March 12, 2003

Mr. Joseph Jones
Bureau of Eastern Remedial Action
Division of Environmental Remediation
New York State Department of
Environmental Conservation
625 Broadway
Albany, NY 12233

Re: Site Numbers 1-30-009 and 1-30-053A
Second/Third Quarter 2002 Progress Report

File: 643.001

Dear Mr. Jones:

Enclosed please find three copies of the Fourth Quarter 2002 Progress Report for the subject sites.

Should you have any questions regarding the enclosed, please feel free to contact Charlie Nehrig at 516-609-1052. Thank you.

Very truly yours,

BARTON & LOGUIDICE, P. C.

Andrew J. Barber
Senior Managing Environmental Scientist

AJB/mfg

cc: G. Anders Carlson, Ph.D., NYSDOH, Albany, NY (2 copies)
Robert Becherer, NYSDEC, Region 1, Stony Brook, NY (1 copy)
John F. Byrne, Esq., NYSDEC-DEE, Tarrytown, NY (1 copy)
James Harrington, NYSDEC, Albany, NY (1 copy)
Charlie Nehrig, Photocircuits (1 copy)
Louis Stans, Photocircuits (1 copy)
Mark Pennington, Esq., Morgan, Lewis & Bockius (1 copy)

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FOURTH QUARTER 2002
PROGRESS REPORT

PHOTOCIRCUITS AND FORMER PASS & SEYMOUR SITES
31 & 45 SEA CLIFF AVENUE

SITE NUMBERS 1-30-009 AND 1-30-053A

Prepared for:
Photocircuits Corporation
31 Sea Cliff Avenue
Glen Cove, New York 11542

Prepared by:
Barton and Loguidice, P.C.
2 Corporate Plaza
264 Washington Avenue Extension
Albany, New York 12203

February, 2003

1.0 Introduction

This Fourth Quarter 2002 Progress Report (4Q02) is being submitted pursuant to the 1997 Order on Consent between Photocircuits Corporation and the New York State Department of Environmental Conservation (NYSDEC).

During the Fourth Quarter of 2002, the following was accomplished:

- One groundwater sampling event was conducted for monitoring wells located on both the 31 and 45A Sea Cliff Avenue sites during the period of October 2-3.

- The Soil Vapor Extraction (SVE) and Air Sparging (AS) system at the 45A Sea Cliff Avenue site was moved from the west side of Building 7 to the east side; the SVE portion of the system has been operating since May and the AS portion of the system was started on December 11.

2.0 Discussion of Results

2.1 SVE System at 31 Sea Cliff Avenue

The SVE system at the 31 Sea Cliff Avenue site was installed as an Interim Remedial Measure (IRM), and started operation in April 2000. The SVE system, equipped with the CatOx/scrubber for extracted vapor treatment, was restarted on July 21, 2000 and was operated continuously until August 2001; system operation was interrupted only for a few brief periods for maintenance activities and in March to mid-May, 2001 because of high water-table conditions. As discussed in the 2Q01 report, the results of vapor sample analyses and the photoionization detector (PID) readings demonstrate that contaminant mass removal versus time has clearly become asymptotic. We conclude that we have demonstrated that there is little or no residual contamination in the unsaturated zone, and that further contaminant removal from the unsaturated zone is infeasible. The SVE system will be decommissioned in the near future.

2.2 Bioremediation Pilot Test

The bioremediation pilot test was started during the week of August 28, 2000 when Terra Systems conducted the injection of a nutrient solution (substrate) into the subsurface at the 31 Sea Cliff Avenue site. Following the injection, groundwater samples were collected from the following monitoring wells/points: MW-7, MW-14, SMP-1, DMP-1, SMP-3, DMP-3, SMP-4 and DMP-4. These wells/points were sampled again on October 18-19, December 20, 2000, March 27-28, 2001and July 11-12, 2001; the March and July sampling events included several wells located along Sea Cliff Avenue (MW-8, MW-9,

MW-12 and MW-13) along with the wells sampled during the previous events. By letter dated October 25, 2001, NYSDEC authorized an additional injection of substrate that had been recommended by Photocircuits. A first phase of additional substrate injection was conducted during the period of February 25 to March 3, 2002; during this period, slightly over 5,000 gallons of substrate was injected (as reported in the 1Q 02 report). On April 29, 2002, an additional injection of 5,777 gallons of substrate was injected using the injection points that had been installed during the February-March injection event. Sampling events conducted in 2002 were January 8-10, April 2-4, June 25-26 and October 2-3; the results from the October sampling event are provided in Appendix A of this report (Note: wells MW-7 and MW-14 were not sampled during these events as they were filled with oil substrate).

A status report on the pilot test (including the data from the samples collected in October 2002) was prepared by Terra Systems and is included as Appendix B of this report. The main conclusion of the report are as follows

- The addition of the edible oil substrate has enhanced the extent and rate of chlorinated solvent biodegradation at the site; degradation rates as high as 268 ug/L per day of total volatile organic compounds (TVOCs) have been observed in areas of higher concentration.

- A first order degradation half life of 462 days was calculated for the average total VOC concentration within the pilot cell area (October 2002 data); this degradation rate suggests that 90% of the total VOC mass within the pilot test cell will be removed within 43 months.

- The newly injected edible oil substrate appears to be adequately distributed.

- Bioremediation will be the primary treatment technology for contaminant destruction at the site.

2.3 IRM at 45 Sea Cliff Avenue

As discussed in the 4Q 2000 report, SVE/AS equipment was procured and delivered to the site. The SVE/AS system consists of a 10 horsepower (hp) regenerative blower and 5 hp compressor, along with electrical controls, filters, moisture separators, and valves; the system is contained within an insulated trailer, which has been located just outside of Building 7. Following delivery, the system components were connected to the piping networks for the AS and SVE wells. Two 1200 lb activated carbon adsorbers were attached in series to the blower outlet to treat recovered vapors. The SVE system was started on November 1, 2000; because the initial contaminant concentrations were relatively high, the AS portion of the system was not started. The AS component of this system was started on March 28, 2001. The system was down from April 20-24 due to

an electrical problem. The system was down most of June and July due to equipment overheating; the system was re-started on July 30 and shut down on September 20.

Monitoring data was presented in the 2Q01 report, including data from sampling of individual SVE wells (March 2001) and sampling of total SVE system effluent over time. Prior to the start of the AS component, the relationship of total contaminant mass removal versus time was clearly becoming asymptotic. The start of the AS component increased contaminant mass recovery somewhat (see the April 2001 sample results). However, the results of the May vapor sample indicate that mass removal versus time relationship became asymptotic. We concluded at that time that we demonstrated that there is little or no residual contamination at that location, and that further contaminant removal is infeasible.

Monitoring wells located on the 45A Sea Cliff Avenue site (MW-1S, MW-2S, MW-3S and MW-4S) and near the 45A Sea Cliff Avenue site (MW-9, MW-10 and MW-11) were sampled in January 2002, and the results are attached. Based on results from the January sampling event, Photocircuits proposed extending the SVE/AS system at the 45A Sea Cliff Avenue site from the west side to the east side of Building 7. The basis for the extension of the system and the proposed piping and equipment layout were provided in the February 13 letter to NYSDEC.

The SVE wells and AS points were installed at the proposed locations on the east side of Building 7 in late February, in preparation for the extension of the system. After field evaluation, it was decided that it would be more efficient to move the aboveground portions of the system (equipment trailer, carbon vessels) to the east side of Building 7 rather than to extend their operation by piping from the west side to the east side of Building 7, as originally proposed. The trailer and carbon vessels were moved in April, and electrical service was also provided to the new location April. Piping and mechanical connections were completed in early May; the original blower malfunctioned and a smaller replacement blower was installed.

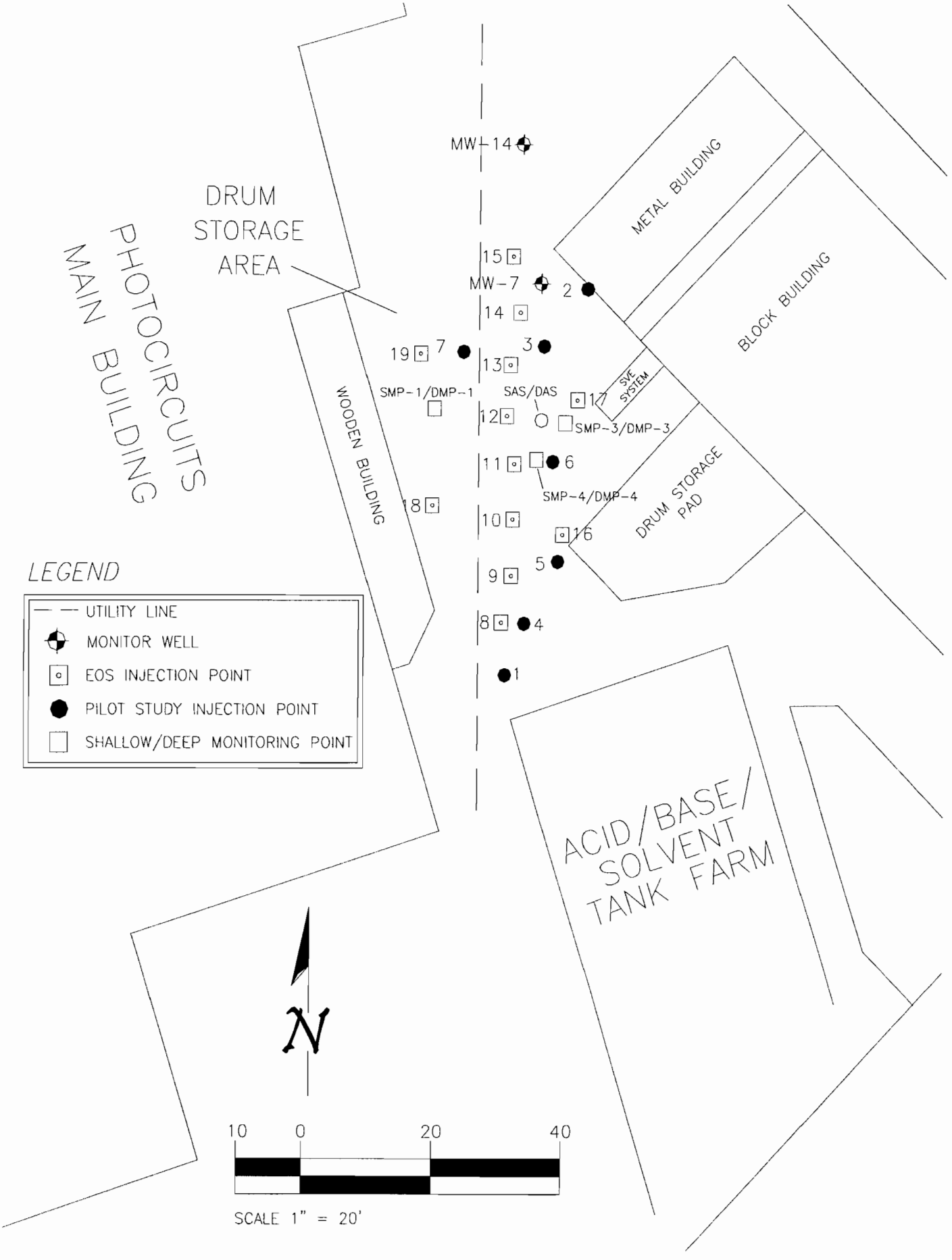
The SVE portion system was started on May 8, a sample of the total system effluent, prior to treatment, was collected; tetrachloroethene was detected at a concentration of 5.3 ppmv. Another effluent sample was collected on June 26; tetrachloroethene was detected at a concentration of 142 ppmv and trichloroethene was detected at a concentration of 2 ppmv. Additional samples were collected on October 3 and December 12 (tetrachloroethene was detected at 1.2 and 1.1 ppmv in these two samples, respectively); analytical results are provided in Appendix A of this report. The AS portion of the system was started on December 11.

2.4 Hydraulic Control along Sea Cliff Avenue

A meeting was held with NYSDEC on October 11, 2001 to discuss the progress of the bioremediation pilot test. Although there was substantial disagreement between Photocircuits and the NYSDEC over the progress of the bioremediation pilot test and the need for groundwater remediation, Photocircuits agreed to review available options for containment of groundwater along the northern boundary of the Photocircuits site (31 Sea Cliff Avenue). Photocircuits conducted the review of remedial options, and by letter dated October 26, 2001, Photocircuits presented the results of the review. The recommended approach for the conditions at the Photocircuits site is the use of hydraulic control. Photocircuits submitted a work plan for the performance of pumping tests necessary for the design of a hydraulic control system on November 13, 2001; following receipt of verbal comments from NYSDEC, Photocircuits submitted a revised work plan on December 7, 2001. Approval for implementation of the work plan was received from NYSDEC by letter dated December 19, 2001. The pumping tests were performed in January and the remedial design report was submitted to NYSDEC on April 11, 2002. NYSDEC approval on the remedial design was received in a letter dated September 19. The installation of the recovery wells was scheduled for early January 2003.

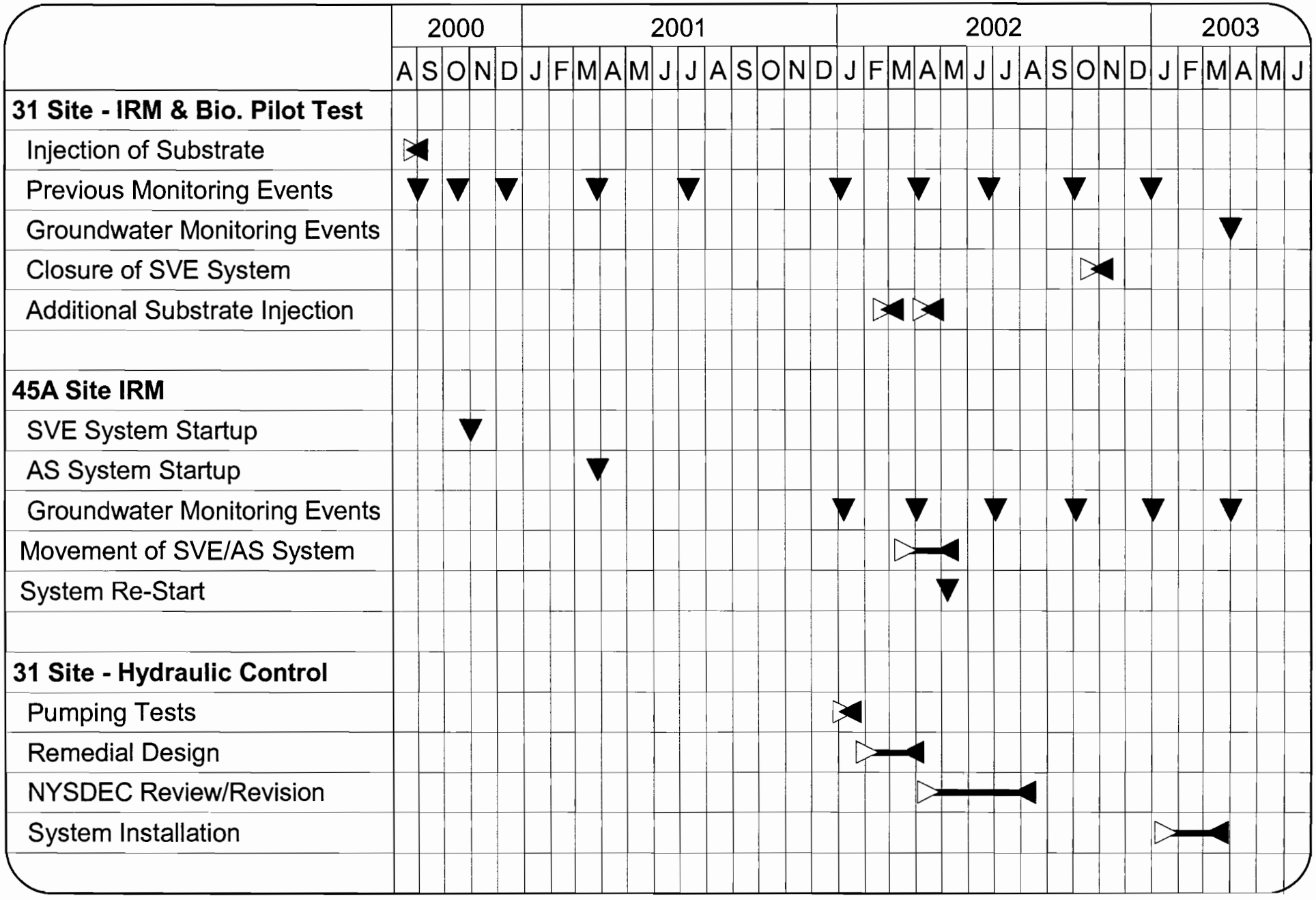
3.0 Schedule

The planned schedule of activities for the next few months is attached.


MW-14
DRUM STORAGE AREA
PHOTOCIRCUITS MAIN BUILDING
METAL BUILDING
BLOCK BUILDING
15
MW-7
2
14
19
7
3
13
SMP-1/DMP-1
SAS/DAS
17
SVE SYSTEM
12
SMP-3/DMP-3
WOODEN BUILDING
11
6
SMP-4/DMP-4
18
DRUM STORAGE PAD
10
16
5
9
8
4
1
ACID/BASE/ SOLVENT TANK FARM
LEGEND
UTILITY LINE
MONITOR WELL
EOS INJECTION POINT
PILOT STUDY INJECTION POINT
SHALLOW/DEEP MONITORING POINT
N
10
0
20
40
SCALE 1" = 20'

Photocircuits - Updated Schedule of Remedial Activities

31 & 45 Sea Cliff Avenue Sites



Terra Systems
INCORPORATED

March 10, 2003

Charlie Nehrig
Photocircuits Corporation
31 Sea Cliff Avenue
Glen Cove, NY 11542

RE: October 2002 Status Report Photocircuits Accelerated Anaerobic Bioremediation Pilot

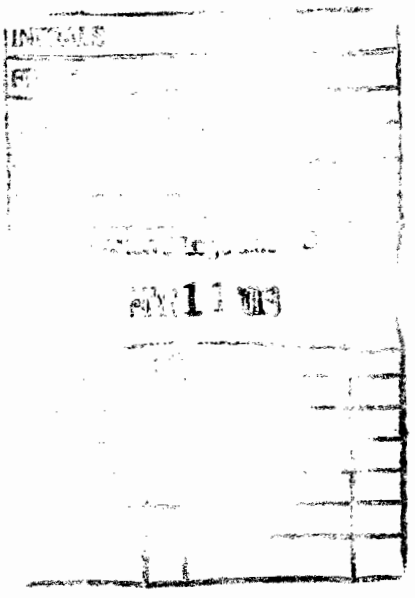
Dear Charlie:

Attached is the October 2002 Status Report for the Photocircuits Accelerated Anaerobic Bioremediation Project. Data from the beginning of the project in August 2000 through October 2002 is provided and discussed. Please let me know if you have any questions.

Sincerely,
TERRA SYSTEMS, INC.

Michael D. Lee, Ph.D.
Vice-President

cc: Andy Barber



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Terra Systems
INCORPORATED

OCTOBER 2002
STATUS REPORT
PHOTOCIRCUITS ACCELERATED ANAEROBIC BIOREMEDIATION PILOT

PREPARED FOR:

PHOTOCIRCUITS CORPORATION
31 SEA CLIFF AVENUE
GLEN COVE, NY 11542

PREPARED BY:

TERRA SYSTEMS, INC.
1035 PHILADELPHIA PIKE
SUITE E
WILMINGTON DE 19809

DECEMBER 20, 2002

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FIGURES

TABLES

1.0 EXECUTIVE SUMMARY

In August 2000, Photocircuits Corporation initiated a pilot study at its 31 Sea Cliff Ave. property to treat chlorinated volatile organic compounds (VOC) using in situ anaerobic bioremediation. The site is characterized by VOC contamination of a sandy, silt, and gravel aquifer. Monitoring data indicate that some biodegradation of these contaminants was occurring at the site prior to the start of the pilot study. The two primary objectives of this pilot study are to 1) evaluate the use of substrate injection to enhance in situ anaerobic biological degradation of chlorinated VOCs in the study area and 2) obtain operating and performance data to optimize the design and operation of a full-scale system. During the operational period of this pilot study, there is no emphasis on reducing any contaminants to a specific regulatory level.

The study area, which encompasses a triangular area roughly 92 feet wide, 157 feet long, and 60 feet deep, underlies the former drum storage area of the Photocircuits Corporation facility. Prior to the start of the pilot test, total chlorinated contaminant concentrations in wells within the pilot area ranged from 457 to 539,000 µg/L. The initial pilot bioremediation system consisted of six injection points in a line spaced about 15 to 20 feet apart. An edible oil substrate (EOS) package was designed to provide a slow release food grade carbon source over a period in excess of twelve months. The substrate concentrations were selected based on previous experience. An additional 5,722 gallons of substrate was injected in months 17 and 19 at twelve injection points. VOC and substrate concentrations have been monitored eight times over a twenty-five month period at eight wells spaced throughout the treatment area. VOC and substrate concentrations have also been monitored at four wells downgradient of the treatment area to determine if the substrate has migrated outside of the area and if the substrate amendment has affected these wells.

The system has been operating since August 31, 2000. Substrate monitoring data indicated that substrate was delivered throughout the treatment area with the highest substrate levels found in well MW-14. In the initial injection event in August 2000, the emulsion moved into this well from several of the injection points and displaced much of the contaminated groundwater within this well. Wells MW-14 and MW-7 have contained the emulsion since April 2002 and have not been sampled. Contaminant levels have increased in MW-14 and MW-7 between August 2000 and January 2002 when the last samples were collected from these wells. An increase in total VOCs has also been observed in SMP-1, but total VOCs have dropped in June and October 2002 to 3,361 µg/L. Total volatiles have increased in DMP-4 by 27%. Desorption of contaminants adsorbed to the soil due to enhanced biological activity may be contributing to the increased contaminant concentrations in MW-14, MW-7, and SMP-1. Contaminants that partitioned into the injected oil may also be released. Where substrate levels were above 50 mg/L, significant declines in total VOC concentrations (45-96%) were generally observed. Degradation rates for the total VOCs (9/1/00 concentration minus 10/2/02 divided by 762 days) were as high as 268 µg/L-day (well SMP-3) in higher concentration areas with greater than 100,000 µg/L total volatiles. In other areas with lower concentrations, total VOC degradation rates were lower, in the range of 10.7 (SMP-4) to 25 µg/L-day (DMP-3). The average total contaminant concentrations within the pilot cell have fallen by 82% since September 2000. This average includes the wells sampled on 10/2/02 and the two wells last sampled on 1/8/02. The recent substrate reinjection increased the TOC concentrations in all wells within the pilot. In October

2002, TOC levels ranged from 40.3 mg/L in DMP-3 to 3,680 mg/L in SMP-4. About 2,200 gallons of emulsion was injected upgradient of the monitoring wells where it should provide a continuous source of organic carbon.

2.0 INTRODUCTION

The enclosed report describes the field pilot study of *in situ* anaerobic bioremediation of a chlorinated solvent plume at the Photocircuits Corporation's 31 Sea Cliff Avenue, Glen Cove, NY facility. The study, which was initiated on August 31, 2000, has the following objectives:

- Determine if the addition of a food grade carbon source will enhance the extent and rate of chlorinated solvent biodegradation at the site.
- Determine the rate of chlorinated solvent biodegradation to estimate the time frame required for contaminant removal.
- Determine if the food grade carbon source can be adequately distributed in the formation such that the microorganisms can utilize it.
- Determine what role bioremediation technology has in the overall remediation strategy for the site.

There have been eight groundwater sampling events during the course of the study. As of October 2002, the average total volatile contaminant concentrations within the pilot have decreased by 82%.

During the treatment period of 25 months, we have successfully demonstrated that the addition of a food grade carbon source will enhance the extent and rate of chlorinated solvent biodegradation at this site as indicated by the following observations:

- Total contaminant concentrations have decreased by an average 82%.
- The average concentrations of the parent compound 1,1,1-trichloroethane has decreased by 96%
- Three monitoring wells (MW-7, MW-14, and DMP-4) have shown increased total volatile concentrations since September 1, 2000 by 27 to 4,529%. Wells MW-7 and MW-14 could not be sampled in April 2002, June 2002, and October 2002 due to the presence of emulsion and the percent change calculations are from September 2000 to January 2002. However, when viewed over the last 13 years, the total VOC concentrations in MW-7 have decreased 96%. From 11/1/99 to 1/8/02, total VOC concentrations have decreased by 44% in MW-14. Since first monitored in May 1999, well DMP-4 has shown an increase in total volatiles from 1,636 to 3,427 µg/L largely due to an increase in the 1TCA degradation product CA between June and October 2002.

It is difficult to determine the total contaminant mass present at this site because of the limited number of soil samples and limited definition of the vertical distribution of this contamination. The total contaminant mass was estimated to be approximately 1,195 pounds based upon the average soil concentrations found in the 1996 or earlier soil borings and a contaminated volume of 361,100 ft^3 (a triangular area 92 feet by 157 feet with a contaminated interval below the water table from 10 to 60 feet below ground surface).

Please note that the goal of this study has been to gather sufficient data to determine the rate and extent of chlorinated solvent biodegradation. If the study area could be isolated such that the contaminant mass did not receive any additional contaminants, Terra Systems, Inc. estimates that

based upon the current degradation rates that approximately 90% of the total contaminant mass can be removed in 43 months. Although an acceptable remediation end point has not been defined for this site, the data suggests that this reduction will be environmentally acceptable since it significantly reduces the probability that chlorinated solvents will migrate off-site.

3.0 BACKGROUND

The Photocircuits Corporation's 31 Sea Cliff Avenue facility, Glen Cove, New York is located on the north shore of Long Island. The plant site is bordered on the north by a light industrial area, to the south and east are arterial roads, and to the west by railroad tracks. The site is generally flat and is covered by manufacturing buildings and parking lots.

3.1 Site Geology/Hydrology

Based on analysis of soil borings and details of well construction at the Photocircuits site, the surficial deposit below the facility is primarily composed of interbedded sand, silt, gravel, and clay layers.

3.2 Nature and Extent of Contamination

The groundwater at the facility has been impacted by chlorinated ethene and chlorinated ethane compounds from various sources. Prior to the start of the pilot test, total volatile organic contaminant concentrations (TVOC) in groundwater ranged from 457 to 539,000 µg/L. Generally, the contamination extends to approximately 90 below ground surface (bgs) with the highest concentrations in the 20 to 50 ft. bgs zone.

3.3 Rationale for Use of Technology

Photocircuits Corporation has been conducting a technology review to determine which remediation technology or technology treatment train will be most appropriate for this facility. Conventional pump-and-treat technologies have been excluded from this review since these technologies have limited applications for aquifer and groundwater restoration (Beeman et al 1993). Other technologies considered have been discussed in other reports submitted to the NYDEC.

Many of the currently utilized cleanup methods for chlorinated solvents employ physical processes that tend to transfer the compounds to another medium. Biological decomposition is one approach that has the potential for destroying hazardous chemicals so that they are rendered harmless for all time.

Semprini et al (1992) outlined the processes affecting movement and fate of halogenated aliphatics as:

1. Advection, the miscible transport in aqueous solution under the influence of the hydraulic potential gradient;
2. Dispersion, the mixing and spreading of concentration fronts, that arises largely from differential rates of movement along the myriad individual flow paths through the porous medium;
3. Sorption, the partitioning of a compound between the moving solution and the stationary solid phase;

4. Immiscible transport, the migration of slightly soluble chemicals as a separate liquid phase, often driven downward by density difference in the case of halogenated aliphatics; and
5. Diffusional transport, the slow migration of solute molecules into the matrix rock or dead-end pores under the influence of a concentration driving force.

Given the heterogeneity of the site and the lack of definitive knowledge of the amount of chlorinated solvents in the impacted area, a technology that can remove a significant amount of the solvents and continue to treat the remaining material is required. While physical technologies such as "pump-and-treat" systems can generally contain a contaminant plume and remove a limited amount of material, it has not been conclusively demonstrated that these technologies can remove a significant amount of the solvents. The USEPA (1996) has stated that

> "The general failure of the pump-and-treat approach was identified as its inability to achieve restoration (i.e., reduction of contaminants to levels required by health-based standards) in 5 to 10 years, as anticipated in the design phase of projects. Although a variety of factors contributed to this shortcoming, tailing and rebound (Section 4) represented the major barrier to achieving remediation goals."

Chemical technologies such as chemical oxidation have promise for removal of a significant portion of the contamination but have not been demonstrated to provide treatment for all of the solvents. For example, 1,1,1-Trichloroethane is resistant to potassium permanganate treatment (ITRC 2000). The chemical oxidants react rapidly with the contaminants and reduced minerals in the soil and do not provide a continuing impact on the contaminants.

As part of the technology review program, Photocircuits Corporation engaged Terra Systems, Inc. (TSI) to conduct an anaerobic bioremediation field pilot study at the facility. The study, which encompasses a triangular area roughly 92 feet wide and 157 long that had been used for drum storage, commenced in August-September, 2000. Eight monitoring points (MW-14, MW-7, SMP-1, DMP-1, SMP-3, DMP-3, SMP-4, and DMP-4) are being utilized to track the progress of the pilot study. Beginning in March 2001, groundwater samples were also collected from 4 additional wells (MW-8, MW-9, MW-12, and MW-13) to determine if any of the injected substrate had migrated away from the study area. It should be noted that these wells are not expected to be impacted by the bioremediation study. The locations of these wells are shown in Figure 1 with the exception of MW-9 that is further to the west.

Historical data indicates that anaerobic biodegradation is occurring at the site as evidenced by the presence of daughter products from the breakdown of tetrachloroethene (PCE) and trichloroethene (TCE) including cis-1,2-dichloroethene (cDCE), trans-1,2-dichloroethene (tDCE), vinyl chloride (VC), and ethene. Acetylene can be produced by the abiotic reaction of PCE or TCE with ferrous sulfide (Butler and Hayes 2000). 1,1,1-Trichloroethane (1TCA) breaks down to 1,1-dichloroethene (1DCE), 1,1-dichloroethane (1DCA), chloroethane (CA), and ethane. However, VC and ethene can also be generated from the breakdown of the 1TCA, 1DCA, and 1DCE. Based on a review of the site historical data, it appears that the biological degradation process is limited by the availability of organic carbon.

3.4 Technology Description

Anaerobic bioremediation, also referred to as reductive dechlorination, of chlorinated solvents is a well documented process that converts chlorinated ethenes and ethanes to innocuous gases.

The following technology description is from a report entitled "Cost and Performance Report – In Situ Anaerobic Bioremediation Pinellas Northeast Site Largo, Florida" prepared for the U.S. Department of Energy (1998) by Sandia National Laboratories and Hazardous Waste Remedial Actions Program.

Bacteria metabolize soluble organic and inorganic compounds to provide energy for the growth and maintenance of bacterial cells. The complex organic molecules that bacteria consume are converted to new cells and various simpler compounds, such as carbon dioxide, that are released back into the environment. This process is referred to as biodegradation. Biodegradation has been used very cost effectively for more than a century in public and industrial wastewater treatment systems. Since bacteria occur naturally in both soil and ground water environments, bioremediation technologies attempt to stimulate the activity of these naturally occurring (or introduced bacteria) to degrade contaminants in a cost-effective manner. Bioremediation is being considered more often as the processes that control the biological degradation of contaminants in soil and ground water become better understood.

In order to produce new bacterial cells, bacteria require carbon, nitrogen, phosphorus, and energy sources, as well as a number of trace minerals. Electrons are released by the biochemical reactions that metabolize complex organic compounds for energy. Biological systems capture this biochemical energy through a series of electron transfer (redox) reactions. The bacteria that are most commonly used in bioremediation systems use organic compounds as their source of carbon and energy; these carbon compounds are referred to as electron donors. Bacterial respiration requires that some chemical compound is available to act as a terminal electron acceptor. Common electron acceptors used by bacteria include oxygen, nitrate, sulfate, Fe^{3+}, and carbon dioxide.

Recently, a class of anaerobic bacteria has been identified that uses halogenated organic compounds as their electron acceptors. The chlorinated VOCs present in the soil and ground water at the Northeast site are among the halogenated organic compounds that can be used in this manner. Halogenated compounds have a high oxidation state; and when a halogen (e.g. chlorine) is chemically replaced by hydrogen, the oxidation state of the chemical is reduced. This process is referred to as reductive dehalogenation, and it forms the basis of the anaerobic process used by the in situ bacteria at the Photocircuits site. Under anaerobic conditions, chlorinated compounds can be degraded via reductive dehalogenation reactions to successively lower chlorinated degradation products, and finally to compounds of significantly lower toxicity. This process is illustrated for PCE below.

$$\underset{\text{step 1}}{\text{PCE} \rightarrow} \underset{\text{step 2}}{\text{TCE} \rightarrow} \underset{\text{step 3}}{\text{DCE} \rightarrow} \underset{\text{step 4}}{\text{VC} \rightarrow} \text{ethene, ethane}$$

Biological activity is frequently limited by the availability of a single growth factor (e.g. electron acceptor, electron donor, nitrogen, etc.) and supplying the proper growth factor can often

stimulate bacterial growth and biodegradation rates. For in situ bioremediation applications, nutrients or electron acceptors are often injected into the contaminated area to enhance the existing microbial degradation processes. Effectively delivering nutrients requires that factors such as site permeability and geochemistry be considered. Each class of contaminant varies in its susceptibility to biodegradation and factors such as aquifer oxidation-reduction potential, microbial ecology, and contaminant toxicity will affect the success of bioremediation at a site. The effective application of in situ bioremediation therefore depends upon careful consideration of the geologic and hydrologic properties at the site and on the type and concentration of contaminants to be treated.

Evaluations of the monitoring data from the Photocircuits site suggested that microbial dechlorination is occurring naturally. cDCE and vinyl chloride (VC) are degradation products of TCE that were measured in high concentrations, but were not contaminants originally disposed of at the site, which suggests that a population of dechlorinating microorganisms is relatively active at Photocircuits

The report continues on to outline the technology advantages and disadvantages which are listed below:

Technology Advantages

- Contaminants are treated in situ with little waste generation
- Contaminant degradation can be relatively fast
- Bioremediation is capable of reducing contaminants to very low levels
- The process stimulates a microbial population that can continue to feed off the dissolved phase of a continuing source after nutrient injection ceases, and
- Often provides a low overall remediation cost relative to other technologies.

Technology Disadvantages

- Contaminant degradation enhancement is dependent on adequate nutrient delivery to all areas of contamination before the nutrients are directly metabolized, which often is primarily a function of site hydrogeology and the appropriate mixing of nutrients, contaminants, and active microbes,
- Site conditions (e.g. soil and ground water chemistry, reductive processes, etc.) must be conducive to the stimulation of biological activity to be effective,
- Bioremediation will not directly degrade contaminants occurring in an immiscible phase,
- High concentrations of contaminants often are toxic to microorganisms,
- Bioremediation may be difficult to optimize at sites with multiple contaminants of concern,
- Incomplete biodegradation of contaminants can lead to the generation of degradation products that are just as toxic or even more so than the parent contaminants, and
- Regulatory concerns over chemical injections into aquifers.

4.0 MATERIALS AND METHODS

4.1 Study Area

The study area encompasses a triangular area roughly 92 feet by 157 feet with a contaminated interval of 50 feet (from the water table at 10 feet to 60 feet) underlies the former drum storage area of the Photocircuits Corporation 31 Sea Cliff Ave, Glen Cove, NY facility. Eight monitoring points (MW-14, MW-7, SMP-1, DMP-1, SMP-3, DMP-3, SMP-4, and DMP-4) are being utilized to track the progress of the pilot study. Beginning in March 2001 groundwater samples were also collected from four additional wells (MW-8, MW-9, MW-12, and MW-13) to determine if the injected substrate had migrated away from the study area. It should be noted that these wells are not expected to be impacted by the bioremediation study.

4.2 Technical Challenges

The key technical challenges for this study are:

a. ability to move a carbon source throughout the contaminated area;
b. estimation of quantity of chlorinated compounds
c. determination of minimum level of TOC required to optimize reductive dechlorination

4.3 Key Design Criteria

The in situ anaerobic bioremediation pilot system was designed for two main objectives;

- develop a nutrient delivery system capable of providing a mixture of nutrients to the subsurface within the heterogeneous aquifer, such that the nutrients will be delivered to all levels in the treatment area within an approximately 24 month operating period, and
- deliver a sufficient quantity of substrate to the treatment area to last for approximately 24 months.

4.4 Treatment System Schematic and Operation

Figure 2 is a schematic of the pilot anaerobic biotreatment system showing the monitoring wells and the injection locations within the treatment cell. Injection points 1 to 7 were used in the first injection event. In this injection event, the nutrients were distributed throughout the vertical extent of the treatment area by a Geoprobe® rig at the beginning of the pilot. The Geoprobe® pushed a drivepoint to about 50 feet bgs. The drill rod was pulled back two feet to inject the fluids under pressure with a Rupe pump. The rod was then withdrawn four feet and additional fluid was injected. This process continued until about 22 ft bgs. Approximately 3,500 gallons of soybean oil emulsion containing soybean oil, soybean lecithin, and tap water (treated to remove chlorine) was injected into five points. Forty gallons of soybean oil was injected at an additional point. In addition to pressure injection of the emulsion followed by injection of chase water to disperse the nutrients, natural groundwater flow has dispersed the substrate.

During the period of February 25, 2002 to March 3, 2002, Terra Systems, Inc. constructed and utilized a low pressure injection system to inject substrate into the pilot area with twelve

injection wells (injection points 8-19). The injection system consisted of 7 one-inch wells installed to 60 ft. below land surface (bls) and 5 one-inch wells installed to 55 ft. bls. Eight of the wells were spaced 7.5 feet apart in a line. Two additional wells were placed on either side of the line. All of the wells had 20 ft. of PVC blank riser and 40 and 35 ft. of PVC screen (0.02 slot) respectively. The wells were installed using the Geoprobe™ direct-push method. Approximately 5,777 gallons of the emulsion was prepared and injected in February and April 2002. A total of 5,777 gallons of the emulsion containing 9,588 pounds of the soybean oil and surfactant mix, 94 pounds of a quick release substrate package, and 5.9 pounds of sodium bromide was injected.

4.5 Operating Parameters

The major operating parameters needed to assess the performance and cost of the bioremediation system were considered to be substrate concentrations and substrate longevity.

4.6 Materials

The test area was injected with emulsified soybean oil in August 29 to September 1, 2000. The key objective of the pilot study is to determine if the addition of a food grade carbon source will enhance the extent and rate of chlorinated solvent biodegradation at the site. TSI formulated an emulsion containing soybean oil, lecithin (a soybean derivative that acts as an emulsifier), and water to provide required organic carbon. The soybean oil is broken down into smaller organic molecules and hydrogen that are then used by the dechlorinating bacteria. In the second injection event, soybean oil, a surfactant mix, a quick release substrate package, sodium bromide (a tracer), and activated carbon-treated water was used to prepare an emulsion.

5.0 RESULTS

The bioremediation pilot study at the Photocircuits Corporation site is being conducted to assess the applicability of substrate injection to accelerate the degradation of the chlorinated contaminants of concern and to identify optimal operating parameters. These data will be used to determine the expected costs and performance of a full-scale system at the site.

5.1 Demonstration Objectives and Approach

The objectives of the pilot in situ bioremediation project are as follows:

- Determine if the addition of a food grade carbon source will enhance the extent and rate of chlorinated solvent biodegradation at the site.
- Determine the rate of chlorinated solvent biodegradation to estimate the time frame required for contaminant removal.
- Determine if the food grade carbon source can be adequately distributed in the formation such that the microorganisms can utilize it.
- Determine what role bioremediation technology has in the overall cleanup strategy for the site.

5.2 Performance Evaluation Criteria

The performance criteria considered in evaluating this in situ anaerobic bioremediation system included:

- Substrate transport and utilization in the remediation study area,
- Contaminant degradation rates and the reduction in mass of the contaminants,
- Fate of chlorinated solvent degradation compounds, and
- Levels to which contaminants can be reduced.

The evaluation data were collected by a monitoring program of eight field sampling events over a 25 month period.

5.3 Organization of Data

The analytical data from the pilot collected from each of the seven sampling events are summarized in the following five tables.

- Table 1 presents the volatile organic data (VOCs), final biodegradation byproducts (ethene and ethane), important electron acceptors (total iron, sulfate, nitrate, and methane), and electron donor as represented by total organic carbon (TOC).

- Table 2 converts the concentrations of the chlorinated ethenes and chlorinated ethanes to micromolar units so that one unit of PCE is equivalent to one unit of TCE, cDCE, tDCE, VC, and ethene. Similarly one unit of 1TCA is equivalent to one unit of 1DCE, 1DCA, CA, or ethane.

- Table 3 presents the field data collected in January, April, June, and October 2002

- Table 4 summarizes the changes between the samples collected within the pilot cell immediately after the oil emulsion injection and the samples collected twenty-five months later. For wells MW-14 and MW-7, samples could not be collected in April, June, or October 2002 because of the accumulation of emulsion. Positive changes indicate that the concentrations of the analyte have decreased. A negative change indicates that the concentrations have increased. In a number of cases, the contaminants were not detected in the initial samples collected after emulsion injection or in the samples collected after twenty-five months. In these cases, the percent change was calculated using the analyte detection limit and the percent changes are designated as greater than (>) or less than (<) the calculated change.

- For the downgradient wells, Table 5 summarizes the percent changes between the sample collected on 3/28/01 and the sample collected on 1/9-12/02 for well MW-9 and between 3/28/01 and 10/2/02 for wells MW-8, MW-12, and MW-13.

- Table 6 summarizes the changes in the chloroethenes, chloroethanes, electron acceptors, and electron donor for all wells from the beginning of the pilot in August-September 2000 to January 2002 or June 2002.

5.4 Project To Date Results

The following table summarizes the status of the key performance measures for this project as of October 2002. Details are described in subsequent sections..

Performance Measures	Values/Results
Treatment Volume: Soil Ground Water Treated:	 Approximately 92' X 157' X 60', 866,640 ft^3 Approximately 1,620,617gallons
System substrate transport effectiveness:	Demonstrated distribution throughout pilot area
Substrate effectiveness:	Enhanced dechlorination
Substrate viability	Lasted for more than one year
Total volatile contaminant degradation rates; 100 mg/L concentration levels 1 – 100 mg/L concentration levels	 268 µg/L-day 11 to 35 µg/L-day
Reduction of total contaminants of concern:	Achieved reductions of 59% to 93% except in MW-14 and MW-7 (through 1/8/02), and DMP-4
Chlorinated solvent degradation product production	General decline in all contaminants with some temporary increases in degradation products, followed by reduction of the degradation products themselves by biological degradation
Waste generated	None
Achievable contaminant reduction levels:	Estimated 90% within 43 months

5.4.1 Chlorinated Ethene Results

In the monitoring wells within the pilot cell, cis-1,2-DCE, VC, and ethene are the predominant chlorinated ethenes with little of the parent compounds, PCE or TCE, being detected. Trans-1,2-DCE is a minor product, present at 1.1% or less of the total chlorinated ethenes. Chlorinated ethenes concentrations greater than 1,000 µg/L were initially only detected in SMP-1 and DMP-3.

PCE concentrations have increased slightly in SMP-4 from 9/1/00 to 10/2/02. PCE was also detected in SMP-3 in July 2001, January 2002, and October 2002 when substrate levels were low. PCE has generally not been detected in the remaining wells. TCE concentrations have increased in DMP-1 and to a lesser extent in MW-7 (through the last sampling point for this well in January 2002). The increases may be a result of dissolution of PCE and subsequent biodegradation to TCE, dissolution of TCE from a source zone, or an inadequate supply of substrate. TCE concentrations in SMP-1 increased from <34 µg/L on 8/31/00 to a maximum of 26,600 µg/L on 4/2/02, but then have declined to <0.72 µg/L on 10/2/02 with improved substrate levels. There has been a corresponding increase in cDCE, VC, and ethene concentrations in this well. There were increased cDCE concentrations in well DMP-1. Over the 25 months of pilot operation, cDCE concentrations have declined in wells MW-7, SMP-1, SMP-3, DMP-3, and SMP-4 by between 81 and 97%. tDCE is a relatively minor component, with concentrations of no more than 376 µg/L in well SMP-1 with high levels of TCE, cDCE, and VC. VC concentrations have increased in wells MW-14 and DMP-4. Decreased VC levels have been observed in wells MW-7, SMP-1, DMP-1, SMP-3, DMP3, and SMP-4 with reductions of 4 to 94 percent.

As previously discussed, the goal of the process is to convert PCE into ethene because the ethene is considered to be environmentally acceptable. Ethene has not been associated with long-term toxicological problems and is a natural occurring plant hormone (Sims et al 1991). Unfortunately, given the field conditions, it is difficult to conduct a material balance. Ethene may be converted to carbon dioxide, ethane, or another product. Ethene may also be transported away with the groundwater, or production of ethene may have slowed due to some limitation on the microbial population including lack of substrate, insufficient nutrients, or lower concentrations of the parent compounds.

Ethene concentrations have increased in wells MW-14 (through1/8/02), MW-7 (through 1/8/02), SMP-1 (through 10/2/02), SMP-3 (through 10/2/02), and DMP-3 (through 10/2/02) from the initial levels observed on 8/31/00-9/1/00. Ethene concentrations for the other three wells of the pilot were lower than measured initially in September 2000. The continued presence of ethene in all of the wells in the pilot area shows that complete dechlorination of the chlorinated ethenes is occurring. Low levels of acetylene, an abiotic degradation product from the reaction of PCE or TCE with ferrous sulfide and ferrous disulfide, were detected in wells MW-14, SMP-1, and SMP-3 in January, April, June, and October 2002

The addition of soybean oil emulsion has resulted in an increase in intermediate and final daughter products from the chlorinated ethenes in pilot area wells MW-14, MW-7, SMP-1, SMP-3, DMP-3, and DMP-4.

In the downgradient monitoring wells sampled in March 2001, July 2001, January 2002, April 2002, June 2002, and October 2002, three of the four wells had parent compounds PCE and/or TCE (MW-8, MW-12, and MW-13) with concentrations greater than 1,000 µg/L of chlorinated ethenes only detected in MW-12. Ethene has increased in MW-12 and has only been detected at low levels in the other downgradient wells. Increases in the VC and ethene concentrations were noted in MW-12 concurrent with the reduction in the TCE and cDCE concentrations. The emulsion injections appear to have had an effect on MW-12 based upon the increases in ethene, methane, and TOC. However, increased levels of TCE and cDCE were noted in MW-12 in October 2002 with decreased levels of VC and ethene. The availability of substrate may be limiting the extent of dechlorination at this well. The very low levels of TCE and cDCE found in MW-8 have fallen to non-detect levels in April, June, and October 2002. PCE, TCE, cDCE, and VC concentrations have decreased slightly in MW-13, but ethene has not been detected in this well. The area around MW-13 appears to be substrate-limited and has largely not been impacted by the oil emulsion injection.

5.4.2 Chlorinated Ethane Results

The analytical data for the pilot test to date provides evidence for biodegradation of the chlorinated ethanes. Wells DMP-1, SMP-3, DMP-3, and SMP-4 had the highest initial concentrations of total chlorinated ethanes with greater than 1,000 µg/L. 1TCA was the primary chlorinated ethane contaminant in wells SMP-3 and DMP-3. Reduced products such as 1,1-dichloroethane, chloroethane, and ethane predominated in wells MW-14, MW-7, SMP-1, DMP-1, SMP-4, and DMP-4.

Well SMP-3 has shown a 97% (178,000 µg/L to 5,660 µg/L) reduction in the 1TCA concentrations. 1TCA levels in wells SMP-3, DMP-3, SMP-4, and DMP-4 have dropped by 95 to 99.5 percent. Between 24% (5,230 to 3,980 µg/L) and 100% (38,200 to 7,620 µg/L) reductions in the 1DCA concentrations were observed in DMP-3 and SMP-3, respectively. However, increased 1DCA concentrations have been noted in MW-14 (through 1/8/02), DMP-1, and DMP-4. Large reductions in the 1DCE concentrations have been observed in wells DMP-3 (96%) and SMP-4 (100%), but 1DCE increased in MW-14 (through 1/8/02) and SMP-3. CA concentrations have declined by 99.7% in DMP-1 (3,290 to 15.5 µg/L) and by 62% in SMP-4, but increased in MW-14, MW-7, SMP-3, and DMP-3. Based upon these results and laboratory studies currently underway with an anaerobic culture derived from the Photocircuits groundwater, we believe that direct utilization of 1TCA and 1DCA may be occurring rather than a reductive dechlorination reaction where daughter products such as CA are produced and degraded. Acetic acid has been reported as a byproduct of 1TCA degradation (Lee and Davis 2001). Alternatively, sulfides generated from the reduction of sulfate may be reacting abiotically with the 1TCA and 1DCA (Gander et al. 2001).

Well SMP-4 has shown decreases in the 1TCA, 1DCA, CA, and ethane concentrations over the twenty-five months following the first injection of the oil emulsion. There was a rebound in concentrations of these compounds between December 2000 and January 2002 in SMP-4. When substrate levels were elevated after the second application of EOS™, the 1TCA and 1DCA concentrations dropped. Concentrations of 1TCA, 1DCA, and 1DCE higher than initial levels were observed in wells MW-14 (1/8/02), MW-7 (1/8/02), DMP-1, SMP-3, and DMP-4.

However, further degradation products CA and ethane levels are elevated in wells MW-14, MW-7, SMP-3, DMP-3, SMP-4, and DMP-4.

Relatively low levels of 1TCA and daughter products were found in downgradient monitoring wells MW-12 and MW-13, which were first monitored for this program in March 2001. No chlorinated ethanes were found in MW-8 or MW-9 until 3.7 µg/L CA was found in MW-8 on 10/2/02. 1DCA and ethane concentrations have increased in MW-12, but 1DCE concentrations have fallen. In MW-13, 1TCA, 1DCA, 1DCE, and ethane concentrations have decreased by 79 to 89%. The substrate injections have had little impact on the downgradient wells except potentially MW-12 where the TOC increased to 73 mg/L in April 2002, but then fell to <0.51 mg/L in June 2002, and increased to 29.4 mg/L in October 2002.

5.4.3 Other Organic Compounds Results

Several other organic compounds were detected in the groundwater including acetone, methylene chloride, 2-butanone, toluene, benzene, p-ethyltoluene, 1,3,5-trimethylbenzene, 2-chlorotoluene, 4-chlorotoluene 1,2,4-trimethylbenzene, naphthalene, o-xylene, n-propylbenzene, and methyl tert butyl ether (MTBE). Over the twenty-five months of the pilot operation to date, acetone concentrations decreased by 99% in DMP-1 and 96% in SMP-3, but increased in MW-14 (through 1/8/02) and SMP-4. Methylene chloride decreased in many wells with declines by as much as 99.9 percent in SMP-1, 97% in DMP-1, 99% in SMP-3, 98% in DMP-1, 86% in DMP-3, 97% in SMP-4, and 38% in MW-7 (through 1/8/02); however, increased methylene chloride concentrations were noted in MW-14 (through 1/8/02) and DMP-4. Methylene chloride can also be anaerobically degraded. Toluene concentrations have declined in six wells, but increased in two wells, MW-14 (through 1/8/02) and DMP-4. Although toluene can be also degraded anaerobically, the addition of soybean oil may have little effect on its biodegradation of toluene as dechlorinators are probably not involved in the biotransformation of toluene. 2-Chlorotoluene concentrations declined by 87% in SMP-3, 45% in DMP-3, >99.5% in SMP-4, and 58% in DMP-4, but increased in MW-7 (through 1/8/02) and DMP-1. 2-Chlorotoluene may be biodegraded to toluene and potentially further under anaerobic conditions. MTBE was first detected at 9.0 µg/L in SMP-3 in July 2001. MTBE was found at levels up to 125 µg/L in DMP-3, SMP-1, SMP-3, and DMP-4 in January 2002. MTBE was not detected in any monitoring well in October 2002. The MTBE appears to have flushed through the system.

Few of the contaminants other than the chlorinated ethenes and ethanes were found in the downgradient wells. 2-Chlorotoluene has increased in MW-12 by 41%, but declined by 37% in MW-13 between 3/28/01 and 10/2/02. 4-Chlorotoluene has only been found in MW-12; it was not detected in 10/2/02. A low level of o-xylene was found in MW-12 in January 2002, but none was detected in June or October 2002. Acetone and benzene have been detected in MW-13, but concentrations of each have decreased.

5.4.4 Sum of VOAs

The sum of the concentrations of all of the contaminants in each well was calculated excluding the final degradation endproduct gases, ethene and ethane. The sum of the VOAs has declined by up to 93% in DMP-1 with large decreases in SMP-1 (88%), SMP-3 (93%), DMP-3 (59%), and SMP-4 (87%). The sum of VOAs has increased by 4529% in MW-14 through 1/8/02 as the contaminated groundwater displaced during injection came back into the well and potentially as

VOCs adsorbed into the oil were released. Increases in the sum of VOAs were also observed to a lesser degree in MW-7 (-33 through 1/8/02) and DMP-4 (-27%). The overall average of the sum of the volatiles has declined by 82% over the course of the pilot. This average includes the wells sampled on 10/2/02 and the two wells (MW-7 and MW-14) last sampled on 1/8/02. Increased biodegradation rates are expected as substrate limitations are overcome with the second injection of substrate.

A first order degradation half-life of 462 days was calculated for the average total volatile contaminants within the pilot cell. Based upon this degradation rate, 90 percent of the total contaminants should be removed within 43 months.

Since 3/28/01, the total volatiles in the downgradient wells outside of the influence of the substrate injection have fallen in MW-12 (17%) and MW-13 (44%), but increased in MW-8 (-106%).

5.4.5 Substrate Distribution

The total organic carbon concentrations in October 2002 ranged from 40 mg/L in SMP-3 to 3,680 mg/L in SMP-4. Wells MW-7 and MW-14 contained the emulsion in October 2002 and were not sampled. They presumably contain very high levels of TOC. TOC levels were below 50 mg/L in October 2002 only in well SMP-3. A substrate level of 50 mg/L TOC should provide sufficient carbon to support dechlorination and other electron accepting processes such as methanogenesis and sulfate-reduction. TOC levels increased from the January 2002 sampling event in all wells as a result of the February-April 2002 injection event.

The substrate injection has apparently impacted TOC levels only in well MW-12 of the downgradient wells. Downgradient wells MW-8, MW-9, MW-12, and MW-13 appear to be substrate-limited.

5.4.6 Electron Acceptor Results

As the microbes breakdown the emulsion, sulfate would be depleted and the concentrations of iron and methane would increase. Nitrate-nitrogen was present in October 2002 at low concentrations of <0.025 to 0.027 mg/L. and is a minor electron acceptor. The predominant electron acceptor in the groundwater in October 2002 was sulfate with concentrations that ranged from 73 mg/L in SMP-4 to 1,200 mg/L in DMP-3. Sulfate concentrations have declined from the initial concentrations in September 2000 in wells MW-14 (92% through 1/8/02), SMP-1 (43%), DMP-1 (96% from 29,600 to 1,040 mg/L), and SMP-4 (92%) as would be expected with consumption of the oil emulsion. However, sulfate levels have increased in MW-7 (though 1/8/02), SMP-3, DMP-3, and DMP-4 over the course of the pilot. The average sulfate concentration in the cell has declined by 88%. Total iron concentrations within the pilot in October 2002 ranged from 4.2 mg/L in DMP-1 to 1,110 mg/L in SMP-4, which indicated that iron is also an important electron acceptor. Total iron concentrations have increased in three of the eight wells in the pilot area. The drop in dissolved iron concentrations in the other wells may be due to precipitation of the ferrous iron with sulfide produced from the utilization of sulfate. During the most recent sampling event in October 2002, methane was detected in all wells with methanogenic conditions (>1,000 µg/L) in MW-14 (though 1/8/02), MW-7 (though 1/8/02),

SMP-1, DMP-3, SMP-4, and DMP-4. Methane concentrations have increased in six wells in the pilot area between September 2000 to January 2002 or October 2002.

Well MW-8 appears to be under aerobic conditions based upon the presence of dissolved oxygen, nitrate, and sulfate, and the low levels of iron and methane. This well is largely uncontaminated. While MW-9 has little organic contamination, it appears to have been impacted by the biodegradation processes upgradient as it has elevated iron and methane levels and decreased sulfate levels. Well MW-12 is under methanogenic conditions based upon the elevated methane levels. Iron and sulfate are also high in MW-12. Methane concentrations are lower in MW-13 and there is little iron. Nitrate and sulfate are present suggesting that well MW-13 is under nitrate-reducing conditions.

5.4.7 Field Parameters

Field parameters including water level, pH, temperature, specific conductivity, redox potential, dissolved oxygen, and bromide (a tracer added with the emulsion) were collected in January, April, June, and October 2002 for wells MW-7, SMP-1, DMP-1, SMP-3, DMP-3, SMP-4, DMP-4, and MW-8. Field parameters were collected for downgradient wells MW-9, MW-12, and MW-13 for the April 2, June 26, and October 3, 2002 sampling events. The water levels ranged between 6.42 feet (SMP-1) to 7.96 feet (MW-8) below the top of the casing for wells from which this data was collected in January 2002. The pH was generally neutral, between 6.3 and 7.6. Well SMP-3 had an elevated pH readings, 8.7-9.9. The basic conditions could inhibit microbial degradation. The pH dropped to slightly acidic conditions of 5.3 in SMP-4 on 6.25.02, but increased to 6.1 in 10/2/02. Downgradient wells MW-12 and MW-13 were slightly acidic, 6.2 to 6.6. The pH in the downgradient well MW-8 ranged from slightly acidic, 6.4 to slightly basic, 8.6. Groundwater temperatures ranged between 11.5 to 22.8 °C. In general the specific conductivity of the groundwater was high, between 2,660 and 5,890 umhos/cm. Downgradient wells MW8 and MW-9 had lower specific conductivity readings of 183 to 200 µmhos/cm. Downgradient wells MW-12 and MW-13 had higher specific conductivity levels.

Negative redox potentials of –35 (SMP-4) to -178 mV (DMP-4) were found in the wells within the pilot cell in October 2002. Downgradient wells MW8 and MW-9 had positive redox potentials in January to October 2002, which is consistent with the low levels of contaminants found in these wells. Although well MW-13 has higher contaminant levels, its redox potential ranged from –10 to 300 mV. Low (<1.0 mg/L) dissolved oxygen readings were observed in wells DMP-3 and DMP-4 in October 2002. Higher dissolved oxygen levels were found in SMP-1, DMP-1, SMP-3, and SMP-4; the high dissolved oxygen levels are not consistent with the low redox potentials and anaerobic conditions found in these wells. Bromide was injected with the emulsion. Wells SMP-1, DMP-1, SMP-3, DMP-3, SMP-4, and DMP-4 had bromide levels of greater than 10 mg/L in June 2002. These wells generally had elevated TOC levels. Bromide levels increased between April and June 2002 in all monitoring wells within the cell except DMP-4. The highest bromide levels were in wells DMP-1, DMP-3, and SMP-4. Wells DMP-3 and SMP-4 had high TOC concentrations. Bromide was not measured for the October 2002 samples.

6.0 DISCUSSION

Previous studies have demonstrated the anaerobic dechlorination of PCE using aquifer solids and water in the laboratory (Parsons et al. 1985, Scholz-Muramatsu et al. 1995, and DiStefano et al. 1991). Previous field studies have also demonstrated the anaerobic dechlorination of PCE (Beeman et al. 1994, Ellis et al. 2000). Therefore, microbial reductive dehalogenation is a potential remedial mechanism for halogenated compounds in groundwater aquifers.

The objective of the technology is to convert PCE and 1TCA into ethene and ethane. The produced ethene is considered to be environmentally acceptable, because ethene has not been associated with long-term toxicological problems and is a natural occurring plant hormone (Sims et al. 1991). Furthermore, ethene is known to further biodegrade to carbon dioxide under aerobic environmental conditions (Beeman et al 1994).

VC has been thought to persist in anaerobic environments and to be more toxic to bacteria than the parent compounds (Barrio-Lage et al. 1991). However, subsequent work has clearly established that VC is biodegraded to ethene and ethane. The pattern of increase and disappearance of cDCE and VC is suggestive of microbial succession.

Conditions continue to be favorable for accelerated anaerobic biodegradation of the chlorinated solvents at the Photocircuits site based upon the following positive results from the pilot to date including:

- decreases in the parent compound concentrations observed in many wells, particularly the large drops in the 1TCA and 1DCA concentrations in wells SMP-3 and DMP-3
- increases in the daughter products including final products ethene and ethane in many of the wells.
- good distribution of substrate and its consumption
- prevalence of reducing conditions based upon the removal of sulfate and the production of dissolved iron and methane

7.0 CONCLUSIONS

Although the pilot study is an on-going program, there is now sufficient data to facilitate a comparison of the project to date results with the project's objectives. The following summary presents the project objectives in bold with the results.

Determine if the addition of a food grade carbon source will enhance the extent and rate of chlorinated solvent biodegradation at the site.

The overall average of the sum of the volatiles has declined by 82% over the course of 25 months. Increases in intermediate and final daughter products from the chlorinated ethenes and ethanes have been observed in all of the primary monitoring wells.

Degradation rates for the total VOCs are as high as 268 µg/L per day in higher concentration areas. In areas with lower total volatile concentrations, degradation rates range from 11 to 35 µg/L per day. Wells MW-7 and MW-14 have shown increases in total VOCs through their last sampling point in January 2002. An increase in the total VOCs was also noted in well DMP-4 associated with an increase in the degradation product CA.

Determine the rate of chlorinated solvent biodegradation to estimate the time frame required for contaminant removal.

A first order degradation half-life of 462 days was calculated for the average total volatile contaminants within the pilot cell. This average includes the wells sampled on 10/2/02 and the two wells last sampled on 1/8/02. Based upon this degradation rate, 90% of the total contaminants should be removed within 43 months.

Determine if the food grade carbon source can be adequately distributed in the formation such that the microorganisms can utilize it.

Total organic carbon (TOC) levels in excess of 50 mg/L were established in all eight of the primary monitoring wells in the study area. The TOC levels after system start up ranged from 39 mg/L to 23,500 mg/L. TOC levels declined from the beginning of the pilot in most wells as the emulsified oil was utilized. TOC levels rose in all wells in the pilot cell after the second injection of the emulsion and ranged from 40 to 3,680 mg/L in October 2002. Although it is not possible to do a mass balance because of site conditions, evidence of primary contaminant reduction combined with increases in intermediate and final daughter products strongly suggests that the TOC decreases are a result of biological utilization.

Determine what role bioremediation has in the overall remediation strategy for the site.

Based on the results to date, it appears that bioremediation can cost effectively destroy the contaminants in an acceptable time frame. As a consequence, it appears that bioremediation will be the primary treatment technology for contaminant destruction at this site.

The one unexplained observation is the increase in contaminant concentrations in MW-14 and MW-7 through 1/8/02, and in DMP-4. There are several potential reasons for the increased concentrations: 1) desorption of contaminants adsorbed to the soil due to enhanced biological activity may be contributing to the increase; or 2) contaminated groundwater displaced during the injection process could be moving back into the well. We are working to understand this phenomenon.

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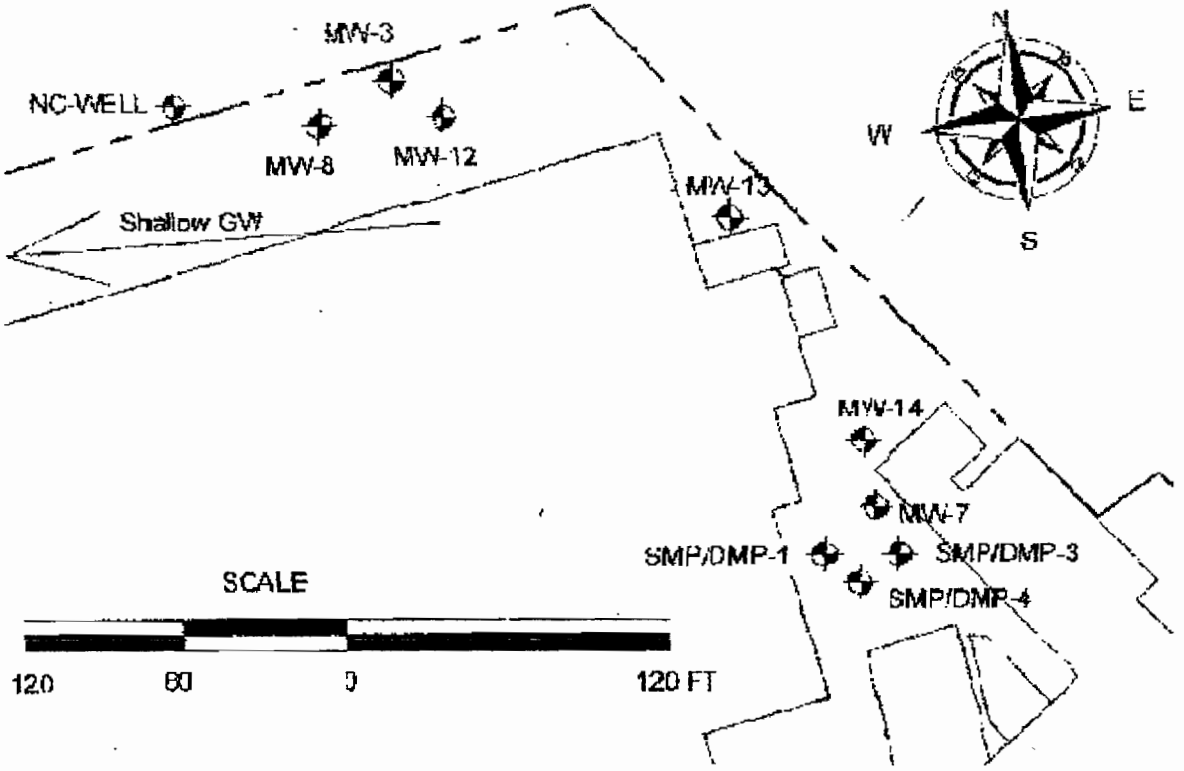
FIGURES

Figure 1. Site Map Showing Monitoring Wells



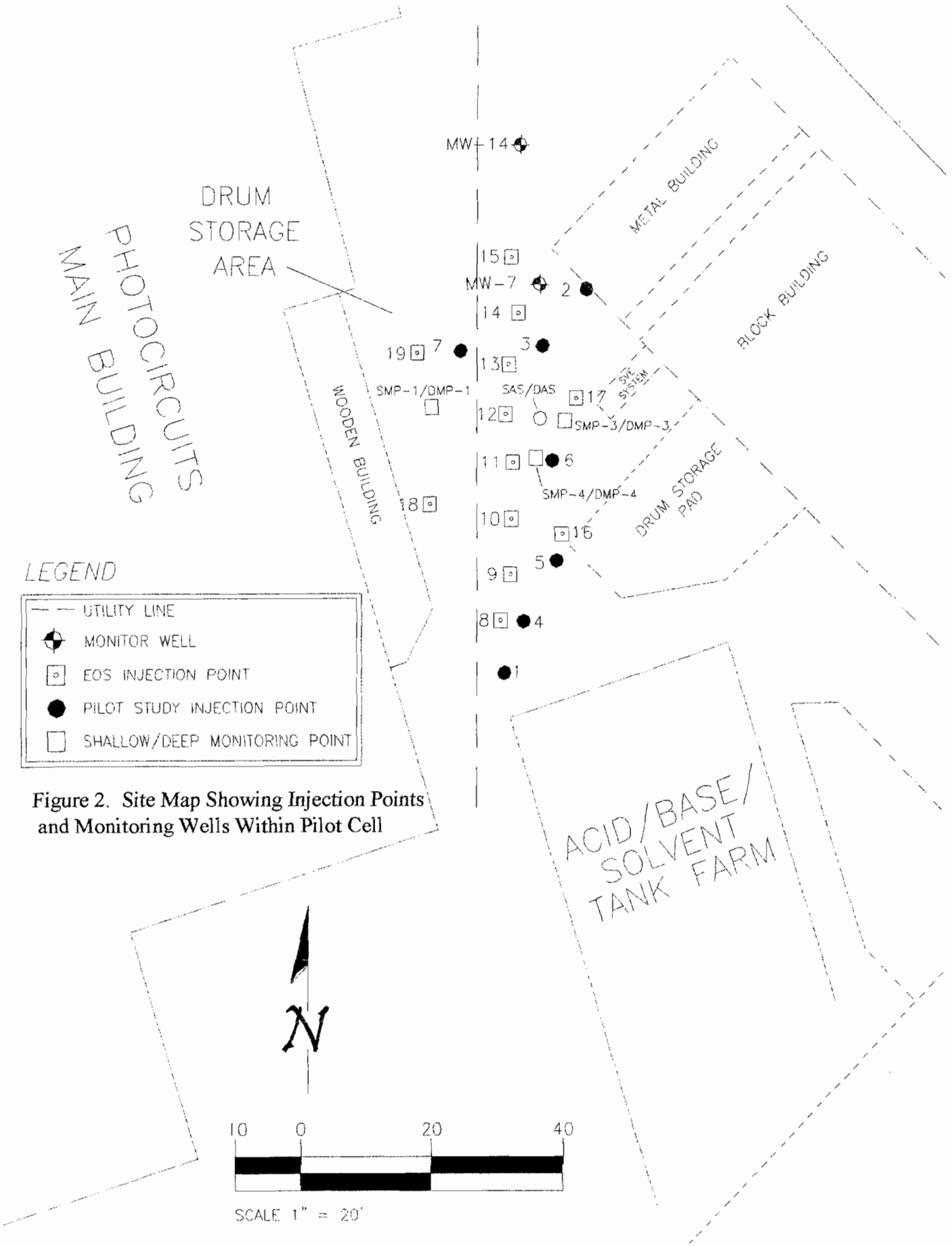


Figure 2. Site Map Showing Injection Points and Monitoring Wells Within Pilot Cell

TABLES

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well		MW-14						MW-7					
Date		8/31/00	10/19/00	12/20/00	3/28/01	7/11/01	1/8/02	8/31/00	10/19/00	12/20/00	3/27/01	7/11/01	1/8/02
Days		0	49	111	209	314	495	0	49	111	208	314	495
Tetrachloroethene	µg/L		<1.4	<0.40	<5.5	<4.0	<2.4	<0.40	<0.56	<0.40	<2.2	<0.20	<0.12
Trichloroethene	µg/L	<0.85	<1.35	<0.85	<10	<3.4	<3.4	<0.85	19.3	<0.85	<4	16	2.7
cis-1,2-Dichloroethene	µg/L	<0.95	<1.7	<0.95	<15	<2.8	<3.6	47.3	283	355	149	187	8.3
trans-1,2-Dichloroethene	µg/L	<1.35	<1.40	<1.35	<11	<2.8	<5.8	<1.35	<0.56	<1.35	<4.4	2.6	2.1
Vinyl Chloride	µg/L	<1.75	10.6	<1.75	114	145	173	39.3	67.1	139	60	63.9	10.5
Ethene	µg/L	43	47	60	65	130	90	63	170	110	33	94	110
Acetylene	µg/L						5.7						<1.2
1,1,1-Trichloroethane	µg/L	14.4	<1.7	8.9	994	2040	1520	<0.55	<0.62	<0.55	<4	<0.16	<0.14
1,1-Dichloroethane	µg/L	126	216	293	9230	18800	14100	122	214	268	135	207	193
1,2-Dichloroethane	µg/L	<0.80	<0.95	<0.80	<10	34.2	<3.2	<0.80	<0.38	<0.80	<4	<0.13	3.7
1,1-Dichloroethene	µg/L	<1.05	6.3	<1.05	443	751	542	<1.05	<0.96	<1.05	<3.6	1.9	<0.22
Chloroethane	µg/L	15.6	<1.25	<1.65	132	298	501	258	181	201	160	269	390
Ethane	µg/L	52	69	48	34	66	49	<6	130	81	34	71	68
Acetone	µg/L	97.8	170	126	<74	551	986	<9.45	52.2	<9.45	<29.6	18.5	<2.3
Methylene Chloride	µg/L	15.1	<1.50	<1.0	220	156	134	12.8	6.0	<1	51.6	3.9	8.0
2-Butanone	µg/L	124	75.3	<5.1	<125	863	344	<5.1	<1.64	<5.1	<50	<6.25	17.2
Toluene	µg/L	3.0	<0.80	<0.80	<7.5	32.4	25	6.2	8.4	8.3	<3	8.6	0.95
Benzene	µg/L	<0.70	<0.70	<0.70	<5	<2.6	<3.4	4.0	3.5	<0.7	<2	2.8	6.5
p-Ethyltoluene	µg/L	<1.2	<1.05	<1.2	<8	<4.4	<4.8	<1.2	<0.68	<1.2	<3.2	<0.22	<0.24
1,3,5-Trimethylbenzene	µg/L	<0.60	<1.50	<0..60	<17	<2.2	<2.4	<0.60	<0.60	<0.6	<6.8	<0.11	<0.12
2-Chlorotoluene	µg/L	<0.85	<1.35	<0.85	<10.5	<3.2	<4.2	<0.85	5.2	<0.85	<4.2	6.3	8.4
1,2,4-Trimethylbenzene	µg/L	<0.65	<1.25	<0.65	<11	<4.4	<2.6	<0.65	<0.50	<0.65	<4.4	1.2	0.93
Naphthalene	µg/L	<1.35	<0.90	<1.35	<9.5	<8.2	<5.4	<1.35	<0.36	<1.35	<3.8	1.2	<0.27
o-Xylene	µg/L	<0.40	<1.35	<0.40	<8	<3.2	<3.2	<0.40	<0.54	<0.4	<3.2	1.1	<0.16
n-Propylbenzene	µg/L	<0.70	<1.40	<0.70	<10.5	<6.2	<2.8	<0.70	<0.56	<0.7	<4.2	<0.31	<0.14
Methyl T-Butyl Ether	µg/L	<1.25	<1.15	<1.25	<14	<1.6	<3.6	<1.25	<0.46	<1.25	<5.6	<0.080	<0.18
Sum VOAs (w/o Gases)	µg/L	396	478	428	11133	23671	18325	490	840	971	556	791	652
Methane	µg/L	44	58	380	1800	6400	8050	660	1900	760	1050	5930	5050
Iron, Total	mg/L	55.2	13.2	69	197	188	279	2.22	1.84	3.93	6.72	8.78	13.1
Sulfate	mg/L	5470	779	32.6	307	1270	441	104	117	264	203	68.9	949
Nitrate-Nitrogen	mg/L		0.15	0.17	<0.025	<0.0015	<0.13		<0.015	0.023	0.029	0.017	0.085
Total Organic Carbon	mg/L	23500	868	1990	2590	3530	2630	38.8	53.1	60	72.9	58.5	1.67

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well		SMP-1									DMP-1								
Date		8/31/00	10/18/00	12/20/00	3/27/01	7/11/01	1/8/02	4/2/02	6/25/02	10/2/02	8/31/00	10/18/00	12/20/00	3/27/01	7/11/01	1/8/02	4/2/02	6/25/02	10/2/02
Days		0	48	111	208	314	495	579	663	762	0	48	111	208	314	495	579	663	762
Tetrachloroethene	µg/L	<16	<0.40	<22	<5.5	<2.0	<6.0	<12	<5.5	<0.22	<0.40	<0.080	<0.40	<5.5	<1.0	<0.60	<0.48	1.1	<0.11
Trichloroethene	µg/L	<34	79	860	1530	25.3	4410	26600	41	<0.72	<0.85	<0.17	<0.85	<10	4.5	<0.85	29.3	10.5	1.6
cis-1,2-Dichloroethene	µg/L	24900	37500	30100	<0.27	12300	18000	42500	25700	680	50.4	1.70	17.4	73.5	38.4	<0.90	44.3	62.1	127
trans-1,2-Dichloroethene	µg/L	<54	69.9	<40	132	34.5	68.5	376	<15.5	<0.62	<1.35	<0.27	<1.35	<11	<0.70	<1.4	3.9	2.8	4.2
Vinyl Chloride	µg/L	4710	5990	5090	4770	4230	3490	1780	8920	2540	188	3.5	40	125	42.7	<4.25	62	25.4	180
Ethene	µg/L	930	2400	1140	900	1890	650	800	1820	3710	560	1080	920	690	110	93	160	210	430
Acetylene	µg/L						<11	7.4	<1.2	<0.52						<1.2	<1.2	<1.2	<1.2
1,1,1-Trichloroethane	µg/L	<22	<0.55	<34	356	158	<7.0	<11	<13	197	<0.55	<0.11	<0.55	193	28.1	<0.70	<0.44	0.89	<0.26
1,1-Dichloroethane	µg/L	506	486	628	708	536	456	366	295	<0.62	91.8	17.6	357	1130	1320	423	240	412	414
1,2-Dichloroethane	µg/L	<32	<0.80	<17	<10	<1.3	<8.0	<11.5	<11.5	<0.46	<0.80	<0.16	<0.80	<10	14.9	<0.80	<0.46	2.9	2.3
1,1-Dichloroethene	µg/L	<42	64.3	<27	184	55.1	143	296	50.5	<0.54	<1.05	<0.21	<1.05	<9	<0.70	<1.10	<0.6	<0.27	<0.27
Chloroethane	µg/L	<72	71.6	<53	<15	<1.8	<33.5	<30.5	<12.0	37.6	3290	43.4	232	159	193	97	69.7	36.9	15.5
Ethane	µg/L	<6	<6	<25	<25	<25	<12	<1.3	3.6	4.6	<6	<6	<50	<100	<50	0.8	<1.3	1.8	1.7
Acetone	µg/L	<378	<9.45	<166	<74	<14.4	<115	<156	<56.5	<2.26	8670	139	557	<74	1150	<11.5	<6.24	48.8	46.8
Methylene Chloride	µg/L	482	43.1	<56	<20.5	11.9	<18.5	<27	<10.5	<0.42	68.3	1.40	22.4	191	32.8	<01.85	<1.08	1.7	1.8
2-Butanone	µg/L	<204	<5.1	<68	<125	<62.5	<860	<250	<190	<7.6	<5.1	<1.02	5.1	<125	<31.3	<86	<10	<3.8	<3.8
Toluene	µg/L	<32	61.1	<19	126	51.4	55	194	114	58.5	36.5	2.80	24.1	40.5	9.1	<0.70	2.2	5.8	7.2
Benzene	µg/L	<28	4.40	<34	<5	<1.3	<8.5	<8	<10.5	94	<0.70	<0.14	5.5	<5	<0.65	<0.85	<0.32	<0.21	48
p-Ethyltoluene	µg/L	<48	<1.2	<20	<8	11.3	<12	<12	<8.0	<0.32	2.9	<0.24	<1.2	<8	<1.1	<1.2	<0.4	1.4	1.7
1,3,5-Trimethylbenzene	µg/L	<24	<0.60	<20	<17	<1.1	<6.0	<10	<10	<0.4	2.8	<0.12	<0.60	<17	<0.55	<0.60	<0.4	1.3	1.6
2-Chlorotoluene	µg/L	<34	16.3	<25	<10.5	47.3	<10.5	<13.5	<12.5	17.8	23.7	<0.17	18.2	<10.5	33.7	79.7	57.6	30.1	27.8
1,2,4-Trimethylbenzene	µg/L	<26	<0.65	<0.65	<11	15.7	<6.5	<8.5	<8.5	<0.34	8.4	0.77	8.4	<11	4.8	4.7	3.4	3.2	4.0
Naphthalene	µg/L	<54	<1.35	<16	<9.5	21.2	<13.5	<7	<14.5	<0.58	3.1	<0.27	<1.35	<9.5	<2.05	<1.35	<0.28	<0.29	1.6
o-Xylene	µg/L	<16	<0.40	<18	<8	11.4	<8.0	<10	<12.5	5.7	<0.40	<0.080	<0.40	<8	<0.80	<0.80	<0.4	0.82	1.1
n-Propylbenzene	µg/L	<28	<0.70	<17	<10.5	<3.1	<7.0	<10.5	<8.0	<0.32	<0.70	<0.14	16.9	<10.5	<1.55	<0.70	<0.42	<0.16	<0.16
Methyl T-Butyl Ether	µg/L	<50	<1.25	<25	<14	<0.80	117	<17	<9.0	<0.36	<1.25	<0.25	<1.25	<14	<0.40	<0.90	<0.68	<0.18	<0.18
Sum VOAs (w/o Gases)	µg/L	30598	44386	36678	7806	17509	26740	72112	35121	1091	12436	210	1304	1912	2872	604	512	648	886
Methane	µg/L	3400	6200	2500	2060	3400	1100	2110	1890	2570	8200	23000	10300	4660	730	330	160	520	2530
Iron, Total	mg/L	19.8	11.6	15.1	11.1	29.9	16.4	18.3	11.2	12.2	88.5	4.45	3.1	21.7	8.65	15.9	4.11	6.8	4.2
Sulfate	mg/L	236	360	443	813	905	732	513	143	134	29600	37.7	179	715	1420	1200	2070	590	1040
Nitrate-Nitrogen	mg/L		0.054	0.071	12.3	0.016	<0.13	0.046	<0.025	<0.025		0.20	0.024	0.05	0.019	<0.13	<0.025	0.004	0.027
Total Organic Carbon	mg/L	91.7	83.4	88	59.7	45.9	23.8	63.1	125	139	299	224	137	132	54.5	8.14	41.1	24.3	58.7

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well		SMP-3									DMP-3								
Date		9/1/00	10/19/00	12/20/00	3/27/01	7/11/01	1/8/02	4/2/02	6/25/02	10/2/02	9/1/00	10/19/00	12/20/00	3/27/01	7/11/01	1/8/02	4/2/02	6/25/02	10/2/02
Days		0	49	111	208	314	495	579	662	761	0	49	111	208	314	495	579	662	761
Tetrachloroethene	µg/L	<80	<80	<8	13.7	12.2	<6.0	<24	<5.5	9.6	<16	60.5	<4.0	<1.1	72.3	34	<12	<2.2	<0.11
Trichloroethene	µg/L	<170	<170	<17	<0.2	<1.7	<8.5	<34	<18	2.6	<34	<13.5	<8.5	<2	8.6	<8.5	<8	<7.2	<0.36
cis-1,2-Dichloroethene	µg/L	<190	<190	<19	2.3	16.4	<9.0	<36	<12	7.5	<38	<17	<9.5	<3	14.9	<9.0	<10.5	<4.8	1.6
trans-1,2-Dichloroethene	µg/L	<270	<270	<27	<0.22	<1.4	<14	<56	<15.5	1.7	<54	<14	<13.5	<2.2	<1.4	<14	<10	<6.2	1.3
Vinyl Chloride	µg/L	<350	<350	<35	38.8	98.8	<42.5	<170	118	105	1040	928	818	145	785	654	397	113	61.2
Ethene	µg/L	84	98	39	18	110	180	220	260	130	430	450	310	290	490	360	220	620	550
Acetylene	µg/L						2.1	5.4	2.2	6.3						<1.2	<1.2	<1.2	<1.2
1,1,1-Trichloroethane	µg/L	178000	235000	32600	33700	13100	14500	7610	8070	5660	19700	14300	23400	793	24000	19500	11600	1350	234
1,1-Dichloroethane	µg/L	38200	47800	4770	<0.5	17600	8860	20500	10800	7620	5230	4860	4200	764	3250	2260	3770	2410	3980
1,2-Dichloroethane	µg/L	<160	<160	<16	6	20.6	<8.0	<32	<11.5	5.3	<32	<9.5	<8.0	<2	25.4	<8.0	<11.5	36.6	29.5
1,1-Dichloroethene	µg/L	<210	<210	<21	<0.27	164	146	<44	112	337	156	<24	<10.5	<1.8	168	<11	<15	17.4	5.6
Chloroethane	µg/L	<330	<330	<33	76.6	411	346	<134	354	509	5370	6970	3760	729	6630	2260	1900	10100	8640
Ethane	µg/L	39	45	41	23	29	17	36	33	11	5.7	9.4	44	12	8.2	8.6	16	31	26
Acetone	µg/L	<1890	<1890	<189	3690	536	<115	<460	<56.5	70.3	<378	<65	<94.5	<14.8	<14.4	<115	<156	945	121
Methylene Chloride	µg/L	2400	<200	<20	14.6	122	89	152	<10.5	24.7	436	149	<10	31.8	58.7	<18.5	<27	91.8	62
2-Butanone	µg/L	<1020	<1020	<102	<2.5	<62.5	<860	<3440	<190	<3.8	<204	<41	<51	<25	<62.5	<860	<250	<76	<3.8
Toluene	µg/L	<160	<160	<16	31.7	96.5	54.5	<28	76	53.8	232	134	103	15.7	140	108	84	85.6	30.5
Benzene	µg/L	<140	<140	<14	<0.1	20.6	<8.5	<34	<10.5	2.6	<28	<7.0	<7.0	<1	<1.3	<8.5	<8	<4.2	<0.21
p-Ethyltoluene	µg/L	<240	<240	<24	<0.16	<2.2	<12	<48	<8.0	<0.16	<48	<17	<12	<1.6	9.9	<12	<12	<3.2	<0.16
1,3,5-Trimethylbenzene	µg/L	<120	<120	<12	0.63	<1.1	<6.0	<24	<10	<0.2	<24	<15	<6	<3.4	<1.1	<6.0	<10	<4.0	1.5
2-Chlorotoluene	µg/L	<170	<170	<17	5.1	<1.6	<10.5	<42	<12.5	21.8	<34	<13.5	<8.5	<2.1	51.5	<10.5	<13.5	<5.0	18.7
1,2,4-Trimethylbenzene	µg/L	<130	<130	<13	<0.22	<2.2	<6.5	<26	<8.5	1.6	<26	<12.5	<6.5	<2.2	17	<6.5	<8.5	<3.4	4.5
Naphthalene	µg/L	<270	<270	<27	<0.19	<4.1	<13.5	<54	<14.5	1.1	<54	<9.0	<13.5	<1.9	<4.1	<13.5	<7	<5.8	1.9
o-Xylene	µg/L	<80	<80	<8	<0.	<1.4	<8.0	<32	<12.5	0.82	<16	<13.5	<4.0	<1.6	<1.6	<8.0	<10	<5.0	1.8
n-Propylbenzene	µg/L	<140	<140	<14	<0.21	<3.1	<7.0	<28	<8.0	<0.16	<28	<14.0	<7.0	<2.1	<3.1	<7.0	<10.5	<3.2	<0.16
Methyl T-Butyl Ether	µg/L	<250	<250	<25	<0.28	9.0	117	<36	<9.0	<0.18	<50	<11.5	<12.5	<2.8	<0.80	125	<17	26.6	<0.18
Sum VOAs (w/o Gases)	µg/L	218600	282800	37370	37579	32207	24113	28262	19530	14434	32164	27402	32281	2479	35231	24941	17751	15176	13195
Methane	µg/L	100	140	44	36	500	1020	2000	5500	740	390	890	800	930	870	1400	3850	11100	3100
Iron, Total	mg/L	50.6	5.91	69.6	3.92	32.5	5.39	8.46	4.63	10.1	60.4	66.8	74.3	20.8	77.5	39.0	35.8	114	38.8
Sulfate	mg/L	286	392	154	53.7	1050	1640	3640	119	558	124	186	137	94.6	173	188	127	185	1200
Nitrate-Nitrogen	mg/L		<0.015	0.53	0.037	<0.015	<0.13	0.009	0.017	<0.025		0.93	0.35	0.073	0.0030	<0.13	0.029	<0.025	<0.025
Total Organic Carbon	mg/L	294	432	22.7	48.1	176	34.4	1600	173	40.3	98.2	88.6	104	27.8	51.8	29.6	102	349	201

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well		SMP-4								DMP-4								
Date		9/1/00	10/19/00	12/20/00	3/27/01	7/11/01	1/8/02	6/25/02	10/2/02	9/1/00	10/19/00	12/20/00	3/27/01	7/11/01	1/8/02	4/2/02	6/25/02	10/2/02
Days		0	48	110	207	313	494	662	761	0	48	110	207	313	494	578	662	761
Tetrachloroethene	µg/L	13.2	<5.6	<0.80	<5.5	9.3	32	70.2	37.5	<0.40	<0.080	<0.080	<0.11	<2.0	<1.2	<0.48	<0.55	<0.11
Trichloroethene	µg/L	<0.85	<5.4	<1.7	<10	<1.7	<3.4	6.5	<0.36	<0.85	<1.70	<0.17	<0.20	<1.7	<1.7	<0.32	<1.8	<0.36
cis-1,2-Dichloroethene	µg/L	143	<6.8	<1.9	<15	10.8	<3.6	30	27.2	<0.95	<1.90	<0.19	<0.30	<1.4	<1.8	<0.42	<1.2	<0.24
trans-1,2-Dichloroethene	µg/L	<1.35	<5.6	<2.7	<11	<1.4	<5.6	0.62	<0.31	<1.35	<2.70	<0.27	3.4	<1.4	<2.8	<0.40	<1.55	1.9
Vinyl Chloride	µg/L	175	34.6	37.6	72.5	111	126	4.9	2.1	<1.75	<3.50	<0.35	2.9	<0.70	<8.5	<0.20	<1.15	5.4
Ethene	µg/L	220	190	220	170	160	340	87	29	250	260	220	160	<6	230	150	200	140
Acetylene	µg/L						<1.2	<1.2	<1.2						<1.2	<1.2	<1.2	<1.2
1,1,1-Trichloroethane	µg/L	3150	246	997	3100	2610	2700	23	11.5	56.3	130	<0.11	15.3	18.4	<1.4	<0.44	<1.3	<0.26
1,1-Dichloroethane	µg/L	4070	1740	1180	2230	3270	2890	135	149	29.7	20.1	<0.14	50.1	30.0	16.3	38.6	78.1	78.2
1,2-Dichloroethane	µg/L	26.2	<3.8	<1.6	<10	19.7	<3.2	<0.46	3.0	<0.80	<1.60	<0.16	8.7	<1.3	<1.6	<0.46	6.5	10.3
1,1-Dichloroethene	µg/L	105	<9.6	<2.1	<9	48.2	130	<0.54	<0.27	<1.05	<2.10	<0.21	<0.18	<1.4	<2.2	<0.6	<1.35	<0.27
Chloroethane	µg/L	1220	827	3000	1590	945	776	147	459	2420	2580	3300	3680	2680	1210	1260	1330	3240
Ethane	µg/L	<6	<6	39	<10	<10	2.4	12	2.7	<6	<6	37	<6	<6	2.4	<1.3	4.7	1.1
Acetone	µg/L	<9.4	<26	<18.9	<74	<14.4	<46	365	421	<9.45	<18.9	<1.89	58.4	<14.4	<23	<6.24	<5.65	<1.13
Methylene Chloride	µg/L	295	123	<2	278	127	66.8	7.5	8.8	22.8	16.6	3.9	19.8	20.8	8.4	12.2	22.2	26.9
2-Butanone	µg/L	<5.1	<16.4	<10.2	<125	<62.5	<344	<7.6	137	<5.1	<10.2	<1.02	<2.5	<62.5	<172	<10	<19	<3.8
Toluene	µg/L	116	37.6	25.5	<7.5	48.2	69.6	<0.40	0.96	11	7.5	3.1	6.1	<1.4	6.9	10.2	7.3	20.2
Benzene	µg/L	<0.70	<2.8	<1.4	<5	<1.3	<3.4	<0.42	<0.21	<0.70	<1.40	<0.14	<0.10	<1.3	<1.7	<0.321	<1.05	<0.21
p-Ethyltoluene	µg/L	4.8	<6.8	<2.4	<8	<2.2	<4.8	<0.32	<0.16	3.7	<2.40	<0.24	1.2	<2.2	<2.4	<0.48	<0.80	2.9
1,3,5-Trimethylbenzene	µg/L	3.2	<6.0	<1.2	<17	<1.1	<2.4	<0.40	<0.2	9.2	<1.20	2.5	3.4	<1.1	<1.2	6.9	<1.0	2.9
2-Chlorotoluene	µg/L	45.5	<5.4	<1.7	<10.5	21.4	<4.2	<0.50	<0.25	64.5	44.5	17.1	31.6	31.9	34.2	40.2	21.1	27.2
1,2,4-Trimethylbenzene	µg/L	8.6	<5.0	<1.3	<11	<2.2	<2.6	<0.34	<0.17	18.3	15.9	5.3	<0.22	9.2	9.0	13.5	5.3	6.4
Naphthalene	µg/L	<1.35	<3.6	<2.7	<9.5	<4.1	<5.4	<0.58	<0.29	4.3	<2.70	<0.27	1.6	<4.1	<2.7	<0.28	<1.45	1.8
o-Xylene	µg/L	<0.40	<5.4	<0.8	<8	<1.6	<3.2	<0.50	<0.25	4.8	<0.80	<0.008	5.0	<1.6	<1.6	3.6	<1.25	2.6
n-Propylbenzene	µg/L	<0.70	<5.6	<1.4	<10.5	<3.1	<2.8	<0.32	<0.16	44.3	<1.40	<0.14	<0.21	<3.1	<1.4	<0.42	<0.80	<0.16
Methy T-Butyl Ether	µg/L	<1.25	<4.6	<2.5	<14	<0.80	<3.6	<0.36	<0.18	<1.25	<2.4	<0.25	<0.28	<0.80	21.9	<0.68	<0.90	<0.18
Sum VOAs (w/o Gases)	µg/L	9376	3008	5240	7271	7221	6790	790	1257	2689	2815	3332	3888	2790	1307	1385	1471	3427
Methane	µg/L	450	470	1100	3650	1800	2600	4120	3300	180	210	190	300	<6	250	240	2480	8600
Iron, Total	mg/L	76.2	38.9	47.1	54.5	41.2	17.8	1010	1110	48.2	39.2	42.5	85.4	116	31.6	29.1	44.1	15.8
Sulfate	mg/L	933	470	435	1700	1910	1630	119	73.1	133	171	98.5	209	323	146	176	249	225
Nitrate-Nitrogen	mg/L		<0.015	0.31	0.19	0.037	<0.13	<0.025	<0.025		0.22	0.31	0.17	<0.015	<0.13	0.051	<0.025	<0.025
Total Organic Carbon	mg/L	73.6	60.4	<0.94	34.6	46.5	31.0	3440	3680	43.7	52.4	50.9	34.6	35.7	7.1	71.7	161	78.3

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well		MW-8						MW-9			MW-12					
Date		3/28/01	7/12/01	1/8/02	4/3/02	6/26/02	10/3/02	3/28/01	7/12/01	1/8/02	3/28/01	7/12/01	1/9/02	4/3/02	6/26/02	10/3/02
Days		0	314	494	579	663	554	0	314	494	0	106	287	371	455	554
Tetrachloroethene	µg/L	<0.11	<0.20	<0.12	<0.24	<0.22	<0.11	<0.11	<0.20	<0.24	<0.11	<0.20	<0.24	<2.4	<1.1	<0.55
Trichloroethene	µg/L	1.8	1.7	[illegible]	<0.16	<0.72	<0.36	<0.20	<0.17	<0.16	122	0.93	16.5	31	67.8	82.5
cis-1,2-Dichloroethene	µg/L	<0.30	1.2	<0.18	<0.21	<0.48	<0.24	<0.30	<0.14	<0.21	1280	18.2	430	503	467	488
trans-1,2-Dichloroethene	µg/L	<0.22	<0.14	<0.28	<0.20	<0.62	<0.23	<0.22	<0.14	<0.20	7.3	<0.14	5.6	<2.0	<2.1	<1.55
Vinyl Chloride	µg/L	<0.25	<0.070	<0.85	<0.10	<0.46	<1.3	<0.25	<0.070	<0.10	244	5.7	298	333	151	83.1
Ethene	µg/L	<6	<6	<1.3	<1.3	1.2	<1.2	<6	<6		6.7	69	180	130	190	17
Acetylene	µg/L			<1.2	<1.2	<1.2	<0.26							<1.2	<1.2	<1.2
1,1,1-Trichloroethane	µg/L	<0.20	<0.16	<0.14	<0.22	<0.52	<0.3	<0.20	<0.16	<0.22	<0.20	<0.16	<0.22	<2.2	<2.6	<1.3
1,1-Dichloroethane	µg/L	<0.14	<0.12	<0.25	<0.22	<0.60	<0.31	<0.14	<0.12	<0.22	72.2	3.7	329	684	345	94.2
1,2-Dichloroethane	µg/L	<0.20	<0.13	<0.16	<0.23	<0.46	<0.23	<0.20	<0.13	<0.23	2.9	<0.13	1.4	<2.3	<2.3	<1.15
1,1-Dichloroethene	µg/L	<0.18	<0.14	<0.22	<0.30	<0.54	<0.27	<0.18	<0.14	<0.30	8.4	<0.14	2.3	<3	<2.7	<1.35
Chloroethane	µg/L	<0.30	<0.18	<0.67	<0.61	<0.48	3.7	<0.3	<0.18	<0.61	<0.30	<0.18	6.1	<6.1	<2.4	<1.2
Ethane	µg/L	<6	<6	<1.3	<1.3	<1.3	<1.3	<6	<6		<6	13	22	11	18	0.8
Acetone	µg/L	<1.48	<1.44	<2.3	<3.12	<2.26	<1.13	<1.48	<1.44	<3.12	<1.48	<1.44	<3.12	<31.2	<1.9	<5.65
Methylene Chloride	µg/L	<0.41	<0.15	<0.37	<0.54	<0.42	<0.21	<0.41	<0.15	<0.54	<0.41	<0.15	<0.54	<5.4	<2.1	<1.05
2-Butanone	µg/L	<2.5	<6.25	<17.2	<5.0	<7.6	<3.8	<2.5	<6.25	<5.0	<2.5	<6.25	<5.0	<50	<38	<19
Toluene	µg/L	<0.15	<0.14	<0.14	<0.14	<0.40	<0.2	<0.15	<0.14	<0.14	0.97	<0.14	5.6	11.4	<2.0	<1.0
Benzene	µg/L	<0.10	<0.13	<0.17	<0.16	<0.42	<0.21	<0.10	<0.13	<0.16	5.3	<0.13	5.4	<1.6	<2.1	<1.05
p-Ethyltoluene	µg/L	<0.16	<0.22	<0.24	<0.24	<0.32	<0.16	<0.16	<0.22	<0.24	<0.16	<0.22	<0.24	<2.4	<1.6	<0.8
1,3,5-Trimethylbenzene	µg/L	<0.34	<0.11	<0.12	<0.20	<0.40	<0.2	<0.34	<0.11	<0.20	<0.34	<0.11	<0.20	<2.0	<2.0	<1
2-Chlorotoluene	µg/L	<0.21	<0.16	<0.21	<0.27	<0.50	<0.25	<0.21	<0.16	<0.27	393	26.9	2690	3660	1940	554
4-Chlorotoluene	µg/L										14.5	<0.17	82.8	139	147	<1.1
1,2,4-Trimethylbenzene	µg/L	<0.22	<0.22	<0.13	<0.26	<0.34	<0.17	<0.22	<0.22	<0.17	<0.22	<0.22	<0.17	<1.7	<1.7	<0.85
Naphthalene	µg/L	<0.19	<0.41	<0.27	<0.14	<0.58	<0.29	<0.19	<0.41	<0.14	<0.19	<0.41	<0.14	<1.4	<2.9	<1.45
o-Xylene	µg/L	<0.16	<0.16	<0.16	<0.20	<0.50	<0.25	<0.16	<0.16	<0.20	<0.16	<0.16	2.3	<2.0	<2.5	<1.25
n-Propylbenzene	µg/L	<0.21	<0.31	<0.14	<0.21	<0.32	<0.16	<0.21	<0.31	<0.21	<0.21	<0.31	<0.21	<2.1	<1.6	<0.8
Methyl t-Butyl Ether	µg/L	<0.28	<0.080	<0.18	<0.34	<0.36	<0.18	<0.28	<0.080	<0.34	<0.28	<0.080	<0.34	<3.4	<1.8	<0.9
Sum VOAs (w/o Gases)	µg/L	1.8	2.9	1.0	0.0	0.0	3.7	0.0	0.0	0.0	2151	55	3875	5361	3118	1302
Methane	mg/L	<6	61	9.1	<0.7	20	3.1	300	940		420	1800	2170	1670	3470	310
Iron, Total	mg/L	0.023	0.088	<0.096	<0.096	0.013	0.23	10.4	21.9		7.29	55.6	61.0	934	46.7	37.1
Sulfate	mg/L	22.6	23.4	27.4	23.2	143	1.46	4.43	23.1		417	824	418	1160	100	407
Nitrate-Nitrogen	mg/L	6.1	5.63	6.93	6.66	6.67	5.67	<0.025	<0.015		<0.025	0.070	0.005	0.099	<0.025	0.031
Total Organic Carbon	mg/L	4.97	<0.94	<0.94	1.41	6.6	4.7	7.98	6.79		33.3	36.6	<0.94	72.6	<0.51	29.4

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well		MW-13					
Date		3/28/01	7/12/01	1/10/02	4/3/02	6/26/02	10/3/02
Days		0	106	288	371	455	554
Tetrachloroethene	µg/L	82.8	120	216	227	16.2	80.5
Trichloroethene	µg/L	85.9	114	216	132	13.9	77.2
cis-1,2-Dichloroethene	µg/L	784	897	1950	988	69.6	501
trans-1,2-Dichloroethene	µg/L	3.6	4.7	11.9	8.0	<0.31	3.0
Vinyl Chloride	µg/L	38.6	58.6	112	74	4.6	26.2
Ethene	µg/L	<6	<6	1.6	<1.3	1.1	<1.3
Acetylene	µg/L			<1.2	<1.2	<1.2	<1.2
1,1,1-Trichloroethane	µg/L	40	36.7	32.2	19.7	1.2	4.3
1,1-Dichloroethane	µg/L	323	351	476	305	17	96.8
1,2-Dichloroethane	µg/L	2.6	2.3	2.8	<0.23	<0.23	<0.23
1,1-Dichloroethene	µg/L	60.6	60.4	75.5	43.6	2.8	13.3
Chloroethane	µg/L	<0.30	<0.18	<0.61	<0.61	<0.24	<0.24
Ethane	µg/L	5.8	6.7	23	8.7	2.7	1.8
Acetone	µg/L	<1.48	<1.44	18.7	<3.12	<1.13	<1.13
Methylene Chloride	µg/L	<0.41	<0.15	<0.54	<0.54	<0.21	<0.21
2-Butanone	µg/L	<2.5	<6.25	<5.0	<5.0	<3.8	<3.8
Toluene	µg/L	<0.15	<0.14	<0.14	<0.14	<0.20	<0.20
Benzene	µg/L	7.1	7.1	8.0	4.7	<0.21	2.0
p-Ethyltoluene	µg/L	<0.16	<0.22	<0.24	<0.24	<0.16	<0.16
1,3,5-Trimethylbenzene	µg/L	<0.34	<0.11	<0.20	<0.20	<0.20	<0.20
2-Chlorotoluene	µg/L	16.3	43.2	76.4	27.8	2.5	10.2
4-Chlorotoluene	µg/L						
1,2,4-Trimethylbenzene	µg/L	<0.22	<0.22	<0.17	<0.17	<0.17	<0.17
Naphthalene	µg/L	<0.19	<0.41	<0.14	<0.14	<0.29	<0.29
o-Xylene	µg/L	<0.16	<0.16	<0.20	<0.20	<0.25	<0.25
n-Propylbenzene	µg/L	<0.21	<0.31	<0.21	<0.21	<0.25	<0.16
Methyl t-Butyl Ether	µg/L	<0.28	<0.080	<0.34	<0.34	<0.18	<0.18
Sum VOAs (w/o Gases)	µg/L	1445	1695	3196	1830	128	815
Methane	mg/L	12	21	250	110	140	920
Iron, Total	mg/L	0.54	0.48	0.93	0.76	0.27	5.04
Sulfate	mg/L	597	579	648	366	22.7	377
Nitrate-Nitrogen	mg/L	3.95	4.68	3.54	4.84	2.15	3.42
Total Organic Carbon	mg/L	9.52	13.3	<0.94	15.4	<0.51	6.0

Table 2. Photocircuits Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

Contaminant	Well	MW-14					MW-7						
Date		8/31/00	10/19/00	12/20/00	3/28/01	7/11/01	1/8/02	8/31/00	10/19/00	12/20/00	3/27/01	7/11/01	1/8/02
Tetrachloroethene	µM		<0.0084	<0.0024	<0.033	<0.024	<0.014	<0.0024	<0.0034	<0.0024	<0.013	<0.0012	<0.00072
Trichloroethene	µM	<0.0065	<0.010	<0.0065	<0.076	<0.026	<0.026	<0.0065	0.15	<0.0065	<0.030	0.12	0.021
cis-1,2-Dichloroethene	µM	<0.0098	<0.018	<0.0098	<0.15	<0.029	<0.037	0.49	2.9	3.7	1.5	1.9	0.086
trans-1,2-Dichloroethene	µM	<0.014	<0.014	<0.014	<0.11	<0.021	<0.060	<0.014	<0.0058	<0.014	<0.045	0.027	0.022
Vinyl Chloride	µM	<0.028	0.17	<0.028	1.8	2.3	2.8	0.63	1.1	2.2	1.0	1.0	0.17
Ethene	µM	1.5	1.7	2.1	2.3	4.6	3.2	2.3	6.1	3.9	1.2	3.4	3.9
Acetylene	µM						0.22						<0.046
1,1,1-Trichloroethane	µM	0.11	<0.013	0.067	7.5	15.3	11.4	<0.0041	<0.046	<0.0041	<0.030	<0.0012	<0.0010
1,1-Dichloroethane	µM	1.3	2.2	3.0	93.2	189.9	142.4	1.2	2.2	2.7	1.4	2.1	1.9
1,2-Dichloroethane	µM	<0.0081	<0.0096	<0.0081	<0.10	0.35	<0.032	<0.0081	<0.0038	<0.0081	<0.040	<0.0013	0.037
1,1-Dichloroethene	µM	<0.011	0.065	<0.011	4.6	7.8	5.6	<0.011	<0.0099	<0.011	<0.037	0.020	<0.0023
Chloroethane	µM	0.24	<0.019	<0.026	2.0	4.6	7.8	4.0	2.8	3.1	2.5	4.2	6.0
Ethane	µM	1.7	2.3	1.6	1.1	2.2	1.6	<0.20	4.3	2.7	1.1	2.4	2.3

Contaminant	Well	SMP-1					DMP-1											
Date		8/31/00	10/18/00	12/20/00	3/27/01	7/11/01	1/8/02	4/2/02	6/25/02	10/2/02	8/31/00	10/18/00	12/20/00	3/27/01	7/11/01	1/8/02	4/2/02	6/25/02	10/2/02
Tetrachloroethene	µM	<0.096	<0.0024	<0.13	<0.033	<0.012	<0.036	<0.091	<0.042	<0.0013	<0.0024	<0.00048	<0.0024	<0.033	<0.0060	<0.0036	<0.0037	0.0066	<0.00066
Trichloroethene	µM	<0.026	0.60	6.5	11.6	0.19	33.6	202.4	0.31	<0.0055	<0.0065	<0.0018	<0.0065	<0.076	0.034	<0.0065	0.22	0.080	0.012
cis-1,2-Dichloroethene	µM	257	387	311	<0.0028	127	186	439	265	7.0	0.52	0.018	0.179567	0.76	0.40	<0.0093	0.46	0.64	1.3
trans-1,2-Dichloroethene	µM	<0.56	0.72	<0.41	1.4	0.36	0.71	3.9	<0.16	<0.0064	<0.014	<0.0028	<0.014	<0.11	<0.0072	<0.014	0.040	0.029	0.043
Vinyl Chloride	µM	75	96	81	76	68	56	28	143	41	3.0	0.056	0.640	2.0	0.68	<0.068	0.99	0.41	2.9
Ethene	µM	33	86	41	32	68	23	29	65	133	20	39	33	25	3.9	3.3	5.7	7.5	15.4
Acetylene	µM						<0.42	0.28	<0.046	<0.085						<0.046	<0.046	<0.046	<0.046
1,1,1-Trichloroethane	µM	<0.16	<0.0041	<0.25	2.7	1.2	<0.052	<0.082	<0.097	<0.0039	<0.0041	<0.00082	<0.0041	1.4	0.21	<0.0052	<0.0033	0.0067	<0.0019
1,1-Dichloroethane	µM	5.1	4.9	6.3	7.2	5.4	4.6	3.7	3.0	2.0	0.93	0.18	3.61	11	13	4.3	2.4	4.2	4.2
1,2-Dichloroethane	µM	<0.32	<0.0081	<0.17	<0.033	<0.033	<0.081	<0.12	<0.12	<0.0048	<0.0081	<0.0016	<0.0081	<0.10	0.15	<0.0081	<0.0046	0.029	0.023
1,1-Dichloroethene	µM	<0.43	0.66	<0.27	1.9	0.57	1.5	3.1	0.52	<0.0056	<0.011	<0.0022	<0.011	<0.093	<0.0071	<0.011	<0.0062	<0.0028	<0.0027
Chloroethane	µM	<1.1	1.1	<0.82	<0.23	<0.23	<0.52	<0.47	<0.19	0.58	51.0	0.67	3.60	2.5	3.0	1.5	1.1	0.57	0.24
Ethane	µM	<0.20	<0.20	<0.83	<0.83	<0.83	<0.43	<0.43	0.12	0.15	<0.20	<0.20	<1.7	<3.3	<1.7	0.027	<0.043	0.060	0.057

Contaminant	Well	SMP-3					DMP-3											
Date		9/1/00	10/19/00	12/20/00	3/27/01	7/11/01	1/8/02	4/2/02	6/25/02	10/2/02	9/1/00	10/19/00	12/20/00	3/27/01	7/11/01	1/8/02	4/2/02	6/25/02	10/2/02
Tetrachloroethene	µM	<0.48	<0.48	<0.048	0.083	0.074	<0.036	<0.14	<0.033	0.058	<0.097	0.36	<0.024	<0.0066	0.44	0.21	<0.072	<0.013	<0.00066
Trichloroethene	µM	<1.3	<1.3	<0.13	<0.0015	<0.013	<0.065	<0.26	<0.14	0.073	<0.26	<0.10	<0.065	<0.015	0.065	<0.065	<0.061	<0.055	<0.0029
cis-1,2-Dichloroethene	µM	<2.0	<2.0	<0.20	0.024	0.17	<0.093	<0.37	<0.12	0.077	<0.39	<0.18	<0.098	<0.031	0.15	<0.093	<0.11	<0.050	0.017
trans-1,2-Dichloroethene	µM	<2.8	<2.8	<0.28	<0.0023	<0.014	<0.14	<0.58	<0.16	0.018	<0.56	<0.14	<0.14	<0.023	<0.014	<0.14	<0.10	<0.064	0.013
Vinyl Chloride	µM	<5.6	<5.6	<0.56	0.62	1.6	<0.68	<2.72	1.9	1.7	17	15	13	2.3	12.6	10.5	6.4	1.8	1.0
Ethene	µM	3.0	3.5	1.4	0.64	3.9	6.4	7.9	9.3	4.6	15.4	16.1	11.1	10.4	17.5	12.9	7.9	22	19.6
Acetylene	µM						0.081	0.21	0.085	0.24						<0.046	<0.046	<0.046	<0.046
1,1,1-Trichloroethane	µM	1334	1762	244	253	98	109	57	60	42	148	107	175	5.9	180	146	87	10	1.8
1,1-Dichloroethane	µM	386	483	48	<0.0051	178	89	207	109	77	53	49	42	7.7	32.8	22.8	38.1	24	40.2
1,2-Dichloroethane	µM	<1.6	<1.6	<0.16	0.061	0.21	<0.081	<0.32	<0.12	0.017	<0.32	<0.096	<0.081	<0.020	0.26	<0.081	<0.112	0.37	0.30
1,1-Dichloroethene	µM	<2.2	<2.2	<0.22	<0.0028	1.7	1.5	<0.45	1.2	3.5	1.6	<0.25	<0.11	<0.018	1.7	<0.11	<0.15	0.18	0.058
Chloroethane	µM	<5.1	<5.1	<0.51	1.2	6.4	5.4	<2.1	5.5	7.9	83	108	58	11	103	35	29	157	134
Ethane	µM	1.3	1.5	1.4	0.77	0.97	0.57	1.20	1.1	0.4	0.19	0.31	1.5	0.40	0.27	0.29	0.53	1.0	0.87

Table 2. Photocircuits Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

Contaminant	Well	SMP-4					DMP-4										
Date		9/1/00	10/19/00	12/20/00	3/27/01	7/11/01	1/8/02	6/25/02	10/2/02	9/1/00	10/19/00	12/20/00	3/27/01	7/11/01	1/8/02	4/2/02	6/25/02	10/2/02
Tetrachloroethene	µM	0.080	<0.0034	<0.0048	<0.033	0.056	0.193	0.42	0.23	<0.0024	<0.00048	<0.00048	<0.00066	<0.012	<0.0072	<0.0029	<0.0033	<0.00066
Trichloroethene	µM	<0.0065	<0.041	<0.013	<0.076	<0.076	<0.076	0.049	<0.0027	<0.0065	<0.013	<0.013	<0.0015	<0.013	<0.013	<0.0024	<0.14	<0.0027
cis-1,2-Dichloroethene	µM	1.5	<0.070	<0.0020	<0.15	0.11	<0.026	0.31	0.28	<0.0098	<0.020	<0.0020	<0.0031	<0.014	<0.019	<0.0043	<0.012	<0.0025
trans-1,2-Dichloroethene	µM	<0.014	<0.058	<0.0028	<0.11	<0.014	<0.058	<0.0064	<0.0032	<0.014	<0.028	<0.0028	0.035	<0.014	<0.029	<0.0041	<0.016	0.020
Vinyl Chloride	µM	2.8	0.55	0.60	1.2	1.8	2.0	0.078	0.034	<0.028	<0.056	<0.0056	0.046	<0.011	<0.14	<0.0032	<0.018	0.086
Ethene	µM	7.9	6.8	7.9	6.1	5.7	12.1	3.1	1.0	8.9	9.3	7.9	5.7	<0.21	8.2	5.4	7.1	5.0
Acetylene	µM						<0.046	<0.046	<0.046						<0.046	<0.046	<0.046	<0.046
1,1,1-Trichloroethane	µM	24	1.8	7.5	23	20	20	0.17	0.086	0.42	0.97	<0.00082	0.11	0.14	<0.010	<0.0033	<0.0097	<0.0019
1,1-Dichloroethane	µM	41	18	12	23	33	29	1.4	1.5	0.30	0.20	<0.0014	0.51	0.30	0.16	0.39	0.79	0.79
1,2-Dichloroethane	µM	0.26	<0.038	<0.016	<0.10	0.20	<0.032	<0.0046	0.030	<0.0081	<0.016	<0.0016	0.088	<0.013	<0.016	<0.0046	0.066	0.10
1,1-Dichloroethene	µM	1.1	<0.099	<0.022	<0.093	0.50	1.3	<0.0056	<0.0028	<0.011	<0.022	<0.0022	<0.0019	<0.014	<0.022	<0.062	<0.014	<0.0028
Chloroethane	µM	19	13	47	25	15	12	2.3	7.1	38	40	51	57	42	19	20	21	50
Ethane	µM	<0.20	<0.20	1.3	<0.33	<0.33	0.080	0.40	0.090	<0.20	<0.20	1.2	<0.20	<0.20	0.080	<0.043	0.16	0.04

Contaminant	Well	MW-8						MW-9			MW-12					
Date		3/28/01	7/12/01	1/8/02	4/3/02	6/25/02	10/3/02	3/28/01	7/12/01	1/8/02	3/28/01	7/12/01	1/9/02	4/3/02	6/26/02	10/3/02
Tetrachloroethene	µM	<0.00066	<0.0012	<0.00072	<0.0014	<0.0013	<0.0066	<0.00066	<0.0012	<0.0014	<0.00066	<0.0012	<0.0144	<0.014	<0.0066	<0.0033
Trichloroethene	µM	0.014	0.013	0.0074	<0.0012	<0.0055	<0.0027	<0.0015	<0.0013	<0.0012	0.93	0.0071	0.13	0.24	0.52	0.63
cis-1,2-Dichloroethene	µM	<0.0031	0.012	<0.0019	<0.022	<0.0050	<0.0025	<0.0031	<0.014	<0.0022	13.2	0.19	4.4	5.2	4.8	5.0
trans-1,2-Dichloroethene	µM	<0.0022	<0.0014	<0.0029	<0.0021	<0.0064	<0.0032	<0.0022	<0.0014	<0.0021	0.075	<0.0014	0.058	<0.021	<0.032	<0.016
Vinyl Chloride	µM	<0.0040	<0.0011	<0.014	<0.0016	<0.0074	<0.0037	<0.0040	<0.0011	<0.0016	3.9	0.091	4.8	5.3	2.416	1.3
Ethene	µM	<0.21	<0.21	<0.046	<0.046	0.043	<0.0046	<0.21	<0.21		0.24	2.5	6.4	4.6	6.8	0.61
Acetylene	µM			<0.046	<0.046	<0.046	<0.046						<0.046	<0.046	<0.046	<0.046
1,1,1-Trichloroethane	µM	<0.0015	<0.0012	<0.0010	<0.0016	<0.0039	<0.0020	<0.0015	<0.0012	<0.0016	<0.0015	<0.0012	<0.0016	<0.016	<0.019	<0.0097
1,1-Dichloroethane	µM	<0.0014	<0.0012	<0.0025	<0.0022	<0.0062	<0.0030	<0.0014	<0.0012	<0.0023	0.73	0.037	3.3	6.9	3.48	1.0
1,2-Dichloroethane	µM	<0.0020	<0.0013	<0.0016	<0.0023	<0.0046	<0.0023	<0.0020	<0.0013	<0.0023	0.029	<0.0013	0.014	<0.023	<0.023	<0.012
1,1-Dichloroethene	µM	<0.0019	<0.0014	<0.0023	<0.0030	<0.0056	<0.0028	<0.0019	<0.0014	<0.0030	0.087	<0.0014	0.024	<0.0031	<0.011	<0.014
Chloroethane	µM	<0.0047	<0.0028	<0.010	<0.0095	<0.0074	0.057	<0.0047	<0.0028	<0.0095	<0.0047	<0.0047	0.095	<0.095	<0.037	<0.019
Ethane	µM	<0.20	<0.20	<0.043	<0.043	<0.043	<0.043	<0.20	<0.20		<0.20	0.43	0.73	0.37	0.60	0.027

Contaminant	Well	MW-13					
Date		3/28/01	7/12/01	1/10/02	4/3/02	6/26/02	10/3/02
Tetrachloroethene	µM	0.499	0.72	1.3	1.4	0.10	0.49
Trichloroethene	µM	0.65	0.87	1.6	1.0	0.11	0.59
cis-1,2-Dichloroethene	µM	8.1	9.3	20.1	10.2	0.72	5.2
trans-1,2-Dichloroethene	µM	0.037	0.049	0.123	0.083	<0.0032	0.031
Vinyl Chloride	µM	0.62	0.94	1.8	1.2	0.074	0.42
Ethene	µM	<0.21	<0.21	0.057	<0.046	0.039	<0.046
Acetylene	µM			<0.046	<0.046	<0.046	<0.046
1,1,1-Trichloroethane	µM	0.30	0.28	0.24	0.15	0.0090	0.032
1,1-Dichloroethane	µM	3.26	3.5	4.8	3.1	0.17	0.98
1,2-Dichloroethane	µM	0.026	0.023	0.028	<0.002	<0.0023	<0.0023
1,1-Dichloroethene	µM	0.63	0.62	0.78	0.45	0.029	0.14
Chloroethane	µM	<0.0047	<0.0025	<0.0095	<0.0095	<0.0037	<0.0037
Ethane	µM	0.19	0.22	0.77	0.29	0.090	0.060

Table 3. Photocircuits Anaerobic Pilot Field Data

Well		MW-7		SMP-1				DMP-1				SMP-3			
Well Depth	**ft**	**23.2**		**9.1**				**19.04**				**14.6**			
Well Diameter	**inch**	**4**		**1**				**1**				**1**			
Date		**1/8/02**	**4/2/02**	**1/8/02**	**4/2/02**	**6/25/02**	**10/2/02**	**1/8/02**	**4/2/02**	**6/25/02**	**10/2/02**	**1/8/02**	**4/2/02**	**6/25/02**	**10/2/02**
Water Level	ft	7.12		6.42				6.88				6.8			
pH		7.36	7.1	7.48	7.3	7.5	7.3	7.29		7.3	7.4	9.94	8.7	8.8	8.8
Temperature	°C	17.9	16.81	11.64	14.84	18.74	24.80	17.85		17.7	21.27	12.06	11.47	19.18	22.80
Spec. Conductivity	umhos/cm	4235	4100	2660	5250	3468	22	5560		3597	4838	5550	5640	5890	4058
Redox PotenIAL	mV	-53	-40	31	-130	-84	-76	-142		-154	-153	-44	-52	-95	-120
Dissolved Oxygen	mg/L	0.36	0.45	2.27	1.72	5.37	4.22	1.98		2.55	1.74	3.87	2.94	1.16	2.16
Bromide	mg/L				20	39			311	977			5	55	

Well		DMP-3				SMP-4				DMP-4			
Well Depth	**ft**	**24.35**				**15.82**				**20.55**			
Well Diameter	**inch**	**1**				**1**				**1**			
Date		**1/8/02**	**4/2/02**	**6/25/02**	**10/2/02**	**1/8/02**	**4/2/02**	**6/25/02**	**10/2/02**	**1/8/02**	**4/2/02**	**6/25/02**	**10/2/02**
Water Level	ft	6.91				6.82				6.71			
pH		6.91	7.1	6.3	6.6	7.62	7.5	5.26	6.1	7.07	7.1	6.7	7.1
Temperature	°C	17.95	16.14	16.94	19.65	16.54	14.82	18.77	22.40	17.64	16.2	17.2	20.42
Spec. Conductivity	umhos/cm	3200	3120	3929	5863	5186	5130	4440	5530	2716	3140	2853	4480
Redox PotenIAL	mV	-120	-110	-146	-154	-165	-170	-25	-35	-121	-80	-176	-178
Dissolved Oxygen	mg/L	1.57	1.43	0.21	0.59	0.73	0.65	7.5	1.32	0.41	0.72	0.58	0.61
Bromide	mg/L		16	179				336			38	19	

Well		MW-8				MW-9	MW-12			MW-13		
Well Depth	**ft**	**>102**										
Well Diameter	**inch**	**4**										
Date		**1/8/02**	**4/2/02**	**6/25/02**	**10/3/02**	**4/2/02**	**4/2/02**	**6/25/02**	**10/3/02**	**4/2/02**	**6/25/02**	**10/3/02**
Water Level	ft	7.96										
pH		8.65	8.4	6.43	8.17	7.1	6.5	6.63	6.6	6.2	6.56	6.61
Temperature	°C	15.43	14.87	12.89	13.46	14.26	14.2	14.6	16.27	16.9	16.00	17.94
Spec. Conductivity	umhos/cm	183	190	221	173	200	4120	4680	4130	1520	960	1558
Redox PotenIAL	mV	240	270	273	84	250	-30	-136	-122	300	279	-10
Dissolved Oxygen	mg/L	8.78	5.32	4.62	10.3	0.92	0.7	0.38	1.14	1.21	0.48	0.6
Bromide	mg/L		5.8	2.0			11	4.1		7.4	0.6	

Table 4. Photocircuits Anaerobic Pilot Percent Change Between 9/1/00 and 1/8/02 or 10/2/02

% Change Between 9/1/00 and 1/8/02 or 10/2/02								
Compound	MW-14	MW-7	SMP-1	DMP-1	SMP-3	DMP-3	SMP-4	DMP-4
Last Sampled	1/8/02	1/8/02	10/2/02	10/2/02	10/2/02	10/2/02	10/2/02	10/2/02
Acetone	-908	0	0	99	96	68	-4379	0
Methylene Chloride	-787	38	100	97	99	86	97	-18
Toluene	-733	85	-83	98	66	87	100	-77
2-Chlorotoluene	0	-888	0	-17	87	45	99	58
Sum VOAs (w/o gases)	-4529	-33	88	93	93	59	87	-27
Methane	-18195	-665	24	69	-640	-695	-633	-4678
Iron	-405	-490	38	95	80	36	-1357	67
Sulfate	92	-813	43	96	-95	-868	92	-69
TOC	89	96	-52	80	86	-105	-4900	-79
PCE	0	0	0	0	88	0	-184	0
TCE	0	-218	0	-88	98	0	0	0
cDCE	0	82	97	-152	96	96	81	0
tDCE	0	-56	0	-211	77	98	-56	-41
VC	-9786	73	46	4	70	94	83	-209
Ethene	-109	-75	-299	23	-55	-28	99	44
1TCA	-10456	0	0	0	97	99	95	100
1DCA	-11090	-58	61	-351	80	24	100	-163
1DCE	-51519	0	0	0	-60	96	100	0
CA	-3112	-51	48	100	-54	-61	62	-34
Ethane	6	-1033	23	72	72	-356	55	82

% Change Between 3/28/00 and 10/3/02				
Compound	MW-8	MW-9	MW-12	MW-13
Acetone	0		0	0
Methylene Chloride	0		0	0
Toluene	0		-3	0
2-Chlorotoluene	0		-41	37
Sum VOAs (w/o gases)	-106		17	44
Methane	48		26	-7567
Iron	-900		-409	-833
Sulfate	94		2	37
TOC	5		98	37
PCE	0		0	3
TCE	80		32	10
cDCE	0		62	36
tDCE	0		79	17
VC	0		66	32
Ethene	0		-154	0
1TCA	0		0	89
1DCA	0		-30	70
1DCE	0		84	78
CA	-1133		0	0
Ethane	0		87	69

Table 5. % Change Between 3/28/01 and 10/3/02

Compound Last Sampled	MW-8 10/3/02	MW-9 1/8/02	MW-12 10/3/02	MW-13 10/3/02
Acetone	0		0	0
Methylene Chloride	0		0	0
Toluene	0		<-3	0
2-Chlorotoluene	0		-41	37
Sum VOAs (w/o gases)	-106		17	44
Methane	48		26	-7567
Iron	-900		-409	-833
Sulfate	94		2	37
TOC	5		98	37
PCE	0		0	3
TCE	80		32	10
cDCE	0		62	36
tDCE	0		>79	17
VC	0		66	32
Ethene	0		-154	0
1TCA	0		0	89
1DCA	0		-30	70
1DCE	0		>84	78
CA	-1133		0	0.0
Ethane	0		<87	69

Table 6. Summary of Changes in Concentrations of Chloroethenes, Chloroethanes, Electron Acceptors, and Electron Donor by Well

Well	Chlorinated Ethene Dechlorination	Chlorinated Ethane Dechlorination	Electron Acceptors	Electron Donor Availability
MW-14	Ethene predominant, VC increasing since March 2001. Not sampled 4/02 or 6/02 because of emulsion.	1TCA, 1DCA, 1DCE, and CA, increased between December 2000 and January 2002 as contaminated water displaced by emulsion moved back into well, ethane fairly stable.	Sulfate decreased by 92%, methane and iron up greatly.	TOC availability good. Emulsion found 4/02, 6/02, and 10/02.
MW-7	Ethene generally predominant product, TCE up slightly. cDCE and VC down by 82 and 73% from start of pilot. tDCE up slightly. Not sampled 4/02 or 6/02 because of emulsion.	1DCA and CA up, CA major product. Ethane produced. Not sampled 4/02, 6/02, or 10/02 because of emulsion.	Sulfate increased from 69 to 949 mg/L from 7/11/01 to 1/8/02, methane and iron up greatly.	TOC had fallen to 1.7 mg/L in ½. Emulsion found 4/02, 6/02, and 10/02.
SMP-1	TCE and cDCE up beginning in January 2002, but fell between April and October 2002 as VC increased and then fell. Ethene increased as more substrate became available.	No 1TCA detected 10/2/02, 1DCA and 1DCE down. Little CA or ethane.	Sulfate down 43% from start of pilot; sulfate levels decreasing with higher substrate. Methane and iron down from start of pilot.	TOC rebounded to 139 mg/L in 10/02; enhanced dechlorination.
DMP-1	TCE, cDCE, and tDCE up slightly in 10/02, VC decreased by 4% as of 10/2/02, ethene predominant product, increased in 10/2/02.	1DCA up 351%, CA down by 99.5%, little ethane detected.	Sulfate down 96%, methane and iron also down.	TOC increased from 24 mg/L in 6/02 to 59 mg/L in 10/02. Adequate supply.
SMP-3	PCE, TCE, cDCE, and tDCE concentrations down by 77 to 98% in October 2002. VC detected, but ethene predominant product.	1TCA down by 97%, 1DCA down 80%, 1DCE and CA increasing, and some ethane.	Sulfate decreased from 3,640 mg/L in April 2002 to 558 mg/L in October 2002, methane decreased since June 2002, and iron variable.	TOC in April 2002 up to 1,600 mg/L; less than optimal levels in October 2002 (40 mg/L)
DMP-3	PCE and TCE not detected 10/2/02. cDCE down by 96, tDCE down 98%, and VC down 94%, ethene major product and increasing.	1TCA down by 93%, 1DCA down 72%, and 1DCE down by 47%. CA increased by 7%. Ethane increasing.	Sulfate stable, methane and iron increasing.	TOC increased to 349 mg/L in 6/02.
SMP-4	PCE and TCE up slightly, cDCE, tDCE, and VC down, ethene decreased, but still predominant.	1TCA, 1DCA, 1DCE, and CA down, but little ethane.	Sulfate decreased by 92%, methane, and iron increasing.	TOC of 3,680 found on 10/2/02.
DMP-4	Low levels of tDCE and VC in 10/02, but ethene .is predominant product.	1TCA down >99.5, 1DCA up 163%, 1DCE non-detect 10/2/02. CA predominant product, but increasing. Little ethane.	Sulfate up 32%, iron down, and methane increased.	TOC increased to 78 mg/L in October 2002, adequate levels.

Table 6 continued. Summary of Changes in Concentrations of Chloroethenes, Chloroethanes, Electron Acceptors, and Electron Donor by Well

Well	Chlorinated Ethene Dechlorination	Chlorinated Ethane Dechlorination	Electron Acceptors	Electron Donor Availability
MW-8	PCE, TCE, cDCE, tDCE, VC and ethene not detected 10/02.. .	Low level of CA detected on 10/3/02.	Little sulfate, iron, or methane.	Little TOC available.
MW-9	No chlorinated ethenes or ethene detected in January 2002.	No chlorinated ethanes or ethane detected.	Low sulfate, some methane and iron.	Little TOC available.
MW-12	TCE, cDCE, tDCE, and VC decreasing, ethene increasing	1DCA increasing, 1TCA, 1DCE, and CA not detected, ethane detected at low level.	Sulfate and methane decreased, iron increased.	TOC level fell to 29 mg/L in October 2002; inadequate levels. .
MW-13	Decreases in PCE, TCE, cDCE, tDCE, and VC concentrations, trace ethene.	Decreases in 1TCA (89%), 1DCA (70%), 1DCE (78%), and ethane (53%) concentrations. No CA.	Methane and iron increased, and sulfate down 37%.	TOC level of 6.0 mg/L in October 2002, below optimal.

Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735
Phone - 631-249-1456 Fax - 631-249-8344

12/27/2002

Custody Document: M9297

Received: 12/19/2002 15:35
Sampled by: Juan Serrano

Client: Photo Circuits

31 Sea Cliff Avenue
Glen Cove,
NY 11542

Project: PhotoCircuits Corp.

31 Sea Cliff Avenue
Glen Cove,
NY 11542

Manager: Charlie Nehrig

Respectfully submitted,

Laboratory Manager

KA.

NYS Lab ID # 10969
NJ Cert. # 73812
CT Cert. # PH0645
MA Cert. # NY061
PA Cert. # 68-535
NH Cert. # 252592-BA
RI Cert. # 161

Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735
Phone - 631-249-1456 Fax - 631-249-8344

12/27/2002

Volatiles - EPA 8260B in AIR

Sample: M9297-1

Client Sample ID: 45A SVE After 24 Hr. Sparging
Matrix: Air Type: Grab
Remarks:
Analyzed Date: 12/26/2002

Collected: 12/12/2002 12:00

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C 812 -7063	0.065	0.065	mg/M3	U
74-87-3	Chloromethane	C 812 -7063	0.056	0.056	mg/M3	U
75-01-4	Vinyl Chloride	C 812 -7063	0.057	0.057	mg/M3	U
74-83-9	Bromomethane	C 812 -7063	0.016	0.016	mg/M3	U
75-00-3	Chloroethane	C 812 -7063	0.041	0.041	mg/M3	U
75-69-4	Trichlorofluoromethane	C 812 -7063	0.022	0.022	mg/M3	U
75-35-4	1,1-Dichloroethene	C 812 -7063	0.048	0.048	mg/M3	U
75-09-2	Methylene Chloride	C 812 -7063	0.075	**0.27**	mg/M3	
156-60-5	t-1,2-Dichloroethene	C 812 -7063	0.065	0.065	mg/M3	U
75-34-3	1,1-Dichloroethane	C 812 -7063	0.10	0.10	mg/M3	U
590-20-7	2,2-Dichloropropane	C 812 -7063	0.024	0.024	mg/M3	U
156-59-2	c-1,2-Dichloroethene	C 812 -7063	0.041	0.041	mg/M3	U
67-66-3	Chloroform	C 812 -7063	0.020	0.020	mg/M3	U
74-97-5	Bromochloromethane	C 812 -7063	0.023	0.023	mg/M3	U
71-55-6	1,1,1-Trichloroethane	C 812 -7063	0.034	0.034	mg/M3	U
563-58-6	1,1-Dichloropropene	C 812 -7063	0.091	0.091	mg/M3	U
56-23-5	Carbon Tetrachloride	C 812 -7063	0.030	0.030	mg/M3	U
107-06-2	1,2 Dichloroethane	C 812 -7063	0.027	0.027	mg/M3	U
71-43-2	Benzene	C 812 -7063	0.024	0.024	mg/M3	U
79-01-6	Trichloroethene	C 812 -7063	0.038	0.038	mg/M3	U
78-87-5	1,2-Dichloropropane	C 812 -7063	0.033	0.033	mg/M3	U
75-27-4	Bromodichloromethane	C 812 -7063	0.023	0.023	mg/M3	U
74-95-3	Dibromomethane	C 812 -7063	0.024	0.024	mg/M3	U
10061-01-5	c-1,3-Dichloropropene	C 812 -7063	0.020	0.020	mg/M3	U
108-88-3	Toluene	C 812 -7063	0.033	0.033	mg/M3	U
10061-02-6	t-1,3-Dichloropropene	C 812 -7063	0.020	0.020	mg/M3	U
79-00-5	1,1,2-Trichloroethane	C 812 -7063	0.027	0.027	mg/M3	U
142-28-9	1,3-Dichloropropane	C 812 -7063	0.022	0.022	mg/M3	U
127-18-4	Tetrachloroethene	C 812 -7063	0.048	**7.30**	mg/M3	
124-48-1	Dibromochloromethane	C 812 -7063	0.019	0.019	mg/M3	U
106-93-4	1,2-Dibromoethane	C 812 -7063	0.031	0.031	mg/M3	U
108-90-7	Chlorobenzene	C 812 -7063	0.039	0.039	mg/M3	U
630-20-6	1,1,1,2-Tetrachloroethane	C 812 -7063	0.048	0.048	mg/M3	U
100-41-4	Ethylbenzene	C 812 -7063	0.048	0.048	mg/M3	U

Environmental Testing Laboratories, Inc.
208 Route 109, Farmingdale NY 11735
Phone - 631-249-1456 Fax - 631-249-8344

12/27/2002

Volatiles - EPA 8260B in AIR

Sample: M9297-1...continue
Client Sample ID: 45A SVE After 24 Hr. Sparging
Matrix: Air Type: Grab
Remarks:
Analyzed Date: 12/26/2002

Collected: 12/12/2002 12:00

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-38-3	m,p-xylene	C 812 -7063	0.061	0.061	mg/M3	U
95-47-6	o-xylene	C 812 -7063	0.042	0.042	mg/M3	U
100-42-5	Styrene	C 812 -7063	0.031	0.031	mg/M3	U
98-82-8	Isopropylbenzene	C 812 -7063	0.035	0.035	mg/M3	U
75-25-2	Bromoform	C 812 -7063	0.012	0.012	mg/M3	U
79-34-5	1,1,2,2-Tetrachloroethane	C 812 -7063	0.030	0.030	mg/M3	U
96-18-4	1,2,3-Trichloropropane	C 812 -7063	0.084	0.084	mg/M3	U
103-65-1	n-Propylbenzene	C 812 -7063	0.029	0.029	mg/M3	U
108-86-1	Bromobenzene	C 812 -7063	0.037	0.037	mg/M3	U
108-67-8	1,3,5-Trimethylbenzene	C 812 -7063	0.046	0.046	mg/M3	U
95-49-8	2-Chlorotoluene	C 812 -7063	0.029	0.029	mg/M3	U
106-43-4	4-Chlorotoluene	C 812 -7063	0.049	0.049	mg/M3	U
99-87-6	4-Isopropyltoluene	C 812 -7063	0.033	0.033	mg/M3	U
95-63-6	1,2,4-trimethylbenzene	C 812 -7063	0.030	0.030	mg/M3	U
135-98-8	sec-Butylbenzene	C 812 -7063	0.038	0.038	mg/M3	U
98-06-6	tert-Butylbenzene	C 812 -7063	0.050	0.050	mg/M3	U
541-73-1	1,3 Dichlorobenzene	C 812 -7063	0.042	0.042	mg/M3	U
106-46-7	1,4-Dichlorobenzene	C 812 -7063	0.026	0.026	mg/M3	U
104-51-8	n-Butylbenzene	C 812 -7063	0.016	0.016	mg/M3	U
95-50-1	1,2-Dichlorobenzene	C 812 -7063	0.037	0.037	mg/M3	U
96-12-8	1,2-Dibromo-3-chloropropane	C 812 -7063	0.072	0.072	mg/M3	U
120-82-1	1,2,4-Trichlorobenzene	C 812 -7063	0.026	0.026	mg/M3	U
87-68-3	Hexachlorobutadiene	C 812 -7063	0.045	0.045	mg/M3	U
91-20-3	Naphthalene	C 812 -7063	0.026	0.026	mg/M3	U
87-61-6	1,2,3-Trichlorobenzene	C 812 -7063	0.031	0.031	mg/M3	U
1634-04-4	MTBE	C 812 -7063	0.13	0.13	mg/M3	U

Surrogate Results

Cas No	Analyte	File ID	DF	Recovery %	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	C 812 -7063	1.00	97.1	70 - 130	
1868-53-7	DIBROMOFLUOROMETHANE	C 812 -7063	1.00	94.1	70 - 130	
2037-26-5	TOLUENE-D8	C 812 -7063	1.00	100	70 - 130	

Environmental Testing Laboratories, Inc.

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12/27/2002

Case Narrative

8260:

The following compounds were calibrated at 25, 50, 100, 150 and 200 ppb levels in the initial calibration curve:

Acetone
2-Butanone
4-Methyl-2-pentanone
2-Hexanone

M&P-Xylenes were calibrated at 10, 40, 100, 200 and 300 ppb levels.

All other compounds were calibrated at 5, 20, 50, 100 and 150 ppb levels.

Samples were quantitated using the continuing calibration standard response factor as opposed to the initial calibration average response factor.

Reviewed by: _____

Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

Phone - 631-249-1456 Fax - 631-249-8344

12/27/2002

ORGANIC METHOD QUALIFIERS

Q - Qualifier - specified entries and their meanings are as follows:

U - The analytical result is a non-detect.

J - Indicates an estimated value. The concentration reported was detected below the Method Detection Limit.

B - The analyte was found in the associated method blank as well as the sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

E - The concentration of the analyte exceeded the calibration range of the instrument.

D - This flag identifies all compounds identified in an analysis at a secondary dilution. In the case of a surrogate this flag indicates a system monitoring compound diluted out.

INORGANIC METHOD QUALIFIERS

C - (Concentration) qualifiers are as follows:

B - Entered if the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

U - Entered when the analyte was analyzed for, but not detected.

Q - Qualifier specific entries and their meanings are as follows:

E - Reported value is estimated because of the presence of interferences.

M - (Method) qualifiers are as follows:

A - Flame AA

AS - Semi-automated Spectrophotometric

AV - Automated Cold Vapor AA

C - Manual Spectrophotometric

F - Furnace AA

P - ICP

T - Titrimetric

OTHER QUALIFIERS

ND - Not Detected

NA - Not Applicable

NR - Not Required

* - Outside Expected Range (NYCDEP Table I/II or Surrogate Limits)

OTHER

- All soil and sediment samples are reported on a dry weight basis.

ETL

Environmental Testing Laboratories, Inc.
20s Route 109 • Farmingdale • New York 11735
631-249-1456 • Fax: 631-249-8344

CHAIN OF CUSTODY DOCUMENT

M 9297

Project Name: Photocircuits | Project Manager: Charlie Nemia | Sampler (Signature): Juan C Serrano (Print) Juan Serrano

Project Address: 31 Sea Cliff Av Glen Cove NY 11542

Client | J/N: | ❑ Rush by: / /

SAMPLE INFO Type: SS = Split Spoon; G = Grab; C = Composite; B = Blank. Matrix: L = Liquid; S = Soil; SL = Sludge; A = Air; W = Wipe. *Air - Vol. (Liters) include Flow (CFM)

ID	Date	Time	Type	Matrix	Sample Location	Total # Cont.	601/602 BTX/BTEX	MTBE	624/8260/8021	625/8270/BN	PCB/Pesticides	Pet. Prods./8100M	RCRA Metals	pH/Flash/React	418.1 - TRPH
1	12/12/02	5pm	DIR	A	45 A SVE AFTER 24hr SPARGING	1		V							
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															

Relinquished by (Signature): Juan C Serrano	Date 12/13/02 Time 1:00	Printed Name & Agent: JUAN SERRANO	Received by (Signature):	Date 12/13 Time 1105	Printed Name & Agent: P. MARONO
Relinquished by (Signature):	Date Time:	Printed Name & Agent:	Received for Lab by (Signature):	Date 12-13-02 Time 15:35	Printed Name: Brian Weiler
Comments & Special Instructions		QA/QC Type:	Number & Type of Containers: 1 - Air Bag.	Preservatives: —	Temp: 5° C

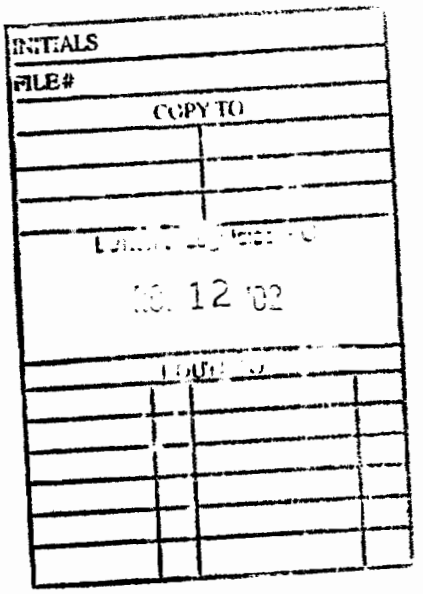
Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735
Phone - 631-249-1456 Fax - 631-249-8344

11/01/2002

Custody Document: L4838

Received: 10/03/2002 18:25
Sampled by: Darik Jordan



Client: Photo Circuits

31 Sea Cliff Avenue
Glen Cove,
NY 11542

Project: Photocircuits Corp.

31 Sea Cliff Avenue
Glen Cove,
NY 11542

Manager: Andy Barber

Respectfully submitted,

Laboratory Manager

NYS Lab ID # 10969
NJ Cert. # 73812
CT Cert. # PH0645
MA Cert. # NY061
PA Cert. # 68-535
NH Cert. # 252592-BA
RI Cert. # 161

Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

Phone - 631-249-1456 Fax - 631-249-8344

11/01/2002

Volatiles - EPA 8260B

Sample: L4838-1

Client Sample ID: SMP-1 Collected: 10/02/2002 16:00

Matrix: Liquid Type: Grab

Remarks: See Case Narrative

Analyzed Date: 10/06/2002

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C 715 -4938	0.76	0.76	ppb	U
75-45-6	Chlorodifluoromethane	C 715 -4938	0.50	0.50	ppb	U
74-87-3	Chloromethane	C 715 -4938	0.64	0.64	ppb	U
75-01-4	Vinyl Chloride	C 717 -4982	46.0	**2540**	ppb	
74-83-9	Bromomethane	C 715 -4938	0.64	0.64	ppb	U
75-00-3	Chloroethane	C 715 -4938	0.48	**37.6**	ppb	
75-69-4	Trichlorofluoromethane	C 715 -4938	0.54	0.54	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	C 715 -4938	0.72	0.72	ppb	U
75-35-4	1,1-Dichloroethene	C 715 -4938	0.54	0.54	ppb	U
67-64-1	Acetone	C 715 -4938	2.26	2.26	ppb	U
75-15-0	Carbon disulfide	C 715 -4938	0.38	0.38	ppb	U
75-09-2	Methylene Chloride	C 715 -4938	0.42	0.42	ppb	U
156-60-5	t-1,2-Dichloroethene	C 715 -4938	0.62	0.62	ppb	U
1634-04-4	Methyl t-butyl ether	C 715 -4938	0.36	0.36	ppb	U
75-34-3	1,1-Dichloroethane	C 715 -4938	0.60	**197**	ppb	
590-20-7	2,2-Dichloropropane	C 715 -4938	0.54	0.54	ppb	U
156-59-2	c-1,2-Dichloroethene	C 717 -4982	48.0	**680**	ppb	
78-93-3	2-Butanone	C 715 -4938	7.60	7.60	ppb	U
74-97-5	Bromochloromethane	C 715 -4938	0.50	0.50	ppb	U
67-66-3	Chloroform	C 715 -4938	0.52	0.52	ppb	U
71-55-6	1,1,1-Trichloroethane	C 715 -4938	0.52	0.52	ppb	U
56-23-5	Carbon Tetrachloride	C 715 -4938	0.44	0.44	ppb	U
563-58-6	1,1-Dichloropropene	C 715 -4938	0.78	0.78	ppb	U
71-43-2	Benzene	C 715 -4938	0.42	**94.0**	ppb	
107-06-2	1,2-Dichloroethane	C 715 -4938	0.46	0.46	ppb	U
79-01-6	Trichloroethene	C 715 -4938	0.72	0.72	ppb	U
78-87-5	1,2-Dichloropropane	C 715 -4938	0.62	0.62	ppb	U
74-95-3	Dibromomethane	C 715 -4938	0.48	0.48	ppb	U
75-27-4	Bromodichloromethane	C 715 -4938	0.40	0.40	ppb	U
110-75-8	2-Chloroethylvinylether	C 715 -4938	0.66	0.66	ppb	U
10061-01-5	c-1,3-Dichloropropene	C 715 -4938	0.32	0.32	ppb	U
108-10-1	4-Methyl-2-pentanone	C 715 -4938	1.26	1.26	ppb	U
108-88-3	Toluene	C 715 -4938	0.40	**58.5**	ppb	
10061-02-6	t-1,3-Dichloropropene	C 715 -4938	0.32	0.32	ppb	U

Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

Phone - 631-249-1456 Fax - 631-249-8344

11/01/2002

Volatiles - EPA 8260B

Sample: L4838-1...continue

Client Sample ID: SMP-1

Collected: 10/02/2002 16:00

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 10/06/2002

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
79-00-5	1,1,2-Trichloroethane	C 715 -4938	0.32	0.32	ppb	U
127-18-4	Tetrachloroethene	C 715 -4938	0.22	0.22	ppb	U
142-28-9	1,3-Dichloropropane	C 715 -4938	0.42	0.42	ppb	U
591-78-6	2-Hexanone	C 715 -4938	1.88	1.88	ppb	U
124-48-1	Dibromochloromethane	C 715 -4938	0.26	0.26	ppb	U
106-93-4	1,2-Dibromoethane	C 715 -4938	0.34	0.34	ppb	U
108-90-7	Chlorobenzene	C 715 -4938	0.30	0.30	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	C 715 -4938	0.40	0.40	ppb	U
100-41-4	Ethylbenzene	C 715 -4938	0.44	**6.30**	ppb	
108-38-3	m,p-xylene	C 715 -4938	0.68	**3.10**	ppb	
95-47-6	o-xylene	C 715 -4938	0.50	**5.70**	ppb	
100-42-5	Styrene	C 715 -4938	0.40	0.40	ppb	U
75-25-2	Bromoform	C 715 -4938	0.42	0.42	ppb	U
98-82-8	Isopropylbenzene	C 715 -4938	0.30	0.30	ppb	U
108-86-1	Bromobenzene	C 715 -4938	0.40	0.40	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	C 715 -4938	0.46	0.46	ppb	U
103-65-1	n-Propylbenzene	C 715 -4938	0.32	0.32	ppb	U
96-18-4	1,2,3-Trichloropropane	C 715 -4938	0.70	0.70	ppb	U
622-96-8	p-Ethyltoluene	C 715 -4938	0.32	0.32	ppb	U
108-67-8	1,3,5-Trimethylbenzene	C 715 -4938	0.40	0.40	ppb	U
95-49-8	2-Chlorotoluene	C 715 -4938	0.50	**17.8**	ppb	
106-43-4	4-Chlorotoluene	C 715 -4938	0.44	0.44	ppb	U
98-06-6	tert-Butylbenzene	C 715 -4938	0.38	0.38	ppb	U
95-63-6	1,2,4-Trimethylbenzene	C 715 -4938	0.34	0.34	ppb	U
135-98-8	sec-Butylbenzene	C 715 -4938	0.44	0.44	ppb	U
99-87-6	4-Isopropyltoluene	C 715 -4938	0.34	0.34	ppb	U
541-73-1	1,3-Dichlorobenzene	C 715 -4938	0.34	0.34	ppb	U
106-46-7	1,4-Dichlorobenzene	C 715 -4938	0.20	0.20	ppb	U
95-50-1	1,2-Dichlorobenzene	C 715 -4938	0.22	**2.20**	ppb	
105-05-5	p-Diethylbenzene	C 715 -4938	0.44	0.44	ppb	U
104-51-8	n-Butylbenzene	C 715 -4938	0.34	0.34	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	C 715 -4938	1.00	1.00	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	C 715 -4938	0.84	0.84	ppb	U
120-82-1	1,2,4-Trichlorobenzene	C 715 -4938	0.26	0.26	ppb	U

Environmental Testing Laboratories, Inc.
208 Route 109, Farmingdale NY 11735
Phone - 631-249-1456 Fax - 631-249-8344

11/01/2002

Volatiles - EPA 8260B

Sample: L4838-1...continue
Client Sample ID: SMP-1
Matrix: Liquid
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Collected: 10/02/2002 16:00
Type: Grab

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
87-68-3	Hexachlorobutadiene	C 715 -4938	0.90	0.90	ppb	U
91-20-3	Naphthalene	C 715 -4938	0.58	0.58	ppb	U
87-61-6	1,2,3-Trichlorobenzene	C 715 -4938	0.38	0.38	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	C715-4938	99.1 %	(76 - 118)	
4774-33-8	DIBROMOFLUOROMETHANE	C715-4938	96.0 %	(83 - 113)	
2037-26-5	TOLUENE-D8	C715-4938	103.0 %	(90 - 111)	
460-00-4	4-BROMOFLUOROBENZENE	C717-4982	101.0 %	(76 - 118)	
4774-33-8	DIBROMOFLUOROMETHANE	C717-4982	87.1 %	(83 - 113)	
2037-26-5	TOLUENE-D8	C717-4982	108.0 %	(90 - 111)	

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11/01/2002

Volatiles - EPA 8260B

Sample: L4838-2

Client Sample ID: DMP-1 Collected: 10/02/2002 15:20

Matrix: Liquid Type: Grab

Remarks: See Case Narrative

Analyzed Date: 10/06/2002

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C 715 -4939	0.38	0.38	ppb	U
75-45-6	Chlorodifluoromethane	C 715 -4939	0.25	0.25	ppb	U
74-87-3	Chloromethane	C 715 -4939	0.32	0.32	ppb	U
75-01-4	Vinyl Chloride	C 717 -4983	2.30	**180**	ppb	
74-83-9	Bromomethane	C 715 -4939	0.32	0.32	ppb	U
75-00-3	Chloroethane	C 715 -4939	0.24	**15.5**	ppb	
75-69-4	Trichlorofluoromethane	C 715 -4939	0.27	0.27	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	C 715 -4939	0.36	0.36	ppb	U
75-35-4	1,1-Dichloroethene	C 715 -4939	0.27	0.27	ppb	U
67-64-1	Acetone	C 715 -4939	1.13	**46.8**	ppb	
75-15-0	Carbon disulfide	C 715 -4939	0.19	0.19	ppb	U
75-09-2	Methylene Chloride	C 715 -4939	0.21	**1.80**	ppb	
156-60-5	t-1,2-Dichloroethene	C 715 -4939	0.31	**4.20**	ppb	
1634-04-4	Methyl t-butyl ether	C 715 -4939	0.18	0.18	ppb	U
75-34-3	1,1-Dichloroethane	C 717 -4983	3.00	**414**	ppb	
590-20-7	2,2-Dichloropropane	C 715 -4939	0.27	0.27	ppb	U
156-59-2	c-1,2-Dichloroethene	C 717 -4983	2.40	**127**	ppb	
78-93-3	2-Butanone	C 715 -4939	3.80	3.80	ppb	U
74-97-5	Bromochloromethane	C 715 -4939	0.25	0.25	ppb	U
67-66-3	Chloroform	C 715 -4939	0.26	0.26	ppb	U
71-55-6	1,1,1-Trichloroethane	C 715 -4939	0.26	0.26	ppb	U
56-23-5	Carbon Tetrachloride	C 715 -4939	0.22	0.22	ppb	U
563-58-6	1,1-Dichloropropene	C 715 -4939	0.39	0.39	ppb	U
71-43-2	Benzene	C 715 -4939	0.21	**48.0**	ppb	
107-06-2	1,2-Dichloroethane	C 715 -4939	0.23	**2.30**	ppb	
79-01-6	Trichloroethene	C 715 -4939	0.36	**1.60**	ppb	
78-87-5	1,2-Dichloropropane	C 715 -4939	0.31	0.31	ppb	U
74-95-3	Dibromomethane	C 715 -4939	0.24	0.24	ppb	U
75-27-4	Bromodichloromethane	C 715 -4939	0.20	0.20	ppb	U
110-75-8	2-Chloroethylvinylether	C 715 -4939	0.33	0.33	ppb	U
10061-01-5	c-1,3-Dichloropropene	C 715 -4939	0.16	0.16	ppb	U
108-10-1	4-Methyl-2-pentanone	C 715 -4939	0.63	0.63	ppb	U
108-88-3	Toluene	C 715 -4939	0.20	**7.20**	ppb	
10061-02-6	t-1,3-Dichloropropene	C 715 -4939	0.16	0.16	ppb	U

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Volatiles - EPA 8260B

Sample: L4838-2...continue
Client Sample ID: DMP-1
Matrix: Liquid
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Type: Grab

Collected: 10/02/2002 15:20

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
79-00-5	1,1,2-Trichloroethane	C 715 -4939	0.16	0.16	ppb	U
127-18-4	Tetrachloroethene	C 715 -4939	0.11	0.11	ppb	U
142-28-9	1,3-Dichloropropane	C 715 -4939	0.21	0.21	ppb	U
591-78-6	2-Hexanone	C 715 -4939	0.94	0.94	ppb	U
124-48-1	Dibromochloromethane	C 715 -4939	0.13	0.13	ppb	U
106-93-4	1,2-Dibromoethane	C 715 -4939	0.17	0.17	ppb	U
108-90-7	Chlorobenzene	C 715 -4939	0.15	0.15	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	C 715 -4939	0.20	0.20	ppb	U
100-41-4	Ethylbenzene	C 715 -4939	0.22	0.22	ppb	U
108-38-3	m,p-xylene	C 715 -4939	0.34	**1.00**	ppb	
95-47-6	o-xylene	C 715 -4939	0.25	**1.10**	ppb	
100-42-5	Styrene	C 715 -4939	0.20	0.20	ppb	U
75-25-2	Bromoform	C 715 -4939	0.21	0.21	ppb	U
98-82-8	Isopropylbenzene	C 715 -4939	0.15	0.15	ppb	U
108-86-1	Bromobenzene	C 715 -4939	0.20	0.20	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	C 715 -4939	0.23	0.23	ppb	U
103-65-1	n-Propylbenzene	C 715 -4939	0.16	0.16	ppb	U
96-18-4	1,2,3-Trichloropropane	C 715 -4939	0.35	0.35	ppb	U
622-96-8	p-Ethyltoluene	C 715 -4939	0.16	**1.70**	ppb	
108-67-8	1,3,5-Trimethylbenzene	C 715 -4939	0.20	**1.60**	ppb	
95-49-8	2-Chlorotoluene	C 715 -4939	0.25	**27.8**	ppb	
106-43-4	4-Chlorotoluene	C 715 -4939	0.22	0.22	ppb	U
98-06-6	tert-Butylbenzene	C 715 -4939	0.19	0.19	ppb	U
95-63-6	1,2,4-Trimethylbenzene	C 715 -4939	0.17	**4.00**	ppb	
135-98-8	sec-Butylbenzene	C 715 -4939	0.22	0.22	ppb	U
99-87-6	4-Isopropyltoluene	C 715 -4939	0.17	0.17	ppb	U
541-73-1	1,3-Dichlorobenzene	C 715 -4939	0.17	0.17	ppb	U
106-46-7	1,4-Dichlorobenzene	C 715 -4939	0.10	0.10	ppb	U
95-50-1	1,2-Dichlorobenzene	C 715 -4939	0.11	0.11	ppb	U
105-05-5	p-Diethylbenzene	C 715 -4939	0.22	0.22	ppb	U
104-51-8	n-Butylbenzene	C 715 -4939	0.17	0.17	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	C 715 -4939	0.50	0.50	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	C 715 -4939	0.42	0.42	ppb	U
120-82-1	1,2,4-Trichlorobenzene	C 715 -4939	0.13	0.13	ppb	U

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Volatiles - EPA 8260B

Sample: L4838-2...continue
Client Sample ID: DMP-1
Matrix: Liquid
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Collected: 10/02/2002 15:20
Type: Grab

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
87-68-3	Hexachlorobutadiene	C 715 -4939	0.45	0.45	ppb	U
91-20-3	Naphthalene	C 715 -4939	0.29	**1.60**	ppb	
87-61-6	1,2,3-Trichlorobenzene	C 715 -4939	0.19	0.19	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	C715-4939	101.0 %	(76- 118)	
4774-33-8	DIBROMOFLUOROMETHANE	C715-4939	96.4 %	(83- 113)	
2037-26-5	TOLUENE-D8	C715-4939	102.0 %	(90- 111)	
460-00-4	4-BROMOFLUOROBENZENE	C717-4983	103.0 %	(76- 118)	
4774-33-8	DIBROMOFLUOROMETHANE	C717-4983	83.4 %	(83- 113)	
2037-26-5	TOLUENE-D8	C717-4983	110.0 %	(90- 111)	

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Volatiles - EPA 8260B

Sample: L4838-3
Client Sample ID: SMP-3
Matrix: Liquid
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Type: Grab

Collected: 10/02/2002 16:30

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C 715 -4940	0.38	0.38	ppb	U
75-45-6	Chlorodifluoromethane	C 715 -4940	0.25	0.25	ppb	U
74-87-3	Chloromethane	C 715 -4940	0.32	0.32	ppb	U
75-01-4	Vinyl Chloride	C 715 -4940	0.23	**105**	ppb	
74-83-9	Bromomethane	C 715 -4940	0.32	0.32	ppb	U
75-00-3	Chloroethane	C 717 -4984	24.0	**509**	ppb	
75-69-4	Trichlorofluoromethane	C 715 -4940	0.27	0.27	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	C 715 -4940	0.36	0.36	ppb	U
75-35-4	1,1-Dichloroethene	C 717 -4984	27.0	**337**	ppb	
67-64-1	Acetone	C 715 -4940	1.13	**70.3**	ppb	
75-15-0	Carbon disulfide	C 715 -4940	0.19	0.19	ppb	U
75-09-2	Methylene Chloride	C 715 -4940	0.21	**24.7**	ppb	
156-60-5	t-1,2-Dichloroethene	C 715 -4940	0.31	**1.70**	ppb	
1634-04-4	Methyl t-butyl ether	C 715 -4940	0.18	0.18	ppb	U
75-34-3	1,1-Dichloroethane	C 717 -4984	30.0	**7620**	ppb	
590-20-7	2,2-Dichloropropane	C 715 -4940	0.27	0.27	ppb	U
156-59-2	c-1,2-Dichloroethene	C 715 -4940	0.24	**7.50**	ppb	
78-93-3	2-Butanone	C 715 -4940	3.80	3.80	ppb	U
74-97-5	Bromochloromethane	C 715 -4940	0.25	0.25	ppb	U
67-66-3	Chloroform	C 715 -4940	0.26	0.26	ppb	U
71-55-6	1,1,1-Trichloroethane	C 717 -4984	26.0	**5660**	ppb	
56-23-5	Carbon Tetrachloride	C 715 -4940	0.22	0.22	ppb	U
563-58-6	1,1-Dichloropropene	C 715 -4940	0.39	0.39	ppb	U
71-43-2	Benzene	C 715 -4940	0.21	**2.60**	ppb	
107-06-2	1,2-Dichloroethane	C 715 -4940	0.23	**5.30**	ppb	
79-01-6	Trichloroethene	C 715 -4940	0.36	**2.60**	ppb	
78-87-5	1,2-Dichloropropane	C 715 -4940	0.31	0.31	ppb	U
74-95-3	Dibromomethane	C 715 -4940	0.24	0.24	ppb	U
75-27-4	Bromodichloromethane	C 715 -4940	0.20	0.20	ppb	U
110-75-8	2-Chloroethylvinylether	C 715 -4940	0.33	0.33	ppb	U
10061-01-5	c-1,3-Dichloropropene	C 715 -4940	0.16	0.16	ppb	U
108-10-1	4-Methyl-2-pentanone	C 715 -4940	0.63	0.63	ppb	U
108-88-3	Toluene	C 715 -4940	0.20	**53.8**	ppb	
10061-02-6	t-1,3-Dichloropropene	C 715 -4940	0.16	0.16	ppb	U

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Volatiles - EPA 8260B

Sample: L4838-3...continue
Client Sample ID: SMP-3 Collected: 10/02/2002 16:30
Matrix: Liquid Type: Grab
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
79-00-5	1,1,2-Trichloroethane	C 715 -4940	0.16	0.16	ppb	U
127-18-4	Tetrachloroethene	C 715 -4940	0.11	**9.60**	ppb	
142-28-9	1,3-Dichloropropane	C 715 -4940	0.21	0.21	ppb	U
591-78-6	2-Hexanone	C 715 -4940	0.94	**4.60**	ppb	
124-48-1	Dibromochloromethane	C 715 -4940	0.13	0.13	ppb	U
106-93-4	1,2-Dibromoethane	C 715 -4940	0.17	0.17	ppb	U
108-90-7	Chlorobenzene	C 715 -4940	0.15	0.15	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	C 715 -4940	0.20	0.20	ppb	U
100-41-4	Ethylbenzene	C 715 -4940	0.22	0.22	ppb	U
108-38-3	m,p-xylene	C 715 -4940	0.34	**1.30**	ppb	
95-47-6	o-xylene	C 715 -4940	0.25	**0.82**	ppb	
100-42-5	Styrene	C 715 -4940	0.20	0.20	ppb	U
75-25-2	Bromoform	C 715 -4940	0.21	0.21	ppb	U
98-82-8	Isopropylbenzene	C 715 -4940	0.15	0.15	ppb	U
108-86-1	Bromobenzene	C 715 -4940	0.20	0.20	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	C 715 -4940	0.23	0.23	ppb	U
103-65-1	n-Propylbenzene	C 715 -4940	0.16	0.16	ppb	U
96-18-4	1,2,3-Trichloropropane	C 715 -4940	0.35	0.35	ppb	U
622-96-8	p-Ethyltoluene	C 715 -4940	0.16	0.16	ppb	U
108-67-8	1,3,5-Trimethylbenzene	C 715 -4940	0.20	0.20	ppb	U
95-49-8	2-Chlorotoluene	C 715 -4940	0.25	**21.8**	ppb	
106-43-4	4-Chlorotoluene	C 715 -4940	0.22	0.22	ppb	U
98-06-6	tert-Butylbenzene	C 715 -4940	0.19	0.19	ppb	U
95-63-6	1,2,4-Trimethylbenzene	C 715 -4940	0.17	**1.60**	ppb	
135-98-8	sec-Butylbenzene	C 715 -4940	0.22	0.22	ppb	U
99-87-6	4-Isopropyltoluene	C 715 -4940	0.17	0.17	ppb	U
541-73-1	1,3-Dichlorobenzene	C 715 -4940	0.17	0.17	ppb	U
106-46-7	1,4-Dichlorobenzene	C 715 -4940	0.10	0.10	ppb	U
95-50-1	1,2-Dichlorobenzene	C 715 -4940	0.11	0.11	ppb	U
105-05-5	p-Diethylbenzene	C 715 -4940	0.22	0.22	ppb	U
104-51-8	n-Butylbenzene	C 715 -4940	0.17	0.17	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	C 715 -4940	0.50	0.50	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	C 715 -4940	0.42	0.42	ppb	U
120-82-1	1,2,4-Trichlorobenzene	C 715 -4940	0.13	0.13	ppb	U

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Volatiles - EPA 8260B

Sample: L4838-3...continue
Client Sample ID: SMP-3
Matrix: Liquid
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Type: Grab

Collected: 10/02/2002 16:30

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
87-68-3	Hexachlorobutadiene	C 715 -4940	0.45	0.45	ppb	U
91-20-3	Naphthalene	C 715 -4940	0.29	**1.10**	ppb	
87-61-6	1,2,3-Trichlorobenzene	C 715 -4940	0.19	0.19	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	C715-4940	103.0 %	(76 - 118)	
4774-33-8	DIBROMOFLUOROMETHANE	C715-4940	92.2 %	(83 - 113)	
2037-26-5	TOLUENE-D8	C715-4940	103.0 %	(90 - 111)	
460-00-4	4-BROMOFLUOROBENZENE	C717-4984	101.0 %	(76 - 118)	
4774-33-8	DIBROMOFLUOROMETHANE	C717-4984	90.4 %	(83 - 113)	
2037-26-5	TOLUENE-D8	C717-4984	107.0 %	(90 - 111)	

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Volatiles - EPA 8260B

Sample: L4838-4

Client Sample ID: DMP-3 Collected: 10/02/2002 16:15

Matrix: Liquid Type: Grab

Remarks: See Case Narrative

Analyzed Date: 10/06/2002

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C 715 -4941	0.38	0.38	ppb	U
75-45-6	Chlorodifluoromethane	C 715 -4941	0.25	0.25	ppb	U
74-87-3	Chloromethane	C 715 -4941	0.32	0.32	ppb	U
75-01-4	Vinyl Chloride	C 715 -4941	0.23	**61.2**	ppb	
74-83-9	Bromomethane	C 715 -4941	0.32	0.32	ppb	U
75-00-3	Chloroethane	C 717 -4985	24.0	**8640**	ppb	
75-69-4	Trichlorofluoromethane	C 715 -4941	0.27	0.27	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	C 715 -4941	0.36	0.36	ppb	U
75-35-4	1,1-Dichloroethene	C 715 -4941	0.27	**5.60**	ppb	
67-64-1	Acetone	C 715 -4941	1.13	**121**	ppb	
75-15-0	Carbon disulfide	C 715 -4941	0.19	0.19	ppb	U
75-09-2	Methylene Chloride	C 715 -4941	0.21	**62.0**	ppb	
156-60-5	t-1,2-Dichloroethene	C 715 -4941	0.31	**1.30**	ppb	
1634-04-4	Methyl t-butyl ether	C 715 -4941	0.18	0.18	ppb	U
75-34-3	1,1-Dichloroethane	C 717 -4985	30.0	**3980**	ppb	
590-20-7	2,2-Dichloropropane	C 715 -4941	0.27	0.27	ppb	U
156-59-2	c-1,2-Dichloroethene	C 715 -4941	0.24	**1.60**	ppb	
78-93-3	2-Butanone	C 715 -4941	3.80	3.80	ppb	U
74-97-5	Bromochloromethane	C 715 -4941	0.25	0.25	ppb	U
67-66-3	Chloroform	C 715 -4941	0.26	0.26	ppb	U
71-55-6	1,1,1-Trichloroethane	C 717 -4985	26.0	**234**	ppb	
56-23-5	Carbon Tetrachloride	C 715 -4941	0.22	0.22	ppb	U
563-58-6	1,1-Dichloropropene	C 715 -4941	0.39	0.39	ppb	U
71-43-2	Benzene	C 715 -4941	0.21	0.21	ppb	U
107-06-2	1,2-Dichloroethane	C 715 -4941	0.23	**29.5**	ppb	
79-01-6	Trichloroethene	C 715 -4941	0.36	0.36	ppb	U
78-87-5	1,2-Dichloropropane	C 715 -4941	0.31	0.31	ppb	U
74-95-3	Dibromomethane	C 715 -4941	0.24	0.24	ppb	U
75-27-4	Bromodichloromethane	C 715 -4941	0.20	0.20	ppb	U
110-75-8	2-Chloroethylvinylether	C 715 -4941	0.33	0.33	ppb	U
10061-01-5	c-1,3-Dichloropropene	C 715 -4941	0.16	0.16	ppb	U
108-10-1	4-Methyl-2-pentanone	C 715 -4941	0.63	0.63	ppb	U
108-88-3	Toluene	C 715 -4941	0.20	**30.5**	ppb	
10061-02-6	t-1,3-Dichloropropene	C 715 -4941	0.16	0.16	ppb	U

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11/01/2002

Volatiles - EPA 8260B

Sample: L4838-4...continue

Client Sample ID: DMP-3 Collected: 10/02/2002 16:15

Matrix: Liquid Type: Grab

Remarks: See Case Narrative

Analyzed Date: 10/06/2002

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
79-00-5	1,1,2-Trichloroethane	C 715 -4941	0.16	0.16	ppb	U
127-18-4	Tetrachloroethene	C 715 -4941	0.11	0.11	ppb	U
142-28-9	1,3-Dichloropropane	C 715 -4941	0.21	0.21	ppb	U
591-78-6	2-Hexanone	C 715 -4941	0.94	**3.00**	ppb	
124-48-1	Dibromochloromethane	C 715 -4941	0.13	0.13	ppb	U
106-93-4	1,2-Dibromoethane	C 715 -4941	0.17	0.17	ppb	U
108-90-7	Chlorobenzene	C 715 -4941	0.15	0.15	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	C 715 -4941	0.20	0.20	ppb	U
100-41-4	Ethylbenzene	C 715 -4941	0.22	0.22	ppb	U
108-38-3	m,p-xylene	C 715 -4941	0.34	**1.90**	ppb	
95-47-6	o-xylene	C 715 -4941	0.25	**1.80**	ppb	
100-42-5	Styrene	C 715 -4941	0.20	0.20	ppb	U
75-25-2	Bromoform	C 715 -4941	0.21	0.21	ppb	U
98-82-8	Isopropylbenzene	C 715 -4941	0.15	0.15	ppb	U
108-86-1	Bromobenzene	C 715 -4941	0.20	0.20	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	C 715 -4941	0.23	0.23	ppb	U
103-65-1	n-Propylbenzene	C 715 -4941	0.16	0.16	ppb	U
96-18-4	1,2,3-Trichloropropane	C 715 -4941	0.35	0.35	ppb	U
622-96-8	p-Ethyltoluene	C 715 -4941	0.16	0.16	ppb	U
108-67-8	1,3,5-Trimethylbenzene	C 715 -4941	0.20	**1.50**	ppb	
95-49-8	2-Chlorotoluene	C 715 -4941	0.25	**18.7**	ppb	
106-43-4	4-Chlorotoluene	C 715 -4941	0.22	0.22	ppb	U
98-06-6	tert-Butylbenzene	C 715 -4941	0.19	0.19	ppb	U
95-63-6	1,2,4-Trimethylbenzene	C 715 -4941	0.17	**4.50**	ppb	
135-98-8	sec-Butylbenzene	C 715 -4941	0.22	0.22	ppb	U
99-87-6	4-Isopropyltoluene	C 715 -4941	0.17	0.17	ppb	U
541-73-1	1,3-Dichlorobenzene	C 715 -4941	0.17	0.17	ppb	U
106-46-7	1,4-Dichlorobenzene	C 715 -4941	0.10	0.10	ppb	U
95-50-1	1,2-Dichlorobenzene	C 715 -4941	0.11	0.11	ppb	U
105-05-5	p-Diethylbenzene	C 715 -4941	0.22	0.22	ppb	U
104-51-8	n-Butylbenzene	C 715 -4941	0.17	0.17	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	C 715 -4941	0.50	0.50	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	C 715 -4941	0.42	0.42	ppb	U
120-82-1	1,2,4-Trichlorobenzene	C 715 -4941	0.13	0.13	ppb	U

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Volatiles - EPA 8260B

Sample: L4838-4...continue
Client Sample ID: DMP-3
Matrix: Liquid
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Type: Grab

Collected: 10/02/2002 16:15

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
87-68-3	Hexachlorobutadiene	C 715 -4941	0.45	0.45	ppb	U
91-20-3	Naphthalene	C 715 -4941	0.29	**1.90**	ppb	
87-61-6	1,2,3-Trichlorobenzene	C 715 -4941	0.19	0.19	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	C715-4941	102.0 %	(76- 118)	
4774-33-8	DIBROMOFLUOROMETHANE	C715-4941	101.0 %	(83- 113)	
2037-26-5	TOLUENE-D8	C715-4941	102.0 %	(90- 111)	
460-00-4	4-BROMOFLUOROBENZENE	C717-4985	102.0 %	(76- 118)	
4774-33-8	DIBROMOFLUOROMETHANE	C717-4985	88.0 %	(83- 113)	
2037-26-5	TOLUENE-D8	C717-4985	108.0 %	(90- 111)	

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Volatiles - EPA 8260B

Sample: L4838-5

Client Sample ID: SMP-4 Collected: 10/02/2002 17:30

Matrix: Liquid Type: Grab

Remarks: See Case Narrative

Analyzed Date: 10/06/2002

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C 715 -4942	0.38	0.38	ppb	U
75-45-6	Chlorodifluoromethane	C 715 -4942	0.25	0.25	ppb	U
74-87-3	Chloromethane	C 715 -4942	0.32	0.32	ppb	U
75-01-4	Vinyl Chloride	C 715 -4942	0.23	**2.10**	ppb	
74-83-9	Bromomethane	C 715 -4942	0.32	0.32	ppb	U
75-00-3	Chloroethane	C 718 -5013	2.40	**459**	ppb	
75-69-4	Trichlorofluoromethane	C 715 -4942	0.27	0.27	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	C 715 -4942	0.36	0.36	ppb	U
75-35-4	1,1-Dichloroethene	C 715 -4942	0.27	0.27	ppb	U
67-64-1	Acetone	C 718 -5013	11.3	**421**	ppb	
75-15-0	Carbon disulfide	C 715 -4942	0.19	0.19	ppb	U
75-09-2	Methylene Chloride	C 715 -4942	0.21	**8.80**	ppb	
156-60-5	t-1,2-Dichloroethene	C 715 -4942	0.31	0.31	ppb	U
1634-04-4	Methyl t-butyl ether	C 715 -4942	0.18	0.18	ppb	U
75-34-3	1,1-Dichloroethane	C 715 -4942	0.30	**149**	ppb	
590-20-7	2,2-Dichloropropane	C 715 -4942	0.27	0.27	ppb	U
156-59-2	c-1,2-Dichloroethene	C 715 -4942	0.24	**27.2**	ppb	
78-93-3	2-Butanone	C 715 -4942	3.80	**137**	ppb	
74-97-5	Bromochloromethane	C 715 -4942	0.25	0.25	ppb	U
67-66-3	Chloroform	C 715 -4942	0.26	0.26	ppb	U
71-55-6	1,1,1-Trichloroethane	C 715 -4942	0.26	**11.5**	ppb	
56-23-5	Carbon Tetrachloride	C 715 -4942	0.22	0.22	ppb	U
563-58-6	1,1-Dichloropropene	C 715 -4942	0.39	0.39	ppb	U
71-43-2	Benzene	C 715 -4942	0.21	0.21	ppb	U
107-06-2	1,2-Dichloroethane	C 715 -4942	0.23	**3.00**	ppb	
79-01-6	Trichloroethene	C 715 -4942	0.36	0.36	ppb	U
78-87-5	1,2-Dichloropropane	C 715 -4942	0.31	0.31	ppb	U
74-95-3	Dibromomethane	C 715 -4942	0.24	0.24	ppb	U
75-27-4	Bromodichloromethane	C 715 -4942	0.20	0.20	ppb	U
110-75-8	2-Chloroethylvinylether	C 715 -4942	0.33	0.33	ppb	U
10061-01-5	c-1,3-Dichloropropene	C 715 -4942	0.16	0.16	ppb	U
108-10-1	4-Methyl-2-pentanone	C 715 -4942	0.63	0.63	ppb	U
108-88-3	Toluene	C 715 -4942	0.20	**0.96**	ppb	
10061-02-6	t-1,3-Dichloropropene	C 715 -4942	0.16	0.16	ppb	U

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11/01/2002

Volatiles - EPA 8260B

Sample: L4838-5...continue
Client Sample ID: SMP-4
Matrix: Liquid
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Type: Grab

Collected: 10/02/2002 17:30

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
79-00-5	1,1,2-Trichloroethane	C 715 -4942	0.16	0.16	ppb	U
127-18-4	Tetrachloroethene	C 715 -4942	0.11	**37.5**	ppb	
142-28-9	1,3-Dichloropropane	C 715 -4942	0.21	0.21	ppb	U
591-78-6	2-Hexanone	C 715 -4942	0.94	**13.6**	ppb	
124-48-1	Dibromochloromethane	C 715 -4942	0.13	0.13	ppb	U
106-93-4	1,2-Dibromoethane	C 715 -4942	0.17	0.17	ppb	U
108-90-7	Chlorobenzene	C 715 -4942	0.15	0.15	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	C 715 -4942	0.20	0.20	ppb	U
100-41-4	Ethylbenzene	C 715 -4942	0.22	0.22	ppb	U
108-38-3	m,p-xylene	C 715 -4942	0.34	0.34	ppb	U
95-47-6	o-xylene	C 715 -4942	0.25	0.25	ppb	U
100-42-5	Styrene	C 715 -4942	0.20	0.20	ppb	U
75-25-2	Bromoform	C 715 -4942	0.21	0.21	ppb	U
98-82-8	Isopropylbenzene	C 715 -4942	0.15	0.15	ppb	U
108-86-1	Bromobenzene	C 715 -4942	0.20	0.20	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	C 715 -4942	0.23	0.23	ppb	U
103-65-1	n-Propylbenzene	C 715 -4942	0.16	0.16	ppb	U
96-18-4	1,2,3-Trichloropropane	C 715 -4942	0.35	0.35	ppb	U
622-96-8	p-Ethyltoluene	C 715 -4942	0.16	0.16	ppb	U
108-67-8	1,3,5-Trimethylbenzene	C 715 -4942	0.20	0.20	ppb	U
95-49-8	2-Chlorotoluene	C 715 -4942	0.25	0.25	ppb	U
106-43-4	4-Chlorotoluene	C 715 -4942	0.22	0.22	ppb	U
98-06-6	tert-Butylbenzene	C 715 -4942	0.19	0.19	ppb	U
95-63-6	1,2,4-Trimethylbenzene	C 715 -4942	0.17	0.17	ppb	U
135-98-8	sec-Butylbenzene	C 715 -4942	0.22	0.22	ppb	U
99-87-6	4-Isopropyltoluene	C 715 -4942	0.17	0.17	ppb	U
541-73-1	1,3-Dichlorobenzene	C 715 -4942	0.17	0.17	ppb	U
106-46-7	1,4-Dichlorobenzene	C 715 -4942	0.10	0.10	ppb	U
95-50-1	1,2-Dichlorobenzene	C 715 -4942	0.11	0.11	ppb	U
105-05-5	p-Diethylbenzene	C 715 -4942	0.22	0.22	ppb	U
104-51-8	n-Butylbenzene	C 715 -4942	0.17	0.17	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	C 715 -4942	0.50	0.50	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	C 715 -4942	0.42	0.42	ppb	U
120-82-1	1,2,4-Trichlorobenzene	C 715 -4942	0.13	0.13	ppb	U

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Volatiles - EPA 8260B

Sample: L4838-5...continue
Client Sample ID: SMP-4
Matrix: Liquid
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Collected: 10/02/2002 17:30
Type: Grab

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
87-68-3	Hexachlorobutadiene	C 715 -4942	0.45	0.45	ppb	U
91-20-3	Naphthalene	C 715 -4942	0.29	0.29	ppb	U
87-61-6	1,2,3-Trichlorobenzene	C 715 -4942	0.19	0.19	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	C715-4942	100.0 %	(76- 118)	
4774-33-8	DIBROMOFLUOROMETHANE	C715-4942	90.7 %	(83- 113)	
2037-26-5	TOLUENE-D8	C715-4942	104.0 %	(90- 111)	
460-00-4	4-BROMOFLUOROBENZENE	C718-5013	100.0 %	(76- 118)	
4774-33-8	DIBROMOFLUOROMETHANE	C718-5013	87.8 %	(83- 113)	
2037-26-5	TOLUENE-D8	C718-5013	106.0 %	(90- 111)	

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Volatiles - EPA 8260B

Sample: L4838-6

Client Sample ID: DMP-4 Collected: 10/02/2002 17:15

Matrix: Liquid Type: Grab

Remarks: See Case Narrative

Analyzed Date: 10/06/2002

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C 715 -4943	0.38	0.38	ppb	U
75-45-6	Chlorodifluoromethane	C 715 -4943	0.25	0.25	ppb	U
74-87-3	Chloromethane	C 715 -4943	0.32	0.32	ppb	U
75-01-4	Vinyl Chloride	C 715 -4943	0.23	**5.40**	ppb	
74-83-9	Bromomethane	C 715 -4943	0.32	0.32	ppb	U
75-00-3	Chloroethane	C 717 -4987	24.0	**3240**	ppb	
75-69-4	Trichlorofluoromethane	C 715 -4943	0.27	0.27	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	C 715 -4943	0.36	0.36	ppb	U
75-35-4	1,1-Dichloroethene	C 715 -4943	0.27	0.27	ppb	U
67-64-1	Acetone	C 715 -4943	1.13	1.13	ppb	U
75-15-0	Carbon disulfide	C 715 -4943	0.19	0.19	ppb	U
75-09-2	Methylene Chloride	C 715 -4943	0.21	**26.9**	ppb	
156-60-5	t-1,2-Dichloroethene	C 715 -4943	0.31	**1.90**	ppb	
1634-04-4	Methyl t-butyl ether	C 715 -4943	0.18	0.18	ppb	U
75-34-3	1,1-Dichloroethane	C 715 -4943	0.30	**78.2**	ppb	
590-20-7	2,2-Dichloropropane	C 715 -4943	0.27	0.27	ppb	U
156-59-2	c-1,2-Dichloroethene	C 715 -4943	0.24	0.24	ppb	U
78-93-3	2-Butanone	C 715 -4943	3.80	3.80	ppb	U
74-97-5	Bromochloromethane	C 715 -4943	0.25	0.25	ppb	U
67-66-3	Chloroform	C 715 -4943	0.26	0.26	ppb	U
71-55-6	1,1,1-Trichloroethane	C 715 -4943	0.26	0.26	ppb	U
56-23-5	Carbon Tetrachloride	C 715 -4943	0.22	0.22	ppb	U
563-58-6	1,1-Dichloropropene	C 715 -4943	0.39	0.39	ppb	U
71-43-2	Benzene	C 715 -4943	0.21	0.21	ppb	U
107-06-2	1,2-Dichloroethane	C 715 -4943	0.23	**10.3**	ppb	
79-01-6	Trichloroethene	C 715 -4943	0.36	0.36	ppb	U
78-87-5	1,2-Dichloropropane	C 715 -4943	0.31	0.31	ppb	U
74-95-3	Dibromomethane	C 715 -4943	0.24	0.24	ppb	U
75-27-4	Bromodichloromethane	C 715 -4943	0.20	0.20	ppb	U
110-75-8	2-Chloroethylvinylether	C 715 -4943	0.33	0.33	ppb	U
10061-01-5	c-1,3-Dichloropropene	C 715 -4943	0.16	0.16	ppb	U
108-10-1	4-Methyl-2-pentanone	C 715 -4943	0.63	0.63	ppb	U
108-88-3	Toluene	C 715 -4943	0.20	**20.2**	ppb	
10061-02-6	t-1,3-Dichloropropene	C 715 -4943	0.16	0.16	ppb	U

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11/01/2002

Volatiles - EPA 8260B

Sample: L4838-6...continue
Client Sample ID: DMP-4
Matrix: Liquid
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Type: Grab

Collected: 10/02/2002 17:15

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
79-00-5	1,1,2-Trichloroethane	C 715 -4943	0.16	0.16	ppb	U
127-18-4	Tetrachloroethene	C 715 -4943	0.11	0.11	ppb	U
142-28-9	1,3-Dichloropropane	C 715 -4943	0.21	0.21	ppb	U
591-78-6	2-Hexanone	C 715 -4943	0.94	0.94	ppb	U
124-48-1	Dibromochloromethane	C 715 -4943	0.13	0.13	ppb	U
106-93-4	1,2-Dibromoethane	C 715 -4943	0.17	0.17	ppb	U
108-90-7	Chlorobenzene	C 715 -4943	0.15	0.15	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	C 715 -4943	0.20	0.20	ppb	U
100-41-4	Ethylbenzene	C 715 -4943	0.22	0.22	ppb	U
108-38-3	m,p-xylene	C 715 -4943	0.34	**2.00**	ppb	
95-47-6	o-xylene	C 715 -4943	0.25	**2.60**	ppb	
100-42-5	Styrene	C 715 -4943	0.20	0.20	ppb	U
75-25-2	Bromoform	C 715 -4943	0.21	0.21	ppb	U
98-82-8	Isopropylbenzene	C 715 -4943	0.15	0.15	ppb	U
108-86-1	Bromobenzene	C 715 -4943	0.20	0.20	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	C 715 -4943	0.23	0.23	ppb	U
103-65-1	n-Propylbenzene	C 715 -4943	0.16	0.16	ppb	U
96-18-4	1,2,3-Trichloropropane	C 715 -4943	0.35	0.35	ppb	U
622-96-8	p-Ethyltoluene	C 715 -4943	0.16	**2.90**	ppb	
108-67-8	1,3,5-Trimethylbenzene	C 715 -4943	0.20	**2.90**	ppb	
95-49-8	2-Chlorotoluene	C 715 -4943	0.25	**27.2**	ppb	
106-43-4	4-Chlorotoluene	C 715 -4943	0.22	0.22	ppb	U
98-06-6	tert-Butylbenzene	C 715 -4943	0.19	0.19	ppb	U
95-63-6	1,2,4-Trimethylbenzene	C 715 -4943	0.17	**6.40**	ppb	
135-98-8	sec-Butylbenzene	C 715 -4943	0.22	0.22	ppb	U
99-87-6	4-Isopropyltoluene	C 715 -4943	0.17	0.17	ppb	U
541-73-1	1,3-Dichlorobenzene	C 715 -4943	0.17	0.17	ppb	U
106-46-7	1,4-Dichlorobenzene	C 715 -4943	0.10	0.10	ppb	U
95-50-1	1,2-Dichlorobenzene	C 715 -4943	0.11	0.11	ppb	U
105-05-5	p-Diethylbenzene	C 715 -4943	0.22	0.22	ppb	U
104-51-8	n-Butylbenzene	C 715 -4943	0.17	0.17	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	C 715 -4943	0.50	0.50	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	C 715 -4943	0.42	0.42	ppb	U
120-82-1	1,2,4-Trichlorobenzene	C 715 -4943	0.13	0.13	ppb	U

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11/01/2002

Volatiles - EPA 8260B

Sample: L4838-6...continue
Client Sample ID: DMP-4
Matrix: Liquid
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Type: Grab

Collected: 10/02/2002 17:15

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
87-68-3	Hexachlorobutadiene	C 715 -4943	0.45	0.45	ppb	U
91-20-3	Naphthalene	C 715 -4943	0.29	**1.80**	ppb	
87-61-6	1,2,3-Trichlorobenzene	C 715 -4943	0.19	0.19	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	C715-4943	100.0 %	(76- 118)	
4774-33-8	DIBROMOFLUOROMETHANE	C715-4943	89.7 %	(83- 113)	
2037-26-5	TOLUENE-D8	C715-4943	104.0 %	(90- 111)	
460-00-4	4-BROMOFLUOROBENZENE	C717-4987	103.0 %	(76- 118)	
4774-33-8	DIBROMOFLUOROMETHANE	C717-4987	86.2 %	(83- 113)	
2037-26-5	TOLUENE-D8	C717-4987	106.0 %	(90- 111)	

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11/01/2002

Volatiles - EPA 8260B

Sample: L4838-7
Client Sample ID: MW-8
Matrix: Liquid
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Type: Grab

Collected: 10/03/2002 12:40

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C 715 -4944	0.38	0.38	ppb	U
75-45-6	Chlorodifluoromethane	C 715 -4944	0.25	0.25	ppb	U
74-87-3	Chloromethane	C 715 -4944	0.32	0.32	ppb	U
75-01-4	Vinyl Chloride	C 715 -4944	0.23	0.23	ppb	U
74-83-9	Bromomethane	C 715 -4944	0.32	0.32	ppb	U
75-00-3	Chloroethane	C 715 -4944	0.24	**3.70**	ppb	
75-69-4	Trichlorofluoromethane	C 715 -4944	0.27	0.27	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	C 715 -4944	0.36	0.36	ppb	U
75-35-4	1,1-Dichloroethene	C 715 -4944	0.27	0.27	ppb	U
67-64-1	Acetone	C 715 -4944	1.13	1.13	ppb	U
75-15-0	Carbon disulfide	C 715 -4944	0.19	0.19	ppb	U
75-09-2	Methylene Chloride	C 715 -4944	0.21	0.21	ppb	U
156-60-5	t-1,2-Dichloroethene	C 715 -4944	0.31	0.31	ppb	U
1634-04-4	Methyl t-butyl ether	C 715 -4944	0.18	0.18	ppb	U
75-34-3	1,1-Dichloroethane	C 715 -4944	0.30	0.30	ppb	U
590-20-7	2,2-Dichloropropane	C 715 -4944	0.27	0.27	ppb	U
156-59-2	c-1,2-Dichloroethene	C 715 -4944	0.24	0.24	ppb	U
78-93-3	2-Butanone	C 715 -4944	3.80	3.80	ppb	U
74-97-5	Bromochloromethane	C 715 -4944	0.25	0.25	ppb	U
67-66-3	Chloroform	C 715 -4944	0.26	0.26	ppb	U
71-55-6	1,1,1-Trichloroethane	C 715 -4944	0.26	0.26	ppb	U
56-23-5	Carbon Tetrachloride	C 715 -4944	0.22	0.22	ppb	U
563-58-6	1,1-Dichloropropene	C 715 -4944	0.39	0.39	ppb	U
71-43-2	Benzene	C 715 -4944	0.21	0.21	ppb	U
107-06-2	1,2-Dichloroethane	C 715 -4944	0.23	0.23	ppb	U
79-01-6	Trichloroethene	C 715 -4944	0.36	0.36	ppb	U
78-87-5	1,2-Dichloropropane	C 715 -4944	0.31	0.31	ppb	U
74-95-3	Dibromomethane	C 715 -4944	0.24	0.24	ppb	U
75-27-4	Bromodichloromethane	C 715 -4944	0.20	0.20	ppb	U
110-75-8	2-Chloroethylvinylether	C 715 -4944	0.33	0.33	ppb	U
10061-01-5	c-1,3-Dichloropropene	C 715 -4944	0.16	0.16	ppb	U
108-10-1	4-Methyl-2-pentanone	C 715 -4944	0.63	0.63	ppb	U
108-88-3	Toluene	C 715 -4944	0.20	0.20	ppb	U
10061-02-6	t-1,3-Dichloropropene	C 715 -4944	0.16	0.16	ppb	U

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Volatiles - EPA 8260B

Sample: L4838-7...continue
Client Sample ID: MW-8
Matrix: Liquid
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Type: Grab

Collected: 10/03/2002 12:40

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
79-00-5	1,1,2-Trichloroethane	C 715 -4944	0.16	0.16	ppb	U
127-18-4	Tetrachloroethene	C 715 -4944	0.11	0.11	ppb	U
142-28-9	1,3-Dichloropropane	C 715 -4944	0.21	0.21	ppb	U
591-78-6	2-Hexanone	C 715 -4944	0.94	0.94	ppb	U
124-48-1	Dibromochloromethane	C 715 -4944	0.13	0.13	ppb	U
106-93-4	1,2-Dibromoethane	C 715 -4944	0.17	0.17	ppb	U
108-90-7	Chlorobenzene	C 715 -4944	0.15	0.15	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	C 715 -4944	0.20	0.20	ppb	U
100-41-4	Ethylbenzene	C 715 -4944	0.22	0.22	ppb	U
108-38-3	m,p-xylene	C 715 -4944	0.34	0.34	ppb	U
95-47-6	o-xylene	C 715 -4944	0.25	0.25	ppb	U
100-42-5	Styrene	C 715 -4944	0.20	0.20	ppb	U
75-25-2	Bromoform	C 715 -4944	0.21	0.21	ppb	U
98-82-8	Isopropylbenzene	C 715 -4944	0.15	0.15	ppb	U
108-86-1	Bromobenzene	C 715 -4944	0.20	0.20	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	C 715 -4944	0.23	0.23	ppb	U
103-65-1	n-Propylbenzene	C 715 -4944	0.16	0.16	ppb	U
96-18-4	1,2,3-Trichloropropane	C 715 -4944	0.35	0.35	ppb	U
622-96-8	p-Ethyltoluene	C 715 -4944	0.16	0.16	ppb	U
108-67-8	1,3,5-Trimethylbenzene	C 715 -4944	0.20	0.20	ppb	U
95-49-8	2-Chlorotoluene	C 715 -4944	0.25	0.25	ppb	U
106-43-4	4-Chlorotoluene	C 715 -4944	0.22	0.22	ppb	U
98-06-6	tert-Butylbenzene	C 715 -4944	0.19	0.19	ppb	U
95-63-6	1,2,4-Trimethylbenzene	C 715 -4944	0.17	0.17	ppb	U
135-98-8	sec-Butylbenzene	C 715 -4944	0.22	0.22	ppb	U
99-87-6	4-Isopropyltoluene	C 715 -4944	0.17	0.17	ppb	U
541-73-1	1,3-Dichlorobenzene	C 715 -4944	0.17	0.17	ppb	U
106-46-7	1,4-Dichlorobenzene	C 715 -4944	0.10	0.10	ppb	U
95-50-1	1,2-Dichlorobenzene	C 715 -4944	0.11	0.11	ppb	U
105-05-5	p-Diethylbenzene	C 715 -4944	0.22	0.22	ppb	U
104-51-8	n-Butylbenzene	C 715 -4944	0.17	0.17	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	C 715 -4944	0.50	0.50	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	C 715 -4944	0.42	0.42	ppb	U
120-82-1	1,2,4-Trichlorobenzene	C 715 -4944	0.13	0.13	ppb	U

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Volatiles - EPA 8260B

Sample: L4838-7...continue
Client Sample ID: MW-8 Collected: 10/03/2002 12:40
Matrix: Liquid Type: Grab
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
87-68-3	Hexachlorobutadiene	C 715 -4944	0.45	0.45	ppb	U
91-20-3	Naphthalene	C 715 -4944	0.29	0.29	ppb	U
87-61-6	1,2,3-Trichlorobenzene	C 715 -4944	0.19	0.19	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	C715-4944	101.0 %	(76 - 118)	
4774-33-8	DIBROMOFLUOROMETHANE	C715-4944	89.2 %	(83 - 113)	
2037-26-5	TOLUENE-D8	C715-4944	103.0 %	(90 - 111)	

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Volatiles - EPA 8260B

Sample: L4838-8
Client Sample ID: MW-12
Matrix: Liquid
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Type: Grab

Collected: 10/03/2002 11:00

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C 715 -4945	1.90	1.90	ppb	U
75-45-6	Chlorodifluoromethane	C 715 -4945	1.25	1.25	ppb	U
74-87-3	Chloromethane	C 715 -4945	1.60	1.60	ppb	U
75-01-4	Vinyl Chloride	C 715 -4945	1.15	**83.1**	ppb	
74-83-9	Bromomethane	C 715 -4945	1.60	1.60	ppb	U
75-00-3	Chloroethane	C 715 -4945	1.20	1.20	ppb	U
75-69-4	Trichlorofluoromethane	C 715 -4945	1.35	1.35	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	C 715 -4945	1.80	1.80	ppb	U
75-35-4	1,1-Dichloroethene	C 715 -4945	1.35	1.35	ppb	U
67-64-1	Acetone	C 715 -4945	5.65	5.65	ppb	U
75-15-0	Carbon disulfide	C 715 -4945	0.95	0.95	ppb	U
75-09-2	Methylene Chloride	C 715 -4945	1.05	1.05	ppb	U
156-60-5	t-1,2-Dichloroethene	C 715 -4945	1.55	1.55	ppb	U
1634-04-4	Methyl t-butyl ether	C 715 -4945	0.90	0.90	ppb	U
75-34-3	1,1-Dichloroethane	C 715 -4945	1.50	**94.2**	ppb	
590-20-7	2,2-Dichloropropane	C 715 -4945	1.35	1.35	ppb	U
156-59-2	c-1,2-Dichloroethene	C 715 -4945	1.20	**488**	ppb	
78-93-3	2-Butanone	C 715 -4945	19.0	19.0	ppb	U
74-97-5	Bromochloromethane	C 715 -4945	1.25	1.25	ppb	U
67-66-3	Chloroform	C 715 -4945	1.30	1.30	ppb	U
71-55-6	1,1,1-Trichloroethane	C 715 -4945	1.30	1.30	ppb	U
56-23-5	Carbon Tetrachloride	C 715 -4945	1.10	1.10	ppb	U
563-58-6	1,1-Dichloropropene	C 715 -4945	1.95	1.95	ppb	U
71-43-2	Benzene	C 715 -4945	1.05	1.05	ppb	U
107-06-2	1,2-Dichloroethane	C 715 -4945	1.15	1.15	ppb	U
79-01-6	Trichloroethene	C 715 -4945	1.80	**82.5**	ppb	
78-87-5	1,2-Dichloropropane	C 715 -4945	1.55	1.55	ppb	U
74-95-3	Dibromomethane	C 715 -4945	1.20	1.20	ppb	U
75-27-4	Bromodichloromethane	C 715 -4945	1.00	1.00	ppb	U
110-75-8	2-Chloroethylvinylether	C 715 -4945	1.65	1.65	ppb	U
10061-01-5	c-1,3-Dichloropropene	C 715 -4945	0.80	0.80	ppb	U
108-10-1	4-Methyl-2-pentanone	C 715 -4945	3.15	3.15	ppb	U
108-88-3	Toluene	C 715 -4945	1.00	1.00	ppb	U
10061-02-6	t-1,3-Dichloropropene	C 715 -4945	0.80	0.80	ppb	U

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11/01/2002

Volatiles - EPA 8260B

Sample: L4838-8...continue

Client Sample ID: MW-12 Collected: 10/03/2002 11:00

Matrix: Liquid Type: Grab

Remarks: See Case Narrative

Analyzed Date: 10/06/2002

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
79-00-5	1,1,2-Trichloroethane	C 715 -4945	0.80	0.80	ppb	U
127-18-4	Tetrachloroethene	C 715 -4945	0.55	0.55	ppb	U
142-28-9	1,3-Dichloropropane	C 715 -4945	1.05	1.05	ppb	U
591-78-6	2-Hexanone	C 715 -4945	4.70	4.70	ppb	U
124-48-1	Dibromochloromethane	C 715 -4945	0.65	0.65	ppb	U
106-93-4	1,2-Dibromoethane	C 715 -4945	0.85	0.85	ppb	U
108-90-7	Chlorobenzene	C 715 -4945	0.75	0.75	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	C 715 -4945	1.00	1.00	ppb	U
100-41-4	Ethylbenzene	C 715 -4945	1.10	1.10	ppb	U
108-38-3	m,p-xylene	C 715 -4945	1.70	1.70	ppb	U
95-47-6	o-xylene	C 715 -4945	1.25	1.25	ppb	U
100-42-5	Styrene	C 715 -4945	1.00	1.00	ppb	U
75-25-2	Bromoform	C 715 -4945	1.05	1.05	ppb	U
98-82-8	Isopropylbenzene	C 715 -4945	0.75	0.75	ppb	U
108-86-1	Bromobenzene	C 715 -4945	1.00	1.00	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	C 715 -4945	1.15	1.15	ppb	U
103-65-1	n-Propylbenzene	C 715 -4945	0.80	0.80	ppb	U
96-18-4	1,2,3-Trichloropropane	C 715 -4945	1.75	1.75	ppb	U
622-96-8	p-Ethyltoluene	C 715 -4945	0.80	0.80	ppb	U
108-67-8	1,3,5-Trimethylbenzene	C 715 -4945	1.00	1.00	ppb	U
95-49-8	2-Chlorotoluene	C 715 -4945	1.25	**554**	ppb	
106-43-4	4-Chlorotoluene	C 715 -4945	1.10	1.10	ppb	U
98-06-6	tert-Butylbenzene	C 715 -4945	0.95	0.95	ppb	U
95-63-6	1,2,4-Trimethylbenzene	C 715 -4945	0.85	0.85	ppb	U
135-98-8	sec-Butylbenzene	C 715 -4945	1.10	1.10	ppb	U
99-87-6	4-Isopropyltoluene	C 715 -4945	0.85	0.85	ppb	U
541-73-1	1,3-Dichlorobenzene	C 715 -4945	0.85	0.85	ppb	U
106-46-7	1,4-Dichlorobenzene	C 715 -4945	0.50	0.50	ppb	U
95-50-1	1,2-Dichlorobenzene	C 715 -4945	0.55	0.55	ppb	U
105-05-5	p-Diethylbenzene	C 715 -4945	1.10	1.10	ppb	U
104-51-8	n-Butylbenzene	C 715 -4945	0.85	0.85	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	C 715 -4945	2.50	2.50	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	C 715 -4945	2.10	2.10	ppb	U
120-82-1	1,2,4-Trichlorobenzene	C 715 -4945	0.65	0.65	ppb	U

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11/01/2002

Volatiles - EPA 8260B

Sample: L4838-8...continue

Client Sample ID: MW-12 Collected: 10/03/2002 11:00

Matrix: Liquid Type: Grab

Remarks: See Case Narrative

Analyzed Date: 10/06/2002

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
87-68-3	Hexachlorobutadiene	C 715 -4945	2.25	2.25	ppb	U
91-20-3	Naphthalene	C 715 -4945	1.45	1.45	ppb	U
87-61-6	1,2,3-Trichlorobenzene	C 715 -4945	0.95	0.95	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	C715-4945	101.0 %	(76- 118)	
4774-33-8	DIBROMOFLUOROMETHANE	C715-4945	92.3 %	(83- 113)	
2037-26-5	TOLUENE-D8	C715-4945	103.0 %	(90- 111)	

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11/01/2002

Volatiles - EPA 8260B

Sample: L4838-9
Client Sample ID: MW-13
Matrix: Liquid
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Type: Grab

Collected: 10/03/2002 14:00

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C 715 -4946	0.38	0.38	ppb	U
75-45-6	Chlorodifluoromethane	C 715 -4946	0.25	0.25	ppb	U
74-87-3	Chloromethane	C 715 -4946	0.32	0.32	ppb	U
75-01-4	Vinyl Chloride	C 715 -4946	0.23	**26.2**	ppb	
74-83-9	Bromomethane	C 715 -4946	0.32	0.32	ppb	U
75-00-3	Chloroethane	C 715 -4946	0.24	0.24	ppb	U
75-69-4	Trichlorofluoromethane	C 715 -4946	0.27	0.27	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	C 715 -4946	0.36	0.36	ppb	U
75-35-4	1,1-Dichloroethene	C 715 -4946	0.27	**13.3**	ppb	
67-64-1	Acetone	C 715 -4946	1.13	1.13	ppb	U
75-15-0	Carbon disulfide	C 715 -4946	0.19	0.19	ppb	U
75-09-2	Methylene Chloride	C 715 -4946	0.21	0.21	ppb	U
156-60-5	t-1,2-Dichloroethene	C 715 -4946	0.31	**3.00**	ppb	
1634-04-4	Methyl t-butyl ether	C 715 -4946	0.18	0.18	ppb	U
75-34-3	1,1-Dichloroethane	C 715 -4946	0.30	**96.8**	ppb	
590-20-7	2,2-Dichloropropane	C 715 -4946	0.27	0.27	ppb	U
156-59-2	c-1,2-Dichloroethene	C 717 -4988	2.40	**501**	ppb	
78-93-3	2-Butanone	C 715 -4946	3.80	3.80	ppb	U
74-97-5	Bromochloromethane	C 715 -4946	0.25	0.25	ppb	U
67-66-3	Chloroform	C 715 -4946	0.26	0.26	ppb	U
71-55-6	1,1,1-Trichloroethane	C 715 -4946	0.26	**4.30**	ppb	
56-23-5	Carbon Tetrachloride	C 715 -4946	0.22	0.22	ppb	U
563-58-6	1,1-Dichloropropene	C 715 -4946	0.39	0.39	ppb	U
71-43-2	Benzene	C 715 -4946	0.21	**2.00**	ppb	
107-06-2	1,2-Dichloroethane	C 715 -4946	0.23	0.23	ppb	U
79-01-6	Trichloroethene	C 715 -4946	0.36	**77.2**	ppb	
78-87-5	1,2-Dichloropropane	C 715 -4946	0.31	0.31	ppb	U
74-95-3	Dibromomethane	C 715 -4946	0.24	0.24	ppb	U
75-27-4	Bromodichloromethane	C 715 -4946	0.20	0.20	ppb	U
110-75-8	2-Chloroethylvinylether	C 715 -4946	0.33	0.33	ppb	U
10061-01-5	c-1,3-Dichloropropene	C 715 -4946	0.16	0.16	ppb	U
108-10-1	4-Methyl-2-pentanone	C 715 -4946	0.63	0.63	ppb	U
108-88-3	Toluene	C 715 -4946	0.20	0.20	ppb	U
10061-02-6	t-1,3-Dichloropropene	C 715 -4946	0.16	0.16	ppb	U

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11/01/2002

Volatiles - EPA 8260B

Sample: L4838-9...continue
Client Sample ID: MW-13
Matrix: Liquid
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Type: Grab

Collected: 10/03/2002 14:00

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
79-00-5	1,1,2-Trichloroethane	C 715 -4946	0.16	0.16	ppb	U
127-18-4	Tetrachloroethene	C 715 -4946	0.11	**80.5**	ppb	
142-28-9	1,3-Dichloropropane	C 715 -4946	0.21	0.21	ppb	U
591-78-6	2-Hexanone	C 715 -4946	0.94	0.94	ppb	U
124-48-1	Dibromochloromethane	C 715 -4946	0.13	0.13	ppb	U
106-93-4	1,2-Dibromoethane	C 715 -4946	0.17	0.17	ppb	U
108-90-7	Chlorobenzene	C 715 -4946	0.15	0.15	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	C 715 -4946	0.20	0.20	ppb	U
100-41-4	Ethylbenzene	C 715 -4946	0.22	0.22	ppb	U
108-38-3	m,p-xylene	C 715 -4946	0.34	0.34	ppb	U
95-47-6	o-xylene	C 715 -4946	0.25	0.25	ppb	U
100-42-5	Styrene	C 715 -4946	0.20	0.20	ppb	U
75-25-2	Bromoform	C 715 -4946	0.21	0.21	ppb	U
98-82-8	Isopropylbenzene	C 715 -4946	0.15	0.15	ppb	U
108-86-1	Bromobenzene	C 715 -4946	0.20	0.20	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	C 715 -4946	0.23	0.23	ppb	U
103-65-1	n-Propylbenzene	C 715 -4946	0.16	0.16	ppb	U
96-18-4	1,2,3-Trichloropropane	C 715 -4946	0.35	0.35	ppb	U
622-96-8	p-Ethyltoluene	C 715 -4946	0.16	0.16	ppb	U
108-67-8	1,3,5-Trimethylbenzene	C 715 -4946	0.20	0.20	ppb	U
95-49-8	2-Chlorotoluene	C 715 -4946	0.25	**10.2**	ppb	
106-43-4	4-Chlorotoluene	C 715 -4946	0.22	0.22	ppb	U
98-06-6	tert-Butylbenzene	C 715 -4946	0.19	0.19	ppb	U
95-63-6	1,2,4-Trimethylbenzene	C 715 -4946	0.17	0.17	ppb	U
135-98-8	sec-Butylbenzene	C 715 -4946	0.22	0.22	ppb	U
99-87-6	4-Isopropyltoluene	C 715 -4946	0.17	0.17	ppb	U
541-73-1	1,3-Dichlorobenzene	C 715 -4946	0.17	0.17	ppb	U
106-46-7	1,4-Dichlorobenzene	C 715 -4946	0.10	0.10	ppb	U
95-50-1	1,2-Dichlorobenzene	C 715 -4946	0.11	0.11	ppb	U
105-05-5	p-Diethylbenzene	C 715 -4946	0.22	0.22	ppb	U
104-51-8	n-Butylbenzene	C 715 -4946	0.17	0.17	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	C 715 -4946	0.50	0.50	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	C 715 -4946	0.42	0.42	ppb	U
120-82-1	1,2,4-Trichlorobenzene	C 715 -4946	0.13	0.13	ppb	U

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11/01/2002

Volatiles - EPA 8260B

Sample: L4838-9...continue

Client Sample ID: MW-13 Collected: 10/03/2002 14:00

Matrix: Liquid Type: Grab

Remarks: See Case Narrative

Analyzed Date: 10/06/2002

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
87-68-3	Hexachlorobutadiene	C 715 -4946	0.45	0.45	ppb	U
91-20-3	Naphthalene	C 715 -4946	0.29	0.29	ppb	U
87-61-6	1,2,3-Trichlorobenzene	C 715 -4946	0.19	0.19	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	C715-4946	99.5 %	(76- 118)	
4774-33-8	DIBROMOFLUOROMETHANE	C715-4946	99.8 %	(83- 113)	
2037-26-5	TOLUENE-D8	C715-4946	102.0 %	(90- 111)	
460-00-4	4-BROMOFLUOROBENZENE	C717-4988	105.0 %	(76- 118)	
4774-33-8	DIBROMOFLUOROMETHANE	C717-4988	85.3 %	(83- 113)	
2037-26-5	TOLUENE-D8	C717-4988	110.0 %	(90- 111)	

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Volatiles - EPA 8260B

Sample: L4838-10

Client Sample ID: MW-35 Collected: 10/03/2002 15:15

Matrix: Liquid Type: Grab

Remarks: See Case Narrative

Analyzed Date: 10/06/2002

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C 715 -4947	0.38	0.38	ppb	U
75-45-6	Chlorodifluoromethane	C 715 -4947	0.25	0.25	ppb	U
74-87-3	Chloromethane	C 715 -4947	0.32	0.32	ppb	U
75-01-4	Vinyl Chloride	C 715 -4947	0.23	0.23	ppb	U
74-83-9	Bromomethane	C 715 -4947	0.32	0.32	ppb	U
75-00-3	Chloroethane	C 715 -4947	0.24	0.24	ppb	U
75-69-4	Trichlorofluoromethane	C 715 -4947	0.27	0.27	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	C 715 -4947	0.36	0.36	ppb	U
75-35-4	1,1-Dichloroethene	C 715 -4947	0.27	0.27	ppb	U
67-64-1	Acetone	C 715 -4947	1.13	1.13	ppb	U
75-15-0	Carbon disulfide	C 715 -4947	0.19	0.19	ppb	U
75-09-2	Methylene Chloride	C 715 -4947	0.21	0.21	ppb	U
156-60-5	t-1,2-Dichloroethene	C 715 -4947	0.31	0.31	ppb	U
1634-04-4	Methyl t-butyl ether	C 715 -4947	0.18	0.18	ppb	U
75-34-3	1,1-Dichloroethane	C 715 -4947	0.30	0.30	ppb	U
590-20-7	2,2-Dichloropropane	C 715 -4947	0.27	0.27	ppb	U
156-59-2	c-1,2-Dichloroethene	C 715 -4947	0.24	**1.10**	ppb	
78-93-3	2-Butanone	C 715 -4947	3.80	3.80	ppb	U
74-97-5	Bromochloromethane	C 715 -4947	0.25	0.25	ppb	U
67-66-3	Chloroform	C 715 -4947	0.26	0.26	ppb	U
71-55-6	1,1,1-Trichloroethane	C 715 -4947	0.26	0.26	ppb	U
56-23-5	Carbon Tetrachloride	C 715 -4947	0.22	0.22	ppb	U
563-58-6	1,1-Dichloropropene	C 715 -4947	0.39	0.39	ppb	U
71-43-2	Benzene	C 715 -4947	0.21	0.21	ppb	U
107-06-2	1,2-Dichloroethane	C 715 -4947	0.23	0.23	ppb	U
79-01-6	Trichloroethene	C 715 -4947	0.36	**39.8**	ppb	
78-87-5	1,2-Dichloropropane	C 715 -4947	0.31	0.31	ppb	U
74-95-3	Dibromomethane	C 715 -4947	0.24	0.24	ppb	U
75-27-4	Bromodichloromethane	C 715 -4947	0.20	0.20	ppb	U
110-75-8	2-Chloroethylvinylether	C 715 -4947	0.33	0.33	ppb	U
10061-01-5	c-1,3-Dichloropropene	C 715 -4947	0.16	0.16	ppb	U
108-10-1	4-Methyl-2-pentanone	C 715 -4947	0.63	0.63	ppb	U
108-88-3	Toluene	C 715 -4947	0.20	0.20	ppb	U
10061-02-6	t-1,3-Dichloropropene	C 715 -4947	0.16	0.16	ppb	U

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Volatiles - EPA 8260B

Sample: L4838-10...continue
Client Sample ID: MW-35
Matrix: Liquid
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Type: Grab

Collected: 10/03/2002 15:15

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
79-00-5	1,1,2-Trichloroethane	C 715 -4947	0.16	0.16	ppb	U
127-18-4	Tetrachloroethene	C 715 -4947	0.11	**4.50**	ppb	
142-28-9	1,3-Dichloropropane	C 715 -4947	0.21	0.21	ppb	U
591-78-6	2-Hexanone	C 715 -4947	0.94	0.94	ppb	U
124-48-1	Dibromochloromethane	C 715 -4947	0.13	0.13	ppb	U
106-93-4	1,2-Dibromoethane	C 715 -4947	0.17	0.17	ppb	U
108-90-7	Chlorobenzene	C 715 -4947	0.15	0.15	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	C 715 -4947	0.20	0.20	ppb	U
100-41-4	Ethylbenzene	C 715 -4947	0.22	0.22	ppb	U
108-38-3	m,p-xylene	C 715 -4947	0.34	0.34	ppb	U
95-47-6	o-xylene	C 715 -4947	0.25	0.25	ppb	U
100-42-5	Styrene	C 715 -4947	0.20	0.20	ppb	U
75-25-2	Bromoform	C 715 -4947	0.21	0.21	ppb	U
98-82-8	Isopropylbenzene	C 715 -4947	0.15	0.15	ppb	U
108-86-1	Bromobenzene	C 715 -4947	0.20	0.20	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	C 715 -4947	0.23	0.23	ppb	U
103-65-1	n-Propylbenzene	C 715 -4947	0.16	0.16	ppb	U
96-18-4	1,2,3-Trichloropropane	C 715 -4947	0.35	0.35	ppb	U
622-96-8	p-Ethyltoluene	C 715 -4947	0.16	0.16	ppb	U
108-67-8	1,3,5-Trimethylbenzene	C 715 -4947	0.20	0.20	ppb	U
95-49-8	2-Chlorotoluene	C 715 -4947	0.25	0.25	ppb	U
106-43-4	4-Chlorotoluene	C 715 -4947	0.22	0.22	ppb	U
98-06-6	tert-Butylbenzene	C 715 -4947	0.19	0.19	ppb	U
95-63-6	1,2,4-Trimethylbenzene	C 715 -4947	0.17	0.17	ppb	U
135-98-8	sec-Butylbenzene	C 715 -4947	0.22	0.22	ppb	U
99-87-6	4-Isopropyltoluene	C 715 -4947	0.17	0.17	ppb	U
541-73-1	1,3-Dichlorobenzene	C 715 -4947	0.17	0.17	ppb	U
106-46-7	1,4-Dichlorobenzene	C 715 -4947	0.10	0.10	ppb	U
95-50-1	1,2-Dichlorobenzene	C 715 -4947	0.11	0.11	ppb	U
105-05-5	p-Diethylbenzene	C 715 -4947	0.22	0.22	ppb	U
104-51-8	n-Butylbenzene	C 715 -4947	0.17	0.17	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	C 715 -4947	0.50	0.50	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	C 715 -4947	0.42	0.42	ppb	U
120-82-1	1,2,4-Trichlorobenzene	C 715 -4947	0.13	0.13	ppb	U

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Volatiles - EPA 8260B

Sample: L4838-10...continue
Client Sample ID: MW-35
Matrix: Liquid
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Type: Grab

Collected: 10/03/2002 15:15

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
87-68-3	Hexachlorobutadiene	C 715 -4947	0.45	0.45	ppb	U
91-20-3	Naphthalene	C 715 -4947	0.29	0.29	ppb	U
87-61-6	1,2,3-Trichlorobenzene	C 715 -4947	0.19	0.19	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	C715-4947	101.0 %	(76- 118)	
4774-33-8	DIBROMOFLUOROMETHANE	C715-4947	88.3 %	(83- 113)	
2037-26-5	TOLUENE-D8	C715-4947	105.0 %	(90- 111)	

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Volatiles - EPA 8260B

Sample: L4838-11

Client Sample ID: MW-45 Collected: 10/03/2002 16:00

Matrix: Liquid Type: Grab

Remarks: See Case Narrative

Analyzed Date: 10/06/2002

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C 715 -4948	3.80	3.80	ppb	U
75-45-6	Chlorodifluoromethane	C 715 -4948	2.50	2.50	ppb	U
74-87-3	Chloromethane	C 715 -4948	3.20	3.20	ppb	U
75-01-4	Vinyl Chloride	C 715 -4948	2.30	2.30	ppb	U
74-83-9	Bromomethane	C 715 -4948	3.20	3.20	ppb	U
75-00-3	Chloroethane	C 715 -4948	2.40	2.40	ppb	U
75-69-4	Trichlorofluoromethane	C 715 -4948	2.70	2.70	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	C 715 -4948	3.60	3.60	ppb	U
75-35-4	1,1-Dichloroethene	C 715 -4948	2.70	2.70	ppb	U
67-64-1	Acetone	C 715 -4948	11.3	11.3	ppb	U
75-15-0	Carbon disulfide	C 715 -4948	1.90	1.90	ppb	U
75-09-2	Methylene Chloride	C 715 -4948	2.10	2.10	ppb	U
156-60-5	t-1,2-Dichloroethene	C 715 -4948	3.10	3.10	ppb	U
1634-04-4	Methyl t-butyl ether	C 715 -4948	1.80	1.80	ppb	U
75-34-3	1,1-Dichloroethane	C 715 -4948	3.00	3.00	ppb	U
590-20-7	2,2-Dichloropropane	C 715 -4948	2.70	2.70	ppb	U
156-59-2	c-1,2-Dichloroethene	C 715 -4948	2.40	2.40	ppb	U
78-93-3	2-Butanone	C 715 -4948	38.0	38.0	ppb	U
74-97-5	Bromochloromethane	C 715 -4948	2.50	2.50	ppb	U
67-66-3	Chloroform	C 715 -4948	2.60	2.60	ppb	U
71-55-6	1,1,1-Trichloroethane	C 715 -4948	2.60	2.60	ppb	U
56-23-5	Carbon Tetrachloride	C 715 -4948	2.20	2.20	ppb	U
563-58-6	1,1-Dichloropropene	C 715 -4948	3.90	3.90	ppb	U
71-43-2	Benzene	C 715 -4948	2.10	2.10	ppb	U
107-06-2	1,2-Dichloroethane	C 715 -4948	2.30	2.30	ppb	U
79-01-6	Trichloroethene	C 715 -4948	3.60	**32.3**	ppb	
78-87-5	1,2-Dichloropropane	C 715 -4948	3.10	3.10	ppb	U
74-95-3	Dibromomethane	C 715 -4948	2.40	2.40	ppb	U
75-27-4	Bromodichloromethane	C 715 -4948	2.00	2.00	ppb	U
110-75-8	2-Chloroethylvinylether	C 715 -4948	3.30	3.30	ppb	U
10061-01-5	c-1,3-Dichloropropene	C 715 -4948	1.60	1.60	ppb	U
108-10-1	4-Methyl-2-pentanone	C 715 -4948	6.30	6.30	ppb	U
108-88-3	Toluene	C 715 -4948	2.00	2.00	ppb	U
10061-02-6	t-1,3-Dichloropropene	C 715 -4948	1.60	1.60	ppb	U

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11/01/2002

Volatiles - EPA 8260B

Sample: L4838-11...continue
Client Sample ID: MW-45
Matrix: Liquid
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Type: Grab

Collected: 10/03/2002 16:00

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
79-00-5	1,1,2-Trichloroethane	C 715 -4948	1.60	1.60	ppb	U
127-18-4	Tetrachloroethene	C 717 -4989	5.50	**2510**	ppb	
142-28-9	1,3-Dichloropropane	C 715 -4948	2.10	2.10	ppb	U
591-78-6	2-Hexanone	C 715 -4948	9.40	9.40	ppb	U
124-48-1	Dibromochloromethane	C 715 -4948	1.30	1.30	ppb	U
106-93-4	1,2-Dibromoethane	C 715 -4948	1.70	1.70	ppb	U
108-90-7	Chlorobenzene	C 715 -4948	1.50	1.50	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	C 715 -4948	2.00	2.00	ppb	U
100-41-4	Ethylbenzene	C 715 -4948	2.20	2.20	ppb	U
108-38-3	m,p-xylene	C 715 -4948	3.40	3.40	ppb	U
95-47-6	o-xylene	C 715 -4948	2.50	2.50	ppb	U
100-42-5	Styrene	C 715 -4948	2.00	2.00	ppb	U
75-25-2	Bromoform	C 715 -4948	2.10	2.10	ppb	U
98-82-8	Isopropylbenzene	C 715 -4948	1.50	1.50	ppb	U
108-86-1	Bromobenzene	C 715 -4948	2.00	2.00	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	C 715 -4948	2.30	2.30	ppb	U
103-65-1	n-Propylbenzene	C 715 -4948	1.60	1.60	ppb	U
96-18-4	1,2,3-Trichloropropane	C 715 -4948	3.50	3.50	ppb	U
622-96-8	p-Ethyltoluene	C 715 -4948	1.60	1.60	ppb	U
108-67-8	1,3,5-Trimethylbenzene	C 715 -4948	2.00	2.00	ppb	U
95-49-8	2-Chlorotoluene	C 715 -4948	2.50	2.50	ppb	U
106-43-4	4-Chlorotoluene	C 715 -4948	2.20	2.20	ppb	U
98-06-6	tert-Butylbenzene	C 715 -4948	1.90	1.90	ppb	U
95-63-6	1,2,4-Trimethylbenzene	C 715 -4948	1.70	1.70	ppb	U
135-98-8	sec-Butylbenzene	C 715 -4948	2.20	2.20	ppb	U
99-87-6	4-Isopropyltoluene	C 715 -4948	1.70	1.70	ppb	U
541-73-1	1,3-Dichlorobenzene	C 715 -4948	1.70	1.70	ppb	U
106-46-7	1,4-Dichlorobenzene	C 715 -4948	1.00	1.00	ppb	U
95-50-1	1,2-Dichlorobenzene	C 715 -4948	1.10	1.10	ppb	U
105-05-5	p-Diethylbenzene	C 715 -4948	2.20	2.20	ppb	U
104-51-8	n-Butylbenzene	C 715 -4948	1.70	1.70	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	C 715 -4948	5.00	5.00	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	C 715 -4948	4.20	4.20	ppb	U
120-82-1	1,2,4-Trichlorobenzene	C 715 -4948	1.30	1.30	ppb	U

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11/01/2002

Volatiles - EPA 8260B

Sample: L4838-11...continue
Client Sample ID: MW-45
Matrix: Liquid
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Collected: 10/03/2002 16:00
Type: Grab

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
87-68-3	Hexachlorobutadiene	C 715 -4948	4.50	4.50	ppb	U
91-20-3	Naphthalene	C 715 -4948	2.90	2.90	ppb	U
87-61-6	1,2,3-Trichlorobenzene	C 715 -4948	1.90	1.90	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	C715-4948	100.0 %	(76 - 118)	
1868-53-7	DIBROMOFLUOROMETHANE	C715-4948	89.7 %	(83 - 113)	
2037-26-5	TOLUENE-D8	C715-4948	103.0 %	(90 - 111)	
460-00-4	4-BROMOFLUOROBENZENE	C717-4989	101.0 %	(76 - 118)	
1868-53-7	DIBROMOFLUOROMETHANE	C717-4989	89.3 %	(83 - 113)	
2037-26-5	TOLUENE-D8	C717-4989	104.0 %	(90 - 111)	

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11/01/2002

Volatiles - EPA 8260B

Sample: L4838-12
Client Sample ID: Trip Blank
Matrix: Liquid
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Collected: 10/03/2002
Type: Trip Blank

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C 715 -4949	0.38	0.38	ppb	U
75-45-6	Chlorodifluoromethane	C 715 -4949	0.25	0.25	ppb	U
74-87-3	Chloromethane	C 715 -4949	0.32	0.32	ppb	U
75-01-4	Vinyl Chloride	C 715 -4949	0.23	0.23	ppb	U
74-83-9	Bromomethane	C 715 -4949	0.32	0.32	ppb	U
75-00-3	Chloroethane	C 715 -4949	0.24	0.24	ppb	U
75-69-4	Trichlorofluoromethane	C 715 -4949	0.27	0.27	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	C 715 -4949	0.36	0.36	ppb	U
75-35-4	1,1-Dichloroethene	C 715 -4949	0.27	0.27	ppb	U
67-64-1	Acetone	C 715 -4949	1.13	1.13	ppb	U
75-15-0	Carbon disulfide	C 715 -4949	0.19	0.19	ppb	U
75-09-2	Methylene Chloride	C 715 -4949	0.21	0.21	ppb	U
156-60-5	t-1,2-Dichloroethene	C 715 -4949	0.31	0.31	ppb	U
1634-04-4	Methyl t-butyl ether	C 715 -4949	0.18	0.18	ppb	U
75-34-3	1,1-Dichloroethane	C 715 -4949	0.30	0.30	ppb	U
590-20-7	2,2-Dichloropropane	C 715 -4949	0.27	0.27	ppb	U
156-59-2	c-1,2-Dichloroethene	C 715 -4949	0.24	0.24	ppb	U
78-93-3	2-Butanone	C 715 -4949	3.80	3.80	ppb	U
74-97-5	Bromochloromethane	C 715 -4949	0.25	0.25	ppb	U
67-66-3	Chloroform	C 715 -4949	0.26	0.26	ppb	U
71-55-6	1,1,1-Trichloroethane	C 715 -4949	0.26	0.26	ppb	U
56-23-5	Carbon Tetrachloride	C 715 -4949	0.22	0.22	ppb	U
563-58-6	1,1-Dichloropropene	C 715 -4949	0.39	0.39	ppb	U
71-43-2	Benzene	C 715 -4949	0.21	0.21	ppb	U
107-06-2	1,2-Dichloroethane	C 715 -4949	0.23	0.23	ppb	U
79-01-6	Trichloroethene	C 715 -4949	0.36	0.36	ppb	U
78-87-5	1,2-Dichloropropane	C 715 -4949	0.31	0.31	ppb	U
74-95-3	Dibromomethane	C 715 -4949	0.24	0.24	ppb	U
75-27-4	Bromodichloromethane	C 715 -4949	0.20	0.20	ppb	U
110-75-8	2-Chloroethylvinylether	C 715 -4949	0.33	0.33	ppb	U
10061-01-5	c-1,3-Dichloropropene	C 715 -4949	0.16	0.16	ppb	U
108-10-1	4-Methyl-2-pentanone	C 715 -4949	0.63	0.63	ppb	U
108-88-3	Toluene	C 715 -4949	0.20	0.20	ppb	U
10061-02-6	t-1,3-Dichloropropene	C 715 -4949	0.16	0.16	ppb	U

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11/01/2002

Volatiles - EPA 8260B

Sample: L4838-12...continue

Client Sample ID: Trip Blank

Collected: 10/03/2002

Matrix: Liquid

Type: Trip Blank

Remarks: See Case Narrative

Analyzed Date: 10/06/2002

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
79-00-5	1,1,2-Trichloroethane	C 715 -4949	0.16	0.16	ppb	U
127-18-4	Tetrachloroethene	C 715 -4949	0.11	0.11	ppb	U
142-28-9	1,3-Dichloropropane	C 715 -4949	0.21	0.21	ppb	U
591-78-6	2-Hexanone	C 715 -4949	0.94	0.94	ppb	U
124-48-1	Dibromochloromethane	C 715 -4949	0.13	0.13	ppb	U
106-93-4	1,2-Dibromoethane	C 715 -4949	0.17	0.17	ppb	U
108-90-7	Chlorobenzene	C 715 -4949	0.15	0.15	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	C 715 -4949	0.20	0.20	ppb	U
100-41-4	Ethylbenzene	C 715 -4949	0.22	0.22	ppb	U
108-38-3	m,p-xylene	C 715 -4949	0.34	0.34	ppb	U
95-47-6	o-xylene	C 715 -4949	0.25	0.25	ppb	U
100-42-5	Styrene	C 715 -4949	0.20	0.20	ppb	U
75-25-2	Bromoform	C 715 -4949	0.21	0.21	ppb	U
98-82-8	Isopropylbenzene	C 715 -4949	0.15	0.15	ppb	U
108-86-1	Bromobenzene	C 715 -4949	0.20	0.20	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	C 715 -4949	0.23	0.23	ppb	U
103-65-1	n-Propylbenzene	C 715 -4949	0.16	0.16	ppb	U
96-18-4	1,2,3-Trichloropropane	C 715 -4949	0.35	0.35	ppb	U
622-96-8	p-Ethyltoluene	C 715 -4949	0.16	0.16	ppb	U
108-67-8	1,3,5-Trimethylbenzene	C 715 -4949	0.20	0.20	ppb	U
95-49-8	2-Chlorotoluene	C 715 -4949	0.25	0.25	ppb	U
106-43-4	4-Chlorotoluene	C 715 -4949	0.22	0.22	ppb	U
98-06-6	tert-Butylbenzene	C 715 -4949	0.19	0.19	ppb	U
95-63-6	1,2,4-Trimethylbenzene	C 715 -4949	0.17	0.17	ppb	U
135-98-8	sec-Butylbenzene	C 715 -4949	0.22	0.22	ppb	U
99-87-6	4-Isopropyltoluene	C 715 -4949	0.17	0.17	ppb	U
541-73-1	1,3-Dichlorobenzene	C 715 -4949	0.17	0.17	ppb	U
106-46-7	1,4-Dichlorobenzene	C 715 -4949	0.10	0.10	ppb	U
95-50-1	1,2-Dichlorobenzene	C 715 -4949	0.11	0.11	ppb	U
105-05-5	p-Diethylbenzene	C 715 -4949	0.22	0.22	ppb	U
104-51-8	n-Butylbenzene	C 715 -4949	0.17	0.17	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	C 715 -4949	0.50	0.50	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	C 715 -4949	0.42	0.42	ppb	U
120-82-1	1,2,4-Trichlorobenzene	C 715 -4949	0.13	0.13	ppb	U

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11/01/2002

Volatiles - EPA 8260B

Sample: L4838-12...continue
Client Sample ID: Trip Blank
Matrix: Liquid
Remarks: See Case Narrative
Analyzed Date: 10/06/2002

Collected: 10/03/2002
Type: Trip Blank

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
87-68-3	Hexachlorobutadiene	C 715 -4949	0.45	0.45	ppb	U
91-20-3	Naphthalene	C 715 -4949	0.29	0.29	ppb	U
87-61-6	1,2,3-Trichlorobenzene	C 715 -4949	0.19	0.19	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	C715-4949	100.0 %	(76-118)	
4774-33-8	DIBROMOFLUOROMETHANE	C715-4949	90.5 %	(83-113)	
2037-26-5	TOLUENE-D8	C715-4949	102.0 %	(90-111)	

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11/01/2002

Volatiles - EPA 8260B in AIR

Sample: L4838-13

Client Sample ID: 45A Site SVE Before Trtmt. Collected: 10/03/2002 12:00

Matrix: Air Type: Grab

Remarks:

Analyzed Date: 10/12/2002

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C 719 -5031	0.077	0.077	mg/M3	U
74-87-3	Chloromethane	C 719 -5031	0.050	0.050	mg/M3	U
75-01-4	Vinyl Chloride	C 719 -5031	0.050	0.050	mg/M3	U
74-83-9	Bromomethane	C 719 -5031	0.076	0.076	mg/M3	U
75-00-3	Chloroethane	C 719 -5031	0.086	0.086	mg/M3	U
75-69-4	Trichlorofluoromethane	C 719 -5031	0.023	0.023	mg/M3	U
75-35-4	1,1-Dichloroethene	C 719 -5031	0.034	0.034	mg/M3	U
75-09-2	Methylene Chloride	C 719 -5031	0.17	0.17	mg/M3	U
156-60-5	t-1,2-Dichloroethene	C 719 -5031	0.050	0.050	mg/M3	U
75-34-3	1,1-Dichloroethane	C 719 -5031	0.053	0.053	mg/M3	U
590-20-7	2,2-Dichloropropane	C 719 -5031	0.037	0.037	mg/M3	U
156-59-2	c-1,2-Dichloroethene	C 719 -5031	0.052	0.052	mg/M3	U
67-66-3	Chloroform	C 719 -5031	0.032	0.032	mg/M3	U
74-97-5	Bromochloromethane	C 719 -5031	0.069	0.069	mg/M3	U
71-55-6	1,1,1-Trichloroethane	C 719 -5031	0.038	0.038	mg/M3	U
563-58-6	1,1-Dichloropropene	C 719 -5031	0.14	0.14	mg/M3	U
56-23-5	Carbon Tetrachloride	C 719 -5031	0.037	0.037	mg/M3	U
107-06-2	1,2 Dichloroethane	C 719 -5031	0.058	0.058	mg/M3	U
71-43-2	Benzene	C 719 -5031	0.027	0.027	mg/M3	U
79-01-6	Trichloroethene	C 719 -5031	0.042	0.042	mg/M3	U
78-87-5	1,2-Dichloropropane	C 719 -5031	0.033	0.033	mg/M3	U
75-27-4	Bromodichloromethane	C 719 -5031	0.020	0.020	mg/M3	U
74-95-3	Dibromomethane	C 719 -5031	0.028	0.028	mg/M3	U
10061-01-5	c-1,3-Dichloropropene	C 719 -5031	0.098	0.098	mg/M3	U
108-88-3	Toluene	C 719 -5031	0.026	0.026	mg/M3	U
10061-02-6	t-1,3-Dichloropropene	C 719 -5031	0.097	0.097	mg/M3	U
79-00-5	1,1,2-Trichloroethane	C 719 -5031	0.021	0.021	mg/M3	U
142-28-9	1,3-Dichloropropane	C 719 -5031	0.038	0.038	mg/M3	U
127-18-4	Tetrachloroethene	C 719 -5031	0.021	**8.34**	mg/M3	
124-48-1	Dibromochloromethane	C 719 -5031	0.022	0.022	mg/M3	U
106-93-4	1,2-Dibromoethane	C 719 -5031	0.021	0.021	mg/M3	U
108-90-7	Chlorobenzene	C 719 -5031	0.020	0.020	mg/M3	U
630-20-6	1,1,1,2-Tetrachloroethane	C 719 -5031	0.023	0.023	mg/M3	U
100-41-4	Ethylbenzene	C 719 -5031	0.021	0.021	mg/M3	U

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11/01/2002

Volatiles - EPA 8260B in AIR

Sample: L4838-13...continue

Client Sample ID: 45A Site SVE Before Trtmt. Collected: 10/03/2002 12:00

Matrix: Air Type: Grab

Remarks:

Analyzed Date: 10/12/2002

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-38-3	m,p-xylene	C 719 -5031	0.032	0.032	mg/M3	U
95-47-6	o-xylene	C 719 -5031	0.026	0.026	mg/M3	U
100-42-5	Styrene	C 719 -5031	0.015	0.015	mg/M3	U
98-82-8	Isopropylbenzene	C 719 -5031	0.012	0.012	mg/M3	U
75-25-2	Bromoform	C 719 -5031	0.027	0.027	mg/M3	U
79-34-5	1,1,2,2-Tetrachloroethane	C 719 -5031	0.039	0.039	mg/M3	U
96-18-4	1,2,3-Trichloropropane	C 719 -5031	0.089	0.089	mg/M3	U
103-65-1	n-Propylbenzene	C 719 -5031	0.027	0.027	mg/M3	U
108-86-1	Bromobenzene	C 719 -5031	0.037	0.037	mg/M3	U
108-67-8	1,3,5-Trimethylbenzene	C 719 -5031	0.021	0.021	mg/M3	U
95-49-8	2-Chlorotoluene	C 719 -5031	0.025	0.025	mg/M3	U
106-43-4	4-Chlorotoluene	C 719 -5031	0.039	0.039	mg/M3	U
99-87-6	4-Isopropyltoluene	C 719 -5031	0.018	0.018	mg/M3	U
95-63-6	1,2,4-trimethylbenzene	C 719 -5031	0.020	0.020	mg/M3	U
135-98-8	sec-Butylbenzene	C 719 -5031	0.025	0.025	mg/M3	U
98-06-6	tert-Butylbenzene	C 719 -5031	0.018	0.018	mg/M3	U
541-73-1	1,3 Dichlorobenzene	C 719 -5031	0.023	0.023	mg/M3	U
106-46-7	1,4-Dichlorobenzene	C 719 -5031	0.030	0.030	mg/M3	U
104-51-8	n-Butylbenzene	C 719 -5031	0.027	0.027	mg/M3	U
95-50-1	1,2-Dichlorobenzene	C 719 -5031	0.014	0.014	mg/M3	U
96-12-8	1,2-Dibromo-3-chloropropane	C 719 -5031	0.030	0.030	mg/M3	U
120-82-1	1,2,4-Trichlorobenzene	C 719 -5031	0.030	0.030	mg/M3	U
87-68-3	Hexachlorobutadiene	C 719 -5031	0.015	0.015	mg/M3	U
91-20-3	Naphthalene	C 719 -5031	0.026	0.026	mg/M3	U
87-61-6	1,2,3-Trichlorobenzene	C 719 -5031	0.10	0.10	mg/M3	U
1634-04-4	MTBE	C 719 -5031	0.076	0.076	mg/M3	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	C719-5031	102.0 %	(77 - 123)	
4774-33-8	DIBROMOFLUOROMETHANE	C719-5031	98.3 %	(62 - 138)	
2037-26-5	TOLUENE-D8	C719-5031	103.0 %	(73 - 127)	

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11/01/2002

Iron, Total

Sample: L4838-1

Client Sample ID: SMP-1 Collected: 10/02/2002 16:00

Matrix: Liquid Type: Grab

Remarks:

Analyzed Date: 10/10/2002

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.031	**12.2**	ppm	

Sample: L4838-2

Client Sample ID: DMP-1 Collected: 10/02/2002 15:20

Matrix: Liquid Type: Grab

Remarks:

Analyzed Date: 10/10/2002

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.031	**4.20**	ppm	

Sample: L4838-3

Client Sample ID: SMP-3 Collected: 10/02/2002 16:30

Matrix: Liquid Type: Grab

Remarks:

Analyzed Date: 10/10/2002

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.031	**10.1**	ppm	

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11/01/2002

Iron, Total

Sample: L4838-4
Client Sample ID: DMP-3 Collected: 10/02/2002 16:15
Matrix: Liquid Type: Grab
Remarks:
Analyzed Date: 10/10/2002

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.031	**38.8**	ppm	

Sample: L4838-5
Client Sample ID: SMP-4 Collected: 10/02/2002 17:30
Matrix: Liquid Type: Grab
Remarks:
Analyzed Date: 10/10/2002

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.098	**1110**	ppm	

Sample: L4838-6
Client Sample ID: DMP-4 Collected: 10/02/2002 17:15
Matrix: Liquid Type: Grab
Remarks:
Analyzed Date: 10/10/2002

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.031	**15.8**	ppm	

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11/01/2002

Iron, Total

Sample: L4838-7

Client Sample ID: MW-8 Collected: 10/03/2002 12:40

Matrix: Liquid Type: Grab

Remarks:

Analyzed Date: 10/10/2002

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.031	**0.23**	ppm	

Sample: L4838-8

Client Sample ID: MW-12 Collected: 10/03/2002 11:00

Matrix: Liquid Type: Grab

Remarks:

Analyzed Date: 10/10/2002

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.031	**37.1**	ppm	

Sample: L4838-9

Client Sample ID: MW-13 Collected: 10/03/2002 14:00

Matrix: Liquid Type: Grab

Remarks:

Analyzed Date: 10/10/2002

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.031	**5.04**	ppm	

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11/01/2002

Nitrogen/Nitrate - EPA 353.2

Sample: L4838-1
Client Sample ID: SMP-1 Collected: 10/02/2002 16:00
Matrix: Liquid Type: Grab
Remarks:
Analyzed Date: 10/04/2002

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	0.025	ppm	U

Sample: L4838-2
Client Sample ID: DMP-1 Collected: 10/02/2002 15:20
Matrix: Liquid Type: Grab
Remarks:
Analyzed Date: 10/04/2002

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	**0.027**	ppm	

Sample: L4838-3
Client Sample ID: SMP-3 Collected: 10/02/2002 16:30
Matrix: Liquid Type: Grab
Remarks:
Analyzed Date: 10/04/2002

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	0.025	ppm	U

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11/01/2002

Nitrogen/Nitrate - EPA 353.2

Sample: L4838-4

Client Sample ID: DMP-3 Collected: 10/02/2002 16:15

Matrix: Liquid Type: Grab

Remarks:

Analyzed Date: 10/04/2002

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	0.025	ppm	U

Sample: L4838-5

Client Sample ID: SMP-4 Collected: 10/02/2002 17:30

Matrix: Liquid Type: Grab

Remarks:

Analyzed Date: 10/04/2002

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	0.025	ppm	U

Sample: L4838-6

Client Sample ID: DMP-4 Collected: 10/02/2002 17:15

Matrix: Liquid Type: Grab

Remarks:

Analyzed Date: 10/04/2002

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	0.025	ppm	U

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11/01/2002

Nitrogen/Nitrate - EPA 353.2

Sample: L4838-7
Client Sample ID: MW-8 Collected: 10/03/2002 12:40
Matrix: Liquid Type: Grab
Remarks:
Analyzed Date: 10/04/2002

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	**5.67**	ppm	

Sample: L4838-8
Client Sample ID: MW-12 Collected: 10/03/2002 11:00
Matrix: Liquid Type: Grab
Remarks:
Analyzed Date: 10/04/2002

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	**0.031**	ppm	

Sample: L4838-9
Client Sample ID: MW-13 Collected: 10/03/2002 14:00
Matrix: Liquid Type: Grab
Remarks:
Analyzed Date: 10/04/2002

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	**3.42**	ppm	

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11/01/2002

Sulfate - EPA 375.4

Sample: L4838-1

Client Sample ID: SMP-1 Collected: 10/02/2002 16:00

Matrix: Liquid Type: Grab

Remarks:

Analyzed Date: 10/04/2002

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	27.9	**134**	ppm	

Sample: L4838-2

Client Sample ID: DMP-1 Collected: 10/02/2002 15:20

Matrix: Liquid Type: Grab

Remarks:

Analyzed Date: 10/04/2002

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	27.9	**1040**	ppm	

Sample: L4838-3

Client Sample ID: SMP-3 Collected: 10/02/2002 16:30

Matrix: Liquid Type: Grab

Remarks:

Analyzed Date: 10/04/2002

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	27.9	**558**	ppm	

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11/01/2002

Sulfate - EPA 375.4

Sample: L4838-4
Client Sample ID: DMP-3
Matrix: Liquid
Remarks:
Analyzed Date: 10/04/2002
Collected: 10/02/2002 16:15
Type: Grab

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	27.9	**1200**	ppm	

Sample: L4838-5
Client Sample ID: SMP-4
Matrix: Liquid
Remarks:
Analyzed Date: 10/04/2002
Collected: 10/02/2002 17:30
Type: Grab

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	27.9	**73.1**	ppm	

Sample: L4838-6
Client Sample ID: DMP-4
Matrix: Liquid
Remarks:
Analyzed Date: 10/04/2002
Collected: 10/02/2002 17:15
Type: Grab

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	27.9	**225**	ppm	

Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

Phone - 631-249-1456 Fax - 631-249-8344

11/01/2002

Sulfate - EPA 375.4

Sample: L4838-7

Client Sample ID: MW-8 Collected: 10/03/2002 12:40

Matrix: Liquid Type: Grab

Remarks:

Analyzed Date: 10/04/2002

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	0.56	**1.46**	ppm	

Sample: L4838-8

Client Sample ID: MW-12 Collected: 10/03/2002 11:00

Matrix: Liquid Type: Grab

Remarks:

Analyzed Date: 10/04/2002

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	27.9	**407**	ppm	

Sample: L4838-9

Client Sample ID: MW-13 Collected: 10/03/2002 14:00

Matrix: Liquid Type: Grab

Remarks:

Analyzed Date: 10/04/2002

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	27.9	**377**	ppm	

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Total Organic Carbon - Method 415.1

Sample: L4838-1
Client Sample ID: SMP-1 Collected: 10/02/2002 16:00
Matrix: Liquid Type: Grab
Remarks: Analyzed by Accutest Labs(NYSDOH#10983)
Analyzed Date: 10/28/2002

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
	TOC	10.0	**139**	mg/L	

Sample: L4838-2
Client Sample ID: DMP-1 Collected: 10/02/2002 15:20
Matrix: Liquid Type: Grab
Remarks: Analyzed by Accutest Labs(NYSDOH#10983)
Analyzed Date: 10/25/2002

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
	TOC	5.00	**58.7**	mg/L	

Sample: L4838-3
Client Sample ID: SMP-3 Collected: 10/02/2002 16:30
Matrix: Liquid Type: Grab
Remarks: Analyzed by Accutest Labs(NYSDOH#10983)
Analyzed Date: 10/25/2002

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
	TOC	5.00	**40.3**	mg/L	

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11/01/2002

Total Organic Carbon - Method 415.1

Sample: L4838-4
Client Sample ID: DMP-3 Collected: 10/02/2002 16:15
Matrix: Liquid Type: Grab
Remarks: Analyzed by Accutest Labs(NYSDOH#10983)
Analyzed Date: 10/25/2002

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
	TOC	10.0	**201**	mg/L	

Sample: L4838-5
Client Sample ID: SMP-4 Collected: 10/02/2002 17:30
Matrix: Liquid Type: Grab
Remarks: Analyzed by Accutest Labs(NYSDOH#10983)
Analyzed Date: 10/28/2002

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
	TOC	200	**3680**	mg/L	

Sample: L4838-6
Client Sample ID: DMP-4 Collected: 10/02/2002 17:15
Matrix: Liquid Type: Grab
Remarks: Analyzed by Accutest Labs(NYSDOH#10983)
Analyzed Date: 10/25/2002

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
	TOC	5.00	**78.3**	mg/L	

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11/01/2002

Total Organic Carbon - Method 415.1

Sample: L4838-7

Client Sample ID: MW-8 Collected: 10/03/2002 12:40

Matrix: Liquid Type: Grab

Remarks: Analyzed by Accutest Labs(NYSDOH#10983)

Analyzed Date: 10/25/2002

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
	TOC	1.00	**4.70**	mg/L	

Sample: L4838-8

Client Sample ID: MW-12 Collected: 10/03/2002 11:00

Matrix: Liquid Type: Grab

Remarks: Analyzed by Accutest Labs(NYSDOH#10983)

Analyzed Date: 10/25/2002

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
	TOC	1.00	**29.4**	mg/L	

Sample: L4838-9

Client Sample ID: MW-13 Collected: 10/03/2002 14:00

Matrix: Liquid Type: Grab

Remarks: Analyzed by Accutest Labs(NYSDOH#10983)

Analyzed Date: 10/25/2002

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
	TOC	1.00	**6.00**	mg/L	

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11/01/2002

Case Narrative

8260:

The following compounds were calibrated at 25, 50, 100, 150 and 200 ppb levels in the initial calibration curve:

- Acetone
- 2-Butanone
- 4-Methyl-2-pentanone
- 2-Hexanone

M&P-Xylenes were calibrated at 10, 40, 100, 200 and 300 ppb levels.

All other compounds were calibrated at 5, 20, 50, 100 and 150 ppb levels.

Samples were quantitated using the continuing calibration standard response factor as opposed to the initial calibration average response factor.

Reviewed by: _____

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11/01/2002

ORGANIC METHOD QUALIFIERS

Q - Qualifier - specified entries and their meanings are as follows:

U - The analytical result is a non-detect.

J - Indicates an estimated value. The concentration reported was detected below the Method Detection Limit.

B - The analyte was found in the associated method blank as well as the sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

E - The concentration of the analyte exceeded the calibration range of the instrument.

D - This flag identifies all compounds identified in an analysis at a secondary dilution. In the case of a surrogate this flag indicates a system mointoring compound diluted out.

INORGANIC METHOD QUALIFIERS

C - (Concentration) qualifiers are as follows:

B - Entered if the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

U - Entered when the analyte was analyzed for, but not detected.

Q - Qualifier specific entries and their meanings are as follows:

E - Reported value is estimated because of the presence of interferences.

M - (Method) qualifiers are as follows:

A - Flame AA

AS - Semi-automated Spectrophotometric

AV - Automated Cold Vapor AA

C - Manual Spectrophotometric

F - Furnace AA

P - ICP

T - Titrimetric

OTHER QUALIFIERS

ND - Not Detected

NA - Not Applicable

NR - Not Required

* - Outside Expected Range (NYCDEP Table I/II or Surrogate Limits)

OTHER

- All soil and sediment samples are reported on a dry weight basis.

ETL

Environmental Testing Laboratories, Inc.
208 Route 109 • Farmingdale • New York 11735
631-249-1456 • Fax: 631-249-8344

CHAIN OF CUSTODY DOCUMENT

L 4838

Project Name: Photocircuits | Project Manager: Andy Barber | Sampler (Signature): Darren Sorden (Print): Derik M. Sorden

Project Address: 31 Sea Cliff Avenue

Client B&L | J/N: 643.001 | ☐ Rush by 1 1

SAMPLE INFO Type: SS = Split Spoon; G = Grab; C = Composite; B = Blank; Matrix: L = Liquid; S = Soil; SL = Sludge; A* = Air; W = Wipe | *Air - Vol. (Liters) include: Flow (CFM)

ID	Date	Time	Type	Matrix	Sample Location	Total. # Cont.	601/602	BTX/BTEX	MTBE	624/8260/8021 8260	625/8270/BN	PCB/Pesticides	Pet.Prods./8100M	RCRA Metals	pH/Flash/React	418.1 - TRPH	TOL	Nitrate	Sulfate	TICs	Volatiles
1	10/2/02	16:00	Grab	H_2O	SMP-1	6			X								X	X	X	X	
2		15:20			DMP-1																
3		16:30			SMP-3																
4		16:15			DMP-3																
5		17:30			SMP-4																
6		17:15			DMP-4																
7	10/3/02	10:40			MW-8																
8		11:00			MW-12																
9		14:00			MW-13																
10		15:15			MW-35	2			X												
11		16:00			MW-45	2			X												
12	—	—			Trip Blank	1			X												
13																					
14	10/3/02	1700	Grab	Vapor	4SA site SVE Before Trtmt.	1														X	
15																					

RECEIVED MAR 16 2003 BUREAU OF EASTERN REMEDIAL ACTION

Relinquished by (Signature):	Date / Time	Printed Name & Agent:	Received by (Signature):	Date / Time	Printed Name & Agent
Relinquished by (Signature): Darren Sorden	Date 10/3/02 Time 18:00	Printed Name & Agent: Derik M. Sorden Barton & Loguidice, P.C.	Received for Lab by (Signature):	Date 10/3/02 Time 18:25	Printed Name Patricia
Comments & Special Instructions: COC 10/4/2		QA/QC Type:	Number & Type of Containers: 27-250 A 32-Vog's	Preservatives: Hcl H_2SO_4/HNO_3	Temp: 5°C