegradation may compound the shift to a reducing environment because of the depletion of available oxygen as bioremediation occurs. As indicated in Figure 5, there were often significant changes in the ORP from the time immediately following injection to the completion of the daily injection events. For example, PTMW-2I, located approximately 20 feet away from the injection line, had a baseline ORP near zero mV indicating a neutral environment. Immediately following the start of the intermediate injection events, the ORP was increased to over 200 mV indicating the effective addition of the oxidant to the subsurface. Following the typical spike in ORP after the injection was initiated, the ORP usually dropped rapidly (within 24 hours) as the oxidant became consumed. This same general trend of increases in ORP followed by rapid decreases was evident in most, though not all, monitoring locations during the intermediate injection events.

Another interesting conclusion that is evident from Figure 5 is that the data implies that shallow injections may positively influence the intermediate groundwater zone. This is best demonstrated by MW-12PI and PTMW-1I. These intermediate monitoring locations had returned to their approximate baseline ORP levels following the completion of intermediate injection events on November 25, 2002. At the initiation of shallow injections on November 26, 2002, there was no immediate increase in the intermediate monitoring locations. However, by December 12, 2002, there was a significant spike in ORP in these intermediate monitoring locations. It is probable that the shallow injection of permanganate ultimately reached the intermediate groundwater zone, although it was not nearly as rapid as the direct injection into the intermediate injection wells.

Temperature monitoring was performed primarily for health and safety reasons to ensure that the reaction would not release an unacceptable level of thermal energy. Although this was not expected to be a problem with permanganate, the monitoring was performed as part of a rigorous health and safety program at the site. The temperature response data are presented graphically in Figure 6. As indicated by the figure, the temperatures in each of the monitoring locations remained relatively constant throughout testing. There was a slight decrease in temperature, but it is likely that this is independent of the Phase I Pilot Test and occurred naturally due to the very cold temperatures in the early weeks of December 2002.

One of the most important parameters evaluated during intermediate well injection events was the depth to water, DTW (i.e., groundwater elevation). DTW readings were collected to evaluate the potential for mounding during injections and to help assess the radius of influence of the injection wells. DTW data for intermediate injection well monitoring are presented in Figure 7. During injection events, there was evidence of localized mounding in the wells closest to the injection line. The mounding generally diminished as the distance from the injection wells increased; however, the proximity to the center point of the injection line was also a significant factor due to the cumulative affects of injections at adjacent wells (i.e., overlapping of the effective ROI). Although some mounding was evident as would be expected, the mounding did not result in the groundwater table rising to the surface in any wells during the intermediate injection events. As will be discussed later in the report, mounding was a much more significant concern during shallow injection events.

Mounding at wells within 20 feet of the center of the injection line typically resulted in a water table rise of 1.5 to 2 feet during intermediate injections. For wells located along the periphery of the injection line (i.e., PT-9I and MW-12PI), the water table rose approximately 1 to 1.5 feet during injection rates of about 15 gpm per well. For monitoring locations along the north property line, the water table increase was typically less than 0.5 feet.

The DO data was used to indicate the level of oxygen available in the subsurface to stimulate bioremediation and to enhance degradation reactions. In general, excellent DO response was noted during injection event monitoring. DO increases were evident in the majority of monitoring locations within 50 feet of the injection line. Just as importantly, DO increases were not significant at distances greater than 50 feet from the injection wells, which helps to define the effective radius of influence of the injection wells in the intermediate zone (see Figure 8). DO increases of greater than 100% were common in wells within 20 feet of the injection line. As would be expected, the DO increases were more pronounced near the center point of the injection line because of the overlapping of the injected oxidant from individual wells. There was no significant increase in DO levels at wells along the north property line over 100 feet away from the injection area.

Wellhead PID screening was provided primarily for health and safety monitoring and the data are presented in Table 10. Additional ambient air screening in breathing zones and at property boundaries was also conducted to ensure the health and safety of site personnel and off-site receptors. There were no health and safety concerns noted during the intermediate injection event, or at any other time during testing.

Colorimetric monitoring for $KMnO_4$ was performed during the pilot test to assist in the evaluation of dosing effectiveness and *in-situ* mixing. In most instances, visual gauging was possible because a deep purple color indicating $KMnO_4$ concentrations in the range of 5 to greater than 25 mg KMnO4 per Liter of groundwater was evident in, and immediately around, the injection wells. Where visual indications were less reliable (i.e., at concentrations under 5 mg/l $KMnO_4$), a colorimetric meter was used. The data collected is presented in Table 8. Since the colorimetric meter can be influenced by other substances within the same color spectrum as permanganate, an upgradient sample from MW-6I was also collected to "blank out" background levels. Upgradient (i.e., background) colorimetric levels were typically at or near .0.3 to mg/l.

As indicated in the table, the concentration of $KMnO_4$ in the aquifer within 17 feet of the injection wells at PTMW-1I in the week following the initial injection event was near 3 mg/l. Concentrations gradually dropped off to around 1 mg/l in the month following injections. During the first few days of injections, much higher levels were present as indicated by visual evidence of a deep, purple color in the groundwater samples. Similar, though slightly lower, levels were present in PTMS-2I, which was located 42 feet from the injection line. As would be expected, there was a lag of several days before the maximum concentrations at PTMW-2I were detected. These data are indicative of good in-situ mixing to a distance of at least 40 feet from the injection line.

Based upon review of all the field screening parameters, it was concluded that the Phase I intermediate injection well network performed effectively with regard to delivery of oxidant to the subsurface. The effective radius of influence, based upon review of screening data and visual observations (i.e., colorimetric changes), is at least 25 feet and is very likely greater than 50 feet in the general direction of natural groundwater flow (toward the north). There was also some likely, short-term influence against the natural groundwater flow direction immediately following the injection events, but that could not be confirmed during the Phase I Pilot Tests.

In-situ mixing of oxidant with the contaminants of concern in the dissolved phase also appeared to be achieved based upon field analyses and visual observations.

4.1.3 Intermediate Contaminant Reduction & Potential Remedial Effectiveness

Although the field screening data presented in the previous section is useful in understanding the radius of influence that is needed for full-scale implementation, the most direct measure of a proposed remedy's ability to meet remedial goals is the reduction in the mass of contamination at the site. This section of the report presents the analytical data obtained to determine if the permanganate injection events at the intermediate wells effectively reduced the concentration of the contaminants of concern in the study area.

As mentioned previously in the report, all analytical data for the intermediate groundwater zone is presented in Table 3. Although the VOC parameter list is extensive as required by the NYSDEC, the primary contaminants of concern at the site are chlorinated VOCs in groundwater: specifically, Tetrachloroethene (PCE), Trichloroethene (TCE), 1,2-Dichloroethene (12DCE), 1,1,1-Trichloroethane (TCA), and Vinyl Chloride (VC). Secondary contaminants of concern include 1,1,2-trichloro-1,2,2-trifluoroethane. The Phase I Pilot Test also included an analysis of several parameters required to evaluate the use of permanganate injection at the site. These parameters included chromium, iron, chlorides, manganese, and total organic carbon (TOC).

Pre-injection (i.e., baseline) sampling was performed between October 30, 2002, and November 7, 2002, to establish pre-test conditions. In order to allow comparison of data to historic site monitoring, analytical samples were collected from pre-existing monitoring wells in the pilot test area as well as from the new monitoring wells installed for the pilot test. The following intermediate monitoring wells were sampled during the Phase I Pilot Test:

- MW-2AI*
- MW-5PI
- MW-6P*
- MW-10PI
- MW-11PI
- MW-12PI
- MW-13PI*
- PTMW-1I
- PTMW-2I
- PTMW-3I
- PTMW-4I
- PTMW-5I
- PTMW-6I

** Wells indicated by an asterisk were sampled for background information and are not discussed in this report.*

In general, the baseline levels of VOCs were either non-detectable or relatively low (less than 10 ug/l) except for the following compounds:

- **1,2DCE:** (maximum concentration of 180 µg/l at PTMW-5I, which is outside the anticipated ROI for the Phase I Pilot Test. Maximum concentration of 48 µg/l at PTMW-1I within the Phase I pilot test study area);
- **Acetone:** (maximum concentration of 10,000 µg/l at PTMW-3I but it may have been related to a lab contaminant because acetone has never been an issue at the site in years of testing and there is no new source of acetone possible since the site is inactive);
- **Chlorofluorocarbons:** (e.g., 1,1,2-trichloro-1,2,2,-trifluoroethane) (maximum concentration of 1,100 µg/l at MW-2AI, which is outside the anticipated ROI for the Phase I Pilot Test. Maximum concentration of 12 µg/l at PTMW-1I within the Phase I Pilot Test study area)[4];
- **Methylene Chloride:** (maximum concentration of 600 µg/l in PTMW-41, however this sample was flagged with a "B" so it may have been the result of blank contamination).
- **PCE:** (maximum concentration of 1,700 µg/l in MW-2AI and concentrations between 14 and 700 µg/l in other intermediate wells sampled);
- **TCE:** (maximum concentration of 320 µg/l in MW-2AI and concentrations between 4 and 88 µg/l in other intermediate wells sampled);
- **VC:** (maximum concentration of 61 µg/l in PTMW-5I, which is outside the anticipated ROI for the Phase I Pilot Test. Maximum concentration of 6 µg/l in PTMW-4I within the pilot test area).

In addition to the VOCs, background data was also collected for TOC, chlorides, iron, manganese, and chromium. TOC background levels ranged from 1 to 4 mg/l. Chloride background levels ranged from 12 to 146 mg/l with the highest baseline levels present in PTMW-1I, PTMW-2I, and PTMW-3I. The lowest levels were present at MW-5PI and MW-12PI. Chromium baseline levels were all less than 3 µg/l. For iron, the baseline levels in groundwater varied greatly with the lowest level of 345 µg/l present at MW-11PI and the highest level of 5,860 µg/l present at PTMW-3I. Most iron concentrations were between 600 and 2,500 µg/l. Manganese baseline levels prior to testing also varied widely with the highest concentrations present at PTMW-5I (3,230 µg/l) and the lowest at PTMW-2I (72 µg/l).

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[4] *It should be noted that chlorofluorocarbons were not anticipated to undergo rapid reaction with permanganate based upon the available literature. Slower biodegradation was expected. However, insufficient data are available with regard to this specific compound's response to permanganate injection. Alternative oxidizers such as hydrogen peroxide (i.e., Fenton's Reagent) may be more appropriate if rapid degradation of chlorofluorocarbons (as well as alkanes present at lower levels) is required. Testing of oxidizers that are more aggressive is recommended if the NYSDEC requires more rapid chlorofluorocarbon degradation.*

After the completion of baseline documentation, the intermediate well injections were initiated for Phase I at wells PT-14I through PT-18I. Injection events were conducted from November 19, 2002, through November 25, 2002. Two post-injection sampling events were conducted to assess the short-term and long-term reductions after consideration of rebound effects. The first post-injection sampling event for the intermediate zone was completed on December 18-19, 2002, approximately 3 to 4 weeks after the completion of injections. The final post-injection sampling event was completed on April 2-4, 2003 approximately 3 months after the completion of injections to ensure that any rebound effects would have already occurred (i.e., the sampling event would represent permanent reduction in contaminant concentrations). The results of the post injection sampling events and removal efficiency estimates are provided in Table 11.

As indicated in Table 10, the concentrations of contaminants in the intermediate groundwater zone were reduced in almost all wells, for all parameters with a few exceptions. In general, contaminant reductions were the greatest in the monitoring points closest to the injection line and nearest to the center of the pilot test area. Contaminant reductions for all VOCs within 50 feet of the injection line were reduced to non-detectable levels within 41 days of injection with the exception of 1,2-DCE which was reduced 62.5% (from 12 µg/l to 5 µg/l). All contaminants of concern within 50 feet of the injection wells were reduced to levels at or below Class GA Groundwater Quality Standards. Although reductions beyond 50 feet were evident for most VOCs, the reductions were not as uniform and a direct correlation to distance from the injection wells was present for some compounds, but not for others. 1,1DCA was reduced to non-detectable levels in all samples (except for one which was only at 5 µg/l), even those as far away as 150 feet from the injection line. However, this data must be interpreted cautiously because starting concentrations before testing were relatively low and it is possible that this reduction is just due to the normal variability of groundwater data from one sampling event to the next.

MW-12PI did not achieve the same high levels of contaminant reductions for most chemicals. Based upon discussions with those overseeing drilling in this area, it was determined that drilling near the westernmost injection wells in Phase I was extremely difficult and injection of oxidant in this area was more difficult than most other areas. In fact, the shallow wells in this area mounded frequently even at very low injection flow rates. Therefore, it is likely that the localized geology at and near MW-12PI adversely effects the ability to inject oxidant when compared to the other wells in the Phase I pilot test area.

A reduction in 1,1,2-trichloro-1,2,2-trifluoroethane was observed in 6 of the 10 intermediate monitoring wells for this phase of testing, although this rate of a reduction was not anticipated based upon the permanganate reaction mechanism (i.e., reaction with carbon-carbon double bonds which are not present in 1,1,2-trichloro-1,2,2-trifluoroethane). Review of the available literature indicates that under certain conditions the permanganate reaction with the VOCs of concern may generate some free hydroxyl radicals. The reductions of chlorofluorocarbons noted might have been caused by free radical formation in a manner similar to that, which occurs with some other oxidants (most notably, Fenton's Reagent).

Since one of the adverse affects of permanganate injection is the possible mobilization of metals and chlorides in the aquifer, these parameters were also evaluated. Chloride increases in the subsurface were not realized in 9 out of 10 monitoring locations and an increase from 95 mg/l to only 112 mg/l was evident in the one well that did exhibit an increase (MW-11PI). Chromium concentration increases were evident in all but the two wells that were over 160 feet from the injection line. Although the percent increases were often high (as high as 1825% in MW-11PI), the actual concentration increases were very minor with only one well exhibiting chromium concentrations exceeding 20 µg/l (38.5 µg/l at MW-11PI). These levels of chromium are not considered a concern. Manganese levels did increase substantially during the first post-injection sampling event 41 days after injections. However, in all wells except for three the concentrations dropped off to below pre-injection levels within the 146 days before the final post-injection sampling event. This temporary increase is considered normal and it is likely that the remaining elevated concentrations of manganese will drop off in the three wells that remained with high Manganese concentrations after the final sampling event.

After completion of post-injection monitoring, it was evident that injection of oxidant into the intermediate zone can result in excellent chlorinated VOC contaminant reduction within 50 feet of the injection wells. In fact, final concentrations after the Phase I intermediate zone injections were at or below 50 µg/l for all VOCs in all wells within the pilot test area. Most parameter concentrations were below their respective Class GA Groundwater Quality Standards. Chlorofluorocarbons appeared to be degraded during the injection events; however, additional testing is required to determine if the 1,1,2-trichloro-1,2,2-trifluoroethane concentration reductions noted were temporary effects caused by the high initial injection volumes of permanganate solution or whether the effects are longer lasting due to *in-situ* oxidation. Use of a more aggressive oxidizer (e.g., Fenton's Reagent) should be considered to more aggressively address chlorofluorocarbons

4.2 Shallow Groundwater Injection Performance

The following sections discuss the results of the shallow groundwater injection events during Phase I of the pilot test.

4.2.1 Shallow Injection Well Performance

As with the intermediate zone evaluation, the performance of the shallow injection well network was primarily evaluated on the ability to deliver the desired quantity of $KMnO_4$ to the subsurface in a reasonable amount of time without causing contaminant migration or unacceptable mounding of groundwater. This aspect of the test focused on mechanical injection data such as flow rates and pressures and the groundwater parameters related to injection (e.g., depth to water, turbidity, etc.).

The average flow rate into the five well, shallow network was 35.8 gallons/minute (approximately 7.1 gpm per well average). However, injection rates varied significantly well by well during the Phase I test because of problems with localized mounding. Some shallow injection wells readily accepted the permanganate solution, and flow rates much higher than the 7.1 gpm were achievable without a significant rise in the localized water table. Conversely, shallow injection wells PT-14S, PT-15S, and PT-18S mounded at flow rates above five gpm and sometimes even mounded at lower flow rates. When mounding neared the surface, injection events at that well location exhibiting the water table rise were suspended until the water table receded locally.

Additional discussion regarding the ability to effectively inject permanganate into the shallow groundwater zone is provided in the following section.

4.2.2 Shallow Permanganate Mixing & Reaction Effectiveness Monitoring

Shallow well injections were initiated on November 26, 2003, immediately following the completion of the intermediate well injections. Throughout shallow well injections, weather conditions including heavy rains with localized flooding hampered the shallow well pilot tests. Due to the shallow water table, the rain events caused the water table to rise to almost immediately beneath the ground surface on several days and testing was suspended to let the water table subside. In addition, the uneven parking lot caused localized ponding of water in some monitoring locations, which may have influenced data collection (i.e., when the wells were opened to collect monitoring parameters, surface water sometimes ran into the monitoring wells). Whenever possible, berms were made around monitoring points and water was kept away from the test area to the greatest practical extent.

Prior to the start of shallow well injections, baseline data were collected from representative wells in the Phase I area to document baseline conditions in the shallow wells (see Table 12).

Baseline data was collected on November 25, 2003, before injection system start-up[5]. Baseline field monitoring in the shallow zone included collection of the same parameters as the intermediate well sampling events. The data collected during the field screening for the shallow injection events are provided in Tables 7 and 8.

As indicated in Table 11, the baseline values for all shallow wells in the Phase I area were typically in the ranges indicated below:

- **pH:** Average[6] pH of 6.37. Values ranged from 5.87 to 6.70 Standard pH Units.
- **Conductivity:** Average conductivity of 0.61 mhos. Values ranged from 0.39 to 1.01 mhos. Unlike the intermediate zone, there was no direct correlation between conductivity and pH in the shallow zone. This may have been due to the impact of the prior intermediate injection events before the start of shallow well testing.
- **ORP:** Average ORP of -66.00. Values ranged from -153 to +26 at the start of shallow testing, with all locations except MW-12PS and PT-12S exhibiting an ORP indicative of reducing environment (i.e., negative) ORP value.
- **Temperature:** Average temperature of 19.12 degrees Celsius. Values ranged from 18.30 to 20.00 deg. C.
- **DTW:** Average depth to water of 3.84 feet. Values ranged from 3.37 to 4.13 feet.
- **Dissolved Oxygen:** Average DO of 0.27 mg/l. Values ranged from 0.11 to 0.65 mg/l. There was a no direct correlation between DO and ORP in the shallow groundwater at the onset of testing.
- **Wellhead VOCs:** The average wellhead VOC readings were 21.9 ppmv equivalence units (isobutylene calibration gas). However, there was wide variation from well to well. Values ranged from zero ppmv at several wellheads to 85.7 at well MW-12PS. Breathing zone VOCs above the wellhead were generally non-detectable, so the localized wellhead VOC readings were not a health and safety concern.

At the onset of shallow permanganate injections, the pH was relatively stable at most well locations. As indicated in Figure 9, there were minor changes in pH evident during shallow well injections (typically changed +/- one pH SU). The pH within the Phase I test area

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[5] Several background samples were collected on 11/26/03 in the morning before the start of shallow well injections.

[6] Logarithmic adjustment made for pH

remained relatively constant between 5.8 and 7.0 throughout shallow well testing. Permanganate degradation reactions typically occur independently of pH values in this range. Since a significant drop in pH was not evident during shallow testing, it is probable that acidic byproducts or intermediates of the degradation reactions were either not present or short-lived. In general, pH monitoring indicated that pH should not be impacted significantly in the subsurface during shallow zone permanganate injections, nor should it inhibit the desired degradation reactions.

Conductivity readings oscillated up and down following the start of shallow permanganate injections on most days of testing (see Figure 10), but returned to (or close to) the previous baseline levels when injections were suspended. This minor change in localized conductivities is not considered significant.

As indicated in Figure 11, there were only relatively minor changes in the ORP during the shallow injection events in most monitoring locations. Increases of only about 35 to 50 mV were typical in most monitoring locations. There was no correlation between changes in the ORP and the distance from the injection line in the shallow wells as there was with the intermediate wells. ORP data did not serve as a good indicator of shallow injection system performance because of the relatively small changes in readings that were observed.

The temperature response data are presented graphically in Figure 12. As indicated by the figure, the temperatures in each of the monitoring locations remained relatively constant throughout testing. There was a slight decreasing temperature trend, but it is likely that this is independent of the Phase I Pilot Testing and occurred naturally due to the very cold temperatures in December 2002.

One of the most important parameters evaluated during shallow well injection events was the depth to water. DTW readings were collected to evaluate the potential for mounding during injections and to help assess the radius of influence of the injection wells. DTW data for shallow injection well monitoring are presented in Figure 13. During injection events, there was severe mounding in several of the injection wells. In fact, the groundwater table reached the surface at each of the injection wells at least once during shallow injections. The most problematic wells from an injection perspective were PT-14S, PT-15S, and PT-18S, which were frequently shut down to allow the water table to lower before continuing with the injections. Flow rates for the shallow wells were maintained below 10 gpm to minimize mounding, and many times were run under 5 gpm at the more problematic wells. The shallow well injection problems were compounded by a severe cold streak in the area wherein freezing temperatures were common overnight. Several wellhead assemblies froze and had to be repaired / replaced during testing.

Unlike the intermediate zone, the degree of mounding was relatively uniform in the shallow zone regardless of distance from the center of the injection line. All monitoring locations within 60 feet of the injection line, whether near the center of the line or the periphery, exhibited a water table rise of approximately 1.5 feet during each day of testing. This mounding would have been more significant if the same, higher, flow rates used during intermediate testing were continued. The fact that the mounding at the monitoring locations 20 to 60 feet away from the injection wells was only about 1 to 1.5 feet, while the mounding at the shallow injection points was often greater than 3 feet (i.e., almost to the surface) indicates that the severe mounding is localized at the point of injection. The mounding evident during testing at the shallow wells was more significant than anticipated by pre-injection modeling and the injection flow rate was reduced accordingly to prevent unwanted migration of contaminants. Subsequent phases of pilot testing well help determine if the problems with shallow injections are limited to this one area of the site or are more widespread.

In general, there was not a significant DO increase evident in the majority of monitoring locations within 50 feet of the injection line (See Figure 13). Although some of the percent increases neared 100%, the actual value of the DO remained low (i.e., all readings were below 0.8 mg/l). It is possible that the DO may increase with time in the subsurface but insufficient data were available to make this determination[7]. This issue will be more carefully monitored during subsequent phases of the pilot test.

Wellhead PID screening was provided primarily for health and safety reasons and the data are presented in Table 7. Additional ambient air screening in breathing zones and at property boundaries was also conducted to ensure the health and safety of site personnel and off-site receptors. This monitoring data are presented in Table 10. There were no health and safety concerns noted during the intermediate injection event, or at any other time during testing.

Colorimetric monitoring for $KMnO_4$ was performed during the shallow groundwater pilot test to assist in the evaluation of dosing effectiveness and *in-situ* mixing in the shallow zone. In most instances, visual gauging was possible because a deep purple color indicating $KMnO_4$ concentrations in the range of 5 to greater than 25 mg KMnO4 per Liter of groundwater was evident in, and immediately around, the injection wells. However, the permanganate levels

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[7] Post-injection monitoring was originally planned to continue after the completion of shallow injection events. However, severe winter storms prevented access to the site and continual snow cover made it impossible to locate wells for sampling.

dropped off significantly beyond 20 feet from the injection line. Shallow zone colorimetric data are presented in Table 8.

Based upon review of all the field-screening parameters and visual observations, it was concluded that the Phase I shallow injection well network did not perform as anticipated. However, it was still effective in delivering permanganate to the subsurface. The major conclusions drawn from the field screening data are that the injection rate for permanganate delivery must be decreased for the shallow zone to prevent mounding at the surface, and that additional time may be required from the onset of injections to see a more pronounced response in field screening parameters at greater distances from the injection line. The effective radius of influence based upon review of screening data (changes in parameter values) and visual observations (i.e., colorimetric changes) is probably only about 20 to 25 feet in the shallow zone initially (in the general direction of natural groundwater flow toward the north). Future monitoring during the following phases of pilot testing will determine if the long-term ROI in the shallow zone is actually greater. *In-situ* mixing of oxidant with the contaminants of concern in the dissolved phase also appeared to be achieved based upon visual observations (color changes) and review of DTW and ORP data. However, the mixing appears to have been better in the intermediate zone injection events.

Additional discussion on the reasons for the difference in performance between the shallow and intermediate zones is presented in Section 4.2.3 which presents the analytical data results.

4.2.3 Shallow Contaminant Reduction & Potential Remedial Effectiveness

Although the field screening data presented in the previous section indicated some potential short-term problems with shallow zone permanganate injection, the problems identified can most likely be corrected by slowing the injection flow rate. The best indicator of long-term effectiveness of a proposed remedy is the reduction in the mass of contamination at the site. This section of the report presents the analytical data obtained to determine if the permanganate injection events at the shallow wells effectively reduced the concentration of the contaminants of concern in the study area.

All analytical data for the shallow groundwater zone monitoring are presented in Table 2. The primary contaminants of concern at the shallow zone are the same as in the intermediate zone: specifically, Tetrachloroethene (PCE), Trichloroethene (TCE), 1,2-Dichloroethene (12DCE), 1,1,1-Trichloroethane (TCA), and Vinyl Chloride (VC). Secondary contaminants include 1,1,2-trichloro-1,2,2-trifluoroethane. The Phase I Pilot Test also included analysis of several parameters required to evaluate the use of permanganate injection at the site. These parameters included chromium, iron, chlorides, manganese, and total organic carbon (TOC).

Pre-injection (i.e., baseline) sampling was performed between October 30, 2002, and November 7, 2002, to establish pre-test conditions. In order to allow comparison of data to historic site monitoring, analytical samples were collected from pre-existing monitoring wells in the pilot test area as well as from the new monitoring wells installed for the pilot test. The following shallow monitoring wells were sampled during the Phase I pilot test:

- MW-2A*
- MW-4PS*
- MW-7P*
- MW-10PS
- MW-11PS
- MW-12PS
- MW-13PS*
- PTMW-1S
- PTMW-2S
- PTMW-3S
- PTMW-4S
- PTMW-5S
- PTMW-6S

** Wells indicated by an asterisk were sampled for background information and are not discussed in this report.*

In general, the baseline levels of VOCs in the shallow wells were either non-detectable or relatively low (less than 10 µg/l) except for the following compounds:

- **1,2DCE:** (maximum concentration of 7,600 µg/l at PTMW-5S which is outside the anticipated ROI of the Phase I Pilot Test area. Maximum concentration of 400 µg/l at PTMW-1S within the Phase I pilot test study area);

- **1,1,1TCA**: (maximum concentration of 29 µg/l in MW-12PS within the Phase I Pilot Test area);

- **1,1DCA:** (maximum concentration of 26 µg/l in PTMW-5S, which is outside the anticipated ROI for the Phase I Pilot Test. Maximum concentration of 4 µg/l at PTMW-1S and PTMW-2S within the Phase I pilot test study area);

- **Chlorofluorocarbons:** (1,1,2-trichloro-1,2,2-trifluoroethane): (maximum concentration of 1,700 µg/l at PTMW-5S, which is outside the anticipated ROI for the Phase I Pilot Test. Maximum concentration of 1,600 µg/l in MW-12PS within the Phase I Pilot Test area);

- **PCE:** (maximum concentration of 2,200 µg/l in PTMW-5S, which is outside the anticipated ROI for the Phase I Pilot Test. Maximum concentration of 1,200 µg/l in MW-12PS within the Phase I Pilot Test area);

- **TCE:** (maximum concentration of 2,000 µg/l in PTMW-5S, which is outside the anticipated ROI for the Phase I Pilot Test. Maximum concentration of 1,400 µg/l in MW-12PS within the Phase I Pilot Test area);

- **VC:** (maximum concentration of 850 µg/l in PTMW-5S, which is outside the anticipated ROI for the Phase I Pilot Test. Maximum concentration of 70 µg/l in MW-11PS within the Phase I Pilot Test area).

In addition to the VOCs, background data were also collected for TOC, chlorides, iron, manganese, and chromium. TOC background levels ranged from 4 to 15 mg/l. Chloride background levels ranged from 19 to 172 mg/l with the highest baseline levels present in MW-10PS and PTMW-5S. The lowest levels were present at MW-11PS and PTMW-3S. Chromium baseline levels were between 1 µg/l and 19 µg/l. For iron, the baseline levels in groundwater varied greatly with the lowest level of 1,510 µg/l present at PTMW-4S and the highest level of 49,000 µg/l present at MW-11PS. Manganese baseline levels prior to testing were relatively consistent throughout the test area with the highest concentrations present at PTMW-2S (925 µg/l) and the lowest at PTMW-6S (81 µg/l). Most manganese concentrations were between 400 and 800 µg/l in the baseline-sampling event.

After the completion of baseline documentation and the intermediate well injections, the shallow well injections were initiated for Phase I at wells PT-14S through PT-18S. Injection events were conducted from November 26, 2002, through December 19, 2002. Two post-injection sampling events were conducted to assess the immediate reductions in contaminants of concern and the projected long-term reductions after consideration of rebound effects. The first post-injection sampling event for the shallow zone was completed on January 29-30, 2003, approximately 31 days after the completion of injections. The final post-injection sampling event was completed on April 2-4, 2003, approximately 103 days after the completion of injections to ensure that any rebound effects would have already occurred (i.e., the sampling event would represent permanent reduction in contaminant concentrations). The results of all post-injection sampling events for the shallow zone are provided in Table 2. Removal efficiency estimates for the shallow zone for all contaminants initially present above 10 µg/l are provided in Table 13.

Despite some of the slower injection rates and less prominent responses in field screening, the analytical data summarized in Tables 2 and 13 indicated that the shallow injection events were eventually effective within 50 feet of the injection line and somewhat effective beyond 50 feet. The concentrations of all contaminants in the shallow groundwater zone at all monitoring locations within 50 feet of the injection line were reduced to non-detectable levels or levels below Class GA Groundwater Quality Standards. However, unlike the intermediate zone injections, the shallow zone contaminant decreases did not all occur within the first 20 to 40 days following the injections. It was not until the second post-injection events more than 100 days after the initial shallow injections that the significant reductions were observed. This observation is consistent with the field screening data in that most field screening parameters did not show rapid changes within the first few weeks following the shallow injection events.

Although reductions beyond 50 feet were evident for most VOCs, the reductions were not as uniform or as significant for most compounds. Reductions for 111TCA and 11DCA were essentially greater than 80% even as far away as 180 feet from the injection line. However, as discussed in the intermediate results section of the report, the reaction mechanism for permanganate is typically not as rapid or efficient for the alkanes. Therefore, these reductions may have been at least partially caused by wave effects and dilution related to the injection events.

Reductions for 12DCE, 1,1,2-trichloro-1,2,2-trifluoroethane, PCE, TCE, and VC were not nearly as pronounced once the distance from the injection line exceeded 50 feet. VC concentrations were only reduced approximately 20% to 30% at distances of only 50 to 60 feet from the injection line while the concentrations of some other compounds *rose* immediately after shallow injections at distances greater than 50 feet from the injection line. Although a second round of post-injection data was not collected at PTMW-5S and PTMW-6S, concentrations of contaminants of concern in these wells *rose* in the first post-injection sampling event[8]. This is likely a temporary phenomena cause by a wave pulse during the shallow injection events and concentrations will likely decrease as seen in almost all other wells during subsequent testing. It is theorized that had a second round of testing occurred in these wells, the reductions would have been similar to those demonstrated by MW-10PS (typical reductions of approximately 15% to 63%) which is located a similar distance away from the injection line. This assumption will be tested in the field during the second phase of pilot testing when additional PTMW-5S and PTMW-6S samples will be collected.

It is interesting to note that better contaminant reductions were noticed at distances approximately 60 to 80 feet from the injection line than from wells 50 to 60 feet from the shallow injection line for almost all parameters. This may be due to geologic variations in the pilot test area because similar results were noticed in the intermediate well sampling events also.

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[8] The evaluation of shallow injection response at wells PTMW-5S and PTMW-6S at distances greater than 150 feet from the injection line is complicated by the fact that only one post-injection sampling round (i.e., the first round, 40 days after injections) was collected for these wells. The second round of post-injection sampling at wells PTMW-5S and PTMW-6S was not conducted after it was realized that these wells should *not* have been sampled for the Phase I Pilot test because they were well outside the anticipated radius of influence for the Phase I test. Given that the shallow well contaminant reductions occurred more significantly after the first post-injection sampling event in almost all other wells sampled, it is probable that the relatively high increases in contaminant levels evident in PTMW-5S and PTMW-6S after the first post-injection sampling event are temporary only. This position will be evaluated prior to the start of the Phase II pilot test work by collecting an additional set of samples from PTMW-5S and PTMW-6S.

Chlorofluorocarbon reductions of 100% were also achieved within 50 feet of the injection line and in general, the 1,1,2-trichloro-1,2,2-trifluoroethane contaminant reduction efficiencies paralleled those of the other contaminants of concern. Based upon the treatability test results, it is possible for degradation of 1,1,2-trichlor-1,2,2-trifluorethane reductions with permanganate injection. However, the mechanism for such reductions via permanganate oxidation is not readily apparent.

In addition to the contaminant reduction efficiencies for the chlorinated VOCs of concern, the possible mobilization of metals and chlorides in the aquifer was also evaluated during the shallow injections. Chloride increases in the subsurface were relatively insignificant with the highest levels of chloride after testing actually lower than at the onset of testing (36.7 µg/l as compared to 69 µg/l at the start of testing). Chromium concentration increases were evident in all but the three wells. Although the percent increases were often high, the actual concentration increases were minor with only one well exhibiting chromium concentrations exceeding 10 µg/l (35.2 µg/l at MW-10PS). These levels of chromium are not considered a concern. Manganese levels also did not increase substantially during the first shallow injection tests except for three wells (PTMW-1S, MW-11PS, and PTMW-6S). This temporary increase is considered normal for permanganate injection and it is likely that the elevated concentrations of manganese will drop off in time.

After evaluation of all data, it was determined that the shallow injection of $KMnO_4$ may be able to reduce contaminant concentrations. However, the cost-effective delivery of oxidant may be problematic using the design flow rates of the Phase I Pilot Test. The physical delivery of permanganate into the shallow zone required much lower flow rates and additional field time as compared to the intermediate injection events. Additionally, the impact of the permanganate at distances greater than 50 feet from the shallow injection line was highly variable with some parameters showing the potential for reductions of close to 100%, while others only indicating potential reductions of 20% to 30%. Additional data will be required from wells further than 100 feet away from the shallow injection line to determine if a "pulsing" wave effect may temporarily push contaminants away from the injection area in the shallow zone. However, it is unlikely that this is a long-term effect because monitoring from wells 180 feet away (MW-10PS) did ultimately indicate the potential for contaminant reductions given a sufficient amount of time after the initial injection events.

It is likely that the permanganate injection events in the shallow zone did not achieve the same results as the intermediate zone injections initially because the first injections in the shallow zone served primarily to flush any contaminants that may have been "trapped" in the smear (i.e., shallow) zone at the site. In addition, the natural soil oxidant demand in the shallow /

vadose zone was significantly higher than in the intermediate, groundwater-only zone such that the bulk of the injected permanganate may have been "used up" in the reaction with the naturally occurring organics in the vadose zone (i.e., leaving less unreacted permanganate to address the contaminants of concern). It is probable that after "trapped" contaminants in the shallow zone were "freed" by the initial flushing (as simulated during the Phase I injections) and the soil oxidant demand was reduced during the initial injections, residual contaminant concentrations may be more readily reduced by permanganate or a different oxidant (e.g., Fenton's Reagent) during additional injection events. A modified Phase II Pilot Test would be able to evaluate this theory through secondary injections in the shallow groundwater zone to determine if a more pronounced reduction of contaminants after a secondary injection is achievable.

In the intermediate zone, where all of the energy of the permanganate delivery system was focused solely on dissolved phase contamination during Phase I injections, the initial response of the injection was much more pronounced.

4.3 Health and Safety Monitoring

The existing Health and Safety Plan (HASP) was modified to specifically address the permanganate injection pilot test and to address the scope of work covered under the pilot test. Tailgate safety meetings were held and documented for each day of field activities. In addition, all ESI employees working on the site attended an internal training program to ensure that the field program was completed safely and effectively. Parties other than ESI or persons who have contracted directly with ESI were responsible for developing and implementing their own site-safety procedures. Access to the construction areas reflected in the Phase I, II, III, IV and V injection drawings was restricted during pilot testing.

Although negative ambient air impacts were not expected or likely, an ambient air monitoring program was included during the pilot test as a precautionary measure. Wellhead monitoring for VOCs was completed periodically during injection events. In addition, breathing zone monitoring was performed on the Pall site and immediately downgradient at the Glen Cove Day Care center property line. The design of the pilot test system minimized particulate emissions through use of covered mixing and transfer vessels and a vacuum eductor system.

The results of the air-monitoring program indicating that there were no concerns are summarized in Table 10.

5.0 CONCLUSIONS & RECOMMENDATIONS

Based upon site observations and review of field and analytical data, the following conclusions can be made regarding the use of potassium permanganate injection to remediate the contaminants of concern at Pall's 30 Sea Cliff Avenue, Glen Cove, New York facility:

- Potassium permanganate solutions can be effectively and safely made up on-site and introduced to the subsurface in a controlled manner.
- There was no significant mobilization of metals and inorganics noted during pilot testing except for manganese. Manganese concentration increases were evident during shallow and intermediate injections in several wells. However, these concentration increases are expected to be short-term and a return to pre-testing levels is anticipated.
- Intermediate injection wells performed in accordance with design projections, with flow rates greater than 15 gpm per well sustainable without unacceptable mounding near the surface.
- Intermediate groundwater zone injections of potassium permanganate can effectively reduce contaminant concentrations of chlorinated VOCs at the site when injected at wells designed for oxidant delivery. The effective radius of influence in the intermediate zone is likely greater than 50 feet in the general direction of groundwater flow (toward the north), with significant reductions of contaminants also noted as far away as 150 feet from the injection wells.
- Contaminants of concern (i.e., chlorinated VOCs) can effectively be reduced by as much as 100% within 50 feet of the intermediate zone injection wells. Chlorinated VOC concentrations within the Phase I pilot test area were reduced to within Class GA Groundwater Quality Standards within 150 days of permanganate injections as far away as 50 feet of the intermediate injection wells. Most reductions occurred in under 41days.
- Chlorofluorocarbons were apparently reduced through potassium permanganate injections in the intermediate groundwater, with reductions of 100% evident in six out of 10 monitoring wells. However, due to the fact that the reaction mechanism of permanganate is not typically effective for 1,1,2-trichloro-1,2,2-trifluoroethane or chlorinated alkanes, it cannot be definitively stated whether the chlorofluorocarbon reductions noted were the result of oxidation / bioremediation due to some limited free radical formation, or were caused by dilution / wave effects.
- Shallow injection wells did not perform in accordance with design predictions because flow rates greater than five gpm per well resulted in surface mounding at several injection locations. It is believed that the five gpm per well injection rate can still effectively treat the shallow groundwater zone, if the field time

required to complete injections is increased. Additional data are required to optimize the delivery system. Also, additional study is necessary to evaluate potential "wave effects" (i.e., a pushing of contaminants because of the localized mounding at the point of injection) during and following shallow injection events because of the results for chlorofluorocarbons and alkanes that were not wholly consistent with what was anticipated based upon the reaction mechanisms typically associated with permanganate.

- The effective radius of influence in the shallow zone is likely up to 50 feet in the general direction of groundwater flow (toward the north), with some evidence of reductions of contaminants also noted as far away as 150 feet from the injection wells. The contaminant reductions noted in the shallow zone were less uniform than those noted in the intermediate groundwater.

- Contaminants of concern (i.e., chlorinated VOCs) can effectively be reduced by as much as 100% within 50 feet of the shallow zone injection wells. However, there was a temporary increase in shallow groundwater contaminant concentrations prior to the long-term reductions noted.

- Chlorinated VOC concentrations within the Phase I Pilot Test area were reduced to within Class GA Groundwater Quality Standards within 150 days of permanganate injections as far away as 50 feet of the shallow injection wells. 1,1,2-trichloro-1,2,2-trifluoroethane was only reduced through potassium permanganate injections in the shallow groundwater at distances less than 50 feet from the shallow injection wells. At distances greater than 50 feet, there was limited evidence of significant 1,1,2-trichloro-1,2,2-trifluoroethane degradation.

Based upon the foregoing conclusions, the following actions are recommended:

- The shallow groundwater portions of the Phase II Pilot Test should proceed as originally designed with the exception that the shallow injection flow rates should be reduced to less than 5 gpm per well. This additional shallow groundwater study is necessary to evaluate the destructive capabilities of oxidizers at lower injection flow rates and the impact of localized mounding, and "wave effects" during and following shallow well injections.

- Additional pilot testing should be performed with a more aggressive oxidant such as Fenton's Reagent to determine if full-scale remediation is potentially possible at lower costs. In addition, the use of Fenton's Reagent will address several secondary contaminants of concern (e.g., chlorofluorocarbons and chlorinated alkanes) that are not as readily reduced by permanganate. Fenton's Reagent injection will require less water addition than permanganate and will help better determine whether dilution and wave effects may have caused some of the contaminant reductions that were noted during Phase I testing.

- Since intermediate zone contaminant reductions were so pronounced, it is recommended that the originally planned Phase II through V pilot tests be eliminated and further evaluations be limited to a small-scale, modified Phase II Pilot Test for the intermediate zone. The details of the modified Phase II Pilot Test for the intermediate zone (as well as the shallow zone) will be addressed in an addendum to the Pilot Test Work Plan and Design as a separate submittal.

- Injection of Fenton's Reagent directly into existing monitoring wells should be evaluated as a localized treatment option. The wells recommended for inclusion in the direct monitoring well injection aspects of the pilot test will be discussed in the addendum to the Pilot Test Work Plan and Design as a separate submittal.

- The mass of oxidant introduced to the shallow zone should be reassessed for the Phase II Pilot Test because of the mixed results obtained at distances greater than 50 feet away from the injection wells and because of the lack of a pronounced response immediately after injection events. If Fenton's Reagent is used in the next phase, the mass of oxidant introduced in the modified Phase II Pilot Test for the intermediate zone should be re-calculated to take the stronger nature of Fenton's Reagent into consideration. If successful, this modified dosing with Fenton's Reagent could reduce full-scale remediation costs and could result in a more rapid degradation of the secondary contaminants of concern such as chlorofluorocarbons (e.g., 1,1,2-trichloro-1,2,2-trifluoroethane).

- The frequency of monitoring at shallow and intermediate monitoring locations should be reduced significantly because of problems identified in the field with the time required for many readings to stabilize. However, the parameters analyzed should not be changed. In addition, several additional rounds of field monitoring after the final injection events should be added to better understand the long-term impacts to ORP, DO, pH, etc. after injection events. The revised monitoring program will be outlined in the addendum to the Pilot Test Work Plan and Design to be submitted separately.

- Fieldwork on the Phase II Pilot Test should be initiated only during the warmer months (after NYSDEC approval of this report) to eliminate many of the problems identified in the field during previous testing during colder months. Performing fieldwork in the warmer months only (typically late March through early November) will protect the health and safety of workers; ensure better data collection; minimize the probability of releases related to frozen piping, fittings, and equipment; and, lower overall pilot test costs.

- Better quality flow meters and a possible particulate filter should be used at the injection manifold to ensure better data acquisition at each wellhead.

Table [illegible]
Groundwater Sample Results - Shallow Groundwater Monitoring Wells
Phase I Pilot Test: Pre-Injection Baseline Monitoring

All results in ug/l except as noted.

Parameter	Upgradient MW-1A 10/30/2002	MW-2A 11/1/2002	MW-3P 10/30/2002	MW-4PS 10/30/2002	Upgradient MW-7P 10/30/2002	Upgradient MW-8PS 10/30/2002	MW-10PS 11/1/2002	MW-11PS 10/31/2002	MW-12PS 11/4/2002	Upgradient MW-13PS 10/28/2002	PTMW-1S 10/30/2002	PTMW-2S 10/31/2002	PTMW-3S 10/31/2002	PTMW-4S 11/7/2002	PTMW-5S 11/4/2002	PTMW-6S 11/1/2002	PT-4S 11/7/2002	PT-6S 11/7/2002	PT-11S 11/6/2002	PT-15S 11/6/2002	PT-17S 11/6/2002
Chloromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Vinyl Chloride	36	300 D	230 D	17	<10	<10	74	70	44	<10	100	41	19	38 D	650 J	34	75	28	49	64	15
Chloroethane	<10	4 J	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methylene Chloride	<10	5 J	<10	2 J	<10	<10	<10	<10	<10	<10	<10	<10	<10	52 BD	<10	8 J	26 B	24 B	<10	<10	<10
Acetone	<10	<10	<10	5 J	<10	<10	<10	<10	77	<10	<10	10	<10	<10	<10	<10	<10	<10	<10	51	51
1,1-Dichloroethene	<10	<10	<10	<10	<10	<10	17	<10	10	<10	1 J	<10	<10	<10	20	3 J	5 J	14	2 J	2 J	2 J
Carbon Disulfide	<10	<10	<10	<10	<10	<10	<10	2 J	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichlorethane	<10	7 J	6 J	1 J	<10	<10	17	2 J	3 J	9 J	5 J	4 J	2 J	2 J	26	3 J	6 J	3 J	4 J	7 J	4 J
1,2-Dichloroethene (total)	4 J	3,500 D	130	140	<10	<10	480 D	50	390 JD	38	470 D	300 D	97	200 D	7,600 D	230 D	780 D	270 JD	300 D	200 D	180
Chloroform	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Freon-113	<10	190	<10	100	<10	<10	140 D	<10	1,600 D	<10	28	10	8 J	270 D	1,700	250 D	680 D	1,400 D	360 D	490 D	200 D
1,2-Dichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-Butanone	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,1,1-Trichloroethane	<10	2 J	<10	<10	<10	<10	16	<10	29	<10	<10	<10	<10	2 J	<10	1 J	3 J	74	2 J	2 J	3 J
Carbon Tetrachloride	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromodichloromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dichloropropane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
cis-1,3-Dichloropropene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Trichloroethene	1 J	200 DJ	3 J	27	<10	<10	510 D	8	1,400 D	14	9 J	6 J	6 J	280 D	2,000 D	260 D	490 D	1,700 D	200 D	350 D	200 D
Dibromochloromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	2 J	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,1,2-Trichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzene	2 J	2 J	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	2 J	<10	<10	<10	<10	<10
trans-1,3-Dichloropropene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromoform	<10	<10	<10	<10	<10	1 J	<10	<10	<10	2 J	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-Methyl-2-Pentanone	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-Hexanone	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Tetrachloroethene	3 J	280 D	<10	3 J	1 J	<10	150	2 J	1,200 D	3 J	9 J	35	3 J	36 D	2,200 D	110	30	1,500 D	14	860 D	40
1,1,2,2-Tetrachloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Toluene	<10	<10	<10	<10	<10	2 J	<10	<10	1 J	<10	1 J	<10	<10	<10	13	<10	<10	<10	<10	<10	<10
Chlorobenzene	<10	<10	<10	<10	<10	<10	2 J	<10	<10	<10	<10	<10	<10	<10	7 J	<10	<10	<10	<10	<10	<10
Ethylbenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	4 J	<10	<10	<10	<10	<10	<10
Styrene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Xylene (total)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	17	<10	<10	<10	<10	<10	<10
Total "Freon" TICs	0	0	11 NJ	38 NJ	0	0	23 NJ	0	80 NJ	0	29 NJ	10 NJ	0	53 NJ	350 NJ	22 NJ	240 NJ	42 NJ	71 NJ	63 NJ	12 J
Total VOCs	46	4,490	369	295	1	3	1,406	134	4,754	66	623	406	135	880	14,437	901	2,075	5,013	931	2,026	695

Notes:

ly 20 feet into the water table.
TICs = Tentatively Identified Compounds, 1,2-DCE listed individually as a VOC because of its importance at the site.
NA = Not Available
Total VOCs does not include TICs
J = Estimated value
B = Analyte is found in associated blank as well as in the sample
E = Compound whose concentrations exceeded the calibration range of the GC/MS for that specific analysis. The sample was diluted and re-analyzed.
D = Compound is identified at a secondary dilution factor.
N = presumptive evidence of a compound, only applicable to TICs.
<## = Compound was analyzed for but not detected. The ## represents the sample quantitation limit (This is similar to the U flag).
* Indicates a guidance value, not a standard.
ND = Tentatively identified compound that was not detected. Actual MDL not available but likely <10 ug/l based upon similar sample matrices.
Acetone levels detected during 11/4 through 11/7 lab analyses are the result of possible lab contamination because acetone was not detected at elevated levels during previous studies, nor was it used at the facility in any significant quantities

Table 1B
Groundwater Sample Results - Intermediate Groundwater Monitoring Wells
Phase I Pilot Test: Pre-Injection Baseline Monitoring

All results in ug/l except as noted.

Parameter	Upgradient MW-1PI 10/30/02	MW-2AI 11/1/02	MW-4PI 10/30/02	MW-5PI 10/31/02	Upgradient MW-6P 10/30/02	Upgradient MW-8PI 10/30/02	MW-10PI 11/1/02	MW-11PI 10/31/02	MW-12PI 11/4/02	Upgradient MW-13PI 10/28/02	Upgradient MW-16PCI 10/29/03	PTMW-1I 10/31/02	PTMW-2I 10/31/02	PTMW-3I 11/1/02	PTMW-4I 11/7/02	PTMW-5I 11/4/02	PTMW-6I 11/4/02	PT-4I 11/7/02	PT-6I 11/7/02	PT-11I 11/6/02	PT-15I 11/5/02	PT-17I 11/5/02
Chloromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Vinyl Chloride	1 J	3 J	<10	2 J	<10	1 J	<10	6 J	<10	21	<10	4 J	2 J	1 J	6 J	61	<10	<10	<10	<10	<10	<10
Chloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methylene Chloride	<10	47	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	2 J	25 B	<10	<10	25 B	24 B	<10	<10	<10
Acetone	<10	38	<10	<10	<10	<10	<10	<10	<10	<10	<10	6 J	110	10,000 D	2,400 D	170	73	28	<10	<10	<10	26
1,1-Dichloroethene	<10	11	<10	<10	2 J	11	<10	9 J	<10	9 J	<10	<10	<10	<10	2 J	1 J	<10	<10	<10	<10	<10	<10
Carbon Disulfide	<10	<10	4 J	<10	<10	<10	2 J	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethane	6 J	13	<10	<10	5 J	20	<10	11	2 J	51	5 J	14	2 J	4 J	13	17	2 J	1 J	2 J	<10	1 J	1 J
1,2-Dichloroethene (total)	26	110	12	23	24	77	91	89	6 J	170 D	<10	41	14	59	110	180 D	32	6 J	7 J	23	44	14
Chloroform	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	2 J	<10	<10
Freon-113	<10	1,100 D	16	9 J	<10	<10	86	10	<10	<10	<10	14	<10	70	46	61	33	<10	160	<10	27	17
1,2-Dichloroethane	<10	<10	<10	<10	1 J	2 J	<10	<10	<10	3 J	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-Butanone	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,1,1-Trichloroethane	<10	<10	<10	<10	1 J	4 J	<10	8 J	<10	2 J	<10	<10	<10	<10	1 J	<10	<10	<10	1 J	<10	<10	<10
Carbon Tetrachloride	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromodichloromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	1 J	<10	<10
1,2-Dichloropropane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
cis-1,3-Dichloropropene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Trichloroethene	9 J	320 D	16	4 J	8 J	34	55	74	8 J	120	<10	74	14	20	82	50	12	9 J	16	3 J	30	9 J
Dibromochloromethane	<10	<10	1 J	<10	<10	1 J	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	1 J	<10	<10	2 J	<10	<10
1,1,2-Trichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
trans-1,3-Dichloropropene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromoform	<10	<10	1 J	<10	<10	2 J	<10	2 J	<10	<10	<10	1 J	<10	<10	<10	<10	2 J	1 J	2 J	1 J	<10	<10
4-Methyl-2-Pentanone	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-Hexanone	<10	1,700 D	<10	14	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Tetrachloroethene	1 J	<10	5 J	<10	4 J	15	130	260 D	43	28	<10	600 D	200 D	120	72	320 D	56	15	150	7 J	130 D	26
1,1,2,2-Tetrachloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Toluene	1 J	1 J	<10	<10	<10	<10	4 J	<10	2 J	<10	<10	2 J	<10	2 J	<10	1 J	<10	<10	<10	<10	<10	<10
Chlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Ethylbenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	4 J	<10	<10	<10	<10	<10
Styrene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Xylene (total)	<10	1 J	<10	<10	<10	<10	7 J	<10	<10	<10	<10	<10	<10	<10	<10	<10	6 J	<10	<10	<10	<10	<10
Total "Freon" TICs	11 NJ	0	0	0	0	0		0	0	0	28 NJ	0	0	7 NJ	16 J	28 NJ	0	0	12 J	0	0	0
Total VOCs	44	3,344	55	52	44	187	355	469	61	405	5	756	342	10.278	2.759	861	223	85	364	39	232	93
Total VOCs (less Acetone)	44	3,308	55	52	44	187	355	469	61	405	5	750	232	278	359	691	150	57	364	39	232	93

Notes:

Intermediate" groundwater is defined as wells screened in the interval from approximately 45 to 65 feet into the water table.
TICs = Tentatively Identified Compounds, 1,2-DCE listed individually as a VOC because of its importance at the site.
NA = Not Available
Total VOCs does not include TICs
J = Estimated value
B = Analyte is found in associated blank as well as in the sample
E = Compound whose concentrations exceeded the calibration range of the GC/MS for that specific analysis. The sample was diluted and re-analyzed.
D = Compound is identified at a secondary dilution factor.
N = presumptive evidence of a compound, only applicable to TICs.
<## = Compound was analyzed for but not detected. The ## represents the sample quantitation limit (This is similar to the U flag).
* Indicates a guidance value, not a standard.
ND = Tentatively identified compound that was not detected, Actual MDL not available but likely <10 ug/l based upon similar sample matrices
Acetone levels detected during 11/4 through 11/7 lab analyses are the result of possible lab contamination because acetone was not detected at elevated levels during previous studies, nor was it used at the facility in any significant quantities.

Table 1C
Groundwater Sample Results - Deep Groundwater Monitoring Wells
Phase I Pilot Test: Pre-Injection Baseline Monitoring

All results in ug/l except as noted.

Parameter	Upgradient MW-1PD 10/30/02	MW-2AD 11/1/02	MW-4PD 10/30/02	MW-5PD 10/31/02	Upgradient MW-6PD 10/30/02	MW-10PD 11/1/02	MW-11PD 10/31/02	MW-12PD 11/4/02	Upgradient MW-13PD 10/29/03	Upgradient MW-14PCD 11/3/02	Upgradient MW-15PCD 10/29/03	Upgradient MW-16PCD 10/29/02
Chloromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Vinyl Chloride	2 J	300 D	<10	16	57	13	10	<10	3 J	110	7 J	<10
Chloroethane	<10	4 J	<10	<10	<10	<10	<10	<10	<10	<10	3 J	<10
Methylene Chloride	<10	5 J	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Acetone	<10	<10	<10	<10	12	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	3 J	10	1 J	11	45	14	12	<10	5 J	11	51	4 J
Carbon Disulfide	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	7 J
1,1-Dichlorethane	12	7 J	2 J	10	97	10	9 J	2 J	49	53	150	9 J
1,2-Dichloroethene (total)	110	3,500 D	35	220 D	920 D	180	130	36	160 D	1,200 D	680 D	91
Chloroform	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Freon-113	<10	190	<10	14	<10	30	8 J	<10	<10	<10	<10	<10
1,2-Dichloroethane	<10	<10	<10	<10	16	<10	<10	<10	<10	<10	3 J	<10
2-Butanone	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,1,1-Trichloroethane	<10	2 J	<10	10	<10	11	13	<10	6 J	<10	5 J	<10
Carbon Tetrachloride	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromodichloromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dichloropropane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
cis-1,3-Dichloropropene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Trichloroethene	72	200 DJ	76	370 D	140	250 D	110	45	140	180 D	220 D	55
Dibromochloromethane	<10	<10	<10	1 J	<10	<10	<10	<10	<10	<10	2 J	<10
1,1,2-Trichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzene	<10	2 J	<10	<10	3 J	<10	<10	<10	<10	1 J	<10	2 J
trans-1,3-Dichloropropene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromoform	<10	<10	<10	1 J	<10	<10	1 J	<10	1 J	<10	2 J	<10
4-Methyl-2-Pentanone	<10	<10	<10	<10	<10	<10	<10	12	<10	<10	<10	<10
2-Hexanone	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Tetrachloroethene	5 J	280 D	3 J	140	46	33	24	2 J	27	47	32	5 J
1,1,2,2-Tetrachloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Toluene	2 J	<10	<10	<10	<10	<10	<10	<10	<10	2 J	<10	<10
Chlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Ethylbenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Styrene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Xylene (total)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Total "Freon" TICs	15 NJ	0	0	0	0	11 NJ	0		0	12 NJ	10 NJ	27 NJ
Total VOCs	206	4,500	117	793	1,336	541	317	97	391	1,604	1,155	173

Notes:

35 to 105 feet into the water table.
TICs = Tentatively Identified Compounds, 1,2-DCE listed individually as a VOC because of its importance at the site.
NA = Not Available
Total VOCs does not include TICs
J = Estimated value
B = Analyte is found in associated blank as well as in the sample
E = Compound whose concentrations exceeded the calibration range of the GC/MS for that specific analysis. The sample was diluted and re-analyzed.
D = Compound is identified at a secondary dilution factor.
N = presumptive evidence of a compound, only applicable to TICs.
<## = Compound was analyzed for but not detected. The ## represents the sample quantitation limit (This is similar to the U flag).
* Indicates a guidance value, not a standard.
ND = Tentatively identified compound that was not detected, Actual MDL not available but likely <10 ug/l based upon similar sample matrices.

Table 2

KMnO4 Injection Analytical Results Summary for Shallow Wells
(All results in ug/l unless indicated)

			SHALLOW WELLS													
Analyte	Collection Date	Collection Date	MW-2A	MW-4PS	MW-7P	MW-10PS	MW-11PS	MW-12PS	MW-13PS	PTMW-1S*	PT-MW2S	PT-MW3S	PTMW-3S	PTMW-4S	PTMW-5S	PTMW-6S
1,1,1-Trichloroethane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				12DJ	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						29							10U	
		11/05/02								2J						
		11/07/02												2J		
	Intermediate Post-Injection (12/18 - 12/19/02)		250U	10U		12DJ	10U	29		2J	20U	10U		2J	10U	20U
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											
1,1,2,2-Tetrachloroethane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							10U	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					1J		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 2

KMnO4 Injection Analytical Results Summary for Shallow Wells

(All results in ug/l unless indicated)

			SHALLOW WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2A**	**MW-4PS**	**MW-7P**	**MW-10PS**	**MW-11PS**	**MW-12PS**	**MW-13PS**	**PTMW-1S***	**PT-MW2S**	**PT-MW3S**	**PTMW-3S**	**PTMW-4S**	**PTMW-5S**	**PTMW-6S**
1,1,2-Trichloroethane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							10U	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	50JD
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											
1,1-Dichloroethane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		1J												
		10/31/02				15DJ	2J				4DJ	2J				
		11/01/02	250U													3DJ
		11/04/02						3J							26	
		11/05/02								4J						
		11/07/02												2J		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		2J	10U		3J	20U	500U	100U
		01/30/03				100U	10U		3J							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					2J		3J	10U						
		04/03/03									10U		10U	3J		
		04/04/03				3DJ		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 2

KMnO4 Injection Analytical Results Summary for Shallow Wells

(All results in ug/l unless indicated)

Analyte	Collection Date	Collection Date	SHALLOW WELLS													
			MW-2A	MW-4PS	MW-7P	MW-10PS	MW-11PS	MW-12PS	MW-13PS	PTMW-1S*	PT-MW2S	PT-MW3S	PTMW-3S	PTMW-4S	PTMW-5S	PTMW-6S
1,1-Dichloroethene	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				11DJ	10U				20U	10U				
		11/01/02	250U													2DJ
		11/04/02						10							20	
		11/05/02								2J						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											
1,2-Dichloroethane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							10U	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 2

KMnO4 Injection Analytical Results Summary for Shallow Wells

(All results in ug/l unless indicated)

			SHALLOW WELLS													
Analyte	Collection Date	Collection Date	MW-2A	MW-4PS	MW-7P	MW-10PS	MW-11PS	MW-12PS	MW-13PS	PTMW-1S*	PT-MW2S	PT-MW3S	PTMW-3S	PTMW-4S	PTMW-5S	PTMW-6S
1,2-Dichloroethene (total)	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		140												
		10/31/02				480D	50				300D	97				
		11/01/02	3500D													230D
		11/04/02						390JD							7600D	
		11/05/02								400E						
		11/07/02												200D		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						410		160	17		180	150	7000	570
		01/30/03				370	28		22							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					4J		18	3J						
		04/03/03									4J		17	130		
		04/04/03				270D		300D								
	Upgradient Background (4/10/03)															
		04/10/03			10U											
1,2-Dichloropropane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							10U	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 2

KMnO4 Injection Analytical Results Summary for Shallow Wells
(All results in ug/l unless indicated)

			SHALLOW WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2A**	**MW-4PS**	**MW-7P**	**MW-10PS**	**MW-11PS**	**MW-12PS**	**MW-13PS**	**PTMW-1S***	**PT-MW2S**	**PT-MW3S**	**PTMW-3S**	**PTMW-4S**	**PTMW-5S**	**PTMW-6S**
2-Butanone	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							10U	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		3J	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											
2-Hexanone	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							10U	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 2

KMnO4 Injection Analytical Results Summary for Shallow Wells

(All results in ug/l unless indicated)

			SHALLOW WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2A**	**MW-4PS**	**MW-7P**	**MW-10PS**	**MW-11PS**	**MW-12PS**	**MW-13PS**	**PTMW-1S***	**PT-MW2S**	**PT-MW3S**	**PTMW-3S**	**PTMW-4S**	**PTMW-5S**	**PTMW-6S**
4-Methyl-2-pentanone	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							10U	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					1J		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											
Acetone	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		5J												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						77							10U	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 2

KMnO4 Injection Analytical Results Summary for Shallow Wells
(All results in ug/l unless indicated)

Analyte	Collection Date	Collection Date	SHALLOW WELLS													
			MW-2A	MW-4PS	MW-7P	MW-10PS	MW-11PS	MW-12PS	MW-13PS	PTMW-1S*	PT-MW2S	PT-MW3S	PTMW-3S	PTMW-4S	PTMW-5S	PTMW-6S
Benzene	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							10U	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											
Bromodichloromethane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							10U	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 2

KMnO4 Injection Analytical Results Summary for Shallow Wells

(All results in ug/l unless indicated)

			SHALLOW WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2A**	**MW-4PS**	**MW-7P**	**MW-10PS**	**MW-11PS**	**MW-12PS**	**MW-13PS**	**PTMW-1S***	**PT-MW2S**	**PT-MW3S**	**PTMW-3S**	**PTMW-4S**	**PTMW-5S**	**PTMW-6S**
Bromoform	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							10U	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											
Bromomethane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							10U	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 2

KMnO4 Injection Analytical Results Summary for Shallow Wells

(All results in ug/l unless indicated)

			SHALLOW WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2A**	**MW-4PS**	**MW-7P**	**MW-10PS**	**MW-11PS**	**MW-12PS**	**MW-13PS**	**PTMW-1S***	**PT-MW2S**	**PT-MW3S**	**PTMW-3S**	**PTMW-4S**	**PTMW-5S**	**PTMW-6S**
Carbon disulfide	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	2J				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							10U	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											
Carbon tetrachloride	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							10U	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 2

KMnO4 Injection Analytical Results Summary for Shallow Wells

(All results in ug/l unless indicated)

			SHALLOW WELLS													
Analyte	Collection Date	Collection Date	MW-2A	MW-4PS	MW-7P	MW-10PS	MW-11PS	MW-12PS	MW-13PS	PTMW-1S*	PT-MW2S	PT-MW3S	PTMW-3S	PTMW-4S	PTMW-5S	PTMW-6S
Chlorobenzene	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							7J	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											
Chloroethane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							10U	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 2

KMnO4 Injection Analytical Results Summary for Shallow Wells

(All results in ug/l unless indicated)

			SHALLOW WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2A**	**MW-4PS**	**MW-7P**	**MW-10PS**	**MW-11PS**	**MW-12PS**	**MW-13PS**	**PTMW-1S***	**PT-MW2S**	**PT-MW3S**	**PTMW-3S**	**PTMW-4S**	**PTMW-5S**	**PTMW-6S**
Chloroform	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							10U	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											
Chloromethane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							10U	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 2

KMnO4 Injection Analytical Results Summary for Shallow Wells

(All results in ug/l unless indicated)

			SHALLOW WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2A**	**MW-4PS**	**MW-7P**	**MW-10PS**	**MW-11PS**	**MW-12PS**	**MW-13PS**	**PTMW-1S***	**PT-MW2S**	**PT-MW3S**	**PTMW-3S**	**PTMW-4S**	**PTMW-5S**	**PTMW-6S**
cis-1,3-Dichloropropene	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							10U	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											
Dibromochloromethane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							10U	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	30JD
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 2

KMnO4 Injection Analytical Results Summary for Shallow Wells

(All results in ug/l unless indicated)

			SHALLOW WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2A**	**MW-4PS**	**MW-7P**	**MW-10PS**	**MW-11PS**	**MW-12PS**	**MW-13PS**	**PTMW-1S***	**PT-MW2S**	**PT-MW3S**	**PTMW-3S**	**PTMW-4S**	**PTMW-5S**	**PTMW-6S**
Ethylbenzene	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							4J	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											
Freon-113	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		100												
		10/31/02				140D	10U				10DJ	8J				
		11/01/02	120DJ													250D
		11/04/02						1600D							1700	
		11/05/02								540E						
		11/07/02												270D		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						970		110	7J		24	300	1400	1000
		01/30/03				800	51		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		3J	150		
		04/04/03				230D		580D								
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 2

KMnO4 Injection Analytical Results Summary for Shallow Wells

(All results in ug/l unless indicated)

Analyte	Collection Date	Collection Date	SHALLOW WELLS													
			MW-2A	**MW-4PS**	**MW-7P**	**MW-10PS**	**MW-11PS**	**MW-12PS**	**MW-13PS**	**PTMW-1S***	**PT-MW2S**	**PT-MW3S**	**PTMW-3S**	**PTMW-4S**	**PTMW-5S**	**PTMW-6S**
	Pre-Injection (10/30 - 11/7/02)															
Methylene chloride		10/30/02		2J												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							10U	
		11/05/02								10U						
		11/07/02												52BD		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											
	Pre-Injection (10/30 - 11/7/02)															
Styrene		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							10U	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 2

KMnO4 Injection Analytical Results Summary for Shallow Wells
(All results in ug/l unless indicated)

			SHALLOW WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2A**	**MW-4PS**	**MW-7P**	**MW-10PS**	**MW-11PS**	**MW-12PS**	**MW-13PS**	**PTMW-1S***	**PT-MW2S**	**PT-MW3S**	**PTMW-3S**	**PTMW-4S**	**PTMW-5S**	**PTMW-6S**
Tetrachloroethene	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		3J												
		10/31/02				110D	2J				24D	3J				
		11/01/02	280D													83D
		11/04/02						1200D							2200D	
		11/05/02								14						
		11/07/02												36D		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						670		89	10U		10U	47	6600	60JD
		01/30/03				350	30		6J							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	26		
		04/04/03				41D		330D								
	Upgradient Background (4/10/03)															
		04/10/03			10U											
Toluene	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						1J							13	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 2

KMnO4 Injection Analytical Results Summary for Shallow Wells

(All results in ug/l unless indicated)

Analyte	Collection Date	Collection Date	SHALLOW WELLS													
			MW-2A	MW-4PS	MW-7P	MW-10PS	MW-11PS	MW-12PS	MW-13PS	PTMW-1S*	PT-MW2S	PT-MW3S	PTMW-3S	PTMW-4S	PTMW-5S	PTMW-6S
trans-1,3-Dichloropropene	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							10U	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											
Trichloroethene	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		27												
		10/31/02				510D	8J				7DJ	6J				
		11/01/02	200DJ													260D
		11/04/02						1400D							2000D	
		11/05/02								250E						
		11/07/02												280D		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						1100		50	5J		4J	210	2700	730
		01/30/03				1000	67		14							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					2J		6J	4J						
		04/03/03									2J		1J	92		
		04/04/03				220D		490D								
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 2

KMnO4 Injection Analytical Results Summary for Shallow Wells
(All results in ug/l unless indicated)

			SHALLOW WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2A**	**MW-4PS**	**MW-7P**	**MW-10PS**	**MW-11PS**	**MW-12PS**	**MW-13PS**	**PTMW-1S***	**PT-MW2S**	**PT-MW3S**	**PTMW-3S**	**PTMW-4S**	**PTMW-5S**	**PTMW-6S**
Vinyl chloride	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		17												
		10/31/02				45DJ	70				40D	19				
		11/01/02	300D													28D
		11/04/02						44							850J	
		11/05/02								49						
		11/07/02												38D		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						40JD		16	10U		27	23	650	60JD
		01/30/03				100U	15		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					14		10U	10U						
		04/03/03									10U		3J	28		
		04/04/03				38D		34DJ								
	Upgradient Background (4/10/03)															
		04/10/03			10U											
Xylene (total)	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10U												
		10/31/02				50U	10U				20U	10U				
		11/01/02	250U													20U
		11/04/02						10U							17	
		11/05/02								10U						
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						100U		10U	10U		10U	20U	500U	100U
		01/30/03				100U	10U		10U							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U		10U	10U						
		04/03/03									10U		10U	10U		
		04/04/03				20U		50U								
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 2

KMnO4 Injection Analytical Results Summary for Shallow Wells

(All results in ug/l unless indicated)

			SHALLOW WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2A**	**MW-4PS**	**MW-7P**	**MW-10PS**	**MW-11PS**	**MW-12PS**	**MW-13PS**	**PTMW-1S***	**PT-MW2S**	**PT-MW3S**	**PTMW-3S**	**PTMW-4S**	**PTMW-5S**	**PTMW-6S**
Total Organic Carbon	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		15												
		10/31/02				12	11				12	9				
		11/01/02	4													13
		11/04/02						4							7	
		11/05/02								6						
		11/07/02												9		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						5		9H	8		7	9	10	12
		01/30/03				9	12		6							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					9.6		5.4	6.4						
		04/03/03									6.5		4.6	7.9		
		04/04/03				10		3.9								
	Upgradient Background (4/10/03)															
		NA														
Chloride	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		47												
		10/31/02				72	19				30	24				
		11/01/02	51													33
		11/04/02						37							69	
		11/05/02								25						
		11/07/02												25		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						36		16	13		29	29	81	26
		01/30/03				24	19		83							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					36.7		82.3	13.5						
		04/03/03									14.5		17.1	48		
		04/04/03				30.5		34.1								
	Upgradient Background (4/10/03)															
		N/A														

Table 2

KMnO4 Injection Analytical Results Summary for Shallow Wells

(All results in ug/l unless indicated)

			SHALLOW WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2A**	**MW-4PS**	**MW-7P**	**MW-10PS**	**MW-11PS**	**MW-12PS**	**MW-13PS**	**PTMW-1S***	**PT-MW2S**	**PT-MW3S**	**PTMW-3S**	**PTMW-4S**	**PTMW-5S**	**PTMW-6S**
Chromium	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		10B												
		10/31/02				19	5B				15	10				
		11/01/02	1B													2B
		11/04/02						1B							4B	
		11/05/02								10B						
		11/07/02												10B		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						4B*		8B*	5B*		4B*	18*	3B*	4B*
		01/30/03				11*	13*		4B*							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					3B		4.3B	1.4B						
		04/03/03									5.4B		4.6B	3.2B		
		04/04/03				35.2		2.1B								
	Upgradient Background (4/10/03)															
		NA														
Iron	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		11700												
		10/31/02				20000	49000				40100	18200				
		11/01/02	602													6410
		11/04/02						2690							43400	
		11/05/02								26000						
		11/07/02												1510		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						5780		18700	20600		16800	8100	59600	20800
		01/30/03				20500	67000		5220							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					68800		2730	19700						
		04/03/03									17100		9360	7120		
		04/04/03				35600		2380								
	Upgradient Background (4/10/03)															
		NA														

Table 2

KMnO4 Injection Analytical Results Summary for Shallow Wells

(All results in ug/l unless indicated)

Analyte	Collection Date	Collection Date	SHALLOW WELLS													
			MW-2A	MW-4PS	MW-7P	MW-10PS	MW-11PS	MW-12PS	MW-13PS	PTMW-1S*	PT-MW2S	PT-MW3S	PTMW-3S	PTMW-4S	PTMW-5S	PTMW-6S
Manganese	Pre-Injection (10/30 - 11/7/02)															
		10/30/02		323												
		10/31/02				479	730				925	635				
		11/01/02	1940													81
		11/04/02						82							570	
		11/05/02								469						
		11/07/02												892		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02														
		12/19/02														
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03						146*		20800*	892		652*	305*	762*	291*
		01/30/03				617*	1100*		1810*							
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					1510		1670	1490						
		04/03/03									697		432	468		
		04/04/03				713		64.9								
	Upgradient Background (4/10/03)															
		NA														

Notes:

1. *All data is draft and is currently undergoing QA/QC review.*
2. *"U" = Compound was analyzed for but not detected.*
3. *"J" = Estimated value.*
4. *"B" = For organics - Parameter was present in the associated blank as well as in the sample. Indicates probable blank contamination - interpret cautiously.*
5. *"B" = For inorganics - Reported value is less than Contract Required Detection Limit, but greater than Instrument Detection Limit.*
6. *"D" = Compounds identified at a secondary dilution factor. If re-analyzed at a higher dilution factor as in an "E" flag, the suffix "DL" is used.*
7. *All results in ug/l except chlorides (mg/l) and TOC (mg/l)*
8. *PTMW-1S was incorrectly labelled on one data report, and was standardized with the correct terminology as "PTMW-1S" on this summary table.*

Table 3

KMnO4 Injection Analytical Results Summary for Intermediate Wells

(All results in ug/l unless indicated)

			INTERMEDIATE WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2AI**	**MW-5PI**	**MW-6P**	**MW-10PI**	**MW-11PI**	**MW-P11I**	**MW-P12I**	**MW-P13I**	**PTMW-1I**	**PTMW-2I**	**PTMW-3I**	**PTMW-4I**	**PT-MW5I**	**PTMW-6I**
1,1,1-Trichloroethane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			70J				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												1J		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						4J		2J	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					3J			4DJ						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											
1,1,2,2-Tetrachloroethane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 3

KMnO4 Injection Analytical Results Summary for Intermediate Wells

(All results in ug/l unless indicated)

			INTERMEDIATE WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2AI**	**MW-5PI**	**MW-6P**	**MW-10PI**	**MW-11PI**	**MW-P11I**	**MW-P12I**	**MW-P13I**	**PTMW-1I**	**PTMW-2I**	**PTMW-3I**	**PTMW-4I**	**PT-MW5I**	**PTMW-6I**
1,1,2-Trichloroethane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											
1,1-Dichloroethane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			10DJ				14DJ	20U	1000U			
		11/01/02	250U			2J										
		11/04/02							2J						12JD	2J
		11/05/02														
		11/07/02												13		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			1J		2J				100U		10U	10U
		12/19/02						6J		27	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					5J			28D						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 3

KMnO4 Injection Analytical Results Summary for Intermediate Wells

(All results in ug/l unless indicated)

			INTERMEDIATE WELLS													
Analyte	Collection Date	Collection Date	MW-2AI	MW-5PI	MW-6P	MW-10PI	MW-11PI	MW-P11I	MW-P12I	MW-P13I	PTMW-1I	PTMW-2I	PTMW-3I	PTMW-4I	PT-MW5I	PTMW-6I
1,1-Dichloroethene	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			7DJ				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												2J		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		8J	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			12DJ						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											
1,2-Dichloroethane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		4J	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			4DJ						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 3

KMnO4 Injection Analytical Results Summary for Intermediate Wells

(All results in ug/l unless indicated)

Analyte	Collection Date	Collection Data	INTERMEDIATE WELLS													
			MW-2AI	MW-5PI	MW-6P	MW-10PI	MW-11PI	MW-P11I	MW-P12I	MW-P13I	PTMW-1I	PTMW-2I	PTMW-3I	PTMW-4I	PT-MW5I	PTMW-6I
1,2-Dichloroethene (total)	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		23			85D				48DJ	13DJ	1000U			
		11/01/02	98DJ			91										
		11/04/02							6J						180D	32
		11/05/02														
		11/07/02												100JD		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		32			66		15				100U		10U	7J
		12/19/02						10U		190	10U	10U		90DJ		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			210D						
		04/03/03									10U	5J	10U			
		04/04/03		4J		49			19					45		
	Upgradient Background (4/10/03)															
		04/10/03			10U											
1,2-Dichloropropane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 3

KMnO4 Injection Analytical Results Summary for Intermediate Wells

(All results in ug/l unless indicated)

			INTERMEDIATE WELLS													
Analyte	Collection Date	Collection Date	MW-2AI	MW-5PI	MW-6P	MW-10PI	MW-11PI	MW-P11I	MW-P12I	MW-P13I	PTMW-1I	PTMW-2I	PTMW-3I	PTMW-4I	PT-MW5I	PTMW-6I
2-Butanone	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											
2-Hexanone	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 3

KMnO4 Injection Analytical Results Summary for Intermediate Wells

(All results in ug/l unless indicated)

			INTERMEDIATE WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2AI**	**MW-5PI**	**MW-6P**	**MW-10PI**	**MW-11PI**	**MW-P11I**	**MW-P12I**	**MW-P13I**	**PTMW-1I**	**PTMW-2I**	**PTMW-3I**	**PTMW-4I**	**PT-MW5I**	**PTMW-6I**
4-Methyl-2-pentanone	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											
Acetone	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	120D	10000D			
		11/01/02	250U			10U										
		11/04/02							10U						250D	73
		11/05/02														
		11/07/02												2400D		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		8J				1400D		16	8J
		12/19/02						25		10U	77	22		2500D		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					75			20U						
		04/03/03									10U	4J	10U			
		04/04/03		10U		10U			5J					50		
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 3

KMnO4 Injection Analytical Results Summary for Intermediate Wells

(All results in ug/l unless indicated)

Analyte	Collection Date	Collection Date	INTERMEDIATE WELLS													
			MW-2AI	MW-5PI	MW-6P	MW-10PI	MW-11PI	MW-P11I	MW-P12I	MW-P13I	PTMW-1I	PTMW-2I	PTMW-3I	PTMW-4I	PT-MW5I	PTMW-6I
Benzene	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		1J	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											
Bromodichloromethane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 3

KMnO4 Injection Analytical Results Summary for Intermediate Wells

(All results in ug/l unless indicated)

			INTERMEDIATE WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2AI**	**MW-5PI**	**MW-6P**	**MW-10PI**	**MW-11PI .**	**MW-P11I**	**MW-P12I**	**MW-P13I**	**PTMW-1I**	**PTMW-2I**	**PTMW-3I**	**PTMW-4I**	**PT-MW5I**	**PTMW-6I**
Bromoform	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	2J
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											
Bromomethane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 3

KMnO4 Injection Analytical Results Summary for Intermediate Wells

(All results in ug/l unless indicated)

			INTERMEDIATE WELLS													
Analyte	Collection Date	Collection Date	MW-2AI	MW-5PI	MW-6P	MW-10PI	MW-11PI	MW-P11I	MW-P12I	MW-P13I	PTMW-1I	PTMW-2I	PTMW-3I	PTMW-4I	PT-MW5I	PTMW-6I
Carbon disulfide	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											
Carbon tetrachloride	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 3

KMnO4 Injection Analytical Results Summary for Intermediate Wells
(All results in ug/l unless indicated)

			INTERMEDIATE WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2AI**	**MW-5PI**	**MW-6P**	**MW-10PI**	**MW-11PI**	**MW-P11I**	**MW-P12I**	**MW-P13I**	**PTMW-1I**	**PTMW-2I**	**PTMW-3I**	**PTMW-4I**	**PT-MW5I**	**PTMW-6I**
Chlorobenzene	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											
Chloroethane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 3

KMnO4 Injection Analytical Results Summary for Intermediate Wells

(All results in ug/l unless indicated)

			INTERMEDIATE WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2AI**	**MW-5PI**	**MW-6P**	**MW-10PI**	**MW-11PI**	**MW-P11I**	**MW-P12I**	**MW-P13I**	**PTMW-1I**	**PTMW-2I**	**PTMW-3I**	**PTMW-4I**	**PT-MW5I**	**PTMW-6I**
Chloroform	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/16/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											
Chloromethane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 3

KMnO4 Injection Analytical Results Summary for Intermediate Wells
(All results in ug/l unless indicated)

Analyte	Collection Date	Collection Date	INTERMEDIATE WELLS													
			MW-2AI	MW-5PI	MW-6P	MW-10PI	MW-11PI	MW-P11I	MW-P12I	MW-P13I	PTMW-1I	PTMW-2I	PTMW-3I	PTMW-4I	PT-MW5I	PTMW-6I
cis-1,3-Dichloropropene	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											
Dibromochloromethane	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	1J
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 3

KMnO4 Injection Analytical Results Summary for Intermediate Wells

(All results in ug/l unless indicated)

			INTERMEDIATE WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2AI**	**MW-5PI**	**MW-6P**	**MW-10PI**	**MW-11PI**	**MW-P11I**	**MW-P12I**	**MW-P13I**	**PTMW-1I**	**PTMW-2I**	**PTMW-3I**	**PTMW-4I**	**PT-MW5I**	**PTMW-6I**
Ethylbenzene	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	4J
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											
Freon-113	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		9J			9DJ				12DJ	9DJ	1000U			
		11/01/02	1100D			66										
		11/04/02							10U						34D	33
		11/05/02														
		11/07/02												48JD		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		27			56		40				80DJ		10U	12
		12/19/02						8J		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					11			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		16			15					39		
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 3

KMnO4 Injection Analytical Results Summary for Intermediate Wells

(All results in ug/l unless indicated)

Analyte	Collection Date	Collection Date	INTERMEDIATE WELLS													
			MW-2AI	MW-5PI	MW-6P	MW-10PI	MW-11PI	MW-P11I	MW-P12I	MW-P13I	PTMW-1I	PTMW-2I	PTMW-3I	PTMW-4I	PT-MW5I	PTMW-6I
	Pre-Injection (10/30 - 11/7/02)															
Methylene chloride		10/30/02														
		10/31/02		10U			20U				50U	20U	130DJ			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												600BD		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											
	Pre-Injection (10/30 - 11/7/02)															
Styrene		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 3

KMnO4 Injection Analytical Results Summary for Intermediate Wells

(All results in ug/l unless indicated)

			INTERMEDIATE WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2AI**	**MW-5PI**	**MW-6P**	**MW-10PI**	**MW-11PI**	**MW-P11I**	**MW-P12I**	**MW-P13I**	**PTMW-1I**	**PTMW-2I**	**PTMW-3I**	**PTMW-4I**	**PT-MW5I**	**PTMW-6I**
	Pre-Injection (10/30 - 11/7/02)															
Tetrachloroethene		10/30/02														
		10/31/02		14			260D				700D	200D	1000U			
		11/01/02	1700D			130										
		11/04/02							43						320D	56
		11/05/02														
		11/07/02												60JD		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		21			130		52				100U		17	18
		12/19/02						37		19	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			25D						
		04/03/03									10U	10U	10U			
		04/04/03		2J		130			27					14		
	Upgradient Background (4/10/03)															
		04/10/03			10U											
	Pre-injection (10/30 - 11/7/02)															
Toluene		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			4J										
		11/04/02							2J						IJ	10U
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 3

KMnO4 Injection Analytical Results Summary for Intermediate Wells

(All results in ug/l unless indicated)

Analyte	Collection Date	Collection Date	INTERMEDIATE WELLS													
			MW-2AI	MW-5PI	MW-6P	MW-10PI	MW-11PI	MW-P11I	MW-P12I	MW-P13I	PTMW-1I	PTMW-2I	PTMW-3I	PTMW-4I	PT-MW5I	PTMW-6I
trans-1,3-Dichloropropene	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						10U	10U
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											
Trichloroethene	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		4J			88D				71D	15DJ	1000U			
		11/01/02	320D			55										
		11/04/02							8J						38JD	12
		11/05/02														
		11/07/02												70JD		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		4J			37		17				100U		10U	3J
		12/19/02						10U		77	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			110D						
		04/03/03									10U	10U	10U			
		04/04/03		2J		45			18					33		
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 3

KMnO4 Injection Analytical Results Summary for Intermediate Wells
(All results in ug/l unless indicated)

			INTERMEDIATE WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2AI**	**MW-5PI**	**MW-6P**	**MW-10PI**	**MW-11PI**	**MW-P11I**	**MW-P12I**	**MW-P13I**	**PTMW-1I**	**PTMW-2I**	**PTMW-3I**	**PTMW-4I**	**PT-MW5I**	**PTMW-6I**
Vinyl chloride	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		2J			5DJ				50U	20U	1000U			
		11/01/02	250U			10U										
		11/04/02							10U						61	10U
		11/05/02														
		11/07/02												6J		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		3J			10U		10U				100U		10U	10U
		12/19/02						10U		14	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			22D						
		04/03/03									10U	10U	10U			
		04/04/03		10U		2J			10U					4J		
	Upgradient Background (4/10/03)															
		04/10/03			10U											
Xylene (total)	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		10U			20U				50U	20U	1000U			
		11/01/02	250U			7J										
		11/04/02							10U						10U	8J
		11/05/02														
		11/07/02												10U		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		10U			10U		10U				100U		10U	10U
		12/19/02						10U		10U	10U	10U		250U		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					10U			20U						
		04/03/03									10U	10U	10U			
		04/04/03		10U		10U			10U					10U		
	Upgradient Background (4/10/03)															
		04/10/03			10U											

Table 3

KMnO4 Injection Analytical Results Summary for Intermediate Wells

(All results in ug/l unless indicated)

			INTERMEDIATE WELLS													
Analyte	Collection Date	Collection Date	MW-2AI	MW-5PI	MW-6P	MW-10PI	MW-11PL	MW-P11I	MW-P12I	MW-P13I	PTMW-1I	PTMW-2I	PTMW-3I	PTMW-4I	PT-MW5I	PTMW-6I
Total Organic Carbon	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		3			2				2	1	4			
		11/01/02	2			7										
		11/04/02							3							1
		11/05/02														
		11/07/02												3		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		5			6		2				22		4	3
		12/19/02						2		5	5	1		4		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					1.8			3.3						
		04/03/03									3.7	3.5	4.3			
		04/04/03		2.6		3.1			3.7					2.9		
	Upgradient Background (4/10/03)															
		NA														
Chloride	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		12			95				146	113	137			
		11/01/02	72			31										
		11/04/02							12							42
		11/05/02														
		11/07/02												49		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		27			55		9				72		10	10
		12/19/02						87		300	20U	20U		31		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					112			283						
		04/03/03									5.1	15	15.6			
		04/04/03		4.1		18.5			10.7					12.8		
	Upgradient Background (4/10/03)															
		N/A														

Table 3

KMnO4 Injection Analytical Results Summary for Intermediate Wells

(All results in ug/l unless indicated)

			INTERMEDIATE WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2AI**	**MW-5PI**	**MW-6P**	**MW-10PI**	**MW-11PI**	**MW-P11I**	**MW-P12I**	**MW-P13I**	**PTMW-1I**	**PTMW-2I**	**PTMW-3I**	**PTMW-4I**	**PT-MW5I**	**PTMW-6I**
Chromium	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		3B			2B				2B	3B	3B			
		11/01/02	2B			2B										
		11/04/02							1B						2B	6B
		11/05/02														
		11/07/02												3B		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		3B			1B		2B				463		3B	1U
		12/19/02						15		5B	1B	40		1B		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					38.5			6.4B						
		04/03/03									4.1B	9.7B	19.6			
		04/04/03		4.7B		1.4B			2.6B					12.3		
	Upgradient Background (4/10/03)															
		NA														
Iron	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		797			345				3220	123	5860			
		11/01/02	1890			623										
		11/04/02							1290						2130	517
		11/05/02														
		11/07/02												2320		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		1210			211		633				30B		666	299
		12/19/02						132		13100	19B	62B		333		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					317			11000						
		04/03/03									835	236	2100			
		04/04/03		2050		280			1460					3760		
	Upgradient Background (4/10/03)															
		NA														

Table 3

KMnO4 Injection Analytical Results Summary for Intermediate Wells

(All results in ug/l unless indicated)

			INTERMEDIATE WELLS													
Analyte	**Collection Date**	**Collection Date**	**MW-2AI**	**MW-5PI**	**MW-6P**	**MW-10PI**	**MW-11PI**	**MW-P11I**	**MW-P12I**	**MW-P13I**	**PTMW-1I**	**PTMW-2I**	**PTMW-3I**	**PTMW-4I**	**PT-MW5I**	**PTMW-6I**
Manganese	Pre-Injection (10/30 - 11/7/02)															
		10/30/02														
		10/31/02		73			242				914	72	1350			
		11/01/02	247			1560										
		11/04/02							132						3230	160
		11/05/02														
		11/07/02												909		
	Intermediate Post-Injection (12/18 - 12/19/02)															
		12/18/02		106			532		107				156000E		1950	120
		12/19/02						52600E		3750	76300E	97700E		110		
	Shallow Post-Injection (1/29 - 1/30/03)															
		01/29/03														
		01/30/03														
	Second Post - Injection (4/2 - 4/4/03)															
		04/02/03					32600			2830						
		04/03/03									335	511	2430			
		04/04/03		212		658			112					299		
	Upgradient Background (4/10/03)															
		NA														

Notes:

1. All data is draft and is currently undergoing QA/QC review.

2. "U" = Compound was analyzed for but not detected.

3. "J" = Estimated value.

4. "B" = For organics - Parameter was present in the associated blank as well as in the sample. Indicates probable blank contamination - interpret cautiously.

5. "B" = For inorganics - Reported value is less than Contract Required Detection Limit, but greater than Instrument Detection Limit.

6. "D" = Compounds identified at a secondary dilution factor. If re-analyzed at a higher dilution factor as in an "E" flag, the suffix "DL" is used.

7. All results in ug/l except chlorides (mg/l) and TOC (mg/l)

8. PTMW-5I was incorrectly labelled on one data report, and was standardized with the correct terminology as "PTMW-5I" on this summary table.

TABLE 4
TREATABILITY STUDY RESULTS SUMMARY

The Site-Specific, Treatability Study concluded the following:

- *$KMnO_4$* rapidly degraded PCE, TCE, *cis*-12DCE, VC, chlorotrifluoroethene, and the low level xylene that was present in the site groundwater under the experimental conditions.

- The degradation of 1,1,2-trichloro-1,2,2-trifluoroethane in the control experiment implied that active biological activities might have occurred in the control experiment during the treatability test. 1,1,2-trichloro-1,2,2-trifluoroethane degradation in the site groundwater was also observed, although the degradation rate was slower than the other chlorinated VOCs. Due to the inconclusive nature of treatability testing for 1,1,2-trichloro-1,2,2-trifluoroethane, additional or alternative remedial measures may be necessary to address chlorofluorocarbon contamination in the groundwater at this site.

- Remediation using *$KMnO_4$* oxidation is a feasible and effective alternative.

- The Pall site has a low *$KMnO_4$* demand estimated at 1 to 4 g/kg soil. The oxidant demand increased with increasing *$KMnO_4$* concentrations.

- The decomposition of *$KMnO_4$* in the subsurface materials is slow. Therefore, a low *$KMnO_4$* dose of 1 to 2 g/L is recommended for pilot testing.

- The impact of *$KMnO_4$* injection on metal leaching was determined not to be significant.

- A site investigation and characterization (i.e., a Pilot Test) was suggested to design and implement an effective oxidant delivery system

Table 5
Phase I Permanganate Injection Pilot Test
KMnO4 Injection Summary

Date of Injection	Daily Water Feed for KMnO4 (gal)	Daily Water Flush (gal)	Daily Mass of Water Injected (lb)	No. of KMnO4 Bins	Daily Mass of KMnO4 Added (lb)	Concentration KMnO4 Injected (%)	Production Time (hrs)	Injection Time (hrs)
Intermediate Injections								
11/12/2002	22,634	0	188,768	1&2	2,732	1.4%	5.40	
11/13/2002	3,126		26,071	1&2	377	1.4%	0.75	
11/18/2002	675	404	8,999	1&2	81	0.9%	0.16	
11/19/2002	28,239	270	237,765	1&2	3,409	1.4%	6.70	6.00
11/20/2002	20,974	402	178,276	3&4	6,600	3.7%	5.00	7.50
11/21/2002	24,625	708	211,277	5&6	5,775	2.7%	6.25	6.25
11/25/2002	18,103	1,267	161,546	7&8(6.25)	3,752	2.3%	4.25	4.25
Totals:	*118,376*	*3,051*	*1,012,701*	*NA*	*22,727*	2.2%	*28.51*	*24.00*
Shallow Injections								
11/26/2002	17,719	883	155,141	7&8	3,673	2.4%	6.50	6.50
12/02/2002	0	623	5,196	7&8	0	0.0%	4.00	4.00
12/10/2002	14,048	1,253	127,610	9&10	2,855	2.2%	2.00	4.00
12/11/2002	13,849	1,078	124,491	9&10	2,814	2.3%	3.00	5.00
12/16/2002	4,583	2,270	57,154	9&10	931	1.6%	1.00	5.00
12/17/2002	18,171	791	158,143	11&12	4,072	2.6%	4.50	6.50
12/18/2002	11,278	680	99,730	11&12	2,528	2.5%	4.00	6.00
Totals:	*79648*	*7578*	*727,465*	*NA*	*16,873*	2.3%	*25*	*37*

Table 5 (Continued)
Phase I Permanganate Injection Pilot Test
Field Work Summary

Date	Job	Weather	Temperature (F)
09/16/2002	Well Installation	Raining	78
09/17/2002	Well Installation	Cloudy / Humid	80
09/18/2002	Well Installation	Cloudy / Humid	80
09/19/2002	Well Installation	Partly Cloudy	78
09/20/2002	Well Installation	N/A	78
09/23/2002	Well Installation	Sunny	78
09/24/2002	Well Installation	Sunny	75
09/25/2002	Well Installation	Sunny	75
09/26/2002	Well Installation	Raining	63
09/30/2002	Well Installation	Sunny	60
10/01/2002	Well Installation	Sunny	80
10/02/2002	Well Installation	Sunny	78
10/03/2002	Well Installation	Sunny	78
10/04/2002	Well Installation	Raining	60
10/07/2002	Well Installation	Raining	65
10/08/2002	Well Installation	Sunny	65
10/09/2002	Well Installation	Sunny	65
10/10/2002	Well Installation	Cloudy	60
10/11/2002	Well Installation	Raining	60
10/12/2002	Well Installation	Raining	60
10/14/2002	Well Installation	Mild	60
11/04/2002	Sample Wells for Baseline	Sunny	40
11/05/2002	Sample Wells for Baseline	Sunny	40
11/07/2002	Sample Wells for Baseline	Sunny	40
11/08/2002	Sample Wells for Baseline	Sunny	40
11/07/2002	Water Injection Test	Sunny	40
11/11/2002	KMnO4 Injections (Intermediate Wells)	N/A	
11/13/2002	KMnO4 Injections (Intermediate Wells)	N/A	
11/18/2002	KMnO4 Injections (Intermediate Wells)	Cloudy	40
11/19/2002	KMnO4 Injections (Intermediate Wells)	Sunny	40
11/20/2002	KMnO4 Injections (Intermediate Wells)	Overcast	40
11/21/2002	KMnO4 Injections (Intermediate Wells)	Cloudy	40
11/25/2002	KMnO4 Injections (Intermediate Wells)	Cloudy	35
11/26/2002	KMnO4 Injections (Shallow Wells)	Sunny	40
12/02/2002	KMnO4 Injections (Shallow Wells)	Breezy	30
12/10/2002	KMnO4 Injections (Shallow Wells)	Sunny	20
12/11/2002	KMnO4 Injections (Shallow Wells)	Raining	35
12/16/2002	KMnO4 Injections (Shallow Wells)	Raining	40
12/17/2002	KMnO4 Injections (Shallow Wells)	Sunny	20
12/18/2002	KMnO4 Injections (Shallow Wells)	Sunny	25
12/19/2002	KMnO4 Injections (Shallow Wells)	Cloudy	25

TABLE 6
PILOT TEST MONITORING PARAMETERS & FREQUENCY

Field Screening & Monitoring Program:

Field Monitoring Parameter	**Field Monitoring Frequency**	**Purpose of Monitoring**
Depth to Water	Baseline Before Injection, Daily During Injection, Weekly Following Injection until Reaction is Complete	Evaluate potential mounding. Evaluate ROI of injection events.
Groundwater Temperature	Baseline Before Injection, Daily During Injection, Weekly Following Injection until Reaction is Complete	Monitor for heat of reaction, health and safety.
Groundwater Conductivity	Baseline Before Injection, Daily During Injection, Weekly Following Injection until Reaction is Complete	Assist in evaluation of possible metals in solution
Groundwater pH	Baseline Before Injection, Daily During Injection, Weekly Following Injection until Reaction is Complete	Data required to evaluate extent of reaction, reaction kinetics, and general system performance
Dissolved Oxygen in Groundwater	Baseline Before Injection, Daily During Injection, Weekly Following Injection until Reaction is Complete	Data required to evaluate extent of reaction, reaction kinetics, and general system performance
Groundwater Turbidity	Baseline Before Injection, Daily During Injection, Weekly Following Injection until Reaction is Complete	Indicator of possible presence / absence of KMnO4 when used in conjunction with other data.
Permanganate in Groundwater (color)	Baseline Before Injection, Daily During Injection, Weekly Following Injection until Reaction is Complete	Direct KMnO4 measurement, extent of reaction, ROI of injection wells, etc.

Continued on next page . . .

TABLE 6 (CONTINUED)

Analytical Sample Collection & Analysis Program:

Sample Analyses Parameter	**When Sampled**	**Purpose of Monitoring**
VOCs and Chlorofluorocarbons in Groundwater	Baseline prior to injection, Twice after start of injection based upon field screening data reviews.	Indicates effectiveness and degree of completion of reaction, residual contaminant levels, etc.
Metals in Groundwater	Baseline prior to injection, Twice after start of injection based upon field screening data reviews.	Indicates potential bi-products of reaction, ion formation, etc.
ORP in Groundwater	Baseline prior to injection, Twice after start of injection based upon field screening data reviews.	Assist in evaluating reaction effectiveness
TOC in Groundwater	Baseline prior to injection, Twice after start of injection based upon field screening data reviews.	Indicator of soil and groundwater oxidant demand, input parameter for model verifications, extent of reaction indicator, etc.
Chloride in Groundwater	Baseline prior to injection, Twice after start of injection based upon field screening data reviews.	Indicates potential bi-products of reaction, degree of reaction completed, etc.

Note: The level of post-injection field monitoring was less than originally planned following the shallow injection events because of severe weather conditions that limited site access. In the months immediately following shallow injections, there were several blizzards that prevented well locating and access for post-injection sampling.

Table 7
Permanganate Injection Pilot Test
Field Monitoring Data Summary

Well	Date/Time	Ph (st. units)	Conductivity (mhos)	ORP (eV)	Temperature (deg. C)	DTW (feet)	Dissolved Oxygen (mg/l)	PID (ppb e.u.)
Shallow Wells Monitored During Phase I Pilot Test								
PT-9S	12/11/02 8:50					3.83		4.9
PT-9S	12/11/02 11:30	6.57	0.612	-210	18.8		0.27	
PT-9S	12/11/02 13:00	6.39	0.718	-165	18.7		0.19	
PT-9S	12/11/02 13:45					3		
PT-9S	12/12/02 10:20					0	0	
PT-9S	12/16/02 9:15					3.35		2.9
PT-9S	12/16/02 15:00					2.34		
PT-9S	12/17/02 8:10					3.41		0
PT-9S	12/17/02 9:30	6.48	0.52	-124	17.9		0.27	
PT-9S	12/17/02 14:00	6.46	0.841	-126	18.1		0.77	
PT-9S	12/17/02 15:00					2.82		
PT-9S	12/18/02 7:30					3.45		
PT-9S	12/18/02 15:30					3.19		
PT-9S	12/19/02 15:00					2.76		
PT-9S	12/19/02 8:00					3.43		0
PT-10S	12/11/02 8:50					4.17		55.6
PT-10S	12/11/02 11:30	6.35	0.69	-162	19.4		0.11	
PT-10S	12/11/02 13:00	6.75	0.708	-210	19.4		0.15	
PT-10S	12/11/02 13:45					3.15		
PT-10S	12/12/02 10:20					3.65	0	
PT-10S	12/16/02 9:15					3.43		2.8
PT-10S	12/16/02 10:30	6.56	0.499	-141	19.1		0.28	
PT-10S	12/16/02 13:45	6.63	0.445	-149	19.2		0.27	
PT-10S	12/16/02 15:00					2.46		
PT-10S	12/17/02 8:10					3.57		3.8
PT-10S	12/17/02 9:30	6.51	0.964	-142	18.7		0.32	
PT-10S	12/17/02 14:00	6.51	0.9	-141	18.8		0.98	
PT-10S	12/17/02 15:00					3.02		
PT-10S	12/18/02 7:30					3.61		
PT-10S	12/18/02 15:30					3.36		
PT-10S	12/19/02 8:00					3.61		4.4
PT-10S	12/19/02 15:00					2.9		
PT-11S	11/26/02 8:15					*3.23*		*28.3*
PT-11S	11/26/02 10:00	*5.98*	*0.546*	-37	*20*		*0.11*	
PT-11S	11/26/02 14:00	5.86	0.533	-22	19.9		0.32	
PT-11S	11/26/02 14:00					2.11		
PT-11S	12/2/02 8:30					4.13		
PT-11S	12/2/02 10:30	6.14	0.531	-65	19.9		0.25	
PT-11S	12/2/02 13:30					2.57		
PT-11S	12/2/02 13:30	6.02	0.503	-48	19.9		0.34	
PT-11S	12/4/02 9:00					3.63		
PT-11S	12/10/02 9:00					3.81		
PT-11S	12/10/02 12:15	6.46	0.736	-199	19.4		0.26	
PT-11S	12/10/02 14:20	6.16	0.586	-90	19.5		0.28	
PT-11S	12/10/02 15:30					2.71		
PT-11S	12/11/02 8:50					3.78		0
PT-11S	12/11/02 9:30	5.9	0.499	-33	19.7		0.3	
PT-11S	12/11/02 13:00	5.95	0.495	-33	19.7		0.27	
PT-11S	12/11/02 13:45					2.76		
PT-11S	12/12/02 10:20					3.33	0	
PT-11S	12/16/02 9:15					3.14		0
PT-11S	12/16/02 10:30	6.34	0.647	-128	19.3		0.18	
PT-11S	12/16/02 13:45	6.38	0.627	-110	19.3		0.28	
PT-11S	12/16/02 15:00					2.11		
PT-11S	12/17/02 8:10					3.28		0
PT-11S	12/17/02 9:30	6.16	0.627	-64	19.3		0.2	
PT-11S	12/17/02 14:00	6.47	0.601	-110	19.4		0.46	

Table 7
Permanganate Injection Pilot Test
Field Monitoring Data Summary

Well	Date/Time	Ph (st. units)	Conductivity (mhos)	ORP (eV)	Temperature (deg. C)	DTW (feet)	Dissolved Oxygen (mg/l)	PID (ppb e.u.)
PT-11S	12/17/02 15:00					2.57		
PT-11S	12/18/02 7:30					3.29		
PT-11S	12/18/02 15:30					3.04		
PT-11S	12/19/02 8:00					3.31		2.8
PT-11S	12/19/02 15:00					2.57		
PT-12S	11/26/02 8:15					*2.75*		*10*
PT-12S	11/26/02 10:00	*5.87*	*0.496*	*15*	*19.6*		*0.21*	
PT-12S	11/26/02 14:00	5.86	0.503	-10	19.8		0.25	
PT-12S	11/26/02 14:00					3.7		
PT-12S	12/2/02 8:30					2.88		
PT-12S	12/2/02 13:30					2.19		
PT-12S	12/4/02 9:00					3.2		
PT-12S	12/10/02 9:00					3.41		
PT-12S	12/10/02 15:30					2.35		
PT-12S	12/11/02 8:50					3.34		0.5
PT-12S	12/11/02 9:30	6.05	0.484	-23	19.1		0.32	
PT-12S	12/11/02 13:00	5.85	0.489	23	18.8		0.23	
PT-12S	12/11/02 13:45					3.41		
PT-12S	12/16/02 9:15					2.75		8.4
PT-12S	12/16/02 15:00					1.75		
PT-12S	12/17/02 8:10					2.84		0.2
PT-12S	12/17/02 9:30	6.21	0.631	-33	18.7		0.25	
PT-12S	12/17/02 14:00	6.27	0.608	-52	18.6		0.44	
PT-12S	12/17/02 15:00					2.19		
PT-12S	12/18/02 7:30					2.91		
PT-12S	12/18/02 15:30					2.59		
PT-12S	12/19/02 8:00					2.88		1.7
PT-12S	12/19/02 15:00					2.17		
PT-14S	11/18/02 9:00	*6.23*	*0.534*	*128*	*17.5*	*3.9*	*1.78*	*7.6*
PT-14S	11/19/02 8:50	6.36	0.573	-50	18.3	3.97	0.23	
PT-14S	11/19/02 10:50					2.78		
PT-14S	11/19/02 15:20	6.35	0.585	-57	18.1	3.65	0.19	
PT-14S	11/20/02 8:00					3.99		
PT-14S	11/20/02 9:20	6.09	0.642	-39	16.8	3	1.3	
PT-14S	11/20/02 12:15					2.9		
PT-14S	11/20/02 14:15					2.88		
PT-14S	11/20/02 14:15	6.31	0.783	-110	18.6		0.45	
PT-14S	11/20/02 15:00	6.47	0.639	-89	16.9	2.38	0.16	
PT-14S	11/21/02 8:00					3.96		
PT-14S	11/21/02 9:30	6.43	0.604	-98	18.7	2.44	0.18	
PT-14S	11/21/02 11:00					2.44		
PT-14S	11/21/02 13:00					2.34		
PT-14S	11/21/02 15:24	6.41	0.544	-95	18.7	2.34	0.07	
PT-14S	11/25/02 9:15	*6.34*	*0.879*	*-138*	*18.3*	*4.13*	*0.21*	*0*
PT-14S	11/25/02 13:00					*2.79*		
PT-14S	11/25/02 14:45					*2.69*		
PT-15S	#VALUE!							
PT-15S	11/19/02 8:50	5.99	0.989	-21	19.9	3.93	0.49	
PT-15S	11/19/02 10:50					2.67		
PT-15S	11/19/02 15:20	6.06	1.35	-23	20	3.31	0.32	
PT-15S	11/20/02 8:00					3.96		
PT-15S	11/20/02 9:20	5.93	1.04	-26	18.1	2.93	0.86	
PT-15S	11/20/02 12:15					2.84		
PT-15S	11/20/02 14:15					2.8		
PT-15S	11/20/02 14:15	6.01	1.48	-29	19.6		0.27	
PT-15S	11/20/02 15:00	6.11	1.39	-17	18.1	2.25	0.09	
PT-15S	11/21/02 8:00					3.94		
PT-15S	11/21/02 9:30	6.12	1.42	-26	19.8	2.33	0.21	

Table 7
Permanganate Injection Pilot Test
Field Monitoring Data Summary

Well	Date/Time	Ph (st. units)	Conductivity (mhos)	ORP (eV)	Temperature (deg. C)	DTW (feet)	Dissolved Oxygen (mg/l)	PID (ppb e.u.)
PT-15S	11/21/02 11:00					2.33		
PT-15S	11/21/02 13:00					2.24		
PT-15S	11/21/02 15:24	6.24	1.69	-40	19.7	2.24	0.15	
PT-15S	11/25/02 9:15	*6.03*	*1.01*	*-56*	*19.6*	*3.92*	*0.65*	*23.4*
PT-15S	11/25/02 13:00					*2.68*		
PT-15S	11/25/02 14:45					*2.6*		
PT-16S	#VALUE!							
PT-16S	11/18/02 9:00	6.13	0.622	-60	19.2	3.71	0.75	55.1
PT-16S	11/19/02 8:50	6.2	0.785	-103	19.4	3.75	0.23	
PT-16S	11/19/02 10:50					2.46		
PT-16S	11/19/02 15:20	6.35	0.788	-140	19.3	3.41	0.2	
PT-16S	11/20/02 8:00					3.77		
PT-16S	11/20/02 9:20	6.1	0.587	-79	19.3	2.71	0.54	
PT-16S	11/20/02 12:15					2.64		
PT-16S	11/20/02 14:15					2.59		
PT-16S	11/20/02 14:15	6.19	0.736	-133	19		0.1	
PT-16S	11/20/02 15:00	6.26	0.538	-69	19.5	3.08	0.07	
PT-16S	11/21/02 8:00					3.37		
PT-16S	11/21/02 9:30	6.38	0.529	-97	19.5	2.13	0.15	
PT-16S	11/21/02 11:00					2.13		
PT-16S	11/21/02 13:00					2.06		
PT-16S	11/21/02 15:24	6.39	0.566	-116	19.3	2.06	0.12	
PT-16S	11/25/02 9:15	*6.56*	*0.556*	*-153*	*18.9*	*3.93*	*0.14*	*0.3*
PT-16S	11/25/02 13:00		.			*2.48*		
PT-16S	11/25/02 14:45					*2.4*		
PT-17S	#VALUE!							
PT-17S	11/18/02 9:00	*6.03*	*0.54*	*-6*	*19.2*	*3.69*	*0.72*	*129*
PT-17S	11/19/02 8:50	6.21	0.597	-64	19.7	3.7	0.71	
PT-17S	11/19/02 10:50					2.4		
PT-17S	11/19/02 15:20	6.23	0.625	-72	19.8	3.39	0.28	
PT-17S	11/20/02 8:00					3.74		
PT-17S	11/20/02 9:20	6.04	0.502	-37	19.7	2.64	0.5	
PT-17S	11/20/02 12:15					2.59		
PT-17S	11/20/02 14:15					2.54		
PT-17S	11/20/02 14:15	6.05	0.578	-45	19.7		0.49	
PT-17S	11/20/02 15:00	6.1	0.529	-34	19.7		0.09	
PT-17S	11/21/02 8:00					3.47		
PT-17S	11/21/02 9:30	6.18	0.523	-36	19.8	2.07	0.06	
PT-17S	11/21/02 11:00					2.07		
PT-17S	11/21/02 13:00					1.99		
PT-17S	11/21/02 15:24	6.21	0.534	-43	19.2	1.99	0.09	
PT-17S	11/25/02 9:15	*6.18*	*0.657*	*-80*	*19.5*	*3.88*	*0.36*	*43.9*
PT-17S	11/25/02 13:00					*2.41*		
PT-17S	11/25/02 14:45					*2.33*		
PT-18S	#VALUE!							
PT-18S	11/19/02 8:50	6.11	0.621	-54	19.6	3.81	0.43	
PT-18S	11/19/02 10:50					2.52		
PT-18S	11/19/02 15:20	6.11	0.555	-59	19	3.51	0.19	
PT-18S	11/20/02 8:00					3.83		
PT-18S	11/20/02 9:20	6.02	0.592	-31	19	2.73	0.45	
PT-18S	11/20/02 12:15							
PT-18S	11/20/02 14:15							
PT-18S	11/20/02 14:15							
PT-18S	11/20/02 15:00		1.76		18.7	3.08		
PT-18S	11/21/02 8:00					3.5		
PT-18S	11/21/02 9:30							
PT-18S	11/21/02 11:00							
PT-18S	11/21/02 13:00							

Table 7
Permanganate Injection Pilot Test
Field Monitoring Data Summary

Well	Date/Time	Ph (st. units)	Conductivity (mhos)	ORP (eV)	Temperature (deg. C)	DTW (feet)	Dissolved Oxygen (mg/l)	PID (ppb e.u.)
PT-18S	11/21/02 15:24							
PT-18S	11/25/02 9:15							*3.1*
PT-18S	11/25/02 13:00					*2.56*		
PT-18S	11/25/02 14:45							
PTMW-1S	11/18/02 9:00	*6.17*	*0.488*	*-53*	*18.4*	*3.73*		
PTMW-1S	11/19/02 8:50	6.23	0.583	-84	19	3.78	0.18	
PTMW-1S	11/19/02 10:50					2.55		
PTMW-1S	11/19/02 15:20	6.33	0.12	-440	19.1	3.47	0.74	
PTMW-1S	11/20/02 8:00					3.81		
PTMW-1S	11/20/02 9:20	6.26	0.75	-123	19.1	2.76	0.48	
PTMW-1S	11/20/02 12:15					2.72		
PTMW-1S	11/20/02 14:15					2.67		
PTMW-1S	11/20/02 14:15	6.22	0.549	-95	18.4		0.15	
PTMW-1S	11/20/02 15:00	6.33	0.81	-133	19	2.56	0.25	
PTMW-1S	11/21/02 8:00					3.48		
PTMW-1S	11/21/02 9:30	6.43	0.765	-138	19.2	2.14	0.31	
PTMW-1S	11/21/02 11:00					2.19		
PTMW-1S	11/21/02 13:00					2.14		
PTMW-1S	11/21/02 15:24	6.43	0.812	-127	19	2.14	0.12	
PTMW-1S	11/25/02 9:15	*6.28*	*0.415*	*-96*	*18.5*	*3.96*	*0.3*	*0*
PTMW-1S	11/25/02 13:00					*2.54*		
PTMW-1S	11/25/02 14:45					*2.46*		
PTMW-1S	11/26/02 8:15					3.97		0.7
PTMW-1S	11/26/02 10:00						0.38	
PTMW-1S	11/26/02 14:00	5.99	0.567	-99	18.2		0.47	
PTMW-1S	11/26/02 14:00					2.69		
PTMW-1S	12/2/02 8:30					4.23		
PTMW-1S	12/2/02 10:30	6.15	0.58	-108	17.4		0.36	
PTMW-1S	12/2/02 13:30					3.82		
PTMW-1S	12/2/02 13:30	6.33	0.606	-146	17.3		0.34	
PTMW-1S	12/4/02 9:00					4.38		
PTMW-1S	12/10/02 9:00					4.54		
PTMW-1S	12/10/02 12:15	6.29	0.649	-133	16.9		0.23	
PTMW-1S	12/10/02 14:20	6.54	0.639	-153	17		0.22	
PTMW-1S	12/10/02 15:30					3.29		
PTMW-1S	12/11/02 8:50					4.52		0
PTMW-1S	12/11/02 9:30	6.94	0.579	-160	16.1		0.32	
PTMW-1S	12/11/02 13:00	6.31	0.646	-156	16.5		0.65	
PTMW-1S	12/11/02 13:45					3.29		
PTMW-1S	12/12/02 10:20					4.08	0	
PTMW-1S	12/16/02 9:15					3.86		2.69
PTMW-1S	12/16/02 10:30	6.5	0.386	-136	16		0.57	
PTMW-1S	12/16/02 13:45	6.84	0.32	-193	15.8		0.25	
PTMW-1S	12/16/02 15:00					2.69		
PTMW-1S	12/17/02 8:10					4.01		1
PTMW-1S	12/17/02 9:30	6.93	0.317	-128	14.7		0.49	
PTMW-1S	12/17/02 14:00	6.32	0.332	-72	14.6		0.42	
PTMW-1S	12/17/02 15:00					3.27		
PTMW-1S	12/18/02 7:30					4.03		
PTMW-1S	12/18/02 15:30					2.84		
PTMW-1S	12/19/02 8:00					4.04		0
PTMW-1S	12/19/02 15:00					3.24		
PTMW-2S	11/18/02 9:00	*6.42*	*0.247*	*-12*	*18*	*3.51*		*0*
PTMW-2S	11/19/02 8:50	6.42	0.418	-41	19	3.52	2.5	
PTMW-2S	11/19/02 10:50					2.35		
PTMW-2S	11/19/02 15:20	6.43	0.442	-69	19.3	3.19		
PTMW-2S	11/20/02 8:00					3.78		
PTMW-2S	11/20/02 9:20	6.81	0.482	-71	19.2		0.58	

Table 7
Permanganate Injection Pilot Test
Field Monitoring Data Summary

Well	Date/Time	Ph (st. units)	Conductivity (mhos)	ORP (eV)	Temperature (deg. C)	DTW (feet)	Dissolved Oxygen (mg/l)	PID (ppb e.u.)
PTMW-2S	11/20/02 12:15					2.5		
PTMW-2S	11/20/02 14:15					2.45		
PTMW-2S	11/20/02 14:15	6.43	0.558	-102	18.5		0.45	
PTMW-2S	11/20/02 15:00	6.78	0.512	-115	18.5	2.73	0.37	
PTMW-2S	11/21/02 8:00					3.58		
PTMW-2S	11/21/02 9:30	6.51	0.497	-101	19.3	2.02	0.07	
PTMW-2S	11/21/02 11:00					2.02		
PTMW-2S	11/21/02 13:00					1.96		
PTMW-2S	11/21/02 15:24	6.56	0.561	-117	19.3	1.96	0.13	
PTMW-2S	11/25/02 9:15	6.7	0.546	-75	18.6	3.7	0.29	0
PTMW-2S	11/25/02 13:00					2.36		
PTMW-2S	11/25/02 14:45					2.29		
PTMW-2S	11/26/02 8:15					*4.72*		*0.1*
PTMW-2S	11/26/02 10:00	*6.18*	*0.571*	*-14*	*18.4*		*0.4*	
PTMW-2S	11/26/02 14:00	6.21	0.582	-102	18.8		0.55	
PTMW-2S	11/26/02 14:00					2.55		
PTMW-2S	12/2/02 8:30					3.99		
PTMW-2S	12/2/02 10:30	6.28	0.563	-112	18		0.35	
PTMW-2S	12/2/02 13:30					3.25		
PTMW-2S	12/2/02 13:30	6.38	0.56	-120	17.9		0.29	
PTMW-2S	12/4/02 9:00					4.12		
PTMW-2S	12/10/02 9:00					4.29		
PTMW-2S	12/10/02 12:15	6.22	0.435	-50	16.7		0.55	
PTMW-2S	12/10/02 14:20	6.41	0.465	-88	17.2		0.62	
PTMW-2S	12/10/02 15:30					3.18		
PTMW-2S	12/11/02 8:50					4.26		0
PTMW-2S	12/11/02 9:30	6.16	0.439	-48	16.5		0.3	
PTMW-2S	12/11/02 13:00	6.38	0.483	-150	17.3		0.41	
PTMW-2S	12/11/02 13:45					3.22		
PTMW-2S	12/12/02 10:20					3.69	0	
PTMW-2S	12/16/02 9:15					3.61		2.71
PTMW-2S	12/16/02 15:00					2.71		
PTMW-2S	12/17/02 8:10					3.74		0.7
PTMW-2S	12/17/02 9:30	6.48	0.538	-66	15.5		0.74	
PTMW-2S	12/17/02 14:00	6.41	0.597	-27	14.9		0.28	
PTMW-2S	12/17/02 15:00					3.11		
PTMW-2S	12/18/02 7:30					3.78		
PTMW-2S	12/18/02 15:30					3.52		
PTMW-2S	12/19/02 8:00					3.79		0
PTMW-2S	12/19/02 15:00					3.04		
PTMW-5S	12/18/02 7:30					2.91		
PTMW-5S	12/18/02 15:30					2.68		
MW-12S	#VALUE!							
MW-12S	11/18/02 9:00	6.16	0.418	86	16.9	3.25	0.43	85.4
MW-12S	11/19/02 8:50	5.94	0.422	19	19.5	3.14	0.34	
MW-12S	11/19/02 10:50					2.85		
MW-12S	11/19/02 15:20	6.23	0.426	13	19.6	2.92	4.01	
MW-12S	11/20/02 8:00					3.22		
MW-12S	11/20/02 9:20	6.06	0.453	51	17.1	2.9	0.6	
MW-12S	11/20/02 12:15							
MW-12S	11/20/02 14:15					2.68		
MW-12S	11/20/02 14:15	5.82	0.388	42	19.2		0.19	
MW-12S	11/20/02 15:00	5.94	0.437	50	16.4	2.69	0.37	
MW-12S	11/21/02 8:00					4.05		
MW-12S	11/21/02 9:30	6.09	0.422	-13	19.7	2.62	0.24	
MW-12S	11/21/02 11:00					2.62		
MW-12S	11/21/02 13:00					2.53		
MW-12S	11/21/02 15:24	6.14	0.383		19.7	2.53	0.27	

Table 7
Permanganate Injection Pilot Test
Field Monitoring Data Summary

Well	Date/Time	Ph (st. units)	Conductivity (mhos)	ORP (eV)	Temperature (deg. C)	DTW (feet)	Dissolved Oxygen (mg/l)	PID (ppb e.u.)
MW-12S	11/25/02 9:15	5.9	0.388	26	19.1	3.37	0.15	85.7
MW-12S	11/25/02 13:00					2.89		
MW-12S	11/25/02 14:45					2.75		
MW-12S	11/26/02 8:15					*4.38*		*22.7*
MW-12S	11/26/02 10:00	*5.81*	*0.4*	*13*	*19.2*		*0.18*	
MW-12S	11/26/02 14:00	6.24	0.413	5	18.2		0.23	
MW-12S	11/26/02 14:00					2.86		
MW-12S	12/2/02 8:30					3.42		
MW-12S	12/2/02 13:30					3.21		
MW-12S	12/4/02 9:00					3.76		
MW-12S	12/10/02 9:00					3.72		
MW-12S	12/10/02 15:30					3.68		
MW-12S	12/11/02 8:50					3.89		264
MW-12S	12/11/02 13:45					3.57		
MW-12S	12/12/02 10:20					0	0	
MW-12S	12/16/02 9:15					2.93		44.4
MW-12S	12/16/02 15:00					2.91		
MW-12S	12/17/02 8:10					3.2		30.1
MW-12S	12/17/02 15:00					3		
MW-12S	12/18/02 7:30					3.43		
MW-12S	12/18/02 15:30					3.12		
MW-12S	12/19/02 8:00					3.42		13.3
MW-12S	12/19/02 15:00					3.05		
Intermediate	1/0/00 0:00							
PT-9I	11/18/02 9:00	*11.27*	*1.71*	*-15*	*17.9*	*3.52*	*0.5*	*0*
PT-9I	11/19/02 8:50	11.19	1.5	-25	18	3.55	0.4	
PT-9I	11/19/02 10:50					2.61		
PT-9I	11/19/02 15:20	11.25	1.49	-396	17.8	2.61	0.24	
PT-9I	11/20/02 8:00					3.52		
PT-9I	11/20/02 9:20	11.21	1.74	-248	18.4	2.72	0.32	
PT-9I	11/20/02 12:15					2.6		
PT-9I	11/20/02 14:15					2.55		
PT-9I	11/20/02 14:15	11.08	1.38	-318	17.6		0.22	
PT-9I	11/20/02 15:00	11.23	1.78	-168	18	2.49	0.24	
PT-9I	11/21/02 8:00					3.32		
PT-9I	11/21/02 9:30	11.21	1.43	34	17.3	2.25	0.21	
PT-9I	11/21/02 11:00					2.25		
PT-9I	11/21/02 13:00					2.14		
PT-9I	11/21/02 15:24	11.28	1.39	-266	17.6	2.14	0.31	
PT-9I	11/25/02 9:15	11.17	1.38	-342	17.8	3.63	0.16	10.9
PT-9I	11/25/02 13:00					2.52		
PT-9I	11/25/02 14:45					2.43		
PT-9I	11/26/02 8:15					*3.65*		*4.4*
PT-9I	11/26/02 10:00	*10.99*	*1.37*	*-170*	*17.5*		*0.22*	
PT-9I	11/26/02 14:00	10.96	1.31	-264	17		0.55	
PT-9I	11/26/02 14:00					2.74		
PT-9I	12/2/02 8:30					3.2		
PT-9I	12/2/02 10:30	11.15	1.42	-347	17.8		0.58	
PT-9I	12/2/02 13:30					3.09		
PT-9I	12/2/02 13:30	11.07	1.38	-282	17.3		0.3	
PT-9I	12/4/02 9:00					4.02		
PT-9I	12/10/02 9:00					4.16		10.4
PT-9I	12/10/02 12:15	11.2	1.75	-337	17.6		0.51	
PT-9I	12/10/02 15:30					3.4		
PT-9I	10/30/06 0:00	11.19	1.72	-274	17.4		0.49	
PT-9I	12/11/02 8:50					4.13		5.7
PT-9I	12/11/02 9:30	11.13	1.64	-409	17.8		0.17	
PT-9I	12/11/02 13:00	11.11	1.05	-482	17.3		0.31	

Table 7
Permanganate Injection Pilot Test
Field Monitoring Data Summary

Well	Date/Time	Ph (st. units)	Conductivity (mhos)	ORP (eV)	Temperature (deg. C)	DTW (feet)	Dissolved Oxygen (mg/l)	PID (ppb e.u.)
PT-9I	12/11/02 13:45					3.34		
PT-9I	12/12/02 10:20					3.69	4.1	
PT-9I	12/16/02 9:15					3.49		2.67
PT-9I	12/16/02 10:30	11.32	1.57	-236	17.3		0.32	
PT-9I	12/16/02 13:45	11.35	1.55	-265	17.1		0.28	
PT-9I	12/16/02 15:00					2.67		
PT-9I	12/17/02 8:10					3.62		4.6
PT-9I	12/17/02 9:30	11.37	1.57	-236	17.2		0.95	
PT-9I	12/17/02 14:00	11.36	1.55	-219	16.9		0.91	
PT-9I	12/17/02 15:00					3.04		
PT-9I	12/18/02 7:30					3.66		
PT-9I	12/18/02 15:30					3.31		
PT-9I	12/19/02 8:00					3.66		6.5
PT-9I	12/19/02 15:00					3.06		
PT-10I	11/18/02 9:00	*8.06*	*0.578*	*71*	*19.6*	*3.31*	*0.57*	*0*
PT-10I	11/19/02 8:50	6.47	0.912	-95	19.9	3.55	0.29	
PT-10I	11/19/02 10:50					2.25		
PT-10I	11/19/02 15:20	6.43	1.01	-92	19.6	2.91	0.19	
PT-10I	11/20/02 8:00					3.4		
PT-10I	11/20/02 9:20	6.75	0.622	-26	20.1	2.45	0.34	
PT-10I	11/20/02 12:15					2.38		
PT-10I	11/20/02 14:15					2.32		
PT-10I	11/20/02 14:15	6.11	0.973	-11	18.9		0.24	
PT-10I	11/20/02 15:00	7.97	0.642	-32	19.2	2.21	0.32	
PT-10I	11/21/02 8:00					3.3		
PT-10I	11/21/02 9:30	6.42	0.99	-78	19.3	1.43	0.34	
PT-10I	11/21/02 11:00					1.93		
PT-10I	11/21/02 13:00					1.87		
PT-10I	11/21/02 15:24	6.53	1.02	-80	19.3	1.87	0.18	
PT-10I	11/25/02 9:15	6.14	0.97	-16	19.1	3.52	0.21	2.6
PT-10I	11/25/02 13:00					2.25		
PT-10I	11/25/02 14:45					2.17		
PT-10I	11/26/02 8:15					*3.54*		*3.9*
PT-10I	11/26/02 10:00	*6.42*	*1*	*-55*	*19.2*		*0.7*	
PT-10I	11/26/02 14:00	6.06	1.01	-35	18.6		0.33	
PT-10I	11/26/02 14:00					2.44		
PT-10I	12/2/02 8:30					3.79		
PT-10I	12/2/02 13:30					2.92		
PT-10I	12/4/02 9:00					3.94		
PT-10I	12/10/02 9:00					4.11		1.3
PT-10I	12/10/02 15:30					3.06		
PT-10I	12/11/02 8:50					4.08		0
PT-10I	12/11/02 13:45					3.11		
PT-10I	12/12/02 10:20					3.62	0	
PT-10I	12/16/02 9:15					3.44		2.45
PT-10I	12/16/02 15:00					2.45		
PT-10I	12/17/02 8:10					3.56		0.8
PT-10I	12/17/02 15:00					2.99		
PT-10I	12/18/02 7:30					3.59		
PT-10I	12/18/02 15:30					3.34		
PT-11I	11/18/02 9:00	*7.88*	*0.314*	*71*	*19.4*	*3.24*		*0*
PT-11I	11/19/02 8:41							
PT-11I	11/19/02 8:50	6.43	0.414	-62	20	3.3	0.87	
PT-11I	11/19/02 10:50					2.17		
PT-11I	11/19/02 15:20	6.62	0.445	-111	19.4	2.83	0.22	
PT-11I	11/20/02 8:00					3.33		
PT-11I	11/20/02 9:20	6.74	0.336	-34	19.8	2.35	0.4	
PT-11I	11/20/02 12:15					2.28		

Table 7
Permanganate Injection Pilot Test
Field Monitoring Data Summary

Well	Date/Time	Ph (st. units)	Conductivity (mhos)	ORP (eV)	Temperature (deg. C)	DTW (feet)	Dissolved Oxygen (mg/l)	PID (ppb e.u.)
PT-11I	11/20/02 14:15					2.24		
PT-11I	11/20/02 14:15	6.67	0.074	-18	18.5		0.28	
PT-11I	11/20/02 15:00	7.7	0.339	-46	18	2.2	0.26	
PT-11I	11/21/02 8:00					3.85		
PT-11I	11/21/02 9:30	6.64	0.428	-106	19.2	1.83	0.38	
PT-11I	11/21/02 11:20					1.83		
PT-11I	11/21/02 13:20					1.77		
PT-11I	11/21/02 15:24	6.59	0.452	-89	18.9	1.77	0.23	
PT-11I	11/25/02 9:15	6.47	0.075	-13	18.7	3.44	0.22	0
PT-11I	11/25/02 13:00					2.15		
PT-11I	11/25/02 14:45					2.08		
PT-11I	11/26/02 8:15					*3.46*		*0.4*
PT-11I	11/26/02 10:00	*6.78*	*0.072*	*-33*	*18.9*		*0.35*	
PT-11I	11/26/02 14:00	6.11	0.372	-10	18.2		0.33	
PT-11I	11/26/02 14:00					2.35		
PT-11I	12/2/02 8:30					3.71		
PT-11I	12/2/02 10:30	7.76	0.086	-75	18.9		0.46	
PT-11I	12/2/02 13:30					2.82		
PT-11I	12/2/02 13:30	6.36	0.118	-18	18.7		0.39	
PT-11I	12/4/02 9:00					3.85		
PT-11I	12/10/02 9:00					4.04		2.1
PT-11I	12/10/02 12:15	6.89	0.072	-70	18.7		3.82	
PT-11I	12/10/02 14:20	7.31	0.07	-57	19		3.64	
PT-11I	12/10/02 15:30					2.98		
PT-11I	12/11/02 8:50					4.01		
PT-11I	12/11/02 9:30	7.06	0.066	-27	19.1		3.35	
PT-11I	12/11/02 13:00	6.66	0.066	-65	19.1		7.9	
PT-11I	12/11/02 13:45					3.04		
PT-11I	12/12/02 10:20					3.58	0	
PT-11I	12/16/02 9:15					3.38		2.37
PT-11I	12/16/02 10:30	10.2	0.171	-126	18.5		1.32	
PT-11I	12/16/02 13:45	9.16	1.178	-142	18.3		3.47	
PT-11I	12/16/02 15:00					2.37		
PT-11I	12/17/02 8:10					3.5		
PT-11I	12/17/02 9:30	6.7	0.347	-34	18.1		3.65	
PT-11I	12/17/02 14:00	8.61	0.231	-141	18.2		3.65	
PT-11I	12/17/02 15:00					2.98		
PT-11I	12/18/02 7:30					3.55		
PT-11I	12/18/02 15:30					3.29		
PT-11I	12/19/02 8:00					3.52		
PT-11I	12/19/02 15:00					2.82		
PT-12I	11/18/02 9:00	*7.9*	*0.348*	*73*	*17.5*	*3.77*	*0.45*	*18.6*
PT-12I	11/19/02 8:50	6.4	0.457	-67	20	3.84	0.27	
PT-12I	11/19/02 10:50					2.65		
PT-12I	11/19/02 15:20	6.53	0.472	-92	19.7	3.5	0.2	
PT-12I	11/20/02 8:00					3.88		
PT-12I	11/20/02 9:20	6.59	0.39	-44	18.8	2.73	0.35	
PT-12I	11/20/02 12:15					2.89		
PT-12I	11/20/02 14:15					2.95		
PT-12I	11/20/02 14:15	6.41	0.403	-33	14.3		0.29	
PT-12I	11/20/02 15:00	7.78	0.396	-16	19.3	3.1	0.31	
PT-12I	11/21/02 8:00					4.31		
PT-12I	11/21/02 9:30	6.58	0.448	-84	19.5	2.79	0.34	
PT-12I	11/21/02 11:00					2.79		
PT-12I	11/21/02 13:00					2.78		
PT-12I	11/21/02 15:24	6.5	0.451	-61	19.5	2.78	0.22	
PT-12I	11/25/02 9:15	6.65	0.372	-81	19.4	3.95	0.24	3.3
PT-12I	11/25/02 13:00					3.04		

Table 7
Permanganate Injection Pilot Test
Field Monitoring Data Summary

Well	Date/Time	Ph (st. units)	Conductivity (mhos)	ORP (eV)	Temperature (deg. C)	DTW (feet)	Dissolved Oxygen (mg/l)	PID (ppb e.u.)
PT-12I	11/25/02 14:45					2.9		
PT-12I	11/26/02 8:15					*3.98*		*4.6*
PT-12I	11/26/02 10:00	*6.39*	*0.394*	*-51*	*19.4*		*0.2*	
PT-12I	11/26/02 14:00	6.27	0.393	-35	19.4		1.85	
PT-12I	11/26/02 14:00					3.6		
PT-12I	12/2/02 8:30					3.43		
PT-12I	12/2/02 13:30					3.82		
PT-12I	12/4/02 9:00					4.25		
PT-12I	12/10/02 9:00					4.31		5.7
PT-12I	12/10/02 15:30					3.95		
PT-12I	12/11/02 8:50					4.31		6.3
PT-12I	12/11/02 13:45					3.95		
PT-12I	12/12/02 10:20					3.91	5	
PT-12I	12/16/02 9:15					3.85		3.55
PT-12I	12/16/02 15:00					3.55		
PT-12I	12/17/02 8:10					3.95		0
PT-12I	12/17/02 15:00					3.72		
PT-12I	12/18/02 7:30					3.96		
PT-12I	12/18/02 15:30					3.88		
PT-13I	11/18/02 9:00	*7.98*	*0.413*	*73*	*17.3*	*4.21*	*0.39*	*85.4*
PT-13I	11/19/02 8:50	6.37	0.797	-79	19.6	4.27	0.31	
PT-13I	11/19/02 10:50					3.15		
PT-13I	11/19/02 15:20	6.79	0.827	-147	19.2	3.96	0.26	
PT-13I	11/20/02 8:00					4.31		
PT-13I	11/20/02 9:20	6.78	0.489	-72	19.3		0.42	
PT-13I	11/20/02 12:15					3.41		
PT-13I	11/20/02 14:15					3.47		
PT-13I	11/20/02 14:15	6.18	0.695	-51	18.5		0.25	
PT-13I	11/20/02 15:00	7.75	0.496	-66	18.7	3.57	0.39	
PT-13I	11/21/02 8:00					5.18		
PT-13I	11/21/02 9:30	6.9	0.75	-132	18.9	3.32	0.38	
PT-13I	11/21/02 11:00					3.32		
PT-13I	11/21/02 13:00					3.32		
PT-13I	11/21/02 15:24	6.53	0.767	-93	18.8	3.32	0.21	
PT-13I	11/25/02 9:15	6.32	0.656	-76	18.9	4.39	0.25	2.3
PT-13I	11/25/02 13:00					3.61		
PT-13I	11/25/02 14:45					3.66		
PT-13I	11/26/02 8:15					*4.45*		*7.2*
PT-13I	11/26/02 10:00	*6.18*	*0.71*	*-79*	*18.6*		*0.24*	
PT-13I	11/26/02 14:00	6.15	0.705	-61	18.2		0.28	
PT-13I	11/26/02 14:00					4.15		
PT-13I	12/2/02 8:30					4.58		
PT-13I	12/2/02 10:30	6.43	0.649	-82	18.9		0.44	
PT-13I	12/2/02 13:30					4.34		
PT-13I	12/2/02 13:30	6.26	0.646	-64	18.6		0.43	
PT-13I	12/4/02 9:00					4.72		
PT-13I	12/10/02 9:00					4.76		
PT-13I	12/10/02 12:15	8.5	0.517	50	18.7		0.37	
PT-13I	12/10/02 14:20	8.23	0.51	-227	18.8		0.37	
PT-13I	12/10/02 15:30					4.5		
PT-13I	12/11/02 8:50					4.78		0
PT-13I	12/11/02 9:30	7.72	0.471	95	18.7		0.54	
PT-13I	12/11/02 13:00	7.7	0.449	-112	17.6		0.23	
PT-13I	12/11/02 13:45					4.5		
PT-13I	12/12/02 10:20					4.38	0	
PT-13I	12/16/02 9:15					4.3		4.09
PT-13I	12/16/02 10:30	7.63	0.594	-158	18.5		1.02	
PT-13I	12/16/02 13:45	7.62	0.635	-154	18.3		1.73	

Table 7
Permanganate Injection Pilot Test
Field Monitoring Data Summary

Well	Date/Time	Ph (st. units)	Conductivity (mhos)	ORP (eV)	Temperature (deg. C)	DTW (feet)	Dissolved Oxygen (mg/l)	PID (ppb e.u.)
PT-13I	12/16/02 15:00					4.09		
PT-13I	12/17/02 8:10					4.41		0
PT-13I	12/17/02 9:30	7.46	0.624	-105	18.1		1.33	
PT-13I	12/17/02 14:00	6.47	0.683	-117	18.3		0.41	
PT-13I	12/17/02 15:00					4.24		
PT-13I	12/18/02 7:30					4.44		
PT-13I	12/18/02 15:30					4.34		
PT-13I	12/19/02 8:00					4.42		0
PT-13I	12/19/02 15:00					4.25		
PTMW-1I	11/18/02 9:00					*3.55*		*0.02*
PTMW-1I	11/19/02 8:30					3.99		
PTMW-1I	11/19/02 10:50				16.9	2.48	1.28	
PTMW-1I	11/19/02 15:20					3.85	4.8	
PTMW-1I	11/20/02 8:00					3.59		
PTMW-1I	11/20/02 9:20	6.97	0.348	-108	18.9	2.76	0.58	
PTMW-1I	11/20/02 12:15					2.73		
PTMW-1I	11/20/02 14:15					2.71		
PTMW-1I	11/20/02 14:15						6.81	
PTMW-1I	11/20/02 15:00					3.05		
PTMW-1I	11/21/02 8:00					3.82		
PTMW-1I	11/21/02 9:30	7.02	0.311	-140	19.2	2.34	6.88	
PTMW-1I	11/21/02 11:26					2.34		
PTMW-1I	11/21/02 13:30					2.27		
PTMW-1I	11/21/02 15:24	6.97	0.319	-139	19.7	2.27		
PTMW-1I	11/25/02 9:15					4.13	0.59	0
PTMW-1I	11/25/02 13:00					2.63		
PTMW-1I	11/25/02 14:45					2.57		
PTMW-1I	11/26/02 8:15					*4.19*		*0*
PTMW-1I	11/26/02 10:00	*6.38*	*0.156*	*13*	*17.9*		*7.17*	
PTMW-1I	11/26/02 14:00	6.28	0.157	64	18.2		6.18	
PTMW-1I	11/26/02 14:00					3.36		
PTMW-1I	12/2/02 8:30					4.37		
PTMW-1I	12/2/02 13:30					3.77		
PTMW-1I	12/4/02 9:00					4.54		
PTMW-1I	12/10/02 9:00					4.56		
PTMW-1I	12/10/02 12:15	7.15	0.11	-39	18.5		4.36	
PTMW-1I	12/10/02 14:20	8.52	0.116	-45	18		5.4	
PTMW-1I	12/10/02 15:30					3.73		
PTMW-1I	12/11/02 8:50					4.62		0
PTMW-1I	12/11/02 9:30	6.75	0.111	-96	18.3		1.59	
PTMW-1I	12/11/02 13:45					0		
PTMW-1I	12/12/02 10:20					4.14	0	
PTMW-1I	12/16/02 9:15					4		3.19
PTMW-1I	12/16/02 10:30	6.27	0.523	-99	16		1.45	
PTMW-1I	12/16/02 13:45	6.71	0.572	160	16.4		0.86	
PTMW-1I	12/16/02 15:00					3.19		
PTMW-1I	12/17/02 8:10					4.09		
PTMW-1I	12/17/02 15:00					3.51		
PTMW-1I	12/18/02 7:30					4.14		
PTMW-1I	12/18/02 15:30					4.17		
PTMW-1I	12/19/02 8:00					4.28		
PTMW-1I	12/19/02 15:00					3.96		
PTMW-2I	11/18/02 9:00	*7.23*	*0.126*	*3*	*15.8*	*3.41*	*1.68*	*0*
PTMW-2I	11/19/02 8:41	6.31	0.12	178	19.7	3.54	0.59	
PTMW-2I	11/19/02 8:50	6.31	0.12	178	19.7	3.54	0.59	
PTMW-2I	11/19/02 10:50					2.2		
PTMW-2I	11/19/02 15:20	7.56	0.12	-79	20.1	3.15	1.2	
PTMW-2I	11/20/02 8:00					3.49		

Table 7
Permanganate Injection Pilot Test
Field Monitoring Data Summary

Well	Date/Time	Ph (st. units)	Conductivity (mhos)	ORP (eV)	Temperature (deg. C)	DTW (feet)	Dissolved Oxygen (mg/l)	PID (ppb e.u.)
PTMW-2I	11/20/02 9:20					2.45	4.63	
PTMW-2I	11/20/02 12:15					2.37		
PTMW-2I	11/20/02 14:15					2.34		
PTMW-2I	11/20/02 14:15	6.88	0.081	-94	18.6		6.36	
PTMW-2I	11/20/02 15:00	6.62	0.137	220	18.7	2.58	0.76	
PTMW-2I	11/21/02 8:00					3.55		
PTMW-2I	11/21/02 9:30	7.14	0.109	-86	19.3	1.97	1.63	
PTMW-2I	11/21/02 11:28					1.97		
PTMW-2I	11/21/02 13:29					1.83		
PTMW-2I	11/21/02 15:24	7.11	0.115	-90	19.6	1.83	1.51	
PTMW-2I	11/25/02 9:15	8.13	0.086	-53	19	3.62	1.34	0
PTMW-2I	11/25/02 13:00					2.34		
PTMW-2I	11/25/02 14:45					2.18		
PTMW-2I	11/26/02 8:15					*3.62*		*0*
PTMW-2I	11/26/02 10:00	*6.62*	*0.092*	*-82*	*18.7*		*7.41*	
PTMW-2I	11/26/02 14:00	6.48	0.094	-95	18.6		7.36	
PTMW-2I	11/26/02 14:00					2.49		
PTMW-2I	12/2/02 8:30					3.86		
PTMW-2I	12/2/02 10:30	6.63	0.082	-66	19.3		3.03	
PTMW-2I	12/2/02 13:30					3.22		
PTMW-2I	12/2/02 13:30	6.73	0.079	-70	19		4.34	
PTMW-2I	12/4/02 9:00					4.01		
PTMW-2I	12/10/02 9:00					4.18		
PTMW-2I	12/10/02 12:15	7.18	0.073	-65	18.8		0.539	
PTMW-2I	12/10/02 14:20	7.33	0.073	-71	18.9		6.71	
PTMW-2I	12/10/02 15:30					3.11		
PTMW-2I	12/11/02 8:50					4.15		
PTMW-2I	12/11/02 9:30	7.22	0.074	-75	18.4		5.74	
PTMW-2I	12/11/02 13:45					0		
PTMW-2I	12/12/02 10:20					3.82	0	
PTMW-2I	12/16/02 9:15					3.55		2.54
PTMW-2I	12/16/02 10:30	6.77	0.063	-31	18.2		5.39	
PTMW-2I	12/16/02 13:45	7.29	0.065	-56	18.6		4.34	
PTMW-2I	12/16/02 15:00					2.54		
PTMW-2I	12/17/02 8:10					3.65		
PTMW-2I	12/17/02 9:30	7.3	0.062	-88	18.3		4.07	
PTMW-2I	12/17/02 14:00	7.1	0.07	-68	18.4		3.43	
PTMW-2I	12/17/02 15:00					2.94		
PTMW-2I	12/18/02 7:30					3.69		
PTMW-2I	12/18/02 15:30					3.27		
PTMW-2I	12/19/02 8:00					3.67		
PTMW-2I	12/19/02 15:00					3.1		
PTMW-5I	11/19/02 8:50	*8.83*	*0.142*	*32*	*17.3*	*3.05*	*0.34*	
PTMW-5I	11/19/02 10:50					2.35		
PTMW-5I	11/19/02 15:20	6.78	0.131	-63	17.4	2.47	0.23	
PTMW-5I	11/20/02 8:00					3.09		
PTMW-5I	11/20/02 9:20	6.84	0.882	-60	18.2	2.49	0.33	
PTMW-5I	11/20/02 12:15					2.43		
PTMW-5I	11/20/02 14:15					2.4		
PTMW-5I	11/20/02 14:15	8.22	0.114	-76	17.2		0.24	
PTMW-5I	11/20/02 15:00	6.85	0.139	68	17.8	2.34	0.46	
PTMW-5I	11/21/02 8:00					3.1		
PTMW-5I	11/21/02 9:30	8.29	0.139	84	17.3	2.22	0.37	
PTMW-5I	11/21/02 11:00					2.22		
PTMW-5I	11/21/02 13:00					2.18		
PTMW-5I	11/21/02 15:24	6.36	0.127	-17	17.3	2.18	0.23	
PTMW-5I	11/25/02 9:15	8.16	0.117	-69	17.2	3.35	0.17	0
PTMW-5I	11/25/02 13:00					2.62		

Table 7
Permanganate Injection Pilot Test
Field Monitoring Data Summary

Well	Date/Time	Ph (st. units)	Conductivity (mhos)	ORP (eV)	Temperature (deg. C)	DTW (feet)	Dissolved Oxygen (mg/l)	PID (ppb e.u.)
PTMW-5I	11/25/02 14:45					2.56		
PTMW-5I	11/26/02 8:15					*3.38*		*18.8*
PTMW-5I	11/26/02 10:00	*6.63*	*0.116*	*-42*	*17.1*		*0.56*	
PTMW-5I	11/26/02 14:00	7.58	0.117	-90	17		0.19	
PTMW-5I	11/26/02 14:00					2.85		
PTMW-5I	12/2/02 8:30					3.17		
PTMW-5I	12/2/02 13:30					2.88		
PTMW-5I	12/4/02 9:00					3.64		
PTMW-5I	12/10/02 9:00					3.75		
PTMW-5I	12/10/02 15:30					3.25		
PTMW-5I	12/11/02 8:50					3.75		0
PTMW-5I	12/11/02 13:45					0		
PTMW-5I	12/12/02 10:20					3.3	0	
PTMW-5I	12/16/02 9:15					3.19		0
PTMW-5I	12/16/02 10:30	9.31	0.182	-81	17.5		0.54	
PTMW-5I	12/16/02 13:45	9.35	0.182	-101	17		0.51	
PTMW-5I	12/16/02 15:00					2.76		
PTMW-5I	12/17/02 8:10					3.33		0
PTMW-5I	12/17/02 9:30	8.83	0.191	-37	17.2		0.29	
PTMW-5I	12/17/02 14:00	8.66	0.185	-52	17.2		0.38	
PTMW-5I	12/17/02 15:00					3.08		
PTMW-5I	12/18/02 7:30					3.38		
PTMW-5I	12/18/02 7:30					3.18		
PTMW-5I	12/18/02 15:30					3.28		
PTMW-5I	12/18/02 15:30					2.88		
PTMW-5I	12/19/02 8:00					3.44		0.1
PTMW-5I	12/19/02 15:00					3.12		
PTMW-6I	11/18/02 9:00	*9.92*	*0.415*	*-19*	*17.3*	*3.5*	*0.54*	*0.6*
PTMW-6I	11/19/02 8:50	7.42	0.814	-33	18.2	3.55	0.29	
PTMW-6I	11/19/02 10:50	6.56	0.847	-47	18.3	3.02		
PTMW-6I	11/19/02 15:20	6.87	0.82	-64	18.2	3.18	0.28	
PTMW-6I	11/20/02 8:00					3.59		
PTMW-6I	11/20/02 9:20	7.88	0.139	-68	17.7	3.1	0.51	
PTMW-6I	11/20/02 12:15					3.11		
PTMW-6I	11/20/02 14:15					3.11		
PTMW-6I	11/20/02 14:15	7.08	0.783	-34	17.7		0.25	
PTMW-6I	11/20/02 15:00	9.69	0.448	-27	18.1	3.08	0.68	
PTMW-6I	11/21/02 8:00							
PTMW-6I	11/21/02 9:30	6.49	0.811	58	17.7	3.03	0.58	
PTMW-6I	11/21/02 11:00					3.03		
PTMW-6I	11/21/02 13:00					3.04		
PTMW-6I	11/21/02 15:24	6.85	0.788	-45	18.1	3.04	0.47	
PTMW-6I	11/25/02 9:15	7.1	0.782	-43	17.7	3.67	0.31	0
PTMW-6I	11/25/02 13:00					3.18		
PTMW-6I	11/25/02 14:45					3.15		
PTMW-6I	11/26/02 8:15					*3.68*		*1.3*
PTMW-6I	11/26/02 10:00	*6.44*	*0.804*	*-31*	*17.5*		*0.54*	
PTMW-6I	11/26/02 14:00	6.99	0.806	-35	17.2		0.27	
PTMW-6I	11/26/02 14:00					3.42		
PTMW-6I	12/2/02 8:30					3.8		
PTMW-6I	12/2/02 10:30	6.31	0.762	-9	17.5		0.39	
PTMW-6I	12/2/02 13:30					3.63		
PTMW-6I	12/2/02 13:30	7.53	0.739	-71	17.8		0.36	
PTMW-6I	12/4/02 9:00					3.93		
PTMW-6I	12/10/02 9:00					3.96		
PTMW-6I	12/10/02 12:15	6.92	0.71	-138	17.9		1.36	
PTMW-6I	12/10/02 14:20	6.88	0.8	-47	17.6		0.24	
PTMW-6I	12/10/02 15:30					3.7		

Table 7
Permanganate Injection Pilot Test
Field Monitoring Data Summary

Well	Date/Time	Ph (st. units)	Conductivity (mhos)	ORP (eV)	Temperature (deg. C)	DTW (feet)	Dissolved Oxygen (mg/l)	PID (ppb e.u.)
PTMW-6I	12/11/02 8:50					3.95		0
PTMW-6I	12/11/02 9:30	8.46	0.493	-144	18		0.36	
PTMW-6I	12/11/02 13:00	9.45	0.465	-178	18.6		0.43	
PTMW-6I	12/11/02 13:45					3.64		
PTMW-6I	12/12/02 10:20					3.6	0	
PTMW-6I	12/16/02 9:15					3.54		0
PTMW-6I	12/16/02 10:30	10.21	0.238	-141	17.5		2.94	
PTMW-6I	12/16/02 13:45	10.16	0.235	-160	17.2		3	
PTMW-6I	12/16/02 15:00					3.34		
PTMW-6I	12/17/02 8:10					3.64		0
PTMW-6I	12/17/02 9:30	10.27	0.228	-117	17.2		0.31	
PTMW-6I	12/17/02 14:00	10.24	0.244	-114	17.1		0.31	
PTMW-6I	12/17/02 15:00					3.5		
PTMW-6I	12/18/02 7:30					3.67		
PTMW-6I	12/18/02 15:30					3.56		
PTMW-6I	12/19/02 8:00					3.65		0
PTMW-6I	12/19/02 15:00					3.41		
MW-12I	11/18/02 9:00	*8.27*	*0.051*	*62*	*17.1*	*4.43*	*0.45*	*6.8*
MW-12I	11/19/02 8:50	6.45	0.049	18	20	4.5	0.41	
MW-12I	11/19/02 10:50					3.05		
MW-12I	11/19/02 15:20	6.76	0.048	-3	19.7	4.32		
MW-12I	11/20/02 8:00					4.52		
MW-12I	11/20/02 9:20	6.51	0.053	39	20.1	3.06	4.3	
MW-12I	11/20/02 12:15							
MW-12I	11/20/02 14:15					3.45		
MW-12I	11/20/02 14:15	6.56	0.055	-26	19.1		0.37	
MW-12I	11/20/02 15:00	6.27	0.054	32	19.2	3.95	0.33	
MW-12I	11/21/02 8:00					3.2		
MW-12I	11/21/02 9:30	6.64	0.052	-20	19.5	3.28	0.27	
MW-12I	11/21/02 11:00					3.28		
MW-12I	11/21/02 13:00					3.32		
MW-12I	11/21/02 15:24	6.92	0.044	-22	19.2	3.37	0.2	
MW-12I	11/25/02 9:15	6.54	0.059	-30	19.5	4.62	0.27	0
MW-12I	11/25/02 13:00					3.58		
MW-12I	11/25/02 14:45					3.58		
MW-12I	11/26/02 8:15					*4.66*		*0*
MW-12I	11/26/02 10:00	*6.31*	*0.061*	*3*	*19*		*0.38*	
MW-12I	11/26/02 14:00	6.81	0.058	-10	18.5		0.25	
MW-12I	11/26/02 14:00					4.29		
MW-12I	12/2/02 8:30					4.78		
MW-12I	12/2/02 10:30	6.78	0.076	-26	19		0.24	
MW-12I	12/2/02 13:30					4.53		
MW-12I	12/2/02 13:30	6.83	0.077	-35	19.1		0.3	
MW-12I	12/4/02 9:00					4.92		
MW-12I	12/10/02 9:00					4.97		
MW-12I	12/10/02 12:15	6.12	0.097	134	18.7		0.67	
MW-12I	12/10/02 14:20	7.31	0.101	-85	19		3.12	
MW-12I	12/10/02 15:30					4.65		
MW-12I	12/11/02 8:50					4.99		0
MW-12I	12/11/02 9:30	5.97	0.096	148	19.4		0.69	
MW-12I	12/11/02 13:00	6.22	0.096	3	19.3		2.8	
MW-12I	12/11/02 13:45					4.65		
MW-12I	12/12/02 10:20					2.95	3.2	
MW-12I	12/16/02 9:15					4.53		0
MW-12I	12/16/02 10:30	7.45	0.092	-96	18.6		0.28	
MW-12I	12/16/02 13:45	7.13	0.094	-61	18.6		0.27	
MW-12I	12/16/02 15:00					4.25		
MW-12I	12/17/02 8:10					4.67		12.7

Table 7
Permanganate Injection Pilot Test
Field Monitoring Data Summary

Well	Date/Time	Ph (st. units)	Conductivity (mhos)	ORP (eV)	Temperature (deg. C)	DTW (feet)	Dissolved Oxygen (mg/l)	PID (ppb e.u.)
MW-12I	12/17/02 9:30	8.13	0.123	-51	18.6		2.08	
MW-12I	12/17/02 14:00	7.08	0.093	-45	18.5		0.43	
MW-12I	12/17/02 15:00					4.39		
MW-12I	12/18/02 7:30					4.63		
MW-12I	12/18/02 15:30					4.53		
MW-12I	12/19/02 8:00					4.64		0
MW-12I	12/19/02 15:00					4.41		
MW-12D	11/18/02 9:00	6.85	0.089	59	18	5.3		13.2
MW-12D	11/19/02 8:50					5.28		
MW-12D	11/19/02 10:50					5.22		
MW-12D	11/20/02 8:00					5.24		
MW-12D	11/20/02 9:20	6.45	0.096	-35	19.1	5.21	2.69	
MW-12D	11/20/02 12:15							
MW-12D	11/20/02 14:15					5.18		
MW-12D	11/20/02 14:15	6.56	0.078	-52	19.2		0.75	
MW-12D	11/20/02 15:00	6.15	0.097	-35	18.5	5.16	1.28	
MW-12D	11/21/02 8:00					4.53		
MW-12D	11/21/02 9:30	6.53	0.106	-6	19.6	5.15	1.08	
MW-12D	11/21/02 11:00					5.15		
MW-12D	11/21/02 13:00					5.13		
MW-12D	11/21/02 15:24	6.68	0.095	1	19.5	5.13	0.89	
MW-12D	11/25/02 9:15	6.65	0.076	-52	19.9	5.18	0.86	0
MW-12D	11/25/02 13:00					5.13		
MW-12D	11/25/02 14:45					5.13		
MW-12D	11/26/02 8:15					5.19		0
MW-12D	11/26/02 10:00	6.35	0.082	10	18.9		0.8	
MW-12D	11/26/02 14:00	6.72	0.085	4	18.6		0.54	
MW-12D	11/26/02 14:00					5.12		
MW-12D	12/2/02 8:30					5.16		
MW-12D	12/2/02 10:30	6.51	0.082	-5	19.4		0.24	
MW-12D	12/2/02 13:30					5.11		
MW-12D	12/2/02 13:30	6.57	0.081	-15	19.3		0.18	
MW-12D	12/4/02 9:00					5.17		
MW-12D	12/10/02 9:00					5.1		
MW-12D	12/10/02 12:15	6.03	0.091	138	18.5		0.63	
MW-12D	12/10/02 14:20	7.04	0.091	-49	19.3		1.32	
MW-12D	12/10/02 15:30					5.08		
MW-12D	12/11/02 8:50					5.1		0
MW-12D	12/11/02 9:30	5.99	0.085	158	18.8		0.39	
MW-12D	12/11/02 13:00	6.31	0.087	-17	19.3		0.25	
MW-12D	12/11/02 13:45					5.14		
MW-12D	12/12/02 10:20					5.02	0.2	
MW-12D	12/16/02 9:15					4.98		0
MW-12D	12/16/02 10:30	7.08	0.115	-62	18.7		1.68	
MW-12D	12/16/02 13:45	7.03	0.114	-66	19		0.96	
MW-12D	12/16/02 15:00					5		
MW-12D	12/17/02 8:10					5.08		1.7
MW-12D	12/17/02 9:30	7.37	0.117	-86	18.3		0.72	
MW-12D	12/17/02 14:00	7.49	0.118	-104	18.3		0.72	
MW-12D	12/17/02 15:00					5.04		
MW-12D	12/18/02 7:30					5.05		
MW-12D	12/18/02 15:30					5		
MW-12D	12/19/02 8:00					5.04		0
MW-12D	12/19/02 15:00					4.9		

Notes:

1. Baseline data for shallow injection events (i.e., - pre-shallow injection) presented in *blue, italic.* Shallow Injections initiated on 11/26/02.
2. Baseline for intermediate injection events presented in *green, italic*. Intermediate injections initiated on 11/19/02.

Table 8
Permanganate Injection Pilot Test
Colormetric Sampling Data Summary

Location	Date	Time	KMnO4 Concentration Equivalent (mg/l)
PT-9S	11/21/2002	13:05	0.50
PT-10S	4/24/2003	NA	19.30
PT-11S	11/26/2002	11:25	9.00
PT-11S	12/17/2002	11:30	10.80
PT-11S	4/24/2003	NA	1.00
PT-12S	11/26/2002	11:25	14.60
PT-12S	4/11/2003	11:25	0.20
PT-12S	4/24/2003	NA	0.20
PT-13S	4/11/2003	11:25	0.30
PT-13S	4/24/2003	NA	0.30
PTMW-1S	12/17/2002	11:30	10.40
PTMW-1S	4/24/2003	NA	3.70
PTMW-2S	12/17/2002	11:30	10.30
PTMW-2S	4/24/2003	NA	2.10
PTMW-3S	4/24/2003	NA	2.30
PTMW-6S	12/17/2002	11:30	32.50
PTMW-6S	4/11/2003	11:25	0.30
PT-9I	11/26/2002	11:25	0.00
PT-11I	11/20/2002	13:15	0.80
PT-11I	11/20/2002	14:21	0.50
PT-11I	11/21/2002	11:08	1.00
PT-11I	11/21/2002	13:05	
PT-11I	11/26/2002	11:25	1.60
PT-11I	12/2/2002	12:30	1.90
PT-11I	12/10/2002	12:30	0.30
PT-11I	12/11/2002	8:30	1.30
PT-11I	12/16/2002	12:35	1.30
PT-11I	12/17/2002	11:30	1.60
PT-12I	11/26/2002	11:25	2.00
PTMW-1I	11/20/2002	13:15	3.30
PTMW-1I	11/20/2002	14:21	2.80
PTMW-1I	11/21/2002	11:08	3.10
PTMW-1I	11/21/2002	13:05	3.10
PTMW-1I	11/26/2002	11:25	1.40
PTMW-1I	12/2/2002	12:30	0.70
PTMW-1I	12/10/2002	12:30	0.80
PTMW-1I	12/11/2002	8:30	
PTMW-1I	12/16/2002	12:35	1.10
PTMW-1I	12/17/2002	11:30	1.30
PTMW-2I	11/20/2002	13:15	2.10
PTMW-2I	11/20/2002	14:21	1.70
PTMW-2I	11/21/2002	11:08	2.20
PTMW-2I	11/21/2002	13:05	1.50
PTMW-2I	11/26/2002	11:25	2.10

Table 8
Permanganate Injection Pilot Test
Colormetric Sampling Data Summary

Location	Date	Time	KMnO4 Concentration Equivalent (mg/l)
PTMW-2I	12/2/2002	12:30	1.10
PTMW-2I	12/10/2002	12:30	2.50
PTMW-2I	12/11/2002	8:30	2.00
PTMW-2I	12/16/2002	12:35	0.70
PTMW-2I	12/17/2002	11:30	0.80
MW-6I	11/20/2002	13:15	0.30
MW-6I	11/20/2002	14:21	0.30
MW-6I	11/21/2002	11:08	0.60
MW-6I	11/21/2002	13:05	0.40
MW-6I	11/26/2002	11:25	0.70
MW-6I	12/2/2002	12:30	0.30
MW-6I	12/10/2002	12:30	2.20
MW-6I	12/11/2002	8:30	1.90
MW-6I	12/16/2002	12:35	1.50
MW-6I	12/17/2002	11:30	2.10
MW-12I	11/20/2002	13:15	1.10
MW-12I	11/20/2002	14:21	1.30
MW-12I	11/21/2002	11:08	1.60
MW-12I	11/21/2002	13:05	1.30

Method 101 and Method 102 Absorbance at 520 nm used for KMnO4 equivalence.

Table 9
Permanganate Injection Pilot Test
Intermediate Injection Event - Baseline Data for Intermediate Monitoring Locations

Well	Date	Time	Ph (st. units)	Conductivity (mhos)	ORP (eV)	Temperature (deg. C)	DTW (feet)	Dissolved Oxygen (mg/l)	PID (ppb e.u.)
PT-14S	11/18/2002	9:00	6.23	0.534	128	17.5	3.9	1.78	7.6
PT-15S	11/18/2002	9:00	5.96	0.939	-23	19	3.91	0.72	86.6
PT-16S	11/18/2002	9:00	6.13	0.622	-60	19.2	3.71	0.75	55.1
PT-17S	11/18/2002	9:00	6.03	0.54	-6	19.2	3.69	0.72	129
PT-18S	11/18/2002	9:00	6.06	0.572	-13	19.2	3.78	0.71	0
PTMW-1S	11/18/2002	9:00	6.17	0.488	-53	18.4	3.73	Mini-Troll	0
PTMW-2S	11/18/2002	9:00	6.42	0.247	-12	18	3.51	Mini-Troll	0
MW-12S	11/18/2002	9:00	6.16	0.418	86	16.9	3.25	0.43	85.4
PT-9I	11/18/2002	9:00	11.27	1.71	-15	17.9	3.52	0.5	0
PT-10I	11/18/2002	9:00	8.06	0.578	71	19.6	3.31	0.57	0
PT-11I	11/18/2002	9:00	7.88	0.314	71	19.4	3.24		0
PT-12I	11/18/2002	9:00	7.9	0.348	73	17.5	3.77	0.45	18.6
PT-13I	11/18/2002	9:00	7.98	0.413	73	17.3	4.21	0.39	85.4
PTMW-1I	11/18/2002	9:00	See Troll Data				3.55		0.02
PTMW-2I	11/18/2002	9:00	7.23	0.126	3	15.8	3.41	1.68	0
PTMW-6I	11/18/2002	9:00	9.92	0.415	-19	17.3	3.5	0.54	0.6
MW-12I	11/18/2002	9:00	8.27	0.051	62	17.1	4.43	0.45	6.8
MW-12D	11/18/2002	9:00	6.85	0.089	59	18	5.3		13.2

Table 10
Permanganate Injection Pilot Test
Ambient Air Monitoring Results

Date	Time	Work Zone PID Results (ppb equiv.)	Perimeter PID Results (ppb equiv.)	Lower Explosive Limit Monitoring (%LEL)	Oxygen Monitoring (% O2)	Carbon Monoxide Monitoring (CO)	Hydrogen Sulfide Monitoring (H2S)
9/16/02	9:30	0.0	0.0				
9/16/02	9:45	0.0					
9/16/02	10:00	0.0					
9/16/02	10:15	0.0					
9/16/02	10:30	0.0	0.0				
9/16/02	10:45	0.0					
9/16/02	11:00	0.0					
9/16/02	11:15	0.0					
9/16/02	11:30	0.0	0.0				
9/16/02	13:00	0.0	0.0				
9/16/02	13:15	0.0					
9/16/02	13:30	0.0					
9/16/02	13:45	0.0					
9/16/02	14:00	0.0	0.0				
9/16/02	14:15	0.0					
9/16/02	14:30	0.0					
9/16/02	14:45	0.0					
9/17/02	8:30	0.0	0.0				
9/17/02	8:45	1.4	0.2				
9/17/02	9:00	2.5	0.0				
9/17/02	9:15	0.0	0.0				
9/17/02	9:30	0.0					
9/17/02	9:45	0.0					
9/17/02	10:00	0.0					
9/17/02	10:45	0.0	0.0				
9/17/02	11:00	0.0					
9/17/02	11:15	0.0					
9/17/02	11:30	0.0	0.0				
9/17/02	11:45	0.0					
9/17/02	12:00	0.0					
9/17/02	13:30	0.0	0.0				
9/17/02	13:45	0.0					
9/17/02	14:00	0.0					
9/17/02	14:15	0.0					
9/17/02	15:15	0.0	0.0	0	20.9	0	0
9/17/02	15:30	0.0	0.0	0			
9/17/02	15:45	0.0	0.0	0			
9/17/02	16:00	0.0		0			
9/17/02	16:15	0.0	0.0	0	20.8	0	0
9/17/02	16:30	0.0	0.0	0			
9/18/02	8:45	0.0	0.0	0	20.9	0	0
9/18/02	9:00	0.0		0			
9/18/02	9:15	0.0		0			
9/18/02	9:30	0.0		0			
9/18/02	9:45	0.0	0.0	0	20.8	0	0
9/18/02	10:00	0.0		0			
9/18/02	10:15	0.0		0			
9/18/02	11:15	0.0	0.0				

Table 10
Permanganate Injection Pilot Test
Ambient Air Monitoring Results

Date	Time	Work Zone PID Results (ppb equiv.)	Perimeter PID Results (ppb equiv.)	Lower Explosive Limit Monitoring (%LEL)	Oxygen Monitoring (% O2)	Carbon Monoxide Monitoring (CO)	Hydrogen Sulfide Monitoring (H2S)
9/18/02	11:30	0.0					
9/18/02	13:15	0.0	0.0	0	20.9	0	0
9/18/02	13:30	0.0		0			
9/18/02	13:45	0.0		0			
9/18/02	14:00	0.0		0			
9/18/02	14:15	0.0	0.0	0	20.8	0	0
9/19/02	7:45	0.0	0.0		21.2	0	0
9/19/02	8:00	0.0					
9/19/02	8:15	0.0					
9/19/02	8:30	2.9	0.0		20.9	0	0
9/19/02	8:45	2.1	0.0		20.9	0	0
9/19/02	9:00	0.8	0.0		20.8	0	0
9/19/02	9:15	0.0	0.0		20.8	0	0
9/19/02	10:00	0.0	0.0			0	0
9/19/02	10:15	0.0					
9/19/02	10:30	0.0					
9/19/02	10:45	0.0					
9/19/02	11:00	0.0	0.0		20.8	0	0
9/19/02	11:15	0.0					
9/19/02	11:30	0.0	0.0		21.0	0	0
9/19/02	11:45	0.0					
9/19/02	12:00	0.0					
9/19/02	13:45	0.0	0.0		21.0	0	0
9/19/02	14:00	0.0					
9/19/02	14:15	0.0					
9/19/02	14:30	0.0					
9/19/02	14:45	0.0	0.0		21.1	0	0
9/20/02	8:30	0.0	0.0	0	20.7	0	0
9/20/02	8:45	0.0		0			
9/20/02	9:00	0.0		0			
9/20/02	9:15	0.0		0			
9/20/02	9:30	0.0	0.0	0	20.7	0	0
9/20/02	10:45	0.0	0.0	0	20.8	0	0
9/20/02	11:00	0.0		0			
9/20/02	11:15	0.0		0			
9/20/02	11:30	0.0	0.0	0	21.0	0	0
9/20/02	11:45	0.0		0			
9/20/02	13:30	0.0	0.0	0	21.0	0	0
9/20/02	13:45	0.0		0			
9/20/02	14:00	0.0		0			
9/20/02	14:15	0.0		0			
9/20/02	14:30						
9/23/02	9:00	0.0	0.0	0	20.9	0	0
9/23/02	9:15	2.8	0.0	0			
9/23/02	9:30	0.0		0			
9/23/02	9:45	0.0		0			
9/23/02	10:00	0.0	0.0	0	20.9	0	0
9/23/02	10:15	0.0		0			

Table 10
Permanganate Injection Pilot Test
Ambient Air Monitoring Results

Date	Time	Work Zone PID Results (ppb equiv.)	Perimeter PID Results (ppb equiv.)	Lower Explosive Limit Monitoring (%LEL)	Oxygen Monitoring (% O2)	Carbon Monoxide Monitoring (CO)	Hydrogen Sulfide Monitoring (H2S)
9/23/02	10:30	0.0		0			
9/23/02	10:45	0.0		0			
9/23/02	11:00	0.0	0.0	0	20.7	0	0
9/23/02	11:15	0.0		0			
9/23/02	11:30	0.0		0			
9/23/02	11:45	0.0		0			
9/23/02	12:00	0.0	0.0	0	20.8	0	0
9/23/02	12:15	0.0		0			
9/23/02	12:30	0.0		0			
9/23/02	12:45	0.0		0			
9/23/02	13:00	0.0	0.0	0	20.8	0	0
9/23/02	13:15	0.0		0			
9/24/02	8:15	0.0	0.0	0	20.8	0	0
9/24/02	8:30	0.0		0			
9/24/02	8:45	0.0		0			
9/24/02	9:00	0.0		0			
9/24/02	9:15	0.0	0.0	0	20.7	0	0
9/24/02	9:30	0.0		0			
9/24/02	9:45	0.0		0			
9/24/02	10:00	0.0	0.0	0	20.7	0	0
9/24/02	11:45	0.0	0.0	0	21.0	0	0
9/24/02	12:00	0.0		0			
9/24/02	12:15	0.4	0.0	0	21.0	0	0
9/24/02	12:30	3.4	0.0	0	20.9	0	0
9/24/02	12:45	0.0		0			
9/24/02	13:15	0.0		0			
9/24/02	13:30	0.0		0			
9/24/02	13:45	0.0	0.0	0	20.8	0	0
9/24/02	14:00	0.0		0			
9/24/02	14:15	0.0		0			
9/24/02	14:30	0.0	0.0	0	20.8	0	0
9/24/02	14:45	0.0		0			
9/24/02	15:00	0.0		0			
9/25/02	9:00	0.0	0.0	0	20.6	0	0
9/25/02	9:15	0.0		0			
9/25/02	9:30	0.0		0			
9/25/02	9:45	0.0		0			
9/25/02	10:00	0.0	0.0	0	20.8	0	0
9/25/02	10:15	0.0		0			
9/25/02	10:30	0.0		0			
9/25/02	10:45	0.0		0			
9/25/02	11:00	0.0	0.0	0	20.7	0	0
9/25/02	11:15	0.0		0			
9/25/02	12:00	0.0	0.0	0	21.1	0	0
9/25/02	12:15	0.0		0			
9/25/02	13:00	0.0	0.0	0	21.1	0	0
9/25/02	13:15	0.0		0			
9/25/02	13:30	0.0		0			

Table 10
Permanganate Injection Pilot Test
Ambient Air Monitoring Results

Date	Time	Work Zone PID Results (ppb equiv.)	Perimeter PID Results (ppb equiv.)	Lower Explosive Limit Monitoring (%LEL)	Oxygen Monitoring (% O2)	Carbon Monoxide Monitoring (CO)	Hydrogen Sulfide Monitoring (H2S)
9/25/02	13:45	0.0		0			
9/25/02	14:30	0.0	0.0	0	21.0	0	0
9/25/02	14:45	0.3		0			
9/25/02	15:00	0.3		0			
9/25/02	15:15	1.1		0			
9/25/02	15:30	0.0	0.0	0	21.0	0	0
9/25/02	15:45	0.0	0.0	0	21.0	0	0
9/25/02	16:00	0.0		0			
9/25/02	16:15	0.0		0			
9/25/02	16:30	0.0	0.0	0	21.1	0	0
9/25/02	16:45	0.0		0			
9/25/02	17:00	0.0		0			
9/25/02	17:15	0.0		0			
9/25/02	17:30	0.0	0.0	0	21.0	0	0
9/25/02	17:45	0.0		0			
9/26/02	9:00	0.0	0.0	0	21.1	0	0
9/26/02	9:15	0.0		0			
9/26/02	9:30	0.0		0			
9/26/02	9:45	0.0		0			
9/26/02	10:00	0.0	0.0	0	21.0	0	0
9/26/02	10:15	0.0		0			
9/26/02	10:30	0.0		0			
9/26/02	10:45	0.0		0			
9/26/02	11:00	0.0	0.0	0	21.0	0	0
9/26/02	11:15	0.0		0			
9/26/02	11:30	0.0		0			
9/26/02	12:45	0.0	0.0	0		0	0
9/26/02	13:00	0.0		0			
9/26/02	13:30	0.0		0			
9/30/02	8:00	0.0	0.0	0	21.0	0	0
9/30/02	8:15	0.0		0			
9/30/02	8:30	0.0		0			
9/30/02	8:45	0.0	0.0	0	21.0	0	0
9/30/02	9:00	0.0		0			
9/30/02	9:15	0.0		0			
9/30/02	9:30	0.0		0			
9/30/02	9:45	0.0	0.0	0	21.1	0	0
9/30/02	10:00	0.0		0			
9/30/02	10:15	0.0		0			
9/30/02	10:30	0.0		0			
9/30/02	10:45	0.0	0.0	0	21.4	0	0
9/30/02	11:00	0.0		0			
9/30/02	11:15	0.0		0			
9/30/02	11:30	0.0	0.0	0	21.6	0	0
9/30/02	11:45	0.0					
9/30/02	12:00	0.0					
9/30/02	12:15	0.0					
9/30/02	12:30	0.0	0.0		21.9	0	0

Table 10
Permanganate Injection Pilot Test
Ambient Air Monitoring Results

Date	Time	Work Zone PID Results (ppb equiv.)	Perimeter PID Results (ppb equiv.)	Lower Explosive Limit Monitoring (%LEL)	Oxygen Monitoring (% O2)	Carbon Monoxide Monitoring (CO)	Hydrogen Sulfide Monitoring (H2S)
9/30/02	12:45	0.0					
9/30/02	13:00	0.0					
9/30/02	13:15	0.0		0			
9/30/02	13:30	0.0	0.0	0	21.9	0	0
9/30/02	13:45	0.0		0			
9/30/02	14:00	0.0		0			
9/30/02	14:15	0.0		0			
9/30/02	14:30	0.0	0.0	0	21.9	0	0
9/30/02	14:45	0.0		0			
9/30/02	15:00	0.0		0			
9/30/02	15:15	0.0		0			
9/30/02	15:30	0.0	0.0	0	21.8	0	0
10/1/02	8:30	0.0	0.0	0	21.1	0	0
10/1/02	8:45	0.0		0			
10/1/02	9:00	0.0		0			
10/1/02	9:15	0.0		0			
10/1/02	9:30	0.0	0.0	0	21.0	0	0
10/1/02	9:45	0.0		0			
10/1/02	10:00	0.0		0			
10/1/02	10:15	0.0		0			
10/1/02	10:30	0.0	0.0	0	21.3	1	0
10/1/02	10:45	0.0		0			
10/1/02	11:45	0.0	0.0	0	21.4	0	0
10/1/02	12:00	0.0		0			
10/1/02	12:45	0.0	0.0	0	21.3	0	0
10/1/02	13:00	0.0		0			
10/1/02	13:15	0.0		0			
10/1/02	13:30	0.0	0.0	0	21.3	0	0
10/1/02	13:45	0.0		0			
10/1/02	14:00	0.0		0			
10/1/02	14:15	0.0		0			
10/1/02	14:30	0.0	0.0	0	21.4	1	0
10/1/02	14:45	0.0		0			
10/2/02	8:15	0.4	0.0	0	21.0	0	0
10/2/02	8:30	0.0		0			
10/2/02	8:45	0.0		0			
10/2/02	9:00	0.0	0.0	0	21.3	0	0
10/2/02	9:15	0.0	0.0	0			
10/2/02	9:30	0.0		0			
10/2/02	9:45	0.0		0			
10/2/02	10:00	0.0	0.0	0	21.6	0	0
10/2/02	10:15	0.0		0			
10/2/02	10:30	0.0		0			
10/2/02	10:45	0.0		0			
10/2/02	11:00	0.0	0.0	0	21.4	0	0
10/2/02	11:15	0.0		0			
10/2/02	11:30	0.0		0			
10/2/02	11:45	0.0		0			

Table 10
Permanganate Injection Pilot Test
Ambient Air Monitoring Results

Date	Time	Work Zone PID Results (ppb equiv.)	Perimeter PID Results (ppb equiv.)	Lower Explosive Limit Monitoring (%LEL)	Oxygen Monitoring (% O2)	Carbon Monoxide Monitoring (CO)	Hydrogen Sulfide Monitoring (H2S)
10/2/02	12:00	0.0	0.0	0	21.5	0	0
10/2/02	12:45	0.0	0.0	0	21.8	0	0
10/2/02	13:00	0.0		0			
10/2/02	13:15	0.0		0			
10/2/02	13:30	0.0	0.0	0	21.7	0	0
10/2/02	13:45	0.0		0			
10/2/02	14:00	0.0	0.0	0	21.6	0	0
10/2/02	14:15	0.0		0			
10/2/02	14:30	0.0		0			
10/2/02	14:45	0.0		0			
10/2/02	15:00	0.0	0.0	0	21.3	0	0
10/3/02	8:45	0.0	0.0	0	21.1	0	0
10/3/02	9:00	0.0		0			
10/3/02	9:15	0.2		0			
10/3/02	9:30	0.0		0			
10/3/02	9:45	0.0		0			
10/3/02	10:00	0.0	0.0	0	21.2	0	0
10/3/02	10:15	0.0		0			
10/3/02	10:30	0.0	0.0	0	21.3	0	0
10/3/02	10:45	0.0		0			
10/3/02	11:00	0.0		0			
10/3/02	11:15	0.0		0			
10/3/02	11:30	0.0	0.0	0	21.3	0	0
10/3/02	11:45	0.0		0			
10/4/02	8:45	0.0	0.0	0	21.0	0	0
10/4/02	9:00	0.0		0			
10/4/02	9:15	0.0		0			
10/4/02	9:30	0.0		0			
10/4/02	9:45	0.0	0.0	0	21.0	0	0
10/4/02	10:00	0.0		0			
10/4/02	10:15	0.0		0			
10/4/02	10:30	0.0		0			
10/4/02	10:45	0.0	0.0	0	21.1	0	0
10/4/02	11:00	0.0		0			
10/4/02	11:15	0.0		0			
10/4/02	11:30	0.0		0			
10/4/02	11:45	0.0	0.0	0	21.0	0	0
10/4/02	12:00	0.0		0			
10/4/02	12:15	0.0		0			
10/4/02	12:30	0.0		0			
10/4/02	12:45	0.0	0.0	0	21.0	0	0
10/4/02	13:00	0.0		0			
10/4/02	13:15	0.0		0			
10/4/02	13:30	0.0		0			
10/4/02	13:45	0.0	0.0	0	21.0	0	0
10/4/02	14:00	0.0		0			
10/4/02	14:15	0.0		0			
10/4/02	14:30	0.0		0			

Table 10
Permanganate Injection Pilot Test
Ambient Air Monitoring Results

Date	Time	Work Zone PID Results (ppb equiv.)	Perimeter PID Results (ppb equiv.)	Lower Explosive Limit Monitoring (%LEL)	Oxygen Monitoring (% O2)	Carbon Monoxide Monitoring (CO)	Hydrogen Sulfide Monitoring (H2S)
10/7/02	8:30	0.0	0.0	0	21.0	0	0
10/7/02	8:45	0.0		0			
10/7/02	9:00	0.0		0			
10/7/02	9:15	0.0		0			
10/7/02	9:30	0.0	0.0	0	21.2	0	0
10/7/02	9:45	0.0		0			
10/7/02	10:00	0.0		0			
10/7/02	10:15	0.0		0			
10/7/02	10:30	0.0	0.0	0	21.2	0	0
10/7/02	10:45	0.0		0			
10/7/02	11:00	0.0		0			
10/7/02	11:15	0.0		0			
10/7/02	11:30	0.0	0.0	0	21.3	1	0
10/7/02	11:45	0.0		0			
10/7/02	12:00	0.0		0			
10/7/02	13:00	0.0	0.0	0	21.3	0	0
10/7/02	13:15	0.0		0			
10/7/02	13:30	0.0		0			
10/7/02	13:45	0.0		0			
10/7/02	14:00	0.0	0.0	0	21.4	0	0
10/7/02	14:15	0.0		0			
10/7/02	14:30	0.0	0.0	0	21.3	0	0
10/8/02	8:15	0.0	0.0	0	21.0	0	0
10/8/02	8:30	0.0		0			
10/8/02	8:45	0.0		0			
10/8/02	9:00	0.0	0.0	0	21.1	0	0
10/8/02	9:15	0.0		0			
10/8/02	9:30	0.0		0			
10/8/02	9:45	0.0		0			
10/8/02	10:00	0.0	0.0	0	21.3	0	0
10/8/02	10:15	0.0		0			
10/8/02	10:30	0.0		0			
10/8/02	11:15	0.0	0.0	0	21.4	0	0
10/8/02	11:30	0.0		0			
10/8/02	11:45	0.0		0			
10/8/02	12:00	0.0		0			
10/8/02	12:30	0.0	0.0	0	21.0	0	0
10/8/02	12:45	0.0		0			
10/8/02	13:00	0.0		0			
10/8/02	13:15	0.0		0			
10/8/02	13:30	0.0	0.0	0	21.3	0	0
10/8/02	13:45	0.0		0			
10/8/02	14:00	0.0	0.0	0	21.0	0	0
10/8/02	14:15	0.0	0.0	0			
10/8/02	14:30	0.0		0			
10/8/02	14:45	0.0		0			
10/8/02	15:00	0.0	0.0	0	21.3	0	0
10/8/02	15:15	0.0		0			

Table 10
Permanganate Injection Pilot Test
Ambient Air Monitoring Results

Date	Time	Work Zone PID Results (ppb equiv.)	Perimeter PID Results (ppb equiv.)	Lower Explosive Limit Monitoring (%LEL)	Oxygen Monitoring (% O2)	Carbon Monoxide Monitoring (CO)	Hydrogen Sulfide Monitoring (H2S)
10/8/02	15:30	0.0		0			
10/8/02	15:45	0.0		0			
10/8/02	16:00	0.0	0.0	0	21.4	0	0
10/9/02	8:30	0.0	0.0	0	21.0	0	0
10/9/02	8:45	0.0		0			
10/9/02	9:00	0.0		0			
10/9/02	9:15	0.0		0			
10/9/02	10:00	0.0	0.0	0	21.1	0	0
10/9/02	10:15	0.0		0			
10/9/02	11:00	0.0	0.0	0	21.2	0	0
10/9/02	11:15	0.0		0			
10/9/02	11:30	0.0		0			
10/9/02	11:45	0.0		0			
10/9/02	12:00	0.0	0.0	0	21.2	0	0
10/9/02	13:15	0.0	0.0	0	21.1	0	0
10/9/02	13:30	0.2		0			
10/9/02	13:45	1.6	0.0	0			
10/9/02	14:00	0.0	0.0	0			
10/9/02	14:15	0.0	0.0	0	21.2	0	0
10/9/02	14:30	0.0		0			
10/9/02	14:45	0.0		0			
10/10/02	8:30	0.0	0.0	0	21.0	0	0
10/10/02	8:45	0.0		0			
10/10/02	9:00	0.0		0			
10/10/02	9:15	0.2		0			
10/10/02	9:30	1.6	0.0	0	21.0	0	0
10/10/02	9:45	0.6	0.0	0			
10/10/02	10:00	0.9	0.0	0			
10/10/02	10:15	1.5	0.2	0			
10/10/02	10:30	0.3	0.0	0			
10/10/02	10:45	0.0	0.0	0			
10/10/02	11:00	0.0	0.0	0			
10/10/02	11:15	0.0	0.0	0			
10/10/02	14:30	1.7	0.0	0	21.2	0	0
10/10/02	14:45	0.0	0.0	0			
10/10/02	15:00	4.9	0.0	0			
10/10/02	15:15	3.4	0.0	0			
10/10/02	15:30	3.5	0.0	0	21.1	0	0
10/14/02	8:30	0.0	0.0	0	21.1	0	0
10/14/02	8:45	0.0	0.0	0	21.1	0	0
10/14/02	9:30	0.0	0.0	0	21.3	0	0
10/14/02	10:00	0.0	0.0	0	21.2	0	0
10/14/02	10:30	0.0	0.0	0	21.1	0	0
10/14/02	11:00	0.0	0.0	0	21.1	0	0
10/14/02	11:30	0.0	0.0	0	21.1	0	0
10/14/02	13:00	0.0	0.0	0	21.1	0	0
10/14/02	13:30	0.0	0.0	0	21.1	0	0
10/14/02	14:00	0.0	0.0	0	21.1	0	0

Table 10
Permanganate Injection Pilot Test
Ambient Air Monitoring Results

Date	Time	Work Zone PID Results (ppb equiv.)	Perimeter PID Results (ppb equiv.)	Lower Explosive Limit Monitoring (%LEL)	Oxygen Monitoring (% O2)	Carbon Monoxide Monitoring (CO)	Hydrogen Sulfide Monitoring (H2S)
10/14/02	15:00	0.0	0.0	0	21.3	0	0
10/14/02	16:00	0.0	0.0	0	21.3	0	0

Table 11
Intermediate Injection Events
Contaminant Reduction Data Summary

		1,1-Dichloroethane (11DCA)				1,2-Dichloroethene (11DCE)				Freon-113				Methylene Chloride				Tetrachloroethene (PCE)			
Well No.	Distance to Nearest Injection Well (ft)	Pre-Injection	Post-Injection (41 Days)	Post-Injection (146 Days)	Final Percent Reduction	Pre-Injection	Post-Injection (41 Days)	Post-Injection (146 Days)	Final Percent Reduction	Pre-Injection	Post-Injection (41 Days)	Post-Injection (146 Days)	Final Percent Reduction	Pre-Injection	Post-Injection (41 Days)	Post-Injection (146 Days)	Final Percent Reduction	Pre-Injection	Post-Injection (41 Days)	Post-Injection (146 Days)	Final Percent Reduction
PTMW-1I	17	14	0	0	100.0%	48	<10	0	100.0%	12	<10	0	100.0%	<10	<10	<10	NA	700	<10	0	100.0%
PTMW-2I	42	<20	<10	<10	NA	13	<10	5	61.5%	9	<10	0	100.0%	<10	<10	<10	NA	200	<10	0	100.0%
MW-12PI	50	2	2	0	100.0%	6	15	19	-216.7%	<10	40	15	NA	<10	<10	<10	NA	43	52	27	37.2%
MW-11PI	68	10	1	5	50.0%	85	66	0	100.0%	9	56	11	-22.2%	<10	<10	<10	NA	260	130	0	100.0%
PTMW-3I	86	<1000	<100	<10	NA	<1000	<100	<10	NA	<1000	80	<10	NA	130	<100	0	100.0%	<1000	<100	<10	NA
PTMW-4I	89	13	<250	0	100.0%	100	90	45	55.0%	48	<250	39	18.8%	600	<250	0	100.0%	60	<250	14	76.7%
MW-5PI	138	<10	< 10	< 10	NA	23	32	4	82.6%	9	27	0	100.0%	<10	<10	<10	NA	14	21	2	85.7%
PTMW-5I	155	12	0	NS	100.0%	180	0	NS	100.0%	34	0	NS	100.0%	<10	<10	NS	NA	320	17	NS	94.7%
PTMW-6I	169	2	0	NS	100.0%	32	7	NS	78.1%	33	12	NS	48.5%	<10	<10	NS	NA	56	18	NS	67.9%
MW-10PI	177	2	NS	0	100.0%	91	NS	49	46.2%	66	NS	16	75.8%	<10	NS	<10	NA	130	NS	130	0.0%

										Parmeters Monitored for Possible Increase Resulting from KMnO4 Injection Event											
		Trichloroethene (TCE)				Vinyl Chloride				Chloride				Chromium				Manganese			
Well No.	Distance from Nearest Injection Well (ft)	Pre-Injection	Post-Injection (41 Days)	Post-Injection (146 Days)	Final Percent Reduction	Pre-Injection	Post-Injection (41 Days)	Post-Injection (146 Days)	Final Percent Reduction	Pre-Injection	Post-Injection (41 Days)	Post-Injection (146 Days)	Final Percent Reduction	Pre-Injection	Post-Injection (41 Days)	Post-Injection (146 Days)	Final Percent Reduction	Pre-Injection	Post-Injection (41 Days)	Post-Injection (146 Days)	Final Percent Reduction
PTMW-1I	17	71	<10	0	100.0%	<50	<10	<10	NA	146	<20	5.1	96.5%	2	1	4.1	-105.0%	914	76300	335	63.3%
PTMW-2I	42	15	<10	0	100.0%	<20	<10	<10	NA	113	<10	15	86.7%	3	40	9.7	-223.3%	72	97700	511	-609.7%
MW-12PI	50	8	17	18	-125.0%	<10	<10	<10	NA	12	9	10.7	10.8%	1	2	2.6	-160.0%	132	107	112	15.2%
MW-11PI	68	88	37	0	100.0%	5	<10	0	100.0%	95	55	112	-17.9%	2	1	38.5	-1825.0%	242	532	32600	-13371.1%
PTMW-3I	86	<1000	<100	<10	NA	<1000	80	<10	NA	137	72	15.6	88.6%	3	463	19.6	-553.3%	1350	156000	2430	-80.0%
PTMW-4I	89	70	<250	33	52.9%	6	<250	4	33.3%	49	31	12.8	73.9%	3	1	12.3	-310.0%	909	110	299	67.1%
MW-5PI	138	4	4	2	50.0%	2	3	0	100.0%	12	27	4.1	65.8%	3	3	4.7	-56.7%	73	106	212	-190.4%
PTMW-5I	155	38	0	NS	100.0%	61	0	NS	100.0%	NS	10	NS	NA	2	3	NS	-50.0%	3230	1950	NS	39.6%
PTMW-6I	169	12	3	NS	75.0%	<10	<10	NS	NA	42	10	NS	76.2%	6	0	NS	100.0%	160	120	NS	25.0%
MW-10PI	177	55	NS	45	18.2%	<10	NS	2	NA	31	NS	18.5	40.3%	2	NS	1.4	30.0%	1560	NS	658	57.8%

Notes:

1. NA = Not applicable because parameter was non-detectable in pre- and post-injection sampling.
2. NS = Not Sampled or Data Not Available due to problem with laboratory deliverables.
3. Non-detectable values in final post-injection sampling event considered 0 ug/l for percent reduction calculations
4. Table only includes values where at least one parameter was detected above 10 ug/l. All other parameters were non-detectable.
5. Acetone data not included in percent reduction calculations due to probable lab contamination and no known sources based on histroic sampling.

Table 12
Permanganate Injection Pilot Test
Shallow Injection Event - Baseline Data for Shallow Monitoring Locations

Well	Date	Time	Ph (st. units)	Conductivity (mhos)	ORP (eV)	Temperature (deg. C)	DTW (feet)	Dissolved Oxygen (mg/l)	PID (ppb e.u.)
PT-11S	11/26/2002	10:00	5.98	0.546	-37	20		0.11	
PT-12S	11/26/2002	10:00	5.87	0.496	15	19.6		0.21	
PT-14S	11/25/2002	9:15	6.34	0.879	-138	18.3	4.13	0.21	0
PT-15S	11/25/2002	9:15	6.03	1.01	-56	19.6	3.92	0.65	23.4
PT-16S	11/25/2002	9:15	6.56	0.556	-153	18.9	3.93	0.14	0.3
PT-17S	11/25/2002	9:15	6.18	0.657	-80	19.5	3.88	0.36	43.9
PTMW-1S	11/25/2002	9:15	6.28	0.415	-96	18.5	3.96	0.3	0
PTMW-2S	11/25/2002	9:15	6.7	0.546	-75	18.6	3.7	0.29	0
MW-12S	11/25/2002	9:15	5.9	0.388	26	19.1	3.37	0.15	85.7
PT-9I	11/25/2002	9:15	11.17	1.38	-342	17.8	3.63	0.16	10.9
PT-10I	11/25/2002	9:15	6.14	0.97	-16	19.1	3.52	0.21	2.6
PT-10I	11/26/2002	10:00	6.42	1	-55	19.2		0.7	
PT-11I	11/25/2002	9:15	6.47	0.075	-13	18.7	3.44	0.22	0
PT-11I	11/26/2002	10:00	6.78	0.072	-33	18.9		0.35	
PT-12I	11/25/2002	9:15	6.65	0.372	-81	19.4	3.95	0.24	3.3
PT-13I	11/25/2002	9:15	6.32	0.656	-76	18.9	4.39	0.25	2.3
PT-13I	11/26/2002	10:00	6.18	0.71	-79	18.6		0.24	
PTMW-1I	11/26/2002	10:00	6.38	0.156	13	17.9		7.17	
PTMW-2I	11/25/2002	9:15	8.13	0.086	-53	19	3.62	1.34	0
PTMW-5I	11/25/2002	9:15	8.16	0.117	-69	17.2	3.35	0.17	0
PTMW-6I	11/25/2002	9:15	7.1	0.782	-43	17.7	3.67	0.31	0
MW-12I	11/25/2002	9:15	6.54	0.059	-30	19.5	4.62	0.27	0
MW-12D	11/25/2002	9:15	6.65	0.076	-52	19.9	5.18	0.86	0

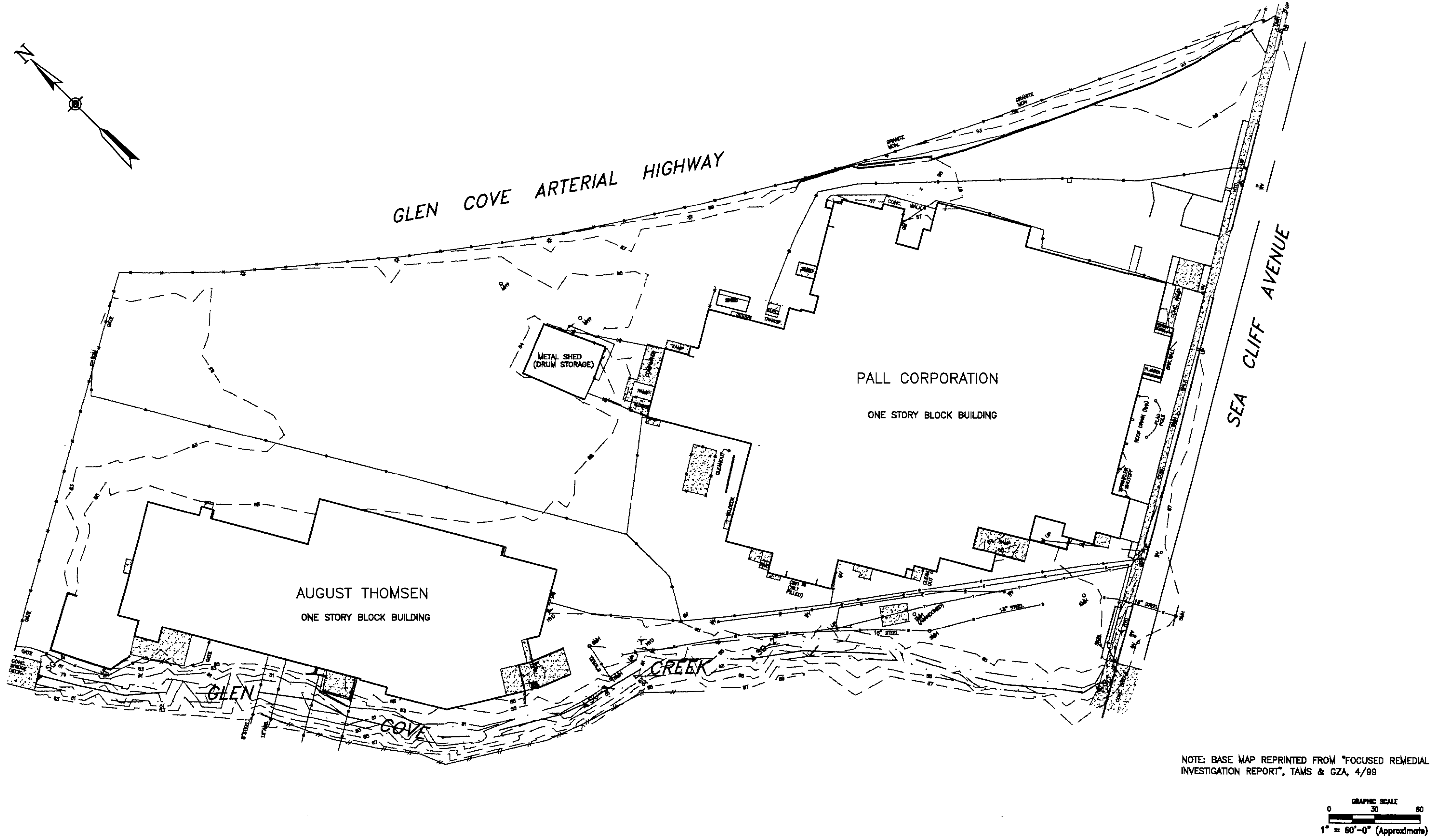
Table 13
Shallow Injection Events
Contaminant Reduction Data Summary

		1,1,1-Trichloroethane (111TCA)				1,1-Dichloroethane (11DCA)				1,2-Dichloroethene (12DCE)				Freon - 113				Tetrachloroethene (PCE)			
Well No.	Distance to Nearest Injection Well (ft)	Pre-Injection	Post-Injection (41 Days)	Post-Injection (146 Days)	Final Percent Reduction	Pre-Injection	Post-Injection (41 Days)	Post-Injection (146 Days)	Final Percent Reduction	Pre-Injection	Post-Injection (41 Days)	Post-Injection (146 Days)	Final Percent Reduction	Pre-Injection	Post-Injection (41 Days)	Post-Injection (146 Days)	Final Percent Reduction	Pre-Injection	Post-Injection (41 Days)	Post-Injection (146 Days)	Final Percent Reduction
PTMW-1S	42	2	<10	0	100.0%	4	2	0	100.0%	400	160	3	99.3%	540	110	0	100.0%	14	89	0	100.0%
PTMW-2S	43	<20	<10	<10	NA	4	<10	0	100.0%	300	17	4	98.7%	10	7	0	100.0%	24	<10	0	100.0%
PTMW-4S	54	2	<20	0	100.0%	2	<20	3	-50.0%	200	150	130	35.0%	270	300	150	44.4%	36	47	26	27.8%
MW-12PS	58	29	<100	0	100.0%	3	<100	0	100.0%	390	410	300	23.1%	1600	970	580	63.8%	1200	670	330	72.5%
MW-11PS	65	<10	<10	<10	NA	2	<10	2	0.0%	50	28	4	92.0%	<10	51	<10	NA	2	30	0	100.0%
PTMW-3S	83	NS	<10	<10	NA	2	3	0	100.0%	97	180	17	82.5%	8	24	3	62.5%	3	<10	0	100.0%
PTMW-5S	153	<10	0	NS	NA	26	0	NS	100.0%	7600	7000	NS	7.9%	1700	1400	NS	17.6%	2200	6600	NS	-200.0%
PTMW-6S	167	<20	0	NS	NA	3	0	NS	100.0%	230	570	NS	-147.8%	250	1000	NS	-300.0%	83	60	130	27.7%
MW-10PS	180	12	<100	0	100.0%	15	<100	3	80.0%	480	370	270	43.8%	140	800	230	-64.3%	110	350	41	62.7%

										Parmeters Monitored for Possible Increase Resulting from KMnO4 Injection Event											
		Trichloroethene (TCE)				Vinyl Chloride				Chloride				Chromium				Manganese			
Well No.	Distance from Nearest Injection Well (ft)	Pre-Injection	Post-Injection (41 Days)	Post-Injection (146 Days)	Final Percent Reduction	Pre-Injection	Post-Injection (41 Days)	Post-Injection (146 Days)	Final Percent Reduction	Pre-Injection	Post-Injection (41 Days)	Post-Injection (146 Days)	Final Percent Reduction	Pre-Injection	Post-Injection (41 Days)	Post-Injection (146 Days)	Final Percent Reduction	Pre-Injection	Post-Injection (41 Days)	Post-Injection (146 Days)	Final Percent Reduction
PTMW-1S	42	250	50	4	98.4%	49	16	0	100.0%	25	16	13.5	46.0%	10	8	1.4	86.0%	469	20800	1490	-217.7%
PTMW-2S	43	7	5	2	71.4%	40	<10	0	100.0%	30	13	14.5	51.7%	15	5	5.4	64.0%	925	892	697	24.6%
PTMW-4S	54	280	210	92	67.1%	38	23	28	26.3%	25	29	48	-92.0%	10	18	3.2	68.0%	892	305	468	47.5%
MW-12PS	58	1400	1100	490	65.0%	44	40	34	22.7%	37	36	34.1	7.8%	1	4	2.1	-110.0%	82	146	64.9	20.9%
MW-11PS	65	8	67	2	75.0%	70	15	14	80.0%	19	19	36.7	-93.2%	5	13	3	40.0%	730	1100	1510	-106.8%
PTMW-3S	83	6	4	1	83.3%	19	27	3	84.2%	24	29	17.1	28.8%	10	4	4.6	54.0%	635	652	432	32.0%
PTMW-5S	153	2000	2700	NS	-35.0%	850	650	NS	23.5%	69	81	NS	-17.4%	4	3	NS	25.0%	570	762	NS	-33.7%
PTMW-6S	167	260	730	NS	-180.8%	28	60	NS	-114.3%	33	26	NS	21.2%	2	4	NS	-100.0%	81	291	NS	-259.3%
MW-10PS	180	510	1000	220	56.9%	45	<100	38	15.6%	72	24	30.5	57.6%	19	11	35.2	-85.3%	479	617	713	-48.9%

Notes:

1. NA = Not applicable because parameter was non-detectable in pre- and post-injection sampling.
2. NS = Not Sampled or Data Not Available due to problem with laboratory deliverables.
3. Non-detectable values in final post-injection sampling event considered 0 ug/l for percent reduction calculations
4. Table only includes values where at least one parameter was detected above 10 ug/l. All other parameters were non-detectable.
5. Acetone data not included in percent reduction calculations due to probable lab contamination and no known sources based on histroic sampling.



NOTE: BASE MAP REPRINTED FROM "FOCUSED REMEDIAL INVESTIGATION REPORT", TAMS & GZA, 4/99

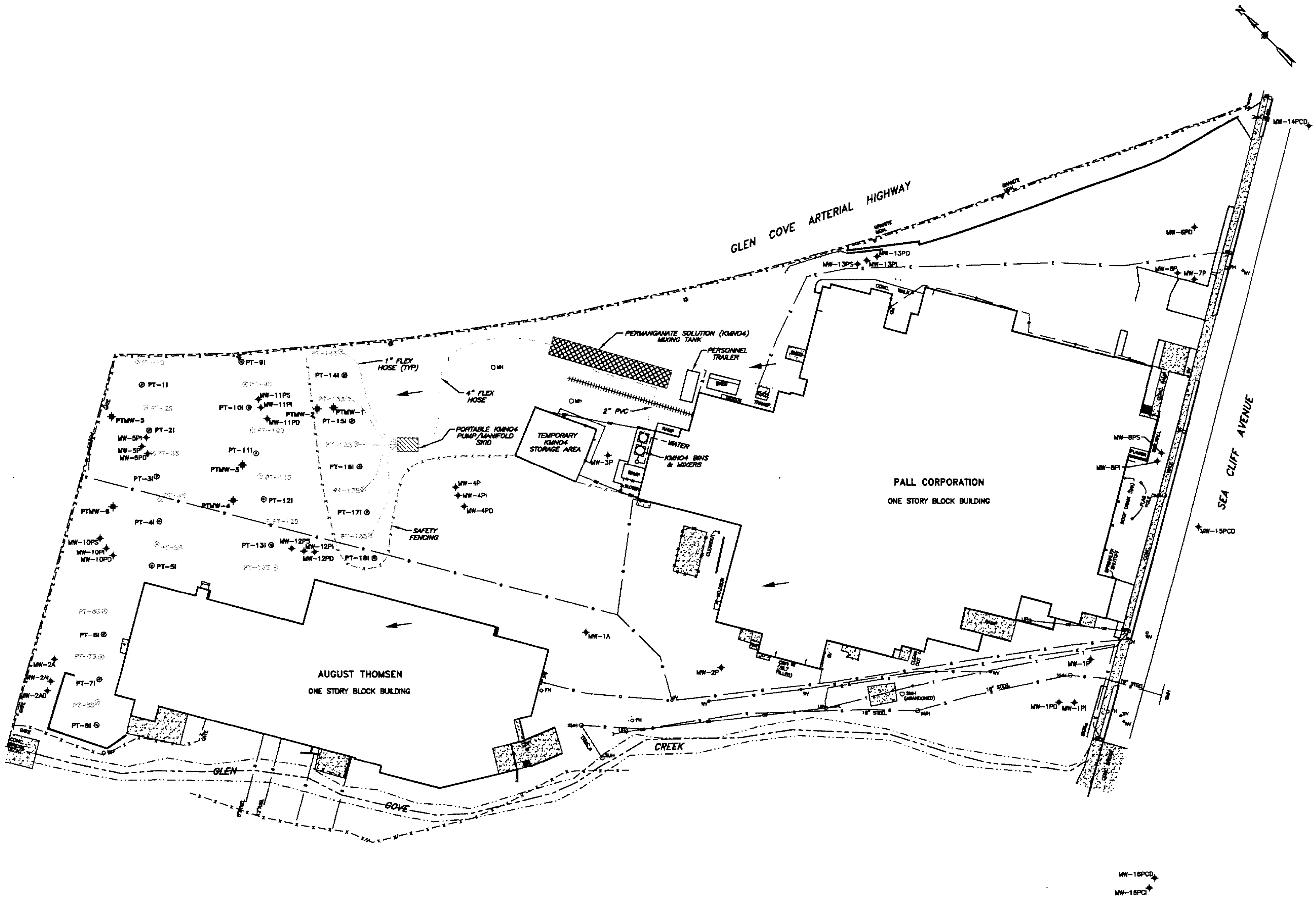
ENVIRO-SCIENCES, INC.
312 EAST MAIN STREET
PATCHOGUE, NEW YORK 11772
PHONE: 631-207-9005 FAX: 631-207-3614

PALL

Pall Corporation
30 Sea Cliff Avenue
Glen Cove, New York 11542

Pall Corp. / August Thomsen
Site Plan

DATE:	03/09/00	DRAWN:	DJS	FIGURE:
REV. NO.	1	DESIGNED:	DJS	1
PROJECT NO.	MT&E-PALL-M371	FILE:	FIGURE1-2.DWG	



NO.	DATE	BY	REVISION

LEGEND

- NEW SHALLOW POTASSIUM PERMANGANATE INJECTION WELL (SCREEN: 5'–25' BGS)
- ◎ NEW INTERMEDIATE POTASSIUM PERMANGANATE INJECTION WELL (SCREEN: 35'–55' BGS)
- ✦ NEW MONITORING PROBE COUPLET (SCREEN: 3'–13' BGS, SCREEN: 45'–65' BGS)
- ▨ INJECTION SYSTEM SKID (PORTABLE)
- ← GROUNDWATER FLOW DIRECTION
- KMNO4 DELIVERY LINE
- TEMPORARY WATER LINE
- SAFETY FENCE
- EXISTING HORIZONTAL SVE WELL TO BE USED FOR PERMANGANATE INJECTION
- ✦ EXISTING MONITORING WELL TO BE USED FOR PERMANGANATE INJECTION
- ✦ EXISTING MONITORING WELL
- UP○ UTILITY POLE
- FH○ FIRE HYDRANT
- CB■ CATCH BASIN
- WV○ WATER VALVE
- GV○ GAS VALVE
- SMH○ SEWER MANHOLE
- MH○ MANHOLE
- —E— UNDERGROUND ELECTRIC LINE
- —T— UNDERGROUND TELEPHONE LINE
- —S— SANITARY SEWER
- —G— UNDERGROUND GAS LINE
- —W— UNDERGROUND WATER LINE
- —OW— OVERHEAD WIRE
- PROPERTY LINE

NOTES

1) *INJECTION WELL SPACING APPROX. 30 FEET (TOTAL OF 36 WELLS).*
2) *EXISTING MONITORING WELLS AVAILABLE FOR INJECTION MONITORING.*
3) *ACCESS TO AUGUST THOMSEN PROPERTY IS POSSIBLE.*
4) *UPGRADIENT REMEDIATION (OFF–SITE) BY OTHERS TO ADDRESS SOURCES.*

GRAPHIC SCALE
0 30 60
1"=30'

	SIGNATURE	DATE
REVIEW ENGR:		
PROJECT ENGR:		
PROJECT MGR:		
CLIENT:		

ENVIRO–SCIENCES, INC.
312 E. MAIN STREET
PATCHOGUE, N.Y. 11772
PHONE: (631) 207–9005

PALL CORPORATION PILOT TEST

30 SEA CLIFF AVENUE
GLEN COVE, NEW YORK

AS-BUILT
PHASE I
PILOT TEST LAYOUT

DESIGNED BY:	DETAILED BY:	CHECKED BY:
SEE SOURCE	TRS	

DRAWING DATE:	ACAD FILE:
9/5/03	PALLASBLT1
PROJECT NO.: PALL–GLENCOVE	CONTRACT:
DRAWING: 2	REVISION:

Figure 3
pH Trend During Intermediate Injections

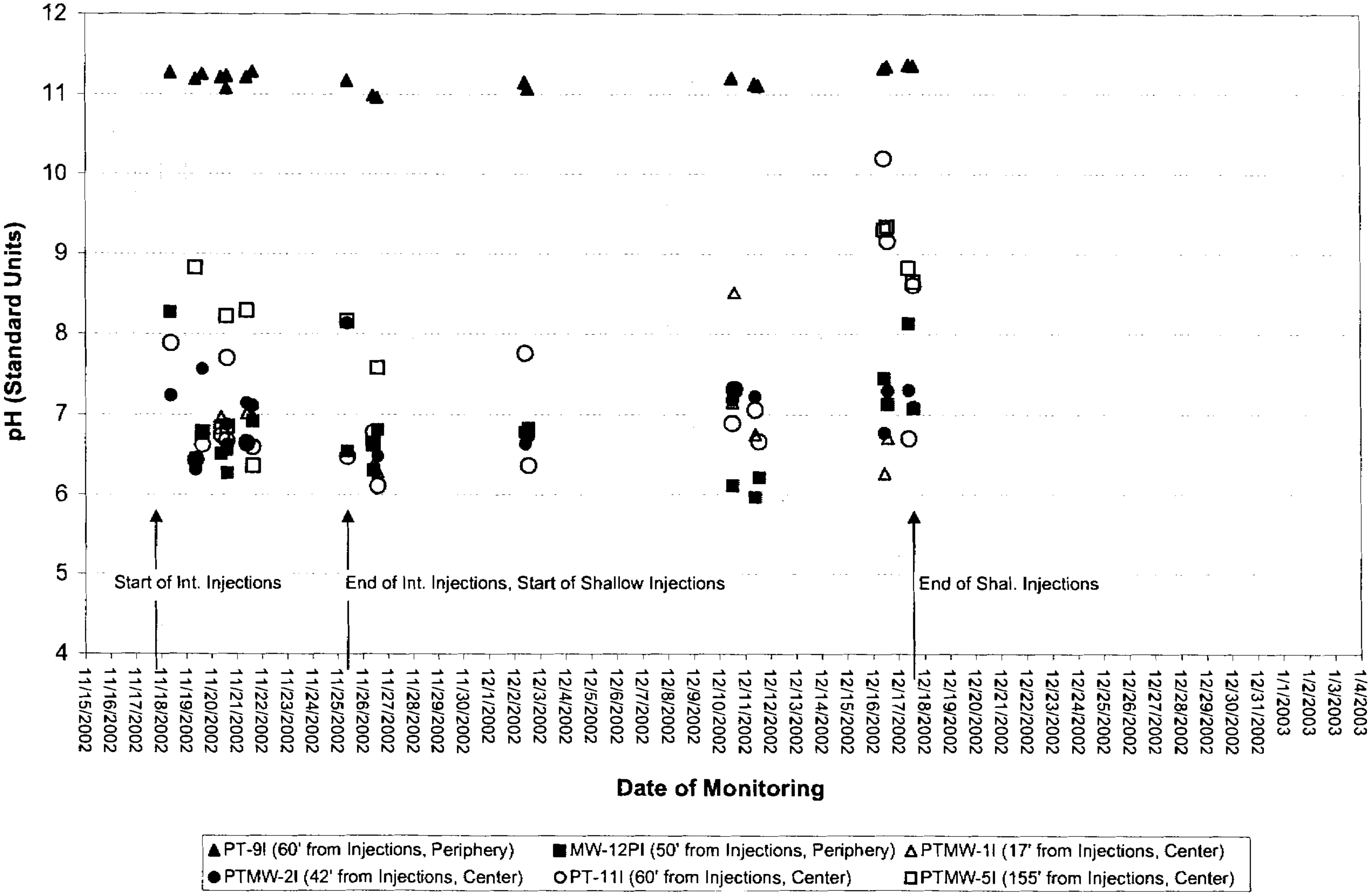


Figure 4
Conductivity Trend During Intermediate Injections

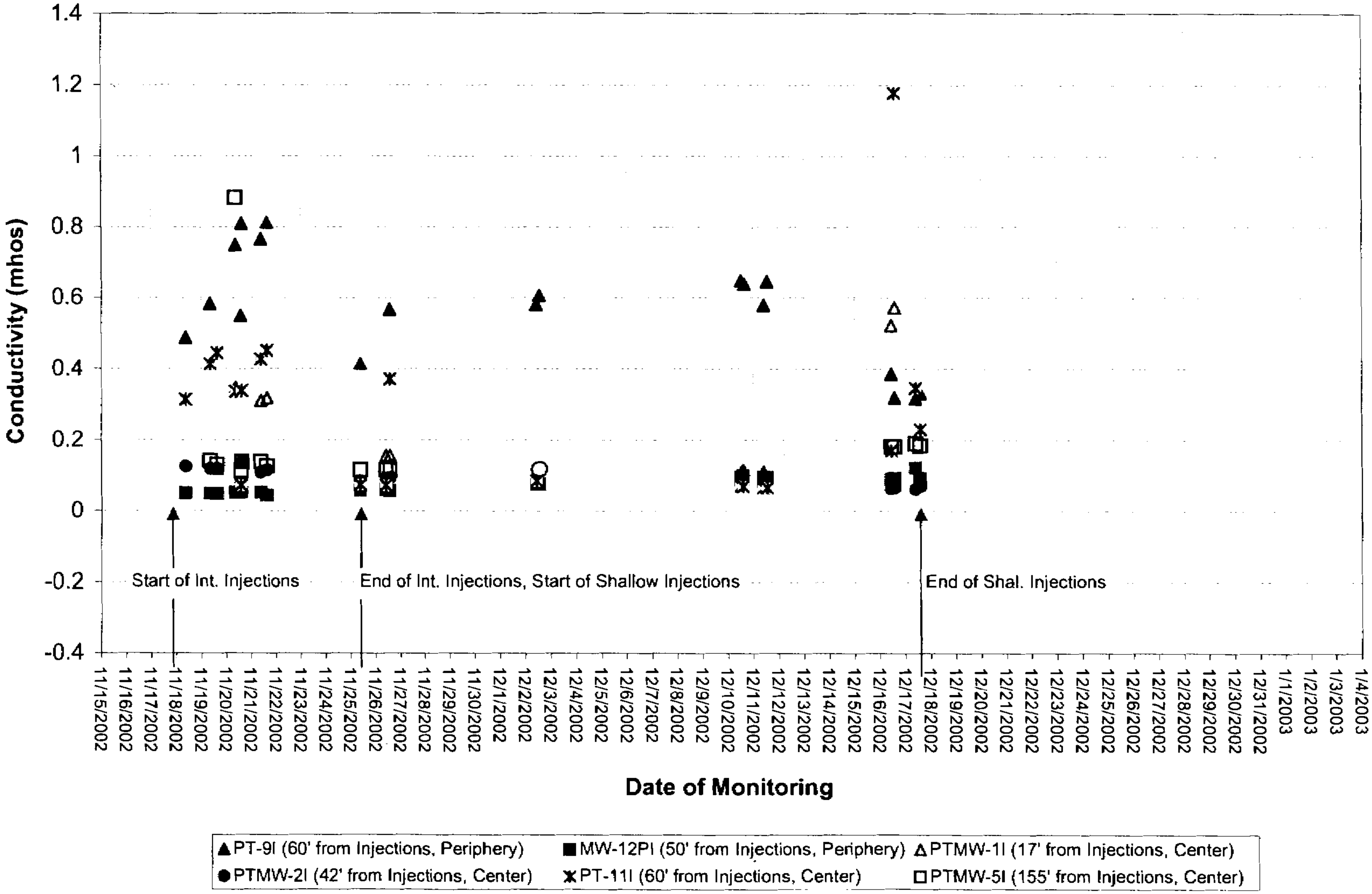


Figure 5

ORP Trend During Intermediate Injections

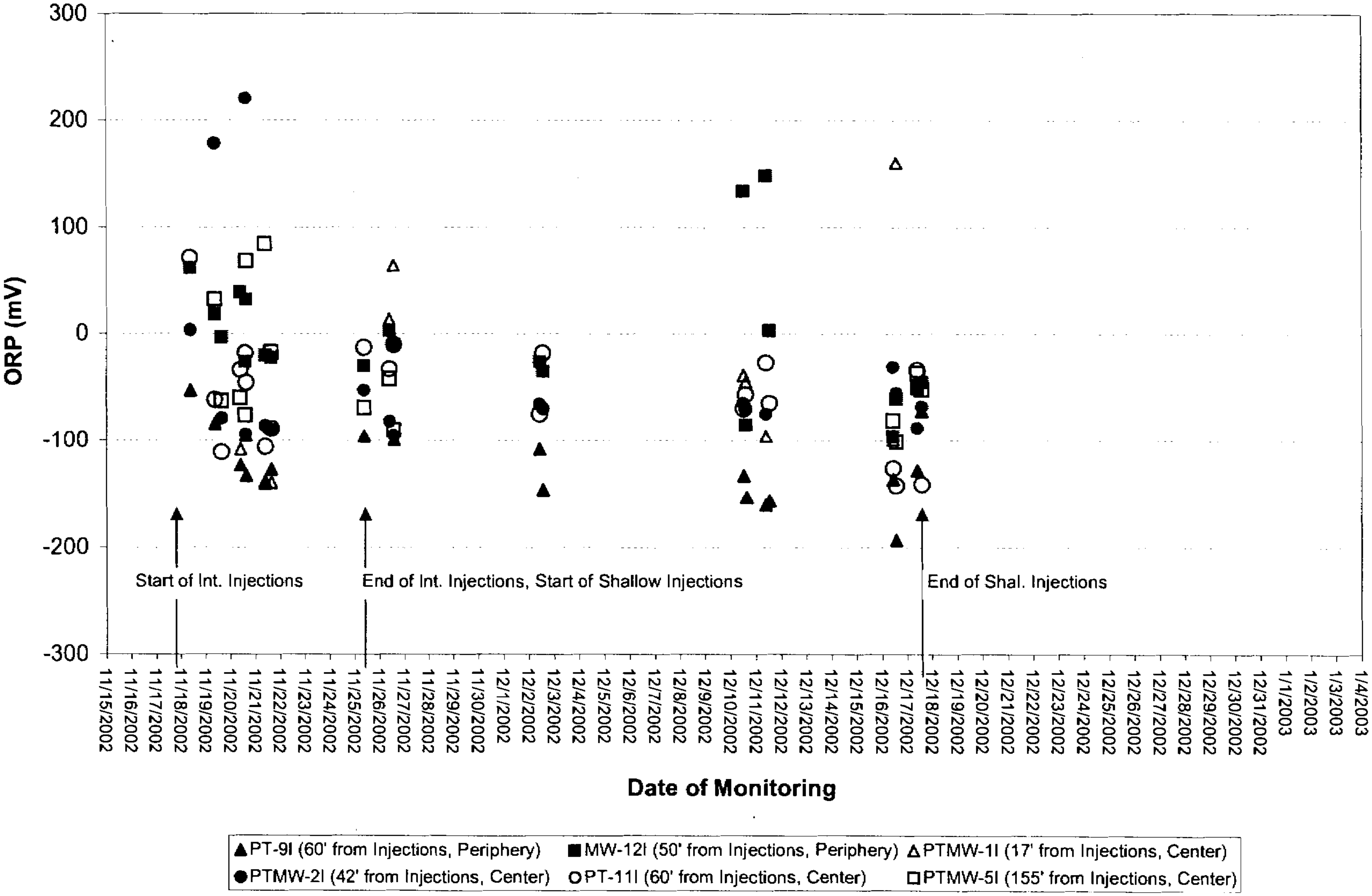


Figure 6
Temperature Trend During Intermediate Injections

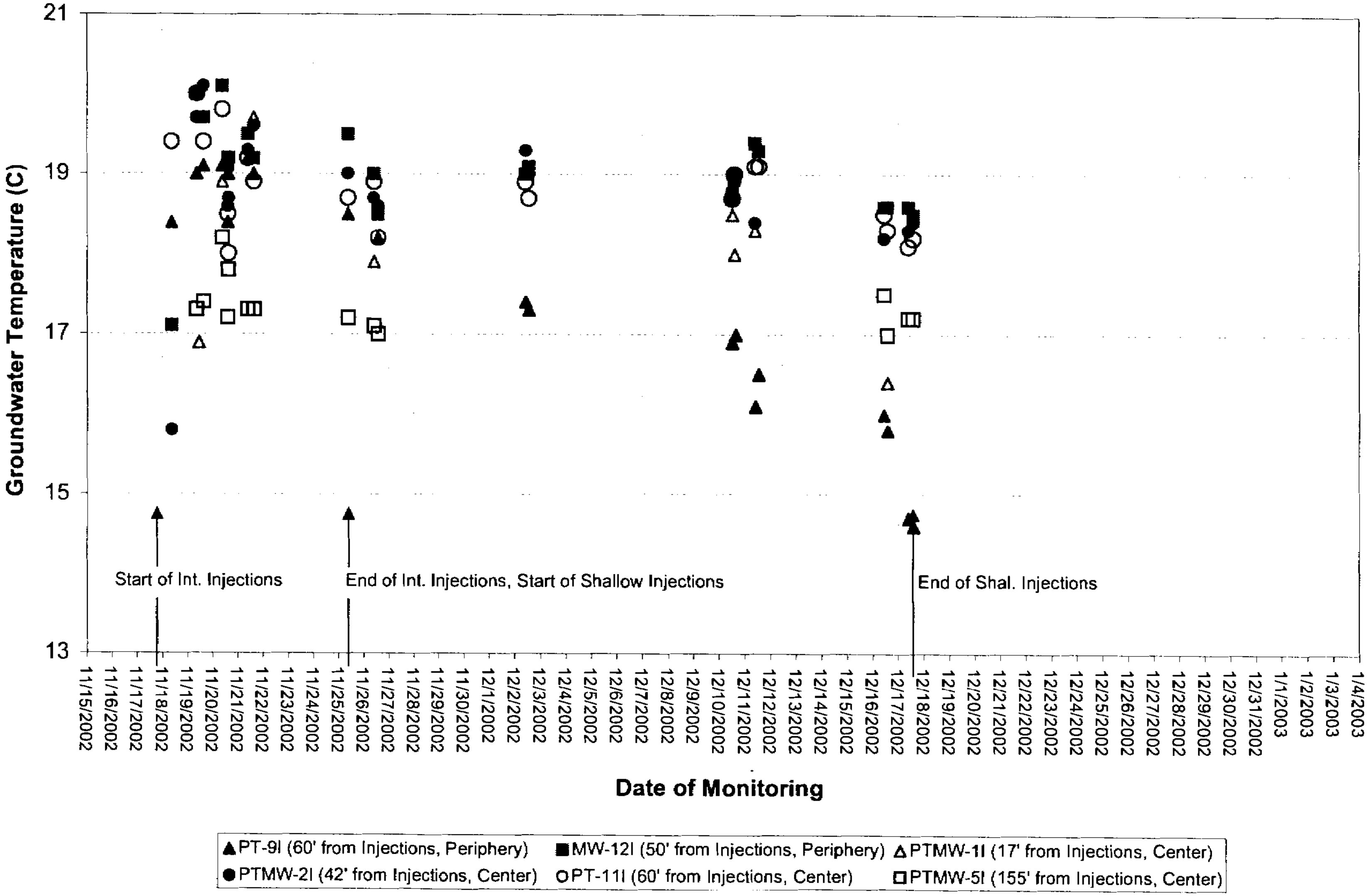


Figure 7

GW Elevation Change During Intermediate Injections

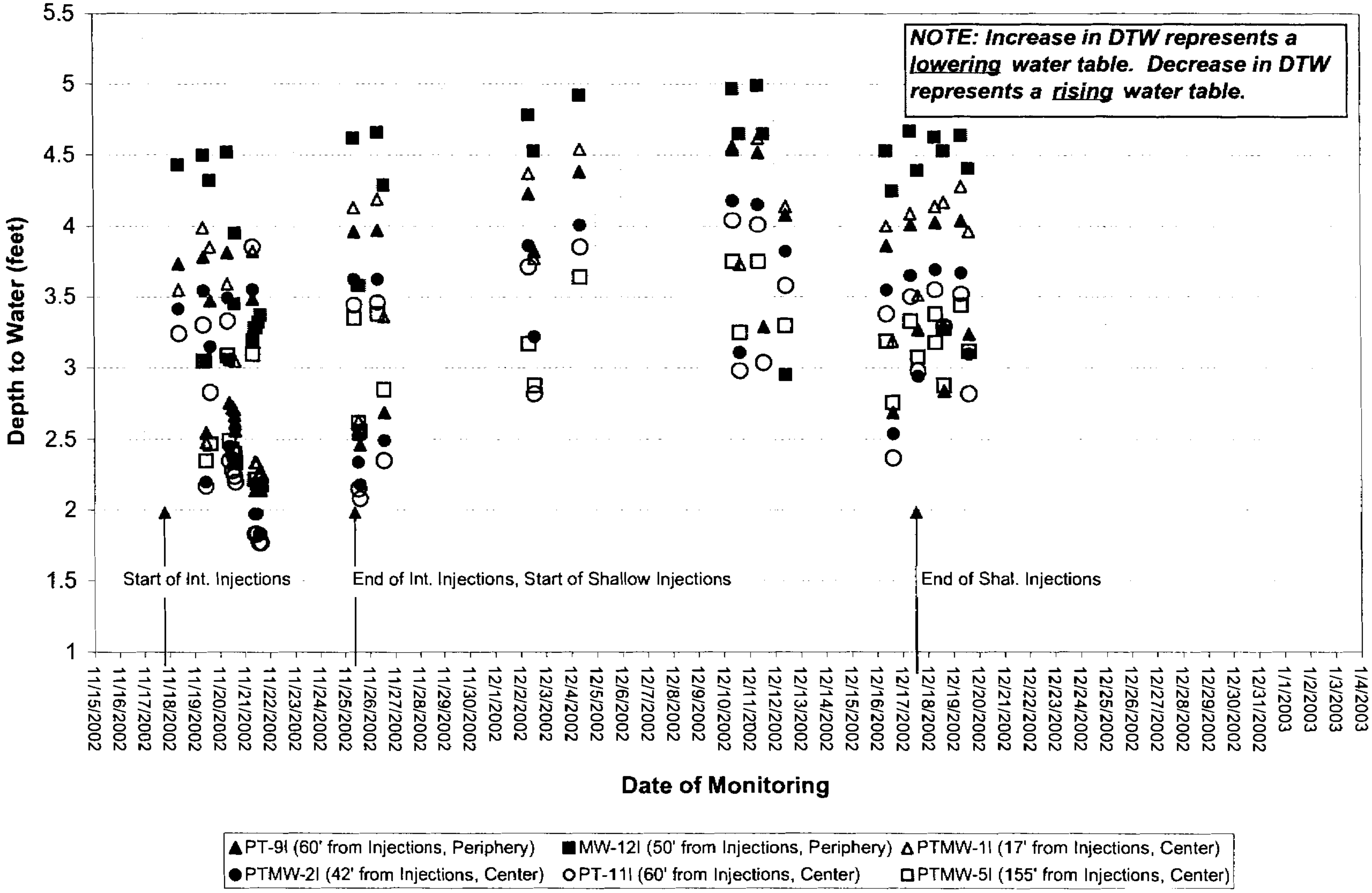


Figure 8

Dissolved Oxygen Trend During Intermediate Injections

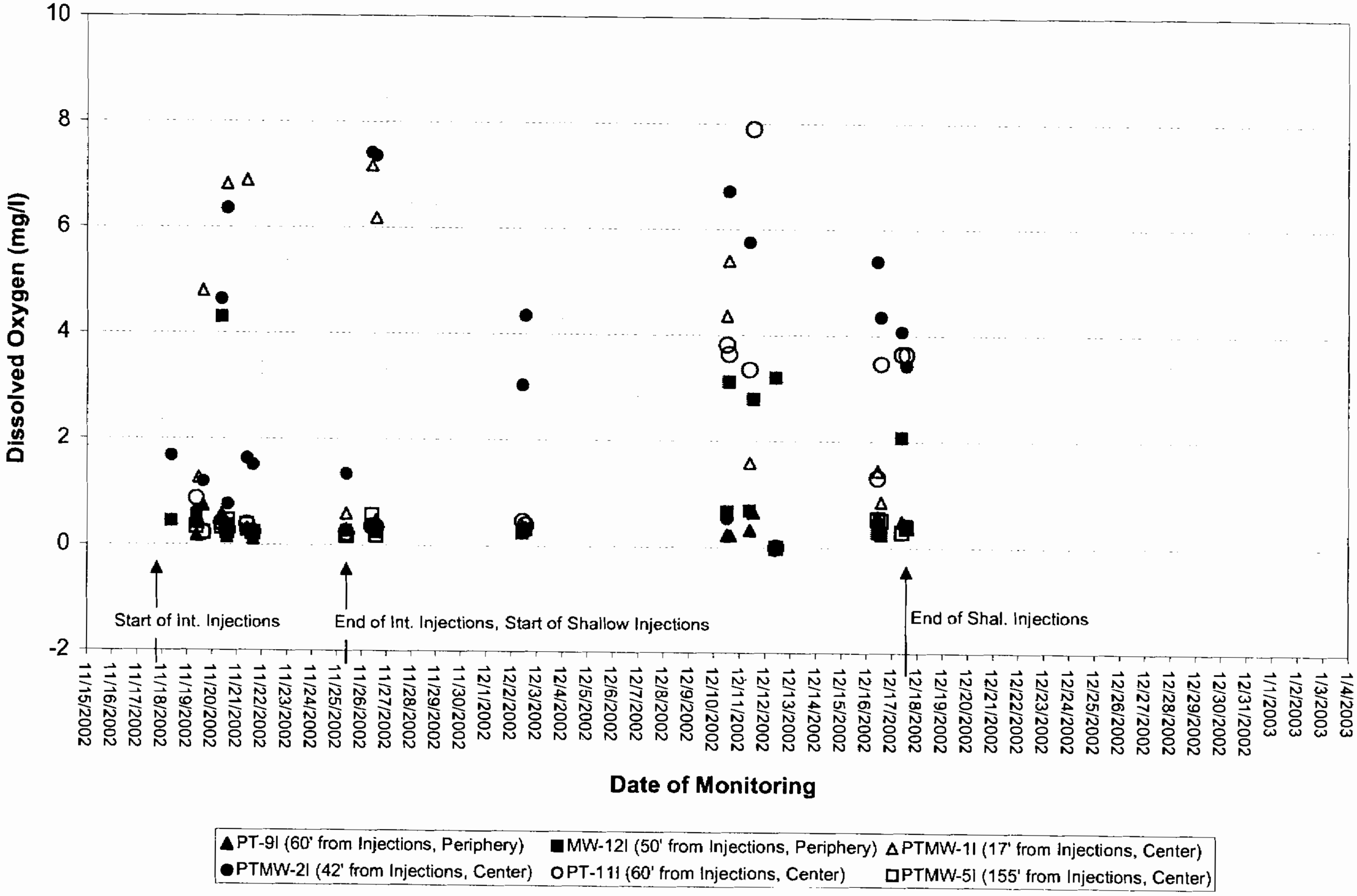


Figure 9
pH Trend During Shallow Injections

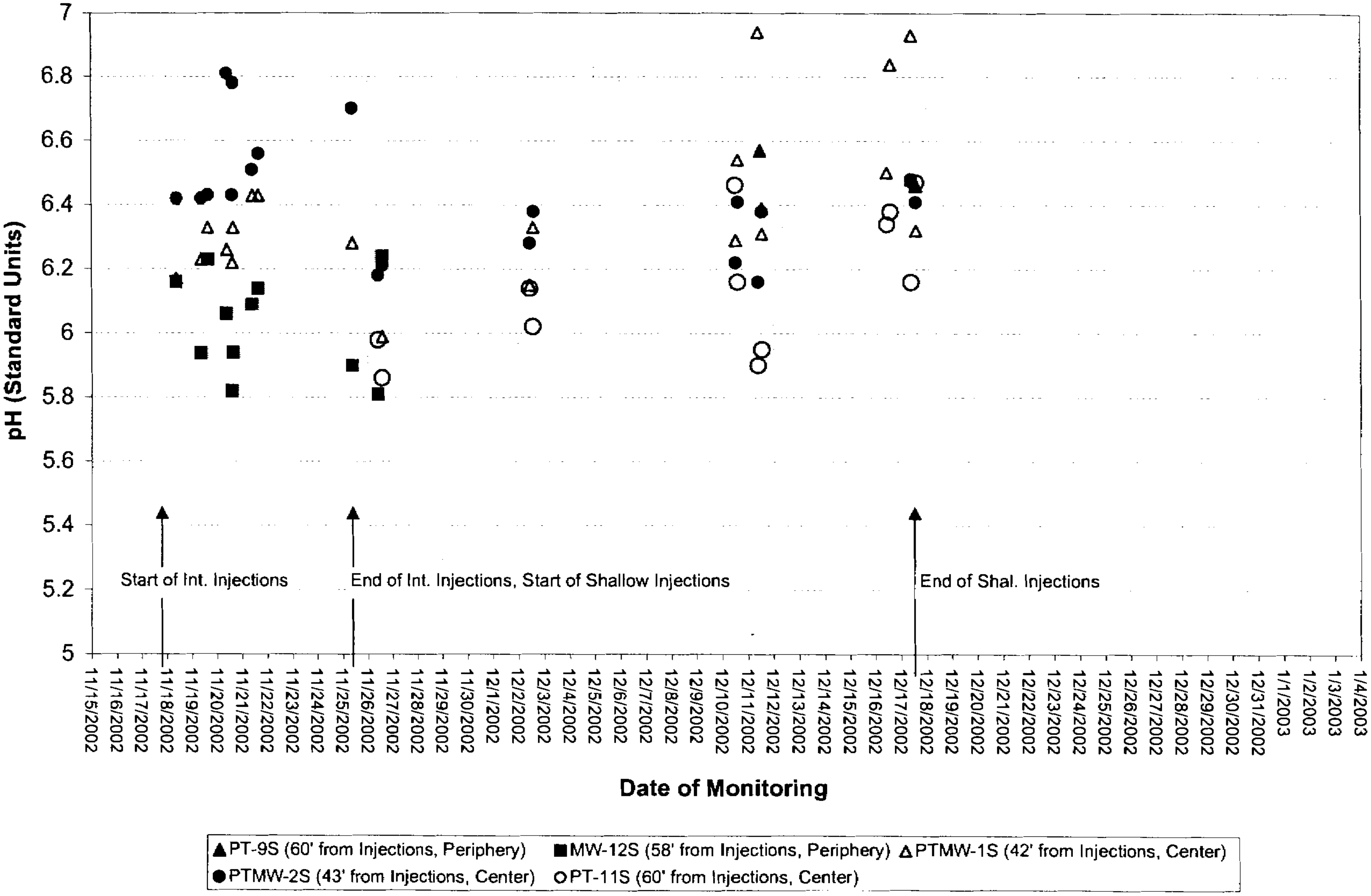


Figure 10
Conductivity Trend During Shallow Injections

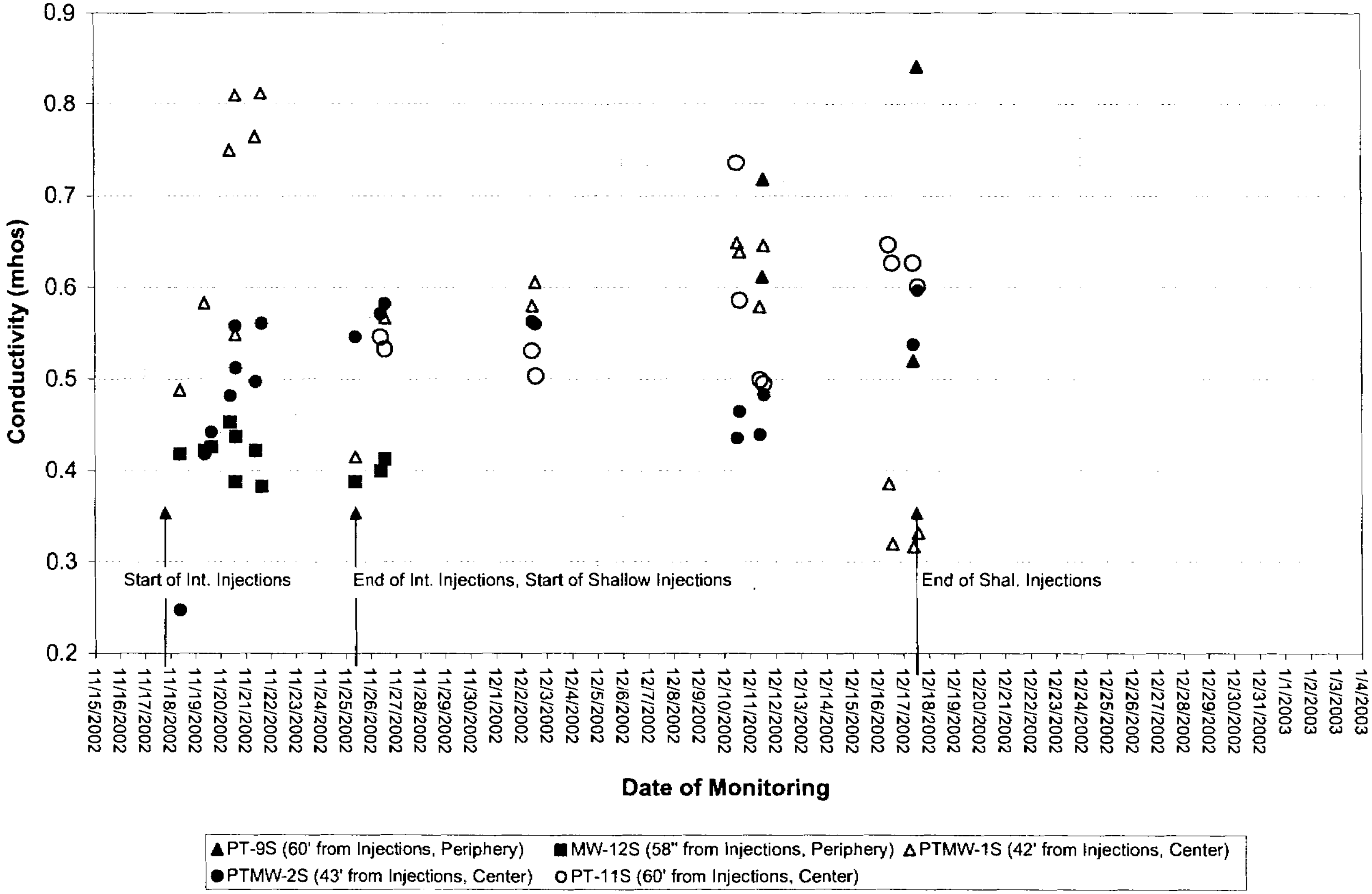


Figure 11
ORP Trend During Shallow Injections

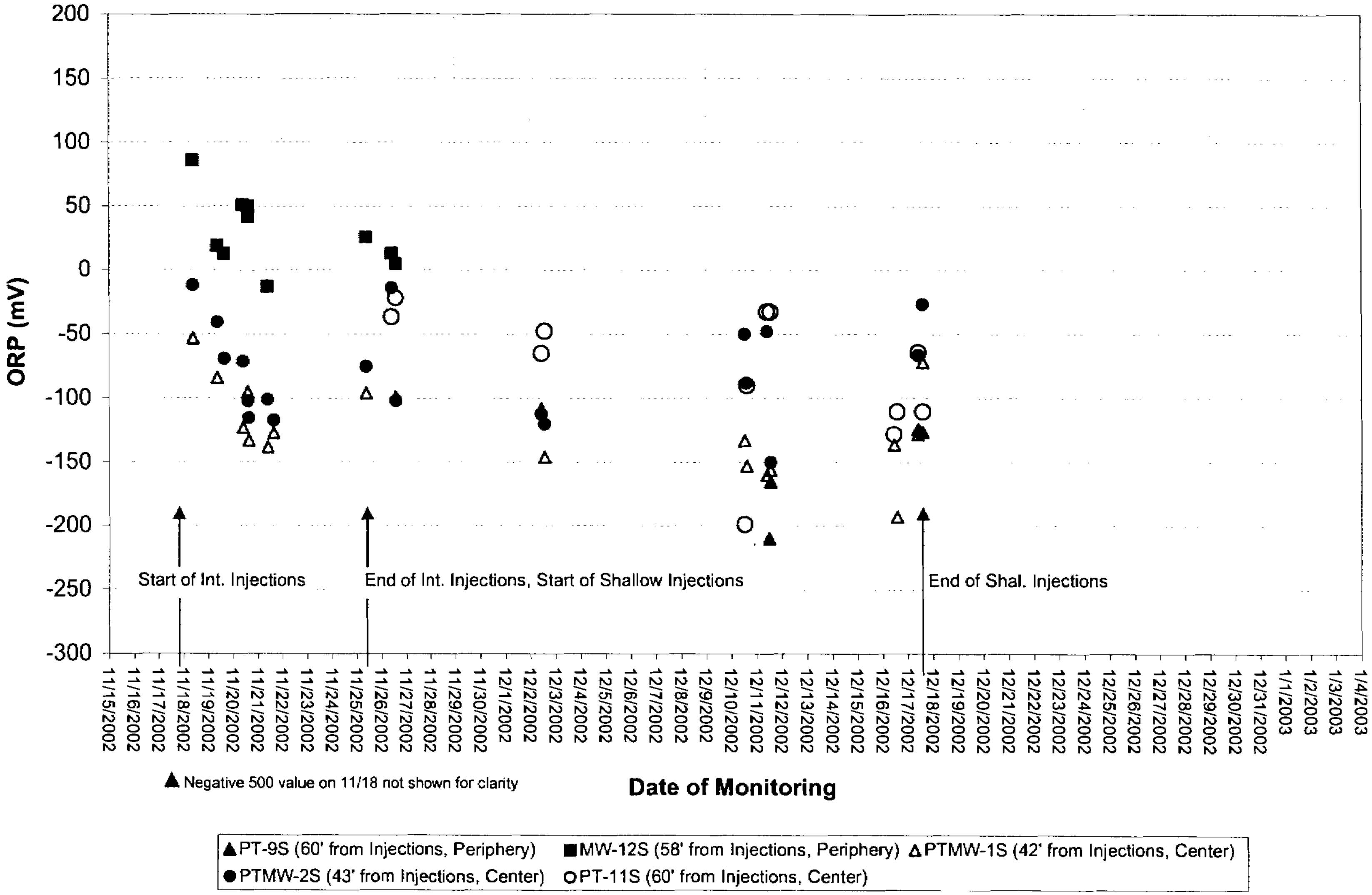


Figure 12

Temperature Trend During Shallow Injections

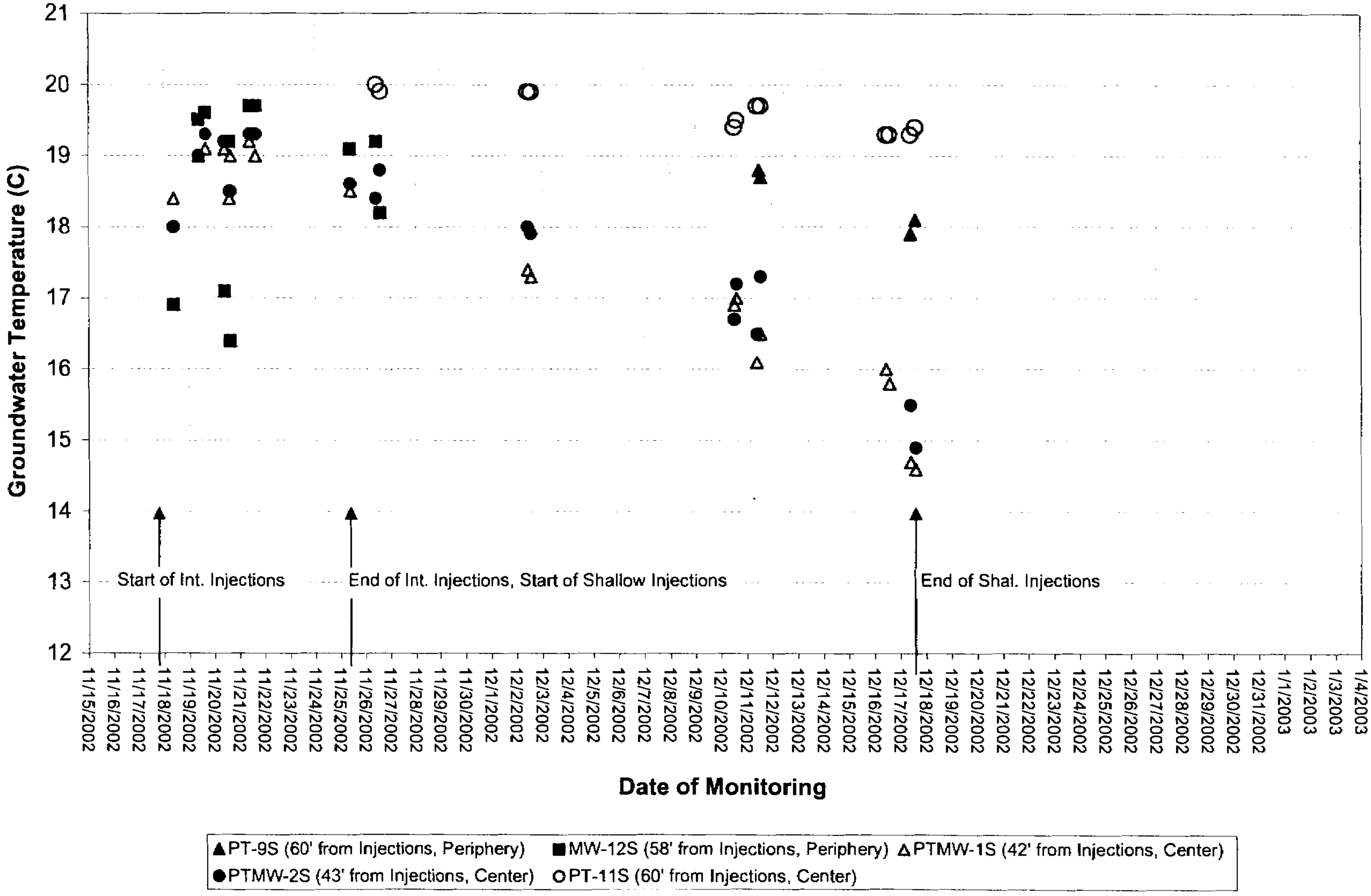
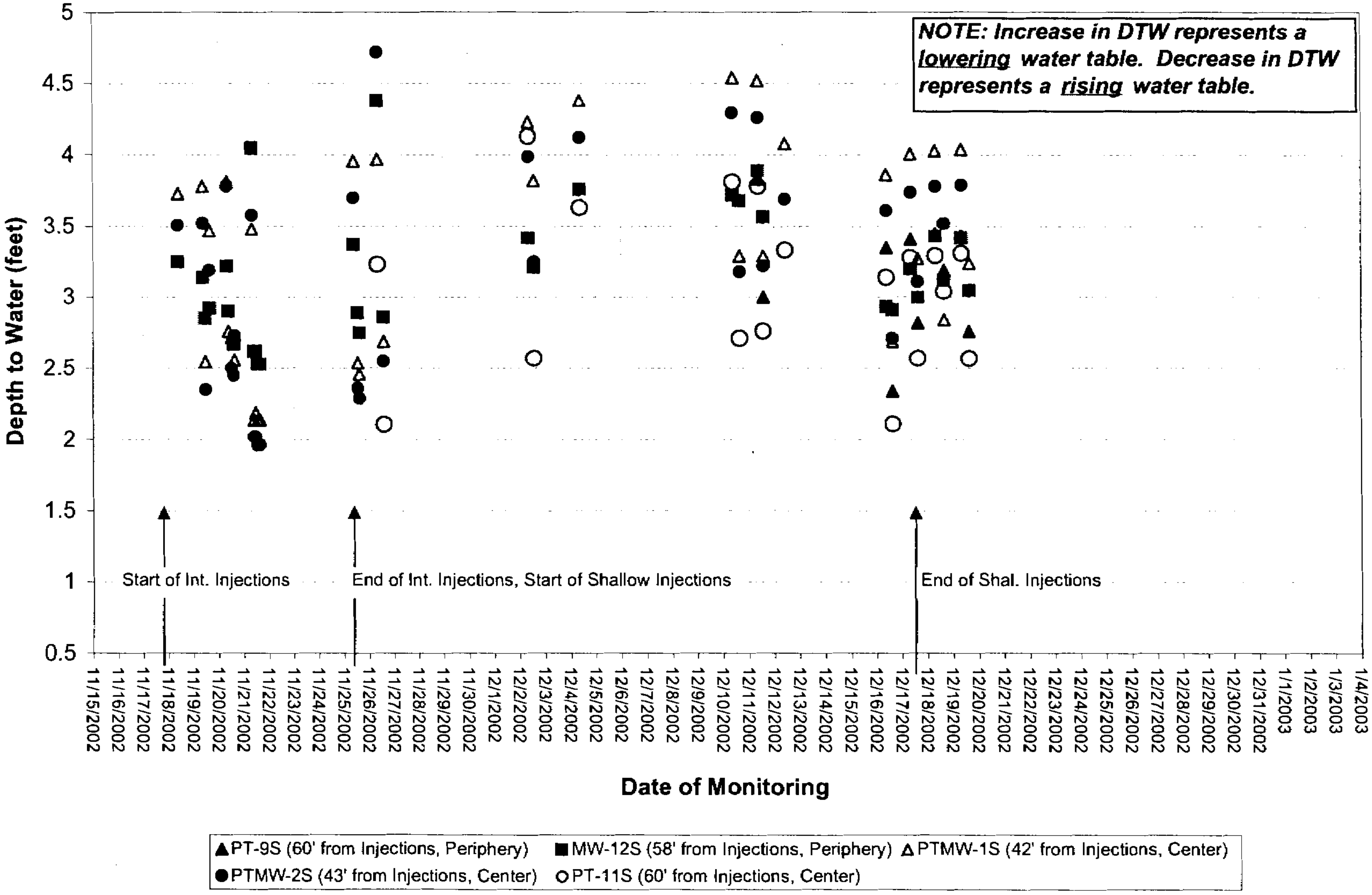


Figure 13
Groundwater Elevation Changes During Shallow Injections



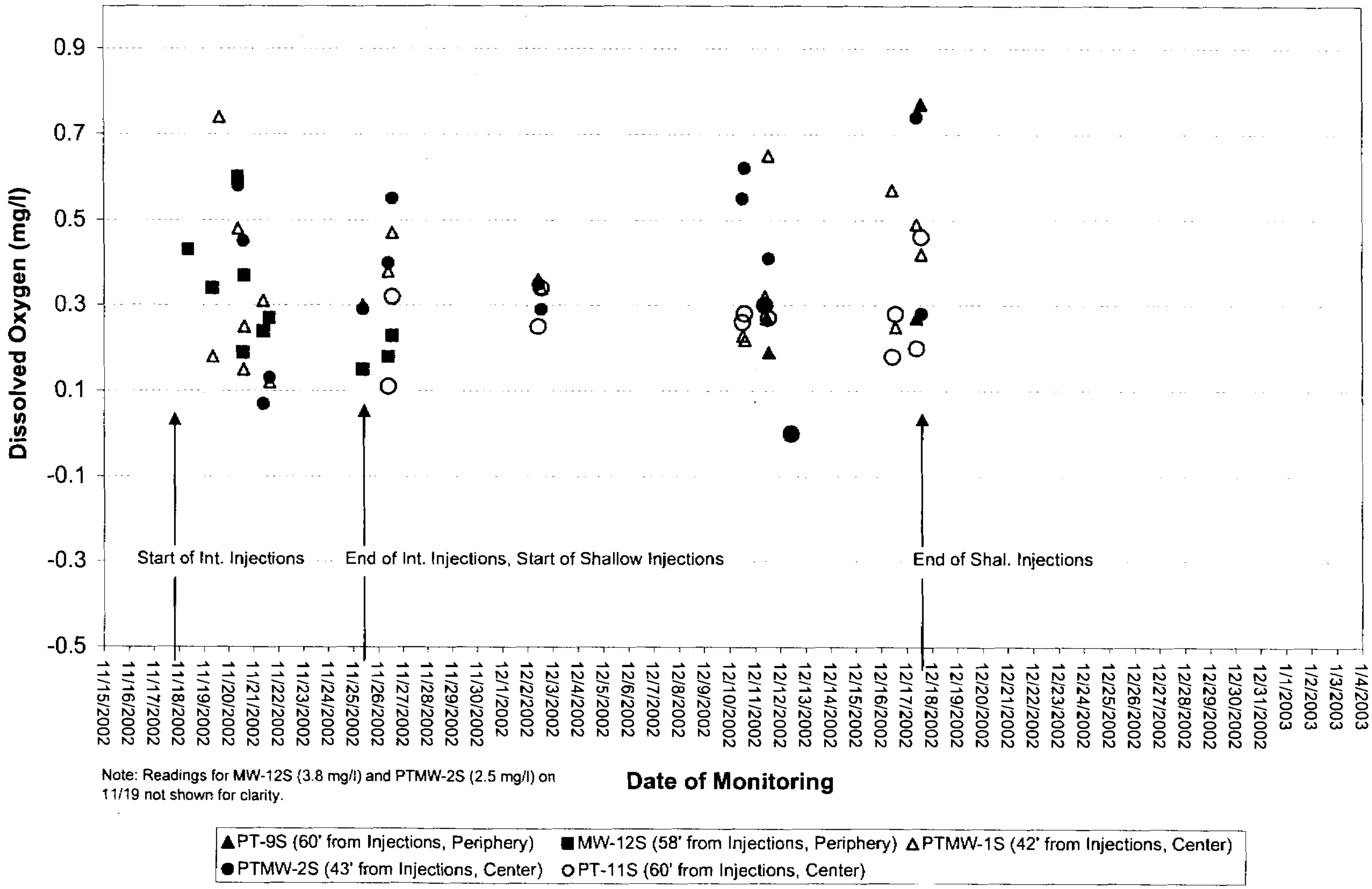
NOTE: Increase in DTW represents a lowering water table. Decrease in DTW represents a rising water table.

Start of Int. Injections

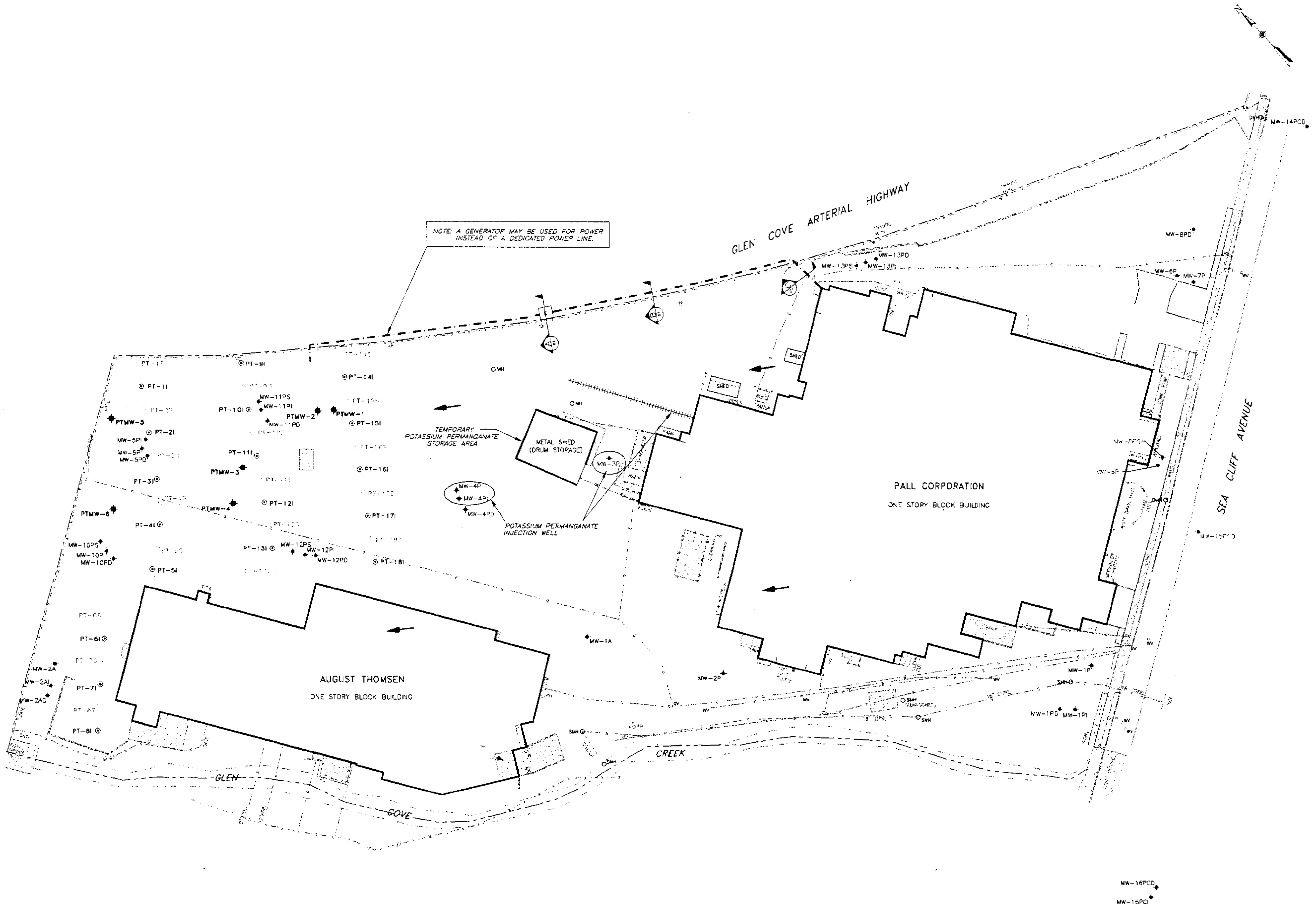
End of Int. Injections, Start of Shallow Injections

End of Shal. Injections

Figure 14
Dissolved Oxygen Changes During Shallow Injections



Note: Readings for MW-12S (3.8 mg/l) and PTMW-2S (2.5 mg/l) on 11/19 not shown for clarity.



NO.	DATE	BY	REVISION

LEGEND

NEW SHALLOW POTASSIUM PERMANGANATE INJECTION WELL (SCREEN: 5'-25' BGS)

⊙ NEW INTERMEDIATE POTASSIUM PERMANGANATE INJECTION WELL (SCREEN: 35'-55' BGS)

✦ NEW MONITORING PROBE COUPLET (SCREEN: 3'-13' BGS, SCREEN: 45'-55' BGS)

INJECTION SYSTEM SKID (PORTABLE, ASSUME 1 SKID TO BE RELOCATED AS NEEDED)

← GROUNDWATER FLOW DIRECTION

E NEW ELECTRIC HANDHOLE

— · — NEW UNDERGROUND ELECTRIC AND DOMESTIC WATER SERVICE

┼┼┼┼┼ EXISTING HORIZONTAL SVE WELL TO BE USED FOR PERMANGANATE INJECTION (PHASE V)

✦ EXISTING MONITORING WELL TO BE USED FOR PERMANGANATE INJECTION (PHASE V)

✦ EXISTING MONITORING WELL

UTILITY POLE

FH FIRE HYDRANT

CB CATCH BASIN

WV WATER VALVE

GV GAS VALVE

SMH ○ SEWER MANHOLE

MH ○ MANHOLE

— E — UNDERGROUND ELECTRIC LINE

— T — UNDERGROUND TELEPHONE LINE

— S — SANITARY SEWER

— G — UNDERGROUND GAS LINE

— W — UNDERGROUND WATER LINE

— OW — OVERHEAD WIRE

— - - — PROPERTY LINE

NOTES

1) *INJECTION WELL SPACING APPROX. 30 FEET (TOTAL OF 36 WELLS).*
2) *EXISTING MONITORING WELLS AVAILABLE FOR INJECTION MONITORING.*
3) *ACCESS TO AUGUST THOMSEN PROPERTY IS POSSIBLE.*
4) *UPGRADIENT REMEDIATION (OFF-SITE) BY OTHERS TO ADDRESS SOURCES.*
5) *LOCATE UNDERGROUND UTILITIES PRIOR TO DRILLING AND EXCAVATING.*

GRAPHIC SCALE

0 30 60

1"=30'

SIGNATURE	DATE
REVIEW ENGR:	
PROJECT ENGR:	
PROJECT MGR:	
CLIENT:	

ENVIRO-SCIENCES, INC.
312 E. MAIN STREET
PATCHOGUE, N.Y. 11772
PHONE: (631) 207-9005

PALL CORPORATION PILOT TEST

30 SEA CLIFF AVENUE
GLEN COVE, NEW YORK

SITE PLAN

DESIGNED BY:	DETAILED BY:	CHECKED BY:
SEE SOURCE	TRS	

DRAWING DATE: 8/6/02	ACAD FILE: PALLY1
PROJECT NO.: PALL-GLENCOVE	CONTRACT:
DRAWING: Y1	REVISION:

PHASE I			
PHASE	INJECTION WELLS	KMNO$_4$ (LBS)	WATER (GALS)
IA	PT-14S, 15S, 16S, 17S, 18S	20,500	132,000
IB	PT-14I, 15I, 16I, 17I, 18I	20,500	132,000

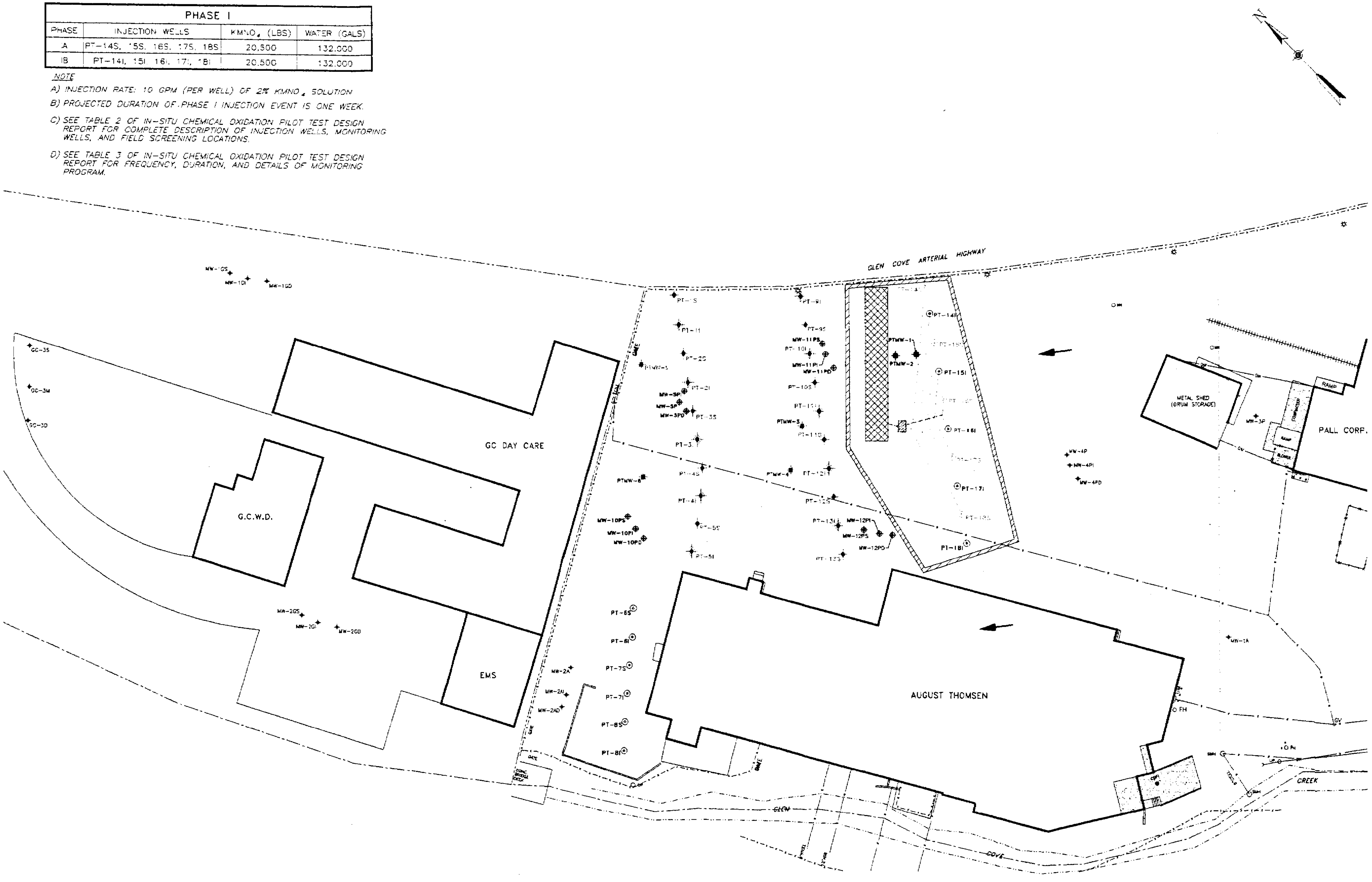
NOTE

A) INJECTION RATE: 10 GPM (PER WELL) OF 2% KMNO$_4$ SOLUTION

B) PROJECTED DURATION OF PHASE I INJECTION EVENT IS ONE WEEK.

C) SEE TABLE 2 OF IN-SITU CHEMICAL OXIDATION PILOT TEST DESIGN REPORT FOR COMPLETE DESCRIPTION OF INJECTION WELLS, MONITORING WELLS, AND FIELD SCREENING LOCATIONS.

D) SEE TABLE 3 OF IN-SITU CHEMICAL OXIDATION PILOT TEST DESIGN REPORT FOR FREQUENCY, DURATION, AND DETAILS OF MONITORING PROGRAM.



NO.	DATE	BY	REVISION

LEGEND

·	NEW SHALLOW POTASSIUM PERMANGANATE INJECTION WELL (SCREEN: 5'-25' BGS)
⊙	NEW INTERMEDIATE POTASSIUM PERMANGANATE INJECTION WELL (SCREEN: 35'-55' BGS)
✦	NEW MONITORING WELL COUPLET USED FOR MONITORING INJECTION EVENT (SCREEN: 3'-13' BGS, SCREEN: 45'-55' BGS)
⊕	EXISTING MONITORING WELL GROUP USED FOR MONITORING INJECTION EVENT (SHALLOW/INTERMEDIATE/DEEP)
✦	NEW SHALLOW INJECTION WELL USED FOR MONITORING INJECTION EVENT DURING PHASE I
✦	NEW INTERMEDIATE INJECTION WELL USED FOR MONITORING INJECTION EVENT DURING PHASE I
◎⊙	NEW INJECTIONS WELLS NOT USED DURING PHASE I
✦	NEW MONITORING WELL COUPLET NOT USED DURING PHASE I
▨	INJECTION SYSTEM SKID (PORTABLE)
▨	PERMANGANATE SOLUTION MIXING EQUIPMENT AREA
▢	CONSTRUCTION AREA
- - - - -	SCH 40 PVC PIPE
- - -	FLEXIBLE HOSE
—·—·—	PROPERTY LINE
←	GROUNDWATER FLOW DIRECTION
✦	EXISTING MONITORING WELL
UP○	UTILITY POLE
FH○	FIRE HYDRANT
CB▣	CATCH BASIN
WV○	WATER VALVE
GV○	GAS VALVE
SMH○	SEWER MANHOLE
MH○	MANHOLE
—E—	UNDERGROUND ELECTRIC LINE
—T—	UNDERGROUND TELEPHONE LINE
—S—	SANITARY SEWER
—G—	UNDERGROUND GAS LINE
—W—	UNDERGROUND WATER LINE
—OW—	OVERHEAD WIRE
+++++++	HORIZONTAL EXTRACTION WELL

GRAPHIC SCALE
0 25 50
1"=25'

SIGNATURE		DATE
REVIEW ENGR:		
PROJECT ENGR:		
PROJECT MGR:		
CLIENT:		

ENVIRO-SCIENCES, INC.
312 E. MAIN STREET
PATCHOGUE, N.Y. 11772
PHONE: (631) 207-9005

PALL CORPORATION PILOT TEST

30 SEA CLIFF AVENUE
GLEN COVE, NEW YORK

PHASE I CONSTRUCTION STAGING

DESIGNED BY:	DETAILED BY:	CHECKED BY:
BF	TS	

DRAWING DATE: 8/6/02	ACAD FILE: PALLY2A
PROJECT NO.: PALL-GLENCOVE	CONTRACT:
DRAWING: Y2A	REVISION:

PHASE II			
PHASE	INJECTION WELLS	KMNO$_4$ (LBS)	WATER (GALS)
IIA	PT-9S, 10S, 11S, 12S, 13S	20,500	132,000
IIB	PT-9I, 10I, 11I, 12I, 13I	20,500	132,000

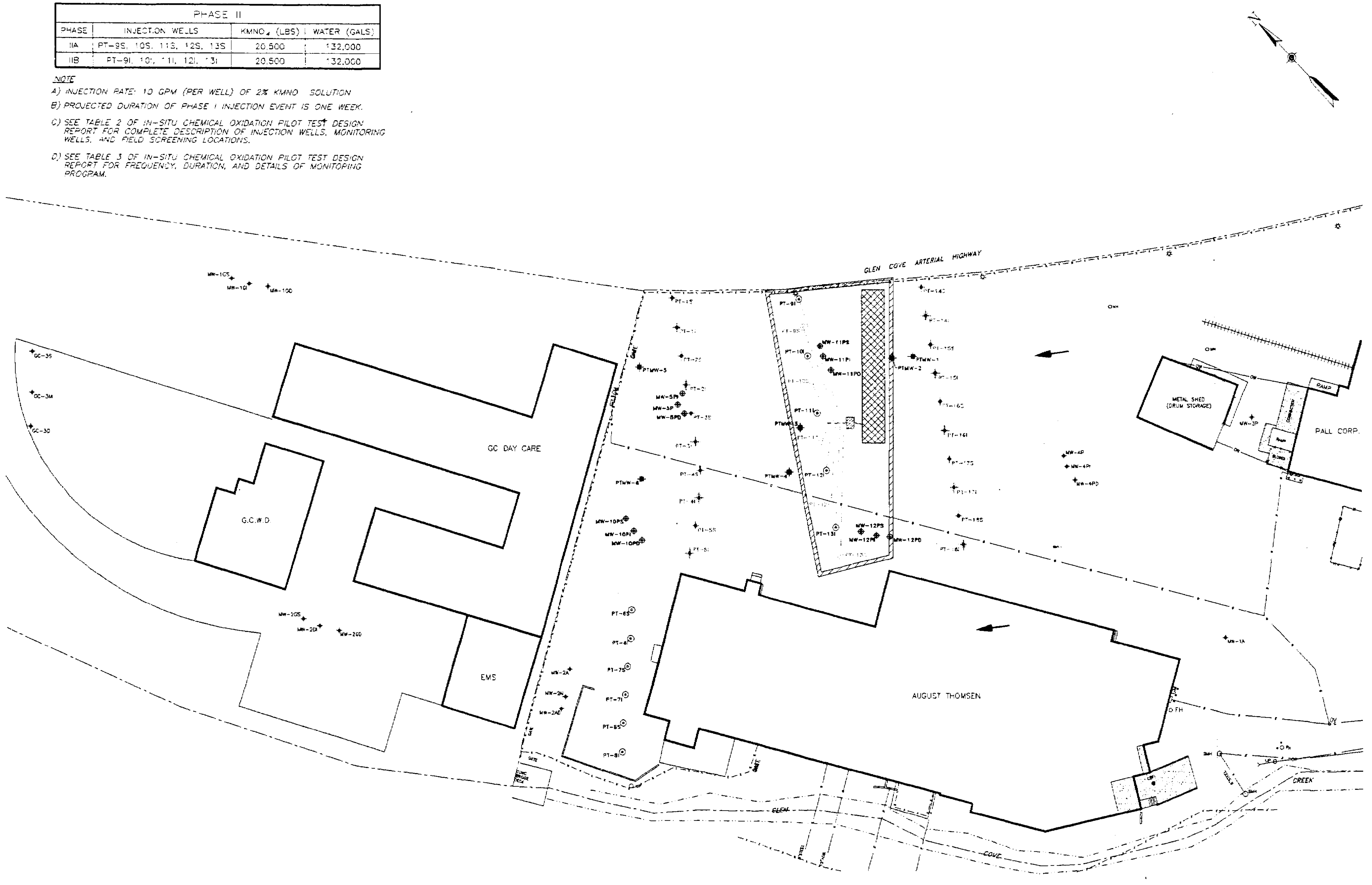
NOTE

A) INJECTION RATE: 10 GPM (PER WELL) OF 2% KMNO SOLUTION

B) PROJECTED DURATION OF PHASE I INJECTION EVENT IS ONE WEEK.

C) SEE TABLE 2 OF IN-SITU CHEMICAL OXIDATION PILOT TEST DESIGN REPORT FOR COMPLETE DESCRIPTION OF INJECTION WELLS, MONITORING WELLS, AND FIELD SCREENING LOCATIONS.

D) SEE TABLE 3 OF IN-SITU CHEMICAL OXIDATION PILOT TEST DESIGN REPORT FOR FREQUENCY, DURATION, AND DETAILS OF MONITORING PROGRAM.



LEGEND

	NEW SHALLOW POTASSIUM PERMANGANATE INJECTION WELL (SCREEN: 5'-25' BGS)
⊙	NEW INTERMEDIATE POTASSIUM PERMANGANATE INJECTION WELL (SCREEN: 35'-55' BGS)
✦	NEW MONITORING WELL COUPLET USED FOR MONITORING INJECTION EVENT (SCREEN: 3'-13' BGS, SCREEN: 45'-55' BGS)
⊕	EXISTING MONITORING WELL GROUP USED FOR MONITORING INJECTION EVENT (SHALLOW/INTERMEDIATE/DEEP)
✦	NEW SHALLOW INJECTION WELL USED FOR MONITORING INJECTION EVENT DURING PHASE II
✦	NEW INTERMEDIATE INJECTION WELL USED FOR MONITORING INJECTION EVENT DURING PHASE II
⊙⊙	NEW INJECTIONS WELLS NOT USED DURING PHASE II
✦	NEW MONITORING WELL COUPLET NOT USED DURING PHASE II
▨	INJECTION SYSTEM SKID (PORTABLE)
▨	PERMANGANATE SOLUTION MIXING EQUIPMENT AREA
☐	CONSTRUCTION AREA
— - —	SCH 40 PVC PIPE
······	FLEXIBLE HOSE
—-—-	PROPERTY LINE
←	GROUNDWATER FLOW DIRECTION
✦	EXISTING MONITORING WELL
UP○	UTILITY POLE
FH○	FIRE HYDRANT
CB▪	CATCH BASIN
WV○	WATER VALVE
GV○	GAS VALVE
SMH○	SEWER MANHOLE
MH○	MANHOLE
—E—	UNDERGROUND ELECTRIC LINE
—T—	UNDERGROUND TELEPHONE LINE
—S—	SANITARY SEWER
—G—	UNDERGROUND GAS LINE
—W—	UNDERGROUND WATER LINE
—OW—	OVERHEAD WIRE
┼┼┼┼┼	HORIZONTAL EXTRACTION WELL

GRAPHIC SCALE
0 25 50
1"=25'

NO.	DATE	BY	REVISION

	SIGNATURE	DATE
REVIEW ENGR:		
PROJECT ENGR:		
PROJECT MGR:		
CLIENT:		

ENVIRO-SCIENCES, INC.
312 E. MAIN STREET
PATCHOGUE, N.Y. 11772
PHONE: (631) 207-9005

PALL CORPORATION PILOT TEST

30 SEA CLIFF AVENUE
GLEN COVE, NEW YORK

PHASE II CONSTRUCTION STAGING

DESIGNED BY: BF	DETAILED BY: TS	CHECKED BY:
DRAWING DATE: 8/6/02	ACAD FILE: PALLY2B1	
PROJECT NO.: PALL-GLENCOVE	CONTRACT:	
DRAWING: **Y2B**	REVISION:	

PHASE III			
PHASE	INJECTION WELLS	$KMNO_4$ (LBS)	WATER (GALS)
IIIA	PT-1S, 2S, 3S, 4S, 5S	20,500	132,000
IIIB	PT-1I, 2I, 3I, 4I, 5I	20,500	132,000

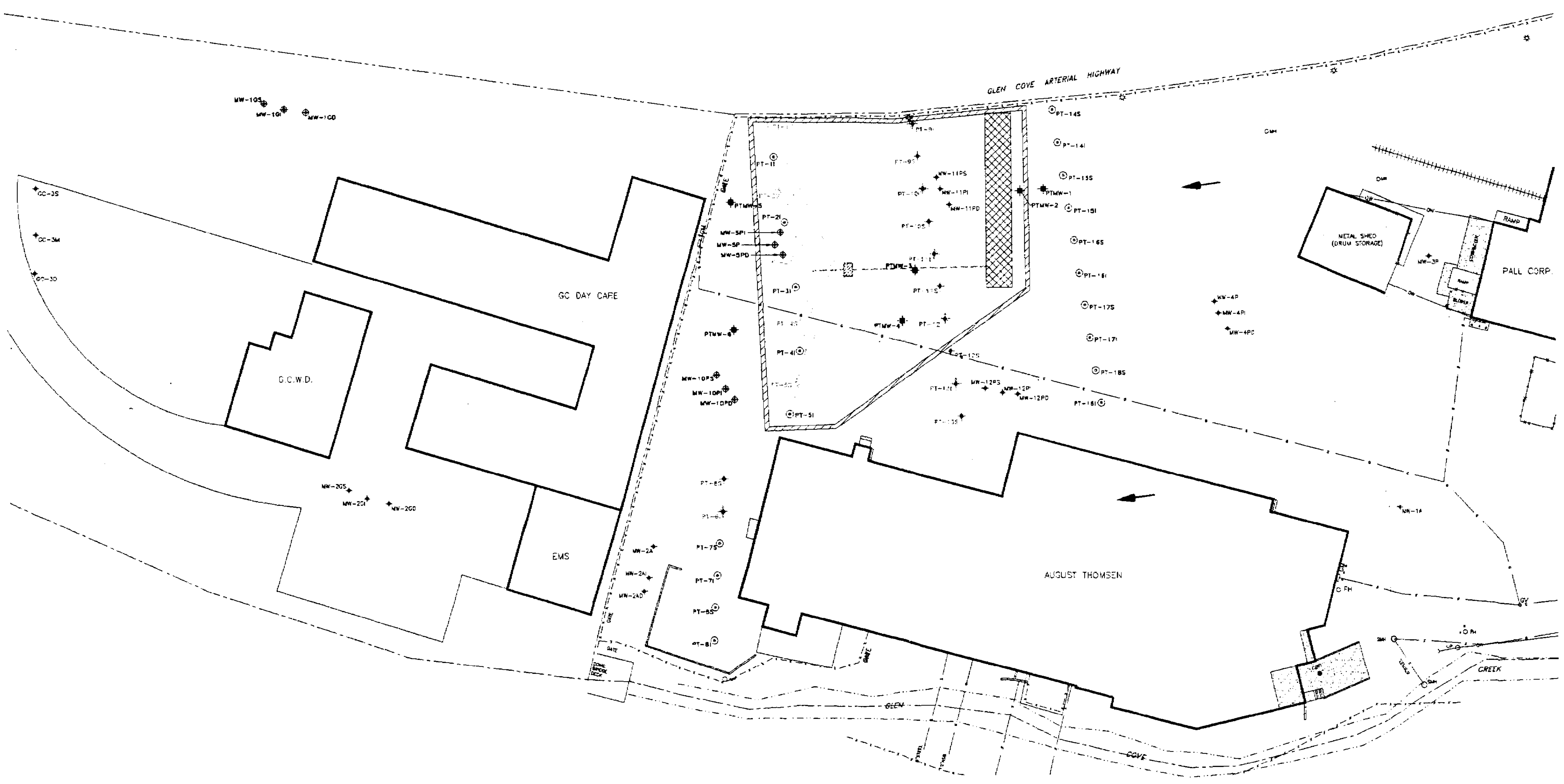
NOTE

A) INJECTION RATE: 10 GPM (PER WELL) OF 2% $KMNO_4$ SOLUTION

B) PROJECTED DURATION OF PHASE I INJECTION EVENT IS ONE WEEK.

C) SEE TABLE 2 OF IN-SITU CHEMICAL OXIDATION PILOT TEST DESIGN REPORT FOR COMPLETE DESCRIPTION OF INJECTION WELLS, MONITORING WELLS, AND FIELD SCREENING LOCATIONS.

D) SEE TABLE 3 OF IN-SITU CHEMICAL OXIDATION PILOT TEST DESIGN REPORT FOR FREQUENCY, DURATION, AND DETAILS OF MONITORING PROGRAM.



NO.	DATE	BY	REVISION

LEGEND

- ⊙ NEW SHALLOW POTASSIUM PERMANGANATE INJECTION WELL (SCREEN: 5'-25' BGS)
- ⊙ NEW INTERMEDIATE POTASSIUM PERMANGANATE INJECTION WELL (SCREEN: 35'-55' BGS)
- ✦ NEW MONITORING WELL COUPLET USED FOR MONITORING INJECTION EVENT (SCREEN: 3'-13' BGS, SCREEN: 45'-55' BGS)
- ⊕ EXISTING MONITORING WELL GROUP USED FOR MONITORING INJECTION EVENT (SHALLOW/INTERMEDIATE/DEEP)
- ✦ NEW SHALLOW INJECTION WELL USED FOR MONITORING INJECTION EVENT DURING PHASE III
- ✦ NEW INTERMEDIATE INJECTION WELL USED FOR MONITORING INJECTION EVENT DURING PHASE III
- ⊙⊙ NEW INJECTIONS WELLS NOT USED DURING PHASE III
- ● NEW MONITORING WELL COUPLET NOT USED DURING PHASE III
- ▨ INJECTION SYSTEM SKID (PORTABLE)
- ▩ PERMANGANATE SOLUTION MIXING EQUIPMENT AREA
- ▭ CONSTRUCTION AREA
- --- SCH 40 PVC PIPE
- - - FLEXIBLE HOSE
- —·— PROPERTY LINE
- ← GROUNDWATER FLOW DIRECTION
- ✦ EXISTING MONITORING WELL
- UPO UTILITY POLE
- FHO FIRE HYDRANT
- CB■ CATCH BASIN
- WV○ WATER VALVE
- GV○ GAS VALVE
- SMHO SEWER MANHOLE
- MHO MANHOLE
- —E— UNDERGROUND ELECTRIC LINE
- —T— UNDERGROUND TELEPHONE LINE
- —S— SANITARY SEWER
- —G— UNDERGROUND GAS LINE
- —W— UNDERGROUND WATER LINE
- —OW— OVERHEAD WIRE
- ┼┼┼┼┼ HORIZONTAL EXTRACTION WELL

GRAPHIC SCALE
0 25 50
1"=25'

SIGNATURE	DATE
REVIEW ENGR:	
PROJECT ENGR:	
PROJECT MGR:	
CLIENT:	

ENVIRO-SCIENCES, INC.
312 E. MAIN STREET
PATCHOGUE, N.Y. 11772
PHONE: (631) 207-9005

PALL CORPORATION PILOT TEST

30 SEA CLIFF AVENUE
GLEN COVE, NEW YORK

PHASE III CONSTRUCTION STAGING

DESIGNED BY:	DETAILED BY:	CHECKED BY:
BF	TS	

DRAWING DATE: 6/25/02
ACAD FILE: PALLY2C1
PROJECT NO.: PALL-GLENCOVE
CONTRACT:
DRAWING: **Y2C**
REVISION:

PHASE IV			
PHASE	INJECTION WELLS	KMNO$_4$ (LBS)	WATER (GALS)
IVA	PT-6S, 7S, 8S	12,300	79,200
IVB	PT-6I, 7I, 8I	12,300	79,200

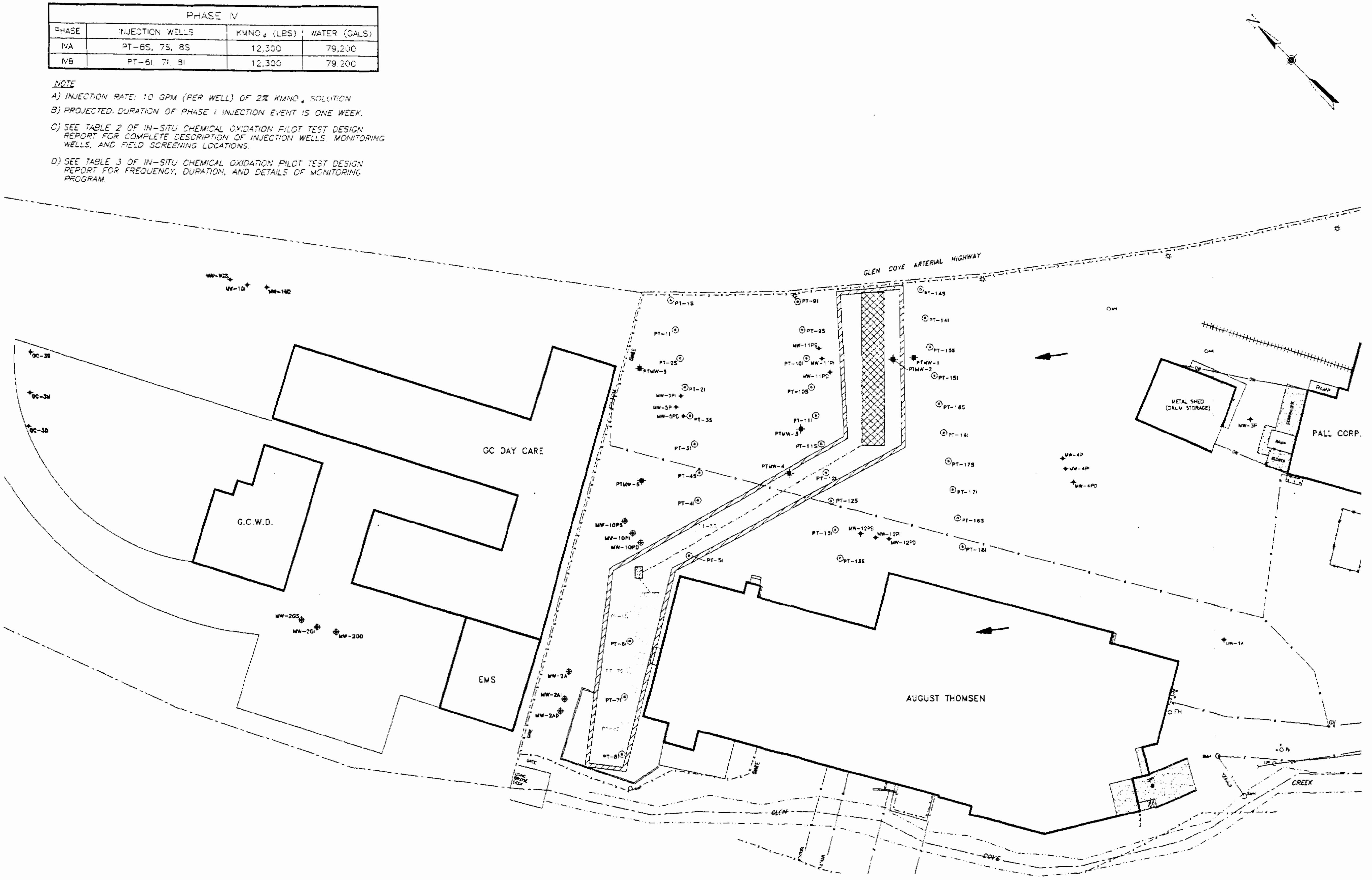
NOTE

A) INJECTION RATE: 10 GPM (PER WELL) OF 2% KMNO$_4$ SOLUTION

B) PROJECTED. DURATION OF PHASE I INJECTION EVENT IS ONE WEEK.

C) SEE TABLE 2 OF IN-SITU CHEMICAL OXIDATION PILOT TEST DESIGN REPORT FOR COMPLETE DESCRIPTION OF INJECTION WELLS, MONITORING WELLS, AND FIELD SCREENING LOCATIONS.

D) SEE TABLE 3 OF IN-SITU CHEMICAL OXIDATION PILOT TEST DESIGN REPORT FOR FREQUENCY, DURATION, AND DETAILS OF MONITORING PROGRAM.



NO.	DATE	BY	REVISION

LEGEND

	NEW SHALLOW POTASSIUM PERMANGANATE INJECTION WELL (SCREEN: 5'-25' BGS)
⊙	NEW INTERMEDIATE POTASSIUM PERMANGANATE INJECTION WELL (SCREEN: 35'-55' BGS)
✚	NEW MONITORING WELL COUPLET USED FOR MONITORING INJECTION EVENT (SCREEN: 3'-13' BGS, SCREEN: 45'-55' BGS)
⊕	EXISTING MONITORING WELL GROUP USED FOR MONITORING INJECTION EVENT (SHALLOW/INTERMEDIATE/DEEP)
◆	NEW SHALLOW INJECTION WELL USED FOR MONITORING INJECTION EVENT DURING PHASE IV
◆	NEW INTERMEDIATE INJECTION WELL USED FOR MONITORING INJECTION EVENT DURING PHASE IV
⊙ ⊙	Z NOT USED DURING PHASE IV
✚	NEW MONITORING WELL COUPLET NOT USED DURING PHASE IV
▨	INJECTION SYSTEM SKID (PORTABLE)
▩	PERMANGANATE SOLUTION MIXING EQUIPMENT AREA
▭	CONSTRUCTION AREA
— — —	SCH 40 PVC PIPE
· ·	FLEXIBLE HOSE
—··—	PROPERTY LINE
←	GROUNDWATER FLOW DIRECTION
✦	EXISTING MONITORING WELL
UP○	UTILITY POLE
FH○	FIRE HYDRANT
CB■	CATCH BASIN
WV○	WATER VALVE
GV○	GAS VALVE
SMH○	SEWER MANHOLE
MH○	MANHOLE
— E —	UNDERGROUND ELECTRIC LINE
— T —	UNDERGROUND TELEPHONE LINE
— S —	SANITARY SEWER
— G —	UNDERGROUND GAS LINE
— W —	UNDERGROUND WATER LINE
— OW —	OVERHEAD WIRE
┼┼┼┼	HORIZONTAL EXTRACTION WELL

GRAPHIC SCALE
0 25 50
1"=25'

SIGNATURE	DATE
REVIEW ENGR:	
PROJECT ENGR:	
PROJECT MGR:	
CLIENT:	

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312 E. MAIN STREET
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PHONE: (631) 207-9005

PALL CORPORATION PILOT TEST

30 SEA CLIFF AVENUE
GLEN COVE, NEW YORK

PHASE IV CONSTRUCTION STAGING

DESIGNED BY: BF	DETAILED BY: TS	CHECKED BY:
DRAWING DATE: 8/6/02	ACAD FILE: PALLY2D1	
PROJECT NO.: PALL-GLENCOVE	CONTRACT:	
DRAWING: **Y2D**	REVISION:	

PHASE V

PHASE	INJECTION WELLS	KMNO$_4$ (LBS)	WATER (GALS)
V	MW-3P, 4P, 4PI, HORIZONTAL WELL	16,400	132,000

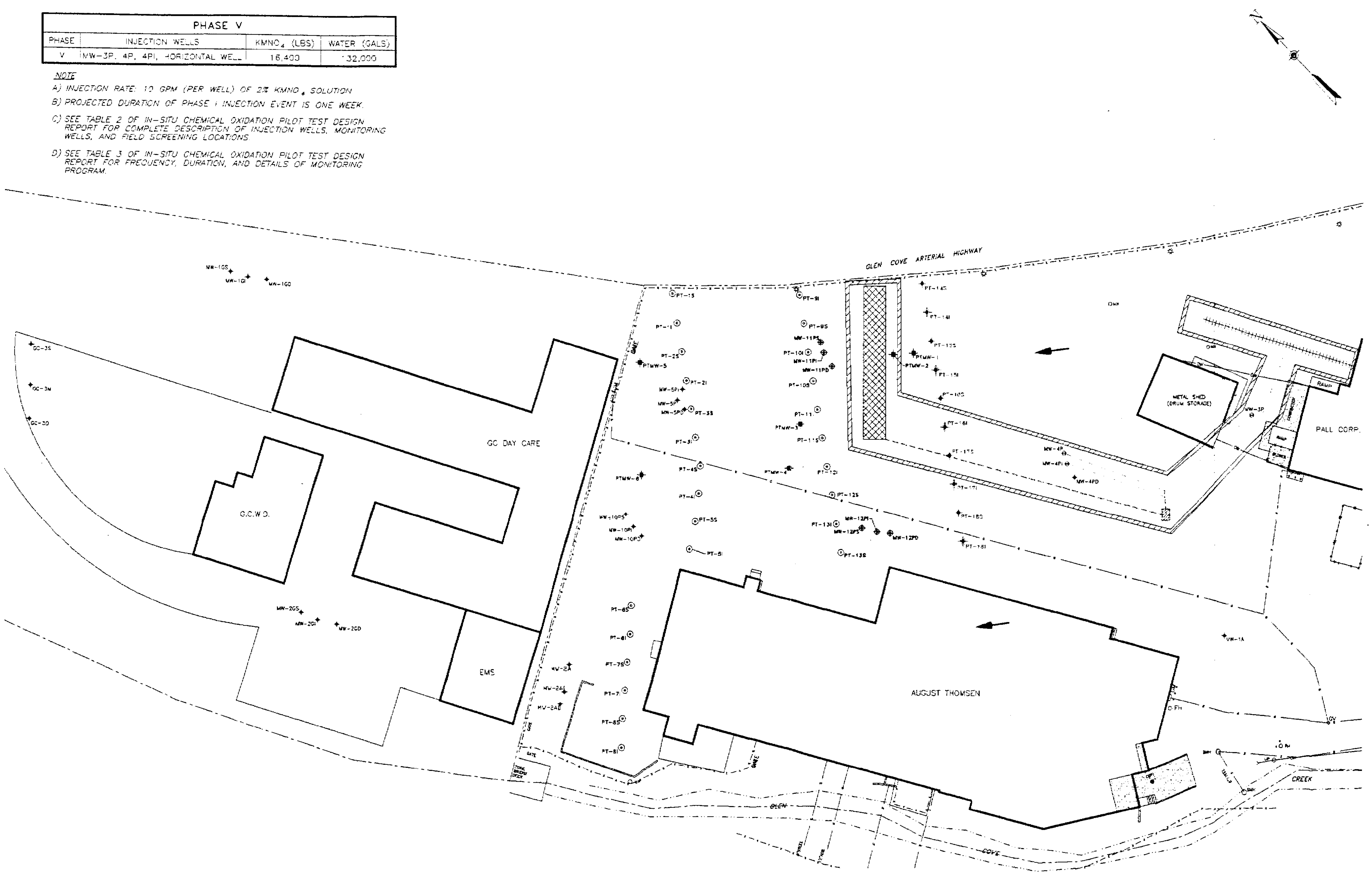
NOTE

A) INJECTION RATE: 10 GPM (PER WELL) OF 2% KMNO$_4$ SOLUTION

B) PROJECTED DURATION OF PHASE I INJECTION EVENT IS ONE WEEK.

C) SEE TABLE 2 OF IN-SITU CHEMICAL OXIDATION PILOT TEST DESIGN REPORT FOR COMPLETE DESCRIPTION OF INJECTION WELLS, MONITORING WELLS, AND FIELD SCREENING LOCATIONS.

D) SEE TABLE 3 OF IN-SITU CHEMICAL OXIDATION PILOT TEST DESIGN REPORT FOR FREQUENCY, DURATION, AND DETAILS OF MONITORING PROGRAM.



NO.	DATE	BY	REVISION

LEGEND

⊙ NEW SHALLOW POTASSIUM PERMANGANATE INJECTION WELL (SCREEN: 5'-25' BGS)
⊙ NEW INTERMEDIATE POTASSIUM PERMANGANATE INJECTION WELL (SCREEN: 35'-55' BGS)
■ NEW MONITORING WELL COUPLET USED FOR MONITORING INJECTION EVENT (SCREEN: 3'-13' BGS, SCREEN: 45'-55' BGS)
⊕ EXISTING MONITORING WELL GROUP USED FOR MONITORING INJECTION EVENT (SHALLOW/INTERMEDIATE/DEEP)
✦ NEW SHALLOW INJECTION WELL USED FOR MONITORING INJECTION EVENT DURING PHASE V
✦ NEW INTERMEDIATE INJECTION WELL USED FOR MONITORING INJECTION EVENT DURING PHASE V
┼┼┼ EXISTING HORIZONTAL WELL TO BE USED AS INJECTION WELL (PHASE V)
⊖ EXISTING MONITORING WELL TO BE USED AS INJECTION WELL (PHASE V)
⊙⊙ NEW INJECTIONS WELLS NOT USED DURING PHASE V
■ NEW MONITORING WELL COUPLET NOT USED DURING PHASE V
▨ INJECTION SYSTEM SKID (PORTABLE)
▩ PERMANGANATE SOLUTION MIXING EQUIPMENT AREA
□ CONSTRUCTION AREA
— — — SCH 40 PVC PIPE
- - - FLEXIBLE HOSE
- - - PROPERTY LINE
← GROUNDWATER FLOW DIRECTION
✦ EXISTING MONITORING WELL
UP○ UTILITY POLE
FH○ FIRE HYDRANT
CB■ CATCH BASIN
WV○ WATER VALVE
GV○ GAS VALVE
SMH○ SEWER MANHOLE
MH○ MANHOLE
—E— UNDERGROUND ELECTRIC LINE
—T— UNDERGROUND TELEPHONE LINE
—S— SANITARY SEWER
—G— UNDERGROUND GAS LINE
—W— UNDERGROUND WATER LINE
—OW— OVERHEAD WIRE

GRAPHIC SCALE
0 25 50
1"=25'

SIGNATURE	DATE
REVIEW ENGR:	
PROJECT ENGR:	
PROJECT MGR:	
CLIENT:	

ENVIRO-SCIENCES, INC.
312 E. MAIN STREET
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PALL CORPORATION PILOT TEST

30 SEA CLIFF AVENUE
GLEN COVE, NEW YORK

PHASE V CONSTRUCTION STAGING

DESIGNED BY:	DETAILED BY:	CHECKED BY:
BF	TS	

DRAWING DATE: 8/6/02
ACAD FILE: PALLY2E1
PROJECT NO.: PALL-GLENCOVE
CONTRACT:
DRAWING: **Y2E**
REVISION:

ONE-LINE DIAGRAM SYMBOLS

———	CIRCUIT AND EQUIPMENT INSTALLED BY THIS CONTRACT
— — —	EQUIPMENT ENCLOSURE
- - -	CONTROL OR INTERLOCK CIRCUIT
—●—	CONNECTION
⌒	MOLDED CASE CIRCUIT BREAKER
▭	FUSE
⟋▭	FUSED DISCONNECT SWITCH
⊣⊢∿	FULL VOLTAGE, NON-REVERSING (FVNR) MAGNETIC MOTOR STARTER
∿	MANUAL MOTOR STARTER
AS	AMMETER SWITCH
VS	VOLTMETER SWITCH
A	AMMETER
V	VOLTMETER
▲	RECEPTACLE-CLASS I, DIVISION 1, GROUPS C, D
▭⟩⟨	FUSED POTENTIAL TRANSFORMERS
⟨	CURRENT TRANSFORMER
∿∿	POWER TRANSFORMER
—○ ○—⏚	LIGHTNING OR SURGE ARRESTER
——⏚	GROUND CONNECTION
WHM	WATT-HOUR METER SOCKET. METER FURNISHED BY UTILITY.
5	MOTOR - NUMBER INDICATES HP

PLAN SYMBOLS

———	NEW CONSTRUCTION
— — —	EXISTING CONSTRUCTION
— — —	EXISTING CONSTRUCTION TO BE REMOVED
———	CONDUIT EXPOSED
— — —	CONDUIT CONCEALED IN WALL CEILING OR HIDDEN FROM VIEW
- - - -	CONDUIT CONCEALED IN FLOOR OR UNDERGROUND
⧘⧘⧘	FLEXIBLE CONDUIT (LIQUIDTIGHT)
— —	GROUND CABLE
—■	BOLTED GROUND CONNECTION
—●	WELDED GROUND CONNECTION
⊚	GROUND ROD
⌒→	HOMERUN. ARROWHEADS INDICATE NUMBER OF CIRCUITS
——○	CONDUIT TURNING UP
——⊃	CONDUIT TURNING DOWN
——|	CONDUIT WITH BUSHING
——]	CONDUIT TERMINATED OR CAPPED
▭	POWER PANEL-480V, 3ø
■	LIGHTING PANEL-120/240V, 1ø OR 208/120V, 3ø
▭⟋	DISCONNECT (SAFETY) SWITCH
MS	MANUAL MOTOR STARTER
☒	MAGNETIC MOTOR STARTER
☒⟋	COMBINATION MAGNETIC MOTOR STARTER
5	MOTOR-NUMBER INDICATES HP
P	PULLBOX
J	JUNCTION BOX
⊗	EXIT LIGHT
L-1	FLUORESCENT LUMINAIRE TYPE L-1
L-1 L-1	INCANDESCENT OR H.I.D. LUMINAIRE TYPE L-1
⊓	EMERGENCY LIGHTING UNIT
◣	EMERGENCY FLUORESCENT LIGHTING FIXTURE
⊖	DUPLEX RECEPTACLE WP-WEATHERPROOF GFCI-GROUND FAULT CIRCUIT INTERRUPTER
●	RECEPTACLE-CLASS I, DIVISION 1, GROUPS C, D
T	THERMOSTAT
S	SINGLE POLE SWITCH
S 3	THREE-WAY SWITCH
S 4	FOUR-WAY SWITCH

SCHEMATIC DIAGRAM SYMBOLS

○ □	TERMINAL
✚	CONDUCTOR CONNECTION
+	NO CONNECTION
—⏚	GROUND
○⊣⊢○	CONTACT NORMALLY OPEN (NO)
○⊣/⊢○	CONTACT NORMALLY CLOSED (NC)
—⟍—	SWITCH
○—○	SELECTOR SWITCH
○ ○	PUSHBUTTON-NORMALLY OPEN MOMENTARY
○⊥○	PUSHBUTTON-NORMALLY CLOSED MOMENTARY
○⟍○	PRESSURE OR VACUUM SWITCH-CLOSES WITH INCREASING PRESSURE OR DECREASING VACUUM
○⊤○	PRESSURE OR VACUUM SWITCH-OPENS WITH INCREASING PRESSURE OR DECREASING VACUUM
○⟍○	LIMIT SWITCH NO
○⟍○	LIMIT SWITCH NO-HELD CLOSED
○⊤○	LIMIT SWITCH NC
○⟋○	LIMIT SWITCH NC-HELD OPEN
○⟍○	NO TIME DELAY CONTACT. TIME DELAY CLOSING AFTER ENERGIZATION
○⊤○	NC TIME DELAY CONTACT. TIME DELAY OPENING AFTER ENERGIZATION
○⟍○	NO TIME DELAY CONTACT. TIME DELAY OPENING AFTER DE-ENERGIZATION
○⊤○	NC TIME DELAY CONTACT. TIME DELAY CLOSING AFTER DE-ENERGIZATION
M	MOTOR STARTER COIL
○—◯—○	RELAY COIL
G	INDICATING LIGHT-COLOR INDICATED A-AMBER R-RED BL-BLUE Y-YELLOW G-GREEN W-WHITE
○⊤○	FLOW SWITCH-OPENS WITH INCREASING FLOW
○⟍○	FLOW SWITCH-CLOSES WITH INCREASING FLOW
○⟍○	LIQUID LEVEL SWITCH-CLOSES ON RISING LEVEL
○⊤○	LIQUID LEVEL SWITCH-OPENS ON RISING LEVEL
○⟍○	TEMPERATURE SWITCH-CLOSES ON RISING TEMPERATURES
○⊤○	TEMPERATURE SWITCH-OPENS ON RISING TEMPERATURES
○⋀○	SOLENOID VALVE COIL
3 OL	THERMAL OVERLOAD RELAY CONTACT NUMBER INDICATES NUMBER OF CONTACTS
▭	FUSE
∿∿	CONTROL POWER TRANSFORMER (CPT)
H	HORN
B	BELL

GENERAL ABBREVIATIONS

A, AUTO	AUTOMATIC
ACK	ACKNOWLEDGE
AFF	ABOVE FINISH FLOOR
AFG	ABOVE FINISH GRADE
BC	BARE COPPER
C	CONDUIT
CB	CIRCUIT BREAKER
CL	CLOSE
CPT	CONTROL POWER TRANSFORMER
CR	CONTROL RELAY
CS	CONTROL SWITCH
CT	CURRENT TRANSFORMER
DWG	DRAWING
ETM	ELAPSED TIME METER
FU	FUSE
FWD	FORWARD
GND	GROUND
H	HAND
HI	HIGH
HS	HIGH SPEED
IL	INDICATING LIGHT
INST	INSTANTANEOUS
L	LOW
LOC	LOCAL
LS	LOW SPEED
MAN	MANUAL
MCC	MOTOR CONTROL CENTER
NC	NORMALLY CLOSED
NL	NIGHT LIGHT (UNSWITCHED FIXTURE)
NO	NORMALLY OPEN
O	OFF
OL	THERMAL OVERLOAD RELAY
OP	OPEN
PB	PUSHBUTTON
PLC	PROGRAMMABLE LOGIC CONTROLLER
REM	REMOTE
REV	REVERSE
SOL	SOLENOID (OTHER THAN VALVE)
SP	SPARE
SS	SELECTOR SWITCH
SV	SOLENOID VALVE
T, T-STAT	THERMOSTAT
TDAE	TIME DELAY AFTER ENERGIZATION
TDAD	TIME DELAY AFTER DE-ENERGIZATION
TDR	TIME DELAY RELAY
TEMP	TEMPERATURE
TMR	TIMER
WP	WEATHERPROOF
XFMR	TRANSFORMER
XP	EXPLOSIONPROOF-CLASS I, DIVISION I, GROUPS C, D

NO.	DATE	BY	REVISION

NOTES:

1) REFER TO THE PIPING & INSTRUMENTATION DIAGRAM LEGEND, DRAWING P1, FOR RELATED SYMBOLS AND DESIGNATIONS.

SIGNATURE	DATE
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PHONE: (631) 207-9005

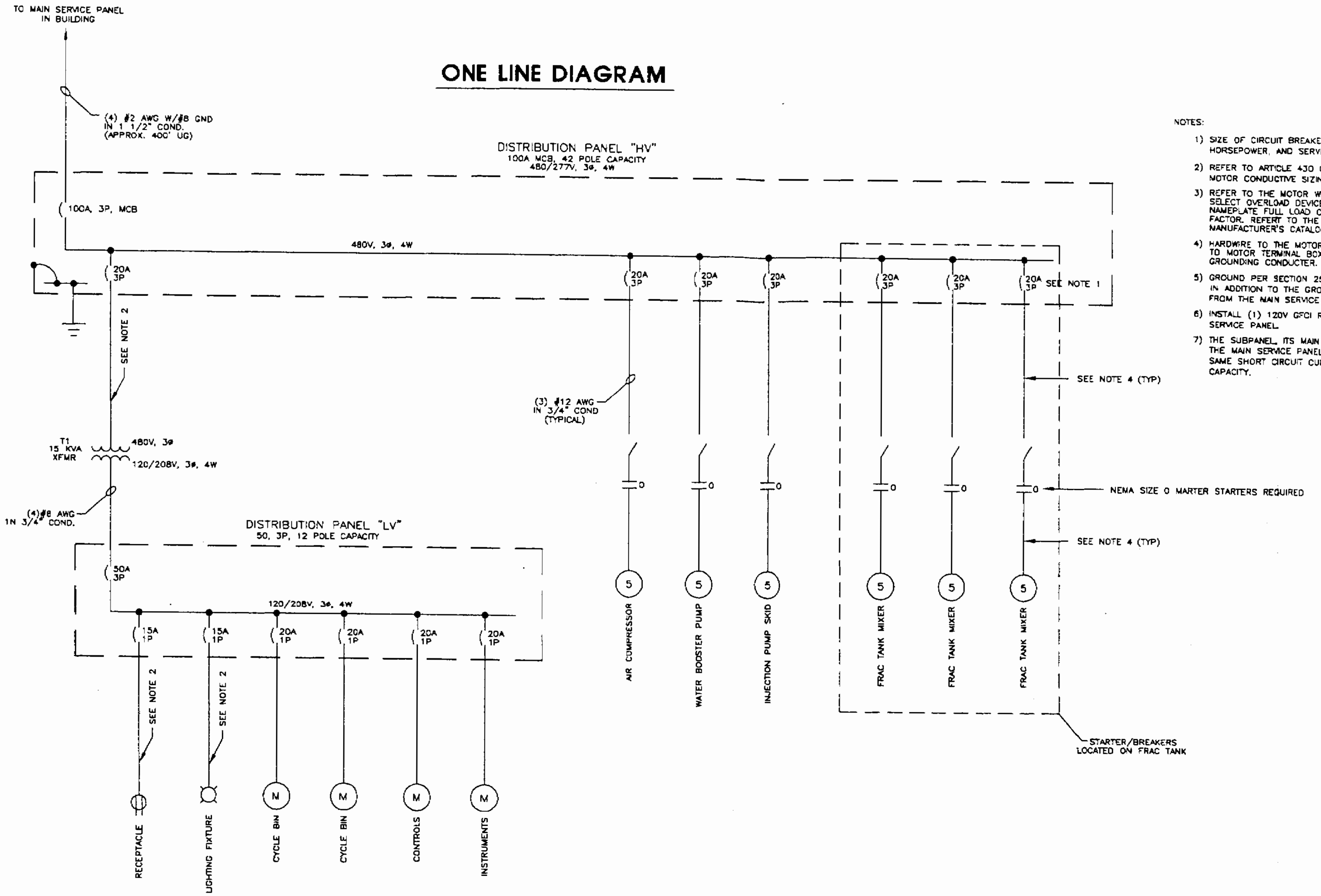
PALL
CORPORATION
PILOT TEST

30 SEA CLIFF AVENUE
GLEN COVE, NEW YORK

ELECTRICAL LEGEND

DESIGNED BY: OJS
DETAILED BY: TRS
CHECKED BY:
DATE: 3/13/02
FILE: PALL-ED
PROJECT NO.: PALL-GLENCOVE
CONTRACT:
DRAWING: **E0**
REVISION:

ONE LINE DIAGRAM

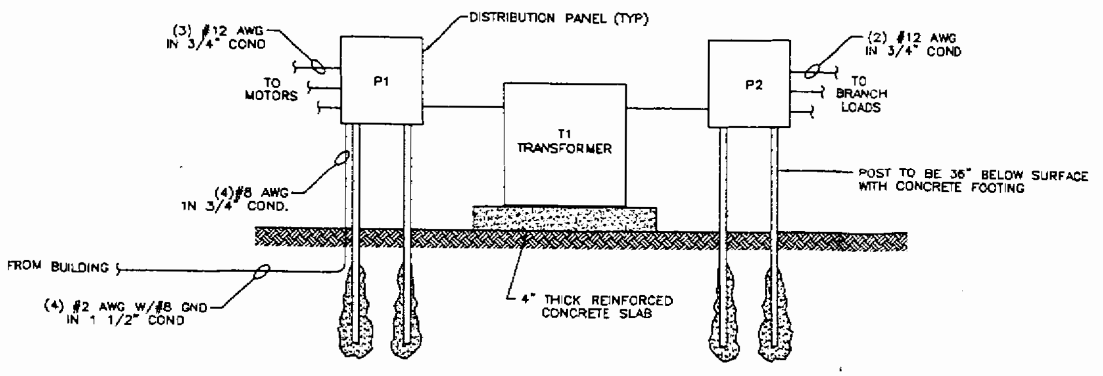


NOTES:

1) SIZE OF CIRCUIT BREAKER CHANGES WITH MOTOR HORSEPOWER, AND SERVICE FACTOR.
2) REFER TO ARTICLE 430 OF THE NEC FOR MOTOR CONDUCTIVE SIZING.
3) REFER TO THE MOTOR WIRING SCHEMATICS. SELECT OVERLOAD DEVICES FROM THE MOTOR NAMEPLATE FULL LOAD CURRENT AND SERVICE FACTOR. REFERT TO THE MOTOR STARTER MANUFACTURER'S CATALOG.
4) HARDWIRE TO THE MOTOR TERMINAL BOX. WIRING TO MOTOR TERMINAL BOX MUST INCLUDE GROUNDING CONDUCTER.
5) GROUND PER SECTION 250-24-A OF THE NEC, IN ADDITION TO THE GROUNDING CONDUCTOR FROM THE MAIN SERVICE PANEL.
6) INSTALL (1) 120V GFCI RECEPTACLE NEAR THE SERVICE PANEL.
7) THE SUBPANEL, ITS MAIN CIRCUIT BREAKER AND THE MAIN SERVICE PANEL MUST HAVE THE SAME SHORT CIRCUIT CURRENT INTERRUPTING CAPACITY.

ELECTRICAL EQUIPMENT ELEVATION

(NOT TO SCALE)



NOTE:

ELECTRICAL GENERATOR MAY BE USED INSTEAD OF HARD WIRED POWER SUPPLY FROM BUILDING.

NO.	DATE	BY	REVISION

LEGEND

⌇⌇⌇	TRANSFORMER
‖	NORMALLY OPEN CONTACT
⁄	SWITCH
⑤	MOTOR (# INDICATES HORSEPOWER)
⏀	RECEPTACLE
⌑	LIGHT
⏚	GROUND

	SIGNATURE	DATE
REVIEW ENGR:		
PROJECT ENGR:		
PROJECT MGR:		
CLIENT:		

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312 E. MAIN STREET
PATCHOGUE, N.Y. 11772
PHONE: (631) 207-9005

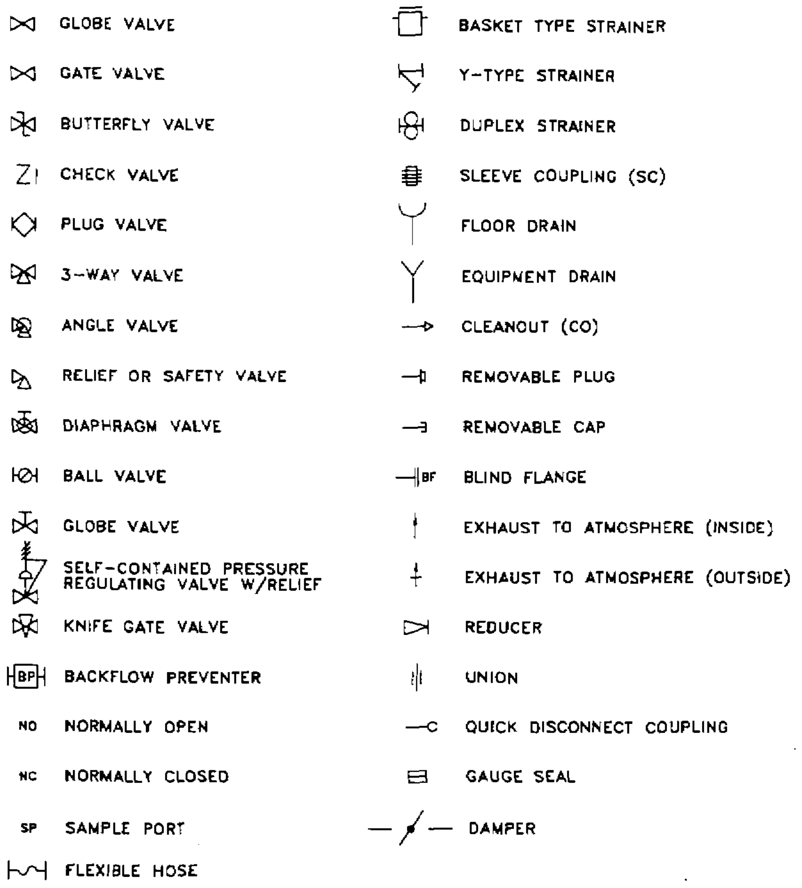
PALL CORPORATION PILOT TEST

30 SEA CLIFF AVENUE
GLEN COVE, NEW YORK

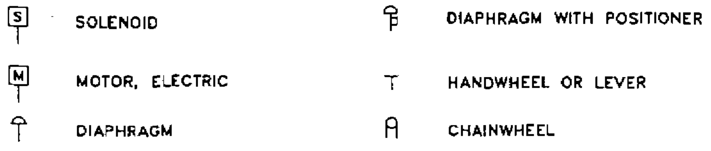
ONE LINE DIAGRAM

[illegible] BF	DETAILED BY: TS	CHECKED BY:
DRAWING DATE: 8/6/02	ACAD FILE: PALLE1	
PROJECT NO.: MT&E - PALL	CONTRACT:	
DRAWING: E1	REVISION:	

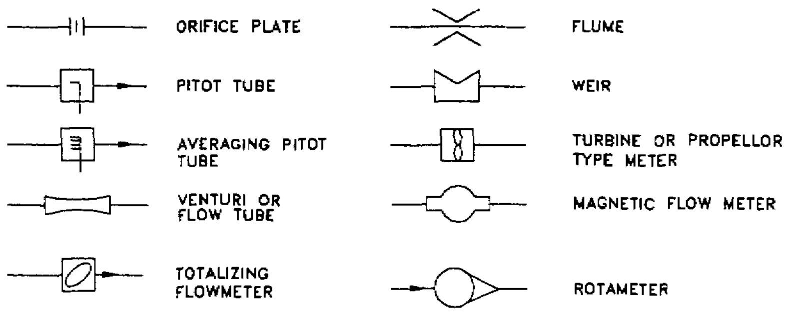
VALVE AND PIPING SYMBOLS



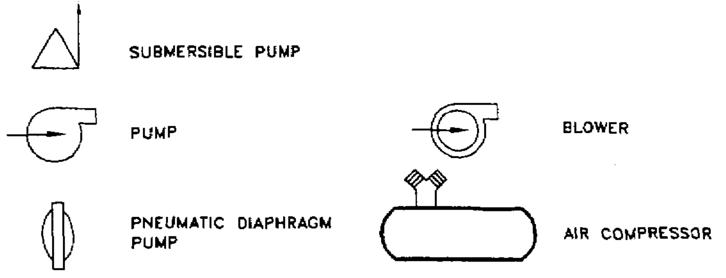
VALVE OPERATOR SYMBOLS



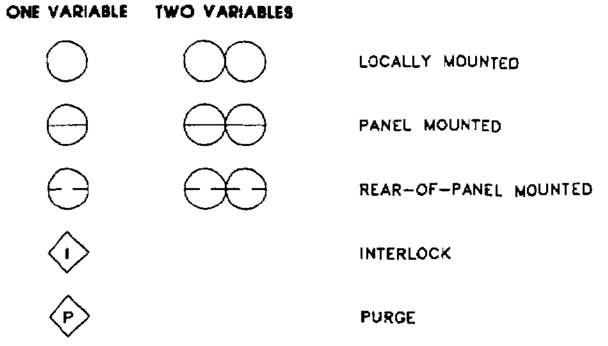
PRIMARY ELEMENT SYMBOLS - FLOW



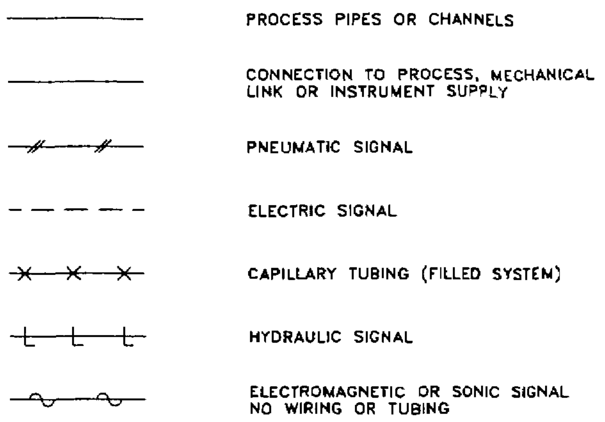
EQUIPMENT SYMBOLS



GENERAL INSTRUMENT SYMBOLS



LINE SYMBOLS



INSTRUMENT IDENTIFICATION TABLE

	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER FLAME				
C	CONDUCTIVITY			CONTROL	
D	DENSITY (SP. GR.)	DIFFERENTIAL			
E	VOLTAGE		PRIMARY ELEMENT		
F	FLOW RATE	RATIO			
G	GAUGING (DIMENSIONAL)		GLASS		
H	HAND (MANUAL)				HIGH
I	CURRENT		INDICATE		
J	POWER	SCAN			
K	TIME OR SCHEDULE			CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW
M	MOISTURE OR HUMIDITY				MIDDLE
N					
O			ORIFICE		
P	PRESSURE OR VACUUM		POINT (TEST)		
Q	QUANT. OR EVENT	INTEGRATE			
R	RADIOACTIVITY		RECORD OR PRINT		
S	SPEED OR FREQ.	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION		
V	VISCOSITY			VALVE OR DAMPER	
W	WEIGHT OR FORCE		WELL		
X	UNCLASSIFIED		UNCLASSIFIED		
Y				RELAY OR COMPUTE	
Z	POSITION			DRIVE, ACTUATE	

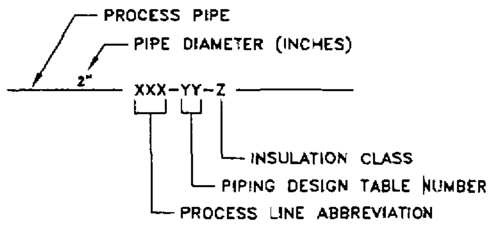
PROCESS LINE ABBREVIATIONS

AIR	AIR, ATMOSPHERIC PRESSURE
BW	BACKWASH
CA	COMPRESSED AIR
CGW	CONTAMINATED GROUNDWATER
D	DRAIN
EFF	EFFLUENT
EXH	EXHAUST
GW	GROUNDWATER
NPW	NON-POTABLE WATER
P	PRODUCT
PW	POTABLE WATER
S	SANITARY
SL	SLUDGE
SP	SAMPLE PORT
SS	STORM SEWER
TF	TOTAL FLUIDS
V	VENT
VAP	VAPOR

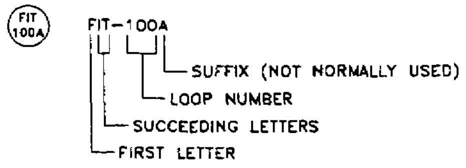
PIPING MATERIAL IDENTIFICATION

CPVC	CHLORINATED POLYVINYL CHLORIDE
CSP	CARBON STEEL PIPE
COP	COPPER
CMP	CORRUGATED METAL PIPE
CIP	CAST IRON PIPE
DIP	DUCTILE IRON PIPE
GAL	GALVANIZED STEEL PIPE
PE	POLYETHYLENE PIPE
PP	POLYPROPYLENE PIPE
PVC	POLYVINYL CHLORIDE PIPE
RCP	REINFORCED CONCRETE PIPE
RUB	RUBBER HOSE
SS	STAINLESS STEEL PIPE
VCP	VITRIFIED CLAY PIPE

PROCESS PIPING IDENTIFICATION



INSTRUMENT IDENTIFICATION



FUNCTION ABBREVIATIONS

DO	DISSOLVED OXYGEN
FC	FAIL CLOSED
FI	FAIL INDETERMINATE
FL	FAIL LOCKED
FO	FAIL OPEN
HOA	HAND-OFF-AUTOMATIC
I/I	CURRENT-TO-CURRENT
I/P	CURRENT-TO-PNEUMATIC
LEL	LOWER EXPLOSIVE LIMIT
LR	LOCAL-REMOTE
OC	OPEN-CLOSE
OO	ON-OFF (MAINTAINED)
ORP	OXIDATION REDUCTION POTENTIAL
OSC	OPEN-STOP-CLOSE (MOMENTARY)
SS	START-STOP (MOMENTARY)
>	HIGH SELECT
<	LOW SELECT
√‾	SQUARE ROOT
Σ	ADD OR TOTALIZE

NO.	DATE	BY	REVISION

APPROVALS

SIGNATURE	DATE
REVIEW ENGR:	
PROJECT ENGR:	
PROJECT MGR:	
CLIENT:	

ENVIRO-SCIENCES, INC.
312 E. MAIN STREET
PATCHOGUE, N.Y. 11772
PHONE: (631) 207-9005

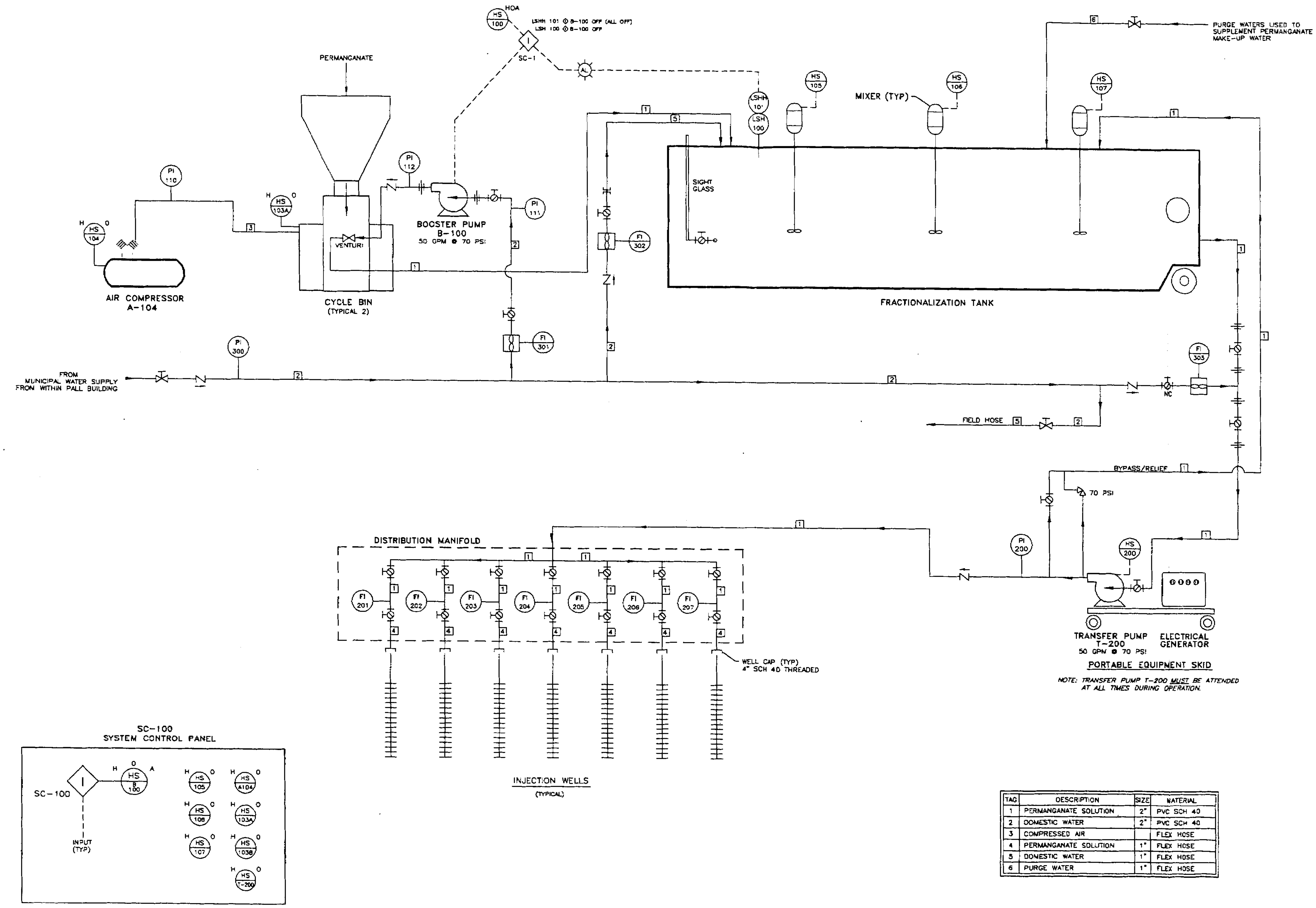
PALL
CORPORATION
PILOT TEST

30 SEA CLIFF AVENUE
GLEN COVE, NEW YORK

PIPING & INSTRUMENTATION
DIAGRAM LEGEND

DESIGNED BY:	DETAILED BY:	CHECKED BY:
DJS	TRS	

DATE: 3/13/02	FILE: PALL-PO
PROJECT NO.: PALL-GLENCOVE	CONTRACT: ????
DRAWING: **PO**	REVISION:



TAG	DESCRIPTION	SIZE	MATERIAL
1	PERMANGANATE SOLUTION	2"	PVC SCH 40
2	DOMESTIC WATER	2"	PVC SCH 40
3	COMPRESSED AIR		FLEX HOSE
4	PERMANGANATE SOLUTION	1"	FLEX HOSE
5	DOMESTIC WATER	1"	FLEX HOSE
6	PURGE WATER	1"	FLEX HOSE

NO.	DATE	BY	REVISION

	SIGNATURE	DATE
REVIEW ENGR:		
PROJECT ENGR:		
PROJECT MGR:		
CLIENT:		

ENVIRO-SCIENCES, INC.
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PHONE: (631) 207-9005

PALL
CORPORATION
PILOT TEST

30 SEA CLIFF AVENUE
GLEN COVE, NEW YORK

PIPING & INSTRUMENTATION DIAGRAM

DESIGNED BY: BF
DETAILED BY: TS
CHECKED BY:
DRAWING DATE: 8/6/02
ACAD FILE: PALLPMD1
PROJECT NO.: PALL-GLEN COVE
CONTRACT:
DRAWING: **P1**
REVISION:

UNIFIED SOIL CLASSIFICATION CHART

CLASSIFICATION CHART

MAJOR DIVISIONS		SYMBOLS		TYPICAL NAMES	ACAD FILL PATTERN
COARSE GRAINED SOILS OVER >No.200 SIEVE SIZE	GRAVELS MORE THAN 1/2 OF COARSE FRACTION> No. 4 SIEVE SIZE	GW	▨	Well graded gravels or gravel-sand mixtures, little or no fines	Cross/0.1/0
		GP	▨	Poorly graded gravels or gravel-sand mixtures, little or no fines	Grass/0.5/0
		GM	▨	Silty gravels, gravel-sand mixtures	Triang/0.2/30
		GC	▨	Clayey gravels, gravel-sand-clay mixtures	Hex/0.1/30
	SANDS MORE THAN 1/2 OF COARSE FRACTION< No. 4 SIEVE SIZE	SW	▨	Well graded sands or gravelly sands, little or no fines	Dots/0.5/0
		SP	▨	Poorly graded sands or gravelly sands, little or no fines	Ar-sand/0.03/0
		SM	▨	Silty sand, sand-silt mixtures	Line/0.5/90
		SC	▨	Clayey sands, sand-clay mixtures	Sacncr/0.5/0
FINE GRAINED SOILS OVER 50%<No. 200 SIEVE SIZE	SILTS & CLAYS LL<50	ML	▨	Inorganic siltys and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	Steel/0.5/45
		CL	▨	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	Clay/0.35/90
		OL	▨	Organic silts, and or organic silty clays of low plasticity	Plasti/0.5/90
	SILTS & CLAYS LL<50	MH	▨	Inorganic silts, micaceous and datomaceous fine sandy or silty soils, slastic silts	Mudst/0.25/45
		CH	▨	Inorganic clays of high plasticity, fat clays	Clay/0.35/135
		OH	▨	Organic clays of medium to high plasticity, organic silty clays, organic silts	Plast/0.35/90
HIGHLY ORGANIC SOILS		Pt	▨	Peat and other highly organic clays	Flex/0.125/0

GRAIN SIZE CHART

CLASSIFICATION	RANGE OF GRAIN SIZES	
	U.S. STANDARD SIEVE SIZE	GRAIN SIZE IN MILLIMETERS
BOULDERS	Above 12"	Above 36"
COBBLES	12" to 3"	306 to 76.2
GRAVEL COARSE FINE	3" to No. 4 3" to 3/4" 3/4" to No. 4	76.2 to 4.75 78.2 to 10.1 10.1 to 4.75
SAND COARSE MEDIUM FINE	No. 4 to No. 200 No. 4 to No. 10 No. 10 to No. 40 No. 40 to No. 200	4.75 to 0.074 4.76 to 2.00 2.00 to 0.420 0.420 to 0.074
SILT & CLAY	Below No. 200	Below No. 0.074

WELL CONSTRUCTION MATERIALS

- ▩ Asphalt (net/.25/45)
- ▨ Concrete (ar-conc/.02/0)
- ▩ Grout (honey/.15/0)
- ▨ Base coarse (hex/.15/0)
- ■ Bentonite (solid)
- ▨ Filter pack (ar-sand/.02/0)
- ▩ Native Fill (earth/.5/0)

- ▯ Solid
- ▤ Slotted PVC
- ⧖ Wire wound PVC
- ▯ Wire wound steel
- ▤ Saw cut

SAMPLE TYPES

SS - Split Spoon
CC - Continuous Core
CG - Cuttings Grab

SYMBOLS

▽ Initial Water Level
▼ Static Water Level

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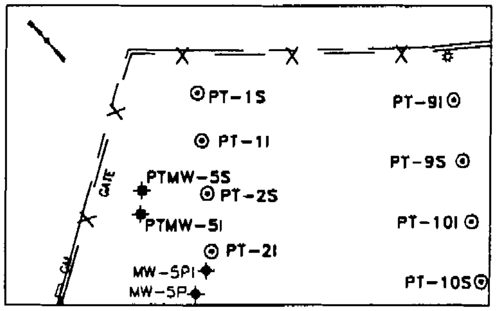
PATCHOGUE, N.Y. 11772
PHONE: (631) 207-9005

Well Number PT-1I

Project Number



Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Date Drilled 9/25/02 T.D. of Hole 57' Diameter 8"

T.O.C. NA Water Depth, Initial NA

Screen: Diam. 4" Length 20' Slot Size 0.020"

Casing: Diam. 4" Length 35' Type Sch 40 pvc

Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger

Driller Carl Pederson Log by Tom Stolworthy Sampling Method Split Spoon

Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
0						Asp	(0-6") Asphalt/basecoarse. Hand dug to 5 feet.
1							
2						SW	(6"-3') Dark brown/black, dry, SAND.
3						Pt	(3'-4') Black, moist, PEAT and organic material. 1" lens of lime.
4						CL	(4'-5') Brown/black, moist, CLAY, trace coarse sand.
5		28					
6							
7							
8		4.4				SP	(5'-10') Dark, brown, wet, fine SAND, some medium and coarse sand, trace coarse gravel.
9							
10							
11							
12		16				SP	(10'-15') Brown, saturated, fine SAND, some coarse gravel, little medium and coarse sand. Poorly sorted.
13							
14							
15							
16							
17							
18		11.6				SP	(15'-20') Brown, wet, saturated, fine and coarse SAND, little fine gravel.
19							
20							
21							
22							
23		4.3				GW	(20'-25') Light brown, wet, saturated, fine SAND and fine GRAVEL, some coarse gravel.
24							
25							
26							
27							
28		8.1				GW	(25'-30') Same as above, some medium sand.
29							
30							

ENVIRO-SCIENCES, INC.
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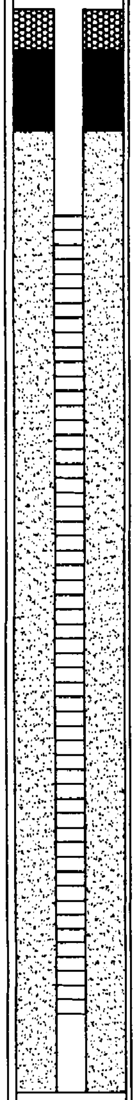
PHONE: (631) 207-9005

Well Number PT-11

Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
30							
31							
32		3.5				GW	(30'-35') Light brown, saturated, fine SAND and fine GRAVEL, some medium sand, trace coarse gravel.
33							
34							
35							
36							
37		8.2				GW	(35'-40') Same as above.
38							
39							
40							
41							
42		8.9				GW	(40'-45') Light brown, saturated, fine GRAVEL and fine SAND, little medium sand, trace coarse sand.
43							
44							
45							
46							
47		10.5				GW	(45'-50') Same as above, little coarse sand.
48							
49							
50							
51							
52		10.4				GW	(50'-55') Same as above.
53							
54							
55							
56		10.2				GW	(55'-57') Same as above.
57							
58							
59							
60							
61							
62							
63							
64							
65							
66							

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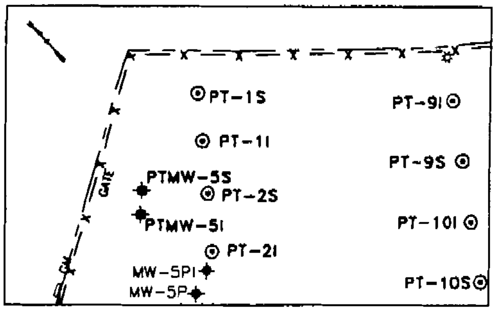
Well Number PT-2I

Project Number



Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Date Drilled 9/23/02 T.D. of Hole 58' Diameter 8"

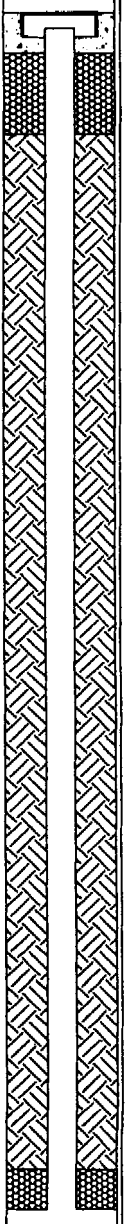
T.O.C. NA Water Depth, Initial NA

Screen: Diam. 4" Length 20' Slot Size 0.020"

Casing: Diam. 4" Length 35' Type Sch 40 pvc

Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger

Driller Carl Pederson Log by Tom Stolworthy Sampling Method Split Spoon



Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
0						Asp	(0-6") Asphalt/basecoarse. Hand dug to 5 feet.
2		731				Pt	(6"-4') Black, moist, PEAT, some clay, little organic matter, trace clay, little organic matter, trace coarse gravel.
4		562				Pt	(4'-5') Grey, moist, PEAT and CLAY, some fine sand, little fine gravel.
8		64.6				GP	(5'-10') Brown, wet, fine GRAVEL, some fine and coarse sand. Poorly sorted.
12		61				GW	(10'-15') Light brown, wet, fine GRAVEL and SAND, little coarse sand.
17		45.4				GW	(15'-20') Same as above, little coarse gravel. Saturated. Sheen, odor.
22		107				GW	(20'-25') Same as above. Sheen, odor.
27		45.8				GW	(25'-30') Brown, wet, fine GRAVEL, some fine sand, little coarse sand.

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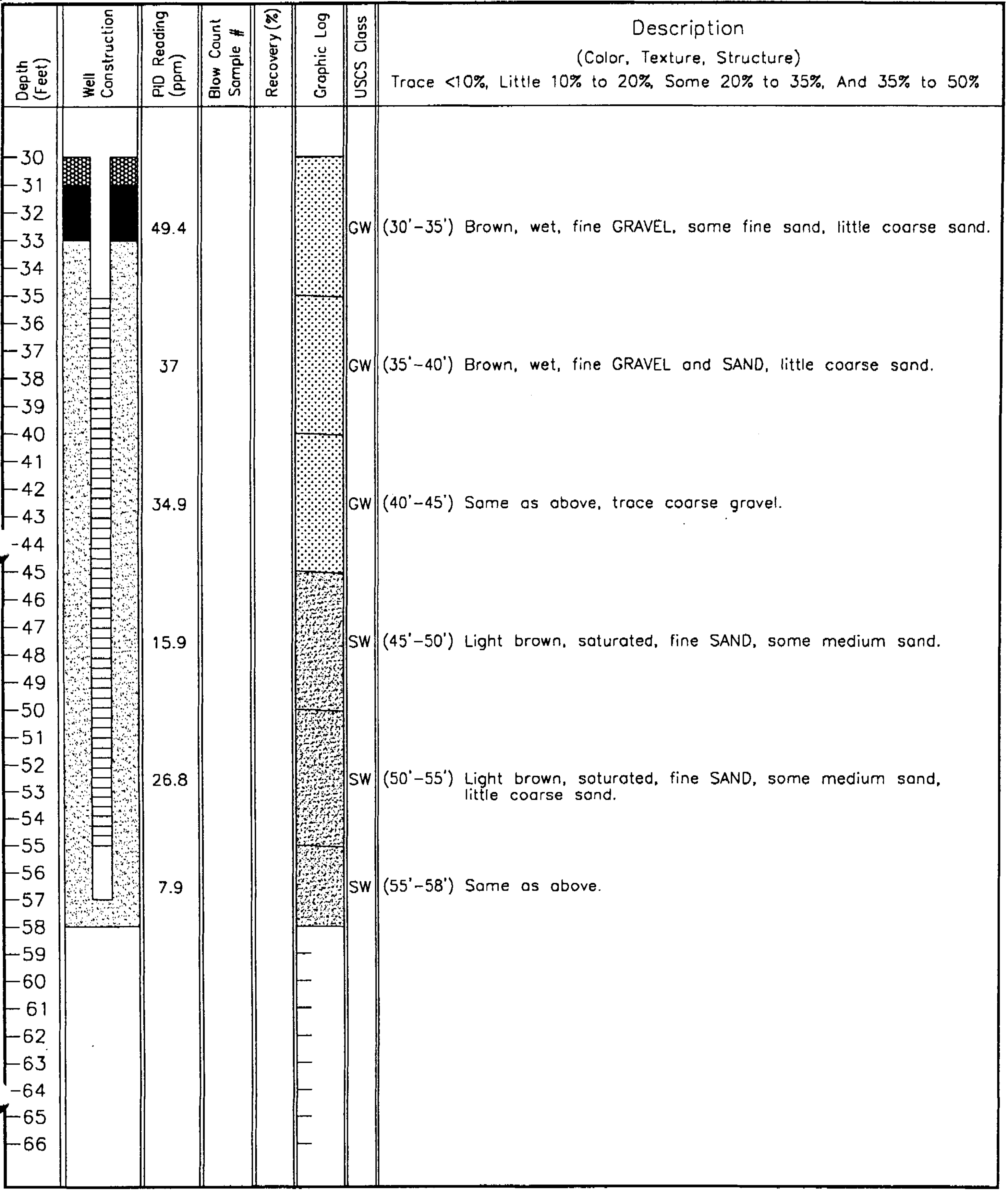
Well Number PT-21

Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.



Depth (Feet)	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
30–35	49.4			GW	(30'-35') Brown, wet, fine GRAVEL, some fine sand, little coarse sand.
35–40	37			GW	(35'-40') Brown, wet, fine GRAVEL and SAND, little coarse sand.
40–45	34.9			GW	(40'-45') Same as above, trace coarse gravel.
45–50	15.9			SW	(45'-50') Light brown, saturated, fine SAND, some medium sand.
50–55	26.8			SW	(50'-55') Light brown, saturated, fine SAND, some medium sand, little coarse sand.
55–58	7.9			SW	(55'-58') Same as above.

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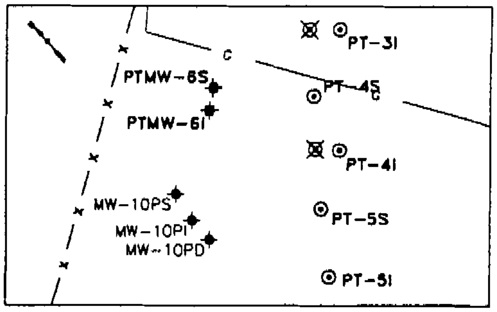
Well Number PT-31

Project Number



Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Date Drilled 10/8/02 T.D. of Hole 58' Diameter 8"

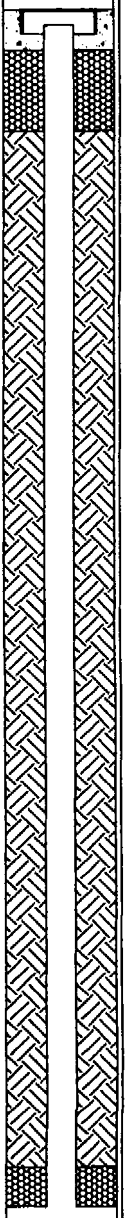
T.O.C. NA Water Depth, Initial NA

Screen: Diam. 4" Length 20' Slot Size 0.020"

Casing: Diam. 4" Length 35' Type Sch 40 pvc

Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger

Driller Carl Pederson Log by Tom Stolworthy Sampling Method Split Spoon



Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
0						Asp	(0–6") Asphalt/basecoarse. Hand dug to 5 feet.
1						Pt	(6"–2.5') Black, moist, PEAT.
4		2.0				SP	(2.5'–5') Brown/black, dry, fine and medium SAND, little coarse sand, little fine gravel. Poorly sorted.
8		1.2				SP	(5'–10') Same as above, some coarse sand.
13		1.2				GW	(10'–15') Light brown, wet, fine SAND and fine GRAVEL.
18		0.6				GW	(15'–20') Same as above, trace coarse gravel.
23		1.1				GW	(20'–25') Light brown, saturated, fine SAND and fine GRAVEL, some silt.
28		1.8				GW	(25'–30') Same as above.

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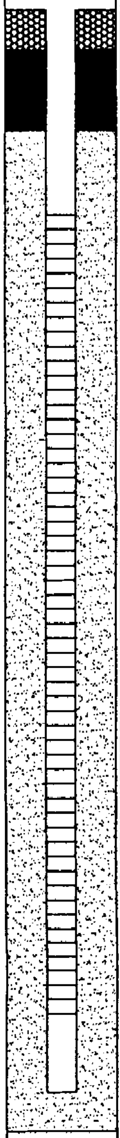
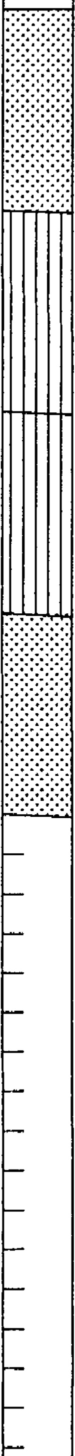
Well Number PT-31

Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.





Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
30–35		1.9				GW	(30'-35') Light brown, wet, fine SAND and fine GRAVEL, some silt.
35–40		1.3				SM	(35'-40') Light brown, saturated, fine SAND and SILT, some fine gravel.
40–45		2.2				SM	(40'-45') Same as above.
45–50		0.7				GW	(45'-50') Light brown, saturated, fine SAND and fine GRAVEL, some silt.
50–55							(50'-55') No recovery.
55–58							(55'-58') No recovery.

Depth scale: 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66

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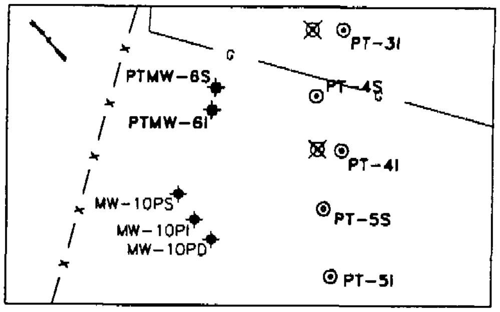
Well Number PT-4I

Project Number



Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Date Drilled 10/7/02 T.D. of Hole 58' Diameter 8"

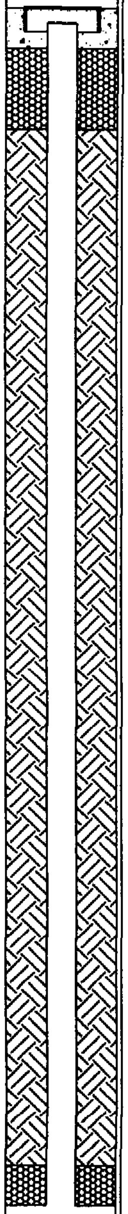
T.O.C. NA Water Depth, Initial NA

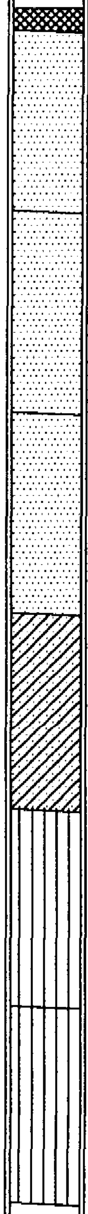
Screen: Diam. 4" Length 20' Slot Size 0.020"

Casing: Diam. 4" Length 35' Type Sch 40 pvc

Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger

Driller Carl Pederson Log by Tom Stolworthy Sampling Method Split Spoon





Depth (Feet)	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
0				Asp	(0-6") Asphalt/basecoarse. Hand dug to 5 feet.
3	4.9			SW	(6"-5') Tan, dry, fine SAND, little coarse sand.
8	3.8			SW	(5'-10') Same as above, some coarse sand.
13	7.2			SW	(10'-15') Light brown, moist to wet at 14', fine and medium SAND, little coarse sand.
18	4.8			SC	(15'-20') Light brown, wet, fine SAND, some clay.
23	4.6			SM	(20'-25') Light brown, wet, fine SAND, some silt, little coarse sand.
28	4.5			SM	(25'-30') Same as above.

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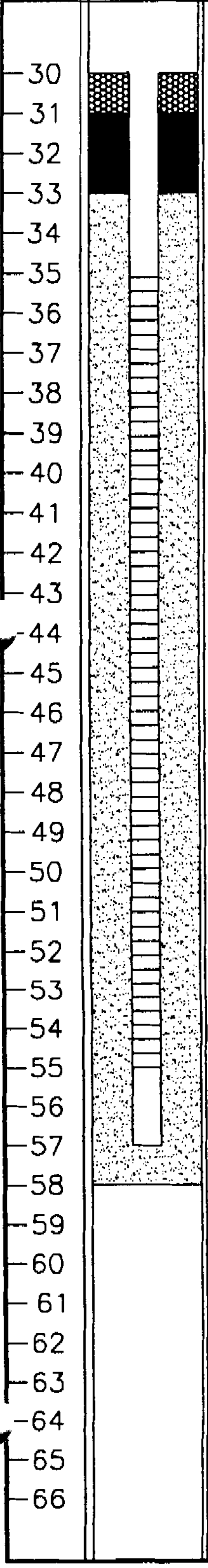
Well Number PT-41

roject Poll Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.



Depth (Feet)	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
30-35	6.1			SM	(30'-35') Light brown, wet, fine SAND, some silt, trace coarse sand.
35-40	4.4			SM	(35'-40') Light brown, wet, fine SAND, some silt, some medium sand.
40-45	3.5			SM	(40'-45') Light brown, wet, fine SAND, some silt, little coarse sand.
45-50	4.3			SM	(45'-50') Same as above.
50-55	4.3				(50'-55') Same as above.
55-58					(55'-58') No recovery.

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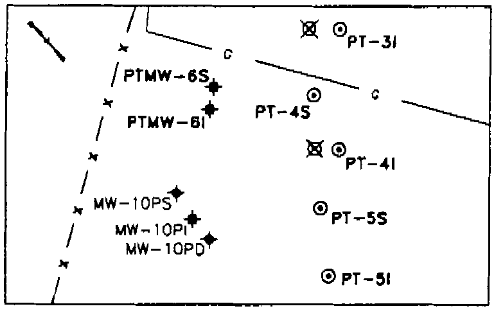
Well Number PT-5I

Project Number



roject Pall Corp. Glen Cove Location 30 Seo Cliff Ave., Glen Cove N.Y.

Date Drilled 10/8/02 T.D. of Hole 58' Diameter 8"

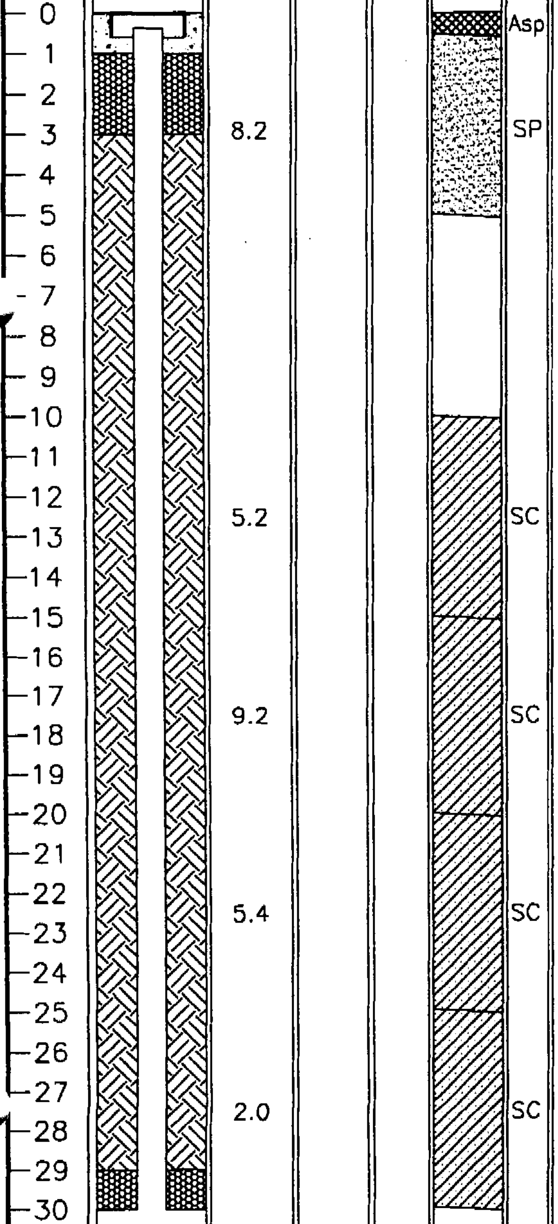
T.O.C. NA Water Depth, Initial NA

Screen: Diam. 4" Length 20' Slot Size 0.020"

Casing: Diam. 4" Length 35' Type Sch 40 pvc

Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger

Driller Carl Pederson Log by Tom Stalworthy Sampling Method Split Spoon



Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
0						Asp	(0–6") Asphalt/basecoarse. Hand dug to 5 feet.
3		8.2				SP	(6"–5') Brown, dry, fine and medium SAND, trace fine gravel.
7							(5'–10') No recovery.
12		5.2				SC	(10'–15') Light brown, moist, fine and medium SAND, some clay.
17		9.2				SC	(15'–20') Same as above, little fine gravel.
22		5.4				SC	(20'–25') Same as above.
28		2.0				SC	(25'–30') Light brown, moist, fine and medium SAND, some clay.

ENVIRO-SCIENCES, INC.
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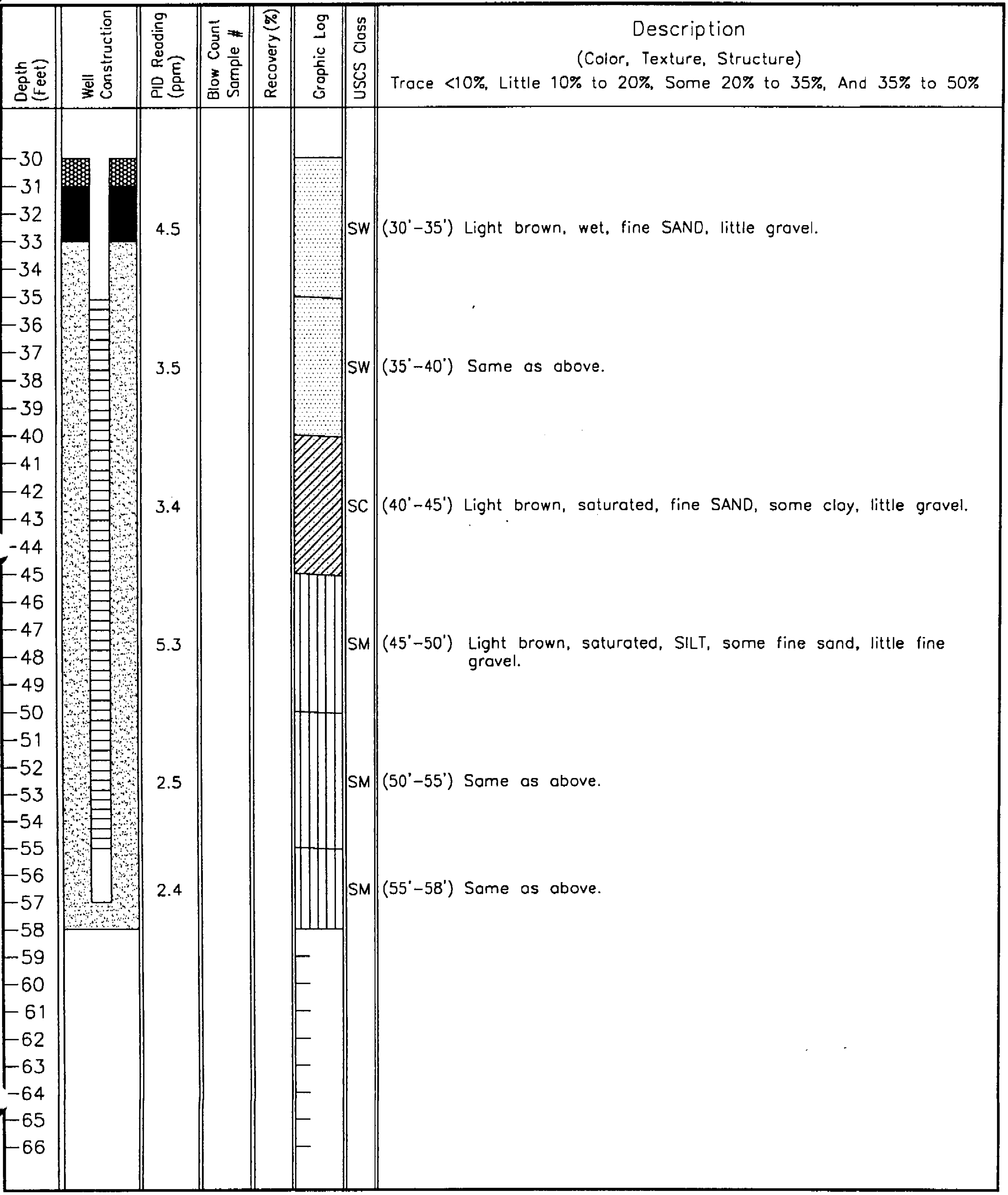
PHONE: (631) 207-9005

Well Number PT-51

Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.



Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
30							
31							
32		4.5				SW	(30'-35') Light brown, wet, fine SAND, little gravel.
33							
34							
35							
36							
37		3.5				SW	(35'-40') Same as above.
38							
39							
40							
41							
42		3.4				SC	(40'-45') Light brown, saturated, fine SAND, some clay, little gravel.
43							
44							
45							
46							
47		5.3				SM	(45'-50') Light brown, saturated, SILT, some fine sand, little fine gravel.
48							
49							
50							
51							
52		2.5				SM	(50'-55') Same as above.
53							
54							
55							
56		2.4				SM	(55'-58') Same as above.
57							
58							
59							
60							
61							
62							
63							
64							
65							
66							

ENVIRO-SCIENCES, INC.
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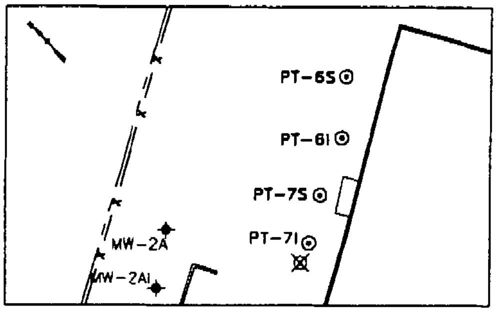
PATCHOGUE, N.Y. 11772
PHONE: (631) 207-9005

Well Number PT-61

Project Number



Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Date Drilled 10/9/02 T.D. of Hole 58' Diameter 8"

T.O.C. NA Water Depth, Initial NA

Screen: Diam. 4" Length 20' Slot Size 0.020"

Casing: Diam. 4" Length 35' Type Sch 40 pvc

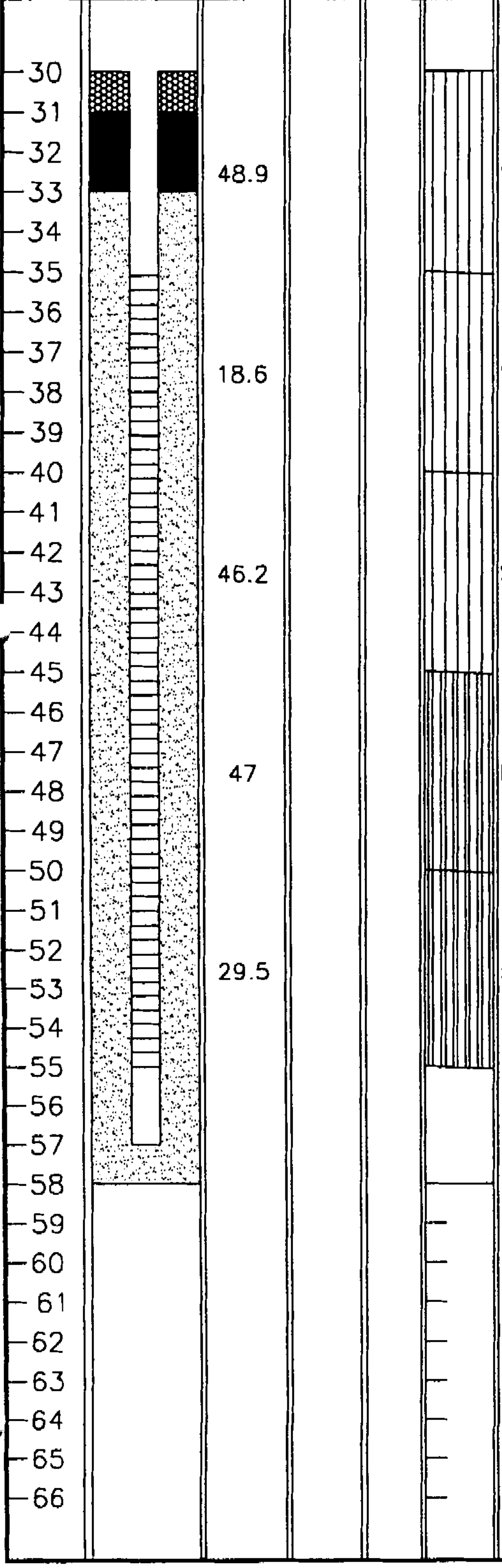
Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger

Driller Carl Pederson Log by Tom Stolworthy Sampling Method Split Spoon

Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
0						Asp	(0-6") Asphalt/basecoarse. Hand dug to 5 feet.
3		3.9				SC	(6"-5') Brown, moist, fine SAND and CLAY.
8		2.7				OL	(5'-10') Black, moist, CLAY, some peat.
12		20.7				OL	(10'-15') Same as above, little fine sand.
17		3.5				SC	(15'-20') Brown, moist to wet, CLAY, some fine sand, some fine gravel.
22		126				SM	(20'-25') Brown, saturated, SILT and fine SAND, some coarse sand, little clay.
28		78.1				SM	(25'-30') Light brown, saturated, SILT, some fine sand.
30							

Well Number PT-61

Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.



Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
30–35		48.9				SM	(30'-35') Light brown, saturated, SILT, some fine sand.
35–40		18.6				SM	(35'-40') Same as above, little fine gravel.
40–45		46.2				SM	(40'-45') Same as above.
45–50		47				ML	(45'-50') Light brown, saturated, SILT.
50–55		29.5				ML	(50'-55') Same as above.
55–58							(55'-58') No recovery.

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312 E. MAIN STREET
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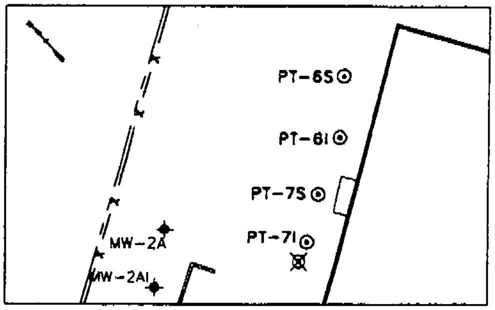
PHONE: (631) 207-9005

Well Number PT-7I

Project Number



Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Date Drilled 10/10/02 T.D. of Hole 58' Diameter 8"

T.O.C. NA Water Depth, Initial NA

Screen: Diam. 4" Length 20' Slot Size 0.020"

Casing: Diam. 4" Length 35' Type Sch 40 pvc

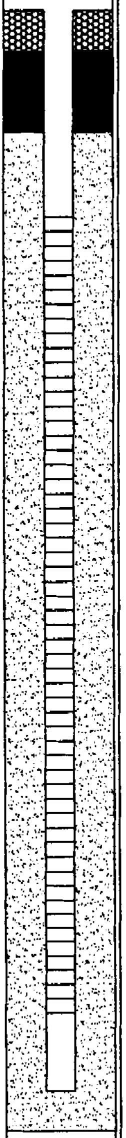
Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger

Driller Carl Pederson Log by Tom Stolworthy Sampling Method

Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
0						Asp	(0-6") Asphalt/basecoarse. Hand dug to 5 feet.
1							
2							
3		62.6				SP	(6"-5') Dark gray, moist, fine and medium SAND, some fine gravel, some coarse sand. Metal cuttings. Poorly sorted, strong odor. Visually impacted.
4							
5							
6							
7		63.5				OL	(5'-10') Black/gray, moist, CLAY, some peat. Strong odor, visually impacted.
8							
9							
10							
11							
12		53.2				OL	(10'-15') Same as above, strong odor, visually impacted.
13							
14							
15							
16							
17		198				SM	(15'-20') Dark brown, wet, SILT and fine SAND, some fine gravel, odor.
18							
19							
20							
21							
22		233				SM	(20'-25') Dark brown, saturated, SILT, some coarse sand. Strong odor.
23							
24							
25							
26							
27		96.9				SM	(25'-30') Same as above, some fine sand. Odor.
28							
29							
30							

Well Number PT-71

roject Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.



Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
30							
31							
32		65.7				SM	(30'-35') Dark brown, saturated, Silt, some fine and coarse sand. Odor.
33							
34							
35							
36							
37		212				ML	(35'-40') Dark brown, saturated, SILT, trace coarse sand. Odor.
38							
39							
40							
41							
42		39.3				ML	(40'-45') Same as above. Odor.
43							
44							
45							
46							
47		18.1				ML	(45'-50') Dark brown, saturated, SILT, little fine sand, trace medium sand. Odor.
48							
49							
50							
51							
52		84				ML	(50'-55') Same as above. Strong odor.
53							
54							
55							
56							(55'-58') No recovery.
57							
58							
59							
60							
61							
62							
63							
64							
65							
66							

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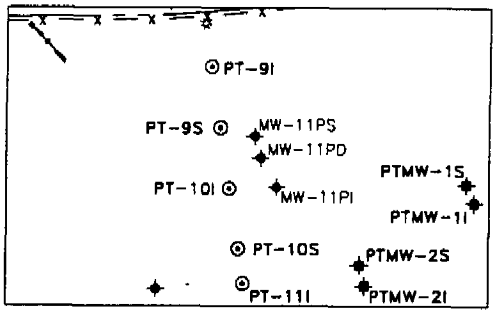
Well Number PT-9I

Project Number



Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Date Drilled 9/25/02 T.D. of Hole 58' Diameter 8"

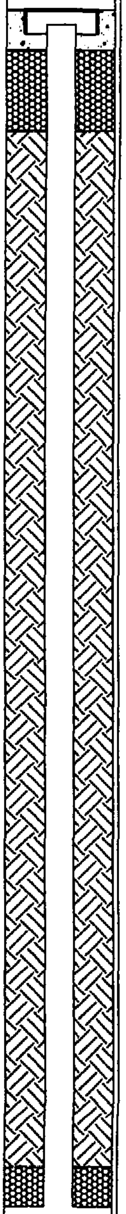
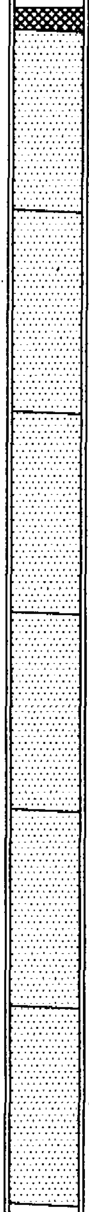
T.O.C. NA Water Depth, Initial NA

Screen: Diam. 4" Length 20' Slot Size 0.020"

Casing: Diam. 4" Length 35' Type Sch 40 pvc

Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger

Driller Carl Pederson Log by Tom Stolworthy Sampling Method Split Spoon

Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
0 1 2						Asp	(0-6") Asphalt/basecoarse. Hand dug to 5 feet.
3 4 5 6		177				SW	(6"-5') Dark brown/black, dry, fine and medium SAND, trace of fine gravel.
7 8 9 10 11		329				SW	(5'-10') Same as above, some coarse sand.
12 13 14 15 16		65.7				SW	(10'-15') Light brown, wet, fine and coarse SAND, little medium sand, trace fine gravel.
17 18 19 20 21		73.6				SW	(15'-20') Same as above.
22 23 24 25 26		57				SW	(20'-25') Light brown, wet, fine and medium SAND, trace coarse sand.
27 28 29 30		192				SW	(25'-30') Same as above, trace coarse sand.

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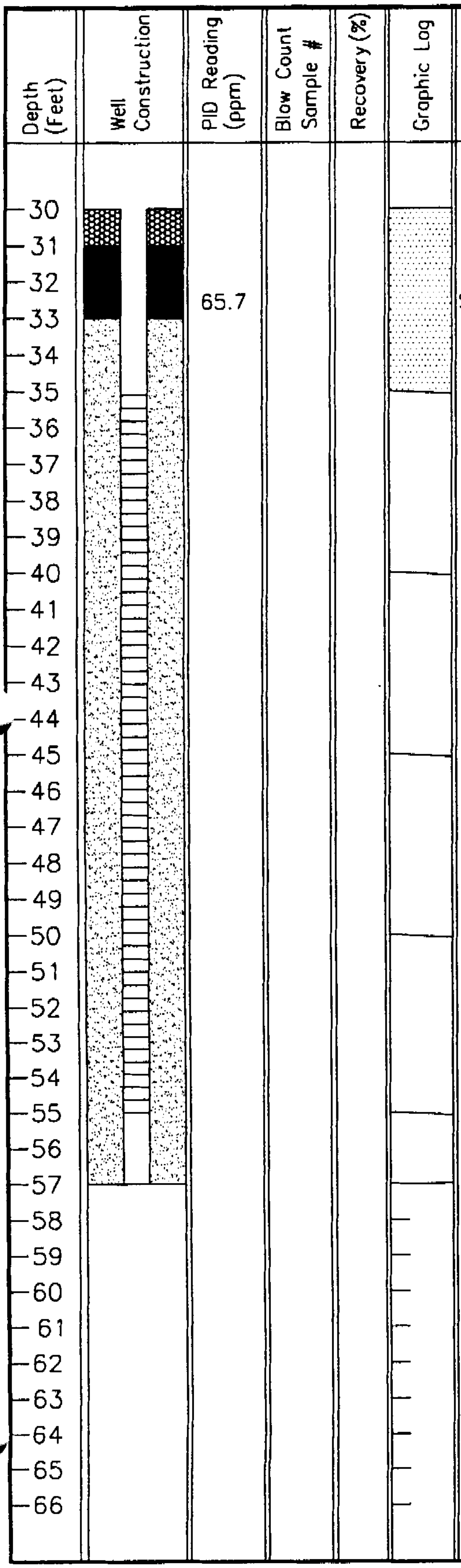
Well Number PT-91

Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.



PID Reading (ppm)	Blow Count Sample #	Recovery (%)	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
65.7			SW	(30'-35') Light brown, wet, fine SAND, some medium sand, little coarse sand.
				(35'-40') No recovery.
				(40'-45') No recovery.
				(45'-50') No recovery.
				(50'-55') No recovery.
				(55'-57') No recovery.
				Note: Drilling from 35'-57' produced no cuttings. Drilling was slow and difficult, cuttings were dissipating into heavy gravel and/or clay.

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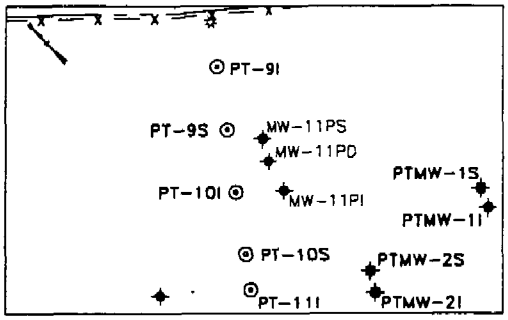
Well Number PT-101

Project Number



Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

ate Drilled 9/26/02 T.D. of Hole 58' Diameter 8"

T.O.C. NA Water Depth, Initial NA

Screen: Diam. 4" Length 20' Slot Size 0.020"

Casing: Diam. 4" Length 35' Type Sch 40 pvc

Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger

Driller Carl Pederson Log by Tom Stolworthy Sampling Method Split Spoon

Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
0						Asp	(0-6") Asphalt/basecoarse. Hand dug to 5 feet.
1						SW	(6"-1.5') Dark brown, dry, fine and medium SAND, trace coarse sand, trace fine gravel.
2						SW	(1.5'-3.5') Light brown, dry, fine SAND, some medium sand.
3							
4		25.3				OL	(3.5'-5') Dark brown/black, moist, CLAY and PEAT, some fine sand, little coarse gravel.
5							
6							
7		16.5				SW	(5'-10') Brown, moist, fine SAND, little medium sand, trace of silt, trace coarse sand.
8							
9							
10							
11							
12		22				SP	(10'-15') Light brown, moist, fine SAND, some medium and coarse sand, trace fine gravel.
13							
14							
15							
16							
17		13.2				SM	(15'-20') Light brown, moist, fine SAND and SILT, little medium and coarse sand, trace fine gravel.
18							
19							
20							
21							
22		14.4				SM	(20'-25') Light brown, wet, fine SAND, some silt, trace fine gravel.
23							
24							
25							
26							
27		15.3				SM	(25'-30') Same as above, little coarse sand.
28							
29							
30							

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PHONE: (631) 207-9005

Well Number PT-101

oject Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
30							
31							
32		14.8				SM	(30'-35') Light brown, saturated, fine SAND and SILT, some coarse sand.
33							
34							
35							
36							
37		11.0				SM	(35'-40') Same as above.
38							
39							
40							
41							
42		7.4				SM	(40'-45') Same as above.
43							
44							
45							
46							
47		6.9				SW	(45'-50') Light brown, saturated, fine and coarse SAND.
48							
49							
50							
51							
52							(50'-55') No recovery.
53							
54							
55							
56							(55'-58') No recovery.
57							
58							
59							
60							
61							
62							
63							
64							
65							
66							

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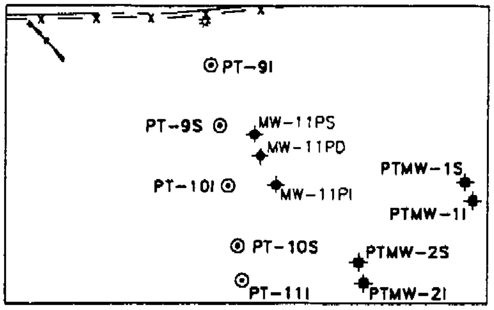
Well Number PT-11I

Project Number



Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Date Drilled 9/30/02 T.D. of Hole 60' Diameter 8"

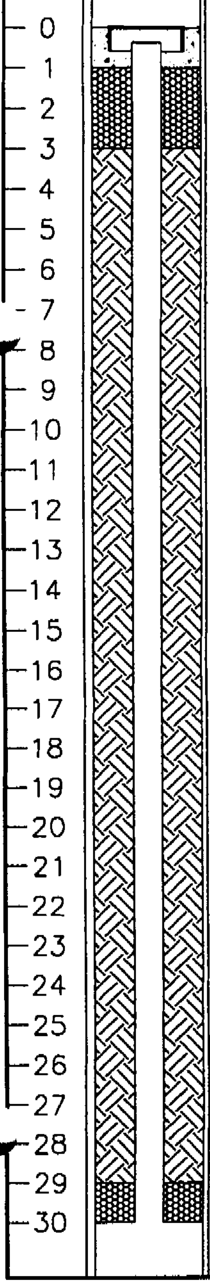
T.O.C. NA Water Depth, Initial NA

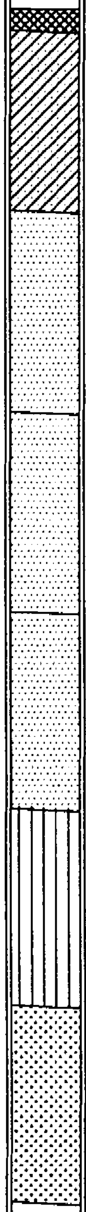
Screen: Diam. 4" Length 20' Slot Size 0.020"

Casing: Diam. 4" Length 35' Type Sch 40 pvc

Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger

Driller Carl Pederson Log by Tom Stolworthy Sampling Method Split Spoon





Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
						Asp	(0-6") Asphalt/basecoarse. Hand dug to 5 feet.
		2.7				SC	(6"-5') Brown, moist, fine SAND and CLAY.
		3.2				SW	(5'-10') Brown, dry, fine and medium SAND, trace fine gravel.
		3.7				SW	(10'-15') Brown, wet, fine and medium SAND, little coarse sand.
		2.4				SW	(15'-20') Brown, wet, fine and medium SAND, little coarse sand, trace coarse gravel.
		4.8				SM	(20'-25') Brown, saturated, fine SAND and SILT, little coarse sand.
		5.4				GW	(25'-30') Brown, wet, fine GRAVEL and fine SAND, little silt, trace coarse gravel.

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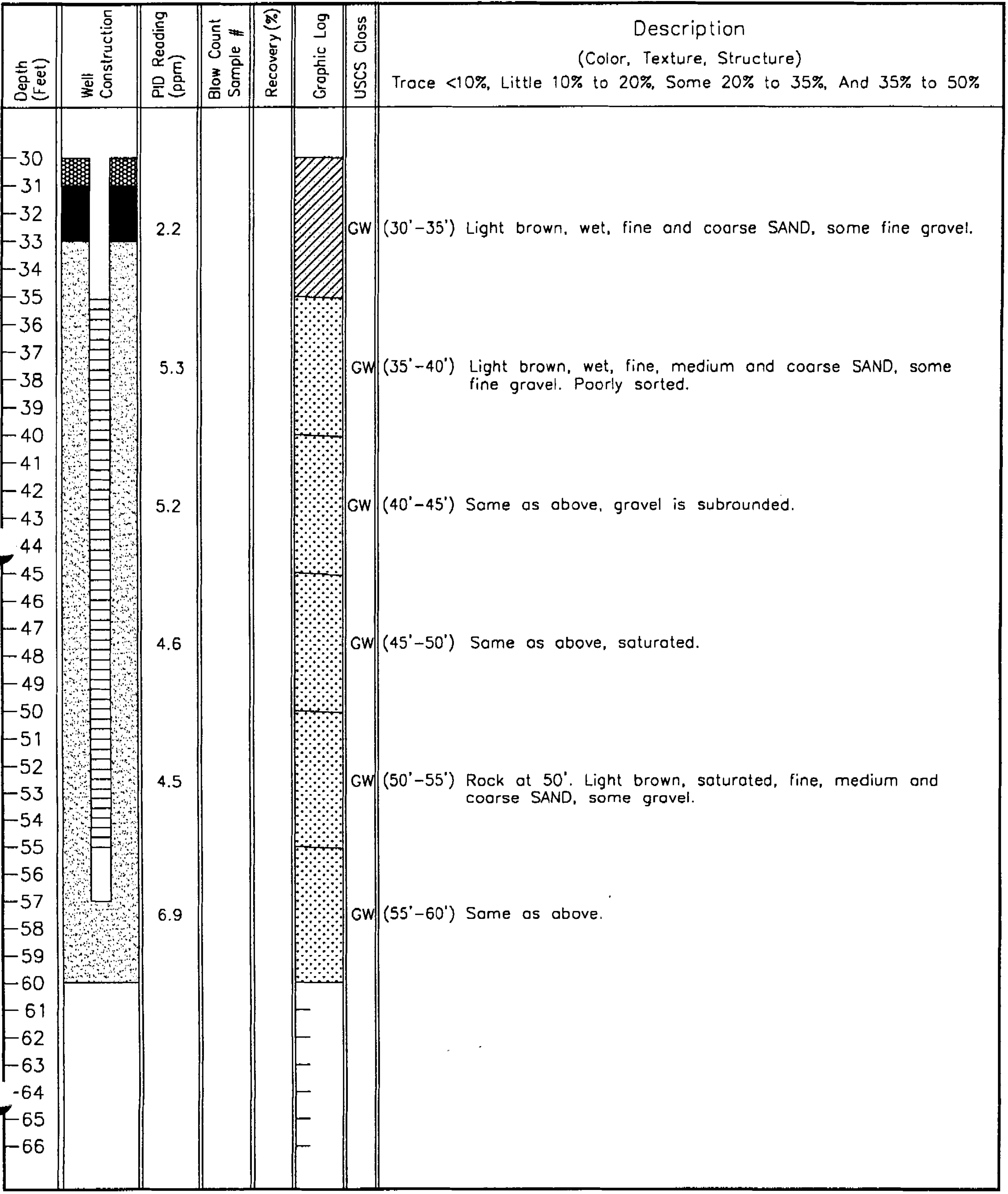
Well Number PT-111

Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.



PID Reading (ppm)	Blow Count Sample #	Recovery (%)	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2.2			GW	(30'-35') Light brown, wet, fine and coarse SAND, some fine gravel.
5.3			GW	(35'-40') Light brown, wet, fine, medium and coarse SAND, some fine gravel. Poorly sorted.
5.2			GW	(40'-45') Same as above, gravel is subrounded.
4.6			GW	(45'-50') Same as above, saturated.
4.5			GW	(50'-55') Rock at 50'. Light brown, saturated, fine, medium and coarse SAND, some gravel.
6.9			GW	(55'-60') Same as above.

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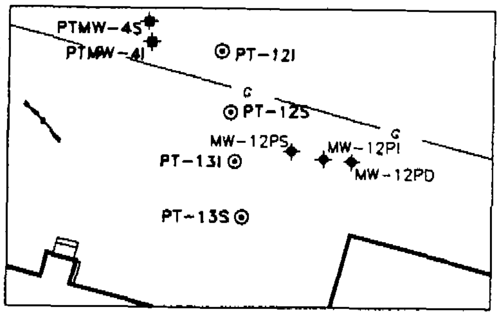
Well Number PT-121

Project Number



Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Date Drilled 10/4/02 T.D. of Hole 58' Diameter 8"

T.O.C. NA Water Depth, Initial NA

Screen: Diam. 4" Length 20' Slot Size 0.020"

Casing: Diam. 4" Length 35' Type Sch 40 pvc

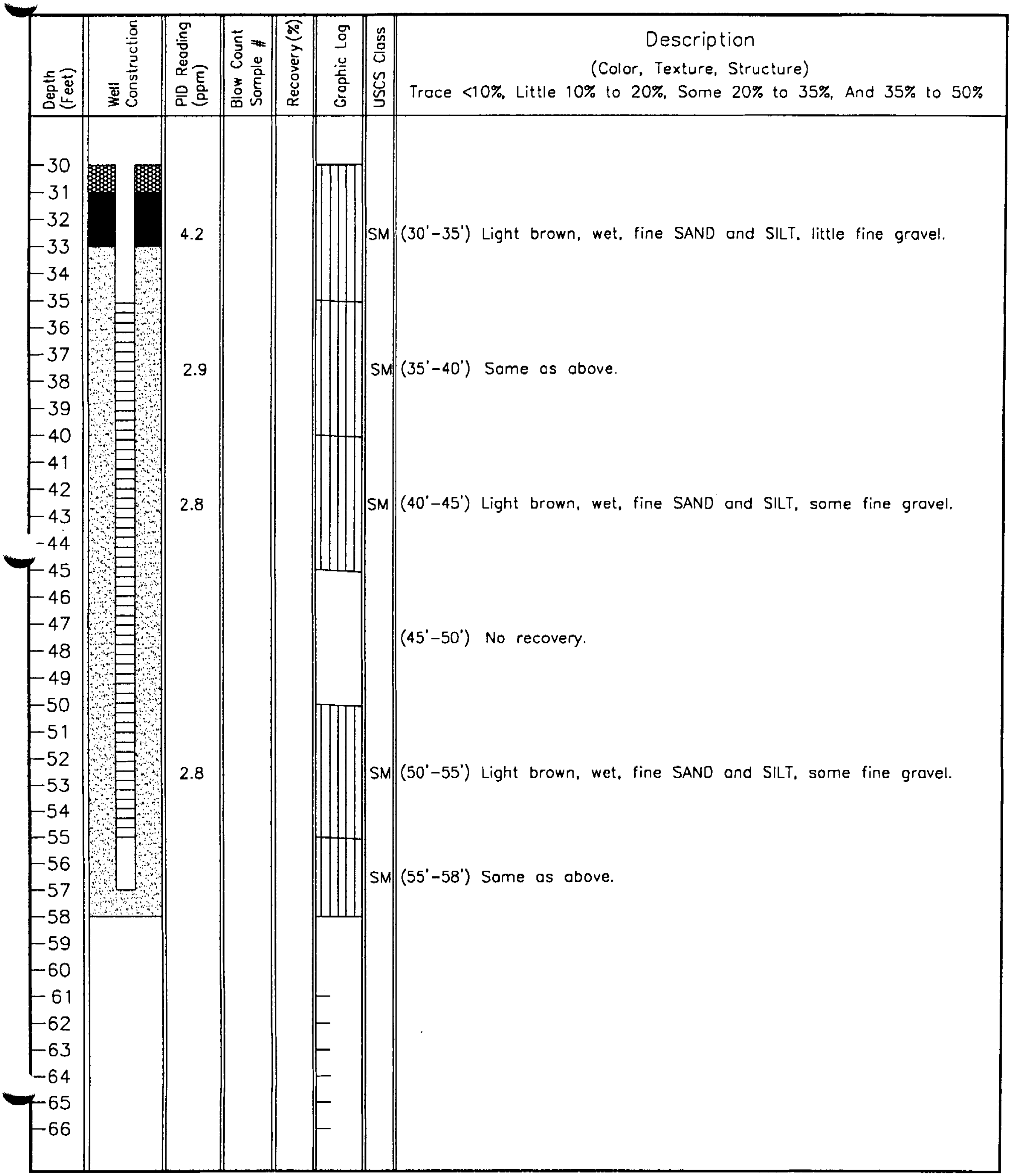
Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger

Driller Carl Pederson Log by Tom Stolworthy Sampling Method Split Spoon

Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
0						Asp	(0-6") Asphalt/bosecoarse. Hand dug to 5 feet.
1							
2							
3		3.1				PT	(6"-5') Brown/black, dry, fineSAND, medium SAND and PEAT.
4							
5							
6							
7							
8		1.9				SC	(5'-10') Light brown, moist, fine SAND, some clay.
9							
10							
11							
12							
13		2.9				SC	(10'-15') Same as above.
14							
15							
16							
17							
18		3.2				SM	(15'-20') Light brown, wet, fine SAND and SILT, little fine gravel.
19							
20							
21							
22							
23							(20'-25') No recovery.
24							
25							
26							
27							
28		1.8				SM	(25'-30') Light brown, wet, fine SAND and SILT, little fine gravel.
29							
30							

Well Number PT-121

Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.



PID Reading (ppm)	Blow Count Sample #	Recovery (%)	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
4.2			SM	(30'-35') Light brown, wet, fine SAND and SILT, little fine gravel.
2.9			SM	(35'-40') Same as above.
2.8			SM	(40'-45') Light brown, wet, fine SAND and SILT, some fine gravel.
				(45'-50') No recovery.
2.8			SM	(50'-55') Light brown, wet, fine SAND and SILT, some fine gravel.
			SM	(55'-58') Same as above.

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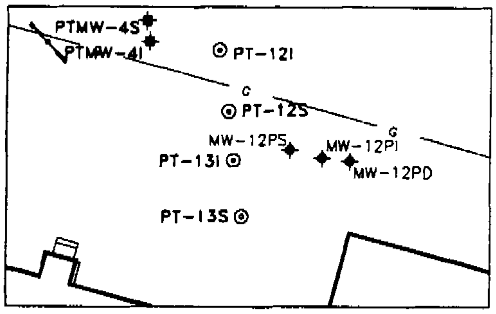
Well Number PT-13I

Project Number



Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Date Drilled 10/4/02 T.D. of Hole 58' Diameter 8"

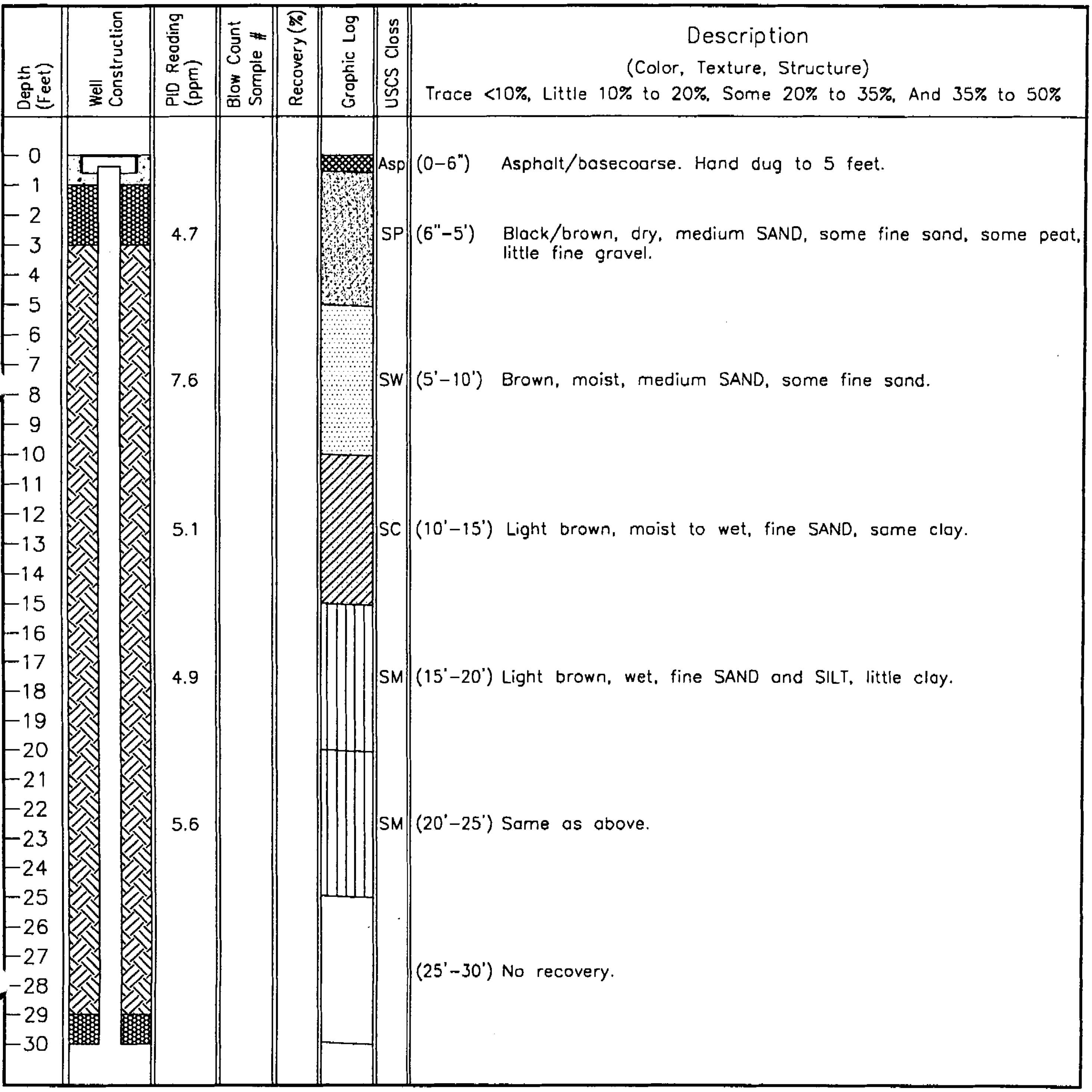
T.O.C. NA Water Depth, Initial NA

Screen: Diam. 4" Length 20' Slot Size 0.020"

Casing: Diam. 4" Length 35' Type Sch 40 pvc

Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger

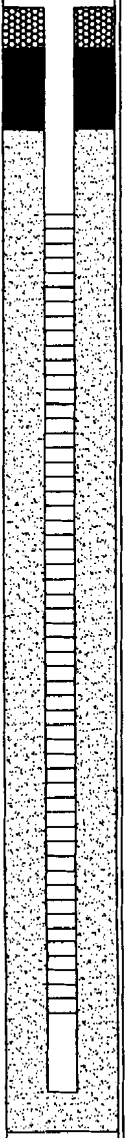
Driller Carl Pederson Log by Tom Stolworthy Sampling Method Split Spoon



Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
0						Asp	(0-6") Asphalt/basecoarse. Hand dug to 5 feet.
1 2 3 4		4.7				SP	(6"-5') Black/brown, dry, medium SAND, some fine sand, some peat, little fine gravel.
5 6 7 8 9		7.6				SW	(5'-10') Brown, moist, medium SAND, some fine sand.
10 11 12 13 14		5.1				SC	(10'-15') Light brown, moist to wet, fine SAND, some clay.
15 16 17 18 19		4.9				SM	(15'-20') Light brown, wet, fine SAND and SILT, little clay.
20 21 22 23 24		5.6				SM	(20'-25') Same as above.
25 26 27 28 29 30							(25'-30') No recovery.

Well Number PT-131

Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

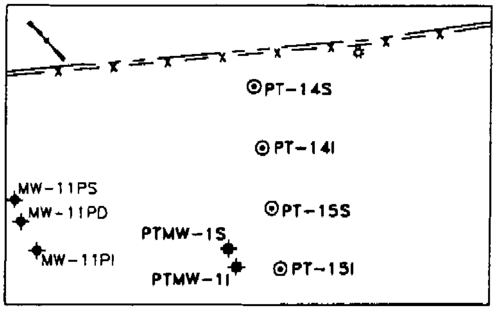


Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
30 31 32 33 34							(30'-35') No recovery.
35 36 37 38 39		3.2				SM	(35'-40') Brown, saturated, fine SAND and SILT.
40 41 42 43 44		4.7				SM	(40'-45') Same as above, little fine gravel.
45 46 47 48 49							(45'-50') No recovery.
50 51 52 53 54							(50'-55') No recovery.
55 56 57							(55'-58') No recovery.
58 59 60 61 62 63 64 65 66							

ENVIRO-SCIENCES, INC.
312 E. MAIN STREET
PATCHOGUE, N.Y. 11772
PHONE: (631) 207-9005

Well Number PT-14I

Project Number



Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Date Drilled 9/30/02 T.D. of Hole 58' Diameter 8" *

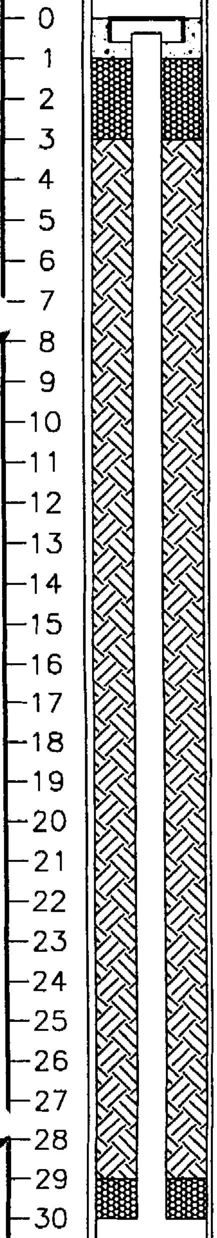
T.O.C. NA Water Depth, Initial NA

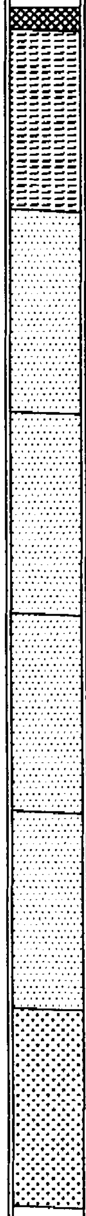
Screen: Diam. 4" Length 20' Slot Size 0.020"

Casing: Diam. 4" Length 35' Type Sch 40 pvc

Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger

Driller Carl Pederson Log by Tom Stolworthy Sampling Method Split Spoon





Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
						Asp	(0-6") Asphalt/basecoarse. Hand dug to 5 feet.
		9.2				Pt	(6"-5') Black, medium SAND and PEAT, trace fine gravel.
		6.0				SW	(5'-10') Dark brown/black, dry, medium SAND, some fine sand, little coarse sand.
		7.0				SW	(10'-15') Light brown, moist, fine SAND, some medium sand, little coarse sand.
		7.1				SW	(15'-20') Same as above, little fine gravel.
		7.7				SW	(20'-25') Light brown, saturated, fine SAND, trace medium and coarse sand.
		11.6				GW	(25'-30') Light brown, saturated, fine GRAVEL and fine SAND, little medium and coarse sand.

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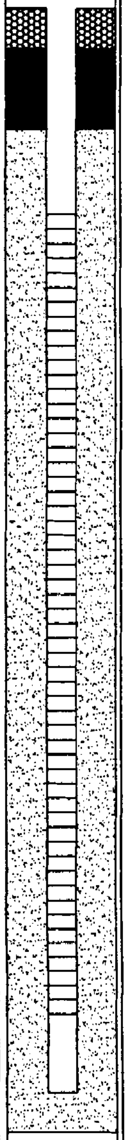
Well Number PT-141

Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.



Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
30							
31							
32		5.5				GW	(30'-35') Light brown, saturated, fine GRAVEL and fine SAND, trace coarse gravel.
33							
34							
35							
36							
37		7.9				GW	(35'-40') Light brown, wet, fine SAND and fine GRAVEL.
38							
39							
40							
41							
42		3.2				GW	(40'-45') Same as above, little coarse sand.
43							
44							
45							
46							
47		7.0				GW	(45'-50') Same as above.
48							
49							
50							
51							
52							(50'-55') No recovery.
53							
54							
55							
56							(55'-58') No recovery.
57							
58							
59							
60							
61							
62							
63							
64							
65							
66							

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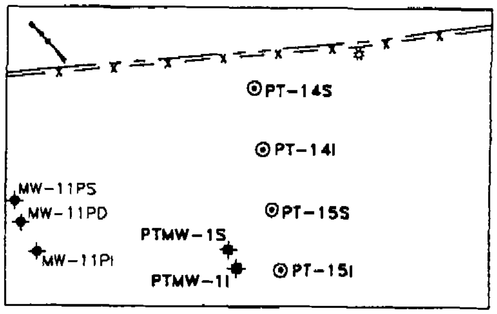
Well Number PT-15I
Project Number



Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.
Date Drilled 10/1/02 T.D. of Hole 58' Diameter 8" *
T.O.C. NA Water Depth, Initial NA
Screen: Diam. 4" Length 20' Slot Size 0.020"
Casing: Diam. 4" Length 35' Type Sch 40 pvc
Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger
Driller Carl Pederson Log by Tom Stolworthy Sampling Method Split Spoon

Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
0						Asp	(0-6") Asphalt/basecoarse. Hand dug to 5 feet.
1 2 3 4 5		22.4				Pt	(6"-5') Dark brown/black, dry, fine and medium SAND, some Peat, little clay.
6 7 8 9 10		14.5				SC	(5'-10') Dark brown, dry, fine and medium SAND, some clay, little coarse sand.
11 12 13 14 15		18.8				SW	(10'-15') Brown, saturated, fine SAND, some coarse sand.
16 17 18 19 20		23.5				GW	(15'-20') Brown, saturated, fine and coarse SAND, some fine gravel.
21 22 23 24 25		13.4				GW	(20'-25') Dark brown, saturated fine SAND and fine GRAVEL, little coarse sand.
26 27 28 29 30		17				GW	(25'-30') Dark brown, saturated, fine GRAVEL, some fine and coarse sand.

Well Number PT-151

Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
30							
31							
32		10				GW	(30'-35') Dark brown, saturated, fine GRAVEL, some fine and coarse sand.
33							
34							
35							
36							
37		9				GW	(35'-40') Same as above.
38							
39							
40							
41							
42							(40'-45') No recovery.
43							
44							
45							
46							
47							(45'-50') No recovery.
48							
49							
50							
51							
52		8.3				SM	(50'-55') Light brown, saturated, SILT and fine SAND.
53							
54							
55							
56		7.7				SM	(55'-58') Same as above, little coarse sand.
57							
58							
59							
60							
61							
62							
63							
64							
65							
66							

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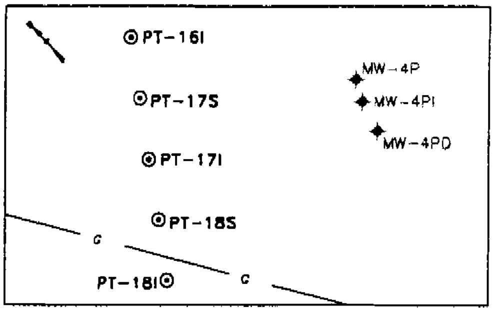
Well Number PT-16I

Project Number



Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Date Drilled 10/1/02 T.D. of Hole 58' Diameter 8" *

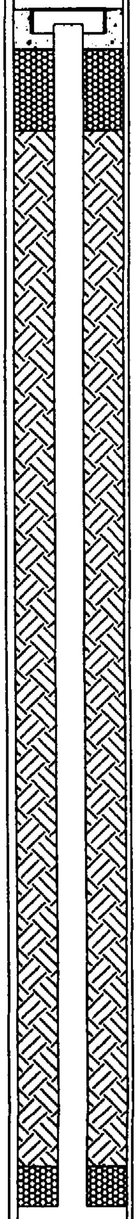
T.O.C. NA Water Depth, Initial NA

Screen: Diam. 4" Length 20' Slot Size 0.020"

Casing: Diam. 4" Length 35' Type Sch 40 pvc

Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger

Driller Carl Pederson Log by Tom Stolworthy Sampling Method Split Spoon



Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
0						Asp	(0-6") Asphalt/basecoarse. Hand dug to 5 feet.
1							
2						SW	(6"-3') Dark brown/black, dry, fine and medium SAND, trace coarse sand and fine gravel.
3						Pt	(3'-4') Dark brown/black, moist, PEAT and CLAY, organic matter (tree roots, etc.).
4							
5		14.8				SW	(4'-5') Dark brown, dry, fine and medium SAND.
6							
7							
8		75.4				SW	(5'-10') Dark brown, wet, fine SAND, litle clay, little fine gravel.
9							
10							
11							
12							
13		169				SW	(10'-15') Brown, wet, fine SAND, little clay, trace fine and coorse gravel.
14							
15							
16							
17							
18		194				SW	(15'-20') Brown, wet, fine SAND, little gravel, little clay.
19							
20							
21							
22							
23		201				SM	(20'-25') Brown, saturated, fine SAND, some silt, little coarse sand.
24							
25							
26							
27							
28		196				SM	(25'-30') Light brown, saturated, fine SAND, SILT and coarse sand, trace fine gravel.
29							
30							

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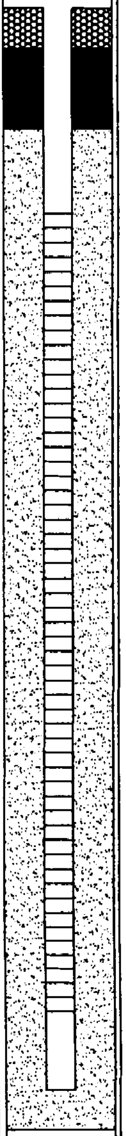
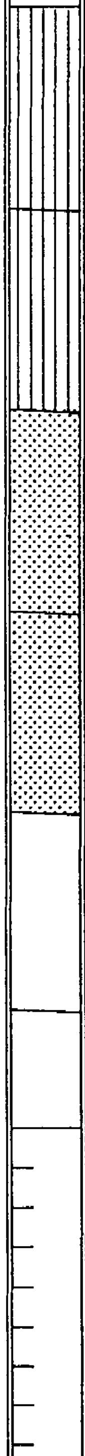
Well Number PT-161

Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.





Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
30							
31							
32		359				SM	(30'-35') Light brown, saturated, SILT and coarse SAND, some fine sand.
33							
34							
35							
36							
37		227				SM	(35'-40') Light brown, saturated, fine SAND, some medium and coarse sand, some silt. Poorly sorted.
38							
39							
40							
41							
42		84.5				GW	(40'-45') Brown, saturated, fine GRAVEL and fine SAND.
43							
44							
45							
46							
47		188				GW	(45'-50') Same as above.
48							
49							
50							
51							
52							(50'-55') No recovery.
53							
54							
55							
56							(55'-58') No recovery.
57							
58							
59							
60							
61							
62							
63							
64							
65							
66							

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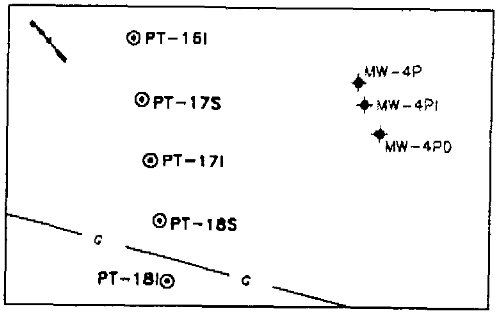
Well Number PT-17I

Project Number



Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Date Drilled 10/2/02 T.D. of Hole 58' Diameter 8" *

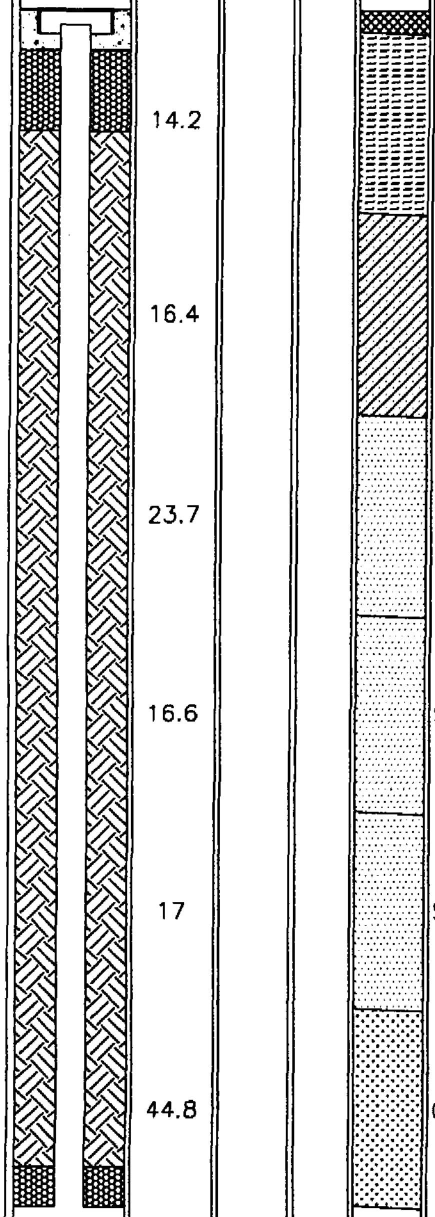
T.O.C. NA Water Depth, Initial NA

Screen: Diam. 4" Length 20' Slot Size 0.020"

Casing: Diam. 4" Length 35' Type Sch 40 pvc

Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger

Driller Carl Pederson Log by Tom Stolworthy Sampling Method Split Spoon



Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
0						Asp	(0-6") Asphalt/basecoarse. Hand dug to 5 feet.
3		14.2				PT	(4'-5') Black, dry, PEAT and CLAY, some medium sand. Organic odor.
8		16.4				SC	(5'-10') Brown/black, dry, fine and medium SAND, some clay. Boulder at 9 feet.
13		23.7				SW	(10'-15') Brown, wet, fine SAND, trace fine gravel.
18		16.6				SW	(15'-20') Brown, wet, fine SAND, little fine gravel. Poor recovery.
23		17				SW	(20'-25') Brown, saturated, fine SAND, some medium sand, little fine gravel.
28		44.8				GW	(25'-30') Brown, wet, fine GRAVEL and fine SAND, trace coarse sand.

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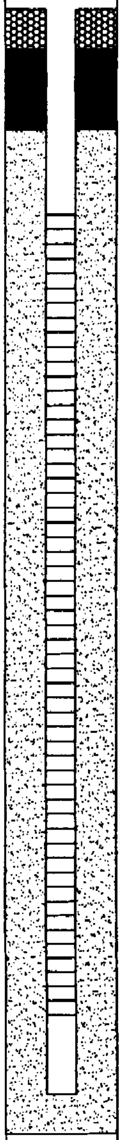
Well Number PT-171

Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
30 31 32 33 34							(30'-35') No recovery.
35 36 37 38 39							(35'-40') No recovery.
40 41 42 43 44		24				SW	(40'-45') Brown, wet, fine SAND. Poor recovery.
45 46 47 48 49		17.3				SW	(45'-50') Light brown, wet, fine SAND, some medium and coarse sand.
50 51 52 53 54		28.1				SW	(50'-55') Same as above.
55 56 57							(55'-58') No recovery.
58 59 60 61 62 63 64 65 66							

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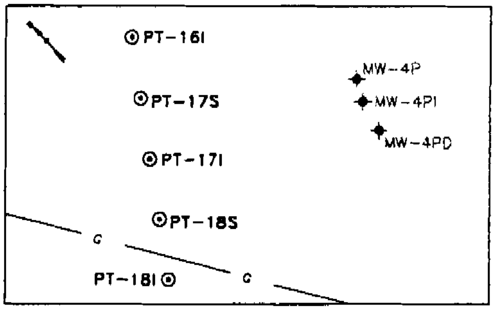
Well Number PT-18I

Project Number



Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Date Drilled 10/3/02 T.D. of Hole 58' Diameter 8" *

T.O.C. NA Water Depth, Initial NA

Screen: Diam. 4" Length 20' Slot Size 0.020"

Casing: Diam. 4" Length 35' Type Sch 40 pvc

Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger

Driller Carl Pederson Log by Tom Stolworthy Sampling Method Split Spoon

Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
0						Asp	(0-6") Asphalt/basecoarse. Hand dug to 5 feet.
1							
2		6.3				PT	(6"-5') Black/brown, dry, PEAT and medium SAND.
3							
4							
5							
6							
7		8.9				SW	(5'-10') Dark brown, dry, fine and medium SAND, trace coarse sand.
8							
9							
10							
11							
12		12				SW	(10'-15') Brown, wet, fine SAND, some medium sand, trace coarse sand.
13							
14							
15							
16							
17		10.9				SW	(15'-20') Same as above. Boulder at 18 feet.
18							
19							
20							
21							
22		7.8				SW	(20'-25') Same as above.
23							
24							
25							
26							
27		8.4				SW	(25'-30') Light brown, wet, fine SAND, some medium sand, little fine gravel.
28							
29							
30							

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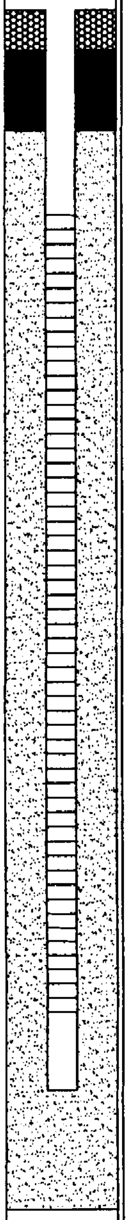
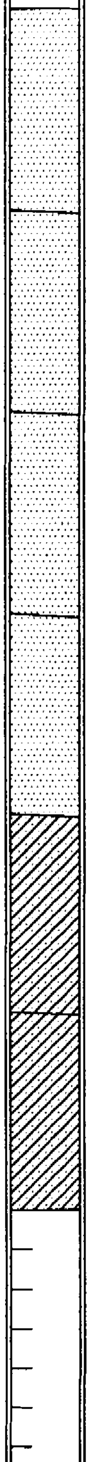
Well Number PT-181

Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.





Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
30–35		7.5				SW	(30'-35') Light brown, wet, fine SAND, some medium sand, little fine gravel.
35–40		10.5				SW	(35'-40') Same as above.
40–45		6.8				SW	(40'-45') Light brown, wet, fine SAND, little coarse sand.
45–50		13				SW	(45'-50') Same as above, trace coarse sand.
50–55		10.7				SC	(50'-55') Light brown, wet, fine SAND, some clay.
55–60		18.6				SC	(55'-60') Same as above.

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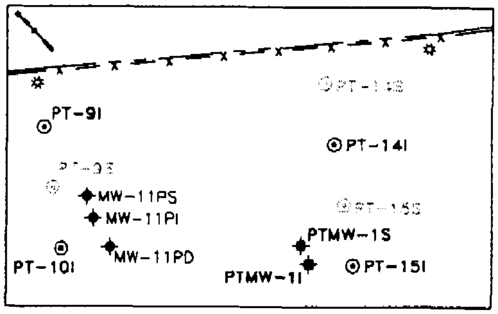
Well Number PTMW-11

Project Number



Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Date Drilled 10/11/02 T.D. of Hole 57' Diameter 8"

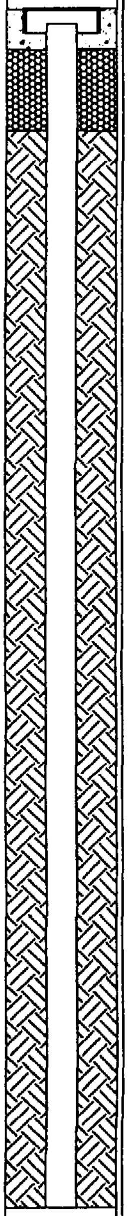
T.O.C. NA Water Depth, Initial NA

Screen: Diam. 4" Length 10' Slot Size 0.020"

Casing: Diam. 4" Length 45' Type Sch 40 pvc

Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger

Driller Carl Pederson Log by Tom Stolworthy Sampling Method Split Spoon



Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2							(0'-4') Hand dug to 5 feet. 6" Asphalt/basecoarse.
5				20%		SW	(4'-6') Brown, dry, fine SAND, little coarse sand and fine gravel.
10		20.3		30%		SW	(9'-11') Brown, wet, fine SAND, some medium sand, trace fine gravel.
15		19		40%		SW	(14'-16') Grey, wet, medium and coarse SAND, little fine gravel.
20		40.3		50%		SW	(19'-21') Grey, wet, medium and coarse SAND, little fine gravel.
25		8.3		60%		SW	(24'-26') Grey/brown, wet, fine SAND, some medium and coarse sand, little fine gravel.
30		80.3		50%		SW	(29'-31') Same as above.

File: PTMW11LOG.dwg

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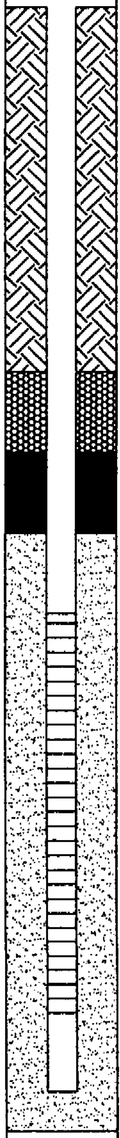
Well Number PTMW-11

Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y. Date 10/11/02



Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
30		5.0		40%		SW	(29'-31') Same as above.
31							
32							
33							
34							
35		10.6		50%		SP	(34'-36') Light brown, wet, fine and medium SAND, some coarse sand, little fine gravel.
36							
37							
38							
39							
40		17.9		30%		GP	(39'-41') Light brown, wet, fine GRAVEL, some coarse and medium sand, little fine gravel.
41							
42							
43							
44							
45		4.6		60%		SC	(44'-46') Light brown, wet, fine SAND, some clay, little medium sand, 2" grey, clay lens at 45'.
46							
47							
48							
49							
50		3.9		70%		SC	(49'-51') Light brown, wet, fine SAND, little medium sand, then grey, moist, clay and silt.
51							
52							
53							
54							
55		3.1		80%		SC	(54'-56') Same as above.
56							
57							
58							
59							
60							
61							
62							
63							
64							
65							
66							

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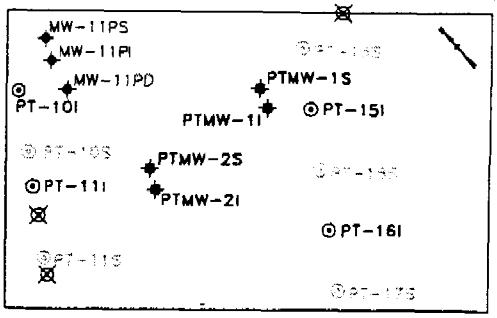
Well Number PTMW-2I

Project Number



Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Date Drilled 10/14/02 T.D. of Hole 59' Diameter 8"

T.O.C. NA Water Depth, Initial NA

Screen: Diam. 4" Length 10' Slot Size 0.020"

Casing: Diam. 4" Length 45' Type Sch 40 pvc

Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger

Driller Carl Pederson Log by Sabine Winslow Sampling Method Split Spoon

Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2		0.0					(0'-4') Hand dug to 5 feet. 6" Asphalt/basecoarse.
5		0.0				SP	(4'-6') Brown, wet, medium to coarse SAND, little fine and coarse gravel, trace cobbles.
10		0.0				SP	(9'-11') Brown, wet, medium to coarse SAND, little fine to coarse gravel.
15		0.0				SP	(14'-16') Same as above.
20		0.0		15%		SP	(19'-21') Same as above.
25							(24'-26') No recovery.
30		0.0				SP	(29'-31') Dark brown, wet, fine to coarse SAND, little fine to coarse gravel.

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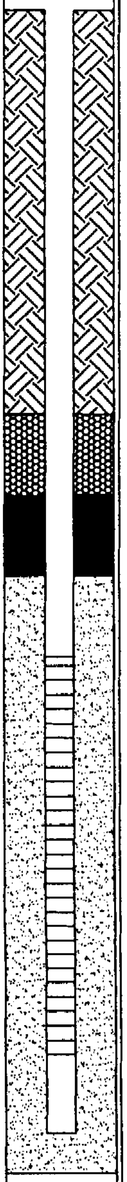
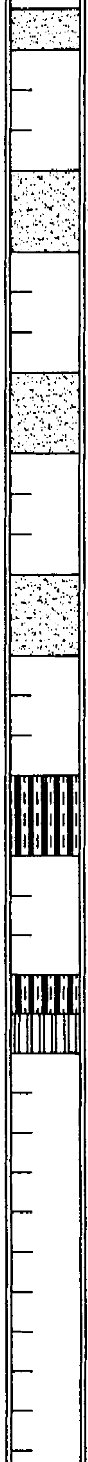
Well Number PTMW-21

Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y. Date 10/14/02





Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
30						SP	
35		0.0				SP	(34'-36') Brown, wet, fine to coarse SAND, little fine to coarse gravel.
40		0.0				SW	(39'-41') Same as above.
45		0.0		5%		SP	(44'-46') Poor recovery, rock in spoon. Brown-gray, wet, fine to coarse SAND, little fine to coarse gravel.
50		0.0				CL	(49'-51') Brown, wet, dense SILT and CLAY.
55		0.0				CL ML	(54'-56') Brown, wet, dense SILT and CLAY to 55 feet then Brown, wet, dense SILT.

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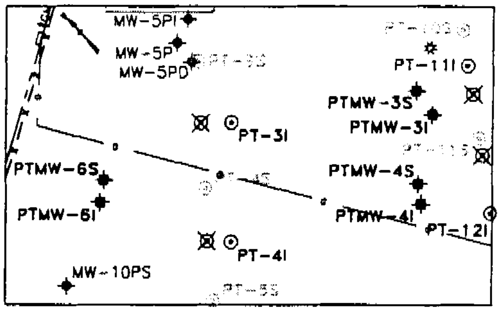
Well Number PTMW-2I

Project Number



Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Date Drilled 10/11/02 T.D. of Hole 57' Diameter 8"

T.O.C. NA Water Depth, Initial NA

Screen: Diam. 4" Length 10' Slot Size 0.020"

Casing: Diam. 4" Length 45' Type Sch 40 pvc

Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger

Driller Carl Pederson Log by Tom Stolworthy Sampling Method Split Spoon

Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
0							
1							
2							(0'-4') Hand dug to 5 feet. 6" Asphalt/basecoarse.
3							
4							
5				10%		SC	(4'-6') Black/brown, moist, CLAY and fine SAND, some coarse sand.
6							
7							
8							
9							
10		9.6		20%		SW	(9'-11') Light brown, wet, coarse and medium SAND, little fine gravel.
11							
12							
13							
14							
15		42.1		50%		SW	(14'-16') Grey, wet, medium and coarse SAND, little fine gravel.
16							
17							
18							
19							
20		136.2		30%		SP	(19'-21') Light brown, wet, medium and coarse SAND, some fine sand, little fine and coarse gravel.
21							
22							
23							
24							
25		26.2		5%		SM	(24'-26') Light brown, wet, fine SAND and SILT.
26							
27							
28							
29							
30		51.2		15%		SW	(29'-31') Brown, wet, medium SAND, some coarse sand.

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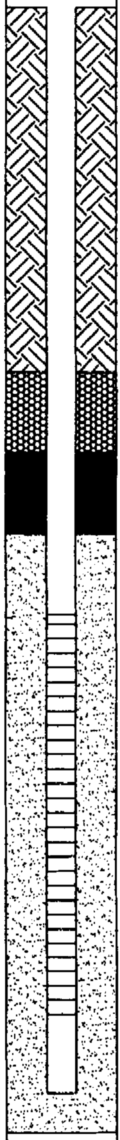
Well Number PTMW-31

Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y. Date 10/11/02



Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
30						SW	
31							
32							
33							
34							
35		37.1		35%		SW	(34'-36') Light brown, wet, medium SAND, some coarse sand.
36							
37							
38							
39							
40		32.3		40%		SW	(39'-41') Same as above.
41							
42							
43							
44							
45		44.8		50%		SC	(44'-46') Light brown, wet, medium and coarse SAND, little medium gravel, trace fine sand and fine gravel.
46							
47							
48							
49							
50		22.0		30%		SC	(49'-51') Light brown, wet, SILT and CLAY, little fine sand.
51							
52							
53							
54							
55		29.3		40%		SC	(54'-56') Light brown, wet, fine and medium SAND, trace coarse sand.
56							
57							
58							
59							
60							
61							
62							
63							
64							
65							
66							

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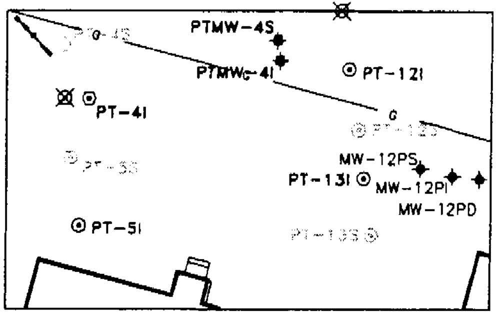
Well Number PTMW-4I

Project Number



Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Date Drilled 10/12/02 T.D. of Hole 58' Diameter 8"

T.O.C. NA Water Depth, Initial NA

Screen: Diam. 4" Length 10' Slot Size 0.020"

Casing: Diam. 4" Length 45' Type Sch 40 pvc

Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger

Driller Carl Pederson Log by Sabine Winslow Sampling Method Split Spoon

Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
0							
1							
2		61.2					(0'-4') Hand dug to 5 feet. 6" Asphalt/basecoarse.
3							
4							
5		96.3				SP	(4'-6') Dark brown-gray, coarse to medium SAND, little coarse and medium gravel, trace fine cobbles.
6							
7							
8							
9							
10		118				SW	(9'-11') Light brown, wet, fine to medium SAND, little coarse sand, trace fine and coarse gravel.
11							
12							
13							
14							
15		158				SW	(14'-16') Light brown, wet, fine to medium SAND, little coarse sand, little fine and medium gravel.
16							
17							
18							
19							
20		381		15%		GW	(19'-21') Gray, wet, coarse SAND and fine and medium GRAVEL, little medium sand, trace fine sand, trace fine cobble.
21							
22							
23							
24							
25		178		15%		SP	(24'-26') Light brown, wet, medium to coarse SAND, little fine to medium gravel, trace coarse gravel.
26							
27							
28							
29							
30		59.3				GW	(29'-31') Light brown, wet, coarse SAND and fine to medium GRAVEL, little medium sand, trace cobbles.

FILE: PTMW4ILOG.DWG

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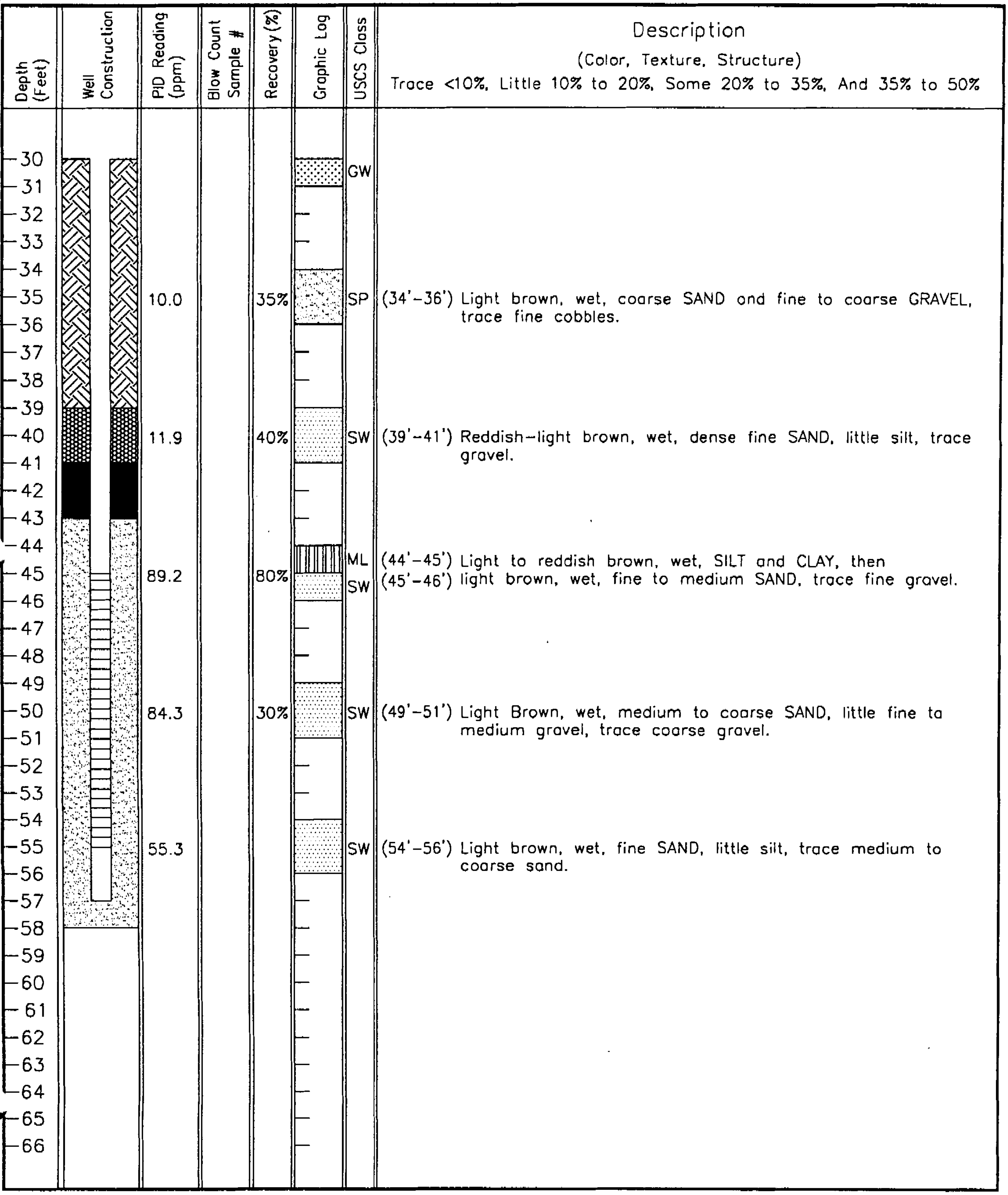
PATCHOGUE, N.Y. 11772
PHONE: (631) 207-9005

Well Number PTMW-41

Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y. Date 10/12/02



Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
30						GW	
31							
32							
33							
34							
35		10.0		35%		SP	(34'-36') Light brown, wet, coarse SAND and fine to coarse GRAVEL, trace fine cobbles.
36							
37							
38							
39							
40		11.9		40%		SW	(39'-41') Reddish-light brown, wet, dense fine SAND, little silt, trace gravel.
41							
42							
43							
44						ML	(44'-45') Light to reddish brown, wet, SILT and CLAY, then
45		89.2		80%		SW	(45'-46') light brown, wet, fine to medium SAND, trace fine gravel.
46							
47							
48							
49							
50		84.3		30%		SW	(49'-51') Light Brown, wet, medium to coarse SAND, little fine to medium gravel, trace coarse gravel.
51							
52							
53							
54							
55		55.3				SW	(54'-56') Light brown, wet, fine SAND, little silt, trace medium to coarse sand.
56							
57							
58							
59							
60							
61							
62							
63							
64							
65							
66							

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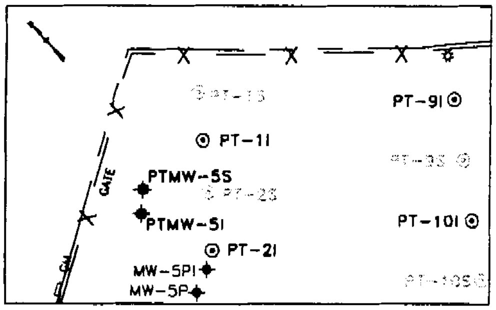
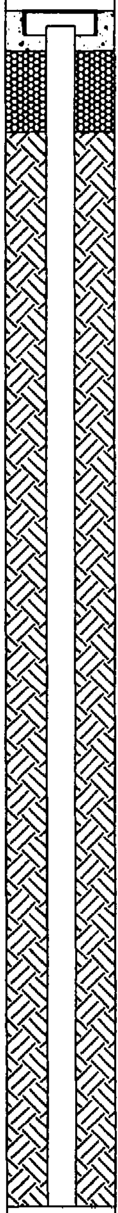
Well Number PTMW-5I

Project Number



Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.
Date Drilled 10/10/02 T.D. of Hole 58' Diameter ~6'
T.O.C. NA Water Depth, Initial NA
Screen: Diam. 4" Length 10' Slot Size 0.020"
Casing: Diam. 4" Length 45' Type Sch 40 pvc
Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger
Driller Carl Pederson Log by Tom Stolworthy Sampling Method Split Spoon



Depth (Feet)	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
2					(0'-4') Hand dug to 5 feet. 6" Asphalt/basecoarse.
5					(4'-6') No Recovery. Rock in Spoon.
7	1134		30%	SP	(6'-8') Brown, wet, medium SAND, some coarse and fine sand, little fine gravel. Sheen, strong odor.
10	340		25%	SP	(9'-11') Dark brown, wet, fine and medium SAND, some coarse sand, little fine gravel. HC odor.
15	183		20%	SP	(14'-16') Dark brown, wet, fine and medium SAND, some coarse sand and fine gravel. HC odor.
20	302		40%	SP	(19'-21') Dark brown, wet, fine and medium SAND, some fine gravel little coarse sand. Slight odor.
25	183		40%	SP	(24'-26') Same as above.
30	80.3		50%	SP	(29'-31') Same as above.

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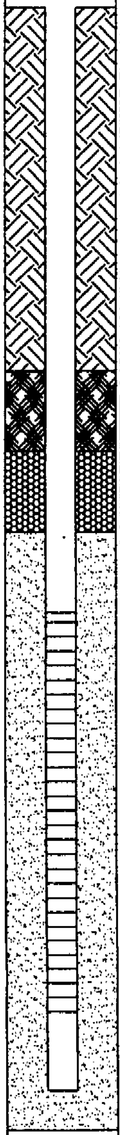
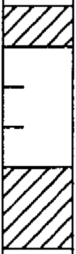
Well Number PTMW-51

Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.





Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
30							
31							
32							
33							
34							
35		90.2		60%		SP	(6'-8') Brown/grey, wet, fine and medium SAND, some coarse sand little fine grovel.
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							
51							
52							
53							
54							
55							
56							
57							
58							
59							
60							
61							
62							
63							
64							
65							
66							

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PHONE: (631) 207-9005

Well Number PTMW-6I

Project Number

Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Date Drilled 10/10/02 T.D. of Hole 58' Diameter 8"

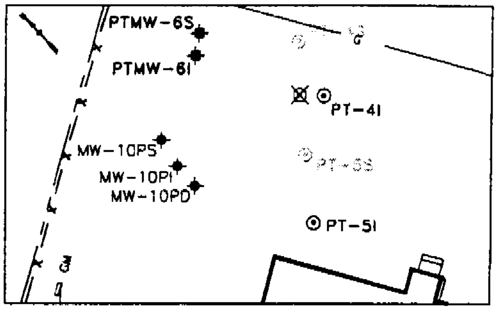
T.O.C. NA Water Depth, Initial ~7'

Screen: Diam. 4" Length 10' Slot Size 0.020"

Casing: Diam. 4" Length 45' Type Sch 40 pvc

Drilling Co. Land, Air & Water Env. Drilling Method Hollow Stem Auger

Driller Carl Pederson Log by Tom Stolworthy Sampling Method Split Spoon



Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
0							
1							
2		18.7					(0'-4') Hand dug to 5 feet. 6" Asphalt/basecoarse. Brown/black, dry, fine and medium SAND, some peat, little fine gravel.
3							
4							
5		22.6		40%		SC	(4'-6') Dark brown, moist, SILT and CLAY to five feet, then Brown, moist, fine and medium SAND, little coarse sand and fine gravel.
6							
7							
8							
9							
10		38.7		20%		SW	(9'-11') Light brown, wet, fine SAND, some medium and coarse sand, trace fine gravel.
11							
12							
13							
14							
15		60.5		50%		SM	(14'-16') Tan/orange-brown, dry to moist, fine SAND and SILT.
16							
17							
18							
19							
20		41.2		50%		SM	(19'-21') Light brown, wet, fine SAND and SILT, little fine gravel.
21							
22							
23							
24							
25		23.2		70%		SW	(24'-26') Tan/orange-brown, wet, fine SAND, some coarse sand.
26							
27							
28							
29							
30		25.4		30%		SP	(29'-30') Tan, wet, fine SAND, some medium and coarse sand, trace of fine gravel.

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PHONE: (631) 207-9005

Well Number PTMW-61

Project Pall Corp. Glen Cove Location 30 Sea Cliff Ave., Glen Cove N.Y.

Depth (Feet)	Well Construction	PID Reading (ppm)	Blow Count Sample #	Recovery (%)	Graphic Log	USCS Class	Description (Color, Texture, Structure) Trace <10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
30						ML	(30'-31') Tan, wet, SILT, trace of coarse sand.
31							
32							
33							
34							
35		33.9		60%		ML	(34'-36') Tan, moist to dry, SILT, little fine sand, little clay.
36							
37							
38							
39							
40		33.2		40%		ML	(34'-36') Same as above.
41							
42							
43							
44							
45		8.7		60%		ML	(44'-46') Tan, moist to wet, SILT, little fine sand, little clay.
46							
47							
48							
49							
50		5.1		50%		SM	(49'-51') Tan to orange-brown, moist, SILT, some fine sand.
51							
52							
53							
54							
55		11.1		70%		SM	(54'-56') Same as above.
56							
57							
58							
59							
60							
61							
62							
63							
64							
65							
66							

Feasibility Study of $KMnO_4$ Oxidation of VOCs and Soils For the Glen Cove, New York Site

Prepared for:
Enviro-Sciences Inc.,

by:

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And
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Environmental Research Institute
University of Connecticut,
Storrs, Connecticut 06269

June 18, 2001

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1. Introduction

A groundwater remediation program is being implemented at a facility located at Glen Cove, New York (GCNY). The groundwater at the site is contaminated with volatile organic compounds (VOCs) that primarily include tetrachloroethylene (PCE), trichloroethylene (TCE), dichloroethylenes (DCEs), vinyl chloride (VC) and two freons (i.e., chloro-triflouoroethene and 1,1,2-trichloro-1,2,2-trifluoroethane).

In-Situ Chemical Oxidation is being evaluated as the remedial technology for the restoration of the GCNY site. Potassium permanganate ($KMnO_4$) is the oxidant that is evaluated as the oxidant to be used in this site. The Environmental Research Institute (ERI) of the University of Connecticut was retained by Enviro-Sciences Inc. (ESI) to conduct bench-scale tests for evaluating the feasibility of using $KMnO_4$ to destroy PCE, TCE, DCEs, VC and freons. In particular, the study has focused on the following: (1) a preliminary characterization of the site soil and groundwater (2) the degradation of target VOCs by permanganate ions in the site groundwater (3) the determination of oxidant demand for the actual site soil (4) the impact of oxidant injection on soil metal leaching.

2. Goals of Proposed Tests

Four bench-scale tests recognized as Tasks 1A, 1B, 1C and 1D were conducted.

- **Task 1A**: Preliminary soil and groundwater characterization
- **Task 1B**: Oxidation of VOCs in the site contaminated groundwater by $KMnO_4$
- **Task 1C**: Determination of oxidant ($KMnO_4$) demand of the GCNY site soil
- **Task 1D**: Examination of the extent of metals leaching from soils due to $KMnO_4$ oxidation

The goals of the tests were to investigate the feasibility of using $KMnO_4$ to remediate the VOCs at the GCNY site. In addition, the oxidant demand of the actual site soil and the impact of oxidant injection on metal leaching from the site soil were determined. Investigation methods used to fulfill the proposed tests are described below.

3. Experimental Section

3.1 Soil and Groundwater Characterization (Task 1A)

The characteristics of the site soil and groundwater are valuable and useful for data interpretation of the proposed tests and for future field applications. Duplicate soil samples (sample ID TS1-S) and groundwater samples (sample ID TS1-GW), collected near MW-12PS, were characterized for parameters including metal content [e.g., iron (Fe), aluminum (Al), manganese (Mn), chromium (Cr), arsenic (As), selenium (Se) and lead (Pb)], pH and total organic carbon content (TOC). The soil was also characterized for its grain size distribution. A list of the analysis methods employed is summarized in Table 1.

- **Selection of Sample Soil and Groundwater for the Tests**

Five soil samples (labeled as TS1-S to TS5-S) and five groundwater samples (labeled as TS1-GW to TS5-GW) were collected from the GCNY site on 03/14/01 and delivered to ERI on 03/15/01 by ESI. The groundwater samples were first analyzed for their VOC levels by the SW-846 8260 method. The results showed that the TS1-GW groundwater contained all targeted VOCs [i.e., chlorinated ethenes (CEs) and freons]. Thus, TS1-S soil and TS1-GW groundwater were selected as the media for this study.

- **Sampling for Characterization of Metals and TOC in Soil (TS1-S) and Groundwater (TS1-GW)**

Samples for metal and TOC analysis were collected in duplicate from the TS1-S soil and from the TS1-GW groundwater, both samples were stored in 2-L amber glass jars and preserved at 4 °C after being received. Sampling of the GCNY soil for metal analysis involved placing approximately 25 g of soil from the soil container into two 20-mL glass vials. The two vials were capped and delivered to ERI's Metal Laboratory for metal analysis, following ERI's QA/QC protocol. Two 40-mL glass vials were used to collect the TS1-GW groundwater. The level of selected metals (i.e., Fe, Al, Mn, As, Cr, Se and Pb) in both soil and groundwater samples was determined using an induced-couple plasma atomic emission system (Perkin-Elmer ICP-Optima 3300 XL) or a graphite furnace atomic adsorption system (Perkin-Elmer Zeeman 5100 PC).

Samples for TOC analysis were collected in duplicate into two 20-mL glass vials for both the sample soil and groundwater. These samples were delivered to ERI's Nutrient Laboratory for TOC measurement using CHN Elemental Analyzer (for soil samples) or TOC Analyzer (for groundwater samples).

- **Soil pH Measurement and Grain Size Analysis**

The soil pH measurement is performed by following SW-846 Method 9045C, an electrometric procedure for measuring pH in soils, sludge and waste samples. The measurement of the soil pH involved adding 20 g of the site soil (with moisture content of 8.1% by weight) and 20 mL of D.I. water in a 50-mL beaker. The beaker was covered with aluminum foil and continuously stirred for 5 minutes. The soil suspension was then let to stand for 1 hour to allow most of the suspended particles to settle down. The soil pH was determined by measuring the pH of the supernatant in the soil-water mixture.

The grain size distribution of the GCNY soil was determined following ASTM Method D 422-63. The fraction of gravel, sand, silt and clay in the sample soil was determined using a series of sieves of specified openings

3.2 Oxidation of VOCs in the GCNY Groundwater by $KMnO_4$ (Task 1B)

The ability of $KMnO_4$ to degrade VOC contaminants in the site groundwater was investigated in three sets of batch experiments (1B-1, 1B-2 and 1B-3), 1B-1 and 1B-2 being two experiments with $KMnO_4$ in different doses (i.e., 0.25 g/L and 1 g/L) and 1B-3 being a control experiment (i.e., without adding $KMnO_4$ solution). Five groundwater samples were analyzed for its VOC levels prior to usage in the tests. The TS1-GW groundwater was found to have VOC levels that were comparable to those reported in an early site investigation report. It was thus selected as the media for the Task 1B study.

The experiments, as shown in Table 2, were conducted under isothermal, completely mixed and headspace free conditions using syringe reactors (Figure 1). A typical experimental system consisted of a 100-mL gas-tight glass syringe connected to a sampling syringe by means of a control valve and luer-lock fitting. The loss of VOCs due to evaporation was minimized by maintaining a zero-headspace condition in the reactor by moving the plungers of both the sampling and reactor syringes simultaneously during the injection of reactants or sampling. At least two samples were collected each day from the reactor and analyzed by a GC-MS system for VOC levels. The samples after being collected were immediately quenched with 5 (1B-1) or 20 µL (1B-2) of 1N sodium thiosulfate ($Na_2S_2O_3$) to stop the reactions between $KMnO_4$ and VOCs. Other parameters including pH, chloride and $KMnO_4$ concentrations were monitored only in the beginning and at the end of the experiments. The experiments were continued for a period of three days (72 h). A list showing experimental conditions and monitored parameters for Task 1B is shown in Table 2. The tests established the VOC degradation by $KMnO_4$ oxidation against time.

In a typical run, ~110 mL of contaminated site groundwater (preserved at 4 °C) and a Teflon-coated stirrer bar were first placed into a syringe reactor. Two samples (5 mL each) were then collected from the reactor and injected into 43-mL volatile organic analysis (VOA) vials that had deionized (DI) water of 38 mL. These two samples were used to determine initial VOC levels in the reactor. Subsequently, 2.5 mL of stock $KMnO_4$ solutions (10 g/L for 1B-1 and 40 g/L for 1B-2) was injected into the reactor to obtain a desired initial $KMnO_4$ concentration (i.e., 0.25 g/L and 1 g/L) and to initiate the reactions. A control experiment (without $KMnO_4$ injection, Task 1B-3) was conducted paralleled to Tasks 1B-1 and 1B-2 to elucidate the degradation of targeted VOCs by $KMnO_4$ oxidation. Parameters such as chlorinated ethenes and two detected freons were monitoring with time by the GC-MS analysis. Other parameters including $KMnO_4$, chloride and pH were measured in the beginning and at the end of the experiment.

- **Measurement of Monitored Parameters ($KMnO_4$, chloride and pH)**

$KMnO_4$ concentrations were determined using an UV-VIS spectrometer (Milton Roy, Spectronic 601). The instrument was set-up for this particular experiment at the wavelength of 526 nm, where $KMnO_4$ shows its maximum of light absorbance. $KMnO_4$ samples were filtered using 0.45 µm filters and measured immediately after sampling. The concentration of $KMnO_4$ was obtained using a pre-built calibration curve, which relates the absorbance as a function of the concentration. Chloride was determined using an ion chromatograph (Dionex

DX-500) equipped with an ion exchange column (Dionex Ionpac 4 mm AS9H). All the pH determinations were made using a pH meter (Accumet, Fisher Scientific).

3.3 Determination of Oxidant Demand of the GCNY Soil (Task 1C)

The GCNY sample soil was determined for its $KMnO_4$ demand through a set of vial experiments performed in duplicate. The experiments were conducted using a vial rotator system (minimizing the breakdown of soil particles) under various $KMnO_4$/soil ratios (e.g., 1 mg/g, 2 mg/g, 4 mg/g, 8 mg/g, 16 mg/g, 40 mg/g) at 20 °C (Figure 2). A summary of the experimental conditions is shown in Table 3. $KMnO_4$ concentrations were monitored every two to three days during the test. The soil oxidant demand (SOD) was determined using equation 1.

$$SOD = V(C_0 - C_s)/m_{soil} \qquad (1)$$

where V = total volume of $KMnO_4$ solution in the vials; C_0 = initial $KMnO_4$ concentration; C_s = $KMnO_4$ concentration at the relatively steady state or at 14 days reaction period; m_{soil} = the mass of dry soil in reactors

The test was terminated and the SOD was calculated when $KMnO_4$ concentration reached a steady state condition or the experiments reached a 14-day testing period (whichever came first). The results of the test provided the oxidant demand of the GCNY soil and the information on reactivity of the site soil with $KMnO_4$.

3.4 Impact of $KMnO_4$ oxidation on Soil Metal Leaching (Task 1D)

The impact of $KMnO_4$ oxidation on the leaching of several metals (i.e., Pb, Cr, As and Se) from the soil was investigated by determining the increase in dissolved metal ions in the samples (made in Section 3.3) at the end of the test. The amount of the increase in dissolved metal ions was determined by comparing the metal ion concentrations of control samples with those of the $KMnO_4$-containing samples. The pH and oxidation-reduction potential (ORP) of all samples were measured so that the correlation between metal leaching with pH, ORP and $KMnO_4$ concentration could be established. The results of Task 1D provide the information on the impact of $KMnO_4$ injection on the leaching of metal ions from the site soil.

4. Results and Discussion

4.1 Soil and Groundwater Characterization (Task 1A)

The soil and groundwater collected from a location near MW-12PS at the GCNY site were characterized for VOCs, metals, TOC and pH. The metal contents of the sample soil and groundwater are listed in Tables 4 and 5, respectively. The GC-MS analysis data of the TS1-GW groundwater is shown in Appendix A. The results indicate that the groundwater is contaminated by *cis*-1, 2-DCE (374 μg/L and 375 μg/L), TCE (91.1 μg/L and 93.8 μg/L), VC (27.7 μg/L and 24.6 μg/L) and two freons (i.e., chloro-triflouoroethene and 1,1,2-trichloro-1, 2, 2-trifluoroethane). The two detected freons are not in the chemical list of the EPA SW-846 8260 method and their quantification standards are currently not available in the market. Therefore, integration area based on the GC-MS chromatogram was used to evaluate their degradation in this study. Two other contaminants (i.e., m-xylene + p-xylene (7.2 μg/L and 7.3 μg/L) and dichloromethane (18 μg/L) were also found in the TS1-GW groundwater.

The metal analysis indicates that iron (5260 mg/kg and 5160 mg/kg) and aluminum (1558 mg/kg and 1811 mg/kg) are relatively abundant in the sample soils (Table 4). Se, As and Cr are three metal elements whose mobilization due to $KMnO_4$ injection is of concern. The soil contains Cr in the level of 9 to 14 mg/kg and has As and Se close to the instrument detection limits (Table 4).

Grain size analysis shows that the sample soil primarily consists of fine sand (32%) and silt (32%) mixed with medium and coarse sand (18%), gravel (12%) and clay (6%) as shown in Figure 3. This soil has a pH of ~8.0 and a total organic carbon content of ~0.1%.

The TS1-GW groundwater contains iron (9960 μg/L and 10900 μg/L), aluminum (5170 μg/L and 5710 μg/L) and manganese (3510 μg/L and 3520 μg/L) (Table 5). As and Se are below the instrument limit and Cr is in the level of 22 to 24 μg/L. The sample ground water has a pH level of 6.8 and a TOC level of 29 mg/L.

4.2 Oxidation of VOCs in the GCNY Groundwater by $KMnO_4$ (Task 1B)

The ability of $KMnO_4$ to degrade target VOCs (i.e., PCE, TCE, DCEs, VC and freons) in the GCNY groundwater was investigated at 20 °C and under completely mixed conditions. Three sets of batch experiments under various reaction conditions were conducted (Table 2). In the first and second set (1B-1 and 1B-2), different concentrations of $KMnO_4$ solutions (i.e., 0.25 g/L and 1 g/L) were employed separately to degrade VOCs in the site groundwater. The third set (1B-3) was the control experiment where no oxidant was added in the reactor. Degradation of PCE, TCE, *cis*-DCE and VC in the three sets of batch experiments is given in Figures 4 to 6, Table 6 and Appendix B (showing the GC-MS raw data of Task 1B samples). The results indicated that $KMnO_4$ degraded both VC and *cis*-DCE within 2 hrs (the first sampling point). TCE and PCE were degraded to below their method detection limits (~1 μg/L) within 32 h. The ability of $KMnO_4$ to degrade PCE, TCE, *cis*-DCE and VC is illuminated when comparing the data of 1B1 and 1B2 experiments with that of 1B-3 (the control experiment). The control experiment in which no oxidant was added showed relatively constant concentrations of VOCs in the GCNY groundwater during the experiment.

Indeed, the behavior of rapid degradation of chlorinated ethenes (CEs) including PCE, TCE, DCEs and VC by $KMnO_4$ was expected. While the degradation rates of these compounds were too fast to determine under the test conditions (i.e., low CE concentrations), the kinetics data of oxidation of CEs with $KMnO_4$ can be found in the literature (Huang et al., 2001). The kinetics study by Huang et al. (1999 and 2001) indicates that $KMnO_4$ can completely mineralize CEs (i.e., oxidatively transform CEs into chloride and carbon dioxides). Permanganate is primarily reduced to manganese oxides during the reactions. The final products of $KMnO_4$ oxidation of CEs are nontoxic to the environment.

Of the two detected freons, chloro-triflouroethene was rapidly degraded (i.e., within 2 h) in $KMnO_4$ solutions in sets 1-B1 and 1-B2 (Tables 7 and 8) while 1,1,2-trichloro-1,2,2-trifluoro was degraded in a relatively slow rate. However, it is expected that both ferons may go further to completion once the oxidant remains in the solutions. Additionally, in 1B-3 (the control experiment), degradation of 1,1,2-trichloro-1,2,2-trifluoro ethane was observed, indicating biological activities might have occurred in 1B-3 during the experiment. Of the two other trace contaminants found in the groundwater, m-xylene and p-xylene were rapidly degraded by $KMnO_4$ while dichloromethane showed little reaction with $KMnO_4$ (Appendix B).

The pH, chloride and $KMnO_4$ were measured for all the three sets in the beginning and at the end of the experiments. The results are shown in Table 9. The average pH value was 6.84 for all the three sets in the beginning and was 6.74 for 1B-1, 6.86 for 1-B2 and 6.96 for 1-B3 at the end of the experiments. $KMnO_4$ concentrations decreased from 250 mg/L to 195 mg/L in 1B-1 and from 1000 mg/L to 773 mg/L in 1B-2. The chloride concentration in 1B-1 and 1B-2 remained ~45 mg/L because the influence from dechlorination of the VOCs (in μg/L level) in the sample groundwater was not significant.

4.3 Oxidant Demand of the GCNY Soil (Task 1C)

The oxidant demand of the GCNY soil was determined through a set of vial experiments under various $KMnO_4$/soil ratios and a water/soil ratio of ~4:1 at 20 °C. The results are shown in Figures 7 and 8, where the $KMnO_4$ concentration (in C/Co) versus time (h) was made to show the consumption tendency of $KMnO_4$ in the actual site soil and in DI water, respectively. It is evident that $KMnO_4$ concentrations remained nearly unchanged in DI water over the course of the test (Figure 8), while $KMnO_4$ degraded in the GCNY soil (Figure 7 and Appendix C). $KMnO_4$ concentration in higher $KMnO_4$ dose vials (i.e., 4 g/L) decreased rapidly in the early stage and slowed down after a reaction period of 120 h. Since the $KMnO_4$ concentration remained relatively constant in control experiments (with no soils), the consumption of $KMnO_4$ in the site soils revealed the demand of soil constituents for $KMnO_4$. For lower concentration vials (0.25 g/L), $KMnO_4$ concentration changed more rapidly during the tests and it was almost completely consumed by 336 h.

The data, observed in the test period of 14 days, was used to determine the SOD using equation 1. The results as shown in Figure 9 and Appendix D indicated that the SOD of the GCNY soil varied from ~1.0 to 4 g $KMnO_4$/kg soil, influenced by the oxidant concentration. The SOD increased as the dosed $KMnO_4$ concentration increased, most likely because the reactivity of permanganate with many organic and inorganic compounds is greater in a higher $KMnO_4$ concentration. In addition, soil-induced $KMnO_4$ decomposition may also contribute in a significant degree to the observed phenomena.

4.4 Impact of $KMnO_4$ oxidation on Soil Metal Leaching (Task 1D)

The impact of $KMnO_4$ concentration and ORP on the mobility of four selected metals (i.e., Pb, As, Cr and Se) of environmental concern was investigated. The change in dissolved concentrations of the four selected metals after 14 days of tests is shown in Table 10 and Appendix E. The data indicates that As remained in not-detected level while Cr, Pb and Se had little increase (in μg/L level) at the end of the tests. The increase in Se is likely from the impurities of $KMnO_4$ used in this study since the Se level in both the sample soil and groundwater is not detected. The slight increase in Cr, most likely the hexavalent Cr under the test conditions, is possibly mainly due to the oxidation of naturally occurring chromium oxides in the soil. However, the increased level (e.g., 102~215 μg/L) is likely to be attenuated by natural soils through both adsorption onto soil surface or by soil reducing capacity. The impact of $KMnO_4$ oxidation and increased ORP during the tests on the metal leaching of As, Pb, Se and Cr from the GCNY soil appears to be insignificant.

5. Conclusions and Recommendations

CONCLUSIONS:

This study was conducted to investigate the feasibility of using $KMnO_4$ as the in-situ oxidant to degrade VOC contaminants at the GCNY site. In addition, the oxidant demand of the GCNY site soil was determined, and the impact of $KMnO_4$ injection on metal ion leaching from the soil was evaluated. Based on the experimental results, the following conclusions were made:

- $KMnO_4$ rapidly degraded PCE, TCE, *cis*-1,2-DCE, VC, chloro-trifluoroethene and xylenes in the GCNY sample groundwater under the experimental conditions.

Remediation of soil and groundwater contaminated with the above compounds by in-situ $KMnO_4$ oxidation is a feasible and effective alternative.

- The degradation of 1,1,2-trichloro-1,2,2-trifluoroethane in the control experiment implied that active biological activities might have occurred in the control experiment during the test. In addition, 1,1,2-trichloro-1,2,2-trifluoroethane in the site groundwater was slowly degraded by $KMnO_4$ oxidation.
- The oxidant demand of the GCNY soil was in the range of 1~4 g/kg soil for $KMnO_4$ and it appeared to increase with the increase in $KMnO_4$ concentration.
- The soil has a low oxidant demand. $KMnO_4$ consumption by soil substances is not considered a hindrance to the use of in situ $KMnO_4$ oxidation technologies.
- The sample soil contains Cr in the level of 9 to 14 mg/kg and has As, Pb and Se close to or below the instrument detection limit (0.199 mg/kg). The data in Table 10 indicates that the impact of $KMnO_4$ injection on the metal leaching of As, Pb, Se and Cr from the GCNY soil is not significant.

RECOMMENDATIONS:

This feasibility study illuminates the ability of $KMnO_4$ to destroy VOCs including PCE, TCE, *cis*-1,2-DCE, VC, chloro-trifluoroethene and xylenes in the GCNY groundwater. It appears that In Situ $KMnO_4$ Oxidation is a feasible remedial technology for the GCNY site. To enhance the effectiveness of $KMnO_4$ oxidation in the remediation application, based on the experimental results, ERI recommends the followings:

- The GCNY soil has a low $KMnO_4$ demand, and the decomposition of $KMnO_4$ in the soil matrix is slow. Thus, a low $KMnO_4$ dose (e.g., 1 g/L or 2 g/L) is recommended to be used during the remediation application.
- The permanganate oxidation technology, like other chemical flushing technologies, requires delivery of the oxidant to contaminants. While the ability of $KMnO_4$ to destroy VOCs and the suitability of the oxidant being used in the site soil have been demonstrated, the success of using this technology for clean-up of the contaminated site depends on whether the oxidant is able to contact the contaminants. Thus, a precise site

investigation and characterization is suggested so that an effective oxidant delivery system can be developed.

6. References

Huang, K. C., Hoag, G. E., Chheda, P., Woody, B. A., and Dobbs, G. (1999). Kinetic Study of Oxidation of Trichloroethylene by Potassium Permanganate. *Environ. Eng. Sci.* 16 (4), pp.265-274.

Huang, K. C., Hoag, G. E., Chheda, P., Woody, B. A., and Dobbs, G. (2001). Kinetics Study of Oxidation of Chlorinated Ethenes with Permanganate. *Journal of Hazardous Materials.* (In Press)

Table 1. A Summary of Analytical Methods Used in the Study

Parameter	Instruments	Analytical Method
pH, ORP and grain size analysis	pH meter (Accumet Fisher Scientific) and standard sieves	Standard methods
$KMnO_4$	Spectrophotometer (Milton Roy)	Colorimetric method
VOCs	GC-MS	USEPA SW-846 8260
·Total organic Carbon	TOC Analyzer (for groundwater) and CHN Analyzer (for soil)	Standard methods for water and soil
Metals (Fe, Al, Mn, Pb, Cr, As and Se)	ICP-AES/OES or AA-GFAAS	3050A for digestion/6010A for ICP or 7000A for GFAA (SW-846)

Table 2. Experimental conditions of Task 1B conducted to investigate the oxidation of VOCs in the GCNY groundwater by $KMnO_4$

Type of experiment	Purpose	Experimental condition			Monitored parameters
		Media	Oxidant g/L	Temp. °C	
Aqueous batch Set 1 (1B-1)	Oxidation of VOCs in the GCNY groundwater by $KMnO_4$	VOC-contaminated groundwater	$KMnO_4$ (0.25 g/L)	20	VOCs, pH, $KMnO_4$ and chloride
Aqueous batch Set 2 (1B-2)	Oxidation of VOCs in the GCNY groundwater by $KMnO_4$	VOC-contaminated groundwater	$KMnO_4$ (1 g/L)	20	VOCs, pH, $KMnO_4$ and chloride
Aqueous batch Set 3 (1B-3)	Control experiment	VOC-contaminated groundwater	None	20	VOCs and pH and chloride

Note: $KMnO_4$, pH and chloride were measured in the beginning and at the end of each run.

Table 3. Test conditions of the vial experiments for determining soil oxidant demand

SOD Batch Exp.	Soil Source	Initial $KMnO_4$ Conc. (g/L)	$KMnO_4$/Soil Ratio (mg/g dry soil)	Water:Soil Ratio
1	GCNY Site Soil	0.25	1	~ 4:1
2	GCNY Site Soil	0.5	2	~ 4:1
3	GCNY Site Soil	1	4	~ 4:1
4	GCNY Site Soil	2	8	~ 4:1
5	GCNY Site Soil	4	16	~ 4:1
6	GCNY Site Soil	10	40	~ 4:1

Note 1. All experiments were conducted in duplicate.

Table 4. Results of metal characterization of the GCNY site soil

Sample ID	Metal Content (mg/kg)						
	[illegible]	Pb	Se	[illegible]	Cr	Fe	Mn
ES-soil-M	1.09	1.44	ND	1558	14.4	5260	160
ES-soil-M(D)	0.748	1.80	ND	1811	8.73	5160	195
Detection Limit	0.199	0.199	0.199	0.496	0.248	0.496	0.248

Note: (D) = duplicated

Table 5. Results of metal characterization of the GCNY site groundwater

Sample ID	Metals Content (μg/L)						
	As	Pb	Se	Al	Cr	Fe	Mn
ES-GW-M	ND	6	ND	5170	22	9960	3510
ES-GW-M(D)	ND	7	ND	5710	24	10900	3520
Detection Limit	4	4	4	10	5	10	5

Note: (D) = duplicated

Table 6. Degradation of VOCs by $KMnO_4$ against time in the GCNY groundwater

Samples	Time, h	VC, μG/L	[illegible] 1,2-DCE, μG/L	TCE, μG/L	PCE, μG/L
1B1	0	54.18/55.9	278.64/291.54	67.94/62.9	ND
	2	ND	ND	6.02	8.6
	8	ND	ND	5.16	ND
	22	ND	ND	5.16	ND
	32	ND/ND	ND/ND	ND/ND	ND/ND
	48	ND	ND	ND	ND
	56	ND	ND	ND	ND
	72	ND/ND	ND/ND	ND/ND	ND/ND
1B2	0	54.18/53.32	275.2/281.22	66.22/68.8	11.18/11.18
	2	ND	ND	4.3	ND
	8	ND	ND	4.3	ND
	22	ND	ND	ND	ND
	32	ND/ND	ND/ND	ND/ND	ND/ND
	48	ND	ND	ND	ND
	56	ND	ND	ND	ND
	72	ND/ND	ND/ND	ND/ND	ND/ND
1B3	0	54.18	273.48	66.22	16.18
	2	52.46	270.9	69.66	13.76
	8	51.6	268.32	71.38	15.48
	22	52.46	268.32	68.8	17.20
	32	50.74	259.72	67.08	17.20
	48	49.02	256.28	67.94	17.20
	56	49.88	254.56	65.36	17.20
	72	50.74	254.56	67.08	16.34

N.D.= Non-detected

Table 7. Degradation of chloro-triflouroethene by $KMnO_4$ with time in the GCNY groundwater

Time hr	Normalized Concentration (C/Co) of Chloro-triflu[illegible]		
	B1	B2	[illegible]
0	1.00/1.00	1.00/1/00	1.00/1.00
2	0	0	0.92
8	0	0	0.86
22	0	0	0.90
32	0/0	0/0	0.82
48	0	0	0.75
56	0	0	0.74
72	0/0	0/0	0.71

Table 8. **Degradation of 1,1,2-trichloro-1,2,2-trifluoro ethane by $KMnO_4$ with time in the GCNY groundwater**

[illegible]	[illegible]	[illegible]	[illegible]
0	1.00	1.00	1.00
2	0.85	0.93	0.85
8	0.88	0.98	0.80
22	0.87	0.83	0.82
32	0.86/0.86	0.87	0.77
48	0.75	0.79	0.70
56	0.72/0.76	0.73/0.76	0.66
72	0.73/0.7	0.77/0.75	0.62

Table 9. The pH, chloride and $KMnO_4$ in the beginning and at end of Task 1B experiments

Samples	Time (hr)					
	0			72		
	pH	chloride, mg/L	KMnO4, mg/L	pH	chloride, mg/L	KMnO4, mg/L
1 B1	6.84	44.15	250	6.74	44.24	194.72
1B2	6.84	43.93	1000	6.86	44.4	772.86
1 B3	6.84	45.28	0	6.91	44.84	Control

Table 10. The dissolved concentrations of Pb, As, Cr and Se in Task 1D vials after a reaction period of 14 days

Sample	$KMnO_4$, mg/L	pH	ORP, mV	Metal concentration, µg/L			
				As	Cr	Pb	Se
0104025-ES-0D	0.00	7.85	360.00	ND	10	ND	ND
010425-ES-0.25	13.87	7.59	440.15	ND	102	ND	ND
-010425-ES-0.5	119.69	7.52	566.25	ND	142	60	16
010425-ES-1	508.99	7.51	590.75	ND	127	15	46
010425-ES-2	3263.91	7.43	611.20	ND	153	29	107
010425-ES-4	6179.96	7.40	627.90	ND	150	65	254
010425-ES-10	9096.15	7.38	651.40	ND	215	166	320

[1] 0104025-ES-0.25 = Sampling date-ESI sample soil-$KMnO_4$ concentration

[2] Parameters measured at the end of the tests.

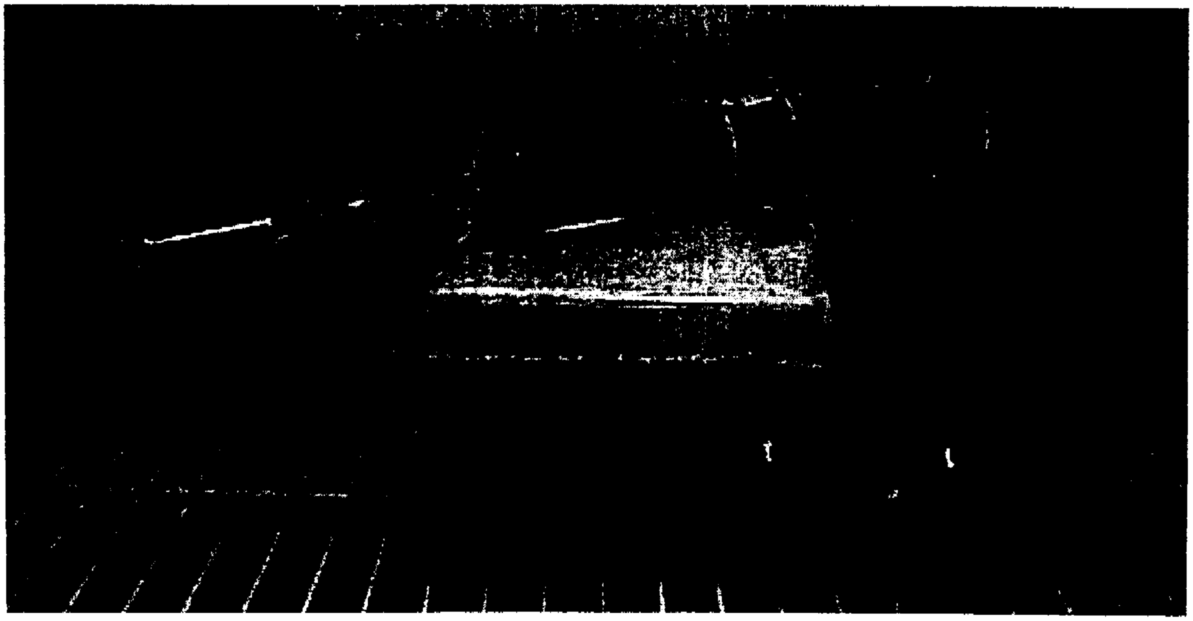

Figure 1. The syringe reactor system used in Task 1B experiment

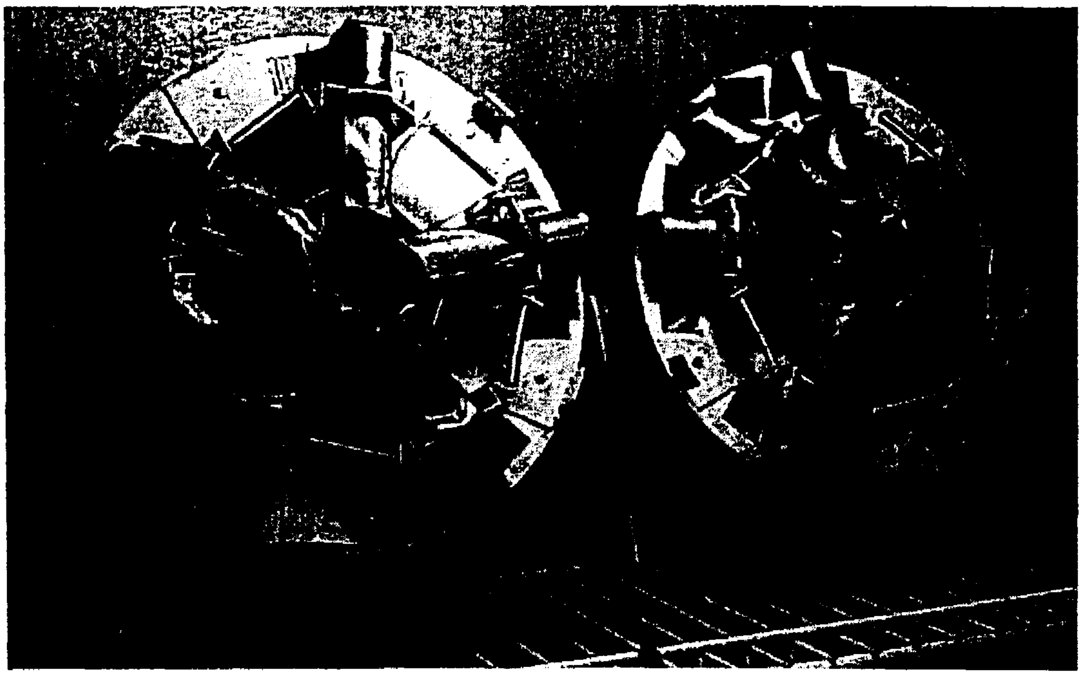

Figure 2. The rotator system used to determine soil oxidant demand

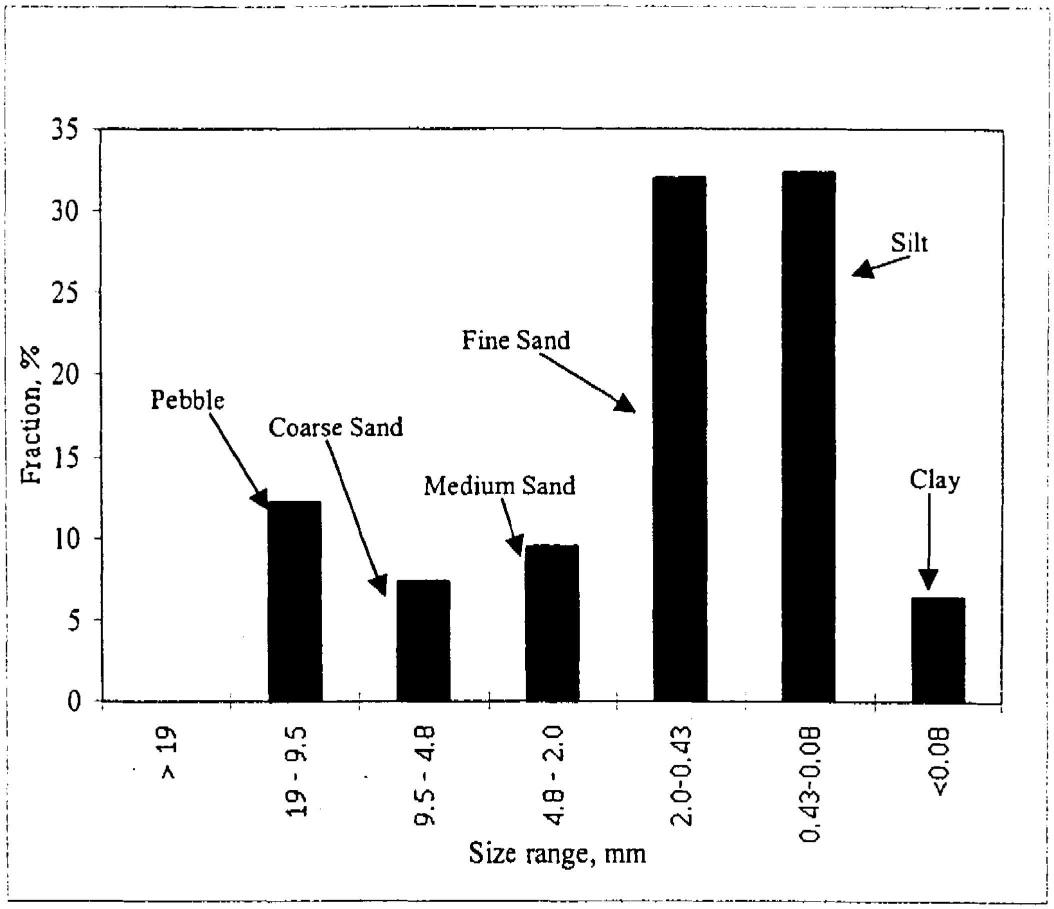

Figure 3. Grain size distribution of the GCNY sample soil.

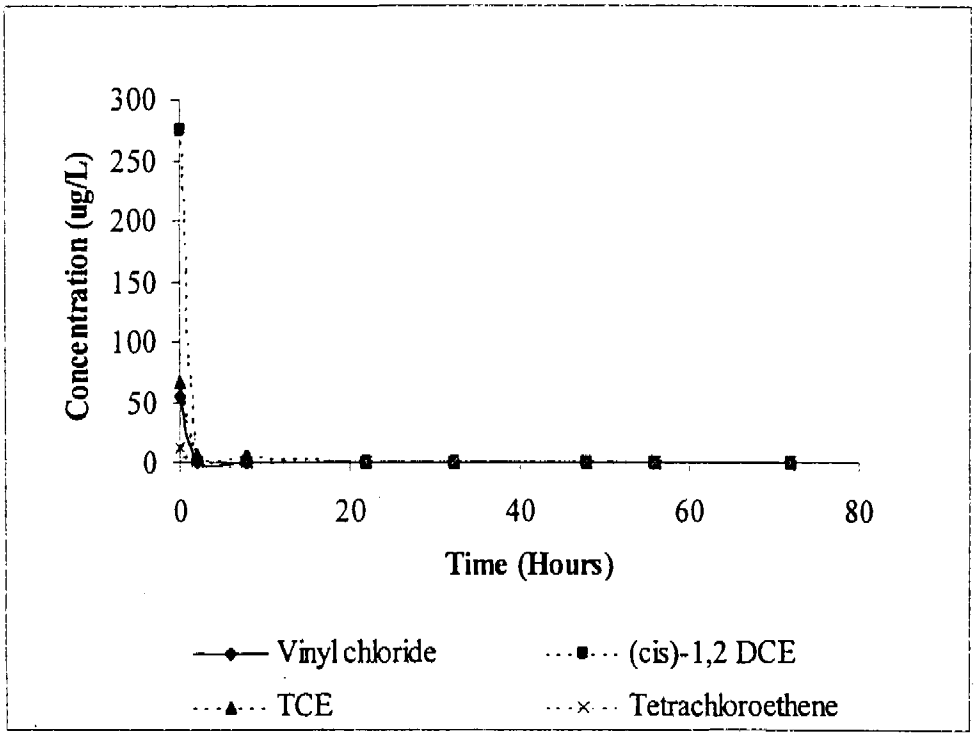

Figure 4. Degradation of PCE, TCE, cis-1,2-DCE and VC by $KMnO_4$ in Task 1B-1. Temp. = 20 °C; Initial concentration = 0.25 g/L $KMnO_4$

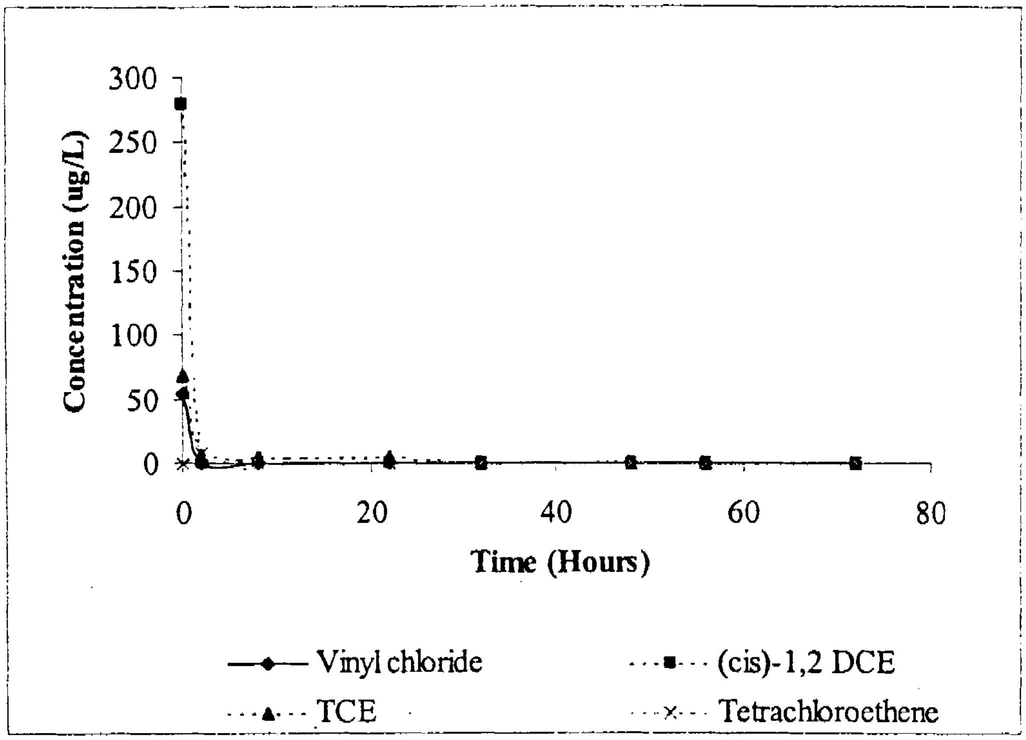

Figure 5 . Degradation of PCE, TCE, cis-1,2-DCE and VC by $KMnO_4$ in Task 1B-2. Temp. = 20 °C; Initial concentration of 1 g/L $KMnO_4$

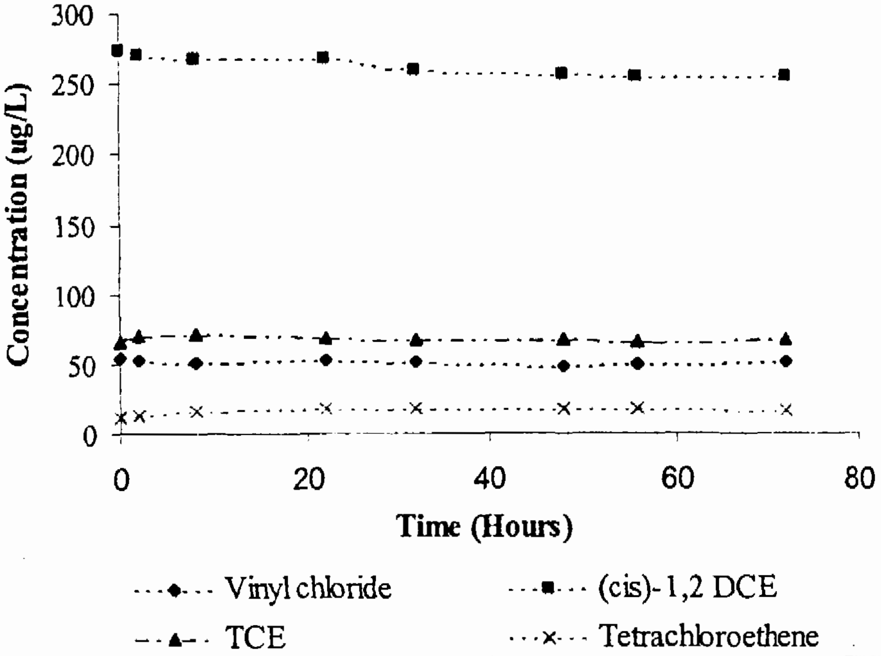

Figure 6. The variation of PCE, TCE, cis-1,2-DCE and VC during Task 1B-3 (the control experiment). = 20 °C; $KMnO_4$ concentration = 0 g/L

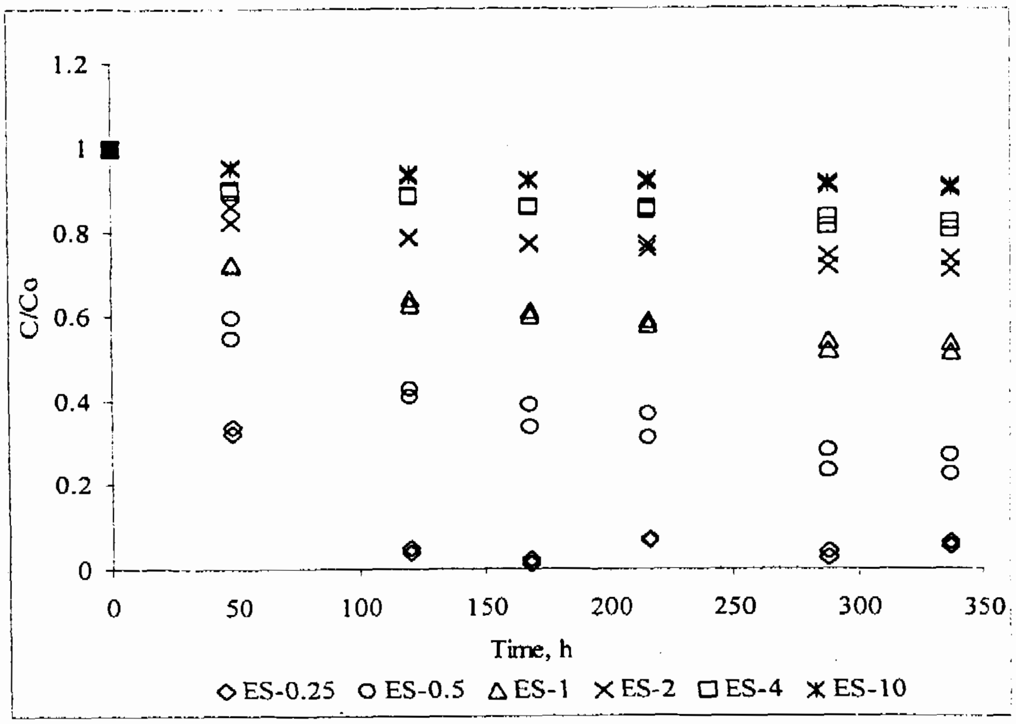

Figure 7. $KMnO_4$ concentration (in C/C_0) versus time during the SOD tests for the GCNY soil. Temp. = 20 °C; Rotator rpm = 0.7; ES-2 = GCNY soil with initial concentration of 2 g/L $KMnO_4$

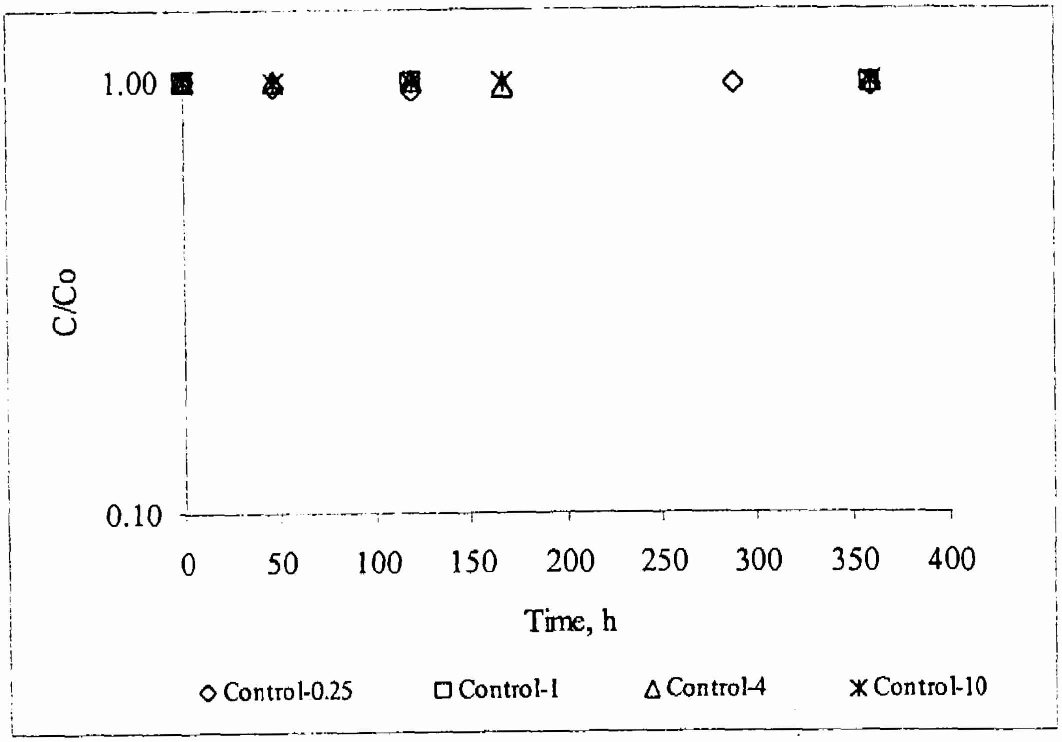

Figure 8. **$KMnO_4$ concentration (in C/C_0) versus time during the SOD tests in the control experiment**

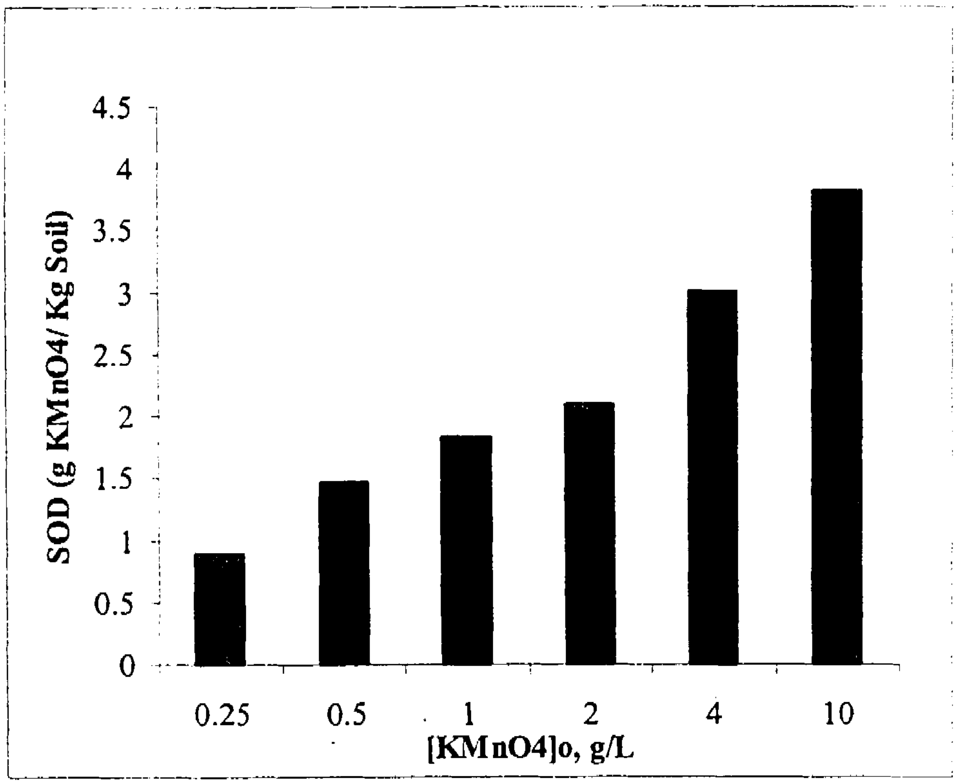

Figure 9. Oxidant demand of the GCNY soil, determined in a reaction period of 14 days.

APPENDIX A:

The GC-MS analysis raw data of TS-1 GW sample groundwater (in duplicate)

ENVIRONMENTAL RESEARCH INSTITUTE

ERI Chain of Custody

Environmental Research Institute
270 Middle Turnpike U-5210
Storrs, Ct 06269-5210 (860)486-4015
Customersupport@eri.uconn.edu

Page 1 of 1

	ERI Use Only	
Customer ID	Project ID	Invoice ID

Turn Around Time (circle)
28 Day 14 Day [✓ 7 Day] Specify

Company	Engineering Lab/ERI (ES KMnO4 Oxidaiton Treatibility Test)	Project Contact	Ken Huang	Billing Contact	
Address	U-5210, Room 164	Phone	486-5893	Phone	
		E-Mail	khuang@eri.uconn.edu	E-Mail	
City	State Zip	Reporting Request		Purchase Order Reference Number	

	Sample			Transfer		
Relinquished By	Ken Huang	Date	03/21/2001	Relinquished By:	Date	
Print/sign		Time	16:00	Print/sign	Time	
Received By:		Date		Received By	Date	
Print/sign		Time		Print/sign	Time	

Storage: W- Walk-in AP- Avery M- Metals O- Organics
Location: O

Test Parameter or CAS Number

	Field Number	ERI ID	Collection Date	Collection Time	Matrix (Key Below)	Preservation (Key Below)	Number of Containers	Comment
1	010321-ES-TS1	0103032-001	03/21/01	15:00	L	R	1	1. These samples need to be analyzed for VOCs
2	010321-ES-TS1D	2	03/21/01	15:00	L	R	1	using the SW-846 82~~7~~60 method
3	010321-ES-TS2	3	03/21/01	15:00	L	R	1	
4	010321-ES-TS3	4	03/21/01	15:00	L	R	1	2. The data needs to be obtained within 7 days for the
5	010321-ES-TS4	5	03/21/01	15:00	L	R	1	subsequent tests for the US project
6	010321-ES-TS5	6	03/21/01	15:00	L	R	1	
7	010321-ES-TS5D	0103032-007	03/21/01	15:00	L	R	1	
8								
9								
10								
11								
12								
13								
14								
15								

Additional Comments/ Special Handling

Matrix: DW- Drinking Water GW- Groundwater WW- Wastewater SW- Seawater L- Liquid
SO- Soil S- Solid F- Filter A- Air T- Biological Tissue O- Other

Preservation: R- Refrigerate (4°C) F- Freeze N- Nitric Acid H- Hydrochloric Acid S- Sulfuric Acid A- Methanol
M- Methylene Chloride S- Sodium Bisulfite C- Chloroform O- Other

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound ES TREATBILITY TEST

Sample Identification:	*LAB BLK*	**Reporting Date:**	3/27/01
Laboratory Identification:		**Sample Matrix:**	Aqueous
Sampling Date:		**Report Data File:**	ol010325L.xls.
Sample Receiving Date:		**Raw Data File:**	01032503.D
Date Analyzed:	*03/26/20 -1:2:*	**Method:**	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	ND	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	ND	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	104	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	104	80-116	**Pass**
toluene-d8(surr3)	100	80-116	**Pass**
4-bromofluorobenzene(surr4)	101	80-120	**Pass**

ND = Not Detected

Environmental Research Institute
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Volatile Organic Compound Results, Project:

Sample Identification:	*'0103032-001,010321-ES-TS1,1/10*	Reporting Date:	3/27/01
Laboratory Identification:	0103032-001	Sample Matrix:	Aqueous
Sampling Date:	3/21/01	Report Data File:	ol0103251.xls
Sample Receiving Date:	3/21/01	Raw Data File:	01032510.D
Date Analyzed:	*03/26/20 -1:6.*	Method:	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	3.0
74-87-3	Chloromethane	ND	1.0
75-01-4	Chloroethene(Vinyl Chloride)	27.7	2.0
74-83-9	Bromomethane	ND	2.0
75-00-3	Chloroethane	ND	2.0
75-69-4	Trichlorofluoromethane	ND	1.0
75-35-4	1,1-Dichloroethene	ND	10
75-09-2	Dichloromethane	18	10
01634-04-4	MTBE	ND	3.0
156-60-5	(trans)-1,2-Dichloroethene	ND	3.0
75-34-3	1,1-Dichloroethane	ND	1.0
78-93-3	Methyl Ethyl Ketone (MEK)	ND	10
594-20-7	2,2-Dichloropropane	ND	1.0
156-59-2	(cis)-1,2-Dichloroethene	373.6	1.0
74-97-5	Bromochloromethane	ND	3.0
67-66-3	Chloroform	ND	1.0
71-55-6	1,1,1-Trichloroethane	ND	1.0
563-58-6	1,1-Dichloropropene	ND	2.0
56-23-5	Tetrachloromethane	ND	1.0
71-43-2	Benzene	ND	1.0
107-06-2	1,2-Dichloroethane	ND	1.0
79-01-6	Trichloroethene	91.1	1.0
78-87-5	1,2-Dichloropropane	ND	1.0
74-95-3	Dibromomethane	ND	1.0
75-27-4	Bromodichloromethane	ND	2.0
10061-01-5	(cis)-1,3-Dichloropropene	ND	2.0
108-10-1	MIBK	ND	2.0
108-88-3	Toluene	ND	1.0
10061-02-6	(trans)-1,3-Dichloropropene	ND	1.0
79-00-5	1,1,2-Trichloroethane	ND	3.0
142-28-9	1,3-Dichloropropane	ND	2.0
127-18-4	Tetrachloroethene	17.7	2.0
124-48-1	Dibromochloromethane	ND	3.0
106-93-4	1,2-Dibromoethane	ND	1.0
108-90-7	Chlorobenzene	ND	1.0
630-20-6	1,1,1,2-Tetrachloroethane	ND	2.0
100-41-4	Ethylbenzene	ND	1.0
108-38-3	m-Xylene + p-Xylene	7.2	2.0
95-47-6	o-Xylene	ND	1.0
100-42-5	Styrene	ND	2.0
75-25-2	Bromoform	ND	1.0
98-82-8	iso-Propylbenzene	ND	2.0
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0
96-18-4	1,2,3-Trichloropropane	ND	2.0
108-86-1	Bromobenzene	ND	1.0
103-65-1	n-Propylbenzene	ND	1.0
108-67-8	1,3,5-Trimethylbenzene	ND	1.0
106-43-4	4-Chlorotoluene	ND	1.0
95-49-8	2-Chlorotoluene	ND	1.0
98-06-9	tert-Butylbenzene	ND	1.0
95-63-6	1,2,4-Trimethylbenzene	ND	2.0
135-98-8	sec-Butylbenzene	ND	1.0
99-87-6	4-iso-Propyltoluene	ND	1.0
541-73-1	1,3-Dichlorobenzene	ND	1.0
106-46-7	1,4-Dichlorobenzene	ND	1.0
104-51-8	n-Butylbenzene	ND	1.0
95-50-1	1,2-Dichlorobenzene	ND	1.0
96-12-8	1,2-Dibromo-3-chloropropane	ND	6.0
120-82-1	1,2,4-Trichlorobenzene	ND	10
87-68-3	Hexachlorobutadiene	ND	3.0
91-20-3	Naphthalene	ND	2.0
87-61-6	1,2,3-Trichlorobenzene	ND	10
67-64-1	Acetone	ND	10

Surrogate Recovery

Compound	**Recovery (%)**	**Limit (%)**	**Condition**
Dibromofluoromethane(surr1)	102	80-116	Pass
1,2-dichloroethane-d4(surr2)	103	80-116	Pass
toluene-d8(surr3)	101	80-116	Pass
4-bromofluorobenzene(surr4)	102	80-120	Pass

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound Results, Project:

Sample Identification:	*'0103032-002,010321-ES-TS1D,1/1-*	Reporting Date:	3/27/01
Laboratory Identification:	'0103032-002	Sample Matrix:	Aqueous
Sampling Date:	3-21-01	Report Data File:	ol010325L.xls.
Sample Receiving Date:	3-21-01	Raw Data File:	01032511.D
Date Analyzed:	*03/26/20 -1:7:*	Method:	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	3.0
74-87-3	Chloromethane	ND	1.0
75-01-4	Chloroethene(Vinyl Chloride)	24.6	2.0
74-83-9	Bromomethane	ND	2.0
75-00-3	Chloroethane	ND	2.0
75-69-4	Trichlorofluoromethane	ND	1.0
75-35-4	1,1-Dichloroethene	ND	10
75-09-2	Dichloromethane	26	10
01634-04-4	MTBE	ND	3.0
156-60-5	(trans)-1,2-Dichloroethene	ND	3.0
75-34-3	1,1-Dichloroethane	ND	1.0
78-93-3	Methyl Ethyl Ketone (MEK)	ND	10
594-20-7	2,2-Dichloropropane	ND	1.0
156-59-2	(cis)-1,2-Dichloroethene	374.7	1.0
74-97-5	Bromochloromethane	ND	3.0
67-66-3	Chloroform	ND	1.0
71-55-6	1,1,1-Trichloroethane	ND	1.0
563-58-6	1,1-Dichloropropene	ND	2.0
56-23-5	Tetrachloromethane	ND	1.0
71-43-2	Benzene	ND	1.0
107-06-2	1,2-Dichloroethane	ND	1.0
79-01-6	Trichloroethene	93.8	1.0
78-87-5	1,2-Dichloropropane	ND	1.0
74-95-3	Dibromomethane	ND	1.0
75-27-4	Bromodichloromethane	ND	2.0
10061-01-5	(cis)-1,3-Dichloropropene	ND	2.0
108-10-1	MIBK	ND	2.0
108-88-3	Toluene	2.0	1.0
10061-02-6	(trans)-1,3-Dichloropropene	ND	1.0
79-00-5	1,1,2-Trichloroethane	ND	3.0
142-28-9	1,3-Dichloropropane	ND	2.0
127-18-4	Tetrachloroethene	18.0	2.0
124-48-1	Dibromochloromethane	ND	3.0
106-93-4	1,2-Dibromoethane	ND	1.0
108-90-7	Chlorobenzene	ND	1.0
630-20-6	1,1,1,2-Tetrachloroethane	ND	2.0
100-41-4	Ethylbenzene	ND	1.0
108-38-3	m-Xylene + p-Xylene	7.3	2.0
95-47-6	o-Xylene	ND	1.0
100-42-5	Styrene	ND	2.0
75-25-2	Bromoform	ND	1.0
98-82-8	iso-Propylbenzene	ND	2.0
79-34-5	1,1,2,2-Tetrachloroethane	ND	2.0
96-18-4	1,2,3-Trichloropropane	ND	2.0
108-86-1	Bromobenzene	ND	1.0
103-65-1	n-Propylbenzene	ND	1.0
108-67-8	1,3,5-Trimethylbenzene	ND	1.0
106-43-4	4-Chlorotoluene	ND	1.0
95-49-8	2-Chlorotoluene	ND	1.0
98-06-9	tert-Butylbenzene	ND	1.0
95-63-6	1,2,4-Trimethylbenzene	ND	2.0
135-98-8	sec-Butylbenzene	ND	1.0
99-87-6	4-iso-Propyltoluene	ND	1.0
541-73-1	1,3-Dichlorobenzene	ND	1.0
106-46-7	1,4-Dichlorobenzene	ND	1.0
104-51-8	n-Butylbenzene	ND	1.0
95-50-1	1,2-Dichlorobenzene	ND	1.0
96-12-8	1,2-Dibromo-3-chloropropane	ND	6.0
120-82-1	1,2,4-Trichlorobenzene	ND	10
87-68-3	Hexachlorobutadiene	ND	3.0
91-20-3	Naphthalene	ND	2.0
87-61-6	1,2,3-Trichlorobenzene	ND	10
67-64-1	Acetone	ND	10

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	101	80-116	Pass
1,2-dichloroethane-d4(surr2)	103	80-116	Pass
toluene-d8(surr3)	99	80-116	Pass

APPENDIX B:

The GC-MS analysis raw data of Task 1B samples

ENVIRONMENTAL RESEARCH INSTITUTE

ERI Chain of Custody

Environmental Research Institute
270 Middle Turnpike U-5210
Storrs, CT 06269-5210 (860)486-4015
Customersupport@eri.uconn.edu

Customer ID Project ID

any	Engineering Lab ERI	Project Contact	Ken Huang
ss	(ES Treatibility Tests)	Phone	486-5893
		E-Mail	khuang@eri.uconn.edu
	State Zip	Reporting Request	

	Sample			Transfer	
ished By	Ken Huang	Date	4.6.01	Relinquished By	
n		Time	11:00	Received	
ed By		Date		Received By	
n		Time		Relinquished	

W

Field Number	ERI ID	Collection Date	Collection Time	Matrix (Key Below)	Preservation (Key Below)	Number of Containers	Comment
403-1B1-0h	0104012 - C01	04-03-01	10:30	L	R	1	These samples need to be analyzed for V[illegible]
403-1B1-0(D)	002	04-03-01	10:30	L	R	1	by SW-846 8260
403-1B2-0h	C03	04-03-01	10:30	L	R	1	
403-1B2-0(D)	C04	04-03-01	10:30	L	R	1	
403-1B3-0h	C05	04-03-01	10:30	L	R	1	
403-1B1-2h	C06	04-03-01	12:30	L	R	1	
403-1B2-2h	C07	04-03-01	12:30	L	R	1	
403-1B3-2h	C08	04-03-01	12:30	L	R	1	
403-1B1-8h	C09	04-03-01	18:30	L	R	1	
403-1B2-8h	C10	04-03-01	18:30	L	R	1	
403-1B3-8h	C11	04-03-01	18:30	L	R	1	
404-1B1-22h	012	04-04-01	8:30	L	R	1	
404-1B2-22h	013	04-04-01	8:30	L	R	1	
404-1B3-22h	C14	04-04-01	8:30	L	R	1	

tional
ments/
pecial
ndling

Matrix: DW: Drinking Water GW: Groundwater
SO: Soil
Preservation: R: Refrigerate
M: Methylene Chloride

ERI Chain of Custody

ENVIRONMENTAL RESEARCH INSTITUTE

Environmental Research Institute
270 Middle Turnpike U-5210
Storrs, Ct 06269-5210 (860)486-4015
Customersupport@eri.uconn.edu

Company: Engineering Lab ERI

Address: (ES Treatibility Tests)

City: State: Zip:

Contact: Ken Huang

486-5893

Phone:

E-Mail: khuang@eri.uconn.edu

Reporting Request:

Purchase Order

Reference Number

Sample				Transfer		
Relinquished By	Ken Huang	Date	4/6/01	Relinquished By		Date
Print/sign		Time	11:00	Print sign		Time
Received By:		Date		Received By		Date
Print/sign		Time		Print sign		Time

Storage Location: 0

W- Walk-in AP- Avery M- Metals O- Organics

Test Parameter or CAS Number

	Field Number	ERI ID	Collection Date	Collection Time	Matrix (Key Below)	Preservation (Key Below)	Number of Containers	Comment
1	10404-1B1-32h	0104012-015	04.04.01	18:30	L	R	1	These samples need to be analyzed for VOC
2	10404-1B1-32(D)	016	04.04.01	18:30	L	R	1	by SW-846 8260
3	10404-1B2-32h	017	04.04.01	18:30	L	R	1	
4	10404-1B2-32(D)	018	04.04.01	18:00	L	R	1	
5	10404-1B3-32h	019	04.04.01	18:00	L	R	1	
	10405-1B1-48h	020	04.05.01	10:30	L	R	1	
	10405-1B2-48h	021	04.05.01	10:30	L	R	1	
	10405-1B3-48h	022	04.05.01	10:30	L	R	1	
	10405-1B1-56h	023	04.05.01	18:00	L	R	1	
	10405-1B1-56(D)	024	04.05.01	18:00	L	R	1	
	10405-1B2-56h	025	04.05.01	18:00	L	R	1	
	10405-1B2-56(D)	026	04.05.01	18:00	L	R	1	
	10405-1B3-56h	027	04.05.01	18:00	L	R	1	
	10406-1B1-72h	028	04.06.01	[illegible]	L	R	1	
	10406-1B1-72(D)	029	04.06.01	[illegible]				

Additional Comments/ Special Handling:

Matrix: DW- Drinking Water GW- Groundwater [illegible] SO- Soil S- [illegible] F- Filter A- Air [illegible] L- Liquid

Preservation: R- Refrigerate (4 C) F- Freeze [illegible] M- Methanol

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*ST MIX 40 PPB*	Reporting Date:	4/11/01
Laboratory Identification:		Sample Matrix:	Aqueous
Sampling Date:		Report Data File:	010409.xls.
Sample Receiving Date:		Raw Data File:	01040904.D
Date Analyzed:	*04/ 9/20 -1:2:*	Method:	EPA-8260

CAS Number	Name	Concentration(ug/L)	Recovery %
75-71-8	Dichlorodifluoromethane	23.3	58%
74-87-3	Chloromethane	31.1	78%
75-01-4	Chloroethene(Vinyl Chloride)	31.2	78%
74-83-9	Bromomethane	38.2	95%
75-00-3	Chloroethane	35.8	90%
75-69-4	Trichlorofluoromethane	30.2	75%
75-35-4	1,1-Dichloroethene	36	89%
75-09-2	Dichloromethane	43	108%
01634-04-4	MTBE	40.7	102%
156-60-5	(trans)-1,2-Dichloroethene	36.9	92%
75-34-3	1,1-Dichloroethane	38.9	97%
78-93-3	Methyl Ethyl Ketone (MEK)	37	92%
594-20-7	2,2-Dichloropropane	43.6	109%
156-59-2	(cis)-1,2-Dichloroethene	38.6	97%
74-97-5	Bromochloromethane	38.4	96%
67-66-3	Chloroform	39.4	99%
71-55-6	1,1,1-Trichloroethane	36.1	90%
563-58-6	1,1-Dichloropropene	36.0	90%
56-23-5	Tetrachloromethane	34.0	85%
71-43-2	Benzene	40.2	101%
107-06-2	1,2-Dichloroethane	40.5	101%
79-01-6	Trichloroethene	36.8	92%
78-87-5	1,2-Dichloropropane	40.9	102%
74-95-3	Dibromomethane	39.8	100%
75-27-4	Bromodichloromethane	39.5	99%
10061-01-5	(cis)-1,3-Dichloropropene	40.9	102%
108-10-1	MIBK	36.2	91%
108-88-3	Toluene	38.5	96%
10061-02-6	(trans)-1,3-Dichloropropene	39.8	100%
79-00-5	1,1,2-Trichloroethane	38.8	97%
142-28-9	1,3-Dichloropropane	39.9	100%
127-18-4	Tetrachloroethene	35.7	89%
124-48-1	Dibromochloromethane	37.7	94%
106-93-4	1,2-Dibromoethane	37.8	95%
108-90-7	Chlorobenzene	38.7	97%
630-20-6	1,1,1,2-Tetrachloroethane	38.1	95%
100-41-4	Ethylbenzene	38.9	97%
108-38-3	m-Xylene + p-Xylene	78.0	98%
95-47-6	o-Xylene	39.6	99%
100-42-5	Styrene	38.5	96%
75-25-2	Bromoform	35.3	88%
98-82-8	iso-Propylbenzene	37.4	93%
79-34-5	1,1,2,2-Tetrachloroethane	38.9	97%
96-18-4	1,2,3-Trichloropropane	38.7	97%
108-86-1	Bromobenzene	38.4	96%
103-65-1	n-Propylbenzene	38.1	95%
108-67-8	1,3,5-Trimethylbenzene	38.2	95%
106-43-4	4-Chlorotoluene	38.2	96%
95-49-8	2-Chlorotoluene	40.4	101%
98-06-9	tert-Butylbenzene	41.7	104%
95-63-6	1,2,4-Trimethylbenzene	38.8	97%
135-98-8	sec-Butylbenzene	36.4	91%
99-87-6	4-iso-Propyltoluene	37.6	94%
541-73-1	1,3-Dichlorobenzene	40.2	100%
106-46-7	1,4-Dichlorobenzene	38.0	95%
104-51-8	n-Butylbenzene	37.4	93%
95-50-1	1,2-Dichlorobenzene	38.3	96%
96-12-8	1,2-Dibromo-3-chloropropane	32.7	82%
120-82-1	1,2,4-Trichlorobenzene	37	92%
87-68-3	Hexachlorobutadiene	34.8	87%
91-20-3	Naphthalene	35.4	89%
87-61-6	1,2,3-Trichlorobenzene	37	92%
67-64-1	Acetone	36	90%

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	98	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	99	80-116	**Pass**
toluene-d8(surr3)	100	80-116	**Pass**
[illegible]	[illegible]	[illegible]	[illegible]

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*ST MIX 40 PPB ULTRA*	Reporting Date:	4/11/01
Laboratory Identification:		Sample Matrix:	Aqueous
Sampling Date:		Report Data File:	010409.xls.
Sample Receiving Date:		Raw Data File:	01040905.D
Date Analyzed:	*04/ 9/20 -1:1:*	Method:	EPA-8260

CAS Number	Name	Concentration(ug/L)	Recovery %
75-71-8	Dichlorodifluoromethane	55.5	139%
74-87-3	Chloromethane	43.7	109%
75-01-4	Chloroethene(Vinyl Chloride)	45.2	113%
74-83-9	Bromomethane	39.9	100%
75-00-3	Chloroethane	37.5	94%
75-69-4	Trichlorofluoromethane	38.1	95%
75-35-4	1,1-Dichloroethene	44	110%
75-09-2	Dichloromethane	45	113%
01634-04-4	MTBE	ND	NA
156-60-5	(trans)-1,2-Dichloroethene	43.2	108%
75-34-3	1,1-Dichloroethane	43.9	110%
78-93-3	Methyl Ethyl Ketone (MEK)	ND	NA
594-20-7	2,2-Dichloropropane	48.3	121%
156-59-2	(cis)-1,2-Dichloroethene	40.8	102%
74-97-5	Bromochloromethane	41.0	102%
67-66-3	Chloroform	42.8	107%
71-55-6	1,1,1-Trichloroethane	41.1	103%
563-58-6	1,1-Dichloropropene	40.5	101%
56-23-5	Tetrachloromethane	40.5	101%
71-43-2	Benzene	43.6	109%
107-06-2	1,2-Dichloroethane	43.2	108%
79-01-6	Trichloroethene	40.5	101%
78-87-5	1,2-Dichloropropane	42.9	107%
74-95-3	Dibromomethane	41.4	103%
75-27-4	Bromodichloromethane	42.4	106%
10061-01-5	(cis)-1,3-Dichloropropene	44.1	110%
108-10-1	MIBK	ND	NA
108-88-3	Toluene	41.0	102%
10061-02-6	(trans)-1,3-Dichloropropene	43.2	108%
79-00-5	1,1,2-Trichloroethane	40.2	100%
142-28-9	1,3-Dichloropropane	39.7	99%
127-18-4	Tetrachloroethene	39.2	98%
124-48-1	Dibromochloromethane	39.2	98%
106-93-4	1,2-Dibromoethane	39.3	98%
108-90-7	Chlorobenzene	41.2	103%
630-20-6	1,1,1,2-Tetrachloroethane	40.3	101%
100-41-4	Ethylbenzene	42.2	106%
108-38-3	m-Xylene + p-Xylene	84.9	106%
95-47-6	o-Xylene	42.8	107%
100-42-5	Styrene	40.3	101%
75-25-2	Bromoform	37.0	92%
98-82-8	iso-Propylbenzene	39.7	99%
79-34-5	1,1,2,2-Tetrachloroethane	39.5	99%
96-18-4	1,2,3-Trichloropropane	39.2	98%
108-86-1	Bromobenzene	40.1	100%
103-65-1	n-Propylbenzene	42.1	105%
108-67-8	1,3,5-Trimethylbenzene	41.5	104%
106-43-4	4-Chlorotoluene	40.9	102%
95-49-8	2-Chlorotoluene	43.8	110%
98-06-9	tert-Butylbenzene	41.1	103%
95-63-6	1,2,4-Trimethylbenzene	41.6	104%
135-98-8	sec-Butylbenzene	39.7	99%
99-87-6	4-iso-Propyltoluene	39.7	99%
541-73-1	1,3-Dichlorobenzene	40.5	101%
106-46-7	1,4-Dichlorobenzene	40.4	101%
104-51-8	n-Butylbenzene	42.2	105%
95-50-1	1,2-Dichlorobenzene	41.0	102%
96-12-8	1,2-Dibromo-3-chloropropane	35.4	88%
120-82-1	1,2,4-Trichlorobenzene	40	99%
87-68-3	Hexachlorobutadiene	39.1	98%
91-20-3	Naphthalene	37.7	94%
87-61-6	1,2,3-Trichlorobenzene	40	99%
67-64-1	Acetone	ND	#VALUE!

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	99	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	101	80-116	**Pass**
toluene-d8(surr3)	101	80-116	**Pass**
[illegible]	[illegible]	80-120	**Pass**

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Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*ST MIX 40 PPB*	Reporting Date:	4/11/01
Laboratory Identification:		Sample Matrix:	Aqueous
Sampling Date:		Report Data File:	010409.xls.
Sample Receiving Date:		Raw Data File:	01040933.D
Date Analyzed:	*04/10/20 -1:0:*	Method:	EPA-8260

CAS Number	Name	Concentration(ug/L)	Recovery %
75-71-8	Dichlorodifluoromethane	24.5	61%
74-87-3	Chloromethane	32.8	82%
75-01-4	Chloroethene(Vinyl Chloride)	31.8	80%
74-83-9	Bromomethane	38.7	97%
75-00-3	Chloroethane	37.1	93%
75-69-4	Trichlorofluoromethane	32.4	81%
75-35-4	1,1-Dichloroethene	38	94%
75-09-2	Dichloromethane	45	112%
01634-04-4	MTBE	40.1	100%
156-60-5	(trans)-1,2-Dichloroethene	38.9	97%
75-34-3	1,1-Dichloroethane	40.1	100%
78-93-3	Methyl Ethyl Ketone (MEK)	36	90%
594-20-7	2,2-Dichloropropane	29.1	73%
156-59-2	(cis)-1,2-Dichloroethene	40.1	100%
74-97-5	Bromochloromethane	39.4	99%
67-66-3	Chloroform	41.7	104%
71-55-6	1,1,1-Trichloroethane	38.8	97%
563-58-6	1,1-Dichloropropene	38.2	95%
56-23-5	Tetrachloromethane	36.1	90%
71-43-2	Benzene	42.3	106%
107-06-2	1,2-Dichloroethane	42.9	107%
79-01-6	Trichloroethene	44.5	111%
78-87-5	1,2-Dichloropropane	41.8	104%
74-95-3	Dibromomethane	41.1	103%
75-27-4	Bromodichloromethane	41.1	103%
10061-01-5	(cis)-1,3-Dichloropropene	38.3	96%
108-10-1	MIBK	35.9	90%
108-88-3	Toluene	39.8	99%
10061-02-6	(trans)-1,3-Dichloropropene	36.1	90%
79-00-5	1,1,2-Trichloroethane	38.9	97%
142-28-9	1,3-Dichloropropane	40.0	100%
127-18-4	Tetrachloroethene	36.5	91%
124-48-1	Dibromochloromethane	37.0	93%
106-93-4	1,2-Dibromoethane	38.0	95%
108-90-7	Chlorobenzene	40.3	101%
630-20-6	1,1,1,2-Tetrachloroethane	38.7	97%
100-41-4	Ethylbenzene	41.1	103%
108-38-3	m-Xylene + p-Xylene	82.2	103%
95-47-6	o-Xylene	41.8	104%
100-42-5	Styrene	40.4	101%
75-25-2	Bromoform	33.9	85%
98-82-8	iso-Propylbenzene	39.4	99%
79-34-5	1,1,2,2-Tetrachloroethane	30.8	77%
96-18-4	1,2,3-Trichloropropane	36.8	92%
108-86-1	Bromobenzene	39.0	98%
103-65-1	n-Propylbenzene	39.8	100%
108-67-8	1,3,5-Trimethylbenzene	39.8	100%
106-43-4	4-Chlorotoluene	39.6	99%
95-49-8	2-Chlorotoluene	41.6	104%
98-06-9	tert-Butylbenzene	43.8	110%
95-63-6	1,2,4-Trimethylbenzene	40.0	100%
135-98-8	sec-Butylbenzene	37.9	95%
99-87-6	4-iso-Propyltoluene	38.4	96%
541-73-1	1,3-Dichlorobenzene	38.8	97%
106-46-7	1,4-Dichlorobenzene	38.4	96%
104-51-8	n-Butylbenzene	38.1	95%
95-50-1	1,2-Dichlorobenzene	38.9	97%
96-12-8	1,2-Dibromo-3-chloropropane	32.0	80%
120-82-1	1,2,4-Trichlorobenzene	36	89%
87-68-3	Hexachlorobutadiene	35.2	88%
91-20-3	Naphthalene	35.2	88%
87-61-6	1,2,3-Trichlorobenzene	36	89%
67-64-1	Acetone	38	94%

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	100	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	102	80-116	**Pass**
toluene-d8(surr3)	100	80-116	**Pass**

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Volatile Organic Compound Results, Project: **ESTreatibility Tests**

Sample Identification:	*ST MIX 40 PPB ULTRA*	**Reporting Date:**	4/11/01
Laboratory Identification:		**Sample Matrix:**	Aqueous
Sampling Date:		**Report Data File:**	010409.xls.
Sample Receiving Date:		**Raw Data File:**	01040934.D
Date Analyzed:	*04/10/20 -1:0:*	**Method:**	EPA-8260

CAS Number	Name	Concentration(ug/L)	Recovery %
75-71-8	Dichlorodifluoromethane	46.8	117%
74-87-3	Chloromethane	46.1	115%
75-01-4	Chloroethene(Vinyl Chloride)	41.4	103%
74-83-9	Bromomethane	47.3	118%
75-00-3	Chloroethane	42.0	105%
75-69-4	Trichlorofluoromethane	34.5	86%
75-35-4	1,1-Dichloroethene	40	101%
75-09-2	Dichloromethane	43	108%
01634-04-4	MTBE	ND	NA
156-60-5	(trans)-1,2-Dichloroethene	40.3	101%
75-34-3	1,1-Dichloroethane	41.1	103%
78-93-3	Methyl Ethyl Ketone (MEK)	ND	NA
594-20-7	2,2-Dichloropropane	28.5	71%
156-59-2	(cis)-1,2-Dichloroethene	38.2	96%
74-97-5	Bromochloromethane	39.5	99%
67-66-3	Chloroform	40.2	101%
71-55-6	1,1,1-Trichloroethane	38.3	96%
563-58-6	1,1-Dichloropropene	37.4	93%
56-23-5	Tetrachloromethane	37.3	93%
71-43-2	Benzene	41.3	103%
107-06-2	1,2-Dichloroethane	42.2	105%
79-01-6	Trichloroethene	42.5	106%
78-87-5	1,2-Dichloropropane	40.5	101%
74-95-3	Dibromomethane	41.1	103%
75-27-4	Bromodichloromethane	40.1	100%
10061-01-5	(cis)-1,3-Dichloropropene	38.1	95%
108-10-1	MIBK	ND	NA
108-88-3	Toluene	38.5	96%
10061-02-6	(trans)-1,3-Dichloropropene	37.5	94%
79-00-5	1,1,2-Trichloroethane	38.3	96%
142-28-9	1,3-Dichloropropane	38.2	96%
127-18-4	Tetrachloroethene	35.3	88%
124-48-1	Dibromochloromethane	37.2	93%
106-93-4	1,2-Dibromoethane	38.3	96%
108-90-7	Chlorobenzene	38.8	97%
630-20-6	1,1,1,2-Tetrachloroethane	38.5	96%
100-41-4	Ethylbenzene	39.6	99%
108-38-3	m-Xylene + p-Xylene	78.8	98%
95-47-6	o-Xylene	40.2	100%
100-42-5	Styrene	38.1	95%
75-25-2	Bromoform	34.6	86%
98-82-8	iso-Propylbenzene	37.0	92%
79-34-5	1,1,2,2-Tetrachloroethane	33.0	83%
96-18-4	1,2,3-Trichloropropane	37.9	95%
108-86-1	Bromobenzene	38.2	95%
103-65-1	n-Propylbenzene	38.7	97%
108-67-8	1,3,5-Trimethylbenzene	38.6	96%
106-43-4	4-Chlorotoluene	36.8	92%
95-49-8	2-Chlorotoluene	40.4	101%
98-06-9	tert-Butylbenzene	42.9	107%
95-63-6	1,2,4-Trimethylbenzene	38.6	96%
135-98-8	sec-Butylbenzene	35.9	90%
99-87-6	4-iso-Propyltoluene	36.3	91%
541-73-1	1,3-Dichlorobenzene	37.6	94%
106-46-7	1,4-Dichlorobenzene	38.1	95%
104-51-8	n-Butylbenzene	36.7	92%
95-50-1	1,2-Dichlorobenzene	38.4	96%
96-12-8	1,2-Dibromo-3-chloropropane	32.0	80%
120-82-1	1,2,4-Trichlorobenzene	36	89%
87-68-3	Hexachlorobutadiene	33.7	84%
91-20-3	Naphthalene	34.2	85%
87-61-6	1,2,3-Trichlorobenzene	36	89%
67-64-1	Acetone	ND	NA

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	99	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	103	80-116	**Pass**
toluene-d8(surr3)	100	80-116	**Pass**
4-bromofluorobenzene(surr4)	103	80-120	**Pass**

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Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*LAB BLK*	**Reporting Date:**	4/11/01
Laboratory Identification:		**Sample Matrix:**	Aqueous
Sampling Date:		**Report Data File:**	010409.xls.
Sample Receiving Date:		**Raw Data File:**	01040910.D
Date Analyzed:	*04/ 9/20 -1:4:*	**Method:**	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	ND	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	ND	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	101	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	108	80-116	**Pass**
toluene-d8(surr3)	100	80-116	**Pass**
4-bromofluorobenzene(surr4)	102	80-120	**Pass**

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Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification: *LAB BLK (SP1)*
Reporting Date: 4/11/01
Laboratory Identification:
Sample Matrix: Aqueous
Sampling Date:
Report Data File: 010409.xls.
Sample Receiving Date:
Raw Data File: 01040907.D
Date Analyzed: *04/ 9/20 -1:2:*
Method: EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	22	1
75-09-2	Dichloromethane	ND	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1-
71-43-2	Benzene	23.9	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	21.2	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	22.0	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	22.0	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	102	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	109	80-116	**Pass**
toluene-d8(surr3)	100	80-116	**Pass**
4-bromofluorobenzene(surr4)	102	80-120	**Pass**

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Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*10403-1B1-0h*	Reporting Date:	4/11/01
Laboratory Identification:	0104012-001 .-	Sample Matrix:	Aqueous
Sampling Date:	4/6/01	Report Data File:	010409.xls.
Sample Receiving Date:	4/9/01	Raw Data File:	01040915.D
Date Analyzed:	*04/ 9/20 -1:8:*	Method:	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	6.3	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	ND	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	32.4	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	7.9	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	0.7	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	99	80-116	Pass
1,2-dichloroethane-d4(surr2)	108	80-116	Pass
toluene-d8(surr3)	100	80-116	Pass
4-bromofluorobenzene(surr4)	102	80-120	Pass

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Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*10403-1B1-0(D)*	Reporting Date:	4/11/01
Laboratory Identification:	0104012-002,-	Sample Matrix:	Aqueous
Sampling Date:	4/6/01	Report Data File:	010409.xls.
Sample Receiving Date:	4/9/01	Raw Data File:	01040916.D
Date Analyzed:	*04/ 9/20 -1:9:*	Method:	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	6.5	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	1	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	33.9	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1-
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	8.4	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	1.5	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	0.7	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	100	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	108	80-116	**Pass**
toluene-d8(surr3)	100	80-116	**Pass**
4-bromofluorobenzene(surr4)	104	80-120	**Pass**

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Volatile Organic Compound Results, Project: **ESTreatibility Tests**

Sample Identification:	*10403-1B2-0h*	Reporting Date:	4/11/01
Laboratory Identification:	0104012-003-	Sample Matrix:	Aqueous
Sampling Date:	4/6/01	Report Data File:	010409.xls.
Sample Receiving Date:	4/9/01	Raw Data File:	01040917.D
Date Analyzed:	*04/ 9/20 -1:0:*	Method:	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	6.3	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	ND	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	32.0	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1-
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	7.7	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	1.3	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	0.7	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	101	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	109	80-116	**Pass**
toluene-d8(surr3)	100	80-116	**Pass**
4-bromofluorobenzene(surr4)	104	80-120	**Pass**

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Volatile Organic Compound Results, Project: **ESTreatibility Tests**

Sample Identification:	*10403-1B2-0(D)*	**Reporting Date:**	4/11/01
Laboratory Identification:	0104012-004-	**Sample Matrix:**	Aqueous
Sampling Date:	4/6/01	**Report Data File:**	010409.xls.
Sample Receiving Date:	4/9/01	**Raw Data File:**	01040918.D
Date Analyzed:	*04/ 9/20 -1:0:*	**Method:**	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	6.2	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	ND	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	32.7	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	8.0	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	1.3	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	0.7	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	100	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	110	80-116	**Pass**
toluene-d8(surr3)	100	80-116	**Pass**
4-bromofluorobenzene(surr4)	103	80-120	**Pass**

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Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification: *10403-1B3-0h** **Reporting Date:** 4/11/01
Laboratory Identification: 0104012-005,- **Sample Matrix:** Aqueous
Sampling Date: 4/6/01 **Report Data File:** 010409.xls.
Sample Receiving Date: 4/9/01 **Raw Data File:** 01040919.D
Date Analyzed: *04/ 9/20 -1:1:* **Method:** EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	6.3	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	ND	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	31.8	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	7.7	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	1.3	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	0.7	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	101	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	108	80-116	**Pass**
toluene-d8(surr3)	100	80-116	**Pass**
4-bromofluorobenzene(surr4)	104	80-120	**Pass**

ND = Not Detected

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Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*10403-1B1-2h*	Reporting Date:	4/11/01
Laboratory Identification:	0104012-006	Sample Matrix:	Aqueous
Sampling Date:	4/6/01	Report Data File:	010409.xls.
Sample Receiving Date:	4/9/01	Raw Data File:	01040920.D
Date Analyzed:	*04/10/20 -1:2:*	Method:	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	1	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	0.7	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	1.0	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	102	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	109	80-116	**Pass**
toluene-d8(surr3)	100	80-116	**Pass**
4-bromofluorobenzene(surr4)	104	80-120	**Pass**

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Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification: *10403-1B2-2h*

Reporting Date: 4/11/01

Laboratory Identification: 0104012-007

Sample Matrix: Aqueous

Sampling Date: 4/6/01

Report Data File: 010409.xls.

Sample Receiving Date: 4/9/01

Raw Data File: 01040921.D

Date Analyzed: *04/10/20 -1:1:*

Method: EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	2	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	0.5	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	101	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	109	80-116	**Pass**
toluene-d8(surr3)	100	80-116	**Pass**
4-bromofluorobenzene(surr4)	103	80-120	**Pass**

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Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*10403-1B3-2h*	**Reporting Date:**	4/11/01
Laboratory Identification:	0104012-008	**Sample Matrix:**	Aqueous
Sampling Date:	4/6/01	**Report Data File:**	010409.xls.
Sample Receiving Date:	4/9/01	**Raw Data File:**	01040922.D
Date Analyzed:	*04/10/20 -1:1:*	**Method:**	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	6.1	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	1	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	31.5	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	8.1	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	1.6	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	0.7	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	100	80-116	Pass
1,2-dichloroethane-d4(surr2)	109	80-116	Pass
toluene-d8(surr3)	100	80-116	Pass
4-bromofluorobenzene(surr4)	104	80-120	Pass

ND = Not Detected

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Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*10403-1B1-8h*	**Reporting Date:**	4/11/01
Laboratory Identification:	0104012-009	**Sample Matrix:**	Aqueous
Sampling Date:	4/6/01	**Report Data File:**	010409.xls.
Sample Receiving Date:	4/9/01	**Raw Data File:**	01040923.D
Date Analyzed:	*04/10/20 -1:2:*	**Method:**	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	1	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	0.8	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	0.6	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	100	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	109	80-116	**Pass**
toluene-d8(surr3)	100	80-116	**Pass**
4-bromofluorobenzene(surr4)	102	80-120	**Pass**

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Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification: *10403-1B2-8h* **Reporting Date:** 4/11/01
Laboratory Identification: 0104012-010 **Sample Matrix:** Aqueous
Sampling Date: 4/6/01 **Report Data File:** 010409.xls.
Sample Receiving Date: 4/9/01 **Raw Data File:** 01040924.D
Date Analyzed: *04/10/20 -1:3:* **Method:** EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	2	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	0.5	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	100	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	109	80-116	**Pass**
toluene-d8(surr3)	99	80-116	**Pass**
4-bromofluorobenzene(surr4)	104	80-120	**Pass**

ND = Not Detected

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Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*10403-1B3-8h*	Reporting Date:	4/11/01
Laboratory Identification:	0104012-011	Sample Matrix:	Aqueous
Sampling Date:	4/6/01	Report Data File:	010409.xls.
Sample Receiving Date:	4/9/01	Raw Data File:	01040925.D
Date Analyzed:	*04/10/20 -1:4:*	Method:	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	6.0	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	1	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	31.2	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	8.3	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	1.8	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	100	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	109	80-116	**Pass**
toluene-d8(surr3)	100	80-116	**Pass**
4-bromofluorobenzene(surr4)	104	80-120	**Pass**

ND = Not Detected

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification: *10404-1B1-22h* | Reporting Date: 4/11/01
Laboratory Identification: 0104012-012 | Sample Matrix: Aqueous
Sampling Date: 4/6/01 | Report Data File: 010409.xls.
Sample Receiving Date: 4/9/01 | Raw Data File: 01040926.D
Date Analyzed: *04/10/20 -1:4:* | Method: EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	1	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	0.9	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	0.6	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	**Recovery (%)**	**Limit (%)**	**Condition**
Dibromofluoromethane(surr1)	100	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	108	80-116	**Pass**
toluene-d8(surr3)	100	80-116	**Pass**
4-bromofluorobenzene(surr4)	100	80-120	**Pass**

ND = Not Detected

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification: *10404-1B2-22h* **Reporting Date:** 4/11/01
Laboratory Identification: 0104012-013 **Sample Matrix:** Aqueous
Sampling Date: 4/6/01 **Report Data File:** 010409.xls.
Sample Receiving Date: 4/9/01 **Raw Data File:** 01040927.D
Date Analyzed: *04/10/20 -1:5:* **Method:** EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	3	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	ND	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	102	80-116	Pass
1,2-dichloroethane-d4(surr2)	110	80-116	Pass
toluene-d8(surr3)	101	80-116	Pass
4-bromofluorobenzene(surr4)	102	80-120	Pass

ND = Not Detected

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification: *10404-1B3-22h* Reporting Date: 4/11/01
Laboratory Identification: 0104012-014 Sample Matrix: Aqueous
Sampling Date: 4/6/01 Report Data File: 010409.xls.
Sample Receiving Date: 4/9/01 Raw Data File: 01040928.D
Date Analyzed: *04/10/20 -1:6:* Method: EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	6.1	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	1	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	31.2	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	8.0	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	2.0	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	101	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	110	80-116	**Pass**
toluene-d8(surr3)	100	80-116	**Pass**
4-bromofluorobenzene(surr4)	104	80-120	**Pass**

ND = Not Detected

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*10404-1B1-32h*	Reporting Date:	4/11/01
Laboratory Identification:	0104012-015	Sample Matrix:	Aqueous
Sampling Date:	4/6/01	Report Data File:	010409.xls.
Sample Receiving Date:	4/9/01	Raw Data File:	01040929.D
Date Analyzed:	*04/10/20 -1:7:*	Method:	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	1	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	0.8	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	ND	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	101	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	110	80-116	**Pass**
toluene-d8(surr3)	101	80-116	**Pass**
4-bromofluorobenzene(surr4)	102	80-120	**Pass**

ND = Not Detected

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*10404-1B1-32(D)*	**Reporting Date:**	4/11/01
Laboratory Identification:	0104012-016	**Sample Matrix:**	Aqueous
Sampling Date:	4/6/01	**Report Data File:**	010409.xls
Sample Receiving Date:	4/9/01	**Raw Data File:**	01040930.D
Date Analyzed:	*04/10/20 -1:7:*	**Method:**	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	1	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	0.8	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	ND	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	101	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	108	80-116	**Pass**
toluene-d8(surr3)	101	80-116	**Pass**
4-bromofluorobenzene(surr4)	100	80-120	**Pass**

ND = Not Detected

Environmental Research Institute
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Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*10404-1B2-32h*	Reporting Date:	4/11/01
Laboratory Identification:	0104012-017	Sample Matrix:	Aqueous
Sampling Date:	4/6/01	Report Data File:	010409.xls.
Sample Receiving Date:	4/9/01	Raw Data File:	01040940.D
Date Analyzed:	*04/10/20 -1:3:*	Method:	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	4	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	0.8	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	0.7	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	ND	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	101	80-116	Pass
1,2-dichloroethane-d4(surr2)	110	80-116	Pass
toluene-d8(surr3)	100	80-116	Pass
4-bromofluorobenzene(surr4)	103	80-120	Pass

ND = Not Detected

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*10404-1B2-32(D)*	**Reporting Date:**	4/11/01
Laboratory Identification:	0104012-018	**Sample Matrix:**	Aqueous
Sampling Date:	4/6/01	**Report Data File:**	010409.xls.
Sample Receiving Date:	4/9/01	**Raw Data File:**	01040941.D
Date Analyzed:	*04/10/20 -1:3:*	**Method:**	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	3	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	0.6	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	ND	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	100	**80-116**	**Pass**
1,2-dichloroethane-d4(surr2)	109	**80-116**	**Pass**
toluene-d8(surr3)	101	**80-116**	**Pass**
4-bromofluorobenzene(surr4)	103	**80-120**	**Pass**

ND = Not Detected

Environmental Research Institute
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Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification: *10404-1B3-32h* **Reporting Date:** 4/11/01
Laboratory Identification: 0104012-019 **Sample Matrix:** Aqueous
Sampling Date: 4/6/01 **Report Data File:** 010409.xls.
Sample Receiving Date: 4/9/01 **Raw Data File:** 01040942.D
Date Analyzed: *04/10/20 -1:4:* **Method:** EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	5.9	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	2	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	30.2	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1-
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	7.8	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	2.0	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	99	80-116	Pass
1,2-dichloroethane-d4(surr2)	108	80-116	Pass
toluene-d8(surr3)	100	80-116	Pass
4-bromofluorobenzene(surr4)	103	80-120	Pass

ND = Not Detected

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*10405-1B1-48h*	Reporting Date:	4/11/01
Laboratory Identification:	0104012-020	Sample Matrix:	Aqueous
Sampling Date:	4/6/01	Report Data File:	010409.xls.
Sample Receiving Date:	4/9/01	Raw Data File:	01040943.D
Date Analyzed:	*04/10/20 -1:5:*	Method:	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	2	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	0.6	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	ND	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	99	80-116	Pass
1,2-dichloroethane-d4(surr2)	107	80-116	Pass
toluene-d8(surr3)	100	80-116	Pass
4-bromofluorobenzene(surr4)	103	80-120	Pass

ND = Not Detected

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*10405-1B2-48h*	**Reporting Date:**	4/11/01
Laboratory Identification:	0104012-021	**Sample Matrix:**	Aqueous
Sampling Date:	4/6/01	**Report Data File:**	010409.xls.
Sample Receiving Date:	4/9/01	**Raw Data File:**	01040944.D
Date Analyzed:	*04/10/20 -1:6:*	**Method:**	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	5	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	0.8	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	ND	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	100	80-116	Pass
1,2-dichloroethane-d4(surr2)	107	80-116	Pass
toluene-d8(surr3)	100	80-116	Pass
4-bromofluorobenzene(surr4)	103	80-120	Pass

ND = Not Detected

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*10405-1B3-48h*	Reporting Date:	4/11/01
Laboratory Identification:	0104012-022	Sample Matrix:	Aqueous
Sampling Date:	4/6/01	Report Data File:	010409.xls.
Sample Receiving Date:	4/9/01	Raw Data File:	01040945.D
Date Analyzed:	*04/10/20 -1:6:*	Method:	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	5.7	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	2	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	29.8	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	7.9	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	2.0	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	99	80-116	Pass
1,2-dichloroethane-d4(surr2)	109	80-116	Pass
toluene-d8(surr3)	100	80-116	Pass
4-bromofluorobenzene(surr4)	102	80-120	Pass

ND = Not Detected

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*10405-1B1-56h*	Reporting Date:	4/11/01
Laboratory Identification:	0104012-023	Sample Matrix:	Aqueous
Sampling Date:	4/6/01	Report Data File:	010409.xls.
Sample Receiving Date:	4/9/01	Raw Data File:	01040946.D
Date Analyzed:	*04/10/20 -1:7:*	Method:	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	ND	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	0.7	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	ND	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	101	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	108	80-116	**Pass**
toluene-d8(surr3)	100	80-116	**Pass**
4-bromofluorobenzene(surr4)	104	80-120	**Pass**

ND = Not Detected

Environmental Research Institute
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Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*10405-1B1-56(D)*	Reporting Date:	4/11/01
Laboratory Identification:	0104012-024	Sample Matrix:	Aqueous
Sampling Date:	4/6/01	Report Data File:	010409.xls.
Sample Receiving Date:	4/9/01	Raw Data File:	01040947.D
Date Analyzed:	*04/10/20 -1:8:*	Method:	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	ND	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	0.8	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	0.7	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	ND	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	101	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	108	80-116	**Pass**
toluene-d8(surr3)	100	80-116	**Pass**
4-bromofluorobenzene(surr4)	103	80-120	**Pass**

ND = Not Detected

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*10405-1B2-56h*	Reporting Date:	4/11/01
Laboratory Identification:	0104012-025	Sample Matrix:	Aqueous
Sampling Date:	4/6/01	Report Data File:	010409.xls.
Sample Receiving Date:	4/9/01	Raw Data File:	01040948.D
Date Analyzed:	*04/10/20 -1:9:*	Method:	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	5	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	0.9	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	ND	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	101	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	109	80-116	**Pass**
toluene-d8(surr3)	100	80-116	**Pass**
4-bromofluorobenzene(surr4)	102	80-120	**Pass**

ND = Not Detected

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound Results, **Project: ESTreatibility Tests**

Sample Identification:	*10405-1B2-56(D)*	**Reporting Date:**	4/11/01
Laboratory Identification:	0104012-026	**Sample Matrix:**	Aqueous
Sampling Date:	4/6/01	**Report Data File:**	010409.xls.
Sample Receiving Date:	4/9/01	**Raw Data File:**	01040949.D
Date Analyzed:	*04/10/20 -1:9:*	**Method:**	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	5	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	0.8	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	ND	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	**Recovery (%)**	**Limit (%)**	**Condition**
Dibromofluoromethane(surr1)	100	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	110	80-116	**Pass**
toluene-d8(surr3)	100	80-116	**Pass**
4-bromofluorobenzene(surr4)	102	80-120	**Pass**

ND = Not Detected

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*10405-1B3-56h*	Reporting Date:	4/11/01
Laboratory Identification:	0104012-027	Sample Matrix:	Aqueous
Sampling Date:	4/6/01	Report Data File:	010409.xls.
Sample Receiving Date:	4/9/01	Raw Data File:	01040950.D
Date Analyzed:	*04/10/20 -1:0:*	Method:	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	5.8	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	ND	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	29.6	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	7.6	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	2.0	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	100	80-116	Pass
1,2-dichloroethane-d4(surr2)	108	80-116	Pass
toluene-d8(surr3)	101	80-116	Pass
4-bromofluorobenzene(surr4)	102	80-120	Pass

ND = Not Detected

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*10406-1B1-72h*	Reporting Date:	4/11/01
Laboratory Identification:	0104012-028	Sample Matrix:	Aqueous
Sampling Date:	4/6/01	Report Data File:	010409.xls.
Sample Receiving Date:	4/9/01	Raw Data File:	01040951.D
Date Analyzed:	*04/10/20 -1:1:*	Method:	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	ND	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	0.8	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	ND	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	100	**80-116**	**Pass**
1,2-dichloroethane-d4(surr2)	110	**80-116**	**Pass**
toluene-d8(surr3)	100	**80-116**	**Pass**
4-bromofluorobenzene(surr4)	103	**80-120**	**Pass**

ND = Not Detected

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification: *10406-1B1-72(D)* **Reporting Date:** 4/11/01
Laboratory Identification: 0104012-029 **Sample Matrix:** Aqueous
Sampling Date: 4/6/01 **Report Data File:** 010409.xls.
Sample Receiving Date: 4/9/01 **Raw Data File:** 01040952.D
Date Analyzed: *04/11/20 -1:2:* **Method:** EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	ND	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	0.8	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	0.8	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	ND	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	100	80-116	Pass
1,2-dichloroethane-d4(surr2)	108	80-116	Pass
toluene-d8(surr3)	101	80-116	Pass
4-bromofluorobenzene(surr4)	103	80-120	Pass

ND = Not Detected

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*10406-1B2-72h*	Reporting Date:	4/11/01
Laboratory Identification:	0104012-030	Sample Matrix:	Aqueous
Sampling Date:	4/6/01	Report Data File:	010409.xls.
Sample Receiving Date:	4/9/01	Raw Data File:	01040953.D
Date Analyzed:	*04/11/20 -1:2:*	Method:	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	7	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	0.8	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	1.1	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	ND	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	100	80-116	**Pass**
1,2-dichloroethane-d4(surr2)	108	80-116	**Pass**
toluene-d8(surr3)	99	80-116	**Pass**
4-bromofluorobenzene(surr4)	102	80-120	**Pass**

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*10406-1B2-72(D)*	**Reporting Date:**	4/11/01
Laboratory Identification:	0104012-031	**Sample Matrix:**	Aqueous
Sampling Date:	4/6/01	**Report Data File:**	010409.xls.
Sample Receiving Date:	4/9/01	**Raw Data File:**	01040954.D
Date Analyzed:	*04/11/20 -1:1:*	**Method:**	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	ND	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	7	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	ND	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	1.1	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	ND	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	ND	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND.	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	100	80-116	Pass
1,2-dichloroethane-d4(surr2)	109	80-116	Pass
toluene-d8(surr3)	100	80-116	Pass
4-bromofluorobenzene(surr4)	104	80-120	Pass

Environmental Research Institute
The University of Connecticut

Volatile Organic Compound Results, Project: ESTreatibility Tests

Sample Identification:	*10403-1B3-72h*	Reporting Date:	4/11/01
Laboratory Identification:	0104012-032	Sample Matrix:	Aqueous
Sampling Date:	4/6/01	Report Data File:	010409.xls.
Sample Receiving Date:	4/9/01	Raw Data File:	01040955.D
Date Analyzed:	*04/11/20 -1:2:*	Method:	EPA-8260

CAS Number	Name	Concentration(ug/L)	MDL (ug/L)
75-71-8	Dichlorodifluoromethane	ND	0.3
74-87-3	Chloromethane	ND	0.1
75-01-4	Chloroethene(Vinyl Chloride)	5.9	0.2
74-83-9	Bromomethane	ND	0.2
75-00-3	Chloroethane	ND	0.2
75-69-4	Trichlorofluoromethane	ND	0.1
75-35-4	1,1-Dichloroethene	ND	1
75-09-2	Dichloromethane	ND	1
01634-04-4	MTBE	ND	0.3
156-60-5	(trans)-1,2-Dichloroethene	ND	0.3
75-34-3	1,1-Dichloroethane	ND	0.1
78-93-3	Methyl Ethyl Ketone (MEK)	ND	1
594-20-7	2,2-Dichloropropane	ND	0.1
156-59-2	(cis)-1,2-Dichloroethene	29.6	0.1
74-97-5	Bromochloromethane	ND	0.3
67-66-3	Chloroform	ND	0.1
71-55-6	1,1,1-Trichloroethane	ND	0.1
563-58-6	1,1-Dichloropropene	ND	0.2
56-23-5	Tetrachloromethane	ND	0.1
71-43-2	Benzene	ND	0.1
107-06-2	1,2-Dichloroethane	ND	0.1
79-01-6	Trichloroethene	7.8	0.1
78-87-5	1,2-Dichloropropane	ND	0.1
74-95-3	Dibromomethane	ND	0.1
75-27-4	Bromodichloromethane	ND	0.2
10061-01-5	(cis)-1,3-Dichloropropene	ND	0.2
108-10-1	MIBK	ND	0.2
108-88-3	Toluene	ND	0.1
10061-02-6	(trans)-1,3-Dichloropropene	ND	0.1
79-00-5	1,1,2-Trichloroethane	ND	0.3
142-28-9	1,3-Dichloropropane	ND	0.2
127-18-4	Tetrachloroethene	1.9	0.2
124-48-1	Dibromochloromethane	ND	0.3
106-93-4	1,2-Dibromoethane	ND	0.1
108-90-7	Chlorobenzene	ND	0.1
630-20-6	1,1,1,2-Tetrachloroethane	ND	0.2
100-41-4	Ethylbenzene	ND	0.1
108-38-3	m-Xylene + p-Xylene	ND	0.2
95-47-6	o-Xylene	ND	0.1
100-42-5	Styrene	ND	0.2
75-25-2	Bromoform	ND	0.1
98-82-8	iso-Propylbenzene	ND	0.2
79-34-5	1,1,2,2-Tetrachloroethane	ND	0.2
96-18-4	1,2,3-Trichloropropane	ND	0.2
108-86-1	Bromobenzene	ND	0.1
103-65-1	n-Propylbenzene	ND	0.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.1
106-43-4	4-Chlorotoluene	ND	0.1
95-49-8	2-Chlorotoluene	ND	0.1
98-06-9	tert-Butylbenzene	ND	0.1
95-63-6	1,2,4-Trimethylbenzene	ND	0.2
135-98-8	sec-Butylbenzene	ND	0.1
99-87-6	4-iso-Propyltoluene	ND	0.1
541-73-1	1,3-Dichlorobenzene	ND	0.1
106-46-7	1,4-Dichlorobenzene	ND	0.1
104-51-8	n-Butylbenzene	ND	0.1
95-50-1	1,2-Dichlorobenzene	ND	0.1
96-12-8	1,2-Dibromo-3-chloropropane	ND	0.6
120-82-1	1,2,4-Trichlorobenzene	ND	1
87-68-3	Hexachlorobutadiene	ND	0.3
91-20-3	Naphthalene	ND	0.2
87-61-6	1,2,3-Trichlorobenzene	ND	1
67-64-1	Acetone	ND	1

Surrogate Recovery

Compound	Recovery (%)	Limit (%)	Condition
Dibromofluoromethane(surr1)	100	**80-116**	**Pass**
1,2-dichloroethane-d4(surr2)	107	**80-116**	**Pass**
toluene-d8(surr3)	100	**80-116**	**Pass**
4-bromofluorobenzene(surr4)	102	**80-120**	**Pass**

ND = Not Detected