Enhanced Reductive Dechlorination Pilot Test Summary Report

25 MELVILLE PARK ROAD SITE
MELVILLE, NEW YORK

ARCADIS

Infrastructure, buildings, environment, communications

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Our Ref.:
NY001332.0009.00002

Date:
14 June 2004

Tables

Figures

Appendices

Disclosure Statement

The laws of New York State require that the corporations which render engineering services in New York be owned by individuals licensed to practice engineering in the State. ARCADIS G&M, Inc. cannot meet that requirement. Therefore, all engineering services rendered to 25 MPR, LLC are being performed by ARCADIS Engineers & Architects of New York, P.C., a New York Professional corporation qualified to render professional engineering in New York. There is no surcharge or extra expense associated with the rendering of professional services by ARCADIS Engineers & Architects of New York, P.C.

ARCADIS G&M, Inc. is performing all those services which do not constitute professional engineering and is providing administrative and personnel support to ARCADIS Engineers & Architects of New York, P.C. All matters relating to the administration of the contract with 25 MPR, LLC are being performed by ARCADIS G&M, Inc. pursuant to its Amended and Restated Services Agreement with ARCADIS Engineers & Architects of New York, P.C. All communications should be referred to the designated project manager at ARCADIS G&M.

1. Introduction

This Enhanced Reductive Dechlorination (ERD) Pilot Test Summary Report (Report) was prepared by ARCADIS and ARCADIS Engineers and Architects of New York, P.C., on behalf of 25 MPR, LLC, for the 25 Melville Park Road Site (hereinafter referred to as the "Site") in Melville, New York.

Plans to implement an ERD pilot test were initiated following an August 2002 letter from the NYSDEC indicating their receptiveness to a six-month pilot demonstration of the ERD technology prior to conditional approval of the Remedial Action Work Plan (RAWP). The first reagent injection associated with the pilot program was conducted on August 14, 2003. The final (Month 6) performance monitoring event was conducted during the week of February 2, 2004. As outlined in the approved ERD Pilot Test Workplan (the Workplan) dated April 1, 2003, the primary objectives of the ERD pilot test were:

- Demonstrate that an anaerobic and reducing in-situ reactive zone (IRZ) can be established at the Site.
- Determine how much the natural rate of reductive dechlorination can be enhanced.
- Determine the carbohydrate loading necessary to create and maintain the IRZ; and,
- Confirm the optimal delivery parameters.

This Report presents the reagent injection and performance monitoring results associated with the six-month pilot program, provides demonstration of how each pilot test objective was successfully met, and includes a discussion regarding the feasibility of applying the technology at the site.

2. Pilot Test Methodology

The following section presents the methodology used for implementing the ERD pilot test. In general, implementation of the ERD pilot test followed the methodology outlined in the Workplan. Any changes to the methods outlined in the Workplan have been identified in each of the respective sections, where applicable.

2.1 Injection and Monitoring Wells

The following sections describe the injection wells that were used to deliver the molasses solution to the subsurface and the monitoring wells that were used to track the progress of the pilot test. Specific details regarding the positioning, installation, and construction details of the pilot test well network are presented. A summary of the construction details for the pilot test injection and monitoring wells associated with each aquifer zone is presented in Table 1.

2.1.1 Injection and Monitoring Well Installation

Injection wells IW-13, IW-14, IW-15, and IW-16 and monitoring wells MW-30, MW-31, MW-32, and MW-33 were installed with a drill rig using 6.25-inch (monitoring wells) and 4.25-inch (injection wells) inside diameter hollow-stem augers. The four new injection wells are constructed of 2-inch diameter, schedule 40 PVC well casing and 2-inch diameter, 0.020-inch (20 slot) PVC well screen. The four new monitoring wells are constructed of 4-inch diameter, schedule 40 PVC well casing and 4-inch diameter, 0.020-inch (20 slot) PVC well screen. The injection and monitoring wells were installed, constructed, and developed in accordance with the procedures described in the Workplan. The well construction logs are provided in Appendix A.

2.1.2 Injection and Monitoring Well Network

A network of nine (9) injection wells (four shallow zone and five intermediate zone) was used to deliver the molasses solution to the subsurface. This network consisted of both new and existing wells, which were aligned in a transect oriented perpendicular to the direction of groundwater flow. Specifically, the shallow zone injection network consisted of existing wells IW-5, IW-6, and MW-12 and newly installed well IW-16 (Figure 1). The intermediate zone injection network consisted of existing wells IW-10 and IW-11 and newly installed wells IW-13, IW-14, and IW-15 (Figure 2).

A network of fourteen (14) monitoring wells (eight shallow zone and six intermediate zone) and one (1) upgradient (background) monitoring well (MW-15) was used to track the progress of the pilot test. This network consisted of both new and existing wells, which were positioned to allow confirmation of the length and width of the resulting IRZ. The shallow zone monitoring network consisted of existing monitoring wells MW-7, MW-8, MW-9, MW-10, MW-11, and MW-29 and newly installed monitoring wells MW-31 and MW-32 (Figure 1). The intermediate zone monitoring

well network consisted of existing monitoring wells MW-16D, MW-23, MW-27D, and MW-28D and newly installed monitoring wells MW-30 and MW-33 (Figure 2).

2.2 Injection Procedures

The following section outlines the procedures used for reagent injections during the six month pilot program. Reagents injected included dilute molasses solution (carbon source), sodium bicarbonate (buffer solution) and potassium bromide (conservative tracer). Appendix B provides a summary of each reagent injection event including injection date, quantity of reagent injected, solution strength, and injection parameters (flow rate and pressure).

2.2.1 Molasses Solution Injection Procedures

Molasses solution injections were conducted in accordance with the procedures outlined in the Workplan. During each injection event, the dilute molasses solution was prepared in batches by thoroughly mixing the molasses and the potable water (along with the bromide tracer and bicarbonate, where applicable) in the proper ratio within a polyethylene mixing tank. Molasses solution batches were mixed on a per well basis. The mixed molasses feed solution was then delivered into the injection wells using a gas-engine powered centrifugal transfer pump. The mixing tank was graduated, allowing the total volume injected into each well to be monitored over time.

During each injection event, the solution strength (molasses and water volumes used), the total volume of solution injected into each injection well, the injection pressure at each injection well, and the injection flow rate were recorded. A summary of the injection parameters recorded for each injection well is provided in Appendix B. As shown in Appendix B, recorded injection parameters indicate that the formation readily accepts the molasses solution. Injection flowrates ranged from 16 to 66 gallons per minute (gpm). However, the average injection flowrate was typically at the higher end of the range. An increase in injection pressure was observed in many of the injection wells during the course of the pilot test; however, this increase did not result in a negative impact to the injection flowrate.

Total organic carbon (TOC) concentrations for injection and monitoring wells located within the IRZ were reviewed on a continuous basis and were used to adjust the molasses solution strength as necessary to achieve optimal TOC loading for ERD within the subsurface. As described previously, a summary of the solution strength used during each injection event is provided in Appendix B.

2.2.2 Sodium Bicarbonate Injection Procedures

Sodium bicarbonate (baking soda) was added as an injection reagent beginning with the injection event conducted on September 29, 2003 to provide additional buffering capacity to the groundwater system. As described in the Workplan, in some hydrogeologic settings, the organic acids produced during the enhanced microbial activity with ERD results in a decrease in the pH of groundwater. This decrease in pH was observed in injection wells and downgradient monitoring wells MW-32 and MW-33 during the September 10 and 22, 2003 performance monitoring events.

Sodium bicarbonate was delivered to the subsurface by thoroughly mixing a predetermined quantity of sodium bicarbonate in with the molasses solution during each batch mix. A summary of the quantities injected during each injection event is provided in Appendix B.

2.2.3 Conservative Tracer Injection Procedures

As described in the Workplan, potassium bromide (KBr) was added to the molasses reagent mixture as a conservative tracer to estimate advective transport times and confirm and document the lateral extent of ambient hydraulic mixing in the test area. A predetermined quantity of KBr was uniformly dissolved in the reagent solution and added to injection wells IW-6 (shallow zone) and IW-11 (intermediate zone) to generate a target concentration of 10 milligrams per liter (mg/L) of bromide in the treatment area. The injection of KBr was conducted during the first molasses solution injection event on August 14, 2003.

2.3 Groundwater Monitoring

The following section outlines the procedures used to monitor the groundwater during the six-month pilot program. Performance monitoring included a baseline monitoring event, followed by a series of performance monitoring events. The data collected from these performance monitoring activities were evaluated against the proposed performance objectives. This comparison was used to determine whether the pilot test was successful. Details regarding the performance monitoring are presented in the following sections. A summary of the groundwater monitoring conducted during the ERD pilot test is presented in Table 2.

2.3.1 Groundwater Sampling Procedures

Due to the highly sensitive nature of the biogeochemical sampling parameters that were collected during the ERD pilot test, both purging and sampling were performed via low-flow (minimal drawdown) techniques using a low-flow submersible pump (i.e., Grundfos Redi-Flo2). If only a TOC sample or a TOC plus alkalinity or bromide sample was being collected from a well, then the groundwater sample was collected from the screen interval using a double-check valve bailer (no purging). The groundwater samples collected for off-site laboratory analysis were shipped to a NYSDOH certified laboratory for analysis. A NYSDEC Analytical Services Protocol (ASP) Category A sample data package was provided by the laboratory for the groundwater samples. Quality assurance/quality control (QA/QC) sampling included the collection of one duplicate sample and one field blank sample per sampling event. The duplicate sample was analyzed for all specified parameters from that sampling event with the exception of the dissolved gases and the field blank sample was analyzed for volatile organic compounds (VOCs) only. Groundwater sampling and equipment decontamination was conducted in accordance with the procedures described in the Workplan.

2.3.2 Baseline Data Collection

To establish baseline conditions (i.e., groundwater conditions prior to the start of the molasses injections) within the anticipated six-month limit of the IRZ, an initial round of groundwater elevation measurements and groundwater quality samples were collected. In addition, to establish site-wide baseline conditions for longer-term performance monitoring beyond the six-month data collection period and to determine the present-day chlorinated VOC (CVOC) dissolved-phase plume configuration, groundwater quality samples were collected from additional select shallow and intermediate zone monitoring wells. In addition, baseline groundwater samples collected from the eight injection wells were analyzed for VOCs (plus TICs) and TOC.

2.3.3 Performance Monitoring Data Collection

Groundwater performance monitoring was conducted to evaluate the development and extent of the IRZ and the effectiveness of the ERD process. Two types of performance monitoring were conducted, "standard" and "interim" performance monitoring.

Standard performance monitoring was conducted at two, four, and six months following the initiation of injections. The data were used to evaluate the progress and

performance of the pilot test. Interim performance monitoring was conducted between each standard performance monitoring event. These events were limited to the collection of down-hole field parameter measurements and grab samples for TOC or TOC plus alkalinity or bromide analysis. Down-hole field parameter measurements were collected from select injection wells and select monitoring wells using a multi-parameter, down-hole, water quality meter. The measurements were recorded with the probe at the center of the screened interval for each well. The data allowed for real-time evaluation of the injection program performance and provided the basis for timely adjustments, when necessary. In addition, supplemental interim performance monitoring events were conducted as necessary (see Table 2).

During several ERD pilot test monitoring events, the DO readings measured with the down-hole water quality meter appeared to be erroneous. During the time between the Month 5 and Month 6 monitoring events, ARCADIS learned from several sources (including the water quality meter manufacturer) that sulfide generation (by-product formation from the utilization of sulfate as an electron acceptor) will cause erroneous DO readings with the multi-parameter meter because sulfide diffuses through the DO probe membrane and collects on the anode. During the Month 6 monitoring event, downhole field parameter measurements were not collected from the injection wells and field measurements were collected starting with wells exhibiting lower sulfide concentrations and progressively moving into areas with higher sulfide levels in an attempt to minimize this problem. This procedure appeared to minimize the problem with the DO probe. During the Month 6 monitoring event, a CHEMetrics field test kit was also used to measure the DO concentrations in select wells and samples were also collected from these wells for the analysis of DO at the laboratory. A summary of the groundwater monitoring conducted during the ERD pilot test baseline monitoring event is presented in Table 2.

2.4 Air Monitoring

ARCADIS conducted two (2) indoor ambient air quality monitoring events during the ERD pilot test to evaluate whether remedial activities were affecting the potential pathway of vapor intrusion. A baseline monitoring event was conducted on July 10, 2003 prior to commencing the ERD technology in order to aid in the evaluation of indoor air quality data. The second indoor ambient air quality monitoring event was conducted on November 13, 2003 (i.e., 3 months after commencing the first injection event). Air quality sampling was conducted at two (2) locations within floor space currently occupied by AT&T (along the eastern wall of the building), which is located adjacent to the area where the IRZ was established. Six liter Summa canisters were

placed at locations representative of the breathing zone (i.e., approximately 3 to 4 feet above the floor surface) during sampling. All indoor ambient air quality sample analyses were performed by Air Toxics Ltd. located in Folsom, California using United States Environmental Protection Agency (USEPA) Method TO-14A. The air quality samples were analyzed for PCE, TCE, 1,1,1-TCA, cis-1,2-DCE, trans-1,2-DCE, 1,1-DCA, 1,1-DCE, and VC. The indoor ambient air quality monitoring was conducted in accordance with the procedures described in the Workplan.

3. Performance Monitoring Results

The following section summarizes the results of the interim and standard performance monitoring events conducted during the six month pilot program. Table 2 provides a summary of the performance monitoring results for total organic carbon, conservative tracer (bromide), biogeochemical, field parameters, target CVOCs (PCE, TCE, 1,2-DCE, and VC), and dissolved gases (ethane, ethene, and methane).

3.1 Total Organic Carbon Results

The TOC results provided in Table 2 show that TOC concentrations within injection wells and downgradient monitoring wells increased substantially as a result of the reagent injections. The average baseline (June 2003) TOC concentration for all injection and monitoring wells included in the ERD pilot program was 4.91 mg/L. The average TOC concentration within injection wells for all performance monitoring events conducted after the first reagent injection was 2,303 mg/L and 2,473 mg/L, for the shallow and intermediate zones, respectively. TOC concentrations of 120 and 300 mg/L (for the Month 5 and Month 6 monitoring events, respectively) were present in the shallow zone up to 158 days (as calculated based on a groundwater velocity of 0.6 feet per day [ft/day]) downgradient of the injection wells (monitoring well MW-29). Similarly, TOC concentrations of 130 and 240 mg/L (for the Month 5 and Month 6 monitoring events, respectively) were present in the intermediate zone up to 133 days downgradient (as calculated based on a groundwater velocity of 0.33 ft/day) of the injection wells (monitoring well MW-27D). TOC concentrations of 2,200 mg/L and 630 mg/L were observed at monitoring wells MW-32 and MW-33, respectively, during the Month 6 monitoring event. MW-32 and MW-33 are located 20 and 30 days downgradient of the injection wells, respectively.

Significant TOC concentrations were not observed in monitoring wells located sidegradient of the injection wells used for reagent injections (i.e., monitoring wells MW-9 and injection wells IW-7 and IW-12) during the six month pilot test.

3.2 Conservative Tracer Results and Estimated Horizontal Groundwater Seepage Velocity

Bromide was detected above baseline conditions in shallow monitoring wells MW-32, MW-8, and MW-7, and in intermediate monitoring wells MW-33 and MW-23. Maximum (peak) bromide concentrations were observed in monitoring wells MW-8 (2.5 mg/L) and MW-23 (0.27 mg/L) during the October 20, 2003 monitoring event.

Peak bromide results from monitoring wells MW-8 and MW-23 were used to estimate advective horizontal groundwater seepage velocities in the shallow and intermediate zones. Based on these results, the calculated horizontal advective groundwater velocities are 0.36 and 0.33 feet per day (ft/day) for the shallow and intermediate zones, respectively. The estimated intermediate zone groundwater velocity is consistent with the arrival times of TOC observed at downgradient monitoring locations during the pilot program. However, TOC observed in the shallow aquifer at locations downgradient of the injection wells indicate that the horizontal groundwater velocity appears to increase to greater than 0.36 ft/day near the downgradient property boundary. The increase in shallow zone horizontal groundwater velocity and other factors such as spatial heterogeneities and dispersion may be influencing the estimated travel times.

For the purposes of calculating estimated travel times from the injection well transect to downgradient monitoring wells for Figures 5, 6, 7, and 8 (see Section 4.0), an "average" apparent shallow zone groundwater velocity of 0.6 ft/day was used. The apparent shallow zone groundwater velocity was determined based on TOC data at downgradient monitoring well locations. First, individual velocities were determined for each downgradient monitoring location (MW-32, MW-8, MW-7, MW-10, MW-29, and MW-31) based on the first observance of TOC at 20 mg/L or greater. Then, the average velocity was calculated based on the average of the individual velocities described above.

3.3 Biogeochemical and Field Parameter Results

Biogeochemical and field parameter performance monitoring results are shown in Table 2. A summary of the key biogeochemical and field parameter results is provided below.

- Dissolved manganese concentrations increased one to three orders of magnitude for all monitoring wells located within the IRZ with the exception

of monitoring well MW-32, which had a comparably lower increase. Baseline dissolved manganese analytical results ranged from 0.016 mg/L (MW-23) to 1.12 mg/L (MW-32). Month 6 dissolved manganese analytical results ranged from 1.45 mg/L (MW-8) to 31.9 mg/L (MW-33).

- Dissolved iron concentrations increased two to three orders of magnitude for all monitoring wells located within the IRZ. Baseline dissolved iron analytical results ranged from below detection (several wells) to only 6.7 mg/L (MW-32), whereas Month 6 dissolved iron analytical results ranged from 199 mg/L (MW-8) to 557 mg/L (MW-11).

- Sulfate has been substantially reduced along the downgradient flow path in both the shallow (monitoring wells MW-8, MW-7, MW-11, MW-10, and MW-29) and intermediate zones (monitoring wells MW-33, MW-23, and MW-27D) when comparing baseline to Month 6 analytical results. Sulfide concentrations increased one to two orders of magnitude in shallow monitoring well MW-32, MW-8, and MW-7 and intermediate zone monitoring wells MW-33 and MW-27D.

- Methane concentrations have increased one to two orders of magnitude in all monitoring wells within the current IRZ. The most significant increase was observed in shallow monitoring well MW-10, which increased from 1.6 to 240 micrograms per liter (ug/L) for the baseline to Month 6 sampling events, respectively.

The oxidation-reduction potential (ORP) and dissolved oxygen (DO) within monitoring wells located downgradient of the injection zone (shallow monitoring wells MW-32, MW-8, MW-7, MW-11, MW-10, MW-29, and MW-31; intermediate monitoring wells MW-33, MW-23, and MW-27D) decreased substantially during the course of the pilot test. The average baseline ORP for these wells was 248 and 421 millivolts (mV) for the shallow and intermediate zones, respectively. The average Month 6 ORP results for these wells were -56 and -48 mV for the shallow and intermediate zones, respectively. The average baseline DO for these wells was 2.0 and 3.6 milligrams per liter (mg/L) for the shallow and intermediate zones, respectively. The average Month 6 DO results for these wells were 1.2 and 1.4 mg/L for the shallow and intermediate zones, respectively. It should be noted that the DO results presented above were based on field measurement using a field DO meter. Because of the potential bias associated with these measurements, groundwater samples from both the intermediate and shallow zones were submitted for laboratory analysis during the

Month 6 performance monitoring event to confirm the accuracy of the field methods. As shown in Table 2, the laboratory analytical results were considerably lower when compared to their respective field measurements. The average shallow zone laboratory analytical DO was 0.6 mg/L (monitoring wells MW-32, MW-7, and MW-29) and the average intermediate zone laboratory analytical DO was 0.6 mg/L (monitoring wells MW-33 and MW-27D).

3.4 Target Chlorinated Volatile Organic Compound Results

Target CVOC (PCE, TCE, 1,2-DCE, and VC) analytical results are shown in Table 2. A summary of all VOC analytical results is provided in Appendix C. A comparison of the baseline and Month 6 PCE iso-concentration contours for the shallow and intermediate zones is provided on Figures 3 and 4, respectively. The concentrations of all target CVOCs have also been provided on Figures 3 and 4. As shown in Table 2 and Figures 3 and 4, the relative distribution of parent compound to daughter compounds shifted dramatically during the six-month pilot program. Specifically, concentrations of PCE, TCE, and 1,2-DCE as a percentage of the total target CVOC concentration detected at monitoring wells within the IRZ (monitoring wells MW-32, MW-8, MW-7, MW-10, MW-11, MW-29, MW-33, MW-23, and MW-27D) have shifted from approximately 72, 20, and 8-percent, respectively (baseline) to 1, 4, and 95-percent, respectively (Month 6).

Total target CVOC concentrations (expressed on a mass basis [ug/L]) increased in shallow zone monitoring wells MW-32, MW-8, and MW-29, and intermediate zone monitoring wells MW-23 and MW-27D when comparing the baseline to the Month 6 monitoring events, respectively. Total target CVOC concentrations decreased in shallow zone monitoring wells MW-7, MW-10, and MW-11, and in intermediate zone monitoring well MW-33 when comparing the baseline to the Month 6 monitoring events, respectively.

The only detection of vinyl chloride during the six-month pilot test was 2 ug/L observed at monitoring well MW-8 during the Month 6 monitoring event.

3.5 Air Monitoring Results

The laboratory analytical results from both the baseline and Month 3 indoor ambient air quality monitoring events show that no site-related constituents of concern (COCs) were detected in ambient air. The data demonstrate that the ERD pilot test reagent injections have not affected indoor ambient air quality. The analytical results were

provided to the NYSDEC, New York State Department of Health (NYSDOH), and Suffolk County Department of Health Services (SCDHS) in monthly Progress Reports 23 and 27.

4. Discussion of Results

The following section presents a detailed discussion of the performance monitoring results presented in Section 3 of this Report. Included in the discussion is a demonstration of how each pilot test objective was successfully achieved and a description of additional pilot test achievements that demonstrate the suitability of the technology for the Site. Figures 5, 6, 7, and 8 have been developed to support the interpretation of results. Figures 5 and 6 provide a comparison of the baseline and Month 6 concentrations of key biogeochemical parameters (methane, sulfate, dissolved iron), and TOC along the downgradient flow path for the shallow and intermediate zones, respectively. Figures 7 and 8 provide a comparison of the baseline and Month 6 concentrations of target CVOCs and ethene [expressed in micromoles per liter] along the downgradient flow path for the shallow and intermediate zones, respectively.

4.1 Achievement of Pilot Test Objectives

Performance monitoring results demonstrate that the pilot test objectives outlined in the Workplan have been successfully achieved. Documentation of how each pilot test objective was met is provided below.

4.1.1 Demonstrating that an Anaerobic and Reducing IRZ can be Established at the Site

As described in the Workplan, the establishment of reducing conditions occurs when subsurface microbes begin the successive utilization of DO and alternative electron acceptors to support respiration following the depletion of oxygen. The general sequence of alternate electron acceptor utilization and respiration byproduct formation is as follows (from least reducing to most reducing):

Oxygen (O_2)	→	Carbon Dioxide (CO_2)
Nitrate (NO_3)	→	Nitrogen (N_2)
Mangenic Manganese (Mn^{4+})	→	Mangenous Manganese (Mn^{2+})
Ferric Iron (Fe^{3+})	→	Ferrous Iron (Fe^{2+})

Sulfate (SO_4^{2-})	→	Sulfide (S^{-2})
Carbon Dioxide (CO_2)	→	Methane (CH_4)

Month 6 biogeochemical and field parameter results demonstrate that the current biogeochemical environment is indicative of strongly reducing conditions. This is evidenced by a significant increase in reduced forms of alternate electron acceptors [dissolved manganese, dissolved iron, sulfide, and methane] and significant decrease in DO. As described in Section 3.3 and shown on Figures 5 and 6, specific observations are as follows:

- The significant increase in dissolved manganese indicates that manganese reduction is occurring within the IRZ.
- The significant increase in dissolved iron indicates that iron reduction is occurring within the IRZ.
- The significant decrease in sulfate and increase in sulfide indicate that sulfanogenesis is occurring within the IRZ; and,
- The significant increase in methane indicates that methanogenesis is occurring within the IRZ.
- Combined with the analytical results described above, the significant decrease in DO and ORP indicate that the current IRZ exhibits strongly reducing conditions.

4.1.2 Determining How Much the Natural Rate of Reductive Dechlorination can be Enhanced

Although site-specific dechlorination rates have not been calculated, the significant transformation of parent compound (PCE and TCE) to daughter compounds (1,2-DCE) demonstrates a substantial increase in the natural rate of reductive dechlorination within the six-month pilot test. As discussed in Section 3.4, concentrations of PCE, TCE, and 1,2-DCE as a percentage of the total target CVOC concentrations detected at monitoring wells within the IRZ have shifted from approximately 72, 20, and 8-percent, respectively (baseline monitoring event) to 1, 4, and 95-percent, respectively (Month 6 monitoring event).

4.1.3 Determining the Carbohydrate Loading Necessary to Create and Maintain the IRZ

When establishing an anaerobic IRZ for ERD, a TOC concentration of between 50 and 100 mg/L is typically targeted to maintain an environment sufficient for the complete reductive dechlorination of CVOCs. A TOC concentration of 1,000 to 10,000 mg/L (varies depending on the site-specific half-life degradation rate of the organic carbon) is normally required within the vicinity of the injection wells in order to achieve the 50 to 100 mg/L target downgradient. As discussed in Section 3.1, pilot test monitoring results indicate that TOC in excess of 100 mg/L is present 158 and 133 days hydraulically downgradient of the injection wells in the shallow and intermediate zones, respectively. Similarly, the average TOC within injection wells during the six month pilot program was greater than 1,000 mg/L. Combined, the TOC analytical data indicate that the carbohydrate loading rate used during the six-month pilot test was sufficient to maintain the IRZ.

The relative increase of TOC at monitoring wells MW-29 (shallow zone) and MW-27D (intermediate zone) from Month 5 to Month 6 indicates that TOC continues to migrate downgradient and that the IRZ did not reach its' maximum downgradient extent during the six month pilot test.

4.1.4 Confirming the Optimal Solution Delivery Parameters

The optimal solution delivery parameters include the carbohydrate loading rate necessary to maintain sufficient TOC within the IRZ and the required injection volume to provide adequate lateral (spatial) coverage of TOC between injection locations. Confirming these parameters was accomplished through adjusting the molasses solution strength and injection volume and subsequent monitoring of TOC at injection wells and downgradient monitoring wells and bromide (conservative tracer) at downgradient/sidegradient monitoring wells (shallow monitoring well MW-32 and intermediate monitoring well MW-33).

As described in Section 4.1.3, TOC analytical results indicate that the carbohydrate loading rate used during the pilot test was sufficient to maintain the IRZ. Additionally, the presence of TOC and bromide at sidegradient monitoring wells MW-32 (located approximately 10-feet sidegradient of shallow zone injection well IW-6) and MW-33 (located approximately 9-feet sidegradient of intermediate injection well IW-11) indicate that the injection volume was sufficient to provide adequate TOC between injection points. Specific observations are as follows:

- A bromide concentration of 0.94 mg/L was observed in shallow zone monitoring well MW-32 during the October 2003 (Month 2) monitoring event. TOC was observed as high as 2,200 mg/L during the February 2004 (Month 6) monitoring event.

- A bromide concentration of 0.11 mg/L was observed in intermediate zone monitoring well MW-33 during the October 2003 (Month 2) monitoring event. TOC was observed as high as 630 mg/L during the February 2004 (Month 6) monitoring event.

Combined, these data indicate that the solution delivery parameters utilized during the pilot program was sufficient to maintain the IRZ.

4.2 Additional Pilot Test Achievements

In addition to achieving the pilot test objectives outlined in the Workplan, performance monitoring results provided further evidence that the IRZ technology is an appropriate remedial strategy for groundwater at the Site. Specifically, performance monitoring data demonstrated that the ERD process releases adsorbed phase mass into the dissolved phase making it available for treatment, and that the target CVOCs are completely degrading along the downgradient flow path. Documentation of the additional pilot test achievements is provided below.

4.2.1 Desorption of Adsorbed Phase Mass

As expected, the biological activity stimulated by the ERD process resulted in a disruption of the natural dissolved phase-adsorbed phase equilibrium in the subsurface. This disruption transferred CVOC mass from the adsorbed phase to the dissolved phase (i.e., desorption). In order to properly quantify the degree of desorption, target compound concentrations as a mass percentage (i.e., ug/L) were converted to micromolar equivalents. Micromolar equivalents were computed by taking the mass based percentage concentration in ug/L and dividing it by the molecular weight of the target compound. Micromolar equivalents represent the quantity of micromoles of the given compound per liter of solute.

CVOC desorption is demonstrated by comparing the ERD pilot test baseline performance monitoring data to the Month 6 performance monitoring data. Figures 7 and 8 show a comparison of the baseline and Month 6 performance monitoring results for the shallow and intermediate zones, respectively. As shown on Figures 7 and 8,

total micromolar equivalents increased up to an order of magnitude at monitoring wells MW-32, MW-8, MW-27D, and MW-29 from the baseline to Month 6 monitoring events, respectively. Groundwater monitoring data also indicate that there is substantial adsorbed phase mass present in the shallow aquifer in the vicinity of MW-29 and intermediate aquifer in the vicinity of monitoring well MW-27D. The residual and sorbed-phase mass represent the most significant portion of CVOC mass to be remediated. The data indicate that this mass is successfully being accessed and made available for treatment within the IRZ.

4.2.2 Demonstration of Contaminant Mass Destruction

Shallow zone Month 6 performance monitoring data illustrate that despite the significant desorption effect, target CVOC mass is being completely degraded along the path of groundwater flow. As shown on Figure 7, total molar equivalents drop by an order of magnitude between MW-8, and downgradient wells MW-7 and MW-10. Furthermore, the total micromolar equivalents at MW-8 and MW-10 are themselves 40 and 75 percent lower than those observed during the baseline event, respectively. Biogeochemical data for monitoring well MW-10 supports these observations. As discussed in Section 3.3, monitoring well MW-10 demonstrated the most significant increase in methane, which is indicative of a strong reducing environment. This pattern is characteristic of a developing IRZ barrier and it is expected that these trends will continue at monitoring well MW-10 and eventually be observed at additional downgradient shallow and intermediate zone monitoring locations.

The Month 6 data also indicate that the IRZ is in the process of maturing to the point where the reductive dechlorination of CVOC mass will achieve short-term remedial objectives. Currently, PCE is being readily desorbed from the formation, and is being degraded at a greater rate than its release into the dissolved phase. As a result, concentrations of PCE and TCE have substantially decreased from baseline conditions. The degradation half-lives of PCE and TCE are shorter than 1,2-DCE in a reducing environment. As a result, the data currently indicate the competing processes of 1,2-DCE formation versus 1,2-DCE degradation. As the IRZ matures further, the rate of 1,2-DCE degradation will eventually exceed the rate of 1,2-DCE formation for the following reasons:

- There is a finite quantity of adsorbed mass being released into the treatment zone. As the source of PCE is removed, the concentration of 1,2-DCE formed from PCE degradation will decline, and eventually the rate of 1,2-DCE degradation will exceed it's rate of formation.

- As the IRZ matures, the rate of 1,2-DCE degradation is expected to accelerate and ultimately level off at a peak mature degradation rate. This typically occurs within 12 to 24 months of initiation of injections.

Given the significant amount of iron naturally present in the mineralogic makeup of the aquifer, this site is a likely candidate for abiotic degradation of chlorinated ethenes. Chlorinated ethenes can react with reduced iron-bearing minerals formed in these anaerobic environments, resulting in their degradation via anaerobic oxidation processes. This abiotic pathway precludes the formation of VC or ethene. The possibility of direct degradation of chlorinated ethenes (including 1,2-DCE) without the formation of VC and ethene, particularly in the presence of iron reduction, has been demonstrated and discussed in numerous literature accounts. The ongoing performance monitoring program will be used to evaluate whether CVOC mass is being degraded via this abiotic degradation pathway.

5. Conclusions

ERD pilot test performance monitoring data indicate that the anaerobic IRZ technology is suitable for the remediation of CVOCs at the Site. Specifically,

- The significant increase in reduced forms of alternate electron acceptors (dissolved iron, dissolved manganese, sulfide, and methane) and decrease in DO and ORP demonstrate that an anaerobic and strongly reducing IRZ can be established at the Site.

- The significant shift of parent compound (PCE and TCE) to daughter compound (1,2-DCE) during the six-month pilot program demonstrates that the natural rate of reductive dechlorination can be significantly enhanced.

- Complete CVOC degradation was observed as evidenced by the decline in total dissolved mass downgradient of the IRZ in shallow monitoring wells MW-7 and MW-10.

- The significant increase in total CVOC mass at monitoring wells located within the limits of the IRZ demonstrates that the ERD process aggressively accessed adsorbed phase mass typically inaccessible to conventional remediation techniques; and,

- TOC and bromide analytical results for injection and monitoring wells indicate that the optimal delivery parameters were determined for maintaining the IRZ and that the current injection well spacing is sufficient for providing complete spatial coverage of TOC between injection locations.

Combined, the above conclusions indicate that the IRZ is in the process of becoming fully mature. Upon maturation (and subsequent establishment of optimal reductive dechlorination rates) and release of the finite quantity of adsorbed phase mass, the IRZ will meet the short-term remedial goals for the Site.

6. Recommendations

Based on the results presented in this report, ARCADIS recommends maintaining the existing anaerobic IRZ with the collection of additional performance monitoring samples. Additional performance monitoring analytical results will be used for the following:

- Providing further evidence that CVOCs are being completely degraded along the downgradient flow path, particularly at the downgradient property boundary.

- Monitoring the maximum downgradient and lateral extents of the existing IRZ to determine if the injection well network needs to be modified in order to completely degrade CVOCS prior to migrating off-site.

- Providing additional information to assist in the design of the source area remedy; and,

- Evaluating control of the CVOC plume (i.e., through declining mass flux at the downgradient property boundary) so that upon its successful demonstration, the IRZ can be expanded into the source area.

TOC analytical results from the ERD pilot test indicate that the IRZ continues to develop downgradient. The additional data collection recommended above will be used to determine the maximum achievable downgradient extent of the IRZ and whether the existing injection well network will be sufficient to remediate CVOCs within the property boundary. The data will also be used to determine the lateral extent of the existing IRZ and whether additional side gradient injection wells will be required to remediate the full width of the plume.

Tables

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Table 1. Injection and Monitoring Well Construction Summary, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

Well Designation	Well Diameter (inches)	Screened Interval (feet bls)	Total Well Depth (ft bls)	Aquifer Zone Designation
Injection Wells				
IW-5	2	45-60	60	Shallow
IW-6	2	45-60	60	Shallow
IW-16	2	45-60	60	Shallow
MW-12	2	46.5-56.5	56.5	Shallow
IW-10	2	75-90	90	Intermediate
IW-11	2	75-90	90	Intermediate
IW-13	2	75-90	90	Intermediate
IW-14	2	60-75	75	Intermediate
IW-15	2	60-75	75	Intermediate
Monitoring Wells				
MW-7	2	40-60	60	Shallow
MW-8	2	40-60	60	Shallow
MW-9	2	40-60	60	Shallow
MW-10	2	40-60	60	Shallow
MW-11	2	40-60	60	Shallow
MW-15	2	48.5-58.5	58.5	Shallow
MW-29	2	45-60	60	Shallow
MW-31	4	60-70	70	Shallow
MW-32	4	45-60	60	Shallow
MW-16D	2	79.5-89.5	89.5	Intermediate
MW-23	2	70-85	85	Intermediate
MW-27D	4	40-55 (Upper) 75-90 (Lower)	90	Intermediate
MW-28D	4	40-55 (Upper) 75-90 (Lower)	90	Intermediate
MW-30	4	75-90	90	Intermediate
MW-33	4	70-85	85	Intermediate

ft bls Feet below land surface.

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Table 2. Concentrations of Metals, Classical Chemistry Analytes, Field Parameters, Target VOCs, and Dissolved Gases in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

Parameters	Well ID: / Date Sampled: / Zone:	MW-15* 06/24/03 Shallow	MW-15* 09/10/03 Shallow	MW-15*, 2 11/04/03 Shallow	MW-15* 01/09/04 Shallow	MW-15* 02/03/04 Shallow	IW-5 06/17/03 Shallow	IW-5 2 10/07/03 Shallow	IW-5 12/04/03 Shallow	IW-5 01/08/04 Shallow	IW-6 06/17/03 Shallow
	UNITS										
DISSOLVED METALS											
Iron, Dissolved	ug/L	<52	--	--	--	<200	--	--	--	--	--
Manganese, Dissolved	ug/L	5.8 B	--	--	--	43.7	--	--	--	--	--
CLASSICAL CHEMISTRY ANALYTES											
Alkalinity, Total (As CaCO3)	mg/L	15.6	--	--	--	--	--	--	--	--	--
Bromide	mg/L	<0.10	--	--	--	--	--	--	--	--	--
Chloride	mg/L	5.6	--	--	--	46.3	--	--	--	--	--
Nitrogen, Nitrate (As N)	mg/L	0.38	--	--	--	1.23	--	--	--	--	--
Nitrogen, Nitrite (as N)	mg/L	<0.10	--	--	--	<0.10	--	--	--	--	--
Total Organic Carbon	mg/L	0.33 B	--	--	--	2.5	20	4500	220	700	13
Sulfate	mg/L	4	--	--	--	2.76	--	--	--	--	--
Sulfide (field)	mg/L	0.007	--	--	--	0.013	--	--	--	--	--
FIELD PARAMETERS											
pH	Standard units	5.40	5.65	5.34	5.59	5.53	4.65	5.12	5.26	4.88	5.20
Specific Conductance	mS/cm	0.066	0.146	0.105	0.155	0.212	0.704	3.32	0.697	0.989	0.473
Dissolved Oxygen	mg/L	8.52	8.72	6.78	--	9.92	3.19	--	0.89	--	2.31
Temperature	deg C	19.98	14.77	15.04	14.79	18.04	21.23	16.84	17.04	16.96	21.50
ORP	mV	336.5	192	219.3	69.8	216.5	261.4	-125	-62.7	-162.3	283.0
VOCs											
Tetrachloroethene	ug/L	6	--	--	--	1700 D	22000 D	--	--	--	53
Trichloroethene	ug/L	<5	--	--	--	32	9200 D	--	--	--	16
cis-1,2-Dichloroethene	ug/L	<5	--	--	--	<5	3300 D	--	--	--	7
Vinyl Chloride	ug/L	<1	--	--	--	<1	<1	--	--	--	<1
LIGHT HYDROCARBONS/PERMANENT GASES											
Ethane	ng/L	9.6	--	--	--	26	--	--	--	--	--
Ethene	ng/L	16	--	--	--	1400	--	--	--	--	--
Methane	ug/L	0.28	--	--	--	6.9	--	--	--	--	--
Oxygen	mg/L	--	--	--	--	--	--	--	--	--	--
Carbon Dioxide	mg/L	--	--	--	--	--	--	--	--	--	--
Nitrogen	mg/L	--	--	--	--	--	--	--	--	--	--

See footnotes on last page.

Table 2. Concentrations of Metals, Classical Chemistry Analytes, Field Parameters, Target VOCs, and Dissolved Gases in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

Parameters	Well ID: / Date Sampled: / Zone:	UNITS	IW-6 09/10/03 Shallow	IW-6 09/22/03 Shallow	IW-6 [2] 10/07/03 Shallow	IW-6 10/20/03 Shallow	IW-6 [2] 11/04/03 Shallow	IW-6 11/10/03 Shallow	IW-6 11/17/03 Shallow	IW-6 [3] 12/05/03 Shallow	IW-6 01/08/04 Shallow	IW-6 02/02/04 Shallow
DISSOLVED METALS												
Iron, Dissolved		ug/L	--	--	--	--	--	--	--	--	--	--
Manganese, Dissolved		ug/L	--	--	--	--	--	--	--	--	--	--
CLASSICAL CHEMISTRY ANALYTES												
Alkalinity, Total (As CaCO3)		mg/L	--	--	<2	--	--	--	--	164	--	--
Bromide		mg/L	--	--	--	--	--	--	--	--	--	--
Chloride		mg/L	--	--	--	--	--	--	--	--	--	--
Nitrogen, Nitrate (As N)		mg/L	--	--	--	--	--	--	--	--	--	--
Nitrogen, Nitrite (as N)		mg/L	--	--	--	--	--	--	--	--	--	--
Total Organic Carbon		mg/L	1800	1900	570	7000	1000	550	5400	690	1200	710
Sulfate		mg/L	--	--	--	--	--	--	--	--	--	--
Sulfide (field)		mg/L	--	--	--	--	--	--	--	--	--	--
FIELD PARAMETERS												
pH		Standard units	4.28	4.01	4.25	4.52	4.84	--	--	4.90	4.92	3.91
Specific Conductance		mS/cm	12.23	1.326	3.266	3.306	1.467	--	--	0.815	1.245	1.502
Dissolved Oxygen		mg/L	2.83	2.41	--	0.28	2.78	--	--	1.37	--	--
Temperature		deg C	15.87	16.09	16.36	16.6	16.56	--	--	16.55	16.88	11.1
ORP		mV	-257.8	-29.4	25.1	-304.9	-93.7	--	--	-68.2	-278.2	--
VOCs												
Tetrachloroethene		ug/L	--	--	--	--	--	--	--	--	--	--
Trichloroethene		ug/L	--	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene		ug/L	--	--	--	--	--	--	--	--	--	--
Vinyl Chloride		ug/L	--	--	--	--	--	--	--	--	--	--
LIGHT HYDROCARBONS/PERMANENT GASES												
Ethane		ng/L	--	--	--	--	--	--	--	--	--	--
Ethene		ng/L	--	--	--	--	--	--	--	--	--	--
Methane		ug/L	--	--	--	--	--	--	--	--	--	--
Oxygen		mg/L	--	--	--	--	--	--	--	--	--	--
Carbon Dioxide		mg/L	--	--	--	--	--	--	--	--	--	--
Nitrogen		mg/L	--	--	--	--	--	--	--	--	--	--

See footnotes on last page.

Table 2. Concentrations of Metals, Classical Chemistry Analytes, Field Parameters, Target VOCs, and Dissolved Gases in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

Parameters	Well ID: / Date Sampled: / Zone:	UNITS	IW-7 06/18/03 Shallow	IW-7 09/10/03 Shallow	IW-7 11/04/03 Shallow	IW-7 01/09/04 Shallow	IW-16 06/27/03 Shallow	IW-16 [2] 10/07/03 Shallow	IW-16 12/05/03 Shallow	MW-12 06/17/03 Shallow	MW-12 [2] 10/07/03 Shallow	MW-12 12/04/03 Shallow
DISSOLVED METALS												
Iron, Dissolved		ug/L	--	--	--	--	--	--	--	--	--	--
Manganese, Dissolved		ug/L	--	--	--	--	--	--	--	--	--	--
CLASSICAL CHEMISTRY ANALYTES												
Alkalinity, Total (As CaCO3)		mg/L	--	--	--	--	--	--	--	--	--	--
Bromide		mg/L	--	--	--	--	--	--	--	--	--	--
Chloride		mg/L	--	--	--	--	--	--	--	--	--	--
Nitrogen, Nitrate (As N)		mg/L	--	--	--	--	--	--	--	--	--	--
Nitrogen, Nitrite (as N)		mg/L	--	--	--	--	--	--	--	--	--	--
Total Organic Carbon		mg/L	--	27	14	0.28 B	4	7300	1000	--	63	110
Sulfate		mg/L	--	--	--	--	--	--	--	--	--	--
Sulfide (field)		mg/L	--	--	--	--	--	--	--	--	--	--
FIELD PARAMETERS												
pH		Standard units	5.32	5.34	4.69	5.28	5.67	5.38	4.83	5.32	4.76	4.79
Specific Conductance		mS/cm	0.094	0.291	0.110	0.313	0.52	4.99	2.225	0.702	0.845	0.507
Dissolved Oxygen		mg/L	6.38	7.0	1.22	--	385	--	2.75	2.11	--	0.91
Temperature		deg C	18.79	15.85	15.67	15.91	22.39	16.65	16.92	19.87	16.3	16.86
ORP		mV	345.0	-5.1	33.6	-36.9	438.4	-144.1	18.5	176.7	-177.3	-180.0
VOCs												
Tetrachloroethene		ug/L	39	--	--	--	6700 D	--	--	8100 D	--	--
Trichloroethene		ug/L	9	--	--	--	5800 D	--	--	980 D	--	--
cis-1,2-Dichloroethene		ug/L	<5	--	--	--	5500 D	--	--	170	--	--
Vinyl Chloride		ug/L	<1	--	--	--	<2	--	--	<2	--	--
LIGHT HYDROCARBONS/PERMANENT GASES												
Ethane		ng/L	--	--	--	--	--	--	--	--	--	--
Ethene		ng/L	--	--	--	--	--	--	--	--	--	--
Methane		ug/L	--	--	--	--	--	--	--	--	--	--
Oxygen		mg/L	--	--	--	--	--	--	--	--	--	--
Carbon Dioxide		mg/L	--	--	--	--	--	--	--	--	--	--
Nitrogen		mg/L	--	--	--	--	--	--	--	--	--	--

See footnotes on last page.

Table 2. Concentrations of Metals, Classical Chemistry Analytes, Field Parameters, Target VOCs, and Dissolved Gases in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

Parameters	Well ID: / Date Sampled: / Zone:	MW-32 06/26/03 Shallow	MW-32 [1] 09/10/03 Shallow	MW-32 09/22/03 Shallow	MW-32 10/08/03 Shallow	MW-32 10/20/03 Shallow	MW-32 [2] 11/04/03 Shallow	MW-32 12/05/03 Shallow	MW-32 01/08/04 Shallow	MW-32 02/05/04 Shallow	MW-8 06/26/03 Shallow
	UNITS										
DISSOLVED METALS											
Iron, Dissolved	ug/L	6700	--	--	86000	--	--	152000	--	199000	249
Manganese, Dissolved	ug/L	1120	--	--	2560	--	--	2040	--	1500	223
CLASSICAL CHEMISTRY ANALYTES											
Alkalinity, Total (As CaCO3)	mg/L	30.6	--	--	41.7	--	--	293	--	277	10.1
Bromide	mg/L	<0.10	<0.10	0.31	0.94	--	--	--	--	--	<0.10
Chloride	mg/L	190	--	--	150	--	--	147	--	207	210
Nitrogen, Nitrate (As N)	mg/L	0.46	--	--	<0.10	--	--	0.0360 B	--	<0.10	0.72
Nitrogen, Nitrite (as N)	mg/L	<0.10	--	--	<0.10	--	--	4.02	--	8.55	<0.10
Total Organic Carbon	mg/L	6.8	20	150	600	--	610	1300	560	2200	3.9
Sulfate	mg/L	59	--	--	170	--	--	112	--	146	15
Sulfide (field)	mg/L	0.007	--	--	0.215	--	--	2.11	--	0.551	0.009
FIELD PARAMETERS											
pH	Standard units	5.50	5.60	4.73	4.58	4.83	4.85	5.00	5.01	4.92	5.75
Specific Conductance	mS/cm	0.822	0.643	0.765	0.861	0.633	1.227	1.873	1.613	2.014	0.735
Dissolved Oxygen	mg/L	2.48	1.10	1.52	0.4	0.2	2.71	3.56	--	1.01	4.40
Temperature	deg C	27.80	15.67	15.82	22.4	16.05	16.33	18.54	16.96	14.47	26.47
ORP	mV	168.3	-203.7	-280.4	-221.6	-409.7	-1.3	-32.7	-196.5	37.0	264.9
VOCs											
Tetrachloroethene	ug/L	1100 D	--	--	8000	--	--	950 D	--	270 DJ	3100 D
Trichloroethene	ug/L	470 D	--	--	6900	--	--	2500 D	--	2500 D	220
cis-1,2-Dichloroethene	ug/L	170	--	--	2300	--	--	11000 D	--	16000 D	25
Vinyl Chloride	ug/L	<2	--	--	<100	--	--	<1	--	<1	<2
LIGHT HYDROCARBONS/PERMANENT GASES											
Ethane	ng/L	26	--	--	64	--	--	19	--	280	34
Ethene	ng/L	73	--	--	110	--	--	86	--	71	120
Methane	ug/L	0.30	--	--	1.7	--	--	1.8	--	5.5	0.34
Oxygen	mg/L	--	--	--	--	--	--	--	--	0.49	--
Carbon Dioxide	mg/L	--	--	--	--	--	--	--	--	940	--
Nitrogen	mg/L	--	--	--	--	--	--	--	--	6.9	--

See footnotes on last page.

Table 2. Concentrations of Metals, Classical Chemistry Analytes, Field Parameters, Target VOCs, and Dissolved Gases in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

Parameters	Well ID:	MW-8 [1]	MW-8	MW-8 [2]	MW-8	MW-8	MW-8	MW-8	MW-8	MW-7	MW-7
	Date Sampled:	09/10/03	09/22/03	10/07/03	10/20/03	11/03/03	12/04/03	01/09/04	02/05/04	06/26/03	11/03/03
	Zone:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
	UNITS										
DISSOLVED METALS											
Iron, Dissolved	ug/L	--	--	--	--	--	200000	--	199000	59 B	--
Manganese, Dissolved	ug/L	--	--	--	--	--	1460	--	1450	737	--
CLASSICAL CHEMISTRY ANALYTES											
Alkalinity, Total (As CaCO3)	mg/L	--	--	--	--	--	--	--	301	2.34	--
Bromide	mg/L	<0.10	--	0.23	2.5	<0.20	--	--	--	<0.10	0.75
Chloride	mg/L	--	--	--	--	--	70	--	96.6	77	--
Nitrogen, Nitrate (As N)	mg/L	--	--	--	--	--	0.0980 B	--	<0.10	0.43	--
Nitrogen, Nitrite (as N)	mg/L	--	--	--	--	--	2.60	--	1.78	<0.10	--
Total Organic Carbon	mg/L	8.5	--	62	16	56	660	150	240	4.7	40
Sulfate	mg/L	--	--	--	--	--	21.8	--	3.5	57	--
Sulfide (field)	mg/L	--	--	--	--	--	0.535	--	0.241	0.004	--
FIELD PARAMETERS											
pH	Standard units	5.57	5.21	5.66	5.71	5.50	5.36	5.78	5.79	5.05	5.57
Specific Conductance	mS/cm	0.352	0.358	0.639	0.513	0.729	1.078	0.874	1.087	405	0.666
Dissolved Oxygen	mg/L	2.40	1.78	--	0.37	0.57	1.92	--	1.34	1.51	0.99
Temperature	deg C	15.29	15.46	15.43	15.62	15.88	19.25	16.33	13.92	21.65	15.62
ORP	mV	110.7	128.3	-79.3	-88.7	25.7	-31.8	-158.7	-35.4	307.6	57.1
VOCs											
Tetrachloroethene	ug/L	--	--	--	--	--	37	--	96	10000 D	--
Trichloroethene	ug/L	--	--	--	--	--	61	--	2500 D	1400 D	--
cis-1,2-Dichloroethene	ug/L	--	--	--	--	--	5100 D	--	31000 D	360	--
Vinyl Chloride	ug/L	--	--	--	--	--	<1	--	2	<2	--
LIGHT HYDROCARBONS/PERMANENT GASES											
Ethane	ng/L	--	--	--	--	--	160	--	40	18	--
Ethene	ng/L	--	--	--	--	--	290	--	96	63	--
Methane	ug/L	--	--	--	--	--	11	--	62	0.38	--
Oxygen	mg/L	--	--	--	--	--	--	--	--	--	--
Carbon Dioxide	mg/L	--	--	--	--	--	--	--	--	--	--
Nitrogen	mg/L	--	--	--	--	--	--	--	--	--	--

See footnotes on last page.

Table 2. Concentrations of Metals, Classical Chemistry Analytes, Field Parameters, Target VOCs, and Dissolved Gases in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

Parameters	Well ID: / Date Sampled: / Zone:	MW-7 12/04/03 Shallow	MW-7 01/09/04 Shallow	MW-7 02/04/04 Shallow	MW-9 06/20/03 Shallow	MW-9 11/04/03 Shallow	MW-9 01/09/04 Shallow	MW-11 06/23/03 Shallow	MW-11 11/03/03 Shallow	MW-11 12/05/03 Shallow	MW-11 01/08/04 Shallow
	UNITS										
DISSOLVED METALS											
Iron, Dissolved	ug/L	269000	--	340000	--	--	--	<52	--	211000	--
Manganese, Dissolved	ug/L	1990	--	2380	--	--	--	40.8	--	57200	--
CLASSICAL CHEMISTRY ANALYTES											
Alkalinity, Total (As CaCO3)	mg/L	--	--	--	--	--	--	61.4	--	--	--
Bromide	mg/L	<0.10	--	--	--	--	--	<0.10	--	--	--
Chloride	mg/L	83.4	--	76.8	--	--	--	52	--	94.6	--
Nitrogen, Nitrate (As N)	mg/L	0.0840 B	--	<0.10	--	--	--	0.62	--	0.0670 B	--
Nitrogen, Nitrite (as N)	mg/L	1.30	--	2.26	--	--	--	<0.10	--	0.381	--
Total Organic Carbon	mg/L	280	150	370	--	4.5	1.2	3.2	9.6	170	580
Sulfate	mg/L	3.66	--	1.07	--	--	--	41	--	51.9	--
Sulfide (field)	mg/L	0.071	--	0.086	--	--	--	0.016	--	--	--
FIELD PARAMETERS											
pH	Standard units	5.81	5.59	5.83	5.71	5.50	5.12	5.65	5.27	5.89	6.38
Specific Conductance	mS/cm	1.096	0.942	1.413	449	0.249	0.223	418	0.632	1.372	1.942
Dissolved Oxygen	mg/L	0.85	--	0.86	7.59	6.46	--	0.68	0.81	2.54	--
Temperature	deg C	14.88	15.61	15.44	19.96	15.07	15.55	20.58	16.11	15.48	15.68
ORP	mV	-38.8	-148.0	-39.4	249.9	198	33.9	238.4	16.0	-47.1	-138.4
VOCs											
Tetrachloroethene	ug/L	56	--	35	130	--	--	5600 D	--	1800 D	--
Trichloroethene	ug/L	31	--	10	47	--	--	2500 D	--	1800 D	--
cis-1,2-Dichloroethene	ug/L	780 D	--	1700 D	6	--	--	2600 D	--	8600 D	--
Vinyl Chloride	ug/L	<1	--	<1	<1	--	--	<2	--	<1	--
LIGHT HYDROCARBONS/PERMANENT GASES											
Ethane	ng/L	22	--	26	--	--	--	24	--	120	--
Ethene	ng/L	83	--	33	--	--	--	33	--	190	--
Methane	ug/L	2.2	--	50	--	--	--	0.40	--	1.6	--
Oxygen	mg/L	--	--	0.69	--	--	--	--	--	--	--
Carbon Dioxide	mg/L	--	--	610	--	--	--	--	--	--	--
Nitrogen	mg/L	--	--	10	--	--	--	--	--	--	--

See footnotes on last page.

Table 2. Concentrations of Metals, Classical Chemistry Analytes, Field Parameters, Target VOCs, and Dissolved Gases in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

Parameters	Well ID: / Date Sampled: / Zone:	MW-11 02/04/04 Shallow	MW-10 06/23/03 Shallow	MW-10 11/03/03 Shallow	MW-10 12/05/03 Shallow	MW-10 01/09/04 Shallow	MW-10 02/03/04 Shallow	MW-29 06/23/03 Shallow	MW-29 01/09/04 Shallow	MW-29 02/03/04 Shallow	MW-31 06/24/03 Shallow
	UNITS										
DISSOLVED METALS											
Iron, Dissolved	ug/L	557000	1040	--	273000	--	467000	<52	--	467000	<52
Manganese, Dissolved	ug/L	28500	494	--	7860	--	3780	44.8	--	20000	32.1
CLASSICAL CHEMISTRY ANALYTES											
Alkalinity, Total (As CaCO3)	mg/L	--	21.1	--	--	--	--	44.2	--	--	42.9
Bromide	mg/L	--	<0.10	--	<0.10	--	--	<0.10	--	--	<0.10
Chloride	mg/L	113	120	--	72.9	--	112	48	--	129	31
Nitrogen, Nitrate (As N)	mg/L	0.104	0.82	--	0.0300 B	--	<0.10	0.98	--	0.159	0.8
Nitrogen, Nitrite (as N)	mg/L	3.6	<0.10	--	1.26	--	3.18	<0.10	--	1.98	<0.10
Total Organic Carbon	mg/L	690	4.9	52	150	600	520	2	120	300	1.7
Sulfate	mg/L	1.38	32	--	9.56	--	1.64	25	--	1.4	24
Sulfide (field)	mg/L	0.05	0.028	--	0.033	--	0.093	0.013	--	0.034	0.005
FIELD PARAMETERS											
pH	Standard units	6.13	5.33	5.50	6.13	6.01	5.91	5.68	6.38	6.46	5.88
Specific Conductance	mS/cm	2.365	559	0.386	1.325	1.434	1.783	315	1.226	1.9	259
Dissolved Oxygen	mg/L	0.91	1.27	0.30	1.80	--	2.54	2.95	--	0.75	2.13
Temperature	deg C	16.82	24.19	15.49	10.95	15.36	14.95	22.11	15.13	13.8	24.93
ORP	mV	-71.2	189.3	66.0	-71.1	-174.8	-27.6	260.5	-195.3	-118.4	306.8
VOCs											
Tetrachloroethene	ug/L	68	4200 D	--	150	--	56	3500 D	--	20	3600 D
Trichloroethene	ug/L	36	1600 D	--	300 D	--	18	990 D	--	14	1100 D
cis-1,2-Dichloroethene	ug/L	8700 D	300	--	1900 D	--	2300 D	400	--	12000 D	420 D
Vinyl Chloride	ug/L	<1	<2	--	<1	--	<1	<2	--	<1	<1
LIGHT HYDROCARBONS/PERMANENT GASES											
Ethane	ng/L	36	15	--	NA	--	12	14	--	51	11
Ethene	ng/L	110	56	--	NA	--	730	27	--	500	40
Methane	ug/L	96	1.6	--	NA	--	240	0.23	--	5.2	0.48
Oxygen	mg/L	--	--	--	--	--	--	--	--	0.76	--
Carbon Dioxide	mg/L	--	--	--	--	--	--	--	--	320	--
Nitrogen	mg/L	--	--	--	--	--	--	--	--	18	--

See footnotes on last page.

Table 2. Concentrations of Metals, Classical Chemistry Analytes, Field Parameters, Target VOCs, and Dissolved Gases in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

Parameters	Well ID: / Date Sampled: / Zone:	MW-31 01/09/04 Shallow	MW-31 02/02/04 Shallow	IW-10 06/18/03 Intermediate	IW-10 09/10/03 Intermediate	IW-10 09/22/03 Intermediate	IW-10 [2] 10/07/03 Intermediate	IW-10 10/20/03 Intermediate	IW-10 [2] 11/04/03 Intermediate	IW-10 11/10/03 Intermediate	IW-10 11/17/03 Intermediate
	UNITS										
DISSOLVED METALS											
Iron, Dissolved	ug/L	--	--	--	--	--	--	--	--	--	--
Manganese, Dissolved	ug/L	--	--	--	--	--	--	--	--	--	--
CLASSICAL CHEMISTRY ANALYTES											
Alkalinity, Total (As CaCO3)	mg/L	--	--	--	--	--	<2	--	--	--	--
Bromide	mg/L	--	--	--	--	--	--	--	--	--	--
Chloride	mg/L	--	--	--	--	--	--	--	--	--	--
Nitrogen, Nitrate (As N)	mg/L	--	--	--	--	--	--	--	--	--	--
Nitrogen, Nitrite (as N)	mg/L	--	--	--	--	--	--	--	--	--	--
Total Organic Carbon	mg/L	28	23	0.56 B	2400	160	310	24000	4200	3000	960
Sulfate	mg/L	--	--	--	--	--	--	--	--	--	--
Sulfide (field)	mg/L	--	--	--	--	--	--	--	--	--	--
FIELD PARAMETERS											
pH	Standard units	6.64	6.64	5.37	4.12	4.01	4.36	4.15	4.31	--	--
Specific Conductance	mS/cm	0.788	--	0.177	1.501	1.309	2.348	3.512	3.53	--	--
Dissolved Oxygen	mg/L	--	0.95	7.53	2.29	2.75	--	0.42	4.57	--	--
Temperature	deg C	14.86	14.98	18.72	15.44	15.62	15.9	16.85	16.54	--	--
ORP	mV	-189.0	-136.9	265.8	-336	-314.4	-105.1	-342.8	-2.1	--	--
VOCs											
Tetrachloroethene	ug/L	--	--	3800 D	--	--	--	--	--	--	--
Trichloroethene	ug/L	--	--	39	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	ug/L	--	--	66	--	--	--	--	--	--	--
Vinyl Chloride	ug/L	--	--	<2	--	--	--	--	--	--	--
LIGHT HYDROCARBONS/PERMANENT GASES											
Ethane	ng/L	--	--	--	--	--	--	--	--	--	--
Ethene	ng/L	--	--	--	--	--	--	--	--	--	--
Methane	ug/L	--	--	--	--	--	--	--	--	--	--
Oxygen	mg/L	--	--	--	--	--	--	--	--	--	--
Carbon Dioxide	mg/L	--	--	--	--	--	--	--	--	--	--
Nitrogen	mg/L	--	--	--	--	--	--	--	--	--	--

See footnotes on last page.

Table 2. Concentrations of Metals, Classical Chemistry Analytes, Field Parameters, Target VOCs, and Dissolved Gases in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

Parameters	Well ID: / Date Sampled: / Zone:	UNITS	IW-10 [3] 12/05/03 Intermediate	IW-10 01/08/04 Intermediate	IW-10 02/02/04 Intermediate	IW-11 06/18/03 Intermediate	IW-11 [2] 10/07/03 Intermediate	IW-11 12/4/2003 Intermediate	IW-11 01/08/04 Intermediate	IW-12 06/18/03 Intermediate	IW-12 09/10/03 Intermediate	IW-12 11/04/03 Intermediate
DISSOLVED METALS												
Iron, Dissolved		ug/L	--	--	--	--	--	--	--	--	--	--
Manganese, Dissolved		ug/L	--	--	--	--	--	--	--	--	--	--
CLASSICAL CHEMISTRY ANALYTES												
Alkalinity, Total (As CaCO3)		mg/L	524	--	--	--	--	--	--	--	--	--
Bromide		mg/L	--	--	--	--	--	--	--	--	--	--
Chloride		mg/L	--	--	--	--	--	--	--	--	--	--
Nitrogen, Nitrate (As N)		mg/L	--	--	--	--	--	--	--	--	--	--
Nitrogen, Nitrite (as N)		mg/L	--	--	--	--	--	--	--	--	--	--
Total Organic Carbon		mg/L	1700	5600	8300	4.4	1300	160	6500	--	10	3.3
Sulfate		mg/L	--	--	--	--	--	--	--	--	--	--
Sulfide (field)		mg/L	--	--	--	--	--	--	--	--	--	--
FIELD PARAMETERS												
pH		Standard units	4.73	4.20	5.04	5.39	4.35	4.81	4.54	5.25	5.26	4.56
Specific Conductance		mS/cm	3.196	4.112	0.545	0.303	1.496	3.101	3.743	0.115	0.238	0.319
Dissolved Oxygen		mg/L	4.32	--	--	5.88	8.14	1.59	--	6.79	4.76	1.64
Temperature		deg C	16.16	16.37	13.5	17.68	16.06	15.96	16.26	18.47	15.18	15.33
ORP		mV	-113.8	-144.2	--	331.2	-180	-52.1	-221.8	343.5	21.4	-53.6
VOCs												
Tetrachloroethene		ug/L	--	--	--	180	--	--	--	120	--	--
Trichloroethene		ug/L	--	--	--	31	--	--	--	72	--	--
cis-1,2-Dichloroethene		ug/L	--	--	--	16	--	--	--	47	--	--
Vinyl Chloride		ug/L	--	--	--	<1	--	--	--	<1	--	--
LIGHT HYDROCARBONS/PERMANENT GASES												
Ethane		ng/L	--	--	--	--	--	--	--	--	--	--
Ethene		ng/L	--	--	--	--	--	--	--	--	--	--
Methane		ug/L	--	--	--	--	--	--	--	--	--	--
Oxygen		mg/L	--	--	--	--	--	--	--	--	--	--
Carbon Dioxide		mg/L	--	--	--	--	--	--	--	--	--	--
Nitrogen		mg/L	--	--	--	--	--	--	--	--	--	--

See footnotes on last page.

Table 2. Concentrations of Metals, Classical Chemistry Analytes, Field Parameters, Target VOCs, and Dissolved Gases in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

Parameters	Well ID: / Date Sampled: / Zone:	IW-12 01/09/04 Intermediate	IW-13 06/27/03 Intermediate	IW-13 [2] 10/07/03 Intermediate	IW-13 12/05/03 Intermediate	IW-13 01/09/04 Intermediate	IW-14 06/27/03 Intermediate	IW-14 [2] 10/07/03 Intermediate	IW-14 12/05/03 Intermediate	IW-14 01/09/04 Intermediate	IW-15 06/27/03 Intermediate
	UNITS										
DISSOLVED METALS											
Iron, Dissolved	ug/L	--	--	--	--	--	--	--	--	--	--
Manganese, Dissolved	ug/L	--	--	--	--	--	--	--	--	--	--
CLASSICAL CHEMISTRY ANALYTES											
Alkalinity, Total (As CaCO3)	mg/L	--	--	--	--	--	--	--	--	--	--
Bromide	mg/L	--	--	--	--	--	--	--	--	--	--
Chloride	mg/L	--	--	--	--	--	--	--	--	--	--
Nitrogen, Nitrate (As N)	mg/L	--	--	--	--	--	--	--	--	--	--
Nitrogen, Nitrite (as N)	mg/L	--	--	--	--	--	--	--	--	--	--
Total Organic Carbon	mg/L	0.43 B	0.57 B	1000	350	700	2.1	1200	420	850	2.2
Sulfate	mg/L	--	--	--	--	--	--	--	--	--	--
Sulfide (field)	mg/L	--	--	--	--	--	--	--	--	--	--
FIELD PARAMETERS											
pH	Standard units	6.17	5.37	4.83	4.94	4.93	5.21	4.73	4.99	4.74	5.04
Specific Conductance	mS/cm	0.489	0.192	0.998	0.950	1.032	0.698	1.705	0.925	1.514	0.524
Dissolved Oxygen	mg/L	--	6.75	--	1.23	--	2.74	--	2.12	--	2.72
Temperature	deg C	15.20	21.1	16.1	16.14	16.00	24.38	16.1	15.97	16.22	21.66
ORP	mV	-119.8	405.6	-166.3	-66.9	-133.7	390.7	-209.8	-13.5	-363.3	307.9
VOCs											
Tetrachloroethene	ug/L	--	690 D	--	--	--	5500 D	--	--	--	57
Trichloroethene	ug/L	--	8 J	--	--	--	580 D	--	--	--	18
cis-1,2-Dichloroethene	ug/L	--	18	--	--	--	310	--	--	--	5
Vinyl Chloride	ug/L	--	<2	--	--	--	<2	--	--	--	<1
LIGHT HYDROCARBONS/PERMANENT GASES											
Ethane	ng/L	--	--	--	--	--	--	--	--	--	--
Ethene	ng/L	--	--	--	--	--	--	--	--	--	--
Methane	ug/L	--	--	--	--	--	--	--	--	--	--
Oxygen	mg/L	--	--	--	--	--	--	--	--	--	--
Carbon Dioxide	mg/L	--	--	--	--	--	--	--	--	--	--
Nitrogen	mg/L	--	--	--	--	--	--	--	--	--	--

See footnotes on last page.

Table 2. Concentrations of Metals, Classical Chemistry Analytes, Field Parameters, Target VOCs, and Dissolved Gases in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

Parameters	Well ID:	IW-15	IW-15	IW-15 [2]	IW-15	IW-15 [2]	IW-15	IW-15	IW-15 [3]	IW-15	IW-15
	Date Sampled:	09/10/03	09/22/03	10/07/03	10/20/03	11/04/03	11/10/03	11/17/03	12/05/03	01/08/04	02/02/04
	Zone:	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
	UNITS										
DISSOLVED METALS											
Iron, Dissolved	ug/L	--	--	--	--	--	--	--	--	--	--
Manganese, Dissolved	ug/L	--	--	--	--	--	--	--	--	--	--
CLASSICAL CHEMISTRY ANALYTES											
Alkalinity, Total (As CaCO3)	mg/L	--	--	<2	--	--	--	--	184	--	--
Bromide	mg/L	--	--	--	--	--	--	--	--	--	--
Chloride	mg/L	--	--	--	--	--	--	--	--	--	--
Nitrogen, Nitrate (As N)	mg/L	--	--	--	--	--	--	--	--	--	--
Nitrogen, Nitrite (as N)	mg/L	--	--	--	--	--	--	--	--	--	--
Total Organic Carbon	mg/L	530	110	150	4000	480	430	1300	810	440	350
Sulfate	mg/L	--	--	--	--	--	--	--	--	--	--
Sulfide (field)	mg/L	--	--	--	--	--	--	--	--	--	--
FIELD PARAMETERS											
pH	Standard units	4.21	3.97	4.3	4.25	4.45	--	--	4.90	4.42	4.70
Specific Conductance	mS/cm	0.651	1.277	1.806	2.198	1.690	--	--	1.385	2.047	0.578
Dissolved Oxygen	mg/L	1.99	2.45	--	0.27	2.37	--	--	1.36	--	--
Temperature	deg C	15.71	15.82	16	16.3	16.20	--	--	15.81	16.12	15.10
ORP	mV	-342.6	-248.3	-8.9	-374.6	-84.6	--	--	-108.0	-339.0	--
VOCs											
Tetrachloroethene	ug/L	--	--	--	--	--	--	--	--	--	--
Trichloroethene	ug/L	--	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	ug/L	--	--	--	--	--	--	--	--	--	--
Vinyl Chloride	ug/L	--	--	--	--	--	--	--	--	--	--
LIGHT HYDROCARBONS/PERMANENT GASES											
Ethane	ng/L	--	--	--	--	--	--	--	--	--	--
Ethene	ng/L	--	--	--	--	--	--	--	--	--	--
Methane	ug/L	--	--	--	--	--	--	--	--	--	--
Oxygen	mg/L	--	--	--	--	--	--	--	--	--	--
Carbon Dioxide	mg/L	--	--	--	--	--	--	--	--	--	--
Nitrogen	mg/L	--	--	--	--	--	--	--	--	--	--

See footnotes on last page.

Table 2. Concentrations of Metals, Classical Chemistry Analytes, Field Parameters, Target VOCs, and Dissolved Gases in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

Parameters	Well ID: / Date Sampled: / Zone:	MW-33 06/26/03 Intermediate	MW-33 [1] 09/10/03 Intermediate	MW-33 09/22/03 Intermediate	MW-33 10/08/03 Intermediate	MW-33 10/20/03 Intermediate	MW-33 11/03/03 Intermediate	MW-33 12/04/03 Intermediate	MW-33 01/08/04 Intermediate	MW-33 02/05/04 Intermediate	MW-23 06/26/03 Intermediate
	UNITS										
DISSOLVED METALS											
Iron, Dissolved	ug/L	<52	--	--	19700	--	--	167000	--	386000	<52
Manganese, Dissolved	ug/L	61.3	--	--	4260	--	--	18800	--	31900	16.3
CLASSICAL CHEMISTRY ANALYTES											
Alkalinity, Total (As CaCO3)	mg/L	72	--	--	116	--	--	361	--	693	17.7
Bromide	mg/L	0.058 B	<0.10	0.059 B	0.11	--	--	--	--	--	<0.10
Chloride	mg/L	44	--	--	100	--	--	93	--	81.2	28
Nitrogen, Nitrate (As N)	mg/L	1.2	--	--	0.10	--	--	0.0360 B	--	0.156	3
Nitrogen, Nitrite (as N)	mg/L	<0.10	--	--	<0.10	--	--	0.820	--	2.3	<0.10
Total Organic Carbon	mg/L	5.6	0.67 B	10	23	--	67	240	13	630	1.3
Sulfate	mg/L	52	--	--	22	--	--	3.34	--	3.64	23
Sulfide (field)	mg/L	0.028	--	--	0.145	--	--	0.62	--	0.124	0.013
FIELD PARAMETERS											
pH	Standard units	6.33	6.52	5.95	6.1	6.06	5.86	5.70	5.77	5.92	5.40
Specific Conductance	mS/cm	0.469	0.785	0.555	0.521	0.526	1.000	1.055	1.299	1.91	0.218
Dissolved Oxygen	mg/L	2.09	0.42	1.42	0.32	0.27	0.41	1.53	--	2.02	2.72
Temperature	deg C	20.23	15.36	15.33	19.36	15.42	15.47	17.02	15.71	11.51	27.18
ORP	mV	424.4	-150	2.1	-33.6	-186.2	-8.2	-83.2	-180.3	-41.2	389.2
VOCs											
Tetrachloroethene	ug/L	2600 D	--	--	87 J	--	--	40	--	<5	340
Trichloroethene	ug/L	120	--	--	210	--	--	64	--	83	150
cis-1,2-Dichloroethene	ug/L	41	--	--	1900	--	--	1400 D	--	1700 D	32
Vinyl Chloride	ug/L	<2	--	--	<20	--	--	<1	--	<1	<2
LIGHT HYDROCARBONS/PERMANENT GASES											
Ethane	ng/L	67	--	--	39	--	--	21	--	100	16
Ethene	ng/L	240	--	--	170	--	--	150	--	44	29
Methane	ug/L	0.35	--	--	1.1	--	--	3.1	--	23	0.26
Oxygen	mg/L	--	--	--	--	--	--	--	--	0.58	--
Carbon Dioxide	mg/L	--	--	--	--	--	--	--	--	700	--
Nitrogen	mg/L	--	--	--	--	--	--	--	--	8.2	--

See footnotes on last page.

Table 2. Concentrations of Metals, Classical Chemistry Analytes, Field Parameters, Target VOCs, and Dissolved Gases in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

Parameters	Well ID:	MW-23 [1]	MW-23	MW-23 [2]	MW-23	MW-23	MW-23	MW-23	MW-23	MW-23	MW-27D
	Date Sampled:	09/10/03	09/22/03	10/07/03	10/20/03	11/03/03	11/17/03	12/04/03	01/09/04	02/04/04	06/24/03
	Zone:	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
	UNITS										
DISSOLVED METALS											
Iron, Dissolved	ug/L	--	--	--	--	--	--	154000	--	248000	<52
Manganese, Dissolved	ug/L	--	--	--	--	--	--	9380	--	26200	152
CLASSICAL CHEMISTRY ANALYTES											
Alkalinity, Total (As CaCO3)	mg/L	--	--	--	--	--	--	--	--	--	28
Bromide	mg/L	<0.10	--	<0.1	0.27	0.22	0.128	--	--	--	<0.10
Chloride	mg/L	--	--	--	--	--	--	81.8	--	151	130
Nitrogen, Nitrate (As N)	mg/L	--	--	--	--	--	--	0.0390 B	--	0.151	2.1
Nitrogen, Nitrite (as N)	mg/L	--	--	--	--	--	--	1.33	--	2.09	<0.10
Total Organic Carbon	mg/L	4.1	--	11	9.5	170	--	280	170	430	6.7
Sulfate	mg/L	--	--	--	--	--	--	3.22	--	2.08	110
Sulfide (field)	mg/L	--	--	--	--	--	--	0.508	--	0.363	0.078
FIELD PARAMETERS											
pH	Standard units	5.60	5.40	5.72	6.08	5.97	--	5.60	5.32	5.72	5.38
Specific Conductance	mS/cm	0.25	0.288	0.446	0.687	1.056	--	0.902	1.087	1.573	740
Dissolved Oxygen	mg/L	1.53	1.81	3.44	0.23	0.25	--	1.11	--	1.18	5.99
Temperature	deg C	15.36	15.42	15.29	15.37	15.42	--	15.01	15.26	15.89	22.27
ORP	mV	-35.8	-91.1	69.6	-129.8	-13.3	--	-38.7	-127.0	-23.5	450
VOCs											
Tetrachloroethene	ug/L	--	--	--	--	--	--	21	--	16	6700 D
Trichloroethene	ug/L	--	--	--	--	--	--	46	--	19	4100 D
cis-1,2-Dichloroethene	ug/L	--	--	--	--	--	--	390 D	--	530 D	1200 D
Vinyl Chloride	ug/L	--	--	--	--	--	--	<1	--	<2	<2
LIGHT HYDROCARBONS/PERMANENT GASES											
Ethane	ng/L	--	--	--	--	--	--	35	--	47	<5.0
Ethene	ng/L	--	--	--	--	--	--	310	--	120	<5.0
Methane	ug/L	--	--	--	--	--	--	10	--	12	0.20
Oxygen	mg/L	--	--	--	--	--	--	--	--	--	--
Carbon Dioxide	mg/L	--	--	--	--	--	--	--	--	--	--
Nitrogen	mg/L	--	--	--	--	--	--	--	--	--	--

See footnotes on last page.

Table 2. Concentrations of Metals, Classical Chemistry Analytes, Field Parameters, Target VOCs, and Dissolved Gases in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

Parameters	Well ID:	MW-27D	MW-27D	MW-27D	MW-27D	MW-28D	MW-28D [2]	MW-28D	MW-30	MW-30	MW-30
	Date Sampled:	11/03/03	12/05/03	01/09/04	02/04/04	06/24/03	11/04/03	01/09/04	06/24/03	01/09/04	02/02/04
	Zone:	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
	UNITS										
DISSOLVED METALS											
Iron, Dissolved	ug/L	--	91300	--	379000	<52	--	--	2060	--	--
Manganese, Dissolved	ug/L	--	6000	--	4380	62.9	--	--	1650	--	--
CLASSICAL CHEMISTRY ANALYTES											
Alkalinity, Total (As CaCO3)	mg/L	--	--	--	--	13.8	--	--	25.2	--	--
Bromide	mg/L	<0.20	0.0830 B	--	--	<0.10	--	--	0.051 B	--	--
Chloride	mg/L	--	197	--	118	52	--	--	27	--	--
Nitrogen, Nitrate (As N)	mg/L	--	0.223	--	<0.10	3.3	--	--	0.96	--	--
Nitrogen, Nitrite (as N)	mg/L	--	<0.10	--	1.69	<0.10	--	--	<0.10	--	--
Total Organic Carbon	mg/L	46	18	130	240	2.3	--	--	2.1	2.4	2.4
Sulfate	mg/L	--	83.8	--	0.598 B	15	--	--	67	--	--
Sulfide (field)	mg/L	--	0.032	--	0.208	0.016	--	--	0.018	--	--
FIELD PARAMETERS											
pH	Standard units	4.63	5.66	6.33	6.13	5.26	5.17	5.55	5.72	5.76	5.56
Specific Conductance	mS/cm	0.919	1.157	1.381	1.626	290	0.111	0.205	320	0.323	--
Dissolved Oxygen	mg/L	1.60	2.07	--	0.98	1.76	1.65	--	1.15	--	0.96
Temperature	deg C	15.24	15.32	15.15	15.66	24.12	15.04	14.87	24.05	14.86	14.92
ORP	mV	239.1	3.4	-290.8	-80.1	299.8	143.1	38.8	162.5	-117.2	73.8
VOCs											
Tetrachloroethene	ug/L	--	1100 D	--	8	77	--	--	5300 D	--	--
Trichloroethene	ug/L	--	1800 D	--	26	19	--	--	470 D	--	--
cis-1,2-Dichloroethene	ug/L	--	9900 D	--	38000 D	1 J	--	--	330 D	--	--
Vinyl Chloride	ug/L	--	<1	--	<1	<1	--	--	<1	--	--
LIGHT HYDROCARBONS/PERMANENT GASES											
Ethane	ng/L	--	21	--	34	<5.0	--	--	71	--	--
Ethene	ng/L	--	120	--	100	22	--	--	220	--	--
Methane	ug/L	--	2.2	--	7.3	5.9	--	--	0.51	--	--
Oxygen	mg/L	--	--	--	0.62	--	--	--	--	--	--
Carbon Dioxide	mg/L	--	--	--	560	--	--	--	--	--	--
Nitrogen	mg/L	--	--	--	12	--	--	--	--	--	--

See footnotes on last page.

Table 2. Concentrations of Metals, Classical Chemistry Analytes, Field Parameters, Target VOCs, and Dissolved Gases in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

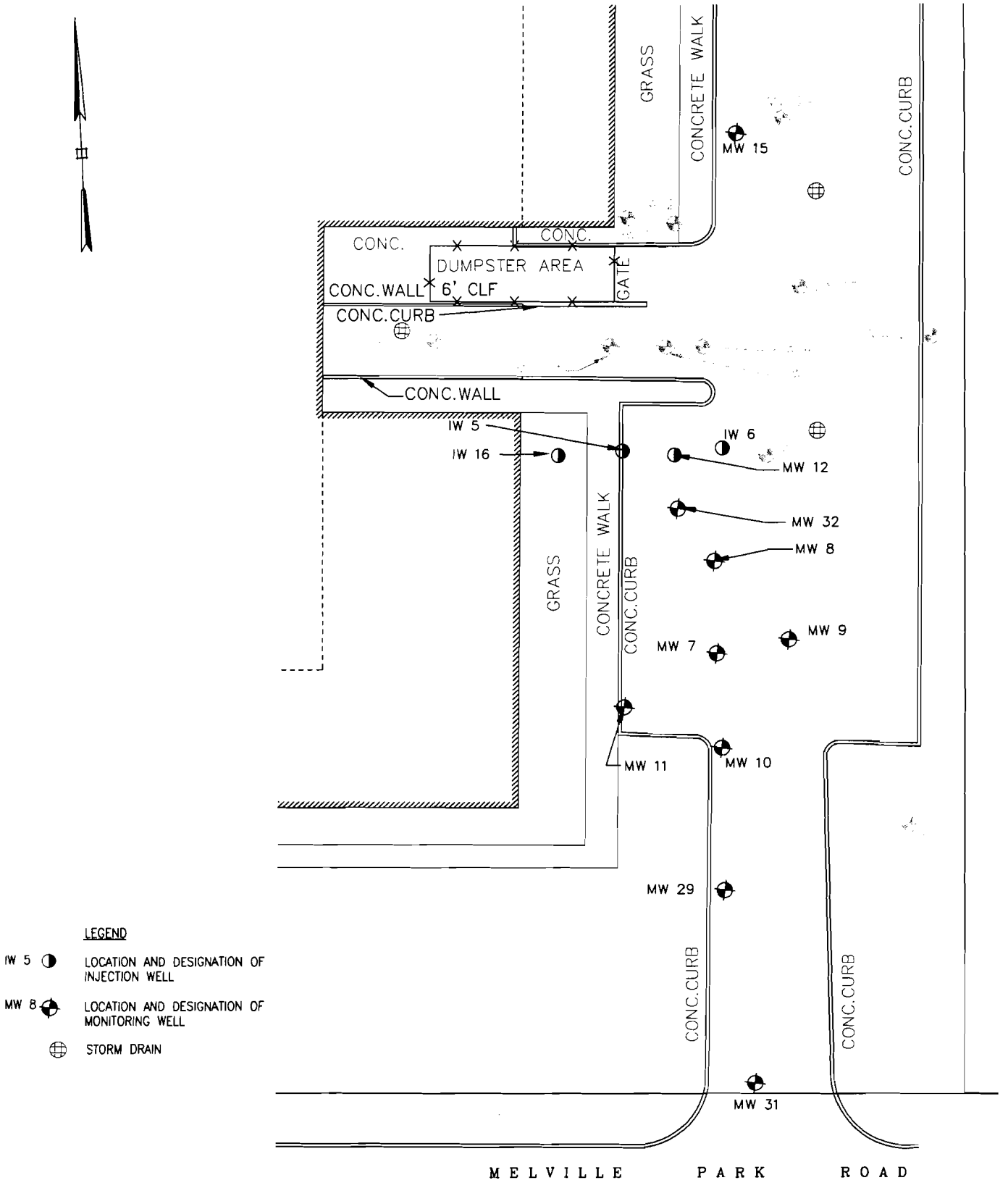
Parameters		Well ID:	MW-16D	MW-16D
		Date Sampled:	06/23/03	01/09/04
		Zone:	Intermediate	Intermediate
	UNITS			
DISSOLVED METALS				
Iron, Dissolved	ug/L		<52	--
Manganese, Dissolved	ug/L		5 B	--
CLASSICAL CHEMISTRY ANALYTES				
Alkalinity, Total (As CaCO3)	mg/L		8.09	--
Bromide	mg/L		<0.10	--
Chloride	mg/L		24	--
Nitrogen, Nitrate (As N)	mg/L		1.8	--
Nitrogen, Nitrite (as N)	mg/L		<0.10	--
Total Organic Carbon	mg/L		0.26 B	0.84 B
Sulfate	mg/L		19	--
Sulfide (field)	mg/L		0.068	--
FIELD PARAMETERS				
pH	Standard units		5.23	5.78
Specific Conductance	mS/cm		171	0.146
Dissolved Oxygen	mg/L		9.22	--
Temperature	deg C		19.87	14.78
ORP	mV		305.7	-105.5
VOCs				
Tetrachloroethene	ug/L		210	--
Trichloroethene	ug/L		<10	--
cis-1,2-Dichloroethene	ug/L		4 J	--
Vinyl Chloride	ug/L		<2	--
LIGHT HYDROCARBONS/PERMANENT GASES				
Ethane	ng/L		<5.0	--
Ethene	ng/L		<5.0	--
Methane	ug/L		0.18	--
Oxygen	mg/L		--	--
Carbon Dioxide	mg/L		--	--
Nitrogen	mg/L		--	--

See footnotes on last page.

Table 2. Concentrations of Dissolved Metals, Classical Chemistry Analytes, Field Parameters, Light Hydrocarbons/Permanent Gases in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

*	MW-15 is an upgradient well used for background measurements.
1	Bromide sampled on 9/11/03.
2	Downhole probe not functioning correctly, dissolved oxygen and ORP readings questionable.
3	TOC sampled on 12/3/03.
mg/L	Milligrams per liter.
mS/cm	MilliSiemens per centimeter.
deg C	Degrees Celsius.
mV	Millivolts.
ng/L	Nanograms per liter.
--	Not analyzed.
ug/L	Micrograms per liter.
IW	Injection Well.
MW	Monitoring Well.
B	Detected between IDL and CRDL.
IDL	Instrument Detection Limit.
CRDL	Contract Required Detection Limit.
D	Detected at secondary dilution.
J	Estimated value.
NA	Not analyzed due to sample container breakage during shipment to the laboratory.

Figures

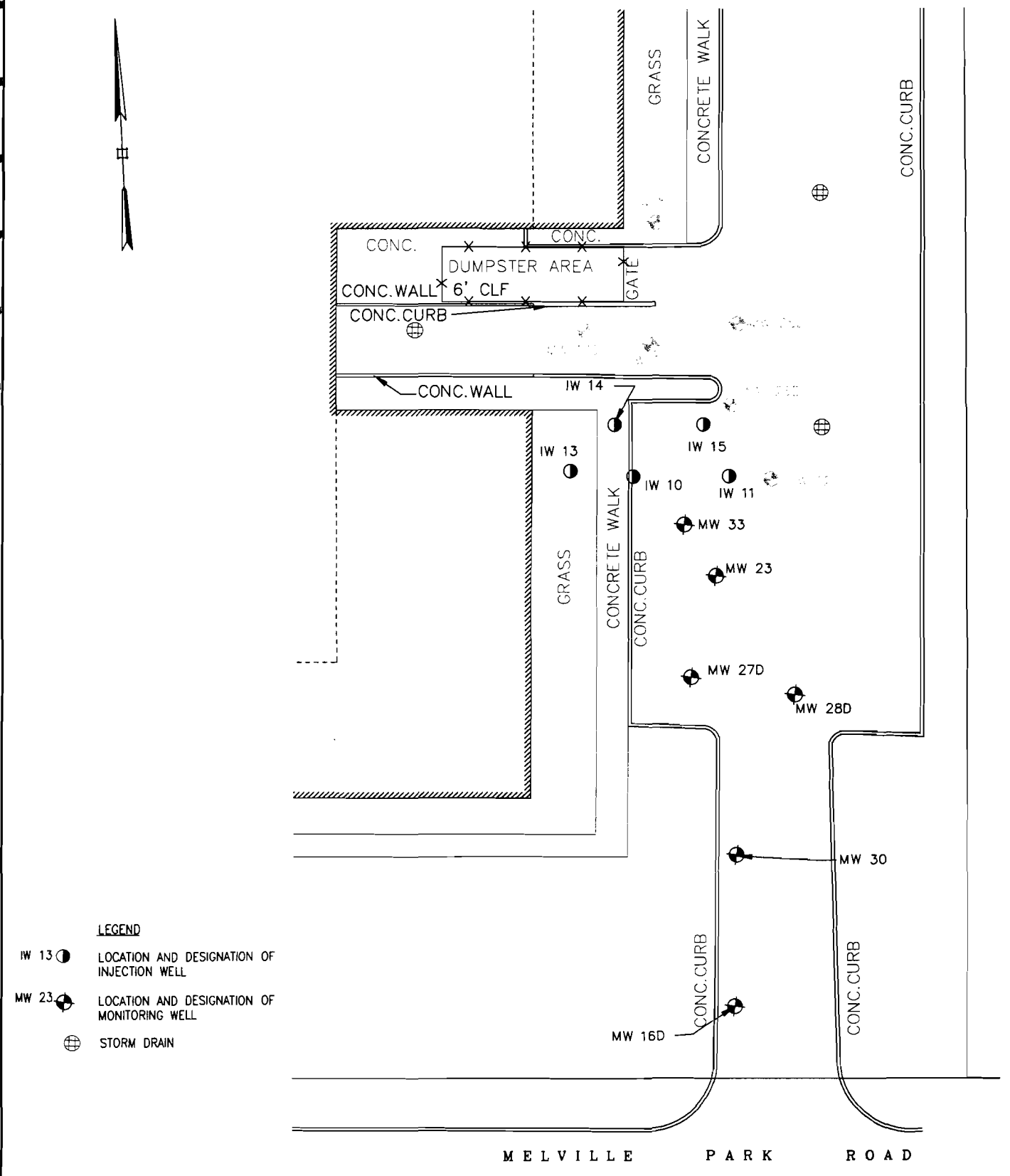


0 30
SCALE IN FEET

ARCADIS
www.arcadis-us.com

PROJECT MANAGER	DEPARTMENT MANAGER	LEAD DESIGN PROF.	CHECKED BY
S. FELDMAN	N. VALKENBURG		C. KEEN
SHEET TITLE: SHALLOW AQUIFER ZONE (45-60 FT BLS) SITE PLAN 25 MELVILLE PARK ROAD, MELVILLE, NEW YORK 25 MPR, L.L.C.		TASK/PHASE NUMBER: 00002	DRAWN BY: LMC
		PROJECT NUMBER: NY001332.0009	DRAWING NUMBER: 1

Acad Version : R16.0
User Name : pinnacle
Date\Time : Tue, 01 Jun 2004 - 11:23am
Path\Name : G:\APROJECT\WHCS Melville\ERD Pilot Test\Pilot Test Summary Report Figures\SITE PLAN.dwg - Layout Tab : INTERMEDIATE



LEGEND

IW 13 — LOCATION AND DESIGNATION OF INJECTION WELL

MW 23 — LOCATION AND DESIGNATION OF MONITORING WELL

STORM DRAIN

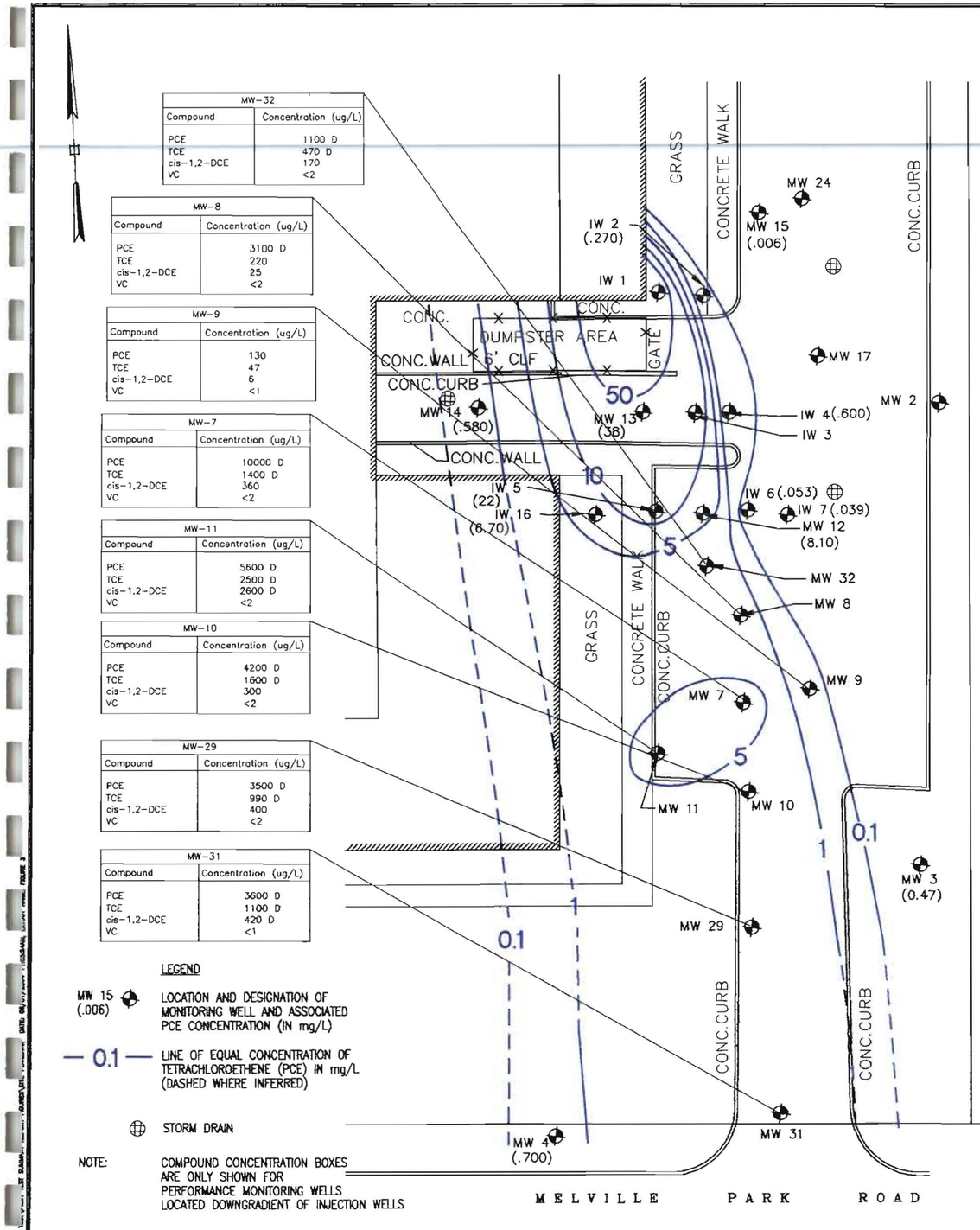
0 30
SCALE IN FEET

ARCADIS
www.arcadis-us.com

PROJECT MANAGER	DEPARTMENT MANAGER	LEAD DESIGN PROF.	CHECKED BY
S. FELDMAN	N. VALKENBURG		C. KEEN

SHEET TITLE
INTERMEDIATE AQUIFER ZONE (60-90 FT BLS)
SITE PLAN
25 MELVILLE PARK ROAD, MELVILLE, NEW YORK
25 MPR, LLC.

TASK/PHASE NUMBER	DRAWN BY
00002	LMC
PROJECT NUMBER	DRAWING NUMBER
NY001332.0009	2



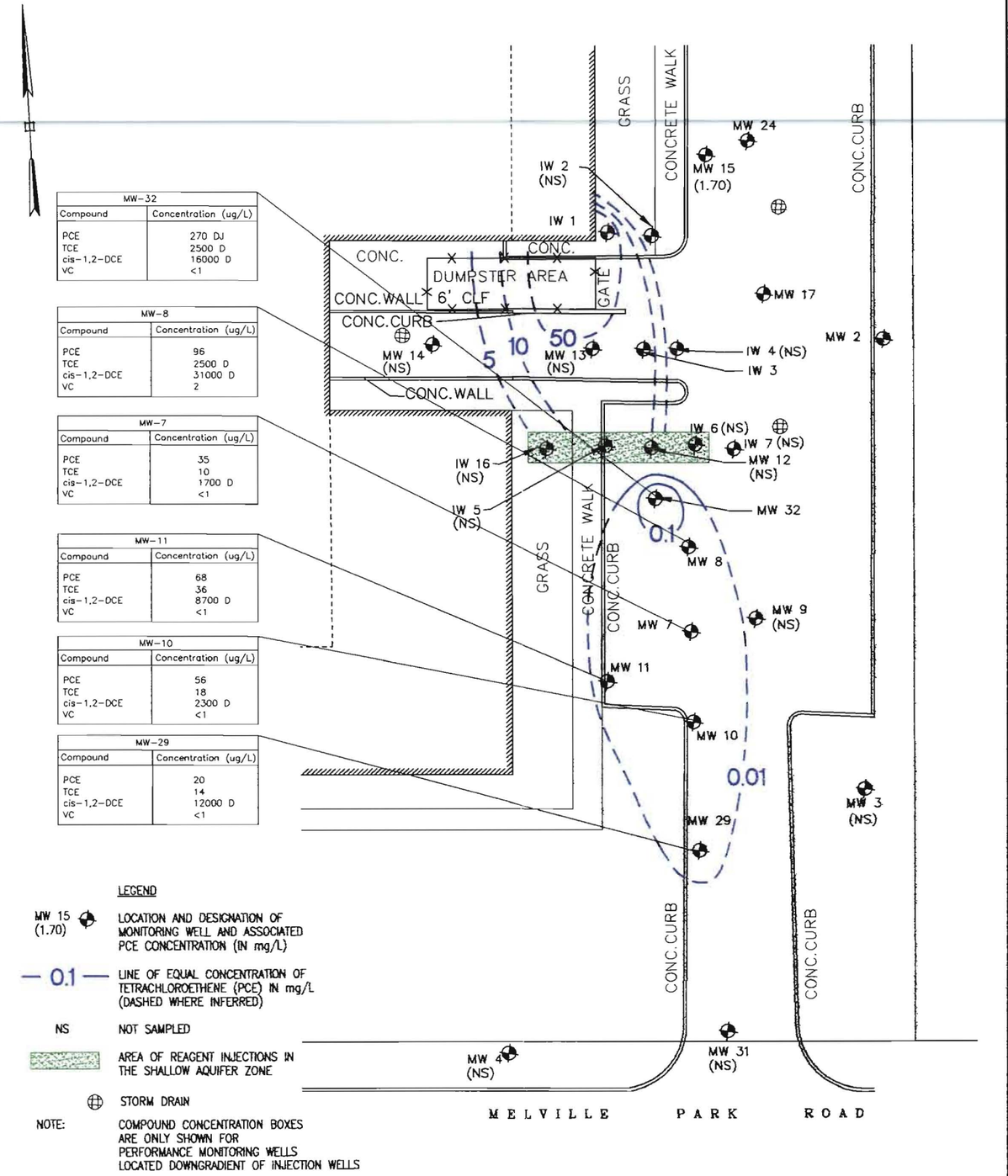
LEGEND

MW 15 (.006) — LOCATION AND DESIGNATION OF MONITORING WELL AND ASSOCIATED PCE CONCENTRATION (IN mg/L)

— 0.1 — LINE OF EQUAL CONCENTRATION OF TETRACHLOROETHENE (PCE) IN mg/L (DASHED WHERE INFERRED)

STORM DRAIN

NOTE: COMPOUND CONCENTRATION BOXES ARE ONLY SHOWN FOR PERFORMANCE MONITORING WELLS LOCATED DOWNGRADIENT OF INJECTION WELLS



LEGEND

MW 15 (1.70) — LOCATION AND DESIGNATION OF MONITORING WELL AND ASSOCIATED PCE CONCENTRATION (IN mg/L)

— 0.1 — LINE OF EQUAL CONCENTRATION OF TETRACHLOROETHENE (PCE) IN mg/L (DASHED WHERE INFERRED)

NS — NOT SAMPLED

AREA OF REAGENT INJECTIONS IN THE SHALLOW AQUIFER ZONE

STORM DRAIN

NOTE: COMPOUND CONCENTRATION BOXES ARE ONLY SHOWN FOR PERFORMANCE MONITORING WELLS LOCATED DOWNGRADIENT OF INJECTION WELLS

0 30
SCALE IN FEET

NO.	DATE	REVISION DESCRIPTION	BY CKD

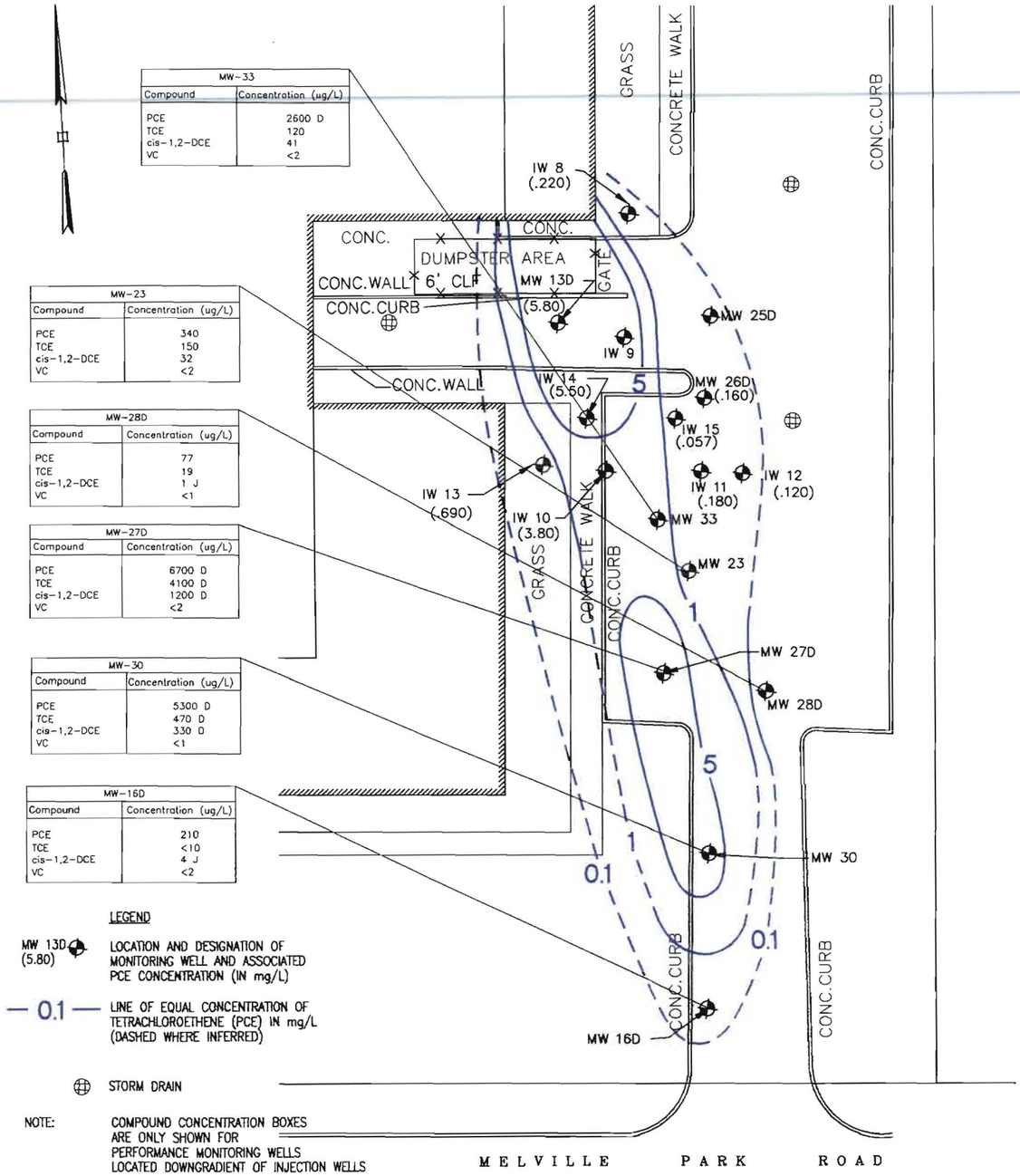
ARCADIS

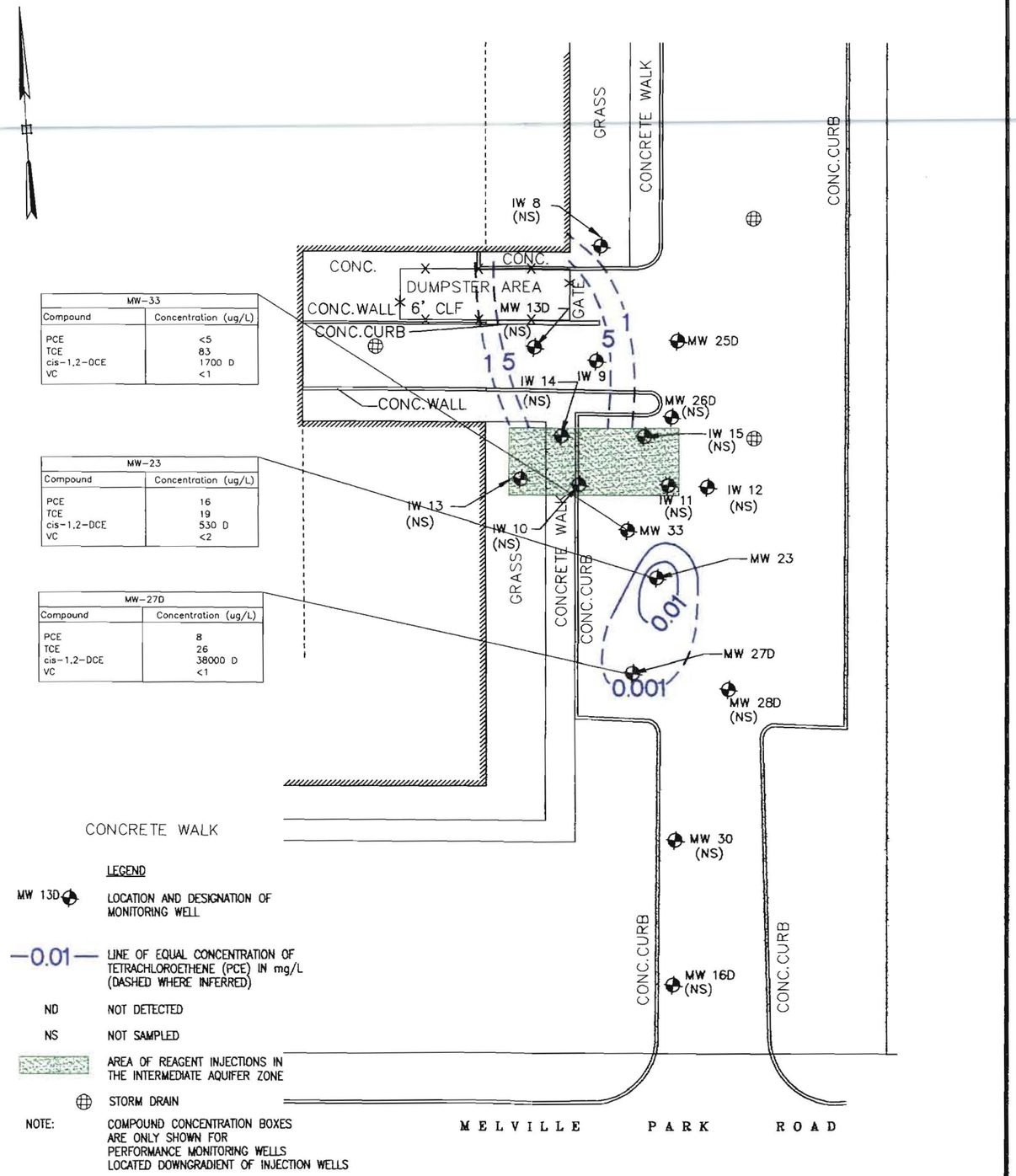
25 MELVILLE PARK ROAD
MELVILLE, NEW YORK
25 MPR, L.L.C.

DRAWN	DATE
A.C.	4/6/04

BASELINE VS. MONTH 6 PCE RESULTS IN SHALLOW ZONE

PROJECT MANAGER	DEPARTMENT MANAGER
S. FELDMAN	N. VALKENBURG
LEAD DESIGN PROF.	CHECKED
	C. KEEN
PROJECT NUMBER	FIGURE
NY01332.009	3





0 30
SCALE IN FEET

NO.	DATE	REVISION DESCRIPTION	BY CKD

ARCADIS

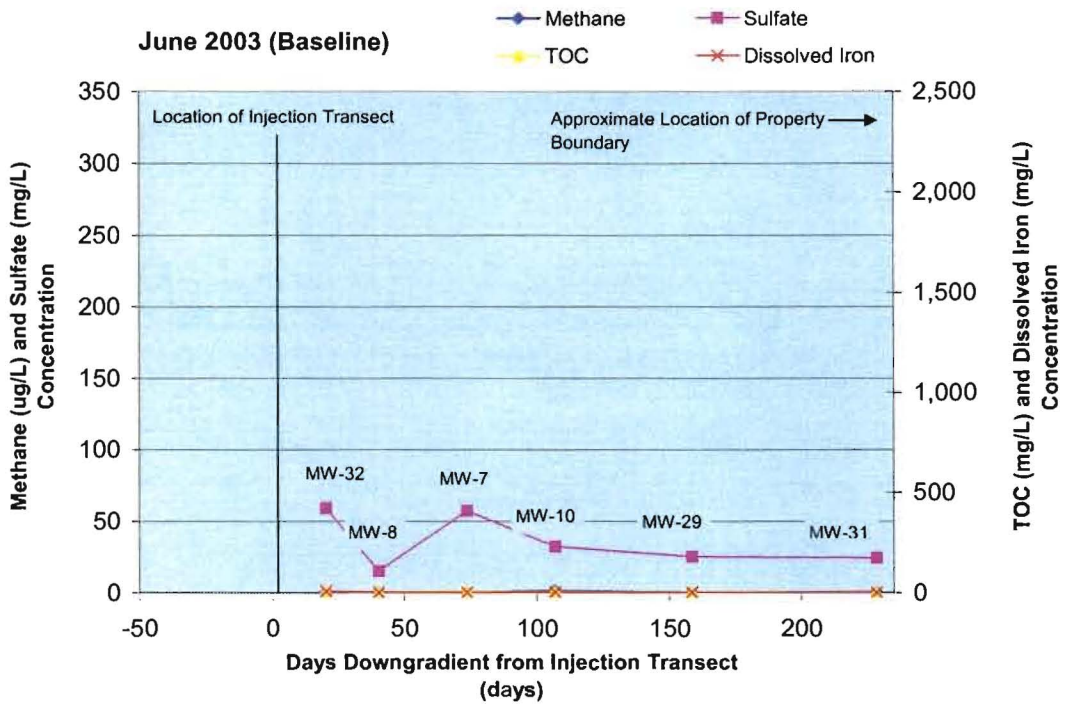
25 MELVILLE PARK ROAD
MELVILLE, NEW YORK
25 MPR, L.L.C.

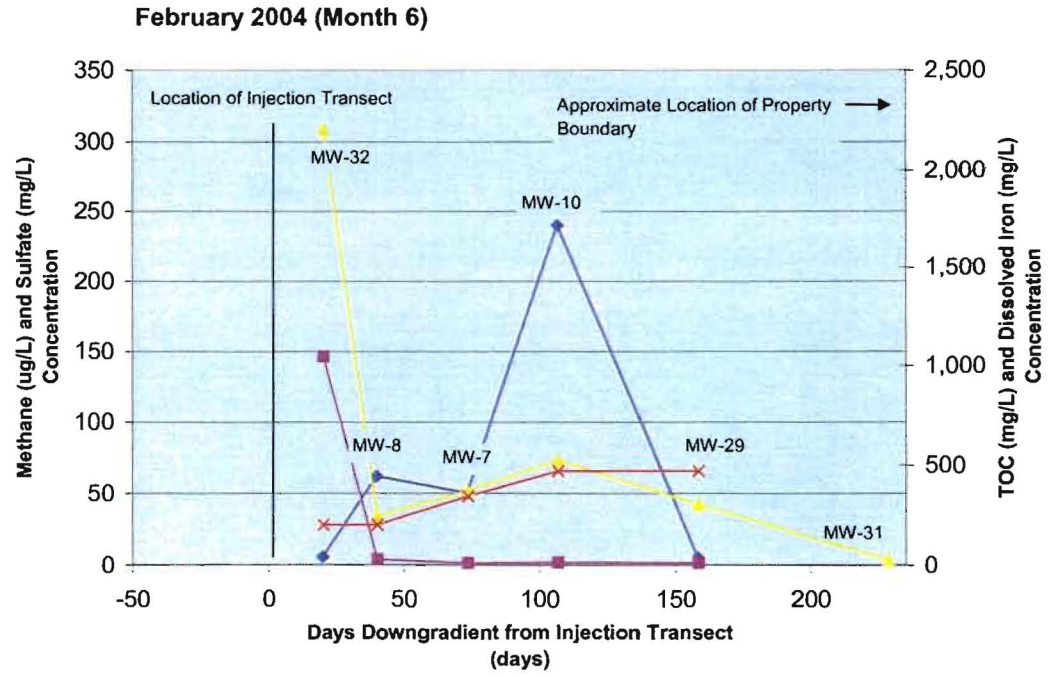
DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
A.G.	4/6/04	S. FELDMAN	M. VALKENBURG
		LEAD DESIGN PROF.	CHECKED
			C. KEEN

BASELINE VS. MONTH 6 PCE RESULTS IN INTERMEDIATE ZONE

PROJECT NUMBER	FIGURE
NY01332.009	4

Figure 5. Biogeochemical and Total Organic Carbon Results Along the Downgradient Flow Path in the Shallow Aquifer. ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

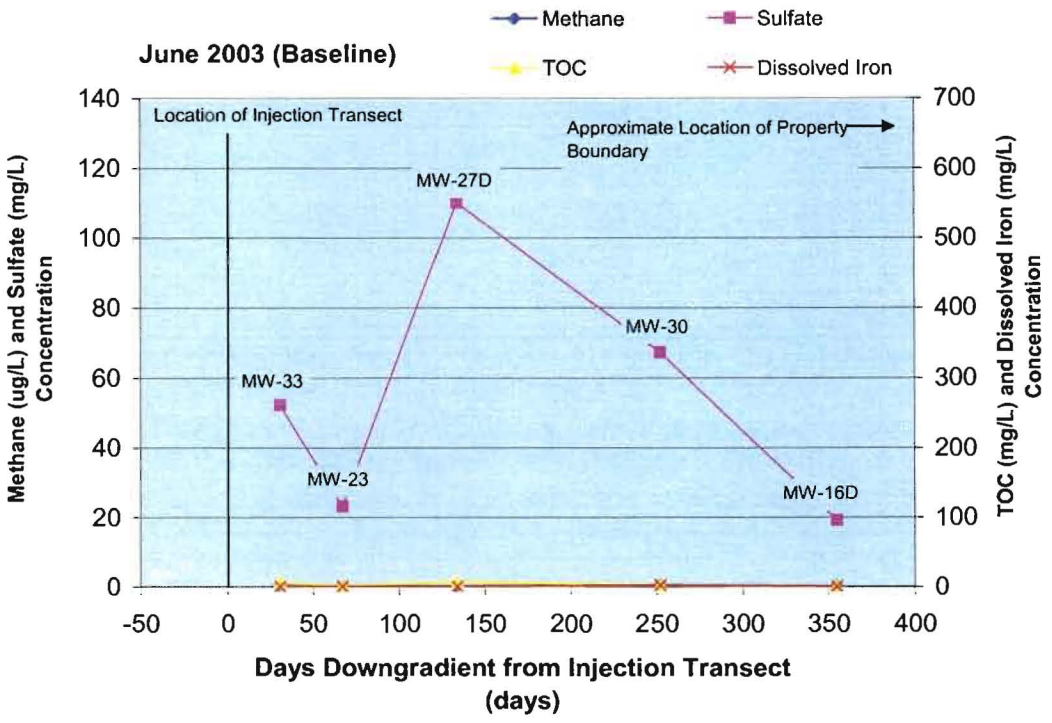


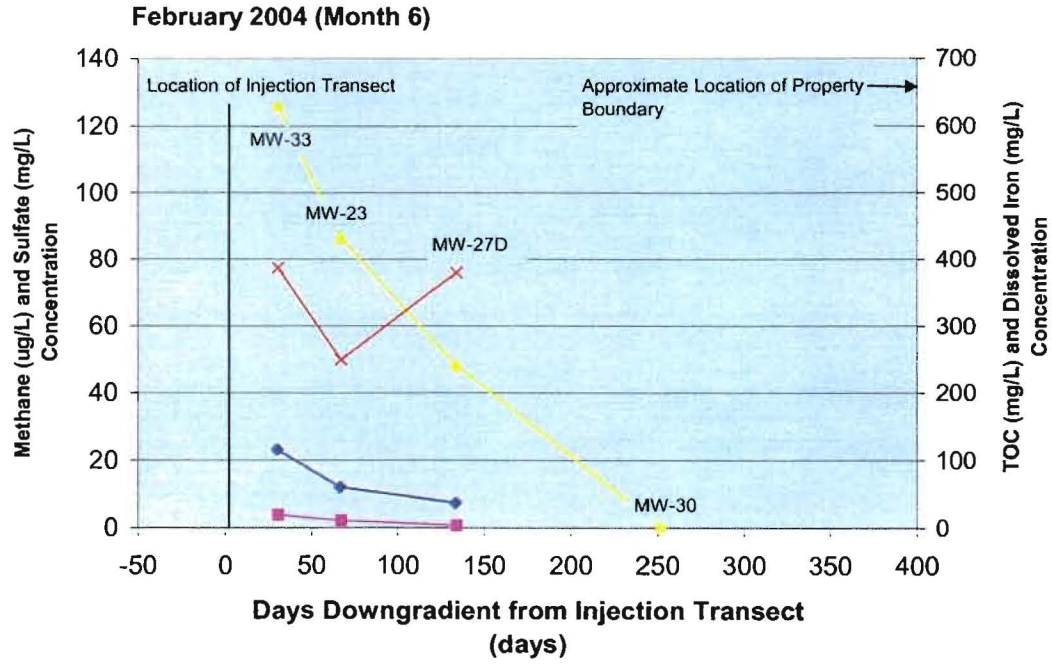


Notes:

1. Days downgradient based on an assumed groundwater velocity of 0.6 feet per day.

Figure 6. Biogeochemical and Total Organic Carbon Results Along the Downgradient Flow Path in the Intermediate Aquifer. ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

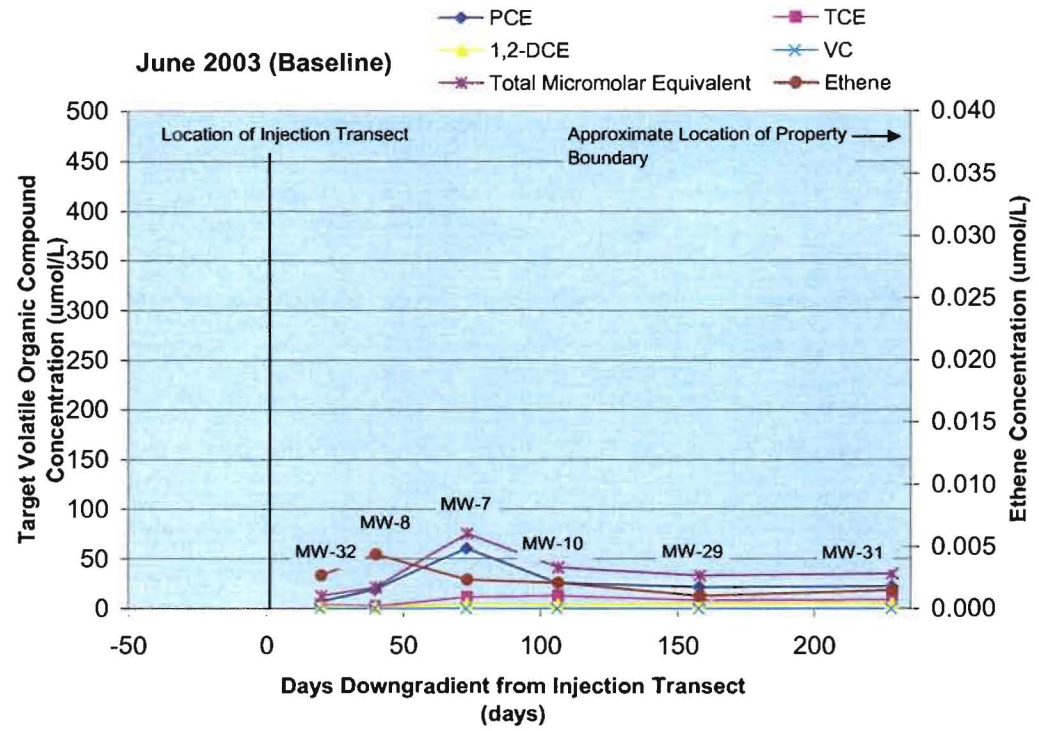


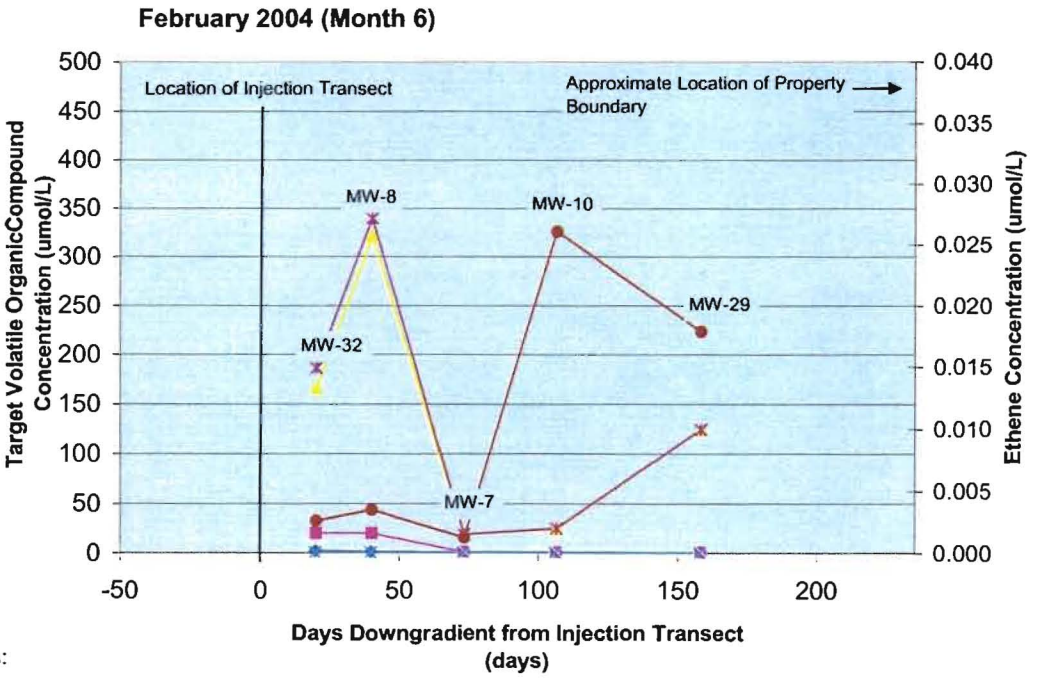


Notes:

1. Days downgradient based on an assumed groundwater velocity of 0.33 feet per day.

Figure 7. Concentration of Target Chlorinated Volatile Organic Compounds and Ethene Along the Downgradient Flow Path in the Shallow Aquifer. ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

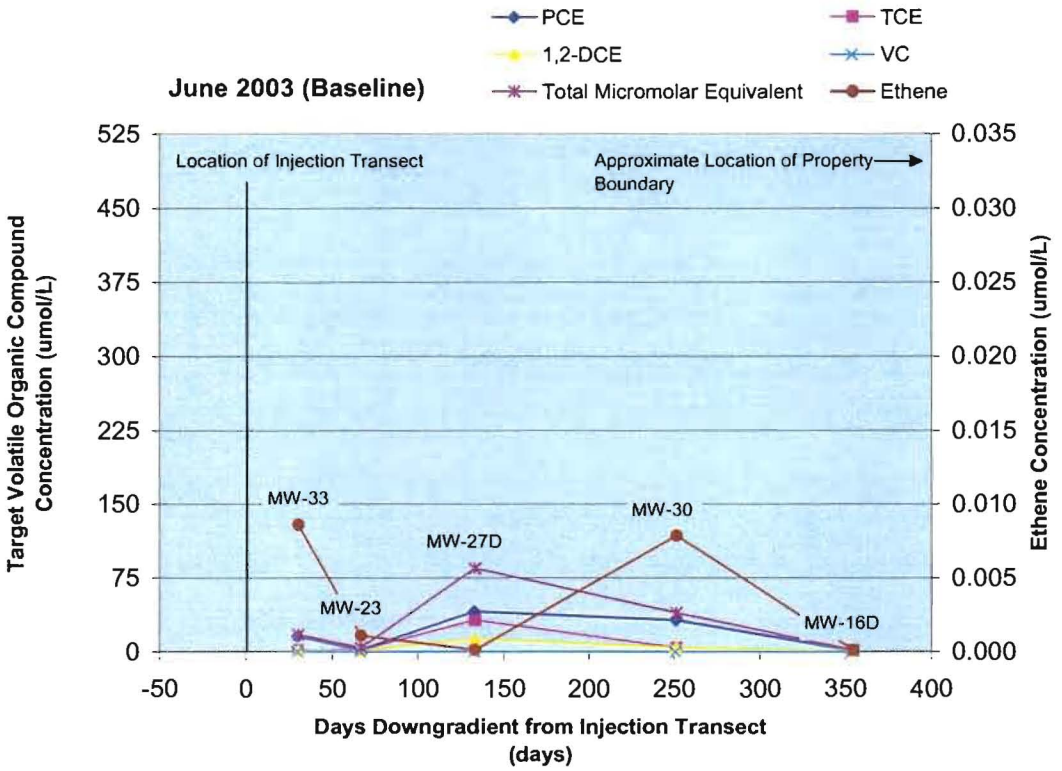


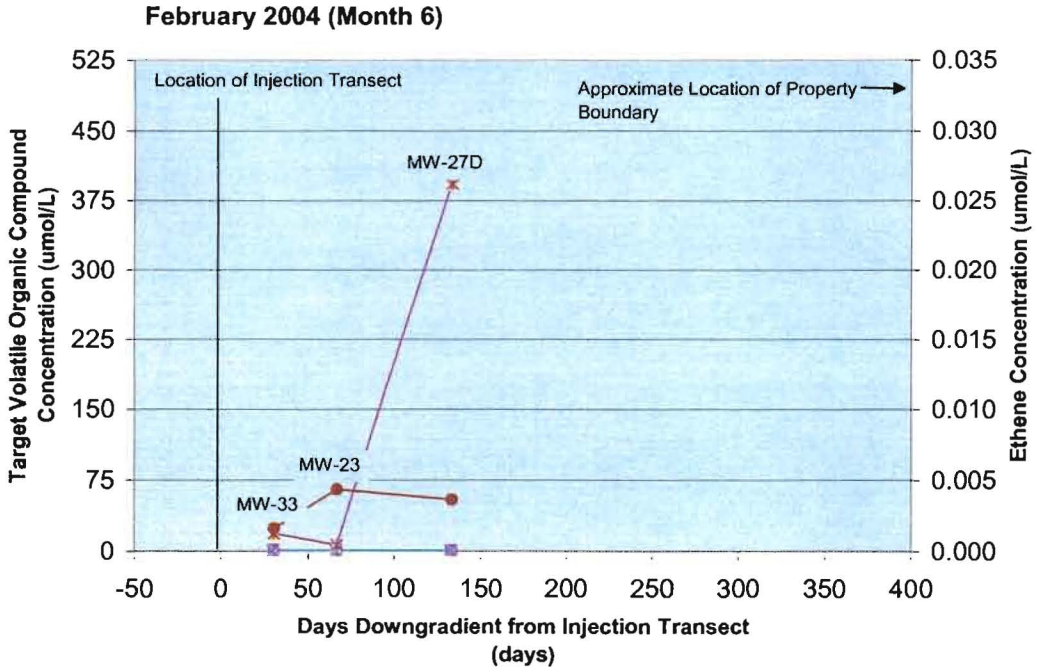


Notes:

1. Days downgradient based on assumed groundwater velocity of 0.6 feet per day.
2. Total micromolar equivalent equals the sum of PCE, TCE, 1,2 DCE, VC, and ethene concentrations.

Figure 8. Concentration of Target Chlorinated Volatile Organic Compounds and Ethene Along the Downgradient Flow Path in the Intermediate Aquifer. ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.





Notes:

1. Days downgradient based on assumed groundwater velocity of 0.33 feet per day.
2. Total micromolar equivalents equals the sum of PCE, TCE, 1,2 DCE, VC, and ethene.

ARCADIS

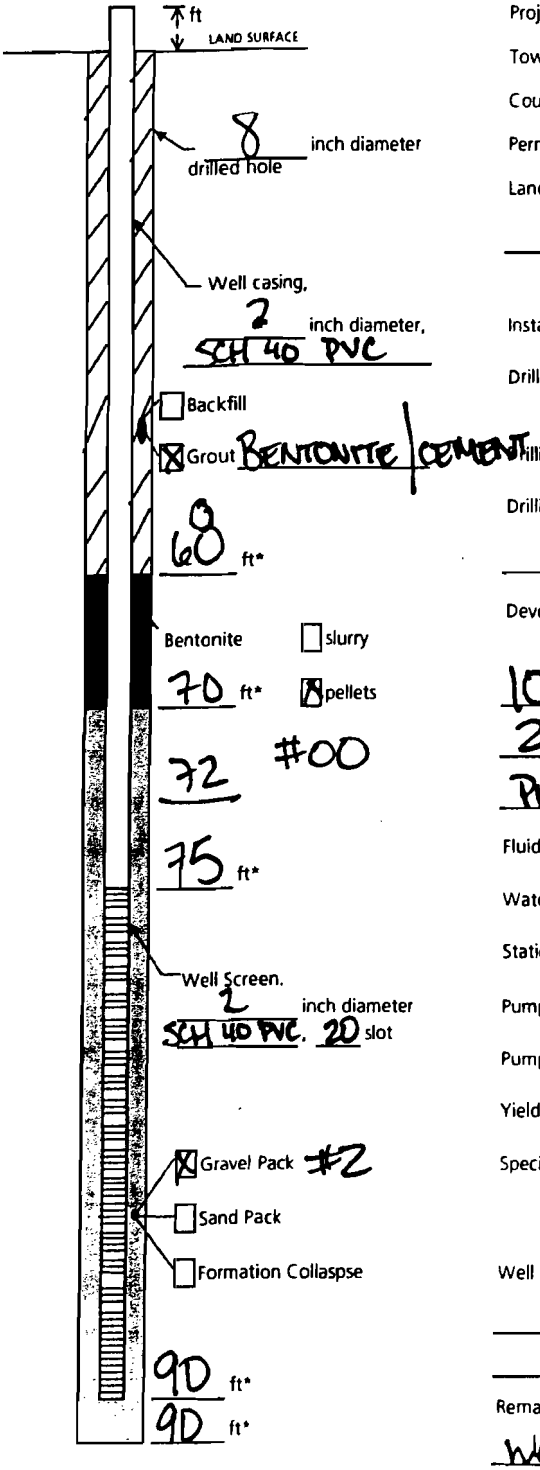
Appendix A

Well Construction Logs

ARCADIS G&M, Inc.

Well Construction Log

(Uncolsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project 25 MPR Well IW-13

Town/City MELVILLE

County SUFFOLK State NY

Permit No. _____

Land-Surface Elevation and Datum:

_____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 5 JUNE 2003

Drilling Method 4.25" HSA

Drilling Contractor DELTA

Drilling Fluid POTABLE WATER

Development Technique(s) and Date(s)

10 JUNE 2003
2" SUBMERSIBLE PUMP
PUMP & SURGE

Fluid Loss During Drilling _____ gallons

Water Removed During Development 150 gallons

Static Depth to Water 51.95 feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose INJECTION

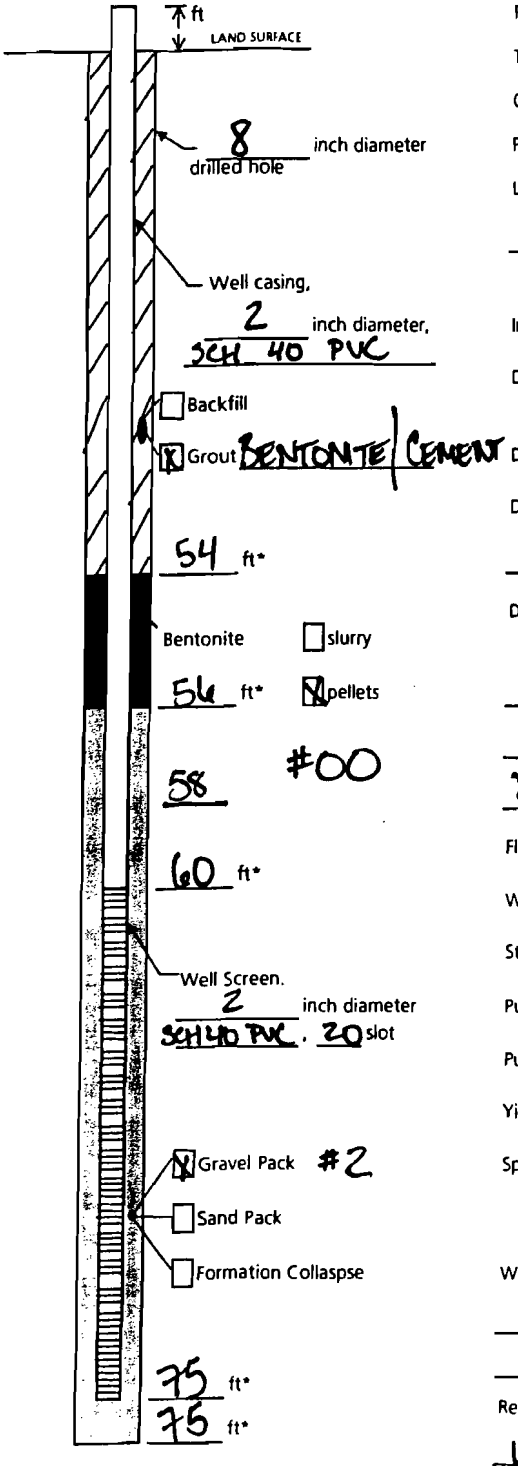
Remarks ~50gal POTABLE WATER USED DURING DRILLING

Prepared by M. SAUBORN

ARCADIS G&M, Inc.

Well Construction Log

(Uncolsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project 25 MPR Well IW-14

Town/City MELVILLE

County SUFFOLK State NY

Permit No.

Land-Surface Elevation and Datum:

____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 3 JUNE

Drilling Method 4.25" HSA

Drilling Contractor DELTA

Drilling Fluid POTABLE WATER

Development Technique(s) and Date(s)

10 JUNE 2003
2" SUBMERSIBLE PUMP
PUMP + SURGE

Fluid Loss During Drilling ____ gallons

Water Removed During Development 110 gallons

Static Depth to Water 50.35 feet below M.P.

Pumping Depth to Water ____ feet below M.P.

Pumping Duration ____ hours

Yield ____ gpm Date ____

Specific Capacity ____ gpm/ft

Well Purpose INJECTION

Remarks ~50 gal WATER USED DURING DRILLING.

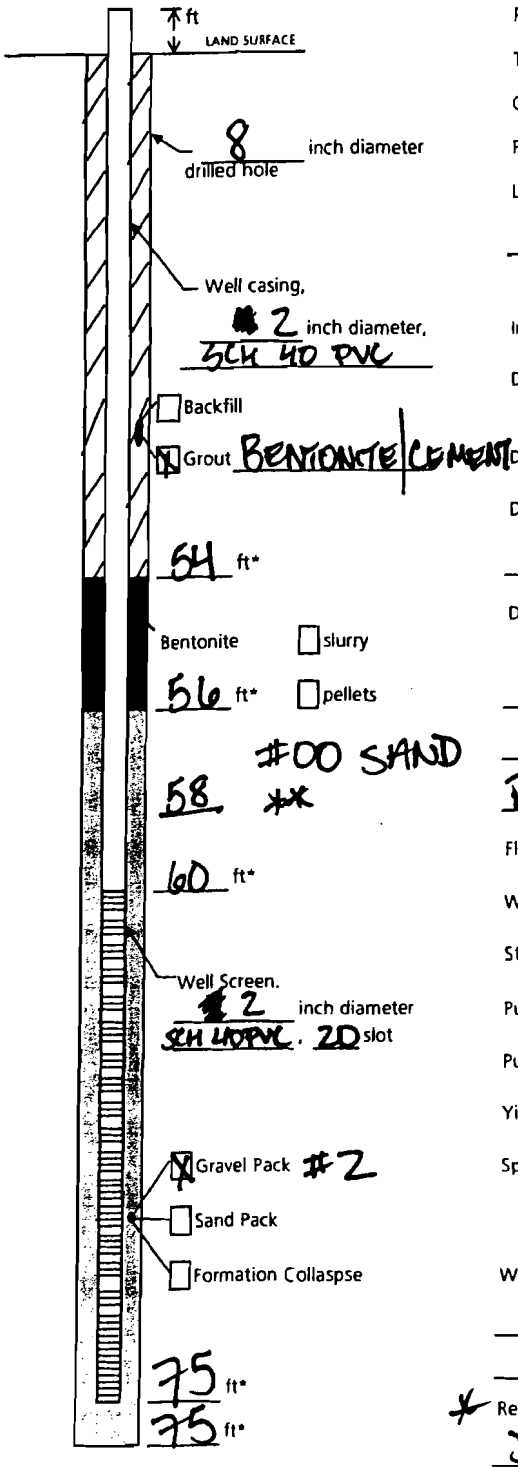
Prepared by M. SAUBORN

WELLCSTR.XLS.xls
7/2/2002

ARCADIS G&M, Inc.

Well Construction Log

(Uncolsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project 25 MPR Well IW-15

Town/City MELVILLE

County SUFFOLK State NY

Permit No.

Land-Surface Elevation and Datum:

feet ☐ Surveyed ☐ Estimated

Installation Date(s) 23 JUNE 2003

Drilling Method 4.25" HSA

Drilling Contractor DELTA

Drilling Fluid POTABLE WATER+

Development Technique(s) and Date(s)

10 JUNE 2003

2" SUBMERSIBLE PUMP

PUMP + SURGE

Fluid Loss During Drilling gallons

Water Removed During Development 75 gallons

Static Depth to Water 49.34 feet below M.P.

Pumping Depth to Water feet below M.P.

Pumping Duration hours

Yield gpm Date

Specific Capacity gpm/ft

Well Purpose INJECTION

* Remarks ~50 gal USED DURING DRILLING

** DIFFERS FROM SPECS DUE TO CLAY LAYER @ ~56'

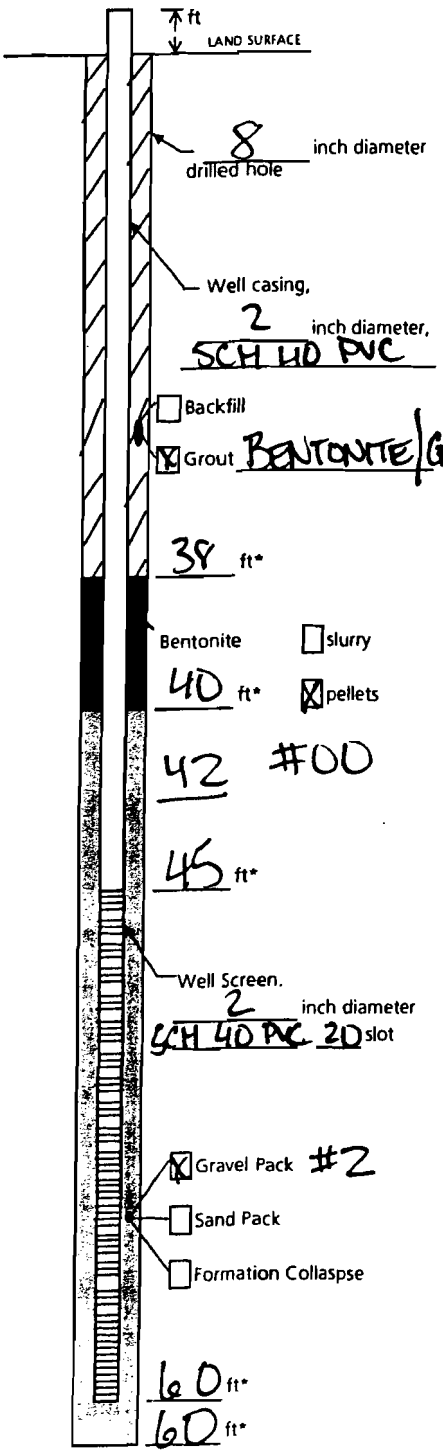
Prepared by M. SAUBORN

WELLCSTR.XLS.xls
7/2/2002

ARCADIS G&M, Inc.

Well Construction Log

(Uncolsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project 25 MPR Well IW-16

Town/City MELVILLE

County SUFFOLK State NY

Permit No. _____

Land-Surface Elevation and Datum:

_____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 4-5 JUNE 2003

Drilling Method 4.25" HSA

Drilling Contractor DELTA

Drilling Fluid POTABLE WATER

Development Technique(s) and Date(s)

10 JUNE 2003
2" SUBMERSIBLE PUMP
PUMP + SURGE

Fluid Loss During Drilling _____ gallons

Water Removed During Development 75 gallons

Static Depth to Water 52.01 feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose INJECTION

Remarks * 450 gal POTABLE WATER USED DURING DRILLING

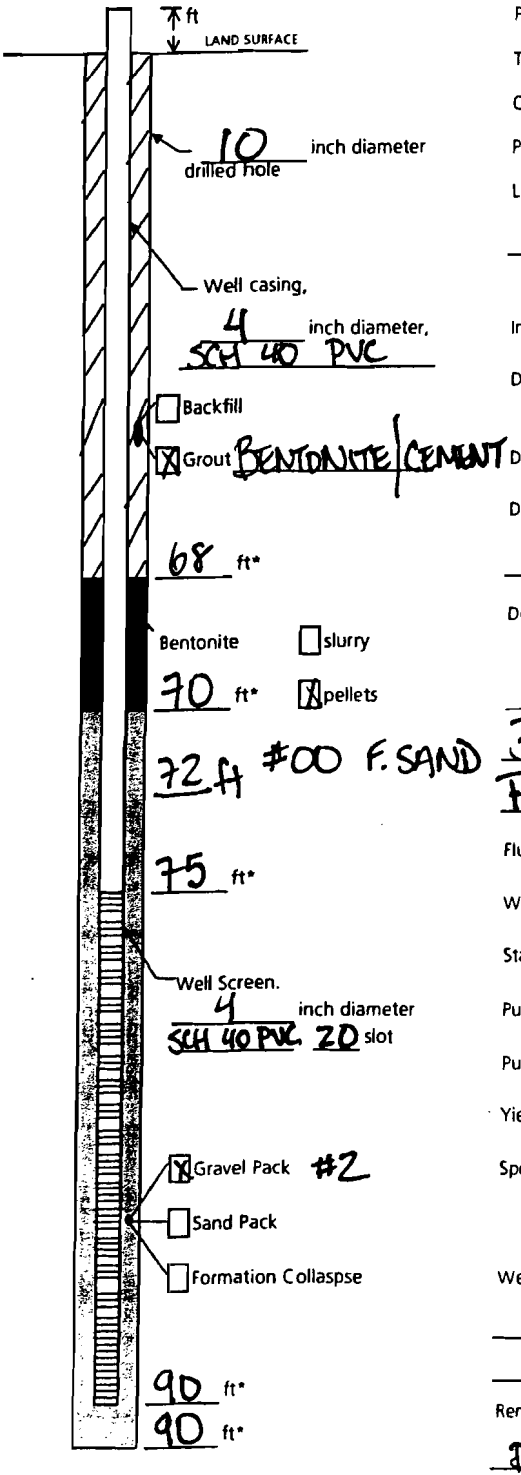
Prepared by M. SAUERBORN

WELLCSTR.XLS.xls
7/2/2002

ARCADIS G&M, Inc.

Well Construction Log

(Uncolsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project 25 MPR Well MW-30

Town/City MELVILLE

County SUFFOLK State NY

Permit No.

Land-Surface Elevation and Datum:

feet ☐ Surveyed ☐ Estimated

Installation Date(s) 27-28 MAY 2003

Drilling Method HSA - 6.25"

Drilling Contractor DELTA

Drilling Fluid POTABLE WATER

Development Technique(s) and Date(s)

9 JUNE 2003
3" SUBMERSIBLE PUMP
PUMP & SURGE

Fluid Loss During Drilling gallons

Water Removed During Development 400 gallons

Static Depth to Water 50.54 feet below M.P.

Pumping Depth to Water feet below M.P.

Pumping Duration hours

Yield gpm Date

Specific Capacity gpm/ft

Well Purpose MONITORING

Remarks USED ~450 gal WATER DURING DRILLING

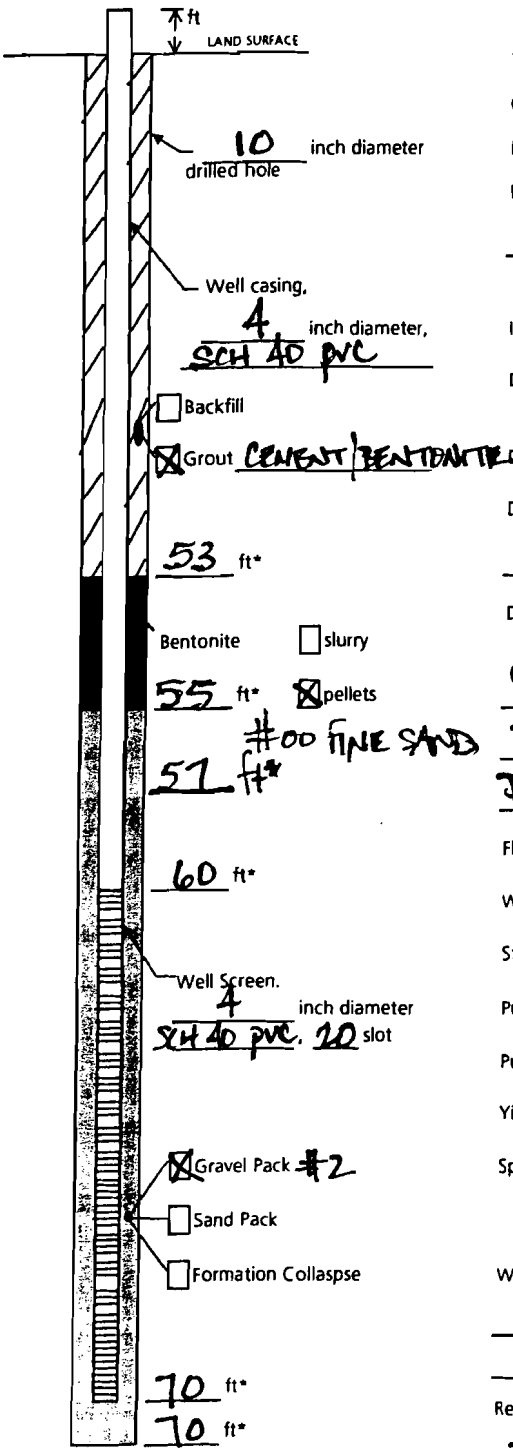
Prepared by M. SAUERBORN

WELLCSTR.XLS.xls
7/2/2002

ARCADIS G&M, Inc.

Well Construction Log

(Uncolsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project 25 MPR Well MW-31

Town/City MELVILLE

County SUFFOLK State NY

Permit No. _____

Land-Surface Elevation and Datum:

_____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 5/23/03

Drilling Method 6.25-INCH ID HSA

Drilling Contractor DELTA

Drilling Fluid WATER FOR KNOCKING OUT BOTTOM PLUG

Development Technique(s) and Date(s)

9 JUNE 2003

3' SUBMERSIBLE PUMP PUMP + SURGE

Fluid Loss During Drilling _____ gallons

Water Removed During Development 250 gallons

Static Depth to Water 49.59 feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose MONITORING

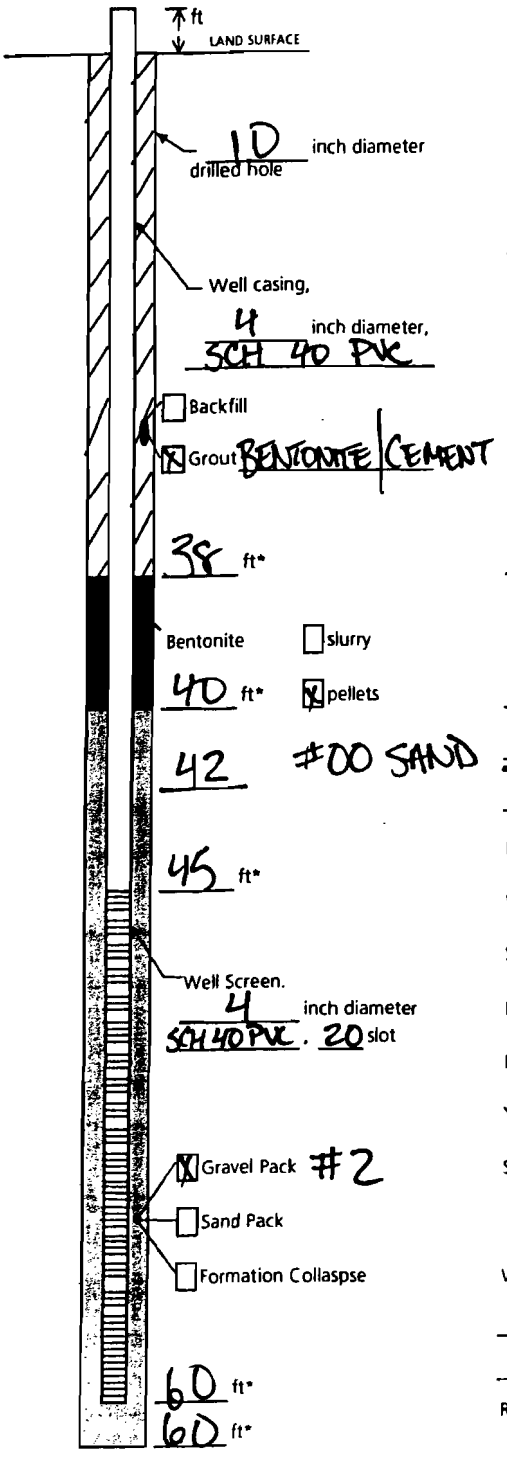
Remarks USED APPROX. 150 GALS TO FILL AUGERS FOR KNOCKING OUT PLUG AND TO AID IN GRAVEL PACK/FINE SAND INSTALLATION

Prepared by M. SAUBORN

ARCADIS G&M, Inc.

Well Construction Log

(Uncolsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project 25 MPR Well MW-32

Town/City MELVILLE

County SUFFOLK State NY

Permit No.

Land-Surface Elevation and Datum:

____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 30 MAY - 2 JUNE 2003

Drilling Method 6.25" HSA

Drilling Contractor DELTA

Drilling Fluid POTABLE WATER

Development Technique(s) and Date(s)

6 JUNE 2003
3" SUBMERSIBLE PUMP
PUMP + SURGE

Fluid Loss During Drilling ____ gallons

Water Removed During Development 290 gallons

Static Depth to Water 49.85 feet below M.P.

Pumping Depth to Water ____ feet below M.P.

Pumping Duration ____ hours

Yield ____ gpm Date ____

Specific Capacity ____ gpm/ft

Well Purpose MONITORING

Remarks USED ~150 gal POTABLE WATER

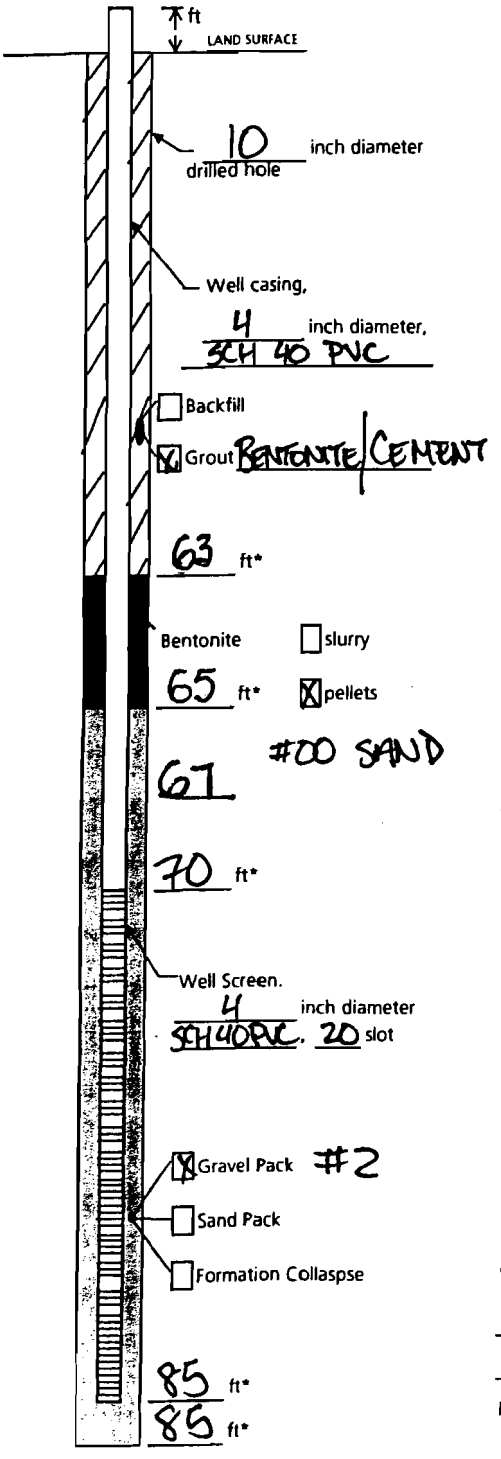
Prepared by M. SAUERBORN

WELLCSTR.XLS.xls
7/2/2002

ARCADIS G&M, Inc.

Well Construction Log

(Uncolsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project 25 MPR Well MW-33

Town/City MELVILLE

County SUFFOLK State NY

Permit No. _____

Land-Surface Elevation and Datum:

_____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 29-30 MAY 2003

Drilling Method 6.25" HSA

Drilling Contractor DELTA

Drilling Fluid POTABLE WATER

Development Technique(s) and Date(s)

6 JUNE 2003
3" SUBMERSIBLE PUMP
PUMP + SURGE

Fluid Loss During Drilling _____ gallons

Water Removed During Development 250 gallons

Static Depth to Water 50.62 feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose MONITORING

Remarks ~150 gal WATER USED DURING DRILLING + INSTALLATION

Prepared by M. SAUBORN

WELLCSTR.XLS.xls
7/2/2002

Appendix B

Reagent Injection Logs

ARCADIS

Summary of Reagent Injection Parameters, Injection Well IW-5, ERD Pilot Test, 25 Melville Park Road, Melville, New York.

Date	Injection No.	Raw Molasses Volume (gallons)	Water Volume (gallons)	Solution Strength (%)	Volume Injected (gallons)	Injection Flowrate (gpm)	Injection Pressure (psi)	Notes and Observations
8/14/2003	1	19	172	10	191	45	0	Vacuum on well head after injection
8/28/2003	2	19	172	10	191	48	0	Vacuum on well head after injection
9/11/2003	3	19	172	10	191	48	0	Vacuum on well head after injection
9/29/2003	4	19	172	10	191	64	0	Vacuum on well head after injection, 19 lbs of sodium bicarbonate added
10/13/2003	5	25.5	166.5	13	192	32	0	Vacuum on well head after injection, 19 lbs of sodium bicarbonate added
10/27/2003	6	19	172	10	191	48	2	Vacuum on well head after injection, 19 lbs of sodium bicarbonate added
11/17/2003	7	19	172	10	191	64	3	Vacuum on well head after injection, 19 lbs of sodium bicarbonate added
12/8/2003	8	25.5	166.5	13	192	64	1	Vacuum on well head after injection, 19 lbs of sodium bicarbonate added
12/29/2003	9	25.5	165.5	13	191	48	2.5	Vacuum on well head after injection, 9 lbs of sodium bicarbonate added
1/21/2004	10	25.5	165.5	13	191	48	0	Vacuum on well head after injection, 9 lbs of sodium bicarbonate added
2/10/2004	11	25.5	165.5	13	191	64	2	Vacuum on well head after injection, 9 lbs of sodium bicarbonate added

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Summary of Reagent Injection Parameters, Injection Well IW-6, ERD Pilot Test, 25 Melville Park Road, Melville, New York.

Date	Injection No.	Raw Molasses Volume (gallons)	Water Volume (gallons)	Solution Strength (%)	Volume Injected (gallons)	Injection Flowrate (gpm)	Injection Pressure (psi)	Notes and Observations
8/14/2003	1	19	172	10	191	25	0	Vacuum on well head after injection; 371 grams KBr tracer added
8/28/2003	2	19	172	10	191	48	0	Vacuum on well head after injection
9/11/2003	3	19	172	10	191	48	0	Vacuum on well head after injection
9/29/2003	4	19	172	10	191	48	0	Vacuum on well head after injection, 19 lbs of sodium bicarbonate added
10/13/2003	5	25.5	166.5	13	192	55	0	Vacuum on well head after injection, 19 lbs of sodium bicarbonate added
10/27/2003	6	19	172	10	191	48	8	Vacuum on well head after injection, 19 lbs of sodium bicarbonate added
11/17/2003	7	19	172	10	191	48	7	Vacuum on well head after injection, 19 lbs of sodium bicarbonate added
12/8/2003	8	25.5	166.5	13	192	48	8	Vacuum on well head after injection, 19 lbs of sodium bicarbonate added
12/29/2003	9	25.5	165.5	13	191	64	7.5	Vacuum on well head after injection, 9 lbs of sodium bicarbonate added
1/21/2004	10	25.5	165.5	13	191	48	4	Vacuum on well head after injection, 9 lbs of sodium bicarbonate added
2/10/2004	11	25.5	165.5	13	191	38	6	Vacuum on well head after injection, 9 lbs of sodium bicarbonate added

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Summary of Reagent Injection Parameters, Injection Well IW-10, ERD Pilot Test, 25 Melville Park Road, Melville, New York.

Date	Injection No.	Raw Molasses Volume (gallons)	Water Volume (gallons)	Solution Strength (%)	Volume Injected (gallons)	Injection Flowrate (gpm)	Injection Pressure (psi)	Notes and Observations
8/14/2003	1	26.4	237.8	10	264	50	0	Vacuum on well head after injection
8/28/2003	2	26.4	237.8	10	264	66	0	Vacuum on well head after injection
9/11/2003	3	26.4	237.8	10	264	53	0	Vacuum on well head after injection
9/29/2003	4	40	224	15	264	53	1	Vacuum on well head after injection, 25 lbs of sodium bicarbonate added
10/13/2003	5	52.8	211.2	20	264	53	5	Vacuum on well head after injection, 25 lbs of sodium bicarbonate added
10/27/2003	6	40	224	15	264	59	4	Vacuum on well head after injection, 25 lbs of sodium bicarbonate added
11/17/2003	7	35	229	13	264	37	7	Vacuum on well head after injection, 26 lbs of sodium bicarbonate added
12/8/2003	8	35	229	13	264	66	5	Vacuum on well head after injection, 26 lbs of sodium bicarbonate added
12/29/2003	9	35	229	13	264	66	8.5	Vacuum on well head after injection, 13 lbs of sodium bicarbonate added
1/19/2004	10	35	229	13	264	66	13	Vacuum on well head after injection, 13 lbs of sodium bicarbonate added
2/10/2004	11	35	229	13	264	53	7.5	Vacuum on well head after injection, 13 lbs of sodium bicarbonate added

ARCADIS

Summary of Reagent Injection Parameters, Injection Well IW-11, ERD Pilot Test, 25 Melville Park Road, Melville, New York.

Date	Injection No.	Raw Molasses Volume (gallons)	Water Volume (gallons)	Solution Strength (%)	Volume Injected (gallons)	Injection Flowrate (gpm)	Injection Pressure (psi)	Notes and Observations
8/14/2003	1	26.4	237.8	10	264	44	0	Vacuum on well head after injection; 556 grams KBr tracer added
8/28/2003	2	26.4	237.8	10	264	66	0	Vacuum on well head after injection
9/11/2003	3	26.4	237.8	10	264	53	0	Vacuum on well head after injection
9/29/2003	4	40	224	15	264	66	0	Vacuum on well head after injection, 25 lbs of sodium bicarbonate added
10/13/2003	5	52.8	211.2	20	264	53	0	Vacuum on well head after injection, 25 lbs of sodium bicarbonate added
10/27/2003	6	40	224	15	264	44	4	Vacuum on well head after injection, 25 lbs of sodium bicarbonate added
11/17/2003	7	35	493	6.6	528	66	8	Vacuum on well head after injection, 26 lbs of sodium bicarbonate added
12/8/2003	8	35	229	13.3	264	53	4	Vacuum on well head after injection, 26 lbs of sodium bicarbonate added
12/29/2003	9	35	493	6.6	528	45	0	Vacuum on well head after injection, 13 lbs of sodium bicarbonate added
1/21/2004	10	35	493	6.6	528	59	0	Vacuum on well head after injection, 13 lbs of sodium bicarbonate added
2/10/2004	11	35	493	6.6	528	26	0	Vacuum on well head after injection, 13 lbs of sodium bicarbonate added

ARCADIS

Summary of Reagent Injection Parameters, Injection Well IW-13, ERD Pilot Test, 25 Melville Park Road, Melville, New York.

Date	Injection No.	Raw Molasses Volume (gallons)	Water Volume (gallons)	Solution Strength (%)	Volume Injected (gallons)	Injection Flowrate (gpm)	Injection Pressure (psi)	Notes and Observations
8/14/2003	1	26.4	237.8	10	264	45	0	Vacuum on well head after injection
8/28/2003	2	26.4	237.8	10	264	66	0	Vacuum on well head after injection
9/11/2003	3	26.4	237.8	10	264	44	0	Vacuum on well head after injection
9/29/2003	4	26.4	237.8	10	264	47	0	Vacuum on well head after injection, 25 lbs of sodium bicarbonate added,
10/13/2003	5	52.8	211.2	20	264	66	2.5	Vacuum on well head after injection, 25 lbs of sodium bicarbonate added,
10/27/2003	6	40	224	15	264	66	0	Vacuum on well head after injection, 25 lbs of sodium bicarbonate added,
11/17/2003	7	35	229	13	264	44	0	Vacuum on well head after injection, 26 lbs of sodium bicarbonate added
12/8/2003	8	35	229	13	264	66	11	Vacuum on well head after injection, 26 lbs of sodium bicarbonate added
12/29/2003	9	35	229	13	264	66	8	Vacuum on well head after injection, 13 lbs of sodium bicarbonate added
1/19/2004	10	35	229	13	264	53	10	Vacuum on well head after injection, 13 lbs of sodium bicarbonate added
2/10/2004	11	35	229	13	264	53	14.5	Vacuum on well head after injection, 13 lbs of sodium bicarbonate added

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Summary of Reagent Injection Parameters, Injection Well IW-14, ERD Pilot Test, 25 Melville Park Road, Melville, New York.

Date	Injection No.	Raw Molasses Volume (gallons)	Water Volume (gallons)	Solution Strength (%)	Volume Injected (gallons)	Injection Flowrate (gpm)	Injection Pressure (psi)	Notes and Observations
8/14/2003	1	26.4	237.8	10	264	50	0	Vacuum on well head after injection
8/28/2003	2	26.4	237.8	10	264	66	14	Vacuum on well head after injection
9/11/2003	3	26.4	237.8	10	264	44	30	Vacuum on well head after injection
9/29/2003	4	40	224	15	264	66	10	Vacuum on well head after injection, 25 lbs of sodium bicarbonate added
10/13/2003	5	52.8	211.2	20	264	44	27	Vacuum on well head after injection, 25 lbs of sodium bicarbonate added
10/27/2003	6	40	224	15	264	44	34	Vacuum on well head after injection, 25 lbs of sodium bicarbonate added
11/17/2003	7	35	229	13	264	44	29	Vacuum on well head after injection, 26 lbs of sodium bicarbonate added
12/8/2003	8	35	229	13	264	44	28	Vacuum on well head after injection, 26 lbs of sodium bicarbonate added
12/29/2003	9	35	229	13	264	53	28	Vacuum on well head after injection, 13 lbs of sodium bicarbonate added
1/21/2004	10	35	229	13	264	53	32	Vacuum on well head after injection, 13 lbs of sodium bicarbonate added
2/10/2004	11	35	229	13	264	38	32.5	Vacuum on well head after injection, 13 lbs of sodium bicarbonate added

ARCADIS

Summary of Reagent Injection Parameters, Injection Well IW-15, ERD Pilot Test, 25 Melville Park Road, Melville, New York.

Date	Injection No.	Raw Molasses Volume (gallons)	Water Volume (gallons)	Solution Strength (%)	Volume Injected (gallons)	Injection Flowrate (gpm)	Injection Pressure (psi)	Notes and Observations
8/14/2003	1	26.4	237.8	10	264	45	11	Vacuum on well head after injection
8/28/2003	2	26.4	237.8	10	264	53	30	Vacuum on well head after injection
9/11/2003	3	26.4	237.8	10	264	38	37	Vacuum on well head after injection
9/29/2003	4	40	224	15	264	26	35	Vacuum on well head after injection, 25 lbs of sodium bicarbonate added
10/13/2003	5	52.8	211.2	20	264	26	30	Vacuum on well head after injection, 25 lbs of sodium bicarbonate added
10/27/2003	6	40	224	15	264	26	32	Vacuum on well head after injection, 25 lbs of sodium bicarbonate added
11/17/2003	7	35	229	13	264	38	28	Vacuum on well head after injection, 26 lbs of sodium bicarbonate added
12/8/2003	8	35	229	13	264	26	--	Vacuum on well head after injection, 26 lbs of sodium bicarbonate added
12/29/2003	9	35	229	13	264	24	39	Vacuum on well head after injection, 13 lbs of sodium bicarbonate added
1/21/2004	10	35	229	13	264	29	40	Vacuum on well head after injection, 13 lbs of sodium bicarbonate added
2/10/2004	11	35	229	13	264	16	38	Vacuum on well head after injection, 13 lbs of sodium bicarbonate added

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Summary of Reagent Injection Parameters, Injection Well IW-16, ERD Pilot Test, 25 Melville Park Road, Melville, New York.

Date	Injection No.	Raw Molasses Volume (gallons)	Water Volume (gallons)	Solution Strength (%)	Volume Injected (gallons)	Injection Flowrate (gpm)	Injection Pressure (psi)	Notes and Observations
8/14/2003	1	19	172	10	191	40	0	Vacuum on well head after injection
8/28/2003	2	19	172	10	191	48	0	Vacuum on well head after injection
9/11/2003	3	19	172	10	191	64	0	Vacuum on well head after injection
9/29/2003	4	19	172	10	191	48	0	Vacuum on well head after injection, 19 lbs of sodium bicarbonate added
10/13/2003	5	25.5	166.5	13	192	48	4.3	Vacuum on well head after injection, 19 lbs of sodium bicarbonate added
10/27/2003	6	19	172	10	191	48	2.5	Vacuum on well head after injection, 19 lbs of sodium bicarbonate added
11/17/2003	7	19	172	10	191	64	2	Vacuum on well head after injection, 19 lbs of sodium bicarbonate added
12/8/2003	8	25.5	166.5	13	192	64	4	Vacuum on well head after injection, 19 lbs of sodium bicarbonate added
12/29/2003	9	25.5	165.5	13	191	64	6	Vacuum on well head after injection, 9 lbs of sodium bicarbonate added
1/19/2004	10	25.5	165.5	13	191	64	4.5	Vacuum on well head after injection, 9 lbs of sodium bicarbonate added
2/10/2004	11	25.5	165.5	13	191	27	3	Vacuum on well head after injection, 9 lbs of sodium bicarbonate added

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Summary of Reagent Injection Parameters, Injection Well MW-12, ERD Pilot Test, 25 Melville Park Road, Melville, New York.

Date	Injection No.	Raw Molasses Volume (gallons)	Water Volume (gallons)	Solution Strength (%)	Volume Injected (gallons)	Injection Flowrate (gpm)	Injection Pressure (psi)	Notes and Observations
8/28/2003	2	4	36	10	40	40	0	Vacuum on well head after injection
9/11/2003	3	4	36	10	40	40	0	Vacuum on well head after injection
9/29/2003	4	4	36	10	40	40	0	Vacuum on well head after injection, 4 lbs of sodium bicarbonate added
10/13/2003	5	4	36	10	40	20	0	Vacuum on well head after injection, 4 lbs of sodium bicarbonate added
10/27/2003	6	19	172	10	191	32	18	Vacuum on well head after injection, 19 lbs of sodium bicarbonate added
11/17/2003	7	19	172	10	191	48	3	Vacuum on well head after injection, 19 lbs of sodium bicarbonate added
12/8/2003	8	25.5	166.5	13	192	38	2	Vacuum on well head after injection, 19 lbs of sodium bicarbonate added
12/29/2003	9	25.5	165.5	13	191	64	0	Vacuum on well head after injection, 9 lbs of sodium bicarbonate added
1/21/2004	10	25.5	165.5	13	191	24	0	Vacuum on well head after injection, 9 lbs of sodium bicarbonate added
2/10/2004	11	25.5	165.5	13	191	64	0	Vacuum on well head after injection, 9 lbs of sodium bicarbonate added

ARCADIS

Appendix C

Volatile Organic Compound Monitoring Results

Appendix C-1. Concentrations of Volatile Organic Compounds in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

Compound: (Units in ug/L)	Sample ID: / Date: / Zone:	MW-15 06/24/03 Shallow	MW-15 02/03/04 Shallow	MW-32 06/26/03 Shallow	MW-32 10/08/03 Shallow	MW-32 12/05/03 Shallow	MW-32 02/05/04 Shallow
Chloromethane		<5	<5	<10	<500	<5	<5
Bromomethane		<5	<5	<10	<500	<5	<5
Vinyl Chloride		<1	<1	<2	<100	<1	<1
Chloroethane		<5	<5	<10	<500	<5	<5
Methylene Chloride		<5	<5	<10	<500	<5	<5
Acetone		<10	<10	<20	<1000	140	33
Carbon Disulfide		<5	<5	<10	<500	<5	<5
1,1-Dichloroethene		<5	<5	<10	<500	<5	<5
1,1-Dichloroethane		<5	4 J	<10	<500	5	7
cis-1,2-Dichloroethene		<5	<5	170	2300	11000 D	16000 D
trans-1,2-Dichloroethene		<5	<5	<10	<500	140	180
Chloroform		<5	<5	<10	<500	<5	<5
1,2-Dichloroethane		<5	<5	<10	<500	<5	<5
2-Butanone		<10	<10	<20	<1000	17	150
1,1,1-Trichloroethane		3 J	16	<10	<500	83	41
Carbon Tetrachloride		<5	<5	<10	<500	<5	<5
Bromodichloromethane		<5	<5	<10	<500	<5	<5
1,2-Dichloropropane		<5	<5	<10	<500	<5	<5
cis-1,3-Dichloropropene		<5	<5	<10	<500	<5	<5
Trichloroethene		<5	32	470 D	6900	2500 D	2500 D
Dibromochloromethane		<5	<5	<10	<500	<5	<5
1,1,2-Trichloroethane		<5	<5	<10	<500	<5	<5
Benzene		<5	<5	<10	<500	<5	<5
trans-1,3-Dichloropropene		<5	<5	<10	<500	<5	<5
Bromoform		<5	<5	<10	<500	<5	<5
4-Methyl-2-Pentanone		<10	<10	<20	<1000	<10	<10
2-Hexanone		<10	<10	<20	<1000	<10	<10
Tetrachloroethene		6	1700 D	1100 D	8000	950 D	270 DJ
1,1,2,2-Tetrachloroethane		<5	<5	<10	<500	<5	<5
Toluene		<5	<5	<10	<500	3 J	1 J
Chlorobenzene		<5	<5	<10	<500	<5	<5
Ethylbenzene		<5	<5	<10	<500	9	4 J
Styrene		<5	<5	<10	<500	<5	<5
Xylene (total)		<5	<5	<10	<500	70	37
Total VOCs		**9**	**1,752**	**1,740**	**17,200**	**14,917**	**19,223**

ug/L	Micrograms per liter.
A	Exceeded calibration range.
D	Detected at secondary dilution.
J	Estimated value.
VOCs	Volatile Organic Compounds.

Appendix C-1. Concentrations of Volatile Organic Compounds in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

Compound: (Units in ug/L)	Sample ID: / Date: / Zone:	MW-8 06/26/03 Shallow	MW-8 12/04/03 Shallow	MW-8 02/05/04 Shallow	MW-7 06/26/03 Shallow	MW-7 12/04/03 Shallow	MW-7 02/04/04 Shallow
Chloromethane		<10	<5	<5	<10	<5	<5
Bromomethane		<10	<5	<5	<10	<5	<5
Vinyl Chloride		<2	<1	2	<2	<1	<1
Chloroethane		<10	<5	<5	<10	<5	<5
Methylene Chloride		<10	<5	<5	<10	<5	<5
Acetone		<20	24	19	<20	78	43
Carbon Disulfide		<10	<5	0.5 J	<10	<5	<5
1,1-Dichloroethene		<10	<5	45	<10	<5	1 J
1,1-Dichloroethane		<10	6	21	<10	4 J	10
cis-1,2-Dichloroethene		25	5100 D	31000 D	360	780 D	1700 D
trans-1,2-Dichloroethene		<10	43	280 DJ	5 J	6	19
Chloroform		<10	<5	<5	<10	<5	<5
1,2-Dichloroethane		<10	<5	<5	<10	<5	<5
2-Butanone		<20	120	130	<20	160	180
1,1,1-Trichloroethane		<10	7	230 AJ	77	<5	<5
Carbon Tetrachloride		<10	<5	<5	<10	<5	<5
Bromodichloromethane		<10	<5	<5	<10	<5	<5
1,2-Dichloropropane		<10	<5	<5	<10	<5	<5
cis-1,3-Dichloropropene		<10	<5	<5	<10	<5	<5
Trichloroethene		220	61	2500 D	1400 D	31	10
Dibromochloromethane		<10	<5	<5	<10	<5	<5
1,1,2-Trichloroethane		<10	<5	<5	<10	<5	<5
Benzene		<10	<5	<5	<10	<5	<5
trans-1,3-Dichloropropene		<10	<5	<5	<10	<5	<5
Bromoform		<10	<5	<5	<10	<5	<5
4-Methyl-2-Pentanone		<20	<10	<10	<20	<10	<10
2-Hexanone		<20	<10	<10	<20	<10	<10
Tetrachloroethene		3100 D	37	96	10000 D	56	35
1,1,2,2-Tetrachloroethane		<10	<5	<5	<10	<5	<5
Toluene		<10	<5	8	<10	<5	<5
Chlorobenzene		<10	<5	<5	<10	<5	<5
Ethylbenzene		<10	<5	11	0.8 J	<5	<5
Styrene		<10	<5	<5	<10	<5	<5
Xylene (total)		<10	3 J	100	9 J	<5	<5
Total VOCs		**3,345**	**5,401**	**34,212.5**	**11,851.8**	**1,115**	**1,998**

ug/L	Micrograms per liter.
A	Exceeded calibration range.
D	Detected at secondary dilution.
J	Estimated value.
VOCs	Volatile Organic Compounds.

Appendix C-1. Concentrations of Volatile Organic Compounds in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

Compound: (Units in ug/L)	Sample ID: / Date: / Zone:	MW-11 06/23/03 Shallow	MW-11 12/05/03 Shallow	MW-11 02/04/04 Shallow	MW-10 06/23/03 Shallow	MW-10 12/05/03 Shallow	MW-10 02/03/04 Shallow
Chloromethane		<10	<5	<5	<10	<5	<5
Bromomethane		<10	<5	<5	<10	<5	<5
Vinyl Chloride		<2	<1	<1	<2	<1	<1
Chloroethane		<10	<5	<5	<10	<5	<5
Methylene Chloride		<10	<5	<5	<10	<5	<5
Acetone		<20	120	170	<20	160	53
Carbon Disulfide		<10	<5	<5	<10	<5	<5
1,1-Dichloroethene		3 J	13	10	<10	2 J	1 J
1,1-Dichloroethane		<10	8	13	<10	4 J	7
cis-1,2-Dichloroethene		2600 D	8600 D	8700 D	300	1900 D	2300 D
trans-1,2-Dichloroethene		28	37	60	4 J	18	23
Chloroform		<10	<5	<5	<10	<5	<5
1,2-Dichloroethane		<10	<5	<5	<10	<5	<5
2-Butanone		<20	59	190	<20	66	240 DJ
1,1,1-Trichloroethane		97	55	28	18	8	<5
Carbon Tetrachloride		<10	<5	<5	<10	<5	<5
Bromodichloromethane		<10	<5	<5	<10	<5	<5
1,2-Dichloropropane		<10	<5	<5	<10	<5	<5
cis-1,3-Dichloropropene		<10	<5	<5	<10	<5	<5
Trichloroethene		2500 D	1800 D	36	1600 D	300 D	18
Dibromochloromethane		<10	<5	<5	<10	<5	<5
1,1,2-Trichloroethane		<10	<5	<5	<10	<5	<5
Benzene		<10	<5	<5	<10	<5	<5
trans-1,3-Dichloropropene		<10	<5	<5	<10	<5	<5
Bromoform		<10	<5	<5	<10	<5	<5
4-Methyl-2-Pentanone		<20	<10	<10	<20	<10	<10
2-Hexanone		<20	<10	<10	<20	<10	<10
Tetrachloroethene		5600 D	1800 D	68	4200 D	150	56
1,1,2,2-Tetrachloroethane		<10	<5	<5	<10	<5	<5
Toluene		<10	0.6 J	0.6 J	<10	<5	<5
Chlorobenzene		<10	<5	<5	<10	<5	<5
Ethylbenzene		<10	0.6 J	0.6 J	<10	<5	<5
Styrene		<10	<5	<5	<10	<5	<5
Xylene (total)		<10	5	9	<10	<5	2 J
Total VOCs		**10,828**	**12,498.2**	**9,285.2**	**6,122**	**2,608**	**2,460**

ug/L	Micrograms per liter.
A	Exceeded calibration range.
D	Detected at secondary dilution.
J	Estimated value.
VOCs	Volatile Organic Compounds.

Appendix C-1. Concentrations of Volatile Organic Compounds in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

Compound: (Units in ug/L)	Sample ID: MW-29 Date: 06/23/03 Zone: Shallow	MW-29 02/03/04 Shallow	MW-33 06/26/03 Intermediate	MW-33 10/08/03 Intermediate
Chloromethane	<10	<5	<10	<100
Bromomethane	<10	<5	<10	<100
Vinyl Chloride	<2	<1	<2	<20
Chloroethane	<10	<5	<10	<100
Methylene Chloride	<10	<5	<10	<100
Acetone	<20	54	<20	<200
Carbon Disulfide	<10	<5	<10	<100
1,1-Dichloroethene	<10	11	<10	<100
1,1-Dichloroethane	<10	14	<10	<100
cis-1,2-Dichloroethene	400	12000 D	41	1900
trans-1,2-Dichloroethene	5 J	94	<10	<100
Chloroform	<10	<5	<10	<100
1,2-Dichloroethane	<10	<5	<10	<100
2-Butanone	<20	130	<20	<200
1,1,1-Trichloroethane	40	41	<10	<100
Carbon Tetrachloride	<10	<5	<10	<100
Bromodichloromethane	<10	<5	<10	<100
1,2-Dichloropropane	<10	<5	<10	<100
cis-1,3-Dichloropropene	<10	<5	<10	<100
Trichloroethene	990 D	14	120	210
Dibromochloromethane	<10	<5	<10	<100
1,1,2-Trichloroethane	<10	<5	<10	<100
Benzene	<10	<5	<10	<100
trans-1,3-Dichloropropene	<10	<5	<10	<100
Bromoform	<10	<5	<10	<100
4-Methyl-2-Pentanone	<20	<10	<20	<200
2-Hexanone	<20	<10	<20	<200
Tetrachloroethene	3500 D	20	2600 D	87 J
1,1,2,2-Tetrachloroethane	<10	<5	<10	<100
Toluene	<10	2 J	<10	<100
Chlorobenzene	<10	<5	<10	<100
Ethylbenzene	<10	4 J	<10	<100
Styrene	<10	<5	<10	<100
Xylene (total)	<10	32	<10	<100
Total VOCs	**4,935**	**12,416**	**2,761**	**2,197**

ug/L	Micrograms per liter.
A	Exceeded calibration range.
D	Detected at secondary dilution.
J	Estimated value.
VOCs	Volatile Organic Compounds.

Appendix C-1. Concentrations of Volatile Organic Compounds in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

Compound: (Units in ug/L)	Sample ID: / Date: / Zone:	MW-33 12/04/03 Intermediate	MW-33 02/05/04 Intermediate	MW-23 06/26/03 Intermediate	MW-23 12/04/03 Intermediate	MW-23 02/04/04 Intermediate	MW-27D 06/24/03 Intermediate
Chloromethane		<5	<5	<10	<5	<10	<10
Bromomethane		<5	<5	<10	<5	<10	<10
Vinyl Chloride		<1	<1	<2	<1	<2	<2
Chloroethane		<5	<5	<10	<5	<10	<10
Methylene Chloride		<5	<5	<10	<5	<10	<10
Acetone		26	44	<20	21	51	<20
Carbon Disulfide		<5	0.7 J	<10	<5	<10	<10
1,1-Dichloroethene		1 J	1 J	<10	<5	<10	<10
1,1-Dichloroethane		3 J	5 J	<10	2 J	<10	<10
cis-1,2-Dichloroethene		1400 D	1700 D	32	390 D	530 D	1200 D
trans-1,2-Dichloroethene		11	17	<10	<5	4 J	16
Chloroform		<5	<5	<10	<5	<10	<10
1,2-Dichloroethane		<5	<5	<10	<5	<10	<10
2-Butanone		69	220 D	<20	44	140	<20
1,1,1-Trichloroethane		6	<5	<10	4 J	<10	32
Carbon Tetrachloride		<5	<5	<10	<5	<10	<10
Bromodichloromethane		<5	<5	<10	<5	<10	<10
1,2-Dichloropropane		<5	<5	<10	<5	<10	<10
cis-1,3-Dichloropropene		<5	<5	<10	<5	<10	<10
Trichloroethene		64	83	150	46	19	4100 D
Dibromochloromethane		<5	<5	<10	<5	<10	<10
1,1,2-Trichloroethane		<5	<5	<10	<5	<10	<10
Benzene		<5	<5	<10	<5	<10	<10
trans-1,3-Dichloropropene		<5	<5	<10	<5	<10	<10
Bromoform		<5	<5	<10	<5	<10	<10
4-Methyl-2-Pentanone		<10	<10	<20	<10	<20	<20
2-Hexanone		<10	<10	<20	<10	<20	<20
Tetrachloroethene		40	<5	340	21	16	6700 D
1,1,2,2-Tetrachloroethane		<5	<5	<10	<5	<10	<10
Toluene		<5	<5	<10	0.7 J	<10	<10
Chlorobenzene		<5	<5	<10	<5	<10	<10
Ethylbenzene		<5	<5	<10	1 J	<10	<10
Styrene		<5	<5	<10	<5	<10	<10
Xylene (total)		4 J	4	<10	2 J	<10	<10
Total VOCs		**1,624**	**2,074.7**	**522**	**531.7**	**760**	**12,048**

ug/L	Micrograms per liter.
A	Exceeded calibration range.
D	Detected at secondary dilution.
J	Estimated value.
VOCs	Volatile Organic Compounds.

Appendix C-1. Concentrations of Volatile Organic Compounds in Groundwater Samples, ERD Pilot Test, 25 Melville Park Road Site, Melville, New York.

Compound: (Units in ug/L)	Sample ID: MW-27D Date: 12/05/03 Zone: Intermediate	MW-27D 02/04/04 Intermediate
Chloromethane	<5	<5
Bromomethane	<5	<5
Vinyl Chloride	<1	<1
Chloroethane	<5	<5
Methylene Chloride	<5	<5
Acetone	33	20
Carbon Disulfide	<5	<5
1,1-Dichloroethene	11	25
1,1-Dichloroethane	8	14
cis-1,2-Dichloroethene	9900 D	38000 D
trans-1,2-Dichloroethene	100	310 DJ
Chloroform	<5	<5
1,2-Dichloroethane	<5	<5
2-Butanone	7 J	<10
1,1,1-Trichloroethane	54	110
Carbon Tetrachloride	<5	<5
Bromodichloromethane	<5	<5
1,2-Dichloropropane	<5	<5
cis-1,3-Dichloropropene	<5	<5
Trichloroethene	1800 D	26
Dibromochloromethane	<5	<5
1,1,2-Trichloroethane	<5	<5
Benzene	<5	<5
trans-1,3-Dichloropropene	<5	<5
Bromoform	<5	<5
4-Methyl-2-Pentanone	<10	<10
2-Hexanone	<10	<10
Tetrachloroethene	1100 D	8
1,1,2,2-Tetrachloroethane	<5	<5
Toluene	2 J	4 J
Chlorobenzene	<5	<5
Ethylbenzene	3 J	10
Styrene	<5	<5
Xylene (total)	24	83
Total VOCs	**13,042**	**38,610**

ug/L	Micrograms per liter.
A	Exceeded calibration range.
D	Detected at secondary dilution.
J	Estimated value.
VOCs	Volatile Organic Compounds.