

**THIRD QUARTER 2000
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:

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P.O. Box 3107
290 Elwood Davis Road
Syracuse, NY 13220

23 October 2000

1.0 Introduction

This Third Quarter 2000 Progress Report (Q3 Report) 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 Third Quarter of 2000, the following tasks were accomplished:

- Operation of the Soil Vapor Extraction (SVE) System at the 31 Sea Cliff Avenue site was continued using the catalytic oxidation unit to treat recovered vapors.
- A contractor for the bioremediation pilot test was selected at the 31 Sea Cliff Avenue site, and injection of nutrient solution was performed during the week of 28 August. Groundwater samples were collected from monitoring wells in the vicinity of the injection area following the nutrient injection. Concurrent with the date of this report, the second round of groundwater monitoring has been completed.
- Three SVE and three air sparge (AS) wells were installed inside of Building 7 (45 Sea Cliff Avenue), and piping was installed to these wells from the outside of Building 7. Preliminary vacuum testing of the SVE wells was conducted.
- A SVE/Air Sparge system was ordered from Lessard Environmental. The system is being installed within a trailer-mounted enclosure. Two (2) 2,000 pound carbon vapor phase adsorbers have been ordered from Carbon Filtration Systems, Inc. to control emissions from the SVE/Air Sparge system.

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. As described in the Q2 Report, vapor concentrations required the changing of the treatment system from activated carbon to a catalytic oxidation unit. The SVE system, equipped with the catalytic oxidizer/scrubber for extracted vapor treatment, was restarted on 21 July and has operated continuously with only a few brief shutdowns for maintenance activities. These shutdowns are described below:

- Corrosion of the stainless steel crossover exhaust (between the CatOx exhaust and the acid scrubber) was observed on 6 September in the area surrounding the water spray cooling unit, and the system was immediately shut down. It was determined that the

exhaust gas temperature range in this area of the crossover would allow the use of acid resistant PVC ductwork. The damaged section of duct was replaced, and the system was brought back online on 10 September. The system was inoperable for a period of 90 hours.

- The system's temperature controller shut the system down on 19 September. A subsequent investigation determined that the stainless steel temperature probe had been corroded by the acidic exhaust gases. A replacement probe was purchased and installed on 21 September and the system was brought back online. A corrosion-resistant Teflon probe has been subsequently installed, and the stainless steel probe has been retained as a back up. The system was inoperable for a period of 52 hours.
- The system was shut down on 23 September due to facility maintenance that required water and electricity to be turned off plant-wide. The system was brought back online on 24 September. The system was inoperable for a period of 24 hours.

SVE system influent air samples are collected monthly for laboratory analysis. Based on the average of influent analyses conducted on 11 August and 28 September, 1,1,1-TCA and 1,1,1-DCA removal rates are estimated at 4.8 lbs/day and 0.2 lbs/day, respectively, during this period. Based on the average influent concentration of samples collected from system start up through this reporting period, and the total hours of system operation through 30 September, total contaminant removal to date is estimated at 784 pounds. Influent monitoring data for the SVE system are included as Attachment A.

2.2 Bioremediation Pilot Test

Terra Systems of Wilmington, Delaware was selected to conduct the bioremediation pilot test after a careful review of possible approaches. Terra Systems was part of a research group that performed a successful bioremediation pilot test at the Dover Air Force Base involving chlorinated VOCs (see *Environmental Science and Technology*, 2000, 34, 2254-2260). Following a review of site data, it was the opinion of Terra Systems that biotic reductive dechlorination is occurring at the site, but the lack of biodegradable substrate is the limiting factor.

During the week of 28 August, Terra Systems was on site to conduct the injection of a nutrient solution (substrate) into the subsurface at the 31 Sea Cliff Avenue site. The solution was comprised primarily of food grade soybean oil, with a minor amount of lecithin as an emulsifier. This mixture was then mixed with water before injection. Zebra Environmental Corp. provided a Case Skid-Steer-mounted Geoprobe unit and a Rupe Co. grout pump for injection of the emulsion.

A Geoprobe drivepoint was pushed to a depth of approximately 50 feet below ground surface (bgs). The drill rod was withdrawn 2 feet to allow for injection of the fluids; after injection of a given quantity of fluid, the drill rod was then withdrawn another four feet and fluid was injected at that level, continuing in 4-foot increments, until

approximately 700 gallons of fluid had been injected between 22 bgs and 48 feet bgs at each borehole (with the exception of BH-1).

The following table summarizes the amount of fluids injected into 7 boreholes in the pilot test area. It should be noted that due to a supplier failure to provide a timely 29 August delivery of a lecithin mixture, pure soybean oil was injected into BH-1 on Tuesday, 29 August as a test of the injectability of straight soybean oil. An alternate supply of lecithin was located and procured on 29 August so that all subsequent boreholes received the soybean oil-lecithin emulsion (90% soybean oil).

Apparently the geology surrounding Borehole BH-6 was connected to former air sparge point SAS, as evidenced by the presence of injected fluid (introduced at all levels) being discharged at the surface from the well casing of SAS. Borehole BH-6 was abandoned, and a replacement borehole, BH-7, was located approximately 10 feet away.

DATE	BOREHOLE NUMBER	SOYBEAN OIL (Gallons)	EMULSION* (Gallons)	WATER (Gallons)
8/29/00	1	40	-0-	117
8/30/00	2	--	55	307
8/30/00	3	--	98.5	593
8/31/00	4	--	105	520
8/31/00	5	--	128	661
9/01/00	6	--	3	42
9/01/00	7	--	124	772
TOTAL		40	551.5	3,012

* 90% Soybean Oil, 10% Lecithin

The following table summarizes the field parameters measured on 31 August and 1 September.

LOCATION	DEPTH TO WATER (Ft)	pH	TEMPERATURE (F)	CONDUCTIVITY (mV)
SMP-1	5.96	8.8	78	-50
DMP-1	5.91	7.7	70	<-80
SMP-3		10.7	76	<-80
DMP-3	6.31	7.0	76	<-80
SMP-4	9.33	7.5	76	<-80
DMP-4	5.75	7.2	76	<-80
MW-7	7.5	7.5	70	<-80

Notes: Conductivity -- 80 mV was the minimum reading obtainable with the equipment.

Initial groundwater monitoring samples were collected immediately following the pilot study. Samples were taken for total organic carbon, volatile organic contaminants, and light hydrocarbon gases. These results are included on Tables 1 and 2 in Attachment B. Cis-1,2-DCE and VC were the predominant chlorinated ethenes detected, with little of the parent compounds PCE or TCE being detected. High concentrations of greater than

1,000 µg/L of the chlorinated ethenes (cis-1,2-DCE and VC) were only detected in SMP-1. Ethene was detected in all wells at concentrations ranging from 43 µg/L in MW-14 to 930 µg/L in SMP-1. This data demonstrates that natural attenuation of these contaminants is occurring using the co-contaminants as substrates. The addition of the soybean oil emulsion should increase the rate and extent of biodegradation.

Evidence for biodegradation of the chlorinated ethanes was also found. Wells SMP-3, DMP-3, and SMP-4 had the highest concentrations of chlorinated ethanes. Reduced products such as 1,1-dichloroethane, chloroethane, and ethane predominated in wells MW-15, MW-7, SMP-1, DMP-1, SMP-4, and DMP-4. Wells SMP-3 and DMP-3 had higher concentrations of 1TCA on a micromolar basis than the daughter products. Ethane was typically present at low concentrations with a maximum of 1.7 µM in MW-14. Ethene may be the predominant product for the breakdown of the chlorinated ethanes in the wells MW-7, DMP-1, DMP-3, SMP-4, and DMP-4 that had relatively low levels of chlorinated ethenes.

The total organic carbon concentrations ranged from 23,500 mg/L in MW-14 to 38.8 mg/L in MW-7. MW-14 contained the emulsion that accounted for the very high TOC levels. Wells SMP-1, DMP-1, SMP-3, and DMP-3 contained TOC levels of greater than 90 mg/L, which may represent contact with the emulsion.

The predominant electron acceptor in the groundwater was sulfate, ranging from 104 mg/L in MW-7 to 29,600 mg/L in DMP-1. Wells MW-14 and SMP-4 also had elevated sulfate levels of 5,470 and 933 mg/L, respectively. Total iron concentrations ranged from 2.2 mg/L in MW-7 to 88.5 mg/L in DMP-3 which indicated that iron is also an important electron acceptor. Methane was detected in all wells. However, only wells SMP-1 and DMP-1 would be considered to be under methanogenic conditions currently with more than 1,000 µg/L methane. As the microbes breakdown the emulsion, we would expect for the sulfate to be depleted and the concentrations of iron and methane to increase.

In summary, conditions appear favorable for accelerated anaerobic biodegradation of the chlorinated solvents at the 31 Sea Cliff Avenue site. The second round of groundwater monitoring is scheduled to be conducted concurrent with this report, the results of which will be summarized in the Q4 report. Photographs taken during the pilot study field operations are included as Attachment E.

2.3 IRM at 45 Sea Cliff Avenue

The approved work plan calls for an IRM at Building 7 on the 45 Sea Cliff Avenue site consisting of SVE and AS. Because several of the SVE and AS wells had to be installed inside of Building 7, in active manufacturing areas where access is very limited, specialized drilling equipment and advance scheduling was necessary. To ensure that this equipment would be able to install the SVE wells and AS points, it was decided to work

at the outside locations first. The installation of the two SVE wells (SVE-1 and SVE-2) outside of Building 7 is described in the Q2 2000 report.

After discussions with the Geoprobe contractor, it was decided that the interior well installations would be attempted using an all-terrain vehicle (ATV) mounted Geoprobe. Further, the SVE wells would have to be installed and constructed like SVE-2 (i.e., 1-inch diameter PVC screen and casing installed through the 2-inch steel casing, which is then retracted). The AS wells would have to be installed using well points (5/16" diameter, 6" length) and flexible tubing (3/8" diameter) as the riser casing. To verify that the ATV-mounted Geoprobe could install the sparge points to the desired depth, a sparge point was installed with an ATV-mounted Geoprobe at location SVE-2 at a depth of 35 feet on 27 July.

On 19 and 26 August, the ATV-mounted Geoprobe was used to install an SVE well and a sparge point at each of the locations inside Building 7 (SVE-4, SVE-5 and SVE-6). Refusal was encountered at an additional location (SVE-3), precluding the installation of both a sparge point and an SVE well at this location. At location SVE-4, the SVE well was installed to a depth of 11 feet, and the sparge point was installed to a depth of 32 feet. At location SVE-5, the SVE well was installed to a depth of 20 feet, and the sparge point was installed to a depth of 32 feet. At location SVE-6, the SVE well was installed to a depth of 16 feet, and the sparge point was installed to a depth of 30 feet. The well network was completed with 2" and 4" PVC piping (SVE wells) and 3/8" copper pipe (AS points) which exit the west side of the building and terminate at the proposed remediation/treatment system location near SVE-2.

On 29-30 August, testing of wells SVE-4, SVE-5 and SVE-6 was conducted using a portable 1-hp blower. The results of this testing are provided as Attachment C.

A Request for Proposal (RFP) was sent to select vendors for an SVE/AS system and associated catalytic oxidizer in September. During the RFP evaluation, it was determined based upon a comparative analysis of carbon treatment versus a catalytic oxidizer that carbon treatment was the most feasible treatment alternative due to: concerns regarding system integrity viability (acid corrosion experiences at the 31 Sea Cliff Avenue site); lead time on treatment system delivery; contaminant-specific carbon adsorption rates; and cost. Lessard Environmental was selected as the preferred bid for the integrated SVE/AS system. The SVE/AS system is being mounted within a trailer enclosure concurrent with this report, and is scheduled for delivery, and site installation, on 23 October. Carbon Filtration Systems, Inc. was selected as the carbon treatment system vendor. Two (2) 2,000 pound carbon vapor phase adsorbers are being specially manufactured by CFS and are scheduled for delivery during the week of 16 October.

ATTACHMENT A

***31 SEA CLIFF AVENUE SVE SYSTEM INFLUENT
MONITORING DATA***

Environmental Testing Laboratories, Inc.

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

8/17/00

EPA 8260 in Air

Sample: K4201-1

Client Sample ID: SVE inlet

Collected: 8/11/00 15:00

Matrix: Air

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 8/16/00

Cas No	Analyte	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	273	273	ug/M3	U
74-87-3	Chloromethane	471	471	ug/M3	U
75-01-4	Vinyl Chloride	508	508	ug/M3	U
74-83-9	Bromomethane	459	459	ug/M3	U
75-00-3	Chloroethane	496	496	ug/M3	U
75-69-4	Trichlorofluoromethane	732	732	ug/M3	U
75-35-4	1,1-Dichloroethene	608	608	ug/M3	U
75-09-2	Methylene Chloride	521	4860	ug/M3	
156-60-5	1,1,2-Dichloroethene	422	422	ug/M3	U
75-34-3	1,1-Dichloroethane	508	7890	ug/M3	
590-20-7	2,2-Dichloropropane	409	409	ug/M3	U
156-59-2	c-1,2-Dichloroethene	471	471	ug/M3	U
67-66-3	Chloroform	459	459	ug/M3	U
74-97-5	Bromochloromethane	595	595	ug/M3	U
71-55-6	1,1,1-Trichloroethane	521	176000	ug/M3	
563-58-6	1,1-Dichloropropene	670	670	ug/M3	U
56-23-5	Carbon Tetrachloride	459	459	ug/M3	U
107-06-2	1,2 Dichloroethane	471	471	ug/M3	U
71-43-2	Benzene	459	459	ug/M3	U
79-01-6	Trichloroethene	583	583	ug/M3	U
78-87-5	1,2-Dichloropropane	446	446	ug/M3	U
75-27-4	Bromodichloromethane	446	446	ug/M3	U
74-95-3	Dibromomethane	608	608	ug/M3	U
10061-01-5	c-1,3-Dichloropropene	446	446	ug/M3	U
108-88-3	Toluene	446	446	ug/M3	U
10061-02-6	t-1,3-Dichloropropene	322	322	ug/M3	U
79-00-5	1,1,2-Trichloroethane	533	533	ug/M3	U
142-28-9	1,3-Dichloropropane	608	608	ug/M3	U
127-18-4	Tetrachloroethene	347	347	ug/M3	U
124-48-1	Dibromochloromethane	484	484	ug/M3	U
106-93-4	1,2-Dibromoethane	471	471	ug/M3	U
108-90-7	Chlorobenzene	484	484	ug/M3	U
630-20-6	1,1,1,2-Tetrachloroethane	434	434	ug/M3	U
100-41-4	Ethylbenzene	484	484	ug/M3	U
108-38-3	m,p-xylene	1090	1090	ug/M3	U
95-47-6	o-xylene	434	434	ug/M3	U
100-42-5	Styrene	496	496	ug/M3	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

8/17/00

EPA 8260 in Air

Sample: K4201-1...continue

Client Sample ID: SVE inlet

Collected: 8/11/00 15:00

Matrix: Air

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 8/16/00

Gas No	Analyte	MDL	Concentration	Units	Q
98-82-8	Isopropylbenzene	409	409	ug/M3	U
75-25-2	Bromoform	360	360	ug/M3	U
79-34-5	1,1,2,2-Tetrachloroethane	446	446	ug/M3	U
96-18-4	1,2,3-Trichloropropane	732	732	ug/M3	U
103-65-1	n-Propylbenzene	422	422	ug/M3	U
108-86-1	Bromobenzene	434	434	ug/M3	U
108-67-8	1,3,5-Trimethylbenzene	347	347	ug/M3	U
95-49-8	2-Chlorotoluene	496	496	ug/M3	U
106-43-4	4-Chlorotoluene	595	595	ug/M3	U
99-87-6	4-Isopropyltoluene	521	521	ug/M3	U
95-63-6	1,2,4-trimethylbenzene	484	484	ug/M3	U
135-98-8	sec-Butylbenzene	459	459	ug/M3	U
98-06-6	tert-Butylbenzene	694	694	ug/M3	U
541-73-1	1,3 Dichlorobenzene	558	558	ug/M3	U
106-46-7	1,4-Dichlorobenzene	459	459	ug/M3	U
104-51-8	n-Butylbenzene	570	570	ug/M3	U
95-50-1	1,2-Dichlorobenzene	508	508	ug/M3	U
96-12-8	1,2-Dibromo-3-chloropropane	880	880	ug/M3	U
120-82-1	1,2,4-Trichlorobenzene	583	583	ug/M3	U
87-68-3	Hexachlorobutadiene	1170	1170	ug/M3	U
91-20-3	Naphthalene	942	9280	ug/M3	
87-61-6	1,2,3-Trichlorobenzene	1220	1220	ug/M3	U
1634-04-4	MTBE	930	930	ug/M3	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

8/17/00

Case Narrative

VOLATILES by EPA 8260:

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

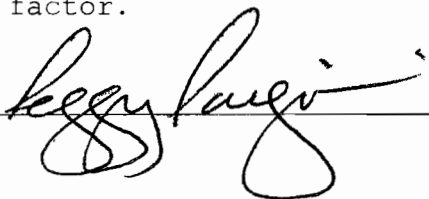
Acetone
2-Butanone
4-Methyl,2-pentanone
2-Hexanone

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

8/17/00

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.

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

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
- NR - when the analyte is not required to be analyzed.
- P - ICP
- T - Titrimetric



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

10/12/0

EPA 8260 in Air**Sample: K2353-1**

Client Sample ID: 092800 SVE Inlet

Collected: 9/28/00 14:00

Matrix: Air

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 10/9/00

Cas No	Analyte	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	71.2	71.2	ug/M3	U
74-87-3	Chloromethane	46.3	46.3	ug/M3	U
75-01-4	Vinyl Chloride	46.3	46.3	ug/M3	U
74-83-9	Bromomethane	70.1	70.1	ug/M3	U
75-00-3	Chloroethane	79.1	514	ug/M3	
75-69-4	Trichlorofluoromethane	21.5	21.5	ug/M3	U
75-35-4	1,1-Dichloroethene	31.6	954	ug/M3	
75-09-2	Methylene Chloride	157	157	ug/M3	U
156-60-5	1,1,2-Dichloroethene	46.3	46.3	ug/M3	U
75-34-3	1,1-Dichloroethane	48.6	8080	ug/M3	
590-20-7	2,2-Dichloropropane	33.9	33.9	ug/M3	U
156-59-2	c-1,2-Dichloroethene	47.5	834	ug/M3	
67-66-3	Chloroform	29.4	29.4	ug/M3	U
74-97-5	Bromochloromethane	63.3	63.3	ug/M3	U
71-55-6	1,1,1-Trichloroethane	699	181000	ug/M3	
563-58-6	1,1-Dichloropropene	124	124	ug/M3	U
56-23-5	Carbon Tetrachloride	33.9	33.9	ug/M3	U
107-06-2	1,2 Dichloroethane	53.1	53.1	ug/M3	U
71-43-2	Benzene	24.9	24.9	ug/M3	U
79-01-6	Trichloroethene	38.4	530	ug/M3	
78-87-5	1,2-Dichloropropane	30.5	30.5	ug/M3	U
75-27-4	Bromodichloromethane	18.1	18.1	ug/M3	U
74-95-3	Dibromomethane	26.0	26.0	ug/M3	U
10061-01-5	c-1,3-Dichloropropene	90.4	90.4	ug/M3	U
108-88-3	Toluene	23.7	23.7	ug/M3	U
10061-02-6	1,1,3-Dichloropropene	89.3	89.3	ug/M3	U
79-00-5	1,1,2-Trichloroethane	19.2	19.2	ug/M3	U
142-28-9	1,3-Dichloropropane	35.0	35.0	ug/M3	U
127-18-4	Tetrachloroethene	19.2	19.2	ug/M3	U
124-48-1	Dibromochloromethane	20.3	20.3	ug/M3	U
106-93-4	1,2-Dibromoethane	19.2	19.2	ug/M3	U
108-90-7	Chlorobenzene	18.1	18.1	ug/M3	U
630-20-6	1,1,1,2-Tetrachloroethane	21.5	21.5	ug/M3	U
100-41-4	Ethylbenzene	19.2	19.2	ug/M3	U
108-38-3	m,p-xylene	29.4	29.4	ug/M3	U
95-47-6	o-xylene	23.7	23.7	ug/M3	U



10/12/0

EPA 8260 in Air

Sample: K2353-1...continue

Client Sample ID: 092800 SVE Inlet

Collected: 9/28/00 14:00

Matrix: Air

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 10/9/00

Cas No	Analyte	MDL	Concentration	Units	Q
100-42-5	Styrene	13.6	13.6	ug/M3	U
98-82-8	Isopropylbenzene	11.3	11.3	ug/M3	U
75-25-2	Bromoform	24.9	24.9	ug/M3	U
79-34-5	1,1,2,2-Tetrachloroethane	36.2	36.2	ug/M3	U
96-18-4	1,2,3-Trichloropropane	81.4	81.4	ug/M3	U
103-65-1	n-Propylbenzene	24.9	24.9	ug/M3	U
108-86-1	Bromobenzene	33.9	33.9	ug/M3	U
108-67-8	1,3,5-Trimethylbenzene	19.2	19.2	ug/M3	U
95-49-8	2-Chlorotoluene	22.6	22.6	ug/M3	U
106-43-4	4-Chlorotoluene	36.2	36.2	ug/M3	U
99-87-6	4-Isopropyltoluene	17.0	17.0	ug/M3	U
95-63-6	1,2,4-trimethylbenzene	18.1	18.1	ug/M3	U
135-98-8	sec-Butylbenzene	22.6	22.6	ug/M3	U
98-06-6	tert-Butylbenzene	17.0	17.0	ug/M3	U
541-73-1	1,3 Dichlorobenzene	21.5	21.5	ug/M3	U
106-46-7	1,4-Dichlorobenzene	27.1	27.1	ug/M3	U
104-51-8	n-Butylbenzene	24.9	24.9	ug/M3	U
95-50-1	1,2-Dichlorobenzene	12.4	12.4	ug/M3	U
96-12-8	1,2-Dibromo-3-chloropropane	27.1	27.1	ug/M3	U
120-82-1	1,2,4-Trichlorobenzene	27.1	27.1	ug/M3	U
87-68-3	Hexachlorobutadiene	13.6	13.6	ug/M3	U
91-20-3	Naphthalene	23.7	23.7	ug/M3	U
87-61-6	1,2,3-Trichlorobenzene	94.9	94.9	ug/M3	U
1634-04-4	MTBE	70.1	70.1	ug/M3	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

10/12/0

Case Narrative

VOLATILES by EPA 8260:

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

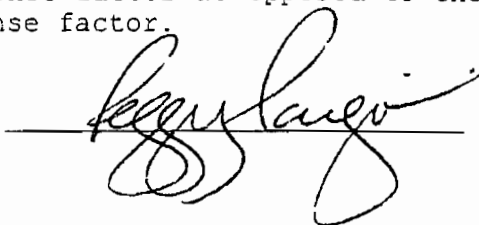
Acetone
2-Butanone
4-Methyl, 2-pentanone
2-Hexanone

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: _____



10/12/0

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.

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

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
- NR - when the analyte is not required to be analyzed.
- P - ICP
- T - Titrimetric



ATTACHMENT B

***31 SEA CLIFF AVENUE
BIOREMEDIATION PILOT STUDY
INITIAL GROUNDWATER MONITORING DATA***

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	MW-14	MW-7	SMP-1	DMP-1	SMP-3	DMP-3	SMP-4	DMP-4
Date	8/31/00	8/31/00	8/31/00	8/31/00	9/1/00	9/1/00	9/1/00	9/1/00
Tetrachloroethene		<0.40	<16	<0.40	<80	<16	13.2	<0.40
Trichloroethene	<0.85	<0.85	<34	<0.85	<170	<34	<0.85	<0.85
cis-1,2-Dichloroethene	<0.95	47.3	24900	50.4	<190	<38	143	<0.95
Vinyl Chloride	<1.75	39.3	4710	188	<350	1040	175	<1.75
Ethene	43	63	930	560	84	430	220	250
1,1,1-Trichloroethane	14.4	<0.55	<22	<0.55	178000	19700	3150	56.3
1,1-Dichloroethane	126	122	506	91.8	38200	5230	4070	29.7
1,2-Dichloroethane	<0.80	<0.80	<32	<0.80	<160	<32	26.2	<0.80
1,1-Dichloroethene	<1.05	<1.05	<42	<1.05	<210	156	105	<1.05
Chloroethane	15.6	258	<72	3290	<330	5370	1220	2420
Ethane	52	<6	<6	<6	39	5.7	<6	<6
Acetone	97.8	<9.45	<378	8670	<1890	<378	<9.4	<9.45
Methylene Chloride	15.1	12.8	482	68.3	2400	436	295	22.8
2-Butanone	124	<5.1	<204	<5.1	<1020	<204	<5.1	<5.1
Toluene	3.0	6.2	<32	36.5	<160	232	116	11
Benzene	<0.70	4.0	<28	<0.70	<140	<28	<0.70	<0.70
p-Ethyltoluene	<1.2	<1.2	<48	2.9	<240	<48	4.8	3.7
1,3,5-Trimethylbenzene	<0.60	<0.60	<24	2.8	<120	<24	3.2	9.2
2-Chlorotoluene	<0.85	<0.85	<34	23.7	<170	<34	45.5	64.5
1,2,4-Trimethylbenzene	<0.65	<0.65	<26	8.4	<130	<26	8.6	18.3
Naphthalene	<1.35	<1.35	<54	3.1	<270	<54	<1.35	4.3
o-Xylene	<0.40	<0.40	<16	<0.40	<80	<16	<0.40	4.8
n-Propylbenzene	<0.70	<0.70	<28	<0.70	<140	<28	<0.70	44.3
Sum VOCs	490.9	552.6	31528	12995.9	218723	32599.7	9533.4	2790.2
Methane	44	660	3400	8200	100	390	450	180
Iron, Total	55.2	2.22	19.8	88.5	50.6	60.4	76.2	48.2
Sulfate	5470	104	236	29600	286	124	933	133
Total Organic Carbon	23500	38.8	91.7	299	294	98.2	73.6	43.7

Table 2. Photocircuits Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

Contaminant	Well	MW-14	MW-7	SMP-1	DMP-1	SMP-3	DMP-3	SMP-4	DMP-4
Date		8/31/01	8/31/01	8/31/01	8/31/01	9/1/01	9/1/01	9/1/01	9/1/01
Tetrachloroethene	µM	<0.0065	<0.0024	<0.096	<0.0024	<0.48	<0.097	0.080	<0.0024
Trichloroethene	µM	<0.0098	<0.0065	<0.026	<0.0065	<1.3	<0.26	<0.0065	<0.0065
cis-1,2-Dichloroethene	µM	<0.028	0.49	257	0.52	<2.0	<0.39	1.5	<0.0098
Vinyl Chloride	µM	1.5	0.63	75	3.0	<5.6	17	2.8	<0.028
Ethene	µM	0.11	2.3	33.2	20	3.0	15.4	7.9	8.9
1,1,1-Trichloroethane	µM	1.3	<0.0041	<0.16	<0.0041	1334	148	24	0.42
1,1-Dichloroethane	µM	<0.0081	1.2	5.1	0.93	386	53	41	0.30
1,2-Dichloroethane	µM	<0.011	<0.0081	<0.32	<0.0081	<1.6	<0.32	0.26	<0.0081
1,1-Dichloroethene	µM	0.24	<0.011	<0.43	<0.011	<2.2	1.6	1.1	<0.011
Chloroethane	µM	1.7	4.0	<1.1	51.0	<5.1	83	19	38
Ethane	µM	<0.20	<0.20	<0.20	<0.20	1.3	0.19	<0.20	<0.20

ATTACHMENT C

***45 SEA CLIFF AVENUE
SVE WELL TEST DATA***

**SVE WELL TEST DATA
41 SEA CLIFF AVENUE**

LOCATION	TIME	PID (PPM)	VACUUM (In. of H2O)
SVE-4 8/29/00	1530	275	36 (Approximately 45 CFM)
	1600	280	
	1630	165	
	1645	240	
	1700	229	
	1715	156	
	1730	153	
	745	142	
	800	392	
	815	248	
SVE-5 8/30/00	845	1650	36 (Approximately 45 CFM)
	900	1675	
	915	>2000	
	930	>2000	
	945	>2000	
	1000	1510	
	1015	>2000	
	1030	>2000	
	1045	>2000	
SVE-6 8/30/00	1115	202	36 (Approximately 45 CFM)
	1130	240	
	1145	230	
	1200	240	
	1230	228	
	1245	143	
	1300	146	
	1315	148	

ATTACHMENT D

PROPOSED SCHEDULE OF ACTIVITIES

Photocircuits - Updated Schedule of Remedial Activities

31 & 45 Sea Cliff Avenue Sites

Page 1 of 1

10/18/00

[illegible]

ATTACHMENT E

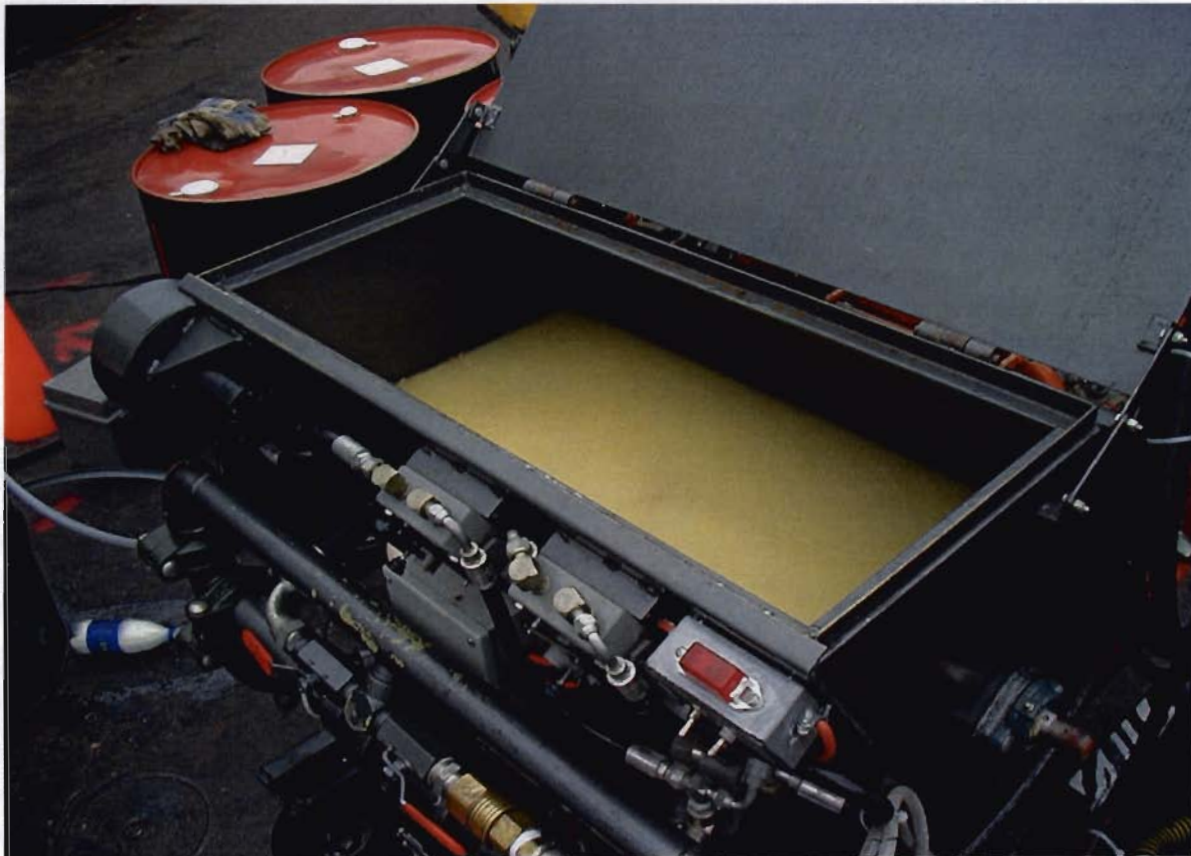
***31 SEA CLIFF AVENUE
BIOREMEDIATION PILOT STUDY PHOTOGRAPHS***



Soil Vapor Extraction System and associated Catalytic Oxidizer installed at 31 Sea Cliff Avenue site.



Preparation of soybean oil/lecithin emulsion for injection at Bioremediation Pilot Study location (31 Sea Cliff Ave).



Injection pump containing soybean oil/lecithin emulsion.



Charging of injection pump with emulsion. Note the stainless steel crossover exhaust between Catalytic Oxidizer and acid scrubber in lower right corner. The corrosion caused by the acidic exhaust stream resulted in the replacement of this section of exhaust with PVC pipe (as discussed in Section 2.1 of this report).



Injection of soybean oil/lecithin emulsion into a borehole.



Installation of SVE/AS-4 inside Building 7 at 45 Sea Cliff Avenue site. Note the channel cut that was required through the production floor. The PVC SVE well riser is evident within the channel cut. The polyethylene tubing inside the channel cut connects to the air sparge point. A vehicle-mounted Geoprobe unit (Mule) had to be pushed by hand through the narrow aisle to access this location.



Portable 1 H.P. blower used to test SVE wells at 45 Sea Cliff Avenue site.



October 27, 2003

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

RE: August 2003 Status Report Photocircuits Accelerated Anaerobic Bioremediation Pilot

Dear Charlie:

Attached is the August 2003 Status Report for the Photocircuits Accelerated Anaerobic Bioremediation Project. Data from the beginning of the project in August 2000 through August 2003 is provided and discussed. Please let me know if you have any questions.

Sincerely,
TERRA SYSTEMS, INC.

Michael D Lee, Ph.D.

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

cc: Andy Barber

INITIALS	
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Barton & Leguina PC	
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ROUTE TO	



**AUGUST 2003
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**

OCTOBER 27, 2003

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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

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Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Table 2. Photocircuits Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

Table 3. Photocircuits Anaerobic Pilot Field Data

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Table 5. Photocircuits Downgradient Wells Percent Change between 3/28/00 and 1/8/02 or 8/4/03

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

ABBREVIATIONS

1DCA	1,1-Dichloroethane
1DCE	1,1-Dichloroethene or 1,1-Dichloroethylene or Vinylidene Chloride
1TCA	1,1,1-Trichloroethane
bgs	Below Ground Surface
CA	Chloroethane
cDCE	cis-1,2-Dichloroethene or cis-1,2-chloroethylene
msl	mean sea level
MTBE	Methyl Tert Butyl Ether
µg/L	Microgram per Liter
µM	Micromole per Liter
PCE	Tetrachloroethene or Perchloroethylene
SRS TM	Slow Release Substrate
TCE	Trichloroethene or Trichloroethylene
tDCE	trans-1,2-Dichloroethene or trans-1,2-Dichloroethylene
TOC	Total Organic Carbon
TSI	Terra Systems, Inc.
VC	Vinyl Chloride
VOC	Volatile Organic Carbon

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 $\mu\text{g/L}$. The initial pilot bioremediation system consisted of six injection points in a line spaced about 15 to 20 feet apart. A slow release substrate (SRS) containing edible oil was designed to provide a slow release food grade carbon source over a period in excess of twelve months. A total of 3,600 gallons of the soybean oil emulsion was injected. The substrate concentrations were selected based on previous experience. An additional 5,722 gallons of the emulsified substrate was injected in months 17 and 19 (February and April 2002) at twelve injection points. VOC and substrate concentrations have been monitored eleven times over a thirty-two month period at eight wells spaced throughout the treatment area. VOC and substrate concentrations have also been monitored at six 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 after the first injection 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. Well MW-7 has contained the emulsion since April 2002 and has not been sampled. Contaminant levels increased in MW-7 between August 2000 and January 2002 when the last sample was collected from this well. An increase in total VOCs has also been observed in wells MW-14 and DMP-4 since the first injection of substrate in August 2000. 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 DMP-4. 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 (63-99%) were generally observed. Degradation rates for the total VOCs (9/1/00 concentration minus 8/4/03 concentration divided by 1067 days) were as high as 182 $\mu\text{g/L-day}$ (well SMP-3) in higher concentration areas with greater than 100,000 $\mu\text{g/L}$ total volatiles. In other areas with lower concentrations, total VOC degradation rates were lower, in the range of 6.9 (SMP-4) to 28 $\mu\text{g/L-day}$ (SMP-1). The average total contaminant concentrations within the pilot cell have fallen by 77% since September 2000. This average includes the wells sampled on 8/4/03 and the well (MW-7) last sampled on 1/8/02. The substrate reinjection in February and April 2002 increased

the TOC concentrations in all wells within the pilot. In August 2003, TOC levels ranged from 132 mg/L in DMP-3 to 1,360 mg/L in MW-14 with an average of 444 mg/L. 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.

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

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. Wells MW-10 and MW-11 were monitored in January 2002 and January 2003. The locations of these wells are shown in Figure 1 with the exception of MW-9, MW-10, and MW-11 that are further to the west. It should be noted that these wells are not expected to be impacted by the bioremediation study.

Ground surface in the vicinity of the study area is about 60 feet above mean sea level (msl). In the pilot area, wells are screened between 10 and 52 feet msl. Downgradient wells 8, 10, and 11 are deep monitoring wells and wells MW-9, MW-12, and MW-13 are shallow wells. The screen intervals for the wells are shown below:

- Well MW-14 10 to 20 feet msl
- MW-7 37 to 52 feet msl
- SMP-1 50 to 52 feet msl
- SMP-3 45 to 47 feet msl
- SMP-4 45 to 47 feet msl
- DMP-1 40 to 42 feet msl

- DMP-3 35 to 37 feet msl,
- DMP-4 38 to 40 feet msl
- MW-8 -111 and -96 feet msl
- MW-9 31 to 46 feet msl
- MW-10 -72 to - 57 feet msl,
- MW-11 -112 to -97 feet mls
- MW-12 9 to 19 feet msl, and
- MW-13 11 to 21 feet msl.

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.

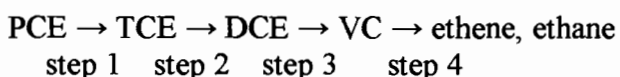
The following technology description is from a report entitled “Cost and Performance Report – In Situ Anaerobic Bioremediation Pinellas Northeast Site Largo, Florida” prepared for the U.S. Department of Energy (1998) by Sandia National Laboratories and Hazardous Waste Remedial Actions Program.

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.



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 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. Wells MW-10 and MW-11 were sampled in January 2002 and January 2003. 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

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.

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. About 4,530 pounds of soybean oil and lecithin was injected. 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. bgs and 5 one-inch wells installed to 55 ft. bgs. 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.

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 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 eleven field sampling events over a 32 month period.

5.2 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 and January, April, and August 2003.
- 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. Well MW-14 was sampled in January, April, and August 2003, but not MW-7. 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 8/4-5/03 for wells MW-8, MW-12, and MW-13, for well MW-9 between 3/28/01 and 1/14/03, and between 1/22/02 and 1/14/03 for wells MW-10 and MW-11.
- 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 August 2003.

5.3 Project To Date Results

The following table summarizes the status of the key performance measures for this project as of August 2003. Details are described in subsequent sections.

Performance Measures	Values/Results
Treatment Volume:	
Soil	Approximately 92' X 157' X 60', 866,640 ft ³
Ground Water Treated:	Approximately 1,620,617 gallons
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	182 µg/L-day
1 – 100 mg/L concentration levels	6.9 to 28 µg/L-day
Reduction of total contaminants of concern:	Achieved reductions of 30% to >99% except in MW-14, 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 48 months

5.3.1 Chlorinated Ethene Results

In the monitoring wells within the pilot cell, cis-1,2-DCE, VC, and ethene were initially 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, TCE, cDCE, tDCE, and VC were not detected in wells SMP-1 and DMP-4 in August 2003; only ethene remained in these wells. TCE, cDCE, tDCE, VC, and ethene concentrations increased in well DMP-1 between October 2002 and January 2003, but then decreased in the April and August 2003 sampling events. In August 2003, ethene represented 87% of the

chlorinated ethenes in well DMP-1. Relatively low levels of TCE, cDCE, tDCE, and VC were also found in well MW-7 at the last sampling point in January 2002 with ethene being the primary product. With the increased substrate levels observed in MW-7, the chlorinated ethene concentrations are expected to decline; however, due to the presence of the emulsion in this well has not been sampled. PCE, TCE, and cDCE were also found in August 2003 at relatively low levels in wells MW-14, DMP-3, and SMP-4. VC concentrations decreased in wells MW-14, DMP-1, SMP-3, and SMP-4 between April and August 2003.

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-7 (through 1/8/02), SMP-3, and DMP-3 through 8/4/03 from the initial levels observed on 8/31/00-9/1/00. Ethene concentrations for the other four 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, SMP-4, and DMP-4.

In the downgradient monitoring wells sampled since March 2001, wells MW-8, MW-10, MW-11, MW-12, and MW-13 had parent compounds PCE and/or TCE. Concentrations greater than 1,000 µg/L of chlorinated ethenes only detected in MW-12. Since March 2001, six months after the first substrate injection, TCE, cDCE, tDCE, and VC concentrations have declined in MW-12 with increased ethene concentrations. The first emulsion injection appeared to have had an effect on MW-12 based upon the increases in ethene, methane, and TOC. However, TCE, cDCE, and VC concentrations have changed little since January 2002. The availability of substrate (<0.9 to 73 mg/L TOC) may be limiting the extent of dechlorination at this well. Ethene has only been detected at low levels in the other downgradient wells. The very low levels of TCE and cDCE found in MW-8 had dissipated from April 2002 until to January 2003, but were detected again in April and August 2003. Little change in the concentrations of PCE, TCE, cDCE, or VC was noted in the deep well MW-10 between 1/22/02 and 1/14/03. Low levels of TCE and cDCE appeared in the deep well MW-11 in January 2003. PCE, TCE, cDCE, tDCE, and VC concentrations have decreased slightly in MW-13, but ethene has only been detected at low concentrations of 5.8 µg/L or less in this well. Although the area around MW-13 appeared to be substrate-limited from March 2001 until November 2002, the availability of substrate has increased to between 24 and 39 mg/L from January through August 2003.

5.3.2 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 99.8% (178,000 µg/L to 372 µg/L) reduction in the 1TCA concentrations. 1TCA levels in wells DMP-3, SMP-4, and DMP-4 have dropped by 82 to 99.9 percent. 1DCA concentrations have dropped in SMP-3 (62%), DMP-4 (>93), SMP-4 (99%), and SMP-1 (>99.6%). However, increased 1DCA concentrations have been noted in MW-14, MW-7 (through 1/8/02), DMP-1, and DMP-3 as a result of the dechlorination of 1TCA. Large reductions in the 1DCE concentrations have been observed in wells SMP-3 (<81%), DMP-3 (58%) and SMP-4 (>98%), but 1DCE increased in MW-14. 1DCE was not detected in August 2000 or 2003 in SMP-1 and DMP-1. CA concentrations have declined by 67% in DMP-1, but increased in other pilot wells. 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 in addition to the 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 2000). Alternatively, sulfides generated from the reduction of sulfate may be reacting abiotically with the 1TCA and 1DCA (Gander et al. 2002).

Well SMP-4 has shown decreases in the 1TCA, 1DCA, CA, and ethane concentrations over the thirty-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 SRSTM, the 1TCA and 1DCA concentrations dropped. Concentrations of 1TCA, 1DCA, and 1DCE higher than initial levels were observed in wells MW-14, MW-7 (through 1/8/02), DMP-1, and DMP-3. However, further degradation products CA and ethane levels are elevated in wells MW-14, MW-7, SMP-1, SMP-3, DMP-3, SMP-4, and DMP-4. Chloroethane can be biodegraded under aerobic and methanogenic conditions (Lee and Davis 2000).

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. In the deep well MW-10, concentrations of 1DCA, 2DCA, 1DCE were relatively stable between January 2002 and January 2003, and CA was detected. A low level of 1DCA was detected in MW-11 in January 2003. 1DCA, 1DCE, and ethane concentrations increased in MW-12 between July 2001 and April 2002, but are now similar to the levels seen in March 2001. In MW-13, 1TCA, 1DCA, 1DCE, and ethane concentrations have decreased by 90 to 97%.

5.3.3 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 thirty-five months of the project operation to date, acetone concentrations decreased by >99.9% in DMP-1, but increased in MW-14 and SMP-4. In August 2003, acetone was found at 613 µg/L in SMP-4 and represented 30% of the total volatiles in this well. Methylene chloride has decreased in all wells except MW-14 with declines by as much as >99.7 percent in SMP-1, >99% in DMP-1, 99.7% in SMP-3, 98% in DMP-3, 99% in SMP-4, 55% in DMP-4, and 38% in MW-7 (through 1/8/02), but increased in MW-14 through August 2003. Methylene chloride can also be anaerobically degraded. Toluene concentrations have declined in all eight wells in the project area. 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 97% in SMP-4 and >98% 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. We are speculating that the MTBE plume is from an off-site source since it was not used on the Photocircuits site. MTBE has not been detected in any monitoring well since July 2002. The MTBE appears to have flushed through the system. In August 2003, other potential components of gasoline including benzene, toluene, o-xylene, 1,2,4-trimethyl benzene, 1,3,5-trimethyl benzene, and/or naphthalene were detected in wells SMP-1, DMP-1, SMP-3, DMP-3, and DMP-4, but not wells SMP-4 or MW-14.

Few of the contaminants other than the chlorinated ethenes and ethanes were found in the downgradient wells. 2-Chlorotoluene concentrations have decreased by 70% in MW-13 between 3/28/01 and 8/4/03, but increased slightly in MW-12. 4-Chlorotoluene has been found in MW-12. A low level of o-xylene was found in MW-12 in January 2002, but none was detected in subsequent samples. Benzene was detected in MW-12 in January 2002, April 2003, and August 2003. Acetone, methylene chloride, benzene, and n-propylbenzene have been detected in MW-13. Concentrations of benzene fell below detection limits in April 2003. None of these compounds were detected in wells MW-10 or MW-11 in January 2002 or January 2003.

5.3.4 Sum of VOAs

The sum of the concentrations of all of the contaminants in each well was calculated excluding the final degradation endproduct gases, acetylene, ethene, and ethane. The sum of the VOAs has declined by up to 99% in SMP-1 with large decreases in DMP-1 (88%), SMP-3 (83%), DMP-3 (30%), and SMP-4 (78%). The sum of VOAs has increased by 3,459% in MW-14 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 (-34%). The overall average of the sum of the volatiles has declined by 79% over the course of the pilot and full scale implementation. This average includes the seven wells sampled on 8/5/03 and the well (MW-7) last sampled on 1/8/02.

A first order degradation half-life of 533 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 48 months.

Since 3/28/01, the total volatiles in the downgradient wells outside of the influence of the substrate injection have fallen in MW-10 (1%), MW-12 (45%), and MW-13 (71%), but increased in MW-8 (-990%), and MW-11 (-5617%) and have remained non-detect in MW-9.

5.3.5 Substrate Distribution

The total organic carbon concentrations in August 2003 within the pilot cell ranged from 132 mg/L in DMP-3 to 1,360 mg/L in MW-14. Well MW-7 contained the emulsion in August 2003 and was not sampled. It presumably contains very high levels of TOC. TOC levels were above 100 mg/L in all wells in August 2003. 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 except MW-14 as a result of the February-April 2002 injection event.

The substrate injection has apparently impacted TOC levels only in wells MW-12 and MW-13 of the downgradient wells. Downgradient wells MW-8, MW-9, MW-10, MW-11, MW-12, and MW-13 appear to be substrate-limited.

5.3.6 Electron Acceptor Results

As the microbes break down the emulsion, sulfate would be depleted and the concentrations of iron and methane would increase. Nitrate-nitrogen was present in August 2003 at low concentrations of 0.026 to 0.33 mg/L and is a minor electron acceptor. The predominant electron acceptor in the groundwater in August 2003 was sulfate with concentrations that ranged from 8.5 mg/L in SMP-1 to 519 mg/L in DMP-3. Sulfate concentrations have declined from the initial concentrations in September 2000 in wells MW-14 (98%), SMP-1 (96%), DMP-1 (99.5% from 29,600 to 138 mg/L), SMP-3 (70%), SMP-4 (94%), and DMP-4 (56%) as would be expected with consumption of the oil emulsion. However, sulfate levels have increased in MW-7 (though 1/8/02) and DMP-3 over the course of the pilot. The average sulfate concentration in the cell has declined by 97%. Total iron concentrations within the pilot in August 2003 ranged from 2.17 mg/L in DMP-1 to 214 mg/L in SMP-4, which indicated that iron is also an important electron acceptor. Total iron concentrations have increased in five of the eight wells in the study 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 August 2003, methanogenic conditions ($>1,000 \mu\text{g/L}$) was detected in all wells. Methane concentrations have increased in all eight monitoring wells in the project area between September 2000 and August 2003.

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. No electron acceptor data was available for wells MW-10 and MW-11. Well MW-12 is under sulfate or iron-reducing conditions based upon the elevated iron levels and

drops in sulfate concentrations. Although methane and iron concentrations have increased in MW-13 and sulfate levels have declined, nitrate levels are high enough (2.16 mg/L) for it to be the dominant electron acceptor.

5.3.7 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 since January 2002 for wells SMP-1, DMP-1, SMP-3, DMP-3, SMP-4, and DMP-4. Field parameters were collected for downgradient wells MW-8, MW-9, MW-12, and MW-13 since the April 2002 sampling event. 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, but declined to between 7.0 and 7.6 from January to August 2003. The pH dropped to slightly acidic conditions of 5.3-6.1 in SMP-4. Downgradient wells MW-12 and MW-13 were slightly acidic to neutral, 6.2 to 7.3. The pH in the downgradient well MW-8 ranged from slightly acidic, 6.4 to slightly basic, 8.7. Groundwater temperatures ranged between 11.5 to 24.8 °C. In general the specific conductivity of the groundwater was high, between 2,660 and 5,890 umhos/cm. Downgradient wells MW-8 and MW-9 had lower specific conductivity readings of 120 to 221 umhos/cm. Downgradient wells MW-12 and MW-13 had higher specific conductivity levels.

Negative redox potentials of -35 (SMP-4) to -128 mV (DMP-4) were found in the wells within the pilot cell in August 2003 except SMP-1. Well SMP-1 went dry during sampling and the field parameters may not be representative. Downgradient well MW-8 had a positive redox potential in August 2003, which is consistent with the low levels of contaminants found in this well. Although well MW-13 has higher contaminant levels, its redox potential ranged from -10 to 300 mV. The redox potential of MW-12 has ranged between -136 mV to 69 mV. Low (<1.0 mg/L) dissolved oxygen reading were observed in well DMP-3 and DMP-4 in August 2003. 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 after July 2002.

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

There have been twelve groundwater sampling events during the course of the study. As of August 2003, the average total volatile contaminant concentrations within the pilot have decreased by 79%.

During the treatment period of 35 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 79%.
- The average concentrations of the parent compound 1,1,1-trichloroethane has decreased by 98%.
- PCE, TCE, cDCE, and VC were not detected in wells SMP-1 and DMP-4 in August 2003.
- Three monitoring wells (MW-7, MW-14, and DMP-4) have shown increased total volatile concentrations since September 1, 2000 by 33 to 3,459%. Well MW-7 could not

be sampled in since January 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 4/28/03, total VOC concentrations have decreased by 57% in MW-14. Since first monitored in May 1999, well DMP-4 has shown an increase in total volatiles from 1,636 to 3,600 $\mu\text{g/L}$ largely due to an increase in the 1TCA degradation product CA between June and August 2003.

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 48 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.

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 79% over the course of 35 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 182 µg/L per day in higher concentration areas. In areas with lower total volatile concentrations, degradation rates range from 6.9 to 28 µg/L per day. Wells MW-7 (through January 2002), MW-14, and DMP-4 have shown increases in total VOCs through their last sampling point in August 2003. The increase in the total VOCs was in well DMP-4 was 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 533 days was calculated for the average total volatile contaminants within the pilot cell. This average includes the wells sampled on 8/4/03 and the well MW-7 last sampled on 1/8/02. Based upon this degradation rate, 90% of the total contaminants should be removed within 48 months.

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

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 132 to 1,360 mg/L in August 2003. 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, MW-7 through 1/8/02, and 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.

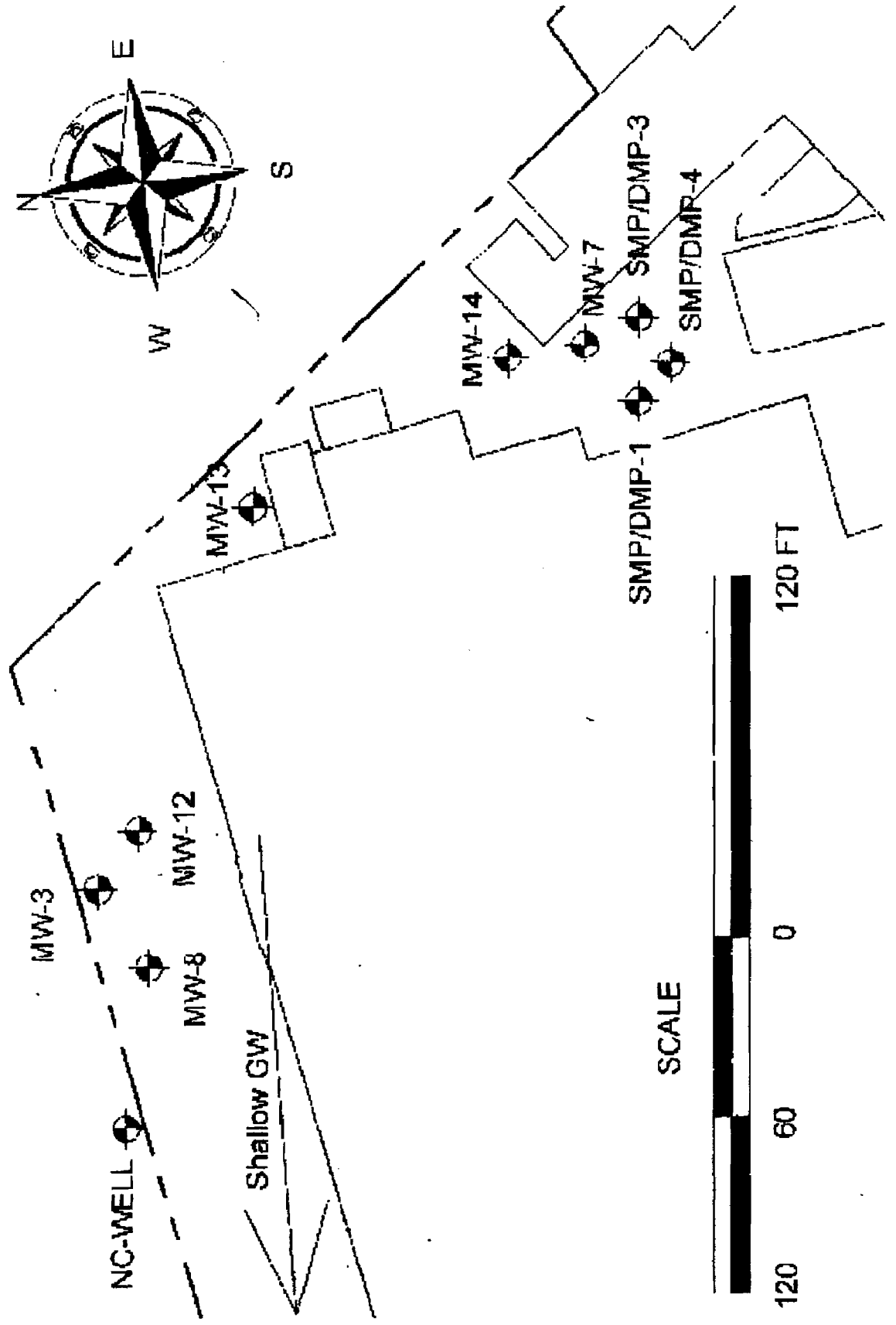
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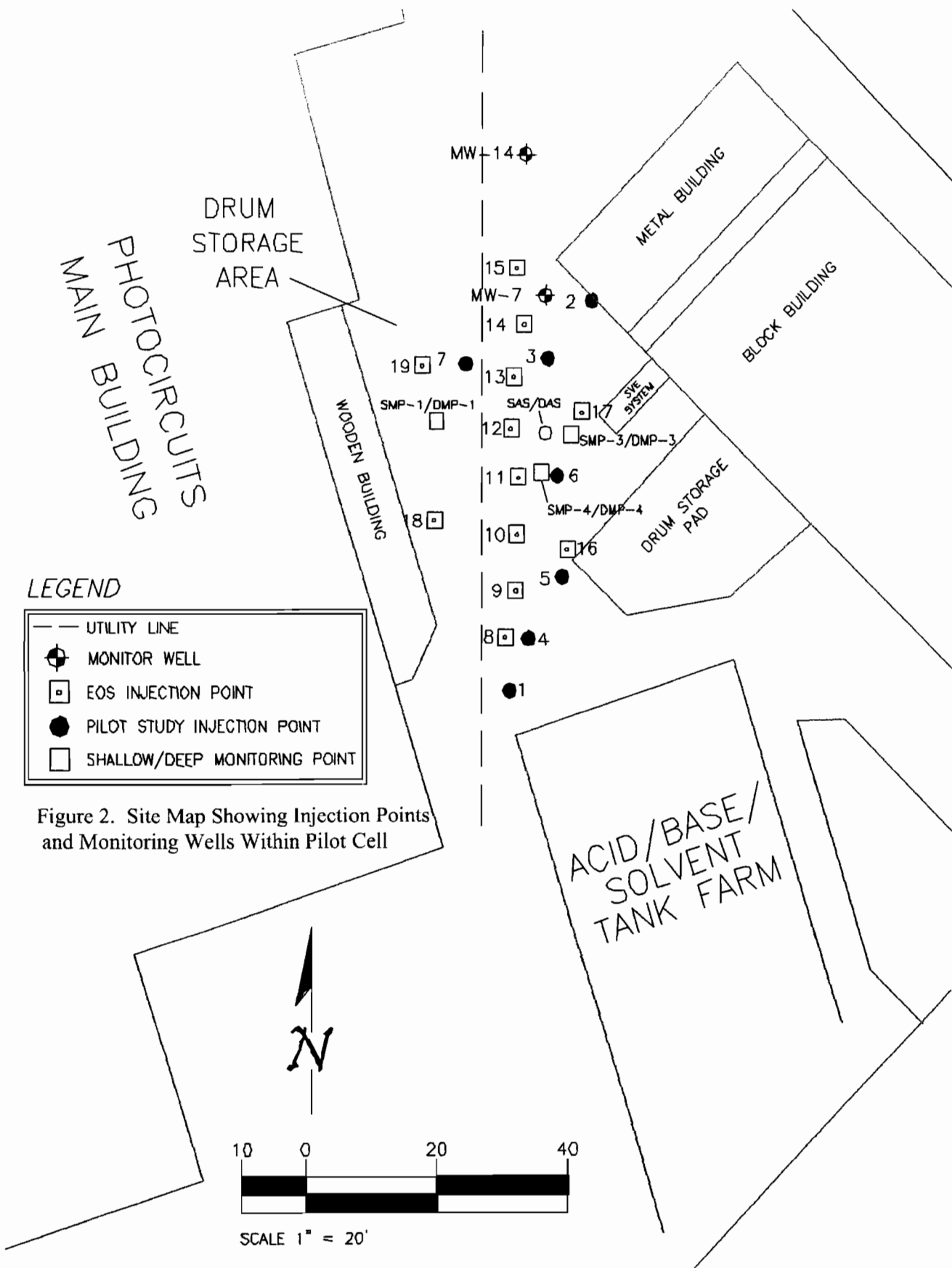
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FIGURES

Figure 1. Site Map Showing Well Locations





TABLES

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	MW-14									
Date	8/31/2000	10/19/2000	12/20/2000	3/28/2001	7/11/2001	1/8/2002	1/14/2003	4/28/2003	8/5/2003	
Days	0	49	111	209	314	495	866	970	1069	
Tetrachloroethene	µg/L	<1.4	<0.40	<5.5	<4.0	<2.4	<31	<38	<3.8	
Trichloroethene	µg/L	<1.35	<0.85	<10	<3.4	<3.4	<23	<21	<2.1	
cis-1,2-Dichloroethene	µg/L	<0.95	<0.95	<15	<2.8	<3.6	<21	<16	8.48	
trans-1,2-Dichloroethene	µg/L	<1.40	<1.35	<11	<2.8	<5.8	<23	<22	<2.20	
Vinyl Chloride	µg/L	10.6	<1.75	114	145	173	<25.5	342	139	
Ethene	µg/L	47	60	65	130	90		68	34	
Acetylene	µg/L					5.7		<1.2	<1.2	
1,1,1-Trichloroethane	µg/L	<1.7	8.9	994	2040	1520	1020	1630	507	
1,1-Dichloroethane	µg/L	216	293	9230	18800	14100	8580	8860	9580	
1,2-Dichloroethane	µg/L	<0.95	<0.80	<10	34.2	<3.2	<11.5	<17	<1.70	
1,1-Dichloroethene	µg/L	<1.05	6.3	443	751	542	323	296	90.8	
Chloroethane	µg/L	<1.25	<1.65	132	298	501	848	1290	2160	
Ethane	µg/L	52	48	34	66	49		18	10	
Acetone	µg/L	97.8	170	126	<74	986	<566	912	754	
Methylene Chloride	µg/L	15.1	<1.50	<1.0	220	134	<31.5	<15	52.9	
2-Butanone	µg/L	124	75.3	<5.1	<125	863	<826	<164	797	
Toluene	µg/L	3.0	<0.80	<0.70	<7.5	25	<19	<20	<2.00	
Benzene	µg/L	<0.70	<0.70	<5	<2.6	<3.4	<20	<21	<2.1	
p-Ethyltoluene	µg/L	<1.05	<1.2	<8	<4.4	<4.8	<31	<15	<1.5	
1,3,5-Trimethylbenzene	µg/L	<0.60	<0.60	<17	<2.2	<2.4	<28.5	<17	<1.70	
2-Chlorotoluene	µg/L	<0.85	<0.85	<10.5	<3.2	<4.2	<19	<15	<1.50	
1,2,4-Trimethylbenzene	µg/L	<0.65	<0.65	<11	<4.4	<2.6	<30	<15	<1.50	
Naphthalene	µg/L	<1.35	<1.35	<9.5	<8.2	<5.4	<47	<40	<4.00	
o-Xylene	µg/L	<0.40	<0.40	<8	<3.2	<3.2	<16.5	<12	<1.20	
n-Propylbenzene	µg/L	<0.70	<0.70	<10.5	<6.2	<2.8	<31	<16	<1.6	
Methyl T-Butyl Ether	µg/L	<1.25	<1.15	<14	<1.6	<3.6	<29	<5.3	<0.53	
Sum VOAs (w/o Gases)	µg/L	396	478	11133	23671	18325	10771	13330	14089	
Methane	µg/L	44	58	1800	6400	8050		10600	6260	
Iron, Total	mg/L	55.2	13.2	69	197	279	186	219	186	
Sulfate	mg/L	5470	779	32.6	307	441	5.97	141	87.5	
Nitrate-Nitrogen	mg/L	0.15	0.17	<0.025	<0.0015	<0.13	<0.025	<0.025	0.080	
Total Organic Carbon	mg/L	23500	868	1990	2590	2630	1900	2650	1360	

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	MW-7									
	8/31/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002				
Days	0	49	111	208	314	495				
Tetrachloroethene	<0.40	<0.56	<0.40	<2.2	<0.20	<0.12				
Trichloroethene	<0.85	19.3	<0.85	<4	16	2.7				
cis-1,2-Dichloroethene	47.3	283	355	149	187	8.3				
trans-1,2-Dichloroethene	<1.35	<0.56	<1.35	<4.4	2.6	2.1				
Vinyl Chloride	39.3	67.1	139	60	63.9	10.5				
Ethene	63	170	110	33	94	110				
Acetylene						<1.2				
1,1,1-Trichloroethane	<0.55	<0.62	<0.55	<4	<0.16	<0.14				
1,1-Dichloroethane	122	214	268	135	207	193				
1,2-Dichloroethane	<0.80	<0.38	<0.80	<4	<0.13	3.7				
1,1-Dichloroethene	<1.05	<0.96	<1.05	<3.6	1.9	<0.22				
Chloroethane	258	181	201	160	269	390				
Ethane	<6	130	81	34	71	68				
Acetone	<9.45	52.2	<9.45	<29.6	18.5	<2.3				
Methylene Chloride	12.8	6.0	<1	51.6	3.9	8.0				
2-Butanone	<5.1	<1.64	<5.1	<50	<6.25	17.2				
Toluene	6.2	8.4	8.3	<3	8.6	0.95				
Benzene	4.0	3.5	<0.7	<2	2.8	6.5				
p-Ethyltoluene	<1.2	<0.68	<1.2	<3.2	<0.22	<0.24				
1,3,5-Trimethylbenzene	<0.60	<0.60	<0.6	<6.8	<0.11	<0.12				
2-Chlorotoluene	<0.85	5.2	<0.85	<4.2	6.3	8.4				
1,2,4-Trimethylbenzene	<0.65	<0.50	<0.65	<4.4	1.2	0.93				
Naphthalene	<1.35	<0.36	<1.35	<3.8	1.2	<0.27				
o-Xylene	<0.40	<0.54	<0.4	<3.2	1.1	<0.16				
n-Propylbenzene	<0.70	<0.56	<0.7	<4.2	<0.31	<0.14				
Methyl T-Butyl Ether	<1.25	<0.46	<1.25	<5.6	<0.080	<0.18				
Sum VOAs (w/o Gases)	490	840	971	556	791	652				
Methane	660	1900	760	1050	5930	5050				
Iron, Total	2.22	1.84	3.93	6.72	8.78	13.1				
Sulfate	104	117	264	203	68.9	949				
Nitrate-Nitrogen		<0.015	0.023	0.029	0.017	0.085				
Total Organic Carbon	38.8	53.1	60	72.9	58.5	1.67				

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	SMP-1											
Date	8/31/2000	10/18/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003
Days	0	48	111	208	314	495	579	663	762	865	970	1068
Tetrachloroethene	µg/L	<0.40	<22	<5.5	<2.0	<6.0	<12	<5.5	<0.22	<2.48	<0.76	<3.80
Trichloroethene	µg/L	79	860	1530	25.3	4410	26600	41	<0.72	<1.84	<0.42	<2.10
cis-1,2-Dichloroethene	µg/L	24900	37500	30100	<0.27	12300	18000	25700	680	<1.68	<0.32	<1.60
trans-1,2-Dichloroethene	µg/L	<54	69.9	<40	132	34.5	68.5	<15.5	<0.62	<1.84	<0.44	<2.20
Vinyl Chloride	µg/L	4710	5990	5090	4770	4230	3490	1780	8920	<2.04	<0.56	<2.80
Ethene	µg/L	930	2400	1140	900	1890	650	800	3710	1180	800	190
Acetylene	µg/L											
1,1,1-Trichloroethane	µg/L	<22	<0.55	<34	356	158	<7.0	<13	<0.52	<1.4	<0.44	<2.20
1,1-Dichloroethane	µg/L	506	486	628	708	536	456	366	197	29.5	26.3	<2.20
1,2-Dichloroethane	µg/L	<32	<0.80	<17	<10	<1.3	<8.0	<11.5	<0.46	<0.92	<0.34	<1.70
1,1-Dichloroethene	µg/L	<42	64.3	<27	184	55.1	143	296	<0.54	<2.52	<0.46	<2.30
Chloroethane	µg/L	<72	71.6	<53	<15	<1.8	<33.5	<30.5	37.6	38.7	241	261
Ethane	µg/L	<6	<6	<25	<25	<25	<12	3.6	4.6	1.8	<6.0	<2.4
Acetone	µg/L	<378	<9.45	<166	<74	<14.4	<115	<56.5	<2.26	<45.3	101	<14.1
Methylene Chloride	µg/L	482	43.1	<56	<20.5	11.9	<18.5	<27	<10.5	<2.52	2.75	<1.50
2-Butanone	µg/L	<204	<5.1	<68	<125	<62.5	<860	<190	<7.6	<66.1	<3.28	<16.4
Toluene	µg/L	<32	61.1	<19	126	51.4	55	194	58.5	25.7	48.9	18.4
Benzene	µg/L	<28	4.40	<34	<5	<1.3	<8.5	<10.5	94	22.8	24.4	<2.10
p-Ethyltoluene	µg/L	<48	<1.2	<20	<8	11.3	<12	<8.0	<0.32	<2.48	<0.30	<1.50
1,3,5-Trimethylbenzene	µg/L	<24	<0.60	<20	<17	<1.1	<6.0	<10	<0.4	<2.28	<0.34	<1.70
2-Chlorotoluene	µg/L	<34	16.3	<25	<10.5	47.3	<10.5	<12.5	17.8	<1.52	10.1	<1.50
1,2,4-Trimethylbenzene	µg/L	<26	<0.65	<65	<11	15.7	<6.5	<8.5	<0.34	<2.4	<0.30	<1.50
Naphthalene	µg/L	<54	<1.35	<16	<9.5	21.2	<13.5	<7	<0.58	<3.76	<0.80	<4.00
o-Xylene	µg/L	<16	<0.40	<18	<8	11.4	<8.0	<10	5.7	<1.32	<0.24	<1.20
n-Propylbenzene	µg/L	<28	<0.70	<17	<10.5	<3.1	<7.0	<8.0	<0.32	<2.48	<0.32	<1.60
Methyl T-Butyl Ether	µg/L	<50	<1.25	<25	<14	<0.80	117	<9.0	<0.36	<2.32	<0.11	<0.053
Sum VOAs (w/o Gases)	µg/L	30598	44386	36678	7806	17509	26740	35121	3631	117	454	279
Methane	µg/L	3400	6200	2500	2060	3400	1100	1890	2570	3680	5290	4810
Iron, Total	mg/L	19.8	11.6	15.1	11.1	29.9	16.4	18.3	12.2	13	42.2	27.6
Sulfate	mg/L	236	360	443	813	905	732	513	134	60.4	25.2	8.5
Nitrate-Nitrogen	mg/L		0.054	0.071	12.3	0.016	<0.13	<0.025	<0.025	0.084	0.11	0.084
Total Organic Carbon	mg/L	91.7	83.4	88	59.7	45.9	23.8	63.1	139	186	1280	168

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	DMP-1											
	8/31/2000	10/18/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003
Date												
Days	0	48	111	208	314	495	579	663	762	865	970	1068
Tetrachloroethene	µg/L	<0.40	<0.080	<0.40	<5.5	<1.0	<0.60	<0.48	1.1	<3.1	<0.76	<1.90
Trichloroethene	µg/L	<0.85	<0.17	<0.85	<10	4.5	<0.85	29.3	10.5	<2.3	5.53	<1.05
cis-1,2-Dichloroethene	µg/L	50.4	1.70	17.4	73.5	38.4	<0.90	44.3	62.1	1610	1100	42.8
trans-1,2-Dichloroethene	µg/L	<1.35	<0.27	<1.35	<11	<0.70	<1.4	3.9	2.8	<2.3	5.75	<1.10
Vinyl Chloride	µg/L	188	3.5	40	125	42.7	<4.25	62	25.4	180	1020	75.8
Ethene	µg/L	560	1080	920	690	110	93	160	210	430	900	320
Acetylene	µg/L											
1,1,1-Trichloroethane	µg/L	<0.55	<0.11	<0.55	193	28.1	<0.70	<0.44	0.89	<0.26	<0.44	<1.10
1,1-Dichloroethane	µg/L	91.8	17.6	357	1130	1320	423	240	412	414	486	162
1,2-Dichloroethane	µg/L	<0.80	<0.16	<0.80	<10	14.9	<0.80	<0.46	2.9	<1.15	<0.34	<0.85
1,1-Dichloroethene	µg/L	<1.05	<0.21	<1.05	<9	<0.70	<1.10	<0.6	<0.27	<3.15	4.7	<1.15
Chloroethane	µg/L	3290	43.4	232	159	193	97	69.7	36.9	<2.45	34.7	1100
Ethane	µg/L	<6	<6	<50	<100	<50	0.8 J	<1.3	1.8	16	24	6.1
Acetone	µg/L	8670	139	557	<74	1150	<11.5	<6.24	48.8	<56.6	86	<7.05
Methylene Chloride	µg/L	68.3	1.40	22.4	191	32.8	<0.85	<1.08	1.7	<3.15	4.87	<0.75
2-Butanone	µg/L	<5.1	<1.02	5.1	<125	<31.3	<86	<10	<3.8	<82.7	<3.28	<8.20
Toluene	µg/L	36.5	2.80	24.1	40.5	9.1	<0.70	2.2	5.8	14.4	14.3	14.2
Benzene	µg/L	<0.70	<0.14	5.5	<5	<0.65	<0.85	<0.32	<0.21	48	214	40.4
p-Ethyltoluene	µg/L	2.9	<0.24	<1.2	<8	<1.1	<1.2	<0.4	1.4	1.7	<3.1	<0.75
1,3,5-Trimethylbenzene	µg/L	2.8	<0.12	<0.60	<17	<0.55	<0.60	<0.4	1.3	<2.85	<0.34	<0.85
2-Chlorotoluene	µg/L	23.7	<0.17	18.2	<10.5	33.7	79.7	57.6	30.1	36.2	31.9	29.1
1,2,4-Trimethylbenzene	µg/L	8.4	0.77	8.4	<11	4.8	4.7	3.4	3.2	<3.0	3.02	<0.75
Naphthalene	µg/L	3.1	<0.27	<1.35	<9.5	<2.05	<1.35	<0.28	<0.29	<1.6	4.18	<2.00
o-Xylene	µg/L	<0.40	<0.080	<0.40	<8	<0.80	<0.80	<0.4	0.82	<1.1	2.97	<0.60
n-Propylbenzene	µg/L	<0.70	<0.14	16.9	<10.5	<1.55	<0.70	<0.42	<0.16	<3.1	<0.32	25.2
Methyl T-Butyl Ether	µg/L	<1.25	<0.25	<1.25	<14	<0.40	<0.90	<0.68	<0.18	<2.9	0.11	<0.26
Sum VOAs (w/o Gases)	µg/L	12436	210	1304	1912	2872	604	512	648	4025	2933	1490
Methane	µg/L	8200	23000	10300	4660	730	330	160	520	3520	15900	24300
Iron, Total	mg/L	88.5	4.45	3.1	21.7	8.65	15.9	4.11	6.8	2.88	13.1	2.17
Sulfate	mg/L	29600	37.7	179	715	1420	1200	2070	590	1040	523	138
Nitrate-Nitrogen	mg/L		0.20	0.024	0.05	0.019	<0.13	<0.025	0.004 J	0.16	0.088	0.026
Total Organic Carbon	mg/L	299	224	137	132	54.5	8.14	41.1	24.3	101	284	151

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	SMP-3											
Date	9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003
Days	0	49	111	208	314	495	579	662	761	864	969	1067
Tetrachloroethene	µg/L	<80	<8	13.7	12.2	<6.0	<24	<5.5	9.6	<6.2	<3.8	<3.80
Trichloroethene	µg/L	<170	<17	<0.2	<1.7	<8.5	<34	<18	2.6	<4.6	<2.10	<2.10
cis-1,2-Dichloroethene	µg/L	<190	<19	2.3	16.4	<9.0	<36	<12	7.5	<4.2	<1.6	<1.60
trans-1,2-Dichloroethene	µg/L	<270	<27	<0.22	<1.4	<14	<56	<15.5	1.7	<4.6	<2.2	<2.20
Vinyl Chloride	µg/L	<350	<35	38.8	98.8	<42.5	<170	118	105	<5.1	73.9	22.9
Ethene	µg/L	84	98	18	110	180	220	260	130	96	94	140
Acetylene	µg/L					2.1	5.4	2.2	6.3	<1.2	<1.2	<1.2
1,1,1-Trichloroethane	µg/L	178000	235000	33700	13100	14500	7610	8070	5660	5780	4510	372
1,1,1-Dichloroethane	µg/L	38200	47700	<0.5	17600	8860	20500	10800	7620	7160	5830	14600
1,2-Dichloroethane	µg/L	<160	<16	6	20.6	<8.0	<32	<11.5	5.3	<2.3	<1.70	<1.70
1,1-Dichloroethene	µg/L	<210	<21	<0.27	164	146	<44	112	337	312	239	38.9
Chloroethane	µg/L	<330	<33	76.6	411	346	<134	354	509	519	1220	9290
Ethane	µg/L	39	45	23	29	17	36	33	11	11	7.5	8.3
Acetone	µg/L	<1890	<189	3690	536	<115	<460	<56.5	70.3	<113	256	<14.1
Methylene Chloride	µg/L	2400	<20	14.6	122	89	152	<10.5	24.7	<6.3	13.6	8.13
2-Butanone	µg/L	<1020	<102	<2.5	<62.5	<860	<3440	<190	<3.8	<165	<16.4	<16.4
Toluene	µg/L	<160	<16	31.7	96.5	54.5	<28	76	53.8	33.2	32.2	41.1
Benzene	µg/L	<140	<14	<0.1	20.6	<8.5	<34	<10.5	2.6	<4.0	<2.10	<2.10
p-Ethyltoluene	µg/L	<240	<24	<0.16	<2.2	<12	<48	<8.0	<0.16	<6.2	<1.50	<1.50
1,3,5-Trimethylbenzene	µg/L	<120	<12	0.63	<1.1	<6.0	<24	<10	<0.2	<5.7	<1.70	<1.70
2-Chlorotoluene	µg/L	<170	<17	5.1	<1.6	<10.5	<42	<12.5	21.8	<3.8	<1.50	<1.50
1,2,4-Trimethylbenzene	µg/L	<130	<13	<0.22	<2.2	<6.5	<26	<8.5	1.6	<6.0	<1.50	<1.50
Naphthalene	µg/L	<270	<27	<0.19	<4.1	<13.5	<54	<14.5	1.1	<9.4	<4.00	<4.00
o-Xylene	µg/L	<80	<8	<0.1	<1.4	<8.0	<32	<12.5	0.82	<3.3	<1.2	<1.20
n-Propylbenzene	µg/L	<140	<14	<0.21	<3.1	<7.0	<28	<8.0	<0.16	<6.2	<1.60	<1.60
Methyl T-Butyl Ether	µg/L	<250	<25	<0.28	9.0	117	<36	<9.0	<0.18	<5.8	<0.53	<0.53
Sum VOAs (w/o Gases)	µg/L	218600	282800	37579	32207	24113	28262	19530	14434	13804	12175	24373
Methane	µg/L	100	140	36	500	1020	2000	5500	740	19500	16000	11600
Iron, Total	mg/L	50.6	591	69.6	3.92	32.5	8.46	4.63	10.1	55.3	9	13.4
Sulfate	mg/L	286	392	154	53.7	1050	3640	119	558	14.1	75.2	85.6
Nitrate-Nitrogen	mg/L	<0.015	0.53	0.037	<0.015	<0.13	0.009 J	0.017 J	<0.025	0.19	0.076	0.055
Total Organic Carbon	mg/L	294	432	48.1	176	34.4	1600	173	40.3	39.1	184	168

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well		DMP-3											
Date		9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003
Days		0	49	111	208	314	495	579	662	761	864	969	1067
Tetrachloroethene	µg/L	<16	60.5	<4.0	<1.1	72.3	34	<12	<2.2	<0.11	<31	21.5	<19.0
Trichloroethene	µg/L	<34	<13.5	<8.5	<2	8.6	<8.5	<8	<7.2	<0.36	<23	<4.20	<10.5
cis-1,2-Dichloroethene	µg/L	<38	<17	<9.5	<3	14.9	<9.0	<10.5	<4.8	1.6	<21	42.7	<8.00
trans-1,2-Dichloroethene	µg/L	<54	<14	<13.5	<2.2	<1.4	<14	<10	<6.2	1.3	<23	<4.40	<11.0
Vinyl Chloride	µg/L	1040	928	818	145	785	654	397	113	61.2	<25.5	146	342
Ethene	µg/L	430	450	310	290	490	360	220	620	550	970	340	490
Acetylene	µg/L						<1.2	<1.2	<1.2	<1.2	<1.2	<2.2	<1.2
1,1,1-Trichloroethane	µg/L	19700	14300	23400	793	24000	19500	11600	1350	234	5970	1510	3610
1,1-Dichloroethane	µg/L	5230	4860	4200	764	3250	2260	3770	2410	3980	10800	8320	10200
1,2-Dichloroethane	µg/L	<32	<9.5	<8.0	<2	25.4	<8.0	<11.5	36.6	29.5	<11.5	<3.4	<8.50
1,1-Dichloroethene	µg/L	156	<24	<10.5	<1.8	168	<11	<15	17.4	5.6	<31.5	36.2	65.1
Chloroethane	µg/L	5370	6970	3760	729	6630	2260	1900	10100	8640	9050	1600	8180
Ethane	µg/L	5.7	9.4	44	12	8.2	8.6	16	31	26	35	17	11
Acetone	µg/L	<378	<65	<94.5	<14.8	<14.4	<11.5	<156	945	121	<566	173	<70.5
Methylene Chloride	µg/L	436	149	<10	31.8	58.7	<18.5	<27	91.8	62	<31.5	34.7	<7.50
2-Butanone	µg/L	<204	<41	<51	<25	<62.5	<860	<250	<76	<3.8	<826	<32.8	<82.0
Toluene	µg/L	232	134	103	15.7	140	108	84	85.6	30.5	56.5	22.5	80.8
Benzene	µg/L	<28	<7.0	<7.0	<1	<1.3	<8.5	<8	<4.2	<0.21	<20	<4.2	<10.5
p-Ethyltoluene	µg/L	<48	<17	<12	<3.4	9.9	<12	<12	<3.2	<0.16	<31	<3.0	<7.50
1,3,5-Trimethylbenzene	µg/L	<24	<15	<6	<2.1	<1.1	<6.0	<10	<4.0	1.5	<28.5	<3.40	<8.50
2-Chlorotoluene	µg/L	<34	<13.5	<8.5	<2.1	51.5	<10.5	<13.5	<5.0	18.7	<19	<3.00	<7.50
1,2,4-Trimethylbenzene	µg/L	<26	<12.5	<6.5	<2.2	17	<6.5	<8.5	<3.4	4.5	<30	<3.00	<7.50
Naphthalene	µg/L	<54	<9.0	<13.5	<1.9	<4.1	<13.5	<7	<5.8	1.9	<47	<8.0	<20.0
o-Xylene	µg/L	<16	<13.5	<4.0	<1.6	<1.6	<8.0	<10	<5.0	1.8	<16.5	<2.40	<6.00
n-Propylbenzene	µg/L	<28	<14.0	<7.0	<2.1	<3.1	<7.0	<10.5	<3.2	<0.16	<31	<3.20	<8.00
Methyl T-Butyl Ether	µg/L	<50	<11.5	<12.5	<2.8	<0.80	125	<17	26.6	<0.18	<29	<1.06	<2.65
Sum VOCs (w/o Gases)	µg/L	32164	27402	32281	2479	35231	24941	17751	15176	13195	25877	11907	22478
Methane	µg/L	390	890	800	930	870	1400	3850	11100	3100	10700	5280	11300
Iron, Total	mg/L	60.4	66.8	74.3	20.8	77.5	39.0	35.8	114	38.8	11.9	3.7	4.0
Sulfate	mg/L	124	186	137	94.6	173	188	127	185	1200	486	1290	519
Nitrate-Nitrogen	mg/L		0.93	0.35	0.073	0.0030	<0.13	0.029	<0.025	<0.025	1.17	0.051	0.15
Total Organic Carbon	mg/L	98.2	88.6	104	27.8	51.8	29.6	102	349	201	316	166	132

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	SMP-4											
Date	9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003	
Days	0	48	110	207	313	494	662	761	864	969	1067	
Tetrachloroethene	µg/L	13.2	<5.6	<0.80	<5.5	9.3	32	70.2	37.5	<31	102	65.6
Trichloroethene	µg/L	<0.85	<5.4	<1.7	<10	<1.7	<3.4	6.5	<0.36	<23	9.8	<2.10
cis-1,2-Dichloroethene	µg/L	143	<6.8	<1.9	<15	10.8	<3.6	30	27.2	<21	31	33.7
trans-1,2-Dichloroethene	µg/L	<1.35	<5.6	<2.7	<11	<1.4	<5.6	0.62	<0.31	<23	<1.10	<2.20
Vinyl Chloride	µg/L	175	34.6	37.6	72.5	111	126	4.9	2.1	<25.5	10.1	<2.80
Ethene	µg/L	220	190	220	170	160	340	87	29	28	82	17
Acetylene	µg/L						<1.2	<1.2	<1.2	<1.2	<1.2	<12.2
1,1,1-Trichloroethane	µg/L	3150	246	997	3100	2610	2700	23	11.5	<17.5	8.54	<2.20
1,1-Dichloroethane	µg/L	4070	1740	1180	2230	3270	2890	135	149	184	80.4	54.5
1,2-Dichloroethane	µg/L	26.2	<3.8	<1.6	<10	19.7	<3.2	<0.46	3.0	<11.5	<0.85	<1.70
1,1-Dichloroethene	µg/L	105	<9.6	<2.1	<9	48.2	130	<0.54	<0.27	<31.5	<1.15	<2.30
Chloroethane	µg/L	1220	827	3000	1590	945	776	147	459	1060	1010	1290
Ethane	µg/L	<6	<6	39	<10	<10	2.4	12	2.7	3.1	4	<1.3
Acetone	µg/L	<9.4	<26	<18.9	<74	<14.4	<46	365	421	1650	433	613
Methylene Chloride	µg/L	295	123	<2	278	127	66.8	7.5	8.8	<31.5	9.85	<1.50
2-Butanone	µg/L	<5.1	<16.4	<10.2	<125	<62.5	<344	<7.6	137	<826	<8.20	<16.4
Toluene	µg/L	116	37.6	25.5	<7.5	48.2	69.6	<0.40	0.96	<19	<1.00	<2.00
Benzene	µg/L	<0.70	<2.8	<1.4	<5	<1.3	<3.4	<0.42	<0.21	<20	<1.05	<2.10
p-Ethyltoluene	µg/L	4.8	<6.8	<2.4	<8	<2.2	<4.8	<0.32	<0.16	<31	<0.75	<1.50
1,3,5-Trimethylbenzene	µg/L	3.2	<6.0	<1.2	<17	<1.1	<2.4	<0.40	<0.2	<28.5	<0.85	<1.70
2-Chlorotoluene	µg/L	45.5	<5.4	<1.7	<10.5	21.4	<4.2	<0.50	<0.25	<19	<0.75	<1.50
1,2,4-Trimethylbenzene	µg/L	8.6	<5.0	<1.3	<11	<2.2	<2.6	<0.34	<0.17	<30	<0.75	<1.50
Naphthalene	µg/L	<1.35	<3.6	<2.7	<9.5	<4.1	<5.4	<0.58	<0.29	<47	<2.00	<4.00
o-Xylene	µg/L	<0.40	<5.4	<0.8	<8	<1.6	<3.2	<0.50	<0.25	<16.5	<0.60	<1.20
n-Propylbenzene	µg/L	<0.70	<5.6	<1.4	<10.5	<3.1	<2.8	<0.32	<0.16	<31	<0.80	<1.60
Methyl T-Butyl Ether	µg/L	<1.25	<4.6	<2.5	<14	<0.80	<3.6	<0.36	<0.18	<29	<0.26	<0.53
Sum VOAs (w/o Gases)	µg/L	9376	3008	5240	7271	7221	6790	790	1257	2894	1695	2057
Methane	µg/L	450	470	1100	3650	1800	2600	4120	3300	14600	23300	12800
Iron, Total	mg/L	76.2	38.9	47.1	54.5	41.2	17.8	1010	1110	541	209	214
Sulfate	mg/L	933	470	435	1700	1910	1630	119	73.1	5.24	119	59.1
Nitrate-Nitrogen	mg/L		<0.015	0.31	0.19	0.037	<0.13	<0.025	<0.025	0.99	0.05	0.33
Total Organic Carbon	mg/L	73.6	60.4	<0.94	34.6	46.5	31.0	3440	3680	1900	1160	837

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	DMP-4											
Date	9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003
Days	0	48	110	207	313	494	578	662	761	864	969	1067
Tetrachloroethene	µg/L	<0.40	<0.080	<0.11	<2.0	<1.2	<0.48	<0.55	<0.11	<31	<19.0	<3.80
Trichloroethene	µg/L	<0.85	<1.70	<0.20	<1.7	<1.7	<0.32	<1.8	<0.36	<23	<10.5	<2.10
cis-1,2-Dichloroethene	µg/L	<0.95	<1.90	<0.30	<1.4	<1.8	<0.42	<1.2	<0.24	<21	<8.00	<1.60
trans-1,2-Dichloroethene	µg/L	<1.35	<2.70	3.4	<1.4	<2.8	<0.40	<1.55	1.9	<23	<14.0	<2.20
Vinyl Chloride	µg/L	<1.75	<3.50	2.9	<0.70	<8.5	<0.20	<1.15	5.4	<25.5	<11.0	<2.80
Ethene	µg/L	250	260	160	<6	230	150	200	140	89	170	81
Acetylene	µg/L					<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
1,1,1-Trichloroethane	µg/L	56.3	130	<0.11	15.3	18.4	<0.44	<1.3	<0.26	<17.5	<11.0	<2.20
1,1-Dichloroethane	µg/L	29.7	20.1	<0.14	50.1	30.0	38.6	78.1	78.2	<21.5	92.5	<2.20
1,2-Dichloroethane	µg/L	<0.80	<1.60	<0.16	8.7	<1.3	<0.46	6.5	10.3	<11.5	<8.50	<1.70
1,1-Dichloroethene	µg/L	<1.05	<2.10	<0.21	<0.18	<1.4	<0.6	<1.35	<0.27	<31.5	<11.5	<2.30
Chloroethane	µg/L	2420	2580	3300	3680	2680	1260	1330	3240	3510	5460	3560
Ethane	µg/L	<6	<6	37	<6	2.4	<1.3	4.7	1.1	2.3	4.4	2.9
Acetone	µg/L	<9.45	<18.9	<1.89	58.4	<14.4	<6.24	<5.65	<1.13	<566	<70.5	<14.1
Methylene Chloride	µg/L	22.8	16.6	3.9	19.8	20.8	12.2	22.2	26.9	<31.5	<7.5	10.2
2-Butanone	µg/L	<5.1	<10.2	<1.02	<2.5	<62.5	<172	<19	<3.8	<826	<82.0	<16.4
Toluene	µg/L	11	7.5	3.1	6.1	<1.4	6.9	10.2	7.3	<19	<10.0	10.7
Benzene	µg/L	<0.70	<1.40	<0.14	<0.10	<1.3	<1.7	<0.321	<1.05	<20	<10.5	<2.10
p-Ethyltoluene	µg/L	3.7	<2.40	<0.24	1.2	<2.2	<2.4	<0.48	<0.80	<31	<7.50	<1.50
1,3,5-Trimethylbenzene	µg/L	9.2	<1.20	2.5	3.4	<1.1	<1.2	6.9	<1.0	<28.5	<8.50	<1.50
2-Chlorotoluene	µg/L	64.5	44.5	17.1	31.6	31.9	34.2	40.2	21.1	<19	<7.50	<1.50
1,2,4-Trimethylbenzene	µg/L	18.3	15.9	5.3	<0.22	9.2	9.0	13.5	5.3	<30	<7.50	<1.50
Naphthalene	µg/L	4.3	<2.70	<0.27	1.6	<4.1	<2.7	<0.28	<1.45	1.8	<47	<20.0
o-Xylene	µg/L	4.8	<0.80	<0.008	5.0	<1.6	<1.6	3.6	<1.25	<16.5	<6.00	<1.20
n-Propylbenzene	µg/L	44.3	<1.40	<0.14	<0.21	<3.1	<1.4	<0.42	<0.80	<31	<8.00	19.4
Methy T-Butyl Ether	µg/L	<1.25	<2.4	<0.25	<0.28	<0.80	21.9	<0.68	<0.18	<29	<2.65	<0.53
Sum VOAs (w/o Gases)	µg/L	2689	2815	3332	3888	2790	1307	1385	1471	3427	5553	3600
Methane	µg/L	180	210	190	300	<6	250	240	2480	21500	22300	19700
Iron, Total	mg/L	48.2	39.2	42.5	85.4	116	31.6	29.1	44.1	15.8	56.8	114
Sulfate	mg/L	133	171	98.5	209	323	146	176	249	3.77	222	59.1
Nitrate-Nitrogen	mg/L		0.22	0.31	0.17	<0.015	<0.13	0.051	<0.025	<0.025	0.18	0.17
Total Organic Carbon	mg/L	43.7	52.4	50.9	34.6	35.7	7.1	71.7	78.3	291	306	295

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	MW-8					MW-9								
	Date	7/12/2001	1/8/2002	4/3/2002	6/26/2002	10/3/2002	1/15/2003	4/28/2003	8/5/2003	3/28/2001	7/12/2001	1/8/2002	1/14/2003	
Days		314	494	579	663	554	658	761	860	0	314	494	657	
Tetrachloroethene	µg/L	<0.20	<0.12	<0.24	<0.22	<0.11	<0.62	<0.76	<0.38	<0.11	<0.20	<0.24	<0.62	
Trichloroethene	µg/L	1.7	0.97	<0.16	<0.72	<0.36	<0.46	1.91	4.22	<0.20	<0.17	<0.16	<0.46	
cis-1,2-Dichloroethene	µg/L	1.2	<0.18	<0.21	<0.48	<0.24	<0.42	3.99	15.4	<0.30	<0.14	<0.21	<0.42	
trans-1,2-Dichloroethene	µg/L	<0.14	<0.28	<0.20	<0.62	<0.23	<0.46	<0.44	<0.22	<0.22	<0.14	<0.20	<0.46	
Vinyl Chloride	µg/L	<0.070	<0.85	<0.10	<0.46	<1.3	<0.51	<0.56	<0.28	<0.25	<0.070	<0.10	<0.51	
Ethene	µg/L	<6	<1.3	<1.3	1.2	<1.2	4.6	<1.3	7.1	<6	<6			
Acetylene	µg/L		<1.2	<1.2	<1.2	<0.26	<1.2	<1.2	<1.2					
1,1,1-Trichloroethane	µg/L	<0.16	<0.14	<0.22	<0.52	<0.3	<0.35	<0.44	<0.22	<0.20	<0.16	<0.22	<0.35	
1,1-Dichloroethane	µg/L	<0.12	<0.25	<0.22	<0.60	<0.31	<0.43	<0.44	<0.22	<0.14	<0.12	<0.22	<0.43	
1,2-Dichloroethane	µg/L	<0.13	<0.16	<0.23	<0.46	<0.23	<0.23	<0.34	<0.17	<0.20	<0.13	<0.23	<0.23	
1,1-Dichloroethene	µg/L	<0.14	<0.22	<0.30	<0.54	<0.27	<0.63	<0.46	<0.23	<0.18	<0.14	<0.30	<0.63	
Chloroethane	µg/L	<0.18	<0.67	<0.61	<0.48	3.7	<0.49	<0.88	<0.44	<0.3	<0.18	<0.61	<0.49	
Ethane	µg/L	<6	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<6	<6			
Acetone	µg/L	<1.44	<2.3	<3.12	<2.26	<1.13	<1.13	<2.82	<1.41	<1.48	<1.44	<3.12	<11.3	
Methylene Chloride	µg/L	<0.15	<0.37	<0.54	<0.42	<0.21	<0.63	<0.30	<0.15	<0.41	<0.15	<0.54	<0.63	
2-Butanone	µg/L	<6.25	<17.2	<5.0	<7.6	<3.8	<16.5	<3.28	<1.64	<2.5	<6.25	<5.0	<16.5	
Toluene	µg/L	<0.14	<0.14	<0.14	<0.40	<0.2	<0.38	<0.40	<0.20	<0.15	<0.14	<0.14	<0.38	
Benzene	µg/L	<0.13	<0.17	<0.16	<0.42	<0.21	<0.4	<0.42	<0.41	<0.10	<0.13	<0.16	<0.4	
p-Ethyltoluene	µg/L	<0.22	<0.24	<0.24	<0.32	<0.16	<0.62	<0.30	<0.15	<0.16	<0.22	<0.24	<0.62	
1,3,5-Trimethylbenzene	µg/L	<0.11	<0.12	<0.20	<0.40	<0.2	<0.57	<0.34	<0.17	<0.34	<0.11	<0.20	<0.57	
2-Chlorotoluene	µg/L	<0.16	<0.21	<0.27	<0.50	<0.25	<0.38	<0.30	<0.15	<0.21	<0.16	<0.27	<0.38	
4-Chlorotoluene	µg/L													
1,2,4-Trimethylbenzene	µg/L	<0.22	<0.13	<0.26	<0.34	<0.17	<0.60	<0.30	<0.15	<0.22	<0.22	<0.17	<0.60	
Naphthalene	µg/L	<0.41	<0.27	<0.14	<0.58	<0.29	<0.94	<0.80	<0.40	<0.19	<0.41	<0.14	<0.94	
o-Xylene	µg/L	<0.16	<0.16	<0.20	<0.50	<0.25	<0.33	<0.24	<0.12	<0.16	<0.16	<0.20	<0.33	
n-Propylbenzene	µg/L	<0.31	<0.14	<0.21	<0.32	<0.16	<0.62	<0.32	<0.16	<0.21	<0.31	<0.21	<0.62	
Methyl t-Butyl Ether	µg/L	<0.080	<0.18	<0.34	<0.36	<0.18	<0.58	<0.11	<0.053	<0.28	<0.080	<0.34	<0.58	
Sum VOAs (w/o Gases)	µg/L	2.9	1.0	0.0	0.0	3.7	0	5.9	19.6	0.0	0.0	0.0	0	
Methane	mg/L	61	9.1	<0.7	20	3.1	76.0	2.1	30	300	940			
Iron, Total	mg/L	0.088 J	<0.096	<0.096	0.013	0.23	0.069	0.061	0.036	10.4	21.9			
Sulfate	mg/L	23.4	27.4	23.2	143	1.46	32.5	28.1	58.6	4.43	23.1			
Nitrate-Nitrogen	mg/L	5.63	6.93	6.66	6.67	5.67	6.28	6.14	5.76	<0.025	<0.015			
Total Organic Carbon	mg/L	<0.94	<0.94	1.41	6.6	4.7	33.4	6.58	4.69	7.98	6.79			

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	MW-10			MW-11			MW-12			MW-13			MW-14		
	1/22/2002	1/14/2003	1/22/2002	1/14/2003	3/28/2001	7/12/2001	1/9/2002	4/3/2002	6/26/2002	10/3/2002	1/15/2003	4/28/2003	8/5/2003		
Days	0	37635	0	37635	0	106	287	371	455	554	658	461	560		
Tetrachloroethene	2.3	<0.62	<0.12	<0.62	<0.11	<0.20	<0.24	<2.4	<1.1	<0.55	<0.62	<0.76	<0.38		
Trichloroethene	6.7	4.7	<0.17	9.9	122	0.93	16.5	31	67.8	82.5	48.7	104	38.1		
cis-1,2-Dichloroethene	231	244	<0.18	18.1	1280	18.2	430	503	467	488	311	369	223		
trans-1,2-Dichloroethene	<0.20	<0.46	<0.28	<0.46	7.3	<0.14	5.6	<2.0	<2.1	<1.55	<0.46	3.84	1.70		
Vinyl Chloride	2.7	<0.51	<0.85	<0.51	244	5.7	298	333	151	83.1	48.8	75.3	29.7		
Ethene					6.7	69	180	130	190	17	<1.3	16	17		
Acetylene								<1.2	<1.2	<1.2	<1.2	<1.2	<1.2		
1,1,1-Trichloroethane	<0.22	<0.35	<0.14	<0.35	<0.20	<0.16	<0.22	<2.2	<2.6	<1.3	<0.35	<0.44	<0.22		
1,1-Dichloroethane	206	190	<0.25	6.3	72.2	3.7	329	684	345	94.2	38.6	38.6	107		
1,2-Dichloroethane	5	5.8	<0.16	<0.23	2.9	<0.13	1.4	<2.3	<2.3	<1.15	<0.23	<0.34	<0.17		
1,1-Dichloroethene	50.3	40.8	<0.25	<0.63	8.4	<0.14	2.3	<3	<2.7	<1.35	<0.63	2.59	6.99		
Chloroethane	<0.49	13.5	<0.67	<0.49	<0.30	<0.18	6.1	<6.1	<2.4	<1.2	<0.49	<0.88	0.91		
Ethane					<6	13	22	11	18	0.8	<1.3	2.9	4.8		
Acetone	<3.12	<11.3	<2.3	<11.3	<1.48	<1.44	<3.12	<31.2	<1.9	<5.65	<11.3	2.82	<1.41		
Methylene Chloride	<0.54	<0.63	<0.37	<0.63	<0.41	<0.15	<0.54	<5.4	<2.1	<1.05	<0.63	<0.30	<0.15		
2-Butanone	<5.0	<16.5	<17.2	<16.5	<2.5	<6.25	<5.0	<50	<38	<19	<16.5	<3.28	<1.64		
Toluene	<0.14	<0.38	<0.14	<0.38	0.97	<0.14	5.6	11.4	<2.0	<1.0	<0.38	<0.40	<0.20		
Benzene	<0.16	<0.4	<0.17	<0.4	5.3	<0.13	5.4	<1.6	<2.1	<1.05	<0.4	2.04	1.39		
p-Ethyltoluene	<0.24	<0.62	<0.24	<0.62	<0.16	<0.22	<0.24	<2.4	<1.6	<0.8	<0.62	<0.30	<0.15		
1,3,5-Trimethylbenzene	<0.20	<0.57	<0.12	<0.57	<0.34	<0.11	<0.20	<2.0	<2.0	<1	<0.57	<0.34	<0.17		
2-Chlorotoluene	<0.27	<0.38	<0.21	<0.38	393	26.9	2690	3660	1940	554	68	145	419		
4-Chlorotoluene					14.5	<0.17	82.8	139	147	<1.1	<0.55	5.95	6.40		
1,2,4-Trimethylbenzene	<0.17	<0.60	<0.13	<0.60	<0.22	<0.22	<0.17	<1.7	<1.7	<0.85	<0.60	<0.30	<0.15		
Naphthalene	<0.14	<0.94	<0.27	<0.94	<0.19	<0.41	<0.14	<1.4	<2.9	<1.45	<0.94	<0.80	<0.40		
o-Xylene	<0.20	<0.33	<0.16	<0.33	<0.16	<0.16	2.3	<2.0	<2.5	<1.25	<0.33	<0.24	<0.12		
m-Propylbenzene	<0.21	<0.62	<0.14	<0.62	<0.21	<0.31	<0.21	<2.1	<1.6	<0.8	<0.62	105	355		
Methyl t-Butyl Ether	<0.34	<0.58	<0.18	<0.58	<0.28	<0.080	<0.34	<3.4	<1.8	<0.9	<0.58	<0.11	<0.053		
Sum VOAs (w/o Gases)	504	498.8	0	34.3	2151	55	3875	5361	3118	1302	515.1	854	1189		
Methane					420	1800	2170	1670	3470	310	33	620	750		
Iron, Total					7.29	55.6	61.0	934	46.7	37.1	13.2	42.1	27.9		
Sulfate					417	824	418	1160	100	407	236	244	440		
Nitrate-Nitrogen					<0.025	0.070	0.005 J	0.099	<0.025	0.031	0.026	0.10	0.085		
Total Organic Carbon					33.3	36.6	<0.94	72.6	<0.51	29.4	43.6	59.2	59.8		

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	MW-13								
Date	3/28/2001	7/12/2001	1/10/2002	4/3/2002	6/26/2002	10/3/2002	1/14/2003	4/29/2003	8/5/2003
Days	0	106	288	371	455	554	0	762	860
Tetrachloroethene	82.8	120	216	227	16.2	80.5	69	13	19.9
Trichloroethene	85.9	114	216	132	13.9	77.2	69.8	12.1	21.0
cis-1,2-Dichloroethene	784	897	1950	988	69.6	501	697	135	326
trans-1,2-Dichloroethene	3.6	4.7	11.9	8.0	<0.31	3.0	<0.46	<0.44	<0.22
Vinyl Chloride	38.6	58.6	112	74	4.6	26.2	16.3	2.60	7.18
Ethene	<6	<6	1.6	<1.3	1.1	<1.3	<1.3	4.5	5.8
Acetylene			<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
1,1,1-Trichloroethane	40	36.7	32.2	19.7	1.2	4.3	3.9	<0.44	1.09
1,1-Dichloroethane	323	351	476	305	17	96.8	95.1	8.85	31.1
1,2-Dichloroethane	2.6	2.3	2.8	<0.23	<0.23	<0.23	<0.23	<0.34	<0.17
1,1-Dichloroethene	60.6	60.4	75.5	43.6	2.8	13.3	10.5	<0.46	3.81
Chloroethane	<0.30	<0.18	<0.61	<0.61	<0.24	<0.24	<0.49	<0.88	<0.44
Ethane	5.8	6.7	23	8.7	2.7	1.8	<1.3	<1.3	<1.3
Acetone	<1.48	<1.44	18.7	<3.12	<1.13	<1.13	<1.13	22.4	<1.41
Methylene Chloride	<0.41	<0.15	<0.54	<0.54	<0.21	<0.21	<0.63	1.88	<0.15
2-Butanone	<2.5	<6.25	<5.0	<5.0	<3.8	<3.8	<16.5	<3.28	<1.64
Toluene	<0.15	<0.14	<0.14	<0.14	<0.20	<0.20	<0.38	<0.40	<0.20
Benzene	7.1	7.1	8.0	4.7	<0.21	2.0	2.1	<0.42	<0.21
p-Ethyltoluene	<0.16	<0.22	<0.24	<0.24	<0.16	<0.16	<0.62	<0.30	<0.15
1,3,5-Trimethylbenzene	<0.34	<0.11	<0.20	<0.20	<0.20	<0.20	<0.57	<0.34	<0.17
2-Chlorotoluene	16.3	43.2	76.4	27.8	2.5	10.2	4.6	3.52	4.90
1,2,4-Trimethylbenzene	<0.22	<0.22	<0.17	<0.17	<0.17	<0.17	<0.60	<0.30	<0.15
Naphthalene	<0.19	<0.41	<0.14	<0.14	<0.29	<0.29	<0.94	<0.80	<0.40
o-Xylene	<0.16	<0.16	<0.20	<0.20	<0.25	<0.25	<0.33	<0.24	<0.12
n-Propylbenzene	<0.21	<0.31	<0.21	<0.21	<0.25	<0.16	<0.62	2.70	4.30
Methyl t-Butyl Ether	<0.28	<0.080	<0.34	<0.34	<0.18	<0.18	<0.58	<0.11	<0.053
Sum VOAs (w/o Gases)	1445	1695	3196	1830	128	815	968.3	202.1	419.3
Methane	12	21	250	110	140	920	1040	1030	820
Iron, Total	0.54	0.48	0.93	0.76	0.27	5.04	2.31	61.1	2.74
Sulfate	597	579	648	366	22.7	377	365	442	419
Nitrate-Nitrogen	3.95	4.68	3.54	4.84	2.15	3.42	3.73	0.57	2.16
Total Organic Carbon	9.52	13.3	<0.94	15.4	<0.51	6.0	29.8	38.9	24.1

Table 2. Photocircuits Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

Contaminant	Well	MW-14	8/31/2000	10/19/2000	12/20/2000	3/28/2001	7/11/2001	1/8/2002	1/14/2003	4/28/2003	8/5/2003
Tetrachloroethene	µM			<0.0084	<0.0024	<0.033	<0.024	<0.014	<0.19	<0.023	<0.023
Trichloroethene	µM	<0.0065	<0.010	<0.0065	<0.0065	<0.076	<0.026	<0.026	<0.18	<0.16	<0.016
cis-1,2-Dichloroethene	µM	<0.0098	<0.018	<0.0098	<0.0098	<0.15	<0.029	<0.037	<0.22	<0.17	0.088
trans-1,2-Dichloroethene	µM	<0.014	<0.014	<0.014	<0.014	<0.11	<0.021	<0.060	<0.24	<0.23	<0.023
Vinyl Chloride	µM	<0.028	0.17	<0.028	<0.028	1.8	2.3	2.8	<0.41	5.5	2.2
Ethene	µM	1.5	1.7	2.1	2.1	2.3	4.6	3.2		2.4	1.2
Acetylene	µM							0.22		<0.046	<0.046
1,1,1-Trichloroethane	µM	0.11	<0.013	0.067	0.067	7.5	15.3	11.4	7.6	12.2	3.8
1,1-Dichloroethane	µM	1.3	2.2	3.0	3.0	93.2	189.9	142.4	86.7	89.5	96.8
1,2-Dichloroethane	µM	<0.0081	<0.0096	<0.0081	<0.0081	<0.10	0.35	<0.032	<0.12	<0.17	<0.017
1,1-Dichloroethene	µM	<0.011	0.065	<0.011	<0.011	4.6	7.8	5.6	3.3	3.1	0.94
Chloroethane	µM	0.24	<0.019	<0.026	<0.026	2.0	4.6	7.8	13.1	20.0	33.5
Ethane	µM	1.7	2.3	1.6	1.6	1.1	2.2	1.6		0.60	0.33

Contaminant	Well	MW-7	8/31/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002
Tetrachloroethene	µM		<0.0024	<0.0034	<0.0024	<0.013	<0.0012	<0.00072
Trichloroethene	µM	<0.0065	0.15	0.15	<0.0065	<0.030	0.12	0.021
cis-1,2-Dichloroethene	µM	0.49	2.9	2.9	3.7	1.5	1.9	0.086
trans-1,2-Dichloroethene	µM	<0.014	<0.0058	<0.0058	<0.014	<0.045	0.027	0.022
Vinyl Chloride	µM	0.63	1.1	1.1	2.2	1.0	1.0	0.17
Ethene	µM	2.3	6.1	3.9	3.9	1.2	3.4	3.9
Acetylene	µM							<0.046
1,1,1-Trichloroethane	µM	<0.0041	<0.046	<0.046	<0.0041	<0.030	<0.0012	<0.0010
1,1-Dichloroethane	µM	1.2	2.2	2.7	2.7	1.4	2.1	1.9
1,2-Dichloroethane	µM	<0.0081	<0.0038	<0.0081	<0.0081	<0.040	<0.0013	0.037
1,1-Dichloroethene	µM	<0.011	<0.0099	<0.011	<0.011	<0.037	0.020	<0.0023
Chloroethane	µM	4.0	2.8	3.1	3.1	2.5	4.2	6.0
Ethane	µM	<0.20	4.3	2.7	2.7	1.1	2.4	2.3

Table 2. Photocircuits Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

Contaminant	Well	SMP-1	8/31/2000	10/18/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003
Tetrachloroethene	µM	<0.096	<0.0024	<0.13	<0.033	<0.012	<0.036	<0.091	<0.042	<0.0013	<0.015	<0.0046	<0.023	
Trichloroethene	µM	<0.026	0.60	6.5	11.6	0.19	33.6	202.4	0.31	<0.0055	<0.014	<0.0032	<0.016	
cis-1,2-Dichloroethene	µM	257	387	311	<0.0028	127	186	439	265	7.0	<0.017	<0.0033	<0.017	
trans-1,2-Dichloroethene	µM	<0.56	0.72	<0.41	1.4	0.36	0.71	3.9	<0.16	<0.0064	<0.019	<0.0045	<0.023	
Vinyl Chloride	µM	75	96	81	76	68	56	28	143	41	<0.033	<0.0090	<0.045	
Ethene	µM	33	86	41	32	68	23	29	65	133	42	29	6.8	
Acetylene	µM													
1,1,1-Trichloroethane	µM	<0.16	<0.0041	<0.25	2.7	1.2	<0.052	0.28	<0.046	<0.085	<0.085	<0.21	<0.085	
1,1-Dichloroethane	µM	5.1	4.9	6.3	7.2	5.4	4.6	3.7	3.0	2.0	0.30	0.27	<0.022	
1,2-Dichloroethane	µM	<0.32	<0.0081	<0.17	<0.033	<0.033	<0.081	<0.12	<0.12	<0.0093	<0.0093	<0.0034	<0.017	
1,1-Dichloroethene	µM	<0.43	0.66	<0.27	1.9	0.57	1.5	3.1	0.52	<0.025	<0.025	<0.0046	<0.024	
Chloroethane	µM	<1.1	1.1	<0.82	<0.23	<0.23	<0.52	<0.47	<0.19	0.58	0.60	3.7	4.0	
Ethane	µM	<0.20	<0.20	<0.83	<0.83	<0.83	<0.43	<0.43	0.12	0.15	0.060	<0.20	<0.080	

Contaminant	Well	DMP-1	8/31/2000	10/18/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003
Tetrachloroethene	µM	<0.0024	<0.00048	<0.0024	<0.033	<0.0060	<0.0036	<0.0037	0.0066	0.0066	<0.00066	<0.019	<0.0046	<0.011
Trichloroethene	µM	<0.0065	<0.0018	<0.0065	<0.076	0.034	<0.0065	0.22	0.080	0.080	0.012	<0.018	0.042	<0.0080
cis-1,2-Dichloroethene	µM	0.52	0.018	0.179566563	0.76	0.40	<0.0093	0.46	0.64	0.64	1.3	17	11.4	0.44
trans-1,2-Dichloroethene	µM	<0.014	<0.0028	<0.014	<0.11	<0.0072	<0.014	0.040	0.029	0.029	0.043	<0.024	0.059	<0.011
Vinyl Chloride	µM	3.0	0.056	0.640	2.0	0.68	<0.068	0.99	0.41	0.41	2.9	28	16.3	1.2
Ethene	µM	20	39	33	25	3.9	3.3	5.7	7.5	7.5	15.4	39	32.1	11.4
Acetylene	µM													
1,1,1-Trichloroethane	µM	<0.0041	<0.00082	<0.0041	1.4	0.21	<0.0052	<0.0033	<0.046	<0.046	<0.046	<0.046	<0.085	<0.085
1,1-Dichloroethane	µM	0.93	0.18	3.61	11	13	4.3	2.4	4.2	4.2	4.2	4.9	4.1	1.6
1,2-Dichloroethane	µM	<0.0081	<0.0016	<0.0081	<0.10	0.15	<0.0081	<0.0046	0.029	0.029	0.023	<0.012	<0.0034	<0.0086
1,1-Dichloroethene	µM	<0.011	<0.0022	<0.011	<0.093	<0.0071	<0.011	<0.0062	<0.0028	<0.0028	<0.0027	<0.033	0.47	<0.012
Chloroethane	µM	51	0.67	3.60	2.5	3.0	1.5	1.1	0.57	0.57	0.24	<0.038	0.54	17.1
Ethane	µM	<0.20	<0.20	<1.7	<3.3	<1.7	0.027	<0.043	0.060	0.060	0.057	0.53	0.80	0.20

Table 2. Photocircuits Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

Contaminant	Well	SMP-3	9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003
Tetrachloroethene	µM	<0.48	<0.48	<0.48	<0.048	0.083	0.074	<0.036	<0.14	<0.033	0.058	<0.038	<0.023	<0.023
Trichloroethene	µM	<1.3	<1.3	<1.3	<0.13	<0.015	<0.013	<0.065	<0.26	<0.14	0.073	<0.035	<0.016	<0.016
cis-1,2-Dichloroethene	µM	<2.0	<2.0	<2.0	<0.20	0.024	0.17	<0.093	<0.37	<0.12	0.077	<0.043	<0.017	<0.017
trans-1,2-Dichloroethene	µM	<2.8	<2.8	<2.8	<0.28	<0.0023	<0.014	<0.14	<0.58	<0.16	0.018	<0.047	<0.023	<0.023
Vinyl Chloride	µM	<5.6	<5.6	<5.6	<0.56	0.62	1.6	<0.68	<2.72	1.9	1.7	<0.082	1.2	0.37
Ethene	µM	3.0	3.5	3.5	1.4	0.64	3.9	6.4	7.9	9.3	4.6	3.4	3.4	5.0
Acetylene	µM							0.081	0.21	0.085	0.24	<0.046	<0.046	<0.046
1,1,1-Trichloroethane	µM	1334	1762	244	244	253	98	109	57	60	42	43	34	2.8
1,1-Dichloroethane	µM	386	483	48	48	<0.0051	178	89	207	109	77	72	59	147
1,2-Dichloroethane	µM	<1.6	<1.6	<1.6	<0.16	0.061	0.21	<0.081	<0.32	<0.12	0.017	<0.023	<0.017	<0.017
1,1-Dichloroethene	µM	<2.2	<2.2	<2.2	<0.22	<0.0028	1.7	1.5	<0.45	1.2	3.5	3.2	2.5	0.40
Chloroethane	µM	<5.1	<5.1	<5.1	<0.51	1.2	6.4	5.4	<2.1	5.5	7.9	8.0	18.9	144
Ethane	µM	1.3	1.5	1.4	1.4	0.77	0.97	0.57	1.20	1.1	0.37	0.37	0.25	0.28

Contaminant	Well	DMP-3	9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003
Tetrachloroethene	µM	<0.097	0.36	<0.024	<0.066	0.44	0.21	<0.072	<0.061	<0.013	<0.00066	<0.19	0.13	<0.11
Trichloroethene	µM	<0.26	<0.10	<0.065	<0.015	0.065	<0.065	<0.065	<0.061	<0.055	<0.0029	<0.18	<0.032	<0.080
cis-1,2-Dichloroethene	µM	<0.39	<0.18	<0.098	<0.031	0.15	<0.093	<0.093	<0.11	<0.050	0.017	<0.22	0.44	<0.083
trans-1,2-Dichloroethene	µM	<0.56	<0.14	<0.14	<0.023	<0.014	<0.14	<0.10	<0.10	<0.064	0.013	<0.24	<0.045	<0.11
Vinyl Chloride	µM	17	15	13	2.3	12.6	10.5	6.4	6.4	1.8	1.0	<0.41	2.3	5.5
Ethene	µM	15.4	16.1	11.1	10.4	17.5	12.9	7.9	7.9	22	19.6	35	12.1	17.5
Acetylene	µM						<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046
1,1,1-Trichloroethane	µM	148	107	175	5.9	180	146	87	87	10	1.8	45	11.3	27.1
1,1-Dichloroethane	µM	53	49	42	7.7	32.8	22.8	38.1	38.1	24	40.2	109	84.0	103.0
1,2-Dichloroethane	µM	<0.32	<0.096	<0.081	<0.020	0.26	<0.081	<0.112	<0.112	0.37	0.30	<0.12	<0.034	<0.086
1,1-Dichloroethene	µM	1.6	<0.25	<0.11	<0.018	1.7	<0.11	<0.15	<0.15	0.18	0.058	<0.32	0.37	0.67
Chloroethane	µM	83	108	58	11	103	35	29	29	157	134	140	25	127
Ethane	µM	0.19	0.31	1.5	0.40	0.27	0.29	0.53	0.53	1.0	0.87	1.2	0.57	0.37

Table 2. Photocircuits Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

Contaminant	Well	SMP-4	9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003
Tetrachloroethene	µM		0.080	<0.0034	<0.0048	<0.033	0.056	0.193	0.42	0.23	<0.19	0.62	0.40
Trichloroethene	µM		<0.0065	<0.041	<0.013	<0.076	<0.076	<0.076	0.049	<0.0027	<0.18	0.075	<0.016
cis-1,2-Dichloroethene	µM		1.5	<0.070	<0.0020	<0.15	0.11	<0.026	0.31	0.28	<0.22	0.32	0.35
trans-1,2-Dichloroethene	µM		<0.014	<0.058	<0.0028	<0.11	<0.014	<0.058	<0.0064	<0.0032	<0.24	<0.011	<0.023
Vinyl Chloride	µM		2.8	0.55	0.60	1.2	1.8	2.0	0.078	0.034	<0.41	0.16	<0.045
Ethene	µM		7.9	6.8	7.9	6.1	5.7	12.1	3.1	1.0	1.0	2.9	0.61
Acetylene	µM							<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	<0.13	0.064	<0.016
1,1-Dichloroethane	µM		41	18	12	23	33	29	1.4	1.5	1.9	0.81	0.55
1,2-Dichloroethane	µM		0.26	<0.038	<0.016	<0.10	0.20	<0.032	<0.0046	0.030	<0.12	<0.0086	<0.017
1,1-Dichloroethene	µM		1.1	<0.099	<0.022	<0.093	0.50	1.3	<0.0056	<0.0028	<0.32	<0.012	<0.023
Chloroethane	µM		19	13	47	25	15	12	2.3	7.1	16	15.7	20.0
Ethane	µM		<0.20	<0.20	1.3	<0.33	<0.33	0.080	0.40	0.090	0.10	0.13	<0.043

Contaminant	Well	DMP-4	9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003
Tetrachloroethene	µM		<0.0024	<0.0048	<0.00048	<0.00066	<0.012	<0.0072	<0.0029	<0.0033	<0.00066	<0.19	<0.11	<0.023
Trichloroethene	µM		<0.0065	<0.013	<0.013	<0.0015	<0.013	<0.013	<0.0024	<0.014	<0.0027	<0.18	<0.080	<0.016
cis-1,2-Dichloroethene	µM		<0.0098	<0.020	<0.0020	<0.0031	<0.014	<0.019	<0.0043	<0.012	<0.0025	<0.22	<0.083	<0.017
trans-1,2-Dichloroethene	µM		<0.014	<0.028	<0.0028	0.035	<0.014	<0.029	<0.0041	<0.016	0.020	<0.24	<0.14	<0.023
Vinyl Chloride	µM		<0.028	<0.056	<0.0056	0.046	<0.011	<0.14	<0.0032	<0.018	0.086	<0.41	<0.18	<0.045
Ethene	µM		8.9	9.3	7.9	5.7	<0.21	8.2	5.4	7.1	5.0	3.2	6.1	2.9
Acetylene	µM							<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046
1,1,1-Trichloroethane	µM		0.42	0.97	<0.00082	0.11	0.14	<0.010	<0.0033	<0.0097	<0.0019	<0.13	<0.082	<0.016
1,1-Dichloroethane	µM		0.30	0.20	<0.0014	0.51	0.30	0.16	0.39	0.79	0.79	<0.22	0.93	<0.022
1,2-Dichloroethane	µM		<0.0081	<0.016	<0.0016	0.088	<0.013	<0.016	<0.0046	0.066	0.10	<0.12	<0.086	<0.017
1,1-Dichloroethene	µM		<0.011	<0.022	<0.0022	<0.0019	<0.014	<0.022	<0.062	<0.014	<0.0028	<0.33	<0.12	<0.024
Chloroethane	µM		38	40	51	57	42	19	20	21	50	54	85	55
Ethane	µM		<0.20	<0.20	1.2	<0.20	<0.20	0.080	<0.043	0.16	0.04	0.077	0.15	0.10

Table 2. Photocircuits Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

Contaminant		Well	MW-8									
Date			3/28/2001	7/12/2001	1/8/2002	4/3/2002	6/25/2002	10/3/2002	1/15/2003	4/28/2003	8/5/2003	
Tetrachloroethene		µM	<0.00066	<0.0012	<0.00072	<0.0014	<0.0013	<0.0066	<0.0037	<0.0046	<0.0023	
Trichloroethene		µM	0.014	0.013	0.0074	<0.0012	<0.0055	<0.0027	<0.0035	0.015	0.032	
cis-1,2-Dichloroethene		µM	<0.0031	0.012	<0.0019	<0.0022	<0.0050	<0.0025	<0.0043	0.041	0.16	
trans-1,2-Dichloroethene		µM	<0.0022	<0.0014	<0.0029	<0.0021	<0.0064	<0.0032	<0.047	<0.0045	<0.0023	
Vinyl Chloride		µM	<0.0040	<0.0011	<0.014	<0.0016	<0.0074	<0.0037	<0.0082	<0.0090	<0.0045	
Ethene		µM	<0.21	<0.21	<0.046	<0.046	0.043	<0.0046	0.16	<0.046	0.25	
Acetylene		µM			<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	<0.0026	<0.0033	<0.0016	
1,1-Dichloroethane		µM	<0.0014	<0.0012	<0.0025	<0.0022	<0.0062	<0.0030	<0.043	<0.0044	<0.0022	
1,2-Dichloroethane		µM	<0.0020	<0.0013	<0.0016	<0.0023	<0.0046	<0.0023	<0.0023	<0.0034	<0.0017	
1,1-Dichloroethene		µM	<0.0019	<0.0014	<0.0023	<0.0030	<0.0056	<0.0028	<0.0065	<0.0047	<0.0024	
Chloroethane		µM	<0.0047	<0.0028	<0.010	<0.0095	<0.0074	0.057	<0.0076	<0.014	<0.0068	
Ethane		µM	<0.20	<0.20	<0.043	<0.043	<0.043	<0.043	<0.043	<0.043	<0.043	

Contaminant		Well	MW-9					MW-10					MW-11				
Date			3/28/2001	7/12/2001	1/8/2002	1/14/2003	1/22/2002	1/14/2003	1/22/2002	1/14/2003	1/22/2002	1/14/2003	1/22/2002	1/14/2003	1/22/2002		
Tetrachloroethene		µM	<0.00066	<0.0012	<0.0014	<0.0037	0.014	<0.0037	<0.0072	<0.0037	<0.0072	<0.0037	<0.0072	<0.0037	<0.0072		
Trichloroethene		µM	<0.0015	<0.0013	<0.0012	<0.0035	0.051	<0.0035	<0.0013	0.036	<0.0013	0.036	<0.0013	0.075	0.19		
cis-1,2-Dichloroethene		µM	<0.0031	<0.014	<0.0022	<0.0043	2.4	<0.0043	<0.0019	2.5	<0.0019	2.5	<0.0019	0.19			
trans-1,2-Dichloroethene		µM	<0.0022	<0.0014	<0.0021	<0.047	<0.0021	<0.047	<0.0029	<0.0047	<0.0029	<0.0047	<0.0029	<0.0047	<0.0047		
Vinyl Chloride		µM	<0.0040	<0.0011	<0.0016	<0.0082	0.043	<0.0082	<0.14	<0.0082	<0.14	<0.0082	<0.14	<0.0082	<0.0082		
Ethene		µM	<0.21	<0.21													
Acetylene		µM															
1,1,1-Trichloroethane		µM	<0.0015	<0.0012	<0.0016	<0.0026	<0.0016	<0.0026	<0.0010	<0.0026	<0.0010	<0.0026	<0.0010	<0.0026	<0.0026		
1,1-Dichloroethane		µM	<0.0014	<0.0012	<0.0023	<0.043	2.1	<0.043	<0.0025	1.9	<0.0025	<0.0025	<0.0025	0.064			
1,2-Dichloroethane		µM	<0.0020	<0.0013	<0.0023	<0.0023	0.051	<0.0023	<0.0016	0.059	<0.0016	<0.0016	<0.0016	<0.0023	<0.0023		
1,1-Dichloroethene		µM	<0.0019	<0.0014	<0.0030	<0.0065	0.52	<0.0065	<0.0025	0.42	<0.0025	<0.0025	<0.0025	<0.0065	<0.0065		
Chloroethane		µM	<0.0047	<0.0028	<0.0095	<0.0076	<0.0047	<0.0076	<0.010	0.21	<0.010	<0.010	<0.010	<0.0076	<0.0076		
Ethane		µM	<0.20	<0.20													

Table 2. Photocircuits Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

Contaminant	Well	MW-12	7/12/2001	1/9/2002	4/3/2002	6/26/2002	10/3/2002	1/15/2003	4/28/2003	8/5/2003
Tetrachloroethene	µM	<0.00066	<0.0012	<0.0144	<0.014	<0.0066	<0.0033	<0.0037	<0.0046	<0.0023
Trichloroethene	µM	0.93	0.0071	0.13	0.24	0.52	0.63	0.37	0.79	0.29
cis-1,2-Dichloroethene	µM	13.2	0.19	4.4	5.2	4.8	5.0	3.2	3.8	2.3
trans-1,2-Dichloroethene	µM	0.075	<0.0014	0.058	<0.021	<0.032	<0.016	<0.047	0.040	0.018
Vinyl Chloride	µM	3.9	0.091	4.8	5.3	2.4	1.3	0.78	1.2	0.48
Ethene	µM	0.24	2.5	6.4	4.6	6.8	0.61	<0.046	0.57	0.61
Acetylene	µM			<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046
1,1,1-Trichloroethane	µM	<0.0015	<0.0012	<0.0016	<0.016	<0.019	<0.0097	<0.0026	<0.0033	<0.0016
1,1-Dichloroethane	µM	0.73	0.037	3.3	6.9	3.5	1.0	0.39	0.39	1.1
1,2-Dichloroethane	µM	0.029	<0.0013	0.014	<0.023	<0.023	<0.012	<0.0023	<0.0034	<0.0017
1,1-Dichloroethene	µM	0.087	<0.0014	0.024	<0.0031	<0.011	<0.014	<0.0065	0.027	0.072
Chloroethane	µM	<0.0047	<0.0047	0.095	<0.095	<0.037	<0.019	<0.0076	<0.0093	0.59
Ethane	µM	<0.20	0.43	0.73	0.37	0.60	0.027	<0.043	0.097	0.16

Contaminant	Well	MW-13	7/12/2001	1/10/2002	4/3/2002	6/26/2002	10/3/2002	1/14/2003	4/29/2003	8/5/2003
Tetrachloroethene	µM	0.50	0.72	1.3	1.4	0.10	0.49	0.42	0.078	0.12
Trichloroethene	µM	0.65	0.87	1.6	1.0	0.11	0.59	0.53	0.092	0.16
cis-1,2-Dichloroethene	µM	8.1	9.3	20.1	10.2	0.72	5.2	7.2	1.39	3.36
trans-1,2-Dichloroethene	µM	0.037	0.049	0.123	0.083	<0.0032	0.031	<0.0047	<0.0045	<0.0045
Vinyl Chloride	µM	0.62	0.94	1.8	1.2	0.074	0.42	0.26	0.042	0.11
Ethene	µM	<0.21	<0.21	0.057	<0.046	0.039	<0.046	<0.046	0.16	0.21
Acetylene	µM			<0.046	<0.046	<0.046	<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	0.029	<0.0033	0.0082
1,1-Dichloroethane	µM	3.3	3.5	4.8	3.1	0.17	0.98	1.0	0.089	0.314
1,2-Dichloroethane	µM	0.026	0.023	0.028	<0.002	<0.0023	<0.0023	<0.0023	<0.0034	<0.0017
1,1-Dichloroethene	µM	0.63	0.62	0.78	0.45	0.029	0.14	0.11	<0.0034	0.039
Chloroethane	µM	<0.0047	<0.0025	<0.0095	<0.0095	<0.0037	<0.0037	<0.0076	<0.014	<0.0068
Ethane	µM	0.19	0.22	0.77	0.29	0.090	0.060	<0.043	<0.043	<0.043

Table 3. Photocircuits Anaerobic Pilot Field Data

Well		MW-7		SMP-1									
Well Depth	ft	23.2		9.1									
Well Diameter	Inch	4		1									
Date		1/8/2002	4/2/2002	1/8/2002	4/2/2002	6/25/2002	10/2/2002	4/28/2002	6/25/2002	10/2/2002	4/28/2003	8/4/2003*	
Water Level	ft	7.12		6.42									
pH		7.4	7.1	7.5	7.3	7.5	7.5	7.3	7.5	7.3	7.1	7.4	
Temperature	°C	17.9	16.81	11.64	14.84	18.74	18.74	24.80	18.74	24.80	14.82	25.86	
Spec. Conductivity	umhos/cm	4235	4100	2660	5250	3468	3468	72	3468	72	4230	6	
Redox Potent/LAL	mV	-53	-40	31	-130	-84	-84	-76	-84	-76	-114	132	
Dissolved Oxygen	mg/L	0.36	0.45	2.27	1.72	5.37	5.37	4.22	5.37	4.22	3.61	7.91	
Bromide	mg/L				20	39	39						
*Well went dry during sampling													
Well		DMP-1		SMP-1									
Well Depth	ft	19.04											
Well Diameter	Inch	1											
Date		1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003					
Water Level	ft	6.88											
pH		7.3	7.3	7.4	7.6	7.6	7.8	6.87					
Temperature	°C	17.85	21.27	17.4	14.85	18.73	14.85	18.73					
Spec. Conductivity	umhos/cm	5560	3597	4838	4000	2970	4384	2970					
Redox Potent/LAL	mV	-142	-154	-153	-85	-41	-155	-41					
Dissolved Oxygen	mg/L	1.98	2.55	1.74	2.35	1.56	1.56	1.75					
Bromide	mg/L		311	977									
Well		SMP-3											
Well Depth	ft	14.6											
Well Diameter	Inch	1											
Date		1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003*					
Water Level	ft	6.8	8.7	8.8	8.8	7.0	7.4	7.55					
pH		9.9	11.47	19.18	22.80	13.35	15.41	21.26					
Temperature	°C	12.06	56.40	5890	4058	359	650	1760					
Spec. Conductivity	umhos/cm	5550	-52	-95	-120	-62	-161	-72					
Redox Potent/LAL	mV	-44	2.94	1.16	2.16	5.41	4.61	5.72					
Dissolved Oxygen	mg/L	3.87	5	55									
Bromide	mg/L												
*Well went dry during sampling													
Well		DMP-3											
Well Depth	ft	24.35											
Well Diameter	Inch	1											
Date		1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003					
Water Level	ft	6.91											
pH		6.9	7.1	6.3	6.6	7.0	7.5	6.66					
Temperature	°C	17.95	16.14	16.94	19.65	17.76	15.57	17.16					
Spec. Conductivity	umhos/cm	3200	3120	3929	5863	5460	4270	4685					
Redox Potent/LAL	mV	-120	-110	-146	-154	-159	-334	-119					
Dissolved Oxygen	mg/L	1.57	1.43	0.21	0.59	0.44	2.15	0.49					
Bromide	mg/L		16	179									
Well		SMP-4											
Well Depth	ft	15.82											
Well Diameter	Inch	1											
Date		1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003					
Water Level	ft	6.82											
pH		7.6	7.5	5.3	6.1	5.7	5.8	5.74					
Temperature	°C	16.54	14.82	18.77	22.40	11.68	15.55	21.61					
Spec. Conductivity	umhos/cm	5186	5130	4440	5530	3200	850	2320					
Redox Potent/LAL	mV	-165	-170	-25	-35	-10	-50	-35					
Dissolved Oxygen	mg/L	0.73	0.65	1.32	1.32	7.19	4.4	3.05					
Bromide	mg/L			336									

Table 4. Photocircuits Anaerobic Pilot Percent Change Between 9/1/00 and 1/8/02 or 1/13/03

Compound	MW-14	MW-7	SMP-1	DMP-1	SMP-3	DMP-3	SMP-4	DMP-4
First Sampled	8/31/2000	8/31/2000	8/31/2000	8/31/2000	9/1/2000	9/1/2000	9/1/2000	9/1/2000
Last Sampled	8/4/2003	1/8/2002	8/4/2003	8/4/2003	8/4/2003	8/4/2003	8/4/2003	8/4/2003
Acetone	-479	0	0	>99.9	0	0	>-6421	0
Methylene Chloride	-3648	38	>99.7	>99	99.7	98	99	55
Toluene	>33	85	<43	61	74	65	98	6
2-Chlorotoluene	0	-888	0	-23	0	0	97	>98
Sum VOAs (w/o gases)	-3459	-33	99	88	89	30	78	-34
Methane	-14127	-665	-41	-196	-11500	-2797	-2744	-10844
Iron	-237	-490	-39	98	74	93	-181	-137
Sulfate	98	-813	96	99.5	70	-319	94	56
TOC	94	96	-83	49	43	-34	-1037	-575
PCE	0	0	0	0	0	0	-397	0
TCE	0	>-218	0	0	0	0	0	0
cDCE	>-793	82	>99.99	15	0	0	76	0
tDCE	0	>-56	0	0	0	0	0	0
VC	>-7843	73	>99.9	60	<93	67	>98	0
Ethene	21	-75	80	43	-67	-14	92	68
ITCA	-3421	0	0	0	99.8	82	>99.9	>96
IDCA	-7503	-58	>99.6	-76	62	-95	99	>93
IDCE	>-8548	0	0	0	<81	58	>98	0
CA	-13746	-51	>-263	67	>-2715	-52	-6	-47
Ethane	81	>-1033	0	-2	79	-93	0	<52

Table 5. Photocircuits Downgradient Wells Percent Change Between 3/28/01 and 1/14/03

Compound	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13
First Sampled	3/28/2001	3/28/2001	1/22/2002	1/22/2002	3/28/2001	3/28/2001
Last Sampled	8/5/2003	1/14/2003	1/14/2003	1/14/2003	8/5/2003	8/5/2003
Acetone	0	0	0	0	0	0
Methylene Chloride	0	0	0	0	0	0
Toluene	0	0	0	0	>79	0
2-Chlorotoluene	0	0	0	0	-7	70
Sum VOAs (w/o gases)	-990	0	1	>-5617	45	71
Methane	>-400				-79	-6733
Iron	-57				-283	-407
Sulfate	-159				-6	30
TOC	6				-80	-153
PCE	0	0	>73	0	0	76
TCE	-134	0	30	>-5722	69	76
cDCE	>-5033	0	-6	>-9956	83	58
tDCE	0	0	0	0	77	>94
VC	0	0	>81	0	88	81
Ethene	>-18				-154	<3
ITCA	0	0	0	0	0	97
IDCA	0	0	8	>-2420	-48	90
IDCE	0	0	19	0	17	94
CA	0	0	>-2655	0	>-203	0
Ethane	0				>20	>78

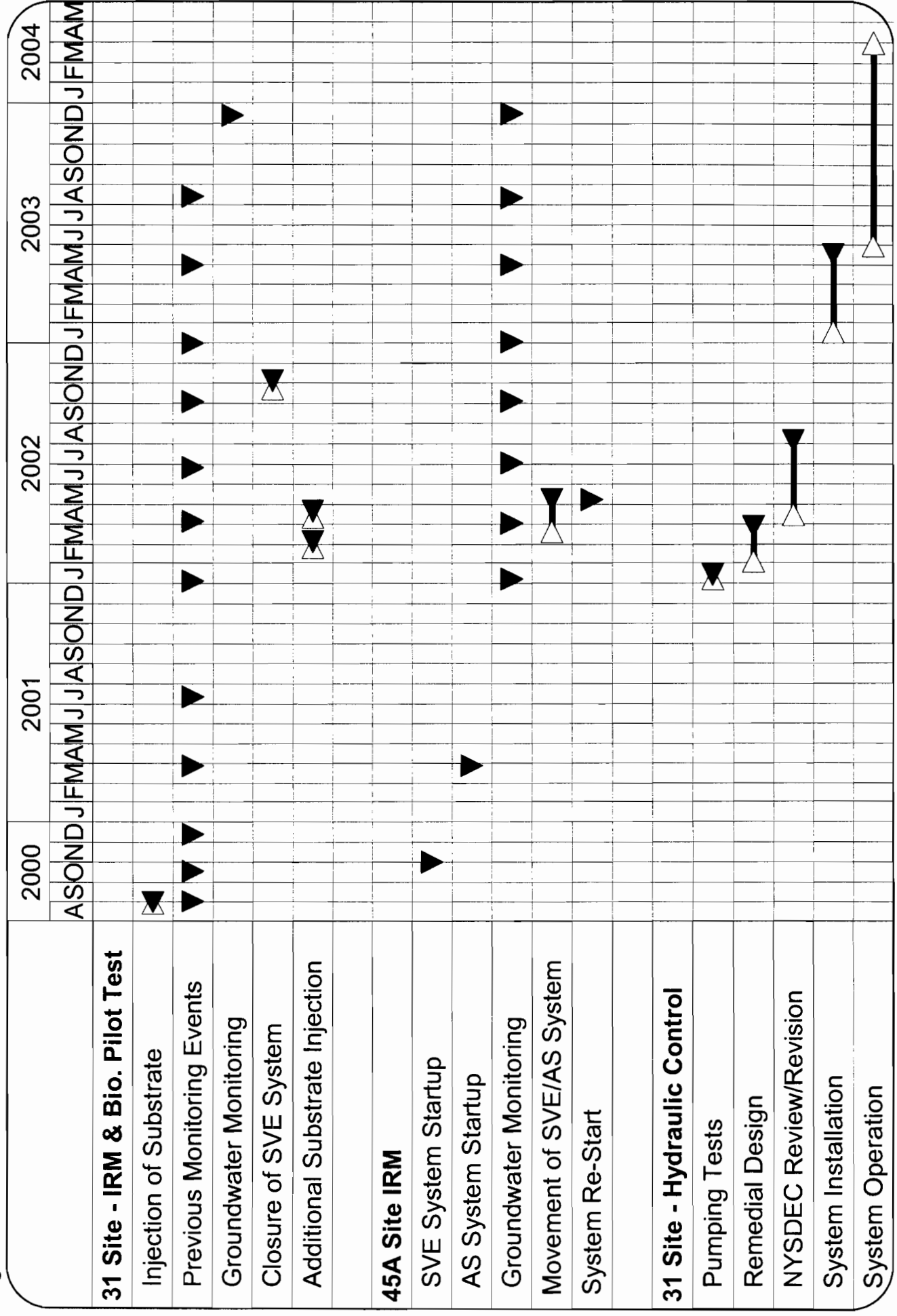
Table 6. Summary of Changes in Concentrations of Chloroethenes, Chloroethanes, Electron Acceptors, and Electron Donor by Well

Well	Chlorinated Ethene Dechlorination	Chlorinated Ethane Dechlorination	Electron Acceptors	Electron Donor Availability
MW-14	Ethene high, VC increased from March 2001 to April 2003, lower in August 2003. VC now primary chlorinated ethene with trace cDCE. Not sampled 4/02, 6/02, or 10/02 because of emulsion.	ITCA, IDCA, IDCE, and CA, increased between December 2000 and July 2001 as contaminated water displaced by emulsion moved back into well. Concentrations of IDCA and IDCE decreased since peak in July 2001, CA increasing. Ethane fairly stable.	Sulfate decreased by 98%, methane and iron up greatly.	TOC availability good. Emulsion found 4/02, 6/02, and 10/02 and TOC levels have been above 1,000 mg/L.
MW-7	Ethene generally predominant product, TCE up slightly. cDCE and VC down by 82 and 73% from start of pilot. IDCE up slightly. Not sampled since 1/02 because of emulsion.	IDCA and CA up. CA major product. Ethane produced.	Sulfate increased from 104 to 949 mg/L from 8/31/00 to 1/8/02. methane and iron up greatly.	TOC had fallen to 1.7 mg/L in 1/02. Emulsion found thereafter.
SMP-1	Over 99.99% of cDCE and 99.9% of VC degraded. Ethene is only compound remaining.	No ITCA detected since 7/01. IDCA down by >99.6% and IDCE not detected. CA produced. Little ethane.	Sulfate down 96% from start of pilot; sulfate levels decreasing with higher substrate. Methane and iron up from start of pilot.	TOC rebounded to 1,280 mg/L in 4/03; enhanced dechlorination. Found adequate level of 168 mg/L in August 2003.
DMP-1	TCE, cDCE, tDCE, and VC concentrations down from start of pilot and ethene predominant product.	IDCA up 76%, but no IDCE detected in August 2003. CA down by 67%, little ethane detected.	Sulfate down 99.5%, methane increased, but iron down.	TOC increased from 24 mg/L in 6/02 to 141 mg/L in August 2003. Adequate supply.
SMP-3	PCE, TCE, cDCE, and IDCE not detected August 2003. VC detected, but ethene predominant product.	ITCA down by 99.8%, IDCA down 62%, IDCE down by <81% and CA increasing as ITCA and IDCA degraded. Some ethane.	Sulfate decreased from 3,640 mg/L in April 2002 to 86 mg/L in August 2003, methane increased greatly and iron variable.	TOC in April 2002 up to 1,600 mg/L, but then fell below optimal levels. Adequate TOC levels in April 2003 (184 mg/L) and August 2003 (168 mg/L).
DMP-3	PCE, TCE, cDCE, and IDCE not detected August 2003. VC increasing. Ethene major product.	ITCA down by 82%, IDCA up by 95%, and IDCE down by 58%. CA increased by 93%. Ethane up.	Sulfate increased. Methane up, but iron decreasing.	TOC increased to 349 mg/L in 6/02 and has remained above 100 mg/L.
SMP-4	PCE up slightly, cDCE and VC down by 76 and >98%, ethene decreased, but still predominant chlorinated ethene.	ITCA, IDCA, and IDCE down by up to 99.9%, CA increasing. Little ethane.	Sulfate decreased to 59 mg/L in August 2003, methane and iron increased greatly.	High levels of TOC (3,680 mg/L found on 10/2/02) and have remained elevated above 800 mg/L.
DMP-4	No detectable PCE, TCE, cDCE, tDCE, or VC in August 2003. Ethene predominant.	ITCA down >96, IDCA down by >93%, IDCE non-detect August 2003. CA predominant product, but decreasing. Little ethane.	Sulfate down 56%, iron and methane increased.	TOC increased to above 200 mg/L in January 2003, 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, tDCE, VC and ethene not detected August 2003. Low levels of TCE and cDCE found.	No chlorinated ethanes or ethane detected in August 2003.	Little sulfate, iron, or methane. Oxygen and nitrate major electron acceptors.	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 lower than in January 2002 to June 2002.	IDCA decreasing from peak concentration in January 2002, 1 TCA not detected, low 1DCE and CA, ethane detected at low level.	Sulfate increased by 6%, iron and methane also increased.	TOC level was 59 mg/L; probably adequate levels.
MW-13	Decreases in PCE, TCE, cDCE, tDCE, and VC concentrations, trace ethene.	Decreases in 1TCA (97%), 1DCA (90%), 1DCE (94), and ethane (78%) concentrations. No CA.	Methane and iron increased, and sulfate down 30%.	TOC level of 24 mg/L in August 2003, below optimal.

31 & 45 Sea Cliff Avenue Sites



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/13/2003

Custody Document: R1001

Received: 08/07/2003 16:51

Sampled by: Derik Jordan/David Hanny

Client: Photocircuits Corporation

31 Sea Cliff Avenue
Glen Cove,
NY 11542

Project: Photocircuits Corp.

31 Sea Cliff Avenue
Glen Cove,
NY 11542

Manager: Andy Barber

Respectfully submitted,

Patricia Werner-Els
Quality Assurance Officer

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RI Cert. # 161

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Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-1

Client Sample ID: RW-1 (PC)

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Type: Grab

Collected: 08/05/2003 10:30

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C1061-2357	0.85	0.85	ppb	U
75-45-6	Chlorodifluoromethane	C1061-2357	0.75	0.75	ppb	U
74-87-3	Chloromethane	C1061-2357	0.70	0.70	ppb	U
75-01-4	Vinyl Chloride	C1061-2357	0.55	115	ppb	
74-83-9	Bromomethane	C1061-2357	0.75	0.75	ppb	U
75-00-3	Chloroethane	C1061-2357	1.40	1.40	ppb	U
75-69-4	Trichlorofluoromethane	C1061-2357	0.65	0.65	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	C1061-2357	0.95	0.95	ppb	U
75-35-4	1,1-Dichloroethene	C1061-2357	0.80	5.03	ppb	
67-64-1	Acetone	C1061-2357	7.90	7.90	ppb	U
75-15-0	Carbon disulfide	C1061-2357	0.65	0.65	ppb	U
75-09-2	Methylene Chloride	C1061-2357	0.80	112	ppb	
156-60-5	trans-1,2-Dichloroethene	C1061-2357	0.75	4.31	ppb	
1634-04-4	Methyl t-butyl ether	C1061-2357	0.37	0.37	ppb	U
75-34-3	1,1-Dichloroethane	C1061-2357	0.47	106	ppb	
590-20-7	2,2-Dichloropropane	C1061-2357	1.65	1.65	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1059-2433	8.00	3010	ppb	
78-93-3	2-Butanone	C1061-2357	2.30	2.30	ppb	U
74-97-5	Bromochloromethane	C1061-2357	0.70	0.70	ppb	U
67-66-3	Chloroform	C1061-2357	0.36	0.36	ppb	U
71-55-6	1,1,1-Trichloroethane	C1061-2357	0.80	0.80	ppb	U
56-23-5	Carbon Tetrachloride	C1061-2357	0.60	0.60	ppb	U
563-58-6	1,1-Dichloropropene	C1061-2357	0.80	0.80	ppb	U
71-43-2	Benzene	C1061-2357	0.55	7.49	ppb	
107-06-2	1,2-Dichloroethane	C1061-2357	0.60	0.60	ppb	U
79-01-6	Trichloroethene	C1061-2357	0.80	606	ppb	
78-87-5	1,2-Dichloropropane	C1061-2357	0.55	0.55	ppb	U
74-95-3	Dibromomethane	C1061-2357	0.85	0.85	ppb	U
75-27-4	Bromodichloromethane	C1061-2357	0.55	0.55	ppb	U
110-75-8	2-Chloroethylvinylether	C1061-2357	0.95	0.95	ppb	U
10061-01-5	cis-1,3-Dichloropropene	C1061-2357	0.45	0.45	ppb	U
108-10-1	4-Methyl-2-pentanone	C1061-2357	4.05	4.05	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-1

Client Sample ID: RW-1 (PC)

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Type: Grab

Collected: 08/05/2003 10:30

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	C1061-2357	0.46	14.2	ppb	
10061-02-6	trans-1,3-Dichloropropene	C1061-2357	0.65	0.65	ppb	U
79-00-5	1,1,2-Trichloroethane	C1061-2357	0.70	0.70	ppb	U
127-18-4	Tetrachloroethene	C1061-2357	1.95	28.7	ppb	
142-28-9	1,3-Dichloropropane	C1061-2357	0.50	0.50	ppb	U
591-78-6	2-Hexanone	C1061-2357	5.05	5.05	ppb	U
124-48-1	Dibromochloromethane	C1061-2357	0.55	0.55	ppb	U
106-93-4	1,2-Dibromoethane	C1061-2357	0.55	0.55	ppb	U
108-90-7	Chlorobenzene	C1061-2357	0.65	0.65	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	C1061-2357	0.55	0.55	ppb	U
100-41-4	Ethylbenzene	C1061-2357	0.55	0.55	ppb	U
108-38-3	m,p-xylene	C1061-2357	1.65	5.34	ppb	
95-47-6	o-xylene	C1061-2357	0.65	0.65	ppb	U
100-42-5	Styrene	C1061-2357	4.85	4.85	ppb	U
75-25-2	Bromoform	C1061-2357	0.70	0.70	ppb	U
98-82-8	Isopropylbenzene	C1061-2357	0.49	0.49	ppb	U
108-86-1	Bromobenzene	C1061-2357	0.36	0.36	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	C1061-2357	0.44	0.44	ppb	U
103-65-1	n-Propylbenzene	C1061-2357	0.60	455	ppb	
96-18-4	1,2,3-Trichloropropane	C1061-2357	1.40	1.40	ppb	U
622-96-8	p-Ethyltoluene	C1061-2357	0.60	0.60	ppb	U
108-67-8	1,3,5-Trimethylbenzene	C1061-2357	0.47	0.47	ppb	U
95-49-8	2-Chlorotoluene	C1061-2357	0.75	540	ppb	
106-43-4	4-Chlorotoluene	C1061-2357	0.70	26.4	ppb	
98-06-6	tert-Butylbenzene	C1061-2357	0.75	0.75	ppb	U
95-63-6	1,2,4-Trimethylbenzene	C1061-2357	0.55	0.55	ppb	U
135-98-8	sec-Butylbenzene	C1061-2357	0.55	0.55	ppb	U
99-87-6	p-Isopropyltoluene	C1061-2357	0.60	0.60	ppb	U
541-73-1	1,3-Dichlorobenzene	C1061-2357	0.41	0.41	ppb	U
106-46-7	1,4-Dichlorobenzene	C1061-2357	0.34	0.34	ppb	U
95-50-1	1,2-Dichlorobenzene	C1061-2357	0.55	0.55	ppb	U
105-05-5	p-Diethylbenzene	C1061-2357	0.55	0.55	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-1

Client Sample ID: RW-1 (PC)

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Type: Grab

Collected: 08/05/2003 10:30

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	C1061-2357	0.44	0.44	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	C1061-2357	0.60	0.60	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	C1061-2357	0.75	0.75	ppb	U
120-82-1	1,2,4-Trichlorobenzene	C1061-2357	0.65	0.65	ppb	U
87-68-3	Hexachlorobutadiene	C1061-2357	1.85	1.85	ppb	U
91-20-3	Naphthalene	C1061-2357	2.30	4.81	ppb	

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1059-2433	95.6 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1059-2433	96.8 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1059-2433	97.5 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	C1061-2357	101.0 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	C1061-2357	93.4 %	(74 - 111)	
2037-26-5	TOLUENE-D8	C1061-2357	103.0 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-2

Client Sample ID: RW-2 (PC)

Collected: 08/05/2003 10:40

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C1061-2358	0.17	0.17	ppb	U
75-45-6	Chlorodifluoromethane	C1061-2358	0.15	0.15	ppb	U
74-87-3	Chloromethane	C1061-2358	0.14	0.14	ppb	U
75-01-4	Vinyl Chloride	C1061-2358	0.11	4.20	ppb	
74-83-9	Bromomethane	C1061-2358	0.15	0.15	ppb	U
75-00-3	Chloroethane	C1061-2358	0.28	0.28	ppb	U
75-69-4	Trichlorofluoromethane	C1061-2358	0.13	0.13	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	C1061-2358	0.19	0.19	ppb	U
75-35-4	1,1-Dichloroethene	C1061-2358	0.16	0.16	ppb	U
67-64-1	Acetone	C1061-2358	1.58	1.58	ppb	U
75-15-0	Carbon disulfide	C1061-2358	0.13	0.13	ppb	U
75-09-2	Methylene Chloride	C1061-2358	0.16	0.16	ppb	U
156-60-5	trans-1,2-Dichloroethene	C1061-2358	0.15	0.15	ppb	U
1634-04-4	Methyl t-butyl ether	C1061-2358	0.074	0.074	ppb	U
75-34-3	1,1-Dichloroethane	C1061-2358	0.095	16.0	ppb	
590-20-7	2,2-Dichloropropane	C1061-2358	0.33	0.33	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1059-2434	0.80	159	ppb	
78-93-3	2-Butanone	C1061-2358	0.46	0.46	ppb	U
74-97-5	Bromochloromethane	C1061-2358	0.14	0.14	ppb	U
67-66-3	Chloroform	C1061-2358	0.072	0.072	ppb	U
71-55-6	1,1,1-Trichloroethane	C1061-2358	0.16	0.16	ppb	U
56-23-5	Carbon Tetrachloride	C1061-2358	0.12	0.12	ppb	U
563-58-6	1,1-Dichloropropene	C1061-2358	0.16	0.16	ppb	U
71-43-2	Benzene	C1061-2358	0.11	0.11	ppb	U
107-06-2	1,2-Dichloroethane	C1061-2358	0.12	0.12	ppb	U
79-01-6	Trichloroethene	C1061-2358	0.16	37.2	ppb	
78-87-5	1,2-Dichloropropane	C1061-2358	0.11	0.11	ppb	U
74-95-3	Dibromomethane	C1061-2358	0.17	0.17	ppb	U
75-27-4	Bromodichloromethane	C1061-2358	0.11	0.11	ppb	U
110-75-8	2-Chloroethylvinylether	C1061-2358	0.19	0.19	ppb	U
10061-01-5	cis-1,3-Dichloropropene	C1061-2358	0.090	0.090	ppb	U
108-10-1	4-Methyl-2-pentanone	C1061-2358	0.81	0.81	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-2

Client Sample ID: RW-2 (PC)

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Type: Grab

Collected: 08/05/2003 10:40

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	C1061-2358	0.092	0.092	ppb	U
10061-02-6	trans-1,3-Dichloropropene	C1061-2358	0.13	0.13	ppb	U
79-00-5	1,1,2-Trichloroethane	C1061-2358	0.14	0.14	ppb	U
127-18-4	Tetrachloroethene	C1061-2358	0.39	2.89	ppb	
142-28-9	1,3-Dichloropropane	C1061-2358	0.099	0.099	ppb	U
591-78-6	2-Hexanone	C1061-2358	1.01	1.01	ppb	U
124-48-1	Dibromochloromethane	C1061-2358	0.11	0.11	ppb	U
106-93-4	1,2-Dibromoethane	C1061-2358	0.11	0.11	ppb	U
108-90-7	Chlorobenzene	C1061-2358	0.13	0.13	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	C1061-2358	0.11	0.11	ppb	U
100-41-4	Ethylbenzene	C1061-2358	0.11	0.11	ppb	U
108-38-3	m,p-xylene	C1061-2358	0.33	0.33	ppb	U
95-47-6	o-xylene	C1061-2358	0.13	0.13	ppb	U
100-42-5	Styrene	C1061-2358	0.97	0.97	ppb	U
75-25-2	Bromoform	C1061-2358	0.14	0.14	ppb	U
98-82-8	Isopropylbenzene	C1061-2358	0.097	0.097	ppb	U
108-86-1	Bromobenzene	C1061-2358	0.072	0.072	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	C1061-2358	0.088	0.088	ppb	U
103-65-1	n-Propylbenzene	C1061-2358	0.12	92.3	ppb	
96-18-4	1,2,3-Trichloropropane	C1061-2358	0.28	0.28	ppb	U
622-96-8	p-Ethyltoluene	C1061-2358	0.12	0.12	ppb	U
108-67-8	1,3,5-Trimethylbenzene	C1061-2358	0.095	0.095	ppb	U
95-49-8	2-Chlorotoluene	C1061-2358	0.15	109	ppb	
106-43-4	4-Chlorotoluene	C1061-2358	0.14	8.46	ppb	
98-06-6	tert-Butylbenzene	C1061-2358	0.15	0.15	ppb	U
95-63-6	1,2,4-Trimethylbenzene	C1061-2358	0.11	0.11	ppb	U
135-98-8	sec-Butylbenzene	C1061-2358	0.11	0.11	ppb	U
99-87-6	p-Isopropyltoluene	C1061-2358	0.12	0.12	ppb	U
541-73-1	1,3-Dichlorobenzene	C1061-2358	0.083	0.083	ppb	U
106-46-7	1,4-Dichlorobenzene	C1061-2358	0.068	0.068	ppb	U
95-50-1	1,2-Dichlorobenzene	C1061-2358	0.11	0.11	ppb	U
105-05-5	p-Diethylbenzene	C1061-2358	0.11	0.11	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-2

Client Sample ID: RW-2 (PC)

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Type: Grab

Collected: 08/05/2003 10:40

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	C1061-2358	0.088	0.088	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	C1061-2358	0.12	0.12	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	C1061-2358	0.15	0.15	ppb	U
120-82-1	1,2,4-Trichlorobenzene	C1061-2358	0.13	0.13	ppb	U
87-68-3	Hexachlorobutadiene	C1061-2358	0.37	0.37	ppb	U
91-20-3	Naphthalene	C1061-2358	0.46	0.46	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1059-2434	96.1 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1059-2434	97.1 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1059-2434	98.6 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	C1061-2358	100.0 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	C1061-2358	91.1 %	(74 - 111)	
2037-26-5	TOLUENE-D8	C1061-2358	103.0 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-3

Client Sample ID: RW-3

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Type: Grab

Collected: 08/05/2003 10:50

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C1061-2359	0.17	0.17	ppb	U
75-45-6	Chlorodifluoromethane	C1061-2359	0.15	0.15	ppb	U
74-87-3	Chloromethane	C1061-2359	0.14	0.14	ppb	U
75-01-4	Vinyl Chloride	C1061-2359	0.11	0.11	ppb	U
74-83-9	Bromomethane	C1061-2359	0.15	0.15	ppb	U
75-00-3	Chloroethane	C1061-2359	0.28	0.28	ppb	U
75-69-4	Trichlorofluoromethane	C1061-2359	0.13	0.13	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	C1061-2359	0.19	0.19	ppb	U
75-35-4	1,1-Dichloroethene	C1061-2359	0.16	0.16	ppb	U
67-64-1	Acetone	C1061-2359	1.58	1.58	ppb	U
75-15-0	Carbon disulfide	C1061-2359	0.13	0.13	ppb	U
75-09-2	Methylene Chloride	C1061-2359	0.16	0.16	ppb	U
156-60-5	trans-1,2-Dichloroethene	C1061-2359	0.15	0.15	ppb	U
1634-04-4	Methyl t-butyl ether	C1061-2359	0.074	0.074	ppb	U
75-34-3	1,1-Dichloroethane	C1061-2359	0.095	6.10	ppb	
590-20-7	2,2-Dichloropropane	C1061-2359	0.33	0.33	ppb	U
156-59-2	cis-1,2-Dichloroethene	C1061-2359	0.17	64.4	ppb	
78-93-3	2-Butanone	C1061-2359	0.46	0.46	ppb	U
74-97-5	Bromochloromethane	C1061-2359	0.14	0.14	ppb	U
67-66-3	Chloroform	C1061-2359	0.072	0.072	ppb	U
71-55-6	1,1,1-Trichloroethane	C1061-2359	0.16	0.16	ppb	U
56-23-5	Carbon Tetrachloride	C1061-2359	0.12	0.12	ppb	U
563-58-6	1,1-Dichloropropene	C1061-2359	0.16	0.16	ppb	U
71-43-2	Benzene	C1061-2359	0.11	0.11	ppb	U
107-06-2	1,2-Dichloroethane	C1061-2359	0.12	0.12	ppb	U
79-01-6	Trichloroethene	C1061-2359	0.16	35.5	ppb	
78-87-5	1,2-Dichloropropane	C1061-2359	0.11	0.11	ppb	U
74-95-3	Dibromomethane	C1061-2359	0.17	0.17	ppb	U
75-27-4	Bromodichloromethane	C1061-2359	0.11	0.11	ppb	U
110-75-8	2-Chloroethylvinylether	C1061-2359	0.19	0.19	ppb	U
10061-01-5	cis-1,3-Dichloropropene	C1061-2359	0.090	0.090	ppb	U
108-10-1	4-Methyl-2-pentanone	C1061-2359	0.81	0.81	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-3

Client Sample ID: RW-3

Collected: 08/05/2003 10:50

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	C1061-2359	0.092	0.092	ppb	U
10061-02-6	trans-1,3-Dichloropropene	C1061-2359	0.13	0.13	ppb	U
79-00-5	1,1,2-Trichloroethane	C1061-2359	0.14	0.14	ppb	U
127-18-4	Tetrachloroethene	C1061-2359	0.39	4.46	ppb	
142-28-9	1,3-Dichloropropane	C1061-2359	0.099	0.099	ppb	U
591-78-6	2-Hexanone	C1061-2359	1.01	1.01	ppb	U
124-48-1	Dibromochloromethane	C1061-2359	0.11	0.11	ppb	U
106-93-4	1,2-Dibromoethane	C1061-2359	0.11	0.11	ppb	U
108-90-7	Chlorobenzene	C1061-2359	0.13	0.13	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	C1061-2359	0.11	0.11	ppb	U
100-41-4	Ethylbenzene	C1061-2359	0.11	0.11	ppb	U
108-38-3	m,p-xylene	C1061-2359	0.33	0.33	ppb	U
95-47-6	o-xylene	C1061-2359	0.13	0.13	ppb	U
100-42-5	Styrene	C1061-2359	0.97	0.97	ppb	U
75-25-2	Bromoform	C1061-2359	0.14	0.14	ppb	U
98-82-8	Isopropylbenzene	C1061-2359	0.097	0.097	ppb	U
108-86-1	Bromobenzene	C1061-2359	0.072	0.072	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	C1061-2359	0.088	0.088	ppb	U
103-65-1	n-Propylbenzene	C1061-2359	0.12	0.12	ppb	U
96-18-4	1,2,3-Trichloropropane	C1061-2359	0.28	0.28	ppb	U
622-96-8	p-Ethyltoluene	C1061-2359	0.12	0.12	ppb	U
108-67-8	1,3,5-Trimethylbenzene	C1061-2359	0.095	0.095	ppb	U
95-49-8	2-Chlorotoluene	C1061-2359	0.15	0.15	ppb	U
106-43-4	4-Chlorotoluene	C1061-2359	0.14	0.14	ppb	U
98-06-6	tert-Butylbenzene	C1061-2359	0.15	0.15	ppb	U
95-63-6	1,2,4-Trimethylbenzene	C1061-2359	0.11	0.11	ppb	U
135-98-8	sec-Butylbenzene	C1061-2359	0.11	0.11	ppb	U
99-87-6	p-Isopropyltoluene	C1061-2359	0.12	0.12	ppb	U
541-73-1	1,3-Dichlorobenzene	C1061-2359	0.083	0.083	ppb	U
106-46-7	1,4-Dichlorobenzene	C1061-2359	0.068	0.068	ppb	U
95-50-1	1,2-Dichlorobenzene	C1061-2359	0.11	0.11	ppb	U
105-05-5	p-Diethylbenzene	C1061-2359	0.11	0.11	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-3

Client Sample ID: RW-3

Collected: 08/05/2003 10:50

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	C1061-2359	0.088	0.088	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	C1061-2359	0.12	0.12	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	C1061-2359	0.15	0.15	ppb	U
120-82-1	1,2,4-Trichlorobenzene	C1061-2359	0.13	0.13	ppb	U
87-68-3	Hexachlorobutadiene	C1061-2359	0.37	0.37	ppb	U
91-20-3	Naphthalene	C1061-2359	0.46	0.46	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	C1061-2359	98.6 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	C1061-2359	95.6 %	(74 - 111)	
2037-26-5	TOLUENE-D8	C1061-2359	106.0 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-4

Client Sample ID: RW-4

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Type: Grab

Collected: 08/05/2003 11:00

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C1061-2360	0.17	0.17	ppb	U
75-45-6	Chlorodifluoromethane	C1061-2360	0.15	4.82	ppb	
74-87-3	Chloromethane	C1061-2360	0.14	0.14	ppb	U
75-01-4	Vinyl Chloride	C1061-2360	0.11	1.24	ppb	
74-83-9	Bromomethane	C1061-2360	0.15	0.15	ppb	U
75-00-3	Chloroethane	C1061-2360	0.28	0.28	ppb	U
75-69-4	Trichlorofluoromethane	C1061-2360	0.13	0.13	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	C1061-2360	0.19	0.19	ppb	U
75-35-4	1,1-Dichloroethene	C1061-2360	0.16	14.8	ppb	
67-64-1	Acetone	C1061-2360	1.58	1.58	ppb	U
75-15-0	Carbon disulfide	C1061-2360	0.13	0.13	ppb	U
75-09-2	Methylene Chloride	C1061-2360	0.16	0.16	ppb	U
156-60-5	trans-1,2-Dichloroethene	C1061-2360	0.15	6.00	ppb	
1634-04-4	Methyl t-butyl ether	C1061-2360	0.074	0.074	ppb	U
75-34-3	1,1-Dichloroethane	C1061-2360	0.095	114	ppb	
590-20-7	2,2-Dichloropropane	C1061-2360	0.33	0.33	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1059-2435	1.60	469	ppb	
78-93-3	2-Butanone	C1061-2360	0.46	0.46	ppb	U
74-97-5	Bromochloromethane	C1061-2360	0.14	0.14	ppb	U
67-66-3	Chloroform	C1061-2360	0.072	0.072	ppb	U
71-55-6	1,1,1-Trichloroethane	C1061-2360	0.16	1.66	ppb	
56-23-5	Carbon Tetrachloride	C1061-2360	0.12	0.12	ppb	U
563-58-6	1,1-Dichloropropene	C1061-2360	0.16	0.16	ppb	U
71-43-2	Benzene	C1061-2360	0.11	0.11	ppb	U
107-06-2	1,2-Dichloroethane	C1061-2360	0.12	1.18	ppb	
79-01-6	Trichloroethene	A1059-2435	2.10	239	ppb	
78-87-5	1,2-Dichloropropane	C1061-2360	0.11	0.11	ppb	U
74-95-3	Dibromomethane	C1061-2360	0.17	0.17	ppb	U
75-27-4	Bromodichloromethane	C1061-2360	0.11	0.11	ppb	U
110-75-8	2-Chloroethylvinylether	C1061-2360	0.19	0.19	ppb	U
10061-01-5	cis-1,3-Dichloropropene	C1061-2360	0.090	0.090	ppb	U
108-10-1	4-Methyl-2-pentanone	C1061-2360	0.81	0.81	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-4

Client Sample ID: RW-4

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Type: Grab

Collected: 08/05/2003 11:00

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	C1061-2360	0.092	0.092	ppb	U
10061-02-6	trans-1,3-Dichloropropene	C1061-2360	0.13	0.13	ppb	U
79-00-5	1,1,2-Trichloroethane	C1061-2360	0.14	0.14	ppb	U
127-18-4	Tetrachloroethene	C1061-2360	0.39	40.2	ppb	
142-28-9	1,3-Dichloropropane	C1061-2360	0.099	0.099	ppb	U
591-78-6	2-Hexanone	C1061-2360	1.01	1.01	ppb	U
124-48-1	Dibromochloromethane	C1061-2360	0.11	0.11	ppb	U
106-93-4	1,2-Dibromoethane	C1061-2360	0.11	0.11	ppb	U
108-90-7	Chlorobenzene	C1061-2360	0.13	0.13	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	C1061-2360	0.11	0.11	ppb	U
100-41-4	Ethylbenzene	C1061-2360	0.11	0.11	ppb	U
108-38-3	m,p-xylene	C1061-2360	0.33	0.33	ppb	U
95-47-6	o-xylene	C1061-2360	0.13	0.13	ppb	U
100-42-5	Styrene	C1061-2360	0.97	0.97	ppb	U
75-25-2	Bromoform	C1061-2360	0.14	0.14	ppb	U
98-82-8	Isopropylbenzene	C1061-2360	0.097	0.097	ppb	U
108-86-1	Bromobenzene	C1061-2360	0.072	0.072	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	C1061-2360	0.088	0.088	ppb	U
103-65-1	n-Propylbenzene	C1061-2360	0.12	3.76	ppb	
96-18-4	1,2,3-Trichloropropane	C1061-2360	0.28	0.28	ppb	U
622-96-8	p-Ethyltoluene	C1061-2360	0.12	0.12	ppb	U
108-67-8	1,3,5-Trimethylbenzene	C1061-2360	0.095	0.095	ppb	U
95-49-8	2-Chlorotoluene	C1061-2360	0.15	4.23	ppb	
106-43-4	4-Chlorotoluene	C1061-2360	0.14	0.14	ppb	U
98-06-6	tert-Butylbenzene	C1061-2360	0.15	0.15	ppb	U
95-63-6	1,2,4-Trimethylbenzene	C1061-2360	0.11	0.11	ppb	U
135-98-8	sec-Butylbenzene	C1061-2360	0.11	0.11	ppb	U
99-87-6	p-Isopropyltoluene	C1061-2360	0.12	0.12	ppb	U
541-73-1	1,3-Dichlorobenzene	C1061-2360	0.083	0.083	ppb	U
106-46-7	1,4-Dichlorobenzene	C1061-2360	0.068	0.068	ppb	U
95-50-1	1,2-Dichlorobenzene	C1061-2360	0.11	0.11	ppb	U
105-05-5	p-Diethylbenzene	C1061-2360	0.11	0.11	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-4

Client Sample ID: RW-4

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Type: Grab

Collected: 08/05/2003 11:00

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	C1061-2360	0.088	0.088	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	C1061-2360	0.12	0.12	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	C1061-2360	0.15	0.15	ppb	U
120-82-1	1,2,4-Trichlorobenzene	C1061-2360	0.13	0.13	ppb	U
87-68-3	Hexachlorobutadiene	C1061-2360	0.37	0.37	ppb	U
91-20-3	Naphthalene	C1061-2360	0.46	0.46	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1059-2435	96.7 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1059-2435	97.8 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1059-2435	97.8 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	C1061-2360	100.0 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	C1061-2360	104.0 %	(74 - 111)	
2037-26-5	TOLUENE-D8	C1061-2360	102.0 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

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08/13/2003

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 and 2-Chloro ethyl vinyl ether 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.



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08/13/2003

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 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)
- x - Outside Expected Range

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

R 1001

Project Name:		Project Manager:		Sampler (Signature):		(Print):	
Project Address:		J/N:		☐ Rush by			
Client		Type: SS = Soil, Spoon; G = Grab; C = Composite; B = Blank		*Air - Vol (Liters)			
SAMPLE INFO		Matrix: L = Liquid; S = Soil; SL = Sludge; A = Air; W = Wipe		Include: Flow (CFM)			
ID	Date	Time	Type	Matrix	Sample Location	Total #	
1						601/602	
2						BTX/BTEX	
3						MTBE	
4						624/8260/8021	
5						625/8270/BN	
6						PCB/Pesticides	
7						Pet. Prods./B100M	
8						RCRA Metals	
9						pH/Flash/React	
10						418.1 - TRPH	
11							
12							
13							
14							
15							
Relinquished by (Signature):		Date:	Printed Name & Agent:		Received by (Signature):		
David Harris		8/17/05	David Harris		David Harris		
Relinquished by (Signature):		Date:	Printed Name & Agent:		Received for Lab by (Signature):		
David Harris		8/17/05	David Harris		David Harris		
Comments & Special Instructions		QA/QC Type:	Number & Type of Containers:		Preservatives:		
			8-DOAS		HCL		
					Temp: 5°C		

SHIPPING COPY

Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Custody Document: P7340

Received: 08/07/2003 16:04

Sampled by: Derik Jordan/David Hanny

Client: Photocircuits Corporation

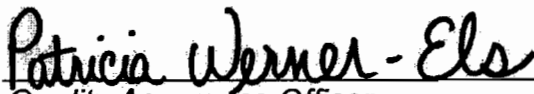
31 Sea Cliff Avenue
Glen Cove,
NY 11542

Project: Photocircuits Corp.

31 Sea Cliff Avenue
Glen Cove,
NY 11542

Manager: Andy Barber

Respectfully submitted,



Quality Assurance Officer

INITIALS	
FILE #	
COPY TO	
Barton R. Lomudde P.C.	
AUG 28 '03	
ROUTE TO	

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

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Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatiles - EPA 8260B in AIR

Sample: P7340-14

Client Sample ID: SVE INF

Matrix: Air

Remarks: See Case Narrative

Analyzed Date: 08/11/2003

Type: Grab

Collected: 08/06/2003 12:00

Volume: 0.87 L

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1059-2429	0.083	0.083	mg/M3	U
74-87-3	Chloromethane	A1059-2429	0.071	0.071	mg/M3	U
75-01-4	Vinyl Chloride	A1059-2429	0.072	0.072	mg/M3	U
74-83-9	Bromomethane	A1059-2429	0.021	0.021	mg/M3	U
75-00-3	Chloroethane	A1059-2429	0.052	0.052	mg/M3	U
75-69-4	Trichlorofluoromethane	A1059-2429	0.028	0.028	mg/M3	U
75-35-4	1,1-Dichloroethene	A1059-2429	0.060	0.060	mg/M3	U
75-09-2	Methylene Chloride	A1059-2429	0.095	0.095	mg/M3	U
156-60-5	t-1,2-Dichloroethene	A1059-2429	0.083	0.083	mg/M3	U
75-34-3	1,1-Dichloroethane	A1059-2429	0.13	0.13	mg/M3	U
590-20-7	2,2-Dichloropropane	A1059-2429	0.031	0.031	mg/M3	U
156-59-2	c-1,2-Dichloroethene	A1059-2429	0.052	0.052	mg/M3	U
67-66-3	Chloroform	A1059-2429	0.026	0.026	mg/M3	U
74-97-5	Bromochloromethane	A1059-2429	0.029	0.029	mg/M3	U
71-55-6	1,1,1-Trichloroethane	A1059-2429	0.043	0.043	mg/M3	U
563-58-6	1,1-Dichloropropene	A1059-2429	0.12	0.12	mg/M3	U
56-23-5	Carbon Tetrachloride	A1059-2429	0.038	0.038	mg/M3	U
107-06-2	1,2 Dichloroethane	A1059-2429	0.034	0.034	mg/M3	U
71-43-2	Benzene	A1059-2429	0.031	0.031	mg/M3	U
79-01-6	Trichloroethene	A1059-2429	0.048	0.048	mg/M3	U
78-87-5	1,2-Dichloropropane	A1059-2429	0.041	0.041	mg/M3	U
75-27-4	Bromodichloromethane	A1059-2429	0.029	0.029	mg/M3	U
74-95-3	Dibromomethane	A1059-2429	0.031	0.031	mg/M3	U
10061-01-5	c-1,3-Dichloropropene	A1059-2429	0.026	0.026	mg/M3	U
108-88-3	Toluene	A1059-2429	0.041	0.041	mg/M3	U
10061-02-6	t-1,3-Dichloropropene	A1059-2429	0.026	0.026	mg/M3	U
79-00-5	1,1,2-Trichloroethane	A1059-2429	0.034	0.034	mg/M3	U
142-28-9	1,3-Dichloropropane	A1059-2429	0.028	0.028	mg/M3	U
127-18-4	Tetrachloroethene	A1059-2429	0.060	7.61	mg/M3	
124-48-1	Dibromochloromethane	A1059-2429	0.024	0.024	mg/M3	U
106-93-4	1,2-Dibromoethane	A1059-2429	0.040	0.040	mg/M3	U
108-90-7	Chlorobenzene	A1059-2429	0.050	0.050	mg/M3	U



Environmental Testing Laboratories, Inc.

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08/20/2003

Volatiles - EPA 8260B in AIR

Sample: P7340-14

Client Sample ID: SVE INF

Matrix: Air

Remarks: See Case Narrative

Analyzed Date: 08/11/2003

Type: Grab

Collected: 08/06/2003 12:00

Volume: 0.87 L

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
630-20-6	1,1,1,2-Tetrachloroethane	A1059-2429	0.060	0.060	mg/M3	U
100-41-4	Ethylbenzene	A1059-2429	0.060	0.060	mg/M3	U
108-38-3	m,p-xylene	A1059-2429	0.077	0.077	mg/M3	U
95-47-6	o-xylene	A1059-2429	0.053	0.053	mg/M3	U
100-42-5	Styrene	A1059-2429	0.040	0.040	mg/M3	U
98-82-8	Isopropylbenzene	A1059-2429	0.045	0.045	mg/M3	U
75-25-2	Bromoform	A1059-2429	0.015	0.015	mg/M3	U
79-34-5	1,1,2,2-Tetrachloroethane	A1059-2429	0.038	0.038	mg/M3	U
96-18-4	1,2,3-Trichloropropane	A1059-2429	0.11	0.11	mg/M3	U
103-65-1	n-Propylbenzene	A1059-2429	0.036	0.036	mg/M3	U
108-86-1	Bromobenzene	A1059-2429	0.046	0.046	mg/M3	U
108-67-8	1,3,5-Trimethylbenzene	A1059-2429	0.058	0.058	mg/M3	U
95-49-8	2-Chlorotoluene	A1059-2429	0.036	0.036	mg/M3	U
106-43-4	4-Chlorotoluene	A1059-2429	0.062	0.062	mg/M3	U
99-87-6	4-Isopropyltoluene	A1059-2429	0.041	0.041	mg/M3	U
95-63-6	1,2,4-trimethylbenzene	A1059-2429	0.038	0.038	mg/M3	U
135-98-8	sec-Butylbenzene	A1059-2429	0.048	0.048	mg/M3	U
98-06-6	tert-Butylbenzene	A1059-2429	0.064	0.064	mg/M3	U
541-73-1	1,3 Dichlorobenzene	A1059-2429	0.053	0.053	mg/M3	U
106-46-7	1,4-Dichlorobenzene	A1059-2429	0.033	0.033	mg/M3	U
104-51-8	n-Butylbenzene	A1059-2429	0.021	0.021	mg/M3	U
95-50-1	1,2-Dichlorobenzene	A1059-2429	0.046	0.046	mg/M3	U
96-12-8	1,2-Dibromo-3-chloropropane	A1059-2429	0.091	0.091	mg/M3	U
120-82-1	1,2,4-Trichlorobenzene	A1059-2429	0.033	0.033	mg/M3	U
87-68-3	Hexachlorobutadiene	A1059-2429	0.057	0.057	mg/M3	U
91-20-3	Naphthalene	A1059-2429	0.033	0.033	mg/M3	U
87-61-6	1,2,3-Trichlorobenzene	A1059-2429	0.040	0.040	mg/M3	U
1634-04-4	MTBE	A1059-2429	0.17	0.17	mg/M3	U



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08/20/2003

Volatiles - EPA 8260B in AIR

Sample: P7340-14

Client Sample ID: SVE INF

Matrix: Air

Remarks: See Case Narrative

Analyzed Date: 08/11/2003

Type: Grab

Collected: 08/06/2003 12:00

Volume: 0.87 L

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1059-2429	95.7 %	(77 - 128)	
4774-33-8	DIBROMOFLUOROMETHANE	A1059-2429	97.0 %	(69 - 157)	
2037-26-5	TOLUENE-D8	A1059-2429	97.2 %	(70 - 124)	



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-1

Client Sample ID: MW-8

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/05/2003 11:15

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2447	0.29	0.29	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2447	0.31	0.31	ppb	U
74-87-3	Chloromethane	A1060-2447	0.31	0.31	ppb	U
75-01-4	Vinyl Chloride	A1060-2447	0.28	0.28	ppb	U
74-83-9	Bromomethane	A1060-2447	0.45	0.45	ppb	U
75-00-3	Chloroethane	A1060-2447	0.44	0.44	ppb	U
75-69-4	Trichlorofluoromethane	A1060-2447	0.48	0.48	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2447	0.28	0.28	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2447	0.23	0.23	ppb	U
67-64-1	Acetone	A1060-2447	1.41	1.41	ppb	U
75-15-0	Carbon disulfide	A1060-2447	0.26	0.26	ppb	U
75-09-2	Methylene Chloride	A1060-2447	0.15	0.15	ppb	U
156-60-5	trans-1,2-Dichloroethene	A1060-2447	0.22	0.22	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2447	0.053	0.053	ppb	U
75-34-3	1,1-Dichloroethane	A1060-2447	0.22	0.22	ppb	U
590-20-7	2,2-Dichloropropane	A1060-2447	0.37	0.37	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1060-2447	0.16	15.4	ppb	
78-93-3	2-Butanone	A1060-2447	1.64	1.64	ppb	U
74-97-5	Bromochloromethane	A1060-2447	0.066	0.066	ppb	U
67-66-3	Chloroform	A1060-2447	0.19	0.19	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2447	0.22	0.22	ppb	U
56-23-5	Carbon Tetrachloride	A1060-2447	0.32	0.32	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2447	0.40	0.40	ppb	U
71-43-2	Benzene	A1060-2447	0.21	0.21	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2447	0.17	0.17	ppb	U
79-01-6	Trichloroethene	A1060-2447	0.21	4.22	ppb	
78-87-5	1,2-Dichloropropane	A1060-2447	0.15	0.15	ppb	U
74-95-3	Dibromomethane	A1060-2447	0.072	0.072	ppb	U
75-27-4	Bromodichloromethane	A1060-2447	0.084	0.084	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2447	0.83	0.83	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2447	0.062	0.062	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2447	1.44	1.44	ppb	U



Environmental Testing Laboratories, Inc.

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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-1

Client Sample ID: MW-8

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/05/2003 11:15

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2447	0.20	0.20	ppb	U
10061-02-6	trans-1,3-Dichloropropene	A1060-2447	0.12	0.12	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2447	0.15	0.15	ppb	U
127-18-4	Tetrachloroethene	A1060-2447	0.38	0.38	ppb	U
142-28-9	1,3-Dichloropropane	A1060-2447	0.040	0.040	ppb	U
591-78-6	2-Hexanone	A1060-2447	1.44	1.44	ppb	U
124-48-1	Dibromochloromethane	A1060-2447	0.044	0.044	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2447	0.097	0.097	ppb	U
108-90-7	Chlorobenzene	A1060-2447	0.15	0.15	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2447	0.061	0.061	ppb	U
100-41-4	Ethylbenzene	A1060-2447	0.12	0.12	ppb	U
108-38-3	m,p-xylene	A1060-2447	0.24	0.24	ppb	U
95-47-6	o-xylene	A1060-2447	0.12	0.12	ppb	U
100-42-5	Styrene	A1060-2447	0.080	0.080	ppb	U
75-25-2	Bromoform	A1060-2447	0.073	0.073	ppb	U
98-82-8	Isopropylbenzene	A1060-2447	0.14	0.14	ppb	U
108-86-1	Bromobenzene	A1060-2447	0.11	0.11	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1060-2447	0.094	0.094	ppb	U
103-65-1	n-Propylbenzene	A1060-2447	0.16	0.16	ppb	U
96-18-4	1,2,3-Trichloropropane	A1060-2447	0.047	0.047	ppb	U
622-96-8	p-Ethyltoluene	A1060-2447	0.15	0.15	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2447	0.17	0.17	ppb	U
95-49-8	2-Chlorotoluene	A1060-2447	0.15	0.15	ppb	U
106-43-4	4-Chlorotoluene	A1060-2447	0.072	0.072	ppb	U
98-06-6	tert-Butylbenzene	A1060-2447	0.12	0.12	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2447	0.15	0.15	ppb	U
135-98-8	sec-Butylbenzene	A1060-2447	0.19	0.19	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2447	0.16	0.16	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2447	0.047	0.047	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2447	0.17	0.17	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2447	0.065	0.065	ppb	U
105-05-5	p-Diethylbenzene	A1060-2447	0.17	0.17	ppb	U



Environmental Testing Laboratories, Inc.

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-1

Client Sample ID: MW-8

Collected: 08/05/2003 11:15

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2447	0.26	0.26	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2447	0.23	0.23	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2447	0.25	0.25	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2447	0.14	0.14	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2447	0.19	0.19	ppb	U
91-20-3	Naphthalene	A1060-2447	0.40	0.40	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2447	96.8 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2447	96.6 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2447	98.4 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-2

Client Sample ID: MW-12

Collected: 08/05/2003 12:05

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2448	0.29	0.29	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2448	0.31	0.31	ppb	U
74-87-3	Chloromethane	A1060-2448	0.31	0.31	ppb	U
75-01-4	Vinyl Chloride	A1060-2448	0.28	29.7	ppb	
74-83-9	Bromomethane	A1060-2448	0.45	0.45	ppb	U
75-00-3	Chloroethane	A1060-2448	0.44	6.99	ppb	
75-69-4	Trichlorofluoromethane	A1060-2448	0.48	0.48	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2448	0.28	0.28	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2448	0.23	0.91	ppb	
67-64-1	Acetone	A1060-2448	1.41	1.41	ppb	U
75-15-0	Carbon disulfide	A1060-2448	0.26	0.26	ppb	U
75-09-2	Methylene Chloride	A1060-2448	0.15	0.15	ppb	U
156-60-5	trans-1,2-Dichloroethene	A1060-2448	0.22	1.70	ppb	
1634-04-4	Methyl t-butyl ether	A1060-2448	0.053	0.053	ppb	U
75-34-3	1,1-Dichloroethane	A1060-2448	0.22	107	ppb	
590-20-7	2,2-Dichloropropane	A1060-2448	0.37	0.37	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1061-2476	0.80	223	ppb	
78-93-3	2-Butanone	A1060-2448	1.64	1.64	ppb	U
74-97-5	Bromochloromethane	A1060-2448	0.066	0.066	ppb	U
67-66-3	Chloroform	A1060-2448	0.19	0.19	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2448	0.22	0.22	ppb	U
56-23-5	Carbon Tetrachloride	A1060-2448	0.32	0.32	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2448	0.40	0.40	ppb	U
71-43-2	Benzene	A1060-2448	0.21	1.39	ppb	
107-06-2	1,2-Dichloroethane	A1060-2448	0.17	0.17	ppb	U
79-01-6	Trichloroethene	A1060-2448	0.21	38.1	ppb	
78-87-5	1,2-Dichloropropane	A1060-2448	0.15	0.15	ppb	U
74-95-3	Dibromomethane	A1060-2448	0.072	0.072	ppb	U
75-27-4	Bromodichloromethane	A1060-2448	0.084	0.084	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2448	0.83	0.83	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2448	0.062	0.062	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2448	1.44	1.44	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-2

Client Sample ID: MW-12

Collected: 08/05/2003 12:05

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2448	0.20	0.20	ppb	U
10061-02-6	trans-1,3-Dichloropropene	A1060-2448	0.12	0.12	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2448	0.15	0.15	ppb	U
127-18-4	Tetrachloroethene	A1060-2448	0.38	0.38	ppb	U
142-28-9	1,3-Dichloropropane	A1060-2448	0.040	0.040	ppb	U
591-78-6	2-Hexanone	A1060-2448	1.44	1.44	ppb	U
124-48-1	Dibromochloromethane	A1060-2448	0.044	0.044	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2448	0.097	0.097	ppb	U
108-90-7	Chlorobenzene	A1060-2448	0.15	0.15	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2448	0.061	0.061	ppb	U
100-41-4	Ethylbenzene	A1060-2448	0.12	0.12	ppb	U
108-38-3	m,p-xylene	A1060-2448	0.24	0.24	ppb	U
95-47-6	o-xylene	A1060-2448	0.12	0.12	ppb	U
100-42-5	Styrene	A1060-2448	0.080	0.080	ppb	U
75-25-2	Bromoform	A1060-2448	0.073	0.073	ppb	U
98-82-8	Isopropylbenzene	A1060-2448	0.14	0.14	ppb	U
108-86-1	Bromobenzene	A1060-2448	0.11	0.11	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1060-2448	0.094	0.094	ppb	U
103-65-1	n-Propylbenzene	A1061-2476	0.80	355	ppb	
96-18-4	1,2,3-Trichloropropane	A1060-2448	0.047	0.047	ppb	U
622-96-8	p-Ethyltoluene	A1060-2448	0.15	0.15	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2448	0.17	0.17	ppb	U
95-49-8	2-Chlorotoluene	A1061-2476	0.75	419	ppb	
106-43-4	4-Chlorotoluene	A1060-2448	0.072	6.40	ppb	
98-06-6	tert-Butylbenzene	A1060-2448	0.12	0.12	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2448	0.15	0.15	ppb	U
135-98-8	sec-Butylbenzene	A1060-2448	0.19	0.19	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2448	0.16	0.16	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2448	0.047	0.047	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2448	0.17	0.17	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2448	0.065	0.065	ppb	U
105-05-5	p-Diethylbenzene	A1060-2448	0.17	0.17	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-2

Client Sample ID: MW-12

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/05/2003 12:05

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2448	0.26	0.26	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2448	0.23	0.23	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2448	0.25	0.25	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2448	0.14	0.14	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2448	0.19	0.19	ppb	U
91-20-3	Naphthalene	A1060-2448	0.40	0.40	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2448	102.0 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2448	97.9 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2448	98.8 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	A1061-2476	96.4 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1061-2476	99.1 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1061-2476	97.6 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-3

Client Sample ID: MW-13

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/05/2003 13:25

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2449	0.29	0.29	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2449	0.31	0.31	ppb	U
74-87-3	Chloromethane	A1060-2449	0.31	0.31	ppb	U
75-01-4	Vinyl Chloride	A1060-2449	0.28	7.18	ppb	
74-83-9	Bromomethane	A1060-2449	0.45	0.45	ppb	U
75-00-3	Chloroethane	A1060-2449	0.44	0.44	ppb	U
75-69-4	Trichlorofluoromethane	A1060-2449	0.48	0.48	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2449	0.28	0.28	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2449	0.23	3.81	ppb	
67-64-1	Acetone	A1060-2449	1.41	1.41	ppb	U
75-15-0	Carbon disulfide	A1060-2449	0.26	0.26	ppb	U
75-09-2	Methylene Chloride	A1060-2449	0.15	0.15	ppb	U
156-60-5	trans-1,2-Dichloroethene	A1060-2449	0.22	0.22	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2449	0.053	0.053	ppb	U
75-34-3	1,1-Dichloroethane	A1060-2449	0.22	31.1	ppb	
590-20-7	2,2-Dichloropropane	A1060-2449	0.37	0.37	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1061-2477	0.80	326	ppb	
78-93-3	2-Butanone	A1060-2449	1.64	1.64	ppb	U
74-97-5	Bromochloromethane	A1060-2449	0.066	0.066	ppb	U
67-66-3	Chloroform	A1060-2449	0.19	0.19	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2449	0.22	1.09	ppb	
56-23-5	Carbon Tetrachloride	A1060-2449	0.32	0.32	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2449	0.40	0.40	ppb	U
71-43-2	Benzene	A1060-2449	0.21	0.21	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2449	0.17	0.17	ppb	U
79-01-6	Trichloroethene	A1060-2449	0.21	21.0	ppb	
78-87-5	1,2-Dichloropropane	A1060-2449	0.15	0.15	ppb	U
74-95-3	Dibromomethane	A1060-2449	0.072	0.072	ppb	U
75-27-4	Bromodichloromethane	A1060-2449	0.084	0.084	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2449	0.83	0.83	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2449	0.062	0.062	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2449	1.44	1.44	ppb	U



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-3

Client Sample ID: MW-13

Collected: 08/05/2003 13:25

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2449	0.20	0.20	ppb	U
10061-02-6	trans-1,3-Dichloropropene	A1060-2449	0.12	0.12	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2449	0.15	0.15	ppb	U
127-18-4	Tetrachloroethene	A1060-2449	0.38	19.9	ppb	
142-28-9	1,3-Dichloropropane	A1060-2449	0.040	0.040	ppb	U
591-78-6	2-Hexanone	A1060-2449	1.44	1.44	ppb	U
124-48-1	Dibromochloromethane	A1060-2449	0.044	0.044	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2449	0.097	0.097	ppb	U
108-90-7	Chlorobenzene	A1060-2449	0.15	0.15	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2449	0.061	0.061	ppb	U
100-41-4	Ethylbenzene	A1060-2449	0.12	0.12	ppb	U
108-38-3	m,p-xylene	A1060-2449	0.24	0.24	ppb	U
95-47-6	o-xylene	A1060-2449	0.12	0.12	ppb	U
100-42-5	Styrene	A1060-2449	0.080	0.080	ppb	U
75-25-2	Bromoform	A1060-2449	0.073	0.073	ppb	U
98-82-8	Isopropylbenzene	A1060-2449	0.14	0.14	ppb	U
108-86-1	Bromobenzene	A1060-2449	0.11	0.11	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1060-2449	0.094	0.094	ppb	U
103-65-1	n-Propylbenzene	A1060-2449	0.16	4.30	ppb	
96-18-4	1,2,3-Trichloropropane	A1060-2449	0.047	0.047	ppb	U
622-96-8	p-Ethyltoluene	A1060-2449	0.15	0.15	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2449	0.17	0.17	ppb	U
95-49-8	2-Chlorotoluene	A1060-2449	0.15	4.90	ppb	
106-43-4	4-Chlorotoluene	A1060-2449	0.072	0.072	ppb	U
98-06-6	tert-Butylbenzene	A1060-2449	0.12	0.12	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2449	0.15	0.15	ppb	U
135-98-8	sec-Butylbenzene	A1060-2449	0.19	0.19	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2449	0.16	0.16	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2449	0.047	0.047	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2449	0.17	0.17	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2449	0.065	0.065	ppb	U
105-05-5	p-Diethylbenzene	A1060-2449	0.17	0.17	ppb	U



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-3

Client Sample ID: MW-13

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/05/2003 13:25

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2449	0.26	0.26	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2449	0.23	0.23	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2449	0.25	0.25	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2449	0.14	0.14	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2449	0.19	0.19	ppb	U
91-20-3	Naphthalene	A1060-2449	0.40	0.40	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2449	98.0 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2449	97.9 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2449	99.1 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	A1061-2477	96.1 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1061-2477	99.4 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1061-2477	98.1 %	(89 - 122)	



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-4

Client Sample ID: MW-14

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 14:20

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2450	2.90	2.90	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2450	3.10	3.10	ppb	U
74-87-3	Chloromethane	A1060-2450	3.10	3.10	ppb	U
75-01-4	Vinyl Chloride	A1060-2450	2.80	139	ppb	
74-83-9	Bromomethane	A1060-2450	4.50	4.50	ppb	U
75-00-3	Chloroethane	A1061-2478	44.0	2160	ppb	
75-69-4	Trichlorofluoromethane	A1060-2450	4.80	4.80	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2450	2.80	2.80	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2450	2.30	90.8	ppb	
67-64-1	Acetone	A1060-2450	14.1	754	ppb	
75-15-0	Carbon disulfide	A1060-2450	2.60	2.60	ppb	U
75-09-2	Methylene Chloride	A1060-2450	1.50	52.9	ppb	
156-60-5	trans-1,2-Dichloroethene	A1060-2450	2.20	2.20	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2450	0.53	0.53	ppb	U
75-34-3	1,1-Dichloroethane	A1061-2478	22.0	9580	ppb	
590-20-7	2,2-Dichloropropane	A1060-2450	3.70	3.70	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1060-2450	1.60	8.48	ppb	
78-93-3	2-Butanone	A1060-2450	16.4	797	ppb	
74-97-5	Bromochloromethane	A1060-2450	0.66	0.66	ppb	U
67-66-3	Chloroform	A1060-2450	1.90	1.90	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2450	2.20	507	ppb	
56-23-5	Carbon Tetrachloride	A1060-2450	3.20	3.20	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2450	4.00	4.00	ppb	U
71-43-2	Benzene	A1060-2450	2.10	2.10	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2450	1.70	1.70	ppb	U
79-01-6	Trichloroethene	A1060-2450	2.10	2.10	ppb	U
78-87-5	1,2-Dichloropropane	A1060-2450	1.50	1.50	ppb	U
74-95-3	Dibromomethane	A1060-2450	0.72	0.72	ppb	U
75-27-4	Bromodichloromethane	A1060-2450	0.84	0.84	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2450	8.30	8.30	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2450	0.62	0.62	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2450	14.4	14.4	ppb	U



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-4

Client Sample ID: MW-14

Collected: 08/04/2003 14:20

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2450	2.00	2.00	ppb	U
10061-02-6	trans-1,3-Dichloropropene	A1060-2450	1.20	1.20	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2450	1.50	1.50	ppb	U
127-18-4	Tetrachloroethene	A1060-2450	3.80	3.80	ppb	U
142-28-9	1,3-Dichloropropane	A1060-2450	0.40	0.40	ppb	U
591-78-6	2-Hexanone	A1060-2450	14.4	14.4	ppb	U
124-48-1	Dibromochloromethane	A1060-2450	0.44	0.44	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2450	0.97	0.97	ppb	U
108-90-7	Chlorobenzene	A1060-2450	1.50	1.50	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2450	0.61	0.61	ppb	U
100-41-4	Ethylbenzene	A1060-2450	1.20	1.20	ppb	U
108-38-3	m,p-xylene	A1060-2450	2.40	2.40	ppb	U
95-47-6	o-xylene	A1060-2450	1.20	1.20	ppb	U
100-42-5	Styrene	A1060-2450	0.80	0.80	ppb	U
75-25-2	Bromoform	A1060-2450	0.73	0.73	ppb	U
98-82-8	Isopropylbenzene	A1060-2450	1.40	1.40	ppb	U
108-86-1	Bromobenzene	A1060-2450	1.10	1.10	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1060-2450	0.94	0.94	ppb	U
103-65-1	n-Propylbenzene	A1060-2450	1.60	1.60	ppb	U
96-18-4	1,2,3-Trichloropropane	A1060-2450	0.47	0.47	ppb	U
622-96-8	p-Ethyltoluene	A1060-2450	1.50	1.50	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2450	1.70	1.70	ppb	U
95-49-8	2-Chlorotoluene	A1060-2450	1.50	1.50	ppb	U
106-43-4	4-Chlorotoluene	A1060-2450	0.72	0.72	ppb	U
98-06-6	tert-Butylbenzene	A1060-2450	1.20	1.20	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2450	1.50	1.50	ppb	U
135-98-8	sec-Butylbenzene	A1060-2450	1.90	1.90	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2450	1.60	1.60	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2450	0.47	0.47	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2450	1.70	1.70	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2450	0.65	0.65	ppb	U
105-05-5	p-Diethylbenzene	A1060-2450	1.70	1.70	ppb	U



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-4

Client Sample ID: MW-14

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 14:20

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2450	2.60	2.60	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2450	2.30	2.30	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2450	2.50	2.50	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2450	1.40	1.40	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2450	1.90	1.90	ppb	U
91-20-3	Naphthalene	A1060-2450	4.00	4.00	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2450	96.3 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2450	96.8 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2450	98.6 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	A1061-2478	96.6 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1061-2478	99.5 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1061-2478	98.9 %	(89 - 122)	



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-5

Client Sample ID: SMP-1

Collected: 08/04/2003 16:00

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2451	2.90	2.90	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2451	3.10	3.10	ppb	U
74-87-3	Chloromethane	A1060-2451	3.10	3.10	ppb	U
75-01-4	Vinyl Chloride	A1060-2451	2.80	2.80	ppb	U
74-83-9	Bromomethane	A1060-2451	4.50	4.50	ppb	U
75-00-3	Chloroethane	A1060-2451	4.40	261	ppb	
75-69-4	Trichlorofluoromethane	A1060-2451	4.80	4.80	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2451	2.80	2.80	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2451	2.30	2.30	ppb	U
67-64-1	Acetone	A1060-2451	14.1	14.1	ppb	U
75-15-0	Carbon disulfide	A1060-2451	2.60	2.60	ppb	U
75-09-2	Methylene Chloride	A1060-2451	1.50	1.50	ppb	U
156-60-5	trans-1,2-Dichloroethene	A1060-2451	2.20	2.20	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2451	0.53	0.53	ppb	U
75-34-3	1,1-Dichloroethane	A1060-2451	2.20	2.20	ppb	U
590-20-7	2,2-Dichloropropane	A1060-2451	3.70	3.70	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1060-2451	1.60	1.60	ppb	U
78-93-3	2-Butanone	A1060-2451	16.4	16.4	ppb	U
74-97-5	Bromochloromethane	A1060-2451	0.66	0.66	ppb	U
67-66-3	Chloroform	A1060-2451	1.90	1.90	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2451	2.20	2.20	ppb	U
56-23-5	Carbon Tetrachloride	A1060-2451	3.20	3.20	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2451	4.00	4.00	ppb	U
71-43-2	Benzene	A1060-2451	2.10	2.10	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2451	1.70	1.70	ppb	U
79-01-6	Trichloroethene	A1060-2451	2.10	2.10	ppb	U
78-87-5	1,2-Dichloropropane	A1060-2451	1.50	1.50	ppb	U
74-95-3	Dibromomethane	A1060-2451	0.72	0.72	ppb	U
75-27-4	Bromodichloromethane	A1060-2451	0.84	0.84	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2451	8.30	8.30	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2451	0.62	0.62	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2451	14.4	14.4	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-5

Client Sample ID: SMP-1

Collected: 08/04/2003 16:00

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2451	2.00	18.4	ppb	
10061-02-6	trans-1,3-Dichloropropene	A1060-2451	1.20	1.20	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2451	1.50	1.50	ppb	U
127-18-4	Tetrachloroethene	A1060-2451	3.80	3.80	ppb	U
142-28-9	1,3-Dichloropropane	A1060-2451	0.40	0.40	ppb	U
591-78-6	2-Hexanone	A1060-2451	14.4	14.4	ppb	U
124-48-1	Dibromochloromethane	A1060-2451	0.44	0.44	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2451	0.97	0.97	ppb	U
108-90-7	Chlorobenzene	A1060-2451	1.50	1.50	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2451	0.61	0.61	ppb	U
100-41-4	Ethylbenzene	A1060-2451	1.20	1.20	ppb	U
108-38-3	m,p-xylene	A1060-2451	2.40	2.40	ppb	U
95-47-6	o-xylene	A1060-2451	1.20	1.20	ppb	U
100-42-5	Styrene	A1060-2451	0.80	0.80	ppb	U
75-25-2	Bromoform	A1060-2451	0.73	0.73	ppb	U
98-82-8	Isopropylbenzene	A1060-2451	1.40	1.40	ppb	U
108-86-1	Bromobenzene	A1060-2451	1.10	1.10	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1060-2451	0.94	0.94	ppb	U
103-65-1	n-Propylbenzene	A1060-2451	1.60	1.60	ppb	U
96-18-4	1,2,3-Trichloropropane	A1060-2451	0.47	0.47	ppb	U
622-96-8	p-Ethyltoluene	A1060-2451	1.50	1.50	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2451	1.70	1.70	ppb	U
95-49-8	2-Chlorotoluene	A1060-2451	1.50	1.50	ppb	U
106-43-4	4-Chlorotoluene	A1060-2451	0.72	0.72	ppb	U
98-06-6	tert-Butylbenzene	A1060-2451	1.20	1.20	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2451	1.50	1.50	ppb	U
135-98-8	sec-Butylbenzene	A1060-2451	1.90	1.90	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2451	1.60	1.60	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2451	0.47	0.47	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2451	1.70	1.70	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2451	0.65	0.65	ppb	U
105-05-5	p-Diethylbenzene	A1060-2451	1.70	1.70	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-5

Client Sample ID: SMP-1

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 16:00

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2451	2.60	2.60	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2451	2.30	2.30	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2451	2.50	2.50	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2451	1.40	1.40	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2451	1.90	1.90	ppb	U
91-20-3	Naphthalene	A1060-2451	4.00	4.00	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2451	97.8 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2451	97.3 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2451	98.7 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735
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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-6

Client Sample ID: DMP-1

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 14:20

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1061-2479	1.45	1.45	ppb	U
75-45-6	Chlorodifluoromethane	A1061-2479	1.55	1.55	ppb	U
74-87-3	Chloromethane	A1061-2479	1.55	1.55	ppb	U
75-01-4	Vinyl Chloride	A1061-2479	1.40	75.8	ppb	
74-83-9	Bromomethane	A1061-2479	2.25	2.25	ppb	U
75-00-3	Chloroethane	A1060-2452	22.0	1100	ppb	
75-69-4	Trichlorofluoromethane	A1061-2479	2.40	2.40	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1061-2479	1.40	1.40	ppb	U
75-35-4	1,1-Dichloroethene	A1061-2479	1.15	1.15	ppb	U
67-64-1	Acetone	A1061-2479	7.05	7.05	ppb	U
75-15-0	Carbon disulfide	A1061-2479	1.30	1.30	ppb	U
75-09-2	Methylene Chloride	A1061-2479	0.75	0.75	ppb	U
156-60-5	trans-1,2-Dichloroethene	A1061-2479	1.10	1.10	ppb	U
1634-04-4	Methyl t-butyl ether	A1061-2479	0.26	0.26	ppb	U
75-34-3	1,1-Dichloroethane	A1061-2479	1.10	162	ppb	
590-20-7	2,2-Dichloropropane	A1061-2479	1.85	1.85	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1061-2479	0.80	42.8	ppb	
78-93-3	2-Butanone	A1061-2479	8.20	8.20	ppb	U
74-97-5	Bromochloromethane	A1061-2479	0.33	0.33	ppb	U
67-66-3	Chloroform	A1061-2479	0.95	0.95	ppb	U
71-55-6	1,1,1-Trichloroethane	A1061-2479	1.10	1.10	ppb	U
56-23-5	Carbon Tetrachloride	A1061-2479	1.60	1.60	ppb	U
563-58-6	1,1-Dichloropropene	A1061-2479	2.00	2.00	ppb	U
71-43-2	Benzene	A1061-2479	1.05	40.4	ppb	
107-06-2	1,2-Dichloroethane	A1061-2479	0.85	0.85	ppb	U
79-01-6	Trichloroethene	A1061-2479	1.05	1.05	ppb	U
78-87-5	1,2-Dichloropropane	A1061-2479	0.75	0.75	ppb	U
74-95-3	Dibromomethane	A1061-2479	0.36	0.36	ppb	U
75-27-4	Bromodichloromethane	A1061-2479	0.42	0.42	ppb	U
110-75-8	2-Chloroethylvinylether	A1061-2479	4.15	4.15	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1061-2479	0.31	0.31	ppb	U
108-10-1	4-Methyl-2-pentanone	A1061-2479	7.20	7.20	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-6

Client Sample ID: DMP-1

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 14:20

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1061-2479	1.00	14.2	ppb	
10061-02-6	trans-1,3-Dichloropropene	A1061-2479	0.60	0.60	ppb	U
79-00-5	1,1,2-Trichloroethane	A1061-2479	0.75	0.75	ppb	U
127-18-4	Tetrachloroethene	A1061-2479	1.90	1.90	ppb	U
142-28-9	1,3-Dichloropropane	A1061-2479	0.20	0.20	ppb	U
591-78-6	2-Hexanone	A1061-2479	7.20	7.20	ppb	U
124-48-1	Dibromochloromethane	A1061-2479	0.22	0.22	ppb	U
106-93-4	1,2-Dibromoethane	A1061-2479	0.49	0.49	ppb	U
108-90-7	Chlorobenzene	A1061-2479	0.75	0.75	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1061-2479	0.31	0.31	ppb	U
100-41-4	Ethylbenzene	A1061-2479	0.60	0.60	ppb	U
108-38-3	m,p-xylene	A1061-2479	1.20	1.20	ppb	U
95-47-6	o-xylene	A1061-2479	0.60	0.60	ppb	U
100-42-5	Styrene	A1061-2479	0.40	0.40	ppb	U
75-25-2	Bromoform	A1061-2479	0.37	0.37	ppb	U
98-82-8	Isopropylbenzene	A1061-2479	0.70	0.70	ppb	U
108-86-1	Bromobenzene	A1061-2479	0.55	0.55	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1061-2479	0.47	0.47	ppb	U
103-65-1	n-Propylbenzene	A1061-2479	0.80	25.2	ppb	
96-18-4	1,2,3-Trichloropropane	A1061-2479	0.23	0.23	ppb	U
622-96-8	p-Ethyltoluene	A1061-2479	0.75	0.75	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1061-2479	0.85	0.85	ppb	U
95-49-8	2-Chlorotoluene	A1061-2479	0.75	29.1	ppb	
106-43-4	4-Chlorotoluene	A1061-2479	0.36	0.36	ppb	U
98-06-6	tert-Butylbenzene	A1061-2479	0.60	0.60	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1061-2479	0.75	0.75	ppb	U
135-98-8	sec-Butylbenzene	A1061-2479	0.95	0.95	ppb	U
99-87-6	p-Isopropyltoluene	A1061-2479	0.80	0.80	ppb	U
541-73-1	1,3-Dichlorobenzene	A1061-2479	0.23	0.23	ppb	U
106-46-7	1,4-Dichlorobenzene	A1061-2479	0.85	0.85	ppb	U
95-50-1	1,2-Dichlorobenzene	A1061-2479	0.32	0.32	ppb	U
105-05-5	p-Diethylbenzene	A1061-2479	0.85	0.85	ppb	U



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208 Route 109, Farmingdale NY 11735
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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-6

Client Sample ID: DMP-1

Collected: 08/04/2003 14:20

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1061-2479	1.30	1.30	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1061-2479	1.15	1.15	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1061-2479	1.25	1.25	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1061-2479	0.70	0.70	ppb	U
87-68-3	Hexachlorobutadiene	A1061-2479	0.95	0.95	ppb	U
91-20-3	Naphthalene	A1061-2479	2.00	2.00	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2452	98.6 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2452	98.2 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2452	98.3 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	A1061-2479	96.4 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1061-2479	99.2 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1061-2479	97.9 %	(89 - 122)	



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208 Route 109, Farmingdale NY 11735

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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-7

Client Sample ID: SMP-3

Collected: 08/04/2003 16:30

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2453	2.90	2.90	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2453	3.10	3.10	ppb	U
74-87-3	Chloromethane	A1060-2453	3.10	3.10	ppb	U
75-01-4	Vinyl Chloride	A1060-2453	2.80	22.9	ppb	
74-83-9	Bromomethane	A1060-2453	4.50	4.50	ppb	U
75-00-3	Chloroethane	A1061-2480	44.0	9290	ppb	
75-69-4	Trichlorofluoromethane	A1060-2453	4.80	4.80	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2453	2.80	2.80	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2453	2.30	38.9	ppb	
67-64-1	Acetone	A1060-2453	14.1	14.1	ppb	U
75-15-0	Carbon disulfide	A1060-2453	2.60	2.60	ppb	U
75-09-2	Methylene Chloride	A1060-2453	1.50	8.13	ppb	
156-60-5	trans-1,2-Dichloroethene	A1060-2453	2.20	2.20	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2453	0.53	0.53	ppb	U
75-34-3	1,1-Dichloroethane	A1061-2480	22.0	14600	ppb	
590-20-7	2,2-Dichloropropane	A1060-2453	3.70	3.70	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1060-2453	1.60	1.60	ppb	U
78-93-3	2-Butanone	A1060-2453	16.4	16.4	ppb	U
74-97-5	Bromochloromethane	A1060-2453	0.66	0.66	ppb	U
67-66-3	Chloroform	A1060-2453	1.90	1.90	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2453	2.20	372	ppb	
56-23-5	Carbon Tetrachloride	A1060-2453	3.20	3.20	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2453	4.00	4.00	ppb	U
71-43-2	Benzene	A1060-2453	2.10	2.10	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2453	1.70	1.70	ppb	U
79-01-6	Trichloroethene	A1060-2453	2.10	2.10	ppb	U
78-87-5	1,2-Dichloropropane	A1060-2453	1.50	1.50	ppb	U
74-95-3	Dibromomethane	A1060-2453	0.72	0.72	ppb	U
75-27-4	Bromodichloromethane	A1060-2453	0.84	0.84	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2453	8.30	8.30	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2453	0.62	0.62	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2453	14.4	14.4	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-7

Client Sample ID: SMP-3

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 16:30

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2453	2.00	41.1	ppb	
10061-02-6	trans-1,3-Dichloropropene	A1060-2453	1.20	1.20	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2453	1.50	1.50	ppb	U
127-18-4	Tetrachloroethene	A1060-2453	3.80	3.80	ppb	U
142-28-9	1,3-Dichloropropane	A1060-2453	0.40	0.40	ppb	U
591-78-6	2-Hexanone	A1060-2453	14.4	14.4	ppb	U
124-48-1	Dibromochloromethane	A1060-2453	0.44	0.44	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2453	0.97	0.97	ppb	U
108-90-7	Chlorobenzene	A1060-2453	1.50	1.50	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2453	0.61	0.61	ppb	U
100-41-4	Ethylbenzene	A1060-2453	1.20	1.20	ppb	U
108-38-3	m,p-xylene	A1060-2453	2.40	2.40	ppb	U
95-47-6	o-xylene	A1060-2453	1.20	1.20	ppb	U
100-42-5	Styrene	A1060-2453	0.80	0.80	ppb	U
75-25-2	Bromoform	A1060-2453	0.73	0.73	ppb	U
98-82-8	Isopropylbenzene	A1060-2453	1.40	1.40	ppb	U
108-86-1	Bromobenzene	A1060-2453	1.10	1.10	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1060-2453	0.94	0.94	ppb	U
103-65-1	n-Propylbenzene	A1060-2453	1.60	1.60	ppb	U
96-18-4	1,2,3-Trichloropropane	A1060-2453	0.47	0.47	ppb	U
622-96-8	p-Ethyltoluene	A1060-2453	1.50	1.50	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2453	1.70	1.70	ppb	U
95-49-8	2-Chlorotoluene	A1060-2453	1.50	1.50	ppb	U
106-43-4	4-Chlorotoluene	A1060-2453	0.72	0.72	ppb	U
98-06-6	tert-Butylbenzene	A1060-2453	1.20	1.20	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2453	1.50	1.50	ppb	U
135-98-8	sec-Butylbenzene	A1060-2453	1.90	1.90	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2453	1.60	1.60	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2453	0.47	0.47	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2453	1.70	1.70	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2453	0.65	0.65	ppb	U
105-05-5	p-Diethylbenzene	A1060-2453	1.70	1.70	ppb	U



Environmental Testing Laboratories, Inc.

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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-7

Client Sample ID: SMP-3

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 16:30

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2453	2.60	2.60	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2453	2.30	2.30	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2453	2.50	2.50	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2453	1.40	1.40	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2453	1.90	1.90	ppb	U
91-20-3	Naphthalene	A1060-2453	4.00	4.00	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2453	97.6 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2453	98.6 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2453	99.0 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	A1061-2480	96.5 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1061-2480	99.4 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1061-2480	98.0 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-8

Client Sample ID: DMP-3

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 15:30

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2454	14.5	14.5	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2454	15.5	15.5	ppb	U
74-87-3	Chloromethane	A1060-2454	15.5	15.5	ppb	U
75-01-4	Vinyl Chloride	A1060-2454	14.0	342	ppb	
74-83-9	Bromomethane	A1060-2454	22.5	22.5	ppb	U
75-00-3	Chloroethane	A1061-2481	44.0	8180	ppb	
75-69-4	Trichlorofluoromethane	A1060-2454	24.0	24.0	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2454	14.0	14.0	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2454	11.5	65.1	ppb	
67-64-1	Acetone	A1060-2454	70.5	70.5	ppb	U
75-15-0	Carbon disulfide	A1060-2454	13.0	13.0	ppb	U
75-09-2	Methylene Chloride	A1060-2454	7.50	7.50	ppb	U
156-60-5	trans-1,2-Dichloroethene	A1060-2454	11.0	11.0	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2454	2.65	2.65	ppb	U
75-34-3	1,1-Dichloroethane	A1061-2481	22.0	10200	ppb	
590-20-7	2,2-Dichloropropane	A1060-2454	18.5	18.5	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1060-2454	8.00	8.00	ppb	U
78-93-3	2-Butanone	A1060-2454	82.0	82.0	ppb	U
74-97-5	Bromochloromethane	A1060-2454	3.30	3.30	ppb	U
67-66-3	Chloroform	A1060-2454	9.50	9.50	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2454	11.0	3610	ppb	
56-23-5	Carbon Tetrachloride	A1060-2454	16.0	16.0	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2454	20.0	20.0	ppb	U
71-43-2	Benzene	A1060-2454	10.5	10.5	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2454	8.50	8.50	ppb	U
79-01-6	Trichloroethene	A1060-2454	10.5	10.5	ppb	U
78-87-5	1,2-Dichloropropane	A1060-2454	7.50	7.50	ppb	U
74-95-3	Dibromomethane	A1060-2454	3.60	3.60	ppb	U
75-27-4	Bromodichloromethane	A1060-2454	4.20	4.20	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2454	41.5	41.5	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2454	3.10	3.10	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2454	72.0	72.0	ppb	U



Environmental Testing Laboratories, Inc.

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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-8

Client Sample ID: DMP-3

Collected: 08/04/2003 15:30

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2454	10.0	80.8	ppb	
10061-02-6	trans-1,3-Dichloropropene	A1060-2454	6.00	6.00	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2454	7.50	7.50	ppb	U
127-18-4	Tetrachloroethene	A1060-2454	19.0	19.0	ppb	U
142-28-9	1,3-Dichloropropane	A1060-2454	2.00	2.00	ppb	U
591-78-6	2-Hexanone	A1060-2454	72.0	72.0	ppb	U
124-48-1	Dibromochloromethane	A1060-2454	2.20	2.20	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2454	4.85	4.85	ppb	U
108-90-7	Chlorobenzene	A1060-2454	7.50	7.50	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2454	3.05	3.05	ppb	U
100-41-4	Ethylbenzene	A1060-2454	6.00	6.00	ppb	U
108-38-3	m,p-xylene	A1060-2454	12.0	12.0	ppb	U
95-47-6	o-xylene	A1060-2454	6.00	6.00	ppb	U
100-42-5	Styrene	A1060-2454	4.00	4.00	ppb	U
75-25-2	Bromoform	A1060-2454	3.65	3.65	ppb	U
98-82-8	Isopropylbenzene	A1060-2454	7.00	7.00	ppb	U
108-86-1	Bromobenzene	A1060-2454	5.50	5.50	ppb	U
79-34-5	1,1,1,2-Tetrachloroethane	A1060-2454	4.70	4.70	ppb	U
103-65-1	n-Propylbenzene	A1060-2454	8.00	8.00	ppb	U
96-18-4	1,2,3-Trichloropropane	A1060-2454	2.35	2.35	ppb	U
622-96-8	p-Ethyltoluene	A1060-2454	7.50	7.50	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2454	8.50	8.50	ppb	U
95-49-8	2-Chlorotoluene	A1060-2454	7.50	7.50	ppb	U
106-43-4	4-Chlorotoluene	A1060-2454	3.60	3.60	ppb	U
98-06-6	tert-Butylbenzene	A1060-2454	6.00	6.00	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2454	7.50	7.50	ppb	U
135-98-8	sec-Butylbenzene	A1060-2454	9.50	9.50	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2454	8.00	8.00	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2454	2.35	2.35	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2454	8.50	8.50	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2454	3.25	3.25	ppb	U
105-05-5	p-Diethylbenzene	A1060-2454	8.50	8.50	ppb	U



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-8

Client Sample ID: DMP-3

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 15:30

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2454	13.0	13.0	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2454	11.5	11.5	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2454	12.5	12.5	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2454	7.00	7.00	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2454	9.50	9.50	ppb	U
91-20-3	Naphthalene	A1060-2454	20.0	20.0	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2454	97.7 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2454	97.9 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2454	98.0 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	A1061-2481	97.3 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1061-2481	99.6 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1061-2481	98.5 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-9

Client Sample ID: SMP-4

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 16:15

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2455	2.90	2.90	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2455	3.10	3.10	ppb	U
74-87-3	Chloromethane	A1060-2455	3.10	3.10	ppb	U
75-01-4	Vinyl Chloride	A1060-2455	2.80	2.80	ppb	U
74-83-9	Bromomethane	A1060-2455	4.50	4.50	ppb	U
75-00-3	Chloroethane	A1060-2455	4.40	1290	ppb	
75-69-4	Trichlorofluoromethane	A1060-2455	4.80	4.80	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2455	2.80	2.80	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2455	2.30	2.30	ppb	U
67-64-1	Acetone	A1060-2455	14.1	613	ppb	
75-15-0	Carbon disulfide	A1060-2455	2.60	2.60	ppb	U
75-09-2	Methylene Chloride	A1060-2455	1.50	1.50	ppb	U
156-60-5	trans-1,2-Dichloroethene	A1060-2455	2.20	2.20	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2455	0.53	0.53	ppb	U
75-34-3	1,1-Dichloroethane	A1060-2455	2.20	54.5	ppb	
590-20-7	2,2-Dichloropropane	A1060-2455	3.70	3.70	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1060-2455	1.60	33.7	ppb	
78-93-3	2-Butanone	A1060-2455	16.4	16.4	ppb	U
74-97-5	Bromochloromethane	A1060-2455	0.66	0.66	ppb	U
67-66-3	Chloroform	A1060-2455	1.90	1.90	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2455	2.20	2.20	ppb	U
56-23-5	Carbon Tetrachloride	A1060-2455	3.20	3.20	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2455	4.00	4.00	ppb	U
71-43-2	Benzene	A1060-2455	2.10	2.10	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2455	1.70	1.70	ppb	U
79-01-6	Trichloroethene	A1060-2455	2.10	2.10	ppb	U
78-87-5	1,2-Dichloropropane	A1060-2455	1.50	1.50	ppb	U
74-95-3	Dibromomethane	A1060-2455	0.72	0.72	ppb	U
75-27-4	Bromodichloromethane	A1060-2455	0.84	0.84	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2455	8.30	8.30	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2455	0.62	0.62	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2455	14.4	14.4	ppb	U



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-9

Client Sample ID: SMP-4

Matrix: Liquid

Type: Grab

Collected: 08/04/2003 16:15

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2455	2.00	2.00	ppb	U
10061-02-6	trans-1,3-Dichloropropene	A1060-2455	1.20	1.20	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2455	1.50	1.50	ppb	U
127-18-4	Tetrachloroethene	A1060-2455	3.80	65.6	ppb	
142-28-9	1,3-Dichloropropane	A1060-2455	0.40	0.40	ppb	U
591-78-6	2-Hexanone	A1060-2455	14.4	14.4	ppb	U
124-48-1	Dibromochloromethane	A1060-2455	0.44	0.44	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2455	0.97	0.97	ppb	U
108-90-7	Chlorobenzene	A1060-2455	1.50	1.50	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2455	0.61	0.61	ppb	U
100-41-4	Ethylbenzene	A1060-2455	1.20	1.20	ppb	U
108-38-3	m,p-xylene	A1060-2455	2.40	2.40	ppb	U
95-47-6	o-xylene	A1060-2455	1.20	1.20	ppb	U
100-42-5	Styrene	A1060-2455	0.80	0.80	ppb	U
75-25-2	Bromoform	A1060-2455	0.73	0.73	ppb	U
98-82-8	Isopropylbenzene	A1060-2455	1.40	1.40	ppb	U
108-86-1	Bromobenzene	A1060-2455	1.10	1.10	ppb	U
79-34-5	1,1,1,2-Tetrachloroethane	A1060-2455	0.94	0.94	ppb	U
103-65-1	n-Propylbenzene	A1060-2455	1.60	1.60	ppb	U
96-18-4	1,2,3-Trichloropropane	A1060-2455	0.47	0.47	ppb	U
622-96-8	p-Ethyltoluene	A1060-2455	1.50	1.50	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2455	1.70	1.70	ppb	U
95-49-8	2-Chlorotoluene	A1060-2455	1.50	1.50	ppb	U
106-43-4	4-Chlorotoluene	A1060-2455	0.72	0.72	ppb	U
98-06-6	tert-Butylbenzene	A1060-2455	1.20	1.20	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2455	1.50	1.50	ppb	U
135-98-8	sec-Butylbenzene	A1060-2455	1.90	1.90	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2455	1.60	1.60	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2455	0.47	0.47	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2455	1.70	1.70	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2455	0.65	0.65	ppb	U
105-05-5	p-Diethylbenzene	A1060-2455	1.70	1.70	ppb	U



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-9

Client Sample ID: SMP-4

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 16:15

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2455	2.60	2.60	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2455	2.30	2.30	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2455	2.50	2.50	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2455	1.40	1.40	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2455	1.90	1.90	ppb	U
91-20-3	Naphthalene	A1060-2455	4.00	4.00	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2455	95.3 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2455	95.1 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2455	97.9 %	(89 - 122)	



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-10

Client Sample ID: DMP-4

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 14:45

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2456	2.90	2.90	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2456	3.10	3.10	ppb	U
74-87-3	Chloromethane	A1060-2456	3.10	3.10	ppb	U
75-01-4	Vinyl Chloride	A1060-2456	2.80	2.80	ppb	U
74-83-9	Bromomethane	A1060-2456	4.50	4.50	ppb	U
75-00-3	Chloroethane	A1061-2482	22.0	3560	ppb	
75-69-4	Trichlorofluoromethane	A1060-2456	4.80	4.80	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2456	2.80	2.80	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2456	2.30	2.30	ppb	U
67-64-1	Acetone	A1060-2456	14.1	14.1	ppb	U
75-15-0	Carbon disulfide	A1060-2456	2.60	2.60	ppb	U
75-09-2	Methylene Chloride	A1060-2456	1.50	10.2	ppb	
156-60-5	trans-1,2-Dichloroethene	A1060-2456	2.20	2.20	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2456	0.53	0.53	ppb	U
75-34-3	1,1-Dichloroethane	A1060-2456	2.20	2.20	ppb	U
590-20-7	2,2-Dichloropropane	A1060-2456	3.70	3.70	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1060-2456	1.60	1.60	ppb	U
78-93-3	2-Butanone	A1060-2456	16.4	16.4	ppb	U
74-97-5	Bromochloromethane	A1060-2456	0.66	0.66	ppb	U
67-66-3	Chloroform	A1060-2456	1.90	1.90	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2456	2.20	2.20	ppb	U
56-23-5	Carbon Tetrachloride	A1060-2456	3.20	3.20	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2456	4.00	4.00	ppb	U
71-43-2	Benzene	A1060-2456	2.10	2.10	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2456	1.70	1.70	ppb	U
79-01-6	Trichloroethene	A1060-2456	2.10	2.10	ppb	U
78-87-5	1,2-Dichloropropane	A1060-2456	1.50	1.50	ppb	U
74-95-3	Dibromomethane	A1060-2456	0.72	0.72	ppb	U
75-27-4	Bromodichloromethane	A1060-2456	0.84	0.84	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2456	8.30	8.30	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2456	0.62	0.62	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2456	14.4	14.4	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-10

Client Sample ID: DMP-4

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 14:45

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2456	2.00	10.7	ppb	
10061-02-6	trans-1,3-Dichloropropene	A1060-2456	1.20	1.20	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2456	1.50	1.50	ppb	U
127-18-4	Tetrachloroethene	A1060-2456	3.80	3.80	ppb	U
142-28-9	1,3-Dichloropropane	A1060-2456	0.40	0.40	ppb	U
591-78-6	2-Hexanone	A1060-2456	14.4	14.4	ppb	U
124-48-1	Dibromochloromethane	A1060-2456	0.44	0.44	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2456	0.97	0.97	ppb	U
108-90-7	Chlorobenzene	A1060-2456	1.50	1.50	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2456	0.61	0.61	ppb	U
100-41-4	Ethylbenzene	A1060-2456	1.20	1.20	ppb	U
108-38-3	m,p-xylene	A1060-2456	2.40	2.40	ppb	U
95-47-6	o-xylene	A1060-2456	1.20	1.20	ppb	U
100-42-5	Styrene	A1060-2456	0.80	0.80	ppb	U
75-25-2	Bromoform	A1060-2456	0.73	0.73	ppb	U
98-82-8	Isopropylbenzene	A1060-2456	1.40	1.40	ppb	U
108-86-1	Bromobenzene	A1060-2456	1.10	1.10	ppb	U
79-34-5	1,1,1,2-Tetrachloroethane	A1060-2456	0.94	0.94	ppb	U
103-65-1	n-Propylbenzene	A1060-2456	1.60	19.4	ppb	
96-18-4	1,2,3-Trichloropropane	A1060-2456	0.47	0.47	ppb	U
622-96-8	p-Ethyltoluene	A1060-2456	1.50	1.50	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2456	1.70	1.70	ppb	U
95-49-8	2-Chlorotoluene	A1060-2456	1.50	1.50	ppb	U
106-43-4	4-Chlorotoluene	A1060-2456	0.72	0.72	ppb	U
98-06-6	tert-Butylbenzene	A1060-2456	1.20	1.20	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2456	1.50	1.50	ppb	U
135-98-8	sec-Butylbenzene	A1060-2456	1.90	1.90	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2456	1.60	1.60	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2456	0.47	0.47	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2456	1.70	1.70	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2456	0.65	0.65	ppb	U
105-05-5	p-Diethylbenzene	A1060-2456	1.70	1.70	ppb	U



Environmental Testing Laboratories, Inc.

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-10

Client Sample ID: DMP-4

Collected: 08/04/2003 14:45

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2456	2.60	2.60	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2456	2.30	2.30	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2456	2.50	2.50	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2456	1.40	1.40	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2456	1.90	1.90	ppb	U
91-20-3	Naphthalene	A1060-2456	4.00	4.00	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2456	96.9 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2456	97.6 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2456	98.2 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	A1061-2482	97.2 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1061-2482	100.0 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1061-2482	97.8 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-11

Client Sample ID: MW-3S

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/06/2003 10:40

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2457	0.29	0.29	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2457	0.31	0.31	ppb	U
74-87-3	Chloromethane	A1060-2457	0.31	0.31	ppb	U
75-01-4	Vinyl Chloride	A1060-2457	0.28	0.28	ppb	U
74-83-9	Bromomethane	A1060-2457	0.45	0.45	ppb	U
75-00-3	Chloroethane	A1060-2457	0.44	0.44	ppb	U
75-69-4	Trichlorofluoromethane	A1060-2457	0.48	0.48	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2457	0.28	0.28	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2457	0.23	0.23	ppb	U
67-64-1	Acetone	A1060-2457	1.41	1.41	ppb	U
75-15-0	Carbon disulfide	A1060-2457	0.26	0.26	ppb	U
75-09-2	Methylene Chloride	A1060-2457	0.15	0.15	ppb	U
156-60-5	trans-1,2-Dichloroethene	A1060-2457	0.22	0.22	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2457	0.053	0.053	ppb	U
75-34-3	1,1-Dichloroethane	A1060-2457	0.22	0.22	ppb	U
590-20-7	2,2-Dichloropropane	A1060-2457	0.37	0.37	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1060-2457	0.16	0.16	ppb	U
78-93-3	2-Butanone	A1060-2457	1.64	1.64	ppb	U
74-97-5	Bromochloromethane	A1060-2457	0.066	0.066	ppb	U
67-66-3	Chloroform	A1060-2457	0.19	0.19	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2457	0.22	0.22	ppb	U
56-23-5	Carbon Tetrachloride	A1060-2457	0.32	0.32	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2457	0.40	0.40	ppb	U
71-43-2	Benzene	A1060-2457	0.21	0.21	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2457	0.17	0.17	ppb	U
79-01-6	Trichloroethene	A1060-2457	0.21	23.5	ppb	
78-87-5	1,2-Dichloropropane	A1060-2457	0.15	0.15	ppb	U
74-95-3	Dibromomethane	A1060-2457	0.072	0.072	ppb	U
75-27-4	Bromodichloromethane	A1060-2457	0.084	0.084	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2457	0.83	0.83	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2457	0.062	0.062	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2457	1.44	1.44	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-11

Client Sample ID: MW-3S

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/06/2003 10:40

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2457	0.20	0.20	ppb	U
10061-02-6	trans-1,3-Dichloropropene	A1060-2457	0.12	0.12	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2457	0.15	0.15	ppb	U
127-18-4	Tetrachloroethene	A1060-2457	0.38	3.72	ppb	
142-28-9	1,3-Dichloropropane	A1060-2457	0.040	0.040	ppb	U
591-78-6	2-Hexanone	A1060-2457	1.44	1.44	ppb	U
124-48-1	Dibromochloromethane	A1060-2457	0.044	0.044	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2457	0.097	0.097	ppb	U
108-90-7	Chlorobenzene	A1060-2457	0.15	0.15	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2457	0.061	0.061	ppb	U
100-41-4	Ethylbenzene	A1060-2457	0.12	0.12	ppb	U
108-38-3	m,p-xylene	A1060-2457	0.24	0.24	ppb	U
95-47-6	o-xylene	A1060-2457	0.12	0.12	ppb	U
100-42-5	Styrene	A1060-2457	0.080	0.080	ppb	U
75-25-2	Bromoform	A1060-2457	0.073	0.073	ppb	U
98-82-8	Isopropylbenzene	A1060-2457	0.14	0.14	ppb	U
108-86-1	Bromobenzene	A1060-2457	0.11	0.11	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1060-2457	0.094	0.094	ppb	U
103-65-1	n-Propylbenzene	A1060-2457	0.16	0.16	ppb	U
96-18-4	1,2,3-Trichloropropane	A1060-2457	0.047	0.047	ppb	U
622-96-8	p-Ethyltoluene	A1060-2457	0.15	0.15	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2457	0.17	0.17	ppb	U
95-49-8	2-Chlorotoluene	A1060-2457	0.15	0.15	ppb	U
106-43-4	4-Chlorotoluene	A1060-2457	0.072	0.072	ppb	U
98-06-6	tert-Butylbenzene	A1060-2457	0.12	0.12	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2457	0.15	0.15	ppb	U
135-98-8	sec-Butylbenzene	A1060-2457	0.19	0.19	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2457	0.16	0.16	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2457	0.047	0.047	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2457	0.17	0.17	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2457	0.065	0.065	ppb	U
105-05-5	p-Diethylbenzene	A1060-2457	0.17	0.17	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-11

Client Sample ID: MW-3S

Collected: 08/06/2003 10:40

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2457	0.26	0.26	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2457	0.23	0.23	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2457	0.25	0.25	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2457	0.14	0.14	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2457	0.19	0.19	ppb	U
91-20-3	Naphthalene	A1060-2457	0.40	0.40	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2457	97.0 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2457	98.0 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2457	98.5 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-12

Client Sample ID: MW-4S

Collected: 08/06/2003 11:45

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2458	0.29	0.29	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2458	0.31	0.31	ppb	U
74-87-3	Chloromethane	A1060-2458	0.31	0.31	ppb	U
75-01-4	Vinyl Chloride	A1060-2458	0.28	0.28	ppb	U
74-83-9	Bromomethane	A1060-2458	0.45	0.45	ppb	U
75-00-3	Chloroethane	A1060-2458	0.44	0.44	ppb	U
75-69-4	Trichlorofluoromethane	A1060-2458	0.48	0.48	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2458	0.28	0.28	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2458	0.23	0.23	ppb	U
67-64-1	Acetone	A1060-2458	1.41	1.41	ppb	U
75-15-0	Carbon disulfide	A1060-2458	0.26	0.26	ppb	U
75-09-2	Methylene Chloride	A1060-2458	0.15	0.15	ppb	U
156-60-5	trans-1,2-Dichloroethene	A1060-2458	0.22	0.22	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2458	0.053	3.50	ppb	
75-34-3	1,1-Dichloroethane	A1060-2458	0.22	0.22	ppb	U
590-20-7	2,2-Dichloropropane	A1060-2458	0.37	0.37	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1060-2458	0.16	0.16	ppb	U
78-93-3	2-Butanone	A1060-2458	1.64	1.64	ppb	U
74-97-5	Bromochloromethane	A1060-2458	0.066	0.066	ppb	U
67-66-3	Chloroform	A1060-2458	0.19	0.19	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2458	0.22	0.22	ppb	U
56-23-5	Carbon Tetrachloride	A1060-2458	0.32	0.32	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2458	0.40	0.40	ppb	U
71-43-2	Benzene	A1060-2458	0.21	0.21	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2458	0.17	0.17	ppb	U
79-01-6	Trichloroethene	A1060-2458	0.21	3.09	ppb	
78-87-5	1,2-Dichloropropane	A1060-2458	0.15	0.15	ppb	U
74-95-3	Dibromomethane	A1060-2458	0.072	0.072	ppb	U
75-27-4	Bromodichloromethane	A1060-2458	0.084	0.084	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2458	0.83	0.83	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2458	0.062	0.062	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2458	1.44	1.44	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-12

Client Sample ID: MW-4S

Collected: 08/06/2003 11:45

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2458	0.20	0.20	ppb	U
10061-02-6	trans-1,3-Dichloropropene	A1060-2458	0.12	0.12	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2458	0.15	0.15	ppb	U
127-18-4	Tetrachloroethene	A1063-2519	1.90	118	ppb	
142-28-9	1,3-Dichloropropane	A1060-2458	0.040	0.040	ppb	U
591-78-6	2-Hexanone	A1060-2458	1.44	1.44	ppb	U
124-48-1	Dibromochloromethane	A1060-2458	0.044	0.044	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2458	0.097	0.097	ppb	U
108-90-7	Chlorobenzene	A1060-2458	0.15	0.15	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2458	0.061	0.061	ppb	U
100-41-4	Ethylbenzene	A1060-2458	0.12	0.12	ppb	U
108-38-3	m,p-xylene	A1060-2458	0.24	0.24	ppb	U
95-47-6	o-xylene	A1060-2458	0.12	0.12	ppb	U
100-42-5	Styrene	A1060-2458	0.080	0.080	ppb	U
75-25-2	Bromoform	A1060-2458	0.073	0.073	ppb	U
98-82-8	Isopropylbenzene	A1060-2458	0.14	0.14	ppb	U
108-86-1	Bromobenzene	A1060-2458	0.11	0.11	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1060-2458	0.094	0.094	ppb	U
103-65-1	n-Propylbenzene	A1060-2458	0.16	0.16	ppb	U
96-18-4	1,2,3-Trichloropropane	A1060-2458	0.047	0.047	ppb	U
622-96-8	p-Ethyltoluene	A1060-2458	0.15	0.15	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2458	0.17	0.17	ppb	U
95-49-8	2-Chlorotoluene	A1060-2458	0.15	0.15	ppb	U
106-43-4	4-Chlorotoluene	A1060-2458	0.072	0.072	ppb	U
98-06-6	tert-Butylbenzene	A1060-2458	0.12	0.12	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2458	0.15	0.15	ppb	U
135-98-8	sec-Butylbenzene	A1060-2458	0.19	0.19	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2458	0.16	0.16	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2458	0.047	0.047	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2458	0.17	0.17	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2458	0.065	0.065	ppb	U
105-05-5	p-Diethylbenzene	A1060-2458	0.17	0.17	ppb	U



Environmental Testing Laboratories, Inc.

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-12

Client Sample ID: MW-4S

Collected: 08/06/2003 11:45

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2458	0.26	0.26	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2458	0.23	0.23	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2458	0.25	0.25	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2458	0.14	0.14	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2458	0.19	0.19	ppb	U
91-20-3	Naphthalene	A1060-2458	0.40	0.40	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2458	97.5 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2458	98.6 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2458	98.3 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	A1063-2519	97.2 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1063-2519	100.0 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1063-2519	99.0 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-13

Client Sample ID: Trip Blank

Collected: 08/06/2003

Matrix: Liquid

Type: Trip Blank

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2444	0.29	0.29	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2444	0.31	0.31	ppb	U
74-87-3	Chloromethane	A1060-2444	0.31	0.31	ppb	U
75-01-4	Vinyl Chloride	A1060-2444	0.28	0.28	ppb	U
74-83-9	Bromomethane	A1060-2444	0.45	0.45	ppb	U
75-00-3	Chloroethane	A1060-2444	0.44	0.44	ppb	U
75-69-4	Trichlorofluoromethane	A1060-2444	0.48	0.48	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2444	0.28	0.28	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2444	0.23	0.23	ppb	U
67-64-1	Acetone	A1060-2444	1.41	1.41	ppb	U
75-15-0	Carbon disulfide	A1060-2444	0.26	0.26	ppb	U
75-09-2	Methylene Chloride	A1060-2444	0.15	1.82	ppb	
156-60-5	trans-1,2-Dichloroethene	A1060-2444	0.22	0.22	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2444	0.053	0.053	ppb	U
75-34-3	1,1-Dichloroethane	A1060-2444	0.22	0.22	ppb	U
590-20-7	2,2-Dichloropropane	A1060-2444	0.37	0.37	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1060-2444	0.16	0.16	ppb	U
78-93-3	2-Butanone	A1060-2444	1.64	1.64	ppb	U
74-97-5	Bromochloromethane	A1060-2444	0.066	0.066	ppb	U
67-66-3	Chloroform	A1060-2444	0.19	0.19	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2444	0.22	0.22	ppb	U
56-23-5	Carbon Tetrachloride	A1060-2444	0.32	0.32	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2444	0.40	0.40	ppb	U
71-43-2	Benzene	A1060-2444	0.21	0.21	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2444	0.17	0.17	ppb	U
79-01-6	Trichloroethene	A1060-2444	0.21	0.21	ppb	U
78-87-5	1,2-Dichloropropane	A1060-2444	0.15	0.15	ppb	U
74-95-3	Dibromomethane	A1060-2444	0.072	0.072	ppb	U
75-27-4	Bromodichloromethane	A1060-2444	0.084	0.084	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2444	0.83	0.83	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2444	0.062	0.062	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2444	1.44	1.44	ppb	U



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-13

Client Sample ID: Trip Blank

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Trip Blank

Collected: 08/06/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2444	0.20	0.20	ppb	U
10061-02-6	trans-1,3-Dichloropropene	A1060-2444	0.12	0.12	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2444	0.15	0.15	ppb	U
127-18-4	Tetrachloroethene	A1060-2444	0.38	0.38	ppb	U
142-28-9	1,3-Dichloropropane	A1060-2444	0.040	0.040	ppb	U
591-78-6	2-Hexanone	A1060-2444	1.44	1.44	ppb	U
124-48-1	Dibromochloromethane	A1060-2444	0.044	0.044	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2444	0.097	0.097	ppb	U
108-90-7	Chlorobenzene	A1060-2444	0.15	0.15	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2444	0.061	0.061	ppb	U
100-41-4	Ethylbenzene	A1060-2444	0.12	0.12	ppb	U
108-38-3	m,p-xylene	A1060-2444	0.24	0.24	ppb	U
95-47-6	o-xylene	A1060-2444	0.12	0.12	ppb	U
100-42-5	Styrene	A1060-2444	0.080	0.080	ppb	U
75-25-2	Bromoform	A1060-2444	0.073	0.073	ppb	U
98-82-8	Isopropylbenzene	A1060-2444	0.14	0.14	ppb	U
108-86-1	Bromobenzene	A1060-2444	0.11	0.11	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1060-2444	0.094	0.094	ppb	U
103-65-1	n-Propylbenzene	A1060-2444	0.16	0.16	ppb	U
96-18-4	1,2,3-Trichloropropane	A1060-2444	0.047	0.047	ppb	U
622-96-8	p-Ethyltoluene	A1060-2444	0.15	0.15	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2444	0.17	0.17	ppb	U
95-49-8	2-Chlorotoluene	A1060-2444	0.15	0.15	ppb	U
106-43-4	4-Chlorotoluene	A1060-2444	0.072	0.072	ppb	U
98-06-6	tert-Butylbenzene	A1060-2444	0.12	0.12	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2444	0.15	0.15	ppb	U
135-98-8	sec-Butylbenzene	A1060-2444	0.19	0.19	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2444	0.16	0.16	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2444	0.047	0.047	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2444	0.17	0.17	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2444	0.065	0.065	ppb	U
105-05-5	p-Diethylbenzene	A1060-2444	0.17	0.17	ppb	U



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-13

Client Sample ID: Trip Blank

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Trip Blank

Collected: 08/06/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2444	0.26	0.26	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2444	0.23	0.23	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2444	0.25	0.25	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2444	0.14	0.14	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2444	0.19	0.19	ppb	U
91-20-3	Naphthalene	A1060-2444	0.40	0.40	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2444	97.1 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2444	97.8 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2444	97.9 %	(89 - 122)	



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08/20/2003

Total Iron by Method SW846 6010

Sample: P7340-1

Client Sample ID: MW-8

Matrix: Liquid

Remarks:

Analyzed Date: 08/13/1903

Preparation Date(s) : 08/12/2003

Type: Grab

Collected: 08/05/2003 11:15

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.018	0.036	ppm	

Sample: P7340-2

Client Sample ID: MW-12

Matrix: Liquid

Remarks:

Analyzed Date: 08/13/1903

Preparation Date(s) : 08/12/2003

Type: Grab

Collected: 08/05/2003 12:05

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.018	27.9	ppm	

Sample: P7340-3

Client Sample ID: MW-13

Matrix: Liquid

Remarks:

Analyzed Date: 08/13/1903

Preparation Date(s) : 08/12/2003

Type: Grab

Collected: 08/05/2003 13:25

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.018	2.74	ppm	



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08/20/2003

Total Iron by Method SW846 6010

Sample: P7340-4

Client Sample ID: MW-14

Collected: 08/04/2003 14:20

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/13/1903

Preparation Date(s) : 08/12/2003

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.018	186	ppm	

Sample: P7340-5

Client Sample ID: SMP-1

Collected: 08/04/2003 16:00

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/13/1903

Preparation Date(s) : 08/12/2003

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.018	27.6	ppm	

Sample: P7340-6

Client Sample ID: DMP-1

Collected: 08/04/2003 14:20

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/13/1903

Preparation Date(s) : 08/12/2003

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.018	2.17	ppm	



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08/20/2003

Total Iron by Method SW846 6010

Sample: P7340-7

Client Sample ID: SMP-3

Matrix: Liquid

Remarks:

Analyzed Date: 08/13/1903

Preparation Date(s) : 08/12/2003

Type: Grab

Collected: 08/04/2003 16:30

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.018	13.4	ppm	

Sample: P7340-8

Client Sample ID: DMP-3

Matrix: Liquid

Remarks:

Analyzed Date: 08/13/1903

Preparation Date(s) : 08/12/2003

Type: Grab

Collected: 08/04/2003 15:30

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.018	3.95	ppm	

Sample: P7340-9

Client Sample ID: SMP-4

Matrix: Liquid

Remarks:

Analyzed Date: 08/13/1903

Preparation Date(s) : 08/12/2003

Type: Grab

Collected: 08/04/2003 16:15

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.018	214	ppm	



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08/20/2003

Total Iron by Method SW846 6010

Sample: P7340-10

Client Sample ID: DMP-4

Matrix: Liquid

Type: Grab

Collected: 08/04/2003 14:45

Remarks:

Analyzed Date: 08/13/1903

Preparation Date(s) : 08/12/2003

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.018	114	ppm	



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08/20/2003

Nitrogen/Nitrate - EPA 353.2

Sample: P7340-1

Client Sample ID: MW-8

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/05/2003 11:15

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	5.76	ppm	

Sample: P7340-2

Client Sample ID: MW-12

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/05/2003 12:05

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	0.085	ppm	

Sample: P7340-3

Client Sample ID: MW-13

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/05/2003 13:25

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	2.16	ppm	



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08/20/2003

Nitrogen/Nitrate - EPA 353.2

Sample: P7340-4

Client Sample ID: MW-14

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 14:20

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	0.080	ppm	

Sample: P7340-5

Client Sample ID: SMP-1

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 16:00

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	0.084	ppm	

Sample: P7340-6

Client Sample ID: DMP-1

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 14:20

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	0.026	ppm	



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08/20/2003

Nitrogen/Nitrate - EPA 353.2

Sample: P7340-7

Client Sample ID: SMP-3

Collected: 08/04/2003 16:30

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/08/2003

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	0.055	ppm	

Sample: P7340-8

Client Sample ID: DMP-3

Collected: 08/04/2003 15:30

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/08/2003

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	0.15	ppm	

Sample: P7340-9

Client Sample ID: SMP-4

Collected: 08/04/2003 16:15

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/08/2003

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	0.33	ppm	



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08/20/2003

Nitrogen/Nitrate - EPA 353.2

Sample: P7340-10

Client Sample ID: DMP-4

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 14:45

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	0.17	ppm	



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08/20/2003

Sulfate - EPA 375.4

Sample: P7340-1

Client Sample ID: MW-8

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/05/2003 11:15

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	0.56	58.6	ppm	

Sample: P7340-2

Client Sample ID: MW-12

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/05/2003 12:05

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	2.79	440	ppm	

Sample: P7340-3

Client Sample ID: MW-13

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/05/2003 13:25

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	2.79	419	ppm	



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08/20/2003

Sulfate - EPA 375.4

Sample: P7340-4

Client Sample ID: MW-14

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 14:20

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	2.79	87.5	ppm	

Sample: P7340-5

Client Sample ID: SMP-1

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 16:00

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	2.79	8.50	ppm	

Sample: P7340-6

Client Sample ID: DMP-1

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 14:20

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	1.12	138	ppm	



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08/20/2003

Sulfate - EPA 375.4

Sample: P7340-7

Client Sample ID: SMP-3

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 16:30

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	1.12	85.6	ppm	

Sample: P7340-8

Client Sample ID: DMP-3

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 15:30

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	2.79	519	ppm	

Sample: P7340-9

Client Sample ID: SMP-4

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 16:15

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	5.58	59.1	ppm	



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08/20/2003

Sulfate - EPA 375.4

Sample: P7340-10

Client Sample ID: DMP-4

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 14:45

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	5.58	59.1	ppm	



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08/20/2003

Total Organic Carbon - Method 415.1

Sample: P7340-1

Client Sample ID: MW-8

Collected: 08/05/2003 11:15

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/18/2003

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.51	4.69	ppm	

Sample: P7340-2

Client Sample ID: MW-12

Collected: 08/05/2003 12:05

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/19/2003

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.51	59.8	ppm	

Sample: P7340-3

Client Sample ID: MW-13

Collected: 08/05/2003 13:25

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/19/2003

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.51	24.1	ppm	



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08/20/2003

Total Organic Carbon - Method 415.1

Sample: P7340-4

Client Sample ID: MW-14

Matrix: Liquid

Remarks:

Analyzed Date: 08/19/2003

Type: Grab

Collected: 08/04/2003 14:20

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.51	1360	ppm	

Sample: P7340-5

Client Sample ID: SMP-1

Matrix: Liquid

Remarks:

Analyzed Date: 08/19/2003

Type: Grab

Collected: 08/04/2003 16:00

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.51	168	ppm	

Sample: P7340-6

Client Sample ID: DMP-1

Matrix: Liquid

Remarks:

Analyzed Date: 08/19/2003

Type: Grab

Collected: 08/04/2003 14:20

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.51	151	ppm	



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

08/20/2003

Total Organic Carbon - Method 415.1

Sample: P7340-7

Client Sample ID: SMP-3

Matrix: Liquid

Remarks:

Analyzed Date: 08/19/2003

Type: Grab

Collected: 08/04/2003 16:30

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.51	168	ppm	

Sample: P7340-8

Client Sample ID: DMP-3

Matrix: Liquid

Remarks:

Analyzed Date: 08/19/2003

Type: Grab

Collected: 08/04/2003 15:30

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.51	132	ppm	

Sample: P7340-9

Client Sample ID: SMP-4

Matrix: Liquid

Remarks:

Analyzed Date: 08/19/2003

Type: Grab

Collected: 08/04/2003 16:15

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.51	837	ppm	



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

08/20/2003

Total Organic Carbon - Method 415.1

Sample: P7340-10

Client Sample ID: DMP-4

Matrix: Liquid

Remarks:

Analyzed Date: 08/19/2003

Collected: 08/04/2003 14:45

Type: Grab

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.51	295	ppm	



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08/20/2003

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 and 2-Chloroethylvinylether 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.



Environmental Testing Laboratories, Inc.

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

08/20/2003

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 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)
- x - Outside Expected Range

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

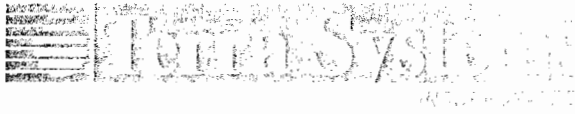
P 07340

Project Name: <u>Proteomics</u>		Project Manager: <u>Andy Becker</u>		Sampler (Signature): <u>DMJ/DRH</u>		(Print): <u>Darick M. Jordan</u>	
Project Address: <u>31 Sea Cliff Ave, Glen Cove, NY</u>							
Client: <u>Proteomics</u> J/N: <u>643.001</u>		☐ Rush by <u>1/1</u>					
SAMPLE INFO		Type: SS = Soil, Spoon; G = Grab; C = Composite; B = Blank Matrix: L = Liquid; S = Soil; SL = Sludge; A = Air; W = Waste		*Air - Vol (Liters) / Include Flow (CFM)			
ID	Date	Time	Type	Matrix	Sample Location	Total # Cont.	
1	8/5/03	11:15	G	L	MW-8	6	601/602
2	8/5/03	12:05			MW-12	6	BTX/BTEX
3	8/5/03	13:25			MW-13	6	MTBE
4	8/5/03	14:20			MW-14	6	624/8260/8021
5	8/4/03	16:00			SMP-1	6	625/8270/BN
6	8/4/03	14:20			DMP-1	6	PCB/Pesticides
7	8/4/03	16:30			SMP-3	6	Pet. Prods./B100M
8	8/4/03	15:30			DMP-3	6	RCRA Metals
9	8/4/03	16:15			SMP-4	6	pH/Flash/React
10	8/4/03	14:45			DMP-4	6	418.1 - TRPH
11	8/6/03	10:40			MW-35	2	8260B
12	8/6/03	11:45			MW-45	2	IDL
13	-	-			Tip Blank	1	N-Hex
14	8/6/03	12:00	G	A	SUE Int.	1	Sulfate
15							Total Iron
Relinquished by (Signature): <u>Darick M. Jordan</u>		Date: <u>8/6/03</u>	Printed Name & Agent: <u>Darick M. Jordan</u>		Received by (Signature): <u>[Signature]</u>		
Relinquished by (Signature):		Date:	Printed Name & Agent:		Received for Lab by (Signature): <u>[Signature]</u>		
Comments & Special Instructions		QA/QC Type:	Number & Type of Containers: <u>30-250P 23-10AS</u>		Preservatives: <u>H2SO4 HCL</u>	Temp: <u>5°C CMB</u>	

10-Annals

10-Annals

10-Annals



October 27, 2003

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

RE: August 2003 Status Report Photocircuits Accelerated Anaerobic Bioremediation Pilot

Dear Charlie:

Attached is the August 2003 Status Report for the Photocircuits Accelerated Anaerobic Bioremediation Project. Data from the beginning of the project in August 2000 through August 2003 is provided and discussed. Please let me know if you have any questions.

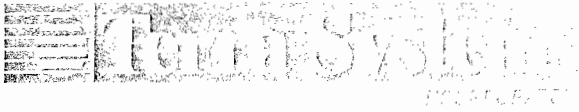
Sincerely,
TERRA SYSTEMS, INC.

Michael D Lee, Ph.D.

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

cc: Andy Barber

INITIALS	
FILE #	
COPY TO	
Barton & Leguizamo PC	
OCT 30 03	
ROUTE TO	



**AUGUST 2003
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**

OCTOBER 27, 2003

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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

Table 2. Photocircuits Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

Table 3. Photocircuits Anaerobic Pilot Field Data

Table 4. Photocircuits Anaerobic Pilot Percent Change Between 9/1/00 and 1/8/02 or 8/4/03

Table 5. Photocircuits Downgradient Wells Percent Change between 3/28/00 and 1/8/02 or 8/4/03

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

ABBREVIATIONS

1DCA	1,1-Dichloroethane
1DCE	1,1-Dichloroethene or 1,1-Dichloroethylene or Vinylidene Chloride
1TCA	1,1,1-Trichloroethane
bgs	Below Ground Surface
CA	Chloroethane
cDCE	cis-1,2-Dichloroethene or cis-1,2-chloroethylene
msl	mean sea level
MTBE	Methyl Tert Butyl Ether
µg/L	Microgram per Liter
µM	Micromole per Liter
PCE	Tetrachloroethene or Perchloroethylene
SRS TM	Slow Release Substrate
TCE	Trichloroethene or Trichloroethylene
tDCE	trans-1,2-Dichloroethene or trans-1,2-Dichloroethylene
TOC	Total Organic Carbon
TSI	Terra Systems, Inc.
VC	Vinyl Chloride
VOC	Volatile Organic Carbon

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 $\mu\text{g/L}$. The initial pilot bioremediation system consisted of six injection points in a line spaced about 15 to 20 feet apart. A slow release substrate (SRS) containing edible oil was designed to provide a slow release food grade carbon source over a period in excess of twelve months. A total of 3,600 gallons of the soybean oil emulsion was injected. The substrate concentrations were selected based on previous experience. An additional 5,722 gallons of the emulsified substrate was injected in months 17 and 19 (February and April 2002) at twelve injection points. VOC and substrate concentrations have been monitored eleven times over a thirty-two month period at eight wells spaced throughout the treatment area. VOC and substrate concentrations have also been monitored at six 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 after the first injection 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. Well MW-7 has contained the emulsion since April 2002 and has not been sampled. Contaminant levels increased in MW-7 between August 2000 and January 2002 when the last sample was collected from this well. An increase in total VOCs has also been observed in wells MW-14 and DMP-4 since the first injection of substrate in August 2000. 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 DMP-4. 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 (63-99%) were generally observed. Degradation rates for the total VOCs (9/1/00 concentration minus 8/4/03 concentration divided by 1067 days) were as high as 182 $\mu\text{g/L-day}$ (well SMP-3) in higher concentration areas with greater than 100,000 $\mu\text{g/L}$ total volatiles. In other areas with lower concentrations, total VOC degradation rates were lower, in the range of 6.9 (SMP-4) to 28 $\mu\text{g/L-day}$ (SMP-1). The average total contaminant concentrations within the pilot cell have fallen by 77% since September 2000. This average includes the wells sampled on 8/4/03 and the well (MW-7) last sampled on 1/8/02. The substrate reinjection in February and April 2002 increased

the TOC concentrations in all wells within the pilot. In August 2003, TOC levels ranged from 132 mg/L in DMP-3 to 1,360 mg/L in MW-14 with an average of 444 mg/L. 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.

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

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. Wells MW-10 and MW-11 were monitored in January 2002 and January 2003. The locations of these wells are shown in Figure 1 with the exception of MW-9, MW-10, and MW-11 that are further to the west. It should be noted that these wells are not expected to be impacted by the bioremediation study.

Ground surface in the vicinity of the study area is about 60 feet above mean sea level (msl). In the pilot area, wells are screened between 10 and 52 feet msl. Downgradient wells 8, 10, and 11 are deep monitoring wells and wells MW-9, MW-12, and MW-13 are shallow wells. The screen intervals for the wells are shown below:

- Well MW-14 10 to 20 feet msl
- MW-7 37 to 52 feet msl
- SMP-1 50 to 52 feet msl
- SMP-3 45 to 47 feet msl
- SMP-4 45 to 47 feet msl
- DMP-1 40 to 42 feet msl

- DMP-3 35 to 37 feet msl,
- DMP-4 38 to 40 feet msl
- MW-8 -111 and -96 feet msl
- MW-9 31 to 46 feet msl
- MW-10 -72 to - 57 feet msl,
- MW-11 -112 to -97 feet mls
- MW-12 9 to 19 feet msl, and
- MW-13 11 to 21 feet msl.

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.

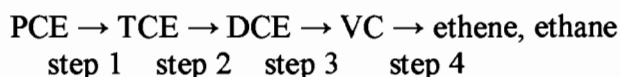
The following technology description is from a report entitled “Cost and Performance Report – In Situ Anaerobic Bioremediation Pinellas Northeast Site Largo, Florida” prepared for the U.S. Department of Energy (1998) by Sandia National Laboratories and Hazardous Waste Remedial Actions Program.

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.



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 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. Wells MW-10 and MW-11 were sampled in January 2002 and January 2003. 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

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.

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. About 4,530 pounds of soybean oil and lecithin was injected. 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. bgs and 5 one-inch wells installed to 55 ft. bgs. 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.

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 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 eleven field sampling events over a 32 month period.

5.2 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 and January, April, and August 2003.
- 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. Well MW-14 was sampled in January, April, and August 2003, but not MW-7. 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 8/4-5/03 for wells MW-8, MW-12, and MW-13, for well MW-9 between 3/28/01 and 1/14/03, and between 1/22/02 and 1/14/03 for wells MW-10 and MW-11.
- 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 August 2003.

5.3 Project To Date Results

The following table summarizes the status of the key performance measures for this project as of August 2003. Details are described in subsequent sections..

Performance Measures	Values/Results
Treatment Volume:	
Soil	Approximately 92' X 157' X 60', 866,640 ft ³
Ground Water Treated:	Approximately 1,620,617 gallons
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	182 µg/L-day
1 – 100 mg/L concentration levels	6.9 to 28 µg/L-day
Reduction of total contaminants of concern:	Achieved reductions of 30% to >99% except in MW-14, 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 48 months

5.3.1 Chlorinated Ethene Results

In the monitoring wells within the pilot cell, cis-1,2-DCE, VC, and ethene were initially 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, TCE, cDCE, tDCE, and VC were not detected in wells SMP-1 and DMP-4 in August 2003; only ethene remained in these wells. TCE, cDCE, tDCE, VC, and ethene concentrations increased in well DMP-1 between October 2002 and January 2003, but then decreased in the April and August 2003 sampling events. In August 2003, ethene represented 87% of the

chlorinated ethenes in well DMP-1. Relatively low levels of TCE, cDCE, tDCE, and VC were also found in well MW-7 at the last sampling point in January 2002 with ethene being the primary product. With the increased substrate levels observed in MW-7, the chlorinated ethene concentrations are expected to decline; however, due to the presence of the emulsion in this well has not been sampled. PCE, TCE, and cDCE were also found in August 2003 at relatively low levels in wells MW-14, DMP-3, and SMP-4. VC concentrations decreased in wells MW-14, DMP-1, SMP-3, and SMP-4 between April and August 2003.

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-7 (through 1/8/02), SMP-3, and DMP-3 through 8/4/03 from the initial levels observed on 8/31/00-9/1/00. Ethene concentrations for the other four 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, SMP-4, and DMP-4.

In the downgradient monitoring wells sampled since March 2001, wells MW-8, MW-10, MW-11, MW-12, and MW-13 had parent compounds PCE and/or TCE. Concentrations greater than 1,000 µg/L of chlorinated ethenes only detected in MW-12. Since March 2001, six months after the first substrate injection, TCE, cDCE, tDCE, and VC concentrations have declined in MW-12 with increased ethene concentrations. The first emulsion injection appeared to have had an effect on MW-12 based upon the increases in ethene, methane, and TOC. However, TCE, cDCE, and VC concentrations have changed little since January 2002. The availability of substrate (<0.9 to 73 mg/L TOC) may be limiting the extent of dechlorination at this well. Ethene has only been detected at low levels in the other downgradient wells. The very low levels of TCE and cDCE found in MW-8 had dissipated from April 2002 until to January 2003, but were detected again in April and August 2003. Little change in the concentrations of PCE, TCE, cDCE, or VC was noted in the deep well MW-10 between 1/22/02 and 1/14/03. Low levels of TCE and cDCE appeared in the deep well MW-11 in January 2003. PCE, TCE, cDCE, tDCE, and VC concentrations have decreased slightly in MW-13, but ethene has only been detected at low concentrations of 5.8 µg/L or less in this well. Although the area around MW-13 appeared to be substrate-limited from March 2001 until November 2002, the availability of substrate has increased to between 24 and 39 mg/L from January through August 2003.

5.3.2 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 99.8% (178,000 µg/L to 372 µg/L) reduction in the 1TCA concentrations. 1TCA levels in wells DMP-3, SMP-4, and DMP-4 have dropped by 82 to 99.9 percent. 1DCA concentrations have dropped in SMP-3 (62%), DMP-4 (>93), SMP-4 (99%), and SMP-1 (>99.6%). However, increased 1DCA concentrations have been noted in MW-14, MW-7 (through 1/8/02), DMP-1, and DMP-3 as a result of the dechlorination of 1TCA. Large reductions in the 1DCE concentrations have been observed in wells SMP-3 (<81%), DMP-3 (58%) and SMP-4 (>98%), but 1DCE increased in MW-14. 1DCE was not detected in August 2000 or 2003 in SMP-1 and DMP-1. CA concentrations have declined by 67% in DMP-1, but increased in other pilot wells. 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 in addition to the 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 2000). Alternatively, sulfides generated from the reduction of sulfate may be reacting abiotically with the 1TCA and 1DCA (Gander et al. 2002).

Well SMP-4 has shown decreases in the 1TCA, 1DCA, CA, and ethane concentrations over the thirty-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 SRSTM, the 1TCA and 1DCA concentrations dropped. Concentrations of 1TCA, 1DCA, and 1DCE higher than initial levels were observed in wells MW-14, MW-7 (through 1/8/02), DMP-1, and DMP-3. However, further degradation products CA and ethane levels are elevated in wells MW-14, MW-7, SMP-1, SMP-3, DMP-3, SMP-4, and DMP-4. Chloroethane can be biodegraded under aerobic and methanogenic conditions (Lee and Davis 2000).

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. In the deep well MW-10, concentrations of 1DCA, 2DCA, 1DCE were relatively stable between January 2002 and January 2003, and CA was detected. A low level of 1DCA was detected in MW-11 in January 2003. 1DCA, 1DCE, and ethane concentrations increased in MW-12 between July 2001 and April 2002, but are now similar to the levels seen in March 2001. In MW-13, 1TCA, 1DCA, 1DCE, and ethane concentrations have decreased by 90 to 97%.

5.3.3 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 thirty-five months of the project operation to date, acetone concentrations decreased by >99.9% in DMP-1, but increased in MW-14 and SMP-4. In August 2003, acetone was found at 613 µg/L in SMP-4 and represented 30% of the total volatiles in this well. Methylene chloride has decreased in all wells except MW-14 with declines by as much as >99.7 percent in SMP-1, >99% in DMP-1, 99.7% in SMP-3, 98% in DMP-3, 99% in SMP-4, 55% in DMP-4, and 38% in MW-7 (through 1/8/02), but increased in MW-14 through August 2003. Methylene chloride can also be anaerobically degraded. Toluene concentrations have declined in all eight wells in the project area. 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 97% in SMP-4 and >98% 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. We are speculating that the MTBE plume is from an off-site source since it was not used on the Photocircuits site. MTBE has not been detected in any monitoring well since July 2002. The MTBE appears to have flushed through the system. In August 2003, other potential components of gasoline including benzene, toluene, o-xylene, 1,2,4-trimethyl benzene, 1,3,5-trimethyl benzene, and/or naphthalene were detected in wells SMP-1, DMP-1, SMP-3, DMP-3, and DMP-4, but not wells SMP-4 or MW-14.

Few of the contaminants other than the chlorinated ethenes and ethanes were found in the downgradient wells. 2-Chlorotoluene concentrations have decreased by 70% in MW-13 between 3/28/01 and 8/4/03, but increased slightly in MW-12. 4-Chlorotoluene has been found in MW-12. A low level of o-xylene was found in MW-12 in January 2002, but none was detected in subsequent samples. Benzene was detected in MW-12 in January 2002, April 2003, and August 2003. Acetone, methylene chloride, benzene, and n-propylbenzene have been detected in MW-13. Concentrations of benzene fell below detection limits in April 2003. None of these compounds were detected in wells MW-10 or MW-11 in January 2002 or January 2003.

5.3.4 Sum of VOAs

The sum of the concentrations of all of the contaminants in each well was calculated excluding the final degradation endproduct gases, acetylene, ethene, and ethane. The sum of the VOAs has declined by up to 99% in SMP-1 with large decreases in DMP-1 (88%), SMP-3 (83%), DMP-3 (30%), and SMP-4 (78%). The sum of VOAs has increased by 3,459% in MW-14 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 (-34%). The overall average of the sum of the volatiles has declined by 79% over the course of the pilot and full scale implementation. This average includes the seven wells sampled on 8/5/03 and the well (MW-7) last sampled on 1/8/02.

A first order degradation half-life of 533 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 48 months.

Since 3/28/01, the total volatiles in the downgradient wells outside of the influence of the substrate injection have fallen in MW-10 (1%), MW-12 (45%), and MW-13 (71%), but increased in MW-8 (-990%), and MW-11 (-5617%) and have remained non-detect in MW-9.

5.3.5 Substrate Distribution

The total organic carbon concentrations in August 2003 within the pilot cell ranged from 132 mg/L in DMP-3 to 1,360 mg/L in MW-14. Well MW-7 contained the emulsion in August 2003 and was not sampled. It presumably contains very high levels of TOC. TOC levels were above 100 mg/L in all wells in August 2003. 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 except MW-14 as a result of the February-April 2002 injection event.

The substrate injection has apparently impacted TOC levels only in wells MW-12 and MW-13 of the downgradient wells. Downgradient wells MW-8, MW-9, MW-10, MW-11, MW-12, and MW-13 appear to be substrate-limited.

5.3.6 Electron Acceptor Results

As the microbes break down the emulsion, sulfate would be depleted and the concentrations of iron and methane would increase. Nitrate-nitrogen was present in August 2003 at low concentrations of 0.026 to 0.33 mg/L and is a minor electron acceptor. The predominant electron acceptor in the groundwater in August 2003 was sulfate with concentrations that ranged from 8.5 mg/L in SMP-1 to 519 mg/L in DMP-3. Sulfate concentrations have declined from the initial concentrations in September 2000 in wells MW-14 (98%), SMP-1 (96%), DMP-1 (99.5% from 29,600 to 138 mg/L), SMP-3 (70%), SMP-4 (94%), and DMP-4 (56%) as would be expected with consumption of the oil emulsion. However, sulfate levels have increased in MW-7 (though 1/8/02) and DMP-3 over the course of the pilot. The average sulfate concentration in the cell has declined by 97%. Total iron concentrations within the pilot in August 2003 ranged from 2.17 mg/L in DMP-1 to 214 mg/L in SMP-4, which indicated that iron is also an important electron acceptor. Total iron concentrations have increased in five of the eight wells in the study 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 August 2003, methanogenic conditions ($>1,000 \mu\text{g/L}$) was detected in all wells. Methane concentrations have increased in all eight monitoring wells in the project area between September 2000 and August 2003.

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. No electron acceptor data was available for wells MW-10 and MW-11. Well MW-12 is under sulfate or iron-reducing conditions based upon the elevated iron levels and

drops in sulfate concentrations. Although methane and iron concentrations have increased in MW-13 and sulfate levels have declined, nitrate levels are high enough (2.16 mg/L) for it to be the dominant electron acceptor.

5.3.7 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 since January 2002 for wells SMP-1, DMP-1, SMP-3, DMP-3, SMP-4, and DMP-4. Field parameters were collected for downgradient wells MW-8, MW-9, MW-12, and MW-13 since the April 2002 sampling event. 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, but declined to between 7.0 and 7.6 from January to August 2003. The pH dropped to slightly acidic conditions of 5.3-6.1 in SMP-4. Downgradient wells MW-12 and MW-13 were slightly acidic to neutral, 6.2 to 7.3. The pH in the downgradient well MW-8 ranged from slightly acidic, 6.4 to slightly basic, 8.7. Groundwater temperatures ranged between 11.5 to 24.8 °C. In general the specific conductivity of the groundwater was high, between 2,660 and 5,890 umhos/cm. Downgradient wells MW-8 and MW-9 had lower specific conductivity readings of 120 to 221 umhos/cm. Downgradient wells MW-12 and MW-13 had higher specific conductivity levels.

Negative redox potentials of -35 (SMP-4) to -128 mV (DMP-4) were found in the wells within the pilot cell in August 2003 except SMP-1. Well SMP-1 went dry during sampling and the field parameters may not be representative. Downgradient well MW-8 had a positive redox potential in August 2003, which is consistent with the low levels of contaminants found in this well. Although well MW-13 has higher contaminant levels, its redox potential ranged from -10 to 300 mV. The redox potential of MW-12 has ranged between -136 mV to 69 mV. Low (<1.0 mg/L) dissolved oxygen reading were observed in well DMP-3 and DMP-4 in August 2003. 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 after July 2002.

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

There have been twelve groundwater sampling events during the course of the study. As of August 2003, the average total volatile contaminant concentrations within the pilot have decreased by 79%.

During the treatment period of 35 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 79%.
- The average concentrations of the parent compound 1,1,1-trichloroethane has decreased by 98%.
- PCE, TCE, cDCE, and VC were not detected in wells SMP-1 and DMP-4 in August 2003.
- Three monitoring wells (MW-7, MW-14, and DMP-4) have shown increased total volatile concentrations since September 1, 2000 by 33 to 3,459%. Well MW-7 could not

be sampled in since January 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 4/28/03, total VOC concentrations have decreased by 57% in MW-14. Since first monitored in May 1999, well DMP-4 has shown an increase in total volatiles from 1,636 to 3,600 µg/L largely due to an increase in the 1TCA degradation product CA between June and August 2003.

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 ft³ (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 48 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.

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 79% over the course of 35 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 182 µg/L per day in higher concentration areas. In areas with lower total volatile concentrations, degradation rates range from 6.9 to 28 µg/L per day. Wells MW-7 (through January 2002), MW-14, and DMP-4 have shown increases in total VOCs through their last sampling point in August 2003. The increase in the total VOCs was in well DMP-4 was 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 533 days was calculated for the average total volatile contaminants within the pilot cell. This average includes the wells sampled on 8/4/03 and the well MW-7 last sampled on 1/8/02. Based upon this degradation rate, 90% of the total contaminants should be removed within 48 months.

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

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 132 to 1,360 mg/L in August 2003. 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, MW-7 through 1/8/02, and 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.

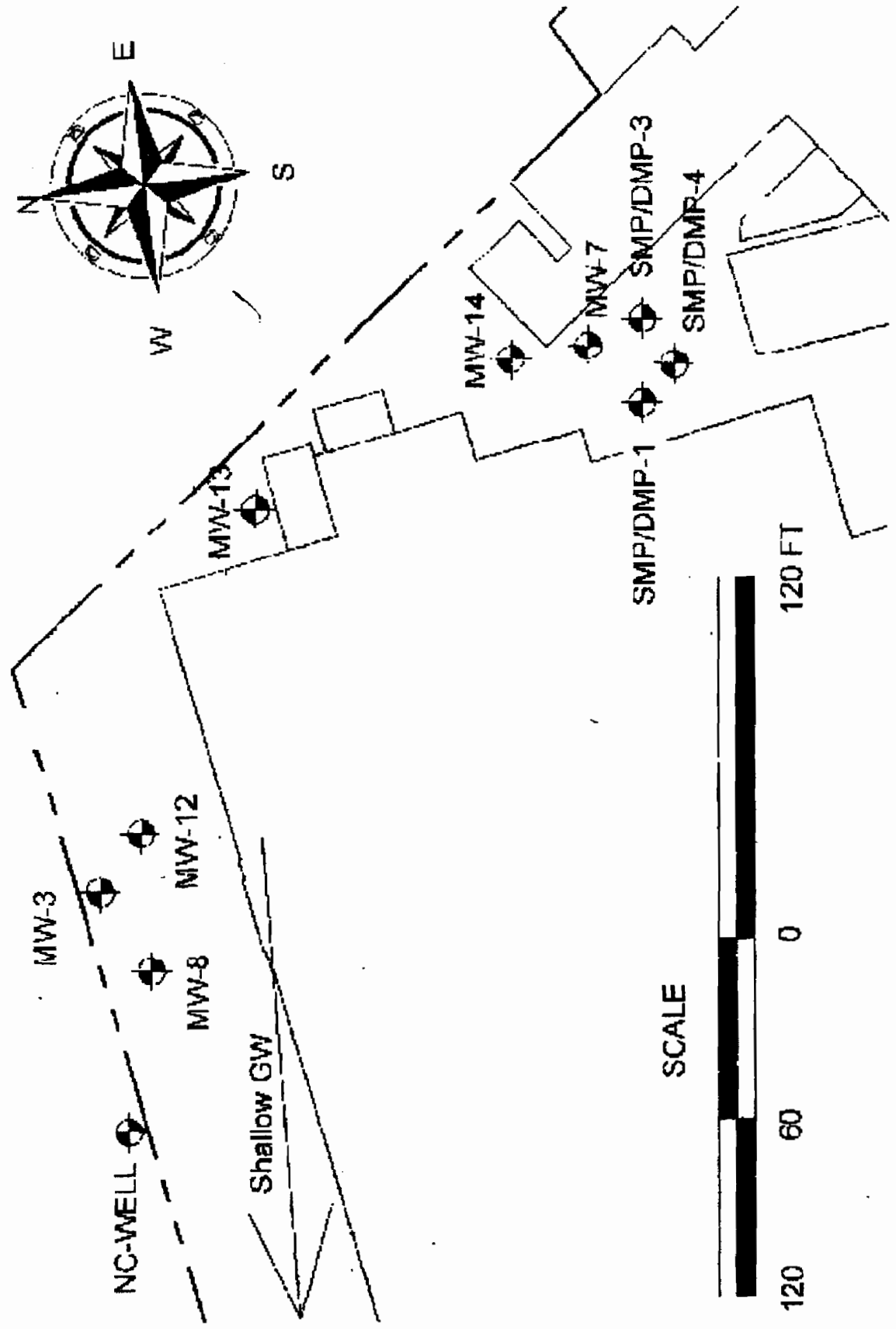
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FIGURES

Figure 1. Site Map Showing Well Locations



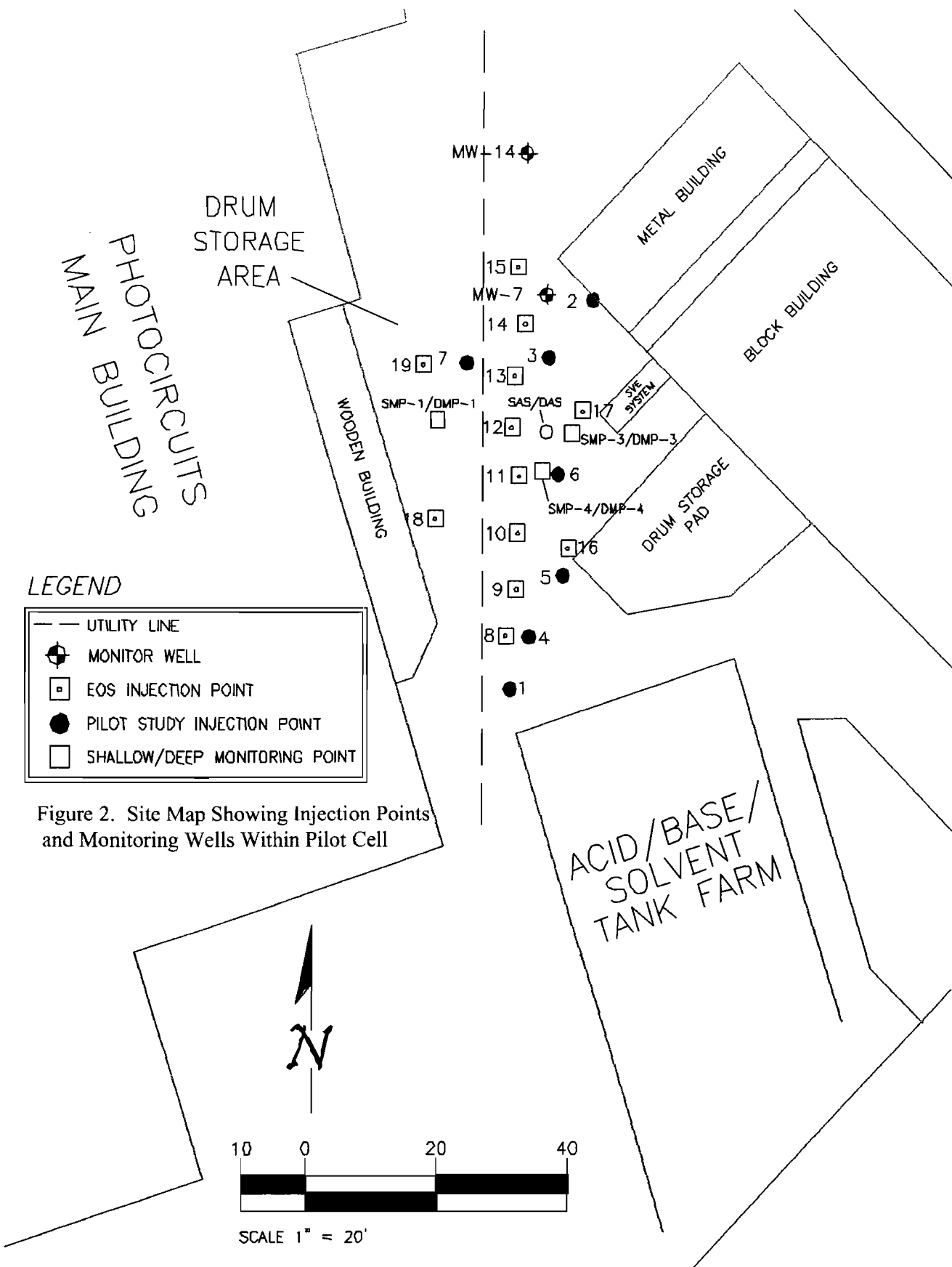


Figure 2. Site Map Showing Injection Points and Monitoring Wells Within Pilot Cell

TABLES

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	MW-14									
Date	8/31/2000	10/19/2000	12/20/2000	3/28/2001	7/11/2001	1/8/2002	1/14/2003	4/28/2003	8/5/2003	
Days	0	49	111	209	314	495	866	970	1069	
Tetrachloroethene	µg/L	<1.4	<0.40	<5.5	<4.0	<2.4	<31	<38	<3.8	
Trichloroethene	µg/L	<0.85	<1.35	<0.85	<10	<3.4	<23	<21	<2.1	
cis-1,2-Dichloroethene	µg/L	<0.95	<1.7	<0.95	<15	<2.8	<3.6	<16	8.48	
trans-1,2-Dichloroethene	µg/L	<1.35	<1.40	<1.35	<11	<2.8	<5.8	<22	<2.20	
Vinyl Chloride	µg/L	<1.75	10.6	<1.75	114	145	173	342	139	
Ethene	µg/L	43	47	60	65	90		68	34	
Acetylene	µg/L					5.7		<1.2	<1.2	
1,1,1-Trichloroethane	µg/L	14.4	<1.7	8.9	994	2040	1520	1020	507	
1,1-Dichloroethane	µg/L	126	216	293	9230	18800	14100	8580	9580	
1,2-Dichloroethane	µg/L	<0.80	<0.95	<0.80	<10	34.2	<3.2	<17	<1.70	
1,1-Dichloroethene	µg/L	<1.05	6.3	<1.05	443	751	542	323	90.8	
Chloroethane	µg/L	15.6	<1.25	<1.65	132	298	501	848	2160	
Ethane	µg/L	52	69	48	34	66	49	18	10	
Acetone	µg/L	97.8	170	126	<74	551	986	<566	754	
Methylene Chloride	µg/L	15.1	<1.50	<1.0	220	156	134	<31.5	52.9	
2-Butanone	µg/L	124	75.3	<5.1	<125	863	344	<826	797	
Toluene	µg/L	3.0	<0.80	<0.80	<7.5	32.4	25	<19	<2.00	
Benzene	µg/L	<0.70	<1.05	<1.2	<8	<2.6	<3.4	<20	<2.1	
p-Ethyltoluene	µg/L	<1.2	<1.05	<1.2	<8	<4.4	<4.8	<31	<1.5	
1,3,5-Trimethylbenzene	µg/L	<0.60	<1.50	<0.60	<17	<2.2	<2.4	<17	<1.70	
2-Chlorotoluene	µg/L	<0.85	<1.35	<0.85	<10.5	<3.2	<4.2	<15	<1.50	
1,2,4-Trimethylbenzene	µg/L	<0.65	<1.25	<0.65	<11	<4.4	<2.6	<15	<1.50	
Naphthalene	µg/L	<1.35	<0.90	<1.35	<9.5	<8.2	<5.4	<40	<4.00	
o-Xylene	µg/L	<0.40	<1.35	<0.40	<8	<3.2	<3.2	<12	<1.20	
n-Propylbenzene	µg/L	<0.70	<1.40	<0.70	<10.5	<6.2	<2.8	<16	<1.6	
Methyl T-Butyl Ether	µg/L	<1.25	<1.15	<1.25	<14	<1.6	<3.6	<29	<0.53	
Sum VOCs (w/o Gases)	µg/L	396	478	428	11133	23671	18325	13330	14089	
Methane	µg/L	44	58	380	1800	6400	8050	10600	6260	
Iron, Total	mg/L	55.2	13.2	69	197	188	279	219	186	
Sulfate	mg/L	5470	779	32.6	307	1270	441	141	87.5	
Nitrate-Nitrogen	mg/L		0.15	0.17	<0.025	<0.0015	<0.13	<0.025	0.080	
Total Organic Carbon	mg/L	23500	868	1990	2590	3530	2630	2650	1360	

Table 1. Photocultures Anaerobic Pilot Analytical Summary

Well	MW-7						
Date	8/31/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	
Days	0	49	111	208	314	495	
Tetrachloroethene	µg/L	<0.40	<0.56	<0.40	<2.2	<0.20	<0.12
Trichloroethene	µg/L	<0.85	19.3	<0.85	<4	16	2.7
cis-1,2-Dichloroethene	µg/L	47.3	283	355	149	187	8.3
trans-1,2-Dichloroethene	µg/L	<1.35	<0.56	<1.35	<4.4	2.6	2.1
Vinyl Chloride	µg/L	39.3	67.1	139	60	63.9	10.5
Ethene	µg/L	63	170	110	33	94	110
Acetylene	µg/L						<1.2
1,1,1-Trichloroethane	µg/L	<0.55	<0.62	<0.55	<4	<0.16	<0.14
1,1-Dichloroethane	µg/L	122	214	268	135	207	193
1,2-Dichloroethane	µg/L	<0.80	<0.38	<0.80	<4	<0.13	3.7
1,1-Dichloroethene	µg/L	<1.05	<0.96	<1.05	<3.6	1.9	<0.22
Chloroethane	µg/L	258	181	201	160	269	390
Ethane	µg/L	<6	130	81	34	71	68
Acetone	µg/L	<9.45	52.2	<9.45	<29.6	18.5	<2.3
Methylene Chloride	µg/L	12.8	6.0	<1	51.6	3.9	8.0
2-Butanone	µg/L	<5.1	<1.64	<5.1	<50	<6.25	17.2
Toluene	µg/L	6.2	8.4	8.3	<3	8.6	0.95
Benzene	µg/L	4.0	3.5	<0.7	<2	2.8	6.5
p-Ethyltoluene	µg/L	<1.2	<0.68	<1.2	<3.2	<0.22	<0.24
1,3,5-Trimethylbenzene	µg/L	<0.60	<0.60	<0.6	<6.8	<0.11	<0.12
2-Chlorotoluene	µg/L	<0.85	5.2	<0.85	<4.2	6.3	8.4
1,2,4-Trimethylbenzene	µg/L	<0.65	<0.50	<0.65	<4.4	1.2	0.93
Naphthalene	µg/L	<1.35	<0.36	<1.35	<3.8	1.2	<0.27
o-Xylene	µg/L	<0.40	<0.54	<0.4	<3.2	1.1	<0.16
n-Propylbenzene	µg/L	<0.70	<0.56	<0.7	<4.2	<0.31	<0.14
Methyl T-Butyl Ether	µg/L	<1.25	<0.46	<1.25	<5.6	<0.080	<0.18
Sum VOAs (w/o Gases)	µg/L	490	840	971	556	791	652
Methane	µg/L	660	1900	760	1050	5930	5050
Iron, Total	mg/L	2.22	1.84	3.93	6.72	8.78	13.1
Sulfate	mg/L	104	117	264	203	68.9	949
Nitrate-Nitrogen	mg/L		<0.015	0.023	0.029	0.017	0.085 J
Total Organic Carbon	mg/L	38.8	53.1	60	72.9	58.5	1.67

Table 1. Photocircuits: Anaerobic Pilot Analytical Summary

Well	SNP-1													
Date	8/31/2000	10/18/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003		
Days	0	48	111	208	314	495	579	663	762	865	970	1068		
Tetrachloroethene	µg/L	<16	<0.40	<22	<5.5	<2.0	<6.0	<12	<5.5	<0.22	<2.48	<0.76	<3.80	
Trichloroethene	µg/L	<34	79	860	1530	25.3	4410	26600	41	<0.72	<1.84	<0.42	<2.10	
cis-1,2-Dichloroethene	µg/L	24900	37500	30100	<0.27	12300	18000	42500	25700	680	<1.68	<0.32	<1.60	
trans-1,2-Dichloroethene	µg/L	<54	69.9	<40	132	34.5	68.5	376	<15.5	<0.62	<1.84	<0.44	<2.20	
Vinyl Chloride	µg/L	4710	5990	5090	4770	4230	3490	1780	8920	2540	<2.04	<0.56	<2.80	
Ethene	µg/L	930	2400	1140	900	1890	650	800	1820	3710	1180	800	190	
Acetylene	µg/L						<11	7.4	<1.2	<2.2	<2.2	<5.5	<2.2	
1,1,1-Trichloroethane	µg/L	<22	<0.55	<34	356	158	<7.0	<11	<13	<0.52	<1.4	<0.44	<2.20	
1,1-Dichloroethane	µg/L	506	486	628	708	536	456	366	295	197	29.5	26.3	<2.20	
1,2-Dichloroethane	µg/L	<32	<0.80	<17	<10	<1.3	<8.0	<11.5	<11.5	<0.46	<0.92	<0.34	<1.70	
1,1-Dichloroethene	µg/L	<42	64.3	<27	184	55.1	143	296	50.5	<0.54	<2.52	<0.46	<2.30	
Chloroethane	µg/L	<72	71.6	<53	<15	<1.8	<33.5	<30.5	<12.0	37.6	38.7	241	261	
Ethane	µg/L	<6	<6	<25	<25	<25	<12	<1.3	3.6	4.6	1.8	<6.0	<2.4	
Acetone	µg/L	<378	<9.45	<166	<74	<14.4	<115	<156	<56.5	<2.26	<45.3	101	<14.1	
Methylene Chloride	µg/L	482	43.1	<56	<20.5	11.9	<18.5	<27	<10.5	<0.42	<2.52	2.75	<1.50	
2-Butanone	µg/L	<204	<5.1	<68	<125	<62.5	<860	<250	<190	<7.6	<66.1	<3.28	<16.4	
Toluene	µg/L	<32	61.1	<19	126	51.4	55	194	114	58.5	25.7	48.9	18.4	
Benzene	µg/L	<28	4.40	<34	<5	<1.3	<8.5	<8	<10.5	94	22.8	24.4	<2.10	
p-Ethyltoluene	µg/L	<48	<1.2	<20	<8	11.3	<12	<12	<8.0	<0.32	<2.48	<0.30	<1.50	
1,3,5-Trimethylbenzene	µg/L	<24	<0.60	<20	<17	<1.1	<6.0	<10	<10	<0.4	<2.28	<0.34	<1.70	
2-Chlorotoluene	µg/L	<34	16.3	<25	<10.5	47.3	<10.5	<13.5	<12.5	17.8	<1.52	10.1	<1.50	
1,2,4-Trimethylbenzene	µg/L	<26	<0.65	<65	<11	15.7	<6.5	<8.5	<8.5	<0.34	<2.4	<0.30	<1.50	
Naphthalene	µg/L	<54	<1.35	<16	<9.5	21.2	<13.5	<7	<14.5	<0.58	<3.76	<0.80	<4.00	
o-Xylene	µg/L	<16	<0.40	<18	<8	11.4	<8.0	<10	<12.5	5.7	<1.32	<0.24	<1.20	
n-Propylbenzene	µg/L	<28	<0.70	<17	<10.5	<3.1	<7.0	<10.5	<8.0	<0.32	<2.48	<0.32	<1.60	
Methyl T-Butyl Ether	µg/L	<50	<1.25	<25	<14	<0.80	117	<17	<9.0	<0.36	<2.32	<0.11	<0.053	
Sum VOCs (w/o Gases)	µg/L	30598	44386	36678	7806	17509	26740	72112	35121	3631	117	454	279	
Methane	µg/L	3400	6200	2500	2060	3400	1100	2110	1890	2570	3680	5290	4810	
Iron, Total	mg/L	19.8	11.6	15.1	11.1	29.9	16.4	18.3	11.2	12.2	13	42.2	27.6	
Sulfate	mg/L	236	360	443	813	905	732	513	143	134	60.4	25.2	8.5	
Nitrate-Nitrogen	mg/L	0.054	0.071	0.071	12.3	0.016	<0.13	0.046	<0.025	<0.025	0.084	0.11	0.084	
Total Organic Carbon	mg/L	91.7	83.4	88	59.7	45.9	23.8	63.1	125	139	186	1280	168	

Table 1. Photocultures Anaerobic Pilot Analytical Summary

Well	DMP-1									
Date	8/31/2000	10/18/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003
Days	0	48	111	208	314	495	579	663	762	865
Tetrachloroethene	µg/L	<0.40	<0.080	<0.40	<5.5	<1.0	<0.60	<0.48	<0.11	<3.1
Trichloroethene	µg/L	<0.85	<0.17	<0.85	<10	4.5	<0.85	29.3	1.6	<2.3
cis-1,2-Dichloroethene	µg/L	50.4	1.70	17.4	73.5	38.4	<0.90	44.3	127	1610
trans-1,2-Dichloroethene	µg/L	<1.35	<0.27	<1.35	<11	<0.70	<1.4	3.9	4.2	<2.3
Vinyl Chloride	µg/L	188	3.5	40	125	42.7	<4.25	62	180	1780
Ethene	µg/L	560	1080	920	690	110	93	160	430	1080
Acetylene	µg/L									
1,1,1-Trichloroethane	µg/L	<0.55	<0.11	<0.55	193	28.1	<0.70	<1.2	<1.2	<1.2
1,1-Dichloroethane	µg/L	91.8	17.6	357	1130	1320	423	0.89	<0.26	<1.75
1,2-Dichloroethane	µg/L	<0.80	<0.16	<0.80	<10	14.9	<0.80	2.9	2.3	4.86
1,1-Dichloroethene	µg/L	<1.05	<0.21	<1.05	<9	<0.70	<1.10	<0.27	<0.27	<1.15
Chloroethane	µg/L	3290	43.4	232	159	193	97	69.7	15.5	<2.45
Ethane	µg/L	<6	<6	<50	<100	<50	0.81	<1.3	1.7	16
Acetone	µg/L	8670	139	557	<74	1150	<11.5	<6.24	46.8	<56.6
Methylene Chloride	µg/L	68.3	1.40	22.4	191	32.8	<0.85	<1.08	1.8	<3.15
2-Butanone	µg/L	<5.1	<1.02	5.1	<125	<31.3	<86	<10	<3.8	<82.7
Toluene	µg/L	36.5	2.80	24.1	40.5	9.1	<0.70	2.2	7.2	14.4
Benzene	µg/L	<0.70	<0.14	5.5	<5	<0.65	<0.85	<0.32	48	98
p-Ethyltoluene	µg/L	2.9	<0.24	<1.2	<8	<1.1	<1.2	<0.4	1.7	<3.1
1,3,5-Trimethybenzene	µg/L	2.8	<0.12	<0.60	<17	<0.55	<0.60	1.4	1.6	<2.85
2-Chlorotoluene	µg/L	23.7	<0.17	18.2	<10.5	33.7	79.7	57.6	27.8	36.2
1,2,4-Trimethybenzene	µg/L	8.4	0.77	8.4	<11	4.8	4.7	3.4	4.0	<3.0
Naphthalene	µg/L	3.1	<0.27	<1.35	<9.5	<2.05	<1.35	<0.28	3.2	3.02
o-Xylene	µg/L	<0.40	<0.080	<0.40	<8	<0.80	<0.80	0.82	1.1	<1.65
n-Propylbenzene	µg/L	<0.70	<0.14	16.9	<10.5	<1.55	<0.70	<0.42	1.1	<3.1
Methyl T-Buyl Ether	µg/L	<1.25	<0.25	<1.25	<14	<0.40	<0.90	<0.16	<0.16	<2.9
Sum VOCs (w/o Gases)	µg/L	12436	210	1304	1912	2872	604	512	886	4025
Methane	µg/L	8200	23000	10300	4660	730	330	520	2530	2933
Iron, Total	mg/L	88.5	4.45	3.1	21.7	8.65	15.9	6.8	4.2	2.88
Sulfate	mg/L	29600	37.7	179	715	1420	1200	590	1040	13.1
Nitrate-Nitrogen	mg/L		0.20	0.024	0.05	0.019	<0.13	0.0041	0.027	0.026
Total Organic Carbon	mg/L	299	224	137	132	54.5	8.14	41.1	58.7	101
								24.3	284	151

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	SNP-3											
Date	9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003
Days	0	49	111	208	314	495	579	662	761	864	969	1067
Tetrachloroethene	µg/L	<80	<80	<8	13.7	12.2	<6.0	<24	<5.5	9.6	<6.2	<3.8
Trichloroethene	µg/L	<170	<170	<17	<0.2	<1.7	<8.5	<34	<18	2.6	<4.6	<2.10
cis-1,2-Dichloroethene	µg/L	<190	<190	<19	2.3	16.4	<9.0	<36	<12	7.5	<4.2	<1.60
trans-1,2-Dichloroethene	µg/L	<270	<270	<27	<0.22	<1.4	<14	<56	<15.5	1.7	<4.6	<2.20
Vinyl Chloride	µg/L	<350	<350	<35	38.8	98.8	<42.5	<170	118	105	<5.1	73.9
Ethene	µg/L	84	98	39	18	110	180	220	260	130	96	94
Acetylene	µg/L						2.1	5.4	2.2	6.3	<1.2	<1.2
1,1,1-Trichloroethane	µg/L	178000	235000	32600	33700	13100	14500	7610	8070	5660	5780	4510
1,1-Dichloroethane	µg/L	38200	47800	4770	<0.5	17600	8860	20500	10800	7620	7160	5830
1,2-Dichloroethane	µg/L	<160	<160	<16	6	20.6	<8.0	<32	<11.5	5.3	<2.3	<1.70
1,1-Dichloroethene Chloroethane	µg/L	<210	<210	<21	<0.27	164	146	<44	112	337	312	239
Ethane	µg/L	<330	<330	<33	76.6	411	346	<134	354	509	519	1220
Acetone	µg/L	39	45	41	23	29	17	36	33	11	11	7.5
Methylene Chloride	µg/L	<1890	<1890	<189	3690	536	<115	<460	<56.5	70.3	<113	256
2-Butanone	µg/L	2400	<200	<20	14.6	122	89	152	<10.5	24.7	<6.3	13.6
Toluene	µg/L	<1020	<1020	<102	<2.5	<62.5	<860	<340	<190	<3.8	<165	<16.4
Benzene	µg/L	<160	<160	<16	31.7	96.5	54.5	<28	76	53.8	33.2	32.2
p-Ethyltoluene	µg/L	<140	<140	<14	<0.1	20.6	<8.5	<34	<10.5	2.6	<4.0	<2.10
1,3,5-Trimethylbenzene	µg/L	<240	<240	<24	<0.16	<2.2	<12	<48	<8.0	<0.16	<6.2	<1.50
2-Chlorotoluene	µg/L	<120	<120	<12	0.63	<1.1	<6.0	<24	<10	<0.2	<5.7	<1.70
1,2,4-Trimethylbenzene	µg/L	<170	<170	<17	5.1	<1.6	<10.5	<42	<12.5	21.8	<3.8	<1.50
Naphthalene	µg/L	<130	<130	<13	<0.22	<2.2	<6.5	<26	<8.5	1.6	<6.0	<1.50
o-Xylene	µg/L	<270	<270	<27	<0.19	<4.1	<13.5	<54	<14.5	1.1	<9.4	<4.00
n-Propylbenzene	µg/L	<80	<80	<8	<0.1	<3.1	<7.0	<32	<12.5	0.82	<3.3	<1.20
Methyl T-Buyl Ether	µg/L	<140	<140	<14	<0.21	<3.1	<7.0	<28	<8.0	<0.16	<6.2	<1.60
Sum VOCs (w/o Gases)	µg/L	<250	<250	<25	<0.28	9.0	117	<36	<9.0	<0.18	<5.8	<0.53
Methane	µg/L	218600	282800	37370	37579	32207	24113	28262	19530	14434	13804	12175
Iron, Total	mg/L	100	140	44	36	500	1020	2000	5500	740	19500	16000
Sulfate	mg/L	50.6	5.91	69.6	3.92	32.5	5.39	8.46	4.63	10.1	55.3	9
Nitrate-Nitrogen	mg/L	286	392	154	53.7	1050	1640	3640	119	558	14.1	75.2
Total Organic Carbon	mg/L	294	<0.015	0.53	0.037	<0.015	<0.13	0.009 J	0.017 J	<0.025	0.19	0.076
			432	22.7	48.1	176	34.4	1600	173	40.3	39.1	184
												168

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	DMP-3									
Date	9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	11/13/2003
Days	0	49	111	208	314	495	579	662	761	864
Tetrachloroethene	µg/L	<16	60.5	<4.0	<1.1	72.3	<12	<2.2	<0.11	<31
Trichloroethene	µg/L	<34	<13.5	<8.5	<2	8.6	<8	<7.2	<0.36	<23
cis-1,2-Dichloroethene	µg/L	<38	<17	<9.5	<3	14.9	<10.5	<4.8	1.6	<21
trans-1,2-Dichloroethene	µg/L	<54	<14	<13.5	<2.2	<1.4	<10	<6.2	1.3	<23
Vinyl Chloride	µg/L	1040	928	818	145	785	397	113	61.2	<25.5
Ethene	µg/L	430	450	310	290	490	220	620	550	970
Acetylene	µg/L									
1,1,1-Trichloroethane	µg/L	19700	14300	23400	793	24000	<1.2	<1.2	<1.2	<1.2
1,1-Dichloroethane	µg/L	5230	4860	4200	764	3250	11600	1350	234	5970
1,2-Dichloroethane	µg/L	<32	<9.5	<8.0	<2	25.4	<11.5	2410	3980	10800
1,1-Dichloroethene	µg/L	156	<24	<10.5	<1.8	168	<11	36.6	29.5	<11.5
Chloroethane	µg/L	5370	6970	3760	729	6630	1900	17.4	5.6	<31.5
Ethane	µg/L	5.7	9.4	44	12	8.2	16	10100	8640	9050
Acetone	µg/L	<378	<65	<94.5	<14.8	<14.4	<156	945	121	<566
Methylene Chloride	µg/L	436	149	<10	31.8	58.7	<27	91.8	62	<31.5
2-Butanone	µg/L	<204	<41	<51	<25	<62.5	<250	<76	<3.8	<826
Toluene	µg/L	232	134	103	15.7	140	84	85.6	30.5	56.5
Benzene	µg/L	<28	<7.0	<7.0	<1	<1.3	<8	<4.2	<0.21	<20
p-Ethyltoluene	µg/L	<48	<17	<12	<1.6	9.9	<12	<3.2	<0.16	<31
1,3,5-Timethylbenzene	µg/L	<24	<15	<6	<3.4	<1.1	<10	<4.0	1.5	<28.5
2-Chlorotoluene	µg/L	<34	<13.5	<8.5	<2.1	51.5	<10.5	<3.5	18.7	<19
1,2,4-Timethylbenzene	µg/L	<26	<12.5	<6.5	<2.2	17	<8.5	<3.4	4.5	<30
Naphthalene	µg/L	<54	<9.0	<13.5	<1.9	<4.1	<7	<5.8	1.9	<47
o-Xylene	µg/L	<16	<13.5	<4.0	<1.6	<1.6	<10	<5.0	1.8	<16.5
n-Propylbenzene	µg/L	<28	<14.0	<7.0	<2.1	<3.1	<10.5	<3.2	<0.16	<31
Methyl T-Butyl Ether	µg/L	<50	<11.5	<12.5	<2.8	<0.80	<17	26.6	<0.18	<29
Sun VOAs (w/o Gases)	µg/L	32164	27402	32281	2479	35231	17751	15176	13195	25877
Methane	µg/L	390	890	800	930	870	3850	11100	3100	10700
Iron, Total	mg/L	60.4	66.8	74.3	20.8	77.5	35.8	114	38.8	11.9
Sulfate	mg/L	124	186	137	94.6	173	127	185	1200	486
Nitrate-Nitrogen	mg/L		0.93	0.35	0.073	0.0030	0.029	<0.025	<0.025	1.17
Total Organic Carbon	mg/L	98.2	88.6	104	27.8	51.8	29.6	349	201	316

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	SMD-4											
Date	9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003	
Days	0	48	110	207	313	494	662	761	864	969	1067	
Tetrachloroethene	µg/L	13.2	<5.6	<0.80	<5.5	9.3	32	70.2	37.5	<31	102	65.6
Trichloroethene	µg/L	<0.85	<5.4	<1.7	<10	<1.7	<3.4	6.5	<0.36	<23	9.8	<2.10
cis-1,2-Dichloroethene	µg/L	143	<6.8	<1.9	<15	10.8	<3.6	30	27.2	<21	31	33.7
trans-1,2-Dichloroethene	µg/L	<1.35	<5.6	<2.7	<11	<1.4	<5.6	0.62	<0.31	<23	<1.10	<2.20
Vinyl Chloride	µg/L	175	34.6	37.6	72.5	111	126	4.9	2.1	<25.5	10.1	<2.80
Ethene	µg/L	220	190	220	170	160	340	87	29	28	82	17
Acetylene	µg/L						<1.2	<1.2	<1.2	<1.2	<12.2	
1,1,1-Trichloroethane	µg/L	3150	246	997	3100	2610	2700	23	11.5	<17.5	8.54	<2.20
1,1-Dichloroethane	µg/L	4070	1740	1180	2230	3270	2890	135	149	184	80.4	54.5
1,2-Dichloroethane	µg/L	26.2	<3.8	<1.6	<10	19.7	<3.2	<0.46	3.0	<11.5	<0.85	<1.70
1,1-Dichloroethene	µg/L	105	<9.6	<2.1	<9	48.2	130	<0.54	<0.27	<31.5	<1.15	<2.30
Chloroethane	µg/L	1220	827	3000	1590	945	776	147	459	1060	1010	1290
Ethane	µg/L	<6	<6	39	<10	<10	2.4	12	2.7	3.1	4	<1.3
Acetone	µg/L	<9.4	<26	<18.9	<74	<14.4	<46	365	421	1650	433	613
Methylene Chloride	µg/L	295	123	<2	278	127	66.8	7.5	8.8	<31.5	9.85	<1.50
2-Butanone	µg/L	<5.1	<16.4	<10.2	<125	<62.5	<344	<7.6	137	<826	<8.20	<16.4
Toluene	µg/L	116	37.6	25.5	<7.5	48.2	69.6	<0.40	0.96	<19	<1.00	<2.00
Benzene	µg/L	<0.70	<2.8	<1.4	<5	<1.3	<3.4	<0.42	<0.21	<20	<1.05	<2.10
p-Ethyltoluene	µg/L	4.8	<6.8	<2.4	<8	<2.2	<4.8	<0.32	<0.16	<31	<0.75	<1.50
1,3,5-Trimethylbenzene	µg/L	3.2	<6.0	<1.2	<17	<1.1	<2.4	<0.40	<0.2	<28.5	<0.85	<1.70
2-Chlorotoluene	µg/L	45.5	<5.4	<1.7	<10.5	21.4	<4.2	<0.50	<0.25	<19	<0.75	<1.50
1,2,4-Trimethylbenzene	µg/L	8.6	<5.0	<1.3	<11	<2.2	<2.6	<0.34	<0.17	<30	<0.75	<1.50
Naphthalene	µg/L	<1.35	<3.6	<2.7	<9.5	<4.1	<5.4	<0.58	<0.29	<47	<2.00	<4.00
o-Xylene	µg/L	<0.40	<5.4	<0.8	<8	<1.6	<3.2	<0.50	<0.25	<16.5	<0.60	<1.20
n-Propylbenzene	µg/L	<0.70	<5.6	<1.4	<10.5	<3.1	<2.8	<0.32	<0.16	<31	<0.80	<1.60
Methyl T-Butyl Ether	µg/L	<1.25	<4.6	<2.5	<14	<0.80	<3.6	<0.36	<0.18	<29	<0.26	<0.53
Sum VOAs (w/o Gases)	µg/L	9376	3008	5240	7271	7221	6790	790	1257	2894	1695	2057
Methane	µg/L	450	470	1100	3650	1800	2600	4120	3300	14600	23300	12800
Iron, Total	mg/L	76.2	38.9	47.1	54.5	41.2	17.8	1010	1110	541	209	214
Sulfate	mg/L	933	470	435	1700	1910	1630	119	73.1	5.24	119	59.1
Nitrate-Nitrogen	mg/L		<0.015	0.31	0.19	0.037	<0.13	<0.025	<0.025	0.99	0.05	0.33
Total Organic Carbon	mg/L	73.6	60.4	<0.94	34.6	46.5	31.0	3440	3680	1900	1160	837

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	DNF-4											
Date	9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003
Days	0	48	110	207	313	494	578	662	761	864	969	1067
Tetrachloroethene	µg/L	<0.40	<0.080	<0.080	<0.11	<2.0	<1.2	<0.48	<0.55	<0.11	<31	<19.0
Trichloroethene	µg/L	<0.85	<1.70	<0.17	<0.20	<1.7	<1.7	<0.32	<1.8	<0.36	<23	<10.5
cis-1,2-Dichloroethene	µg/L	<0.95	<1.90	<0.19	<0.30	<1.4	<1.8	<0.42	<1.2	<0.24	<21	<1.60
trans-1,2-Dichloroethene	µg/L	<1.35	<2.70	<0.27	3.4	<1.4	<2.8	<0.40	<1.55	1.9	<23	<14.0
Vinyl Chloride	µg/L	<1.75	<3.50	<0.35	2.9	<0.70	<8.5	<0.20	<1.15	5.4	<25.5	<11.0
Ethene	µg/L	250	260	220	160	<6	230	150	200	140	89	170
Acetylene	µg/L						<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
1,1,1-Trichloroethane	µg/L	56.3	130	<0.11	15.3	18.4	<1.4	<0.44	<1.3	<0.26	<17.5	<11.0
1,1-Dichloroethane	µg/L	29.7	20.1	<0.14	50.1	30.0	16.3	38.6	78.1	78.2	<21.5	92.5
1,2-Dichloroethane	µg/L	<0.80	<1.60	<0.16	8.7	<1.3	<1.6	<0.46	6.5	10.3	<11.5	<8.50
1,1-Dichloroethene	µg/L	<1.05	<2.10	<0.21	<0.18	<1.4	<2.2	<0.6	<1.35	<0.27	<31.5	<11.5
Chloroethane	µg/L	2420	2580	3300	3680	2680	1210	1260	1330	3240	3510	5460
Ethane	µg/L	<6	<6	37	<6	<6	2.4	<1.3	4.7	1.1	2.3	4.4
Acetone	µg/L	<9.45	<18.9	<1.89	58.4	<14.4	<2.3	<6.24	<5.65	<1.13	<566	<70.5
Methylene Chloride	µg/L	22.8	16.6	3.9	19.8	20.8	8.4	12.2	22.2	26.9	<31.5	<7.5
2-Butanone	µg/L	<5.1	<10.2	<1.02	<2.5	<62.5	<172	<10	<19	<3.8	<826	<82.0
Toluene	µg/L	11	7.5	3.1	6.1	<1.4	6.9	10.2	7.3	20.2	<19	<10.0
Benzene	µg/L	<0.70	<1.40	<0.14	<0.10	<1.3	<1.7	<0.321	<1.05	<0.21	<20	<10.5
p-Ethyltoluene	µg/L	3.7	<2.40	<0.24	1.2	<2.2	<2.4	<0.48	<0.80	2.9	<31	<7.50
1,3,5-Trimethylbenzene	µg/L	9.2	<1.20	2.5	3.4	<1.1	<1.2	6.9	<1.0	2.9	<28.5	<8.50
2-Chlorotoluene	µg/L	64.5	44.5	17.1	31.6	31.9	34.2	40.2	21.1	27.2	<19	<7.50
1,2,4-Trimethylbenzene	µg/L	18.3	15.9	5.3	<0.22	9.2	9.0	13.5	5.3	6.4	<30	<7.50
Naphthalene	µg/L	4.3	<2.70	<0.27	1.6	<4.1	<2.7	<0.28	<1.45	1.8	<47	<20.0
o-Xylene	µg/L	4.8	<0.80	<0.008	5.0	<1.6	<1.6	3.6	<1.25	2.6	<16.5	<6.00
n-Propylbenzene	µg/L	44.3	<1.40	<0.14	<0.21	<3.1	<1.4	<0.42	<0.80	<0.16	<31	<8.00
Methyl-T-Butyl Ether	µg/L	<1.25	<2.4	<0.25	<0.28	<0.80	21.9	<0.68	<0.90	<0.18	<29	<2.65
Sum VOCs (w/o Gases)	µg/L	2689	2815	3332	3888	2790	1307	1385	1471	3427	3510	5533
Methane	µg/L	180	210	190	300	<6	250	240	2480	8600	21500	22300
Iron, Total	mg/L	48.2	39.2	42.5	85.4	116	31.6	29.1	44.1	15.8	56.8	62.1
Sulfate	mg/L	133	171	98.5	209	323	146	176	249	225	3.77	222
Nitrate-Nitrogen	mg/L		0.22	0.31	0.17	<0.015	<0.13	0.051	<0.025	<0.025	0.18	59.1
Total Organic Carbon	mg/L	43.7	52.4	50.9	34.6	35.7	7.1	71.7	161	78.3	291	306

Table 1. Photocredits Anaerobic Pilot Analytical Summary

Well	MW-8										MW-9			
	Date	3/28/2001	7/12/2001	1/8/2002	4/3/2002	6/26/2002	10/3/2002	1/15/2003	4/28/2003	8/5/2003	3/28/2001	7/12/2001	1/8/2002	1/14/2003
Days		0	314	494	579	663	554	658	761	860	0	314	494	657
Tetrachloroethene	µg/L	<0.11	<0.20	<0.12	<0.24	<0.22	<0.11	<0.62	<0.76	<0.38	<0.11	<0.20	<0.24	<0.62
Trichloroethene	µg/L	1.8	1.7	0.97	<0.16	<0.72	<0.36	<0.46	1.91	4.22	<0.20	<0.17	<0.16	<0.46
cis-1,2-Dichloroethene	µg/L	<0.30	1.2	<0.18	<0.21	<0.48	<0.24	<0.42	3.99	15.4	<0.30	<0.14	<0.21	<0.42
trans-1,2-Dichloroethene	µg/L	<0.22	<0.14	<0.28	<0.20	<0.62	<0.23	<0.46	<0.44	<0.22	<0.22	<0.14	<0.20	<0.46
Vinyl Chloride	µg/L	<0.25	<0.070	<0.85	<0.10	<0.46	<1.3	<0.51	<0.56	<0.28	<0.25	<0.070	<0.10	<0.51
Ethene	µg/L	<6	<6	<1.3	<1.3	1.2	<1.2	4.6	<1.3	7.1	<6	<6		
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	<0.35	<0.44	<0.22	<0.20	<0.16	<0.22	<0.35
1,1-Dichloroethane	µg/L	<0.14	<0.12	<0.25	<0.22	<0.60	<0.31	<0.43	<0.44	<0.22	<0.14	<0.12	<0.22	<0.43
1,2-Dichloroethane	µg/L	<0.20	<0.13	<0.16	<0.23	<0.46	<0.23	<0.23	<0.34	<0.17	<0.20	<0.13	<0.23	<0.23
1,1-Dichloroethene	µg/L	<0.18	<0.14	<0.22	<0.30	<0.54	<0.27	<0.63	<0.46	<0.23	<0.18	<0.14	<0.30	<0.63
Chloroethane	µg/L	<0.30	<0.18	<0.67	<0.61	<0.48	3.7	<0.49	<0.88	<0.44	<0.3	<0.18	<0.61	<0.49
Ethane	µg/L	<6	<6	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<6	<6		
Acetone	µg/L	<1.48	<1.44	<2.3	<3.12	<2.26	<1.13	<11.3	<2.82	<1.41	<1.48	<1.44	<3.12	<11.3
Methylene Chloride	µg/L	<0.41	<0.15	<0.37	<0.54	<0.42	<0.21	<0.63	<0.30	<0.15	<0.41	<0.15	<0.54	<0.63
2-Butanone	µg/L	<2.5	<6.25	<17.2	<5.0	<7.6	<3.8	<16.5	<3.28	<1.64	<2.5	<6.25	<5.0	<16.5
Toluene	µg/L	<0.15	<0.14	<0.14	<0.14	<0.40	<0.2	<0.38	<0.40	<0.20	<0.15	<0.14	<0.14	<0.38
Benzene	µg/L	<0.10	<0.13	<0.17	<0.16	<0.42	<0.21	<0.4	<0.42	<0.41	<0.10	<0.13	<0.16	<0.4
p-Ethyltoluene	µg/L	<0.16	<0.22	<0.24	<0.24	<0.32	<0.16	<0.62	<0.30	<0.15	<0.16	<0.22	<0.24	<0.62
1,3,5-Timethylbenzene	µg/L	<0.34	<0.11	<0.12	<0.20	<0.40	<0.2	<0.57	<0.34	<0.17	<0.34	<0.11	<0.20	<0.57
2-Chlorotoluene	µg/L	<0.21	<0.16	<0.21	<0.27	<0.50	<0.25	<0.38	<0.30	<0.15	<0.21	<0.16	<0.27	<0.38
4-Chlorotoluene	µg/L													
1,2,4-Timethylbenzene	µg/L	<0.22	<0.22	<0.13	<0.26	<0.34	<0.17	<0.60	<0.30	<0.15	<0.22	<0.22	<0.17	<0.60
Naphthalene	µg/L	<0.19	<0.41	<0.27	<0.14	<0.58	<0.29	<0.94	<0.80	<0.40	<0.19	<0.41	<0.14	<0.94
o-Xylene	µg/L	<0.16	<0.16	<0.16	<0.20	<0.50	<0.25	<0.33	<0.24	<0.12	<0.16	<0.16	<0.20	<0.33
n-Propylbenzene	µg/L	<0.21	<0.31	<0.14	<0.21	<0.32	<0.16	<0.62	<0.32	<0.16	<0.21	<0.31	<0.21	<0.62
Methyl t-Butyl Ether	µg/L	<0.28	<0.080	<0.18	<0.34	<0.36	<0.18	<0.58	<0.11	<0.053	<0.28	<0.080	<0.34	<0.58
Sum VOAs (w/o Gases)	µg/L	1.8	2.9	1.0	0.0	0.0	3.7	0	5.9	19.6	0.0	0.0	0.0	0
Methane	mg/L	<6	61	9.1	<0.7	20	3.1	76.0	2.1	30	300	940		
Iron, Total	mg/L	0.023 J	0.088 J	<0.096	<0.096	0.013	0.23	0.069	0.061	0.036	10.4	21.9		
Sulfate	mg/L	22.6	23.4	27.4	23.2	143	1.46	32.5	28.1	58.6	4.43	23.1		
Nitrate-Nitrogen	mg/L	6.1	5.63	6.93	6.66	6.67	5.67	6.28	6.14	5.76	<0.025	<0.015		
Total Organic Carbon	mg/L	4.97	<0.94	<0.94	1.41	6.6	4.7	33.4	6.38	4.69	7.98	6.79		

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	MTW-10		MTW-11		MTW-12																	
Date	1/22/2002	1/14/2003	1/22/2002	1/14/2003	3/28/2001	7/12/2001	1/9/2002	4/3/2002	6/26/2002	10/3/2002	1/15/2003	4/28/2003	8/5/2003									
Days	0	37635	0	37635	0	106	287	371	455	554	658	461	560									
Tetrachloroethene	µg/L	2.3	<0.62	<0.12	<0.62	<0.11	<0.20	<0.24	<2.4	<1.1	<0.55	<0.62	<0.76	<0.38								
Trichloroethene	µg/L	6.7	4.7	<0.17	9.9	122	0.93	16.5	31	67.8	82.5	48.7	104	38.1								
cis-1,2-Dichloroethene	µg/L	231	244	<0.18	18.1	1280	18.2	430	503	467	488	311	369	223								
trans-1,2-Dichloroethene	µg/L	<0.20	<0.46	<0.28	<0.46	7.3	<0.14	5.6	<2.0	<2.1	<1.55	<0.46	3.84	1.70								
Vinyl Chloride	µg/L	2.7	<0.51	<0.85	<0.51	244	5.7	298	333	151	83.1	48.8	75.3	29.7								
Ethene	µg/L					6.7	69	180	130	190	17	<1.3	16	17								
Acetylene	µg/L								<1.2	<1.2	<1.2	<1.2	<1.2	<1.2								
1,1,1-Trichloroethane	µg/L	<0.22	<0.35	<0.14	<0.35	<0.20	<0.16	<0.22	<2.2	<2.6	<1.3	<0.35	<0.44	<0.22								
1,1-Dichloroethane	µg/L	206	190	<0.25	6.3	72.2	3.7	329	684	345	94.2	38.6	38.6	107								
1,2-Dichloroethane	µg/L	5	5.8	<0.16	<0.23	2.9	<0.13	1.4	<2.3	<2.3	<1.15	<0.23	<0.34	<0.17								
1,1-Dichloroethene	µg/L	50.3	40.8	<0.25	<0.63	8.4	<0.14	2.3	<3	<2.7	<1.35	<0.63	2.59	6.99								
Chloroethane	µg/L	<0.49	13.5	<0.67	<0.49	<0.30	<0.18	6.1	<6.1	<2.4	<1.2	<0.49	<0.88	0.91								
Ethane	µg/L					<6	13	22	11	18	0.8	<1.3	2.9	4.8								
Acetone	µg/L	<3.12	<11.3	<2.3	<11.3	<1.48	<1.44	<3.12	<31.2	<1.9	<5.65	<11.3	2.82	<1.41								
Methylene Chloride	µg/L	<0.54	<0.63	<0.37	<0.63	<0.41	<0.15	<0.54	<5.4	<2.1	<1.05	<0.63	<0.30	<0.15								
2-Butanone	µg/L	<5.0	<16.5	<17.2	<16.5	<2.5	<6.25	<5.0	<50	<38	<19	<16.5	<3.28	<1.64								
Toluene	µg/L	<0.14	<0.38	<0.14	<0.38	0.97	<0.14	5.6	11.4	<2.0	<1.0	<0.38	<0.40	<0.20								
Benzene	µg/L	<0.16	<0.4	<0.17	<0.4	5.3	<0.13	5.4	<1.6	<2.1	<1.05	<0.4	2.04	1.39								
p-Ethyltoluene	µg/L	<0.24	<0.62	<0.24	<0.62	<0.16	<0.22	<0.24	<2.4	<1.6	<0.8	<0.62	<0.30	<0.15								
1,3,5-Trimethylbenzene	µg/L	<0.20	<0.57	<0.12	<0.57	<0.34	<0.11	<0.20	<2.0	<2.0	<1	<0.57	<0.34	<0.17								
2-Chlorotoluene	µg/L	<0.27	<0.38	<0.21	<0.38	393	26.9	2690	3660	1940	554	68	145	419								
4-Chlorotoluene	µg/L					14.5	<0.17	82.8	139	147	<1.1	<0.55	5.95	6.40								
1,2,4-Trimethylbenzene	µg/L	<0.17	<0.60	<0.13	<0.60	<0.22	<0.22	<0.17	<1.7	<1.7	<0.85	<0.60	<0.30	<0.15								
Naphthalene	µg/L	<0.14	<0.94	<0.27	<0.94	<0.19	<0.41	<0.14	<1.4	<2.9	<1.45	<0.94	<0.80	<0.40								
o-Xylene	µg/L	<0.20	<0.33	<0.16	<0.33	<0.16	<0.16	2.3	<2.0	<2.5	<1.25	<0.33	<0.24	<0.12								
n-Propylbenzene	µg/L	<0.21	<0.62	<0.14	<0.62	<0.21	<0.31	<0.21	<2.1	<1.6	<0.8	<0.62	105	355								
Methyl-t-Butyl Ether	µg/L	<0.34	<0.58	<0.18	<0.58	<0.28	<0.080	<0.34	<3.4	<1.8	<0.9	<0.58	<0.11	<0.053								
Sum VOAs (w/o Gases)	µg/L	504	498.8	0	34.3	2151	55	3875	5361	3118	1302	515.1	854	1189								
Methane	mg/L					420	1800	2170	1670	3470	310	33	620	750								
Iron, Total	mg/L					7.29	55.6	61.0	934	46.7	37.1	13.2	42.1	27.9								
Sulfate	mg/L					417	824	418	1160	100	407	236	244	440								
Nitrate-Nitrogen	mg/L					<0.025	0.070	0.005.1	0.099	<0.025	0.031	0.026	0.10	0.085								
Total Organic Carbon	mg/L					33.3	36.6	<0.94	72.6	<0.51	29.4	43.6	59.2	59.8								

Table 1. Photocultis Anaerobic Pilot Analytical Summary

Well	MW-13									
Date	3/28/2001	7/12/2001	1/10/2002	4/3/2002	6/26/2002	10/3/2002	1/14/2003	4/29/2003	8/5/2003	
Days	0	106	288	371	455	554	0	762	860	
Tetrachloroethene	µg/L	82.8	120	216	227	16.2	80.5	69	13	
Trichloroethene	µg/L	85.9	114	216	132	13.9	77.2	69.8	12.1	
cis-1,2-Dichloroethene	µg/L	784	897	1950	988	69.6	501	697	135	
trans-1,2-Dichloroethene	µg/L	3.6	4.7	11.9	8.0	<0.31	3.0	<0.46	<0.44	
Vinyl Chloride	µg/L	38.6	58.6	112	74	4.6	26.2	16.3	2.60	
Ethene	µg/L	<6	<6	1.6	<1.3	1.1	<1.3	<1.3	4.5	
Acetylene	µg/L			<1.2	<1.2	<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	3.9	<0.44	
1,1-Dichloroethane	µg/L	323	351	476	305	17	96.8	95.1	8.85	
1,2-Dichloroethane	µg/L	2.6	2.3	2.8	<0.23	<0.23	<0.23	<0.23	<0.34	
1,1-Dichloroethene	µg/L	60.6	60.4	75.5	43.6	2.8	13.3	10.5	<0.46	
Chloroethane	µg/L	<0.30	<0.18	<0.61	<0.61	<0.24	<0.24	<0.49	<0.88	
Ethane	µg/L	5.8	6.7	23	8.7	2.7	1.8	<1.3	<1.3	
Acetone	µg/L	<1.48	<1.44	18.7	<3.12	<1.13	<1.13	<11.3	22.4	
Methylene Chloride	µg/L	<0.41	<0.15	<0.54	<0.54	<0.21	<0.21	<0.63	1.88	
2-Butanone	µg/L	<2.5	<6.25	<5.0	<5.0	<3.8	<3.8	<16.5	<3.28	
Toluene	µg/L	<0.15	<0.14	<0.14	<0.14	<0.20	<0.20	<0.38	<0.40	
Benzene	µg/L	7.1	7.1	8.0	4.7	<0.21	2.0	2.1	<0.42	
p-Ethyltoluene	µg/L	<0.16	<0.22	<0.24	<0.24	<0.16	<0.16	<0.62	<0.30	
1,3,5-Trimethylbenzene	µg/L	<0.34	<0.11	<0.20	<0.20	<0.20	<0.20	<0.57	<0.34	
2-Chlorotoluene	µg/L	16.3	43.2	76.4	27.8	2.5	10.2	4.6	3.52	
1,2,4-Trimethylbenzene	µg/L	<0.22	<0.22	<0.17	<0.17	<0.17	<0.17	<0.60	<0.30	
Naphthalene	µg/L	<0.19	<0.41	<0.14	<0.14	<0.29	<0.29	<0.94	<0.80	
o-Xylene	µg/L	<0.16	<0.16	<0.20	<0.20	<0.25	<0.25	<0.33	<0.24	
n-Propylbenzene	µg/L	<0.21	<0.31	<0.21	<0.21	<0.25	<0.16	<0.62	2.70	
Methyl t-Butyl Ether	µg/L	<0.28	<0.080	<0.34	<0.34	<0.18	<0.18	<0.58	<0.11	
Sum VOAs (w/o Gases)	µg/L	1445	1695	3196	1830	128	815	968.3	202.1	
Methane	mg/L	12	21	250	110	140	920	1040	1030	
Iron, Total	mg/L	0.54	0.48	0.93	0.76	0.27	5.04	2.31	61.1	
Sulfate	mg/L	597	579	648	366	22.7	377	365	442	
Nitrate-Nitrogen	mg/L	3.95	4.68	3.54	4.84	2.15	3.42	3.73	419	
Total Organic Carbon	mg/L	9.52	13.3	<0.94	15.4	<0.51	6.0	29.8	38.9	
									24.1	

Table 2. Photochemicals Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

[illegible]

Table 2. Photocircuits Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

Contaminant	Well	SMP-1														
Date		8/31/2000	10/18/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003			
Tetrachloroethene	µM	<0.096	<0.0024	<0.13	<0.033	<0.012	<0.036	<0.091	<0.042	<0.0013	<0.015	<0.0046	<0.023			
Trichloroethene	µM	<0.026	0.60	6.5	11.6	0.19	33.6	202.4	0.31	<0.0055	<0.014	<0.0032	<0.016			
cis-1,2-Dichloroethene	µM	257	387	311	<0.0028	127	186	439	265	7.0	<0.017	<0.0033	<0.017			
trans-1,2-Dichloroethene	µM	<0.56	0.72	<0.41	1.4	0.36	0.71	3.9	<0.16	<0.0064	<0.019	<0.0045	<0.023			
Vinyl Chloride	µM	75	96	81	76	68	56	28	143	41	<0.033	<0.0090	<0.045			
Ethene	µM	33	86	41	32	68	23	29	65	133	42	29	6.8			
Acetylene	µM						<0.42	0.28	<0.046	<0.085	<0.085	<0.21	<0.085			
1,1,1-Trichloroethane	µM	<0.16	<0.0041	<0.25	2.7	1.2	<0.052	<0.082	<0.097	<0.010	<0.010	<0.0032	<0.016			
1,1-Dichloroethane	µM	5.1	4.9	6.3	7.2	5.4	4.6	3.7	3.0	2.0	0.30	0.27	<0.022			
1,2-Dichloroethane	µM	<0.32	<0.0081	<0.17	<0.033	<0.033	<0.081	<0.12	<0.12	<0.0093	<0.0093	<0.0034	<0.017			
1,1-Dichloroethene	µM	<0.43	0.66	<0.27	1.9	0.57	1.5	3.1	0.52	<0.025	<0.025	<0.0046	<0.024			
Chloroethane	µM	<1.1	1.1	<0.82	<0.23	<0.23	<0.52	<0.47	<0.19	0.58	0.60	3.7	4.0			
Ethane	µM	<0.20	<0.20	<0.83	<0.83	<0.83	<0.43	<0.43	0.12	0.15	0.60	<0.20	<0.080			
Contaminant	Well	DMP-1														
Date		8/31/2000	10/18/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003			
Tetrachloroethene	µM	<0.0024	<0.00048	<0.0024	<0.033	<0.0060	<0.0036	<0.0037	0.0066	<0.00066	<0.019	<0.0046	<0.011			
Trichloroethene	µM	<0.0065	<0.0018	<0.0065	<0.076	0.034	<0.0065	0.22	0.080	0.012	<0.018	0.042	<0.0080			
cis-1,2-Dichloroethene	µM	0.52	0.018	0.179566563	0.76	0.40	<0.0093	0.46	0.64	1.3	17	11.4	0.44			
trans-1,2-Dichloroethene	µM	<0.014	<0.0028	<0.014	<0.11	<0.0072	<0.014	0.040	0.029	0.043	<0.024	0.059	<0.011			
Vinyl Chloride	µM	3.0	0.056	0.640	2.0	0.68	<0.068	0.99	0.41	2.9	28	16.3	1.2			
Ethene	µM	20	39	33	25	3.9	3.3	5.7	7.5	15.4	39	32.1	11.4			
Acetylene	µM						<0.46	<0.046	<0.046	<0.046	<0.046	<0.085	<0.085			
1,1,1-Trichloroethane	µM	<0.0041	<0.00082	<0.0041	1.4	0.21	<0.0052	<0.0033	0.0067	<0.0019	<0.0013	<0.0033	<0.0082			
1,1-Dichloroethane	µM	0.93	0.18	3.61	11	13	4.3	2.4	4.2	4.2	4.9	4.1	1.6			
1,2-Dichloroethane	µM	<0.0081	<0.0016	<0.0081	<0.10	0.15	<0.0081	<0.0046	0.029	0.023	<0.012	<0.0034	<0.0086			
1,1-Dichloroethene	µM	<0.011	<0.0022	<0.011	<0.093	<0.0071	<0.011	<0.0062	<0.0028	<0.0027	<0.033	0.47	<0.012			
Chloroethane	µM	51	0.67	3.60	2.5	3.0	1.5	1.1	0.57	0.24	<0.038	0.54	17.1			
Ethane	µM	<0.20	<0.20	<1.7	<3.3	<1.7	0.027	<0.43	0.060	0.057	0.53	0.80	0.20			

Table 2. Photocircuits Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

Contaminant	Well	SMP-3	9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003
Tetrachloroethene	µM		<0.48	<0.48	<0.048	0.083	0.074	<0.036	<0.14	<0.033	0.058	<0.038	<0.023	<0.023
Trichloroethene	µM		<1.3	<1.3	<0.13	<0.0015	<0.013	<0.065	<0.26	<0.14	0.073	<0.035	<0.016	<0.016
cis-1,2-Dichloroethene	µM		<2.0	<2.0	<0.20	0.024	0.17	<0.093	<0.37	<0.12	0.077	<0.043	<0.017	<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	<0.047	<0.023	<0.023
Vinyl Chloride	µM		<5.6	<5.6	<0.56	0.62	1.6	<0.68	<2.72	1.9	1.7	<0.082	1.2	0.37
Ethene	µM		3.0	3.5	1.4	0.64	3.9	6.4	7.9	9.3	4.6	3.4	3.4	5.0
Acetylene	µM							0.081	0.21	0.085	0.24	<0.046	<0.046	<0.046
1,1,1-Trichloroethane	µM	1334	1762	244	253	98	109	89	207	60	42	43	34	2.8
1,1-Dichloroethane	µM	386	483	48	<0.0051	178	89	207	109	60	42	72	59	147
1,2-Dichloroethane	µM	<1.6	<1.6	<0.16	0.061	0.21	<0.081	<0.32	<0.12	0.017	<0.023	<0.017	<0.017	<0.017
1,1-Dichloroethene	µM	<2.2	<2.2	<0.22	<0.0028	1.2	1.5	<0.45	<2.1	1.2	3.5	3.2	2.5	0.40
Chloroethane	µM	<5.1	<5.1	<0.51	1.2	6.4	5.4	<2.1	1.20	1.1	0.37	0.37	0.25	0.28
Ethane	µM	1.3	1.5	1.4	0.77	0.97	0.57							
Contaminant	Well	DMP-3	9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003
Tetrachloroethene	µM		<0.097	0.36	<0.024	<0.0066	0.44	0.21	<0.072	<0.013	<0.00066	<0.19	0.13	<0.11
Trichloroethene	µM		<0.26	<0.10	<0.065	<0.015	0.065	<0.065	<0.061	<0.055	<0.0029	<0.18	0.032	<0.080
cis-1,2-Dichloroethene	µM		<0.39	<0.18	<0.098	<0.031	0.15	<0.093	<0.11	<0.050	0.017	<0.22	0.44	<0.083
trans-1,2-Dichloroethene	µM		<0.56	<0.14	<0.14	<0.023	<0.014	<0.14	<0.10	<0.064	0.013	<0.24	<0.045	<0.11
Vinyl Chloride	µM		17	15	13	2.3	12.6	10.5	6.4	1.8	1.0	<0.41	2.3	5.5
Ethene	µM		15.4	16.1	11.1	10.4	17.5	12.9	7.9	22	19.6	35	12.1	17.5
Acetylene	µM							<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046
1,1,1-Trichloroethane	µM	148	107	175	5.9	180	146	87	10	24	40.2	109	84.0	103.0
1,1-Dichloroethane	µM	53	49	42	7.7	32.8	22.8	38.1	0.37	0.30	<0.12	<0.034	<0.086	<0.086
1,2-Dichloroethane	µM	<0.32	<0.096	<0.081	<0.020	1.7	<0.11	<0.15	0.18	0.058	<0.32	0.37	0.67	0.67
Chloroethane	µM	1.6	<0.25	<0.11	<0.018	103	35	29	157	134	140	140	127	127
Ethane	µM	83	108	58	11	103	35	29	157	134	140	140	127	127
	µM		0.19	0.31	1.5	0.40	0.27	0.29	0.53	1.0	0.87	1.2	0.57	0.37

Table 2. Photocircuits Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

Contaminant	Well	SMP-4	9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003
Tetrachloroethene	µM	0.080	<0.0034	<0.0048	<0.0048	<0.033	0.056	0.193	0.42	0.23	<0.19	0.62	0.40
Trichloroethene	µM	<0.0065	<0.041	<0.013	<0.013	<0.076	<0.076	<0.076	0.049	<0.0027	<0.18	0.075	<0.016
cis-1,2-Dichloroethene	µM	1.5	<0.070	<0.0020	<0.015	0.11	<0.026	0.31	0.28	<0.22	0.32	0.35	
trans-1,2-Dichloroethene	µM	<0.014	<0.058	<0.0028	<0.11	<0.014	<0.058	<0.0064	<0.0032	<0.24	<0.011	<0.023	
Vinyl Chloride	µM	2.8	0.55	0.60	1.2	1.8	2.0	0.078	0.034	<0.41	0.16	<0.045	
Ethene	µM	7.9	6.8	7.9	6.1	5.7	12.1	3.1	1.0	1.0	2.9	0.61	
Acetylene	µM							<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	<0.13	0.064	<0.016	
1,1-Dichloroethane	µM	41	18	12	23	33	29	1.4	1.5	1.9	0.81	0.55	
1,2-Dichloroethane	µM	0.26	<0.038	<0.016	<0.10	0.20	<0.032	<0.0046	0.030	<0.12	<0.0086	<0.017	
1,1-Dichloroethene	µM	1.1	<0.099	<0.022	<0.093	0.50	1.3	<0.0056	<0.0028	<0.32	<0.012	<0.023	
Chloroethane	µM	19	13	47	25	15	12	2.3	7.1	16	15.7	20.0	
Ethane	µM	<0.20	<0.20	1.3	<0.33	<0.33	0.080	0.40	0.090	0.10	0.13	<0.043	

Contaminant	Well	DMP-4	9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003
Tetrachloroethene	µM	<0.0024	<0.00048	<0.00048	<0.00066	<0.012	<0.0072	<0.0029	<0.0033	<0.00066	<0.19	<0.11	<0.023	
Trichloroethene	µM	<0.0065	<0.013	<0.013	<0.0015	<0.013	<0.013	<0.013	<0.0024	<0.14	<0.0027	<0.18	<0.080	
cis-1,2-Dichloroethene	µM	<0.0098	<0.020	<0.0020	<0.0031	<0.014	<0.019	<0.0043	<0.012	<0.0025	<0.22	<0.083	<0.017	
trans-1,2-Dichloroethene	µM	<0.014	<0.028	<0.0028	0.035	<0.014	<0.029	<0.0041	<0.016	0.020	<0.24	<0.14	<0.023	
Vinyl Chloride	µM	<0.028	<0.056	<0.0056	0.046	<0.011	<0.14	<0.0032	<0.018	0.086	<0.41	<0.18	<0.045	
Ethene	µM	8.9	9.3	7.9	5.7	<0.21	8.2	5.4	7.1	5.0	3.2	6.1	2.9	
Acetylene	µM						<0.046	<0.046	<0.046	<0.046	<0.046	<0.046		
1,1,1-Trichloroethane	µM	0.42	0.97	<0.00082	0.11	0.14	<0.010	<0.0033	<0.0097	<0.0019	<0.13	<0.082	<0.016	
1,1-Dichloroethane	µM	0.30	0.20	<0.0014	0.51	0.30	0.16	0.39	0.79	0.79	<0.22	0.93	<0.022	
1,2-Dichloroethane	µM	<0.0081	<0.016	<0.0016	0.088	<0.013	<0.016	<0.0046	0.066	0.10	<0.12	<0.086	<0.017	
1,1-Dichloroethene	µM	<0.011	<0.022	<0.0022	<0.0019	<0.014	<0.022	<0.062	<0.014	<0.0028	<0.33	<0.12	<0.024	
Chloroethane	µM	38	40	51	57	42	19	20	21	50	54	85	55	
Ethane	µM	<0.20	<0.20	1.2	<0.20	<0.20	0.080	<0.043	0.16	0.04	0.077	0.15	0.10	

Contaminant	Well	MW-8
Date	3/28/2001	7/12/2001
Tetrachloroethene	µM <0.00066	<0.0012
Trichloroethene	µM 0.014	0.013
cis-1,2-Dichloroethene	µM <0.0031	0.012
trans-1,2-Dichloroethene	µM <0.0022	<0.0014
Vinyl Chloride	µM <0.0040	<0.0011
Ethene	µM <0.21	<0.21
Acetylene	µM	<0.046
1,1,1-Trichloroethane	µM <0.0015	<0.0012
1,1,1-Dichloroethane	µM <0.0014	<0.0012
1,2-Dichloroethane	µM <0.0020	<0.0013
1,1-Dichloroethene	µM <0.0019	<0.0014
Chloroethane	µM <0.0047	<0.0028
Ethane	µM <0.20	<0.20
	1/8/2002	4/3/2002
	<0.00072	<0.0014
	0.0074	<0.0012
	<0.0019	<0.022
	<0.0029	<0.0021
	<0.014	<0.0016
	<0.046	<0.046
	<0.046	<0.046
	<0.0016	<0.0016
	<0.0025	<0.0022
	<0.0016	<0.0023
	<0.0023	<0.0030
	<0.010	<0.0095
	<0.043	<0.043
	6/25/2002	10/3/2002
	<0.0013	<0.0066
	<0.0055	<0.0027
	<0.0050	<0.0025
	<0.0064	<0.0032
	<0.0074	<0.0037
	0.043	<0.0082
	<0.0046	<0.0090
	<0.046	<0.046
	<0.046	<0.046
	<0.0039	<0.0026
	<0.0020	<0.0033
	<0.0030	<0.0044
	<0.0023	<0.0034
	<0.0023	<0.0047
	<0.0056	<0.014
	<0.0074	<0.0068
	0.057	<0.043
	<0.043	<0.043
	1/15/2003	4/28/2003
	<0.0037	<0.0046
	<0.0035	0.015
	<0.0043	0.041
	<0.047	<0.0045
	<0.0082	<0.0023
	<0.0090	<0.0045
	0.16	0.25
	<0.046	<0.046
	<0.046	<0.046
	<0.0026	<0.0016
	<0.0033	<0.0022
	<0.0044	<0.0017
	<0.0034	<0.0024
	<0.0047	<0.0068
	<0.014	<0.043
	<0.0068	<0.043
	<0.043	<0.043
	8/5/2003	
	<0.0023	
	0.032	
	0.16	

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Table 2. Photocircuits Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

Contaminant	Well	MW-12	3/28/2001	7/12/2001	1/9/2002	4/3/2002	6/26/2002	10/3/2002	1/15/2003	4/28/2003	8/5/2003
Tetrachloroethene	µM	<0.00066	<0.0012	<0.0144	<0.014	<0.0066	<0.0033	<0.0037	<0.0046	<0.0023	
Trichloroethene	µM	0.93	0.0071	0.13	0.24	0.52	0.63	0.37	0.79	0.29	
cis-1,2-Dichloroethene	µM	13.2	0.19	4.4	5.2	4.8	5.0	3.2	3.8	2.3	
trans-1,2-Dichloroethene	µM	0.075	<0.0014	0.058	<0.021	<0.032	<0.016	<0.047	0.040	0.018	
Vinyl Chloride	µM	3.9	0.091	4.8	5.3	2.4	1.3	0.78	1.2	0.48	
Ethene	µM	0.24	2.5	6.4	4.6	6.8	0.61	<0.046	0.57	0.61	
Acetylene	µM			<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	
1,1,1-Trichloroethane	µM	<0.0015	<0.0012	<0.0016	<0.016	<0.019	<0.0097	<0.0026	<0.0033	<0.0016	
1,1-Dichloroethane	µM	0.73	0.037	3.3	6.9	3.5	1.0	0.39	0.39	1.1	
1,2-Dichloroethane	µM	0.029	<0.0013	0.014	<0.023	<0.023	<0.012	<0.0023	<0.0034	<0.0017	
1,1-Dichloroethene	µM	0.087	<0.0014	0.024	<0.0031	<0.011	<0.014	<0.0065	0.027	0.072	
Chloroethane	µM	<0.0047	<0.0047	0.095	<0.095	<0.037	<0.019	<0.0076	<0.0093	0.59	
Ethane	µM	<0.20	0.43	0.73	0.37	0.60	0.027	<0.043	0.097	0.16	
Contaminant	Well	MW-13	3/28/2001	7/12/2001	1/10/2002	4/3/2002	6/26/2002	10/3/2002	1/14/2003	4/29/2003	8/5/2003
Tetrachloroethene	µM	0.50	0.72	1.3	1.4	0.10	0.49	0.42	0.078	0.12	
Trichloroethene	µM	0.65	0.87	1.6	1.0	0.11	0.59	0.53	0.092	0.16	
cis-1,2-Dichloroethene	µM	8.1	9.3	20.1	10.2	0.72	5.2	7.2	1.39	3.36	
trans-1,2-Dichloroethene	µM	0.037	0.049	0.123	0.083	<0.0032	0.031	<0.0047	<0.0045	<0.0045	
Vinyl Chloride	µM	0.62	0.94	1.8	1.2	0.074	0.42	0.26	0.042	0.11	
Ethene	µM	<0.21	<0.21	0.057	<0.046	0.039	<0.046	<0.046	0.16	0.21	
Acetylene	µM			<0.046	<0.046	<0.046	<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	0.029	<0.0033	0.0082	
1,1-Dichloroethane	µM	3.3	3.5	4.8	3.1	0.17	0.98	1.0	0.089	0.314	
1,2-Dichloroethane	µM	0.026	0.023	0.028	<0.002	<0.0023	<0.0023	<0.0023	<0.0034	<0.0017	
1,1-Dichloroethene	µM	0.63	0.62	0.78	0.45	0.029	0.14	0.11	<0.0034	0.039	
Chloroethane	µM	<0.0047	<0.0025	<0.0095	<0.0095	<0.0037	<0.0037	<0.0076	<0.014	<0.0068	
Ethane	µM	0.19	0.22	0.77	0.29	0.090	0.060	<0.043	<0.043	<0.043	

Table 3. Photocircuitry Anaerobic Pilot Field Data

Well		DMF-4									
Well Depth	ft	20.55									
Well Diameter	inch	1									
Date		1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003			
Water Level	ft	6.71	7.1	6.7	7.1	7.0	7.0	6.36			
pH		7.1	7.1	6.7	7.1	7.0	7.0	6.36			
Temperature	°C	17.64	16.2	17.2	20.42	16.50	14.74	17.66			
Spec. Conductivity	umhos/cm	2716	3140	2853	4480	3579	4850	4130			
Redox Potential/AL	mV	-121	-80	-176	-178	-129	-163	-128			
Dissolved Oxygen	mg/L	0.41	0.72	0.58	0.61	2.3	0.78	0.55			
Bromide	mg/L		38	19							

Well		MW-8									
Well Depth	ft	>102									
Well Diameter	inch	4									
Date		1/8/2002	4/2/2002	6/25/2002	10/3/2002	1/15/2003	4/28/2003	8/5/2003			
Water Level	ft	7.96	8.4	6.4	8.2	7.2	7.0	6.33			
pH		8.7	8.4	6.4	8.2	7.2	7.0	6.33			
Temperature	°C	15.43	14.87	12.89	13.46	14.15	14.49	13.74			
Spec. Conductivity	umhos/cm	183	190	221	173	178	191	175			
Redox Potential/AL	mV	240	270	273	84	139	98	239.4			
Dissolved Oxygen	mg/L	8.78	5.32	4.62	10.3	13.56	13.96	11.54			
Bromide	mg/L		5.8	2.0							

Well		MW-9									
Well Depth	ft										
Well Diameter	inch										
Date		4/2/2002	1/14/2003	4/2/2002	6/25/2002	10/3/2002	1/15/2003	4/28/2003	8/5/2003		
Water Level	ft										
pH		7.1	6.8	6.5	6.6	6.6	7.1	6.8	6.5		
Temperature	°C	14.26	15.97	14.2	14.6	16.27	14.89	15.48	16.02		
Spec. Conductivity	umhos/cm	200	120	4120	4680	4130	1860	2398	3808		
Redox Potential/AL	mV	250	178	-30	-136	-122	69	-132	-99		
Dissolved Oxygen	mg/L	0.92	4.04	0.7	0.38	1.14	11.88	1.28	0.41		
Bromide	mg/L			11	4.1						

Well		MW-13									
Well Depth	ft										
Well Diameter	inch										
Date		4/2/2002	6/25/2002	10/3/2002	1/14/2003	4/29/2003	8/5/2003				
Water Level	ft										
pH		6.2	6.6	6.6	7.0	7.3	6.52				
Temperature	°C	16.9	16.00	17.94	17.94	16.76	18.1				
Spec. Conductivity	umhos/cm	1520	960	1558	1361	885	1528				
Redox Potential/AL	mV	300	279	-10	101	-3	219				
Dissolved Oxygen	mg/L	1.21	0.48	0.6	3.87	1.9	4.86				
Bromide	mg/L	7.4	0.6								

Table 3. Photocircuits Anaerobic Pilot Field Data

Well		MW-7		SMP-1					
Well Depth	ft	23.2		9.1					
Well Diameter	inch	4		1					
Date		1/8/2002	4/2/2002	1/8/2002	4/2/2002	6/25/2002	10/2/2002	4/28/2003	8/4/2003*
Water Level	ft	7.12		6.42					
pH		7.4		7.1		7.5	7.3	7.5	7.1
Temperature	°C	17.9		16.81		11.64	14.84	18.74	24.80
Spec. Conductivity	umhos/cm	4235		4100		2660	5250	3468	2586
Redox Potential	mV	-33		-40		31	-130	-84	6
Dissolved Oxygen	mg/L	0.36		0.45		2.27	1.72	5.37	132
Bromide	mg/L					20		39	791

Well went dry during sampling

Well		SMP-1							
Well Depth	ft	19.04							
Well Diameter	inch	1							
Date		1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003	
Water Level	ft	6.88							
pH		7.3		7.4		7.6	7.8	6.87	
Temperature	°C	17.85		17.7		21.27	17.4	14.85	18.73
Spec. Conductivity	umhos/cm	5500		3597		4838	4000	4384	2970
Redox Potential	mV	-142		-154		-153	-85	-155	-41
Dissolved Oxygen	mg/L	1.98		2.55		1.74	2.35	1.56	1.75
Bromide	mg/L		311	977					

Well went dry during sampling

Well		SMP-3							
Well Depth	ft	14.6							
Well Diameter	inch	1							
Date		1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003*	
Water Level	ft	6.8							
pH		9.9		8.7		8.8	8.8	7.0	7.4
Temperature	°C	12.06		11.47		19.18	22.80	13.35	15.41
Spec. Conductivity	umhos/cm	5550		5640		5890	4058	359	650
Redox Potential	mV	-44		-52		-95	-120	-62	-161
Dissolved Oxygen	mg/L	3.87		2.94		1.16	2.16	5.41	4.61
Bromide	mg/L			5		55			5.72

Well went dry during sampling

Well		DMF-3							
Well Depth	ft	24.35							
Well Diameter	inch	1							
Date		1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003	
Water Level	ft	6.91							
pH		6.9		7.1		6.3	6.6	7.0	7.5
Temperature	°C	17.95		16.14		16.94	19.65	17.76	17.16
Spec. Conductivity	umhos/cm	3200		3200		3929	5863	5460	4685
Redox Potential	mV	-120		-110		-146	-154	-139	-334
Dissolved Oxygen	mg/L	1.57		1.43		0.21	0.59	0.44	2.15
Bromide	mg/L			16		179			0.49

Well went dry during sampling

Well		SMP-4							
Well Depth	ft	15.82							
Well Diameter	inch	1							
Date		1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003	
Water Level	ft	6.82							
pH		7.6		7.5		5.3	6.1	5.7	5.8
Temperature	°C	16.54		14.82		18.77	22.40	11.08	15.55
Spec. Conductivity	umhos/cm	5186		5130		4440	5530	3200	830
Redox Potential	mV	-165		-170		-25	-35	-10	-35
Dissolved Oxygen	mg/L	0.73		0.65		7.5	1.32	7.19	4.4
Bromide	mg/L					336			3.05

Table 4. Photocircuits Anaerobic Pilot Percent Change Between 9/1/00 and 1/8/02 or 1/13/03

Compound	MW-14 8/31/2000 8/4/2003	MW-7 8/31/2000 1/8/2002	SMP-1 8/31/2000 8/4/2003	DMP-1 8/31/2000 8/4/2003	SMP-3 9/1/2000 8/4/2003	DMP-3 9/1/2000 8/4/2003	SMP-4 9/1/2000 8/4/2003	DMP-4 9/1/2000 8/4/2003
First Sampled								
Last Sampled								
Acetone	-479	0	0	>99.9	0	0	>-6421	0
Methylene Chloride	-3648	38	>99.7	>99	99.7	98	99	55
Toluene	>33	85	<43	61	74	65	98	6
2-Chlorotoluene	0	-888	0	-23	0	0	97	>98
Sum VOAs (w/o gases)	-3459	-33	99	88	89	30	78	-34
Methane	-14127	-665	-41	-196	-11500	-2797	-2744	-10844
Iron	-237	-490	-39	98	74	93	-181	-137
Sulfate	98	-813	96	99.5	70	-319	94	56
TOC	94	96	-83	49	43	-34	-1037	-575
PCE	0	0	0	0	0	0	-397	0
TCE	0	>-218	0	0	0	0	0	0
cDCE	>-793	82	>99.99	15	0	0	76	0
iDCE	0	>-56	0	0	0	0	0	0
VC	>-7843	73	>99.9	60	<93	67	>98	0
Ethene	21	-75	80	43	-67	-14	92	68
ITCA	-3421	0	0	0	99.8	82	>99.9	>96
IDCA	-7503	-58	>99.6	-76	62	-95	99	>93
iDCE	>-8548	0	0	0	<81	58	>98	0
CA	-13746	-51	>-263	67	>-2715	-52	-6	-47
Ethane	81	>-1033	0	-2	79	-93	0	<52

Table 5. Photocircuits Downgradient Wells Percent Change Between 3/28/01 and 1/14/03

Compound	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13
First Sampled	3/28/2001	3/28/2001	1/22/2002	1/22/2002	3/28/2001	3/28/2001
Last Sampled	8/5/2003	1/14/2003	1/14/2003	1/14/2003	8/5/2003	8/5/2003
Acetone	0	0	0	0	0	0
Methylene Chloride	0	0	0	0	0	0
Toluene	0	0	0	0	>79	0
2-Chlorotoluene	0	0	0	0	-7	70
Sum VOAs (w/o gases)	-990	0	1	>-5617	45	71
Methane	>400				-79	-6733
Iron	-57				-283	-407
Sulfate	-159				-6	30
TOC	6				-80	-153
PCE	0	0	>73	0	0	76
TCE	-134	0	30	>-5722	69	76
cDCE	>-5033	0	-6	>-9956	83	58
oDCE	0	0	0	0	77	>94
VC	0	0	>81	0	88	81
Ethene	>-18				-154	<3
ITCA	0	0	0	0	0	97
IDCA	0	0	8	>-2420	-48	90
IDCE	0	0	19	0	17	94
CA	0	0	>-2655	0	>-203	0
Ethane	0				>20	>78

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 high, VC increased from March 2001 to April 2003, lower in August 2003. VC now primary chlorinated ethene with trace cDCE. Not sampled 4/02, 6/02, or 10/02 because of emulsion.	1TCA, 1IDCA, 1IDCE, and CA increased between December 2000 and July 2001 as contaminated water displaced by emulsion moved back into well. Concentrations of 1IDCA and 1IDCE decreased since peak in July 2001, CA increasing. Ethane fairly stable.	Sulfate decreased by 98%, methane and iron up greatly.	TOC availability good. Emulsion found 4/02, 6/02, and 10/02 and TOC levels have been above 1,000 mg/L.
MW-7	Ethene generally predominant product, TCE up slightly. cDCE and VC down by 82 and 73% from start of pilot. 1DCE up slightly. Not sampled since 1/02 because of emulsion.	1IDCA and CA up, CA major product. Ethane produced.	Sulfate increased from 104 to 949 mg/L from 8/31/00 to 1/8/02, methane and iron up greatly.	TOC had fallen to 1.7 mg/L in 1/02. Emulsion found thereafter.
SMP-1	Over 99.99% of cDCE and 99.9% of VC degraded. Ethene is only compound remaining.	No 1TCA detected since 7/01. 1IDCA down by >99.6% and 1DCE not detected. CA produced. Little ethane.	Sulfate down 96% from start of pilot; sulfate levels decreasing with higher substrate. Methane and iron up from start of pilot.	TOC rebounded to 1,280 mg/L in 4/03; enhanced dechlorination. Found adequate level of 168 mg/L in August 2003.
DMP-1	TCE, cDCE, 1DCE, and VC concentrations down from start of pilot and ethene predominant product.	1IDCA up 76%, but no 1DCE detected in August 2003. CA down by 67%, little ethane detected.	Sulfate down 99.5%, methane increased, but iron down.	TOC increased from 24 mg/L in 6/02 to 141 mg/L in August 2003. Adequate supply.
SMP-3	PCE, TCE, cDCE, and 1DCE not detected August 2003. VC detected, but ethene predominant product.	1TCA down by 99.8%, 1IDCA down 62%, 1DCE down by <81%, and CA increasing as 1TCA and 1IDCA degraded. Some ethane.	Sulfate decreased from 3,640 mg/L in April 2002 to 86 mg/L in August 2003, methane increased greatly and iron variable.	TOC in April 2002 up to 1,600 mg/L, but then fell below optimal levels. Adequate TOC levels in April 2003 (184 mg/L) and August 2003 (168 mg/L).
DMP-3	PCE, TCE, cDCE, and 1DCE not detected August 2003. VC increasing. Ethene major product.	1TCA down by 82%, 1IDCA up by 95%, and 1DCE down by 58%. CA increased by 93%. Ethane up.	Sulfate increased. Methane up, but iron decreasing.	TOC increased to 349 mg/L in 6/02 and has remained above 100 mg/L.
SMP-4	PCE up slightly, cDCE and VC down by 76 and >98%, ethene decreased, but still predominant chlorinated ethene.	1TCA, 1IDCA, and 1DCE down by up to 99.9%, CA increasing. Little ethane.	Sulfate decreased to 59 mg/L in August 2003, methane and iron increased greatly.	High levels of TOC (3,680 mg/L found on 10/2/02) and have remained elevated above 800 mg/L.
DMP-4	No detectable PCE, TCE, cDCE, 1DCE, or VC in August 2003. Ethene predominants.	1TCA down >96, 1IDCA down by >93%, 1DCE non-detected August 2003. CA predominant product, but decreasing. Little ethane.	Sulfate down 56%, iron and methane increased.	TOC increased to above 200 mg/L in January 2003, adequate levels.

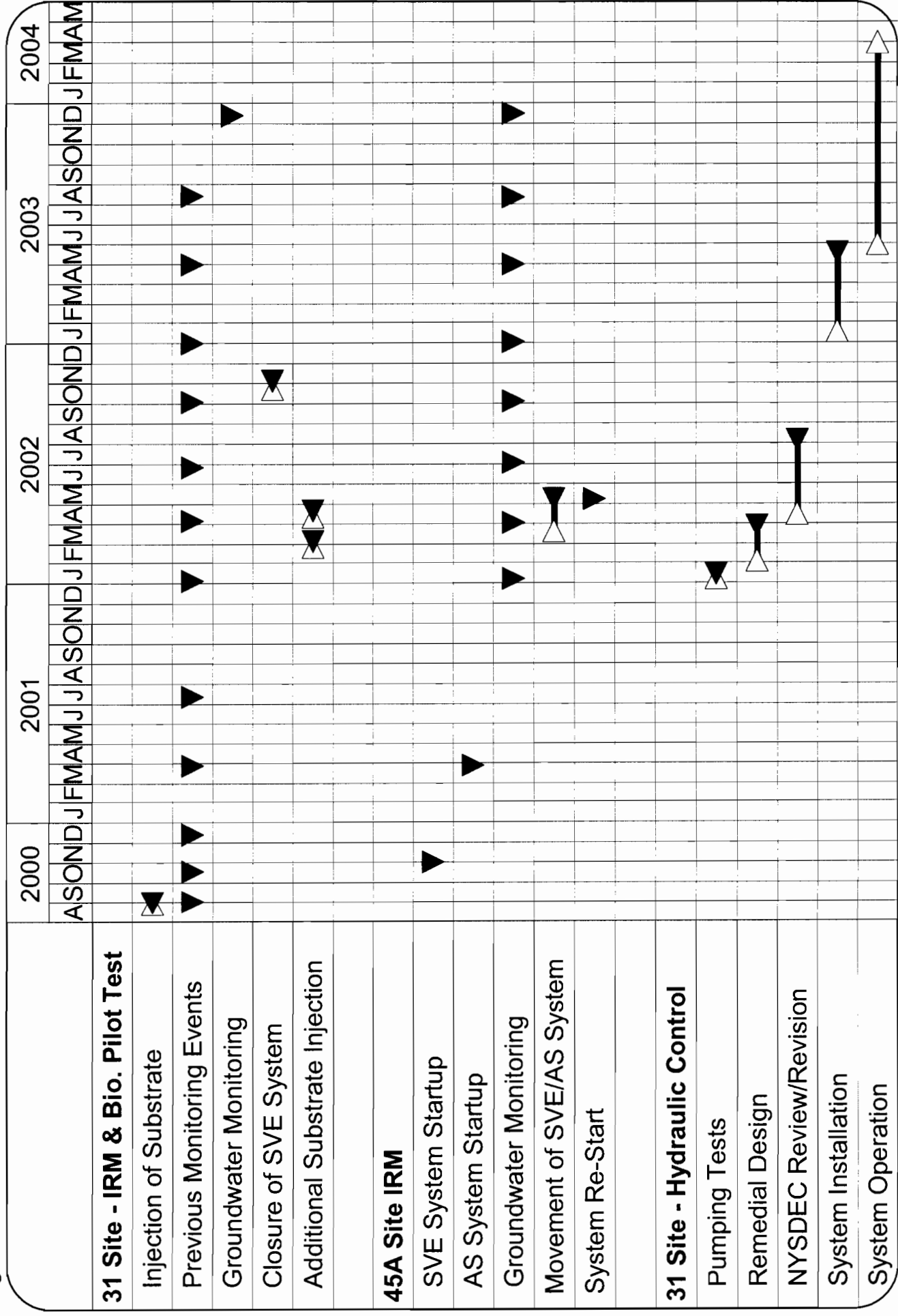
Table 6 continued. Summary of Changes in Concentrations of Chloroethenes, Chloroethanes, Electron Acceptors, and Electron Donor by Well

Well	Chlorinated Ethene Dechlorination	Chlorinated Ethane Dechlorination	Electron Acceptors	Electron Donor Availability
MW-8	PCE, IDCE, VC and ethene not detected August 2003. Low levels of TCE and cDCE found.	No chlorinated ethanes or ethane detected in August 2003.	Little sulfate, iron, or methane. Oxygen and nitrate major electron acceptors.	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, IDCE, and VC decreasing, ethene lower than in January 2002 to June 2002.	IDCA decreasing from peak concentration in January 2002. 1TCA not detected, low IDCE and CA, ethane detected at low level.	Sulfate increased by 6%, iron and methane also increased.	TOC level was 59 mg/L; probably adequate levels.
MW-13	Decreases in PCE, TCE, cDCE, IDCE, and VC concentrations, trace ethene.	Decreases in 1TCA (97%), IDCA (90%), IDCE (94), and ethane (78%) concentrations. No CA.	Methane and iron increased, and sulfate down 50%.	TOC level of 24 mg/L in August 2003, below optimal.

Photocircuits - Updated Schedule of Remedial Activities

31 & 45 Sea Cliff Avenue Sites

Page 1 of 1



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/13/2003

Custody Document: R1001

Received: 08/07/2003 16:51

Sampled by: Derik Jordan/David Hanny

Client: Photocircuits Corporation

31 Sea Cliff Avenue
Glen Cove,
NY 11542

Project: Photocircuits Corp.

31 Sea Cliff Avenue
Glen Cove,
NY 11542

Manager: Andy Barber

Respectfully submitted,

Patricia Werner-Els
Quality Assurance Officer

INITIALS	
FILE#	
COPY TO	
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AUG 28 2003	
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NYS Lab ID # 10969

NJ Cert. # 73812

CT Cert. # PH0645

MA Cert. # NY061

PA Cert. # 68-535

NH Cert. # 252592-BA

RI Cert. # 161

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Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-1

Client Sample ID: RW-1 (PC)

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Type: Grab

Collected: 08/05/2003 10:30

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C1061-2357	0.85	0.85	ppb	U
75-45-6	Chlorodifluoromethane	C1061-2357	0.75	0.75	ppb	U
74-87-3	Chloromethane	C1061-2357	0.70	0.70	ppb	U
75-01-4	Vinyl Chloride	C1061-2357	0.55	115	ppb	
74-83-9	Bromomethane	C1061-2357	0.75	0.75	ppb	U
75-00-3	Chloroethane	C1061-2357	1.40	1.40	ppb	U
75-69-4	Trichlorofluoromethane	C1061-2357	0.65	0.65	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	C1061-2357	0.95	0.95	ppb	U
75-35-4	1,1-Dichloroethene	C1061-2357	0.80	5.03	ppb	
67-64-1	Acetone	C1061-2357	7.90	7.90	ppb	U
75-15-0	Carbon disulfide	C1061-2357	0.65	0.65	ppb	U
75-09-2	Methylene Chloride	C1061-2357	0.80	112	ppb	
156-60-5	trans-1,2-Dichloroethene	C1061-2357	0.75	4.31	ppb	
1634-04-4	Methyl t-butyl ether	C1061-2357	0.37	0.37	ppb	U
75-34-3	1,1-Dichloroethane	C1061-2357	0.47	106	ppb	
590-20-7	2,2-Dichloropropane	C1061-2357	1.65	1.65	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1059-2433	8.00	3010	ppb	
78-93-3	2-Butanone	C1061-2357	2.30	2.30	ppb	U
74-97-5	Bromochloromethane	C1061-2357	0.70	0.70	ppb	U
67-66-3	Chloroform	C1061-2357	0.36	0.36	ppb	U
71-55-6	1,1,1-Trichloroethane	C1061-2357	0.80	0.80	ppb	U
56-23-5	Carbon Tetrachloride	C1061-2357	0.60	0.60	ppb	U
563-58-6	1,1-Dichloropropene	C1061-2357	0.80	0.80	ppb	U
71-43-2	Benzene	C1061-2357	0.55	7.49	ppb	
107-06-2	1,2-Dichloroethane	C1061-2357	0.60	0.60	ppb	U
79-01-6	Trichloroethene	C1061-2357	0.80	606	ppb	
78-87-5	1,2-Dichloropropane	C1061-2357	0.55	0.55	ppb	U
74-95-3	Dibromomethane	C1061-2357	0.85	0.85	ppb	U
75-27-4	Bromodichloromethane	C1061-2357	0.55	0.55	ppb	U
110-75-8	2-Chloroethylvinylether	C1061-2357	0.95	0.95	ppb	U
10061-01-5	cis-1,3-Dichloropropene	C1061-2357	0.45	0.45	ppb	U
108-10-1	4-Methyl-2-pentanone	C1061-2357	4.05	4.05	ppb	U



Environmental Testing Laboratories, Inc.

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

08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-1

Client Sample ID: RW-1 (PC)

Collected: 08/05/2003 10:30

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	C1061-2357	0.46	14.2	ppb	
10061-02-6	trans-1,3-Dichloropropene	C1061-2357	0.65	0.65	ppb	U
79-00-5	1,1,2-Trichloroethane	C1061-2357	0.70	0.70	ppb	U
127-18-4	Tetrachloroethene	C1061-2357	1.95	28.7	ppb	
142-28-9	1,3-Dichloropropane	C1061-2357	0.50	0.50	ppb	U
591-78-6	2-Hexanone	C1061-2357	5.05	5.05	ppb	U
124-48-1	Dibromochloromethane	C1061-2357	0.55	0.55	ppb	U
106-93-4	1,2-Dibromoethane	C1061-2357	0.55	0.55	ppb	U
108-90-7	Chlorobenzene	C1061-2357	0.65	0.65	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	C1061-2357	0.55	0.55	ppb	U
100-41-4	Ethylbenzene	C1061-2357	0.55	0.55	ppb	U
108-38-3	m,p-xylene	C1061-2357	1.65	5.34	ppb	
95-47-6	o-xylene	C1061-2357	0.65	0.65	ppb	U
100-42-5	Styrene	C1061-2357	4.85	4.85	ppb	U
75-25-2	Bromoform	C1061-2357	0.70	0.70	ppb	U
98-82-8	Isopropylbenzene	C1061-2357	0.49	0.49	ppb	U
108-86-1	Bromobenzene	C1061-2357	0.36	0.36	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	C1061-2357	0.44	0.44	ppb	U
103-65-1	n-Propylbenzene	C1061-2357	0.60	455	ppb	
96-18-4	1,2,3-Trichloropropane	C1061-2357	1.40	1.40	ppb	U
622-96-8	p-Ethyltoluene	C1061-2357	0.60	0.60	ppb	U
108-67-8	1,3,5-Trimethylbenzene	C1061-2357	0.47	0.47	ppb	U
95-49-8	2-Chlorotoluene	C1061-2357	0.75	540	ppb	
106-43-4	4-Chlorotoluene	C1061-2357	0.70	26.4	ppb	
98-06-6	tert-Butylbenzene	C1061-2357	0.75	0.75	ppb	U
95-63-6	1,2,4-Trimethylbenzene	C1061-2357	0.55	0.55	ppb	U
135-98-8	sec-Butylbenzene	C1061-2357	0.55	0.55	ppb	U
99-87-6	p-Isopropyltoluene	C1061-2357	0.60	0.60	ppb	U
541-73-1	1,3-Dichlorobenzene	C1061-2357	0.41	0.41	ppb	U
106-46-7	1,4-Dichlorobenzene	C1061-2357	0.34	0.34	ppb	U
95-50-1	1,2-Dichlorobenzene	C1061-2357	0.55	0.55	ppb	U
105-05-5	p-Diethylbenzene	C1061-2357	0.55	0.55	ppb	U



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08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-1

Client Sample ID: RW-1 (PC)

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Type: Grab

Collected: 08/05/2003 10:30

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	C1061-2357	0.44	0.44	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	C1061-2357	0.60	0.60	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	C1061-2357	0.75	0.75	ppb	U
120-82-1	1,2,4-Trichlorobenzene	C1061-2357	0.65	0.65	ppb	U
87-68-3	Hexachlorobutadiene	C1061-2357	1.85	1.85	ppb	U
91-20-3	Naphthalene	C1061-2357	2.30	4.81	ppb	

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1059-2433	95.6 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1059-2433	96.8 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1059-2433	97.5 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	C1061-2357	101.0 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	C1061-2357	93.4 %	(74 - 111)	
2037-26-5	TOLUENE-D8	C1061-2357	103.0 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-2

Client Sample ID: RW-2 (PC)

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Type: Grab

Collected: 08/05/2003 10:40

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C1061-2358	0.17	0.17	ppb	U
75-45-6	Chlorodifluoromethane	C1061-2358	0.15	0.15	ppb	U
74-87-3	Chloromethane	C1061-2358	0.14	0.14	ppb	U
75-01-4	Vinyl Chloride	C1061-2358	0.11	4.20	ppb	
74-83-9	Bromomethane	C1061-2358	0.15	0.15	ppb	U
75-00-3	Chloroethane	C1061-2358	0.28	0.28	ppb	U
75-69-4	Trichlorofluoromethane	C1061-2358	0.13	0.13	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	C1061-2358	0.19	0.19	ppb	U
75-35-4	1,1-Dichloroethene	C1061-2358	0.16	0.16	ppb	U
67-64-1	Acetone	C1061-2358	1.58	1.58	ppb	U
75-15-0	Carbon disulfide	C1061-2358	0.13	0.13	ppb	U
75-09-2	Methylene Chloride	C1061-2358	0.16	0.16	ppb	U
156-60-5	trans-1,2-Dichloroethene	C1061-2358	0.15	0.15	ppb	U
1634-04-4	Methyl t-butyl ether	C1061-2358	0.074	0.074	ppb	U
75-34-3	1,1-Dichloroethane	C1061-2358	0.095	16.0	ppb	
590-20-7	2,2-Dichloropropane	C1061-2358	0.33	0.33	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1059-2434	0.80	159	ppb	
78-93-3	2-Butanone	C1061-2358	0.46	0.46	ppb	U
74-97-5	Bromochloromethane	C1061-2358	0.14	0.14	ppb	U
67-66-3	Chloroform	C1061-2358	0.072	0.072	ppb	U
71-55-6	1,1,1-Trichloroethane	C1061-2358	0.16	0.16	ppb	U
56-23-5	Carbon Tetrachloride	C1061-2358	0.12	0.12	ppb	U
563-58-6	1,1-Dichloropropene	C1061-2358	0.16	0.16	ppb	U
71-43-2	Benzene	C1061-2358	0.11	0.11	ppb	U
107-06-2	1,2-Dichloroethane	C1061-2358	0.12	0.12	ppb	U
79-01-6	Trichloroethene	C1061-2358	0.16	37.2	ppb	
78-87-5	1,2-Dichloropropane	C1061-2358	0.11	0.11	ppb	U
74-95-3	Dibromomethane	C1061-2358	0.17	0.17	ppb	U
75-27-4	Bromodichloromethane	C1061-2358	0.11	0.11	ppb	U
110-75-8	2-Chloroethylvinylether	C1061-2358	0.19	0.19	ppb	U
10061-01-5	cis-1,3-Dichloropropene	C1061-2358	0.090	0.090	ppb	U
108-10-1	4-Methyl-2-pentanone	C1061-2358	0.81	0.81	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-2

Client Sample ID: RW-2 (PC)

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Type: Grab

Collected: 08/05/2003 10:40

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	C1061-2358	0.092	0.092	ppb	U
10061-02-6	trans-1,3-Dichloropropene	C1061-2358	0.13	0.13	ppb	U
79-00-5	1,1,2-Trichloroethane	C1061-2358	0.14	0.14	ppb	U
127-18-4	Tetrachloroethene	C1061-2358	0.39	2.89	ppb	
142-28-9	1,3-Dichloropropane	C1061-2358	0.099	0.099	ppb	U
591-78-6	2-Hexanone	C1061-2358	1.01	1.01	ppb	U
124-48-1	Dibromochloromethane	C1061-2358	0.11	0.11	ppb	U
106-93-4	1,2-Dibromoethane	C1061-2358	0.11	0.11	ppb	U
108-90-7	Chlorobenzene	C1061-2358	0.13	0.13	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	C1061-2358	0.11	0.11	ppb	U
100-41-4	Ethylbenzene	C1061-2358	0.11	0.11	ppb	U
108-38-3	m,p-xylene	C1061-2358	0.33	0.33	ppb	U
95-47-6	o-xylene	C1061-2358	0.13	0.13	ppb	U
100-42-5	Styrene	C1061-2358	0.97	0.97	ppb	U
75-25-2	Bromoform	C1061-2358	0.14	0.14	ppb	U
98-82-8	Isopropylbenzene	C1061-2358	0.097	0.097	ppb	U
108-86-1	Bromobenzene	C1061-2358	0.072	0.072	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	C1061-2358	0.088	0.088	ppb	U
103-65-1	n-Propylbenzene	C1061-2358	0.12	92.3	ppb	
96-18-4	1,2,3-Trichloropropane	C1061-2358	0.28	0.28	ppb	U
622-96-8	p-Ethyltoluene	C1061-2358	0.12	0.12	ppb	U
108-67-8	1,3,5-Trimethylbenzene	C1061-2358	0.095	0.095	ppb	U
95-49-8	2-Chlorotoluene	C1061-2358	0.15	109	ppb	
106-43-4	4-Chlorotoluene	C1061-2358	0.14	8.46	ppb	
98-06-6	tert-Butylbenzene	C1061-2358	0.15	0.15	ppb	U
95-63-6	1,2,4-Trimethylbenzene	C1061-2358	0.11	0.11	ppb	U
135-98-8	sec-Butylbenzene	C1061-2358	0.11	0.11	ppb	U
99-87-6	p-Isopropyltoluene	C1061-2358	0.12	0.12	ppb	U
541-73-1	1,3-Dichlorobenzene	C1061-2358	0.083	0.083	ppb	U
106-46-7	1,4-Dichlorobenzene	C1061-2358	0.068	0.068	ppb	U
95-50-1	1,2-Dichlorobenzene	C1061-2358	0.11	0.11	ppb	U
105-05-5	p-Diethylbenzene	C1061-2358	0.11	0.11	ppb	U



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208 Route 109, Farmingdale NY 11735

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

08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-2

Client Sample ID: RW-2 (PC)

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Type: Grab

Collected: 08/05/2003 10:40

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	C1061-2358	0.088	0.088	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	C1061-2358	0.12	0.12	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	C1061-2358	0.15	0.15	ppb	U
120-82-1	1,2,4-Trichlorobenzene	C1061-2358	0.13	0.13	ppb	U
87-68-3	Hexachlorobutadiene	C1061-2358	0.37	0.37	ppb	U
91-20-3	Naphthalene	C1061-2358	0.46	0.46	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1059-2434	96.1 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1059-2434	97.1 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1059-2434	98.6 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	C1061-2358	100.0 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	C1061-2358	91.1 %	(74 - 111)	
2037-26-5	TOLUENE-D8	C1061-2358	103.0 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-3

Client Sample ID: RW-3

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Type: Grab

Collected: 08/05/2003 10:50

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C1061-2359	0.17	0.17	ppb	U
75-45-6	Chlorodifluoromethane	C1061-2359	0.15	0.15	ppb	U
74-87-3	Chloromethane	C1061-2359	0.14	0.14	ppb	U
75-01-4	Vinyl Chloride	C1061-2359	0.11	0.11	ppb	U
74-83-9	Bromomethane	C1061-2359	0.15	0.15	ppb	U
75-00-3	Chloroethane	C1061-2359	0.28	0.28	ppb	U
75-69-4	Trichlorofluoromethane	C1061-2359	0.13	0.13	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	C1061-2359	0.19	0.19	ppb	U
75-35-4	1,1-Dichloroethene	C1061-2359	0.16	0.16	ppb	U
67-64-1	Acetone	C1061-2359	1.58	1.58	ppb	U
75-15-0	Carbon disulfide	C1061-2359	0.13	0.13	ppb	U
75-09-2	Methylene Chloride	C1061-2359	0.16	0.16	ppb	U
156-60-5	trans-1,2-Dichloroethene	C1061-2359	0.15	0.15	ppb	U
1634-04-4	Methyl t-butyl ether	C1061-2359	0.074	0.074	ppb	U
75-34-3	1,1-Dichloroethane	C1061-2359	0.095	6.10	ppb	
590-20-7	2,2-Dichloropropane	C1061-2359	0.33	0.33	ppb	U
156-59-2	cis-1,2-Dichloroethene	C1061-2359	0.17	64.4	ppb	
78-93-3	2-Butanone	C1061-2359	0.46	0.46	ppb	U
74-97-5	Bromochloromethane	C1061-2359	0.14	0.14	ppb	U
67-66-3	Chloroform	C1061-2359	0.072	0.072	ppb	U
71-55-6	1,1,1-Trichloroethane	C1061-2359	0.16	0.16	ppb	U
56-23-5	Carbon Tetrachloride	C1061-2359	0.12	0.12	ppb	U
563-58-6	1,1-Dichloropropene	C1061-2359	0.16	0.16	ppb	U
71-43-2	Benzene	C1061-2359	0.11	0.11	ppb	U
107-06-2	1,2-Dichloroethane	C1061-2359	0.12	0.12	ppb	U
79-01-6	Trichloroethene	C1061-2359	0.16	35.5	ppb	
78-87-5	1,2-Dichloropropane	C1061-2359	0.11	0.11	ppb	U
74-95-3	Dibromomethane	C1061-2359	0.17	0.17	ppb	U
75-27-4	Bromodichloromethane	C1061-2359	0.11	0.11	ppb	U
110-75-8	2-Chloroethylvinylether	C1061-2359	0.19	0.19	ppb	U
10061-01-5	cis-1,3-Dichloropropene	C1061-2359	0.090	0.090	ppb	U
108-10-1	4-Methyl-2-pentanone	C1061-2359	0.81	0.81	ppb	U



Environmental Testing Laboratories, Inc.

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

08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-3

Client Sample ID: RW-3

Collected: 08/05/2003 10:50

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	C1061-2359	0.092	0.092	ppb	U
10061-02-6	trans-1,3-Dichloropropene	C1061-2359	0.13	0.13	ppb	U
79-00-5	1,1,2-Trichloroethane	C1061-2359	0.14	0.14	ppb	U
127-18-4	Tetrachloroethene	C1061-2359	0.39	4.46	ppb	
142-28-9	1,3-Dichloropropane	C1061-2359	0.099	0.099	ppb	U
591-78-6	2-Hexanone	C1061-2359	1.01	1.01	ppb	U
124-48-1	Dibromochloromethane	C1061-2359	0.11	0.11	ppb	U
106-93-4	1,2-Dibromoethane	C1061-2359	0.11	0.11	ppb	U
108-90-7	Chlorobenzene	C1061-2359	0.13	0.13	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	C1061-2359	0.11	0.11	ppb	U
100-41-4	Ethylbenzene	C1061-2359	0.11	0.11	ppb	U
108-38-3	m,p-xylene	C1061-2359	0.33	0.33	ppb	U
95-47-6	o-xylene	C1061-2359	0.13	0.13	ppb	U
100-42-5	Styrene	C1061-2359	0.97	0.97	ppb	U
75-25-2	Bromoform	C1061-2359	0.14	0.14	ppb	U
98-82-8	Isopropylbenzene	C1061-2359	0.097	0.097	ppb	U
108-86-1	Bromobenzene	C1061-2359	0.072	0.072	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	C1061-2359	0.088	0.088	ppb	U
103-65-1	n-Propylbenzene	C1061-2359	0.12	0.12	ppb	U
96-18-4	1,2,3-Trichloropropane	C1061-2359	0.28	0.28	ppb	U
622-96-8	p-Ethyltoluene	C1061-2359	0.12	0.12	ppb	U
108-67-8	1,3,5-Trimethylbenzene	C1061-2359	0.095	0.095	ppb	U
95-49-8	2-Chlorotoluene	C1061-2359	0.15	0.15	ppb	U
106-43-4	4-Chlorotoluene	C1061-2359	0.14	0.14	ppb	U
98-06-6	tert-Butylbenzene	C1061-2359	0.15	0.15	ppb	U
95-63-6	1,2,4-Trimethylbenzene	C1061-2359	0.11	0.11	ppb	U
135-98-8	sec-Butylbenzene	C1061-2359	0.11	0.11	ppb	U
99-87-6	p-Isopropyltoluene	C1061-2359	0.12	0.12	ppb	U
541-73-1	1,3-Dichlorobenzene	C1061-2359	0.083	0.083	ppb	U
106-46-7	1,4-Dichlorobenzene	C1061-2359	0.068	0.068	ppb	U
95-50-1	1,2-Dichlorobenzene	C1061-2359	0.11	0.11	ppb	U
105-05-5	p-Diethylbenzene	C1061-2359	0.11	0.11	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-3

Client Sample ID: RW-3

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Type: Grab

Collected: 08/05/2003 10:50

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	C1061-2359	0.088	0.088	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	C1061-2359	0.12	0.12	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	C1061-2359	0.15	0.15	ppb	U
120-82-1	1,2,4-Trichlorobenzene	C1061-2359	0.13	0.13	ppb	U
87-68-3	Hexachlorobutadiene	C1061-2359	0.37	0.37	ppb	U
91-20-3	Naphthalene	C1061-2359	0.46	0.46	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	C1061-2359	98.6 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	C1061-2359	95.6 %	(74 - 111)	
2037-26-5	TOLUENE-D8	C1061-2359	106.0 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-4

Client Sample ID: RW-4

Collected: 08/05/2003 11:00

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	C1061-2360	0.17	0.17	ppb	U
75-45-6	Chlorodifluoromethane	C1061-2360	0.15	4.82	ppb	
74-87-3	Chloromethane	C1061-2360	0.14	0.14	ppb	U
75-01-4	Vinyl Chloride	C1061-2360	0.11	1.24	ppb	
74-83-9	Bromomethane	C1061-2360	0.15	0.15	ppb	U
75-00-3	Chloroethane	C1061-2360	0.28	0.28	ppb	U
75-69-4	Trichlorofluoromethane	C1061-2360	0.13	0.13	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	C1061-2360	0.19	0.19	ppb	U
75-35-4	1,1-Dichloroethene	C1061-2360	0.16	14.8	ppb	
67-64-1	Acetone	C1061-2360	1.58	1.58	ppb	U
75-15-0	Carbon disulfide	C1061-2360	0.13	0.13	ppb	U
75-09-2	Methylene Chloride	C1061-2360	0.16	0.16	ppb	U
156-60-5	trans-1,2-Dichloroethene	C1061-2360	0.15	6.00	ppb	
1634-04-4	Methyl t-butyl ether	C1061-2360	0.074	0.074	ppb	U
75-34-3	1,1-Dichloroethane	C1061-2360	0.095	114	ppb	
590-20-7	2,2-Dichloropropane	C1061-2360	0.33	0.33	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1059-2435	1.60	469	ppb	
78-93-3	2-Butanone	C1061-2360	0.46	0.46	ppb	U
74-97-5	Bromochloromethane	C1061-2360	0.14	0.14	ppb	U
67-66-3	Chloroform	C1061-2360	0.072	0.072	ppb	U
71-55-6	1,1,1-Trichloroethane	C1061-2360	0.16	1.66	ppb	
56-23-5	Carbon Tetrachloride	C1061-2360	0.12	0.12	ppb	U
563-58-6	1,1-Dichloropropene	C1061-2360	0.16	0.16	ppb	U
71-43-2	Benzene	C1061-2360	0.11	0.11	ppb	U
107-06-2	1,2-Dichloroethane	C1061-2360	0.12	1.18	ppb	
79-01-6	Trichloroethene	A1059-2435	2.10	239	ppb	
78-87-5	1,2-Dichloropropane	C1061-2360	0.11	0.11	ppb	U
74-95-3	Dibromomethane	C1061-2360	0.17	0.17	ppb	U
75-27-4	Bromodichloromethane	C1061-2360	0.11	0.11	ppb	U
110-75-8	2-Chloroethylvinylether	C1061-2360	0.19	0.19	ppb	U
10061-01-5	cis-1,3-Dichloropropene	C1061-2360	0.090	0.090	ppb	U
108-10-1	4-Methyl-2-pentanone	C1061-2360	0.81	0.81	ppb	U



Environmental Testing Laboratories, Inc.

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

08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-4

Client Sample ID: RW-4

Collected: 08/05/2003 11:00

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	C1061-2360	0.092	0.092	ppb	U
10061-02-6	trans-1,3-Dichloropropene	C1061-2360	0.13	0.13	ppb	U
79-00-5	1,1,2-Trichloroethane	C1061-2360	0.14	0.14	ppb	U
127-18-4	Tetrachloroethene	C1061-2360	0.39	40.2	ppb	
142-28-9	1,3-Dichloropropane	C1061-2360	0.099	0.099	ppb	U
591-78-6	2-Hexanone	C1061-2360	1.01	1.01	ppb	U
124-48-1	Dibromochloromethane	C1061-2360	0.11	0.11	ppb	U
106-93-4	1,2-Dibromoethane	C1061-2360	0.11	0.11	ppb	U
108-90-7	Chlorobenzene	C1061-2360	0.13	0.13	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	C1061-2360	0.11	0.11	ppb	U
100-41-4	Ethylbenzene	C1061-2360	0.11	0.11	ppb	U
108-38-3	m,p-xylene	C1061-2360	0.33	0.33	ppb	U
95-47-6	o-xylene	C1061-2360	0.13	0.13	ppb	U
100-42-5	Styrene	C1061-2360	0.97	0.97	ppb	U
75-25-2	Bromoform	C1061-2360	0.14	0.14	ppb	U
98-82-8	Isopropylbenzene	C1061-2360	0.097	0.097	ppb	U
108-86-1	Bromobenzene	C1061-2360	0.072	0.072	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	C1061-2360	0.088	0.088	ppb	U
103-65-1	n-Propylbenzene	C1061-2360	0.12	3.76	ppb	
96-18-4	1,2,3-Trichloropropane	C1061-2360	0.28	0.28	ppb	U
622-96-8	p-Ethyltoluene	C1061-2360	0.12	0.12	ppb	U
108-67-8	1,3,5-Trimethylbenzene	C1061-2360	0.095	0.095	ppb	U
95-49-8	2-Chlorotoluene	C1061-2360	0.15	4.23	ppb	
106-43-4	4-Chlorotoluene	C1061-2360	0.14	0.14	ppb	U
98-06-6	tert-Butylbenzene	C1061-2360	0.15	0.15	ppb	U
95-63-6	1,2,4-Trimethylbenzene	C1061-2360	0.11	0.11	ppb	U
135-98-8	sec-Butylbenzene	C1061-2360	0.11	0.11	ppb	U
99-87-6	p-Isopropyltoluene	C1061-2360	0.12	0.12	ppb	U
541-73-1	1,3-Dichlorobenzene	C1061-2360	0.083	0.083	ppb	U
106-46-7	1,4-Dichlorobenzene	C1061-2360	0.068	0.068	ppb	U
95-50-1	1,2-Dichlorobenzene	C1061-2360	0.11	0.11	ppb	U
105-05-5	p-Diethylbenzene	C1061-2360	0.11	0.11	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/13/2003

Volatile Compounds - EPA 8260B

Sample: R1001-4

Client Sample ID: RW-4

Matrix: Liquid

Type: Grab

Collected: 08/05/2003 11:00

Remarks: See Case Narrative

Analyzed Date: 08/09/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	C1061-2360	0.088	0.088	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	C1061-2360	0.12	0.12	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	C1061-2360	0.15	0.15	ppb	U
120-82-1	1,2,4-Trichlorobenzene	C1061-2360	0.13	0.13	ppb	U
87-68-3	Hexachlorobutadiene	C1061-2360	0.37	0.37	ppb	U
91-20-3	Naphthalene	C1061-2360	0.46	0.46	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1059-2435	96.7 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1059-2435	97.8 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1059-2435	97.8 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	C1061-2360	100.0 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	C1061-2360	104.0 %	(74 - 111)	
2037-26-5	TOLUENE-D8	C1061-2360	102.0 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/13/2003

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 and 2-Chloro ethyl vinyl ether 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.



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/13/2003

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 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)
- x - Outside Expected Range

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

R 1001

Project Name:		Project Manager:		Sampler (Signature):		(Print):	
Project Address:							
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.	
1							601/602
2							BTX/BTEX
3							MTBE
4							624/8260/8021
5							625/8270/BN
6							PCB/Pesticides
7							Pet. Prods./B100M
8							RCRA Metals
9							pH/Flash/React
10							418.1 - TRPH
11							
12							
13							
14							
15							
Relinquished by (Signature):		Date:		Printed Name & Agent:		Received by (Signature):	
David Henry		8/17/02		David Henry		David Henry	
Relinquished by (Signature):		Date:		Printed Name & Agent:		Received for Lab by (Signature):	
						PJT	
Comments & Special Instructions		QA/QC Type:		Number & Type of Containers:		Preservatives:	
				8-100AS		HCL	
						Temp: 5°C	

SHIPPING COPY

Environmental Testing Laboratories, Inc.

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

08/20/2003

Custody Document: P7340

Received: 08/07/2003 16:04
Sampled by: Derik Jordan/David Hanny

Client: Photocircuits Corporation

31 Sea Cliff Avenue
Glen Cove,
NY 11542

Project: Photocircuits Corp.

31 Sea Cliff Avenue
Glen Cove,
NY 11542

Manager: Andy Barber

Respectfully submitted,

Patricia Werner-Els
Quality Assurance Officer

INITIALS	
FILE #	
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Barton R. Lomnitz PC	
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ROUTE TO	

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

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Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatiles - EPA 8260B in AIR

Sample: P7340-14

Client Sample ID: SVE INF

Matrix: Air

Remarks: See Case Narrative

Analyzed Date: 08/11/2003

Type: Grab

Collected: 08/06/2003 12:00

Volume: 0.87 L

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1059-2429	0.083	0.083	mg/M3	U
74-87-3	Chloromethane	A1059-2429	0.071	0.071	mg/M3	U
75-01-4	Vinyl Chloride	A1059-2429	0.072	0.072	mg/M3	U
74-83-9	Bromomethane	A1059-2429	0.021	0.021	mg/M3	U
75-00-3	Chloroethane	A1059-2429	0.052	0.052	mg/M3	U
75-69-4	Trichlorofluoromethane	A1059-2429	0.028	0.028	mg/M3	U
75-35-4	1,1-Dichloroethene	A1059-2429	0.060	0.060	mg/M3	U
75-09-2	Methylene Chloride	A1059-2429	0.095	0.095	mg/M3	U
156-60-5	t-1,2-Dichloroethene	A1059-2429	0.083	0.083	mg/M3	U
75-34-3	1,1-Dichloroethane	A1059-2429	0.13	0.13	mg/M3	U
590-20-7	2,2-Dichloropropane	A1059-2429	0.031	0.031	mg/M3	U
156-59-2	c-1,2-Dichloroethene	A1059-2429	0.052	0.052	mg/M3	U
67-66-3	Chloroform	A1059-2429	0.026	0.026	mg/M3	U
74-97-5	Bromochloromethane	A1059-2429	0.029	0.029	mg/M3	U
71-55-6	1,1,1-Trichloroethane	A1059-2429	0.043	0.043	mg/M3	U
563-58-6	1,1-Dichloropropene	A1059-2429	0.12	0.12	mg/M3	U
56-23-5	Carbon Tetrachloride	A1059-2429	0.038	0.038	mg/M3	U
107-06-2	1,2 Dichloroethane	A1059-2429	0.034	0.034	mg/M3	U
71-43-2	Benzene	A1059-2429	0.031	0.031	mg/M3	U
79-01-6	Trichloroethene	A1059-2429	0.048	0.048	mg/M3	U
78-87-5	1,2-Dichloropropane	A1059-2429	0.041	0.041	mg/M3	U
75-27-4	Bromodichloromethane	A1059-2429	0.029	0.029	mg/M3	U
74-95-3	Dibromomethane	A1059-2429	0.031	0.031	mg/M3	U
10061-01-5	c-1,3-Dichloropropene	A1059-2429	0.026	0.026	mg/M3	U
108-88-3	Toluene	A1059-2429	0.041	0.041	mg/M3	U
10061-02-6	t-1,3-Dichloropropene	A1059-2429	0.026	0.026	mg/M3	U
79-00-5	1,1,2-Trichloroethane	A1059-2429	0.034	0.034	mg/M3	U
142-28-9	1,3-Dichloropropane	A1059-2429	0.028	0.028	mg/M3	U
127-18-4	Tetrachloroethene	A1059-2429	0.060	7.61	mg/M3	
124-48-1	Dibromochloromethane	A1059-2429	0.024	0.024	mg/M3	U
106-93-4	1,2-Dibromoethane	A1059-2429	0.040	0.040	mg/M3	U
108-90-7	Chlorobenzene	A1059-2429	0.050	0.050	mg/M3	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatiles - EPA 8260B in AIR

Sample: P7340-14

Client Sample ID: SVE INF

Matrix: Air

Remarks: See Case Narrative

Analyzed Date: 08/11/2003

Type: Grab

Collected: 08/06/2003 12:00

Volume: 0.87 L

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
630-20-6	1,1,1,2-Tetrachloroethane	A1059-2429	0.060	0.060	mg/M3	U
100-41-4	Ethylbenzene	A1059-2429	0.060	0.060	mg/M3	U
108-38-3	m,p-xylene	A1059-2429	0.077	0.077	mg/M3	U
95-47-6	o-xylene	A1059-2429	0.053	0.053	mg/M3	U
100-42-5	Styrene	A1059-2429	0.040	0.040	mg/M3	U
98-82-8	Isopropylbenzene	A1059-2429	0.045	0.045	mg/M3	U
75-25-2	Bromoform	A1059-2429	0.015	0.015	mg/M3	U
79-34-5	1,1,2,2-Tetrachloroethane	A1059-2429	0.038	0.038	mg/M3	U
96-18-4	1,2,3-Trichloropropane	A1059-2429	0.11	0.11	mg/M3	U
103-65-1	n-Propylbenzene	A1059-2429	0.036	0.036	mg/M3	U
108-86-1	Bromobenzene	A1059-2429	0.046	0.046	mg/M3	U
108-67-8	1,3,5-Trimethylbenzene	A1059-2429	0.058	0.058	mg/M3	U
95-49-8	2-Chlorotoluene	A1059-2429	0.036	0.036	mg/M3	U
106-43-4	4-Chlorotoluene	A1059-2429	0.062	0.062	mg/M3	U
99-87-6	4-Isopropyltoluene	A1059-2429	0.041	0.041	mg/M3	U
95-63-6	1,2,4-trimethylbenzene	A1059-2429	0.038	0.038	mg/M3	U
135-98-8	sec-Butylbenzene	A1059-2429	0.048	0.048	mg/M3	U
98-06-6	tert-Butylbenzene	A1059-2429	0.064	0.064	mg/M3	U
541-73-1	1,3 Dichlorobenzene	A1059-2429	0.053	0.053	mg/M3	U
106-46-7	1,4-Dichlorobenzene	A1059-2429	0.033	0.033	mg/M3	U
104-51-8	n-Butylbenzene	A1059-2429	0.021	0.021	mg/M3	U
95-50-1	1,2-Dichlorobenzene	A1059-2429	0.046	0.046	mg/M3	U
96-12-8	1,2-Dibromo-3-chloropropane	A1059-2429	0.091	0.091	mg/M3	U
120-82-1	1,2,4-Trichlorobenzene	A1059-2429	0.033	0.033	mg/M3	U
87-68-3	Hexachlorobutadiene	A1059-2429	0.057	0.057	mg/M3	U
91-20-3	Naphthalene	A1059-2429	0.033	0.033	mg/M3	U
87-61-6	1,2,3-Trichlorobenzene	A1059-2429	0.040	0.040	mg/M3	U
1634-04-4	MTBE	A1059-2429	0.17	0.17	mg/M3	U



Environmental Testing Laboratories, Inc.

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

08/20/2003

Volatiles - EPA 8260B in AIR

Sample: P7340-14

Client Sample ID: SVE INF

Matrix: Air

Remarks: See Case Narrative

Analyzed Date: 08/11/2003

Type: Grab

Collected: 08/06/2003 12:00

Volume: 0.87 L

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1059-2429	95.7 %	(77 - 128)	
4774-33-8	DIBROMOFLUOROMETHANE	A1059-2429	97.0 %	(69 - 157)	
2037-26-5	TOLUENE-D8	A1059-2429	97.2 %	(70 - 124)	



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-1

Client Sample ID: MW-8

Collected: 08/05/2003 11:15

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2447	0.29	0.29	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2447	0.31	0.31	ppb	U
74-87-3	Chloromethane	A1060-2447	0.31	0.31	ppb	U
75-01-4	Vinyl Chloride	A1060-2447	0.28	0.28	ppb	U
74-83-9	Bromomethane	A1060-2447	0.45	0.45	ppb	U
75-00-3	Chloroethane	A1060-2447	0.44	0.44	ppb	U
75-69-4	Trichlorofluoromethane	A1060-2447	0.48	0.48	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2447	0.28	0.28	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2447	0.23	0.23	ppb	U
67-64-1	Acetone	A1060-2447	1.41	1.41	ppb	U
75-15-0	Carbon disulfide	A1060-2447	0.26	0.26	ppb	U
75-09-2	Methylene Chloride	A1060-2447	0.15	0.15	ppb	U
156-60-5	trans-1,2-Dichloroethene	A1060-2447	0.22	0.22	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2447	0.053	0.053	ppb	U
75-34-3	1,1-Dichloroethane	A1060-2447	0.22	0.22	ppb	U
590-20-7	2,2-Dichloropropane	A1060-2447	0.37	0.37	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1060-2447	0.16	15.4	ppb	
78-93-3	2-Butanone	A1060-2447	1.64	1.64	ppb	U
74-97-5	Bromochloromethane	A1060-2447	0.066	0.066	ppb	U
67-66-3	Chloroform	A1060-2447	0.19	0.19	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2447	0.22	0.22	ppb	U
56-23-5	Carbon Tetrachloride	A1060-2447	0.32	0.32	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2447	0.40	0.40	ppb	U
71-43-2	Benzene	A1060-2447	0.21	0.21	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2447	0.17	0.17	ppb	U
79-01-6	Trichloroethene	A1060-2447	0.21	4.22	ppb	
78-87-5	1,2-Dichloropropane	A1060-2447	0.15	0.15	ppb	U
74-95-3	Dibromomethane	A1060-2447	0.072	0.072	ppb	U
75-27-4	Bromodichloromethane	A1060-2447	0.084	0.084	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2447	0.83	0.83	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2447	0.062	0.062	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2447	1.44	1.44	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-1

Client Sample ID: MW-8

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/05/2003 11:15

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2447	0.20	0.20	ppb	U
10061-02-6	trans-1,3-Dichloropropene	A1060-2447	0.12	0.12	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2447	0.15	0.15	ppb	U
127-18-4	Tetrachloroethene	A1060-2447	0.38	0.38	ppb	U
142-28-9	1,3-Dichloropropane	A1060-2447	0.040	0.040	ppb	U
591-78-6	2-Hexanone	A1060-2447	1.44	1.44	ppb	U
124-48-1	Dibromochloromethane	A1060-2447	0.044	0.044	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2447	0.097	0.097	ppb	U
108-90-7	Chlorobenzene	A1060-2447	0.15	0.15	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2447	0.061	0.061	ppb	U
100-41-4	Ethylbenzene	A1060-2447	0.12	0.12	ppb	U
108-38-3	m,p-xylene	A1060-2447	0.24	0.24	ppb	U
95-47-6	o-xylene	A1060-2447	0.12	0.12	ppb	U
100-42-5	Styrene	A1060-2447	0.080	0.080	ppb	U
75-25-2	Bromoform	A1060-2447	0.073	0.073	ppb	U
98-82-8	Isopropylbenzene	A1060-2447	0.14	0.14	ppb	U
108-86-1	Bromobenzene	A1060-2447	0.11	0.11	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1060-2447	0.094	0.094	ppb	U
103-65-1	n-Propylbenzene	A1060-2447	0.16	0.16	ppb	U
96-18-4	1,2,3-Trichloropropane	A1060-2447	0.047	0.047	ppb	U
622-96-8	p-Ethyltoluene	A1060-2447	0.15	0.15	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2447	0.17	0.17	ppb	U
95-49-8	2-Chlorotoluene	A1060-2447	0.15	0.15	ppb	U
106-43-4	4-Chlorotoluene	A1060-2447	0.072	0.072	ppb	U
98-06-6	tert-Butylbenzene	A1060-2447	0.12	0.12	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2447	0.15	0.15	ppb	U
135-98-8	sec-Butylbenzene	A1060-2447	0.19	0.19	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2447	0.16	0.16	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2447	0.047	0.047	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2447	0.17	0.17	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2447	0.065	0.065	ppb	U
105-05-5	p-Diethylbenzene	A1060-2447	0.17	0.17	ppb	U



Environmental Testing Laboratories, Inc.

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-1

Client Sample ID: MW-8

Collected: 08/05/2003 11:15

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2447	0.26	0.26	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2447	0.23	0.23	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2447	0.25	0.25	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2447	0.14	0.14	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2447	0.19	0.19	ppb	U
91-20-3	Naphthalene	A1060-2447	0.40	0.40	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2447	96.8 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2447	96.6 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2447	98.4 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-2

Client Sample ID: MW-12

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/05/2003 12:05

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2448	0.29	0.29	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2448	0.31	0.31	ppb	U
74-87-3	Chloromethane	A1060-2448	0.31	0.31	ppb	U
75-01-4	Vinyl Chloride	A1060-2448	0.28	29.7	ppb	
74-83-9	Bromomethane	A1060-2448	0.45	0.45	ppb	U
75-00-3	Chloroethane	A1060-2448	0.44	6.99	ppb	
75-69-4	Trichlorofluoromethane	A1060-2448	0.48	0.48	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2448	0.28	0.28	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2448	0.23	0.91	ppb	
67-64-1	Acetone	A1060-2448	1.41	1.41	ppb	U
75-15-0	Carbon disulfide	A1060-2448	0.26	0.26	ppb	U
75-09-2	Methylene Chloride	A1060-2448	0.15	0.15	ppb	U
156-60-5	trans-1,2-Dichloroethene	A1060-2448	0.22	1.70	ppb	
1634-04-4	Methyl t-butyl ether	A1060-2448	0.053	0.053	ppb	U
75-34-3	1,1-Dichloroethane	A1060-2448	0.22	107	ppb	
590-20-7	2,2-Dichloropropane	A1060-2448	0.37	0.37	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1061-2476	0.80	223	ppb	
78-93-3	2-Butanone	A1060-2448	1.64	1.64	ppb	U
74-97-5	Bromochloromethane	A1060-2448	0.066	0.066	ppb	U
67-66-3	Chloroform	A1060-2448	0.19	0.19	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2448	0.22	0.22	ppb	U
56-23-5	Carbon Tetrachloride	A1060-2448	0.32	0.32	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2448	0.40	0.40	ppb	U
71-43-2	Benzene	A1060-2448	0.21	1.39	ppb	
107-06-2	1,2-Dichloroethane	A1060-2448	0.17	0.17	ppb	U
79-01-6	Trichloroethene	A1060-2448	0.21	38.1	ppb	
78-87-5	1,2-Dichloropropane	A1060-2448	0.15	0.15	ppb	U
74-95-3	Dibromomethane	A1060-2448	0.072	0.072	ppb	U
75-27-4	Bromodichloromethane	A1060-2448	0.084	0.084	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2448	0.83	0.83	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2448	0.062	0.062	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2448	1.44	1.44	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-2

Client Sample ID: MW-12

Matrix: Liquid

Type: Grab

Collected: 08/05/2003 12:05

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2448	0.20	0.20	ppb	U
10061-02-6	trans-1,3-Dichloropropene	A1060-2448	0.12	0.12	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2448	0.15	0.15	ppb	U
127-18-4	Tetrachloroethene	A1060-2448	0.38	0.38	ppb	U
142-28-9	1,3-Dichloropropane	A1060-2448	0.040	0.040	ppb	U
591-78-6	2-Hexanone	A1060-2448	1.44	1.44	ppb	U
124-48-1	Dibromochloromethane	A1060-2448	0.044	0.044	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2448	0.097	0.097	ppb	U
108-90-7	Chlorobenzene	A1060-2448	0.15	0.15	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2448	0.061	0.061	ppb	U
100-41-4	Ethylbenzene	A1060-2448	0.12	0.12	ppb	U
108-38-3	m,p-xylene	A1060-2448	0.24	0.24	ppb	U
95-47-6	o-xylene	A1060-2448	0.12	0.12	ppb	U
100-42-5	Styrene	A1060-2448	0.080	0.080	ppb	U
75-25-2	Bromoform	A1060-2448	0.073	0.073	ppb	U
98-82-8	Isopropylbenzene	A1060-2448	0.14	0.14	ppb	U
108-86-1	Bromobenzene	A1060-2448	0.11	0.11	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1060-2448	0.094	0.094	ppb	U
103-65-1	n-Propylbenzene	A1061-2476	0.80	355	ppb	
96-18-4	1,2,3-Trichloropropane	A1060-2448	0.047	0.047	ppb	U
622-96-8	p-Ethyltoluene	A1060-2448	0.15	0.15	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2448	0.17	0.17	ppb	U
95-49-8	2-Chlorotoluene	A1061-2476	0.75	419	ppb	
106-43-4	4-Chlorotoluene	A1060-2448	0.072	6.40	ppb	
98-06-6	tert-Butylbenzene	A1060-2448	0.12	0.12	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2448	0.15	0.15	ppb	U
135-98-8	sec-Butylbenzene	A1060-2448	0.19	0.19	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2448	0.16	0.16	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2448	0.047	0.047	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2448	0.17	0.17	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2448	0.065	0.065	ppb	U
105-05-5	p-Diethylbenzene	A1060-2448	0.17	0.17	ppb	U



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208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-2

Client Sample ID: MW-12

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/05/2003 12:05

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2448	0.26	0.26	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2448	0.23	0.23	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2448	0.25	0.25	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2448	0.14	0.14	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2448	0.19	0.19	ppb	U
91-20-3	Naphthalene	A1060-2448	0.40	0.40	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2448	102.0 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2448	97.9 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2448	98.8 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	A1061-2476	96.4 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1061-2476	99.1 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1061-2476	97.6 %	(89 - 122)	



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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-3

Client Sample ID: MW-13

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/05/2003 13:25

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2449	0.29	0.29	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2449	0.31	0.31	ppb	U
74-87-3	Chloromethane	A1060-2449	0.31	0.31	ppb	U
75-01-4	Vinyl Chloride	A1060-2449	0.28	7.18	ppb	
74-83-9	Bromomethane	A1060-2449	0.45	0.45	ppb	U
75-00-3	Chloroethane	A1060-2449	0.44	0.44	ppb	U
75-69-4	Trichlorofluoromethane	A1060-2449	0.48	0.48	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2449	0.28	0.28	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2449	0.23	3.81	ppb	
67-64-1	Acetone	A1060-2449	1.41	1.41	ppb	U
75-15-0	Carbon disulfide	A1060-2449	0.26	0.26	ppb	U
75-09-2	Methylene Chloride	A1060-2449	0.15	0.15	ppb	U
156-60-5	trans-1,2-Dichloroethene	A1060-2449	0.22	0.22	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2449	0.053	0.053	ppb	U
75-34-3	1,1-Dichloroethane	A1060-2449	0.22	31.1	ppb	
590-20-7	2,2-Dichloropropane	A1060-2449	0.37	0.37	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1061-2477	0.80	326	ppb	
78-93-3	2-Butanone	A1060-2449	1.64	1.64	ppb	U
74-97-5	Bromochloromethane	A1060-2449	0.066	0.066	ppb	U
67-66-3	Chloroform	A1060-2449	0.19	0.19	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2449	0.22	1.09	ppb	
56-23-5	Carbon Tetrachloride	A1060-2449	0.32	0.32	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2449	0.40	0.40	ppb	U
71-43-2	Benzene	A1060-2449	0.21	0.21	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2449	0.17	0.17	ppb	U
79-01-6	Trichloroethene	A1060-2449	0.21	21.0	ppb	
78-87-5	1,2-Dichloropropane	A1060-2449	0.15	0.15	ppb	U
74-95-3	Dibromomethane	A1060-2449	0.072	0.072	ppb	U
75-27-4	Bromodichloromethane	A1060-2449	0.084	0.084	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2449	0.83	0.83	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2449	0.062	0.062	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2449	1.44	1.44	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-3

Client Sample ID: MW-13

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/05/2003 13:25

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2449	0.20	0.20	ppb	U
10061-02-6	trans-1,3-Dichloropropene	A1060-2449	0.12	0.12	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2449	0.15	0.15	ppb	U
127-18-4	Tetrachloroethene	A1060-2449	0.38	19.9	ppb	
142-28-9	1,3-Dichloropropane	A1060-2449	0.040	0.040	ppb	U
591-78-6	2-Hexanone	A1060-2449	1.44	1.44	ppb	U
124-48-1	Dibromochloromethane	A1060-2449	0.044	0.044	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2449	0.097	0.097	ppb	U
108-90-7	Chlorobenzene	A1060-2449	0.15	0.15	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2449	0.061	0.061	ppb	U
100-41-4	Ethylbenzene	A1060-2449	0.12	0.12	ppb	U
108-38-3	m,p-xylene	A1060-2449	0.24	0.24	ppb	U
95-47-6	o-xylene	A1060-2449	0.12	0.12	ppb	U
100-42-5	Styrene	A1060-2449	0.080	0.080	ppb	U
75-25-2	Bromoform	A1060-2449	0.073	0.073	ppb	U
98-82-8	Isopropylbenzene	A1060-2449	0.14	0.14	ppb	U
108-86-1	Bromobenzene	A1060-2449	0.11	0.11	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1060-2449	0.094	0.094	ppb	U
103-65-1	n-Propylbenzene	A1060-2449	0.16	4.30	ppb	
96-18-4	1,2,3-Trichloropropane	A1060-2449	0.047	0.047	ppb	U
622-96-8	p-Ethyltoluene	A1060-2449	0.15	0.15	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2449	0.17	0.17	ppb	U
95-49-8	2-Chlorotoluene	A1060-2449	0.15	4.90	ppb	
106-43-4	4-Chlorotoluene	A1060-2449	0.072	0.072	ppb	U
98-06-6	tert-Butylbenzene	A1060-2449	0.12	0.12	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2449	0.15	0.15	ppb	U
135-98-8	sec-Butylbenzene	A1060-2449	0.19	0.19	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2449	0.16	0.16	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2449	0.047	0.047	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2449	0.17	0.17	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2449	0.065	0.065	ppb	U
105-05-5	p-Diethylbenzene	A1060-2449	0.17	0.17	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-3

Client Sample ID: MW-13

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/05/2003 13:25

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2449	0.26	0.26	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2449	0.23	0.23	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2449	0.25	0.25	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2449	0.14	0.14	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2449	0.19	0.19	ppb	U
91-20-3	Naphthalene	A1060-2449	0.40	0.40	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2449	98.0 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2449	97.9 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2449	99.1 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	A1061-2477	96.1 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1061-2477	99.4 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1061-2477	98.1 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-4

Client Sample ID: MW-14

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 14:20

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2450	2.90	2.90	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2450	3.10	3.10	ppb	U
74-87-3	Chloromethane	A1060-2450	3.10	3.10	ppb	U
75-01-4	Vinyl Chloride	A1060-2450	2.80	139	ppb	
74-83-9	Bromomethane	A1060-2450	4.50	4.50	ppb	U
75-00-3	Chloroethane	A1061-2478	44.0	2160	ppb	
75-69-4	Trichlorofluoromethane	A1060-2450	4.80	4.80	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2450	2.80	2.80	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2450	2.30	90.8	ppb	
67-64-1	Acetone	A1060-2450	14.1	754	ppb	
75-15-0	Carbon disulfide	A1060-2450	2.60	2.60	ppb	U
75-09-2	Methylene Chloride	A1060-2450	1.50	52.9	ppb	
156-60-5	trans-1,2-Dichloroethene	A1060-2450	2.20	2.20	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2450	0.53	0.53	ppb	U
75-34-3	1,1-Dichloroethane	A1061-2478	22.0	9580	ppb	
590-20-7	2,2-Dichloropropane	A1060-2450	3.70	3.70	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1060-2450	1.60	8.48	ppb	
78-93-3	2-Butanone	A1060-2450	16.4	797	ppb	
74-97-5	Bromochloromethane	A1060-2450	0.66	0.66	ppb	U
67-66-3	Chloroform	A1060-2450	1.90	1.90	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2450	2.20	507	ppb	
56-23-5	Carbon Tetrachloride	A1060-2450	3.20	3.20	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2450	4.00	4.00	ppb	U
71-43-2	Benzene	A1060-2450	2.10	2.10	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2450	1.70	1.70	ppb	U
79-01-6	Trichloroethene	A1060-2450	2.10	2.10	ppb	U
78-87-5	1,2-Dichloropropane	A1060-2450	1.50	1.50	ppb	U
74-95-3	Dibromomethane	A1060-2450	0.72	0.72	ppb	U
75-27-4	Bromodichloromethane	A1060-2450	0.84	0.84	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2450	8.30	8.30	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2450	0.62	0.62	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2450	14.4	14.4	ppb	U



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-4

Client Sample ID: MW-14

Collected: 08/04/2003 14:20

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2450	2.00	2.00	ppb	U
10061-02-6	trans-1,3-Dichloropropene	A1060-2450	1.20	1.20	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2450	1.50	1.50	ppb	U
127-18-4	Tetrachloroethene	A1060-2450	3.80	3.80	ppb	U
142-28-9	1,3-Dichloropropane	A1060-2450	0.40	0.40	ppb	U
591-78-6	2-Hexanone	A1060-2450	14.4	14.4	ppb	U
124-48-1	Dibromochloromethane	A1060-2450	0.44	0.44	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2450	0.97	0.97	ppb	U
108-90-7	Chlorobenzene	A1060-2450	1.50	1.50	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2450	0.61	0.61	ppb	U
100-41-4	Ethylbenzene	A1060-2450	1.20	1.20	ppb	U
108-38-3	m,p-xylene	A1060-2450	2.40	2.40	ppb	U
95-47-6	o-xylene	A1060-2450	1.20	1.20	ppb	U
100-42-5	Styrene	A1060-2450	0.80	0.80	ppb	U
75-25-2	Bromoform	A1060-2450	0.73	0.73	ppb	U
98-82-8	Isopropylbenzene	A1060-2450	1.40	1.40	ppb	U
108-86-1	Bromobenzene	A1060-2450	1.10	1.10	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1060-2450	0.94	0.94	ppb	U
103-65-1	n-Propylbenzene	A1060-2450	1.60	1.60	ppb	U
96-18-4	1,2,3-Trichloropropane	A1060-2450	0.47	0.47	ppb	U
622-96-8	p-Ethyltoluene	A1060-2450	1.50	1.50	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2450	1.70	1.70	ppb	U
95-49-8	2-Chlorotoluene	A1060-2450	1.50	1.50	ppb	U
106-43-4	4-Chlorotoluene	A1060-2450	0.72	0.72	ppb	U
98-06-6	tert-Butylbenzene	A1060-2450	1.20	1.20	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2450	1.50	1.50	ppb	U
135-98-8	sec-Butylbenzene	A1060-2450	1.90	1.90	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2450	1.60	1.60	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2450	0.47	0.47	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2450	1.70	1.70	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2450	0.65	0.65	ppb	U
105-05-5	p-Diethylbenzene	A1060-2450	1.70	1.70	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-4

Client Sample ID: MW-14

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 14:20

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2450	2.60	2.60	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2450	2.30	2.30	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2450	2.50	2.50	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2450	1.40	1.40	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2450	1.90	1.90	ppb	U
91-20-3	Naphthalene	A1060-2450	4.00	4.00	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2450	96.3 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2450	96.8 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2450	98.6 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	A1061-2478	96.6 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1061-2478	99.5 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1061-2478	98.9 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-5

Client Sample ID: SMP-1

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 16:00

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2451	2.90	2.90	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2451	3.10	3.10	ppb	U
74-87-3	Chloromethane	A1060-2451	3.10	3.10	ppb	U
75-01-4	Vinyl Chloride	A1060-2451	2.80	2.80	ppb	U
74-83-9	Bromomethane	A1060-2451	4.50	4.50	ppb	U
75-00-3	Chloroethane	A1060-2451	4.40	261	ppb	
75-69-4	Trichlorofluoromethane	A1060-2451	4.80	4.80	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2451	2.80	2.80	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2451	2.30	2.30	ppb	U
67-64-1	Acetone	A1060-2451	14.1	14.1	ppb	U
75-15-0	Carbon disulfide	A1060-2451	2.60	2.60	ppb	U
75-09-2	Methylene Chloride	A1060-2451	1.50	1.50	ppb	U
156-60-5	trans-1,2-Dichloroethene	A1060-2451	2.20	2.20	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2451	0.53	0.53	ppb	U
75-34-3	1,1-Dichloroethane	A1060-2451	2.20	2.20	ppb	U
590-20-7	2,2-Dichloropropane	A1060-2451	3.70	3.70	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1060-2451	1.60	1.60	ppb	U
78-93-3	2-Butanone	A1060-2451	16.4	16.4	ppb	U
74-97-5	Bromochloromethane	A1060-2451	0.66	0.66	ppb	U
67-66-3	Chloroform	A1060-2451	1.90	1.90	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2451	2.20	2.20	ppb	U
56-23-5	Carbon Tetrachloride	A1060-2451	3.20	3.20	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2451	4.00	4.00	ppb	U
71-43-2	Benzene	A1060-2451	2.10	2.10	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2451	1.70	1.70	ppb	U
79-01-6	Trichloroethene	A1060-2451	2.10	2.10	ppb	U
78-87-5	1,2-Dichloropropane	A1060-2451	1.50	1.50	ppb	U
74-95-3	Dibromomethane	A1060-2451	0.72	0.72	ppb	U
75-27-4	Bromodichloromethane	A1060-2451	0.84	0.84	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2451	8.30	8.30	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2451	0.62	0.62	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2451	14.4	14.4	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-5

Client Sample ID: SMP-1

Collected: 08/04/2003 16:00

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2451	2.00	18.4	ppb	
10061-02-6	trans-1,3-Dichloropropene	A1060-2451	1.20	1.20	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2451	1.50	1.50	ppb	U
127-18-4	Tetrachloroethene	A1060-2451	3.80	3.80	ppb	U
142-28-9	1,3-Dichloropropane	A1060-2451	0.40	0.40	ppb	U
591-78-6	2-Hexanone	A1060-2451	14.4	14.4	ppb	U
124-48-1	Dibromochloromethane	A1060-2451	0.44	0.44	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2451	0.97	0.97	ppb	U
108-90-7	Chlorobenzene	A1060-2451	1.50	1.50	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2451	0.61	0.61	ppb	U
100-41-4	Ethylbenzene	A1060-2451	1.20	1.20	ppb	U
108-38-3	m,p-xylene	A1060-2451	2.40	2.40	ppb	U
95-47-6	o-xylene	A1060-2451	1.20	1.20	ppb	U
100-42-5	Styrene	A1060-2451	0.80	0.80	ppb	U
75-25-2	Bromoform	A1060-2451	0.73	0.73	ppb	U
98-82-8	Isopropylbenzene	A1060-2451	1.40	1.40	ppb	U
108-86-1	Bromobenzene	A1060-2451	1.10	1.10	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1060-2451	0.94	0.94	ppb	U
103-65-1	n-Propylbenzene	A1060-2451	1.60	1.60	ppb	U
96-18-4	1,2,3-Trichloropropane	A1060-2451	0.47	0.47	ppb	U
622-96-8	p-Ethyltoluene	A1060-2451	1.50	1.50	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2451	1.70	1.70	ppb	U
95-49-8	2-Chlorotoluene	A1060-2451	1.50	1.50	ppb	U
106-43-4	4-Chlorotoluene	A1060-2451	0.72	0.72	ppb	U
98-06-6	tert-Butylbenzene	A1060-2451	1.20	1.20	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2451	1.50	1.50	ppb	U
135-98-8	sec-Butylbenzene	A1060-2451	1.90	1.90	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2451	1.60	1.60	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2451	0.47	0.47	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2451	1.70	1.70	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2451	0.65	0.65	ppb	U
105-05-5	p-Diethylbenzene	A1060-2451	1.70	1.70	ppb	U



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-5

Client Sample ID: SMP-1

Collected: 08/04/2003 16:00

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2451	2.60	2.60	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2451	2.30	2.30	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2451	2.50	2.50	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2451	1.40	1.40	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2451	1.90	1.90	ppb	U
91-20-3	Naphthalene	A1060-2451	4.00	4.00	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2451	97.8 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2451	97.3 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2451	98.7 %	(89 - 122)	



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-6

Client Sample ID: DMP-1

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 14:20

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1061-2479	1.45	1.45	ppb	U
75-45-6	Chlorodifluoromethane	A1061-2479	1.55	1.55	ppb	U
74-87-3	Chloromethane	A1061-2479	1.55	1.55	ppb	U
75-01-4	Vinyl Chloride	A1061-2479	1.40	75.8	ppb	
74-83-9	Bromomethane	A1061-2479	2.25	2.25	ppb	U
75-00-3	Chloroethane	A1060-2452	22.0	1100	ppb	
75-69-4	Trichlorofluoromethane	A1061-2479	2.40	2.40	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1061-2479	1.40	1.40	ppb	U
75-35-4	1,1-Dichloroethene	A1061-2479	1.15	1.15	ppb	U
67-64-1	Acetone	A1061-2479	7.05	7.05	ppb	U
75-15-0	Carbon disulfide	A1061-2479	1.30	1.30	ppb	U
75-09-2	Methylene Chloride	A1061-2479	0.75	0.75	ppb	U
156-60-5	trans-1,2-Dichloroethene	A1061-2479	1.10	1.10	ppb	U
1634-04-4	Methyl t-butyl ether	A1061-2479	0.26	0.26	ppb	U
75-34-3	1,1-Dichloroethane	A1061-2479	1.10	162	ppb	
590-20-7	2,2-Dichloropropane	A1061-2479	1.85	1.85	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1061-2479	0.80	42.8	ppb	
78-93-3	2-Butanone	A1061-2479	8.20	8.20	ppb	U
74-97-5	Bromochloromethane	A1061-2479	0.33	0.33	ppb	U
67-66-3	Chloroform	A1061-2479	0.95	0.95	ppb	U
71-55-6	1,1,1-Trichloroethane	A1061-2479	1.10	1.10	ppb	U
56-23-5	Carbon Tetrachloride	A1061-2479	1.60	1.60	ppb	U
563-58-6	1,1-Dichloropropene	A1061-2479	2.00	2.00	ppb	U
71-43-2	Benzene	A1061-2479	1.05	40.4	ppb	
107-06-2	1,2-Dichloroethane	A1061-2479	0.85	0.85	ppb	U
79-01-6	Trichloroethene	A1061-2479	1.05	1.05	ppb	U
78-87-5	1,2-Dichloropropane	A1061-2479	0.75	0.75	ppb	U
74-95-3	Dibromomethane	A1061-2479	0.36	0.36	ppb	U
75-27-4	Bromodichloromethane	A1061-2479	0.42	0.42	ppb	U
110-75-8	2-Chloroethylvinylether	A1061-2479	4.15	4.15	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1061-2479	0.31	0.31	ppb	U
108-10-1	4-Methyl-2-pentanone	A1061-2479	7.20	7.20	ppb	U



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-6

Client Sample ID: DMP-1

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 14:20

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1061-2479	1.00	14.2	ppb	
10061-02-6	trans-1,3-Dichloropropene	A1061-2479	0.60	0.60	ppb	U
79-00-5	1,1,2-Trichloroethane	A1061-2479	0.75	0.75	ppb	U
127-18-4	Tetrachloroethene	A1061-2479	1.90	1.90	ppb	U
142-28-9	1,3-Dichloropropane	A1061-2479	0.20	0.20	ppb	U
591-78-6	2-Hexanone	A1061-2479	7.20	7.20	ppb	U
124-48-1	Dibromochloromethane	A1061-2479	0.22	0.22	ppb	U
106-93-4	1,2-Dibromoethane	A1061-2479	0.49	0.49	ppb	U
108-90-7	Chlorobenzene	A1061-2479	0.75	0.75	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1061-2479	0.31	0.31	ppb	U
100-41-4	Ethylbenzene	A1061-2479	0.60	0.60	ppb	U
108-38-3	m,p-xylene	A1061-2479	1.20	1.20	ppb	U
95-47-6	o-xylene	A1061-2479	0.60	0.60	ppb	U
100-42-5	Styrene	A1061-2479	0.40	0.40	ppb	U
75-25-2	Bromoform	A1061-2479	0.37	0.37	ppb	U
98-82-8	Isopropylbenzene	A1061-2479	0.70	0.70	ppb	U
108-86-1	Bromobenzene	A1061-2479	0.55	0.55	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1061-2479	0.47	0.47	ppb	U
103-65-1	n-Propylbenzene	A1061-2479	0.80	25.2	ppb	
96-18-4	1,2,3-Trichloropropane	A1061-2479	0.23	0.23	ppb	U
622-96-8	p-Ethyltoluene	A1061-2479	0.75	0.75	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1061-2479	0.85	0.85	ppb	U
95-49-8	2-Chlorotoluene	A1061-2479	0.75	29.1	ppb	
106-43-4	4-Chlorotoluene	A1061-2479	0.36	0.36	ppb	U
98-06-6	tert-Butylbenzene	A1061-2479	0.60	0.60	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1061-2479	0.75	0.75	ppb	U
135-98-8	sec-Butylbenzene	A1061-2479	0.95	0.95	ppb	U
99-87-6	p-Isopropyltoluene	A1061-2479	0.80	0.80	ppb	U
541-73-1	1,3-Dichlorobenzene	A1061-2479	0.23	0.23	ppb	U
106-46-7	1,4-Dichlorobenzene	A1061-2479	0.85	0.85	ppb	U
95-50-1	1,2-Dichlorobenzene	A1061-2479	0.32	0.32	ppb	U
105-05-5	p-Diethylbenzene	A1061-2479	0.85	0.85	ppb	U



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-6

Client Sample ID: DMP-1

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 14:20

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1061-2479	1.30	1.30	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1061-2479	1.15	1.15	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1061-2479	1.25	1.25	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1061-2479	0.70	0.70	ppb	U
87-68-3	Hexachlorobutadiene	A1061-2479	0.95	0.95	ppb	U
91-20-3	Naphthalene	A1061-2479	2.00	2.00	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2452	98.6 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2452	98.2 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2452	98.3 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	A1061-2479	96.4 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1061-2479	99.2 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1061-2479	97.9 %	(89 - 122)	



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-7

Client Sample ID: SMP-3

Collected: 08/04/2003 16:30

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2453	2.90	2.90	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2453	3.10	3.10	ppb	U
74-87-3	Chloromethane	A1060-2453	3.10	3.10	ppb	U
75-01-4	Vinyl Chloride	A1060-2453	2.80	22.9	ppb	
74-83-9	Bromomethane	A1060-2453	4.50	4.50	ppb	U
75-00-3	Chloroethane	A1061-2480	44.0	9290	ppb	
75-69-4	Trichlorofluoromethane	A1060-2453	4.80	4.80	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2453	2.80	2.80	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2453	2.30	38.9	ppb	
67-64-1	Acetone	A1060-2453	14.1	14.1	ppb	U
75-15-0	Carbon disulfide	A1060-2453	2.60	2.60	ppb	U
75-09-2	Methylene Chloride	A1060-2453	1.50	8.13	ppb	
156-60-5	trans-1,2-Dichloroethene	A1060-2453	2.20	2.20	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2453	0.53	0.53	ppb	U
75-34-3	1,1-Dichloroethane	A1061-2480	22.0	14600	ppb	
590-20-7	2,2-Dichloropropane	A1060-2453	3.70	3.70	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1060-2453	1.60	1.60	ppb	U
78-93-3	2-Butanone	A1060-2453	16.4	16.4	ppb	U
74-97-5	Bromochloromethane	A1060-2453	0.66	0.66	ppb	U
67-66-3	Chloroform	A1060-2453	1.90	1.90	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2453	2.20	372	ppb	
56-23-5	Carbon Tetrachloride	A1060-2453	3.20	3.20	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2453	4.00	4.00	ppb	U
71-43-2	Benzene	A1060-2453	2.10	2.10	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2453	1.70	1.70	ppb	U
79-01-6	Trichloroethene	A1060-2453	2.10	2.10	ppb	U
78-87-5	1,2-Dichloropropane	A1060-2453	1.50	1.50	ppb	U
74-95-3	Dibromomethane	A1060-2453	0.72	0.72	ppb	U
75-27-4	Bromodichloromethane	A1060-2453	0.84	0.84	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2453	8.30	8.30	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2453	0.62	0.62	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2453	14.4	14.4	ppb	U



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-7

Client Sample ID: SMP-3

Collected: 08/04/2003 16:30

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2453	2.00	41.1	ppb	
10061-02-6	trans-1,3-Dichloropropene	A1060-2453	1.20	1.20	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2453	1.50	1.50	ppb	U
127-18-4	Tetrachloroethene	A1060-2453	3.80	3.80	ppb	U
142-28-9	1,3-Dichloropropane	A1060-2453	0.40	0.40	ppb	U
591-78-6	2-Hexanone	A1060-2453	14.4	14.4	ppb	U
124-48-1	Dibromochloromethane	A1060-2453	0.44	0.44	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2453	0.97	0.97	ppb	U
108-90-7	Chlorobenzene	A1060-2453	1.50	1.50	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2453	0.61	0.61	ppb	U
100-41-4	Ethylbenzene	A1060-2453	1.20	1.20	ppb	U
108-38-3	m,p-xylene	A1060-2453	2.40	2.40	ppb	U
95-47-6	o-xylene	A1060-2453	1.20	1.20	ppb	U
100-42-5	Styrene	A1060-2453	0.80	0.80	ppb	U
75-25-2	Bromoform	A1060-2453	0.73	0.73	ppb	U
98-82-8	Isopropylbenzene	A1060-2453	1.40	1.40	ppb	U
108-86-1	Bromobenzene	A1060-2453	1.10	1.10	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1060-2453	0.94	0.94	ppb	U
103-65-1	n-Propylbenzene	A1060-2453	1.60	1.60	ppb	U
96-18-4	1,2,3-Trichloropropane	A1060-2453	0.47	0.47	ppb	U
622-96-8	p-Ethyltoluene	A1060-2453	1.50	1.50	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2453	1.70	1.70	ppb	U
95-49-8	2-Chlorotoluene	A1060-2453	1.50	1.50	ppb	U
106-43-4	4-Chlorotoluene	A1060-2453	0.72	0.72	ppb	U
98-06-6	tert-Butylbenzene	A1060-2453	1.20	1.20	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2453	1.50	1.50	ppb	U
135-98-8	sec-Butylbenzene	A1060-2453	1.90	1.90	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2453	1.60	1.60	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2453	0.47	0.47	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2453	1.70	1.70	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2453	0.65	0.65	ppb	U
105-05-5	p-Diethylbenzene	A1060-2453	1.70	1.70	ppb	U



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-7

Client Sample ID: SMP-3

Collected: 08/04/2003 16:30

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2453	2.60	2.60	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2453	2.30	2.30	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2453	2.50	2.50	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2453	1.40	1.40	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2453	1.90	1.90	ppb	U
91-20-3	Naphthalene	A1060-2453	4.00	4.00	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2453	97.6 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2453	98.6 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2453	99.0 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	A1061-2480	96.5 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1061-2480	99.4 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1061-2480	98.0 %	(89 - 122)	



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-8

Client Sample ID: DMP-3

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 15:30

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2454	14.5	14.5	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2454	15.5	15.5	ppb	U
74-87-3	Chloromethane	A1060-2454	15.5	15.5	ppb	U
75-01-4	Vinyl Chloride	A1060-2454	14.0	342	ppb	
74-83-9	Bromomethane	A1060-2454	22.5	22.5	ppb	U
75-00-3	Chloroethane	A1061-2481	44.0	8180	ppb	
75-69-4	Trichlorofluoromethane	A1060-2454	24.0	24.0	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2454	14.0	14.0	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2454	11.5	65.1	ppb	
67-64-1	Acetone	A1060-2454	70.5	70.5	ppb	U
75-15-0	Carbon disulfide	A1060-2454	13.0	13.0	ppb	U
75-09-2	Methylene Chloride	A1060-2454	7.50	7.50	ppb	U
156-60-5	trans-1,2-Dichloroethene	A1060-2454	11.0	11.0	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2454	2.65	2.65	ppb	U
75-34-3	1,1-Dichloroethane	A1061-2481	22.0	10200	ppb	
590-20-7	2,2-Dichloropropane	A1060-2454	18.5	18.5	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1060-2454	8.00	8.00	ppb	U
78-93-3	2-Butanone	A1060-2454	82.0	82.0	ppb	U
74-97-5	Bromochloromethane	A1060-2454	3.30	3.30	ppb	U
67-66-3	Chloroform	A1060-2454	9.50	9.50	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2454	11.0	3610	ppb	
56-23-5	Carbon Tetrachloride	A1060-2454	16.0	16.0	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2454	20.0	20.0	ppb	U
71-43-2	Benzene	A1060-2454	10.5	10.5	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2454	8.50	8.50	ppb	U
79-01-6	Trichloroethene	A1060-2454	10.5	10.5	ppb	U
78-87-5	1,2-Dichloropropane	A1060-2454	7.50	7.50	ppb	U
74-95-3	Dibromomethane	A1060-2454	3.60	3.60	ppb	U
75-27-4	Bromodichloromethane	A1060-2454	4.20	4.20	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2454	41.5	41.5	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2454	3.10	3.10	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2454	72.0	72.0	ppb	U



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-8

Client Sample ID: DMP-3

Collected: 08/04/2003 15:30

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2454	10.0	80.8	ppb	
10061-02-6	trans-1,3-Dichloropropene	A1060-2454	6.00	6.00	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2454	7.50	7.50	ppb	U
127-18-4	Tetrachloroethene	A1060-2454	19.0	19.0	ppb	U
142-28-9	1,3-Dichloropropane	A1060-2454	2.00	2.00	ppb	U
591-78-6	2-Hexanone	A1060-2454	72.0	72.0	ppb	U
124-48-1	Dibromochloromethane	A1060-2454	2.20	2.20	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2454	4.85	4.85	ppb	U
108-90-7	Chlorobenzene	A1060-2454	7.50	7.50	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2454	3.05	3.05	ppb	U
100-41-4	Ethylbenzene	A1060-2454	6.00	6.00	ppb	U
108-38-3	m,p-xylene	A1060-2454	12.0	12.0	ppb	U
95-47-6	o-xylene	A1060-2454	6.00	6.00	ppb	U
100-42-5	Styrene	A1060-2454	4.00	4.00	ppb	U
75-25-2	Bromoform	A1060-2454	3.65	3.65	ppb	U
98-82-8	Isopropylbenzene	A1060-2454	7.00	7.00	ppb	U
108-86-1	Bromobenzene	A1060-2454	5.50	5.50	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1060-2454	4.70	4.70	ppb	U
103-65-1	n-Propylbenzene	A1060-2454	8.00	8.00	ppb	U
96-18-4	1,2,3-Trichloropropane	A1060-2454	2.35	2.35	ppb	U
622-96-8	p-Ethyltoluene	A1060-2454	7.50	7.50	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2454	8.50	8.50	ppb	U
95-49-8	2-Chlorotoluene	A1060-2454	7.50	7.50	ppb	U
106-43-4	4-Chlorotoluene	A1060-2454	3.60	3.60	ppb	U
98-06-6	tert-Butylbenzene	A1060-2454	6.00	6.00	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2454	7.50	7.50	ppb	U
135-98-8	sec-Butylbenzene	A1060-2454	9.50	9.50	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2454	8.00	8.00	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2454	2.35	2.35	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2454	8.50	8.50	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2454	3.25	3.25	ppb	U
105-05-5	p-Diethylbenzene	A1060-2454	8.50	8.50	ppb	U



Environmental Testing Laboratories, Inc.

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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-8

Client Sample ID: DMP-3

Collected: 08/04/2003 15:30

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2454	13.0	13.0	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2454	11.5	11.5	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2454	12.5	12.5	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2454	7.00	7.00	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2454	9.50	9.50	ppb	U
91-20-3	Naphthalene	A1060-2454	20.0	20.0	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2454	97.7 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2454	97.9 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2454	98.0 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	A1061-2481	97.3 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1061-2481	99.6 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1061-2481	98.5 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-9

Client Sample ID: SMP-4

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 16:15

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2455	2.90	2.90	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2455	3.10	3.10	ppb	U
74-87-3	Chloromethane	A1060-2455	3.10	3.10	ppb	U
75-01-4	Vinyl Chloride	A1060-2455	2.80	2.80	ppb	U
74-83-9	Bromomethane	A1060-2455	4.50	4.50	ppb	U
75-00-3	Chloroethane	A1060-2455	4.40	1290	ppb	
75-69-4	Trichlorofluoromethane	A1060-2455	4.80	4.80	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2455	2.80	2.80	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2455	2.30	2.30	ppb	U
67-64-1	Acetone	A1060-2455	14.1	613	ppb	
75-15-0	Carbon disulfide	A1060-2455	2.60	2.60	ppb	U
75-09-2	Methylene Chloride	A1060-2455	1.50	1.50	ppb	U
156-60-5	trans-1,2-Dichloroethene	A1060-2455	2.20	2.20	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2455	0.53	0.53	ppb	U
75-34-3	1,1-Dichloroethane	A1060-2455	2.20	54.5	ppb	
590-20-7	2,2-Dichloropropane	A1060-2455	3.70	3.70	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1060-2455	1.60	33.7	ppb	
78-93-3	2-Butanone	A1060-2455	16.4	16.4	ppb	U
74-97-5	Bromochloromethane	A1060-2455	0.66	0.66	ppb	U
67-66-3	Chloroform	A1060-2455	1.90	1.90	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2455	2.20	2.20	ppb	U
56-23-5	Carbon Tetrachloride	A1060-2455	3.20	3.20	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2455	4.00	4.00	ppb	U
71-43-2	Benzene	A1060-2455	2.10	2.10	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2455	1.70	1.70	ppb	U
79-01-6	Trichloroethene	A1060-2455	2.10	2.10	ppb	U
78-87-5	1,2-Dichloropropane	A1060-2455	1.50	1.50	ppb	U
74-95-3	Dibromomethane	A1060-2455	0.72	0.72	ppb	U
75-27-4	Bromodichloromethane	A1060-2455	0.84	0.84	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2455	8.30	8.30	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2455	0.62	0.62	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2455	14.4	14.4	ppb	U



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-9

Client Sample ID: SMP-4

Collected: 08/04/2003 16:15

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2455	2.00	2.00	ppb	U
10061-02-6	trans-1,3-Dichloropropene	A1060-2455	1.20	1.20	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2455	1.50	1.50	ppb	U
127-18-4	Tetrachloroethene	A1060-2455	3.80	65.6	ppb	
142-28-9	1,3-Dichloropropane	A1060-2455	0.40	0.40	ppb	U
591-78-6	2-Hexanone	A1060-2455	14.4	14.4	ppb	U
124-48-1	Dibromochloromethane	A1060-2455	0.44	0.44	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2455	0.97	0.97	ppb	U
108-90-7	Chlorobenzene	A1060-2455	1.50	1.50	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2455	0.61	0.61	ppb	U
100-41-4	Ethylbenzene	A1060-2455	1.20	1.20	ppb	U
108-38-3	m,p-xylene	A1060-2455	2.40	2.40	ppb	U
95-47-6	o-xylene	A1060-2455	1.20	1.20	ppb	U
100-42-5	Styrene	A1060-2455	0.80	0.80	ppb	U
75-25-2	Bromoform	A1060-2455	0.73	0.73	ppb	U
98-82-8	Isopropylbenzene	A1060-2455	1.40	1.40	ppb	U
108-86-1	Bromobenzene	A1060-2455	1.10	1.10	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1060-2455	0.94	0.94	ppb	U
103-65-1	n-Propylbenzene	A1060-2455	1.60	1.60	ppb	U
96-18-4	1,2,3-Trichloropropane	A1060-2455	0.47	0.47	ppb	U
622-96-8	p-Ethyltoluene	A1060-2455	1.50	1.50	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2455	1.70	1.70	ppb	U
95-49-8	2-Chlorotoluene	A1060-2455	1.50	1.50	ppb	U
106-43-4	4-Chlorotoluene	A1060-2455	0.72	0.72	ppb	U
98-06-6	tert-Butylbenzene	A1060-2455	1.20	1.20	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2455	1.50	1.50	ppb	U
135-98-8	sec-Butylbenzene	A1060-2455	1.90	1.90	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2455	1.60	1.60	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2455	0.47	0.47	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2455	1.70	1.70	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2455	0.65	0.65	ppb	U
105-05-5	p-Diethylbenzene	A1060-2455	1.70	1.70	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-9

Client Sample ID: SMP-4

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 16:15

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2455	2.60	2.60	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2455	2.30	2.30	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2455	2.50	2.50	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2455	1.40	1.40	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2455	1.90	1.90	ppb	U
91-20-3	Naphthalene	A1060-2455	4.00	4.00	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2455	95.3 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2455	95.1 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2455	97.9 %	(89 - 122)	



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-10

Client Sample ID: DMP-4

Collected: 08/04/2003 14:45

Matrix: Liquid

Type: Grab

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2456	2.90	2.90	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2456	3.10	3.10	ppb	U
74-87-3	Chloromethane	A1060-2456	3.10	3.10	ppb	U
75-01-4	Vinyl Chloride	A1060-2456	2.80	2.80	ppb	U
74-83-9	Bromomethane	A1060-2456	4.50	4.50	ppb	U
75-00-3	Chloroethane	A1061-2482	22.0	3560	ppb	
75-69-4	Trichlorofluoromethane	A1060-2456	4.80	4.80	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2456	2.80	2.80	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2456	2.30	2.30	ppb	U
67-64-1	Acetone	A1060-2456	14.1	14.1	ppb	U
75-15-0	Carbon disulfide	A1060-2456	2.60	2.60	ppb	U
75-09-2	Methylene Chloride	A1060-2456	1.50	10.2	ppb	
156-60-5	trans-1,2-Dichloroethene	A1060-2456	2.20	2.20	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2456	0.53	0.53	ppb	U
75-34-3	1,1-Dichloroethane	A1060-2456	2.20	2.20	ppb	U
590-20-7	2,2-Dichloropropane	A1060-2456	3.70	3.70	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1060-2456	1.60	1.60	ppb	U
78-93-3	2-Butanone	A1060-2456	16.4	16.4	ppb	U
74-97-5	Bromochloromethane	A1060-2456	0.66	0.66	ppb	U
67-66-3	Chloroform	A1060-2456	1.90	1.90	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2456	2.20	2.20	ppb	U
56-23-5	Carbon Tetrachloride	A1060-2456	3.20	3.20	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2456	4.00	4.00	ppb	U
71-43-2	Benzene	A1060-2456	2.10	2.10	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2456	1.70	1.70	ppb	U
79-01-6	Trichloroethene	A1060-2456	2.10	2.10	ppb	U
78-87-5	1,2-Dichloropropane	A1060-2456	1.50	1.50	ppb	U
74-95-3	Dibromomethane	A1060-2456	0.72	0.72	ppb	U
75-27-4	Bromodichloromethane	A1060-2456	0.84	0.84	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2456	8.30	8.30	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2456	0.62	0.62	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2456	14.4	14.4	ppb	U



Environmental Testing Laboratories, Inc.

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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-10

Client Sample ID: DMP-4

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 14:45

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2456	2.00	10.7	ppb	
10061-02-6	trans-1,3-Dichloropropene	A1060-2456	1.20	1.20	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2456	1.50	1.50	ppb	U
127-18-4	Tetrachloroethene	A1060-2456	3.80	3.80	ppb	U
142-28-9	1,3-Dichloropropane	A1060-2456	0.40	0.40	ppb	U
591-78-6	2-Hexanone	A1060-2456	14.4	14.4	ppb	U
124-48-1	Dibromochloromethane	A1060-2456	0.44	0.44	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2456	0.97	0.97	ppb	U
108-90-7	Chlorobenzene	A1060-2456	1.50	1.50	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2456	0.61	0.61	ppb	U
100-41-4	Ethylbenzene	A1060-2456	1.20	1.20	ppb	U
108-38-3	m,p-xylene	A1060-2456	2.40	2.40	ppb	U
95-47-6	o-xylene	A1060-2456	1.20	1.20	ppb	U
100-42-5	Styrene	A1060-2456	0.80	0.80	ppb	U
75-25-2	Bromoform	A1060-2456	0.73	0.73	ppb	U
98-82-8	Isopropylbenzene	A1060-2456	1.40	1.40	ppb	U
108-86-1	Bromobenzene	A1060-2456	1.10	1.10	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1060-2456	0.94	0.94	ppb	U
103-65-1	n-Propylbenzene	A1060-2456	1.60	19.4	ppb	
96-18-4	1,2,3-Trichloropropane	A1060-2456	0.47	0.47	ppb	U
622-96-8	p-Ethyltoluene	A1060-2456	1.50	1.50	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2456	1.70	1.70	ppb	U
95-49-8	2-Chlorotoluene	A1060-2456	1.50	1.50	ppb	U
106-43-4	4-Chlorotoluene	A1060-2456	0.72	0.72	ppb	U
98-06-6	tert-Butylbenzene	A1060-2456	1.20	1.20	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2456	1.50	1.50	ppb	U
135-98-8	sec-Butylbenzene	A1060-2456	1.90	1.90	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2456	1.60	1.60	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2456	0.47	0.47	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2456	1.70	1.70	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2456	0.65	0.65	ppb	U
105-05-5	p-Diethylbenzene	A1060-2456	1.70	1.70	ppb	U



Environmental Testing Laboratories, Inc.

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-10

Client Sample ID: DMP-4

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/04/2003 14:45

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2456	2.60	2.60	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2456	2.30	2.30	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2456	2.50	2.50	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2456	1.40	1.40	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2456	1.90	1.90	ppb	U
91-20-3	Naphthalene	A1060-2456	4.00	4.00	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2456	96.9 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2456	97.6 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2456	98.2 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	A1061-2482	97.2 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1061-2482	100.0 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1061-2482	97.8 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-11

Client Sample ID: MW-3S

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/06/2003 10:40

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2457	0.29	0.29	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2457	0.31	0.31	ppb	U
74-87-3	Chloromethane	A1060-2457	0.31	0.31	ppb	U
75-01-4	Vinyl Chloride	A1060-2457	0.28	0.28	ppb	U
74-83-9	Bromomethane	A1060-2457	0.45	0.45	ppb	U
75-00-3	Chloroethane	A1060-2457	0.44	0.44	ppb	U
75-69-4	Trichlorofluoromethane	A1060-2457	0.48	0.48	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2457	0.28	0.28	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2457	0.23	0.23	ppb	U
67-64-1	Acetone	A1060-2457	1.41	1.41	ppb	U
75-15-0	Carbon disulfide	A1060-2457	0.26	0.26	ppb	U
75-09-2	Methylene Chloride	A1060-2457	0.15	0.15	ppb	U
156-60-5	trans-1,2-Dichloroethene	A1060-2457	0.22	0.22	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2457	0.053	0.053	ppb	U
75-34-3	1,1-Dichloroethane	A1060-2457	0.22	0.22	ppb	U
590-20-7	2,2-Dichloropropane	A1060-2457	0.37	0.37	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1060-2457	0.16	0.16	ppb	U
78-93-3	2-Butanone	A1060-2457	1.64	1.64	ppb	U
74-97-5	Bromochloromethane	A1060-2457	0.066	0.066	ppb	U
67-66-3	Chloroform	A1060-2457	0.19	0.19	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2457	0.22	0.22	ppb	U
56-23-5	Carbon Tetrachloride	A1060-2457	0.32	0.32	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2457	0.40	0.40	ppb	U
71-43-2	Benzene	A1060-2457	0.21	0.21	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2457	0.17	0.17	ppb	U
79-01-6	Trichloroethene	A1060-2457	0.21	23.5	ppb	
78-87-5	1,2-Dichloropropane	A1060-2457	0.15	0.15	ppb	U
74-95-3	Dibromomethane	A1060-2457	0.072	0.072	ppb	U
75-27-4	Bromodichloromethane	A1060-2457	0.084	0.084	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2457	0.83	0.83	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2457	0.062	0.062	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2457	1.44	1.44	ppb	U



Environmental Testing Laboratories, Inc.

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-11

Client Sample ID: MW-3S

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/06/2003 10:40

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2457	0.20	0.20	ppb	U
10061-02-6	trans-1,3-Dichloropropene	A1060-2457	0.12	0.12	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2457	0.15	0.15	ppb	U
127-18-4	Tetrachloroethene	A1060-2457	0.38	3.72	ppb	
142-28-9	1,3-Dichloropropane	A1060-2457	0.040	0.040	ppb	U
591-78-6	2-Hexanone	A1060-2457	1.44	1.44	ppb	U
124-48-1	Dibromochloromethane	A1060-2457	0.044	0.044	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2457	0.097	0.097	ppb	U
108-90-7	Chlorobenzene	A1060-2457	0.15	0.15	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2457	0.061	0.061	ppb	U
100-41-4	Ethylbenzene	A1060-2457	0.12	0.12	ppb	U
108-38-3	m,p-xylene	A1060-2457	0.24	0.24	ppb	U
95-47-6	o-xylene	A1060-2457	0.12	0.12	ppb	U
100-42-5	Styrene	A1060-2457	0.080	0.080	ppb	U
75-25-2	Bromoform	A1060-2457	0.073	0.073	ppb	U
98-82-8	Isopropylbenzene	A1060-2457	0.14	0.14	ppb	U
108-86-1	Bromobenzene	A1060-2457	0.11	0.11	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1060-2457	0.094	0.094	ppb	U
103-65-1	n-Propylbenzene	A1060-2457	0.16	0.16	ppb	U
96-18-4	1,2,3-Trichloropropane	A1060-2457	0.047	0.047	ppb	U
622-96-8	p-Ethyltoluene	A1060-2457	0.15	0.15	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2457	0.17	0.17	ppb	U
95-49-8	2-Chlorotoluene	A1060-2457	0.15	0.15	ppb	U
106-43-4	4-Chlorotoluene	A1060-2457	0.072	0.072	ppb	U
98-06-6	tert-Butylbenzene	A1060-2457	0.12	0.12	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2457	0.15	0.15	ppb	U
135-98-8	sec-Butylbenzene	A1060-2457	0.19	0.19	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2457	0.16	0.16	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2457	0.047	0.047	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2457	0.17	0.17	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2457	0.065	0.065	ppb	U
105-05-5	p-Diethylbenzene	A1060-2457	0.17	0.17	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-11

Client Sample ID: MW-3S

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/06/2003 10:40

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2457	0.26	0.26	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2457	0.23	0.23	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2457	0.25	0.25	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2457	0.14	0.14	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2457	0.19	0.19	ppb	U
91-20-3	Naphthalene	A1060-2457	0.40	0.40	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2457	97.0 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2457	98.0 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2457	98.5 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-12

Client Sample ID: MW-4S

Matrix: Liquid

Type: Grab

Collected: 08/06/2003 11:45

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2458	0.29	0.29	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2458	0.31	0.31	ppb	U
74-87-3	Chloromethane	A1060-2458	0.31	0.31	ppb	U
75-01-4	Vinyl Chloride	A1060-2458	0.28	0.28	ppb	U
74-83-9	Bromomethane	A1060-2458	0.45	0.45	ppb	U
75-00-3	Chloroethane	A1060-2458	0.44	0.44	ppb	U
75-69-4	Trichlorofluoromethane	A1060-2458	0.48	0.48	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2458	0.28	0.28	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2458	0.23	0.23	ppb	U
67-64-1	Acetone	A1060-2458	1.41	1.41	ppb	U
75-15-0	Carbon disulfide	A1060-2458	0.26	0.26	ppb	U
75-09-2	Methylene Chloride	A1060-2458	0.15	0.15	ppb	U
156-60-5	trans-1,2-Dichloroethene	A1060-2458	0.22	0.22	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2458	0.053	3.50	ppb	
75-34-3	1,1-Dichloroethane	A1060-2458	0.22	0.22	ppb	U
590-20-7	2,2-Dichloropropane	A1060-2458	0.37	0.37	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1060-2458	0.16	0.16	ppb	U
78-93-3	2-Butanone	A1060-2458	1.64	1.64	ppb	U
74-97-5	Bromochloromethane	A1060-2458	0.066	0.066	ppb	U
67-66-3	Chloroform	A1060-2458	0.19	0.19	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2458	0.22	0.22	ppb	U
56-23-5	Carbon Tetrachloride	A1060-2458	0.32	0.32	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2458	0.40	0.40	ppb	U
71-43-2	Benzene	A1060-2458	0.21	0.21	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2458	0.17	0.17	ppb	U
79-01-6	Trichloroethene	A1060-2458	0.21	3.09	ppb	
78-87-5	1,2-Dichloropropane	A1060-2458	0.15	0.15	ppb	U
74-95-3	Dibromomethane	A1060-2458	0.072	0.072	ppb	U
75-27-4	Bromodichloromethane	A1060-2458	0.084	0.084	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2458	0.83	0.83	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2458	0.062	0.062	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2458	1.44	1.44	ppb	U



Environmental Testing Laboratories, Inc.

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-12

Client Sample ID: MW-4S

Matrix: Liquid

Type: Grab

Collected: 08/06/2003 11:45

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2458	0.20	0.20	ppb	U
10061-02-6	trans-1,3-Dichloropropene	A1060-2458	0.12	0.12	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2458	0.15	0.15	ppb	U
127-18-4	Tetrachloroethene	A1063-2519	1.90	118	ppb	
142-28-9	1,3-Dichloropropane	A1060-2458	0.040	0.040	ppb	U
591-78-6	2-Hexanone	A1060-2458	1.44	1.44	ppb	U
124-48-1	Dibromochloromethane	A1060-2458	0.044	0.044	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2458	0.097	0.097	ppb	U
108-90-7	Chlorobenzene	A1060-2458	0.15	0.15	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2458	0.061	0.061	ppb	U
100-41-4	Ethylbenzene	A1060-2458	0.12	0.12	ppb	U
108-38-3	m,p-xylene	A1060-2458	0.24	0.24	ppb	U
95-47-6	o-xylene	A1060-2458	0.12	0.12	ppb	U
100-42-5	Styrene	A1060-2458	0.080	0.080	ppb	U
75-25-2	Bromoform	A1060-2458	0.073	0.073	ppb	U
98-82-8	Isopropylbenzene	A1060-2458	0.14	0.14	ppb	U
108-86-1	Bromobenzene	A1060-2458	0.11	0.11	ppb	U
79-34-5	1,1,2,2-Tetrachloroethane	A1060-2458	0.094	0.094	ppb	U
103-65-1	n-Propylbenzene	A1060-2458	0.16	0.16	ppb	U
96-18-4	1,2,3-Trichloropropane	A1060-2458	0.047	0.047	ppb	U
622-96-8	p-Ethyltoluene	A1060-2458	0.15	0.15	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2458	0.17	0.17	ppb	U
95-49-8	2-Chlorotoluene	A1060-2458	0.15	0.15	ppb	U
106-43-4	4-Chlorotoluene	A1060-2458	0.072	0.072	ppb	U
98-06-6	tert-Butylbenzene	A1060-2458	0.12	0.12	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2458	0.15	0.15	ppb	U
135-98-8	sec-Butylbenzene	A1060-2458	0.19	0.19	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2458	0.16	0.16	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2458	0.047	0.047	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2458	0.17	0.17	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2458	0.065	0.065	ppb	U
105-05-5	p-Diethylbenzene	A1060-2458	0.17	0.17	ppb	U



Environmental Testing Laboratories, Inc.

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-12

Client Sample ID: MW-4S

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Grab

Collected: 08/06/2003 11:45

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2458	0.26	0.26	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2458	0.23	0.23	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2458	0.25	0.25	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2458	0.14	0.14	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2458	0.19	0.19	ppb	U
91-20-3	Naphthalene	A1060-2458	0.40	0.40	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2458	97.5 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2458	98.6 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2458	98.3 %	(89 - 122)	
460-00-4	4-BROMOFLUOROBENZENE	A1063-2519	97.2 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1063-2519	100.0 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1063-2519	99.0 %	(89 - 122)	



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-13

Client Sample ID: Trip Blank

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Trip Blank

Collected: 08/06/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
75-71-8	Dichlorodifluoromethane	A1060-2444	0.29	0.29	ppb	U
75-45-6	Chlorodifluoromethane	A1060-2444	0.31	0.31	ppb	U
74-87-3	Chloromethane	A1060-2444	0.31	0.31	ppb	U
75-01-4	Vinyl Chloride	A1060-2444	0.28	0.28	ppb	U
74-83-9	Bromomethane	A1060-2444	0.45	0.45	ppb	U
75-00-3	Chloroethane	A1060-2444	0.44	0.44	ppb	U
75-69-4	Trichlorofluoromethane	A1060-2444	0.48	0.48	ppb	U
76-13-1	1,1,2-Trichlorotrifluoroethane	A1060-2444	0.28	0.28	ppb	U
75-35-4	1,1-Dichloroethene	A1060-2444	0.23	0.23	ppb	U
67-64-1	Acetone	A1060-2444	1.41	1.41	ppb	U
75-15-0	Carbon disulfide	A1060-2444	0.26	0.26	ppb	U
75-09-2	Methylene Chloride	A1060-2444	0.15	1.82	ppb	
156-60-5	trans-1,2-Dichloroethene	A1060-2444	0.22	0.22	ppb	U
1634-04-4	Methyl t-butyl ether	A1060-2444	0.053	0.053	ppb	U
75-34-3	1,1-Dichloroethane	A1060-2444	0.22	0.22	ppb	U
590-20-7	2,2-Dichloropropane	A1060-2444	0.37	0.37	ppb	U
156-59-2	cis-1,2-Dichloroethene	A1060-2444	0.16	0.16	ppb	U
78-93-3	2-Butanone	A1060-2444	1.64	1.64	ppb	U
74-97-5	Bromochloromethane	A1060-2444	0.066	0.066	ppb	U
67-66-3	Chloroform	A1060-2444	0.19	0.19	ppb	U
71-55-6	1,1,1-Trichloroethane	A1060-2444	0.22	0.22	ppb	U
56-23-5	Carbon Tetrachloride	A1060-2444	0.32	0.32	ppb	U
563-58-6	1,1-Dichloropropene	A1060-2444	0.40	0.40	ppb	U
71-43-2	Benzene	A1060-2444	0.21	0.21	ppb	U
107-06-2	1,2-Dichloroethane	A1060-2444	0.17	0.17	ppb	U
79-01-6	Trichloroethene	A1060-2444	0.21	0.21	ppb	U
78-87-5	1,2-Dichloropropane	A1060-2444	0.15	0.15	ppb	U
74-95-3	Dibromomethane	A1060-2444	0.072	0.072	ppb	U
75-27-4	Bromodichloromethane	A1060-2444	0.084	0.084	ppb	U
110-75-8	2-Chloroethylvinylether	A1060-2444	0.83	0.83	ppb	U
10061-01-5	cis-1,3-Dichloropropene	A1060-2444	0.062	0.062	ppb	U
108-10-1	4-Methyl-2-pentanone	A1060-2444	1.44	1.44	ppb	U



Environmental Testing Laboratories, Inc.

208 Route 109, Farmingdale NY 11735

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

08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-13

Client Sample ID: Trip Blank

Matrix: Liquid

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Type: Trip Blank

Collected: 08/06/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
108-88-3	Toluene	A1060-2444	0.20	0.20	ppb	U
10061-02-6	trans-1,3-Dichloropropene	A1060-2444	0.12	0.12	ppb	U
79-00-5	1,1,2-Trichloroethane	A1060-2444	0.15	0.15	ppb	U
127-18-4	Tetrachloroethene	A1060-2444	0.38	0.38	ppb	U
142-28-9	1,3-Dichloropropane	A1060-2444	0.040	0.040	ppb	U
591-78-6	2-Hexanone	A1060-2444	1.44	1.44	ppb	U
124-48-1	Dibromochloromethane	A1060-2444	0.044	0.044	ppb	U
106-93-4	1,2-Dibromoethane	A1060-2444	0.097	0.097	ppb	U
108-90-7	Chlorobenzene	A1060-2444	0.15	0.15	ppb	U
630-20-6	1,1,1,2-Tetrachloroethane	A1060-2444	0.061	0.061	ppb	U
100-41-4	Ethylbenzene	A1060-2444	0.12	0.12	ppb	U
108-38-3	m,p-xylene	A1060-2444	0.24	0.24	ppb	U
95-47-6	o-xylene	A1060-2444	0.12	0.12	ppb	U
100-42-5	Styrene	A1060-2444	0.080	0.080	ppb	U
75-25-2	Bromoform	A1060-2444	0.073	0.073	ppb	U
98-82-8	Isopropylbenzene	A1060-2444	0.14	0.14	ppb	U
108-86-1	Bromobenzene	A1060-2444	0.11	0.11	ppb	U
79-34-5	1,1,1,2-Tetrachloroethane	A1060-2444	0.094	0.094	ppb	U
103-65-1	n-Propylbenzene	A1060-2444	0.16	0.16	ppb	U
96-18-4	1,2,3-Trichloropropane	A1060-2444	0.047	0.047	ppb	U
622-96-8	p-Ethyltoluene	A1060-2444	0.15	0.15	ppb	U
108-67-8	1,3,5-Trimethylbenzene	A1060-2444	0.17	0.17	ppb	U
95-49-8	2-Chlorotoluene	A1060-2444	0.15	0.15	ppb	U
106-43-4	4-Chlorotoluene	A1060-2444	0.072	0.072	ppb	U
98-06-6	tert-Butylbenzene	A1060-2444	0.12	0.12	ppb	U
95-63-6	1,2,4-Trimethylbenzene	A1060-2444	0.15	0.15	ppb	U
135-98-8	sec-Butylbenzene	A1060-2444	0.19	0.19	ppb	U
99-87-6	p-Isopropyltoluene	A1060-2444	0.16	0.16	ppb	U
541-73-1	1,3-Dichlorobenzene	A1060-2444	0.047	0.047	ppb	U
106-46-7	1,4-Dichlorobenzene	A1060-2444	0.17	0.17	ppb	U
95-50-1	1,2-Dichlorobenzene	A1060-2444	0.065	0.065	ppb	U
105-05-5	p-Diethylbenzene	A1060-2444	0.17	0.17	ppb	U



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08/20/2003

Volatile Compounds - EPA 8260B

Sample: P7340-13

Client Sample ID: Trip Blank

Collected: 08/06/2003

Matrix: Liquid

Type: Trip Blank

Remarks: See Case Narrative

Analyzed Date: 08/12/2003

Analytical Results

Cas No	Analyte	File ID	MDL	Concentration	Units	Q
104-51-8	n-Butylbenzene	A1060-2444	0.26	0.26	ppb	U
95-93-2	1,2,4,5-Tetramethylbenzene	A1060-2444	0.23	0.23	ppb	U
96-12-8	1,2-Dibromo-3-chloropropane	A1060-2444	0.25	0.25	ppb	U
120-82-1	1,2,4-Trichlorobenzene	A1060-2444	0.14	0.14	ppb	U
87-68-3	Hexachlorobutadiene	A1060-2444	0.19	0.19	ppb	U
91-20-3	Naphthalene	A1060-2444	0.40	0.40	ppb	U

Surrogate Results

Cas No	Analyte	File ID	% Recovery	QC Limits	Q
460-00-4	4-BROMOFLUOROBENZENE	A1060-2444	97.1 %	(93 - 110)	
4774-33-8	DIBROMOFLUOROMETHANE	A1060-2444	97.8 %	(74 - 111)	
2037-26-5	TOLUENE-D8	A1060-2444	97.9 %	(89 - 122)	



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08/20/2003

Total Iron by Method SW846 6010

Sample: P7340-1

Client Sample ID: MW-8

Collected: 08/05/2003 11:15

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/13/1903

Preparation Date(s) : 08/12/2003

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.018	0.036	ppm	

Sample: P7340-2

Client Sample ID: MW-12

Collected: 08/05/2003 12:05

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/13/1903

Preparation Date(s) : 08/12/2003

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.018	27.9	ppm	

Sample: P7340-3

Client Sample ID: MW-13

Collected: 08/05/2003 13:25

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/13/1903

Preparation Date(s) : 08/12/2003

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.018	2.74	ppm	



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08/20/2003

Total Iron by Method SW846 6010

Sample: P7340-4

Client Sample ID: MW-14

Collected: 08/04/2003 14:20

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/13/1903

Preparation Date(s) : 08/12/2003

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.018	186	ppm	

Sample: P7340-5

Client Sample ID: SMP-1

Collected: 08/04/2003 16:00

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/13/1903

Preparation Date(s) : 08/12/2003

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.018	27.6	ppm	

Sample: P7340-6

Client Sample ID: DMP-1

Collected: 08/04/2003 14:20

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/13/1903

Preparation Date(s) : 08/12/2003

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.018	2.17	ppm	



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08/20/2003

Total Iron by Method SW846 6010

Sample: P7340-7

Client Sample ID: SMP-3

Collected: 08/04/2003 16:30

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/13/1903

Preparation Date(s) : 08/12/2003

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.018	13.4	ppm	

Sample: P7340-8

Client Sample ID: DMP-3

Collected: 08/04/2003 15:30

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/13/1903

Preparation Date(s) : 08/12/2003

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.018	3.95	ppm	

Sample: P7340-9

Client Sample ID: SMP-4

Collected: 08/04/2003 16:15

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/13/1903

Preparation Date(s) : 08/12/2003

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.018	214	ppm	



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08/20/2003

Total Iron by Method SW846 6010

Sample: P7340-10

Client Sample ID: DMP-4

Collected: 08/04/2003 14:45

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/13/1903

Preparation Date(s) : 08/12/2003

Analytical Results

Cas No	Analyte	MDL	Concentration	Units	Q
7439-89-6	Iron	0.018	114	ppm	



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08/20/2003

Nitrogen/Nitrate - EPA 353.2

Sample: P7340-1

Client Sample ID: MW-8

Collected: 08/05/2003 11:15

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/08/2003

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	5.76	ppm	

Sample: P7340-2

Client Sample ID: MW-12

Collected: 08/05/2003 12:05

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/08/2003

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	0.085	ppm	

Sample: P7340-3

Client Sample ID: MW-13

Collected: 08/05/2003 13:25

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/08/2003

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	2.16	ppm	



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08/20/2003

Nitrogen/Nitrate - EPA 353.2

Sample: P7340-4

Client Sample ID: MW-14

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 14:20

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	0.080	ppm	

Sample: P7340-5

Client Sample ID: SMP-1

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 16:00

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	0.084	ppm	

Sample: P7340-6

Client Sample ID: DMP-1

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 14:20

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	0.026	ppm	



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08/20/2003

Nitrogen/Nitrate - EPA 353.2

Sample: P7340-7

Client Sample ID: SMP-3

Collected: 08/04/2003 16:30

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/08/2003

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	0.055	ppm	

Sample: P7340-8

Client Sample ID: DMP-3

Collected: 08/04/2003 15:30

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/08/2003

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	0.15	ppm	

Sample: P7340-9

Client Sample ID: SMP-4

Collected: 08/04/2003 16:15

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/08/2003

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	0.33	ppm	



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08/20/2003

Nitrogen/Nitrate - EPA 353.2

Sample: P7340-10

Client Sample ID: DMP-4

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 14:45

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14797-55-8	Nitrate	0.025	0.17	ppm	



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08/20/2003

Sulfate - EPA 375.4

Sample: P7340-1

Client Sample ID: MW-8

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/05/2003 11:15

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	0.56	58.6	ppm	

Sample: P7340-2

Client Sample ID: MW-12

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/05/2003 12:05

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	2.79	440	ppm	

Sample: P7340-3

Client Sample ID: MW-13

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/05/2003 13:25

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	2.79	419	ppm	



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08/20/2003

Sulfate - EPA 375.4

Sample: P7340-4

Client Sample ID: MW-14

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 14:20

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	2.79	87.5	ppm	

Sample: P7340-5

Client Sample ID: SMP-1

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 16:00

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	2.79	8.50	ppm	

Sample: P7340-6

Client Sample ID: DMP-1

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 14:20

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	1.12	138	ppm	



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08/20/2003

Sulfate - EPA 375.4

Sample: P7340-7

Client Sample ID: SMP-3

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 16:30

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	1.12	85.6	ppm	

Sample: P7340-8

Client Sample ID: DMP-3

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 15:30

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	2.79	519	ppm	

Sample: P7340-9

Client Sample ID: SMP-4

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 16:15

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	5.58	59.1	ppm	



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08/20/2003

Sulfate - EPA 375.4

Sample: P7340-10

Client Sample ID: DMP-4

Matrix: Liquid

Remarks:

Analyzed Date: 08/08/2003

Type: Grab

Collected: 08/04/2003 14:45

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
14808-79-8	Sulfate	5.58	59.1	ppm	



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08/20/2003

Total Organic Carbon - Method 415.1

Sample: P7340-1

Client Sample ID: MW-8

Collected: 08/05/2003 11:15

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/18/2003

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.51	4.69	ppm	

Sample: P7340-2

Client Sample ID: MW-12

Collected: 08/05/2003 12:05

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/19/2003

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.51	59.8	ppm	

Sample: P7340-3

Client Sample ID: MW-13

Collected: 08/05/2003 13:25

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/19/2003

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.51	24.1	ppm	



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08/20/2003

Total Organic Carbon - Method 415.1

Sample: P7340-4

Client Sample ID: MW-14

Matrix: Liquid

Remarks:

Analyzed Date: 08/19/2003

Type: Grab

Collected: 08/04/2003 14:20

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.51	1360	ppm	

Sample: P7340-5

Client Sample ID: SMP-1

Matrix: Liquid

Remarks:

Analyzed Date: 08/19/2003

Type: Grab

Collected: 08/04/2003 16:00

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.51	168	ppm	

Sample: P7340-6

Client Sample ID: DMP-1

Matrix: Liquid

Remarks:

Analyzed Date: 08/19/2003

Type: Grab

Collected: 08/04/2003 14:20

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.51	151	ppm	



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08/20/2003

Total Organic Carbon - Method 415.1

Sample: P7340-7

Client Sample ID: SMP-3

Collected: 08/04/2003 16:30

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/19/2003

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.51	168	ppm	

Sample: P7340-8

Client Sample ID: DMP-3

Collected: 08/04/2003 15:30

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/19/2003

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.51	132	ppm	

Sample: P7340-9

Client Sample ID: SMP-4

Collected: 08/04/2003 16:15

Matrix: Liquid

Type: Grab

Remarks:

Analyzed Date: 08/19/2003

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.51	837	ppm	



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08/20/2003

Total Organic Carbon - Method 415.1

Sample: P7340-10

Client Sample ID: DMP-4

Matrix: Liquid

Remarks:

Analyzed Date: 08/19/2003

Type: Grab

Collected: 08/04/2003 14:45

Analytical Results

Cas No	Analyte	MDL	Result	Units	Q
	TOC	0.51	295	ppm	



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08/20/2003

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 and 2-Chloroethylvinylether 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.



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08/20/2003

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 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)
- x - Outside Expected Range

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

P 07340

Project Name: <u>Proteomics</u>		Project Manager: <u>Andy Becker</u>		Sampler (Signature): <u>DM S/ DR H</u>		(Print): <u>Derik M. Sader</u>	
Project Address: <u>31 Sea Cliff Ave, Glen Cove, NY</u>							
Client: <u>Proteomics JN: 643,001</u>		Rush by: <u>1/1</u>					
SAMPLE INFO		Type: SS = Spill Spill, G = Grab, C = Composite, B = Blank Matrix: L = Liquid, S = Soil, SL = Sludge, A* = Air, W = Waste		*Air - Vol. (Liters) Include: Flow (CFM)			
ID	Date	Time	Type	Matrix	Sample Location	Total # Cont.	
1	8/5/03	11:15	G	L	MW-8	6	601/602
2	8/5/03	12:05			MW-12	6	BTX/BTEX
3	8/5/03	13:35			MW-13	6	MTBE
4	8/5/03	14:30			MW-14	6	624/6260/8021
5	8/4/03	16:00			SMP-1	6	625/8270/BN
6	8/4/03	14:30			DMP-1	6	PCB/Pesticides
7	8/4/03	16:30			SMP-3	6	Pet. Prods./8100M
8	8/4/03	15:30			DMP-3	6	RCRA Metals
9	8/4/03	16:15			SMP-4	6	pH/Flash/React
10	8/4/03	14:45			DMP-4	6	418.1 - TRPH
11	8/6/03	10:40			MW-35	2	8260 B
12	8/6/03	11:45			MW-45	2	IDL
13	-	-			Trip Blank	1	N-Hex
14	8/6/03	12:00	G	A	SUE Inf.	1	Sulfate
15							Total Iron
Relinquished by (Signature): <u>Derik M. Sader</u>		Date: <u>8/6/03</u>	Printed Name & Agent: <u>Derik M. Sader</u>		Received by (Signature): <u>[Signature]</u>		
Relinquished by (Signature):		Date:	Printed Name & Agent:		Received for Lab by (Signature): <u>[Signature]</u>		
Comments & Special Instructions		Time	QA/QC Type:		Number & Type of Containers: <u>30-2500 28-1045</u>		
					Preservatives: <u>1454 HCL</u>		
					Temp: <u>5°C</u>		

10-Ambly PNAS

10-11-03



October 27, 2003

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

RE: August 2003 Status Report Photocircuits Accelerated Anaerobic Bioremediation Pilot

Dear Charlie:

Attached is the August 2003 Status Report for the Photocircuits Accelerated Anaerobic Bioremediation Project. Data from the beginning of the project in August 2000 through August 2003 is provided and discussed. Please let me know if you have any questions.

Sincerely,
TERRA SYSTEMS, INC.

Michael D. Lee, Ph.D.

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

cc: Andy Barber

INITIALS	
FILE #	
COPY TO	
Barton & Leguillon PC	
001303	
ROUTE TO	



**AUGUST 2003
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**

OCTOBER 27, 2003

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ABBREVIATIONS

1DCA	1,1-Dichloroethane
1DCE	1,1-Dichloroethene or 1,1-Dichloroethylene or Vinylidene Chloride
1TCA	1,1,1-Trichloroethane
bgs	Below Ground Surface
CA	Chloroethane
cDCE	cis-1,2-Dichloroethene or cis-1,2-chloroethylene
msl	mean sea level
MTBE	Methyl Tert Butyl Ether
µg/L	Microgram per Liter
µM	Micromole per Liter
PCE	Tetrachloroethene or Perchloroethylene
SRS™	Slow Release Substrate
TCE	Trichloroethene or Trichloroethylene
tDCE	trans-1,2-Dichloroethene or trans-1,2-Dichloroethylene
TOC	Total Organic Carbon
TSI	Terra Systems, Inc.
VC	Vinyl Chloride
VOC	Volatile Organic Carbon

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 $\mu\text{g/L}$. The initial pilot bioremediation system consisted of six injection points in a line spaced about 15 to 20 feet apart. A slow release substrate (SRS) containing edible oil was designed to provide a slow release food grade carbon source over a period in excess of twelve months. A total of 3,600 gallons of the soybean oil emulsion was injected. The substrate concentrations were selected based on previous experience. An additional 5,722 gallons of the emulsified substrate was injected in months 17 and 19 (February and April 2002) at twelve injection points. VOC and substrate concentrations have been monitored eleven times over a thirty-two month period at eight wells spaced throughout the treatment area. VOC and substrate concentrations have also been monitored at six 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 after the first injection 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. Well MW-7 has contained the emulsion since April 2002 and has not been sampled. Contaminant levels increased in MW-7 between August 2000 and January 2002 when the last sample was collected from this well. An increase in total VOCs has also been observed in wells MW-14 and DMP-4 since the first injection of substrate in August 2000. 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 DMP-4. 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 (63-99%) were generally observed. Degradation rates for the total VOCs (9/1/00 concentration minus 8/4/03 concentration divided by 1067 days) were as high as 182 $\mu\text{g/L-day}$ (well SMP-3) in higher concentration areas with greater than 100,000 $\mu\text{g/L}$ total volatiles. In other areas with lower concentrations, total VOC degradation rates were lower, in the range of 6.9 (SMP-4) to 28 $\mu\text{g/L-day}$ (SMP-1). The average total contaminant concentrations within the pilot cell have fallen by 77% since September 2000. This average includes the wells sampled on 8/4/03 and the well (MW-7) last sampled on 1/8/02. The substrate reinjection in February and April 2002 increased

the TOC concentrations in all wells within the pilot. In August 2003, TOC levels ranged from 132 mg/L in DMP-3 to 1,360 mg/L in MW-14 with an average of 444 mg/L. 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.

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

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. Wells MW-10 and MW-11 were monitored in January 2002 and January 2003. The locations of these wells are shown in Figure 1 with the exception of MW-9, MW-10, and MW-11 that are further to the west. It should be noted that these wells are not expected to be impacted by the bioremediation study.

Ground surface in the vicinity of the study area is about 60 feet above mean sea level (msl). In the pilot area, wells are screened between 10 and 52 feet msl. Downgradient wells 8, 10, and 11 are deep monitoring wells and wells MW-9, MW-12, and MW-13 are shallow wells. The screen intervals for the wells are shown below:

- Well MW-14 10 to 20 feet msl
- MW-7 37 to 52 feet msl
- SMP-1 50 to 52 feet msl
- SMP-3 45 to 47 feet msl
- SMP-4 45 to 47 feet msl
- DMP-1 40 to 42 feet msl

- DMP-3 35 to 37 feet msl,
- DMP-4 38 to 40 feet msl
- MW-8 -111 and -96 feet msl
- MW-9 31 to 46 feet msl
- MW-10 -72 to - 57 feet msl,
- MW-11 -112 to -97 feet mls
- MW-12 9 to 19 feet msl, and
- MW-13 11 to 21 feet msl.

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.

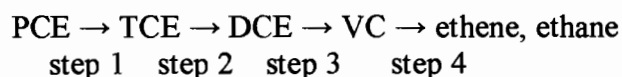
The following technology description is from a report entitled “Cost and Performance Report – In Situ Anaerobic Bioremediation Pinellas Northeast Site Largo, Florida” prepared for the U.S. Department of Energy (1998) by Sandia National Laboratories and Hazardous Waste Remedial Actions Program.

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.



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 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. Wells MW-10 and MW-11 were sampled in January 2002 and January 2003. 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

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.

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. About 4,530 pounds of soybean oil and lecithin was injected. 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. bgs and 5 one-inch wells installed to 55 ft. bgs. 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.

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 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 eleven field sampling events over a 32 month period.

5.2 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 and January, April, and August 2003.
- 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. Well MW-14 was sampled in January, April, and August 2003, but not MW-7. 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 8/4-5/03 for wells MW-8, MW-12, and MW-13, for well MW-9 between 3/28/01 and 1/14/03, and between 1/22/02 and 1/14/03 for wells MW-10 and MW-11.
- 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 August 2003.

5.3 Project To Date Results

The following table summarizes the status of the key performance measures for this project as of August 2003. Details are described in subsequent sections..

Performance Measures	Values/Results
Treatment Volume:	
Soil	Approximately 92' X 157' X 60', 866,640 ft ³
Ground Water Treated:	Approximately 1,620,617 gallons
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	182 µg/L-day
1 – 100 mg/L concentration levels	6.9 to 28 µg/L-day
Reduction of total contaminants of concern:	Achieved reductions of 30% to >99% except in MW-14, 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 48 months

5.3.1 Chlorinated Ethene Results

In the monitoring wells within the pilot cell, cis-1,2-DCE, VC, and ethene were initially 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, TCE, cDCE, tDCE, and VC were not detected in wells SMP-1 and DMP-4 in August 2003; only ethene remained in these wells. TCE, cDCE, tDCE, VC, and ethene concentrations increased in well DMP-1 between October 2002 and January 2003, but then decreased in the April and August 2003 sampling events. In August 2003, ethene represented 87% of the

chlorinated ethenes in well DMP-1. Relatively low levels of TCE, cDCE, tDCE, and VC were also found in well MW-7 at the last sampling point in January 2002 with ethene being the primary product. With the increased substrate levels observed in MW-7, the chlorinated ethene concentrations are expected to decline; however, due to the presence of the emulsion in this well has not been sampled. PCE, TCE, and cDCE were also found in August 2003 at relatively low levels in wells MW-14, DMP-3, and SMP-4. VC concentrations decreased in wells MW-14, DMP-1, SMP-3, and SMP-4 between April and August 2003.

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-7 (through 1/8/02), SMP-3, and DMP-3 through 8/4/03 from the initial levels observed on 8/31/00-9/1/00. Ethene concentrations for the other four 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, SMP-4, and DMP-4.

In the downgradient monitoring wells sampled since March 2001, wells MW-8, MW-10, MW-11, MW-12, and MW-13 had parent compounds PCE and/or TCE. Concentrations greater than 1,000 µg/L of chlorinated ethenes only detected in MW-12. Since March 2001, six months after the first substrate injection, TCE, cDCE, tDCE, and VC concentrations have declined in MW-12 with increased ethene concentrations. The first emulsion injection appeared to have had an effect on MW-12 based upon the increases in ethene, methane, and TOC. However, TCE, cDCE, and VC concentrations have changed little since January 2002. The availability of substrate (<0.9 to 73 mg/L TOC) may be limiting the extent of dechlorination at this well. Ethene has only been detected at low levels in the other downgradient wells. The very low levels of TCE and cDCE found in MW-8 had dissipated from April 2002 until to January 2003, but were detected again in April and August 2003. Little change in the concentrations of PCE, TCE, cDCE, or VC was noted in the deep well MW-10 between 1/22/02 and 1/14/03. Low levels of TCE and cDCE appeared in the deep well MW-11 in January 2003. PCE, TCE, cDCE, tDCE, and VC concentrations have decreased slightly in MW-13, but ethene has only been detected at low concentrations of 5.8 µg/L or less in this well. Although the area around MW-13 appeared to be substrate-limited from March 2001 until November 2002, the availability of substrate has increased to between 24 and 39 mg/L from January through August 2003.

5.3.2 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 99.8% (178,000 µg/L to 372 µg/L) reduction in the 1TCA concentrations. 1TCA levels in wells DMP-3, SMP-4, and DMP-4 have dropped by 82 to 99.9 percent. 1DCA concentrations have dropped in SMP-3 (62%), DMP-4 (>93%), SMP-4 (99%), and SMP-1 (>99.6%). However, increased 1DCA concentrations have been noted in MW-14, MW-7 (through 1/8/02), DMP-1, and DMP-3 as a result of the dechlorination of 1TCA. Large reductions in the 1DCE concentrations have been observed in wells SMP-3 (<81%), DMP-3 (58%) and SMP-4 (>98%), but 1DCE increased in MW-14. 1DCE was not detected in August 2000 or 2003 in SMP-1 and DMP-1. CA concentrations have declined by 67% in DMP-1, but increased in other pilot wells. 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 in addition to the 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 2000). Alternatively, sulfides generated from the reduction of sulfate may be reacting abiotically with the 1TCA and 1DCA (Gander et al. 2002).

Well SMP-4 has shown decreases in the 1TCA, 1DCA, CA, and ethane concentrations over the thirty-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 SRSTM, the 1TCA and 1DCA concentrations dropped. Concentrations of 1TCA, 1DCA, and 1DCE higher than initial levels were observed in wells MW-14, MW-7 (through 1/8/02), DMP-1, and DMP-3. However, further degradation products CA and ethane levels are elevated in wells MW-14, MW-7, SMP-1, SMP-3, DMP-3, SMP-4, and DMP-4. Chloroethane can be biodegraded under aerobic and methanogenic conditions (Lee and Davis 2000).

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. In the deep well MW-10, concentrations of 1DCA, 2DCA, 1DCE were relatively stable between January 2002 and January 2003, and CA was detected. A low level of 1DCA was detected in MW-11 in January 2003. 1DCA, 1DCE, and ethane concentrations increased in MW-12 between July 2001 and April 2002, but are now similar to the levels seen in March 2001. In MW-13, 1TCA, 1DCA, 1DCE, and ethane concentrations have decreased by 90 to 97%.

5.3.3 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 thirty-five months of the project operation to date, acetone concentrations decreased by >99.9% in DMP-1, but increased in MW-14 and SMP-4. In August 2003, acetone was found at 613 µg/L in SMP-4 and represented 30% of the total volatiles in this well. Methylene chloride has decreased in all wells except MW-14 with declines by as much as >99.7 percent in SMP-1, >99% in DMP-1, 99.7% in SMP-3, 98% in DMP-3, 99% in SMP-4, 55% in DMP-4, and 38% in MW-7 (through 1/8/02), but increased in MW-14 through August 2003. Methylene chloride can also be anaerobically degraded. Toluene concentrations have declined in all eight wells in the project area. 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 97% in SMP-4 and >98% 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. We are speculating that the MTBE plume is from an off-site source since it was not used on the Photocircuits site. MTBE has not been detected in any monitoring well since July 2002. The MTBE appears to have flushed through the system. In August 2003, other potential components of gasoline including benzene, toluene, o-xylene, 1,2,4-trimethyl benzene, 1,3,5-trimethyl benzene, and/or naphthalene were detected in wells SMP-1, DMP-1, SMP-3, DMP-3, and DMP-4, but not wells SMP-4 or MW-14.

Few of the contaminants other than the chlorinated ethenes and ethanes were found in the downgradient wells. 2-Chlorotoluene concentrations have decreased by 70% in MW-13 between 3/28/01 and 8/4/03, but increased slightly in MW-12. 4-Chlorotoluene has been found in MW-12. A low level of o-xylene was found in MW-12 in January 2002, but none was detected in subsequent samples. Benzene was detected in MW-12 in January 2002, April 2003, and August 2003. Acetone, methylene chloride, benzene, and n-propylbenzene have been detected in MW-13. Concentrations of benzene fell below detection limits in April 2003. None of these compounds were detected in wells MW-10 or MW-11 in January 2002 or January 2003.

5.3.4 Sum of VOAs

The sum of the concentrations of all of the contaminants in each well was calculated excluding the final degradation endproduct gases, acetylene, ethene, and ethane. The sum of the VOAs has declined by up to 99% in SMP-1 with large decreases in DMP-1 (88%), SMP-3 (83%), DMP-3 (30%), and SMP-4 (78%). The sum of VOAs has increased by 3,459% in MW-14 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 (-34%). The overall average of the sum of the volatiles has declined by 79% over the course of the pilot and full scale implementation. This average includes the seven wells sampled on 8/5/03 and the well (MW-7) last sampled on 1/8/02.

A first order degradation half-life of 533 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 48 months.

Since 3/28/01, the total volatiles in the downgradient wells outside of the influence of the substrate injection have fallen in MW-10 (1%), MW-12 (45%), and MW-13 (71%), but increased in MW-8 (-990%), and MW-11 (-5617%) and have remained non-detect in MW-9.

5.3.5 Substrate Distribution

The total organic carbon concentrations in August 2003 within the pilot cell ranged from 132 mg/L in DMP-3 to 1,360 mg/L in MW-14. Well MW-7 contained the emulsion in August 2003 and was not sampled. It presumably contains very high levels of TOC. TOC levels were above 100 mg/L in all wells in August 2003. 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 except MW-14 as a result of the February-April 2002 injection event.

The substrate injection has apparently impacted TOC levels only in wells MW-12 and MW-13 of the downgradient wells. Downgradient wells MW-8, MW-9, MW-10, MW-11, MW-12, and MW-13 appear to be substrate-limited.

5.3.6 Electron Acceptor Results

As the microbes break down the emulsion, sulfate would be depleted and the concentrations of iron and methane would increase. Nitrate-nitrogen was present in August 2003 at low concentrations of 0.026 to 0.33 mg/L and is a minor electron acceptor. The predominant electron acceptor in the groundwater in August 2003 was sulfate with concentrations that ranged from 8.5 mg/L in SMP-1 to 519 mg/L in DMP-3. Sulfate concentrations have declined from the initial concentrations in September 2000 in wells MW-14 (98%), SMP-1 (96%), DMP-1 (99.5% from 29,600 to 138 mg/L), SMP-3 (70%), SMP-4 (94%), and DMP-4 (56%) as would be expected with consumption of the oil emulsion. However, sulfate levels have increased in MW-7 (though 1/8/02) and DMP-3 over the course of the pilot. The average sulfate concentration in the cell has declined by 97%. Total iron concentrations within the pilot in August 2003 ranged from 2.17 mg/L in DMP-1 to 214 mg/L in SMP-4, which indicated that iron is also an important electron acceptor. Total iron concentrations have increased in five of the eight wells in the study 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 August 2003, methanogenic conditions ($>1,000 \mu\text{g/L}$) was detected in all wells. Methane concentrations have increased in all eight monitoring wells in the project area between September 2000 and August 2003.

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. No electron acceptor data was available for wells MW-10 and MW-11. Well MW-12 is under sulfate or iron-reducing conditions based upon the elevated iron levels and

drops in sulfate concentrations. Although methane and iron concentrations have increased in MW-13 and sulfate levels have declined, nitrate levels are high enough (2.16 mg/L) for it to be the dominant electron acceptor.

5.3.7 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 since January 2002 for wells SMP-1, DMP-1, SMP-3, DMP-3, SMP-4, and DMP-4. Field parameters were collected for downgradient wells MW-8, MW-9, MW-12, and MW-13 since the April 2002 sampling event. 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, but declined to between 7.0 and 7.6 from January to August 2003. The pH dropped to slightly acidic conditions of 5.3-6.1 in SMP-4. Downgradient wells MW-12 and MW-13 were slightly acidic to neutral, 6.2 to 7.3. The pH in the downgradient well MW-8 ranged from slightly acidic, 6.4 to slightly basic, 8.7. Groundwater temperatures ranged between 11.5 to 24.8 °C. In general the specific conductivity of the groundwater was high, between 2,660 and 5,890 umhos/cm. Downgradient wells MW-8 and MW-9 had lower specific conductivity readings of 120 to 221 umhos/cm. Downgradient wells MW-12 and MW-13 had higher specific conductivity levels.

Negative redox potentials of -35 (SMP-4) to -128 mV (DMP-4) were found in the wells within the pilot cell in August 2003 except SMP-1. Well SMP-1 went dry during sampling and the field parameters may not be representative. Downgradient well MW-8 had a positive redox potential in August 2003, which is consistent with the low levels of contaminants found in this well. Although well MW-13 has higher contaminant levels, its redox potential ranged from -10 to 300 mV. The redox potential of MW-12 has ranged between -136 mV to 69 mV. Low (<1.0 mg/L) dissolved oxygen readings were observed in well DMP-3 and DMP-4 in August 2003. 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 after July 2002.

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

There have been twelve groundwater sampling events during the course of the study. As of August 2003, the average total volatile contaminant concentrations within the pilot have decreased by 79%.

During the treatment period of 35 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 79%.
- The average concentrations of the parent compound 1,1,1-trichloroethane has decreased by 98%.
- PCE, TCE, cDCE, and VC were not detected in wells SMP-1 and DMP-4 in August 2003.
- Three monitoring wells (MW-7, MW-14, and DMP-4) have shown increased total volatile concentrations since September 1, 2000 by 33 to 3,459%. Well MW-7 could not

be sampled in since January 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 4/28/03, total VOC concentrations have decreased by 57% in MW-14. Since first monitored in May 1999, well DMP-4 has shown an increase in total volatiles from 1,636 to 3,600 µg/L largely due to an increase in the 1TCA degradation product CA between June and August 2003.

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 ft³ (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 48 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.

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 79% over the course of 35 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 182 µg/L per day in higher concentration areas. In areas with lower total volatile concentrations, degradation rates range from 6.9 to 28 µg/L per day. Wells MW-7 (through January 2002), MW-14, and DMP-4 have shown increases in total VOCs through their last sampling point in August 2003. The increase in the total VOCs was in well DMP-4 was 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 533 days was calculated for the average total volatile contaminants within the pilot cell. This average includes the wells sampled on 8/4/03 and the well MW-7 last sampled on 1/8/02. Based upon this degradation rate, 90% of the total contaminants should be removed within 48 months.

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

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 132 to 1,360 mg/L in August 2003. 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, MW-7 through 1/8/02, and 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.

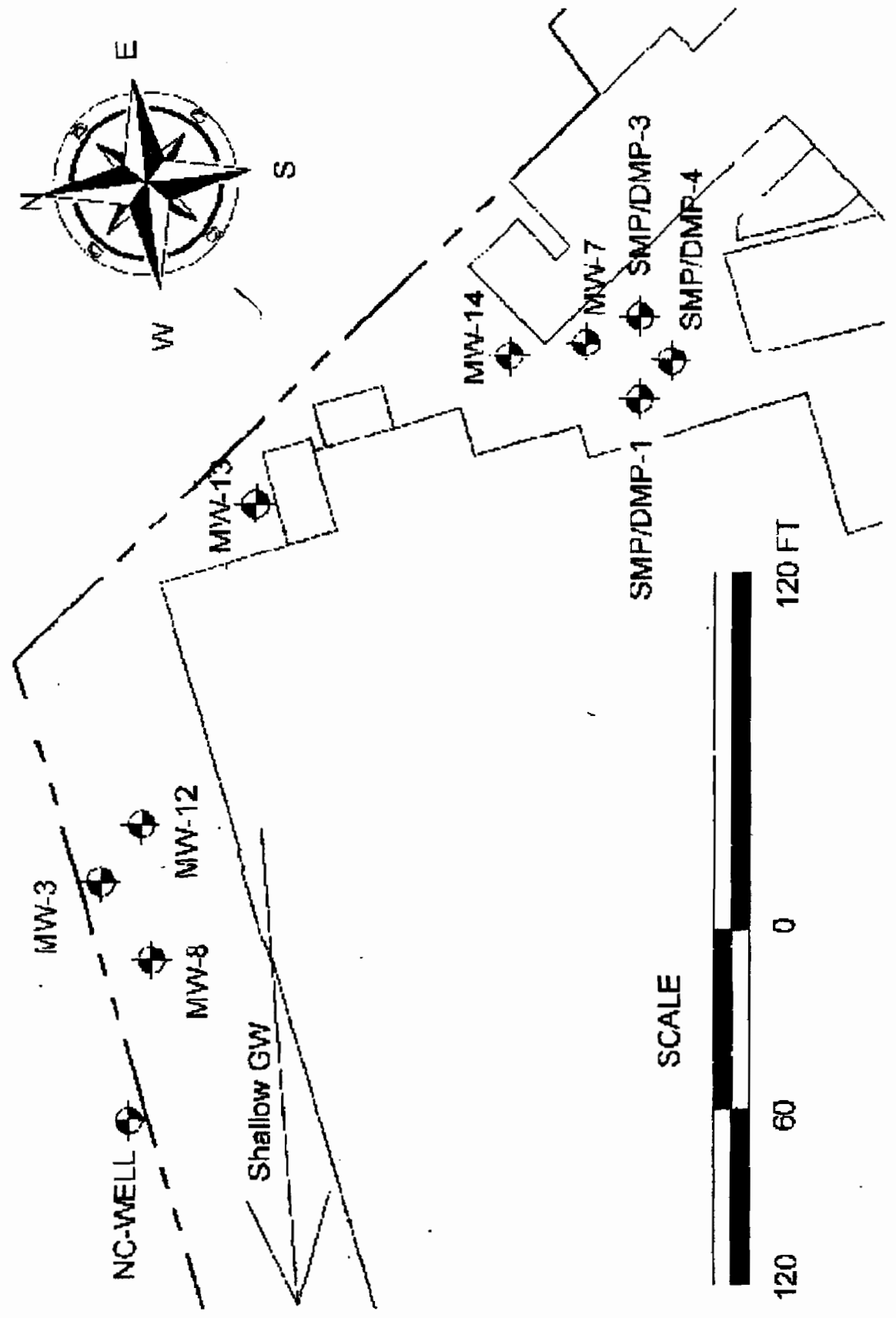
8.0 REFERENCES

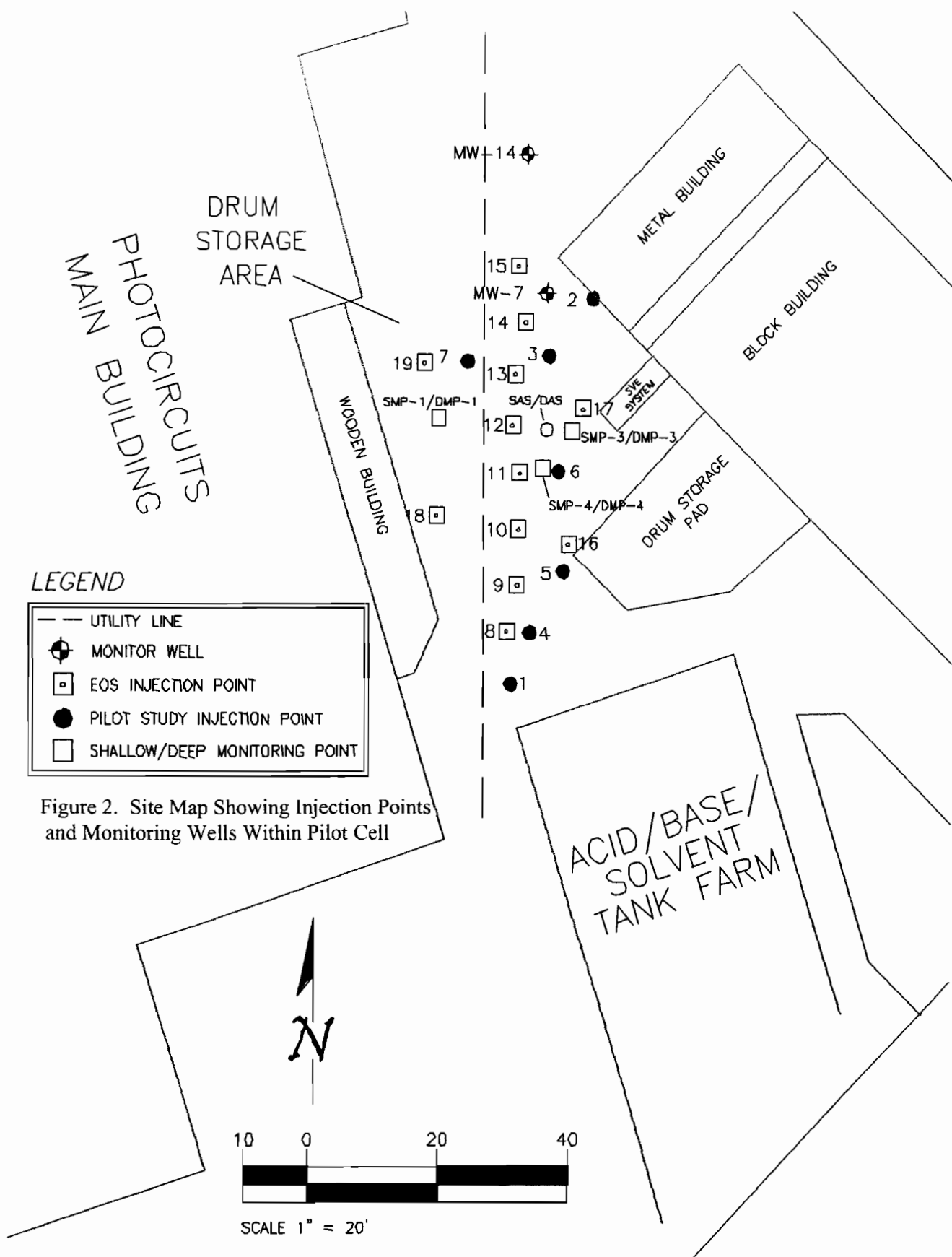
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FIGURES

Figure 1. Site Map Showing Well Locations





TABLES

Table 1. Photocults Anaerobic Pilot Analytical Summary

Well	MTW-14									
Date	8/31/2000	10/19/2000	12/20/2000	3/28/2001	7/11/2001	1/8/2002	1/14/2003	4/28/2003	8/5/2003	
Days	0	49	111	209	314	495	866	970	1069	
Tetrachloroethene	µg/L	<1.4	<0.40	<5.5	<4.0	<2.4	<31	<38	<3.8	
Trichloroethene	µg/L	<1.35	<0.85	<10	<3.4	<3.4	<23	<21	<2.1	
cis-1,2-Dichloroethene	µg/L	<0.95	<1.7	<0.95	<15	<2.8	<3.6	<16	8.48	
trans-1,2-Dichloroethene	µg/L	<1.35	<1.40	<1.35	<11	<2.8	<5.8	<22	<2.20	
Vinyl Chloride	µg/L	<1.75	10.6	<1.75	114	145	173	342	139	
Ethene	µg/L	43	47	60	65	130	90	68	34	
Acetylene	µg/L					5.7		<1.2	<1.2	
1,1,1-Trichloroethane	µg/L	14.4	<1.7	8.9	994	2040	1520	1020	507	
1,1-Dichloroethane	µg/L	126	216	293	9230	18800	14100	8580	9580	
1,2-Dichloroethane	µg/L	<0.80	<0.95	<0.80	<10	34.2	<3.2	<17	<1.70	
1,1-Dichloroethene	µg/L	<1.05	6.3	<1.05	443	751	542	323	90.8	
Chloroethane	µg/L	15.6	<1.25	<1.65	132	298	501	848	2160	
Ethane	µg/L	52	69	48	34	66	49	18	10	
Acetone	µg/L	97.8	170	126	<74	551	986	<566	754	
Methylene Chloride	µg/L	15.1	<1.50	<1.0	220	156	134	<31.5	52.9	
2-Butanone	µg/L	124	75.3	<5.1	<125	863	344	<826	797	
Toluene	µg/L	3.0	<0.80	<0.80	<7.5	32.4	25	<19	<2.00	
Benzene	µg/L	<0.70	<0.70	<0.70	<5	<2.6	<3.4	<20	<2.1	
p-Ethyltoluene	µg/L	<1.2	<1.05	<1.2	<8	<4.4	<4.8	<31	<1.5	
1,3,5-Trimethylbenzene	µg/L	<0.60	<1.50	<0.60	<17	<2.2	<2.4	<17	<1.70	
2-Chlorotoluene	µg/L	<0.85	<1.35	<0.85	<10.5	<3.2	<4.2	<19	<1.50	
1,2,4-Trimethylbenzene	µg/L	<0.65	<1.25	<0.65	<11	<4.4	<2.6	<30	<1.50	
Naphthalene	µg/L	<1.35	<0.90	<1.35	<9.5	<8.2	<5.4	<40	<4.00	
o-Xylene	µg/L	<0.40	<1.35	<0.40	<8	<3.2	<3.2	<16.5	<1.20	
n-Propylbenzene	µg/L	<0.70	<1.40	<0.70	<10.5	<6.2	<2.8	<31	<1.6	
Methyl T-Buyl Ether	µg/L	<1.25	<1.15	<1.25	<14	<1.6	<3.6	<29	<0.53	
Sum VOAs (w/o Gases)	µg/L	396	478	428	11133	23671	18325	10771	14089	
Methane	µg/L	44	58	380	1800	6400	8050	10600	6260	
Iron, Total	mg/L	55.2	13.2	69	197	188	279	186	186	
Sulfate	mg/L	5470	779	32.6	307	1270	441	5.97	87.5	
Nitrate-Nitrogen	mg/L	0.15	0.17	<0.025	<0.0015	<0.13	<0.025	<0.025	0.080	
Total Organic Carbon	mg/L	23500	868	1990	2590	3530	2630	1900	1360	

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	MW-7						
Date	8/31/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	
Days	0	49	111	208	314	495	
Tetrachloroethene	µg/L	<0.40	<0.56	<0.40	<2.2	<0.20	<0.12
Trichloroethene	µg/L	<0.85	19.3	<0.85	<4	16	2.7
cis-1,2-Dichloroethene	µg/L	47.3	283	355	149	187	8.3
trans-1,2-Dichloroethene	µg/L	<1.35	<0.56	<1.35	<4.4	2.6	2.1
Vinyl Chloride	µg/L	39.3	67.1	139	60	63.9	10.5
Ethene	µg/L	63	170	110	33	94	110
Acetylene	µg/L						<1.2
1,1,1-Trichloroethane	µg/L	<0.55	<0.62	<0.55	<4	<0.16	<0.14
1,1-Dichloroethane	µg/L	122	214	268	135	207	193
1,2-Dichloroethane	µg/L	<0.80	<0.38	<0.80	<4	<0.13	3.7
1,1-Dichloroethene	µg/L	<1.05	<0.96	<1.05	<3.6	1.9	<0.22
Chloroethane	µg/L	258	181	201	160	269	390
Ethane	µg/L	<6	130	81	34	71	68
Acetone	µg/L	<9.45	52.2	<9.45	<29.6	18.5	<2.3
Methylene Chloride	µg/L	12.8	6.0	<1	51.6	3.9	8.0
2-Butanone	µg/L	<5.1	<1.64	<5.1	<50	<6.25	17.2
Toluene	µg/L	6.2	8.4	8.3	<3	8.6	0.95
Benzene	µg/L	4.0	3.5	<0.7	<2	2.8	6.5
p-Ethyltoluene	µg/L	<1.2	<0.68	<1.2	<3.2	<0.22	<0.24
1,3,5-Trimethylbenzene	µg/L	<0.60	<0.60	<0.6	<6.8	<0.11	<0.12
2-Chlorotoluene	µg/L	<0.85	5.2	<0.85	<4.2	6.3	8.4
1,2,4-Trimethylbenzene	µg/L	<0.65	<0.50	<0.65	<4.4	1.2	0.93
Naphthalene	µg/L	<1.35	<0.36	<1.35	<3.8	1.1	<0.27
o-Xylene	µg/L	<0.40	<0.54	<0.4	<3.2	1.1	<0.16
n-Propylbenzene	µg/L	<0.70	<0.56	<0.7	<4.2	<0.31	<0.14
Methyl T-Butyl Ether	µg/L	<1.25	<0.46	<1.25	<5.6	<0.080	<0.18
Sum VOCs (w/o Gases)	µg/L	490	840	971	556	791	652
Methane	µg/L	660	1900	760	1050	5930	5050
Iron, Total	mg/L	2.22	1.84	3.93	6.72	8.78	13.1
Sulfate	mg/L	104	117	264	203	68.9	949
Nitrate-Nitrogen	mg/L		<0.015	0.023	0.029	0.017	0.085 J
Total Organic Carbon	mg/L	38.8	53.1	60	72.9	58.5	1.67

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	SNP-1									
Date	8/31/2000									
Days	0									
Tetrachloroethene	µg/L	<16	<0.40	<22	<5.5	<2.0	<6.0	<12	<5.5	<0.22
Trichloroethene	µg/L	<34	79	860	1530	25.3	4410	26600	41	<0.72
cis-1,2-Dichloroethene	µg/L	24900	37500	30100	<0.27	12300	18000	42500	25700	680
trans-1,2-Dichloroethene	µg/L	<54	69.9	<40	132	34.5	68.5	376	<15.5	<0.62
Vinyl Chloride	µg/L	4710	5990	5090	4770	4230	3490	1780	8920	2540
Ethene	µg/L	930	2400	1140	900	1890	650	800	1820	3710
Acetylene	µg/L						<11	7.4	<1.2	<2.2
1,1,1-Trichloroethane	µg/L	<22	<0.55	<34	356	158	<7.0	<11	<13	<0.52
1,1-Dichloroethane	µg/L	506	486	628	708	536	456	366	295	197
1,2-Dichloroethane	µg/L	<32	<0.80	<17	<10	<1.3	<8.0	<11.5	<11.5	<0.46
1,1-Dichloroethene	µg/L	<42	64.3	<27	184	55.1	143	296	50.5	<0.54
Chloroethane	µg/L	<72	71.6	<53	<15	<1.8	<33.5	<30.5	<12.0	37.6
Ethane	µg/L	<6	<6	<25	<25	<25	<12	<1.3	3.6	4.6
Acetone	µg/L	<378	<9.45	<166	<74	<14.4	<115	<156	<56.5	<2.26
Methylene Chloride	µg/L	482	43.1	<56	<20.5	11.9	<18.5	<27	<10.5	<0.42
2-Butanone	µg/L	<204	<5.1	<68	<125	<62.5	<860	<250	<190	<7.6
Toluene	µg/L	<32	61.1	<19	126	51.4	55	194	114	58.5
Benzene	µg/L	<28	4.40	<34	<5	<1.3	<8.5	<8	<10.5	94
p-Ethyltoluene	µg/L	<48	<1.2	<20	<8	11.3	<12	<12	<8.0	<0.32
1,3,5-Trimethylbenzene	µg/L	<24	<0.60	<20	<17	<1.1	<6.0	<10	<10	<0.4
2-Chlorotoluene	µg/L	<34	16.3	<25	<10.5	47.3	<10.5	<13.5	<12.5	17.8
1,2,4-Trimethylbenzene	µg/L	<26	<0.65	<0.65	<11	15.7	<6.5	<8.5	<8.5	<0.34
Naphthalene	µg/L	<54	<1.35	<16	<9.5	21.2	<13.5	<7	<14.5	<0.58
o-Xylene	µg/L	<16	<0.40	<18	<8	11.4	<8.0	<10	<12.5	5.7
n-Propylbenzene	µg/L	<28	<0.70	<17	<10.5	<3.1	<7.0	<10.5	<8.0	<0.32
Methyl T-Butyl Ether	µg/L	<50	<1.25	<25	<14	<0.80	117	<17	<9.0	<0.36
Sum VOCs (w/o Gases)	µg/L	30598	44386	36678	7806	17509	26740	72112	35121	3631
Methane	µg/L	3400	6200	2500	2060	3400	1100	2110	1890	2570
Iron, Total	mg/L	19.8	11.6	15.1	11.1	29.9	16.4	18.3	11.2	12.2
Sulfate	mg/L	236	360	443	813	905	732	513	143	134
Nitrate-Nitrogen	mg/L		0.054	0.071	12.3	0.016	<0.13	0.046	<0.025	<0.025
Total Organic Carbon	mg/L	91.7	83.4	88	59.7	45.9	23.8	63.1	125	139
										186
										1280
										168

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	DNAP-1									
Date	8/31/2000	10/18/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003
Days	0	48	111	208	314	495	579	663	762	865
Tetrachloroethene	µg/L	<0.40	<0.080	<0.40	<5.5	<1.0	<0.60	<0.48	<0.11	<3.1
Trichloroethene	µg/L	<0.85	<0.17	<0.85	<10	4.5	<0.85	29.3	1.6	<2.3
cis-1,2-Dichloroethene	µg/L	50.4	1.70	17.4	73.5	38.4	<0.90	44.3	127	1610
trans-1,2-Dichloroethene	µg/L	<1.35	<0.27	<1.35	<11	<0.70	<1.4	3.9	4.2	<2.3
Vinyl Chloride	µg/L	188	3.5	40	125	42.7	<4.25	62	180	1780
Ethene	µg/L	560	1080	920	690	110	93	160	430	1080
Acetylene	µg/L									
1,1,1-Trichloroethane	µg/L	<0.55	<0.11	<0.55	193	28.1	<0.70	<0.44	<0.26	<1.75
1,1-Dichloroethane	µg/L	91.8	17.6	357	1130	1320	423	412	414	486
1,2-Dichloroethane	µg/L	<0.80	<0.16	<0.80	<10	14.9	<0.80	<0.46	2.3	<1.15
1,1-Dichloroethene	µg/L	<1.05	<0.21	<1.05	<9	<0.70	<1.10	<0.27	<0.27	<3.15
Chloroethane	µg/L	3290	43.4	232	159	193	97	69.7	15.5	<2.45
Ethane	µg/L	<6	<6	<50	<100	<50	0.81	<1.3	1.7	16
Acetone	µg/L	8670	139	557	<74	1150	<11.5	<6.24	46.8	<56.6
Methylene Chloride	µg/L	68.3	1.40	22.4	191	32.8	<01.85	<1.08	1.8	<3.15
2-Butanone	µg/L	<5.1	<1.02	5.1	<125	<31.3	<86	<10	<3.8	<82.7
Toluene	µg/L	36.5	2.80	24.1	40.5	9.1	<0.70	2.2	7.2	14.4
Benzene	µg/L	<0.70	<0.14	5.5	<5	<0.65	<0.85	<0.32	48	98
p-Ethyltoluene	µg/L	2.9	<0.24	<1.2	<8	<1.1	<1.2	<0.4	1.7	<3.1
1,3,5-Trimethylbenzene	µg/L	2.8	<0.12	<0.60	<17	<0.55	<0.60	1.4	1.7	<3.1
2-Chlorotoluene	µg/L	23.7	<0.17	18.2	<10.5	33.7	79.7	57.6	27.8	36.2
1,2,4-Trimethylbenzene	µg/L	8.4	0.77	8.4	<11	4.8	4.7	3.4	4.0	<3.0
Naphthalene	µg/L	3.1	<0.27	<1.35	<9.5	<2.05	<1.35	<0.28	3.2	3.02
o-Xylene	µg/L	<0.40	<0.080	<0.40	<8	<0.80	<0.80	0.82	1.1	<1.65
n-Propylbenzene	µg/L	<0.70	<0.14	16.9	<10.5	<1.55	<0.70	<0.42	<0.16	<3.1
Methyl T-Butyl Ether	µg/L	<1.25	<0.25	<1.25	<14	<0.40	<0.90	<0.18	<0.18	<2.9
Sum VOCs (w/o Gases)	µg/L	12436	210	1304	1912	2872	604	512	886	4025
Methane	µg/L	8200	23000	10300	4660	730	330	160	2530	3520
Iron, Total	mg/L	88.5	4.45	3.1	21.7	8.65	15.9	4.11	4.2	2.88
Sulfate	mg/L	29600	37.7	179	715	1420	1200	590	1040	1020
Nitrate-Nitrogen	mg/L		0.20	0.024	0.05	0.019	<0.13	<0.025	0.027	0.16
Total Organic Carbon	mg/L	299	224	137	132	54.5	8.14	41.1	58.7	101
								24.3		284
										151

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	SNAP-3											
Date	9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003
Days	0	49	111	208	314	495	579	662	761	864	969	1067
Tetrachloroethene	µg/L	<80	<80	<8	13.7	12.2	<6.0	<24	<5.5	9.6	<6.2	<3.8
Trichloroethene	µg/L	<170	<170	<17	<0.2	<1.7	<8.5	<34	<18	2.6	<4.6	<2.10
cis-1,2-Dichloroethene	µg/L	<190	<190	<19	2.3	16.4	<9.0	<36	<12	7.5	<4.2	<1.60
trans-1,2-Dichloroethene	µg/L	<270	<270	<27	<0.22	<1.4	<14	<56	<15.5	1.7	<4.6	<2.2
Vinyl Chloride	µg/L	<350	<350	<35	38.8	98.8	<12.5	<170	118	105	<5.1	73.9
Ethene	µg/L	84	98	39	18	110	180	220	260	130	96	94
Acetylene	µg/L						2.1	5.4	2.2	6.3	<1.2	<1.2
1,1,1-Trichloroethane	µg/L	178000	235000	32600	33700	13100	14500	7610	8070	5660	5780	4510
1,1-Dichloroethane	µg/L	38200	47800	4770	<0.5	17600	8860	20500	10800	7620	7160	5830
1,2-Dichloroethane	µg/L	<160	<160	<16	6	20.6	<8.0	<32	<11.5	5.3	<2.3	<1.70
1,1-Dichloroethene	µg/L	<210	<210	<21	<0.27	164	146	<44	112	337	312	239
Chloroethane	µg/L	<330	<330	<33	76.6	411	346	<134	354	509	519	1220
Ethane	µg/L	39	45	41	23	29	17	36	33	11	11	7.5
Acetone	µg/L	<1890	<1890	<189	3690	536	<115	<460	<56.5	70.3	<113	256
Methylene Chloride	µg/L	2400	<200	<20	14.6	122	89	152	<10.5	24.7	<6.3	13.6
2-Butanone	µg/L	<1020	<1020	<102	<2.5	<62.5	<860	<3440	<190	<3.8	<165	<16.4
Toluene	µg/L	<160	<160	<16	31.7	96.5	54.5	<28	76	53.8	33.2	32.2
Benzene	µg/L	<140	<140	<14	<0.1	20.6	<8.5	<34	<10.5	2.6	<4.0	<2.10
p-Ethyltoluene	µg/L	<240	<240	<24	<0.16	<2.2	<12	<48	<8.0	<0.16	<6.2	<1.50
1,3,5-Trimethylbenzene	µg/L	<120	<120	<12	0.63	<1.1	<6.0	<24	<10	<0.2	<5.7	<1.70
2-Chlorotoluene	µg/L	<170	<170	<17	5.1	<1.6	<10.5	<42	<12.5	21.8	<3.8	<1.50
1,2,4-Trimethylbenzene	µg/L	<130	<130	<13	<0.22	<2.2	<6.5	<26	<8.5	1.6	<6.0	<1.50
Naphthalene	µg/L	<270	<270	<27	<0.19	<4.1	<13.5	<54	<14.5	1.1	<9.4	<4.00
o-Xylene	µg/L	<80	<80	<8	<0.	<1.4	<8.0	<32	<12.5	0.82	<3.3	<1.20
n-Propylbenzene	µg/L	<140	<140	<14	<0.21	<3.1	<7.0	<28	<8.0	<0.16	<6.2	<1.60
Methyl T-Buyl Ether	µg/L	<250	<250	<25	<0.28	9.0	117	<36	<9.0	<0.18	<5.8	<0.53
Sum VOCs (w/o Gases)	µg/L	218600	282800	37370	37579	32207	24113	28262	19530	14434	13804	12175
Methane	µg/L	100	140	44	36	500	1020	2000	5500	740	19500	16000
Iron, Total	mg/L	50.6	5.91	69.6	3.92	32.5	5.39	8.46	4.63	10.1	55.3	9
Sulfate	mg/L	286	392	154	53.7	1050	1640	3640	119	558	14.1	75.2
Nitrate-Nitrogen	mg/L		<0.015	0.53	0.037	<0.015	<0.13	0.009 J	0.017 J	<0.025	0.19	0.076
Total Organic Carbon	mg/L	294	432	22.7	48.1	176	34.4	1600	173	40.3	39.1	184

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	DNR-3													
Date	9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003		
Days	0	49	111	208	314	495	579	662	761	864	969	1067		
Tetrachloroethene	µg/L	<16	60.5	<4.0	<1.1	72.3	34	<12	<2.2	<0.11	<31	21.5	<19.0	
Trichloroethene	µg/L	<34	<13.5	<8.5	<2	8.6	<8.5	<7.2	<0.36	<23	<4.20	<10.5		
cis-1,2-Dichloroethene	µg/L	<38	<17	<9.5	<3	14.9	<9.0	<10.5	<4.8	1.6	<21	42.7	<8.00	
trans-1,2-Dichloroethene	µg/L	<54	<14	<13.5	<2.2	<1.4	<14	<10	<6.2	1.3	<23	<4.40	<11.0	
Vinyl Chloride	µg/L	1040	928	818	145	785	654	397	113	61.2	<25.5	146	342	
Ethene	µg/L	430	450	310	290	490	360	220	620	550	970	340	490	
Acetylene	µg/L						<1.2	<1.2	<1.2	<1.2	<1.2	<2.2	<1.2	
1,1,1-Trichloroethane	µg/L	19700	14300	23400	793	24000	19500	11600	1350	234	5970	1510	3610	
1,1-Dichloroethane	µg/L	5230	4860	4200	764	3250	2260	3770	2410	3980	10800	8320	10200	
1,2-Dichloroethane	µg/L	<32	<9.5	<8.0	<2	25.4	<8.0	<11.5	36.6	29.5	<11.5	<3.4	<8.50	
1,1-Dichloroethene	µg/L	156	<24	<10.5	<1.8	168	<11	<15	17.4	5.6	<31.5	36.2	65.1	
Chloroethane	µg/L	5370	6970	3760	729	6630	2260	1900	10100	8640	9050	1600	8180	
Ethane	µg/L	5.7	9.4	44	12	8.2	8.6	16	31	26	35	17	11	
Acetone	µg/L	<378	<65	<94.5	<14.8	<14.4	<115	<156	945	121	<566	173	<70.5	
Methylene Chloride	µg/L	436	149	<10	31.8	58.7	<18.5	<27	91.8	62	<31.5	34.7	<7.50	
2-Butanone	µg/L	<204	<41	<51	<25	<62.5	<860	<250	<76	<3.8	<826	<32.8	<82.0	
Toluene	µg/L	232	134	103	15.7	140	108	84	85.6	30.5	56.5	22.5	80.8	
Benzene	µg/L	<28	<7.0	<7.0	<1	<1.3	<8.5	<8	<4.2	<0.21	<20	<4.2	<10.5	
p-Ethyltoluene	µg/L	<48	<17	<12	<1.6	9.9	<12	<12	<3.2	<0.16	<31	<3.0	<7.50	
1,3,5-Trimethylbenzene	µg/L	<24	<15	<6	<3.4	<1.1	<6.0	<10	<4.0	1.5	<28.5	<3.40	<8.50	
2-Chlorotoluene	µg/L	<34	<13.5	<8.5	<2.1	51.5	<10.5	<13.5	<3.4	18.7	<19	<3.00	<7.50	
1,2,4-Trimethylbenzene	µg/L	<26	<12.5	<6.5	<2.2	17	<6.5	<8.5	<3.4	4.5	<30	<3.00	<7.50	
Naphthalene	µg/L	<54	<9.0	<13.5	<1.9	<4.1	<13.5	<7	<5.8	1.9	<47	<8.0	<20.0	
o-Xylene	µg/L	<16	<13.5	<4.0	<1.6	<1.6	<8.0	<10	<5.0	1.8	<16.5	<2.40	<6.00	
n-Propylbenzene	µg/L	<28	<14.0	<7.0	<2.1	<3.1	<7.0	<10.5	<3.2	<0.16	<31	<3.20	<8.00	
Methyl T-Butyl Ether	µg/L	<50	<11.5	<12.5	<2.8	<0.80	125	<17	26.6	<0.18	<29	<1.06	<2.65	
Sum VOAs (w/o Gases)	µg/L	32164	27402	32281	2479	35231	24941	17751	15176	13195	25877	11907	22478	
Methane	µg/L	390	890	800	930	870	1400	3850	11100	3100	10700	5280	11300	
Iron, Total	mg/L	60.4	66.8	74.3	20.8	77.5	39.0	35.8	114	38.8	11.9	3.7	4.0	
Sulfate	mg/L	124	186	137	94.6	173	188	127	185	1200	486	1290	519	
Nitrate-Nitrogen	mg/L		0.93	0.35	0.073	0.0030	<0.13	0.029	<0.025	<0.025	1.17	0.051	0.15	
Total Organic Carbon	mg/L	98.2	88.6	104	27.8	51.8	29.6	102	349	201	316	166	132	

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	SNP-4												
Date	9/1/2000												
Days	0												
Tetrachloroethene	µg/L	13.2	<5.6	<0.80	<5.5	9.3	32	70.2	37.5	<31	102	65.6	
Trichloroethene	µg/L	<0.85	<5.4	<1.7	<10	<1.7	<3.4	6.5	<0.36	<23	9.8	<2.10	
cis-1,2-Dichloroethene	µg/L	143	<6.8	<1.9	<15	10.8	<3.6	30	27.2	<21	31	33.7	
trans-1,2-Dichloroethene	µg/L	<1.35	<5.6	<2.7	<11	<1.4	<5.6	0.62	<0.31	<23	<1.10	<2.20	
Vinyl Chloride	µg/L	175	34.6	37.6	72.5	111	126	4.9	2.1	<25.5	10.1	<2.80	
Ethene	µg/L	220	190	220	170	160	340	87	29	28	82	17	
Acetylene	µg/L						<1.2	<1.2	<1.2	<1.2	<1.2	<12.2	
1,1,1-Trichloroethane	µg/L	3150	246	997	3100	2610	2700	23	11.5	<17.5	8.54	<2.20	
1,1-Dichloroethane	µg/L	4070	1740	1180	2230	3270	2890	135	149	184	80.4	54.5	
1,2-Dichloroethane	µg/L	26.2	<3.8	<1.6	<10	19.7	<3.2	<0.46	3.0	<11.5	<0.85	<1.70	
1,1-Dichloroethene	µg/L	105	<9.6	<2.1	<9	48.2	130	<0.54	<0.27	<31.5	<1.15	<2.30	
Chloroethane	µg/L	1220	827	3000	1590	945	776	147	459	1060	1010	1290	
Ethane	µg/L	<6	<6	39	<10	<10	2.4	12	2.7	3.1	4	<1.3	
Acetone	µg/L	<9.4	<26	<18.9	<74	<14.4	<46	365	421	1650	433	613	
Methylene Chloride	µg/L	295	123	<2	278	127	66.8	7.5	8.8	<31.5	9.85	<1.50	
2-Butanone	µg/L	<5.1	<16.4	<10.2	<125	<62.5	<344	<7.6	137	<826	<8.20	<16.4	
Toluene	µg/L	116	37.6	25.5	<7.5	48.2	69.6	<0.40	0.96	<19	<1.00	<2.00	
Benzene	µg/L	<0.70	<2.8	<1.4	<5	<1.3	<3.4	<0.42	<0.21	<20	<1.05	<2.10	
p-Ethyltoluene	µg/L	4.8	<6.8	<2.4	<8	<2.2	<4.8	<0.32	<0.16	<31	<0.75	<1.50	
1,3,5-Trimethylbenzene	µg/L	3.2	<6.0	<1.2	<17	<1.1	<2.4	<0.40	<0.2	<28.5	<0.85	<1.70	
2-Chlorotoluene	µg/L	45.5	<5.4	<1.7	<10.5	21.4	<4.2	<0.50	<0.25	<19	<0.75	<1.50	
1,2,4-Trimethylbenzene	µg/L	8.6	<5.0	<1.3	<11	<2.2	<2.6	<0.34	<0.17	<30	<0.75	<1.50	
Naphthalene	µg/L	<1.35	<3.6	<2.7	<9.5	<4.1	<5.4	<0.58	<0.29	<47	<2.00	<4.00	
o-Xylene	µg/L	<0.40	<5.4	<0.8	<8	<1.6	<3.2	<0.50	<0.25	<16.5	<0.60	<1.20	
n-Propylbenzene	µg/L	<0.70	<5.6	<1.4	<10.5	<3.1	<2.8	<0.32	<0.16	<31	<0.80	<1.60	
Methyl T-Butyl Ether	µg/L	<1.25	<4.6	<2.5	<14	<0.80	<3.6	<0.36	<0.18	<29	<0.26	<0.53	
Sum VOAs (w/o Gases)	µg/L	9376	3008	5240	7271	7221	6790	790	1257	2894	1695	2057	
Methane	µg/L	450	470	1100	3650	1800	2600	4120	3300	14600	23300	12800	
Iron, Total	µg/L	76.2	38.9	47.1	54.5	41.2	17.8	1010	1110	541	209	214	
Sulfate	mg/L	933	470	435	1700	1910	1630	119	73.1	5.24	119	59.1	
Nitrate-Nitrogen	mg/L		<0.015	0.31	0.19	0.037	<0.13	<0.025	<0.025	0.99	0.05	0.33	
Total Organic Carbon	mg/L	73.6	60.4	<0.94	34.6	46.5	31.0	3440	3680	1900	1160	837	

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	DNF-4												
Date	9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003	
Days	0	48	110	207	313	494	578	662	761	864	969	1067	
Tetrachloroethene	µg/L	<0.40	<0.080	<0.080	<0.11	<2.0	<1.2	<0.48	<0.55	<0.11	<31	<19.0	
Trichloroethene	µg/L	<0.85	<1.70	<0.17	<0.20	<1.7	<1.7	<0.32	<1.8	<0.36	<23	<10.5	
cis-1,2-Dichloroethene	µg/L	<0.95	<1.90	<0.19	<0.30	<1.4	<1.8	<0.42	<1.2	<0.24	<21	<8.00	
trans-1,2-Dichloroethene	µg/L	<1.35	<2.70	<0.27	3.4	<1.4	<2.8	<0.40	<1.55	1.9	<23	<14.0	
Vinyl Chloride	µg/L	<1.75	<3.50	<0.35	2.9	<0.70	<8.5	<0.20	<1.15	5.4	<25.5	<11.0	
Ethene	µg/L	250	260	220	160	<6	230	150	200	140	89	170	
Acetylene	µg/L						<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	
1,1,1-Trichloroethane	µg/L	56.3	130	<0.11	15.3	18.4	<1.4	<0.44	<1.3	<0.26	<17.5	<11.0	
1,1-Dichloroethane	µg/L	29.7	20.1	<0.14	50.1	30.0	16.3	38.6	78.1	78.2	<21.5	92.5	
1,2-Dichloroethane	µg/L	<0.80	<1.60	<0.16	8.7	<1.3	<1.6	<0.46	6.5	10.3	<11.5	<8.50	
1,1-Dichloroethene	µg/L	<1.05	<2.10	<0.21	<0.18	<1.4	<2.2	<0.6	<1.35	<0.27	<31.5	<11.5	
Chloroethane	µg/L	2420	2580	3300	3680	2680	1210	1260	1330	3240	3510	5460	
Ethane	µg/L	<6	<6	37	<6	<6	2.4	<1.3	4.7	1.1	2.3	4.4	
Acetone	µg/L	<9.45	<18.9	<1.89	58.4	<14.4	<23	<6.24	<5.65	<1.13	<566	<70.5	
Methylene Chloride	µg/L	22.8	16.6	3.9	19.8	20.8	8.4	12.2	22.2	26.9	<31.5	<7.5	
2-Butanone	µg/L	<5.1	<10.2	<1.02	<2.5	<62.5	<172	<10	<19	<3.8	<826	<82.0	
Toluene	µg/L	11	7.5	3.1	6.1	<1.4	6.9	10.2	7.3	20.2	<19	<10.0	
Benzene	µg/L	<0.70	<1.40	<0.14	<0.10	<1.3	<1.7	<0.321	<1.05	<0.21	<20	<10.5	
p-Ethyltoluene	µg/L	3.7	<2.40	<0.24	1.2	<2.2	<2.4	<0.48	<0.80	2.9	<31	<7.50	
1,3,5-Trimethylbenzene	µg/L	9.2	<1.20	2.5	3.4	<1.1	<1.2	6.9	<1.0	2.9	<28.5	<8.50	
2-Chlorotoluene	µg/L	64.5	44.5	17.1	31.6	31.9	34.2	40.2	21.1	27.2	<19	<7.50	
1,2,4-Trimethylbenzene	µg/L	18.3	15.9	5.3	<0.22	9.2	9.0	13.5	5.3	6.4	<30	<7.50	
Naphthalene	µg/L	4.3	<2.70	<0.27	1.6	<4.1	<2.7	<0.28	<1.45	1.8	<47	<20.0	
o-Xylene	µg/L	4.8	<0.80	<0.008	5.0	<1.6	<1.6	3.6	<1.25	2.6	<16.5	<6.00	
n-Propylbenzene	µg/L	44.3	<1.40	<0.14	<0.21	<3.1	<1.4	<0.42	<0.80	<0.16	<31	<8.00	
Methyl T-Butyl Ether	µg/L	<1.25	<2.4	<0.25	<0.28	<0.80	21.9	<0.68	<0.90	<0.18	<29	<2.65	
Sum VOAs (w/o Gases)	µg/L	2689	2815	3332	3888	2790	1307	1385	1471	3427	3510	5553	
Methane	µg/L	180	210	190	300	<6	250	240	2480	8600	21500	22300	
Iron, Total	mg/L	48.2	39.2	42.5	85.4	116	31.6	29.1	44.1	15.8	56.8	62.1	
Sulfate	mg/L	133	171	98.5	209	323	146	176	249	225	3.77	222	
Nitrate-Nitrogen	mg/L		0.22	0.31	0.17	<0.015	<0.13	0.051	<0.025	<0.025	<0.025	0.18	
Total Organic Carbon	mg/L	43.7	52.4	50.9	34.6	35.7	7.1	71.7	161	78.3	291	306	

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	MW-8										MW-9			
	Date	3/28/2001	7/12/2001	1/8/2002	4/3/2002	6/26/2002	10/3/2002	1/15/2003	4/28/2003	8/5/2003	3/28/2001	7/12/2001	1/8/2002	1/14/2003
Days		0	314	494	579	663	554	658	761	860	0	314	494	657
Tetrachloroethene	µg/L	<0.11	<0.20	<0.12	<0.24	<0.22	<0.11	<0.62	<0.76	<0.38	<0.11	<0.20	<0.24	<0.62
Trichloroethene	µg/L	1.8	1.7	0.97	<0.16	<0.72	<0.36	<0.46	1.91	4.22	<0.20	<0.17	<0.16	<0.46
cis-1,2-Dichloroethene	µg/L	<0.30	1.2	<0.18	<0.21	<0.48	<0.24	<0.42	3.99	15.4	<0.30	<0.14	<0.21	<0.42
trans-1,2-Dichloroethene	µg/L	<0.22	<0.14	<0.28	<0.20	<0.62	<0.23	<0.46	<0.44	<0.22	<0.22	<0.14	<0.20	<0.46
Vinyl Chloride	µg/L	<0.25	<0.070	<0.85	<0.10	<0.46	<1.3	<0.51	<0.56	<0.28	<0.25	<0.070	<0.10	<0.51
Ethene	µg/L	<6	<6	<1.3	<1.3	1.2	<1.2	4.6	<1.3	7.1	<6	<6		
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	<0.35	<0.44	<0.22	<0.20	<0.16	<0.22	<0.35
1,1-Dichloroethane	µg/L	<0.14	<0.12	<0.25	<0.22	<0.60	<0.31	<0.43	<0.44	<0.22	<0.14	<0.12	<0.22	<0.43
1,2-Dichloroethane	µg/L	<0.20	<0.13	<0.16	<0.23	<0.46	<0.23	<0.23	<0.34	<0.17	<0.20	<0.13	<0.23	<0.23
1,1-Dichloroethene Chloroethane	µg/L	<0.18	<0.14	<0.22	<0.30	<0.54	<0.27	<0.63	<0.46	<0.23	<0.18	<0.14	<0.30	<0.63
Ethane	µg/L	<0.30	<0.18	<0.67	<0.61	<0.48	3.7	<0.49	<0.88	<0.44	<0.3	<0.18	<0.61	<0.49
Etane	µg/L	<6	<6	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<6	<6		
Acetone	µg/L	<1.48	<1.44	<2.3	<3.12	<2.26	<1.13	<11.3	<2.82	<1.41	<1.48	<1.44	<3.12	<1.13
Methylene Chloride	µg/L	<0.41	<0.15	<0.37	<0.54	<0.42	<0.21	<0.63	<0.30	<0.15	<0.41	<0.15	<0.54	<0.63
2-Butanone	µg/L	<2.5	<6.25	<17.2	<5.0	<7.6	<3.8	<16.5	<3.28	<1.64	<2.5	<6.25	<5.0	<16.5
Toluene	µg/L	<0.15	<0.14	<0.14	<0.14	<0.40	<0.2	<0.38	<0.40	<0.20	<0.15	<0.14	<0.14	<0.38
Benzene	µg/L	<0.10	<0.13	<0.17	<0.16	<0.42	<0.21	<0.4	<0.42	<0.41	<0.10	<0.13	<0.16	<0.4
p-Ethyltoluene	µg/L	<0.16	<0.22	<0.24	<0.24	<0.32	<0.16	<0.62	<0.30	<0.15	<0.16	<0.22	<0.24	<0.62
1,3,5-Trimethylbenzene	µg/L	<0.34	<0.11	<0.12	<0.20	<0.40	<0.2	<0.57	<0.34	<0.17	<0.34	<0.11	<0.20	<0.57
2-Chlorotoluene	µg/L	<0.21	<0.16	<0.21	<0.27	<0.50	<0.25	<0.38	<0.30	<0.15	<0.21	<0.16	<0.27	<0.38
4-Chlorotoluene	µg/L													
1,2,4-Trimethylbenzene	µg/L	<0.22	<0.22	<0.13	<0.26	<0.34	<0.17	<0.60	<0.30	<0.15	<0.22	<0.22	<0.17	<0.60
Naphthalene	µg/L	<0.19	<0.41	<0.27	<0.14	<0.58	<0.29	<0.94	<0.80	<0.40	<0.19	<0.41	<0.14	<0.94
o-Xylene	µg/L	<0.16	<0.16	<0.16	<0.20	<0.50	<0.25	<0.33	<0.24	<0.12	<0.16	<0.16	<0.20	<0.33
n-Propylbenzene	µg/L	<0.21	<0.31	<0.14	<0.21	<0.32	<0.16	<0.62	<0.32	<0.16	<0.21	<0.31	<0.21	<0.62
Methyl t-Butyl Ether	µg/L	<0.28	<0.080	<0.18	<0.34	<0.36	<0.18	<0.58	<0.11	<0.053	<0.28	<0.080	<0.34	<0.58
Sum VOCs (w/o Gases)	µg/L	1.8	2.9	1.0	0.0	0.0	3.7	0	5.9	19.6	0.0	0.0	0.0	0
Methane	mg/L	<6	61	9.1	<0.7	20	3.1	76.0	2.1	30	300	940		
Iron, Total	mg/L	0.023 J	0.088 J	<0.096	<0.096	0.013	0.23	0.069	0.061	0.036	10.4	21.9		
Sulfate	mg/L	22.6	23.4	27.4	23.2	143	1.46	32.5	28.1	58.6	4.43	23.1		
Nitrate-Nitrogen	mg/L	6.1	5.63	6.93	6.66	6.67	5.67	6.28	6.14	5.76	<0.025	<0.015		
Total Organic Carbon	mg/L	4.97	<0.94	<0.94	1.41	6.6	4.7	33.4	6.58	4.69	7.98	6.79		

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	MW-10		MW-11		MW-12		1/9/2002	4/3/2002	6/26/2002	10/3/2002	1/15/2003	4/28/2003	8/5/2003
	Date	1/22/2002	1/14/2003	1/22/2002	1/14/2003	3/28/2001	7/12/2001						
Tetrachloroethene	µg/L	2.3	<0.62	<0.12	<0.62	<0.11	<0.20	<0.24	<2.4	<1.1	<0.55	<0.62	<0.38
Trichloroethene	µg/L	6.7	4.7	<0.17	9.9	122	0.93	16.5	31	67.8	82.5	48.7	38.1
cis-1,2-Dichloroethene	µg/L	231	244	<0.18	18.1	1280	18.2	430	503	467	488	311	223
trans-1,2-Dichloroethene	µg/L	<0.20	<0.46	<0.28	<0.46	7.3	<0.14	5.6	<2.0	<2.1	<1.55	<0.46	1.70
Vinyl Chloride	µg/L	2.7	<0.51	<0.85	<0.51	244	5.7	298	333	151	83.1	48.8	29.7
Ethene	µg/L					6.7	69	180	130	190	17	<1.3	17
Acetylene	µg/L								<1.2	<1.2	<1.2	<1.2	<1.2
1,1,1-Trichloroethane	µg/L	<0.22	<0.35	<0.14	<0.35	<0.20	<0.16	<0.22	<2.2	<2.6	<1.3	<0.35	<0.22
1,1-Dichloroethane	µg/L	206	190	<0.25	6.3	72.2	3.7	329	684	345	94.2	38.6	107
1,2-Dichloroethane	µg/L	5	5.8	<0.16	<0.23	2.9	<0.13	1.4	<2.3	<2.3	<1.15	<0.23	<0.17
1,1-Dichloroethene	µg/L	50.3	40.8	<0.25	<0.63	8.4	<0.14	2.3	<3	<2.7	<1.35	<0.63	6.99
Chloroethane	µg/L	<0.49	13.5	<0.67	<0.49	<0.30	<0.18	6.1	<6.1	<2.4	<1.2	<0.49	0.91
Ethane	µg/L					<6	13	22	11	18	0.8	<1.3	4.8
Acetone	µg/L	<3.12	<11.3	<2.3	<11.3	<1.48	<1.44	<3.12	<31.2	<1.9	<5.65	<11.3	2.82
Methylene Chloride	µg/L	<0.54	<0.63	<0.37	<0.63	<0.41	<0.15	<0.54	<5.4	<2.1	<1.05	<0.63	<0.15
2-Butanone	µg/L	<5.0	<16.5	<17.2	<16.5	<2.5	<6.25	<5.0	<50	<38	<19	<16.5	<3.28
Toluene	µg/L	<0.14	<0.38	<0.14	<0.38	0.97	<0.14	5.6	11.4	<2.0	<1.0	<0.38	<0.20
Benzene	µg/L	<0.16	<0.4	<0.17	<0.4	5.3	<0.13	5.4	<1.6	<2.1	<1.05	<0.4	2.04
p-Ethyltoluene	µg/L	<0.24	<0.62	<0.24	<0.62	<0.16	<0.22	<0.24	<2.4	<1.6	<0.8	<0.62	<0.15
1,3,5-Timethylbenzene	µg/L	<0.20	<0.57	<0.12	<0.57	<0.34	<0.11	<0.20	<2.0	<2.0	<1	<0.57	<0.17
2-Chlorotoluene	µg/L	<0.27	<0.38	<0.21	<0.38	393	26.9	2690	3660	1940	554	68	419
4-Chlorotoluene	µg/L					14.5	<0.17	82.8	139	147	<1.1	<0.55	6.40
1,2,4-Trimethylbenzene	µg/L	<0.17	<0.60	<0.13	<0.60	<0.22	<0.22	<0.17	<1.7	<1.7	<0.85	<0.60	<0.15
Naphthalene	µg/L	<0.14	<0.94	<0.27	<0.94	<0.19	<0.41	<0.14	<1.4	<2.9	<1.45	<0.94	<0.40
o-Xylene	µg/L	<0.20	<0.33	<0.16	<0.33	<0.16	<0.16	2.3	<2.0	<2.5	<1.25	<0.33	<0.12
n-Propylbenzene	µg/L	<0.21	<0.62	<0.14	<0.62	<0.21	<0.31	<0.21	<2.1	<1.6	<0.8	<0.62	105
Methyl t-Butyl Ether	µg/L	<0.34	<0.58	<0.18	<0.58	<0.28	<0.080	<0.34	<3.4	<1.8	<0.9	<0.58	<0.053
Sum VOCs (w/o Gases)	µg/L	504	498.8	0	34.3	2151	55	3875	5361	3118	1302	515.1	854
Methane	mg/L					420	1800	2170	1670	3470	310	33	750
Iron, Total	mg/L					7.29	55.6	61.0	934	46.7	37.1	13.2	42.1
Sulfate	mg/L					417	824	418	1160	100	407	236	440
Nitrate-Nitrogen	mg/L					<0.025	0.070	0.005 J	0.099	<0.025	0.031	0.026	0.085
Total Organic Carbon	mg/L					33.3	36.6	<0.94	72.6	<0.51	29.4	43.6	59.2

Table 1. Photocircuits Anaerobic Pilot Analytical Summary

Well	MW-13									
Date	3/28/2001	7/12/2001	1/10/2002	4/3/2002	6/26/2002	10/3/2002	1/14/2003	4/29/2003	8/5/2003	
Days	0	106	288	371	455	554	0	762	860	
Tetrachloroethene	µg/L	82.8	120	216	227	16.2	80.5	69	13	19.9
Trichloroethene	µg/L	85.9	114	216	132	13.9	77.2	69.8	12.1	21.0
cis-1,2-Dichloroethene	µg/L	784	897	1950	988	69.6	501	697	135	326
trans-1,2-Dichloroethene	µg/L	3.6	4.7	11.9	8.0	<0.31	3.0	<0.46	<0.44	<0.22
Vinyl Chloride	µg/L	38.6	58.6	112	74	4.6	26.2	16.3	2.60	7.18
Ethene	µg/L	<6	<6	1.6	<1.3	1.1	<1.3	<1.3	4.5	5.8
Acetylene	µg/L			<1.2	<1.2	<1.2	<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	3.9	<0.44	1.09
1,1-Dichloroethane	µg/L	323	351	476	305	17	96.8	95.1	8.85	31.1
1,2-Dichloroethane	µg/L	2.6	2.3	2.8	<0.23	<0.23	<0.23	<0.23	<0.34	<0.17
1,1-Dichloroethene	µg/L	60.6	60.4	75.5	43.6	2.8	13.3	10.5	<0.46	3.81
Chloroethane	µg/L	<0.30	<0.18	<0.61	<0.61	<0.24	<0.24	<0.49	<0.88	<0.44
Ethane	µg/L	5.8	6.7	23	8.7	2.7	1.8	<1.3	<1.3	<1.3
Acetone	µg/L	<1.48	<1.44	18.7	<3.12	<1.13	<1.13	<1.13	22.4	<1.41
Methylene Chloride	µg/L	<0.41	<0.15	<0.54	<0.54	<0.21	<0.21	<0.63	1.88	<0.15
2-Butanone	µg/L	<2.5	<6.25	<5.0	<5.0	<3.8	<3.8	<16.5	<3.28	<1.64
Toluene	µg/L	<0.15	<0.14	<0.14	<0.14	<0.20	<0.20	<0.38	<0.40	<0.20
Benzene	µg/L	7.1	7.1	8.0	4.7	<0.21	2.0	2.1	<0.42	<0.21
p-Ethyltoluene	µg/L	<0.16	<0.22	<0.24	<0.24	<0.16	<0.16	<0.62	<0.30	<0.15
1,3,5-Trimethylbenzene	µg/L	<0.34	<0.11	<0.20	<0.20	<0.20	<0.20	<0.57	<0.34	<0.17
2-Chlorotoluene	µg/L	16.3	43.2	76.4	27.8	2.5	10.2	4.6	3.52	4.90
1,2,4-Trimethylbenzene	µg/L	<0.22	<0.22	<0.17	<0.17	<0.17	<0.17	<0.60	<0.30	<0.15
Naphthalene	µg/L	<0.19	<0.41	<0.14	<0.14	<0.29	<0.29	<0.94	<0.80	<0.40
o-Xylene	µg/L	<0.16	<0.16	<0.20	<0.20	<0.25	<0.25	<0.33	<0.24	<0.12
n-Propylbenzene	µg/L	<0.21	<0.31	<0.21	<0.21	<0.25	<0.16	<0.62	2.70	4.30
Methyl t-Butyl Ether	µg/L	<0.28	<0.080	<0.34	<0.34	<0.18	<0.18	<0.58	<0.11	<0.053
Sum VOCs (w/o Gases)	µg/L	1445	1695	3196	1830	128	815	968.3	202.1	419.3
Methane	mg/L	12	21	250	110	140	920	1040	1030	820
Iron, Total	mg/L	0.54	0.48	0.93	0.76	0.27	5.04	2.31	61.1	2.74
Sulfate	mg/L	597	579	648	366	22.7	377	365	442	419
Nitrate-Nitrogen	mg/L	3.95	4.68	3.54	4.84	2.15	3.42	3.73	0.57	2.16
Total Organic Carbon	mg/L	9.52	13.3	<0.94	15.4	<0.51	6.0	29.8	38.9	24.1

Table 2. Photocircuits Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

Contaminant	Well	MW-14 8/31/2000	10/19/2000	12/20/2000	3/28/2001	7/11/2001	1/8/2002	1/14/2003	4/28/2003	8/5/2003
Tetrachloroethene	µM	<0.0065	<0.0084	<0.0024	<0.033	<0.024	<0.014	<0.19	<0.023	<0.023
Trichloroethene	µM	<0.0065	<0.010	<0.0065	<0.076	<0.026	<0.026	<0.18	<0.16	<0.016
cis-1,2-Dichloroethene	µM	<0.0098	<0.018	<0.0098	<0.15	<0.029	<0.037	<0.22	<0.17	0.088
trans-1,2-Dichloroethene	µM	<0.014	<0.014	<0.014	<0.11	<0.021	<0.060	<0.24	<0.23	<0.023
Vinyl Chloride	µM	<0.028	0.17	<0.028	1.8	2.3	2.8	<0.41	5.5	2.2
Ethene	µM	1.5	1.7	2.1	2.3	4.6	3.2		2.4	1.2
Acetylene	µM						0.22		<0.046	<0.046
1,1,1-Trichloroethane	µM	0.11	<0.013	0.067	7.5	15.3	11.4	7.6	12.2	3.8
1,1-Dichloroethane	µM	1.3	2.2	3.0	93.2	189.9	142.4	86.7	89.5	96.8
1,2-Dichloroethane	µM	<0.0081	<0.0096	<0.0081	<0.10	0.35	<0.032	<0.12	<0.17	<0.017
1,1-Dichloroethene	µM	<0.011	0.065	<0.011	4.6	7.8	5.6	3.3	3.1	0.94
Chloroethane	µM	0.24	<0.019	<0.026	2.0	4.6	7.8	13.1	20.0	33.5
Ethane	µM	1.7	2.3	1.6	1.1	2.2	1.6		0.60	0.33
Contaminant	Well	MW-7 8/31/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002			
Date										
Tetrachloroethene	µM	<0.0024	<0.0034	<0.0024	<0.013	<0.0012	<0.00072			
Trichloroethene	µM	<0.0065	0.15	<0.0065	<0.030	0.12	0.021			
cis-1,2-Dichloroethene	µM	0.49	2.9	3.7	1.5	1.9	0.086			
trans-1,2-Dichloroethene	µM	<0.014	<0.0058	<0.014	<0.045	0.027	0.022			
Vinyl Chloride	µM	0.63	1.1	2.2	1.0	1.0	0.17			
Ethene	µM	2.3	6.1	3.9	1.2	3.4	3.9			
Acetylene	µM						<0.046			
1,1,1-Trichloroethane	µM	<0.0041	<0.046	<0.0041	<0.030	<0.0012	<0.0010			
1,1-Dichloroethane	µM	1.2	2.2	2.7	1.4	2.1	1.9			
1,2-Dichloroethane	µM	<0.0081	<0.0038	<0.0081	<0.040	<0.0013	0.037			
1,1-Dichloroethene	µM	<0.011	<0.0099	<0.011	<0.037	0.020	<0.0023			
Chloroethane	µM	4.0	2.8	3.1	2.5	4.2	6.0			
Ethane	µM	<0.20	4.3	2.7	1.1	2.4	2.3			

Table 2. Photocircuits Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

Contaminant	Well	SMP-1												
Date		8/31/2000	10/18/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003	
Tetrachloroethene	µM	<0.096	<0.0024	<0.13	<0.033	<0.012	<0.036	<0.091	<0.042	<0.0013	<0.015	<0.0046	<0.023	
Trichloroethene	µM	<0.026	0.60	6.5	11.6	0.19	33.6	202.4	0.31	<0.0055	<0.014	<0.0032	<0.016	
cis-1,2-Dichloroethene	µM	257	387	311	<0.0028	127	186	439	265	7.0	<0.017	<0.0033	<0.017	
trans-1,2-Dichloroethene	µM	<0.56	0.72	<0.41	1.4	0.36	0.71	3.9	<0.16	<0.0064	<0.019	<0.0045	<0.023	
Vinyl Chloride	µM	75	96	81	76	68	56	28	143	41	<0.033	<0.0090	<0.045	
Ethene	µM	33	86	41	32	68	23	29	65	133	42	29	6.8	
Acetylene	µM													
1,1,1-Trichloroethane	µM	<0.16	<0.0041	<0.25	2.7	1.2	<0.42	0.28	<0.046	<0.085	<0.085	<0.21	<0.085	
1,1-Dichloroethane	µM	5.1	4.9	6.3	7.2	5.4	4.6	3.7	<0.097	<0.010	<0.010	<0.0032	<0.016	
1,2-Dichloroethane	µM	<0.32	<0.0081	<0.17	<0.033	<0.033	<0.081	<0.12	<0.12	<0.0093	<0.0093	<0.0034	<0.017	
1,1-Dichloroethene	µM	<0.43	0.66	<0.27	1.9	0.57	1.5	3.1	0.52	<0.025	<0.025	<0.0046	<0.024	
Chloroethane	µM	<1.1	1.1	<0.82	<0.23	<0.23	<0.52	<0.47	<0.19	0.58	0.60	3.7	4.0	
Ethane	µM	<0.20	<0.20	<0.83	<0.83	<0.83	<0.43	<0.43	0.12	0.15	0.060	<0.20	<0.080	
Contaminant	Well	DMP-1												
Date		8/31/2000	10/18/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003	
Tetrachloroethene	µM	<0.0024	<0.00048	<0.0024	<0.033	<0.0060	<0.0036	<0.0037	0.0066	<0.00066	<0.019	<0.0046	<0.011	
Trichloroethene	µM	<0.0065	<0.0018	<0.0065	<0.076	0.034	<0.0065	0.22	0.080	0.012	<0.018	0.042	<0.0080	
cis-1,2-Dichloroethene	µM	0.52	0.018	0.17956563	0.76	0.40	<0.0093	0.46	0.64	1.3	17	11.4	0.44	
trans-1,2-Dichloroethene	µM	<0.014	<0.0028	<0.014	<0.11	<0.0072	<0.014	0.040	0.029	0.043	<0.024	0.059	<0.011	
Vinyl Chloride	µM	3.0	0.056	0.640	2.0	0.68	<0.068	0.99	0.41	2.9	28	16.3	1.2	
Ethene	µM	20	39	33	25	3.9	3.3	5.7	7.5	15.4	39	32.1	11.4	
Acetylene	µM													
1,1,1-Trichloroethane	µM	<0.0041	<0.00082	<0.0041	1.4	0.21	<0.0052	<0.0033	0.0067	<0.0019	<0.0013	<0.0033	<0.0082	
1,1-Dichloroethane	µM	0.93	0.18	3.61	11	13	4.3	2.4	4.2	4.2	4.9	4.1	1.6	
1,2-Dichloroethane	µM	<0.0081	<0.0016	<0.0081	<0.10	0.15	<0.0081	<0.0046	0.029	0.023	<0.012	<0.0034	<0.0086	
1,1-Dichloroethene	µM	<0.011	<0.0022	<0.011	<0.093	<0.0071	<0.011	<0.0062	<0.0028	<0.0027	<0.033	0.47	<0.012	
Chloroethane	µM	51	0.67	3.60	2.5	3.0	1.5	1.1	0.57	0.24	<0.038	0.54	17.1	
Ethane	µM	<0.20	<0.20	<1.7	<3.3	<1.7	0.027	<0.043	0.060	0.057	0.53	0.80	0.20	

Table 2. Photocredits Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

Contaminant	Well	SMP-3																
Date		9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003					
Tetrachloroethene	µM	<0.48	<0.48	<0.048	0.083	0.074	<0.036	<0.14	<0.033	0.058	<0.038	<0.023	<0.023					
Trichloroethene	µM	<1.3	<1.3	<0.13	<0.0015	<0.013	<0.065	<0.26	<0.14	0.073	<0.035	<0.016	<0.016					
cis-1,2-Dichloroethene	µM	<2.0	<2.0	<0.20	0.024	0.17	<0.093	<0.37	<0.12	0.077	<0.043	<0.017	<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	<0.047	<0.023	<0.023					
Vinyl Chloride	µM	<5.6	<5.6	<0.56	0.62	1.6	<0.68	<2.72	1.9	1.7	<0.082	1.2	0.37					
Ethene	µM	3.0	3.5	1.4	0.64	3.9	6.4	7.9	9.3	4.6	3.4	3.4	5.0					
Acetylene	µM						0.081	0.21	0.085	0.24	<0.046	<0.046	<0.046					
1,1,1-Trichloroethane	µM	1334	1762	244	253	98	109	57	60	42	43	34	2.8					
1,1-Dichloroethane	µM	386	483	48	<0.0051	178	89	207	109	77	72	59	147					
1,2-Dichloroethane	µM	<1.6	<1.6	<0.16	0.061	0.21	<0.081	<0.32	<0.12	0.017	<0.023	<0.017	<0.017					
1,1-Dichloroethene	µM	<2.2	<2.2	<0.22	<0.0028	1.7	1.5	<0.45	1.2	3.5	3.2	2.5	0.40					
Chloroethane	µM	<5.1	<5.1	<0.51	1.2	6.4	5.4	<2.1	5.5	7.9	8.0	18.9	144					
Ethane	µM	1.3	1.5	1.4	0.77	0.97	0.57	1.20	1.1	0.37	0.37	0.25	0.28					

Contaminant	Well	DMP-3																
Date		9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003					
Tetrachloroethene	µM	<0.097	0.36	<0.024	<0.0066	0.44	0.21	<0.072	<0.013	<0.00066	<0.19	0.13	<0.11					
Trichloroethene	µM	<0.26	<0.10	<0.065	<0.015	0.065	<0.065	<0.061	<0.055	<0.0029	<0.18	<0.032	<0.080					
cis-1,2-Dichloroethene	µM	<0.39	<0.18	<0.098	<0.031	0.15	<0.093	<0.11	<0.050	0.017	<0.22	0.44	<0.083					
trans-1,2-Dichloroethene	µM	<0.56	<0.14	<0.14	<0.023	<0.014	<0.14	<0.10	<0.064	0.013	<0.24	<0.045	<0.11					
Vinyl Chloride	µM	17	15	13	2.3	12.6	10.5	6.4	1.8	1.0	<0.41	2.3	5.5					
Ethene	µM	15.4	16.1	11.1	10.4	17.5	12.9	7.9	22	19.6	35	12.1	17.5					
Acetylene	µM						<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046					
1,1,1-Trichloroethane	µM	148	107	175	5.9	180	146	87	10	1.8	45	11.3	27.1					
1,1-Dichloroethane	µM	53	49	42	7.7	32.8	22.8	38.1	24	40.2	109	84.0	103.0					
1,2-Dichloroethane	µM	<0.32	<0.096	<0.081	<0.020	0.26	<0.081	<0.112	0.37	0.30	<0.12	<0.034	<0.086					
1,1-Dichloroethene	µM	1.6	<0.25	<0.11	<0.018	1.7	<0.11	<0.15	0.18	0.058	<0.32	0.37	0.67					
Chloroethane	µM	83	108	58	11	103	35	29	157	134	140	25	127					
Ethane	µM	0.19	0.31	1.5	0.40	0.27	0.29	0.53	1.0	0.87	1.2	0.57	0.37					

Table 2. Photocircuits Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

Contaminant	Well	SMP-4												
Date		9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003		
Tetrachloroethene	µM	0.080	<0.0034	<0.0048	<0.033	0.056	0.193	0.42	0.23	<0.19	0.62	0.40		
Trichloroethene	µM	<0.0065	<0.041	<0.013	<0.076	<0.076	<0.076	0.049	<0.0027	<0.18	0.075	<0.016		
cis-1,2-Dichloroethene	µM	1.5	<0.070	<0.0020	<0.15	0.11	<0.026	0.31	0.28	<0.22	0.32	0.35		
trans-1,2-Dichloroethene	µM	<0.014	<0.058	<0.0028	<0.11	<0.014	<0.058	<0.0064	<0.0032	<0.24	<0.011	<0.023		
Vinyl Chloride	µM	2.8	0.55	0.60	1.2	1.8	2.0	0.078	0.034	<0.41	0.16	<0.045		
Ethene	µM	7.9	6.8	7.9	6.1	5.7	12.1	3.1	1.0	1.0	2.9	0.61		
Acetylene	µM						<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	<0.13	0.064	<0.016		
1,1-Dichloroethane	µM	41	18	12	23	33	29	1.4	1.5	1.9	0.81	0.55		
1,2-Dichloroethane	µM	0.26	<0.038	<0.016	<0.10	0.20	<0.032	<0.0046	0.030	<0.12	<0.0086	<0.017		
1,1-Dichloroethene	µM	1.1	<0.099	<0.022	<0.093	0.50	1.3	<0.0056	<0.0028	<0.32	<0.012	<0.023		
Chloroethane	µM	19	13	47	25	15	12	2.3	7.1	16	15.7	20.0		
Ethane	µM	<0.20	<0.20	1.3	<0.33	<0.33	0.080	0.40	0.090	0.10	0.13	<0.043		
Contaminant	Well	DMP-4												
Date		9/1/2000	10/19/2000	12/20/2000	3/27/2001	7/11/2001	1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003	
Tetrachloroethene	µM	<0.0024	<0.00048	<0.00048	<0.00066	<0.012	<0.0072	<0.0029	<0.0033	<0.00066	<0.19	<0.11	<0.023	
Trichloroethene	µM	<0.0065	<0.013	<0.013	<0.0015	<0.013	<0.013	<0.0024	<0.14	<0.0027	<0.18	<0.080	<0.016	
cis-1,2-Dichloroethene	µM	<0.0098	<0.020	<0.0020	<0.0031	<0.014	<0.019	<0.0043	<0.012	<0.0025	<0.22	<0.083	<0.017	
trans-1,2-Dichloroethene	µM	<0.014	<0.028	<0.0028	0.035	<0.014	<0.029	<0.0041	<0.016	0.020	<0.24	<0.14	<0.023	
Vinyl Chloride	µM	<0.028	<0.056	<0.0056	0.046	<0.011	<0.14	<0.0032	<0.018	0.086	<0.41	<0.18	<0.045	
Ethene	µM	8.9	9.3	7.9	5.7	<0.21	8.2	5.4	7.1	5.0	3.2	6.1	2.9	
Acetylene	µM						<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	
1,1,1-Trichloroethane	µM	0.42	0.97	<0.00082	0.11	0.14	<0.010	<0.0033	<0.0097	<0.0019	<0.13	<0.082	<0.016	
1,1-Dichloroethane	µM	0.30	0.20	<0.0014	0.51	0.30	0.16	0.39	0.79	0.79	<0.22	0.93	<0.022	
1,2-Dichloroethane	µM	<0.0081	<0.016	<0.0016	0.088	<0.013	<0.016	<0.0046	0.066	0.10	<0.12	<0.086	<0.017	
1,1-Dichloroethene	µM	<0.011	<0.022	<0.0022	<0.0019	<0.014	<0.022	<0.062	<0.014	<0.0028	<0.33	<0.12	<0.024	
Chloroethane	µM	38	40	51	57	42	19	20	21	50	54	85	55	
Ethane	µM	<0.20	<0.20	1.2	<0.20	<0.20	0.080	<0.043	0.16	0.04	0.077	0.15	0.10	

Table 2. Photocircuits Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

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Table 2. Photocircuits Anaerobic Pilot Chlorinated Solvents in Micromolar Concentrations

Contaminant	Well	MW-12																		
Date		3/28/2001	7/12/2001	1/9/2002	4/3/2002	6/26/2002	10/3/2002	1/15/2003	4/28/2003	8/5/2003										
Tetrachloroethene	µM	<0.00066	<0.0012	<0.0144	<0.014	<0.0066	<0.0033	<0.0037	<0.0046	<0.0023										
Trichloroethene	µM	0.93	0.0071	0.13	0.24	0.52	0.63	0.37	0.79	0.29										
cis-1,2-Dichloroethene	µM	13.2	0.19	4.4	5.2	4.8	5.0	3.2	3.8	2.3										
trans-1,2-Dichloroethene	µM	0.075	<0.0014	0.058	<0.021	<0.032	<0.016	<0.047	0.040	0.018										
Vinyl Chloride	µM	3.9	0.091	4.8	5.3	2.4	1.3	0.78	1.2	0.48										
Ethene	µM	0.24	2.5	6.4	4.6	6.8	0.61	<0.046	0.57	0.61										
Acetylene	µM			<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046										
1,1,1-Trichloroethane	µM	<0.0015	<0.0012	<0.0016	<0.016	<0.019	<0.0097	<0.0026	<0.0033	<0.0016										
1,1-Dichloroethane	µM	0.73	0.037	3.3	6.9	3.5	1.0	0.39	0.39	1.1										
1,2-Dichloroethane	µM	0.029	<0.0013	0.014	<0.023	<0.023	<0.012	<0.0023	<0.0034	<0.0017										
1,1-Dichloroethene	µM	0.087	<0.0014	0.024	<0.0031	<0.011	<0.014	<0.0065	0.027	0.072										
Chloroethane	µM	<0.0047	<0.0047	0.095	<0.095	<0.037	<0.019	<0.0076	<0.0093	0.59										
Ethane	µM	<0.20	0.43	0.73	0.37	0.60	0.027	<0.043	0.097	0.16										
Contaminant	Well	MW-13																		
Date		3/28/2001	7/12/2001	1/10/2002	4/3/2002	6/26/2002	10/3/2002	1/14/2003	4/29/2003	8/5/2003										
Tetrachloroethene	µM	0.50	0.72	1.3	1.4	0.10	0.49	0.42	0.078	0.12										
Trichloroethene	µM	0.65	0.87	1.6	1.0	0.11	0.59	0.53	0.092	0.16										
cis-1,2-Dichloroethene	µM	8.1	9.3	20.1	10.2	0.72	5.2	7.2	1.39	3.36										
trans-1,2-Dichloroethene	µM	0.037	0.049	0.123	0.083	<0.0032	0.031	<0.0047	<0.0045	<0.0045										
Vinyl Chloride	µM	0.62	0.94	1.8	1.2	0.074	0.42	0.26	0.042	0.11										
Ethene	µM	<0.21	<0.21	0.057	<0.046	0.039	<0.046	<0.046	<0.046	0.21										
Acetylene	µM			<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046										
1,1,1-Trichloroethane	µM	0.30	0.28	0.24	0.15	0.090	0.032	0.029	<0.0033	0.0082										
1,1-Dichloroethane	µM	3.3	3.5	4.8	3.1	0.17	0.98	1.0	0.089	0.314										
1,2-Dichloroethane	µM	0.026	0.023	0.028	<0.002	<0.0023	<0.0023	<0.0023	<0.0034	<0.0017										
1,1-Dichloroethene	µM	0.63	0.62	0.78	0.45	0.029	0.14	0.11	<0.0034	0.039										
Chloroethane	µM	<0.0047	<0.0025	<0.0095	<0.0095	<0.0037	<0.0037	<0.0076	<0.014	<0.0068										
Ethane	µM	0.19	0.22	0.77	0.29	0.090	0.060	<0.043	<0.043	<0.043										

Table 3. Photocircuits Anaerobic Pilot Field Data

Well		DMF-4									
Well Depth	ft	20.55									
Well Diameter	inch	1									
Date		1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003			
Water Level	ft	6.71									
pH		7.1	7.1	6.7	7.1	7.0	7.0	6.36			
Temperature	°C	17.64	16.2	17.2	20.42	16.50	14.74	17.66			
Spec. Conductivity	umhos/cm	2716	3140	2853	4480	3579	4850	4130			
Redox Potential	mV	-121	-80	-176	-178	-129	-163	-128			
Dissolved Oxygen	mg/L	0.41	0.72	0.58	0.61	2.3	0.78	0.55			
Bromide	mg/L		38	19							

Well		MW-8									
Well Depth	ft	>102									
Well Diameter	inch	4									
Date		1/8/2002	4/2/2002	6/25/2002	10/3/2002	1/15/2003	4/28/2003	8/5/2003			
Water Level	ft	7.96									
pH		8.7	8.4	6.4	8.2	7.2	7.0	6.33			
Temperature	°C	15.43	14.87	12.89	13.46	14.15	14.49	13.74			
Spec. Conductivity	umhos/cm	183	190	221	173	178	191	175			
Redox Potential	mV	240	270	273	84	139	98	239.4			
Dissolved Oxygen	mg/L	8.78	5.32	4.62	10.3	13.56	13.96	11.54			
Bromide	mg/L		5.8	2.0							

Well		MW-9									
Well Depth	ft	MW-12									
Well Diameter	inch										
Date		4/2/2002	1/14/2003	4/2/2002	6/25/2002	10/3/2002	1/15/2003	4/28/2003	8/5/2003		
Water Level	ft	7.1	6.8	6.5	6.6	6.6	7.1	6.8	6.52		
pH											
Temperature	°C	14.26	15.97	14.2	14.6	16.27	14.89	15.48	16.02		
Spec. Conductivity	umhos/cm	200	4120	120	4680	4130	1860	2598	3808		
Redox Potential	mV	250	178	-30	-136	-122	69	-132	-99		
Dissolved Oxygen	mg/L	0.92	4.04	0.7	0.38	1.14	11.88	1.28	0.41		
Bromide	mg/L			11	4.1						

Well		MW-13									
Well Depth	ft										
Well Diameter	inch										
Date		4/2/2002	6/25/2002	10/3/2002	1/14/2003	4/29/2003	8/5/2003				
Water Level	ft										
pH		6.2	6.6	6.6	7.0	7.3	6.52				
Temperature	°C	16.9	16.00	17.94	17.94	16.76	18.1				
Spec. Conductivity	umhos/cm	1520	960	1538	1361	885	1528				
Redox Potential	mV	300	279	-10	101	-3	219				
Dissolved Oxygen	mg/L	1.21	0.48	0.6	3.87	1.9	4.86				
Bromide	mg/L	7.4	0.6								

Table 3. Photoacoustic Anaerobic Pilot Field Data

Well		MW-7		SNP-1							
Well Depth	ft	23.2		9.1							
Well Diameter	inch	4		1							
Date		1/8/2002	4/2/2002	1/8/2002	4/2/2002	6/25/2002	10/2/2002	4/28/2003	8/4/2003*		
Water Level	ft	7.12		6.42							
pH		7.4	7.1	7.5	7.3	7.5	7.3	7.1	7.4		
Temperature	°C	17.9	16.81	11.64	14.84	18.74	24.80	14.82	25.86		
Spec. Conductivity	umhos/cm	4235	4100	2660	5250	3468	22	4230	6		
Redox Potential	mV	-53	-40	31	-130	-84	-76	-114	132		
Dissolved Oxygen	mg/L	0.36	0.45	2.27	1.72	5.37	4.22	3.61	7.91		
Bromide	mg/L			20		39					
*Well went dry during sampling											
Well		DMF-1		SNP-3							
Well Depth	ft	19.04		14.6							
Well Diameter	inch	1		1							
Date		1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003			
Water Level	ft	6.88									
pH		7.3	7.3	7.4	7.6	7.8	6.87				
Temperature	°C	17.85	17.7	21.27	17.4	14.85	18.73	18.73			
Spec. Conductivity	umhos/cm	5560	3597	4838	4000	4384	2970	41			
Redox Potential	mV	-142	-154	-153	-85	-155	-41				
Dissolved Oxygen	mg/L	1.98	2.35	1.74	2.35	1.56	1.75				
Bromide	mg/L		311	977							
*Well went dry during sampling											
Well		SNP-3									
Well Depth	ft	14.6									
Well Diameter	inch	1									
Date		1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003*			
Water Level	ft	6.8									
pH		9.9	8.7	8.8	8.8	7.0	7.4	7.55			
Temperature	°C	12.06	11.47	19.18	22.80	13.35	15.41	21.26			
Spec. Conductivity	umhos/cm	5550	5640	5890	4058	359	650	1760			
Redox Potential	mV	-44	-52	-95	-120	-62	-161	-72			
Dissolved Oxygen	mg/L	3.87	2.94	1.16	2.16	5.41	4.61	5.72			
Bromide	mg/L		5	55							
*Well went dry during sampling											
Well		DMF-3									
Well Depth	ft	24.35									
Well Diameter	inch	1									
Date		1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003			
Water Level	ft	6.91									
pH		6.9	7.1	6.3	6.6	7.0	7.5	6.66			
Temperature	°C	17.95	16.14	16.94	19.65	17.76	15.57	17.16			
Spec. Conductivity	umhos/cm	3200	3120	3929	5863	5460	4685	4270			
Redox Potential	mV	-120	-110	-146	-154	-159	-334	-119			
Dissolved Oxygen	mg/L	1.57	1.43	0.21	0.59	0.44	2.15	0.49			
Bromide	mg/L		16	179							
*Well went dry during sampling											
Well		SNP-4									
Well Depth	ft	15.82									
Well Diameter	inch	1									
Date		1/8/2002	4/2/2002	6/25/2002	10/2/2002	1/13/2003	4/28/2003	8/4/2003			
Water Level	ft	6.82									
pH		7.6	7.5	5.3	6.1	5.7	5.8	5.74			
Temperature	°C	16.54	14.82	18.77	22.40	11.68	15.55	21.61			
Spec. Conductivity	umhos/cm	5186	5130	4440	5530	3200	850	2320			
Redox Potential	mV	-165	-170	-25	-35	-10	-50	-35			
Dissolved Oxygen	mg/L	0.73	0.65	7.5	1.32	7.19	4.4	3.05			
Bromide	mg/L			336							

Table 4. Photocircuits Anaerobic Pilot Percent Change Between 9/1/00 and 1/8/02 or 1/13/03

Compound	MW-14 8/31/2000	MW-7 8/31/2000	SMP-1 8/31/2000	DMP-1 8/31/2000	SMP-3 9/1/2000	DMP-3 9/1/2000	SMP-4 9/1/2000	DMP-4 9/1/2000
First Sampled	8/4/2003	1/8/2002	8/4/2003	8/4/2003	8/4/2003	8/4/2003	8/4/2003	8/4/2003
Last Sampled								
Acetone	-479	0	0	>99.9	0	0	>-6421	0
Methylene Chloride	-3648	38	>99.7	>99	99.7	98	99	55
Toluene	>33	85	<43	61	74	65	98	6
2-Chlorotoluene	0	-888	0	-23	0	0	97	>98
Sum VOAs (w/o gases)	-3459	-33	99	88	89	30	78	-34
Methane	-14127	-665	-41	-196	-11500	-2797	-2744	-10844
Iron	-237	-490	-39	98	74	93	-181	-137
Sulfate	98	-813	96	99.5	70	-319	94	56
TOC	94	96	-83	49	43	-34	-1037	-575
PCE	0	0	0	0	0	0	-397	0
TCE	0	>-218	0	0	0	0	0	0
cDCE	>-793	82	>99.99	15	0	0	76	0
IDCE	0	>-56	0	0	0	0	0	0
VC	>-7843	73	>99.9	60	<93	67	>98	0
Ethene	21	-75	80	43	-67	-14	92	68
ITCA	-3421	0	0	0	99.8	82	>99.9	>96
IDCA	-7503	-58	>99.6	-76	62	-95	99	>93
IDCE	>-8548	0	0	0	<81	58	>98	0
CA	-13746	-51	>-263	67	>-2715	-52	-6	-47
Ethane	81	>-1033	0	-2	79	-93	0	<52

Table 5. Photocircuits Downgradient Wells Percent Change Between 3/28/01 and 1/14/03

Compound	First Sampled	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13
Acetone	8/5/2003	0	0	0	0	0	0
Methylene Chloride	3/28/2001	0	0	0	0	0	0
Toluene	3/28/2001	0	0	0	0	>79	0
2-Chlorotoluene	3/28/2001	0	0	0	0	-7	70
Summ VOAs (w/o gases)	8/5/2003	-990	0	1	>-5617	45	71
Methane	3/28/2001	>-400				-79	-6733
Iron	8/5/2003	-57				-283	-407
Sulfate	3/28/2001	-159				-6	30
TOC	8/5/2003	6				-80	-153
PCE	3/28/2001	0	0	>73	0	0	76
TCE	3/28/2001	-134	0	30	>-5722	69	76
cDCE	3/28/2001	>-5033	0	-6	>-9956	83	58
oDCE	3/28/2001	0	0	0	0	77	>94
VC	3/28/2001	0	0	>81	0	88	81
Ethene	3/28/2001	>-18				-154	<3
ITCA	3/28/2001	0	0	0	0	0	97
IDCA	3/28/2001	0	0	8	>-2420	-48	90
IDCE	3/28/2001	0	0	19	0	17	94
CA	3/28/2001	0	0	>-2655	0	>-203	0
Ethane	3/28/2001	0				>20	>78

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

Well	Chlorinated Ethene Dechlorination	Chlorinated Ethane Dechlorination	Electron Acceptors	Electron Donor Availability
MW-14	Ethene high, VC increased from March 2001 to April 2003, lower in August 2003. VC now primary chlorinated ethene with trace cDCE. Not sampled 4/02, 6/02, or 10/02 because of emulsion.	ITCA, IDCA, IDCE, and CA, increased between December 2000 and July 2001 as contaminated water displaced by emulsion moved back into well. Concentrations of IDCA and IDCE decreased since peak in July 2001, CA increasing. Ethane fairly	Sulfate decreased by 98%, methane and iron up greatly.	TOC availability good. Emulsion found 4/02, 6/02, and 10/02 and TOC levels have been above 1,000 mg/L.
MW-7	Ethene generally predominant product, TCE up slightly, cDCE and VC down by 82 and 73% from start of pilot. IDCE up slightly. Not sampled since 1/02 because of emulsion.	ITCA and CA up, CA major product. Ethane produced.	Sulfate increased from 104 to 949 mg/L from 8/31/00 to 1/8/02, methane and iron up greatly.	TOC had fallen to 1.7 mg/L in 1/02. Emulsion found thereafter.
SMP-1	Over 99.99% of cDCE and 99.9% of VC degraded. Ethene is only compound remaining.	No ITCA detected since 7/01. IDCA down by >99.6% and IDCE not detected. CA produced. Little ethane.	Sulfate down 96% from start of pilot; sulfate levels decreasing with higher substrate. Methane and iron up from start of pilot.	TOC rebounded to 1,280 mg/L in 4/03; enhanced dechlorination. Found adequate level of 168 mg/L in August 2003.
DMP-1	TCE, cDCE, IDCE, and VC concentrations down from start of pilot and ethene predominant product.	IDCA up 76%, but no IDCE detected in August 2003, CA down by 67%, little ethane detected.	Sulfate down 99.5%, methane increased, but iron down.	TOC increased from 24 mg/L in 6/02 to 141 mg/L in August 2003. Adequate supply.
SMP-3	PCE, TCE, cDCE, and IDCE not detected August 2003. VC detected, but ethene predominant product.	ITCA down by 99.8%, IDCA down 62%, IDCE down by <81%, and CA increasing as ITCA and IDCA degraded. Some ethane.	Sulfate decreased from 3,640 mg/L in April 2002 to 86 mg/L in August 2003, methane increased greatly and iron variable.	TOC in April 2002 up to 1,600 mg/L, but then fell below optimal levels. Adequate TOC levels in April 2003 (184 mg/L) and August 2003 (168 mg/L).
DMP-3	PCE, TCE, cDCE, and IDCE not detected August 2003. VC increasing. Ethene major product.	ITCA down by 82%, IDCA up by 95%, and IDCE down by 58%. CA increased by 93%. Ethane up.	Sulfate increased. Methane up, but iron decreasing.	TOC increased to 349 mg/L in 6/02 and has remained above 100 mg/L.
SMP-4	PCE up slightly, cDCE and VC down by 76 and >98%, ethene decreased, but still predominant chlorinated ethene.	ITCA, IDCA, and IDCE down by up to 99.9%, CA increasing. Little ethane.	Sulfate decreased to 59 mg/L in August 2003, methane and iron increased greatly.	High levels of TOC (3,680 mg/L found on 10/2/02) and have remained elevated above 800 mg/L.
DMP-4	No detectable PCE, TCE, cDCE, IDCE, or VC in August 2003. Ethene predominants.	ITCA down >96, IDCA down by >93%, IDCE non-detect August 2003. CA predominant product, but decreasing. Little ethane.	Sulfate down 56%, iron and methane increased.	TOC increased to above 200 mg/L in January 2003, adequate levels.