



**MALCOLM
PIRNIE**

FINAL

**PRELIMINARY DESIGN INVESTIGATION
REPORT**

VOLUME I OF II

**Dover Municipal Well No. 4
Superfund Site**

Dover, New Jersey

**Army Corps of Engineers
Kansas City District**



May 2002

100001

**ADDENDUM TO THE FINAL
PRELIMINARY DESIGN INVESTIGATION REPORT (MAY 2002)
DOVER MUNICIPAL WELL NO. 4 SUPERFUND SITE
DOVER, NEW JERSEY**

INTRODUCTION

Malcolm Pirnie was contracted by the United States Army Corps of Engineers (USACE), Kansas City District, (Contract Number DACW41-96-D-9003 Task Order 0029) to conduct a Preliminary Design Investigation (PDI) at the Dover Municipal Well No.4 (DMW4) Superfund Site in Dover, New Jersey. From February 2000 to September 2001, Malcolm Pirnie conducted three phases of the PDI in order to complete the following objectives:

- Identify the source of chlorinated volatile organic compounds (VOCs) detected in DMW4.
- Define the nature and extent of soil and groundwater containing chlorinated VOCs in the Study Area.

Four rounds of groundwater samples were collected during Phases I, II, and III of the PDI in order to delineate the groundwater contamination in the Study Area. The results were presented in the Final Preliminary Design Investigation Report (May 2002).

After the Final PDI Report was submitted, the USACE and United States Environmental Protection Agency (USEPA) increased the scope of work of the PDI to fulfill the following objectives:

- Determine if Dense Non-Aqueous Phase Liquids (DNAPL) are present in the shallow aquifer of the source area at 272 Route 46 Dover, New Jersey (dry cleaner),
- Delineate the down-gradient extent of chlorinated VOCs in the shallow aquifer,
- Confirm decreasing trends of chlorinated VOCs in the intermediate and deep aquifer, and

- Evaluate Monitored Natural Attenuation (MNA) as a remedial option for the shallow, intermediate, and deep aquifers.

These objectives were fulfilled during the fourth phase of the PDI (Phase IV PDI), which was conducted from December 2002 to February 2003. The results of the Phase IV PDI are presented in this addendum to the May 2002 Final PDI Report. The evaluation of MNA as a remedial alternative will be presented in a separate report.

SCOPE OF WORK

The scope of work for the Phase IV PDI was implemented over the course of three field events conducted from December 2002 to February 2003. Soil borings were drilled, a shallow monitoring well was installed, and water from a sump and steam-condensing unit in the basement of the dry cleaner were sampled during the week of December 2, 2002. Round 5 groundwater samples were collected from three wells in the shallow aquifer, four wells in the intermediate aquifer, and two wells in the deep aquifer on December 17 and 18, 2002. Round 6 groundwater samples were collected from one well in the intermediate aquifer and one well in the deep aquifer on February 19, 2003. The scope of work for the Phase IV PDI is outlined in Contract Modification No. 0029-05 dated September 20, 2002 and is summarized below.

- Drill four soil borings in the source area to the top of the first confining layer to determine if there is DNAPL present at the bottom of the shallow aquifer (Figure 1).
- Drill and install a monitoring well in the shallow aquifer near the Rockaway River in order to delineate the down-gradient extent of chlorinated VOCs in the shallow aquifer (Figure 2).
- Collect a water sample from the sump in the basement of the dry cleaner to determine whether discharges from the sump represent an ongoing source of chlorinated VOCs to the shallow aquifer.
- Collect Round 5 groundwater samples from select monitoring wells to confirm the decreasing trends in VOCs. Round 5 groundwater samples

were collected from three wells in the shallow aquifer, four wells in the intermediate aquifer, and two wells in the deep aquifer.

- Collect Round 6 groundwater samples from one well in the intermediate aquifer and one well in the deep aquifer to confirm the concentration of chlorinated VOCs detected during the Round 5 groundwater sampling event.

METHODS AND PROCEDURES

All of the work completed during the Phase IV PDI was conducted according to the methods and procedures outlined in the Final PDI Report (May 2002).

FIELD INVESTIGATION

Soil Sampling Results

Four soil borings (SB-28, SB-29, SB-30, and SB-31) were drilled to the top of the first confining layer in the source area during the Phase IV PDI to determine if DNAPL is present at the bottom of the shallow aquifer (Figure 1). Split-spoon soil samples were collected continuously from ground surface to the bottom of the shallow aquifer. Each soil sample was field screened for the presence of DNAPL using a hydrophobic dye (Sudan IV). The hydrophobic dye test is a qualitative field screening method that is used to determine the presence or absence of DNAPL in soil. The screening results showed that DNAPL was not present in any of the split-spoon soil samples. Soil samples collected from the interval immediately above the first confining layer were also analyzed for VOCs using the Multi-Media, Multi-Concentration Organic Analytical Service (OLM04.2) under the USEPA Contract Laboratory Program (CLP) to confirm the results of the field screening tests. The laboratory data was validated by the USEPA and the validation report is attached to this addendum. No VOCs were detected in the confirmation samples (Table 1). Soil boring logs of SB-28, SB-29, SB-30, and SB-31 are attached to this addendum.

Steam Condensing Unit and Sump Sampling Results

On December 4, 2002, the USEPA conducted a Resource Conservation and Recovery Act (RCRA) inspection of the dry cleaner. During this inspection, the operator of the dry cleaner notified the USEPA that water from a steam-condensing unit in the basement is periodically dumped into the sump in the basement floor. A clothes press on the first floor feeds the steam-condensing unit located in the basement.

In order to investigate whether operations at the dry cleaner contribute VOCs to the source area, one water sample (SMP-1) was collected from the sump and three water samples (CND-1, CND-2, and CND-3) were collected from the steam-condensing unit on December 4, 2002. These samples were analyzed for VOCs using the Low Concentration Organic Analytical Service (OLC03.2) under the USEPA CLP. The laboratory data was validated by the USEPA and the validation report is attached to this addendum. The results show the concentration of tetrachloroethylene (PCE) in the sump sample (SMP-1) was 360 ug/L (Table 2). The results also show the concentration of PCE in the steam-condensing unit samples (CND-1, CND-2, and CND-3) ranges from 12 to 22 ug/L (Table 2).

Groundwater Sampling Results

Round 5 and Round 6 groundwater samples were collected in December 2002 and February 2003, respectively, as part of the Phase IV PDI. Groundwater samples were collected from the following monitoring wells:

Round 5: MW-11S, MW-15S, MW-16S, MW-15I, MW-6I, MW-2C, MW-7C, MW-2D, and MW-6D.

Round 6: MW-6I and MW-2D.

The groundwater samples collected during Round 5 were analyzed for VOCs using the Low Concentration Organic Analytical Service (OLC03.2) under the USEPA CLP. Round 6 groundwater samples were also analyzed for VOCs using Low Concentration Organic Analytical Service (OLC03.2); however, due to time constraints, the samples were not analyzed under CLP, but were analyzed by a USEPA Region II CLP-certified

laboratory instead. USEPA personnel validated all of the laboratory data and the validation report is attached to this addendum.

Shallow Aquifer

Round 5 groundwater samples were collected from MW-11S, MW-15S, and the newly installed MW-16S, which are screened in the shallow aquifer. Figure 3 shows the concentration of chlorinated VOCs in the groundwater from monitoring wells MW-11S, MW-15S, and MW-16S from various rounds of groundwater sampling during the PDI. The results of Round 5 groundwater samples collected from MW-15S show that the concentration of PCE has increased from 4,700 ug/L in 2001 to 8,300 ug/l in 2002. The results of groundwater samples collected from MW-11S during Round 5 show that the concentration of PCE decreased from 210 ug/L in 2001 to 25 ug/L in 2002. This concentration still remains above the potential Applicable or Relevant and Appropriate Requirement (ARAR) (New Jersey Maximum Contaminant Level for Drinking Water, 1 ug/L) for PCE. The results of groundwater samples collected from MW-16S during Round 5, which was installed near the Rockaway River, show that VOCs were not detected (Table 3). Soil boring and well construction logs of the newly installed MW-16S are attached to this addendum.

Intermediate Aquifer

Round 5 groundwater samples were collected from MW-15I, MW-6I, MW-2C, and MW-7C, which are screened in the intermediate aquifer. Figure 4 shows the concentration of chlorinated VOCs in the groundwater from monitoring wells MW-15I, MW-6I, MW-2C, and MW-7C from various rounds of groundwater sampling during the PDI. The results summarized in Table 3 and presented on Figure 4 show that the concentration of PCE in MW-15I, which is located at the source area, decreased from 230 ug/L in 2000 to 120 ug/L in 2002. The concentration of PCE in groundwater samples collected from MW-6I, which is located approximately 900 feet down-gradient from the dry cleaner, increased from 38 ug/L in 2000 to 300 ug/L in 2002. This apparent increase in PCE concentration in MW-6I was confirmed with an additional groundwater sample collected in Round 6. The results of the Round 6 groundwater sample show the concentration of PCE in MW-6I

is 400 ug/L. The concentration of PCE in groundwater samples collected from MW-2C, which is located over 1000 feet down-gradient of the dry cleaner, decreased from 6 ug/L in 2000 to 4.9 ug/L in 2002. PCE was not detected in the groundwater sample collected from MW-7C, which is over 1600 feet from the dry cleaner.

Deep Aquifer

Round 5 groundwater samples were collected from MW-6D and MW-2D, which are screened in the deep aquifer. The results of Round 5 groundwater samples collected from MW-6D show that the concentration of PCE has remained stable at 19 ug/L (Figure 5). The concentration of PCE in groundwater samples collected from MW-2D during Round 5 was 2.6 ug/L, which is above the potential groundwater ARAR of 1 ug/L (New Jersey Maximum Contaminant Level for Drinking Water) (Table 3).

Round 6 groundwater samples were collected from MW-2D to confirm the results of Round 5. The results of the groundwater sample collected from MW-2D during Round 6 show the concentration of PCE is 1.9 ug/L. Groundwater from MW-6D was not sampled during Round 6.

CONCLUSIONS

The following conclusions can be made based on the results of the Phase IV PDI:

- Four soil borings were drilled to the top of the first confining layer during the Phase IV PDI. The results of Sudan IV hydrophobic dye testing and the analysis of saturated soil samples collected from the bottom of the first confining unit show no DNAPL is present in the source area.
- PCE was detected at 360 ug/L in the water sample collected from the sump in the basement of the dry cleaner. This data shows that the water in the sump could be a continuing source of PCE to the shallow aquifer.
- PCE was detected at 12 ug/L, 14 ug/L, and 22 ug/L in water samples collected from the steam-condensing unit of the clothes press in the basement of the dry cleaner. This water is reportedly poured into the sump.

- PCE and compounds typically associated with the biodegradation of PCE (i.e., trichloroethene, 1,2-dichloroethene, and vinyl chloride) were not detected in the groundwater sample collected from monitoring well MW-16S, which is located in the shallow aquifer near the Rockaway River. These results show that the shallow groundwater plume is not discharging to the Rockaway River.
- Concentrations of PCE, while still at or above the potential groundwater ARAR (New Jersey Maximum Contaminant Level for Drinking Water, 1 ug/L) in the intermediate aquifer, have significantly decreased since the 1990 Phase I Remedial Investigation. The concentration of PCE in MW-6I decreased from 1200 ug/L in 1989 to 38 ug/L in 2000. However, the concentration of PCE increased from 38 ug/L in 2000 to 300 ug/L in 2002 and 400 ug/L in 2003. The reason for this increase in PCE concentration is unknown.
- The concentration of PCE in groundwater collected from monitoring well MW-2D in Rounds 5 and 6 was 2.6 ug/L and 1.9 ug/L, respectively. These concentrations are both above the potential groundwater ARAR (New Jersey Maximum Contaminant Level for Drinking Water, 1 ug/L) for PCE. Therefore, the down-gradient extent of PCE in the deep aquifer is not defined.

Table 1
VOCs Detected in Soil Samples Collected During Phase IV PDI
Dover Municipal Well No. 4
Dover, New Jersey

Sample Name Sample Depth (feet below ground surface) Matrix Units Sample Date	Potential Standard ug/Kg	SB-28 22 Soil ug/kg 12/4/2002	SB-29 16 Soil ug/kg 12/4/2002	SB-30 16.5 Soil ug/kg 12/4/2002	SB-31 18 Soil ug/kg 12/4/2002
Parameter					
Vinyl Chloride (VC)	2,000	ND	ND	ND	ND
cis-1,2-Dichloroethene (cis-1,2-DCE)	1,000	ND	ND	ND	ND
Trichloroethene (TCE)	1,000	ND	ND	ND	ND
Tetrachloroethene (PCE)	1,000	ND	ND	ND	ND
Trichlorofluoromethane	NA	ND	ND	ND	ND
Bromoethane	1,000	ND	ND	ND	ND
2-Butanone	50,000	ND	ND	ND	ND
4-Methyl-2-pentanone	50,000	ND	ND	ND	ND
Acetone	100,000	ND	ND	ND	ND
Carbon Disulfide	NA	ND	ND	ND	ND
Chloromethane	10,000	ND	ND	ND	ND
Chloroform	1,000	ND	ND	ND	ND
Cyclohexane	NA	ND	ND	ND	ND
Methyl Acetate	NA	ND	ND	ND	ND
Methylcyclohexane	NA	ND	ND	ND	ND
Methylene Chloride	1,000	ND	ND	ND	ND
Ethylbenzene	100,000	ND	ND	ND	ND
Toluene	500,000	ND	ND	ND	ND
Xylenes (total)	10,000	ND	ND	ND	ND

Notes:

NA - Not Available

ND - Not Detected

Potential Standard is the lower of the proposed NJ Residential

Direct Contact Soil Criteria and the NJ Impact to Groundwater

Soil Criteria (NJAC 7:26F).

Table 2
VOCs Detected in Water Samples Collected From The Sump and
Steam-Condensing Unit During Phase IV PDI
Dover Municipal Well No. 4
Dover, New Jersey

Sample Name Matrix Units Sample Date	SMP-1 Water ug/L 12/4/2002	CND-1 Water ug/L 12/4/2002	CND-2 Water ug/L 12/4/2002	CND-3 Water ug/L 12/4/2002
Parameter				
1,2,4-Trimethylbenzene	ND	ND	ND	3.5
2-Butanone	1.4	12	12	11
4-Methyl-2-pentanone	ND	2.3	2	3.2
Acetone	4.3	160	140	150
cis-1,2-Dichloroethene (cis-1,2-DCE)	7.1	ND	ND	ND
Tetrachloroethene (PCE)	360	12	14	22
Trichloroethene (TCE)	2.6	ND	ND	ND

ND = Non-Detect

Table 3
VOCs Detected in Groundwater Samples Collected During Phase IV PDI
Dover Municipal Well No. 4
Dover, New Jersey

Sample Name Matrix Units Sample Date Parameter	Potential Standard ug/L	MW-11S Water ug/L 12/18/2002	MW-15S Water ug/L 12/18/2002	MW-15S (Dup) Water ug/L 12/18/2002	MW-16S Water ug/L 12/17/2002	MW-15I Water ug/L 12/18/2002	MW-6I Water ug/L 12/18/2002	MW-2C Water ug/L 12/17/2002	MW-7C Water ug/L 12/17/2002
1,1,1-Trichloroethane	30	ND	ND	ND	0.18 J	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	1	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	3	0.36 J	89 J	160 J	ND	2 J	5 J	ND	ND
1,1-Dichloroethane	50	ND	ND	ND	0.3 J	ND	ND	ND	ND
1,2-Dichloroethane	2	ND	ND	ND	0.52	ND	ND	ND	ND
1,2-Dichloropropane	1	ND	220 J	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	600	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone	300	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	700	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	4	ND	670	700	ND	ND	15	ND	ND
Bromomethane	10	ND	ND	ND	ND	ND	ND	ND	ND
Carbon disulfide	NA	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	NA	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	6	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane	3	0.62 J	ND	ND	1	ND	ND	ND	ND
cis-1,2-Dichloroethene (cis-1,2,-DCE)	10	0.93 J	920	1100	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	NA	0.26 J	ND	76 J	ND	ND	ND	ND	ND
Dibromochloromethane	10	ND	ND	ND	ND	ND	ND	ND	ND
Methyl acetate	NA	ND	140 J	130 J	ND	ND	ND	ND	ND
Methylcyclohexane	NA	0.72 J	220 J	220 J	ND	3.4 J	ND	ND	ND
Methylene chloride	2	ND	ND	ND	ND	ND	ND	ND	ND

100011

Table 3
VOCs Detected in Groundwater Samples Collected During Phase IV PDI
Dover Municipal Well No. 4
Dover, New Jersey

Sample Name Matrix Units Sample Date Parameter	Potential Standard ug/L	MW-11S Water ug/L 12/18/2002	MW-15S Water ug/L 12/18/2002	MW-15S (Dup) Water ug/L 12/18/2002	MW-16S Water ug/L 12/17/2002	MW-15I Water ug/L 12/18/2002	MW-6I Water ug/L 12/18/2002	MW-2C Water ug/L 12/17/2002	MW-7C Water ug/L 12/17/2002
Methyl-tert-butyl ether (MTBE)	70	0.24 J	ND	ND	0.27 J	ND	ND	ND	ND
Tetrachloroethene (PCE)	1	25	8300	9000	ND	120	300	4.9	ND
Trichloroethene (TCE)	1	0.89 J	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	NA	ND	ND	ND	ND	ND	ND	0.31 J	ND

Notes:

NA - Not Applicable

ND - Not Detected

J - Estimated Value

Potential Standard is the lowest of the Federal MCLs (40 CFR 141),

NJMCLs (NJAC 7:10-16), or the NJ Groundwater Quality

Criteria (NJAC 7:9-6).

Exceedances of the Potential Standards are highlighted and bolded.

100012

Table 3
VOCs Detected in Groundwater Samples Collected During Phase IV PDI
Dover Municipal Well No. 4
Dover, New Jersey

Sample Name Matrix Units Sample Date Parameter	Potential Standard ug/L	MW-2D Water ug/L 12/17/2002	MW-6D Water ug/L 12/18/2002	MW-6I Water ug/L 2/19/2003	MW-6I (Dup) Water ug/L 2/19/2003	MW-2D Water ug/L 2/19/2003
1,1,1-Trichloroethane	30	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	1	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	3	ND	ND	ND	ND	ND
1,1-Dichloroethane	50	ND	ND	ND	ND	ND
1,2-Dichloroethane	2	0.51	0.33 J	ND	0.18 J	0.15 J
1,2-Dichloropropane	1	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	600	ND	ND	ND	ND	ND
2-Butanone	300	ND	ND	ND	ND	ND
Acetone	700	ND	ND	ND	ND	ND
Bromoform	4	ND	ND	ND	ND	ND
Bromomethane	10	ND	ND	ND	ND	ND
Carbon disulfide	NA	ND	ND	ND	ND	ND
Chloroethane	NA	0.51	0.31 J	ND	ND	ND
Chloroform	6	0.17 J	ND	ND	0.15 J	0.11 J
Chloromethane	3	1.2	0.72	ND	0.40 J	0.27 J
cis-1,2-Dichloroethene (cis-1,2,-DCE)	10	ND	0.13 J	ND	ND	ND
cis-1,3-Dichloropropene	NA	ND	ND	ND	ND	ND
Dibromochloromethane	10	ND	ND	ND	ND	ND
Methyl acetate	NA	ND	ND	ND	ND	ND
Methylcyclohexane	NA	ND	0.41 J	ND	ND	ND
Methylene chloride	2	ND	ND	7.3 J	ND	ND

Table 3
VOCs Detected in Groundwater Samples Collected During Phase IV PDI
Dover Municipal Well No. 4
Dover, New Jersey

Sample Name Matrix Units Sample Date	Potential Standard ug/L	MW-2D Water ug/L 12/17/2002	MW-6D Water ug/L 12/18/2002	MW-6I Water ug/L 2/19/2003	MW-6I (Dup) Water ug/L 2/19/2003	MW-2D Water ug/L 2/19/2003
Parameter						
Methyl-tert-butyl ether (MTBE)	70	0.24 J	10	ND	0.28 J	0.11 J
Tetrachloroethene (PCE)	1	2.6	19 J	400 J	370 JD	1.9 J
Trichloroethene (TCE)	1	ND	ND	ND	0.26 J	0.14 J
Trichlorofluoromethane	NA	0.27 J	ND	ND	ND	ND

Notes:

NA - Not Applicable

ND - Not Detected

J - Estimated Value

Potential Standard is the lowest of the Federal MCLs (40 CFR 141),

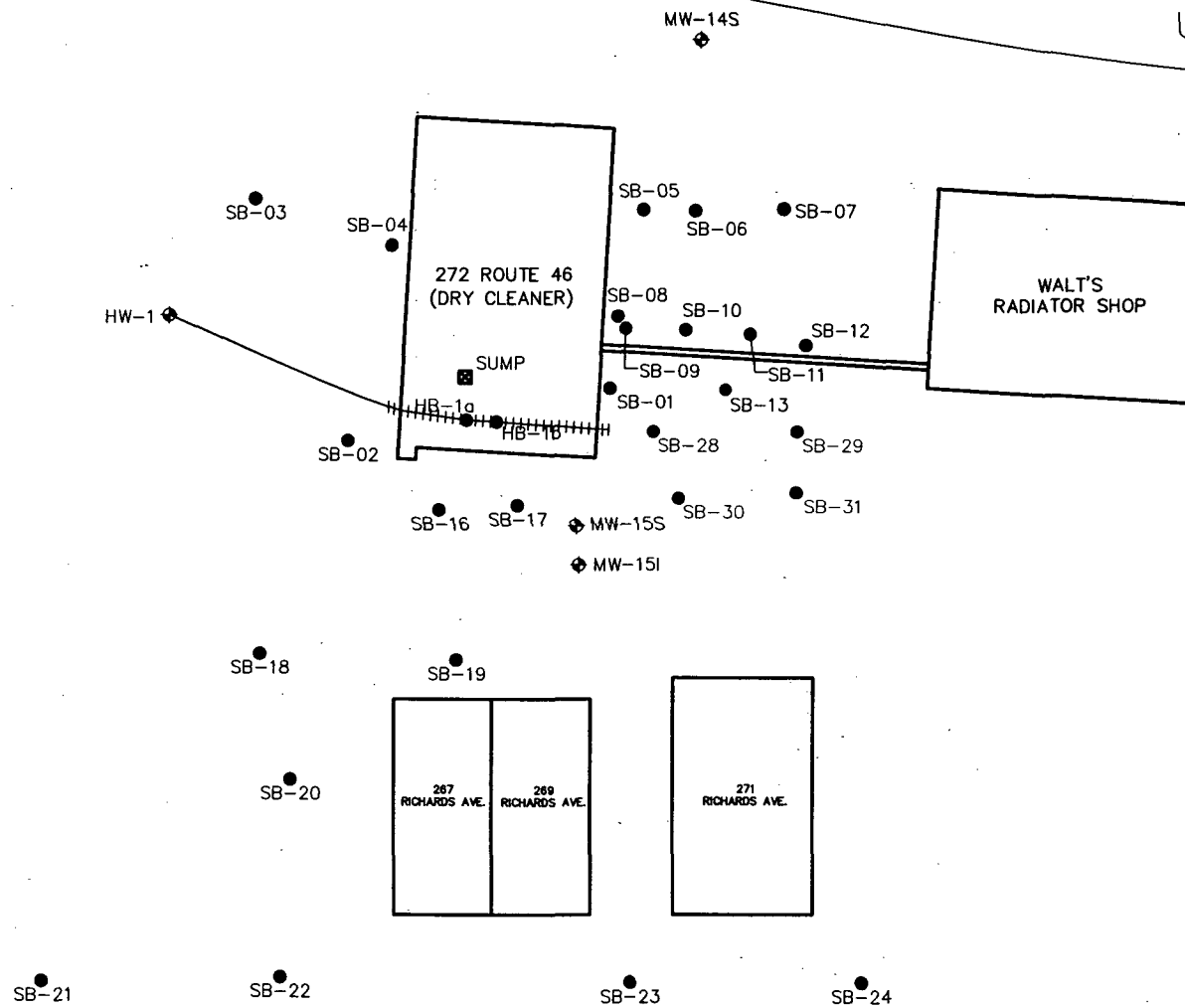
NJMCLs (NJAC 7:10-16), or the NJ Groundwater Quality

Criteria (NJAC 7:9-6).

Exceedances of the Potential Standards are highlighted and bolded.

100014

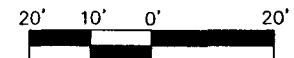
US ROUTE 46



NOTE:
THIS FIGURE WAS DRAWN WITH MANUAL
MEASUREMENTS NOT WITH SURVEY DATA,
THEREFORE THE ACCURACY OF THE BORING
LOCATIONS IS +/- 3 FEET.

LEGEND:

- ◆ EXISTING MONITORING WELLS (MW-14S)
- PDI SOIL BORINGS (SB-01)
- ◆ HORIZONTAL WELL (HW-1)
- PHASE IV SOIL BORINGS (SB-28)



RICHARDS AVENUE

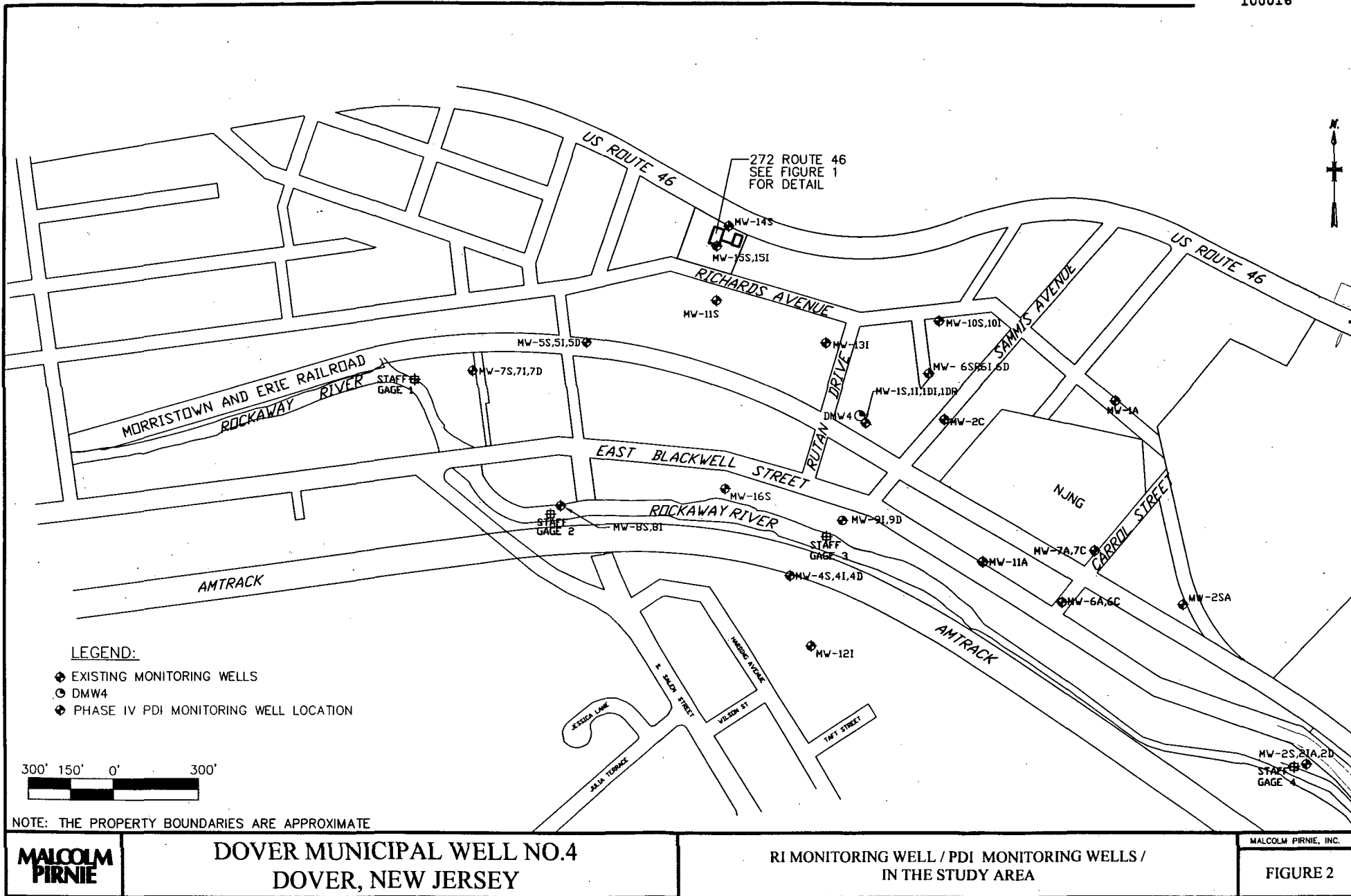
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DOVER MUNICIPAL WELL NO.4
DOVER, NEW JERSEY

PDI MONITORING WELLS, HORIZONTAL WELL
AND SOIL BORINGS NEAR 272 ROUTE 46

MALCOLM PIRNIE, INC.

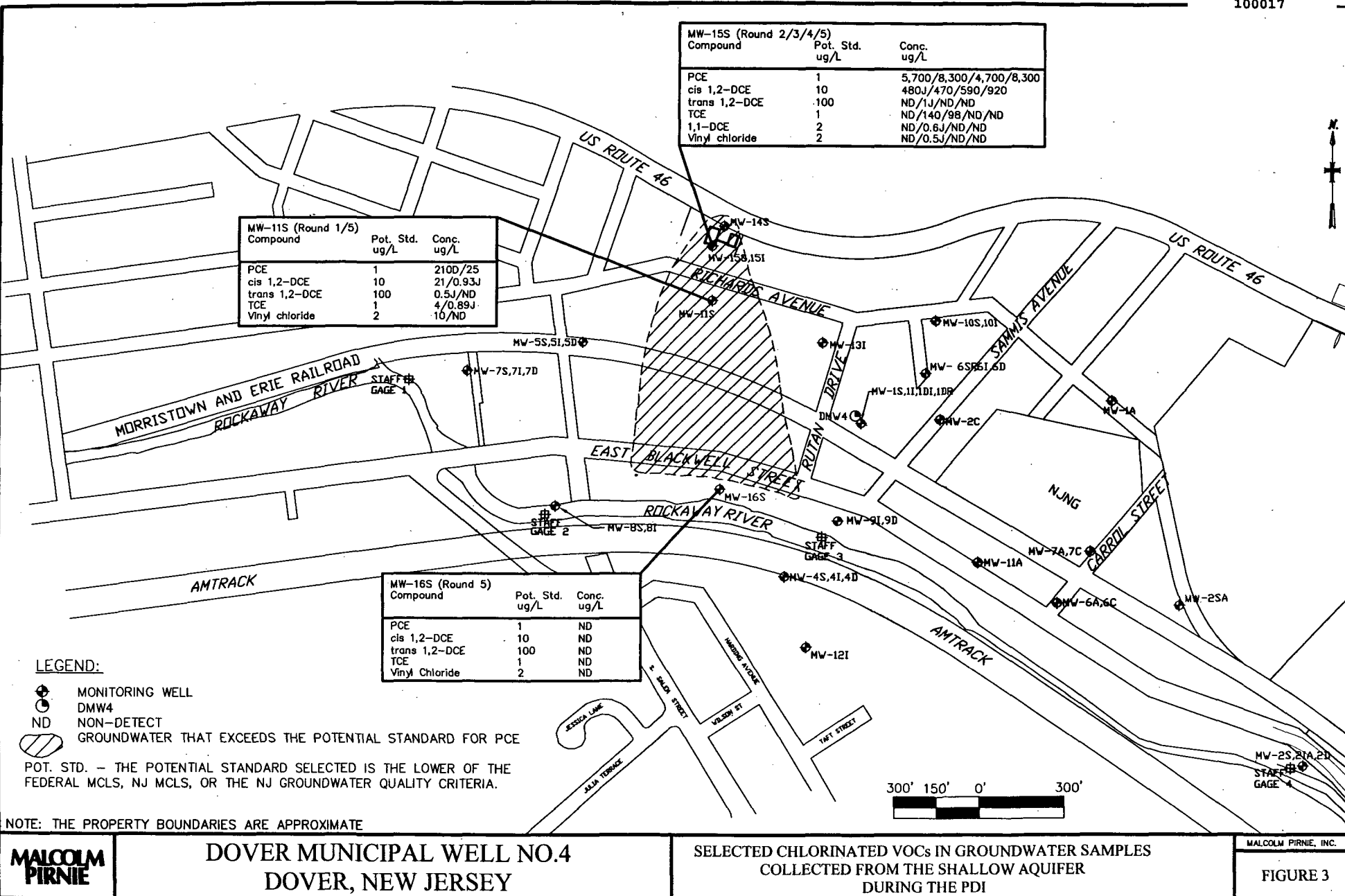
FIGURE 1



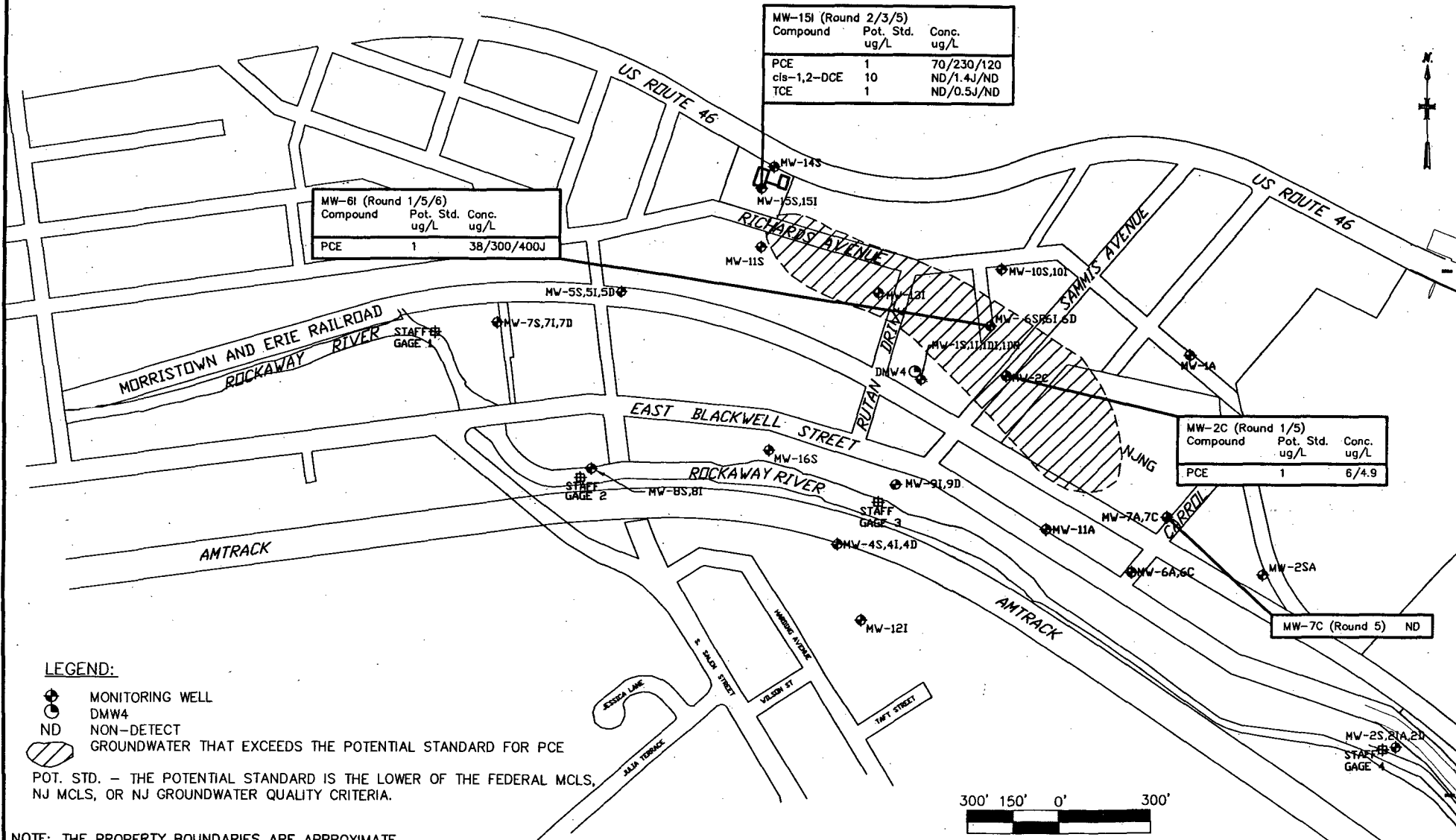
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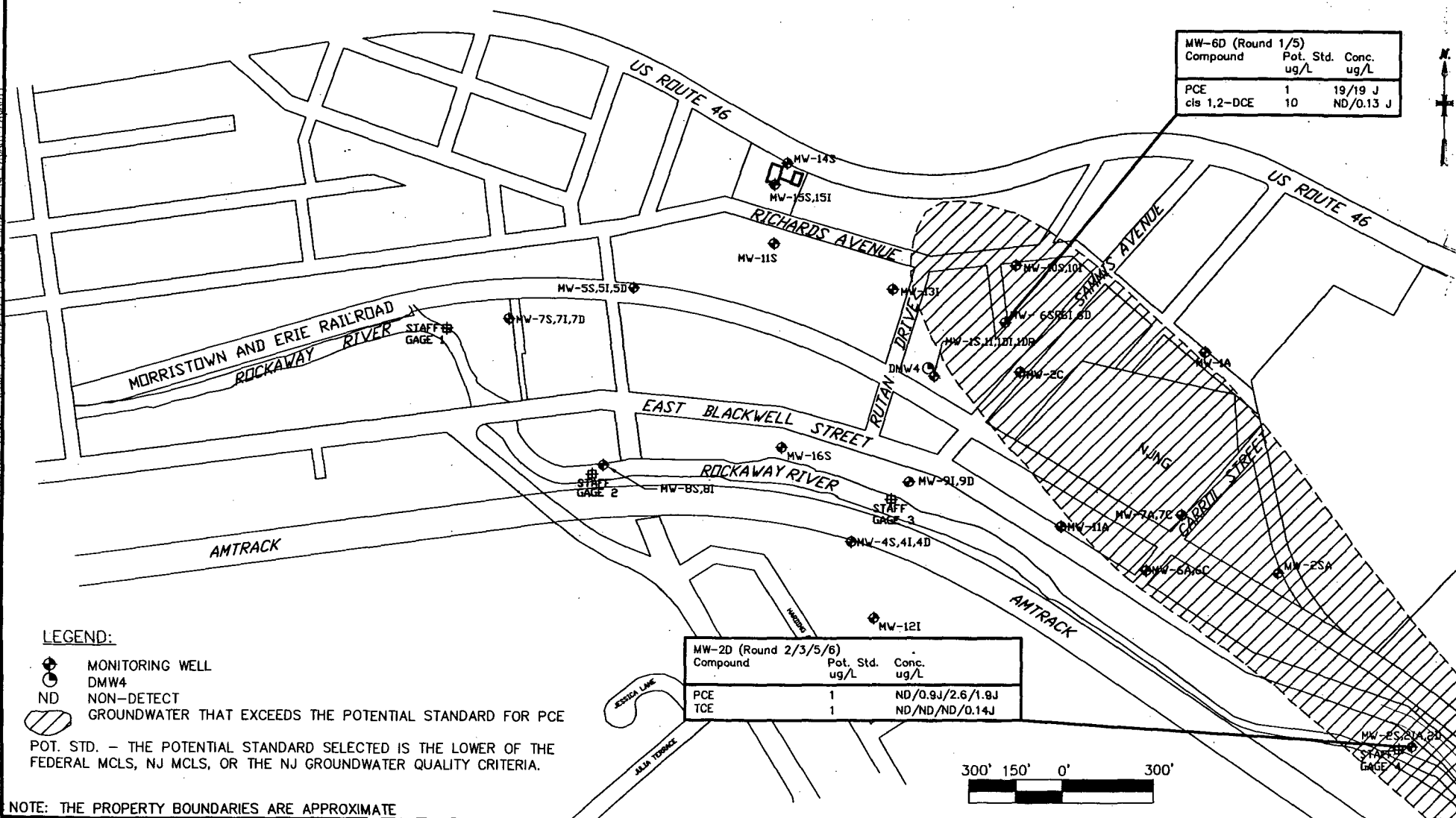
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MALCOLM PIRNIE, INC.

FIGURE 4

35780\TBOV2.dwg J:\0285780\JUNE 2003\WAD27BASE.dwg JES:None

Header: Scale: 1:1 Date: 02/13/2004 Title: 15-58 Layout: 1



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DOVER MUNICIPAL WELL NO.4 DOVER, NEW JERSEY

SELECTED CHLORINATED VOCs IN GROUNDWATER SAMPLES
COLLECTED FROM THE DEEP AQUIFER
DURING THE PDI

MALCOLM PIRNIE, INC.

FIGURE 5

MALCOLM PIRNIE, INC.

17-17 ROUTE 208 NORTH, FAIR LAWN NJ, 07410

BORING: SB-28

PROJECT NAME:	Dover Municipal Well #4	DATE:	12/3/02
JOB NUMBER:	0285-780	LOCATION:	Dover, NJ
DRILLING FIRM:	Soil Testing Inc	WEATHER:	P-Cloudy, windy, 15F
DRILLING METHOD:	HAS, 2 1/2 id, 140 # Hammer 30" drop, 1 3/8" SS sampler	ELEVATION:	N/A
DRILLER:	PD	DATUM:	Ground Surface
HELPER:	BK	HYDROGEOLOGIST:	John Ifkovits

SAMPLE INFORMATION						Depth	SOIL DESCRIPTION	Stratigraphy	REMARKS
No.	Depth	Rec	Blows per 6"						
1	0-2'	12"	2				6" Topsoil		PID 10.5
				2			(1) SAND, fine to med, some silt and gravel fine to med, brown, dry		
					2	3			
2	2-4'	10"	3				(2) SAA		PID 8.4
				4					
					4	6			
3	4-6'	6"	4				(3) SAA		PID 2.7
				6					
					5	8			
4	6-8'	12"	6				(4) SAND, fine to med, some silt and gravel fine to coarse, tan brown, dry		PID 27.4
				8					
					13	25			
5	8-10'	13"	30				(5) SAA, moist		PID 64.2
				50					
					40	38			
6	10-12'	15"	12				(6) SAA, saturated		DTW @ 9' bgs
				24					PID 45.4
					23	22			
7	12-14'	NR	34				(7) SAND, fine to med, little silt, little gravel, fine to coarse brown, saturated		
				44					
					50	70			
8	14-16'	20	9				(8) SAND, fine to coarse, trace silt, trace gravel Brown, saturated		PID 4.2
				7					
					7	8			
9	16-18'	18"	9				(9) SAA		PID 5.3
				23					
					17	43			
10	18-20'	20"	14				(10) SAND, fine to coarse, little silt, little gravel, fine to coarse Brown, saturated		PID 5.5
				18					
					26	20			
11	20-22'	16"	17				(11) SAA		PID 6.3
				32					
					15	18			
12	22-24'	6"	38				(12) SAND, fine, some silt brown, saturated		PID 12.8
				100/2					
						24			EOB @ 22' 8" bgs
									Boring grouted on completion
						26			
						28			
						30			
						32			

MALCOLM PIRNIE, INC.

17-17 ROUTE 208 NORTH, FAIR LAWN NJ, 07410

BORING: SB-29

PROJECT NAME:	Dover Municipal Well #4	DATE:	12/3/02
JOB NUMBER:	0285-780	LOCATION:	Dover, NJ
DRILLING FIRM:	Soil Testing Inc	WEATHER:	P-Cloudy, windy, 15F
DRILLING METHOD:	HAS, 2 1/2 id, 140 # Hammer 30" drop, 1 3/8" SS sampler	ELEVATION:	N/A
DRILLER:	PD	DATUM:	Ground Surface
HELPER:	BK	HYDROGEOLOGIST:	John Ifkovits

SAMPLE INFORMATION					Depth	SOIL DESCRIPTION	Stratigraphy	REMARKS	
No.	Depth	Rec	Blows per 6"						
1	0-2'	6"	2		2	6" Topsoil (1) SAND, fine to med, some silt and gravel fine to med, tan brown, dry		PID 1.9	
				2					
				3					
					4				
2	2-4'	20"	6		4	(2) SAA		PID 0.0	
				9					
				16					
					14				
3	4-6'	14"	20		6	(3) SAND, fine to med, some gravel, fine to coarse, little silt, trace cobbles, brown, moist		PID 4.1	
				22					
				20					
					19				
4	6-8'	14"	12		8	(4) SAND, fine to med, some silt and gravel fine, brown, saturated		DTW @ 6' bgs PID 60.7	
				16					
				14					
					12				
5	8-10'	14"	10		10	(5) SAA		PID 14.2	
				9					
				9					
					11				
6	10-12'	20"	6		12	(6) SAA		PID 4.8	
				5					
				6					
					7				
7	12-14'	15"	9		14	(7) SAND, fine to medium, little silt brown, saturated		PID 1.6	
				11					
				7					
					8				
8	14-16'	16"	6		16	(8) SAA		PID 0.0	
				14					
				15					
					19				
9	16-18'	16"	10		18	(9) SAND, fine, and SILT brown, saturated		PID 0.0	
				7					
				9					
					10				
10	18-20'	12"	6		20	(10) SAA		EOB @ 20' bgs Boring grouted on completion	
				7					
				9					
					9				
					20				
					22				
					24				
					26				
					28				
					30				
					32				

MALCOLM PIRNIE, INC.

17-17 ROUTE 208 NORTH, FAIR LAWN NJ, 07410

BORING: SB-30

PROJECT NAME:	Dover Municipal Well #4	DATE:	12/3/02
JOB NUMBER:	0285-780	LOCATION:	Dover, NJ
DRILLING FIRM:	Soil Testing Inc	WEATHER:	P-Cloudy, windy, 15F
DRILLING METHOD:	HAS, 2 1/2 Id, 140 # Hammer 30" drop, 1 3/8" SS sampler	ELEVATION:	N/A
DRILLER:	PD	DATUM:	Ground Surface
HELPER:	BK	HYDROGEOLOGIST:	John Ifkovits

SAMPLE INFORMATION						Depth	SOIL DESCRIPTION	Strati graphy	REMARKS
No.	Depth	Rec	Blows per 6"						
1	0-2'	4"	3			2	6" Topsoil (1) SAND, fine to med, some silt and gravel fine to med, trace cobbles, tan brown, dry		PID 0.0
				4					
					4				
2	2-4'	5"	9			4	(2) SAA		PID 0.0
				6					
					6				
					11	6	(3) SAA		PID 0.0
3	4-6'	18"	29						
				51					
					57	8	(4) SAND, fine to med, some silt and gravel fine, trace cobbles, brown, moist		PID 0.0
					75				
4	6-8'	5"	100/5						
						10	(5) SAA, saturated		DTW @ 8' bgs PID 3.3
5	8-10'	19"	14						
				14					
					15	12	(6) SAND, fine to coarse, little gravel, fine to medium, trace gravel, brown, saturated		PID 1.6
					21				
6	10-12'	12"	8						
				24		14	(7) SAA		PID 0.2
					17				
					6				
7	12-14'	10"	6			16	(8) SAA		PID 0.6
				6					
					17				
					8	18	(9) SAND, fine, and SILT, trace cobbles brown, saturated		PID 0.0
8	14-16'	12"	15						
				22					
					14	20			EOB @ 18' bgs Boring grouted on completion
					16				
9	16-18'	20"	14						
				17		22			
					20				
					21				
						24			
						26			
						28			
						30			
						32			

100022

MALCOLM PIRNIE, INC.

17-17 ROUTE 208 NORTH, FAIR LAWN NJ, 07410

BORING: SB-31

PROJECT NAME:	Dover Municipal Well #4	DATE:	12/3/02
JOB NUMBER:	0285-780	LOCATION:	Dover, NJ
DRILLING FIRM:	Soil Testing Inc	WEATHER:	P-Cloudy, windy, 15F
DRILLING METHOD:	HAS, 2 1/2 id, 140 # Hammer 30" drop, 1 3/8" SS sampler	ELEVATION:	N/A
DRILLER:	PD	DATUM:	Ground Surface
HELPER:	BK	HYDROGEOLOGIST:	John Ifkovits

SAMPLE INFORMATION						Depth	SOIL DESCRIPTION	Stratigraphy	REMARKS
No.	Depth	Rec	Blows per 6"						
1	0-2'	10"	2			2	6" Topsoil (1) SAND, fine to med, some silt and gravel fine to med, tan brown, dry		PID 0.0
				2					
					3				
							4		
2	2-4'	13"	6			4	(2) SAA		PID 0.0
				9					
					16				
							14		
3	4-6'	16"	20			6	(3) SAND, fine to med, some gravel, fine to coarse, little silt, trace cobbles, brown, moist		PID 0.6
				22					
					20				
							19		
4	6-8'	17"	12			8	(4) SAA		PID 1.5 DTW @ 6' 6" bgs
				16					
					14				
							12		
5	8-10'	6"	10			10	(5) SAND, fine to med, some silt and gravel fine, brown, saturated		PID 0.6
				9					
					9				
							11		
6	10-12'	10"	6			12	(6) SAA		PID 0.0
				5					
					6				
							7		
7	12-14'	10"	9			14	(7) SAND, fine to medium, little silt brown, saturated		PID 0.2
				11					
					7				
							8		
8	14-16'	10"	6			16	(8) SAA		PID 0.1
				14					
					15				
							19		
9	16-18'	12"	10			18	(9) SAA		PID 0.0
				7					
					9				
							10		
10	18-20'	16"	6			20	(10) SAND, fine, and SILT brown, saturated		PID 0.0
				7					
					9				
							9		
						22			EOB @ 20' bgs Boring grouted on completion

100023

MALCOLM PIRNIE, INC.

17-17 ROUTE 208 NORTH, FAIR LAWN NJ, 07410

BORING: MW-16S

PROJECT NAME:	Dover Municipal Well #4	DATE:	12/2/02
JOB NUMBER:	0285-780	LOCATION:	Dover, NJ
DRILLING FIRM:	Soil Testing Inc	WEATHER:	P-Cloudy, windy, 25F
DRILLING METHOD:	HAS, 2 1/2 id, 140 # Hammer 30" drop, 1 3/8" SS sampler	ELEVATION:	N/A
DRILLER:	PD	DATUM:	Ground Surface
HELPER:	BK	HYDROGEOLOGIST:	John Ifkovits

SAMPLE INFORMATION				Depth	SOIL DESCRIPTION	Strati graphy	REMARKS
No.	Depth	Rec	Blows per 6"				
1	0-2'	10"	2		6" Topsoil		
			3		(1) SAND, fine to coarse, little silt and grave, fine to med.		
				2	cobbles, cinders (fill), brown, dry		
				4			
2	5-7'	15"	6		(2) SAND, fine to Medium, little silt and gravel, fine to coarse		
			9		brown saturated		
			15	6			
				9			
				8			
				10			
				12			
				14			
				16			
				18			EOB @ 17' bgs
				20			
				22			
				24			
				26			
				28			
				30			
				32			

100024

MALCOLM PIRNIE, INC.			FLUSHMOUNT OVERBURDEN WELL	
Project: Dover Municipal Well #4 Pre-Design Investigation (2)		Project Number: 0285-780		MW-16S
Client: USACE/USEPA		Date: 12/02/02		NJDEP Permit No. 25-61132
Drilling Method: 6 1/4" HSAs		Subcontractor: Soil Testing, Inc.		
Development Method: Overpumping and Surging		Measuring Point		
Bucking Posts: N/A		Type: Top of Casing		
		Elevation (ft):		
Item	Depth Below Ground Surface	Description		
Grade	0 feet			
Riser Pipe	0.5 feet			
Top of Seal	1 foot	Surface Seal Type: Concrete		
		Backfill/Grout Type: Cement-Bentonite		
		Riser Pipe Type: Type 316 Stainless Steel Riser Pipe ID: 4 inches		
		Borehole Diameter: 10 inches		
		Type of Seal: Bentonite		
Top of Filter Pack	2 feet			
Top of Screen	3 feet	Screen Type: Type 304 Stainless Steel Screen ID: 4 inches Screen Slot Size: 10 slot Screen Length: 10 feet		
		Filter/Sand Pack Type: No.1 Morie Sand		
Base of Screen	13 feet			
End Cap	16 feet	Sump Type: Type 316 Stainless Steel Sump Length: 3 feet Sump Diameter: 4 inches		
Drilled Depth	17 feet			
Total Depth	17 feet			
Notes:				

DACW41-96-D-9003

**MALCOLM
PIRNIE**

FINAL

**PRELIMINARY DESIGN
INVESTIGATION REPORT**

VOLUME I OF II

**Dover Municipal Well No. 4
Superfund Site**

U.S. Army Corps of Engineers
Kansas City District



Dover, New Jersey

May 2002

**PRELIMINARY DESIGN INVESTIGATION REPORT
DOVER MUNICIPAL WELL NO. 4**

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Executive Summary

EXECUTIVE SUMMARY

Dover Municipal Well No. 4 (DMW4), tapping the deep aquifer in a three aquifer buried valley system, was installed in 1962 and began operation as a municipal water supply well in June 1965. From 1965 until 1980, DMW4 was one of the town's primary water supply wells with an intermittent pumping rate of 1,100 gallons per minute (gpm). In March of 1980, the Town of Dover and the New Jersey Department of Environmental Protection (NJDEP) documented the presence of chlorinated volatile organic compounds (VOCs), specifically 1,1,1-trichloroethane (1,1,1-TCA), tetrachloroethene (PCE), and trichloroethene (TCE), in the groundwater collected from this well. Based on these results, DMW4 was voluntarily removed from service by the Town of Dover in September 1980.

TRC Environmental Consultants, Inc. (TRC) conducted a Phase I Remedial Investigation (RI) in 1989 and Malcolm Pirnie, Inc. (Malcolm Pirnie) conducted a Phase II RI in 1998 to define the nature and extent of groundwater contamination in the Study Area. These RIs defined the nature and extent of chlorinated VOCs in the intermediate and deep aquifers. However, the RIs did not define the nature and extent of chlorinated VOCs in the groundwater of the shallow aquifer or identify the potential source(s).

Malcolm Pirnie conducted a Preliminary Design Investigation (PDI) in three phases from 1999 to 2001 to complete the following goals:

1. Define the nature and extent of chlorinated VOCs in the groundwater of the shallow aquifer and identify the source.
2. Update information on the intermediate and deep aquifers since the completion of the Operable Unit 1 (OU1) RI. Define the southern extent of chlorinated VOCs in the groundwater of the intermediate aquifer and define the down-gradient extent of chlorinated VOCs in the groundwater of the deep aquifer.
3. Build a groundwater flow model and a solute transport model for use during the Remedial Design (RD).
4. Conduct a bench scale treatability study to determine if chemical oxidation will be effective at remediating the source area.

The results of the PDI show:

1. The property at 272 Route 46, Dover, New Jersey is the source of chlorinated VOCs in the shallow aquifer and is likely the source of the chlorinated VOCs in the intermediate and deep aquifers.
2. The nature and extent of unsaturated soil that contains chlorinated VOCs at concentrations above the potential cleanup standards for soil remediation is a relatively small area that is east of the property at 272 Route 46, Dover, New Jersey.
3. The nature and extent of groundwater in the shallow aquifer that contains chlorinated VOCs at concentrations above the potential groundwater cleanup standards extends 1,000 feet south of the property at 272 Route 46, Dover, New Jersey to the Rockaway River.
4. The extent of groundwater containing chlorinated VOCs in the intermediate aquifer is a small area around monitoring well MW-8I.
5. The down-gradient extent of groundwater containing chlorinated VOCs in the deep aquifer is between MW-6D and MW-2D.
6. A solute transport model and a groundwater flow model were built and calibrated for use during the RD.
7. A bench scale treatability study of the chemical oxidation process was conducted that shows that the treatment reduced 99 percent of the chlorinated VOCs in the groundwater samples and approximately 72 percent of the chlorinated VOCs in a mixture of soil and groundwater. This data shows that this remedial technology will be effective at reducing the concentration of chlorinated VOCs in the unsaturated soil and groundwater at 272 Route 46, Dover, New Jersey.

Introduction

1

1.0 INTRODUCTION

Malcolm Pirnie was contracted by the United States Army Corps of Engineers (USACE), Kansas City District, (Contract Number DACW41-96-D-9003 Task Order 0029) to conduct a Pre-Design Investigation (PDI) at the Dover Municipal Well No. 4 (DMW4) Superfund Site in Dover, New Jersey. This work was conducted as part of the Remedial Design (RD) under OU1. The USACE was contracted by Region II of the United States Environmental Protection Agency (USEPA) to subcontract and oversee the RD outlined in the Record of Decision (ROD) dated September 30, 1992.

Malcolm Pirnie conducted the PDI in three phases. The first phase of the PDI (Phase I PDI) was conducted in February/March 2000. The objectives, which are outlined below, were completed and the Draft PDI Report was submitted to the USACE and USEPA in July 2000. However, after the Draft PDI report was submitted, the USACE and USEPA increased the scope of the PDI to determine if 272 Route 46, Dover, New Jersey or Walt's Radiator Shop was the source of PCE detected in the shallow aquifer during the Phase I PDI. The second phase of the PDI (Phase II PDI) was conducted in September/October 2000. The Phase II PDI objectives, which are outlined below, were completed and the Revised Draft PDI Report was submitted to the USACE and the USEPA in March 2001. However, after reviewing the report, the USACE and the USEPA decided to increase the scope of the PDI to define the nature and extent of unsaturated soil and shallow groundwater contamination detected at 272 Route 46, Dover, New Jersey during the Phase II PDI. The third phase of the PDI (Phase III PDI) was conducted in August/September 2001. The Phase III PDI objectives, which are outlined below, were completed and this Revised Draft PDI Report presents the information from Phases I, II, and III of the PDI.

1.1 OBJECTIVES

The objectives of the Phase I PDI are:

- to detect potential source(s) of PCE in the shallow aquifer northwest of DMW4.
- to define the southern extent of chlorinated Volatile Organic Compounds (VOCs) in the intermediate aquifer. The nature and extent of chlorinated VOCs in the remaining portion of the intermediate aquifer were defined in the draft Remedial Investigation (RI) under Operable Unit 2 (OU2).
- to build a groundwater flow model that can be used to design a groundwater extraction system during the RD.
- to build a solute transport model that can be used to characterize the influent groundwater quality to the proposed treatment system for selected extraction system designs, to evaluate the effects the extraction systems could have on offsite contamination, and to evaluate the effect offsite contamination could have on the selected extraction and treatment systems.

The objectives of the Phase II PDI are:

- to determine if the down-gradient extent of PCE in the deep aquifer is between MW-6D and MW-2D. The nature and extent of chlorinated VOCs in the remaining portion of the deep aquifer were defined in the draft RI under OU2.
- to evaluate whether 272 Route 46, Dover, New Jersey or Walt's Radiator Shop is the source of VOCs detected in the groundwater at MW-11S, which was installed during the Phase I PDI.

- to define the extent of PCE in unsaturated soils at 272 Route 46, Dover, New Jersey and Walt's Radiator Shop.
- to evaluate whether 272 Route 46, Dover, New Jersey or Walt's Radiator Shop is the source of the PCE detected in the groundwater at MW-6I. MW-6I is screened in the intermediate aquifer approximately 900 feet southeast of 272 Route 46, Dover, New Jersey and Walt's Radiator Shop.
- to evaluate available information on the nature and extent of contamination at Spartan Oil and determine if it could affect the OU1 RD.
- to update the groundwater flow and solute transport models with the newly collected data.

The objectives of the Phase III PDI are:

- to further delineate the nature and extent of chlorinated VOCs in unsaturated soil near 272 Route 46, Dover, New Jersey.
- to further delineate the nature and extent of chlorinated VOCs in shallow groundwater down-gradient of 272 Route 46, Dover, New Jersey.
- to characterize the concentration of iron and Total Organic Carbon (TOC) in unsaturated soil and the concentration of inorganic parameters in groundwater in the shallow aquifer to evaluate remedial technologies.
- to determine if dense non-aqueous phase liquids are present on top of Layer 2 in the source area.

This data will be used in the OU2 Feasibility Study (FS) and the RD under OU1 and OU2.

Site Background and Setting

2

2.0 SITE BACKGROUND AND SETTING

The purpose of this section is to summarize data collected by TRC during the Phase I RI (1990) and the data collected by Malcolm Pirnie during the OU2 RI (1999) to put the PDI objectives into perspective.

2.1 SITE DESCRIPTION

The DMW4 is located in Lot 15, Block 23-14, which is approximately 450 feet north of the Rockaway River in the Town of Dover, Morris County, New Jersey. However, because the previous investigations were conducted throughout the Town of Dover and western Rockaway Township, the area of investigation will be referred to as the "Study Area". The up-valley limit of the Study Area is the Princeton Avenue Well Field, which is 7,000 feet west of DMW4. The northern and southern limits of the Study Area extend to the edges of the unconsolidated valley-fill deposits. These limits roughly coincide with the steepening topography. The eastern limit of the Study Area extends to the Howmet property. The Study Area includes approximately 640 acres or one square mile of land. The limits of the Study Area are shown on Figure 2-1.

DMW4 is bound by Richards Avenue to the north, Rutan Street (formerly Hooey Street) to the west, Sammis Avenue to the east, and East Blackwell Street to the south. The Morristown and Erie Railroad is approximately thirty feet to the south of DMW4. These features are shown on Figure 2-2.

2.2 SITE HISTORY

DMW4, tapping the deep aquifer of a three aquifer buried valley system, was installed in 1962 and began operation as a municipal water supply well in June 1965. From 1965 until 1980, DMW4 was one of the town's primary water supply wells with an intermittent pumping rate of 1,100 gpm. In March 1980, the Town of Dover and the New Jersey Department of Environmental Protection (NJDEP) documented the presence of

chlorinated VOCs, specifically 1,1,1-trichloroethane (1,1,1-TCA), tetrachloroethene (PCE), and trichloroethene (TCE) in the groundwater collected from this well. Based on these results, DMW4 was voluntarily removed from service by the Town of Dover in September 1980. Table 2-1 summarizes the project history.

In 1990, TRC Environmental Consultants, Inc. (TRC) completed a Phase I RI for the NJDEP. The Phase I RI identified chlorinated VOCs in the shallow, intermediate, and deep aquifers in the Study Area. PCE was detected north of DMW4 in the intermediate and deep aquifers.

On September 30, 1992, the USEPA issued a ROD for groundwater remediation at DMW4 based on the Phase I RI. The ROD states that contaminated groundwater will be extracted from the deep aquifer by pumping DMW4 and from the more highly contaminated portion of the intermediate aquifer by pumping up to two new extraction wells. The ROD also stipulates using an onsite air stripper to remove VOCs and discharge the water to Dover's water supply system. Any excess water will be injected into the aquifer.

After finishing the ROD, the USEPA divided the project into two operable units. OU1 was established to implement the RD for DMW4. OU2 was established to conduct an RI that would further define the nature and extent of groundwater contamination, identify and investigate specific sources of contamination, and to develop and evaluate remedial alternatives, as appropriate. Malcolm Pirnie completed the OU2 RI field investigation and submitted the Draft OU2 RI Report in February 1999.

2.3 GEOLOGY

This section describes the regional and site specific geological conditions in the Study Area as described in the Draft OU2 RI. A brief discussion of the regional geology is presented to put the site into perspective within the geological framework of the region and to describe the geologic history. This discussion of the regional geology is based on published geologic data. The geology in the Study Area is described in detail based on Malcolm Pirnie's interpretation of the data collected from the RI and confirmed during the PDI.

2.3.1 Regional Geologic Setting

The Study Area lies within the New England physiographic province. Specifically, this area is referred to as the New Jersey Highlands and consists of northeast-southwest trending ridge and valley terrain. The ridges are broad, rounded or flat-topped and extend to 1,000 feet above mean sea level (MSL). The valleys are narrow and are 300 to 500 feet above MSL.

Bedrock in the region consists of Precambrian granitic gneiss. Two bedrock formations occur in the Study Area, divided by a northeast-southwest trending contact that is in the center of the Rockaway River valley. West of the contact is brownish-gray granitic gneiss which contains microcline, microperthite, quartz, hornblende, pyroxene, and mica. This formation is called the Byram Gneiss. To the east of the contact, is light gray to nearly white granitic gneiss called the Losee Gneiss. The Losee Gneiss consists of oligoclase and quartz, with minor amounts of orthoclase, pyroxene, hornblende, and biotite. Both formations are blocky jointed masses that strike northeast and dip steeply to the southeast.

In the upland areas of the region, bedrock is overlain by alluvium, morainal deposits, and glacial till. The morainal deposits and glacial till are composed of a heterogeneous mixture of boulders, cobbles, gravel, sand, silt, and clay till deposited by the Wisconsin glaciation. The alluvium is composed of sand, gravel, and silt deposited by rivers. In contrast, the lowlands or deeply incised bedrock valleys are typically filled with alluvium and lacustrine deposits. The alluvium deposits are typically well sorted sand and gravel. The lacustrine deposits are typically interlayered sands, silts, and clays. The valley fill deposits can be hundreds of feet thick near the center of the valley.

2.3.2 Local Geology

The geologic interpretations presented below are based on the visual observation of soil samples collected while drilling eight pilot borings to bedrock during the OU2 RI and confirmed with numerous borings during the PDI. A description of each geologic formation will be presented in the order that they were encountered during drilling, which is from youngest to oldest. The location of the TRC RI monitoring wells and Malcolm

Pirnie RI monitoring wells, pilot borings, SimulProbe soil borings, surface water and sediment samples, and staff gages are shown on Figure 2-3.

The surficial geology of the Study Area consists of valley fill deposits. The valley fill deposits consist of alluvium (fluvial deposits) and lacustrine deposits. The valley fill deposits have been divided into five layers, as shown in the geologic cross-section on Figure 2-4. The location of cross-section A-A' is shown on Figure 2-3.

2.3.2.1 Layer 1

A layer of alluvial (fluvial) fine to medium sand with gravel, cobbles, and silt lenses extends across the Study Area. This layer ranges in thickness from 12 to 28 feet. This material is consistent with fluvial formations that were laid down by the Rockaway River as it meandered across the river valley. Layer 1 directly overlies bedrock north of Route 46.

2.3.2.2 Layer 2

A continuous layer of glacial lacustrine silt and very fine sand underlies Layer 1 throughout the Study Area. This layer ranges in thickness from 2 to 36 feet, as shown on Figure 2-4. These deposits are consistent with glacial lake deposits that were created by an ice dam at the leading edge of the glacier in the Rockaway River Valley.

2.3.2.3 Layer 3

A layer of glacial lacustrine fine to medium sand with silt lenses underlies Layer 2 across the Study Area. This layer ranges in thickness from 6 to 32 feet, as shown on Figure 2-4. These deposits are consistent with glacial lake deposits that were created by an ice dam at the leading edge of the glacier in the Rockaway River Valley. Layer 3 is bounded to the north of DMW4 by the bedrock valley wall, which was estimated to be next to Richards Avenue during the RI. However, data collected during the PDI shows that the bedrock wall is further north than Richards Avenue and is north of Route 46. Layer 3 is bounded to the south of DMW4 by the bedrock valley wall, which is southwest of MW-8I and SP-6.

2.3.2.4 Layer 4

Layer 4 is composed of glacial lacustrine silt with a trace of fine sand and clay. This layer is either discontinuous or very thin in some locations. Figure 2-4 shows this layer as discontinuous because the silt lenses in some places are only two feet thick and there are hundreds of feet between borings. Therefore, there is insufficient information to determine if they connect together. However, this layer reaches a maximum thickness of 50 feet at MW-2.

2.3.2.5 Layer 5

Layer 5 is composed of glacial lacustrine fine to coarse sand with silt lenses. This layer ranges in thickness from 22 to 84 feet and is consistent with glacial lake deposits. There is a gravel and cobble lens in the middle of this layer as shown on Figure 2-4. Layer 5 is bounded by the bedrock valley wall north of DMW4 between MW-6 and Richards Avenue, and south of DMW4 just north of MW-8. Layer 5 extends east and west throughout the Study Area.

2.4 HYDROGEOLOGY

This section describes the groundwater within the geologic framework described in the previous section. Groundwater has been observed in the valley fill deposits at the site. The groundwater in the alluvial deposits (Layer 1) occurs as an unconfined aquifer. Groundwater in the lacustrine sands (Layers 3 and 5) occurs as semi-confined aquifers.

2.4.1 Regional Hydrogeology

Alluvial and lacustrine deposits that fill the river valleys of this region generally are the most abundant and reliable groundwater supplies. The more permeable layers, which are mainly sand and gravel, form one or more aquifers that may be unconfined, semi-confined, or confined beneath silt or clay. High-yielding portions of aquifers are used for water supplies by municipalities and industry (Gill and Vecchioli, 1965).

Groundwater is unconfined in the alluvial deposits (Layer 1) forming a water table aquifer. The water table aquifer is recharged by infiltration intermittently, during

and immediately following precipitation. However, discharge is continuous as long as the water table is above the surface of the Rockaway River. The transmissivity of the water table aquifer at Dover Municipal Well No. 5, which is located a few miles west of DMW4, was estimated to be 280,000 gallons per day per foot (gpd/ft) (Gordon, 1993).

Groundwater in the lacustrine sand and gravel is recharged by vertical groundwater flow. Groundwater in the lacustrine sand and gravel flows down the Rockaway River Valley ultimately discharging to the Whippany River Basin. The transmissivity of the deep aquifer (Layer 5) at DMW4 was estimated to be 93,800 gpd/ft (Gordon, 1993).

2.4.2 Local Hydrogeology

Three aquifers have been identified in the Study Area as shown on the hydrogeologic cross-section (Figure 2-5). The shallow aquifer is in the alluvium (Layer 1) which is under water table conditions. The shallow aquifer is separated from the intermediate aquifer by an aquitard (Layer 2) consisting of 2 to 36 feet of silt. The intermediate aquifer (Layer 3) occurs in 6 to 32 feet of fine to medium sand with discontinuous silt layers under semi-confined conditions. The intermediate aquifer is separated from the deep aquifer by a discontinuous aquitard (Layer 4) consisting of zero to 50 feet of silt. Sometimes the intermediate aquifer directly overlies the deep aquifer. The deep aquifer (Layer 5) is composed of layers of fine to medium sand, gravel and cobbles, and medium to coarse sand. There is a discontinuous silt layer between the fine to medium sand and the gravel and cobble layer at DMW4.

2.4.2.1 Shallow Aquifer

The saturated thickness of the shallow aquifer ranges from 2 to 15 feet. The shallow aquifer directly overlies bedrock north of Route 46. The average hydraulic gradient of the shallow aquifer is 0.008 as calculated from the Draft RI water table map on Figure 2-6.

The hydraulic conductivity of the shallow aquifer was calculated to be 24 feet per day (ft/d) from an aquifer test conducted at the Howmet facility by Paulus, Sokolowski, and Sarter Consulting Engineers (TRC, 1990). The hydraulic conductivity of the shallow

aquifer was also calculated to range from 67 to 240 ft/d based on an aquifer test conducted at New Jersey Natural Gas (NJNG) by Geonics (TRC, 1990). The values calculated by Geonics appear unrealistically high for the fine to medium grained soil in this aquifer. The hydraulic conductivity of the shallow aquifer was estimated to be 14 ft/d from slug tests. The slug test results indicate that the hydraulic conductivity of the shallow aquifer varies considerably from 0.36 to 56 ft/d. This range of hydraulic conductivity values is typical for alluvial aquifers. The average hydraulic conductivity of the water table aquifer was calculated to be 19 ft/d based on the slug test results and the aquifer test conducted at Howmet. Groundwater moves at approximately 0.43 ft/d based on a hydraulic gradient of 0.008 and an effective porosity of 0.35. Therefore, groundwater near Route 46, which is the area believed to be the source of PCE contamination, could reach the Rockaway River (1,000 feet) in 6.4 years.

2.4.2.2 Aquitard 1

The vertical hydraulic conductivity of Aquitard 1 is 0.3 ft/d (1.127×10^{-4} cm/sec) based on a Shelby tube sample collected during the OU2 RI. This data and the fact that drawdown was seen in the water table wells when TRC pumped DMW4 (screened in the deep aquifer), shows that this aquitard is very leaky. The leaky nature of this layer is also made evident by the small difference in the water level elevation in wells screened in the shallow and intermediate aquifers at the same well cluster.

2.4.2.3 Intermediate Aquifer

The hydraulic gradient of the intermediate aquifer is 0.0018 as calculated from the Draft RI potentiometric surface map shown on Figure 2-7. The hydraulic conductivity of the intermediate aquifer was calculated to be 67 ft/d from an aquifer test conducted at NJNG by Geonics. The average hydraulic conductivity of the aquifer was calculated to be 33 ft/d based on slug test data. The slug test results, which range from 0.34 to 122 ft/d, show that there is considerable variability in the hydraulic conductivity of this aquifer. Combining the slug test results with the results of the aquifer test at NJNG, shows that the average hydraulic conductivity of the aquifer is 50 ft/d. Therefore,

groundwater moves at approximately 0.3 feet per day under static conditions based on a hydraulic gradient of 0.002 and an effective porosity of 0.35.

2.4.2.4 Aquitard 2

Aquitard 2 is up to 50 feet thick in the eastern portion of the Study Area. However, this layer becomes very thin and possibly discontinuous in the western portion of the Study Area. Figure 2-4 shows this aquitard as a discontinuous layer. However, the very thin layers of silt may be connected forming a very thin confining unit. The discontinuous or leaky nature of this aquitard is made evident by boring logs and measuring drawdown in the intermediate aquifer while pumping the deep aquifer during the TRC aquifer test on DMW4. The thin or discontinuous nature of this confining unit is also made evident by the small difference in the water level elevation in wells screened in well clusters that are in the shallow and intermediate aquifers.

2.4.2.5 Deep Aquifer

The hydraulic gradient of the deep aquifer is 0.002 as calculated from the Draft RI potentiometric surface map shown on Figure 2-8. The hydraulic conductivity of the deep aquifer was calculated to be from 64 to 163 ft/d based on the aquifer test conducted on DMW4 by TRC (TRC, 1990). The transmissivity of the deep aquifer was calculated to be 93,800 gpd/ft from an aquifer test conducted on DMW4 by Dan Raviv, Inc. in 1984 (TRC, 1990). This equated to a hydraulic conductivity of 180 ft/d based on a 70 foot thick aquifer. The hydraulic conductivity of this aquifer was calculated to be 52 ft/d based on slug test data. The average hydraulic conductivity of the aquifer was estimated to be 180 ft/d because the aquifer test conducted on DMW4 is considered the most accurate data. Therefore, groundwater moves at approximately one ft/d based on a hydraulic gradient of 0.002 and an effective porosity of 0.35.

2.4.3 Groundwater Movement

Groundwater moves horizontally through the aquifers and vertically through the confining units or silt layers. This is shown graphically on a generalized hydrogeologic cross-section of the Rockaway River Valley (Figure 2-5). This figure shows that

groundwater is flowing down the Rockaway River Valley in the intermediate and deep aquifers. Groundwater in the shallow aquifer flows towards and discharges to the Rockaway River.

Groundwater is flowing up from the intermediate to the shallow aquifer in the western and eastern portion of the Study Area. However, groundwater is flowing down from the shallow to the intermediate aquifer near MW-1.

Groundwater in the western portion of the Study Area near MW-7 and MW-1 is flowing up from the deep to the intermediate aquifer through Aquitard 2. However, the head difference between monitoring wells in well clusters that are screened in the intermediate and deep aquifer is very small. This implies that the aquitard is discontinuous or very leaky. Groundwater in the eastern portion of the Study Area, near MW-1, is flowing from the intermediate to the deep aquifer. The aquitard in the eastern portion of the Study Area is substantially thicker. Therefore, the head difference between wells (MW-2I and MW-2D), which are screened in the intermediate and deep aquifers, is much larger. This shows that the aquitard in this area acts more like a confining unit and is not discontinuous like the aquitard in the western portion of the Study Area.

There is a small downward head between the intermediate and deep aquifer at MW-1 and a larger downward head between these two aquifers at MW-2. This could be from pumping at the Howmet facility down-gradient of the site.

2.5 NATURE AND EXTENT OF CONTAMINATION

The nature and extent of groundwater contamination in the Study Area is described in the Draft OU2 RI. A summary of this information is presented below. Because the Draft RI and PDI focus on the chlorinated VOC contamination in the Study Area, the nature and extent of other organic and inorganic compounds are not included in this summary.

2.5.1 Shallow Aquifer

Chlorinated solvents detected in the shallow aquifer are shown on Figure 2-9. This figure shows that chlorinated VOCs were detected in various groundwater samples

(MW-7S, MW-8S, SP-10, SP-6, and SP-1B) collected in the Study Area. However, they do not define a single plume. Based on this data and considering the groundwater flow directions in the shallow aquifer shown on Figure 2-6, it appears that there is a source of chlorinated VOCs northwest of DMW4 and south of the Rockaway River.

2.5.2 Intermediate Aquifer

Chlorinated VOCs detected in the intermediate aquifer are shown on Figure 2-10. This figure shows a PCE plume northeast of DMW4. The PCE most likely migrated from the shallow aquifer into the intermediate aquifer either by the natural gradient or the induced gradient created by DMW4 when it was used for a water supply.

Figure 2-10 also shows that a second plume of chlorinated VOCs is migrating down the Rockaway River Valley. The down-gradient extent of chlorinated VOCs is interpreted as being between MW-6A and MW-2D. The extent of the chlorinated VOCs on the southern side of the Rockaway River was not determined during the RI.

2.5.3 Deep Aquifer

Chlorinated VOCs detected in the deep aquifer are shown on Figure 2-11. This figure shows that the PCE detected in the intermediate aquifer near DMW4 has migrated through the discontinuous or thin aquitard separating the intermediate and deep aquifer and into the deep aquifer. The leading edge of the PCE was not defined during the OU2 RI.

Scope of Work

3

3
Scope of Work

3.0 SCOPE OF WORK

The objectives outlined in Section 1.0 were fulfilled by conducting the following scope of work. The scope of work for the Phase I PDI, outlined in the Contract Modification No.0029 dated September 30, 1999, was modified as a result of conference calls with the USEPA and USACE. Table 3-1 summarizes the scope of work and the rationale for the additions and changes.

The scope of work for the Phase II PDI, outlined in Contract Modification No. 0029-02 dated September 26, 2000, was implemented after the Draft PDI Report was submitted in July 2000. Table 3-1 also summarizes this scope of work and the rationale for any additions and changes.

The scope of work for the Phase III PDI, outlined in Contract Modification No. 0029-04 dated July 20, 2001, was implemented after the Revised Draft PDI Report was submitted in March 2001. Table 3-1 also summarizes this scope of work and the rationale for any additions and changes. The location of monitoring wells and HydroPunch® borings drilled and installed during the PDI are shown on Figures 3-1 and 3-2.

3.1 PHASE I SCOPE OF WORK

The Phase I scope of work is summarized in a planning letter dated February 4, 2000 and summarized below.

- Collect groundwater samples (HP-1 and HP-2) from the shallow aquifer down-gradient of two suspected sources located on the north side of US Route 46 (Figure 3-1). Groundwater screening samples HP-1 and HP-2 were collected using a HydroPunch® sampler because property access and unrealistic requirements in the town road permits prevented the installation of monitoring wells.
- Install MW-10S and MW-11S in the shallow aquifer down-gradient of two potential sources.

- Install monitoring well MW-12I to define the southern extent of VOCs in the intermediate aquifer.
- Abandon MW-6S in the shallow aquifer because it was found to be damaged during the OU2 RI and replace it with MW-6SR.
- Collect one round of water level measurements to determine the direction of groundwater flow in the shallow, intermediate, and deep aquifers.
- Collect one round of groundwater samples from the 4 new monitoring wells and 12 existing monitoring wells to detect the source of PCE in the shallow aquifer, determine the southern extent of VOCs in the intermediate aquifer, and further characterize the PCE plume in the intermediate and deep aquifers for the calibration of the solute transport model.
- Construct and calibrate a groundwater flow model that will be used to evaluate selected extraction system designs during the RD.
- Construct and calibrate a solute transport model to evaluate the impact the extraction system has on contamination from other environmental sites in the Study Area (i.e., NJNG), evaluate the impact other offsite contamination could have on the selected extraction and treatment system, and estimate the influent concentration of PCE to the treatment system for extraction system designs during the RD.
- Perform an Environmental Database Search to locate sites with potential contamination in the Study Area that may impact the influent water quality of the proposed treatment system.

3.2 PHASE II SCOPE OF WORK

The Phase II scope of work is summarized in a planning letter dated September 15, 2000 and summarized below.

- Install MW-14S and MW-15S in the shallow aquifer up-gradient and down-gradient, respectively, of 272 Route 46, Dover, New Jersey.
- Collect soil samples from the shallow monitoring well borings and eight additional shallow borings at 272 Route 46, Dover, New Jersey and Walt's Radiator Shop for VOC analysis by the Contract Laboratory Program (CLP).
- Install three monitoring wells (MW-10I, MW-13I, and MW-15I) in the intermediate aquifer down-gradient of suspected source areas.
- Collect two rounds of groundwater samples from the five newly installed monitoring wells and existing well MW-2D for VOC analysis by the CLP.
- Conduct a NJDEP file review of the Spartan Oil site.
- Update the groundwater flow and solute transport models with the newly collected data.

3.3 PHASE III SCOPE OF WORK

The Phase III scope of work is summarized in a planning letter dated July 3, 2001 and summarized below.

- Drill 14 borings near 272 Route 46, Dover, New Jersey and 2 borings on the Morristown and Erie Railroad right of way to collect unsaturated soil and shallow HydroPunch® groundwater samples.
- Drill a horizontal boring beneath 272 Route 46, Dover, New Jersey to collect two unsaturated soil samples and install a horizontal well.
- Analyze unsaturated soil and shallow groundwater samples for VOCs by the CLP and inorganic parameters by STL laboratories.
- Conduct a bench scale treatability study to evaluate the effectiveness of chemical oxidation as a treatment technique on an unsaturated soil sample from boring B-9 and a groundwater sample from MW-15S.
- Collect a groundwater sample from MW-15S and analyze the sample for VOCs and Base Neutral Analysis (BNA) by the CLP.

Methods and Procedures

4

4.0 METHODS AND PROCEDURES

This field investigation was performed in accordance with the DMW4 OU1 and OU2 Final Field Sampling Plan (July 1996) and Final Quality Assurance Project Plan (July 1996) as amended in the February 4, 2000 PDI Work Plan Letter, the September 15, 2000 PDI Work Plan Letter, and the July 3, 2001 PDI Work Plan Letter. The methods and procedures used to conduct the investigation are summarized in the following sections.

4.1 HYDROPUNCH® SAMPLES

Groundwater screening samples were collected from soil borings using a HydroPunch®. The HydroPunch® borings were drilled with 3-1/4-inch inside diameter hollow stem augers to a depth of four feet below the water table. Split-spoon (2-inch diameter) soil samples were collected according to ASTM D 1586-84, to document the stratigraphy and to detect the water table. Soil samples from each boring were described and recorded on a geologic log (Appendix A). Each unsaturated split-spoon sample was cut in half and the organic vapors were immediately measured with a Photo-Ionization Detector (PID) (11.7 Ev lamp) by passing the probe over the surface of the sample. The PID concentrations were recorded on the geologic log. The back of the drilling rig, drill rods, hollow stem augers, HydroPunch® sampler, bailer, split-spoons, and any other equipment that entered the borehole were decontaminated between drilling locations by steam cleaning. The decontamination water was collected in a plastic-lined area and transferred to 55-gallon drums for storage.

Once the boring was advanced to four feet below the water table, the HydroPunch® sampler was lowered through the augers and pushed or driven approximately three feet into the undisturbed formation. The sampler housing was retracted to expose the screen and allow groundwater to enter the sampler. The HydroPunch® was used in the "Hydrocarbon Mode" and the groundwater sample was removed using a small diameter bailer that was lowered through the drill rods into the sample chamber. This allowed the field crew to lower the bailer into the sampler many times to fill the sample bottles. Each sample bottle was filled with a single bailer of

groundwater. The samples were collected in 40ml glass vials, preserved with hydrochloric acid, placed on ice, and shipped overnight for low concentration Target Compound List (TCL) Volatile Organic Analysis (VOA). Two HydroPunch® borings that were drilled on Route 46 were grouted to the frost line with cement/bentonite (95%/5%) grout. The remaining portion of the boring was filled to the surface with quick-set concrete, as specified by the New Jersey Department of Transportation (NJDOT). The NJDOT was the regulatory authority on boring abandonment procedures because they were drilled on Route 46. The remaining HydroPunch® borings filled with cement/bentonite (95%/5%) grout to land surface.

4.2 MONITORING WELL INSTALLATION AND DEVELOPMENT

Five monitoring wells were installed in the shallow aquifer and four monitoring wells were installed in the intermediate aquifer to collect groundwater samples and to measure the depth to water in each aquifer.

4.2.1 Shallow Monitoring Well Installation

Each shallow monitoring well boring was drilled to 12 feet below the water table with 6-¼ inch (inside diameter) hollow stem augers. Split-spoon (2-inch diameter) soil samples were collected (in accordance with ASTM D 1586-84) from land surface to the final depth to document the stratigraphy and to detect the water table. Soil samples from each boring were described and recorded on a geologic log (Appendix A). Each unsaturated split-spoon sample was cut in half and the organic vapors were measured with a PID (11.7 Ev lamp) by passing the probe over the surface of the sample. The PID concentrations were recorded on the geologic log. Soil samples were collected from monitoring well borings MW-14 and MW-15 for laboratory analysis. Soil sample collection procedures are outlined in Section 4.5.

Each monitoring well was installed according to N.J.A.C. 7:14A-6.13 and USACE requirements. When there was less than four feet between the water table and land surface, the wells were installed so that the screen bridges the water table with one foot above and nine feet below the water table. Each well was constructed with 10 feet of four-inch

diameter Type 316 stainless steel wire-wrap screen (0.010-inch slot) and sufficient Schedule 5 Type 316 stainless steel casing to reach land surface. A three-foot Schedule 5 Type 316 stainless steel sump was attached to the bottom of each screen. A sump was not available when MW-15S was installed. However, because the shallow aquifer was very coarse, the USEPA approved installing the well without the sump. Each well screen was surrounded by Morie No. 00 sand that extends from the bottom of the boring (one foot below the bottom of the well) to one foot above the top of the screen. A one-foot thick bentonite (high-solids) slurry seal, mixed according to the manufacturer's instructions, was placed on top of the sand pack with a side discharging tremie pipe. Concrete was poured from the bentonite seal to the edge of a sloping two-foot by two-foot by three-inch thick apron which secures the protective curb box in place. The NJDEP well number was stamped on an aluminum identification tag, which was secured to the inside of the curb box. The top of the riser pipe was covered with a locking compression seal well cap. A surveyor's mark was placed on the top of well casing and used as a measuring point. Drill cuttings were placed in labeled drums and removed from the Study Area by a licensed waste hauler as described Section 4.8. Well construction logs are in Appendix B.

4.2.2 Intermediate Monitoring Well Installation

A 12-inch diameter boring was drilled one foot into the upper confining unit with hollow stem augers. Split-spoon soil samples were collected from land surface to one foot into the upper confining unit, according to ASTM D 1586-84, to determine the location of the upper confining unit and to characterize the aquifer. Soil samples from each boring were described and recorded on a geologic log (Appendix A). Each unsaturated split-spoon soil sample was cut in half and the organic vapors were immediately measured with a PID (11.7 Ev lamp) by passing the probe over the surface of the sample. The PID concentrations were recorded on the geologic log.

Once the upper confining unit was penetrated one foot, six-inch diameter black steel casing was lowered through the augers, pushed one foot into the aquitard, and grouted with a side discharging tremie pipe (5% bentonite/95% cement) in place. The grout extends from the bottom of the borehole to slightly below the frost line, which is

four feet below grade. Concrete was poured from just below the frost line to the edge of the sloping two by two-foot by three-inch apron.

After waiting more than 24-hours for the grout to set, a six-inch (nominal) diameter boring was drilled to the bottom of the intermediate aquifer using the mud rotary drilling method. Bentonite mud was used when it became too difficult to drill with water. Split-spoon soil samples were collected from the upper confining unit to the bottom of the intermediate aquifer. The intermediate well was screened at the bottom of the intermediate aquifer so it was consistent with the existing intermediate wells.

Each intermediate monitoring well was installed according to the requirements listed in N.J.A.C. 7:14A-6.13 and the USACE. Each intermediate monitoring well was constructed with ten feet of Type 316 stainless steel (0.010-inch slot) wire wrap screen and sufficient stainless steel (Schedule 5 Type 316) riser to reach land surface. MW-15I was constructed with five feet of well screen because the aquifer was very thin. A three-foot Schedule 5 Type 316 stainless steel sump was attached to the bottom of each screen.

The well screen was surrounded by Morie No. 00 sand, which extends from the bottom of the boring to two feet above the top of the screen. A two-foot thick bentonite (high-solids) slurry seal, mixed according to the manufacturer's instructions, was poured with a side discharging tremie pipe on top of the filter pack. Cement grout was poured with a side discharging tremie pipe from the bentonite seal to two feet below land surface. The NJDEP well number was stamped on an aluminum identification tag, which was secured to the inside of the curb box. The top of the well was covered with a locking compression seal well cap. A surveyor's mark was placed on the concrete well apron and the top of well casing and used as a measuring point. Drill cuttings were placed in 55-gallon drums, labeled, and removed from the site by a licensed waste hauler, as described in Section 4.8. Well construction logs are in Appendix B.

4.2.3 Monitoring Well Development

Monitoring wells MW-6SR, MW-10S, MW-10I, MW-11S, MW-12I, MW-13I, MW-14S, MW-15S, and MW-15I installed during the PDI were developed by pumping groundwater with a submersible pump to remove fine-grained soil from the well, sand pack, and the surrounding formation. The wells were also developed with surging by

turning the pump on and off. Well development was continued for one hour or until groundwater samples had a turbidity of 50 Nephelometric Turbidity Units (NTUs) or less. Development was continued up to two additional hours to achieve less than 10 percent variation in the specific conductance, pH, and temperature, which were recorded at one-half well volume intervals. All of the wells were successfully developed to these requirements. However, at the end of two additional hours of developing MW-10S and MW-11S the specific conductance, pH, and temperature stabilized, but the turbidity remained greater than 50 NTUs. Development water was put in labeled 55-gallon drums and removed from the site by a licensed waste hauler, as described in Section 4.8.

4.3 HORIZONTAL WELL

One horizontal well was installed in the unsaturated zone beneath 272 Route 46, Dover, New Jersey (Figure 3-2). This well was drilled with a horizontal drilling rig, which drills with a flat chisel type bit and uses water to flush the cuttings out of the borehole. A 4-inch diameter hole was drilled from the parking lot, which is west of the building located at 272 Route 46, Dover, New Jersey, to beneath the basement of the building (Figure 3-2). The boring was continued across the entire length of the basement and came back up to land surface in the backyard of 271 Richards Avenue. The location and depth of the borehole was continually tracked with information transmitted from the drilling bit to a hand held device that followed the progress of the drilling. The borehole is approximately three to five feet below the bottom of the basement slab and one to two feet above the top of the water table. Only two soil samples were collected while drilling the horizontal boring because it is very difficult to collect soil samples while drilling a horizontal boring. This is true because the soil samples are collected with a unique sampling device that opens to allow soil to enter the chamber at the selected sampling interval and the contractor had a difficult time getting the chamber open when attempting to collect a soil sample. The two soil samples (HB-1a and HB-1b) were sent to an USEPA approved laboratory for VOC analysis as part of the CLP. Since only two soil samples were collected and only a limited volume of soil was available in each sample, soil samples were not described on a boring

log or screen by a PID. Once the borehole was finished, the hole was reamed to 8 inches in diameter to accommodate a well.

An 8-inch diameter horizontal well was constructed with 40 feet of Schedule 80 high density polyethylene (HDPE) well screen, which extends across the entire length of the basement and sticks out four feet on either side (Figure 3-2). Sufficient Schedule 80 casing was used to reach land surface at the location shown on Figure 3-2. A heat welded cap was fixed to the bottom of the screen. A locking compression plug was used to cap the well at the well head. The well head was protected in a curb box, which was cemented in place. No gravel pack or grout was used to surround the screen or casing because they can not be inserted in the annulus with this type of drilling method. The lack of gravel pack and grout will not affect the integrity and future use of the well because the well may be used to deliver treatment chemicals to the vadose zone during pilot scale testing, which may be conducted during the OU2 RD. The well will not be used to pump groundwater so there is no concern of well plugging. The well will also not be used as a monitoring point since there is no grout seal.

4.4 WELL ABANDONMENT

Monitoring well MW-6S was abandoned because it was determined to be damaged during the OU2 RI. The well was over-drilled with hollow stem augers and removed. The borehole was grouted (cement 95%/bentonite 5%) to the ground surface with a side discharging tremie pipe. The protective curb box, concrete apron, well, and cuttings were drummed and disposed as Investigation Derived Waste (IDW). The Well Abandonment Report is presented in Appendix B.

4.5 SOIL BORINGS

Soil borings were drilled with 3-1/4 inch inside diameter hollow stem augers. Continuous split-spoon (2-inch diameter) soil samples were collected from land surface to the water table, according to ASTM D 1586-84, to document the stratigraphy and to detect the water table. Each unsaturated sample was cut in half and the organic vapors

were screened with a PID (11.7 Ev lamp) by passing the probe over the surface of the sample immediately after the split-spoon was opened. A soil sample was collected from the portion of the sample that had the highest PID reading using an En Core™ sampler. These samples were collected according to USEPA CLP procedures (Appendix C). Soil samples from each boring were recorded on a geologic log (Appendix A). Each unsaturated sample was placed in an 8-ounce soil jar and covered with aluminum foil. After approximately 15 minutes, organic vapors were measured with the PID by piercing the aluminum foil with the PID probe. The PID concentrations were recorded on the geologic log. After completing each boring, the En Core™ sample collected from the split-spoon with the highest PID reading was submitted for CLP analysis for VOCs. The remaining En Core™ samples were discarded as IDW. The back of the drilling rig, drill rods, hollow stem augers, split spoons, and any other equipment that entered the borehole were decontaminated between drilling locations by steam cleaning. The decontamination water was collected in 55-gallon drums or in a plastic-lined area and transferred to 55-gallon drums for storage. The soil borings were grouted to a few inches below ground surface with cement/bentonite (95%/5%) grout. The surface conditions were replaced with either asphalt or sand.

4.6 SURVEYING

Each new monitoring well was surveyed to determine the elevation (relative to Mean Sea Level) of the measuring point on the top of the well casing using a United States Geological Survey (USGS) benchmark (NAV1929). The location of the new wells, soil borings (Phase I & II), and HydroPunch® borings were also surveyed to the New Jersey coordinate system using a USGS benchmark. The elevation of the measuring point on Staff Gage 3 was also surveyed because it was repaired. The survey information is presented in Table 4-1.

4.7 WATER LEVEL MEASUREMENTS

Two synoptic rounds of water levels were measured during the first phase of the PDI. Water levels were measured in all of the monitoring wells (installed up to the date of the measurements) to an accuracy of 0.01 feet with an electronic water level indicator. At the start of the PDI, Staff Gages 1 and 2 were missing and Staff Gage 3 was damaged. Staff Gages 1 and 2 were not replaced because it was not in the scope of the PDI. However, Staff Gage 3 was repaired and the elevation of the measuring point was surveyed.

During the first round of water level measurements, groundwater from MW-9I discharged to the land surface after the compression cap was removed. Therefore, the water level was not measured. A second round of water levels was measured to get a measurement from all of the wells. However, during the second round groundwater discharged from MW-8I, MW-9I, and MW-9D to the land surface after the compression caps were removed. The water level in these wells was measured by adding a piece of casing to each well, which extended the well casing above land surface. Water level measurements were collected after allowing each water level to stabilize.

The water level indicator was decontaminated between each well with Alconox and water followed by a deionized water rinse.

4.8 GROUNDWATER SAMPLING

Four rounds of groundwater samples were collected during the Phase I, II, and III PDI using USEPA Region II low flow groundwater sampling techniques (Appendix C). The groundwater samples were collected two weeks after the newly installed monitoring wells were developed.

The first round of groundwater samples was collected from the four monitoring wells installed during the first phase of the PDI (MW-6SR, MW-10S, MW-11S, and MW-12I), 11 existing RI monitoring wells (MW-1S, MW-1I, MW-1D, MW-1DR, MW-4I, MW-5I, MW-6I, MW-6D, MW-7I, MW-8I, and MW-9I) and one NJNG monitoring well (MW-2C). The second and third rounds of groundwater samples were collected

from the five monitoring wells installed as part of the second phase of the PDI (MW-10I, MW-13I, MW-14S, MW-15S, and MW-15I) and one existing deep well (MW-2D). In the fourth round, only one groundwater sample was collected from MW-15S as part of the third phase of the PDI.

4.8.1 Monitoring Well Purging Procedures

The locking steel cap and internal well cap were removed and the depth to water was measured with an electronic water level indicator. The cable and probe of the meter were decontaminated before each use with Alconox and rinsed with potable water. This was followed by a deionized water rinse.

A two-inch diameter submersible pump with dedicated Teflon tubing was lowered into the well until the pump intake was in the center of the screen. The pumping rate was set at approximately 250 ml/min, which caused less than 0.3 feet of drawdown. Groundwater samples were collected after field parameters (i.e., redox, pH, turbidity, temperature, conductivity, and dissolved oxygen) stabilized according to USEPA Low Flow Sampling procedures outlined in Appendix C. The purge water was collected in 55-gallon drums and stored at DMW4.

4.8.2 Groundwater Sampling Procedures

Groundwater samples were collected immediately after field parameters stabilized. A piece of polyethylene sheeting was laid on the ground beside each well and the sampling equipment and sample bottles were placed on the polyethylene sheeting. The groundwater samples were collected with a two-inch diameter submersible pump set at a flow rate of approximately 100 ml/min, according to USEPA low flow sampling procedures (see Appendix C). Two 40-ml vials were filled, leaving no head space or air bubbles. The samples were preserved in the field with hydrochloric acid to a pH of <2. The sample bottles were placed into coolers with ice and sent to a USEPA CLP laboratory for analysis.

The equipment entering the well was handled with phthalate-free gloves to prevent contamination. The Teflon tubing used with the submersible pump, gloves, and

polyethylene sheeting were replaced between sampling locations to prevent cross contamination. Groundwater sampling logs are in Appendix D.

Data recorded in the field logbook and sampling logs included:

- Name and location of job.
- Well and sample identification numbers.
- Date of sample collection.
- Method of purging and sample acquisition.
- Depth to water.
- Volume of water removed during purging.
- Redox, pH, turbidity, temperature, conductivity, and dissolved oxygen.
- Organic vapor levels.
- Type of analysis.

4.9 INVESTIGATION DERIVED WASTE

Drill cuttings, development water, decontamination water, purge water from sampling, Personal Protective Equipment (PPE) from all three phases of the PDI and materials from abandoning MW-6S were disposed of as IDW. During all three phases of the PDI, the PPE was disposed of as municipal waste. During the Phase I PDI, non-PPE IDW was picked up by a licensed waste hauler at each drilling location and transported to a Transportation, Storage and Disposal (TSD) facility as a non-hazardous waste for characterization and disposal. It was anticipated that these wastes would be non-hazardous based on the extensive waste characterization performed during the OU2 RI. The IDW generated during the Phase II PDI at 272 Route 46, Dover, New Jersey was staged on the property. The IDW generated during the Phase III PDI from the property was staged at DMW4 and characterized before transportation to the TSD facility. These drill cuttings were characterized prior to transportation because they were generated near an area that could contain chlorinated VOCs, and because elevated PID readings were measured during sample collection. The results of the waste characterization during the Phase II PDI showed that the IDW was non-hazardous and therefore this material was disposed of a non-hazardous waste. The results of the waste characterization during the Phase III PDI

showed that the IDW contained chlorinated VOCs. Based on these results and elevated PID readings of soil samples collected during drilling, the IDW generated during the Phase III PDI was disposed of as a characteristic hazardous waste. All of the IDW was disposed in accordance with federal, state, and local regulations. The results of the waste characterization analyses are included in Appendix E.

Field Investigation Results**5**

5.0 FIELD INVESTIGATION RESULTS

5.1 LOCAL GEOLOGY

Soil borings were drilled to:

1. Install five monitoring wells in the shallow aquifer.
2. Install four monitoring wells in the intermediate aquifer.
3. Collect unsaturated soil samples from 21 borings.
4. Collect 21 HydroPunch® groundwater samples.

The monitoring wells and HydroPunch® locations within the study area are shown on Figure 3-1. The soil boring locations at 272 Route 46, Dover, New Jersey are shown on Figure 3-2. Soil samples from each boring were described and recorded on geologic logs in Appendix A. The characteristics of the shallow aquifer were consistent with the geologic interpretation of the Study Area summarized in Section 2.3 with two exceptions. The new borings show that the intermediate aquifer is slightly thicker than characterized during the RI and ranges in thickness from 2 to 36 feet. These borings also show that the intermediate aquifer extends further north than previously characterized. The intermediate aquifer ends north of Route 46 instead of at Richards Avenue near 272 Route 46, Dover, New Jersey.

5.2 HYDROGEOLOGY

Two synoptic rounds of water levels were measured in the monitoring wells installed during the first phase of the PDI, existing RI monitoring wells, and existing staff gages, as shown on Table 5-1. The second, more complete round of water levels were used to draw the potentiometric surface of the shallow, intermediate, and deep aquifers shown on Figures 5-1, 5-2, and 5-3. The groundwater flow directions shown on these figures are consistent with the groundwater flow directions shown in the Draft RI Report.

5.3 SOIL SAMPLING RESULTS

This section outlines the results of the soil samples collected during the PDI, which were analyzed for VOCs using the Multi-Media, Multi-Concentration Organic Analytical Service (OLM04.2) under the CLP. Soil samples were collected from 16 soil borings and 2 monitoring well borings during the Phase II and Phase III PDI. During the Phase III PDI, each HydroPunch® boring was continued until the probe could not be pushed any further (i.e., refusal).

USEPA Region II personnel validated all of the laboratory data. The data validation packages, including the CLP Data Assessments, Standard Operating Procedure Checklists, and laboratory data sheets (with validation qualifiers) are in Appendix F. The Sample Trip Reports, which cross-reference the project sample numbers with the CLP sample identification numbers, are also included in Appendix F. The data was determined to be valid and usable to determine the nature and extent of soil contamination.

The soil sample results are summarized in Table 5-2 and shown on Figure 5-4. These results were compared to the lower concentration of each compound from the proposed New Jersey Residential Direct Contact Soil Criteria (NJAC 7:26F) and the New Jersey Impact to Groundwater Soil Criteria (NJAC 7:26F) (Appendix G). A review of this table shows that there is a source of PCE in the unsaturated soil at 272 Route 46, Dover, New Jersey. The data shows that three soil samples contain VOCs above the potential cleanup standards. Soil samples collected from SB-8, SB-9, and SB-10, contained PCE at 37,000 ug/Kg, 110,000 ug/Kg, and 18,000 ug/Kg, respectively, which all exceeded the lower of the two proposed New Jersey soil cleanup standards for PCE (Impact to Groundwater Soil Cleanup Criteria - 1,000 ug/Kg). The concentration of PCE in the other soil samples ranged from non-detect to 180 ug/Kg. The concentrations of PCE in unsaturated soil samples are shown on Figure 5-4. The data on this figure shows that a small area around SB-8, SB-9, and SB-10 should be remediated because the concentration of PCE exceeds the potential cleanup standard. However, consideration should be given to remediating a larger area, which extends from the basement of 272 Route 46, Dover, New Jersey to SB-12, based on the PID readings while drilling soil

borings and the horizontal well boring and the pattern of groundwater contamination discussed in Section 5.4. Miscellaneous chemicals other than PCE were detected in the soil. However, they were detected at concentrations that are below the potential cleanup standards.

5.4 GROUNDWATER SAMPLING RESULTS

This section outlines the results of the groundwater samples collected during the PDI. Groundwater screening samples were collected from 12 soil borings using a HydroPunch® sampler. One grab water sample was collected from the sump in the basement of 272 Route 46, Dover, New Jersey. Groundwater samples were also collected from monitoring wells during four separate sampling rounds during the PDI, as shown below.

Round One: MW-1S, MW-1I, MW-1D, MW-1DR, MW-2C, MW-4I, MW-5I, MW-6R, MW-6I, MW-6D, MW-7I, MW-8I, MW-9I, MW-10S, and MW-11S,

Round Two: MW-2D, MW-10I, MW-13I, MW-14S, MW-15S, and MW-15I

Round Three: MW-2D, MW-10I, MW-13I, MW-14S, MW-15S, and MW-15I

Round Four: MW-15S

All of the samples were analyzed for VOCs using the Low Concentration Organic Analytical Service (OLC02.1) under the CLP and USEPA Region II laboratories. One groundwater sample collected from MW-15S (Round Four) was also analyzed for BNA to determine if potential petroleum hydrocarbon contamination up-gradient of 272 Route 46, Dover, New Jersey could impact the remediation at this site. All of the groundwater samples were analyzed by an USEPA CLP lab with the exception of the Round 3 groundwater samples (Phase II PDI), which were analyzed by the USEPA Region II laboratory because a CLP lab was not available.

USEPA Region II personnel validated all of the laboratory data. The data validation packages, including the CLP Data Assessments, Standard Operating Procedure

Checklists, and laboratory data sheets (with validation qualifiers), are in Appendix F. The Sample Trip Reports, which cross-reference the project sample numbers with the CLP sample identification numbers, are also included in Appendix F. The groundwater data from the Phase I and Phase II PDI was determined to be valid and usable to determine the nature and extent of groundwater contamination. Most of the data from the Phase III PDI was determined to be valid and usable, however, some of the groundwater screening data was affected by sediment and extremely small head space bubbles in the sample bottles. This data was rejected by the data validators. The sediment and the extremely small amount of headspace in these samples was unavoidable and is often the result of collecting groundwater screening samples with a HydroPunch® sampler.

The groundwater analytical results were compared to potential groundwater Applicable or Relevant and Appropriate Requirements (ARARs). Potential groundwater ARARs include relevant standards derived from the Safe Drinking Water Act Maximum Contaminant Levels (MCLs) (40 CFR 141), the New Jersey Drinking Water Quality Act MCLs (NJAC 7:10-16), and the New Jersey Groundwater Quality Criteria (GQCs) (NJAC 7:9-6). Groundwater ARARs were previously selected in the 1992 ROD for OU1 (USEPA, 1992). The 1992 ROD specified the lower of the relevant federal or state MCLs for each contaminant of concern in selecting the groundwater cleanup standards. The NJDEP GQCs, NJDEP MCLs, and Federal MCLs are listed in Appendix G.

5.4.1 Shallow Aquifer

Groundwater samples were collected from newly installed monitoring wells MW-10S, MW-11S, MW-14S, MW-15S, MW-6R and existing monitoring well MW-1S during the PDI. Groundwater screening samples were also collected using a HydroPunch® sampler in twelve soil borings designated HP-1, HP-2, SB-09, SB-10, SB-13, SB-17, SB-20, SB-21, SB-22, SB-24, SB-25, and SB-27. The results summarized in Tables 5-3 through 5-7 and presented on Figures 5-5 and 5-6 show that chlorinated VOCs were not detected in groundwater samples collected from HP-1, HP-2, MW-10S, MW-6R, and MW-1S. This shows that a source of PCE is not located at Tinny's Auto Body, Triangle Auto Transmissions, or J&D Auto.

Chlorinated VOCs were detected in the groundwater screening samples collected from SB-09, SB-10, SB-13, SB-17, SB-20, SB-21, SB-22, and SB-24, and groundwater samples collected from monitoring wells MW-14S and MW-15S. These results, shown on Figure 5-5, show that chlorinated VOCs were detected in the groundwater samples near 272 Route 46, Dover, New Jersey. This figure also shows the distribution of PCE and the other chlorinated VOCs, such as TCE, cis-1,2-dichloroethylene (cis-1,2-DCE), and vinyl chloride (VC), that are created by the biodegradation of PCE in an anaerobic environment. The concentration of PCE in groundwater samples ranges from non-detect in SB-21 and SB-22 to 19,000 ug/L at SB-13. The concentration of PCE (19,000 ug/L) at SB-13 is greater than 1% of the solubility of PCE (solubility of PCE is 0.015 g/100ml; therefore, 19,000 ug/L equals 13% of the solubility of PCE), which is indicative of the presence of a Dense Non-Aqueous Phase Liquid (DNAPL). However, the presence of DNAPL will be addressed in the OU2 RD. TCE was detected in seven groundwater samples and ranges in concentration from 1.1 ug/L in SB-21 to 89 ug/L in SB-17. Cis-1,2-DCE was detected in two groundwater samples and ranges in concentration from 27 ug/L in SB-20 to 220 ug/L in SB-17. VC was detected in three groundwater sample and ranges in concentration from 45 ug/L in SB-20 to 140 ug/L in SB-17. The presence of TCE, cis-1,2-DCE, and VC shows that biodegradation is occurring and the PCE has degraded to VC by reductive dechlorination. Figure 5-5 shows that a groundwater plume is being created by the soil contamination shown on Figure 5-4. This data also shows that the source of the groundwater contamination is larger than the area of soil that exceeds the potential cleanup standards for soil remediation (Figure 5-4) and the area causing groundwater contamination extends from SB-12 to beneath the basement of 272 Route 46, Dover, New Jersey (Figure 5-4).

Figure 5-6 shows the concentration of chlorinated VOCs in the groundwater of the Study Area from HydroPunch® borings HP-1, HP-2, SB-25, and SB-27 and monitoring wells MW-11S, MW-15S, MW-1S, MW-6R, and MW-10S. This figure shows that groundwater containing chlorinated VOCs at concentrations above the potential groundwater ARARs starts at 272 Route 46, Dover, New Jersey and migrates south towards the Rockaway River. This data also shows that the PCE is being

biodegraded into daughter products such as TCE, cis-1,2-DCE, trans-1,2-dichloroethylene (trans-1,2-DCE), and VC.

One groundwater sample was also collected from MW-15S and analyzed for BNA to determine if the petroleum hydrocarbons detected at Johnson's Truck Accessories could impact the site. No BNA compounds were detected in the groundwater collected from MW-15S. Therefore, potential petroleum hydrocarbon groundwater contamination at Johnson's Truck Accessories is not expected to impact the remediation at this site.

The results of a grab water sample collected from the sump in the basement of 272 Route 46, Dover, New Jersey (S-01) show that the water contained 70 ug/L of PCE. This water leaches into the shallow aquifer beneath the basement. This discharge should be stopped before any soil or groundwater remediation is started.

5.4.2 Intermediate Aquifer

Groundwater samples were collected from newly installed monitoring wells MW-10I, MW-12I, MW-13I, MW-15I and existing monitoring wells MW-1I, MW-4I, MW-5I, MW-6I, MW-7I, MW-8I, MW-9I, and MW-2C (NJNG) screened in the intermediate aquifer. The results are summarized in Tables 5-4 through 5-6 and presented on Figure 5-7. PCE was detected at 70 ug/L and 230 ug/L in groundwater samples collected from MW-15I. This shows that PCE migrated from the shallow aquifer to the intermediate aquifer at 272 Route 46, Dover, New Jersey. The concentration of PCE in groundwater samples collected from MW-6I is 38 ug/L. The concentration of PCE in groundwater samples collected from MW-2C is 6 ug/L. This data shows that a plume of groundwater containing chlorinated VOCs, starts at 272 Route 46, Dover, New Jersey and migrates past MW-2C (Figure 5-7).

The concentration of PCE in MW-6I and MW-2C has decreased significantly through time from natural attenuation. The concentration of PCE in MW-6I decreased from 1200 ug/L in 1988 to 38 ug/L in 2000. The concentration of PCE in MW-2C decreased from 320 ug/L in 1993 to 6 ug/L in 2000. The concentration of PCE in these wells is plotted on Figure 5-8. This plot shows that the decrease in concentration of PCE in the groundwater collected from MW-6I and MW-2C is linear when plotted on semi-

logarithmic graph paper. The slope of these lines is the first order decay rate of PCE. The first order decay rate of PCE is $-0.0007/\text{day}$ in MW-6I and $-0.0015/\text{day}$ in MW-2C. The correlation coefficient (R) is 0.98 for MW-6I and 0.96 for MW-2C. These values are within the range of first order decay rates for PCE. This figure also shows that natural attenuation would decrease the concentration of PCE in MW-2C and MW-6I to less than 1 ug/L (the lower of the two proposed New Jersey soil cleanup standards – Impact to Groundwater Soil Cleanup Criteria) in 2004 and 2014, respectively.

Groundwater samples were collected from MW-4I, MW-8I, MW-9I, and MW-12I during the PDI. The results show that the groundwater that contains chlorinated VOCs in this part of the Study Area is a small area around MW-8I and is therefore a much smaller area than defined in the RI.

5.4.3 Deep Aquifer

Groundwater samples were collected from MW-1D, MW-1DR, and MW-6D screened in the deep aquifer. The results, summarized on Table 5-4 and presented on Figure 5-9, show that the concentration of PCE in groundwater collected from MW-6D is 19 ug/L. The concentration of PCE in groundwater collected from MW-1DR is 1 ug/L. The concentration of PCE in groundwater collected from MW-2D is 0.9 ug/L. Therefore, the lateral extent of the PCE groundwater plume is bound by MW-1DR to the southwest and the down-gradient extent of the PCE groundwater plume is bound by MW-2D. This is shown on Figure 5-9.

Environmental Database Search**6**

6.0 ENVIRONMENTAL DATABASE SEARCH

Environmental Data Resources, Inc. (EDR) was contracted to search databases for environmental records that show properties in the Study Area that potentially have contamination. The EDR report is included in Appendix H.

The ERD search shows twenty sites within one half mile of DMW4 that potentially have contamination. A freedom of information file search request was prepared for the 20 sites and submitted to the NJDEP. The NJDEP Bureau of Community Relations responded that they did not have any files for 19 of the 20 sites. The NJDEP did have information describing the NJNG site on Carrol Street.

The files on NJNG were reviewed to evaluate data on the nature and extent of the groundwater contamination. Results of groundwater samples collected from monitoring wells at the site were used in the calibration of the solute transport model.

A second file search was made for the Spartan Oil Company located between the NJNG and DMW4. The NJDEP Division of Responsible Party Site Remediation File Review Unit processed the file review request. The NJDEP indicated that there were no available records for the site within their various divisions. The site has been placed in No Further Remedial Action status. A Draft Preliminary Assessment has reportedly been performed; however, this document was not available for review.

Bench Scale Treatability Study

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Bench Scale Treatability Study

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7.0 BENCH SCALE TREATABILITY STUDY

In-Situ Oxidative Technologies, Inc. (ISOTEC) was subcontracted to Malcolm Pirnie to conduct a bench scale treatability study of in-situ chemical oxidation to oxidize chlorinated VOCs in the unsaturated soil and shallow groundwater at 272 Route 46, Dover, New Jersey. The ISOTEC process is based on Fenton's chemistry, which uses a proprietary catalyst to produce hydroxyl radicals that oxidize chemical bonds in chlorinated VOCs. Bench scale experiments were conducted on groundwater and on a mixture of soil and groundwater that was prepared by ISOTEC at their facility. ISOTEC conducted the bench scale test on a soil-groundwater (soil-slurry) mixture made by mixing unsaturated soil collected from SB-09, which was collected from the area with the highest concentration of PCE (110,000 ug/Kg), and groundwater collected from MW-15S, which contained approximately 6 mg/L of PCE.

The results of the soil-slurry test show an average of 72% and a maximum of 86% destruction of chlorinated VOCs. ISOTEC also conducted the bench scale test on groundwater collected from MW-15S. The results of the groundwater test show that greater than 99% destruction of chlorinated VOCs. The results of this bench scale test show that the ISOTEC chemical oxidation process will be effective at significantly reducing the concentration of chlorinated VOCs in the unsaturated soil and shallow groundwater at the site. A copy of the ISOTEC treatability study is in Appendix I.

A groundwater sample collected from MW-15S was analyzed for inorganic parameters to determine if the chemical oxidation treatment technique could be successful at remediating chlorinated VOCs at 272 Route 46, Dover, New Jersey. The results on Table 7-1 show that the concentration of iron and manganese in the shallow aquifer is low. The limited amount of iron and manganese will be used as a catalyst during the treatment. However, because the concentration of dissolved iron and manganese is low they will not precipitate and clog the aquifer. The low concentration of alkalinity shows that the groundwater is weakly buffered and therefore a high volume of treatment chemicals will not be needed for the treatment to be effective. The groundwater has a pH of 5.46, which is slightly lower than the target pH (5.85 – 6.13) during groundwater treatment. Therefore, significant pH adjustment will not be

necessary for the treatment to be effective. The concentration of dissolved oxygen is borderline between the aquifer being aerobic and anaerobic. However, the fact that the PCE is dechlorinating down to VC at 272 Route 46, Dover, New Jersey shows that the aquifer is anaerobic in this area. The low concentrations of phosphate, sulfate, and nitrate shows that they will provide only a limited amount of electron acceptors, which will enhance natural bioremediation after the chemical oxidation treatment. However, because the chemical oxidation treatment will change the aquifer from an anaerobic to an aerobic environment only VC will dechlorinate by natural bioremediation after the chemical oxidation.

An unsaturated soil sample collected from SB-09 was analyzed for total iron, dissolved iron, and total organic carbon (TOC). The results on Table 7-2 show that even though there is considerable amount of iron on the soil, very little dissolves in the groundwater. This is also evidenced by the very low concentration of iron in the groundwater (Table 7-1). The concentration of TOC varies from 492 to 14,500 mg/Kg. Areas of soil that have moderately high concentrations of TOC will reduce the effectiveness of the treatment by competing for the hydroxyl radicals, which are needed to oxidize the chlorinated VOCs. However, this can be easily overcome by increasing the volume of treatment chemicals.

Groundwater Flow and Solute Transport Models

8

8.0 GROUNDWATER FLOW AND SOLUTE TRANSPORT MODELS

A groundwater flow model was constructed and calibrated to evaluate selected extraction system designs. The groundwater flow conceptual model was documented in a Technical Memorandum dated February 2000 (Appendix K). The calibration and sensitivity analysis of the model are described in a Revised Technical Memorandum dated February 2001 (Appendix L). A solute transport model was constructed and used with the groundwater flow model to; evaluate the effects offsite groundwater contamination will have on the extraction and treatment system, evaluate the effects the extraction system will have on offsite groundwater contamination, and estimate the concentration of PCE that would enter the treatment system. The calibration of the solute transport model was described in a Revised Technical Memorandum dated March 2001 (Appendix M). The development and calibration of the models are summarized below.

8.1 GROUNDWATER FLOW MODEL

8.1.1 Conceptual Design

A numerical three-dimensional groundwater flow model was designed to simulate groundwater flow in the shallow, intermediate, and deep aquifers in the Study Area. The groundwater flow model was built using the United States Geological Survey's (USGS) three-dimensional finite difference groundwater flow modeling program MODFLOW (McDonald and Harbaugh, 1988). The Groundwater Modeling System (GMS), developed by Brigham Young University for the United States Department of Defense, was used as the pre- and post-processor for the numerical model. The conceptual model was constructed in GMS. The MODFLOW results were evaluated in GMS and through the USGS particle tracking model post-processor MODPATH (Pollack, 1989). MODPATH was used to assess the flow path of water within the model and evaluate the effectiveness of each groundwater extraction system design.

A conceptual groundwater flow model was developed to define the dimensions and characteristics of the model and organize the input parameters for the numerical

model. The Rockaway River Basin groundwater model prepared by the United States Geological Survey (USGS, 1993) was used as the starting point for the conceptual model. However, this model was changed to focus the model on the Study Area, convert it from a quasi-three dimensional model to a true three-dimensional model, and take into account site specific information collected during the Phase I and OU2 RIs and the PDI.

The USGS Rockaway River Basin model is a quasi three-dimensional model because it does not represent the fine-grained soil in between the aquifers as separate layers. It represents flow through these fine-grained units as a leakance factor through the bottom of each aquifer. For the groundwater flow model to be used with a solute transport model and simulate the migration of groundwater contamination, it must be a true three-dimensional groundwater flow model that simulates groundwater flow through these fine-grained layers.

The model layers were selected based on the complex stratigraphy in the Study Area documented in the RIs. Stratigraphic information from boring logs was entered into GMS and geostatistically analyzed to produce top and bottom surfaces of the various stratigraphic units. The six layers included in the model are summarized below:

Layer 1 represents the shallow aquifer, which is the first transmissive layer. The shallow aquifer ranges in saturated thickness from two to 15 feet.

Layer 2 represents Aquitard 1, which is the first semi-confining unit. Layer 2 ranges in thickness from four to 36 feet with an average thickness of 14 feet.

Layer 3 represents the intermediate aquifer, which is the second transmissive layer. The intermediate aquifer ranges in thickness from seven to 33 feet with an average thickness of 22 feet.

Layer 4 represents Aquitard 2, which is the second semi-confining unit. Layer 4 is a discontinuous layer with a maximum thickness of 50 feet in the eastern portion of the Study Area. The average thickness of Layer 4 is 11 feet.

Layer 5 and Layer 6 represent the deep aquifer, which is the third transmissive layer. The deep aquifer was separated into two layers with the bottom of the gravel and cobble layer representing the bottom of Layer 5. Layer 6 represents the medium to coarse sands beneath the cobble zone. This aquifer was separated into two layers because Dover Municipal Well No. 4 is screened only in Layer 5 and the model's transient calibration will be done with an aquifer test conducted by pumping Dover Municipal Well No. 4. Layer 5 has a maximum thickness of 65 and an average thickness of 34 feet. Layer 6 has a maximum thickness of 96 feet and an average thickness of a 27 feet.

The model grid, boundaries, and input parameters are discussed in detail in the Technical Memorandum dated February 2000 (Appendix K).

8.1.2 Groundwater Flow Model Calibration

The groundwater flow model was calibrated by running steady state and transient simulations and comparing the resulting hydraulic heads to field measured heads. The steady state calibration was conducted by comparing simulated steady-state heads to static water levels to show that the groundwater model accurately simulates static water levels in the Study Area. The transient calibration was conducted by simulating the aquifer test conducted during the Phase I RI and comparing the simulated heads to measured water levels in monitoring wells.

The model results during the steady state calibration were compared to two types of field data including, the estimated mean annual water level data from the shallow, intermediate, and deep aquifers and a synoptic round of groundwater levels. The difference in observed heads versus modeled heads was evaluated using the Mean Error, Absolute Mean Error, and Root Mean Squared Error. A trial and error method was used to adjust the individual model parameters until these errors were minimized.

The model results during the transient calibration were compared to water levels measured in monitoring wells during a pumping test conducted during the Phase I RI. As part of the transient calibration process, aquifer properties were adjusted until the model-predicted values matched the field-measured water levels. Once the transient simulation

was completed, the steady state simulations were repeated to verify that the modeled predicted heads were consistent with the observed heads under steady-state conditions. Once the model simulated the static water levels and the pumping water levels with reasonable accuracy (based on observed historical water level fluctuation ranges), the model was considered calibrated. The steady-state and transient calibrations are discussed in detail in the Revised Technical Memorandum dated February 2001 (Appendix L).

8.2 SOLUTE TRANSPORT MODEL

The solute transport model was operated using the USACE three-dimensional solute transport modeling program MT3DMS (Zheng and Wang, 1998). GMS was used as the pre- and post-processor for the model. GMS was also used to operate and evaluate model simulations.

The model was conceptualized using the solute transport characteristics of the shallow, intermediate, and deep aquifers that were defined in the 1990 Phase I and 1999 RIs. Each model simulation was conducted in two steps. The first step simulated the time between 1965 and 1980 when DMW4 pumped at 1,100 gallons per minute (gpm) for an average of 9.5 hours per day, which equates to a constant (24 hour) rate of 450 gpm. During this step, a continuous source of PCE (250,000 ug/L) was started at 272 Route 46, Dover, New Jersey in 1973 and held constant until 1980. The first step of the model shows that the concentration of PCE at DMW4 is 325 ug/L in 1980. This concentration is within an order of magnitude of the concentration of PCE (122 ug/L) detected in DMW4 in 1980. The plume configuration at the end of the first step was used as the starting point of the second step. The second step simulated the non-pumping period between 1980 and 2000.

The model simulated results were compared to the concentrations of PCE detected in 1987, 1993, 1998, and 2000. The concentrations of PCE modeled in the shallow aquifer match very well to the concentrations observed from 1987 to 2000. With the exception of MW-2C in 1993 and MW-10I in 2000, the model calibrated very well to the concentration of PCE detected in the intermediate aquifer. In 1993, the modeled

concentration of PCE in monitoring well MW-2C was 16 ug/L and the actual concentration of PCE in MW-2C was 320 and 650 ug/L in two sampling rounds. However, in 1993 and 2000 the modeled concentration of PCE was much closer to the actual concentration of PCE in MW-2C. In 1998, the modeled concentration of PCE in MW-2C was 7 ug/L and the actual concentration of PCE in MW-2C was 13 to 16 ug/L in two sampling rounds. In 2000, the modeled concentration of PCE was 3 ug/L and the actual concentration of PCE in MW-2C was 6 ug/L. In 2000, the modeled concentration of PCE in MW-10I was 50 ug/L and the actual concentration of PCE in MW-10I was non-detect. This shows that the model is simulating the extent of the PCE too far to the north. This data is shown on Table 3 in Appendix M. Overall, the model also calibrated well to the deep aquifer. The concentration of PCE modeled in the deep aquifer matched very well to the groundwater quality data collected in 1998. However, the model predicted the concentration of PCE in MW-2D would be higher than it was measured in 2000. Based on these comparisons, the solute transport model can be used to predict the migration of contaminants in the Study Area under various extraction scenarios. A technical memorandum describing the conceptualization and calibration is in Appendix M.

Conclusions and Recommendations

9

9.0 CONCLUSIONS AND RECOMMENDATIONS

9.1 CONCLUSIONS

The following conclusions can be made based on the results of the Preliminary Design Investigation:

- PCE was detected in unsaturated soil samples at 37,000 ug/Kg in SB-08, 110,000 ug/Kg in SB-09, and 18,000 ug/Kg in SB-10, which were drilled adjacent to 272 Route 46, Dover, New Jersey. The concentration of PCE in the soil samples from the other nine borings ranged from 3 ug/Kg to 150 ug/Kg. These results show there is PCE in unsaturated soil at concentrations above the NJDEP Residential Direct Contact Soil Cleanup Criteria (4 mg/Kg) and Impact to Groundwater Soil Cleanup Criteria (1 mg/Kg) and that there is a source of PCE at 272 Route 46, Dover, New Jersey.
- PCE was detected at 70 ug/L in a grab water sample collected from the sump in 272 Route 46, Dover, New Jersey. This concentration is above the potential cleanup standard (New Jersey Maximum Contaminant Level for Drinking Water, 1 ug/L). Therefore, this discharge should be stopped before remediation is started.
- PCE and compounds typically associated with the biodegradation of PCE (TCE, cis-1,2-DCE, and VC) were detected in groundwater samples collected from monitoring wells MW-15S and MW-11S, which are screened in the shallow aquifer down-gradient of 272 Route 46, Dover, New Jersey. PCE and compounds typically associated with the biodegradation of PCE (TCE, cis-1,2-DCE, and VC) were also detected in groundwater screening samples collected from 10 soil borings at 272 Route 46, Dover, New Jersey. Groundwater collected from MW-14S, which was installed just upgradient of 272 Route 46, Dover, New Jersey, did contain PCE but at a concentration that was just above the laboratory Contract Required Quantification Limits (CRQLs). This data shows that there is a source of PCE at 272 Route 46, Dover, New Jersey.

- PCE detected in groundwater collected from MW-15I show that PCE has migrated from the shallow to the intermediate aquifer at 272 Route 46, Dover, New Jersey. Given the groundwater flow direction in the intermediate aquifer, this data shows that 272 Route 46, Dover, New Jersey is the source of the PCE detected in the intermediate aquifer.
- Groundwater samples collected from MW-12I show that the southern extent of PCE in the intermediate aquifer is between MW-4I and MW-12I.
- The concentration of PCE in groundwater collected from MW-2D has decreased from 2 ug/l in 1998 and 1999 to below the potential cleanup standard (New Jersey Maximum Contaminant Level for Drinking Water, 1 ug/L) in 2000. Therefore, the down-gradient extent of PCE in the deep aquifer is between MW-6D and MW-2D.
- Concentrations of PCE and TCE, while still at or above potential cleanup standards in the intermediate and deep aquifers, have significantly decreased since the 1990 Phase I RI. The concentration of PCE in MW-6I decreased from 1200 ug/L in 1989 to 38 ug/L in 2000. The concentration of PCE in MW-2C decreased from 300 ug/L in 1993 to 6 ug/L in 2000.
- HydroPunch® soil borings were not capable of reaching Layer 2. Therefore, there is insufficient information to prove if DNAPL exists on top of Layer 2 in the source area. However, the concentration of PCE in groundwater samples collected from this area is greater than one percent (13%) of the solubility of PCE. This shows that there is a potential for DNAPL to exist on top of Layer 2 in the source area.
- A groundwater flow model was constructed and calibrated to evaluate selected groundwater extraction system designs during the RD.

- A solute transport model was constructed and calibrated to characterize the influent groundwater quality to the treatment system for selected groundwater extraction system designs, evaluate the effects the extraction system could have on offsite contamination, and the effects the offsite contamination could have on the extraction system during the RD.
- Historical pumping and groundwater quality data were used to qualitatively evaluate the effects offsite contamination could have on various groundwater extraction systems. A few facts are outlined below:
 1. Since all manufacturing of natural gas ended by 1951, most of the Manufactured Gas Plant (MGP) residues (including DNAPL) detected at this site must have been present since sometime before 1951.
 2. DMW4 operated from 1965 to 1980.
 3. Groundwater quality data from DMW4 and NJNG shows that the LNAPL, DNAPL, and the BNA compounds associated with the MGP residues detected in the shallow aquifer at NJNG have not been detected in groundwater collected from DMW4. It is not known whether the LNAPL encountered near Spartan Oil is associated with NJNG.

Based on historical data, offsite contamination at NJNG is not expected to impact groundwater quality if DMW4 is pumped at an average rate not exceeding 450 gpm. This pumping rate represents the average pumping rate at which DMW4 operated from 1965 to 1980.

9.2 RECOMMENDATIONS

Malcolm Pirnie recommends proceeding with a Focused Feasibility Study for OU2. Malcolm Pirnie recommends updating the OU2 RI with this information and proceeding with the RD of OU1.

References**10**

10.0 REFERENCES

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Tables

Tables

TABLE 2-1
CHRONOLOGY OF EVENTS AND SITE INVESTIGATIONS
DOVER MUNICIPAL WELL NO. 4
DOVER, NEW JERSEY

<u>DATE</u>	<u>EVENT</u>
1962	DMW4 drilled and installed.
June 1965	DMW4 started operating as a municipal well.
March 1980	Analysis of groundwater samples collected from DMW4, by the Town of Dover, identified the presence of chlorinated hydrocarbons; 1,1,1 trichloroethane (118 ppb), tetrachloroethylene (122 ppb), 1,2 dichloroethylene (49 ppb), and trichlorethylene (2 ppb).
July-Sept. 1980	NJDEP conducted additional groundwater sampling which showed the presence of TCE.
September 1980	DMW4 was voluntarily removed from service by the Town of Dover and DMW3 was used in place of DMW4.
January 1982- March 1985	Hydrogeologic investigations conducted by Alfred Crew Consulting Engineers in January 1982 and March 1985 determined the following: total chlorinated hydrocarbons in DMW4 was from eight to 170 ppb; pumping DMW4 caused a downward hydraulic gradient at NJNG (Figure 2-1) during a 21-day variable-rate pumping test; the area of influence of DMW4 could not be determined with existing observation wells.
December 1982	Subsurface investigations conducted at Howmet (Figure 2-1) by Paulus, Sokolowski, & Sarter Consulting Engineers showed the presence of chlorinated hydrocarbons in both shallow and intermediate aquifers.
February 1982	Subsurface investigations conducted at NJNG by Geonics confirmed the presence of chlorinated hydrocarbons (>100 ppb) in shallow aquifer.
March 1983	NJNG's Phase II investigation showed that the shallow and intermediate aquifer were contaminated with various organic compounds.

TABLE 2-1 (cont.)
CHRONOLOGY OF EVENTS AND SITE INVESTIGATIONS
DOVER MUNICIPAL WELL NO. 4
DOVER, NEW JERSEY

<u>DATE</u>	<u>EVENT</u>
June 1986	Howmet and NJNG were issued directives from NJDEP to pay for a RI/FS at DMW4. Howmet and NJNG did not comply, however both companies are under NJDEP Administrative Consent Orders (ACOs) to remediate their properties.
October 1986	TRC was contracted by NJDEP to conduct an RI/FS of DMW4.
April 1987	A community relations meeting was held by the USEPA and NJDEP to provide residents and local officials with an update on past and future activities.
September 1990	The Final Phase I RI Report of DMW4 by TRC was released.
August 7, 1992- September 15, 1992	RI/FS report was released for public review/comment.
August 19, 1992	Public meeting was held discussing the selected remedy for the site.
September 30, 1992	A ROD was issued for the remediation of DMW4.
March 1996	Malcolm Pirnie submitted the Final OU2 Remedial Investigation Work Plan.
February 1999	Malcolm Pirnie submitted the Draft OU2 Remedial Investigation Report.
July 2000	Malcolm Pirnie submitted the Draft Preliminary Design Investigation Report.
March 2001	Malcolm Pirnie submitted the Revised Draft Preliminary Design Investigation Report.

**Table 3-1
Scope of Work Summary
Dover Municipal Well No. 4
Dover, New Jersey**

Scope of Work Outlined in Contract	Boring/Well Number	Rationale	Completed or Changed	Revised Scope of Work	Reason for Change in Scope
Phase One Scope of Work					
Monitoring Well Abandonment	MW-6S	Well damaged	Completed		
Monitoring Well Installation	MW-10I MW-6SR MW-11S Shallow Well Shallow Well	Define the southern extent of 1,1,1-TCA/TCE plume in the intermediate aquifer Define the water quality at the MW-6 cluster/Replacing MW-6S Define the water quality west of the Suspected Source Area and make sure the PCE is not coming from 272 Route 46, Dover, NJ/Walt's Radiator Shop Define the water quality in the Suspected Source Area at Carlson's Auto Body Define the water quality in the Suspected Source Area at Tinny's Auto Body and Triangle Auto Transmissions Determine the concentration of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ	Completed Completed Completed Changed Changed Changed	 Hydropunch Borings Hydropunch Borings Added monitoring well	 Access/Bond issues with the Town Access/Bond issues with the Town Added to define water quality down gradient of J&D Auto
Soil Sampling	Shallow Well Borings	Determine the concentration of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ Determine the concentration of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ Determine the concentration of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ Determine the concentration of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ	Changed	Omit Soil Sampling	Deleted because the borings were not drilled within the suspected source areas where vadose zone contamination would be expected. The borings were drilled down-gradient of the suspected source areas to determine whether a VOC plume was present.
Groundwater Sampling ¹ 2 Rounds ⁴	New Wells	Determine the lateral extent of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ Determine the extent of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ	Changed ²	Only collected one round of groundwater samples ²	Deleted second round because of time restraints. Added 12 existing wells and one NJNG well to further characterize/update the plume configuration and concentrations.
Groundwater Sampling ³	DMW4	Determine the extent of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ 1000 gpm, 500 gpm, and 300 gpm Determine the extent of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ	Changed	Groundwater Flow & Solute Transport Modeling	Sampling DMW4 was replaced because it would have characterized groundwater less than 300 feet from the well when the highest concentration of PCE in the plume is over 500 feet away.
Water Level Measurements	All RI Wells	Draw potentiometric maps of the Shallow, Intermediate, and Deep aquifers	Completed		
Review Discharge Permits in Dover	None	Identify the discharge permits in Dover at the NJDEP	Completed		
Review ISRA cases in Dover	None	Identify the ISRA cases in Dover to determine potential sources of contamination.	Changed	Environmental Database Search in Township of Dover	Environmental Database Search is more comprehensive than ISRA search.
Evaluate Remedial Scenarios	None	Evaluate impacts extraction systems will have on off-site contamination; evaluate impacts off-site contamination will have on extraction systems; and characterize influent water quality to treatment systems.	Changed	Omit model runs from PDI	This work will be conducted during the Remedial Design where it is more appropriate.

¹ The groundwater samples were to be analyzed for TCL VOCs via CLP OLM04.2 with lower detection limits specified.

² The groundwater samples were analyzed for Low Concentration TCL VOCs via CLP OLC02.1 because of time constraints (i.e., specifying lower detection limits for OLM04.2 substantially increased the lead time needed to book lab space).

³ The groundwater samples were to be analyzed for TCL VOCs (+MTBE), TPH, and TAL metals.

⁴ The second round of groundwater samples were to be collected if VOCS are detected in the first round of samples.

⁵ The second round of groundwater sampling was deleted because of time constraints. However, the QA/QC samples were increased to 20 %.

Table 3-1 (con't)
Scope of Work Summary
Dover Municipal Well No. 4
Dover, New Jersey

Scope of Work Outlined in Contract	Boring/Well Number	Rationale	Completed or Changed	Revised Scope of Work	Reason for Change in Scope
Phase Two Scope of Work					
Monitoring Well Installation	MW-14S	Define the water quality in the shallow aquifer upgradient of 272 Route 46, Dover, NJ	Completed		
	MW-15S	Define the water quality in the shallow aquifer between 272 Route 46, Dover, NJ and MW-11S	Completed		
	MW-15I	Define the water quality in intermediate aquifer (if present) in immediate vicinity of 272 Route 46, Dover NJ	Completed		
	MW-13I	Define the water quality in intermediate aquifer between 272 Route 46, Dover, NJ and the MW-6 cluster	Completed		
	MW-10I	Define the water quality in the intermediate aquifer between Tinny's Auto Body/Carlson's Auto Body and the MW-6 cluster	Completed		
Soil Sampling	8 Soil Borings	Detect the source of the PCE in the shallow aquifer One soil sample from MW-14 and MW-15 monitoring well borings as well as eight shallow soil borings for analysis of TCL VOCs	Completed		
Groundwater Sampling ¹ 2 Rounds ²	Additional PDI Wells and existing well MW-2D	Determine the concentration of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover NJ Determine the concentration of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ	Completed		The second round of groundwater samples was deleted due time constraints
Conduct NJDEP File Review of Spartan Oil site	none	Determine the concentration of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ Determine the lateral extent of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ Determine the extent of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ	Completed		

¹ The groundwater samples were to be analyzed for TCL VOCs via CLP OLM04.2 with lower detection limits specified

² The groundwater samples were analyzed for Low Concentration TCL VOCs via CLP OLC02.1 because of time constraints (i.e., specifying lower detection limits for OLM04.2 substantially increased the lead time needed to book lab space).

³ The groundwater samples were to be analyzed for TCL VOCs (+MTBE), TPH, and TAL metals

⁴ The second round of groundwater samples were to be collected if VOCs are detected in the first round of samples

⁵ The second round of groundwater sampling was deleted because of time constraints. However, the QA/QC samples were increased to 20 %

**Table 3-1 (cont.)
Scope of Work Summary
Dover Municipal Well No. 4
Dover, New Jersey**

Scope of Work Outlined in Contract	Boring/Well Number	Rationale	Completed or Changed	Revised Scope of Work	Reason for Change in Scope
Phase Three Scope of Work					
Soil Sampling/ Soil Borings	SB-9	Collect unsaturated soil with the highest concentration of VOCs for Bench Scale Testing, determine the concentration of VOCs in the shallow aquifer, and determine if there is DNAPL at the bottom of the shallow aquifer.	Completed	Horizontal Boring Horizontal Boring	Ceiling is too low in basement to perform work according to scope. Ceiling is too low in basement to perform work according to scope.
	SB-10	Further define the eastern limit of VOCs in the unsaturated soil.	Completed		
	SB-11	Further define the eastern limit of VOCs in the unsaturated soil.	Completed		
	SB-12	Further define the eastern limit of VOCs in the unsaturated soil.	Completed		
	SB-13	Further define the eastern limit of VOCs in the unsaturated soil.	Completed		
	SB-14	Determine the concentration of VOCs in unsaturated soil underneath the building.	Changed		
	SB-15	Determine the concentration of VOCs in unsaturated soil underneath the building.	Changed		
	SB-16	Determine the concentration of VOCs in unsaturated soil in the back of the building where drums were reportedly stored.	Completed		
	SB-17	Determine the concentration of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ.	Completed		
	SB-18	Determine the concentration of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ.	Completed		
	SB-19	Determine the concentration of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ.	Completed		
	SB-20	Determine the lateral extent of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ.	Completed		
	SB-21	Determine the concentration of VOCs in the unsaturated soil down-gradient	Completed		
	SB-22	Determine the extent of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ.	Completed		
	SB-23	Determine the concentration of VOCs in the unsaturated soil down-gradient of 272 Route 46, Dover, NJ, if needed.	Completed		
	SB-24	Determine the concentration of VOCs in the unsaturated soil down-gradient of 272 Route 46, Dover, NJ, if needed.	Completed		
	SB-25	Determine the extent of VOCs in the unsaturated soil down-gradient of 272 Route 46, Dover, NJ and on railroad right-of-way, if needed.	Completed		
	SB-26	Determine the extent of VOCs in the unsaturated soil down-gradient of 272 Route 46, Dover, NJ and on railroad right-of-way, if needed.	Not Completed		
	B-27	Determine the extent of VOCs in the unsaturated soil down-gradient of 272 Route 46, Dover, NJ and on railroad right-of-way, if needed.	Completed		Drilled boring for HydroPunch groundwater sample but did not collect soil sample for laboratory analysis because the location is down-gradient of the source. Drilled boring for HydroPunch groundwater sample but did not collect soil sample for laboratory analysis because the location is down-gradient of the source. Drilled boring for HydroPunch groundwater sample but did not collect soil sample for laboratory analysis because the location is down-gradient of the source. Drilled boring for HydroPunch groundwater sample but did not collect soil sample for laboratory analysis because the location is down-gradient of the source. Drilled boring for HydroPunch groundwater sample but did not collect soil sample for laboratory analysis because the location is down-gradient of the source. Drilled boring for HydroPunch groundwater sample but did not collect soil sample for laboratory analysis because the location is down-gradient of the source. Insufficient room on right-of-way at this location to drill borings

¹ The groundwater samples were to be analyzed for TCL VOCs via CLP OLM04.2 with lower detection limits specified.

² The groundwater samples were analyzed for Low Concentration TCL VOCs via CLP OLC02.1 because of time constraints (i.e., specifying lower detection limits for OLM04.2 substantially increased the lead time needed to book lab space).

³ The groundwater samples were to be analyzed for TCL VOCs (+MTBE), TPH, and TAL metals.

⁴ The second round of groundwater samples were to be collected if VOCs are detected in the first round of samples.

⁵ The second round of groundwater sampling was deleted because of time constraints. However, the QA/QC samples were increased to 20 %.

**Table 3-1 (cont.)
Scope of Work Summary
Dover Municipal Well No. 4
Dover, New Jersey**

Scope of Work Outlined in Contract	Boring/Well Number	Rationale	Completed or Changed	Revised Scope of Work	Reason for Change in Scope
Phase Three Scope of Work					
Groundwater Hydropunch Sampling	B-9	Further define the eastern limit of VOCs in the shallow aquifer.	Completed		
	B-10	Further define the eastern limit of VOCs in the shallow aquifer.	Completed		
	B-11	Further define the eastern limit of VOCs in the shallow aquifer.	Not completed		Soil was impenetrable with the sampling devise
	B-12	Further define the eastern limit of VOCs in the shallow aquifer.	Not completed		Soil was impenetrable with the sampling devise
	B-13	Further define the eastern limit of VOCs in the shallow aquifer.	Completed		
	B-14	Determine the concentration of VOCs in shallow groundwater (if possible) underneath the building	Not completed		Drilled horizontal boring in unsaturated zone.
	B-15	Determine the concentration of VOCs in shallow groundwater (if possible) underneath the building	Not completed		Drilled horizontal boring in unsaturated zone.
	B-16	Determine the concentration of VOCs in shallow groundwater in the back of the building where drums where reportedly stored.	Not completed		Soil was impenetrable with the sampling devise
	B-17	Determine the concentration of VOCs in shallow groundwater in the back of the building where drums where reportedly stored.	Completed		
	B-18	Determine the western limit of VOCs in the shallow aquifer	Not completed		Soil was impenetrable with the sampling devise
	B-19	Determine the concentration of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ	Not completed		Soil was impenetrable with the sampling devise
	B-20	Determine the concentration of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ	Completed		
	B-21	Determine the concentration of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ	Completed		
	B-22	Determine the concentration of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ	Completed		
	B-23	Determine the concentration of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ	Not Completed		Soil was impenetrable with the sampling devise
Bench Scale Treatability Study	B-24	Determine the lateral extent of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ	Completed		
	B-25	Determine the extent of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ on railroad right-of-way	Completed		
	B-26	Determine the extent of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ on railroad right-of-way	Not Completed		Insufficient room on right-of-way to drill borings
	B-27	Determine the extent of VOCs in the shallow aquifer down-gradient of 272 Route 46, Dover, NJ on railroad right-of-way	Completed		
		Evaluate the effectiveness of Chemical Oxidation Treatment Technology	Completed		
			Executed additional scope	Installed horizontal well in beneath 272 Route 46, Dover, NJ	Will be used during the RD
			Executed additional scope	Collect groundwater sample from MW-15S; analyze for VOCs and BNA by CLP.	Determine if recently discovered upgradient source (Johnson Truck Accessories) of petroleum hydrocarbons will effect the RD
			Executed additional scope	Collect grab water sample from the sump in 272 Route 46, Dover, NJ	Evaluate if it is a source of groundwater contamination

¹ The groundwater samples were to be analyzed for TCL VOCs via CLP OLM04.2 with lower detection limits specified.

² The groundwater samples were analyzed for Low Concentration TCL VOCs via CLP OLC02.1 because of time constraints (i.e., specifying lower detection limits for OLM04.2 substantially increased the lead time needed to book lab space).

³ The groundwater samples were to be analyzed for TCL VOCs (+MTBE), TPH, and TAL metals.

⁴ The second round of groundwater samples were to be collected if VOCs are detected in the first round of samples.

⁵ The second round of groundwater sampling was deleted because of time constraints. However, the QA/QC samples were increased to 20 %.

**TABLE 4-1
SURVEY DATA
DOVER MUNICIPAL WELL NO. 4
DOVER, NEW JERSEY**

Description	Northing	Easting	Measuring Point Elevation* (MSL)
HP-1	748219.945	2034744.15	-
HP-2	748284.554	2034943.421	-
B-1	NA ¹	NA ¹	-
B-2	NA ¹	NA ¹	-
B-3	NA ¹	NA ¹	-
B-4	748239.555	480102.697	-
B-5	748226.048	480145.012	-
B-6	748222.704	480157.244	-
B-7	748220.224	480168.719	-
B-8	748209.446	480140.176	-
MW-6SR	747780.579	2034712.533	554.78
MW-10S	747947.279	2034751.871	555.83
MW-10I	747948.961	2034758.458	556.37
MW-11S	748016.974	2033966.557	554.74
MW-12I	746787.403	2034298.612	552.26
MW-13I	747867.398	2034352.388	556.43
MW-14S	748279.108	2034009.271	562.91
MW-15S	748209.004	2033967.141	558.30
MW-15I	748202.689	2033965.712	558.15
Staff Gage 3A	747178.269	2034352.924	548.29

¹ Boring was not surveyed because it was covered by a car

* - Measuring point is the top of the well casing for monitoring wells and the top of the pipe for staff gages.

TABLE 5-1
WATER LEVEL MEASUREMENTS
DOVER MUNICIPAL WELL NO. 4
DOVER , NEW JERSEY

Location	Measuring Point Elevation (MSL)	3/10/2000		3/24/2000	
		Depth to Water (TOC)	Water Level Elevation (MSL)	Depth to Water (TOC)	Water Level Elevation (MSL)
MW-1S	553.33	4.16	549.17	3.97	549.36
MW-1I	553.1	3.42	549.68	3.02	550.08
MW-1DI	553.58	3.78	549.80	3.21	550.37
MW-1DR	553.49	3.92	549.57	3.31	550.18
MW-2S	548.08	4.61	543.47	4.46	543.62
MW-2SA	549.16	NA	NA	2.56	546.60
MW-2IA	549.62	2.85	546.77	2.3	547.32
MW-2D	548.81	3.08	545.73	1.85	546.96
MW-4I	554.49	4.41	550.08	3.97	550.52
MW-4D	553.78	4.9	548.88	4.22	549.56
MW-5S	555.25	4.4	550.85	4.7	550.55
MW-5I	555.87	4.58	551.29	4.2	551.67
MW-5D	555.54	4.19	551.35	3.72	551.82
MW-6SR	554.78	5.11	549.67	4.68	550.10
MW-6I	555.11	5.12	549.99	4.34	550.77
MW-6D	555.4	6.14	549.26	5.46	549.94
MW-7S	553.21	2.42	550.79	2.21	551.00
MW-7I	553.13	1.31	551.82	1.11	552.02
MW-7D	553.05	1.04	552.01	0.68	552.37
MW-8S	552.25	3.8	548.45	3.78	548.47
MW-8I	551.83	0.77	551.06	0	551.83
MW-9I	550.07	flowing	NA	-0.31	550.38
MW-9D	549.68	0.46	549.22	-0.01	549.69
MW-10S	555.83	3.74	552.09	3.32	552.51
MW-11S	554.74	4.7	550.04	4.33	550.41
MW-12I	552.26	2.76	549.50	2.46	549.80
STAFF 1	548.17	NA	NA	NA	NA
STAFF 2	551.23	NA	NA	NA	NA
STAFF 3	544.47	NA	NA	NA	NA
STAFF 3A	548.29	3.45	544.84	3.3	544.99
STAFF 4	542.78	2.44	540.34	2.8	539.98

NA = Not Available

MSL = Feet above mean sea level.

TOC = Measurement taken from the top of the well casing.

Table 5-2
VOCs Detected in Soil Samples Collected During PDI
Dover Municipal Well No. 4
Dover, New Jersey

Sample Name	Potential Standard	SB-01	SB-02	SB-03	SB-04	SB-05	Duplicate of SB-05	SB-06	SB-07	SB-08
Sample Depth (feet below ground surface)		2 to 4	6 to 8	8 to 10	8 to 10	8 to 10	8 to 10	6 to 8	10 to 12	6 to 8
Matrix		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Sample Date		9/22/2000	9/22/2000	9/22/2000	9/22/2000	9/21/2000	9/21/2000	9/21/2000	9/22/2000	9/21/2000
Parameter										
Vinyl Chloride (VC)	2,000	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene (cis-1,2-DCE)	1,000	ND	14 J	ND	ND	ND	ND	ND	ND	ND
Trichloroethene (TCE)	1,000	ND	16 J	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene (PCE)	1,000	3 J	12 J	14 J	32 J	78 J	110 J	150 J	48 J	37,000 J
Trichlorofluoromethane	NA	ND	ND	2 J	ND	ND	ND	ND	ND	ND
Bromoethane	79,000	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone	50,000	ND	ND	ND	10 J	3 J	2 J	ND	ND	ND
4-Methyl-2-pentanone	50,000	ND	ND	ND	ND	ND	0.9 J	ND	ND	ND
Acetone	1,000,000	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide	NA	ND	ND	1 J	ND	ND	ND	ND	ND	ND
Chloromethane	520,000	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	1,000	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexane	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl Acetate	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylcyclohexane	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	1,000	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	100,000	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	500,000	1 J	2 J	1 J	1 J	2 J	2 J	ND	2 J	ND
Xylenes (total)	10,000	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND - Not Detected

J - Estimated Value

NA - Not Available

HB-1a and HB-1b were collected from the horizontal boring.

Potential Standard is the lower of the proposed NJ Residential
Direct Contact Soil Criteria and the NJ Impact to Groundwater
Soil Criteria (NJAC 7:26F).

Exceedances of the Potential Standards are highlighted and bolded.

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Table 5-2
VOCs Detected in Soil Samples Collected During PDI
Dover Municipal Well No. 4
Dover, New Jersey

Sample Name		SB-09	SB-10	SB-11	SB-12	SB-13	SB-16	SB-17	SB-18
Sample Depth (feet below ground surface)	Potential	8 to 11	4 to 6	6 to 8	4 to 6	6 to 8	4 to 6	6 to 8	2 to 4
Matrix	Standard	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Sample Date		8/6/2001	8/6/2001	8/7/2001	8/7/2001	8/6/2001	8/6/2001	8/7/2001	8/7/2001
Parameter									
Vinyl Chloride (VC)	2,000	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene (cis-1,2-DCE)	1,000	ND	ND	ND	3 J	5 J	ND	ND	ND
Trichloroethene (TCE)	1,000	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene (PCE)	1,000	110,000	18,000	ND	19	24	2 J	19	150
Trichlorofluoromethane	NA	ND	ND	ND	ND	ND	ND	ND	ND
Bromoethane	79,000	ND	ND	3 J	1 J	ND	ND	ND	ND
2-Butanone	50,000	ND	ND	11 J	4 J	ND	ND	45	24
4-Methyl-2-pentanone	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	1,000,000	ND	ND	160 J	ND	ND	ND	ND	340
Carbon Disulfide	NA	ND	ND	ND	2 J	ND	ND	ND	ND
Chloromethane	520,000	ND	ND	ND	ND	ND	ND	3 J	ND
Chloroform	1,000	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexane	NA	ND	ND	ND	ND	ND	ND	ND	ND
Methyl Acetate	NA	ND	ND	ND	ND	ND	ND	ND	1 J
Methylcyclohexane	NA	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	1,000	1500 J	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	100,000	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	500,000	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes (total)	10,000	ND	ND	ND	ND	ND	ND	ND	ND

ND - Not Detected

J - Estimated Value

NA - Not Available

HB-1a and HB-1b were collected from the horizontal boring.

Potential Standard is the lower of the proposed NJ Residential
Direct Contact Soil Criteria and the NJ Impact to Groundwater
Soil Criteria (NJAC 7:26F).

Exceedances of the Potential Standards are highlighted and bolded.

Table 5-2
VOCs Detected in Soil Samples Collected During PDI
Dover Municipal Well No. 4
Dover, New Jersey

Sample Name		SB-19	Duplicate of SB-19	SB-20	HB-1a	HB-1b	MW-14S	Duplicate of MW-14S	MW-15I
Sample Depth (feet below ground surface)	Potential	2 to 4	2 to 4	2 to 4	3.5	4.0	6 to 8	6 to 8	2 to 4
Matrix	Standard	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Sample Date		8/8/2001	8/8/2001	8/8/2001	8/2/2001	8/2/2001	9/28/2000	9/28/2000	9/25/2000
Parameter									
Vinyl Chloride (VC)	2,000	ND	ND	ND	31	ND	ND	ND	ND
cis-1,2-Dichloroethene (cis-1,2-DCE)	1,000	ND	ND	ND	2 J	1 J	ND	ND	ND
Trichloroethene (TCE)	1,000	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene (PCE)	1,000	6	1 J	1 J	2 J	33	3 J	5 J	13 J
Trichlorofluoromethane	NA	ND	ND	ND	ND	ND	ND	ND	ND
Bromoethane	79,000	1 J	ND	ND	ND	ND	ND	ND	ND
2-Butanone	50,000	4 J	ND	ND	10 J	ND	ND	ND	14 J
4-Methyl-2-pentanone	50,000	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	1,000,000	ND	ND	ND	36 J	19 J	ND	ND	130 J
Carbon Disulfide	NA	ND	ND	ND	13 J	3 J	ND	ND	ND
Chloromethane	520,000	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	1,000	ND	ND	ND	2 J	ND	ND	ND	ND
Cyclohexane	NA	ND	ND	ND	2 J	ND	ND	ND	ND
Methyl Acetate	NA	ND	ND	ND	ND	ND	ND	ND	ND
Methylcyclohexane	NA	ND	ND	ND	12J	ND	ND	ND	ND
Methylene Chloride	1,000	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	100,000	ND	ND	ND	3 J	ND	ND	ND	ND
Toluene	500,000	ND	ND	ND	2 J	ND	1 J	6 J	ND
Xylenes (total)	10,000	ND	ND	ND	20 J	ND	ND	10	ND

ND - Not Detected

J - Estimated Value

NA - Not Available

HB-1a and HB-1b were collected from the horizontal boring.

Potential Standard is the lower of the proposed NJ Residential

Direct Contact Soil Criteria and the NJ Impact to Groundwater

Soil Criteria (NJAC 7:26F).

Exceedances of the Potential Standards are highlighted and bolded.

100105

Table 5-3
VOCs Detected in Groundwater Screening Samples
Collected During PDI
Dover Municipal Well No. 4
Dover, New Jersey

Sample Name Matrix Units Sample Date	Potential Standard ug/L	HP-1 WATER ug/L 2/25/2000	HP-2 WATER ug/L 2/25/2000	HP-2 Dup WATER ug/L 2/25/2000	HP-9 WATER ug/L 08/13/0221	HP-10 WATER ug/L 8/13/2001	HP-13 WATER ug/L 8/9/2001	HP-17 WATER ug/L 8/14/2001	HP-20 WATER ug/L 8/13/2001
Parameter	ug/L								
Vinyl chloride	2	ND	ND	ND	ND	ND	ND	140 D	45 D
1,1-Dichloroethene (1,1-DCE)	2	ND	ND	ND	ND	0.65	ND	ND	ND
cis-1,2-Dichloroethene (cis-1,2-DCE)	10	ND	ND	ND	1.2	2.6	4.3	220 D	27 D
trans-1,2-Dichloroethene (trans-1,2-DCE)	100	ND	ND	ND	ND	ND	ND	1.9	1.2
Trichloroethene (TCE)	1	ND	ND	ND	2.1	3.7	4 J	89 D	6.9
Tetrachloroethene (PCE)	1	ND	ND	ND	11,000 D	8,900 D	19,000 D	430 D	6.4
1,2-Dichlorobenzene	600	5	1	1	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	75	0.4 J	ND	ND	ND	ND	ND	ND	ND
Acetone	700	R	10 J	R	ND	36	ND	ND	ND
Carbon Disulfide	NA	0.3 J	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	NA	ND	ND	ND	ND	ND	ND	0.63	ND
Chlorobenzene	4	ND	ND	ND	ND	0.95	0.5 J	ND	ND
tert-Butyl Methyl Ether (MTBE)	70	ND	ND	ND	ND	ND	ND	ND	2.9
Benzene	1	12	0.8 J	0.9 J	ND	ND	ND	ND	ND
Ethylbenzene	700	0.3 J	ND	ND	ND	ND	ND	ND	ND
Xylenes (total)	40	2 X	ND	ND	ND	ND	ND	ND	ND

ND - Not Detected

D - Dilution Result

J - Estimated Value

X - Qualifier not defined in the case narrative.

R - Analysis did not pass EPA QA/QC

Potential Standard is the lowest of the Federal MCLs (40 CFR 141),

NJMCLs (NJAC 7:10-16), or the NJ Groundwater Quality

Criteria (NJAC 7:9-6).

Exceedances of the Potential Standards are highlighted and bolded.

Table 5-3
VOCs Detected in Groundwater Screening Samples
Collected During PDI
Dover Municipal Well No. 4
Dover, New Jersey

Sample Name Matrix Units Sample Date Parameter	Potential Standard ug/L	HP-21 WATER ug/L 8/10/2001	HP-22 WATER ug/L 8/10/2001	HP-24 WATER ug/L 8/15/2001	HP-25 WATER ug/L 8/9/2001	HP-27 WATER ug/L 8/9/2001	S-01 (Sump) WATER ug/L 8/2/2001
Vinyl chloride	2	0.55 J	130 D	ND	0.85	ND	ND
1,1-Dichloroethene (1,1-DCE)	2	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene (cis-1,2-DCE)	10	2.5 J	5.1	0.65	2.4	4 J	1.3
trans-1,2-Dichloroethene (trans-1,2-DCE)	100	ND	1.6	ND	ND	ND	ND
Trichloroethene (TCE)	1	1.1	0.89	7.5	ND	2.4 J	0.6 J
Tetrachloroethene (PCE)	1	0.96	0.61	200 D	0.72	2.9 J	70 D
1,2-Dichlorobenzene	600	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	75	ND	ND	ND	ND	ND	ND
Acetone	700	29 J	ND	ND	ND	ND	ND
Carbon Disulfide	NA	1.8 J	0.63	ND	ND	ND	ND
Isopropylbenzene	NA	ND	ND	ND	ND	ND	ND
Chlorobenzene	4	ND	ND	ND	ND	R	ND
tert-Butyl Methyl Ether (MTBE)	70	18 J	ND	0.6	22 J	2.3	2.3
Benzene	1	ND	ND	ND	ND	ND	ND
Ethylbenzene	700	ND	ND	ND	ND	ND	ND
Xylenes (total)	40	ND	ND	ND	ND	ND	0.025 J

ND - Not Detected

D - Dilution Result

J - Estimated Value

X - Qualifier not defined in the case narrative.

R - Analysis did not pass EPA QA/QC

Potential Standard is the lowest of the Federal MCLs (40 CFR 141),

NJMCLs (NJAC 7:10-16), or the NJ Groundwater Quality

Criteria (NJAC 7:9-6).

Exceedances of the Potential Standards are highlighted and bolded.

Table 5-4

VOCs Detected in First Round of Groundwater
 Samples Collected During PDI
 Dover Municipal Well No. 4
 Dover, New Jersey

Sample Name Matrix Units Sample Date Parameter	Potential Standard ug/L	MW-1S WATER ug/L 3/15/2000	MW-1I WATER ug/L 3/15/2000	Duplicate of MW-1I WATER ug/L 3/15/2000	MW-1D WATER ug/L 3/15/2000	MW-1DR WATER ug/L 3/15/2000	MW-2C WATER ug/L 3/17/2000	MW-4I WATER ug/L 3/16/2000
1,1,1-Trichloroethane (1,1,1-TCA)	30	ND	ND	ND	ND	ND	ND	2
1,1-Dichloroethane (1,1-DCA)	50	ND	ND	ND	ND	ND	ND	0.8 J
1,1-Dichloroethene (1,1-DCE)	2	ND	ND	ND	ND	ND	ND	1
1,2-Dichlorobenzene	600	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	50	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	1	ND	ND	ND	ND	ND	ND	ND
Acetone	700	R	R	R	R	R	R	7 J
Benzene	1	ND	ND	ND	ND	ND	ND	ND
Carbon disulfide	NA	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene (cis-1,2-DCE)	10	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	700	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene (PCE)	1	ND	ND	ND	ND	1	6	ND
trans-1,2-Dichloroethene (trans-1,2-DCE)	100	ND	ND	ND	ND	ND	ND	ND
Trichloroethene (TCE)	1	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride (VC)	2	ND	ND	ND	ND	ND	ND	ND
Xylenes (total)	40	ND	ND	ND	ND	ND	ND	ND

ND - Not Detected

R - Analysis did not pass EPA QA/QC

D - Dilution Result

X - Qualifier not defined in the case narrative

J - Estimated Value

Potential Standard is the lowest of the Federal MCLs (40 CFR 141),
 NJMCLs (NJAC 7:10-16), or the NJ Groundwater Quality
 Criteria (NJAC 7:9-6).

Exceedances of the Potential Standards are highlighted and bolded.

Table 5-4

VOCs Detected in First Round of Groundwater
 Samples Collected During PDI
 Dover Municipal Well No. 4
 Dover, New Jersey

Sample Name Matrix Units Sample Date Parameter	Potential Standard ug/L	Duplicate of MW-4I WATER ug/L 3/16/2000	MW-5I WATER ug/L 3/17/2000	MW-6SR WATER ug/L 3/16/2000	Duplicate of MW-6SR WATER ug/L 3/16/2000	MW-6I WATER ug/L 3/16/2000	MW-6D WATER ug/L 3/16/2000	MW-7I WATER ug/L 3/17/2000
1,1,1-Trichloroethane (1,1,1-TCA)	30	2	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane (1,1-DCA)	50	0.7 J	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene (1,1-DCE)	2	1	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	600	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	50	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	1	ND	0.7 J	ND	ND	ND	ND	ND
Acetone	700	R	R	R	R	R	R	R
Benzene	1	ND	ND	ND	ND	ND	ND	ND
Carbon disulfide	NA	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene (cis-1,2-DCE)	10	ND	0.9 J	ND	ND	ND	ND	ND
Ethylbenzene	700	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene (PCE)	1	ND	ND	ND	ND	38 D	19	0.3 J
trans-1,2-Dichloroethene (trans-1,2-DCE)	100	ND	ND	ND	ND	ND	ND	ND
Trichloroethene (TCE)	1	ND	0.5 J	ND	ND	ND	ND	ND
Vinyl chloride (VC)	2	ND	ND	ND	ND	ND	ND	ND
Xylenes (total)	40	ND	ND	ND	ND	ND	ND	ND

ND - Not Detected

R - Analysis did not pass EPA QA/QC

D - Dilution Result

X - Qualifier not defined in the case narrative.

J - Estimated Value

Potential Standard is the lowest of the Federal MCLs (40 CFR 141),
 NJMCLs (NJAC 7:10-16), or the NJ Groundwater Quality
 Criteria (NJAC 7:9-6).

Exceedances of the Potential Standards are highlighted and bolded.

Table 5-4

VOCs Detected in First Round of Groundwater
 Samples Collected During PDI
 Dover Municipal Well No. 4
 Dover, New Jersey

Sample Name Matrix Units Sample Date	Potential Standard ug/L	MW-8I WATER ug/L 3/17/2000	MW-9I WATER ug/L 3/17/2000	Duplicate of MW-9I WATER ug/L 3/17/2000	MW-10S WATER ug/L 3/16/2000	MW-11S WATER ug/L 3/17/2000	MW-12I WATER ug/L 3/16/2000
Parameter	ug/L						
1,1,1-Trichloroethane (1,1,1-TCA)	30	1	ND	ND	ND	ND	ND
1,1-Dichloroethane (1,1-DCA)	50	0.4 J	2	2	ND	ND	ND
1,1-Dichloroethene (1,1-DCE)	2	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	600	ND	ND	ND	ND	0.8 J	0.4 J
1,2-Dichloroethane	50	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	1	ND	ND	ND	ND	ND	ND
Acetone	700	R	R	R	R	R	R
Benzene	1	ND	ND	ND	ND	ND	ND
Carbon disulfide	NA	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene (cis-1,2-DCE)	10	ND	ND	ND	ND	21	ND
Ethylbenzene	700	ND	ND	ND	ND	ND	ND
Tetrachloroethene (PCE)	1	ND	ND	ND	ND	210 D	ND
trans-1,2-Dichloroethene (trans-1,2-DCE)	100	ND	ND	ND	ND	0.5 J	ND
Trichloroethene (TCE)	1	1	ND	ND	ND	4	ND
Vinyl chloride (VC)	2	ND	ND	ND	ND	10	ND
Xylenes (total)	40	ND	ND	ND	ND	ND	ND

ND - Not Detected

R - Analysis did not pass EPA QA/QC

D - Dilution Result

X - Qualifier not defined in the case narrative

J - Estimated Value

Potential Standard is the lowest of the Federal MCLs (40 CFR 141),

NJMCLs (NJAC 7:10-16), or the NJ Groundwater Quality

Criteria (NJAC 7:9-6).

Exceedances of the Potential Standards are highlighted and bolded.

Table 5-5
VOCs Detected in Second Round of Groundwater Samples
Collected During PDI
Dover Municipal Well No. 4
Dover, New Jersey

Sample Name Matrix Units Sample Date Parameter	Potential Standard ug/L	MW-2D WATER ug/L 10/25/2000	MW-10I WATER ug/L 10/24/2000	MW-13I WATER ug/L 10/24/2000	MW-14S WATER ug/L 10/25/2000	MW-15S WATER ug/L 10/24/2000	Duplicate of MW-15S WATER ug/L 10/24/2000	MW-15I WATER ug/L 10/24/2000	Duplicate of MW-15I WATER ug/L 10/24/2000
Trichloroflouromethane	NA	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone	300	2 J	R	R	3 J	R	R	R	R
1,1,1-Trichloroethane (1,1,1-TCA)	30	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	10	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane (1,1-DCA)	50	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene (1,1-DCE)	2	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	600	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	50	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	1	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	700	ND J	R	R	ND J	R	R	R	R
Benzene	1	ND	ND	ND	ND	ND	ND	ND	ND
Carbon disulfide	NA	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene (cis-1,2-DCE)	10	ND	ND	ND	ND	480 J	410 J	ND	ND
Ethylbenzene	700	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene (PCE)	1	ND	ND	ND J	2	5700	6900	70	88
trans-1,2-Dichloroethene (trans-1,2-DCE)	100	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene (TCE)	1	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	2	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes (total)	40	ND	ND	ND	ND	ND	ND	ND	ND

ND - Not Detected

NA - Not Available

R - Analysis did not pass EPA QA/QC

J - Estimated Value

Potential Standard is the lowest of the Federal MCLs (40 CFR 141),

NJMCLs (NJAC 7:10-16), or the NJ Groundwater Quality

Criteria (NJAC 7:9-6).

Exceedances of the Potential Standards are highlighted and bolded.

Table 5-6
VOCs Detected in Third Round of Groundwater Samples
Collected During PDI
Dover Municipal Well No. 4
Dover, New Jersey

Sample Name Matrix Units Sample Date Parameter	Potential Standard ug/L	MW-2D WATER ug/L 11/7/2000	MW-10I WATER ug/L 11/7/2000	MW-13I WATER ug/L 11/6/2000	MW-14S WATER ug/L 11/7/2000	MW-15S WATER ug/L 11/6/2000	Duplicate of MW-15S WATER ug/L 11/6/2000	MW-15I WATER ug/L 11/6/2000	Duplicate of MW-15I WATER ug/L 11/6/2000
Trichloroflouromethane	NA	0.4 J	ND	ND	ND	ND	ND	ND	ND
2-Butanone	300	2	3	2.4	3	2	1.8	4.7	4.5
1,1,1-Trichloroethane (1,1,1-TCA)	30	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	10	ND	ND	ND	ND	1.6	1.7	ND	ND
1,1-Dichloroethane (1,1-DCA)	50	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene (1,1-DCE)	2	ND	ND	ND	ND	0.6 J	0.7 J	ND	ND
1,2-Dichlorobenzene	600	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	50	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	1	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	700	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	1	ND	ND	ND	ND	ND	ND	ND	ND
Carbon disulfide	NA	ND	ND	ND	ND	4.4	ND	ND	ND
cis-1,2-Dichloroethene (cis-1,2-DCE)	10	ND	ND	ND	ND	470	480	1.4 J	ND
Ethylbenzene	700	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene (PCE)	1	0.9 J	ND	0.9 J	1.1	8300	9000	230	230
trans-1,2-Dichloroethene (trans-1,2-DCE)	100	ND	ND	ND	ND	1 J	1 J	ND	ND
Trichloroethene (TCE)	1	ND	ND	ND	ND	140	140	0.5 J	ND
Vinyl chloride	2	ND	ND	ND	ND	0.5 J	0.5 J	ND	ND
Xylenes (total)	40	ND	ND	ND	ND	ND	ND	ND	ND

ND - Not Detected

NA - Not available

R - Analysis did not pass EPA QA/QC

J - Estimated Value

Potential Standard is the lowest of the Federal MCLs (40 CFR 141),

NJMCLs (NJAC 7:10-16), or the NJ Groundwater Quality

Criteria (NJAC 7:9-6).

Exceedances of the Potential Standards are highlighted and bolded.

100112

Table 5-7
VOCs Detected in Groundwater Samples Collected During Phase III PDI
Dover Municipal Well No. 4
Dover, New Jersey

Sampling Name Matrix Units Parameter	Potential Standard ug/L	MW-15S Water ug/L
Vinyl Chloride	2	0.92
trans-1,2-Dichloroethene	100	1.7
cis-1,2-Dichloroethene	10	590 D
Trichloroethene	1	98 J
Tetrachloroethene	1	4700 D

D - Dilution Result

J - Estimated Value

Potential Standard is the lowest of the Federal MCLs (40 CFR 141),
NJMCLs (NJAC 7:10-16), or the NJ Groundwater Quality
Criteria (NJAC 7:9-6).

Exceedances of the Potential Standards are highlighted and bolded.

Table 7-1
Inorganic Parameters in Groundwater
Phase III PDI
Dover Municipal Well No. 4
Dover, New Jersey

Samle Name	MW-15S
Matrix	Water
Units	mg/L
Sample Date	8/14/2001
Calcium (total)	39.7
Iron (total)	1.56
Magnesium (total)	13.2
Manganese (total)	1.16
Potassium (total)	2.64
Sodium (total)	57.1
Alkalinity	24.5
Biological Oxygen Demand (BOD)	2.0 U
Chloride	160
Chemical Oxygen Demand (COD)	10.0 U
Nitrate (NO ₃)	1.6
Oil & Grease	10.0 U
Sulfate (SO ₄)	24.7
Total Organic Carbon (TOC)	1.0 U
Total Phosphate (as P)	0.037
DO*	0.64
pH*	5.46

U = Not Detected

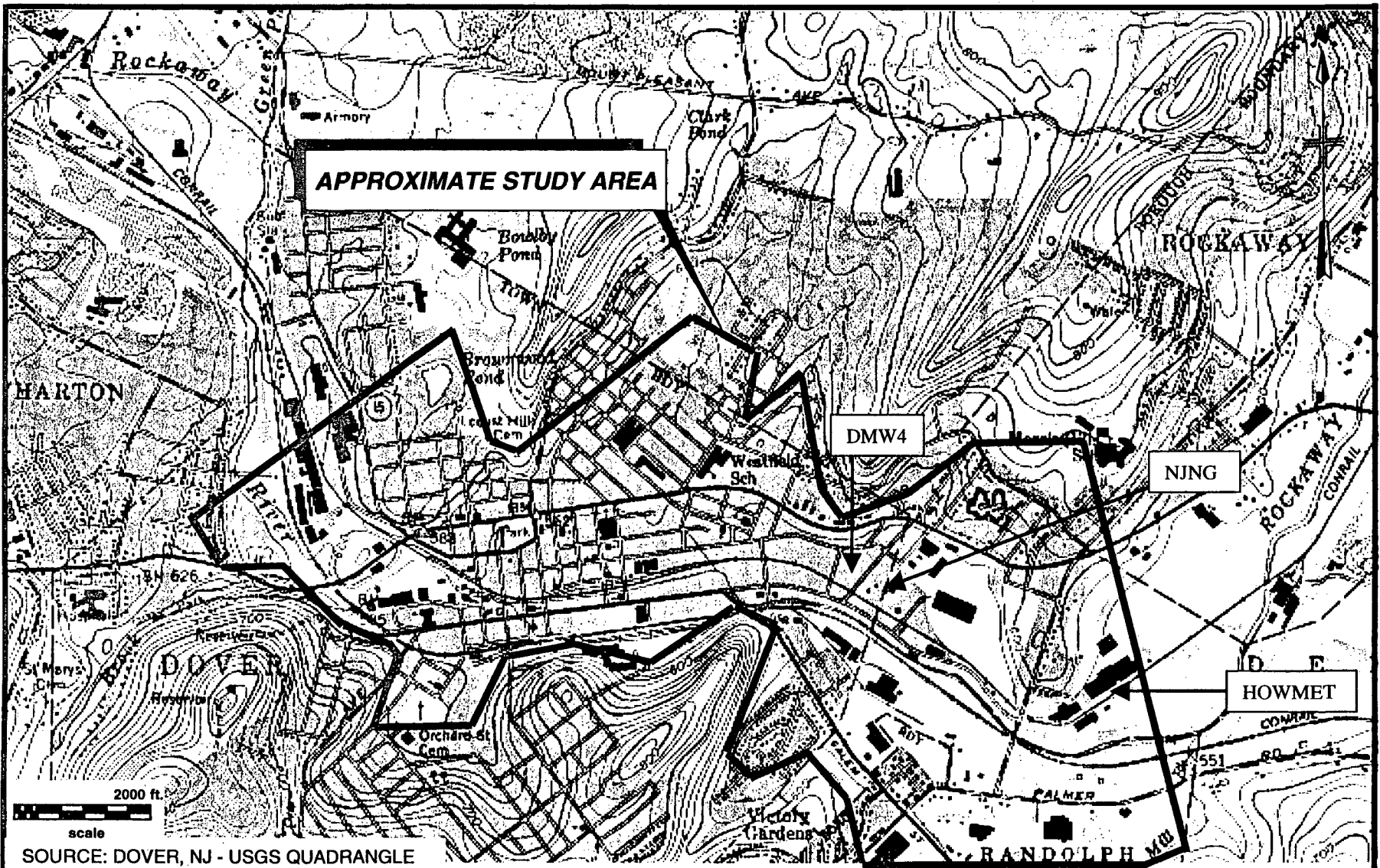
* Measured in the field

Table 7-2
Inorganic Parameters in Soil
Phase III PDI
Dover Municipal Well No. 4
Dover, New Jersey

Sample Name Matrix Units	SB-11 Soil mg/Kg	SB-13 Soil mg/Kg	SB-17 Soil mg/Kg	SB-19 Soil mg/Kg	SB-20 Soil mg/Kg
Iron (total)	21000	21300	21600	25800	25600
Iron (2+)*	0.1U	0.1U	0.1U	0.1U	0.1U
TOC	7690	1120	492	3040	14500

* from SPLP Leachate

Figures



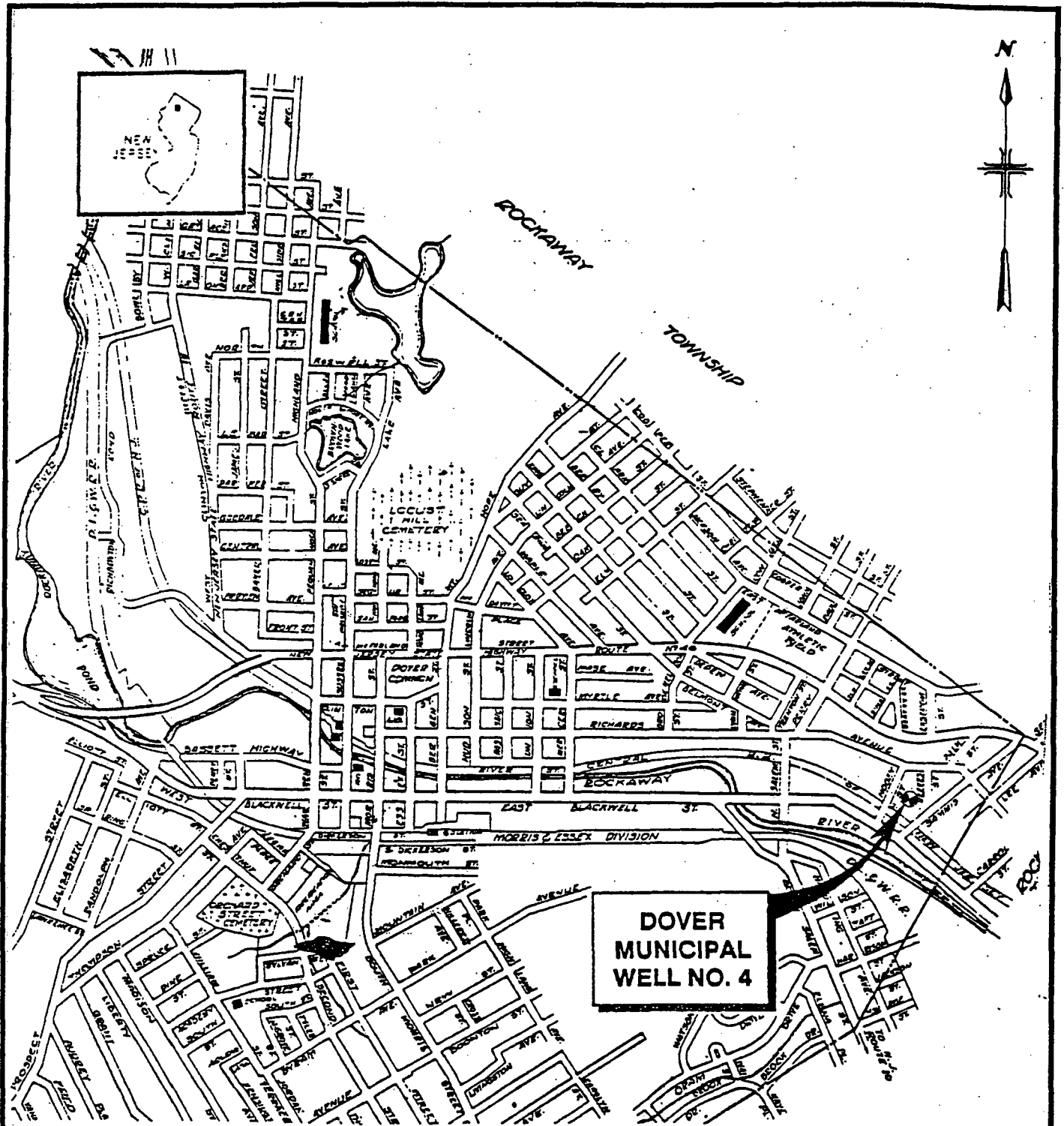
**MALCOLM
PIRNIE**

STUDY AREA MAP
DOVER MUNICIPAL WELL NO. 4
DOVER, NEW JERSEY

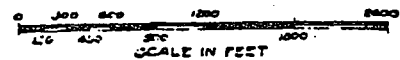
MALCOLM PIRNIE, INC.

FIGURE 2-1

100117



SOURCE: FEASIBILITY STUDY REPORT (TRC, JULY 1992).



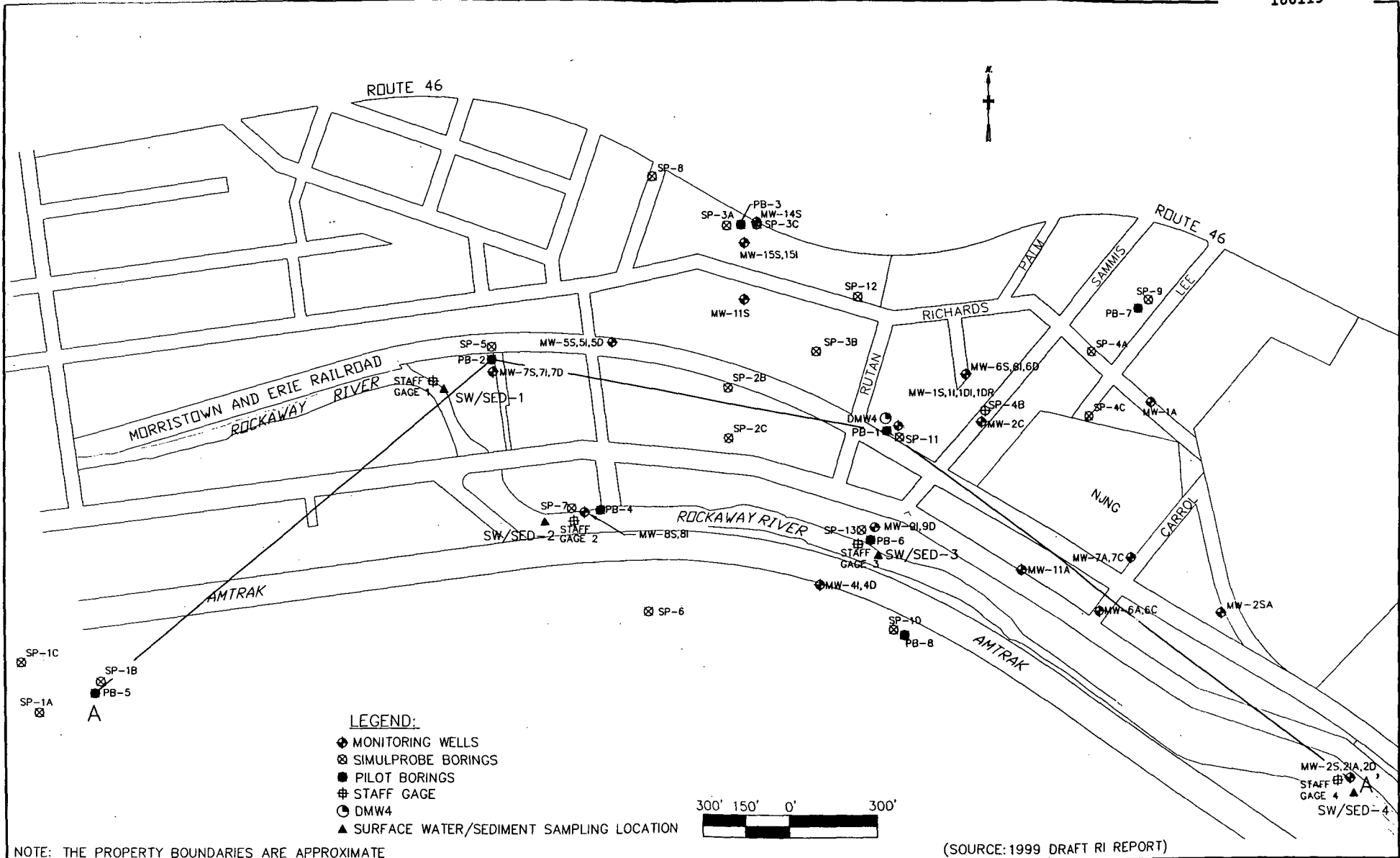
**MALCOLM
PIRNIE**

LOCATION DETAIL MAP

MALCOLM PIRNIE, INC.

**DOVER MUNICIPAL WELL NO. 4
DOVER, NEW JERSEY**

FIGURE 2-2



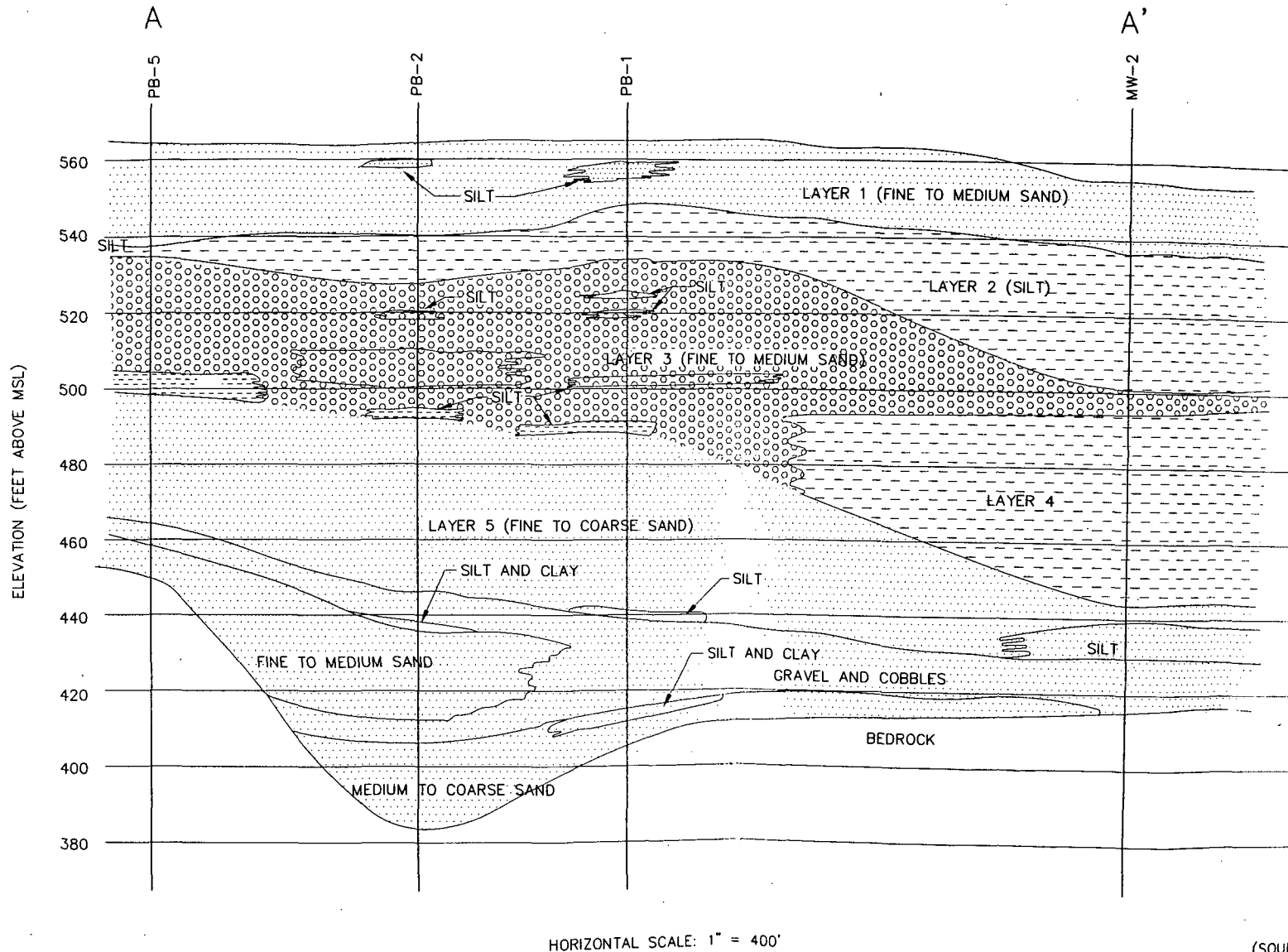
**MALCOLM
PIRNE**

DOVER MUNICIPAL WELL NO.4 DOVER, NEW JERSEY

OU2 RI SIMULPROBE, MONITORING WELL, STAFF GAGE
SURFACE WATER, SEDIMENT, AND CROSS - SECTION LOCATIONS

MALCOLM PIRNE, INC.

FIGURE 2-3



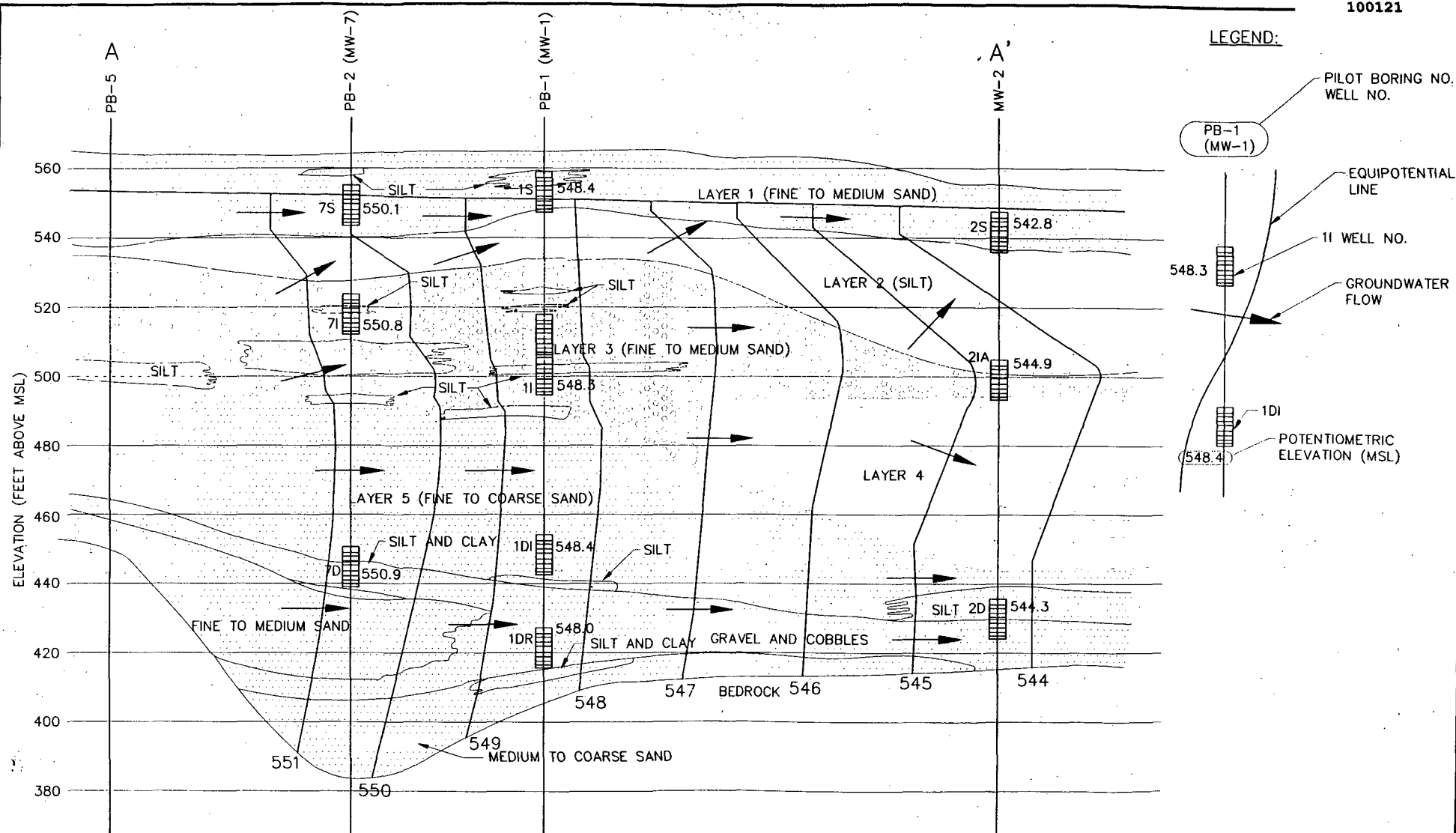
(SOURCE: 1999 DRAFT RI REPORT)

**MALCOLM
PIRNIE**

**DOVER MUNICIPAL WELL NO.4
DOVER, NEW JERSEY**

GEOLOGIC CROSS SECTION A-A'

FIGURE 2-4



HORIZONTAL SCALE: 1" = 400'

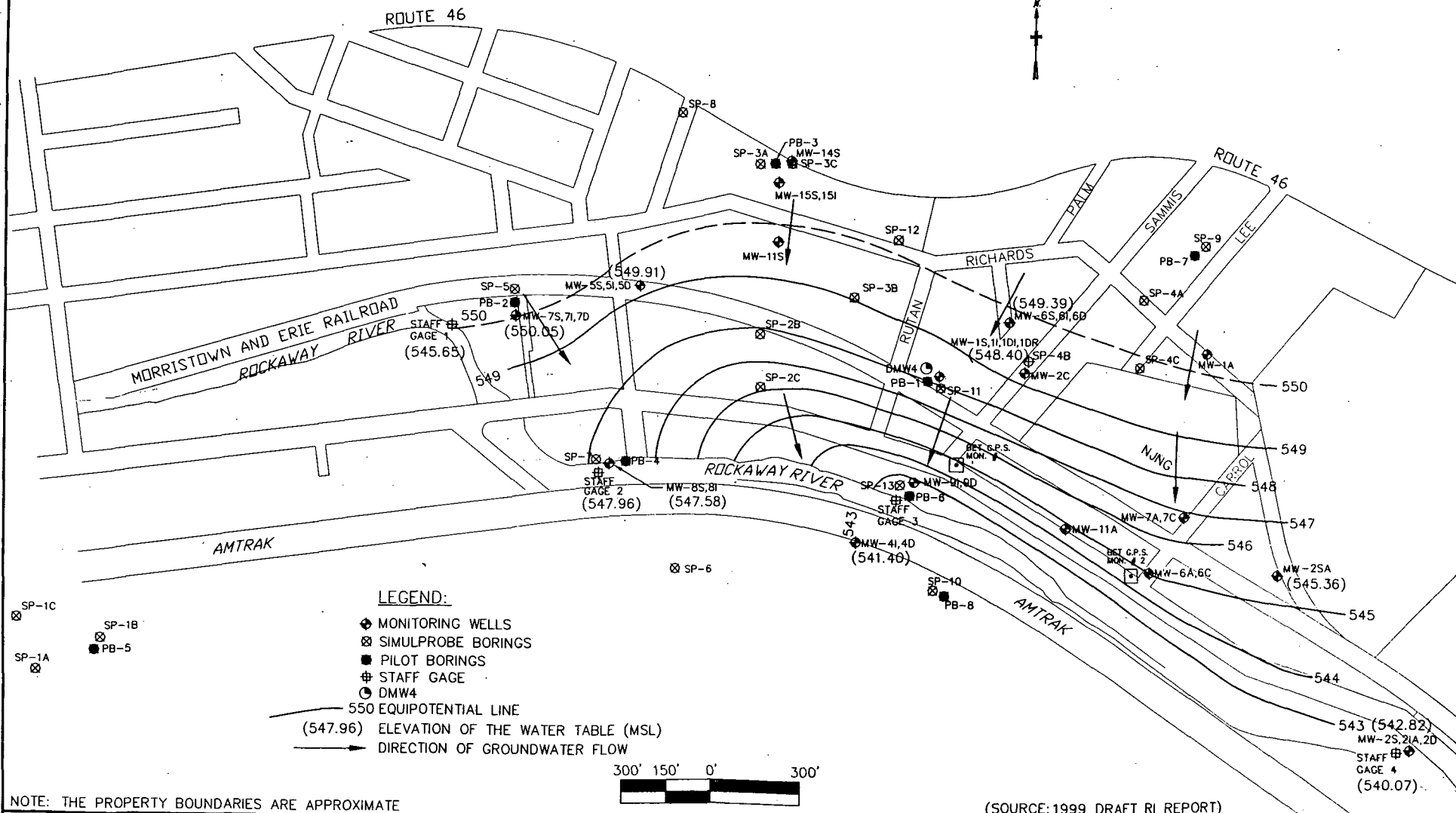
(SOURCE: 1999 DRAFT RI REPORT)

GENERALIZED HYDROGEOLOGIC CROSS-SECTION OCTOBER 19, 1998

MALLON PAPER, INC.

FIGURE 2-5

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NOTE: THE PROPERTY BOUNDARIES ARE APPROXIMATE

(SOURCE: 1999 DRAFT RI REPORT)

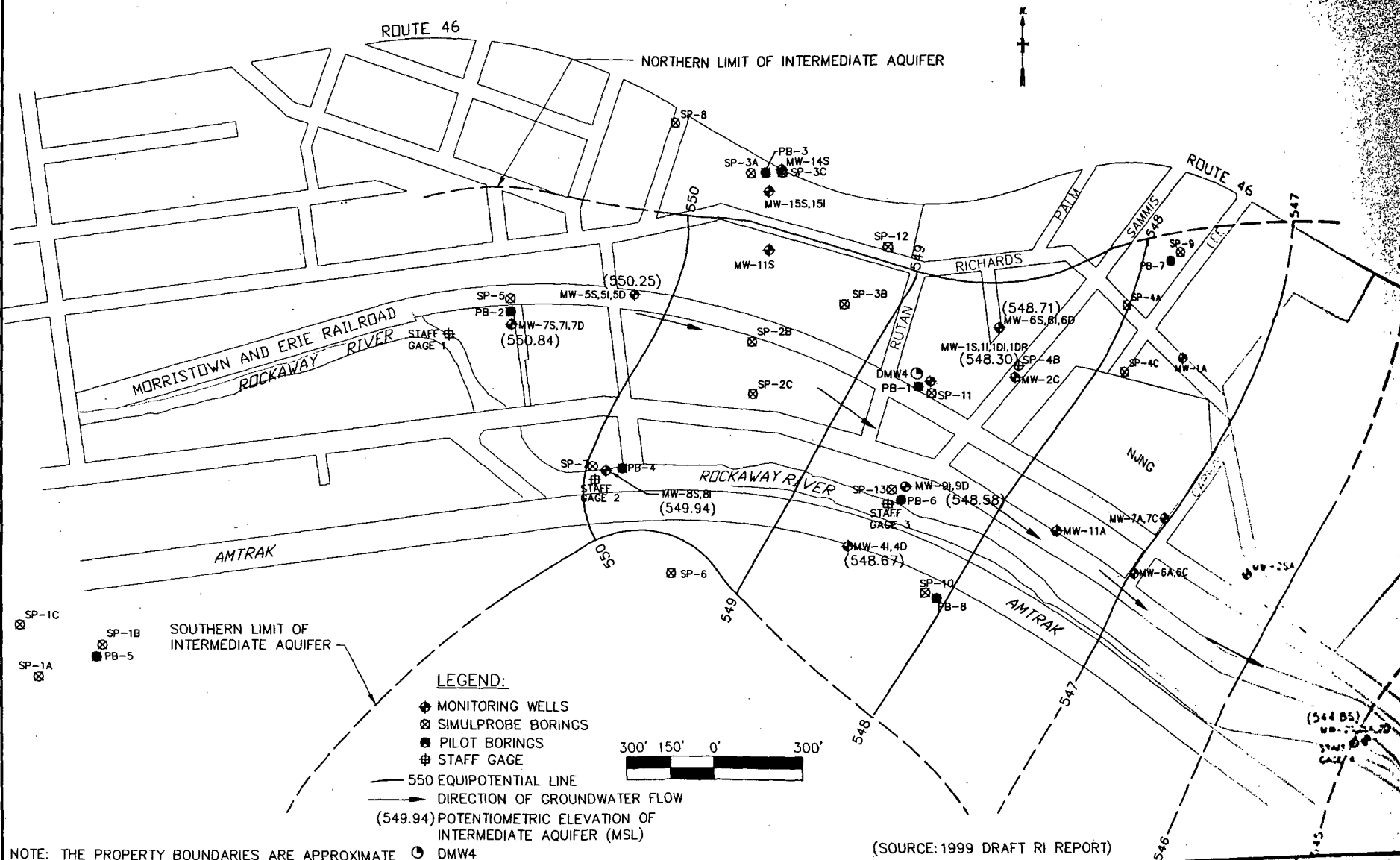
**MALCOLM
PIRNIE**

DOVER MUNICIPAL WELL NO.4
DOVER, NEW JERSEY

POTENTIOMETRIC SURFACE OF THE SHALLOW AQUIFER ON OCT. 19, 1998

MALCOLM PIRNIE, INC

FIGURE 2-6



NOTE: THE PROPERTY BOUNDARIES ARE APPROXIMATE

Ⓛ DMW4

(SOURCE: 1999 DRAFT RI REPORT)

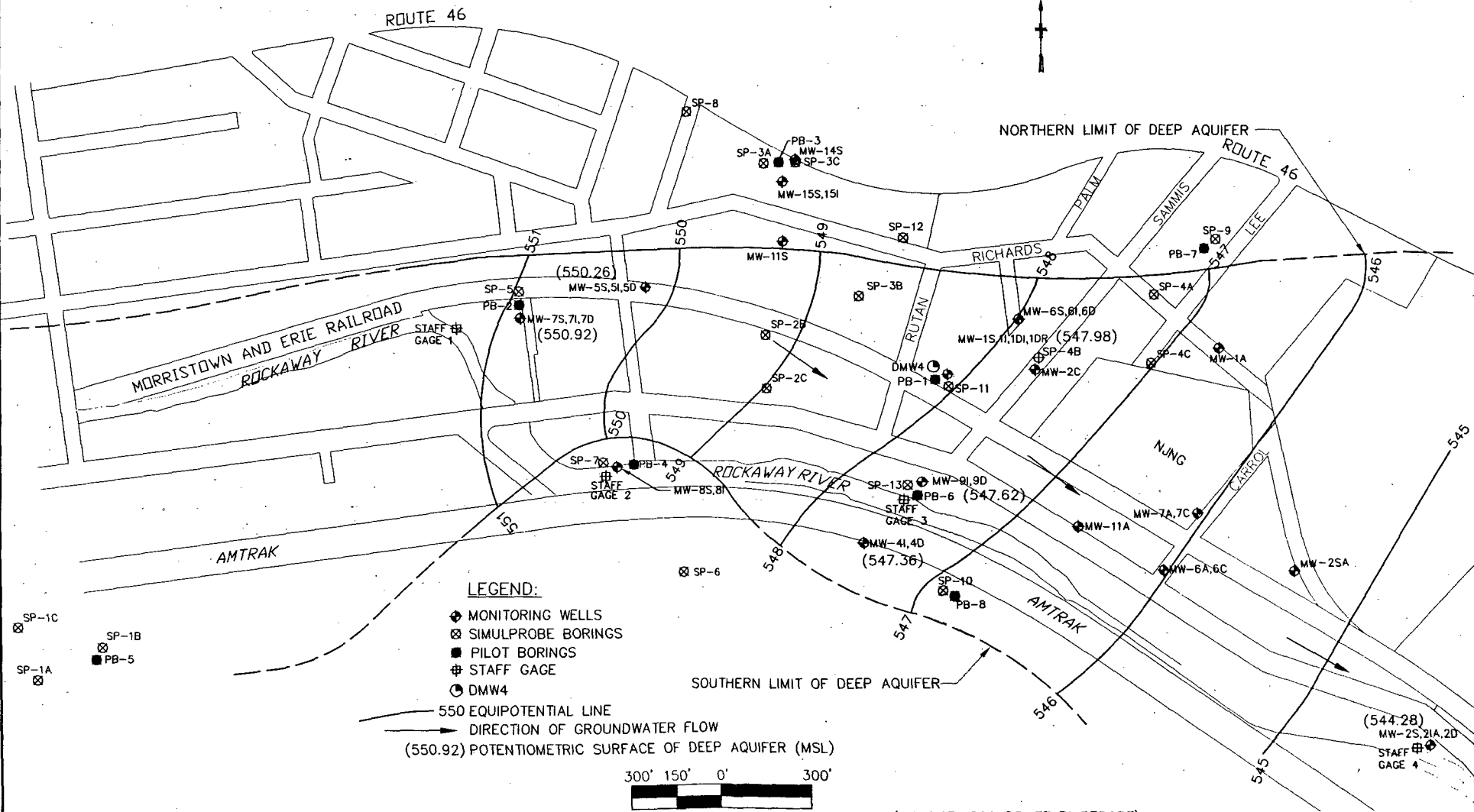
**MALCOLM
PIRNIE**

DOVER MUNICIPAL WELL NO.4
DOVER, NEW JERSEY

POTENTIOMETRIC SURFACE OF THE INTERMEDIATE AQUIFER ON OCT. 19, 1998

FIGURE 2-7

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NOTE: THE PROPERTY BOUNDARIES ARE APPROXIMATE

(SOURCE: 1999 DRAFT RI REPORT)

**MALCOLM
PIRNE**

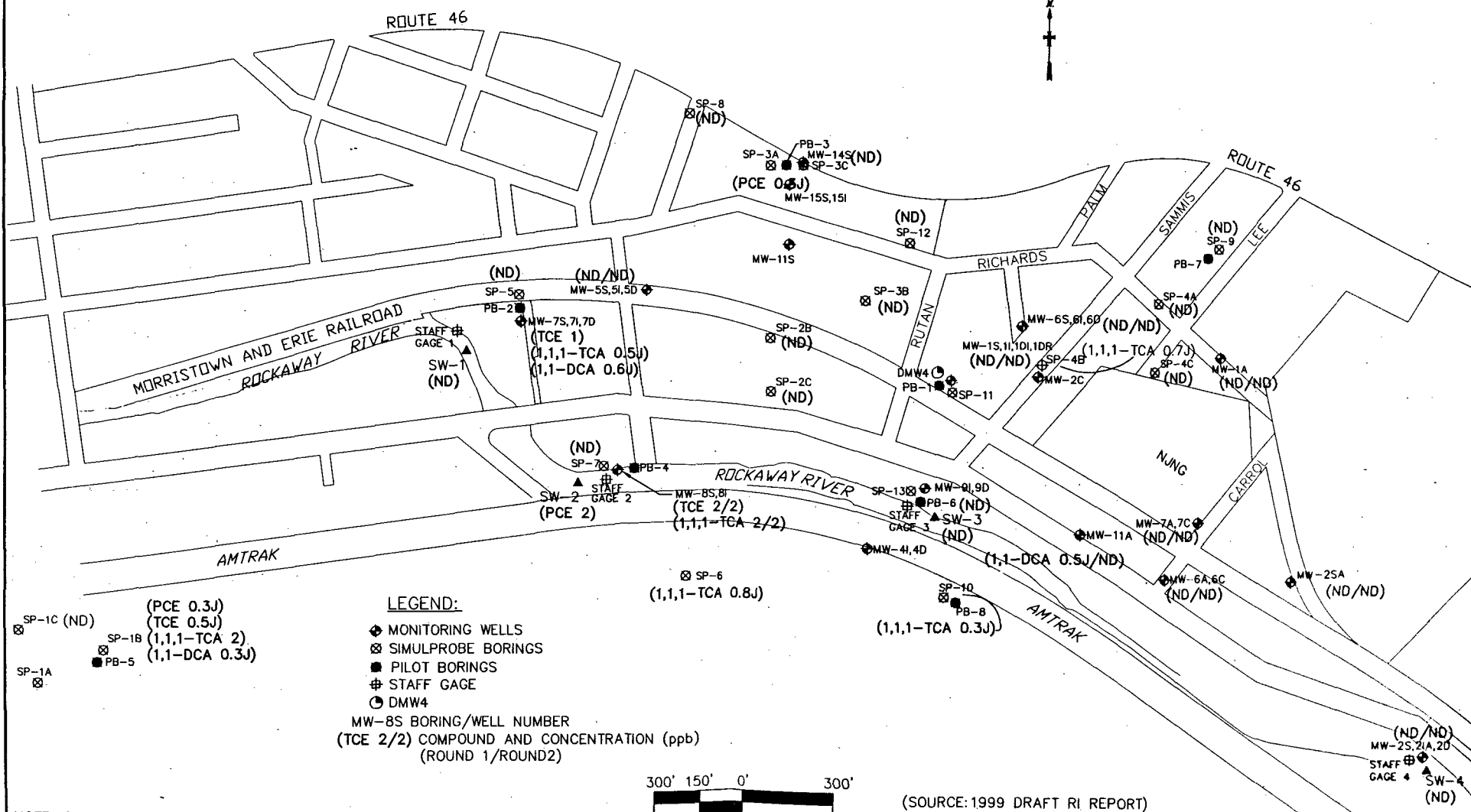
DOVER MUNICIPAL WELL NO.4 DOVER, NEW JERSEY

POTENTIOMETRIC SURFACE OF THE
DEEP AQUIFER ON OCT. 19, 1998

MALCOLM PIRNE, INC.

FIGURE 2-8

XREFS: SITE I:\0285780\JUNE2000\STBOX.dwg IMAGES: None
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**MALCOLM
PIRNIE**

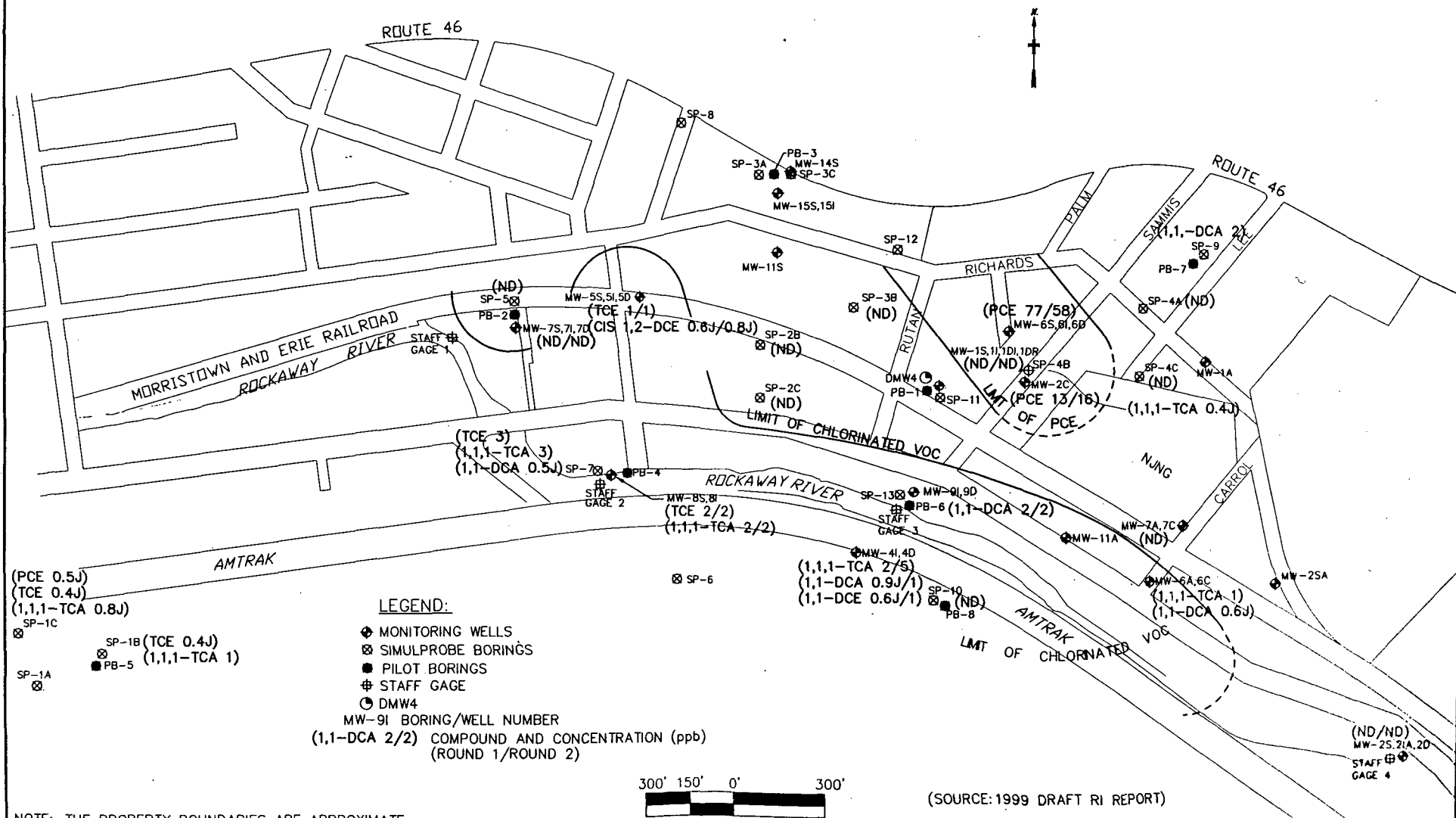
DOVER MUNICIPAL WELL NO.4 DOVER, NEW JERSEY

CHLORINATED VOCs IN GROUNDWATER SAMPLES COLLECTED
FROM RI SIMULPROBE BORINGS AND MONITORING WELLS
SHALLOW AQUIFER

MALCOLM PIRNIE, INC.

FIGURE 2-9

XREFS: I:\0285780\JUNE2000\STBOX.dwg IMAGES: None
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 Spec: PIRNIE STANDARD File I:\0285780\FEB 2004 FIG2-10JC.DWG Scale: 1:1 Date: 02/12/2004 Time: 10:18 Layout: Layout2



NOTE: THE PROPERTY BOUNDARIES ARE APPROXIMATE

(SOURCE: 1999 DRAFT RI REPORT)

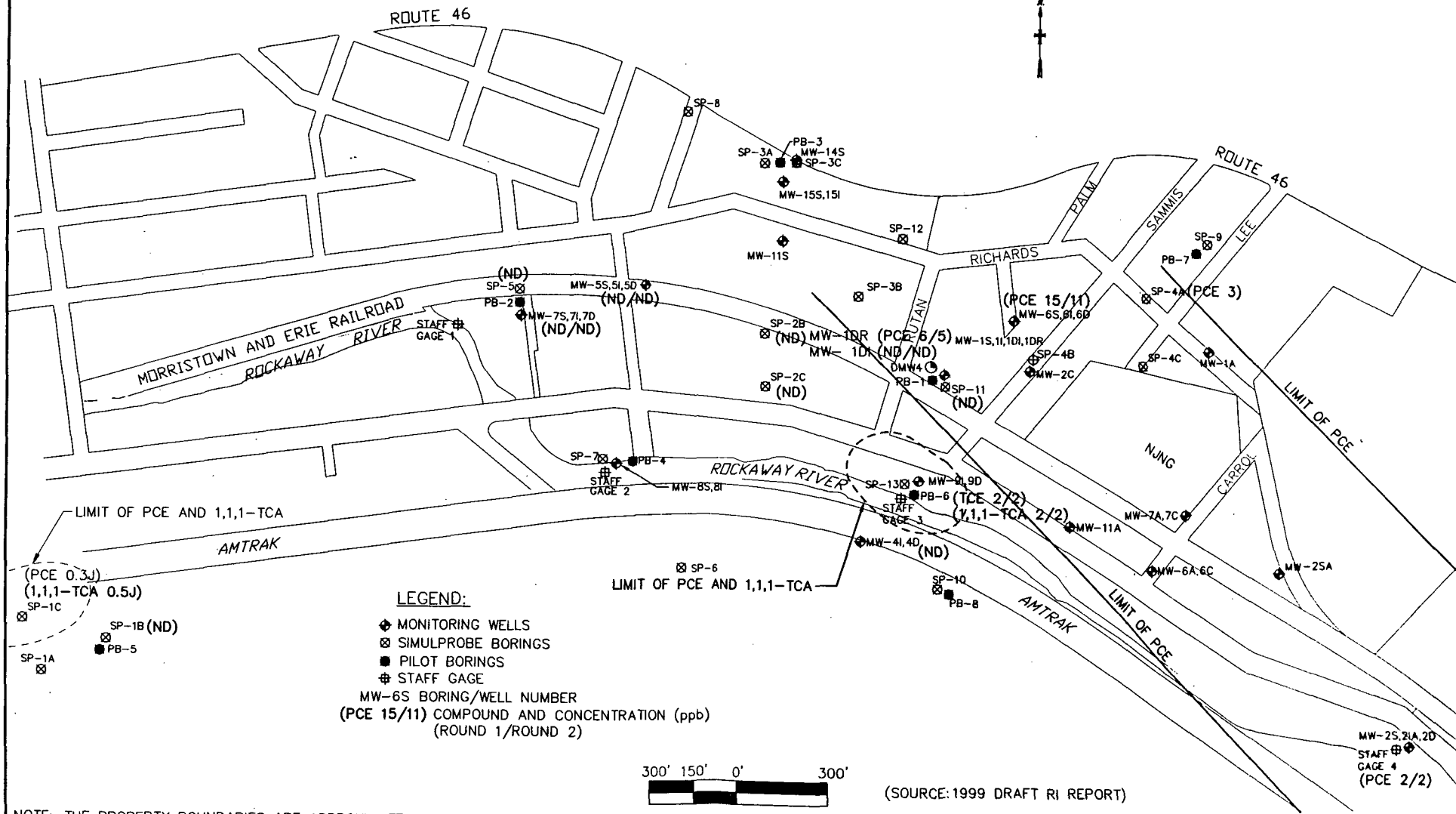
**MALCOLM
PIRNIE**

DOVER MUNICIPAL WELL NO.4 DOVER, NEW JERSEY

CHLORINATED VOCs IN GROUNDWATER SAMPLES COLLECTED
FROM RI SIMULPROBE BORINGS AND MONITORING WELLS
INTERMEDIATE AQUIFER

FIGURE 2-10

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**MALCOLM
PIRNIE**

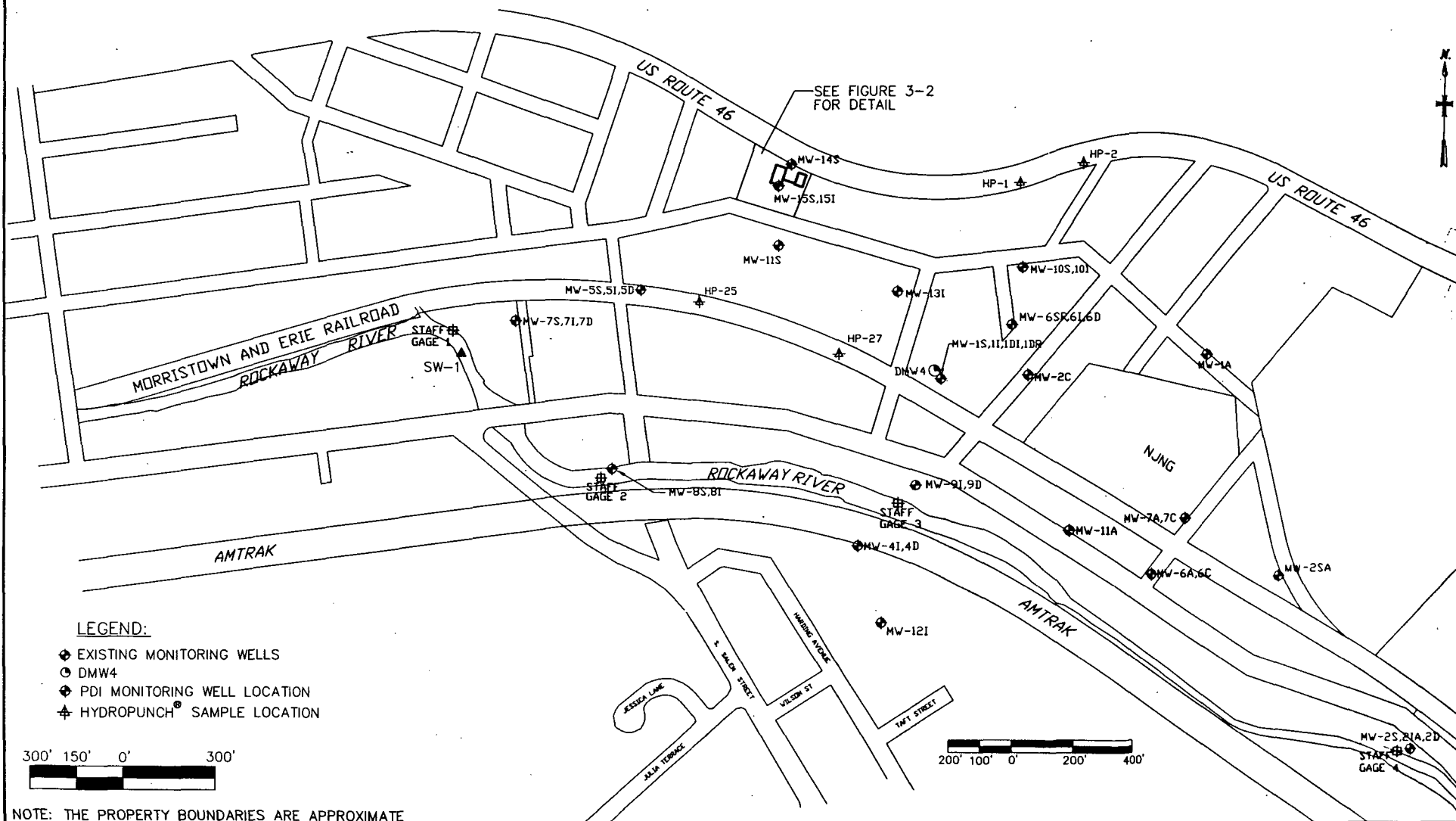
DOVER MUNICIPAL WELL NO.4 DOVER, NEW JERSEY

CHLORINATED VOCs IN GROUNDWATER SAMPLES COLLECTED
FROM RI SIMULPROBE BORINGS AND MONITORING WELLS
DEEP AQUIFER

MALCOLM PIRNIE, INC.

FIGURE 2-11

XREFS: K:\0285780\1\BBOX2.dwg K:\0285780\FEB2001\NAD27BASE.dwg IMAGETAG: none
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**MALCOLM
PIRNE**

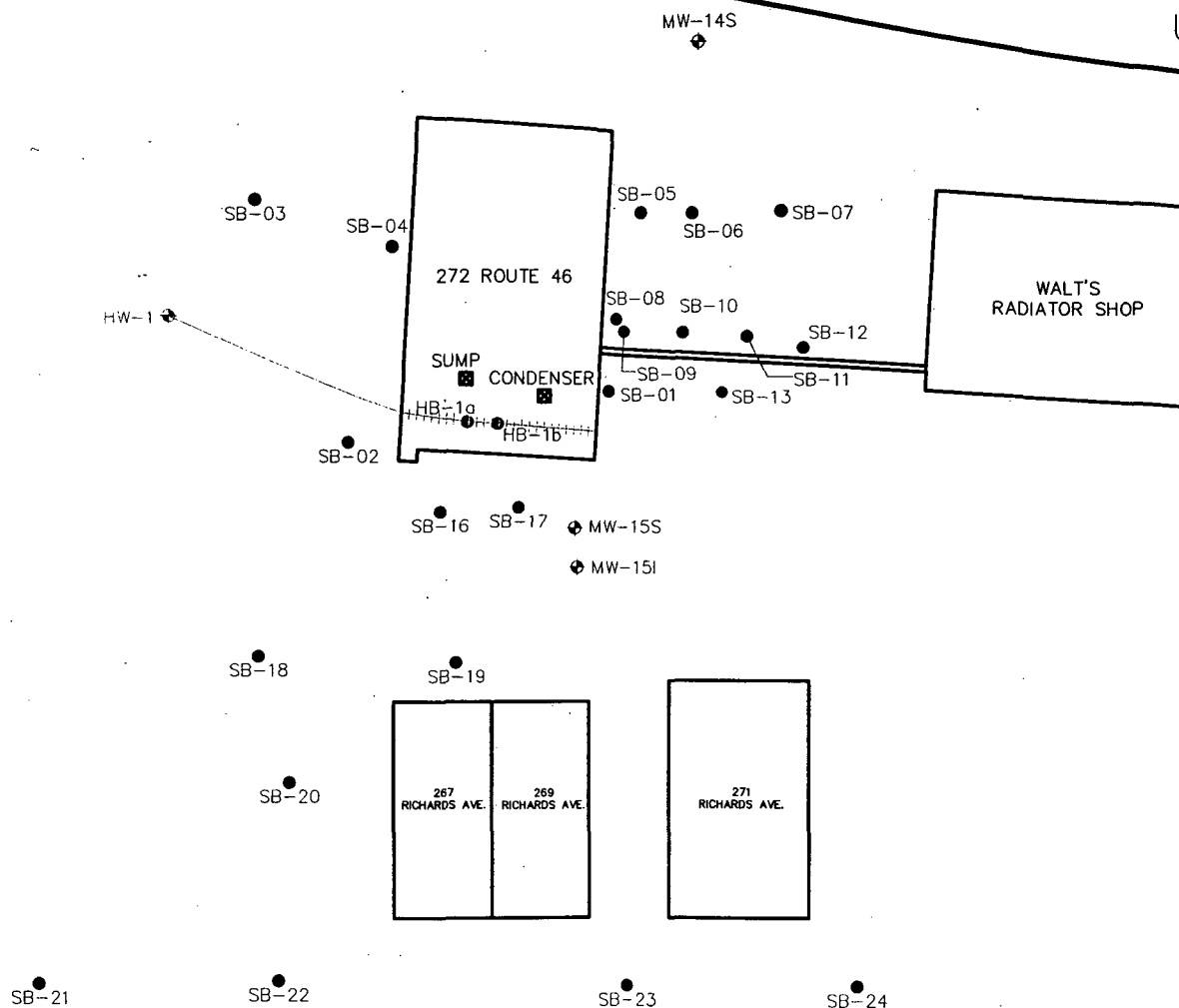
DOVER MUNICIPAL WELL NO.4 DOVER, NEW JERSEY

RI MONITORING WELLS / PDI MONITORING WELLS /
HYDROPUNCH LOCATIONS IN THE STUDY AREA

MALCOLM PIRNE, INC.

FIGURE 3-1

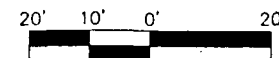
US ROUTE 46



NOTE:
THIS FIGURE WAS DRAWN WITH MANUAL
MEASUREMENTS NOT WITH SURVEY DATA,
THEREFORE THE ACCURACY OF THE BORING
LOCATIONS IS +/- 3 FEET.

LEGEND:

- ◆ EXISTING MONITORING WELLS (MW-14S)
- PHASE II SOIL BORINGS (SB-01)
- PHASE III SOIL BORINGS (SB-09)
- ◆ HORIZONTAL WELL (HW-1)



RICHARDS AVENUE

**MALCOLM
PIRNIE**

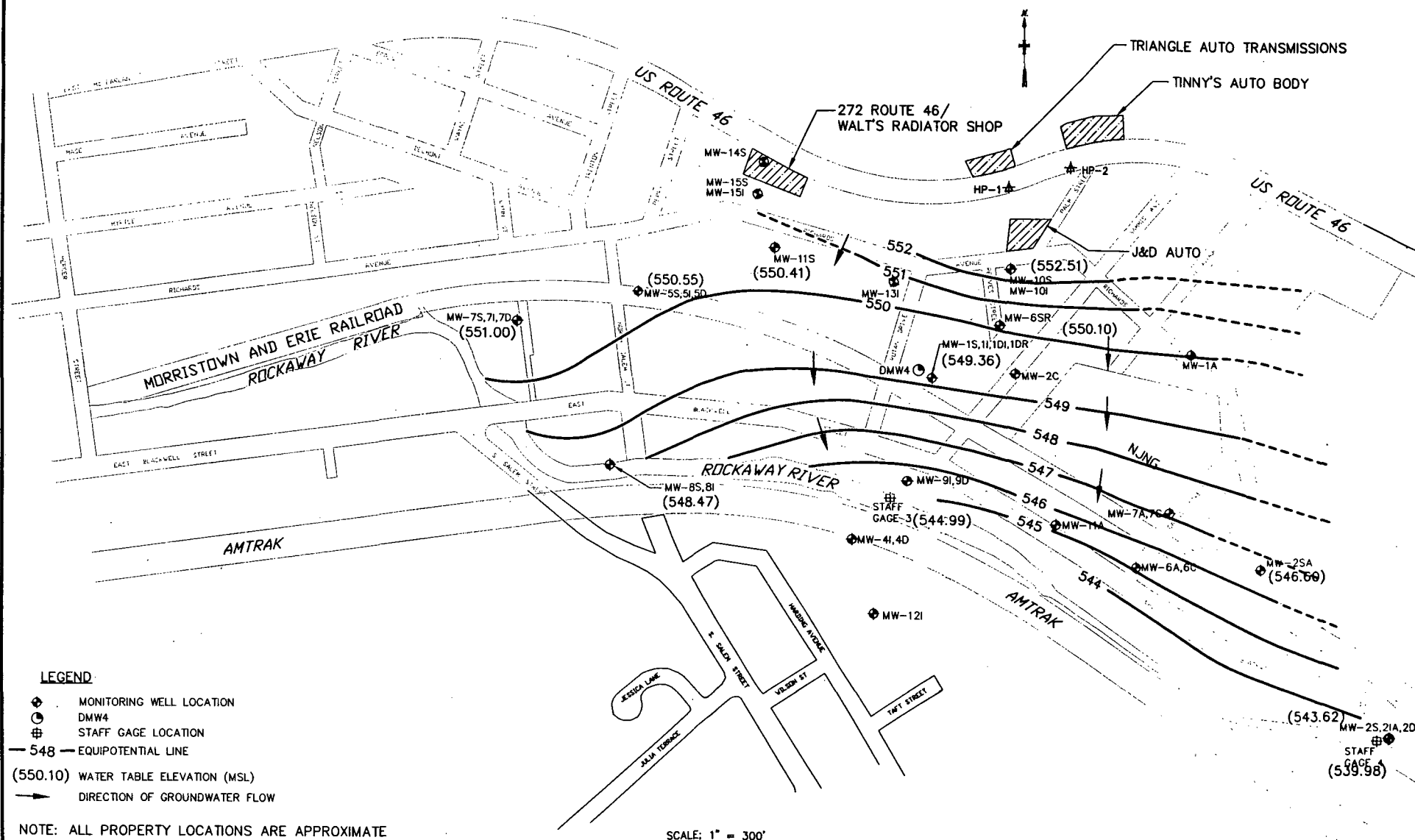
**DOVER MUNICIPAL WELL NO.4
DOVER, NEW JERSEY**

**PDI MONITORING WELLS, HORIZONTAL WELL,
AND HYDROPUNCH LOCATIONS NEAR 272 ROUTE 46**

MALCOLM PIRNIE, INC.

FIGURE 3-2

XREFS: 85780, \$TBOX2.dwg, I:\0285780\MAY2000\SSITE IMAGES\None User: orectho Spec: PIRNIE STANDARD File: I:\0285780\FEB 2004\FIG5-1.DWG Scale: 1:1 Date: 02/12/2004 Time: 10:50 Layout: Layout1



**MALCOLM
PIRNIE**

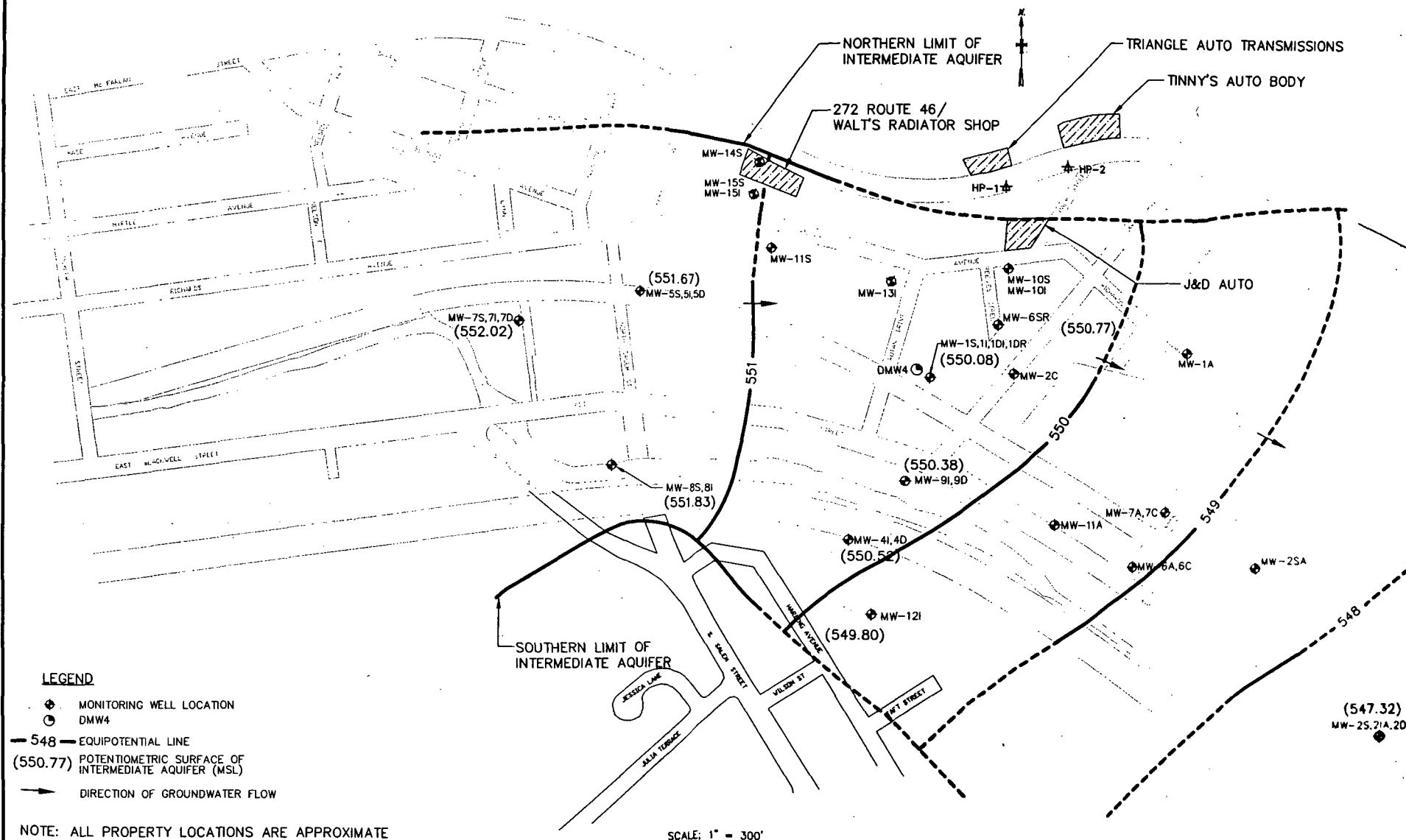
DOVER MUNICIPAL WELL NO.4 DOVER, NEW JERSEY

POTENTIOMETRIC SURFACE OF SHALLOW AQUIFER
ON MARCH 24, 2000

MALCOLM PIRNIE, INC.

FIGURE 5-1

XREFS: I:\0285780\STBOX2.dwg I:\0285780\MAY2000\SSITE IMAGES: None
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**MALCOLM
PIRNIE**

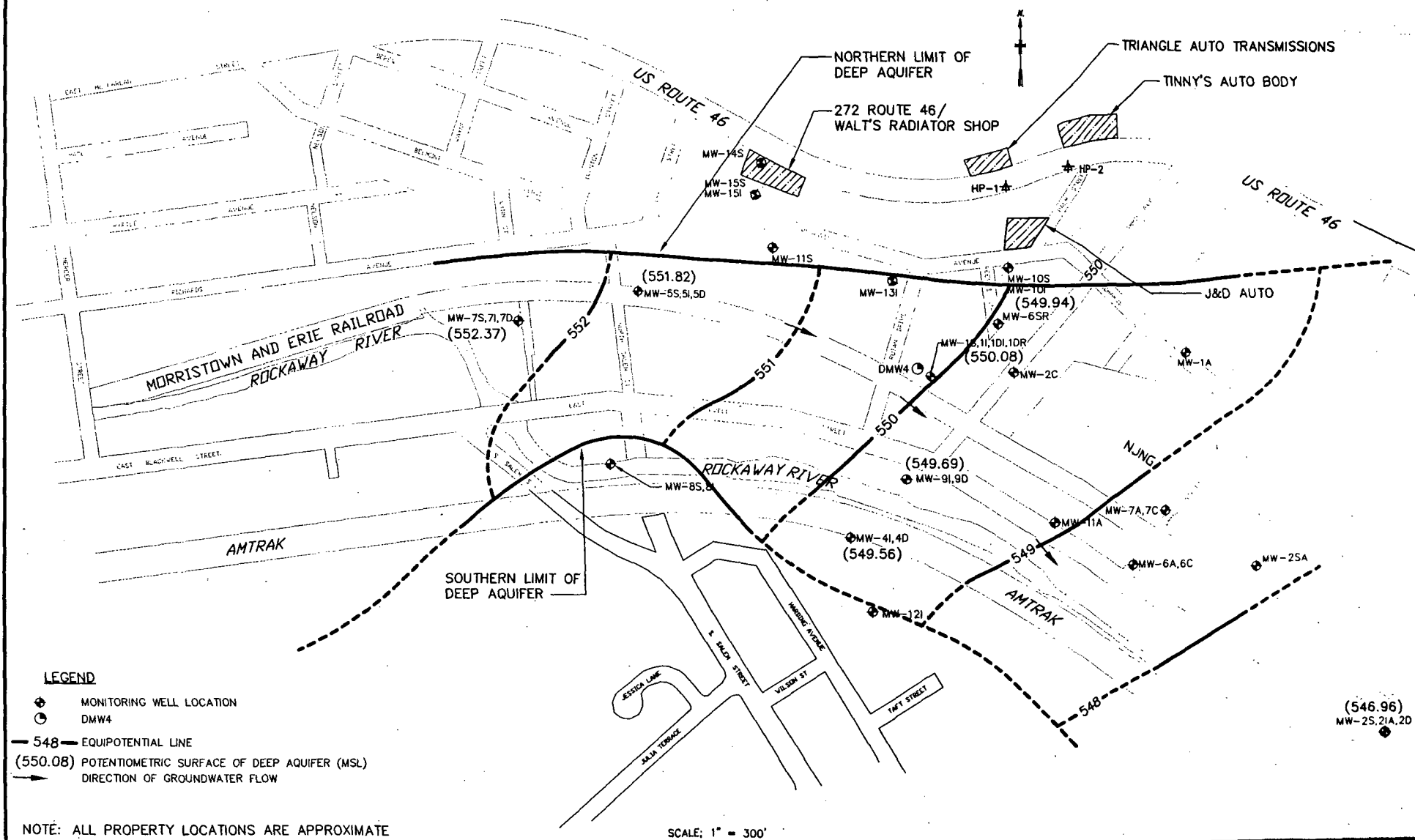
DOVER MUNICIPAL WELL NO.4 DOVER, NEW JERSEY

POTENTIOMETRIC SURFACE OF INTERMEDIATE AQUIFER
ON MARCH 24, 2000

MALCOLM PIRNIE, INC.

FIGURE 5-2

XREFS: I:\0285780\50\STBOX2.dwg I:\0285780\MAY2000\5SITE IMAGES:None
 User: orecc User: jpec:PIRNE STANDARD File: I:\0285780\FEB 2004\FIG5-3.DWG Scale: 1:1 Date: 02/12/2004 Time: 11:26 Layout: Layout1



**MALCOLM
PIRNE**

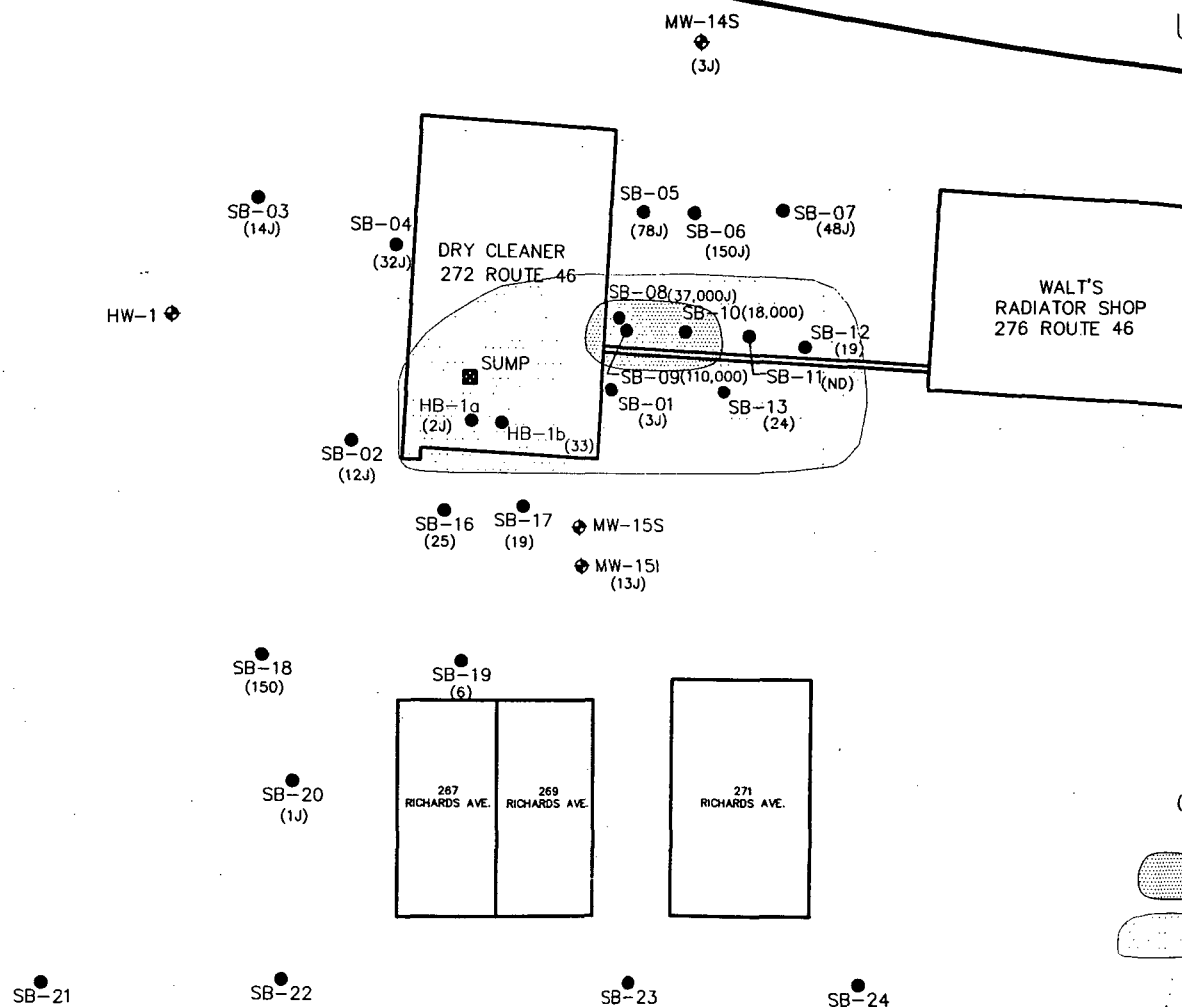
DOVER MUNICIPAL WELL NO.4 DOVER, NEW JERSEY

POTENTIOMETRIC SURFACE OF DEEP AQUIFER
ON MARCH 24, 2000

MALCOLM PIRNE, INC.

FIGURE 5-3

US ROUTE 46

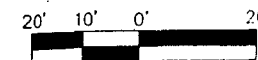


NOTE:
THIS FIGURE WAS DRAWN WITH MANUAL
MEASUREMENTS NOT WITH SURVEY DATA.
THEREFORE THE ACCURACY OF THE BORING
LOCATIONS IS +/- 3 FEET.

LEGEND:

- ◆ EXISTING MONITORING WELLS (MW-14S)
- PHASE II SOIL BORINGS (SB-01)
- PHASE III SOIL BORINGS (SB-09)
- ◆ HORIZONTAL WELL (HW-1)
- (3J) PCE CONCENTRATIONS IN SOIL (ug/Kg)

- SOILS THAT EXCEED POTENTIAL STANDARDS FOR PCE
- SOIL THAT SHOULD BE CONSIDERED FOR REMEDIATION BASED ON GROUNDWATER CONTAMINATION IMPACTS



RICHARDS AVENUE

**MALCOLM
PIRNE**

DOVER MUNICIPAL WELL NO.4
DOVER, NEW JERSEY

TETRACHLOROETHENE (PCE) IN SOIL
NEAR 272 ROUTE 46, DOVER, NJ

MALCOLM PIRNE, INC.

FIGURE 5-4

US ROUTE 46

COMPOUND	POT.STD. ug/L	CONC. ug/L (ROUND 2/3)
PCE	1	2/1.1

COMPOUND	POT.STD. ug/L	CONC. ug/L
TCE	1	2.1
PCE	1	11,000 D

COMPOUND	POT.STD. ug/L	CONC. ug/L
TCE	1	3.7
PCE	1	8,900 D

COMPOUND	POT.STD. ug/L	CONC. ug/L
Vinyl chloride	2	140 D
cis-1,2-DCE	10	220 D
TCE	1	89 D
PCE	1	430 D

COMPOUND	POT.STD. ug/L	CONC. ug/L
Vinyl chloride	2	45 D
cis-1,2-DCE	10	27 D
TCE	1	6.9
PCE	1	6.4

COMPOUND	POT.STD. ug/L	CONC. ug/L
Vinyl chloride	2	130 D

COMPOUND	POT.STD. ug/L	CONC. ug/L
TCE	1	1.1

MW-14S

SB-03

SB-04

SB-05

SB-06

SB-07

HW-1

272 ROUTE 46

SUMP
CONDENSER

HB-1a

HB-1b

SB-02

SB-08

SB-10

SB-11

(NS)

SB-12

(NS)

SB-09

SB-01

SB-13

SB-16

(NS)

SB-17

(NS)

MW-15S

MW-15I

SB-18

(NS)

SB-19

(NS)

SB-20

267 RICHARDS AVE.

269 RICHARDS AVE.

271 RICHARDS AVE.

SB-21

SB-22

SB-23

(NS)

SB-24

COMPOUND	POT.STD. ug/L	CONC. ug/L
TCE	1	7.5
PCE	1	200 D

LEGEND:

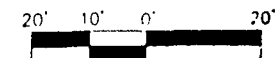
- ◆ EXISTING MONITORING WELLS (MW-14S)
- PHASE II SOIL BORINGS (SB-01)
- PHASE III SOIL BORINGS (SB-09)
- ◆ HORIZONTAL WELL (HW-1)
- (NS) NOT SAMPLED-UNABLE TO COLLECT HYDROPUNCH GROUNDWATER SAMPLE
- (ND) NON-DETECT

APPROXIMATE EXTENT OF GROUNDWATER THAT EXCEEDS POTENTIAL STANDARD FOR PCE

NOTE: THIS FIGURE WAS DRAWN WITH MANUAL MEASUREMENTS NOT WITH SURVEY DATA. THEREFORE THE ACCURACY OF THE BORING LOCATIONS IS +/- 3 FEET.

HYDROPUNCH GROUNDWATER SAMPLES WERE NOT COLLECTED FROM PHASE II SOIL BORINGS

POT.STD. - THE POTENTIAL STANDARD IS THE LOWEST OF THE FEDERAL MCLs, NJMCLs, OR NJ GROUNDWATER QUALITY CRITERIA



RICHARDS AVENUE

MALCOLM
PIRNEDOVER MUNICIPAL WELL NO.4
DOVER, NEW JERSEYCHLORINATED VOCs IN GROUNDWATER IN THE
SHALLOW AQUIFER NEAR 272 ROUTE 46, DOVER, NJ

MALCOLM PIRNE, INC.

FIGURE 5-5

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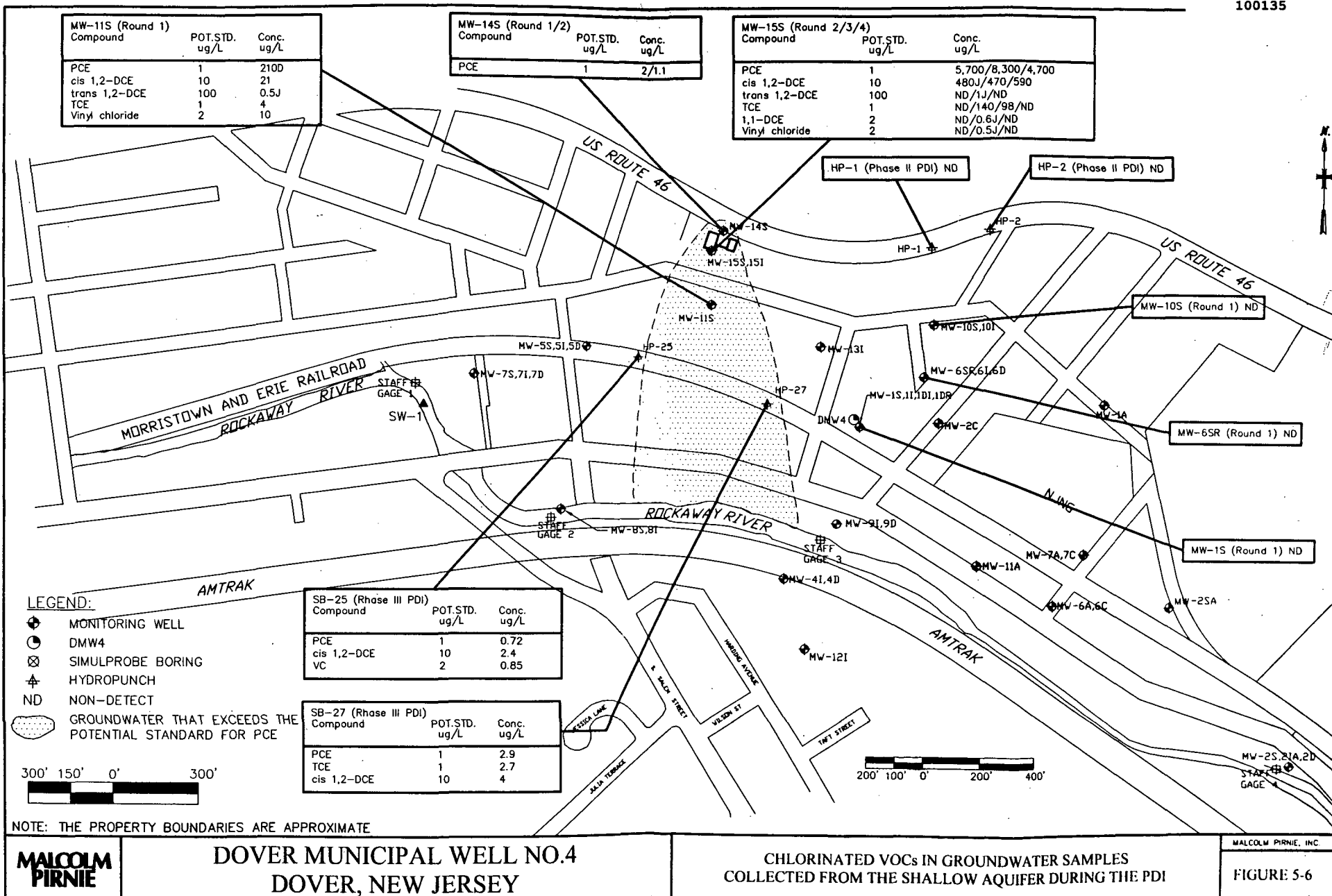
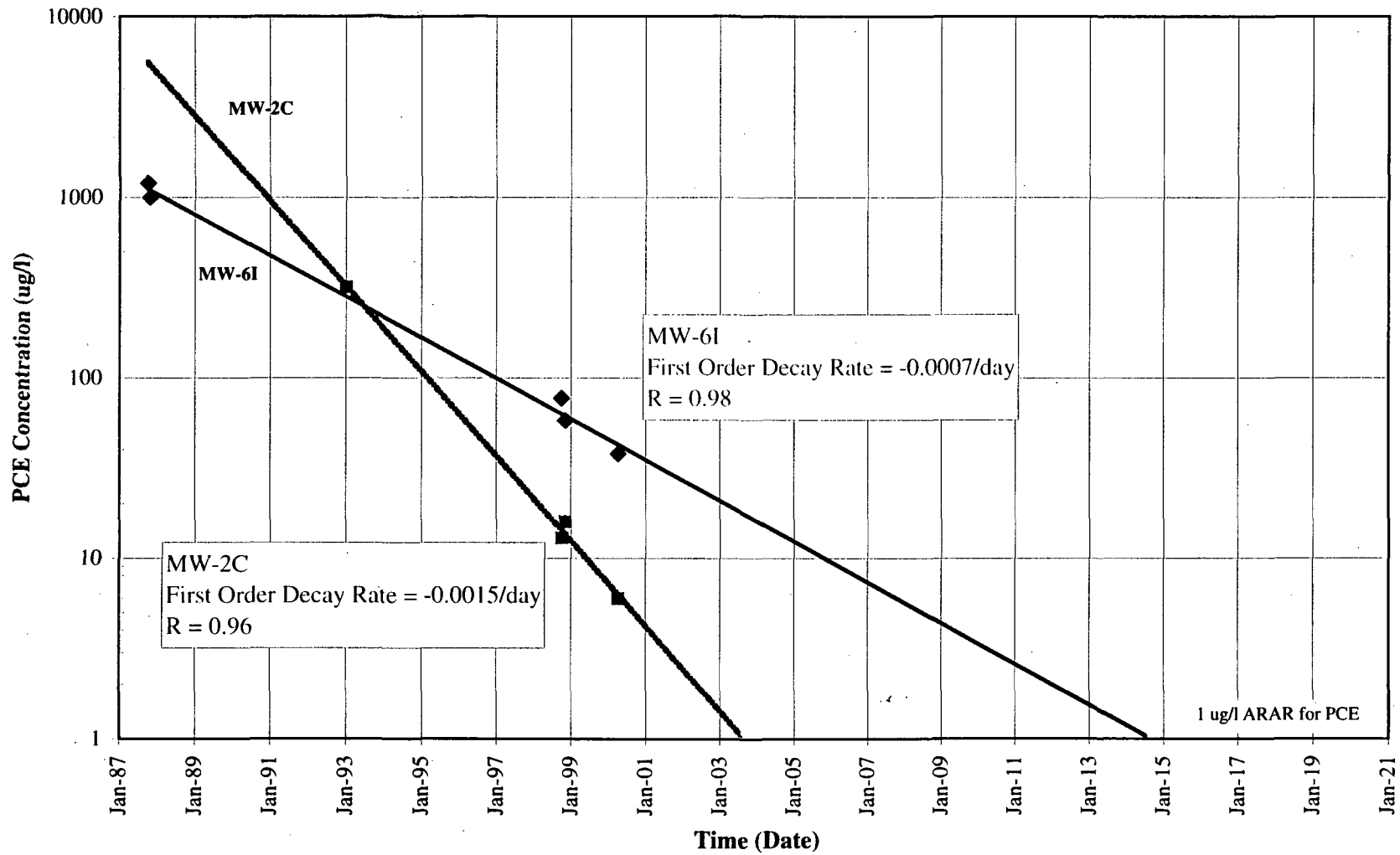




Figure 5-8
Logarithmic Plot of PCE Concentration in Groundwater
Dover Municipal Well No. 4
Dover, New Jersey



100137



A

Appendix A

Appendix

A

APPENDIX A

GEOLOGIC LOGS

BORING: SB-01

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

PROJECT NAME:	Dover Municipal Well #4 Pre-Design Investigation	DATE:	9/25/2000
JOB NUMBER:	0285-780	LOCATION:	Dover, NJ
DRILLING FIRM:	Advanced Drilling, Inc.	WEATHER:	P cloudy, 60F
DRILLING METHOD:	Tripod/140 # hammer	ELEVATION:	N/A
DRILLER:	Scott Alberella	DATUM:	Ground Surface
HELPER:	Ron	HYDROGEOLOGIST:	John Ifkovits

SAMPLE INFORMATION						Depth	SOIL DESCRIPTION	Stratigraphy	REMARKS
No.	Depth	Rec	Blows per 6"						
1	0-2'	NR	5	5			(1) NR		(1) cloged spoon tip
				8					
				8					
2	2-4'	14"	14						
				17			(2) SILT, trace sand, fine and gravel, lt brown to tan brown, dry		PID 34.6
				22					
				23					
3	4-6'	15"	44						
				23			(3) FILL, silt w/ clay, sand, fine. And gravel ashes @ 5'6", tan brown to red brown, dry		PID 20.8
				97					
				90					
4	6-8'	5"	43						
				63			(4) SAND, w/ silt and gravel, grey brown to brown, dry to moist		PID 15.7
				50					
				100/2					
							8		EOB @ 8' bgs
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		

MALCOLM PIRNIE, INC.**BORING: SB-02**

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

PROJECT NAME: Dover Municipal Well #4 Pre-Design Investigation**DATE:** 9/22/2000**JOB NUMBER:** 0285-780**LOCATION:** Dover, NJ**DRILLING FIRM:** Advanced Drilling, Inc.**WEATHER:** Clear, calm, 80F**DRILLING METHOD:** HSA 4 1/4 Id**ELEVATION:** N/A**DRILLER:** Roger Logel**DATUM:** Ground Surface**HELPER:** Jerney Logel/Ron**HYDROGEOLOGIST:** John Ifkovits

SAMPLE INFORMATION					Depth	SOIL DESCRIPTION	Strati graphy	REMARKS
No.	Depth	Rec	Blows per 6"					
1	0-2'	3"	4			(1) SAND, silt, dk brown, dry		PID 1.1
				4				
					6			
					9			
2	2-4'	3"	3			(2) CLAY, w/ trace sand and silt, red brown, dry to moist		PID 5.6
				3				
					4			
					10			
3	4-6'	16"	18			(3) (6") CLAY, w/ sand and trace gravel, red brown, moist (10") GRAVEL, w/ sand, trace clay; grey brown to red brown, dry		PID 1.2
				32				
					49			
					28			
4	6-8'	8"	52			(4) (6") CLAY w/ sand, silt, and gravel, red brown to brown, moist (2") GRAVEL, white, dry		PID 6.4
				49				
					74			
					36			
5	8-10'	10"	18			(5) SAND w/ gravel, brown, moist		PID 4.7
				16				Saturated @ 8' bgs
					19			
					21			EOB @ 10' bgs

MALCOLM PIRNIE, INC.**BORING: SB-03**

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

PROJECT NAME:	Dover Municipal Well #4 Pre-Design Investigation	DATE:	9/22/2000
JOB NUMBER:	0285-780	LOCATION:	Dover, NJ
DRILLING FIRM:	Advanced Drilling, Inc.	WEATHER:	Clear, calm, 75F
DRILLING METHOD:	HSA 4 1/4 Id	ELEVATION:	N/A
DRILLER:	Roger Logel	DATUM:	Ground Surface
HELPER:	Jermey Logel/Ron	HYDROGEOLOGIST:	John Ifkovits

SAMPLE INFORMATION				Depth	SOIL DESCRIPTION	Stratigraphy	REMARKS
No.	Depth	Rec	Blows per 6"				
1	0-2'	6"	16		(1) SAND, silt, gravel, lt grey to brown, dry		PID 5.3
			13				
			9				
			11	2	(2) SAND, silt, clay and gravel lt to dk brown, dry		PID 19.4
2	2-4'	8"	13				
			11				
			9				
			11	4	(3) GRAVEL, sand, brown, dry		PID NA
3	4-6'	<1"	11				
			11				
			7				
			11	6	(4) CLAY, w/ sand, fine, and silt, trace gravel, brown, dry to moist		PID 44.8
4	6-8'	14"	11				
			36				
			48				
			100/4	8	(5) SAND, w/ silt clay, and gravel. red brown, moist		PID 63.4
5	8-10'	4"	100/4				
			-				
			-				
			-	10	(6) SAA, saturated		PID NA DTW @ 10'
6	10-12'	17"	32				
			23				
			19				
			11	12			EOB @ 12'
				14			
				16			
				18			
				20			
				22			
				24			
				26			
				28			
				30			
				32			

MALCOLM PIRNIE, INC.**BORING:SB-04**

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

PROJECT NAME:	Dover Municipal Well #4 Pre-Design Investigation	DATE:	9/22/2000
JOB NUMBER:	0285-780	LOCATION:	Dover, NJ
DRILLING FIRM:	Advanced Drilling, Inc.	WEATHER:	Clear, breeze, 70F
DRILLING METHOD:	HSA 4 1/4 id	ELEVATION:	N/A
DRILLER:	Roger Logel	DATUM:	Ground Surface
HELPER:	Jermey Logel/Ron	HYDROGEOLOGIST:	John Ifkovits

SAMPLE INFORMATION						Depth	SOIL DESCRIPTION	Strati graphy	REMARKS
No.	Depth	Rec	Blows per 6"						
1	0-2'	2"	7			2	(1) SAND, w/ silt, trace gravel and clay, dk brown to tan brown, dry		PID 1.3
				5					
					4				
						3			
2	2-4'	1"	2			4	(2) SAND, gravel, dry, brown		(2) cloged spoon tip
				2					
					6				
						5			
3	4-6'	14"	2			6	(3) (5") CLAY, w/ sand annd silt, ,trace gravel, dk brown, moist (9") CLAY, trace sand and silt, lt brown, moist		PID 1.2
				2					
					2				
						8			
4	6-8'	17"	12			8	(4) CLAY, w/ sand, silt, and gravel, tan brown to brown, moist		PID 1.5
				37					
					49				
						75			
5	8-10'	14"	37			10	(5) SAND, w/ clay, silt, and gravel, grey brown to tan brown, moist		PID 7.8
				62					
					100/4				
						-			
6	10-12'	18"	19			12	(6) SAND, med, brown, saturated		PID NA DTW @ 10' bgs EOB @ 12' bgs
				16					
					18				
						21			

MALCOLM PIRNIE, INC.**BORING: SB-05**

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

PROJECT NAME: Dover Municipal Well #4 Pre-Design Investigation**DATE:** 9/21/2000**JOB NUMBER:** 0285-780**LOCATION:** Dover, NJ**DRILLING FIRM:** Advanced Drilling, Inc.**WEATHER:** P cloudy, breeze, 70F**DRILLING METHOD:** HSA 4 1/4 Id**ELEVATION:** N/A**DRILLER:** Roger Logel**DATUM:** Ground Surface**HELPER:** Jermy Logel/Ron**HYDROGEOLOGIST:** John Ifkovits

SAMPLE INFORMATION						Depth	SOIL DESCRIPTION	Strati graphy	REMARKS
No.	Depth	Rec	Blows per 6"						
1	0-2'	2"	-			2	(1) FILL, sand, silt, asphalt		
				10					
					9				
					10				
2	2-4'	2"	8			4	(2) SAA		
				1					
					2				
					6				
3	4-6'	8"	8			6	(3) Concrete, crushed, trace sand, white to grey		PID 19.4
				75					
					18				
					9				
4	6-8'	20"	4			8	(4) (8") SAND, med, w/ gravel, silt, tan brown (6") CLAY, trace silt, tan brown (6") SAND and GRAVEL, large, tan brown		PID 52.6
				4					
					39				
					89				
5	8-10'	14"	67			10	(5) SAND, w/ gravel and silt, lt grey to brown		PID 241
				68					
					100/4				
					-				
6	10-12'	18"	8			12	(6) (12") SAND, med to coarse, brown to tan, moist (6") SAND, fine brown to tan, saturated		PID 61.4
				7					
					7				
					9				DTW @ 11.5' bgs EOB @ 12' bgs
						14			
						16			
						18			
						20			
						22			
						24			
						26			
						28			
						30			
						32			

MALCOLM PIRNIE, INC.

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

BORING: SB-06**PROJECT NAME:** Dover Municipal Well #4 Pre-Design Investigation**DATE:** 9/21/2000**JOB NUMBER:** 0285-780**LOCATION:** Dover, NJ**DRILLING FIRM:** Advanced Drilling, Inc.**WEATHER:** Clear, breeze, 70F**DRILLING METHOD:** HSA 4 1/4 Id**ELEVATION:** N/A**DRILLER:** Roger Logel**DATUM:** Ground Surface**HELPER:** Jermy Logel/Ron**HYDROGEOLOGIST:** John Ifkovits

SAMPLE INFORMATION						Depth	SOIL DESCRIPTION	Strati graphy	REMARKS
No.	Depth	Rec	Blows per 6"						
1	0-2'	2"	4			2	(1) SAND, w/ silt and gravel, tan brown		Boulder 2 - 3.5' bgs
				4					
					8				
						7			
2	2-4'	2"	100/2			4	(2) FILL, w/ concrete, trace clay, sand and gravel, lt grey to lt brown		PID 36.2
3	4-6'	6"	3			6	(3) FILL, w/ concrete, sand, med, clay, dk brown to lt grey		PID 37
				3					
					4				
						4			
4	6-8'	8"	3			8	(4) CLAY, w/ sand and gravel, tan brown, dry		PID 34
				47					
					100/5				
5	8-10'	12"	68			10	(5) SAND, med to fine, w/ gravel, trace silt, lt brown to red brown, dry		DTW @ 10' bgs
				47					
					45				
						100			
6	10-12'	12"	37			12	(6) SAND, med, trace gravel		EOB @ 12' bgs
				13					
					13				
						10			

MALCOLM PIRNIE, INC.**BORING: SB-07**

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

PROJECT NAME: Dover Municipal Well #4 Pre-Design Investigation**DATE:** 9/22/00**JOB NUMBER:** 0285-780**LOCATION:** Dover, NJ**DRILLING FIRM:** Advanced Drilling, Inc.**WEATHER:** Clear, calm, 65F**DRILLING METHOD:** HSA 4 1/4 Id**ELEVATION:** N/A**DRILLER:** Roger Logel**DATUM:** Ground Surface**HELPER:** Jermei Logel/Ron**HYDROGEOLOGIST:** John Ifkovits

SAMPLE INFORMATION				Depth	SOIL DESCRIPTION	Stratigraphy	REMARKS
No.	Depth	Rec	Blows per 6"				
1	0-2'	10"	14		0-6" Blacktop and Gravel		
			14		(1) FILL, sand, silt, clay, gravel, grey brown to red brown, dry		PID 10.2
			16	2			
2	2-4'	10"	10		(2) FILL, clay, trace sand and gravel, red brown to yellow brown, dry		PID 27.2
			10				
			13				
			14	4			
3	4-6'	14"	14		(3) SAND, fine with silt, some clay and gravel, grey brown to brown, dry		PID 32.2
			13				
			8				
			12	6			
4	6-8'	5"	12		(4) CLAY, with med sand and silt, foliated, tan brown, dry		PID 42.3
			100/5				
				8			
5	8-10'	10"	24		(5) SAND, med, trace silt and gravel, brown		PID 97.8
			42				
			100/5				
				10			
6	10-12'	16"	7		(6) SAND, med to coarse, trace silt, brown, moist to saturated		PID 126.4
			7				
			9				DTW @ 11' bgs
			10	12			EOB @ 12' bgs
				14			
				16			
				18			
				20			
				22			
				24			
				26			
				28			
				30			
				32			

MALCOLM PIRNIE, INC.**BORING: SB-08**

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

PROJECT NAME: Dover Municipal Well #4 Pre-Design Investigation**DATE:** 9/21/00**JOB NUMBER:** 0285-780**LOCATION:** Dover, NJ**DRILLING FIRM:** Advanced Drilling, Inc.**WEATHER:** P-cloudy, breezy, 70F**DRILLING METHOD:** HSA 4 1/4 Id**ELEVATION:** N/A**DRILLER:** Roger Logel**DATUM:** Ground Surface**HELPER:** Jerney Logel/Ron**HYDROGEOLOGIST:** John Ifkovits

SAMPLE INFORMATION						Depth	SOIL DESCRIPTION	Stratigraphy	REMARKS
No.	Depth	Rec	Blows per 6"						
1	0-2'	3"	-				(1) FILL, gravel, asphalt, sand, dark brown to brown		
				4					
					4	2	(2) SAA		
2	2-4'	2"	4						
				2					
					3				
					8	4	(3) CLAY, with sand, fine, silt, trace gravel and fill, brown to red brown		PID 436
3	4-6'	16"	2						
				1					
					1	6			
4	6-8'	18"	2				(4) (5") SAA		PID 851
				27			(13") SILT, with sand, fine, and clay, trace gravel, red brown to brown, moist		
					30	8			
					52		(5) SAND, med, with silt gravel and trace clay, tan to green brown, moist		PID 596
5	8-10'	16"	42						
				54					
					75	10	(6) SAND, med, with silt, grey brown, moist		PID 459
					34				
6	10-12'	16"	37						
				46					
					49	12	(7) SAND, fine, with silt, saturated, brown		DTW @ 12' bgs saturated soil with strong solvent odor
7	12-14'	14"	8						
				8					
					13	14			EOB @ 14' bgs
					8				
						16			
						18			
						20			
						22			
						24			
						26			
						28			
						30			
						32			

BORING: SB-09

PROJECT NAME: Dover Municipal Well No. 4 Superfund Site

DATE: 8/6/2001

JOB NUMBER: 0285 780

LOCATION: Dover, NJ

DRILLING FIRM: ERC

WEATHER: Hot 85°F

DRILLING METHOD: Direct Push

ELEVATION: n/a

DRILLER: Chuck Coskery

DATUM: Ground Surface

HELPER: n/a

HYDROGEOLOGIST: John Ifkovits

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MALCOLM PIRNIE, INC.**BORING: SB-10**

17-17 ROUTE 208 NORTH, FAIR LAWN, NEW JERSEY 07410

PROJECT NAME:	Dover Municipal Well No. 4 Superfund Site	DATE:	8/6/2001
JOB NUMBER:	0285 780	LOCATION:	Dover, NJ
DRILLING FIRM:	ERC	WEATHER:	Hot 85°F
DRILLING METHOD:	Direct Push	ELEVATION:	n/a
DRILLER:	Chuck Coskery	DATUM:	Ground Surface
HELPER:	n/a	HYDROGEOLOGIST:	John Ifkovits

SAMPLE INFORMATION							Depth	SOIL DESCRIPTION	REMARKS	
No.	Depth (feet)	Rec (in)	Blows per 6"						Depth	PID
1	0-4	14	-	-	-	-		Sand, gravel, clay, and concrete (fill) Gray to tan; Moist to dry.	0-4'	2.0
2	4-8	48	-	-	-	-	4	16" Fine sand with tan gravel and organics Brown topsoil; Dry 8" Sand and silt, red-brown clay; Dry 24" Clay, fine sand and silt with gravel, tan-brown; Dry	4-6' Note: Collect DPDI3-SB-10 from 4-6' interval.	28.0 5.0
3	8-12	48	-	-	-	-	8	Fine to med. Sand with silt, clay, and gravel, loamy. Tan brown to brown; Dry to moist.	8-10'	4.0
									10-12'	0.0
4	12-16	32	-	-	-	-	12	8" Fine sand with clay and silt, trace gravel. Tan-brown, saturated. 24" Med. To Coarse. Sand with silt and trace clay Tan-brown, saturated.	12-16' Note: Collect DPDI3-HP-10 water sample at 15' BGS with power probe water sampling device.	5.0
4	16-18	20	-	-	-	-	16	Med to coarse with silt. Brown, saturated.	Note: Refusal at 18'	
									</	

17-17 ROUTE 208 NORTH, FAIR LAWN, NEW JERSEY 07410

BORING: SB-11

DATE: 8/7/2001

JOB NUMBER: 0285 780

LOCATION: Dover, NJ

DRILLING FIRM: ERC

WEATHER: Hot 85°F

DRILLING METHOD: Direct Push

ELEVATION: n/a

DRILLER: Chuck Coskery

DATUM: Ground Surface

HELPER: n/a

HYDROGEOLOGIST: John Ifkovits

Note: Refusal @ 9', moved 3' toward Rt. 46
Probe to 8', collect sample from 8-12'
Refusal @ 7.5'. Moved 2' back toward
first attempt. After three attempts, all
reached refusal @ 7.5-9.0'.

Note: No Hydropunch sample can be
collected @ SB-11 due to refusal found
above the water table. A conventional
rig can not be used due to overhead
powerlines.

17-17 ROUTE 208 NORTH, FAIR LAWN, NEW JERSEY 07410

BORING: SB-12

PROJECT NAME: Dover Municipal Well No. 4 Superfund Site

DATE: 8/7/2001

JOB NUMBER: 0285 780

LOCATION: Dover, NJ

DRILLING FIRM: ERC

WEATHER: Hot 85°F

DRILLING METHOD: Direct Push

ELEVATION: n/a

DRILLER: Chuck Coskery

DATUM: Ground Surface

HELPER: n/a

HYDROGEOLOGIST: John Ifkovits

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17-17 ROUTE 208 NORTH, FAIR LAWN, NEW JERSEY 07410

PROJECT NAME: Dover Municipal Well No. 4 Superfund Site

DATE: 8/7/2001

JOB NUMBER: 0285 780

LOCATION: Dover, NJ

DRILLING FIRM: ERC

WEATHER: Hot 85°F

DRILLING METHOD: Direct Push

ELEVATION: n/a

DRILLER: Chuck Coskery

DATUM: Ground Surface

HELPER: n/a

HYDROGEOLOGIST: John Ifkovits

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MALCOLM PIRNIE, INC.

17-17 ROUTE 208 NORTH, FAIR LAWN, NEW JERSEY 07410

BORING: SB-16

PROJECT NAME:	Dover Municipal Well No. 4 Superfund Site	DATE:	8/8/2001
JOB NUMBER:	0285 780	LOCATION:	Dover, NJ
DRILLING FIRM:	ERC	WEATHER:	Hot 85°F
DRILLING METHOD:	Direct Push	ELEVATION:	n/a
DRILLER:	Chuck Coskery	DATUM:	Ground Surface
HELPER:	n/a	HYDROGEOLOGIST:	John Ifkovits

SAMPLE INFORMATION							Depth	SOIL DESCRIPTION	REMARKS	
No.	Depth (feet)	Rec (in)	Blows per 6"						Depth	PID
1	0-4	30	-	-	-	-	4	12" Gravel and silty sand (fill); Black to tan-brown, dry.	0-4'	0.0
								18" Sand and clay with silt and gravel Tan-brown, dry to slightly moist.		
2	4-8	30	-	-	-	-		Fine to coarse sand with silt and clay Gray-brown to tan-brown, crushed stone, dry.	4-8'	0.0

17-17 ROUTE 208 NORTH, FAIR LAWN, NEW JERSEY 07410

BORING: SB-17

DATE: 8/8/2001

JOB NUMBER: 0285 780

LOCATION: Dover, NJ

DRILLING FIRM: ERC

WEATHER: Hot 85°F

DRILLING METHOD: Direct Push

ELEVATION: n/a

DRILLER: *Chuck Coskery*

DATUM: Ground Surface

HELPER: n/a

HYDROGEOLOGIST: John Ifkovits

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17-17 ROUTE 208 NORTH, FAIR LAWN, NEW JERSEY 07410

BORING: SB-18

DATE: 8/8/2001

JOB NUMBER: 0285 780

LOCATION: Dover, NJ

DRILLING FIRM: ERC

WEATHER: Hot 90°F

DRILLING METHOD: Direct Push

ELEVATION: n/a

DRILLER: Chuck Coskery

DATUM: Ground Surface

HELPER: n/a

HYDROGEOLOGIST: John Ifkovits

Depth	PID
0-4'	0.0

Note: Refusal found at 4.0" BGS.
Move location and refusal at 4.0' BGS.
Refusal found @ 4th SB-18 location,
Old foundation may be refusal source.

Note: No Hydropunch sample collected

Note: Collect **DPDI3-SB-18**

BORING: SB-19

17-17 ROUTE 208 NORTH, FAIR LAWN, NEW JERSEY 07410

PROJECT NAME:	Dover Municipal Well No. 4 Superfund Site	DATE:	8/13/2001
JOB NUMBER:	0285 780	LOCATION:	Dover, NJ
DRILLING FIRM:	ERC	WEATHER:	Hot 85°F
DRILLING METHOD:	Direct Push	ELEVATION:	n/a
DRILLER:	Chuck Coskery	DATUM:	Ground Surface
HELPER:	n/a	HYDROGEOLOGIST:	John Ifkovits

[illegible]

17-17 ROUTE 208 NORTH, FAIR LAWN, NEW JERSEY 07410

PROJECT NAME: Dover Municipal Well No. 4 Superfund Site

DATE: 8/11/2001

JOB NUMBER: 0285 780

LOCATION: Dover, NJ

DRILLING FIRM: ERC

WEATHER: Hot 85°F

DRILLING METHOD: Direct Push

ELEVATION: n/a

DRILLER: Chuck Coskery

DATUM: Ground Surface

HELPER: n/a

HYDROGEOLOGIST: John Ifkovits

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MALCOLM PIRNIE, INC.

17-17 ROUTE 208 NORTH, FAIR LAWN, NEW JERSEY 07410

BORING: SB-21

PROJECT NAME:	Dover Municipal Well No. 4 Superfund Site	DATE:	8/10/2001
JOB NUMBER:	0285 780	LOCATION:	Dover, NJ
DRILLING FIRM:	ERC	WEATHER:	Hot 85°F
DRILLING METHOD:	Direct Push	ELEVATION:	n/a
DRILLER:	Chuck Coskery	DATUM:	Ground Surface
HELPER:	n/a	HYDROGEOLOGIST:	John Ifkovits

SAMPLE INFORMATION							Depth	SOIL DESCRIPTION	REMARKS	
No.	Depth (feet)	Rec (in)	Blows per 6"						Depth	PID
1	0-4	20	-	-	-	-	0	4" Organics ad sandy topsoil.	0-4'	0.0
								10" Fine sand and silt; tan, dry.		
								6" Fine to med sand and gravel with trace clay. Crushed stone: tan and dry.		
2	4-8	20	-	-	-	-	4	3" Sluff material, sand, and gravel	4-8'	0.0
								8" Loose clay with silt (moist); dk. Gray		
								9" Clay, very dense; Gray moist to dry.		
3	8-12	46	-	-	-	-	8	14" Clay and sand; brown to gray. Saturated	8-12'	0.0
								20" Till; gray to dk. Gray.		
								12" Med to fine sand with clay, silt, and gravel Saturated gray to gray-green.		

MALCOLM PIRNIE, INC.

17-17 ROUTE 208 NORTH, FAIR LAWN, NEW JERSEY 07410

BORING: SB-22

PROJECT NAME:	Dover Municipal Well No. 4 Superfund Site	DATE:	8/10/2001
JOB NUMBER:	0285 780	LOCATION:	Dover, NJ
DRILLING FIRM:	ERC	WEATHER:	Hot 85°F
DRILLING METHOD:	Direct Push	ELEVATION:	n/a
DRILLER:	Chuck Coskery	DATUM:	Ground Surface
HELPER:	n/a	HYDROGEOLOGIST:	John Ifkovits

SAMPLE INFORMATION							Depth	SOIL DESCRIPTION	REMARKS	
No.	Depth (feet)	Rec (In)	Blows per 6"						Depth	PID
1	0-4	23	-	-	-	-	0	Gravel with sand and silt; tan-brown to tan. Dry.	0-4'	N/A
2	4-8	30	-	-	-	-	4	7" Coarse sand and crushed rock with silt. 14" Med to fine sand and clay with trace gravel Red-tan to tan-brown. Slightly plastic, dry. 9" Crushed stone and sand with clay Tan to tan-brown; dry to moist.	4-8'	N/A
3	8-12	34	-	-	-	-	8	6" Red tan clay, moist. 8" Crushed stone with sand and trace silt Dk. Gray to brown; moist 12" Med to coarse sand with silt and clay, trace gravel Moist to saturated. 8" Sand and gravel with silt; drk. Brown and sauturated	8-12'	N/A

17-17 ROUTE 208 NORTH, FAIR LAWN, NEW JERSEY 07410

BORING: SB-23

PROJECT NAME:	Dover Municipal Well No. 4 Superfund Site	DATE:	8/15/2001
JOB NUMBER:	0285 780	LOCATION:	Dover, NJ
DRILLING FIRM:	ERC	WEATHER:	Hot 85°F
DRILLING METHOD:	Direct Push	ELEVATION:	n/a
DRILLER:	Chuck Coskery	DATUM:	Ground Surface
HELPER:	n/a	HYDROGEOLOGIST:	John Ifkovits

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MALCOLM PIRNIE, INC.

BORING: SB-24

17-17 ROUTE 208 NORTH, FAIR LAWN, NEW JERSEY 07410

PROJECT NAME:	Dover Municipal Well No. 4 Superfund Site	DATE:	8/15/2001
JOB NUMBER:	0285 780	LOCATION:	Dover, NJ
DRILLING FIRM:	ERC	WEATHER:	Hot 85°F
DRILLING METHOD:	Direct Push	ELEVATION:	n/a
DRILLER:	Chuck Coskery	DATUM:	Ground Surface
HELPER:	n/a	HYDROGEOLOGIST:	John Ifkovits

SAMPLE INFORMATION							Depth	SOIL DESCRIPTION	REMARKS	
No.	Depth (feet)	Rec (in)	Blows per 6"						Depth	PID
1	0-4	14	-	-	-	-	4	Topsoil with sand and gravel; Brown to tan-brown, dry	0-4'	0.0
2	4-8	30	-	-	-	-	14" Fine sand with silt and trace gravel. Tan to gray-brown. Dry.	4-8'	0.0	
							8" Crushed stone			
							8" Med to coarse sand and gravel with silt Tan-brown; dry to moist.	Note: Water @ 8' BGS. Collect DPDI3-HP-24@ 16'BGS		

17-17 ROUTE 208 NORTH, FAIR LAWN, NEW JERSEY 07410

BORING: SB-25

DATE: 8/9/2001

LOCATION: Dover, NJ

WEATHER: Hot 85°F

ELEVATION: n/a

DATUM: Ground Surface

HYDROGEOLOGIST: John Ifkovits

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17-17 ROUTE 208 NORTH, FAIR LAWN, NEW JERSEY 07410

BORING: SB-27

PROJECT NAME:	Dover Municipal Well No. 4 Superfund Site	DATE:	8/9/2001
JOB NUMBER:	0285 780	LOCATION:	Dover, NJ
DRILLING FIRM:	ERC	WEATHER:	Hot 85°F
DRILLING METHOD:	Direct Push	ELEVATION:	n/a
DRILLER:	Chuck Coskery	DATUM:	Ground Surface
HELPER:	n/a	HYDROGEOLOGIST:	John Ifkovits

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MALCOLM PIRNIE, INC.

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

BORING: HP-1

PROJECT NAME:	Dover Municipal Well #4 Pre-Design Investigation	DATE:	2/25/00
JOB NUMBER:	0285-780	LOCATION:	Dover, NJ
DRILLING FIRM:	Advanced Drilling, Inc.	WEATHER:	Overcast, 40Fs
DRILLING METHOD:	GEFCO SS-15 with 3 1/4-inch Hollow Stem Augers	ELEVATION:	N/A
DRILLER:	Scott Alberalla	DATUM:	Ground Surface
HELPER:	Cory Colluci	HYDROGEOLOGIST:	Joe Caragine

SAMPLE INFORMATION							Depth	SOIL DESCRIPTION	Strati- graphy	REMARKS
No.	Depth	Rec	Blows per 6"							
							2	Asphalt Road Bed Material Brown F - M SAND; some Silt and Gravel		Description is from cuttings.
							4			
1	5 - 7 ft	12"	12	19	17	20		Brown F - M Silty SAND; some Gravel *Wet		Hnu = BKG.
							6			Cuttings are saturated at ~ 5 feet
							8	END OF BORING AT 9 FEET		Drilled to 9 feet and pushed HydroPunch Sampler to ~12 feet. Sampler met refusal.
							10			
							12			
							14			
							16			
							18			
							20			
							22			
							24			
							26			
							28			

MALCOLM PIRNIE, INC.

BORING: HP-2

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

PROJECT NAME: Dover Municipal Well #4 Pre-Design Investigation

DATE: 2/25/00

JOB NUMBER: 0285-780

LOCATION: Dover, NJ

DRILLING FIRM: Advanced Drilling, Inc.

WEATHER: Overcast, 40Fs

DRILLING METHOD: GEFCO SS-15 with 3 1/4-inch Hollow Stem Augers

ELEVATION: N/A

DRILLER: Scott Alberalla

DATUM: Ground Surface

HELPER: Cory Colluci

HYDROGEOLOGIST: Joe Caragine

SAMPLE INFORMATION							Depth	SOIL DESCRIPTION	Stratigraphy	REMARKS
No.	Depth	Rec	Blows per 6"							
							2	Asphalt Road Bed Material Brown F - M SAND; some Silt and Gravel		Description is from cuttings.
							4			
1	5 - 7 ft	17"	12	15	19	22	6	Brown F - M Silty SAND; some Gravel and trace Clay		Hnu = BKG.
							8			
							10	Brown F - M Silty SAND; some Clay		Hnu = BKG.
							12			
							14			
3	15 - 17 ft	0"	19	26	n/a	n/a	16	No Recovery		Augers hit bedrock at ~16 ft. Material is wet at ~16 feet
							18	END OF BORING AT 16 FEET		Placed HydroPunch Sampler into borehole and was able to open sampler and collect groundwater sample from just above bedrock.
							20			
							22			
							24			
							26			
							28			

MALCOLM PIRNIE, INC.

BORING: MW-6SR

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

PROJECT NAME: Dover Municipal Well #4 Pre-Design Investigation

DATE: 2/18/00

JOB NUMBER: 0285-780

LOCATION: Dover, NJ

DRILLING FIRM: Advanced Drilling, Inc.

WEATHER: Snow, 20Fs

DRILLING METHOD: GEPCO SS-15 with 6 1/4-inch Hollow Stem Augers

ELEVATION: N/A

DRILLER: Scott Alberalla

DATUM: Ground Surface

HELPER: Jeremy Logell

HYDROGEOLOGIST: Joe Caragine

SAMPLE INFORMATION							Depth	SOIL DESCRIPTION	Stratigraphy	REMARKS
No.	Depth	Rec	Blows per 6"							
1	0 - 2 ft	18"	6	8	5	3	2	Brown F-M Silty SAND; some Gravel		Hnu = BKG.
								Drill through cobbles beginning at ~ 3 feet		Cuttings are saturated at ~ 4 feet
2	5 - 7 ft	12"	19	16	23	13	6	Brown F - C SAND; some Gravel and Cobbles *Wet		Hnu = BKG.
3	10 - 12 ft	16"	7	7	8	8	10	Gray F - C SAND; some Gravel and Cobbles *Wet		Hnu = BKG.
4	15 - 17 ft	10"	18	24	28	10	16	Gray F- C SAND; some Gravel and Cobbles *Wet		Hnu = BKG.
							18	END OF BORING AT 17 FEET		
							20			
							22			
							24			
							26			
							28			

MALCOLM PIRNIE, INC.

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

BORING: MW-10S

PROJECT NAME:	Dover Municipal Well #4 Pre-Design Investigation	DATE:	2/23/00
JOB NUMBER:	0285-780	LOCATION:	Dover, NJ
DRILLING FIRM:	Advanced Drilling, Inc.	WEATHER:	Clear, 30Fs
DRILLING METHOD:	GEFCO SS-15 with 6 1/4-inch Hollow Stem Augers	ELEVATION:	N/A
DRILLER:	Scott Alberalla	DATUM:	Ground Surface
HELPER:	Cory Colluci	HYDROGEOLOGIST:	Joe Caragine

SAMPLE INFORMATION							Depth	SOIL DESCRIPTION	Stratigraphy	REMARKS
No.	Depth	Rec	Blows per 6"							
1	0 - 2 ft	14"	5	3	8	6	2	Brown F - C Silty SAND; some Gravel and Cobbles		Hnu = BKG.
								Drill through cobbles beginning at ~2 feet		Cuttings are saturated at ~4 feet
2	5 - 7 ft	6"	32	20	22	15	6	Gray-Brown F - C SAND; some Gravel and Cobbles and trace Silt * Wet		Hnu = BKG.
							8			
3	10 - 12 ft	12"	13	10	11	15	10	Gray F - C SAND; some Gravel and Cobbles *Wet		Hnu = BKG.
							12			
							14			
4	15 - 17 ft	2"	14	32	50/1	n/a		Gray F - C SAND; some Gravel and Cobbles *Wet		Hnu = BKG.
							16			
							18	END OF BORING AT 17 FEET		
							20			
							22			
							24			
							26			
							28			

BORING: MW-101

PROJECT NAME: Dover Municipal Well #4 Pre-Design Investigation

DATE: 10/2/00

JOB NUMBER: 0285-780

LOCATION: Doyer, NJ

DRILLING FIRM: Advanced Drilling, Inc.

WEATHER: P-Cloudy, 65F

DRILLING METHOD: HAS 8 1/4" id / mud rotary

ELEVATION: 556.39

DRILLER: Rick Empson

DATUM: Ground Surface

HELPER: Rick Hoffman

HYDROGEOLOGIST: J Ifkovits/J Claypool

100169

MALCOLM PIRNIE, INC.

BORING: MW-101

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

SAMPLE INFORMATION						Depth	SOIL DESCRIPTION	Stratigraphy	REMARKS
No.	Depth	Rec	Blows per 6"						
10	32-34'	16"	7	5			(10) SILT, with sand, fine, occ clay laminae, lt grey, wet		
				6		34			
11	34-36'	18"	7	6			(11) SILT, med stiff, some sand, very fine, lt grey, wet		
				4					
12	36-38'	14"	9	9		36	(12) (6") SAA		
				8			(8") SAND, fine well sorted, trace silt, wet		
13	38-40'	11"	6	5		38	(13) SAND, poorly sorted, very fine to med, occ silt and clay, yellow brown, Fe stains lowest 2"		
				7					
14	40-42'	11"	4	6		40	(14) SAND and GRAVEL, poorly sorted, some clay, red brown, wet		
				5					
15	42-44'	16"	4	5		42	(15) SAA		
				9					
16	44-46'	4"	9	17		44	(16) SAND and GRAVEL, poorly sorted, some silt, yellow brown		
				27					
17	46-48'	12"	17	12		46	(17) SAA (red sand stone)		
				12					
18	48-50'	8"	7	17		48	(18) SAND, med, occ gravel some silt, red brown		
				21					
				12		50			Cobbles
						52			
						54			Cobbles
19	55-57'		21	16		56	(19) SAND and GRAVEL, poorly sorted, some silt and clay, red brown matrix, wet		
				16					
				22		58			
						60			Cobbles to 60'
20	60-62'		25	24		62	(20) SAND, poorly sorted, some clay, med dense, occ gravel, fine, orange brown		
				21					
				20		64			
21	65-67'		27	23		66	(21) SAND and GRAVEL, poorly sorted, Fe stains, orange brown matrix		
				48					

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

SAMPLE INFORMATION						Depth	SOIL DESCRIPTION	Stratigraphy	REMARKS
No.	Depth	Rec.	Blows per ft						
					50/1				EOB @ 66'7"
						68			
						70			Little to no Mud loss at this location
						72			
						74			
						76			
						78			
						80			
						82			
						84			
						86			
						88			
						90			
						92			
						94			
						96			
						98			
						100			

MALCOLM PIRNIE, INC.**BORING: MW-11S**

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

PROJECT NAME:	Dover Municipal Well #4 Pre-Design Investigation	DATE:	2/23/00
JOB NUMBER:	0285-780	LOCATION:	Dover, NJ
DRILLING FIRM:	Advanced Drilling, Inc.	WEATHER:	Clear, 30Fs
DRILLING METHOD:	GEFCO SS-15 with 6 1/4-inch Hollow Stem Augers	ELEVATION:	N/A
DRILLER:	Scott Alberalla	DATUM:	Ground Surface
HELPER:	Cory Colluci	HYDROGEOLOGIST:	Joe Caragine

SAMPLE INFORMATION							Depth	SOIL DESCRIPTION	Stratigraphy	REMARKS
No.	Depth	Rec	Blows per 6"							
1	0 - 2 ft	12"	6	8	3	5		Brown F - C Silty SAND; trace Gravel		Hnu = BKG.
							2			
								Drill through cobbles beginning at ~3 feet		Cuttings are saturated at ~4 feet
							4			
2	5 - 7 ft	8"	32	30	20	17		Brown F - C SAND; some Gravel and Cobbles and trace Silty *Wet		Hnu = BKG.
							6			
							8			
3	10 - 12 ft	6"	16	29	9	15	10	Brown F - C SAND; some Gravel and Cobbles and trace Silt *Wet		Hnu = BKG.
							12			
							14			
4	15 - 17 ft	0"	28	50/1	n/a	n/a		No Recovery Cobble in nose of spoon		Hnu = BKG.
							16			
								END OF BORING AT 17 FEET		
							18			
							20			
							22			
							24			
							26			
							28			

MALCOLM PIRNIE, INC.

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

BORING: MW-121

PROJECT NAME:	Dover Municipal Well #4 Pre-Design Investigation	DATE:	2/17 -22/00
JOB NUMBER:	0285-780	LOCATION:	Dover, NJ
DRILLING FIRM:	Advanced Drilling, Inc.	WEATHER:	Clear, 30Fs
DRILLING METHOD:	GEFCO SS-15 w/8-1/4-in HSAs and 6" Mud Rotary	ELEVATION:	N/A
DRILLER:	Scott Alberalla	DATUM:	Ground Surface
HELPER:	Jeremy Logell/Cory Colucci	HYDROGEOLOGIST:	Joe Caragine

SAMPLE INFORMATION							Depth	SOIL DESCRIPTION	Stratigraphy	REMARKS
No.	Depth	Rec	Blows per 6"							
1	0 - 2 ft	16"	12	8	8	5	2	Dark Brown F - M SAND; some Silt and trace Gravel		Hnu = BKG.
							4			
2	5 - 7 ft	12"	12	17	21	19	6	Gray - Brown F Sandy CLAY; trace Gravel Brown F - M SAND; trace Silt and Gravel		Hnu = BKG.
							8	Drilling through cobbles beginning at ~7 feet		Cuttings are saturated at ~8 feet
3	10 - 12 ft	16"	16	26	27	15	10	Brown F - C SAND; some Gravel and Cobbles and trace Silt "Wet"		Hnu = BKG.
							12			
							14			
4	15 - 17 ft	18"	1	5	6	6	16	Brown F - M SAND; trace Silt and Gravel Gray - Brown SILT; trace F Sand		Hnu = BKG. Bottom 3" of spoon was Silt material
5	17 - 19 ft	20"	6	5	9	10	18	Gray SILT; trace Clay		Hnu = BKG. Drilled to 18 ft and installed 6" casing to 19 ft
							20			Boring was continued with 6" mud rotary drilling.
6	21 - 23 ft	21"	9	8	10	9	22	Gray SILT; trace Clay and F Sand		Hnu = BKG.
							24			
7	26 - 28 ft	18"	9	9	16	16	26	Gray SILT; trace Clay and F Sand		Hnu = BKG.
							28			

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

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MALCOLM PIRNIE, INC.

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

BORING: MW-12I

SAMPLE INFORMATION							Depth	SOIL DESCRIPTION	Stratigraphy	REMARKS
No.	Depth	Rec	Blows per 6"							
							58			
							60			
14	61 - 63 ft	14"	24	21	23	33		Gray VF - F SAND		Hnu = BKG.
							62			
							64			
15	66 - 68 ft	16"	43	34	37	34	66	Gray VF - F SAND		Hnu = BKG.
							68			
							70			
16	71 - 73 ft	14"	23	13	12	14		Gray VF - F SAND		Hnu = BKG.
								Gray SILT; trace VF Sand and Clay		
							72			
17	73 - 75 ft	16"	16	14	12	12		Gray SILT; trace Clay		Hnu = BKG.
							74			
							76	END OF BORING AT 75 FEET		
							76			
							80			
							82			
							84			
							86			

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MALCOLM PIRNIE, INC.

BORING: MW - 131

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

PROJECT NAME: Dover Municipal Well #4 Pre-Design Investigation DATE: 9/27/00
 JOB NUMBER: 0285-780 LOCATION: Dover, NJ
 DRILLING FIRM: Advanced Drilling, Inc. WEATHER: Clear, light breeze 65F
 DRILLING METHOD: HAS 8 1/4 Id / mud rotary ELEVATION: 556.4
 DRILLER: Rick Empson DATUM: Ground Surface
 HELPER: Rick Hoffman HYDROGEOLOGIST: John Ifkovits

SAMPLE INFORMATION					Depth	SOIL DESCRIPTION	Stratigraphy	REMARKS
No.	Depth	Rec.	Blows per 6"					
						Top soil with organics		
					2			Cobbles @ 2'6" and gravel
					4			Difficult drilling
1	5-7'	3"	100/3		6	(1) GRAVEL, silt and sand, fine, tan, very dry		
					8			
					10			Large Boulder @ 8'6"
2	10-12'	16"	23	48	12	(2) SAND, coarse, and GRAVEL, coarse, saturated		DTW @ 10' bgs
				21	14			
					16			
					18			
3	15-17'	8"	4	19	20	(3) GRAVEL, with sand, med to coarse, tan brown to brown, saturated		
				25	22			
				32	24			
					26			
					28			Softer drilling @ 18'
4	20-22'	18"	5	5	30	(4) SILT, sand, fine, and trace clay, grey brown to grey		
				7	32			
				9				
5	25-27'	14"	4	5		(5) SAA		
				5				
				4				
6	30-32'	16"	5	3		(6) SAA		
				2				
				4				

MALCOLM PIRNIE, INC.

BORING: MW-131

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

SAMPLE INFORMATION					Depth	SOIL DESCRIPTION	Stratigraphy	REMARKS
No.	Depth	Rec	Blows per 6"					
					34			
7	35-37'	13"	6			(7) SILT, with sand, fine, grey		
				6	36			
				7				
					38			
					40			
8	40-42'	14"	12			(8) SAND, med to fine, with silt, brown		
				8				
				7				
					42			
				8				
					44			
9	45-57'	16"	10			(9) SAND, med, with silt, brown		
				9	46			
				10				
				9	48			
					50			
10	50-52'	10"	9			(10) SILT, with sand, fine, brown		
				8				
				9				
					52			EOB @ 52' bgs
					54			
					56			
					58			
					60			
					62			
					64			
					66			

MALCOLM PIRNIE, INC.

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

BORING: MW-14S

PROJECT NAME:	Dover Municipal Well #4 Pre-Design Investigation	DATE:	9/28/00
JOB NUMBER:	0285-780	LOCATION:	Dover, NJ
DRILLING FIRM:	Advanced Drilling, Inc.	WEATHER:	Clear, calm 60F
DRILLING METHOD:	HSA 6 1/4 Id	ELEVATION:	562.89
DRILLER:	Rick Empson	DATUM:	Ground Surface
HELPER:	Rick Hoffman	HYDROGEOLOGIST:	John Ifkovits

SAMPLE INFORMATION						Depth	SOIL DESCRIPTION	Stratigraphy	REMARKS
No.	Depth	Rec	Blows	per 6"					
1	0-2'	15"	19				(1) FILL, sand, gravel, silt and clay, trace blacktop, tan brown to brown, moist		PID 95.5
				17					
					16				
					21	2			
2	2-4'	6"	7				(2) FILL, sand, silt, red brown, trace gravel, dark brown, moist		PID 182.2
				8					
					8				
					9	4			
3	4-6'	NR	7				(3) NR		
				4					
					3				
					3	6			
4	6-8'	14"	4				(4) SILT, with clay, sand, fine to medium, trace gravel, tan brown to yellow brown, some modling, moist		PID 403.8
				5					
					15				
					16	8			
5	8-10'	10"	5				(5) CLAY, with silt, trace sand and gravel, tan brown to yellow brown, moist		PID 273.5
				100/6					
					-	10			
6	10-12'	12"	22				(6) SAND, med to coarse, and gravel, with silt, brown, moist to very moist		PID 258.7
				25					
					21				
					19	12			
7	12-14'	8"	37				(7) SAA, saturated		PID 640.3
				28					DTW @ 12' bgs
					43				
					67	14			
8	15-17'	8"	4				(8) SAND, med to fine, with silt, saturated		
				7		16			
					13				
					4				
						18			
						20			
9	20-22'	10"	18				(9) SAA		
				19					
					48				
					35	22			EOB @ 22' bgs
						24			
						26			
						28			
						30			
						32			

MALCOLM PIRNIE, INC.

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

BORING: MW-15S

PROJECT NAME: Dover Municipal Well #4 Pre-Design Investigation DATE: 9/26/00
JOB NUMBER: 0285-780 LOCATION: Dover, NJ
DRILLING FIRM: Advanced Drilling, Inc. WEATHER: Overcast, 11 rain 60F
DRILLING METHOD: HSA 6 1/4 Id. ELEVATION: 558.29
DRILLER: Rick Empson DATUM: Ground Surface
HELPER: Rick Hoffman HYDROGEOLOGIST: John Ifkovits

SAMPLE INFORMATION					Depth	SOIL DESCRIPTION	Stratigraphy	REMARKS
No.	Depth	Rec.	Blows per 6"					
1	0-2'	3"	4			(1) SILT, with sand, fine, organics, gravel, dark brown, moist		
			6		2			
			7					
					4			
2	5-7'	12"	29			(2) SAND, med, with silt and gravel		PID 17.6
			29		6			
			37					
			37		8			
					10			
3	10-12'	14"	9			(3) SAND, coarse, saturated		PID 147.6
			9					
			12		12			
			4		14			
4	15-17'	12"	2			(4) (2") SAND, med to coarse, with gravel, trace silt, brown, saturated		
			3		16	(10") SILT, sand, fine, brown, saturated		
			3					EOB @ 17' bgs
			3		18			
					20			
					22			
					24			
					26			
					28			
					30			
					32			

MALCOLM PIRNIE, INC.

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

BORING: MW-151

PROJECT NAME:	Dover Municipal Well #4 Pre-Design Investigation	DATE:	9/25/00
JOB NUMBER:	0285-780	LOCATION:	Dover, NJ
DRILLING FIRM:	Advanced Drilling, Inc.	WEATHER:	P. Cloudy, 65F
DRILLING METHOD:	HSA 8 1/4 Id / mud rotary	ELEVATION:	558.16
DRILLER:	Rick Empson	DATUM:	Ground Surface
HELPER:	Rick Hoffman	HYDROGEOLOGIST:	John Ifkovits

SAMPLE INFORMATION					Depth	SOIL DESCRIPTION	Stratigraphy	REMARKS
No.	Depth	Rec	Blows per 6"					
1	0-2'	5"	5			(1) SILT, with sand, fine, organics, dark brown, moist		PID 6.6
				4				
				5				
					4			
2	2-4'	14"	17		2	(2) (6") SILT, with sand, trace gravel, organics, dark brown, moist		PID 13.0
				22		(8") SAND, med, with silt and trace gravel, tan brown to tan		
				44	4	(3) (10") GRAVEL, w/ sand, fine, lt grey to grey brown, dry		PID 3.4
				68		(6") SAND, med with silt and gravel, tan brown, dry		
3	4-6'	16"	72		6	(4) SAND, med with silt and gravel, grey brown, dry		PID 1.9
				47				
				46				
				48				
4	6-8'	2"	72		8	(5) (7") SAND, med, trace silt, brown, saturated		DTW @ 8' bgs
				47		(11") SAND, coarse, trace silt, brown, saturated		PID 68.9 (saturated)
				22				
				12				
5	8-10'	18"	12		10	(6) SAND, med to coarse with gravel, trace silt, brown, saturated		
				11				
				10				
6	10-12'	10"	10		12	(7) SAA		
				5				
				3				
				4				
7	12-14'	16"	3		14	(8) (10") SAA		
				3		(8") SILT, with clay, sand, fine, yellow brown, saturated		
				3				
8	14-16'	18"	9		16	(9) SAA		Aquitard 15'6" to 24'
				9				
				4				
				3				
9	16-18'	10"	3		18	(10) SAA		
				2				
				1				
				1				
10	18-20'	10"	5		20			
				1				
				2				
				3				
					22			
					24			
11	25-27'	18"	27		26	(11) SAND, coarse, with gravel		
				27				
				15				
				10				
					28			cobbles @ 28'
					30			
12	30-32'	12"	5		32	(12) SAA		
				48				
				28				
				16				

MALCOLM PIRNIE, INC.

BORING: MW-15I

ONE INTERNATIONAL BOULEVARD MAHWAH, NEW JERSEY 07495-0018

SAMPLE INFORMATION						Depth	SOIL DESCRIPTION	Soil graphy	REMARKS
No.	Depth	Rec	Blows	per	6"				
						34	Bedrock @ 34'6"		EOB @ 34'6" bgs
						36			
						38			
						40			
						42			
						44			
						46			
						48			
						50			
						52			
						54			
						56			
						58			
						60			
						62			
						64			
						66			

B
Appendix B

Appendix B

APPENDIX B

**WELL CONSTRUCTION LOGS,
INSTALLATION, AND ABANDONMENT REPORTS**

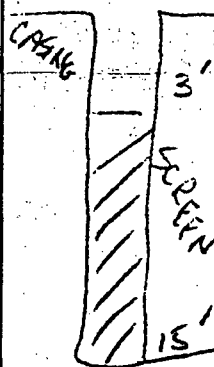
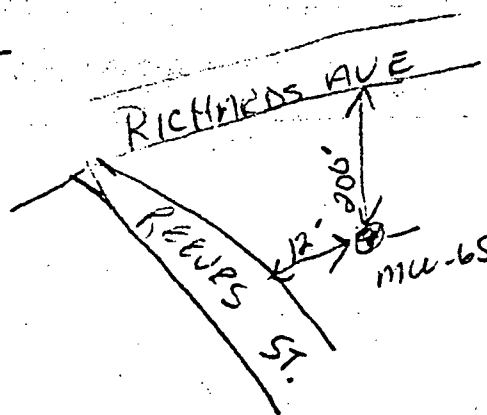
DWR-020
8/97New Jersey Department of Environmental Protection
Water Supply Element - Bureau of Water Allocation**WELL ABANDONMENT REPORT**MAIL TO: Bureau of Water Allocation
PO Box 426
Trenton, NJ 08625-0426WELL PERMIT # 25-29169
of well sealedDATE WELL SEALED 2-18-00PROPERTY OWNER Pateron WellsADDRESS 327 Richards Ave, Dover, NJWELL LOCATION 327 Richard Ave, MORRIS, Dover
Street & No., Township, CountyMW-65
Well No.23+24
Lot No.23-10
Block No.USE OF WELL PRIOR TO ABANDONMENT: MaintainingREASON FOR ABANDONMENT: No longer neededWAS A NEW WELL DRILLED? ☐ YES ☒ NO

PERMIT # OF NEW WELL _____

TOTAL DEPTH OF WELL 15'DIAMETER 4"CASING LENGTH 3'SCREEN LENGTH 12'NUMBER OF CASINGS 1

MATERIAL USED TO DECOMMISSION WELL:

<u>8</u>	Gallons of Water
<u>95</u>	Lbs. of Cement
	Lbs. of Bentonite
	Lbs. of Sand/Gravel
	(none if well is contaminated)

FORMATION: ☐ Consolidated
☒ UnconsolidatedCross-section
of sealed wellDraw a sketch showing distance and relations of well site to
nearest roads, buildings, etc.

To permit adequate grouting, the casing should remain in place, but ungrouted liner pipes or any other obstructions must be removed. Pressure grouting is the only accepted method.

WAS CASING LEFT IN PLACE? ☐ YES ☒ NOCASING MATERIAL: PVCWERE OTHER OBSTRUCTIONS LEFT IN WELL? ☐ YES ☒ NO WHAT WERE THE OBSTRUCTIONS: _____

IF "YES", AUTHORIZATION GRANTED BY _____ ON _____

(NJDEP Official)

(Date)

Was an alternative decommissioning method used? ☐ YES ☒ NO

IF "YES", authorization granted by _____ ON _____

(NJDEP Official)

(Date)

I certify that this well was sealed in accordance with N.J.A.C. 7:9-9.1 et seq.

ROGER LOGEL
Performing Work (Print or Type)
Name of NJ Certified Well Sealer

3 COLT RD, PITTSFORD, NJ
Address
Roger Logel
Signature of NJ Certified Well Sealer
Performing Work

4-17-00
Mailing Date
M1166
Registration #

COPIES:

White - Water Allocation

Yellow - Owner

Pink - Health Dept.

Goldenrod - Driller

MALCOLM PIRNIE, INC.			FLUSHMOUNT OVERBURDEN WELL MW-6SR	
Project:	Dover Municipal Well #4 Pre-Design Investigation	Project Number:	0285-780	
Client:	USACE/USEPA	Date:	02/18/00	
Drilling Method:	6 1/4" HSAs	Subcontractor:	Advanced Drilling, Inc.	
Development Method:	Overpumping and Surging	Measuring Point	Top of Casing	
Bucking Posts:	N/A	Elevation (ft):	554.78	
Item	Depth Below Ground Surface	Description		
Grade	0 feet			
Riser Pipe	0.5 feet			
Top of Seal	1 feet	Surface Seal Type: Concrete Backfill/Grout Type: Cement-Bentonite Riser Pipe Type: Type 316 Stainless Steel Riser Pipe ID: 4 inches Borehole Diameter: 10 inches		
Top of Filter Pack	2 feet	Type of Seal: Bentonite Slurry		
Top of Screen	3 feet	Screen Type: Type 304 Stainless Steel Screen ID: 4 inches Screen Slot Size: 10 slot Screen Length: 10 feet		
		Filter/Sand Pack Type: No. 00 Morie Sand		
Base of Screen	13 feet			
End Cap	16 feet	Sump Type: Type 316 Stainless Steel Sump Length: 3 feet Sump Diameter: 4 inches		
Drilled Depth	17 feet			
Total Depth	17 feet			
Notes: Shallow water table was encountered and well construction was compressed to fit below the ground surface.				

DWR-138 M
11/98New Jersey Department of Environmental Protection
Bureau of Water Allocation**MONITORING WELL RECORD**Well Permit No. 25 55717Atlas Sheet Coordinates 25 03 461OWNER IDENTIFICATION - Owner EPAAddress 290 BROADWAY, 19TH FL.City NEW YORKState NYZip Code

WELL LOCATION - If not the same as owner please give address.

Owner's Well No. MW-6SRCounty MORRISMunicipality DOVER TOWNLot No. 1Block No. 2314Address 10 REEVE ST.DATE WELL STARTED 2/18/00DATE WELL COMPLETED 2/18/00

TYPE OF WELL (as per Well Permit Categories)

MONITORINGRegulatory Program Requiring Well CERCLACase I.D.# CONSULTING FIRM/FIELD SUPERVISOR (if applicable) Michael RiniTele. # 201/529-4700**WELL CONSTRUCTION**Total depth drilled 17 ft.Well finished to 13 ft.

Borehole diameter:

Top 10.25 in.Bottom 10.25 in.Well was finished: ☐ above grade☒ flush mountedFinished above grade, casing height (stick above land surface) ft.

Was steel protective casing installed?

☒ Yes ☐ NoStatic water level after drilling 3.5 ft.Water level was measured using TAPEWell was developed for 2 hoursat gpmMethod of development PumpWas permanent pumping equipment installed? ☐ Yes ☒ NoPump capacity gpmPump type: Drilling Fluid Type of Rig FeelingHealth and Safety Plan submitted? ☐ Yes ☒ NoLevel of Protection used on site (circle one) None D C B A

I certify that I have constructed the above referenced well in accordance with all well permit requirements and applicable State rules and regulations.

Drilling Company ADVANCED DRILLING, INC.Driller (Print) Scott ALBERALLADriller's Signature Scott AlberallaRegistration No. J1320 Date 3/27/00

Note: Measure all depths from land surface	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating (lbs/sch no.)
Single/Inner Casing	0	3	4	Standard Steel	144
Middle Casing (for triple cased wells only)	-				
Outer Casing (largest diameter)	-				
Open Hole or Screen (No. Used <u>10</u>)	3	13	4	Standard Steel	144
Blank Casings (No. Used <u>1</u>)	-				
Tail Piece <u>SAND FILTER</u>	2	17		#1 SAND FILTER	
Gravel Pack	1	2		#00SAND SCREEN	
Grout	0	1		Neat Cement Bentonite	50 lbs. 10 lbs.

Grouting Method FeelingDrilling Method H5 Auger**GEOLOGIC LOG**

Note each depth where water was encountered in consolidated formations.

0-3' - Dry silty F-M SAND + GRAVEL3'-5' - Cobbles5'-17' - moist to wet F-C SAND + gravel, silt, clay, cobbles

MALCOLM PIRNIE, INC.			FLUSHMOUNT OVERBURDEN WELL MW-10S	
Project: Dover Municipal Well #4 Pre-Design Investigation		Project Number: 0285-780		NJDEP Permit No. 25-55715
Client: USACE/USEPA		Date: 02/23/00		Subcontractor: Advanced Drilling, Inc.
Drilling Method: 6 1/4" HSAs		Measuring Point		
Development Method: Overpumping and Surging		Type: Top of Casing		
Bucking Posts: N/A		Elevation (ft): 555.83		
Item	Depth Below Ground Surface	Description		
Grade	0 feet	Surface Seal Type: Concrete Backfill/Grout Type: Cement-Bentonite Riser Pipe Type: Type 316 Stainless Steel Riser Pipe ID: 4 inches Borehole Diameter: 10 inches Type of Seal: Bentonite Slurry Screen Type: Type 304 Stainless Steel Screen ID: 4 inches Screen Slot Size: 10 slot Screen Length: 10 feet Filter/Sand Pack Type: No. 00 Morie Sand Sump Type: Type 316 Stainless Steel Sump Length: 3 feet Sump Diameter: 4 inches		
Riser Pipe	0.5 feet			
Top of Seal	1 feet			
Top of Filter Pack	2 feet			
Top of Screen	3 feet			
Base of Screen	13 feet			
End Cap	16 feet			
Drilled Depth	17 feet			
Total Depth	17 feet			
Notes: Shallow water table was encountered and well construction was compressed to fit below the ground surface.				

DWR-138 M
11/98

New Jersey Department of Environmental Protection
Bureau of Water Allocation

MONITORING WELL RECORD

Well Permit No. 25 55715

Atlas Sheet Coordinates 25 03 462

OWNER IDENTIFICATION - Owner USEPA C/D BARCIA, DIEGO

Address 290 BROADWAY, 19TH FL.

City NEW YORK

State NY

Zip Code

WELL LOCATION - If not the same as owner please give address. Owner's Well No. MW-105

County MORRIS

Municipality DOVER TOWN

Lot No. 4

Block No. 2314

Address 338 RICHARDS AVE.

DATE WELL STARTED 2/23/00

DATE WELL COMPLETED 2/23/00

TYPE OF WELL (as per Well Permit Categories)

MONITORING

Regulatory Program Requiring Well CERCLA

Case I.D.#

CONSULTING FIRM/FIELD SUPERVISOR (if applicable) Malcolm Pirnie, Inc. Tele. # 201/529-4700

WELL CONSTRUCTION

Total depth drilled 16 ft.

Well finished to 13 ft.

Borehole diameter:

Top 10.25 in.

Bottom 10.25 in.

Well was finished: ☐ above grade

☒ flush mounted

Finished above grade, casing height (stick

above land surface ft.

Was steel protective casing installed?

☒ Yes ☐ No

Static water level after drilling 3.9 ft.

Water level was measured using TAPE

Well was developed for 1.5 hours

at 1 gpm

Method of development Pump

Was permanent pumping equipment installed? ☐ Yes ☒ No

Pump capacity gpm

Pump type:

Drilling Fluid Type of Rig Trailer

Health and Safety Plan submitted? ☐ Yes ☒ No

Level of Protection used on site (circle one) None C B A

I certify that I have constructed the above referenced well in accordance with all well permit requirements and applicable State rules and regulations.

Drilling Company ADVANCED DRILLING, INC.

Well Driller (Print) Scott ALBERMILLA

Driller's Signature Scott Albermilla

Registration No. J1320 Date 3/27/00

Note: Measure all depths from land surface	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating (lbs/sch no.)
Single/Inner Casing	0	3	4	Stainless Steel	144
Middle Casing (for triple cased wells only)	-				
Outer Casing (largest diameter)	-				
Open Hole or Screen (No. Used <u>10</u>)	3	13	4	Stainless Steel	144
Blank Casings (No. Used <u>1</u>)	-				
Tail Piece <u>SAND FILTER</u>	2	16		#1 SAND FILTER	
Gravel Pack	1	2		#00 SANDSIL	
Grout	0	1		Neat Cement Bentonite	<u>50</u> lbs. <u>10</u> lbs.

Grouting Method Tremie

Drilling Method 45 Auger

GEOLOGIC LOG

Note each depth where water was encountered in consolidated formations.

0-16' - Pump & wet side F-C
SAND, + GRAVEL, drilled
cables.

100188

COPIES: White - DEP

Canary - Driller

Pink - Owner

Goldenrod - Health Dept.

MALCOLM PIRNIE, INC.			OVERBURDEN MULTICASED WELL	
Project: Dover Municipal Well #4 Pre-Design Investigation (2)		Project Number: 0285-780		MW-101
Client: USACE/USEPA		Date: 10/02-10/04		NJDEP Permit No. 25-57015
Drilling Method: 8 1/4" HSAs/6" Mud Rotary		Subcontractor: Advanced Drilling, Inc.		
Development Method: Overpumping and Surging		Measuring Point		
Bucking Posts: N/A		Type: Top of Casing		
		Elevation (ft): 556.39		
Item	Depth Below Ground Surface	Description		
Grade	0 feet			
Riser Pipe	0.5 feet			
		Surface Seal Type:	Concrete	
		Grout Type:	Cement-Bentonite	
		Borehole Diameter:	12 inches	
		Casing Type:	Black Steel	
		Casing ID:	6 inches	
Base of Borehole	16 feet	Borehole Diameter:	6 inches	
Base of Casing	17 feet	Grout Type:	Cement-bentonite	
		Riser Pipe Type:	Type 316 Stainless Steel	
		Riser Pipe ID:	2 inches	
Top of Seal.	38 feet	Type of Seal:	Bentonite Slurry	
Top of Filter Pack.	40 feet	Screen Type:	Type 304 Stainless Steel	
Top of Screen.	42 feet	Screen ID:	2 inches	
		Screen Slot Size:	10 slot	
		Screen Length:	10 feet	
		Filter/Sand Pack Type:	No. 00 Morie Sand	
Base of Screen.	52 feet	Sump Type:	Type 316 Stainless Steel	
End Cap	55 feet	Sump Length:	3 feet	
		Sump Diameter:	2 inches	
Drilled Depth	70 feet	Hole Plug		
Total Depth	70 feet			
Notes:				
100189				

New Jersey Department of Environmental Protection
Bureau of Water Allocation
MONITORING WELL RECORDWell Permit No. 25 - 51015Atlas Sheet Coordinates 25 10 45OWNER IDENTIFICATION - Owner US EPA
Address 290 BROADWAY 10TH FLOOR
City NEW YORK State NY Zip Code WELL LOCATION - If not the same as owner please give address. Owner's Well No. MW-101
County MORRIS Municipality DOVER TOWN Lot No. 4 Block No. 25 14
Address 338 RICHARDS AVE.DATE WELL STARTED 10/2/00
TYPE OF WELL (as per Well Permit Categories) MONITORING DATE WELL COMPLETED 10/4/00
Regulatory Program Requiring Well Case I.D.# CONSULTING FIRM/FIELD SUPERVISOR (if applicable) Melchor P. Ponce, Inc. Tele. # 201/529-4700**WELL CONSTRUCTION**Total depth drilled 70 ft.
Well finished to 55 ft.Borehole diameter:
Top 10.25 in.
Bottom 6 in.Well was finished: ☐ above grade
☒ flush mountedIf finished above grade, casing height (stick
above land surface ft.Was steel protective casing installed?
☒ Yes ☐ NoStatic water level after drilling 8.33 ft.Water level was measured using TAPEWell was developed for 1/2 hours
at 3 gpmMethod of development PumpWas permanent pumping equipment installed? ☐ Yes ☒ NoPump capacity gpmPump type: Drilling Fluid Type of Rig DrillingHealth and Safety Plan submitted? ☐ Yes ☒ NoLevel of Protection used on site (circle one) None (D) C B AI certify that I have constructed the above referenced well in
accordance with all well permit requirements and applicable
State rules and regulations.Drilling Company ADVANCED DRILLING, INC.Well Driller (Print) RICHARD D. EMPSONDriller's Signature Richard EmpsonRegistration No. J1312 Date 11/7/00

Note: Measure all depths from land surface	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating (lbs/sch no.)
Single/Inner Casing	0	42	2"	STAINLESS STEEL	10
Middle Casing (for triple cased wells only)	-				
Outer Casing (largest diameter)	0	17	6	STEEL	144
Open Hole or Screen (No. Used <u>10</u>)	42	52	2	STAINLESS STEEL	10
Blank Casing (No. Used <u>3"</u>)	52	55	3	STAINLESS STEEL	Pump
Blank Casing (No. Used <u>3"</u>)	55	70		BENTONITE	HOLE PLUG
Gravel Pack	37.5	39.5		#00 SAND	FILTER
Grout	0	42		Neat Cement	100 lbs.
	0	17		Bentonite	200 lbs.

Grouting Method UrethaneDrilling Method HSAUGER/AIR ROTARY**GEOLOGIC LOG**

Note each depth where water was encountered in consolidated formations.

3' Topsoil

3'-16' Dry SAND, GRAVEL, COBBLES

16'-37.5' Wet VF-SAND+SILT

37.5'-48' Wet F-C SAND+GRAVEL

48'-60' Wet F-C SAND, LITTLE GRAVEL+SILT

60'-70' Wet SILT, SAND, GRAVEL, LITTLE SILT, SCATTERED COBBLES

100190

MALCOLM PIRNIE, INC.			FLUSHMOUNT OVERBURDEN WELL MW-11S	
Project: Dover Municipal Well #4 Pre-Design Investigation		Project Number: 0285-780		NJDEP Permit No. 25-25716
Client: USACE/USEPA		Date: 02/23/00		Subcontractor: Advanced Drilling, Inc.
Drilling Method: 6 1/4" HSAs		Measuring Point		
Development Method: Overpumping and Surging		Type: Top of Casing		
Bucking Posts: N/A		Elevation (ft): 554.74		
Item	Depth Below Ground Surface	Description		
Grade	0 feet	Surface Seal Type: Concrete Backfill/Grout Type: Cement-Bentonite Riser Pipe Type: Type 316 Stainless Steel Riser Pipe ID: 4 inches Borehole Diameter: 10 inches Type of Seal: Bentonite Slurry Screen Type: Type 304 Stainless Steel Screen ID: 4 inches Screen Slot Size: 10 slot Screen Length: 10 feet Filter/Sand Pack Type: No. 00 Morie Sand Sump Type: Type 316 Stainless Steel Sump Length: 3 feet Sump Diameter: 4 inches		
Riser Pipe	0.5 feet			
Top of Seal	1 feet			
Top of Filter Pack	2 feet			
Top of Screen	3 feet			
Base of Screen	13 feet			
End Cap	16 feet			
Drilled Depth	17 feet			
Total Depth	17 feet			
Notes: Shallow water table was encountered and well construction was compressed to fit below the ground surface.				

DWR-138 M

11/98

New Jersey Department of Environmental Protection

Bureau of Water Allocation

MONITORING WELL RECORD

Well Permit No. 25 55716Atlas Sheet Coordinates 25 03 462OWNER IDENTIFICATION - Owner EPAAddress 290 BROADWAY, 19TH FL.City NEW YORK State NY Zip Code WELL LOCATION - If not the same as owner please give address. Owner's Well No. MW-115County MORRIS Municipality DOVER TOWN Lot No. 12 Block No. 2315Address 272 RICHARDS AVE.

TYPE OF WELL (as per Well Permit Categories)

MONITORINGDATE WELL STARTED 2/23/00
DATE WELL COMPLETED 2/23/00Regulatory Program Requiring Well CERCLACase I.D.#

CONSULTING FIRM/FIELD SUPERVISOR (if applicable)

Walden Pump, Inc.Tele. # 201/521-4700

WELL CONSTRUCTION

Total depth drilled 16 ft.Well finished to 13 ft.

Borehole diameter:

Top 10.25 in.Bottom 10.25 in.Well was finished: ☐ above grade
☒ flush mountedWell finished above grade, casing height (stick
above land surface ft.

Was steel protective casing installed?

☒ Yes ☐ NoStatic water level after drilling 4 ft.Water level was measured using TAPPWell was developed for 1.5 hoursat gpmMethod of development PumpWas permanent pumping equipment installed? ☐ Yes ☒ NoPump capacity gpmPump type: Drilling Fluid Type of Rig TabletHealth and Safety Plan submitted? ☐ Yes ☒ NoLevel of Protection used on site (circle one) None (C) B AI certify that I have constructed the above referenced well in
accordance with all well permit requirements and applicable
State rules and regulations.Drilling Company ADVANCED DRILLING, INC.Well Driller (Print) Scott ALBERALLADriller's Signature Scott AlberallaRegistration No. J1320 Date 3/27/00

Note: Measure all depths from land surface	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating (lbs/sch no.)
Single/Inner Casing	0	3	4	Stainless Steel	144
Middle Casing (for triple cased wells only)	-				
Outer Casing (largest diameter)	-				
Open Hole or Screen (No. Used <u>10</u>)	3	13	4	Stainless Steel	144
Blank Casings (No. Used <u></u>)	-				
Tail Piece <u>SAND FILTER</u>	2	16		#1 SAND FILTER	
Gravel Pack	1	2		#00 SAND SEAL	
Grout	0	1		Neat Cement Bentonite	<u>50</u> lbs. <u>10</u> lbs.

Grouting Method FreeDrilling Method H. Steyer

GEOLOGIC LOG

Note each depth where water was encountered in consolidated
formations.0-3' Dry Sand, F.C. SAND + Gravel3'-16' Damp & wet F.C. SANDSame Sand, wetter
CERCLA

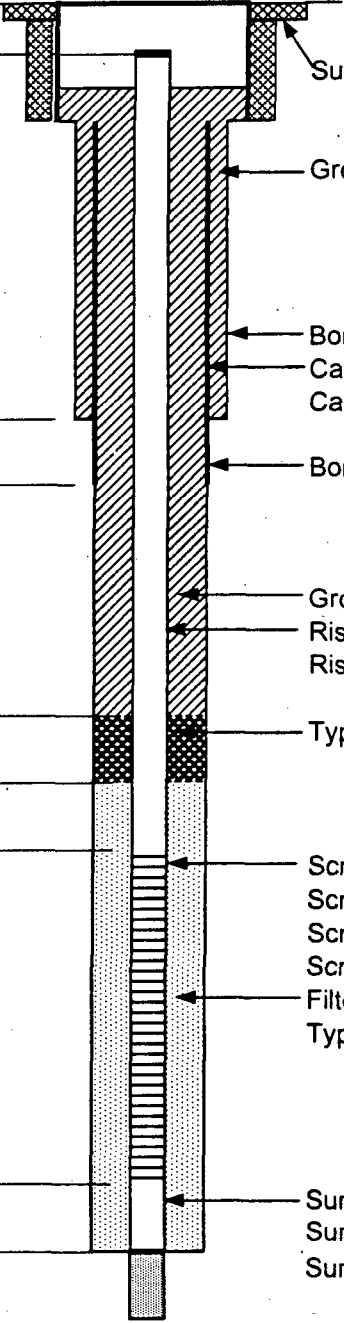
100192

COPIES: White - DEP

Canary - Driller

Pink - Owner

Goldenrod - Health Dept.

MALCOLM PIRNIE, INC.		OVERBURDEN MULTICASED WELL MW-12I	
Project:	Dover Municipal Well #4 Pre-Design Investigation	Project Number:	0285-780
Client:	USACE/USEPA	Date: 02/17-02/20	NJDEP Permit No. 25-55718
Drilling Method:	8 1/4" HSAs/6" Mud Rotary	Subcontractor: Advanced Drilling, Inc.	
Development Method:	Overpumping and Surging	Measuring Point	
Bucking Posts:	N/A	Type:	Top of Casing
		Elevation (ft):	552.26
Item	Depth Below Ground Surface	Description	
Grade	0 feet		
Riser Pipe	0.5 feet		
		Surface Seal Type:	Concrete
		Grout Type:	Cement-Bentonite
		Borehole Diameter:	12 inches
		Casing Type:	Black Steel
		Casing ID:	6 inches
Base of Borehole	18 feet	Borehole Diameter:	6 inches
Base of Casing	19 feet	Grout Type:	Cement-bentonite
		Riser Pipe Type:	Type 316 Stainless Steel
		Riser Pipe ID:	2 inches
Top of Seal.	56.5 feet	Type of Seal:	Bentonite Slurry
Top of Filter Pack.	58.5 feet	Screen Type:	Type 304 Stainless Steel
Top of Screen.	61 feet	Screen ID:	2 inches
		Screen Slot Size:	10 slot
		Screen Length:	10 feet
		Filter/Sand Pack Type:	No. 00 Morie Sand
Base of Screen.	71 feet	Sump Type:	Type 316 Stainless Steel
End Cap	74 feet	Sump Length:	3 feet
		Sump Diameter:	2 inches
Drilled Depth	74 feet		
Total Depth	75 feet		
Notes:	Total drilled depth was 74 feet but final split spoon sample was collected to 75 feet. Well was set at base of drilled borehole at 74 feet.		

DWR-138 M
11/98

New Jersey Department of Environmental Protection

Bureau of Water Allocation

MONITORING WELL RECORD

Well Permit No. 25 - 55718

Atlas Sheet Coordinates 25 : 03 48.4

OWNER IDENTIFICATION - Owner EPA

Address 290 BROADWAY, 19TH FL.

City NEW YORK

State NY

Zip Code

WELL LOCATION - If not the same as owner please give address.

Owner's Well No. MW-12I

County MORRIS

Municipality DOVER TOWN

Lot No. 4.01

Block No. 2204

Address 58 HARDING AVE.

DATE WELL STARTED 2/17/00

DATE WELL COMPLETED 2/22/00

TYPE OF WELL (as per Well Permit Categories)

MONITORING

Regulatory Program Requiring Well CERCLA

Case I.D.#

CONSULTING FIRM/FIELD SUPERVISOR (if applicable)

Molelon Pierre, Inc. Tele. # 201/529-4200

WELL CONSTRUCTION

Total depth drilled 75 ft.

Well finished to 71 ft.

Borehole diameter:

Top 10.25 in.

Bottom 10.25 in.

Well was finished: ☐ above grade

☒ flush mounted

Finished above grade, casing height (stick

above land surface ft.

Was steel protective casing installed?

☐ Yes ☒ No

Static water level after drilling 3 ft.

Water level was measured using TAPE

Well was developed for 3/4 hours

at 1 gpm

Method of development Pump

Was permanent pumping equipment installed? ☐ Yes ☒ No

Pump capacity gpm

Pump type:

Drilling Fluid

Type of Rig Chiller

Health and Safety Plan submitted? ☐ Yes ☒ No

Level of Protection used on site (circle one) None D C B A

I certify that I have constructed the above referenced well in accordance with all well permit requirements and applicable State rules and regulations.

Drilling Company

ADVANCED DRILLING, INC.

Well Driller (Print)

Scott ALBERALIA

Driller's Signature

Scott Alberalia

Registration No. 11320

Date 3/27/00

Note: Measure all depths from land surface	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating (lbs/sch no.)
Single/Inner Casing	0	61	2	Stainless Steel	144
Middle Casing (for triple cased wells only)	-				
Outer Casing (largest diameter)	0	19	6	Steel	144
Open Hole or Screen (No. Used <u>10</u>)	61	71	2	Stainless Steel	144
Blank Casings (No. Used <u></u>)	-				
Tail Piece <u>Sand Filter</u>	58.5	75		#1 Sand Filter	
Gravel Pack	56.5	58.5		# 20 SAND	
Grout	0	56.5		Neat Cement	700 lbs.
	0	19		Bentonite	140 lbs.

Grouting Method Tremie

Drilling Method HSA Auger Rotary

GEOLOGIC LOG

Note each depth where water was encountered in consolidated formations.

0-4' - Dry F.M. SAND, sand silt and gravel.

4'-10' - Damp F-SAND/clay, trace of gravel & silt

10'-20' - Moist. Wet F.C. SANDY gravel, rounded pebbles with silt

20'-40' - wet silt, trace of F-SAND/clay
40'-55' - wet F-SAND, trace silt & gravel
55'-70' - wet VF-SAND

70'-75' - wet VF-SAND, SILT, CLAY

100194

COPIES: White - DEP

Canary - Driller

Pink - Owner

Goldenrod - Health Dept.

MALCOLM PIRNIE, INC.		OVERBURDEN MULTICASED WELL	
Project: Dover Municipal Well #4		Project Number: 0285-780	
Pre-Design Investigation (2)		NJDEP Permit No. 25-57016	
Client: USACE/USEPA		Date: 09/27-10/5	
Drilling Method: 8 1/4" HSAs/6" Mud Rotary		Subcontractor: Advanced Drilling, Inc.	
Development Method: Overpumping and Surging		Measuring Point	
Bucking Posts: N/A		Type: Top of Casing	
		Elevation (ft): 556.4	
Item	Depth Below Ground Surface	Description	
Grade	0 feet		
Riser Pipe	0.5 feet	Surface Seal Type: Concrete	
		Grout Type: Cement-Bentonite	
		Borehole Diameter: 12 inches	
		Casing Type: Black Steel	
		Casing ID: 6 inches	
Base of Borehole	20 feet	Borehole Diameter: 6 inches	
Base of Casing	21 feet	Grout Type: Cement-bentonite	
		Riser Pipe Type: Type 316 Stainless Steel	
		Riser Pipe ID: 2 inches	
Top of Seal.	33 feet	Type of Seal: Bentonite Slurry	
Top of Filter Pack.	35 feet		
Top of Screen.	37 feet	Screen Type: Type 304 Stainless Steel	
		Screen ID: 2 inches	
		Screen Slot Size: 10 slot	
		Screen Length: 10 feet	
		Filter/Sand Pack Type: No. 00 Morie Sand	
Base of Screen.	47 feet		
End Cap	50	Sump Type: Type 316 Stainless Steel	
		Sump Length: 3 feet	
		Sump Diameter: 2 inches	
Drilled Depth	50 feet		
Total Depth	52 feet		
Notes: Total drilled depth was 50 feet but final split spoon sample was collected to 52 feet. Well was set at base of drilled borehole at 50 feet.			
		100195	

DWR-138 M
11/98

New Jersey Department of Environmental Protection
Bureau of Water Allocation
MONITORING WELL RECORD

Well Permit No. 25 - 57014

Atlas Sheet Coordinates 25 03 462

OWNER IDENTIFICATION - Owner US EPA
Address 290 BROADWAY 19TH FLOOR
City NEW YORK State NY Zip Code

WELL LOCATION - If not the same as owner please give address. Owner's Well No. MW-13I
County MORRIS Municipality DOVER TOWN Lot No. 20 Block No. 23-15
Address 25 RUTAN DRIVE

TYPE OF WELL (as per Well Permit Categories) MONITORING DATE WELL STARTED 9/27/00
Regulatory Program Requiring Well DATE WELL COMPLETED 10/5/00
Case I.D.#

CONSULTING FIRM/FIELD SUPERVISOR (if applicable) McLellan Pinner, Inc. Tele. # 201/539-4700

WELL CONSTRUCTION

Total depth drilled 52 ft.
Well finished to 50 ft.

Borehole diameter: 10.25 in.
Top 6 in.
Bottom 6 in.

Well was finished: ☐ above grade
☒ flush mounted

Finished above grade, casing height (stick
above land surface ft.)

Was steel protective casing installed?
☒ Yes ☐ No

Static water level after drilling 7.85 ft.

Water level was measured using TAPE

Well was developed for 1 hours
at 3 gpm

Method of development Pump

Was permanent pumping equipment installed? ☐ Yes ☒ No

Pump capacity gpm

Pump type:

Drilling Fluid Type of Rig Trucking

Health and Safety Plan submitted? ☐ Yes ☒ No

Level of Protection used on site (circle one) None (D) C B A

I certify that I have constructed the above referenced well in
accordance with all well permit requirements and applicable
State rules and regulations.

Drilling Company ADVANCED DRILLING, INC.

Driller (Print) Richard Empson

Driller's Signature Richard Empson

Registration No. 11312 Date 11/7/00

Note: Measure all depths from land surface	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating (lbs/sch no.)
Single/Inner Casing	0	37	2	STAINLESS STEEL	10
Middle Casing (for triple cased wells only)	-				
Outer Casing (largest diameter)	0	21	6	STEEL	144
Open Hole or Screen (No. Used <u>10</u>)	37	47	2	STAINLESS STEEL	10
Blank Casings <u>SS</u> (No. Used <u>Sump</u>)	47	50	3	STAINLESS STEEL	Sump
Tail Piece <u>SAND PACK FILTER</u>	35	52		#00 SAND FILTER	
Gravel Pack	33	35		BENTONITE PELLETS	
Grout	0	33		Neat Cement Bentonite	1000 lbs. 800 lbs.

Grouting Method TREMIER
Drilling Method HSAUGER/ROTARY

GEOLOGIC LOG

Note each depth where water was encountered in consolidated formations.
<u>4" topsoil</u>
<u>4'-9' - DRY SAND, GRAVEL, COBBLES + Boulders, little silt</u>
<u>9'-18' - wet SAND + GRAVEL, little silt</u>
<u>18'-38' - wet F.F. SAND, little silt</u>
<u>38'-48' - wet F.F. SAND, little silt</u>
<u>48'-52' - wet F.F. SAND, little silt</u>

100196

COPIES: White - DEP

Canary - Driller

Pink - Owner

Goldenrod - Health Dept.

MALCOLM PIRNIE, INC.			FLUSHMOUNT OVERBURDEN WELL	
Project: Dover Municipal Well #4		Project Number: 0285-780		MW-14S
Pre-Design Investigation (2)				NJDEP Permit No. 25-57011
Client: USACE/USEPA	Date: 09/28/00	Subcontractor: Advanced Drilling, Inc.		
Drilling Method: 6 1/4" HSAs	Measuring Point			
Development Method: Overpumping and Surging	Type:		Top of Casing	
Bucking Posts: N/A	Elevation (ft):		562.89	
Item	Depth Below Ground Surface	Description		
Grade	0 feet	Surface Seal Type: Concrete Backfill/Grout Type: Cement-Bentonite Riser Pipe Type: Type 316 Stainless Steel Riser Pipe ID: 4 inches Borehole Diameter: 10 inches Type of Seal: Bentonite Slurry Screen Type: Type 304 Stainless Steel Screen ID: 4 inches Screen Slot Size: 10 slot Screen Length: 10 feet Filter/Sand Pack Type: No. 00 Morie Sand Sump Type: Type 316 Stainless Steel Sump Length: 3 feet Sump Diameter: 4 inches		
Riser Pipe	0.5 feet			
Top of Seal	6 feet			
Top of Filter Pack	8 feet			
Top of Screen	10 feet			
Base of Screen	20 feet			
End Cap	23 feet			
Drilled Depth	24 feet			
Total Depth	24 feet			
Notes:				

DWR-138 M
11/98

New Jersey Department of Environmental Protection
Bureau of Water Allocation
MONITORING WELL RECORD

Well Permit No. 25 57011

Atlas Sheet Coordinates 25 107 432

OWNER IDENTIFICATION - Owner US EPA
Address 290 BROADWAY 19TH FLOOR
City NEW YORK State NY Zip Code

WELL LOCATION - If not the same as owner please give address. Owner's Well No. MW-145
County MORRIS Municipality DOVER TOWN Lot No. 8A Block No. 23 10
Address 272 ROUTE 46

TYPE OF WELL (as per Well Permit Categories) MONITORING DATE WELL STARTED 9/28/00
Regulatory Program Requiring Well DATE WELL COMPLETED 9/28/00
Case I.D.#

CONSULTING FIRM/FIELD SUPERVISOR (if applicable) Malcolm Pirnie, Inc. Tele. # 201/589-4700

WELL CONSTRUCTION

Total depth drilled 24 ft.
Well finished to 23 ft.

Borehole diameter:
Top 10.25 in.
Bottom 10.25 in.

Well was finished: ☐ above grade
☒ flush mounted

Finished above grade, casing height (stick
above land surface ft.)

Was steel protective casing installed?
☒ Yes ☐ No

Static water level after drilling 11.98 ft.

Water level was measured using TAE

Well was developed for 3 hours
at 1/2 gpm

Method of development Pump

Was permanent pumping equipment installed? ☐ Yes ☒ No

Pump capacity gpm

Pump type:

Drilling Fluid Type of Rig Tailer

Health and Safety Plan submitted? ☐ Yes ☒ No

Level of Protection used on site (circle one) None (D) C B A

I certify that I have constructed the above referenced well in
accordance with all well permit requirements and applicable
State rules and regulations.

Drilling Company ADVANCED DRILLING, INC.

Driller (Print) Richard D Empson

Driller's Signature Richard Empson

Registration No. 11312 Date 11/7/00

Note: Measure all depths from land surface	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating (lbs/sch no.)
Single/Inner Casing	0	10	4	STAINLESS STEEL	10
Middle Casing (for triple cased wells only)	-				
Outer Casing (largest diameter)	-				
Open Hole or Screen (No. Used <u>101</u>)	10	20	4	STAINLESS STEEL	10
Blank Casings <u>STEEL</u> (No. Used <u>Sump</u>)	20	23	3	STAINLESS STEEL	SUMP
Tail Piece <u>SAND FILTER</u>	8	24		#00 SAND FILTER	
Gravel Pack	6	8		DETON. TEP BLETSEAL	
Grout	0	6		Neat Cement Bentonite	200 lbs. 40 lbs.

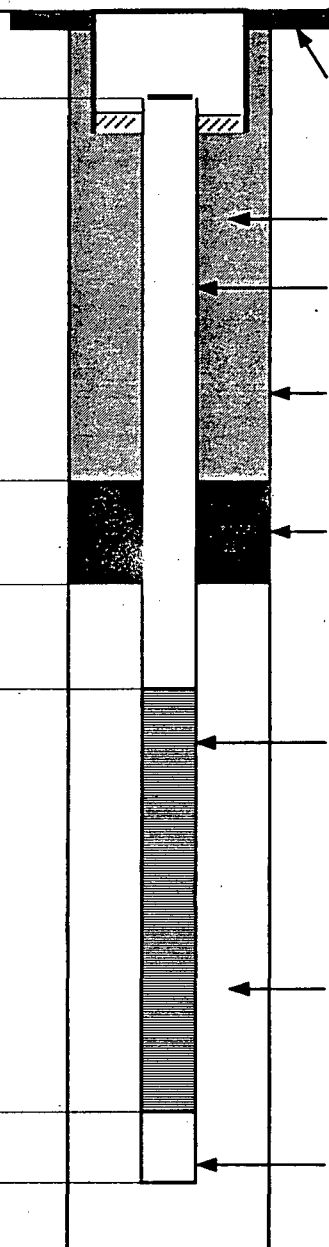
Grouting Method Tremie
Drilling Method H S Auger

GEOLOGIC LOG

Note each depth where water was encountered in consolidated
formations.

2" Depth
2'-4' - Dry SILT + SAND, some GRAVEL
4'-8' - Moist SILT, some SAND +
GRAVEL, little clay
8'-24' - Dry to wet SAND, GRAVEL
COBBLES, little SILT

100198

MALCOLM PIRNIE, INC.		FLUSHMOUNT OVERBURDEN WELL MW-15S	
Project:	Dover Municipal Well #4 Pre-Design Investigation (2)	Project Number:	0285-780
Client:	USACE/USEPA	Date:	09/26/00
Drilling Method:	6 1/4" HSAs	Subcontractor: Advanced Drilling, Inc.	
Development Method:	Overpumping and Surging	Measuring Point	
Bucking Posts:	N/A	Type:	Top of Casing
		Elevation (ft):	558.29
Item	Depth Below Ground Surface	Description	
Grade	0 feet		
Riser Pipe	0.5 feet		
		Surface Seal Type:	Concrete
		Backfill/Grout Type:	Cement-Bentonite
		Riser Pipe Type:	Type 316 Stainless Steel
		Riser Pipe ID:	4 inches
		Borehole Diameter:	10 inches
Top of Seal	1 feet	Type of Seal:	Bentonite Slurry
Top of Filter Pack	3 feet		
Top of Screen	5 feet	Screen Type:	Type 304 Stainless Steel
		Screen ID:	4 inches
		Screen Slot Size:	10 slot
		Screen Length:	10 feet
		Filter/Sand Pack Type:	No. 00 Morie Sand
Base of Screen	15 feet		
End Cap	15 feet	Sump Type:	Type 316 Stainless Steel
		Sump Length:	0 feet
		Sump Diameter:	4 inches
Drilled Depth	17 feet		
Total Depth	17 feet		
Notes:	10' screen section had welded end cap, no sump used at this location		

New Jersey Department of Environmental Protection
Bureau of Water Allocation
MONITORING WELL RECORDWell Permit No. 25 57013Atlas Sheet Coordinates 25 107 467OWNER IDENTIFICATION - Owner US EPA
Address 270 BROADWAY 10TH FLOOR
City NEW YORK State NY Zip Code WELL LOCATION - If not the same as owner please give address. Owner's Well No. MW-155
County MORRIS Municipality DOVER TOWN Lot No. 8 Block No. 23 10
Address 247 249 RICHARDS AVENUEDATE WELL STARTED 9/26/00
DATE WELL COMPLETED 9/26/00
TYPE OF WELL (as per Well Permit Categories) MONITORING
Regulatory Program Requiring Well Case I.D.# CONSULTING FIRM/FIELD SUPERVISOR (if applicable) Malcolm Pirnie, Inc. Tele. # 201/529-4700**WELL CONSTRUCTION**Total depth drilled 17 ft.
Well finished to 15 ft.Borehole diameter:
Top 10.25 in.
Bottom 10.25 in.Well was finished: ☐ above grade
☒ flush mountedFlushed above grade, casing height (stick
above land surface ft.Was steel protective casing installed?
☒ Yes ☐ NoStatic water level after drilling 8.15 ft.Water level was measured using TAPEWell was developed for 1 hours
at 1 gpmMethod of development PumpWas permanent pumping equipment installed? ☐ Yes ☒ NoPump capacity gpmPump type: Drilling Fluid - Type of Rig TrailerHealth and Safety Plan submitted? ☐ Yes ☒ NoLevel of Protection used on site (circle one) None D C B AI certify that I have constructed the above referenced well in
accordance with all well permit requirements and applicable
State rules and regulations.Drilling Company ADVANCED DRILLING, INC.Driller (Print) SCOTT ALBERALLADriller's Signature Scott AlberallaRegistration No. 11320 Date 11/7/00

Note: Measure all depths from land surface	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating (lbs/sch no.)
Single/Inner Casing	0	5	4	STAINLESS STEEL	10
Middle Casing (for triple cased wells only)	-				
Outer Casing (largest diameter)	-				
Open Hole or Screen (No. Used <u>10</u>)	5	15	4	STAINLESS STEEL	10
Blank Casings (No. Used <u>1</u>)	-				
~~Tail Piece~~ SAND FILTER	3	17		#00 SAND FILTER	
Gravel Pack	1	3		Bentinite Slurry Seal	
Grout	0	1		Neat Cement Bentonite	50 lbs. 10 lbs.

Grouting Method GroutDrilling Method HS Auger**GEOLOGIC LOG**Note each depth where water was encountered in consolidated
formations.2" Gravel
2"-4" - Dry SILT, some SAND &
Gravel, trace of organic
4"-14" - Moist to wet M-C SAND,
some SILT + GRAVEL
14"-17" - Wet SAND + SILT

100200

MALCOLM PIRNIE, INC.			OVERBURDEN MULTICASED WELL	
Project: Dover Municipal Well #4		Project Number: 0285-780		MW-15I
Pre-Design Investigation (2)				NJDEP Permit No. 25-57012
Client: USACE/USEPA		Date: 09/25-09/29		Subcontractor: Advanced Drilling, Inc.
Drilling Method: 8 1/4" HSAs/6" Mud Rotary		Measuring Point		
Development Method: Overpumping and Surging		Type: Top of Casing		
Bucking Posts: N/A		Elevation (ft): 558.16		
Item	Depth Below Ground Surface	Description		
Grade	0 feet			
Riser Pipe	0.5 feet			
		Surface Seal Type:	Concrete	
		Grout Type:	Cement-Bentonite	
		Borehole Diameter:	12 inches	
		Casing Type:	Black Steel	
		Casing ID:	6 inches	
Base of Borehole	17 feet	Borehole Diameter:	6 inches	
Base of Casing	18 feet	Grout Type:	Cement-bentonite	
		Riser Pipe Type:	Type 316 Stainless Steel	
		Riser Pipe ID:	2 inches	
Top of Seal.	22.5 feet	Type of Seal:	Bentonite Slurry	
Top of Filter Pack.	24.5 feet	Screen Type:	Type 304 Stainless Steel	
Top of Screen.	26.5 feet	Screen ID:	2 inches	
		Screen Slot Size:	10 slot	
		Screen Length:	5 feet	
		Filter/Sand Pack Type:	No. 00 Morie Sand	
Base of Screen.	31.5 feet	Sump Type:	Type 316 Stainless Steel	
End Cap	34.5 feet	Sump Length:	3 feet	
		Sump Diameter:	2 inches	
Drilled Depth	35.5 feet			
Total Depth	35.5 feet			
Notes:				

DWR-138 M
11/98New Jersey Department of Environmental Protection
Bureau of Water Allocation
MONITORING WELL RECORDWell Permit No. 25 - 57012Atlas Sheet Coordinates 25 - 03 - 462OWNER IDENTIFICATION - Owner US EPA
Address 290 BROADWAY 19TH FLOOR
City NEW YORK State NY Zip Code WELL LOCATION - If not the same as owner please give address. Owner's Well No. MW-151
County MORRIS Municipality DOVER TOWN Lot No. 5 Block No. 23-10
Address 267-269 RICHARDS AVENUETYPE OF WELL (as per Well Permit Categories) MONITORING DATE WELL STARTED 9/25/00
Regulatory Program Requiring Well DATE WELL COMPLETED 9/29/00
Case I.D.# CONSULTING FIRM/FIELD SUPERVISOR (if applicable) Malcolm Pirnie, Inc. Tele. # 201/529-1700**WELL CONSTRUCTION**Total depth drilled 35 ft.
Well finished to 34 ft.Borehole diameter:
Top 10.25 in.
Bottom 6 in.Well was finished: ☐ above grade
☒ flush mountedFinished above grade, casing height (stick
above land surface ft.Was steel protective casing installed?
☒ Yes ☐ NoStatic water level after drilling 8 ft.Water level was measured using TAPEWell was developed for 1 hours
at 3 gpmMethod of development PumpWas permanent pumping equipment installed? ☐ Yes ☒ NoPump capacity gpmPump type: Drilling Fluid Type of Rig TowerHealth and Safety Plan submitted? ☐ Yes ☒ NoLevel of Protection used on site (circle one) None C B AI certify that I have constructed the above referenced well in
accordance with all well permit requirements and applicable
State rules and regulations.Drilling Company ADVANCED DRILLING, INC.Driller (Print) SCOTT ALBERMILLDriller's Signature Scott AlbermillRegistration No. 71320 Date 11/7/00

Note: Measure all depths from land surface	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating (lbs/sch no.)
Single/Inner Casing	0	26	2	STAINLESS STEEL	10
Middle Casing (for triple cased wells only)	-				
Outer Casing (largest diameter)	0	18	6	STEEL	144
Open Hole or Screen (No. Used <u>10</u>)	26	31	2	STAINLESS STEEL	10
Blank Casings <u>SS</u> (No. Used <u>Sump</u>)	31	34	3	STAINLESS STEEL	SUMP
Tail Piece <u>SAND FILTER</u>	24	35		#20 SAND FILTER	
Gravel Pack	22	24		BENTONITE ALLET SEAL	
Grout	0	22		Neat Cement	lbs.
	0	18		Bentonite	lbs.

Grouting Method Thermal
Drilling Method HSAUGER/Retain**GEOLOGIC LOG**Note each depth where water was encountered in consolidated
formations.

4" Shovel

4'-4'- Dry Silt, some sand, little gravel

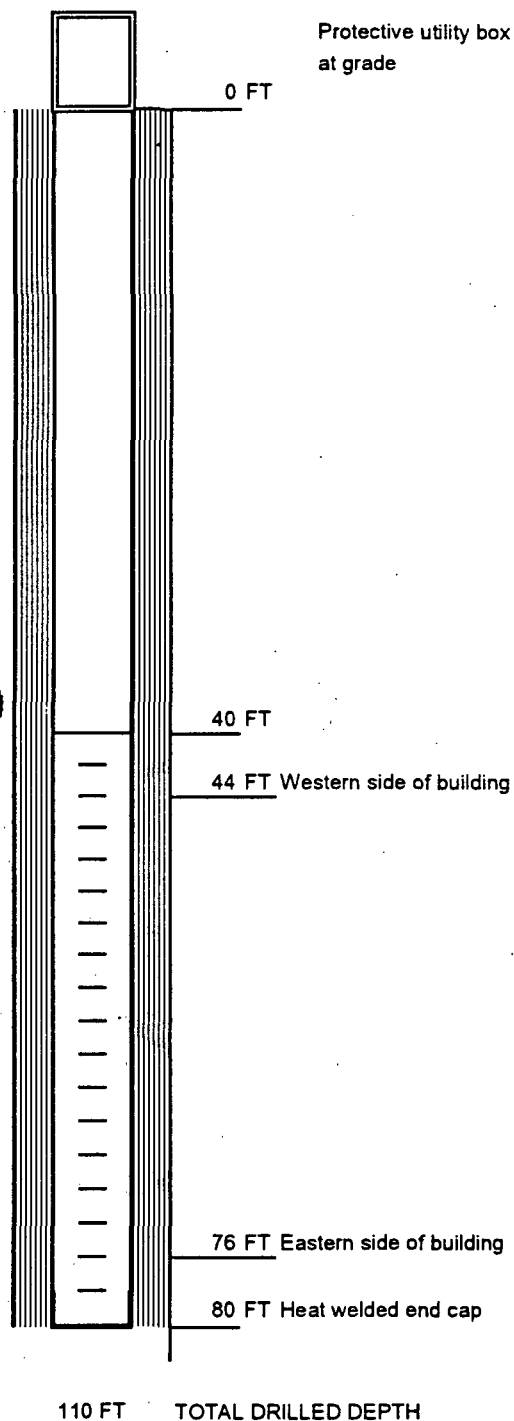
4'-7'- Dry SAND + GRAVEL

7'-14'- Moist & Wet M-SAND, some SILT + GRAVEL

14'-20'- wet SILT, trace clay, F-SAND

20'-23'- wet VF SAND + SILT

23'-35'- wet SILT, SAND, GRAVEL, COBBLES

MALCOLM PIRNIE, INC.17 ROUTE 208 NORTH
FAIRLAWN, NJ 07410**HORIZONTAL WELL CONSTRUCTION LOG**ALL MEASUREMENTS ARE FROM HDD ENTRANCE
UNLESS OTHERWISE NOTED

PROJECT NAME Dovere PDI 3
PROJECT # 00285 780
WELL I.D. HW 1
LOCATION ED Dolls Dry Cleaners

DRILLING CONTRACTOR Directional Technologies, Inc.
DRILLER Mike Bertram
DRILLING METHOD Horizontal Directional Drilling
DRILLING FLUID Mud
DRILLING DATE 08/02/2001
COMPLETION DATE 08/03/2001
DEVELOPMENT DATE 08/03/2001
WELL PURPOSE Chemical Oxidation / Soil vapor extraction

CASING JOINTS: ☒ HEAT WELDED ☐ COUPLING JOINT
CASING 4 INCH (I.D.) ☒ HDPE ☐ PVC
SCREEN 4 INCH (I.D.) .020 SLOT ☐ PVC
☒ HDPE

REMARKS

HYDROGEOLOGIST John Ifkovits

100203

Appendix

C

C

Appendix C

APPENDIX C

**USEPA LOW FLOW GROUNDWATER
SAMPLING PROTOCOL
&
EN CORE™ SAMPLING PROTOCOL**

**U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION II**

**GROUND WATER SAMPLING PROCEDURE
LOW STRESS (Low Flow) PURGING AND SAMPLING**

I. SCOPE & APPLICATION

This Low Stress (or Low-Flow) Purging and Sampling Procedure is the EPA Region II standard method for collecting low stress (low flow) ground water samples from monitoring wells. Low stress Purging and Sampling results in collection of ground water samples from monitoring wells that are representative of ground water conditions in the geological formation. This is accomplished by minimizing stress on the geological formation and minimizing disturbance of sediment that has collected in the well. The procedure applies to monitoring wells that have an inner casing with a diameter of 2.0 inches or greater, and maximum screened intervals of ten feet unless multiple intervals are sampled. The procedure is appropriate for collection of ground water samples that will be analyzed for volatile and semi-volatile organic compounds (VOCs and SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals, and microbiological and other contaminants in association with all EPA programs.

This procedure does not address the collection of light or dense non-aqueous phase liquids (LNAPL or DNAPL) samples, and should be used for aqueous samples only. For sampling NAPLs, the reader is referred to the following EPA publications: DNAPL Site Evaluation (Cohen & Mercer, 1993) and the RCRA Ground-Water Monitoring: Draft Technical Guidance (EPA/530-R-93-001), and references therein.

II. METHOD SUMMARY

The purpose of the low stress purging and sampling procedure is to collect ground water samples from monitoring wells that are representative of ground water conditions in the geological formation.

This is accomplished by setting the intake velocity of the sampling pump to a flow rate that limits drawdown inside the well casing.

Sampling at the prescribed (low) flow rate has three primary benefits. First, it minimizes disturbance of sediment in the bottom of the well, thereby producing a sample with low turbidity (i.e., low concentration of suspended particles). Typically, this saves time and analytical costs by eliminating the need for collecting and analyzing an additional filtered sample from the same well. Second, this procedure minimizes aeration of the ground water during sample collection, which improves the sample quality for VOC analysis. Third, in most cases the procedure significantly reduces the volume of ground water purged from a well and the costs associated with its proper treatment and disposal.

III. ADDRESSING POTENTIAL PROBLEMS

Problems that may be encountered using this technique include a) difficulty in sampling wells with insufficient yield; b) failure of one or more key indicator parameters to stabilize; c) cascading of water and/or formation of air bubbles in the tubing; and d) cross-contamination between wells.

Insufficient Yield

Wells with insufficient yield (i.e., low recharge rate of the well) may dewater during purging. Care should be taken to avoid loss of pressure in the tubing line due to dewatering of the well below the level of the pump's intake. Purging should be interrupted before the water level in the well drops below the top of the pump, as this may induce cascading of the sand pack. Pumping the well dry should therefore be avoided to the extent possible in all cases. Sampling should commence as soon as the volume in the well has recovered sufficiently to allow collection of samples. Alternatively, ground water samples may be obtained with techniques designed for the unsaturated zone, such as lysimeters.

Failure to Stabilize Key Indicator Parameters

If one or more key indicator parameters fails to stabilize after 4 hours, one of four options should be considered: a) continue purging in an attempt to achieve stabilization; b) discontinue purging, do not collect samples, and document attempts to reach stabilization in the log book; c) discontinue purging, collect samples, and document attempts to reach stabilization in the log book; or d) Secure the well, purge and collect samples the next day (preferred). The key indicator parameter for samples to be analyzed for VOCs is dissolved oxygen. The key indicator parameter for all other samples is turbidity.

Cascading

To prevent cascading and/or air bubble formation in the tubing, care should be taken to ensure that the flow rate is sufficient to maintain pump suction. Minimize the length and diameter of tubing (i.e., 1/4 or 3/8 inch ID) to ensure that the tubing remains filled with ground water during sampling.

Cross-Contamination

To prevent cross-contamination between wells, it is strongly recommended that dedicated, in-place pumps be used. As an alternative, the potential for cross-contamination can be reduced by performing the more thorough "daily decontamination procedures between sampling of each well in addition to the start of each sampling day (see Section VII, below).

Equipment Failure

Adequate equipment should be on-hand so that equipment failures do not adversely impact sampling activities.

IV. PLANNING DOCUMENTATION AND EQUIPMENT

- < Approved site-specific Field Sampling Plan/Quality Assurance Project Plan (QAPP). This plan must specify the type of pump and other equipment to be used. The QAPP must also specify the depth to which the pump intake should be lowered in each well. Generally, the target depth will correspond to the mid-point of the most permeable zone in the screened interval. Borehole geologic and geophysical logs can be used to help select the most permeable zone. However, in some cases, other criteria may be used to select the target depth for the pump intake. In all cases, the target depth must be approved by the EPA hydrogeologist or EPA project scientist.
- < Well construction data, location map, field data from last sampling event.
- < Polyethylene sheeting.
- < Flame Ionization Detector (FID) and Photo Ionization Detector (PID).
- < Adjustable rate, positive displacement ground water sampling pump (e.g., centrifugal or bladder pumps constructed of stainless steel or Teflon). A peristaltic pump may only be used for inorganic sample collection.
- < Interface probe or equivalent device for determining the presence or absence of NAPL.
- < Teflon or Teflon-lined polyethylene tubing to collect samples for organic analysis. Teflon or Teflon-lined polyethylene, PVC, Tygon or polyethylene tubing to collect samples for inorganic analysis. Sufficient tubing of the appropriate material must be available so that each well has dedicated tubing.
- < Water level measuring device, minimum 0.01 foot accuracy, (electronic preferred for tracking water level drawdown during all pumping operations).
- < Flow measurement supplies (e.g., graduated cylinder and stop watch or in-line flow meter).
- < Power source (generator, nitrogen tank, etc.).
- < Monitoring instruments for indicator parameters. Eh and dissolved oxygen must be monitored in-line using an instrument with a continuous readout display. Specific conductance, pH, and temperature may be monitored either in-line or using separate probes. A nephelometer is used to measure turbidity.
- < Decontamination supplies (see Section VII, below).
- < Logbook (see Section VIII, below).
- < Sample bottles.
- < Sample preservation supplies (as required by the analytical methods).

- < Sample tags or labels, chain of custody.

V. SAMPLING PROCEDURES

Pre-Sampling Activities

1. Start at the well known or believed to have the least contaminated ground water and proceed systematically to the well with the most contaminated ground water. Check the well, the lock, and the locking cap for damage or evidence of tampering. Record observations.
2. Lay out sheet of polyethylene for placement of monitoring and sampling equipment.
3. Measure VOCs at the rim of the unopened well with a PID and FID instrument and record the reading in the field log book.
4. Remove well cap.
5. Measure VOCs at the rim of the opened well with a PID and an FID instrument and record the reading in the field log book.
6. If the well casing does not have a reference point (usually a V-cut or indelible mark in the well casing), make one. Note that the reference point should be surveyed for correction of ground water elevations to the mean geodesic datum (MSL).
7. Measure and record the depth to water (to 0.01 ft) in all wells to be sampled prior to purging. Care should be taken to minimize disturbance in the water column and dislodging of any particulate matter attached to the sides or settled at the bottom of the well.
8. If desired, measure and record the depth of any NAPLs using an interface probe. Care should be taken to minimize disturbance of any sediment that has accumulated at the bottom of the well. Record the observations in the log book. If LNAPLs and/or DNAPLs are detected, install the pump at this time, as described in step 9, below. Allow the well to sit for several days between the measurement or sampling of any DNAPLs and the low-stress purging and sampling of the ground water.

Sampling Procedures

9. Install Pump: Slowly lower the pump, safety cable, tubing and electrical lines into the well to the depth specified for that well in the EPA-approved QAPP or a depth otherwise approved by the EPA hydrogeologist or EPA project scientist. The pump intake must be kept at least two (2) feet above the bottom of the well to prevent disturbance and re-suspension of any sediment or NAPL present in the bottom of the well. Record the depth to which the pump is lowered.

10. Measure Water Level: Before starting the pump, measure the water level again with the pump in the well. Leave the water level measuring device in the well.
 11. Purge Well: Start pumping the well at 200 to 500 milliliters per minute (ml/min). The water level should be monitored approximately every five minutes. Ideally, a steady flow rate should be maintained that results in a stabilized water level (drawdown of 0.3 ft or less). Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to ensure stabilization of the water level. As noted above, care should be taken to maintain pump suction and to avoid entrainment of air in the tubing. Record each adjustment made to the pumping rate and the water level measured immediately after each adjustment.
 12. Monitor Indicator Parameters: During purging of the well, monitor and record the field indicator parameters (turbidity, temperature, specific conductance, pH, Eh, and DO) approximately every five minutes. The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings as follows (Puls and Barcelona, 1996):
 - ± 0.1 for pH
 - $\pm 3\%$ for specific conductance (conductivity)
 - ± 10 mv for redox potential
 - $\pm 10\%$ for DO and turbidity
- Dissolved oxygen and turbidity usually require the longest time to achieve stabilization. The pump must not be removed from the well between purging and sampling.
13. Collect Samples: Collect samples at a flow rate between 100 and 250 ml/min and such that drawdown of the water level within the well does not exceed the maximum allowable drawdown of 0.3 ft. VOC samples must be collected first and directly into sample containers. All sample containers should be filled with minimal turbulence by allowing the ground water to flow from the tubing gently down the inside of the container.
- Ground water samples to be analyzed for volatile organic compounds (VOCs) require pH adjustment. The appropriate EPA Program Guidance should be consulted to determine whether pH adjustment is necessary. If pH adjustment is necessary for VOC sample preservation, the amount of acid to be added to each sample vial prior to sampling should be determined, drop by drop, on a separate and equal volume of water (e.g., 40 ml). Ground water purged from the well prior to sampling can be used for this purpose.
14. Remove Pump and Tubing: After collection of the samples, the tubing, unless permanently installed, must be properly discarded or dedicated to the well for re-sampling by hanging the tubing inside the well.
 15. Measure and record well depth.

16. Close and lock the well.

VI. FIELD QUALITY CONTROL SAMPLES

Quality control samples must be collected to determine if sample collection and handling procedures have adversely affected the quality of the ground water samples. The appropriate EPA Program Guidance should be consulted in preparing the field QC sample requirements of the site-specific QAPP.

All field quality control samples must be prepared exactly as regular investigation samples with regard to sample volume, containers, and preservation. The following quality control samples should be collected during the sampling event:

- < Field duplicates
- < Trip blanks for VOCs only
- < Equipment blank (not necessary if equipment is dedicated to the well)

As noted above, ground water samples should be collected systematically from wells with the lowest level of contamination through to wells with highest level of contamination. The equipment blank should be collected after sampling from the most contaminated well.

VII. DECONTAMINATION

Non-disposable sampling equipment, including the pump and support cable and electrical wires which contact the sample, must be decontaminated thoroughly each day before use ("daily decon") and after each well is sampled ("between-well decon"). Dedicated, in-place pumps and tubing must be thoroughly decontaminated using "daily decon" procedures (see #17, below) prior to their initial use. For centrifugal pumps, it is strongly recommended that non-disposable sampling equipment, including the pump and support cable and electrical wires in contact with the sample, be decontaminated thoroughly each day before use ("daily decon").

EPA's field experience indicates that the life of centrifugal pumps may be extended by removing entrained grit. This also permits inspection and replacement of the cooling water in centrifugal pumps. All non-dedicated sampling equipment (pumps, tubing, etc.) must be decontaminated after each well is sampled ("between-well decon", see #18 below).

17. Daily Decon

A) Pre-rinse: Operate pump in a deep basin containing 8 to 10 gallons of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

B) Wash: Operate pump in a deep basin containing 8 to 10 gallons of a non-phosphate detergent solution, such as Alconox, for 5 minutes and flush other equipment with fresh detergent solution for 5 minutes. Use the detergent sparingly.

C) Rinse: Operate pump in a deep basin of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

D) Disassemble pump.

E) Wash pump parts: Place the disassembled parts of the pump into a deep basin containing 8 to 10 gallons of non-phosphate detergent solution. Scrub all pump parts with a test tube brush.

F) Rinse pump parts with potable water.

G) Rinse the following pump parts with distilled/ deionized water: inlet screen, the shaft, the suction interconnector, the motor lead assembly, and the stator housing.

H) Place impeller assembly in a large glass beaker and rinse with 1% nitric acid (HNO_3).

I) Rinse impeller assembly with potable water.

J) Place impeller assembly in a large glass beaker and rinse with isopropanol.

K) Rinse impeller assembly with distilled/deionized water.

18. **Between-Well Decon**

A) Pre-rinse: Operate pump in a deep basin containing 8 to 10 gallons of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

B) Wash: Operate pump in a deep basin containing 8 to 10 gallons of a non-phosphate detergent solution, such as Alconox, for 5 minutes and flush other equipment with fresh detergent solution for 5 minutes. Use the detergent sparingly.

C) Rinse: Operate pump in a deep basin of potable water for 5 minutes and flush other equipment with potable water for 5 minutes.

D) Final Rinse: Operate pump in a deep basin of distilled/deionized water to pump out 1 to 2 gallons of this final rinse water.

VIII. FIELD LOG BOOK

A field log book must be kept each time ground water monitoring activities are conducted in the field. The field log book should document the following:

- < Well identification number and physical condition.
- < Well depth, and measurement technique.
- < Static water level depth, date, time, and measurement technique.

- < Presence and thickness of immiscible liquid layers and detection method.
- < Collection method for immiscible liquid layers.
- < Pumping rate, drawdown, indicator parameters values, and clock time, at three to five minute intervals; calculate or measure total volume pumped.
- < Well sampling sequence and time of sample collection.
- < Types of sample bottles used and sample identification numbers.
- < Preservatives used.
- < Parameters requested for analysis.
- < Field observations of sampling event.
- < Name of sample collector(s).
- < Weather conditions.
- < QA/QC data for field instruments.

IX. REFERENCES

- Cohen, R.M. and J.W. Mercer, 1993, DNAPL Site Evaluation, C.K. Smoley Press, Boca Raton, Florida.
- Puls, R.W. and M.J. Barcelona, 1996, Low-Flow (Minimal Drawdown) Ground-water Sampling Procedures, EPA/540/S-95/504.
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DRAFT

Procedures For Collecting Samples When Using En Core™ Samplers for Analysis Through the USEPA Contract Laboratory Program (CLP)

EQUIPMENT

- En Core™ Samplers (5g).
- 60ml wide mouth soil sample containers for dry weight.
- T-handle.
- Stainless steel spoon or spatula.
- Paper towels.

SAMPLING PROCEDURES

1. Collect three En Core™ samples and one percent moisture sample (60ml wide mouth glass container with no head space) for each sample point location.
2. Remove the sampler and cap from the En Core™ package and attach the T-handle to the sampler body.
3. Quickly push the sampler into a freshly exposed surface of soil (ground surface or soil core sampler) until the sampler is full.
4. Check to see whether the sampler is full by looking into the viewing hole in the T-handle. The back o-ring on the plunger will show in the viewing window when soil has fully pushed the plunger back. The plunger can only be rotated when it is completely pushed to the back of the sampler body. If the plunger can be twisted, this indicates that soil has completely filled the sampler and the back o-rings have sealed.
5. Scrape any excess soil flush with the edge of the sampler using a dedicated or decontaminated stainless steel trowel.
6. Use a paper towel to quickly and carefully wipe the sampler head so that the cap can be tightly attached and sealed.
7. To attach the cap, push the cap on with a twisting motion. The cap is properly sealed when the two locking arms are completely seated over the ridge on the body of the sampler.
8. Complete the sample label on the En Core™ zipper lock package.
9. Fill in the sample identification number (i.e. CLP number,) on the self adhesive label attached beneath the sample label on the En Core™ package.

10. Tear the self adhesive label at the perforation and attach the label to the rim of the sampler cap.
11. Place the sampler back into the En Core™ zipper lock package and seal the zipper lock. The CLP Sample label may be used as a custody seal to be placed over the opening of the En Core™ zipper lock package to ensure sample integrity. If the CLP label is not used as a custody seal, the CLP sample label must be attached to the exterior of the En Core™ package and a custody seal place over the opening of the package.
12. Repeat the procedure above for the other two samplers.
13. Once all three samplers have been filled, labeled and packaged, place the three En Core™ packages into one large zipper lock bag with a completed sample tag. Sample tags are required by the CLP, unless waived by the Regional Sample Control Coordinator (RSCC).
14. Collect the percent moisture sample in a separate sample container (60ml wide mouth glass container).
15. Double volume is required for the collection of the MS/MSD samples. This includes six En Core™ samplers and one 60ml wide mouth glass container.
16. Store all samples in a cooler with bagged ice to maintain 4 degrees Celsius while storing on site and during shipment to the laboratory.
17. Samples must be shipped off site to the laboratory within 24 hours.
18. Samples must be received by the laboratory for preservation and preparation for extraction with in 2 days from the date of sample collection.

Note: The En Core sampler can not be used in the normal manner when sampling non-cohesive/unconsolidated soils (e.g., sands). When sampling sandy soils, the procedure to be used in place of step 3 above is as follows:

3. Manually pull back the plunger to form the seal on the back of the sampler body. Use a dedicated or decontaminated stainless steel trowel or spatula as a rigid structure to push the soil into the sampler. The soil should be packed tight to completely fill the sampler. Proceed through the remaining steps.

Figure 1 - En Core™ Sampler and Zipper Lock Package

Zipper lock package

Plunger with o-ring

Ridge

Sampler body

Sampler cap with locking arms

Self adhesive label



Regional CLP Sample Collection Guidelines for Volatiles in Soil by CLP-Modified SW-846 Method 5035

May 2000

Collect the following:

When collecting soil samples by the CLP modified Method 5035 for analysis by the CLP SOW OLM04.2, you **MUST** collect samples using one of the following options:

- 1.) **Three Encore™ (or equivalent) sample containers** each filled with approximately 5 g of sample and **at least one glass container*** filled with sample with no headspace.
- 2.) **Two pre-prepared, pre-weighed, closed-system sample vials** each with approximately 1 g sodium bisulfate preservative, 5 mLs of reagent water, a stirring bar, and approximately 5 g of sample. If the soil effervesces when tested with sodium bisulfate, **use no preservative**. Instead, use two pre-prepared, pre-weighed, closed-system sample vials each with approximately 5 g sample and a stirring bar.

Include one glass container* filled with sample with no headspace.

* - Glass Containers - 40 mL, 60mL or 4 oz (120mL) widemouth .

Things to Remember:

- When scheduling CLP laboratories, Regions must immediately inform CLP Sample Management Office coordinators if samples are to be analyzed using the CLP modified Method 5035 and the type of containers to be used.
 - Before adding soil to pre-weighed vials, weigh the vials to confirm the *tared weight*. If the weight varies by more than 0.1 g, record the new weight on the label and on the sample documentation. Do not add labels to these vials once the tared weight is determined/confirmed.
 - After the soil sample has been added to the vials, weigh the vial and contents to determine the *final weight*. Record this weight on both the vial label, and on the sample documentation.
 - Samplers must ship samples on the same day as sample collection to avoid exceeding sample holding times. All samples must reach the laboratory within 24 hours of sampling.
 - Sodium bisulfate cannot be used on carbonaceous soils. **Check the soil before using this method of collection!** Soil can be checked by placing a test sample in a clean vial, and adding several drops of sodium bisulfate. If the soil bubbles, collect samples in a clean sample container with only a stirring bar and note this problem on the TR/COC.
 - For any sample requiring quality control samples (i.e., MS and MSD), it is suggested that up to six extra Encore™ samples be taken for Option 1, and up to four extra closed system vials be taken for Option 2. Note: For Option 2, MS and MSD samples for Medium Level Methanol Extraction analyses must come from the glass containers.
 - Field blanks should be processed as appropriate when collecting samples.
-

Useful Sample Collection Information (by Sample Container)

May 2000

Option 1

Encore™ (or equivalent) Sample Containers

Sample Amount: 5 grams

Preservative: N/A

Storage: Cool to 4°C immediately after collection.

Shipping: Must reach laboratory within 24 hours.

Sample Labeling: Legibly print the sample number on the detachable label provided with the Encore™ bag, and attach to the Encore™ container. Apply any labels with additional information, as specified by the Region, on the EnCore™ bag.

Custody Seal: Initial the custody seal and place over the top of the closed EnCore™ bag in such a manner that the bag cannot be opened (even partially) and the contents removed. Two or three seals may need to be used. **Do not place custody seals directly on the Encore™ sample container.**

Sample Tag: The sample tag should be secured to the bag after the EnCore™ sample container has been placed inside. This can be done using tape, or other methods, provided that the sample tag is securely fastened to the bag and will not become dislodged in transit.

Option 2

Pre-Weighed, Closed-System, Purge-And Trap Vials

Sample Amount: 5 grams

Preservative: 1 g Sodium Bisulfate per 5 mL reagent water. If soil effervesces when tested, use a vial containing only a stir bar.

Storage: Cool to 4°C immediately after collection.

Shipping: Must reach laboratory within 24 hours.

Sample Labeling: Sample labels should already be attached to the vials when prepared in advance by the supplier. **No additional labels** should be attached since the vials have already been pre-weighed. If additional labels **must** be used, the vials and attached labels (before addition of sample) **must** be weighed to the nearest 0.1 g and this value reported to the laboratory. Consult the Region for guidance.

Custody Seal: *Placing custody seals on pre-weighed vials may invalidate the tared weight. Dust from packing material used in coolers may also invalidate the tared weight.* Therefore, place pre-weighed vials in either zip-lock or Whirl-pak plastic bags. Apply custody seals to the plastic bag containing the vial so that the vial cannot be removed without either breaking the custody seal or tearing the bag.

Sample Tag: Attach sample tags following standard procedures.

Appendix D

APPENDIX D

GROUNDWATER SAMPLING LOGS

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 285780 DATE: August 14, 2001
PROJECT NAME: Dover Well #4 SAMPLERS: J. Caragine
SITE LOCATION: Dover, New Jersey J. Ifkovits
SITE CONTACT: _____ WEATHER: Hot, Humid, 80 °F

WELL IDENTIFICATION NUMBER: MW-15S PERMIT: 25-57013
WELL HEADSPACE READING: N/A PID MODEL/LAMP: N/A
DEPTH TO WATER (Before Purging): 8.21 FEET FROM TOP OF CASING
WELL DEPTH: 14.92 FEET FROM TOP OF CASING
HEIGHT OF WATER IN WELL: 6.71 FEET
WATER IN ONE WELL VOLUME: 4.4 GALLONS
PURGE TIME (start/finish): 1145/1235 PURGE RATE: ~250ml/min
WELL EVACUATION DEVICE: 2" Grundfos Submersible Pump
SAMPLING TIME (start/finish): 1237/1258 SAMPLE RATE: ~100 & ~250 ml/min
SAMPLE COLLECTION DEVICE: USEPA Low Flow Sampling Method
SAMPLE APPEARANCE: Clear

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1150	1155	1200	1205	1210	1215	1220	1225	1230	1235
pH (SU)	5.49	5.38	5.31	5.34	5.38	5.40	5.43	5.44	5.44	5.46
specific conductivity (mS)	0.547	0.535	0.513	0.509	0.508	0.507	0.508	0.509	0.507	0.508
turbidity (NTU's)	5	2	1	1	1	1	1	1	2	2
dissolved oxygen (mg/l)	0.94	0.76	0.68	0.65	0.58	0.48	0.54	0.58	0.63	0.64
temperature (degrees C)	21.7	21.7	22.3	23.0	23.5	24.2	24.3	24.7	25.3	25.6
redox potential (mv)	311	314	308	293	289	285	300	290	297	300
depth to water (feet)	8.34	8.35	8.34	8.34	8.34	8.35	8.35	8.34	8.34	8.33
volume purged (L)	~1.25	~2.5	~3.75	~5.0	~6.25	~7.5	~8.75	~10.0	~11.25	~12.5

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: _____

LABORATORY: _____

CONTACT: _____

STL Edison / Isotech

Casing Diameter/Volume conversions
(inches) (gallons per foot)

2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES: _____

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-780 DATE: March 15, 2000
PROJECT NAME: Dover Municipal Well #4 SAMPLERS: J. Caragine/J. Karn
SITE LOCATION: Dover, NJ J. Ifkovits/F. Stephens
SITE CONTACT: Diego Garcia WEATHER: Clear, 50Fs

WELL IDENTIFICATION NUMBER: MW-1S PERMIT: _____
WELL HEADSPACE READING: BKG PID MODEL/LAMP: PI-101 w/11.7 eV Lamp
DEPTH TO WATER (Before Purging): 3.88 FEET FROM TOP OF CASING
WELL DEPTH: 15.60 FEET FROM TOP OF CASING
HEIGHT OF WATER IN WELL: 11.72 FEET
WATER IN ONE WELL VOLUME: ~8 GALLONS
PURGE TIME (start/finish): 1312/1335 PURGE RATE: ~250 ml/min
WELL EVACUATION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
SAMPLING TIME (start/finish): 1337/1339 SAMPLE RATE: ~100 ml/min
SAMPLE COLLECTION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
SAMPLE APPEARANCE: Clear

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1320	1325	1330	1335						
pH (SU)	6.38	6.41	6.43	6.42						
specific conductivity (mS)	0.354	0.353	0.356	0.356						
turbidity (NTU's)	89	59	62	59						
dissolved oxygen (mg/l)	3.24	2.96	2.91	2.95						
temperature (degrees C)	13.2	14.2	14.6	14.9						
redox potential (mv)	202	214	223	231						
depth to water (feet)	4.16	4.16	4.16	4.16						
volume purged (gal or L)	~2.0	~3.25	~4.5	~5.75						

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: VOCs
LABORATORY: EnviroSystems, Inc.
CONTACT: Mohan Khare

Casing Diameter/Volume conversions	
(inches)	(gallons per foot)
2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES:

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-780 DATE: March 15, 2000
PROJECT NAME: Dover Municipal Well #4 SAMPLERS: J. Caragine/J. Karn
SITE LOCATION: Dover, NJ J. Ifkovits/F. Stephens
SITE CONTACT: Diego Garcia WEATHER: Clear, 50Fs

WELL IDENTIFICATION NUMBER: MW-11 PERMIT: _____
WELL HEADSPACE READING: BKG PID MODEL/LAMP: PI-101 w/11.7 eV Lamp
DEPTH TO WATER (Before Purging): 3.01 FEET FROM TOP OF CASING
WELL DEPTH: 72.80 FEET FROM TOP OF CASING
HEIGHT OF WATER IN WELL: 69.79 FEET
WATER IN ONE WELL VOLUME: ~46 GALLONS
PURGE TIME (start/finish): 1215/1244 PURGE RATE: ~250 ml/min
WELL EVACUATION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
SAMPLING TIME (start/finish): 1247/1249 SAMPLE RATE: ~100 ml/min
SAMPLE COLLECTION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
SAMPLE APPEARANCE: Clear

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1224	1229	1234	1239	1244					
pH (SU)	7.6	7.58	7.58	7.59	7.6					
specific conductivity (mS)	0.404	0.403	0.403	0.403	0.403					
turbidity (NTU's)	131	106	80	69	64					
dissolved oxygen (mg/l)	0.52	0.5	0.5	0.51	0.52					
temperature (degrees C)	13.1	13.8	14.2	14.5	14.6					
redox potential (mv)	160	144	136	131	132					
depth to water (feet)	4.37	4.28	4.24	4.21	4.2					
volume purged (gal or L)	~2.5	~3.5	~4.75	~6.0	~7.25					

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: VOCs
LABORATORY: EnviroSystems, Inc.
CONTACT: Mohan Khare

Casing Diameter/Volume conversions	
(inches)	(gallons per foot)
2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES:

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-780 DATE: March 15, 2000
PROJECT NAME: Dover Municipal Well #4 SAMPLERS: J. Caragine/J. Karn
SITE LOCATION: Dover, NJ J. Ifkovits/F. Stephens
SITE CONTACT: Diego Garcia WEATHER: Clear, 50Fs

WELL IDENTIFICATION NUMBER: MW-1D PERMIT: _____
WELL HEADSPACE READING: BKG PID MODEL/LAMP: PI-101 w/11.7 eV Lamp
DEPTH TO WATER (Before Purging): 3.34 FEET FROM TOP OF CASING
WELL DEPTH: 125.70 FEET FROM TOP OF CASING
HEIGHT OF WATER IN WELL: 122.36 FEET
WATER IN ONE WELL VOLUME: ~20 GALLONS
PURGE TIME (start/finish): 1407/1423 PURGE RATE: ~250 ml/min
WELL EVACUATION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
SAMPLING TIME (start/finish): 1425/1427 SAMPLE RATE: ~100 ml/min
SAMPLE COLLECTION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
SAMPLE APPEARANCE: Clear

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1413	1418	1423							
pH (SU)	10.07	10.37	10.36							
specific conductivity (mS)	0.285	0.284	0.284							
turbidity (NTU's)	9	5	4							
dissolved oxygen (mg/l)	2.08	2.09	2.07							
temperature (degrees C)	14.3	15.0	15.0							
redox potential (mv)	39	-19	-21							
depth to water (feet)	3.41	3.40	3.40							
volume purged (gal or L)	~1.5	~2.75	~4.0							

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: VOCs
LABORATORY: EnviroSystems, Inc.
CONTACT: Mohan Khare

Casing Diameter/Volume conversions	
(inches)	(gallons per foot)
2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES:

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-780 DATE: March 15, 2000
PROJECT NAME: Dover Municipal Well #4 SAMPLERS: J. Caragine/J. Karn
SITE LOCATION: Dover, NJ J. Ifkovits/F. Stephens
SITE CONTACT: Diego Garcia WEATHER: Clear, 50Fs

WELL IDENTIFICATION NUMBER: MW-1DR PERMIT: _____
WELL HEADSPACE READING: BKG PID MODEL/LAMP: PL-101 w/11.7 eV Lamp
DEPTH TO WATER (Before Purging): 3.53 FEET FROM TOP OF CASING
WELL DEPTH: 152.30 FEET FROM TOP OF CASING
HEIGHT OF WATER IN WELL: 148.77 FEET
WATER IN ONE WELL VOLUME: ~24 GALLONS
PURGE TIME (start/finish): 1455/1514 PURGE RATE: ~250 ml/min
WELL EVACUATION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
SAMPLING TIME (start/finish): 1516/1522 SAMPLE RATE: ~100 ml/min
SAMPLE COLLECTION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
SAMPLE APPEARANCE: Clear

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1459	1504	1509	1514						
pH (SU)	6.68	6.46	6.46	6.46						
specific conductivity (mS)	0.131	0.131	0.132	0.134						
turbidity (NTU's)	41	24	30	33						
dissolved oxygen (mg/l)	1.52	0.66	0.53	0.51						
temperature (degrees C)	13.4	14.0	14.0	14.1						
redox potential (mv)	160	197	157	151						
depth to water (feet)	3.62	3.61	3.61	3.61						
volume purged (gal or L)	~1.0	~2.25	~3.5	~4.75						

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: VOCs
LABORATORY: EnviroSystems, Inc.
CONTACT: Mohan Khare

Casing Diameter/Volume conversions	
(inches)	(gallons per foot)
2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES:

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-780 DATE: March 16, 2000
PROJECT NAME: Dover Municipal Well #4 SAMPLERS: J. Caragine/J. Karn
SITE LOCATION: Dover, NJ J. Ifkovits/F. Stephens
SITE CONTACT: Diego Garcia WEATHER: Overcast, 50Fs

WELL IDENTIFICATION NUMBER: MW-4I PERMIT: _____
WELL HEADSPACE READING: BKG PID MODEL/LAMP: HNu PI-101 w/11.7 eV Lamp
DEPTH TO WATER (Before Purging): 4.01 FEET FROM TOP OF CASING
WELL DEPTH: 59.60 FEET FROM TOP OF CASING
HEIGHT OF WATER IN WELL: 55.59 FEET
WATER IN ONE WELL VOLUME: ~9 GALLONS
PURGE TIME (start/finish): 1402/1422 PURGE RATE: ~250 ml/min
WELL EVACUATION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
SAMPLING TIME (start/finish): 1425/1429 SAMPLE RATE: ~100 ml/min
SAMPLE COLLECTION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
SAMPLE APPEARANCE: Clear

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1407	1412	1417	1422						
pH (SU)	7.22	7.19	7.19	7.20						
specific conductivity (mS)	0.443	0.448	0.449	0.450						
turbidity (NTU's)	34	20	20	23						
dissolved oxygen (mg/l)	3.42	0.88	0.81	0.79						
temperature (degrees C)	13.0	12.8	12.9	12.9						
redox potential (mv)	249	113	101	99						
depth to water (feet)	4.08	4.08	4.08	4.08						
volume purged (gal or L)	~1.25	~2.50	~3.75	~5.0						

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: VOCs
LABORATORY: EnviroSystems, Inc.
CONTACT: Mohan Khare

Casing Diameter/Volume conversions
(inches) (gallons per foot)
2.0 0.1632
4.0 0.6528
6.0 1.4687
8.0 2.6115

NOTES:

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-780 DATE: March 17, 2000
 PROJECT NAME: Dover Municipal Well #4 SAMPLERS: J. Caragine/J. Karn
 SITE LOCATION: Dover, NJ J. Ifkovits/F. Stephens
 SITE CONTACT: Diego Garcia WEATHER:

WELL IDENTIFICATION NUMBER: MW-51 PERMIT:

WELL HEADSPACE READING: BKG PID MODEL/LAMP: HNu PI-101 w/11.7 eV Lamp
 DEPTH TO WATER (Before Purging): 3.81 FEET FROM TOP OF CASING
 WELL DEPTH: 57.40 FEET FROM TOP OF CASING
 HEIGHT OF WATER IN WELL: 53.59 FEET
 WATER IN ONE WELL VOLUME: ~35 GALLONS
 PURGE TIME (start/finish): 1205/1226 PURGE RATE: ~250 ml/min
 WELL EVACUATION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
 SAMPLING TIME (start/finish): 1230/1232 SAMPLE RATE: ~100 ml/min
 SAMPLE COLLECTION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
 SAMPLE APPEARANCE: Clear

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1211	1216	1221	1226						
pH (SU)	7.75	7.74	7.75	7.73						
specific conductivity (mS)	0.301	0.300	0.319	0.318						
turbidity (NTU's)	152	101	98	92						
dissolved oxygen (mg/l)	3.80	2.92	2.86	2.85						
temperature (degrees C)	8.1	9.0	9.6	9.8						
redox potential (mv)	185	153	135	133						
depth to water (feet)	3.84	3.84	3.85	3.85						
volume purged (gal or L)	~1.5	~2.75	~4.0	~5.25						

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: VOCs

LABORATORY: EnviroSystems, Inc.
 CONTACT: Mohan Khare

Casing Diameter/Volume conversions	
(inches)	(gallons per foot)
2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES:

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-780 DATE: March 16, 2000
PROJECT NAME: Dover Municipal Well #4 SAMPLERS: J. Caragine/J. Karn
SITE LOCATION: Dover, NJ J. Ifkovits/F. Stephens
SITE CONTACT: Diego Garcia WEATHER: Overcast, 50Fs

WELL IDENTIFICATION NUMBER: MW-6SR PERMIT: _____
WELL HEADSPACE READING: BKG PID MODEL/LAMP: HNu PI-101 w/11.7 eV Lamp
DEPTH TO WATER (Before Purging): 4.48 FEET FROM TOP OF CASING
WELL DEPTH: 15.65 FEET FROM TOP OF CASING
HEIGHT OF WATER IN WELL: 11.17 FEET
WATER IN ONE WELL VOLUME: ~7 GALLONS
PURGE TIME (start/finish): 0958/1023 PURGE RATE: ~250 ml/min
WELL EVACUATION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
SAMPLING TIME (start/finish): 1025/1030 SAMPLE RATE: ~100 ml/min
SAMPLE COLLECTION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
SAMPLE APPEARANCE: Clear

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1003	1008	1013	1018	1023					
pH (SU)	5.72	5.67	5.69	5.69	5.67					
specific conductivity (mS)	0.221	0.220	0.220	0.220	0.219					
turbidity (NTU's)	23	23	16	16	16					
dissolved oxygen (mg/l)	4.05	3.85	3.34	3.33	3.35					
temperature (degrees C)	10.8	11.1	11.8	11.9	12.2					
redox potential (mv)	230	261	276	279	280					
depth to water (feet)	5.39	5.51	5.62	5.63	5.65					
volume purged (gal or L)	~1.25	~2.5	~3.75	~4.0	~5.25					

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: VOCs
LABORATORY: Envirosystems, Inc.
CONTACT: Mohan Khare

Casing Diameter/Volume conversions
(inches) (gallons per foot)
2.0 0.1632
4.0 0.6528
6.0 1.4687
8.0 2.6115

NOTES:

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER:	0285-780	DATE:	March 16, 2000
PROJECT NAME:	Dover Municipal Well #4	SAMPLERS:	J. Caragine/J. Karn
SITE LOCATION:	Dover, NJ		J. Ifkovits/F. Stephens
SITE CONTACT:	Diego Garcia	WEATHER:	Overcast, 50Fs

WELL IDENTIFICATION NUMBER:	MW-61	PERMIT:	
WELL HEADSPACE READING:	BKG	PID MODEL/LAMP:	HNu PI-101 w/11.7 eV Lamp
DEPTH TO WATER (Before Purging):	4.69	FEET FROM TOP OF CASING	
WELL DEPTH:	30.34	FEET FROM TOP OF CASING	
HEIGHT OF WATER IN WELL:	25.65	FEET	
WATER IN ONE WELL VOLUME:	~17	GALLONS	
PURGE TIME (start/finish):	1113/1133	PURGE RATE:	~250 ml/min
WELL EVACUATION DEVICE:	2" Grundfos Pump w/ Dedicated Poly Tubing		
SAMPLING TIME (start/finish):	1135/1137	SAMPLE RATE:	~100 ml/min
SAMPLE COLLECTION DEVICE:	2" Grundfos Pump w/ Dedicated Poly Tubing		
SAMPLE APPEARANCE:	Clear		

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1118	1123	1128	1133						
pH (SU)	6.11	6.07	6.07	6.06						
specific conductivity (mS)	0.132	0.132	0.131	0.130						
turbidity (NTU's)	72	50	52	54						
dissolved oxygen (mg/l)	3.05	2.95	2.89	2.86						
temperature (degrees C)	12.3	13.0	12.7	12.9						
redox potential (mv)	252	292	290	291						
depth to water (feet)	4.71	4.71	4.72	4.72						
volume purged (gal or L)	~1.25	~2.5	~3.75	~4.0						

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED:	VOCs
LABORATORY:	EnviroSystems, Inc.
CONTACT:	Mohan Khare

Casing Diameter/Volume conversions	
(inches)	(gallons per foot)
2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES:

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER:	0285-780	DATE:	March 16, 2000
PROJECT NAME:	Dover Municipal Well #4	SAMPLERS:	J. Caragine/J. Karn
SITE LOCATION:	Dover, NJ		J. Ifkovits/F. Stephens
SITE CONTACT:	Diego Garcia	WEATHER:	Overcast, 50Fs

WELL IDENTIFICATION NUMBER:	MW-6D	PERMIT:	
WELL HEADSPACE READING:	BKG	PID MODEL/LAMP:	HNu PI-101 w/11.7 eV Lamp
DEPTH TO WATER (Before Purging):	5.58	FEET FROM TOP OF CASING	
WELL DEPTH:	80.51	FEET FROM TOP OF CASING	
HEIGHT OF WATER IN WELL:	74.93	FEET	
WATER IN ONE WELL VOLUME:	~49	GALLONS	
PURGE TIME (start/finish):	1036/1055	PURGE RATE:	~250 ml/min
WELL EVACUATION DEVICE:	2" Grundfos Pump w/ Dedicated Poly Tubing		
SAMPLING TIME (start/finish):	1057/1059	SAMPLE RATE:	~100 ml/min
SAMPLE COLLECTION DEVICE:	2" Grundfos Pump w/ Dedicated Poly Tubing		
SAMPLE APPEARANCE:	Clear		

FIELD PARAMETERS	Initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1040	1045	1050	1055						
pH (SU)	6.04	5.97	5.94	5.93						
specific conductivity (mS)	0.272	0.298	0.329	0.331						
turbidity (NTU's)	82	69	57	52						
dissolved oxygen (mg/l)	1.66	1.81	1.11	1.09						
temperature (degrees C)	12.1	12.2	12.3	12.3						
redox potential (mv)	247	223	197	192						
depth to water (feet)	5.60	5.59	5.60	5.61						
volume purged (gal or L)	~1.0	~2.25	~3.5	~4.75						

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED:	VOCs
LABORATORY:	EnviroSystems, Inc.
CONTACT:	Mohan Khare

Casing Diameter/Volume conversions	
(inches)	(gallons per foot)
2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES:



ONE INTERNATIONAL BLVD., MAHWAH, NEW JERSEY 07495-0018

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-780 DATE: March 17, 2000
PROJECT NAME: Dover Municipal Well #4 SAMPLERS: J. Caragine/J. Karn
SITE LOCATION: Dover, NJ J. Ifkovits/F. Stephens
SITE CONTACT: Diego Garcia WEATHER: Overcast, Light Rain 35-40F

WELL IDENTIFICATION NUMBER: MW-71 PERMIT: _____
WELL HEADSPACE READING: 0 PID MODEL/LAMP: HNu PI-101 w/11.7 eV Lamp
DEPTH TO WATER (Before Purging): 0.86 FEET FROM TOP OF CASING
WELL DEPTH: 54.38 FEET FROM TOP OF CASING
HEIGHT OF WATER IN WELL: 53.52 FEET
WATER IN ONE WELL VOLUME: ~9 GALLONS
PURGE TIME (start/finish): 0945/1025 PURGE RATE: ~250 ml/min
WELL EVACUATION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
SAMPLING TIME (start/finish): 1027/1030 SAMPLE RATE: 50 ml/min
SAMPLE COLLECTION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
SAMPLE APPEARANCE: Turbid / Cloudy

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	0949	0955	1000	1005	1010	1015	1020	1025		
pH (SU)	8.74	8.73	8.73	8.72	8.69	8.50	8.41	8.50		
specific conductivity (mS)	0.231	0.230	0.227	0.225	0.223	0.223	0.223	0.223		
turbidity (NTU's)	999	999	794	624	577	639	675	678		
dissolved oxygen (mg/l)	0.27	0.38	0.76	0.45	0.28	0.28	0.30	0.54		
temperature (degrees C)	8.3	8.4	8.5	8.5	8.5	8.6	8.7	8.6		
redox potential (mv)	63	35	18	16	25	23	21	20		
depth to water (feet)	1.24	1.25	1.24	1.24	1.17	1.15	1.14	1.13		
volume purged (gal or L)	1L	2.25L	3.5L	4.75L	6L	7.25L	8.5L	9.75L		

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: VOA
LABORATORY: EnviroSystems, Inc.
CONTACT: Mohan Khare

Casing Diameter/Volume conversions	
(inches)	(gallons per foot)
2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES:

100231

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER:	0285-780	DATE:	March 17, 2000
PROJECT NAME:	Dover Municipal Well #4	SAMPLERS:	J. Caragine/J. Karn
SITE LOCATION:	Dover, NJ		J. Ifkovits/F. Stephens
SITE CONTACT:	Diego Garcia	WEATHER:	Overcast. Light Snow 30F

WELL IDENTIFICATION NUMBER:	MW-81	PERMIT:	
WELL HEADSPACE READING:	0	PID MODEL/LAMP:	HNu PI-101 w/11.7 eV Lamp
DEPTH TO WATER (Before Purging):	0.00	FEET FROM TOP OF CASING	
WELL DEPTH:	49.00	FEET FROM TOP OF CASING	
HEIGHT OF WATER IN WELL:	49.00	FEET	
WATER IN ONE WELL VOLUME:	~8	GALLONS	
PURGE TIME (start/finish):	1056/1125	PURGE RATE:	~250 ml/min
WELL EVACUATION DEVICE:	2" Grundfos Pump w/ Dedicated Poly Tubing		
SAMPLING TIME (start/finish):	1127/1135	SAMPLE RATE:	50 ml/min
SAMPLE COLLECTION DEVICE:	2" Grundfos Pump w/ Dedicated Poly Tubing		
SAMPLE APPEARANCE:	Turbid / Orange		

FIELD PARAMETERS	Initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1100	1105	1110	1115	1120	1125				
pH (SU)	7.13	6.97	6.94	6.95	6.94	6.95				
specific conductivity (mS)	0.493	0.508	0.511	0.507	0.503	0.492				
turbidity (NTU's)	724	908	668	258	345	281				
dissolved oxygen (mg/l)	2.57	2.54	1.59	3.51	1.26	1.17				
temperature (degrees C)	7.3	7.4	7.5	5.5	5.7	6.5				
redox potential (mv)	76	71	87	50	63	60				
depth to water (feet)	0.0	0.0	0.0	0.0	0.0	0.0				
volume purged (gal or L)	1L	2.25L	3.5L	4.75L	6.0L	7.25L				

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED:	VOA
LABORATORY:	EnviroSystems, Inc.
CONTACT:	Mohan Khare

Casing Diameter/Volume conversions (inches) (gallons per foot) 2.0 0.1632 4.0 0.6528 6.0 1.4687 8.0 2.6115	NOTES:
	MS/MSD BXF92

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER:	0285-780	DATE:	March 17, 2000
PROJECT NAME:	Dover Municipal Well #4	SAMPLERS:	J. Caragine/J. Karn
SITE LOCATION:	Dover, NJ		J. Ifkovits/F. Stephens
SITE CONTACT:	Diego Garcia	WEATHER:	Overcast. Snow 30F

WELL IDENTIFICATION NUMBER:	MW-9I	PERMIT:	
WELL HEADSPACE READING:	0	PID MODEL/LAMP:	HNu PI-101 w/11.7 eV Lamp
DEPTH TO WATER (Before Purging):	0.00*	FEET FROM TOP OF CASING	
WELL DEPTH:	62.00	FEET FROM TOP OF CASING	
HEIGHT OF WATER IN WELL:	62.00	FEET	
WATER IN ONE WELL VOLUME:	~10	GALLONS	
PURGE TIME (start/finish):	1200/1220	PURGE RATE:	~250 ml/min
WELL EVACUATION DEVICE:	2" Grundfos Pump w/ Dedicated Poly Tubing		
SAMPLING TIME (start/finish):	1222/1225	SAMPLE RATE:	50 ml/min
SAMPLE COLLECTION DEVICE:	2" Grundfos Pump w/ Dedicated Poly Tubing		
SAMPLE APPEARANCE:	Slightly Turbid		

FIELD PARAMETERS	Initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1205	1210	1215	1220						
pH (SU)	7.53	7.52	7.54	7.54						
specific conductivity (mS)	0.436	0.411	0.444	0.445						
turbidity (NTU's)	381	412	393	365						
dissolved oxygen (mg/l)	0.53	0.32	0.29	0.26						
temperature (degrees C)	6.7	6.9	6.6	6.4						
redox potential (mv)	112	109	106	108						
depth to water (feet)	0.0	0.0	0.0	0.0						
volume purged (gal or L)	1.25L	2.50L	3.75L	5.0L						

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED:	VOA
LABORATORY:	EnviroSystems, Inc.
CONTACT:	Mohan Khare

Casing Diameter/Volume conversions (inches) (gallons per foot) 2.0 0.1632 4.0 0.6528 6.0 1.4687 8.0 2.6115	NOTES: * = Artesian Blind Dup 165 @ 0845 BZL68

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-780 DATE: March 16, 2000
 PROJECT NAME: Dover Municipal Well #4 SAMPLERS: J. Caragine/J. Karn
 SITE LOCATION: Dover, NJ J. Ifkovits/F. Stephens
 SITE CONTACT: Diego Garcia WEATHER: Overcast, 50Fs

WELL IDENTIFICATION NUMBER: MW-10S PERMIT: _____
 WELL HEADSPACE READING: BKG PID MODEL/LAMP: HNu PI-101 w/11.7 eV Lamp
 DEPTH TO WATER (Before Purging): 3.11 FEET FROM TOP OF CASING
 WELL DEPTH: 15.00 FEET FROM TOP OF CASING
 HEIGHT OF WATER IN WELL: 11.89 FEET
 WATER IN ONE WELL VOLUME: ~8 GALLONS
 PURGE TIME (start/finish): 1221/1251 PURGE RATE: ~250 ml/min
 WELL EVACUATION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
 SAMPLING TIME (start/finish): 1253/1255 SAMPLE RATE: ~100 ml/min
 SAMPLE COLLECTION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
 SAMPLE APPEARANCE: Clear

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1226	1231	1236	1241	1246	1251				
pH (SU)	5.65	5.51	5.49	5.48	5.47	5.48				
specific conductivity (mS)	0.104	0.104	0.104	0.104	0.104	0.104				
turbidity (NTU's)	230	232	228	212	122	116				
dissolved oxygen (mg/l)	5.65	5.33	5.27	5.16	5.14	5.14				
temperature (degrees C)	12.1	12.4	12.9	12.8	13.0	13.2				
redox potential (mv)	231	281	296	301	302	302				
depth to water (feet)	3.37	3.39	3.39	3.40	3.40	3.40				
volume purged (gal or L)	~1.25	~2.5	~3.75	~5.0	~6.25	~7.5				

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: VOCs
 LABORATORY: EnviroSystems, Inc.
 CONTACT: Mohan Khare

Casing Diameter/Volume conversions	
(inches)	(gallons per foot)
2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES:

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER:	0285-780	DATE:	March 17, 2000
PROJECT NAME:	Dover Municipal Well #4	SAMPLERS:	J. Caragine/J. Karn
SITE LOCATION:	Dover, NJ		J. Ifkovits/F. Stephens
SITE CONTACT:	Diego Garcia	WEATHER:	Overcast, 50Fs

WELL IDENTIFICATION NUMBER:	MW-11S	PERMIT:	
WELL HEADSPACE READING:	BKG	PID MODEL/LAMP:	HNu PI-101 w/11.7 eV Lamp
DEPTH TO WATER (Before Purging):	4.35	FEET FROM TOP OF CASING	
WELL DEPTH:	15.30	FEET FROM TOP OF CASING	
HEIGHT OF WATER IN WELL:	10.95	FEET	
WATER IN ONE WELL VOLUME:	-7	GALLONS	
PURGE TIME (start/finish):	0943/1008	PURGE RATE:	~250 ml/min
WELL EVACUATION DEVICE:	2" Grundfos Pump w/ Dedicated Poly Tubing		
SAMPLING TIME (start/finish):	1010/1012	SAMPLE RATE:	~100 ml/min
SAMPLE COLLECTION DEVICE:	2" Grundfos Pump w/ Dedicated Poly Tubing		
SAMPLE APPEARANCE:	Clear		

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	0948	0953	0958	1003	1008					
pH (SU)	6.34	6.34	6.34	6.36	6.37					
specific conductivity (mS)	0.642	0.641	0.647	0.649	0.648					
turbidity (NTU's)	192	170	149	121	119					
dissolved oxygen (mg/l)	1.42	1.31	6.61	5.80	5.76					
temperature (degrees C)	8.9	9.6	10.6	11.1	11.5					
redox potential (mv)	-343	-157	-455	-471	-472					
depth to water (feet)	4.59	4.61	4.69	4.71	4.71					
volume purged (gal or L)	~1.25	~2.5	~3.75	~5.0	~6.25					

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED:	VOCs
LABORATORY:	EnviroSystems, Inc.
CONTACT:	Mohan Khare

Casing Diameter/Volume conversions	
(inches)	(gallons per foot)
2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES:

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-780 DATE: March 16, 2000
PROJECT NAME: Dover Municipal Well #4 SAMPLERS: J. Caragine/J. Karn
SITE LOCATION: Dover, NJ J. Ifkovits/F. Stephens
SITE CONTACT: Diego Garcia WEATHER: Overcast, 50Fs

WELL IDENTIFICATION NUMBER: MW-121 PERMIT: _____
WELL HEADSPACE READING: BKG PID MODEL/LAMP: HNu PI-101 w/11.7 eV Lamp
DEPTH TO WATER (Before Purging): 2.55 FEET FROM TOP OF CASING
WELL DEPTH: 73.60 FEET FROM TOP OF CASING
HEIGHT OF WATER IN WELL: 71.05 FEET
WATER IN ONE WELL VOLUME: ~12 GALLONS
PURGE TIME (start/finish): 1458/1526 PURGE RATE: ~250 ml/min
WELL EVACUATION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
SAMPLING TIME (start/finish): 1528/1530 SAMPLE RATE: ~100 ml/min
SAMPLE COLLECTION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
SAMPLE APPEARANCE: Clear

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1501	1506	1511	1516	1521	1526				
pH (SU)	9.28	9.00	8.90	8.83	8.80	8.79				
specific conductivity (mS)	0.349	0.330	0.329	0.332	0.333	0.335				
turbidity (NTU's)	72	47	58	61	59	57				
dissolved oxygen (mg/l)	4.96	4.19	4.22	4.52	4.54	4.50				
temperature (degrees C)	14.0	13.9	14.6	14.8	15.1	15.2				
redox potential (mv)	96	114	111	108	106	105				
depth to water (feet)	2.75	2.76	2.78	2.78	2.78	2.78				
volume purged (gal or L)	~1.0	~2.25	~3.5	~4.75	~6.0	~7.25				

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: VOCs
LABORATORY: EnviroSystems, Inc.
CONTACT: Mohan Khare

Casing Diameter/Volume conversions	
(inches)	(gallons per foot)
2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES:

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-780 DATE: March 17, 2000
PROJECT NAME: Dover Municipal Well #4 SAMPLERS: J. Caragine/J. Karn
SITE LOCATION: Dover, NJ J. Ifkovits/F. Stephens
SITE CONTACT: Diego Garcia WEATHER: Overcast, 50Fs

WELL IDENTIFICATION NUMBER: MW-2C PERMIT: _____
WELL HEADSPACE READING: BKG PID MODEL/LAMP: HNu PI-101 w/11.7 eV Lamp
DEPTH TO WATER (Before Purging): 3.20 FEET FROM TOP OF CASING
WELL DEPTH: 48.46 FEET FROM TOP OF CASING
HEIGHT OF WATER IN WELL: 45.26 FEET
WATER IN ONE WELL VOLUME: ~7 GALLONS
PURGE TIME (start/finish): 1050/1129 PURGE RATE: ~250 ml/min
WELL EVACUATION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
SAMPLING TIME (start/finish): 1133/1135 SAMPLE RATE: ~100 ml/min
SAMPLE COLLECTION DEVICE: 2" Grundfos Pump w/ Dedicated Poly Tubing
SAMPLE APPEARANCE: Clear

FIELD PARAMETERS	Initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1104	1109	1114	1119	1124	1129				
pH (SU)	8.62	8.58	8.52	8.44	8.37	8.31				
specific conductivity (mS)	0.564	0.502	0.460	0.410	0.409	0.406				
turbidity (NTU's)	353	251	170	113	99	90				
dissolved oxygen (mg/l)	5.20	4.07	3.42	2.96	2.82	2.80				
temperature (degrees C)	10.7	11.7	12.1	12.1	12.0	12.2				
redox potential (mv)	168	170	170	171	176	179				
depth to water (feet)	3.43	3.43	3.40	3.45	3.36	3.38				
volume purged (gal or L)	~3.5	~4.75	~6.0	~7.25	~8.5	~9.75				

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: VOCs
LABORATORY: EnviroSystems, Inc.
CONTACT: Mohan Khare

Casing Diameter/Volume conversions
(inches) (gallons per foot)
2.0 0.1632
4.0 0.6528
6.0 1.4687
8.0 2.6115

NOTES:

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-780 DATE: 11/7/2000
PROJECT NAME: Dover DPD12 SAMPLERS: J. Caragine
SITE LOCATION: Dover, NJ J. Ifkovits
SITE CONTACT: _____ WEATHER: Partly cloudy 45-50°F

WELL IDENTIFICATION NUMBER: MW-2D PERMIT: _____
WELL HEADSPACE READING: 1 PID MODEL/LAMP: Mini Rae 10-6
DEPTH TO WATER (Before Purging): 3.98 FEET FROM TOP OF CASING
WELL DEPTH: 133.1 FEET FROM TOP OF CASING
SCREEN INTERVAL: NA FEET FROM TOP OF CASING
PUMP INTAKE: 125 FEET FROM TOP OF CASING
PURGE TIME (start/finish): 1115 / 1148 PURGE RATE: 250ml/ min.
WELL EVACUATION DEVICE: 2" Grunfoes Submersible Pump w/ dedicated poly tube.
SAMPLING TIME (start/finish): 1150 / 1153 SAMPLE RATE: 200ml/ min.
SAMPLE COLLECTION DEVICE: Valved Poly Manifold from 2" Grunfoes Pump.
SAMPLE APPEARANCE: _____

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1123	1129	1131	1135	1139	1144	1148			
pH (SU)	6.94	6.81	6.68	6.59	6.53	6.5	6.45			
specific conductivity (mS)	0.1	0.404	0.11	0.137	0.155	0.171	0.176			
turbidity (NTU's)	5	5	5	4	4	4	3			
dissolved oxygen (mg/l)	3.73	3.03	2.7	2.5	2.59	2.17	2.21			
temperature (degrees C)	13.7	13.8	13.8	13.7	13.8	13.8	13.8			
redox potential (mv)	295	315	328	335	338	340	341			
depth to water (feet)	3.98	3.98	3.98	3.98	3.98	3.98	3.98			
volume purged (gal or L)	250ml	1L	2L	3L	4L	5L	6L			

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: TCL VOC's
LABORATORY: _____
CONTACT: _____

Casing Diameter/Volume conversions	
(inches)	(gallons per foot)
2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES: MS / MSD

100238

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-780 DATE: 11/7/2000
PROJECT NAME: Dover DPD12 SAMPLERS: J. Caragine
SITE LOCATION: Dover, NJ J. Ifkovits
SITE CONTACT: WEATHER: Cloudy 45-50°F

WELL IDENTIFICATION NUMBER: MW-101 PERMIT:
WELL HEADSPACE READING: 0 PID MODEL/LAMP: Mini Rae 10-6
DEPTH TO WATER (Before Purging): 8.22 FEET FROM TOP OF CASING
WELL DEPTH: 54.6 FEET FROM TOP OF CASING
SCREEN INTERVAL: 41.5 to 51.5 FEET FROM TOP OF CASING
PUMP INTAKE: 47 FEET FROM TOP OF CASING
PURGE TIME (start/finish): 1018 / 1050 PURGE RATE: 250ml/ min.
WELL EVACUATION DEVICE: 2" Grunfoes Submersible Pump w/ dedicated poly tube.
SAMPLING TIME (start/finish): 1051 / 1053 SAMPLE RATE: 200ml/ min.
SAMPLE COLLECTION DEVICE: Valved Poly Manifold from 2" Grunfoes Pump.
SAMPLE APPEARANCE:

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1026	1030	1034	1038	1042	1046	1050			
pH (SU)	7.03	7.02	7.02	7.02	7.02	7.02	7.02			
specific conductivity (mS)	0.423	0.424	0.421	0.424	0.428	0.429	0.429			
turbidity (NTU's)	27	68	91	100	68	58	64			
dissolved oxygen (mg/l)	2.72	130	0.49	0.36	0.32	0.3	0.26			
temperature (degrees C)	12.8	13.4	13.9	14.2	14.1	14.1	14.1			
redox potential (mv)	268	265	241	223	206	200	198			
depth to water (feet)	8.37	8.37	8.37	8.38	8.38	8.38	8.38			
volume purged (gal or L)	250ml	1L	2L	3L	4L	5L	6L			

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: TCL VOC's
LABORATORY:
CONTACT:

Casing Diameter/Volume conversions	
(inches)	(gallons per foot)
2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES:

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-780 DATE: 11/6/2000
PROJECT NAME: Dover DPD12 SAMPLERS: J. Caragine
SITE LOCATION: Dover, NJ J. Ifkovits
SITE CONTACT: WEATHER: Clear, breezy, 45-50°F

WELL IDENTIFICATION NUMBER: MW-131 PERMIT:
WELL HEADSPACE READING: 2.7 PID MODEL/LAMP: Mini Rae 10-6
DEPTH TO WATER (Before Purging): 7.82 FEET FROM TOP OF CASING
WELL DEPTH: 50.1 FEET FROM TOP OF CASING
SCREEN INTERVAL: 37 to 47 FEET FROM TOP OF CASING
PUMP INTAKE: 42 FEET FROM TOP OF CASING
PURGE TIME (start/finish): 1234 / 1306 PURGE RATE: 250ml/ min.
WELL EVACUATION DEVICE: 2" Grunfoes Submersible Pump w/ dedicated poly tube.
SAMPLING TIME (start/finish): 1308 / 1311 SAMPLE RATE: 200ml/ min.
SAMPLE COLLECTION DEVICE: Valved Poly Manifold from 2" Grunfoes Pump.
SAMPLE APPEARANCE:

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1242	1246	1250	1254	1258	1302	1306			
pH (SU)	8.25	8.18	8.16	8.13	8.14	8.14	8.15			
specific conductivity (mS)	0.663	0.661	0.533	0.52	0.466	0.441	0.438			
turbidity (NTU's)	567	356	122	59	28	20	18			
dissolved oxygen (mg/l)	0.38	0.2	0.55	0.58	0.63	0.66	0.68			
temperature (degrees C)	15.5	15.6	15.7	15.8	16	16.2	16.3			
redox potential (mv)	124	135	191	192	204	212	217			
depth to water (feet)	8.33	8.33	8.33	8.34	8.16	8.14	8.14			
volume purged (gal or L)	250ml	1L	2L	3L	4L	5L	6L			

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: TCL VOC's
LABORATORY:
CONTACT:

Casing Diameter/Volume conversions	
(inches)	(gallons per foot)
2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES:

100240

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-780 DATE: 11/7/2000
PROJECT NAME: Dover DPD12 SAMPLERS: J. Caragine
SITE LOCATION: Dover, NJ J. Ifkovits
SITE CONTACT: WEATHER: Clear, 40-45°F

WELL IDENTIFICATION NUMBER: MW-14S PERMIT:
WELL HEADSPACE READING: 4.2 PID MODEL/LAMP: Mini Rae 10-6
DEPTH TO WATER (Before Purging): 12.11 FEET FROM TOP OF CASING
WELL DEPTH: 22.9 FEET FROM TOP OF CASING
SCREEN INTERVAL: 10 to 20 FEET FROM TOP OF CASING
PUMP INTAKE: 15 FEET FROM TOP OF CASING
PURGE TIME (start/finish): 0902 / 0940 PURGE RATE: 250ml/ min.
WELL EVACUATION DEVICE: 2" Grunfoes Submersible Pump w/ dedicated poly tube.
SAMPLING TIME (start/finish): 0940 / 0943 SAMPLE RATE: 200ml/ min.
SAMPLE COLLECTION DEVICE: Valved Poly Manifold from 2" Grunfoes Pump.
SAMPLE APPEARANCE:

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	912	926	930	934	938					
pH (SU)	6.1	6.12	6.1	6.11	6.11					
specific conductivity (mS)	0.588	0.582	0.582	0.582	0.581					
turbidity (NTU's)	18	50	56	76	60					
dissolved oxygen (mg/l)	1.21	1.22	0.63	0.37	0.38					
temperature (degrees C)	16.2	17.8	18.6	18.4	17.8					
redox potential (mv)	166	194	175	166	161					
depth to water (feet)	12.63	13.36	13.12	12.61	12.63					
volume purged (gal or L)	250ml	3L	4L	5L	6L					

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: TCL VOC's
LABORATORY:
CONTACT:

Casing Diameter/Volume conversions (inches)	(gallons per foot)
2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES: Pump is silting and flow rate is continually adjusted.

100241

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-780 DATE: 11/6/2000
PROJECT NAME: Dover DPD12 SAMPLERS: J. Caragine
SITE LOCATION: Dover, NJ J. Ifkovits
SITE CONTACT: WEATHER: Clear, breezy, 45-50°

WELL IDENTIFICATION NUMBER: MW-15S PERMIT:
WELL HEADSPACE READING: 24 PID MODEL/LAMP: Mini Rae 10-6
DEPTH TO WATER (Before Purging): 8.58 FEET FROM TOP OF CASING
WELL DEPTH: 15 FEET FROM TOP OF CASING
SCREEN INTERVAL: 5 to 15 FEET FROM TOP OF CASING
PUMP INTAKE: 11 FEET FROM TOP OF CASING
PURGE TIME (start/finish): 1005 / 1050 PURGE RATE: 250ml/ min.
WELL EVACUATION DEVICE: 2" Grunfoes Submersible Pump w/ dedicated poly tube.
SAMPLING TIME (start/finish): 1050 / 1056 SAMPLE RATE: 200ml/ min.
SAMPLE COLLECTION DEVICE: Valved Poly Manifold from 2" Grunfoes Pump.
SAMPLE APPEARANCE:

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1025	1029	1034	1039	1044	1049				
pH (SU)	6.04	6.04	6.04	6.03	6.04	6.04				
specific conductivity (mS)	0.529	0.534	0.534	0.521	0.529	0.53				
turbidity (NTU's)	6	6	5	6	6	5				
dissolved oxygen (mg/l)	0.84	0.68	0.79	0.89	0.72	0.68				
temperature (degrees C)	16.7	16.6	16.3	16.5	16	15.5				
redox potential (mv)	294	303	311	293	296	296				
depth to water (feet)	8.65	8.59	8.59	8.63	8.63	8.63				
volume purged (gal or L)	250ml	1L	2L	3L	4L	5L				

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: TCL VOC's
LABORATORY: USEPA Laboratory Branch, Edison, NJ.
CONTACT: John Birri (732)906-6886

Casing Diameter/Volume conversions (inches) (gallons per foot)	NOTES: Duplicate sample MW-51S @1038
2.0 0.1632	
4.0 0.6528	
6.0 1.4687	
8.0 2.6115	

100242

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-780 DATE: 11/6/2000
PROJECT NAME: Dover DPD12 SAMPLERS: J. Caragine
SITE LOCATION: Dover, NJ J. Ifkovits
SITE CONTACT: WEATHER: Clear, breezy, 45-50°F

WELL IDENTIFICATION NUMBER: MW-151 PERMIT:
WELL HEADSPACE READING: 10.5 PID MODEL/LAMP: Mini Rae 10-6
DEPTH TO WATER (Before Purging): 8.35 FEET FROM TOP OF CASING
WELL DEPTH: 34.73 FEET FROM TOP OF CASING
SCREEN INTERVAL: 26.5 to 31.5 FEET FROM TOP OF CASING
PUMP INTAKE: 28 FEET FROM TOP OF CASING
PURGE TIME (start/finish): 1115 / 1150 PURGE RATE: 250ml/ min.
WELL EVACUATION DEVICE: 2" Grunfoes Submersible Pump w/ dedicated poly tube.
SAMPLING TIME (start/finish): 1150 / 1156 SAMPLE RATE: 200ml/ min.
SAMPLE COLLECTION DEVICE: Valved Poly Manifold from 2" Grunfoes Pump.
SAMPLE APPEARANCE: Clear

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1125	1129	1134	1139	1144	1149				
pH (SU)	6.24	6.13	6.09	6.05	6.03	6.02				
specific conductivity (mS)	0.409	0.398	0.395	0.394	0.395	0.393				
turbidity (NTU's)	189	103	68	41	22	18				
dissolved oxygen (mg/l)	3.29	2.91	2.87	3	3.01	2.99				
temperature (degrees C)	13.5	15.2	16	16.4	16.8	16.9				
redox potential (mv)	278	264	271	285	282	287				
depth to water (feet)	8.36	8.37	8.37	8.37	8.37	8.37				
volume purged (gal or L)	250ml	1L	2L	3L	4L	5L				

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: TCL VOC's
LABORATORY:
CONTACT:

Casing Diameter/Volume conversions	
(inches)	(gallons per foot)
2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES: Duplicate sample MW-511 @ 1120.

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285 780 DATE: 10/25/2000
PROJECT NAME: Dover DPDI2 SAMPLERS: John Ifkovits
SITE LOCATION: Dover NJ Tom Robinson
SITE CONTACT: _____ WEATHER: Cloudy 60°

WELL IDENTIFICATION NUMBER: MW 2D PERMIT: _____
WELL HEADSPACE READING: 8.3 PID MODEL/LAMP: MINI RAE 10-6
DEPTH TO WATER (Before Purging): 4.09 FEET FROM TOP OF CASING
WELL DEPTH: 133.1 FEET FROM TOP OF CASING
SCREEN INTERVAL: _____ FEET FROM TOP OF CASING
PUMP INTAKE: 125 FEET FROM TOP OF CASING
PURGE TIME (start/finish): 1201 / 1244 PURGE RATE: 250ml / min.
WELL EVACUATION DEVICE: 2" Grunfoes Submersible Pump w/ dedicated poly tube
SAMPLING TIME (start/finish): 1242 / 1244 SAMPLE RATE: 200ml / min.
SAMPLE COLLECTION DEVICE: Valved Poly Manifold from 2" Grunfoes Pump
SAMPLE APPEARANCE: Slightly cloudy

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1224	1228	1232	1236	1240					
pH (SU)	6.85	6.79	6.68	6.66	6.64					
specific conductivity (mS)	0.107	0.107	0.104	0.102	0.102					
turbidity (NTU's)	2	2	2	2	2					
dissolved oxygen (mg/l)	4.56	5.3	4.75	4.32	4.3					
temperature (degrees C)	18.4	18.4	18.3	18.3	18.4					
redox potential (mv)	238	247	256	264	269					
depth to water (feet)	3.85	3.84	3.8	3.8	3.77					
volume purged (gal or L)	250ml	1L	2L	3L	4L					

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: TCL VOC's
LABORATORY: Mitkem Corporation (MITKEM), 175 Metro Center Boulevard, Warwick, RI 02886
CONTACT: Sample Manager (401) 732-3400

Casing Diameter/Volume conversions	
(inches)	(gallons per foot)
2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES: Monitoring Well 2D is of PVC construction.

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285 780 DATE: 10/24/2000
PROJECT NAME: Dover DPDI2 SAMPLERS: John Ifkovits
SITE LOCATION: Dover NJ Tom Robinson
SITE CONTACT: WEATHER: Sunny, clear 65*

WELL IDENTIFICATION NUMBER: MW 101 PERMIT: MINI RAE 10-6
WELL HEADSPACE READING: 1.9 PID MODEL/LAMP: MINI RAE 10-6
DEPTH TO WATER (Before Purging): 8.13 FEET FROM TOP OF CASING
WELL DEPTH: 54.6 FEET FROM TOP OF CASING
SCREEN INTERVAL: 41.5 to 51.5 FEET FROM TOP OF CASING
PUMP INTAKE: 46.5 FEET FROM TOP OF CASING
PURGE TIME (start/finish): 1525 / 1604 PURGE RATE: 250ml / min.
WELL EVACUATION DEVICE: 2" Grunfoes Submersible Pump w/ dedicated poly tube
SAMPLING TIME (start/finish): 1604 / 1605 SAMPLE RATE: 200ml / min.
SAMPLE COLLECTION DEVICE: Valved Poly Manifold from 2" Grunfoes Pump
SAMPLE APPEARANCE: Clear

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1545	1549	1553	1557	1601					
pH (SU)	7.09	6.94	6.87	6.77	6.7					
specific conductivity (mS)	0.42	0.423	0.423	0.425	0.426					
turbidity (NTU's)	-2	-2	-1	-1	0					
dissolved oxygen (mg/l)	5.14	-0.29	-0.25	-0.21	-0.17					
temperature (degrees C)	20	19.5	19.2	19	18.7					
redox potential (mv)	216	222	224	226	226					
depth to water (feet)	8.09	8.09	8.09	8.09	8.09					
volume purged (gal or L)	250ml	1L	2L	3L	4L					

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: TCL VOC's
LABORATORY: Mitkem Corporation (MITKEM), 175 Metro Center Boulevard, Warwick, RI 02886
CONTACT: Sample Manager (401) 732-3400

Casing Diameter/Volume conversions (inches) (gallons per foot)	NOTES: Dissolved oxygen sensor need to recalibrated, showing minus bar on readouts.
2.0 0.1632	
4.0 0.6528	
6.0 1.4687	
8.0 2.6115	

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285 780 DATE: 10/24/2000
PROJECT NAME: Dover DPDI2 SAMPLERS: John Ifkovits
SITE LOCATION: Dover NJ Tom Robinson
SITE CONTACT: WEATHER: Sunny, clear 65°

WELL IDENTIFICATION NUMBER: MW 131 PERMIT:
WELL HEADSPACE READING: 0.4 PID MODEL/LAMP: MINI RAE 10-6
DEPTH TO WATER (Before Purging): 7.87 FEET FROM TOP OF CASING
WELL DEPTH: 50.1 FEET FROM TOP OF CASING
SCREEN INTERVAL: 37 to 47 FEET FROM TOP OF CASING
PUMP INTAKE: 42 FEET FROM TOP OF CASING
PURGE TIME (start/finish): 1354 / 1433 PURGE RATE: 250ml /min.
WELL EVACUATION DEVICE: 2" Grunfoes Submersible Pump w/ dedicated poly tube
SAMPLING TIME (start/finish): 1434 / 1435 SAMPLE RATE: 200ml /min.
SAMPLE COLLECTION DEVICE: Valved Poly Manifold from 2" Grunfoes Pump
SAMPLE APPEARANCE: Slightly turbid

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1400	1404	1408	1412	1416	1420	1424	1428	1432	
pH (SU)	6.36	9.61	9.32	8.93	8.42	8.42	8.45	8.51	8.53	
specific conductivity (mS)	0	0.543	0.563	0.602	0.622	0.624	0.622	0.614	0.617	
turbidity (NTU's)	30	17	17	16	17	17	17	16	13	
dissolved oxygen (mg/l)	8.74	1.87	1.52	1.15	0.79	0.53	0.032	0.045	0.035	
temperature (degrees C)	20.5	18.2	18.1	18	18.4	18.7	19.3	19.9	20.2	
redox potential (mv)	18	-49	-80	-126	-137	-141	-157	-163	-157	
depth to water (feet)	7.88	7.86	7.86	7.86	7.85	7.85	7.85	7.85	7.85	
volume purged (gal or L)	250ml	1L	2L	3L	4L	5L	6L	7L	8L	

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: TCL VOC's
LABORATORY: Mitkem Corporation (MITKEM), 175 Metro Center Boulevard, Warwick, RI 02886
CONTACT: Sample Manager (401) 732-3400

Casing Diameter/Volume conversions	
(inches)	(gallons per foot)
2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES:

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285 780 DATE: 10/25/2000
PROJECT NAME: Dover DPDI2 SAMPLERS: John Ifkovits
SITE LOCATION: Dover NJ Tom Robinson
SITE CONTACT: WEATHER: Overcast 65*

WELL IDENTIFICATION NUMBER: MW 14S PERMIT:
WELL HEADSPACE READING: 7.3 PID MODEL/LAMP: MINI RAE 10-6
DEPTH TO WATER (Before Purging): 12.05 FEET FROM TOP OF CASING
WELL DEPTH: 22.9 FEET FROM TOP OF CASING
SCREEN INTERVAL: 10 to 20 FEET FROM TOP OF CASING
PUMP INTAKE: 15 FEET FROM TOP OF CASING
PURGE TIME (start/finish): 1312 / 1401 PURGE RATE: 250ml / min.
WELL EVACUATION DEVICE: 2" Grunfoes Submersible Pump w/ dedicated poly tube
SAMPLING TIME (start/finish): 1400 / 1401 SAMPLE RATE: 200ml / min.
SAMPLE COLLECTION DEVICE: Valved Poly Manifold from 2" Grunfoes Pump
SAMPLE APPEARANCE: Turbid

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1335	1339	1343	1347	1351	1355	1359			
pH (SU)	6.17	6.15	6.14	6.13	6.13	6.15	6.17			
specific conductivity (mS)	0.58	0.579	0.579	0.58	0.589	0.589	0.593			
turbidity (NTU's)	27	26	27	188	208	210	200			
dissolved oxygen (mg/l)	0.75	0.83	0.83	1.63	1.56	1.67	1.6			
temperature (degrees C)	21.3	21.3	21.4	23	22.7	22.6	21.7			
redox potential (mv)	163	163	160	96	79	86	79			
depth to water (feet)	12.16	12.12	12.72	12.7	13.12	13.87	14.03			
volume purged (gal or L)	250ml	1L	2L	3L	4L	5L	6L			

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: TCL VOC's
LABORATORY: Mitkem Corporation (MITKEM), 175 Metro Center Boulevard, Warwick, RI 02886
CONTACT: Sample Manager (401) 732-3400

Casing Diameter/Volume conversions	
(inches)	(gallons per foot)
2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES:

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285 780 DATE: 10/24/2000
PROJECT NAME: Dover DPDI2 SAMPLERS: John Ifkovits
SITE LOCATION: Dover NJ Tom Robinson
SITE CONTACT: WEATHER: Sunny, clear 60°

WELL IDENTIFICATION NUMBER: MW 15S PERMIT:
WELL HEADSPACE READING: 34.9 PID MODEL/LAMP: MINI RAE 10-6
DEPTH TO WATER (Before Purging): 8.34 FEET FROM TOP OF CASING
WELL DEPTH: 15 FEET FROM TOP OF CASING
SCREEN INTERVAL: 5 to 15 FEET FROM TOP OF CASING
PUMP INTAKE: 11 FEET FROM TOP OF CASING
PURGE TIME (start/finish): 1105 / 1149 PURGE RATE: 250ml / min.
WELL EVACUATION DEVICE: 2" Grunfoes Submersible Pump w/ dedicated poly tube
SAMPLING TIME (start/finish): 1150 / 1154 SAMPLE RATE: 200ml / min.
SAMPLE COLLECTION DEVICE: Valved Poly Manifold from 2" Grunfoes Pump
SAMPLE APPEARANCE: Clear

FIELD PARAMETERS	Initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1125	1129	1133	1137	1141	1145	1149			
pH (SU)	5.78	5.88	6.03	6.06	6.07	6.07	6.08			
specific conductivity (mS)	0.515	0.511	0.507	0.507	0.507	0.507	0.506			
turbidity (NTU's)	6	7	6	5	4	3	1			
dissolved oxygen (mg/l)	1.46	1.06	0.87	0.74	0.58	0.48	0.47			
temperature (degrees C)	16.3	17	18.1	18.7	19.3	19.6	19.9			
redox potential (mv)	124	113	112	129	140	146	148			
depth to water (feet)	8.48	8.5	8.52	8.53	8.53	8.53	8.53			
volume purged (gal or L)	250ml	1L	2L	3L	4L	5L	6L			

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: TCL VOC's
LABORATORY: Mitkem Corporation (MITKEM), 175 Metro Center Boulevard, Warwick, RI 02886
CONTACT: Sample Manager (401) 732-3400

Casing Diameter/Volume conversions	
(inches)	(gallons per foot)
2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES: Dupilcate sample - DPDI2-MW-51S

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285 780 DATE: 10/24/2000
PROJECT NAME: Dover DPDI2 SAMPLERS: John Ifkovits
SITE LOCATION: Dover NJ Tom Robinson
SITE CONTACT: WEATHER: Clear, sunny 63*

WELL IDENTIFICATION NUMBER: MW 151 PERMIT:
WELL HEADSPACE READING: 4.8 PID MODEL/LAMP: MINI RAE 10-6
DEPTH TO WATER (Before Purging): 8.22 FEET FROM TOP OF CASING
WELL DEPTH: 34.73 FEET FROM TOP OF CASING
SCREEN INTERVAL: 26.5 to 31.5 FEET FROM TOP OF CASING
PUMP INTAKE: 28 FEET FROM TOP OF CASING
PURGE TIME (start/finish): 1215 / 1243 PURGE RATE: 250ml / min.
WELL EVACUATION DEVICE: 2" Grunfoes Submersible Pump w/ dedicated poly tube
SAMPLING TIME (start/finish): 1243 / 1245 SAMPLE RATE: 200ml / min.
SAMPLE COLLECTION DEVICE: Valved Poly Manifold from 2" Grunfoes Pump
SAMPLE APPEARANCE: Clear

FIELD PARAMETERS	initial	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
time (00:00)	1229	1233	1237	1241						
pH (SU)	6.12	6.1	6.14	6.16						
specific conductivity (mS)	0.383	0.379	0.377	0.377						
turbidity (NTU's)	0	0	0	1						
dissolved oxygen (mg/l)	2.73	2.35	2.47	2.49						
temperature (degrees C)	17.5	18	18.5	18.8						
redox potential (mv)	225	218	219	219						
depth to water (feet)	8.21	8.21	8.21	8.24						
volume purged (gal or L)	250ml	1L	2L	3L						

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: TCL VOC's
LABORATORY: Mitkem Corporation (MITKEM), 175 Metro Center Boulevard, Warwick, RI 02886
CONTACT: Sample Manager (401) 732-3400

Casing Diameter/Volume conversions	
(inches)	(gallons per foot)
2.0	0.1632
4.0	0.6528
6.0	1.4687
8.0	2.6115

NOTES: Duplicate sample - DPDI2- MW- 511

E

Appendix E

Appendix

E

APPENDIX E

**INVESTIGATION DERIVED WASTE
INFORMATION**



NYSDOH
AIHA
CTDOH

ELAP
PAT, LPAT
PH-0205

11418
102391

October 12, 2000

Steve Sanders
Allied Waste Services, Inc.
2163 Merrick Avenue
Merrick, New York, 11566

Re: Dover, Malcolm Pirnie Inc - Project No.: 859

Dear Mr. Sanders:

Enclosed please find the Laboratory Analysis Report(s) for the sample(s) received on October 05, 2000. American Analytical Laboratories, Inc. analyzed the samples through October 10, 2000 for the following:

CLIENT ID	ANALYSIS
D-09	TCLP Volatiles, Flashpoint
D-01	TCLP Volatiles, Flashpoint

This report consists of 3 pages of analytical results.

If you have any questions or require further information, please call at your convenience. American Analytical Laboratories, Inc. would like to thank you for the opportunity to be of service to you.

Best Regards,

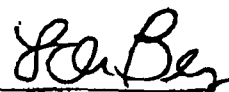
American Analytical Laboratories, Inc.

Client: Allied Waste Services, Inc.	Client ID: Dover, Malcolm Pirnie Inc - Project No.: 859 (D-09)
Date received: 10/05/00	Laboratory ID: 0014595
Date extracted: NA	Matrix: Soil
Date analyzed: 10/10/00	Contractor: 11418

TCLP VOLATILE ANALYSIS

Parameter	Regulatory Limit	Cas No.	Results mg/L
BENZENE	0.50 mg/L	71-43-2	<0.001
2-BUTANONE	0.50 mg/L	78-93-3	<0.001
CARBON TETRACHLORIDE	0.50 mg/L	56-23-5	<0.001
CHLOROBENZENE	100.0 mg/L	108-90-7	<0.001
CHLOROFORM	6.0 mg/L	67-66-3	<0.001
1,2-DICHLOROETHANE	0.50 mg/L	107-06-2	<0.001
1,4-DICHLOROBENZENE	7.5 mg/L	106-46-7	<0.001
1,1-DICHLOROETHYLENE	0.70 mg/L	75-35-4	<0.001
TETRACHLOROETHYLENE	0.7 mg/L	127-18-4	0.002
TRICHLOROETHYLENE	0.5 mg/L	79-01-6	<0.001
VINYL CHLORIDE	0.20 mg/L	75-01-4	<0.001

Method: SW846, 1311 extraction tcip.


Laboratory Director

000001

AMERICAN
ANALYTICAL
LABORATORIES

56 TOLEDO STREET • FARMINGDALE, NEW YORK 11735 • (631) 454-6100 • FAX: (631) 454-8027

100253

Client: Allied Waste Services, Inc.	Client ID: Dover, Malcolm Pirnie Inc - Project No.: 859 (D-01)
Date received: 10/05/00	Laboratory ID: 0014596
Date extracted: NA	Matrix: Soil
Date analyzed: 10/10/00	Contractor: 11418

TCLP VOLATILE ANALYSIS

Parameter	Regulatory Limit	Cas No.	Results mg/L
BENZENE	0.50 mg/L	71-43-2	<0.001
2-BUTANONE	0.50 mg/L	78-93-3	<0.001
CARBON TETRACHLORIDE	0.50 mg/L	58-23-5	<0.001
CHLOROBENZENE	100.0 mg/L	108-90-7	<0.001
CHLOROFORM	6.0 mg/L	67-66-3	<0.001
1,2-DICHLOROETHANE	0.50 mg/L	107-06-2	<0.001
1,4-DICHLOROBENZENE	7.5 mg/L	106-46-7	<0.001
1,1-DICHLOROETHYLENE	0.70 mg/L	75-35-4	<0.001
TETRACHLOROETHYLENE	0.7 mg/L	127-18-4	0.067
TRICHLOROETHYLENE	0.5 mg/L	79-01-6	<0.001
VINYL CHLORIDE	0.20 mg/L	75-01-4	<0.001

Method: SW846, 1311 extraction tclp.


Laboratory Director

000002



56 TOLEDO STREET • FARMINGDALE, NEW YORK 11735 • (631) 454-6100 • FAX: (631) 454-8027

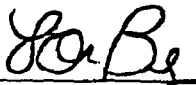
100254

Client: Allied Waste Services, Inc.	Client ID: Dover, Malcolm Pimie Inc - Project No.: 859 (See Below)
Date received: 10/05/00	Laboratory ID: See Below
Date extracted: 10/09/00	Matrix: Soil
Date analyzed: 10/09/00	Contractor: 11418

FLASHPOINT RESULTS

LABORATORY ID	CLIENT ID	PARAMETER	RESULTS
0014595	D-09	Flashpoint	>140° F
0014596	D-01	Flashpoint	>140° F

Method: SW846/1010


Laboratory Director

000003

CHAIN OF CUSTODY / ANALYSIS REQUEST

100256



100257

MXI Environmental Services
17600 Job Stuart Highway, Abingdon Va. 24211 (540) 628-6636

February 21, 2001

Allied Waste Services
3201 South 81st street
Philadelphia PA 19153
Attn: Larry Caldwell

RE: ANALYSIS FOR DOVER WELL NO. 4

Dear Mr. Caldwell:

Please note that the composite analysis (sample ID # AB46398 , lab ID # TN00020) submitted by MXI environmental services on January 17, 2001 includes the drummed waste received from Dover well no. 4. This analysis is a composite of several waste streams thus additional parameters may not apply. If you have any questions please contact me at 540-628-6636.

With kindest regards,

MXI ENVIRONMENTAL SERVICES



Joey Atkins
Project Manager

JA

Jan-24-01 02:48P

P.02

Tri-State Analytical Laboratory, L.L.C.

P.O. Box 2024

Johnson City, TN 37605

Telephone: 423-926-6385

Fax: 423-926-6997

EPA Laboratory Number TN00020

Page 1 of 3

CERTIFICATE OF REPORT

Report Date: 1/24/01

Report To: Joey Atkins
MXI Environmental
17600 Jeb Stuart Hwy.
Abingdon, VA 24210

Account Code: MXI01

Location Code: MXI

LOG-IN RECORD # 58978

Sample Location/Description: MXI Environmental
MXI-RO

Sample ID # AB46398

Sample Collection Date: 1/3/01

Time: 12:00 PM

Received in Lab: 1/5/01

Parameter	Result	MDL OQL	Unit of Measure	Method	Analysis Start Date/Time	Analyst
Oil & Grease	5280	5	mg/kg	EPA 1664	1/9/01 12:50	SY
pH	5.9	0.1	su	SW846-9045	1/5/01 14:15	CS
Total Organic Halogens	<1.0	1.0	ug/g	SW846-8020	1/24/01 12:00	CS
TCLP Arsenic	<0.01	0.01	mg/l	3010A-8010B	1/10/01 16:15	JF
TCLP Barium	0.7	0.1	mg/l	3010A,6010B	1/10/01 16:15	JF
TCLP Cadmium	<0.01	0.01	mg/l	3010A,6010B	1/10/01 16:15	JF
TCLP Chromium	<0.01	0.01	mg/l	3010A,6010B	1/10/01 16:15	JF
TCLP Mercury	<0.001	0.001	mg/l	EPA 245.2	1/11/01 15:00	JF
TCLP Lead	0.08	0.05	mg/l	3010A-6010B	1/10/01 16:15	JF
TCLP Selenium	<0.01	0.01	mg/l	3010A,6010B	1/10/01 16:15	JF
TCLP Silver	<0.01	0.01	mg/l	3010A,6010B	1/10/01 16:15	JF
Benzene	1.73	1	mg/kg	SW846-8020	1/12/01 3:10	MB
Toluene	23.7	1	mg/kg	SW846-8020	1/12/01 3:10	MB
Ethylbenzene	19.9	1	mg/kg	SW846-8020	1/12/01 3:10	MB
Xylene	93.9	1	mg/kg	SW846-8020	1/12/01 3:10	MB
Benzene	41	5	ug/l	5030,8260	1/11/01 23:28	JJ
Carbon Tetrachloride	Not detected	5	ug/l	5030,8260	1/11/01 23:28	JJ
Chlorobenzene	Not detected	5	ug/l	5030,8260	1/11/01 23:28	JJ
Chloroform	Not detected	5	ug/l	5030,8260	1/11/01 23:28	JJ
1,4-dichlorobenzene	Not detected	5	ug/l	5030,8260	1/11/01 23:28	JJ

FOOTNOTES (If applicable):

MDL = Minimum Detection Limit

< "Less Than" > "Greater Than"

If Sample Result = "", Unable to determine due to nature of sample

If Sample Result = "", See COMMENTS

COMMENTS:

TCLP Method Reference SW846-1311

OQL = Organics Quantitation Limit

J = Estimated Value

MDL / OQL column for surrogates represents % recovery

MDL / OQL column for library search compounds (*) represents % match quality.

Sheryl C. Gibson
Sheryl C. Gibson, Data Analyst

FORMAT: SINGLE

100259

Jan-24-01 02:48P

P.03

Tri-State Analytical Laboratory, L.L.C.

P.O. Box 2024

Johnson City, TN 37605

Telephone: 423-926-6385

Fax: 423-926-6997

EPA Laboratory Number TN00020

Page 2 of 3

CERTIFICATE OF REPORT

Report Date: 1/24/01

Report To: Joey Atkins

MXI Environmental

17600 Jeb Stuart Hwy.

Abingdon, VA 24210

Account Code: MXI01

Location Code: MXI

LOG-IN RECORD # 58978

Sample Location/Description: MXI Environmental
MXI-RO

Sample ID # AB46398

Sample Collection Date: 1/3/01

Time: 12:00 PM

Received in Lab: 1/5/01

Parameter	Result	MDL OQL	Unit of Measure	Method	Analysis Start Date/Time	Analyst
1,2-dichloroethane	Not detected	5	ug/l	5030,8280	1/11/01 23:28	JJ
1,1-dichloroethane	Not detected	5	ug/l	6030,8280	1/11/01 23:28	JJ
Methyl Ethyl Ketone	Not detected	100	ug/l	5030,8280	1/11/01 23:28	JJ
Tetrachloroethane	Not detected	5	ug/l	6030,8260	1/11/01 23:28	JJ
Trichloroethane	Not detected	5	ug/l	5030,8260	1/11/01 23:28	JJ
Vinyl Chloride	Not detected	5	ug/l	5030,8280	1/11/01 23:28	JJ
1,4-Dichlorobenzene	Not detected	10	ug/l	3510,8270	1/13/01 0:37	JJ
2,4-Dinitrotoluene	Not detected	10	ug/l	3510,8270	1/13/01 0:37	JJ
Hexachlorobenzene	Not detected	10	ug/l	3510,8270	1/13/01 0:37	JJ
Hexachlorobutadiene	Not detected	10	ug/l	3510,8270	1/13/01 0:37	JJ
Hexachloroethane	Not detected	10	ug/l	3510,8270	1/13/01 0:37	JJ
Nitrobenzene	Not detected	10	ug/l	3510,8270	1/13/01 0:37	JJ
Pyridine	Not detected	20	ug/l	3510,8270	1/13/01 0:37	JJ
2-Methylphenol	Not detected	20	ug/l	3510,8270	1/13/01 0:37	JJ
3-Methylphenol	Not detected	20	ug/l	3510,8270	1/13/01 0:37	JJ
4-Methylphenol	Not detected	20	ug/l	3510,8270	1/13/01 0:37	JJ
Pentachlorophenol	Not detected	20	ug/l	3510,8270	1/13/01 0:37	JJ
2,4,5-Trichlorophenol	Not detected	20	ug/l	3510,8270	1/13/01 0:37	JJ
2,4,6-Trichlorophenol	Not detected	20	ug/l	3510,8270	1/13/01 0:37	JJ
2-Fluorophenol (Surrogate)	99.35	50	%	3510,8270	1/13/01 0:37	JJ
Phenol-d6 (Surrogate)	58.71	29	%	3510,8270	1/13/01 0:37	JJ
Nitrobenzene-d9 (Surrogate)	58.45	59	%	3510,8270	1/13/01 0:37	JJ

FOOTNOTES (if applicable):

MDL = Minimum Detection Limit

< "Less Than" > "Greater Than"

If Sample Result = "", Unable to determine due to nature of sample

If Sample Result = "", See COMMENTS

COMMENTS:

TCLP Method Reference SW846-1311

OQL = Organic Quantitation Limit

J = Estimated Value

MDL / OQL column for surrogates represents % recovery

MDL / OQL column for library search compounds (*) represents % match quality.

Sheryl C. Gibson
Sheryl C. Gibson, Data Analyst

FORMAT: SINGLE

100260

Jan-24-01 02:48P

P.04

Tri-State Analytical Laboratory, L.L.C.

Page 3 of 3

P.O. Box 2024

Johnson City, TN 37605

Telephone: 423-926-6385

Fax: 423-926-6997

EPA Laboratory Number T180026

CERTIFICATE OF REPORT

Report Date: 1/24/01

Report To: Joey Atkins
MXI Environmental
17800 Jeb Stuart Hwy.
Abingdon, VA 24210

Account Code: MX101

Location Code: MXI

LOG-IN RECORD # 58978

Sample Location/Description: MXI Environmental
MXI-RO

Sample ID # AB46398

Sample Collection Date: 1/3/01

Time: 12:00 PM

Received in Lab: 1/5/01

Parameter	Result	MDL OQL	Unit of Measure	Method	Analysis Start Date/Time	Analyst
2-Fluorobiphenyl (Surrogate)	63.93	64	%	3510.8270	1/13/01 0:37	JJ
2,4,6-Tribromophenol (Surrogate)	172.73	86	%	3510.8270	1/13/01 0:37	JJ
Terphenyl-d14 (Surrogate)	53.24	53	%	3510.8270	1/13/01 0:37	JJ
Total Petroleum Hydrocarbons	6919	4	mg/kg	TPH-DRO	1/8/01 18:47	JJ
Total Petroleum Hydrocarbons	811	5	mg/kg	TPH-GRO	1/12/01 3:10	MB

FOOTNOTES (if applicable):

MDL = Minimum Detection Limit

< "Less Than" > "Greater Than"

If Sample Result = **, Unable to determine due to nature of sample

If Sample Result = **, See COMMENTS

COMMENTS:

TCLP Method Reference SW846-1311

OQL = Organic Quantitation Limit

J = Estimated Value

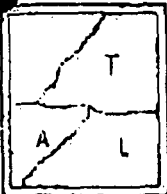
MDL / OQL column for surrogates represents % recovery

MDL / OQL column for library search compounds (*) represents % match quality.

Sheryl C. Gibson
Sheryl C. Gibson, Data Analyst

FORMAT: SINGLE

100261



Vol + 5 Vol

[illegible]

MXI**MXI Maumee Express, Inc****MANIFEST**

P.O. Box 278
Somerville, NJ 08876
Phone: (732) 424-8441
Fax: (732) 424-8446

17600 Jeb Stuart Hwy
Abingdon, VA 24211
Phone: (540) 628-1156
Fax: (540) 628-4435

14750 Boyle Ave.
Fontana, CA 92337
Phone: (909) 350-9090
Fax: (909) 350-9287

MXI EPA ID NO.:
NJD986607380

7864

GENERATOR NAME / ADDRESS <i>USEPA Region II Dover Municipal Wt H#4 Dover NJ</i>		PHONE (AREA CODE) TRACTOR TRAILER		GENERATOR EPA ID NO.: <i>NJD986607380</i>	
MXI REP. LOADING (PRINT)	PROCEDURE	BOX SPOTTED	BOX REMOVED	TIME AT GENERATOR (MILITARY TIME ONLY) ARRIVAL TIME DEPARTURE TIME	
COMMENTS OR DELAYS AT GENERATOR				EQUIPMENT USED	

BROKER:	STATE MANIFEST NO.:
PO. NO#: <i>KR007733</i>	

(X) HM	PROPER U.S. SHIPPING NAME	U.S. D.O.T. HAZARDOUS CLASS	NA/UN/NO.	PACKING GROUP	NO. CONT.	CONT. TYPE	NET QUANTITY	UNIT MEASURE	WASTE	FORM
1	<i>RCRA Waste Solid</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>5</i>	<i>DM</i>	<i>2200</i>	<i>P</i>		
2	<i>RCRA Waste Liquid</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>1</i>	<i>DM</i>	<i>55</i>	<i>G</i>		
3										

HAZARD HANDLING INSTRUCTIONS INCLUDING CONTAINER EXEMPTION (I.E. IDENTIFICATION SHIPMENT OF A NON-HAZARDOUS NATURE WHICH DOES NOT HAVE TO BE MANIFESTED).

GENERATOR'S CERTIFICATION: This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation, U.S. EPA and the State. The wastes described above were consigned to the Transporter named. The Treatment, Storage or Disposal Facility can and will accept the shipment of hazardous waste, and has a valid permit to do so. I certify that the foregoing is true and correct to the best of my knowledge.

Payment to the contractor/broker for waste removal does not constitute payment to the carrier and if the contractor/broker does not pay the carrier, the generator is obligated to pay the agreed rate offered to the contractor/broker.

PLEASE PRINT NAME / TITLE <i>John J. ...</i>	GENERATOR'S SIGNATURE <i>X</i> I HAVE READ THE ABOVE AND UNDERSTAND AND AGREE TO ALL OF ITS CONTENT.	DATE LOADED <i>1/1/04</i> MO. DAY YR.

TSDF NAME / ADDRESS <i>MXI 17600 Jeb Stuart Hwy. Abingdon VA</i>		PHONE <i>540 628 1156</i> (AREA CODE)		TSDF EPA ID NO.:	
MXI REP. UNLOADING (PRINT)		PROCEDURE	BOX SPOTTED	BOX REMOVED	TIME AT TSDF (MILITARY TIME ONLY) ARRIVAL TIME DEPARTURE TIME
COMMENTS OR DELAYS AT TSDF				EQUIPMENT USED	
PLEASE PRINT NAME / TITLE		TSDF SIGNATURE <i>X</i>		DATE UNLOADED <i>1/1/04</i> MO. DAY YR.	

NJD986607380	FL- NJD986607380	MD- HWH 539	NJ- 50059	OH- UPWO389242-OH	TN- NJD986607380
AT- PC-1469	GA- NJD986607380	MA- NJD986607380	SW- 18582	OK- 3762	UT- NJD986607380
H- 778	IL- 3401	MI- NJD986607380	NM- NJD986607380	PA- AH 0420	VT- NJD986607380
AZ- NJD986607380	IN- NJD986607380	MN- UPWO389242-OH	NY- JA-334	RI- 702	VA- NJD9866073801
CA- 3184	KS- NJD986607380	MS- NJD986607380	NV- UPWO389242-OH	SC- NJD986607380	WV- UPWO389242-OH
CT- HW-613	KE- NJD986607380	MO- H-2083	NC- NJD986607380	TX- 41825	WI- 16148
DE- HW-409	LA- NJD986607380	NH- TNH-0211			

100263

White: MXI original Canary: Retained by TSDF Pink: Retained by Generator

MXI Maumee Express, Inc

MANIFEST

P.O. Box 278
Somerville, NJ 08876
Phone: (732) 424-8441
Fax: (732) 424-8446

17600 Jeb Stuart Hgwy
Abingdon, VA 24211
Phone: (540) 628-1156
Fax: (540) 628-4435

14750 Boyle Ave.
Fontana, CA 92337
Phone: (909) 350-9090
Fax: (909) 350-9287

MXI EPA ID NO.:
NJD986607380

7870

GENERATOR NAME / ADDRESS USEPA Region II Dover Municipal WLF # 4 Dover NJ		PHONE (AREA CODE) TRACTOR TRAILER		GENERATOR EPA ID NO.: NJD986607380	
MXI REP. LOADING (PRINT) G. V. L. 2	PROCEDURE	BOX SPOTTED	BOX REMOVED	TIME AT GENERATOR (MILITARY TIME ONLY) ARRIVAL TIME DEPARTURE TIME	
COMMENTS OR DELAYS AT GENERATOR				EQUIPMENT USED	

BROKER:				STATE MANIFEST NO.: BLD 7768							
PO. NO#:											
(X) HM	PROPER U.S. SHIPPING NAME	U.S. D.O.T. HAZARDOUS CLASS	NA/UN/NO.	PACKING GROUP	NO. CONT.	CONT. TYPE	NET QUANTITY	UNIT MEASURE	WASTE	FORM	
1	Non DOT Non RCRA Waste Soil	N/A	N/A	N/A	22	DR	8800	P			
2	Non DOT Non RCRA Waste Water	N/A	N/A	N/A	13	DR	700	G			
3											

ADDITIONAL HANDLING INSTRUCTIONS INCLUDING CONTAINER EXEMPTION (I.E. IDENTIFICATION SHIPMENT OF A NON-HAZARDOUS NATURE WHICH DOES NOT HAVE TO BE MANIFESTED). **24 Hour Emergency Telf (732) 424-8441**

GENERATOR'S CERTIFICATION: This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation, U.S. EPA and the State. The wastes described above were consigned to the Transporter named. The Treatment, Storage or Disposal Facility can and will accept the shipment of hazardous waste, and has a valid permit to do so. I certify that the foregoing is true and correct to the best of my knowledge.

Payment to the contractor/broker for waste removal does not constitute payment to the carrier and if the contractor/broker does not pay the carrier, the generator is obligated to pay the agreed rate offered to the contractor/broker.

PLEASE PRINT NAME / TITLE John J. L...	GENERATOR'S SIGNATURE X	DATE LOADED 10/16/00 MO. DAY YR.

TSDF NAME / ADDRESS MXI Environmental 17600 Jeb Stuart Highway Abingdon VA 24211		PHONE (540) 628-1156		TSDF EPA ID NO.: NOT REQUIRED	
		(AREA CODE)		APPOINTMENT TIME	
MXI REP. UNLOADING (PRINT)		PROCEDURE	BOX SPOTTED	BOX REMOVED	TIME AT TSDF (MILITARY TIME ONLY) ARRIVAL TIME DEPARTURE TIME
COMMENTS OR DELAYS AT TSDF				EQUIPMENT USED	
PLEASE PRINT NAME / TITLE		TSDF SIGNATURE X		DATE UNLOADED 1 / 1 MO. DAY YR.	

MD-986607380	FL- NJD986607380	MD- HWH 539	NJ- 50059	OH- UPWO389242-OH	TN- NJD986607380
AL- PC-1469	GA- NJD986607380	MA- NJD986607380	SW-18582	OK- 3762	UT- NJD986607380
H-778	IL- 3401	MI- NJD986607380	NM- NJD986607380	PA- AH 0420	VT- NJD986607380
AZ- NJD986607380	IN- NJD986607380	MN- UPWO389242-OH	NY- JA-334	RI- 702	VA- NJD9866073801
CA- 3184	KS- NJD986607380	MS- NJD986607380	NV- UPWO389242-OH	SC- NJD986607380	WV- UPWO389242-OH
CT- HW-613	KE- NJD986607380	MO- H-2083	NC- NJD986607380	TX- 41825	WI- 16148
DE- HW-409	LA- NJD986607380	NH- TNH-0211			

100264



898 Fernhill Road • West Chester, PA 19380-4256
(610) 436-4749 • Fax (610) 430-6948

No 1206

SHIP NO.

DATE

BILL OF LADING NO.

ACCOUNT CODE

APPROVAL NO.

RECEIVING SLIP

GENERATOR INFORMATION:

Generator: USEPA REGION II

EPA ID#

Site Address: 290 Broadway, 15th Floor, NY NY

TRANSPORTER INFORMATION:

Transporter: Eldredge Inc.Truck Number: 867Driver: Randy Bass

QUANTITY RECEIVED:

No. Gallons:

No. Drums:

No. Tons:

a. 6
b. 4

TREATMENT LOCATION:

Receiving Tank Number:

Start:

End:

Net Gallons:

LAB RESULTS: 9902-1809E

Total Halogens:

Flash Point:

Sp. Gravity:

PCB's:

pH:

BS&W:

% Oil:

% Cuff:

% Water:

% Solids:

17

98.5%

0.5%

REJECTION: 9902-1806E

Reason:

1 OIL: 1%

Tox: 22ppm

1 CUFF: 1%

Tox: 22ppm

1 OIL: 2100ppm

PCB's: 22ppm

1 WATER: 74%

PCB's: 22ppm

1 MOIST: 21.6%

FP: 7110°F

1 SOLIDS: 24%

FP: 7110°F

BILLING INFORMATION:

Unit Price:

CERTIFICATION:

Driver's Company:

Signature:



898 Fernhill Road • West Chester, PA 19380-4256
(610) 436-4749 • Fax (610) 430-6948

No 1236

SLIP NO.

DATE

BILL OF LADING NO.

ACCOUNT CODE

APPROVAL NO.

2/29/00

026048

DOVER NJ

RECEIVING SLIP

GENERATOR INFORMATION:

Generator: Dover Muni Well #44

EPA ID#

Site Address: Dover NJ

TRANSPORTER INFORMATION:

Transporter: Eldredge Inc.Truck Number: 893 / 87Driver: Carl Hower

QUANTITY RECEIVED:

a 1 solids

No. Gallons: No. Drums: b 1 water No. Tons:

TREATMENT LOCATION:

Receiving Tank Number: Start: End: Net Gallons:

LAB RESULTS: 0003-1872E

Total Halogens: 48ppm
PCB's: 48ppmFlash Point: 2110°F
Sp. Gravity:
pH:

BS&W:

% Oil:

% Cuff:

% Water:

% Solids:

400 ppm2.7%

REJECTION: 0003-1878E

Reason: 1. Oil 1%Tox: 48ppm FP: 2110°F 1. Cuff: -PCB's: 48ppm 1. Water 99%1. Solids: -

BILLING INFORMATION:

Unit Price:

CERTIFICATION:

Driver's Company:

Signature:



898 Fernhill Road • West Chester, PA 19380-4256
(610) 436-4749 • Fax (610) 430-6948

No 1228

SLIP NO.

DATE

BILL OF LADING NO.

ACCOUNT CODE

APPROVAL NO.

RECEIVING SLIP

GENERATOR INFORMATION:

Generator: USEPA REGION II

EPA ID#

Site Address: Dover Municipal Well #4, Dover NJ

TRANSPORTER INFORMATION:

Transporter: ELK TRANSPORTTruck Number: 205Driver: WAYNE C MOHR

QUANTITY RECEIVED:

No. Gallons: No. Drums: 11 (water) No. Tons:

TREATMENT LOCATION:

Receiving Tank Number: Start: End: Net Gallons:

LAB RESULTS: 0003-1850ETotal Halogens: 2.2ppmPCB's: 2.2ppmFlash Point: >110°F

Sp. Gravity:

pH:

BS&W:

% Oil: 1%% Cuff: —% Water: 99%% Solids: —REJECTION: 0003-1840E

Reason:

% OIL: 2%TOX: 2.2ppm% CUFF: 1%PCB's: 2.2ppm% WATER: 99%FP: >110°F% SOLIDS: 5%0003-1840E% OIL: 1%TOX: 2.2ppm% CUFF: —PCB: 2.2ppm% WATER: 99%FP: >110°F% SOLIDS: —

BILLING INFORMATION:

Unit Price:

CERTIFICATION:

Driver's Company:

ELK TRANSPORTATION

Signature:

Wayne C Mohr

02604



898 Fernhill Road • West Chester, PA 19380-4256
 Phone: (610) 436-4749
 FAX: (610) 480-6948

Protecting Our Environment

Bill of Lading No. DOVER
 Account Code DOVER
 Manifest No. DOVER
 P.O. # DOVER

SHIPPER USEPA REGION II
 ADDRESS 290 BROADWAY, 19TH FLOOR NEW YORK, NY 10007 PHONE (202) 600-0000

I certify that the material(s) described below is properly classified, packaged, marked and labeled and is in proper condition to be transported under the applicable regulations of the Environmental Protection Agency and the Department of Transportation.
 Payment to the contractor for waste removal does not constitute payment to the carrier, and if the contractor does not pay the carrier, the generator is obligated to pay the agreed rate offered to the contractor.

AUTHORIZED SIGNATURE [Signature] PRINTED NAME [Name] DATE 6/25/00

CARRIER Eldredge, Inc.
898 Fernhill Road West Chester, PA 19380 (610) 436-4749

ADDRESS [Signature] PRINTED NAME Carl Hone DATE 6-24-00

SIGNATURE [Signature] PRINTED NAME Carl Hone DATE 6-24-00

FACILITY Eldredge, Inc.

ADDRESS 898 Fern Hill Road West Chester, PA 19380 (610) 436-4749

THIS IS TO CERTIFY RECEIPT OF THE MATERIAL

SIGNATURE [Signature] PRINTED NAME [Name] DATE [Date]

H.M.	U.S. DOT DESCRIPTION (Including Proper Shipping Name, Hazard Class and I.D. Number)	FORM	WEIGHT OF VOLUME	NO. AND CONT.
	NON RCRA/NON DOT REGULATED SOLIDS	S	300 p	01
	Non RCRA/NON DOT regulated liquids (Decontaminants)		250 p	01

DRIVER NOTE: MUST TAKE AND WEAR FULL SAFETY GEAR WHEN LOADING AND UNLOADING

Special Handling Instructions and Additional Information: In case of emergency call (610) 436-4749 (24-hours), Eldredge, Inc. #1
 This Shipment will be Recycled at Eldredge, Inc.

USEPA REGION II
 DOVER MUNICIPAL WELL
 DOVER NJ 078

DATE	UNIT	START TRIP	START LOCATION	ARRIVE GENERATOR	DEPART GENERATOR	ARRIVE DISPOSAL	DEPART DISPOSAL	END TRIP	END LOCATION	NO CHARGE HOURS	TOTAL HOURS
06-24-00	543	9:15	FC	10:30	11:15		7:15	11:15	Dover NJ		

CENTER	CATALOG #	DESCRIPTION	BOTH	INVOICE	SALES JNL
	515	243			

DATE COMPLETED

TOTAL MILES

Press Hard!

TOTAL FUEL

TOTAL OIL QTS.

TOTAL EXPENSE

PAY HOURS

PAY MILEAGE

PAY LOAD

PAY PERIOD

OFFICE USE

APPROVAL

DATE

DATE RECD

SYSTEM ENTRY

DATE

ORIGINAL FUEL SLIPS & TOLL RECEIPTS MUST BE ATTACHED
 ALL RECEIPTS MUST INCLUDE PRO NO, DRIVER NAME & TRUCK NO

100268



898 Fernhill Road • West Chester, PA 19380-4256
(610) 436-4749 • Fax (610) 430-6948

SLIP NO. **No 2913**DATE 7/2/88

BILL OF LADING NO. _____

ACCOUNT CODE ALLIED W

APPROVAL NO. _____

RECEIVING SLIP**GENERATOR INFORMATION:**Generator: USEPA Region II EPA ID# _____Site Address: Dover NJ**TRANSPORTER INFORMATION:**Transporter: EIKTruck Number: 213Driver: RONALD KOENIG**QUANTITY RECEIVED:**No. Gallons: _____ No. Drums: 3 No. Tons: _____**TREATMENT LOCATION:**

Receiving Tank Number: _____ Start: _____ End: _____ Net Gallons: _____

LAB RESULTS: 0003-2080ETotal Halogens: 22mFlash Point: 71105

Sp. Gravity: _____

PCB's: 21m

pH: _____

BS&W: _____

% Oil: 1%

% Cuff: _____

% Water: 99%

% Solids: _____

REJECTION:

Reason: _____

BILLING INFORMATION:Unit Price: 150.00**CERTIFICATION:**Driver's Company: EIK TRANSPORTATIONSignature: Ronald Koenig

ALLIED WASTE SERVICES, INC.

2163 MERRICK AVE., MERRICK, NY 11566 • TEL: 1-800-969-DIRT • FAX: 516-867-6480

NON-HAZARDOUS MATERIAL MANIFEST

Log Number

GENERATOR

Generator Name USEPA REGION II Shipping Location DOVER MUNICIPAL WASTE #41
Address 290 BROADWAY, 19TH FL. Address DOVER, NJ
NEW YORK NY 10007
Phone No. 201 529-4700 Phone No. _____

Approval Number	Description of Material	Codes	Gross Weight	Tare Weight	Net Weight (Tons)
	NON HAZARDOUS ~~WASTE~~ WATER IN DRUMS 107154				

I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law, is not a DOT hazardous substance as defined by 49 CFR Part 172 or any applicable state law, has been fully and accurately described above, classified, packaged and is in proper condition for transportation according to applicable regulations.

Joe Capone Generator Authorized Agent Name [Signature] Signature [Signature] Shipment Date

TRANSPORTER

Transporter Name ELV TRANSPORT Driver Name (Print) MARK WHITEHOUSE
Address 225 WARREN Vehicle License No./State AB85990 PA
READING PA Truck Number 205
State Permit # PA 240

I hereby certify that the above named material was picked up at the generator site listed above.

I hereby certify that the above named material was delivered without incident to the destination listed below.

[Signature] Driver Signature 2 25 00 Shipment Date [Signature] Driver Signature [Signature] Delivery Date

DESTINATION

Site Name ELDRIDGE INC Phone No. 610 436-4749
898 FERNHILL PD
Address W. CHESTER, PA 19380 State Permit # WMGR035

I hereby certify that the above named material has been accepted and to the best of my knowledge the foregoing is true and accurate.

Steve MacCallister
Name of Authorized Agent

[Signature]
Signature

CONTRACTOR

28 FEB 00
Receipt Date

100270

898 Fernhill Road • West Chester, PA 19380-4256

Phone: (610) 436-4749

FAX: (610) 430-6948

Bill of Lading No.

Account Code

Manifest No.

P.O.#

DOVER

Protecting Our Environment



SHIPPER USEPA REGION II
ADDRESS 290 BROADWAY, 19TH FLOOR NEW YORK, NY 10007 PHONE (000) 000-0000

(I certify that the material(s) described below is properly classified, packaged, marked and labeled and is in proper condition to be transported under the applicable regulations of the Environmental Protection Agency and the Department of Transportation. Payment to the contractor for waste removal does not constitute payment to the carrier and if the contractor does not pay the carrier, the generator is obligated to pay the agreed rate offered to the contractor.)

AUTHORIZED SIGNATURE [Signature] PRINTED NAME JOE C. ALLEN DATE 2/22/00

CARRIER Eldredge, Inc.
898 Fernhill Road West Chester, PA 19380 (610) 436-4749

ADDRESS [Signature] PRINTED NAME [Signature] DATE 2/22/00

SIGNATURE [Signature] PRINTED NAME [Signature] DATE 2/22/00

FACILITY Eldredge, Inc.

ADDRESS 898 Fern Hill Road West Chester, PA 19380 PHONE (610) 436-4749

THIS IS TO CERTIFY RECEIPT OF THE MATERIAL

SIGNATURE [Signature] PRINTED NAME [Signature] DATE [Signature]

U.S. DOT DESCRIPTION (including Proper Shipping Name, Hazard Class and LD. Number)	FORM	WEIGHT OF VOLUME	NO. AND T. CONTAIN
a. NON-RCRA/NON DOT REGULATED LIQUIDS			60
b. NON-RCRA/NON DOT REGULATED SOLIDS			41
10-513		2400	005
11600			012

DRIVER NOTE: MUST TAKE AND WEAR FULL SAFETY GEAR WHEN LOADING AND UNLOADING

Special Handling Instructions and Additional Information

In Case of Emergency call (610) 436-4749 (24-hours), Eldredge, Inc.*
Shipment will be Recycled at Eldredge, Inc.

USEPA REGION II
DOVER MUNICIPAL WELL
DOVER NJ 07

DATE	UNIT	START TRIP	START LOCATION	ARRIVE GENERATOR	DEPART GENERATOR	ARRIVE DISPOSAL	DEPART DISPOSAL	END TRIP	END LOCATION	NO CHARGE HOURS	TOTAL HOUR
2/22	SLT		10:00	12:00	13:00	17:00	17:30				

CENTER	CATALOG #	DESCRIPTION	BOTH	INVOICE	SALES INL

DATE COMPLETED

TOTAL MILES

TOTAL FUEL

TOTAL OIL OILS

TOTAL EXPENSE

PAY HOURS

PAY MILEAGE

PAY LOAD

PAY PERIOD

OFFICE USE

APPROVAL

DATE

DATE RECD

SYSTEM ENTRY

DATE

ORIGINAL FUEL SLIPS & TOLL RECEIPTS MUST BE ATTACHED
ALL RECEIPTS MUST INCLUDE PRO NO. DRIVER NAME & TRUCK NO.

100271

State of New Jersey
Department of Environmental Protection
Hazardous Waste Regulation Division
Hazardous Waste
P.O. Box 427, Trenton, NJ 08646-0427

NJA 3060843

Generator's Name: **Frederic Carlage, Inc.**

Generator's Phone: ()

Generator's Address:

Frederic Carlage, Inc.

US EPA ID Number:

US EPA ID Number:

Generator's Name and Site Address:

Cycle Chen, Inc.
217 S. First Street
Elizabeth, NJ 07208

US EPA ID Number:

Transporter's Name:

Carrier's Name:

Facility's Name:

11. US DOT Description (Including Proper Shipping Name, Hazard Class or Division, ID Number and Packing Group)

12. Containers

No.

Type

Total Quantity

a. **NO-HAZARDOUS WASTE SOLID, N.O.S.**
Class 9, HAZ999, PG III (DOTS, D039)

019 09000 2 10 10 1 21

13. Additional Description for Materials Listed Above
Solid w/ trace benzene & PMS 1002
Class 9, PG III

14. Handling Instructions (as listed on DOT label)

15. Special Handling Instructions and Additional Information

24 Hour Emergency # 732-016-1000

Plate # AWH 8230 NJ

Alt P.O. # 752-70

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by name, quantity, hazard classification, and are in all respects in proper condition for transport by highway according to applicable regulations and DOT and DOT regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated, the use of less hazardous materials, to be environmentally preferable and that I have selected the practicable method of treatment, storage, or disposal currently available and most appropriate to the waste and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to reduce the waste generated and select the best waste management method that is available to me and that I can afford.

Printed Name:

Signature:

17. Transporter's Acknowledgment of Receipt of Materials

Printed Name:

Signature:

18. Transporter's Acknowledgment of Receipt of Materials

Printed Name:

Signature:

AWT Environmental Services, Inc.

P.O. Box 128, Sayreville, NJ 08872
(732) 613-1660 Fax (732) 613-1536

Material Profile Sheet

Product Code: _____

Generator No: _____

A. GENERATOR INFORMATION

GENERATOR NAME USEPA REGION II
MAILING ADDRESS 290 BRADWAY
NEW YORK CITY
GENERATOR CONTACT _____
GENERATOR PHONE # _____
SITE ADDRESS DOVER WELLS DR, DOVER, NJ
NAME OF WASTE DRILL CUTTINGS w/ BITUMENS & PCE

GENERATOR USEPA ID NY0980654/21

AWT COORDINATOR P. POSTERINO

PROJECT # 7432

WASTE ID # _____

PROCESS GENERATING WASTE _____

DRILLING

B. PHYSICAL CHARACTERISTICS OF WASTE

Color/Physical Description: BROWN

STRONG INCIDENTAL ODOR PRESENT

YES ☒ NO ☒

WASTEWATER
NONWASTEWATER

SPECIFIC
GRAVITY: _____

PHYSICAL STATE @ 70°F

SOLID ☒ SINGLE PHASE
LIQUID ☐ BI-LAYERED
POWDER ☐ MULTI-LAYERED
SEMI SOLID ☐ SLUDGE

FLASHPOINT
- < 70° F
- > 200° F
- 70° F - 100° F
- 101° F - 141° F
- 142° F - 200° F
- > 200° F
- NO FLASH
- EXACT

Ignitable (if solid) ☒ Yes ☒ No
Closed Cup ☐ Open Cup ☒

LIQUID/SOLID/SLUDGE
% Sludge
% Suspended Solids
% Solid/Debris
% Free Liquids

pH
- < 2.0
- 2.0-9
- 9.0-12.4
- > 12.50
- EXACT

Dumpable? ☒ Yes ☐ No
Pumpable? ☐ Yes ☒ No
Pourable? ☐ Yes ☒ No

C. CHEMICAL COMPOSITION Is MSDS Attached? Yes No
provided prior Is Analysis Attached? Yes No

	RANGE MINIMUM	RANGE MAXIMUM
<u>SOIL W/ TRACE BENZENE</u>		
<u>& PCE</u>		<u>100%</u>

D. REGULATORY INFORMATION

USEPA HAZARDOUS WASTE? ☒ YES ☐ NO

USEPA CODE(S): SE, D018, D039

APPLICABLE SUBCATEGORIES: _____

STATE HAZARDOUS WASTE? ☒ YES ☐ NO

STATE CODE(S): SE

D.O.T. HAZARDOUS WASTE? ☐ YES ☐ NO

PROPER SHIPPING NAME: HAZARDOUS WASTE SOLID, NEW

CLASS: 9 I.D. NO: NA 3077 P.G. II R.Q.: _____

E. SHIPPING INFORMATION/SHIPMENT METHOD:

BULK LIQUID
BULK SOLID
DUMP TRAILER
ROLL-OFF
DRUM SIZE
PALLETS
CUBIC YARD BOX

ANTICIPATED VOLUME: _____

QUANTITY: 28 x 55

UNITS: _____

PRICE: _____

FREQUENCY: _____

F. SPECIAL HANDLING CONSIDERATIONS

CERCLA FACILITIES _____

NO LANDFILL _____

PROJECT CODE _____

OTHER _____

INCINERATE ONLY _____

CCT SALES CODE _____

G. TRANSPORTATION ARRANGEMENTS

LTL PICK-UP ☒

DEDICATED LOAD ☐

AST/FCF

H. OTHER HAZARDOUS CHARACTERISTICS

INDICATE IF THE WASTE IS:

RCRA REACTIVE
WATER REACTIVE
RADIOACTIVE
SUBJECT TO SUBPART FF
BENZENE REGULATIONS
ETIOLOGICAL
TSCA REGULATED
OXIDIZING MATERIAL
PYROPHORIC
EXPLOSIVE/SHOCK SENSITIVE
NONE OF THE ABOVE

Indicate If This Waste Contains Any Of The Following:

	None	or Less Than	or Actual
PCB's	☒	< 50PPM	PPM
Cyanides	☒	< 250PPM	PPM
Phenolics	☒	< 50 PPM	PPM
Sulfides	☒	< 500 PPM	PPM
VOC's	☒	< 500 PPM	PPM

Is this waste characteristically hazardous for metals or organics (EPA Waste Codes D004-D043)? ☒ Yes ☐ No. If yes, please list the constituents and concentrations in Section D.

Does this waste contain underlying hazardous constituents as defined in 40 CFR 268 (2)(1) at concentrations exceeding the UTS treatment standards? ☒ Yes ☐ No. If yes, please list constituents and concentrations in Section D.

GENERATOR CERTIFICATION: I hereby certify that all information submitted in this and all attached documents is complete, contains true and accurate descriptions and is representative of the waste material, and that all relevant information regarding known or suspected hazards in the possession of the generator has been disclosed. If the TSD discovers, after having taken delivery of the waste, that any waste does not conform to the identification and description on this MPS then the TSD shall provide notice of such condition to the Generator and coordinate the return of the nonconforming waste to the point of origin as set forth on the manifest or to such other locations designated in writing by the Generator. Generator agrees to reimburse AWT for all handling, packaging, clean-up and transportation costs or charges, damage to equipment, and costs associated with lost time incurred by the TSD during the receipt, handling, temporary storage and return of such nonconforming waste to point of origin or to such other location designated by Generator. I hereby authorize the TSD to amend or correct any information on the MPS with the full understanding that any amendment or correction is performed and will be conducted as such to meet any approval.

AUTHORIZED SIGNATURE _____

TITLE: Field Tech

MPT
Asst. for USEPA REG II

DATE 10/4/01

100274

White = TSD Facility Yellow = Customer Pink = AWT Environmental Services, Inc.

AWT Environmental Services, Inc.

P.O. Box 128, Sayreville, NJ 08

732-613-1660, Fax (732) 613-1

LAND DISPOSAL RESTRICTION NOTIFICATION AND CERTIFICATION FORM

Generator Name:

USEPA REGION II

Generator EPA ID #:

NJ012076-4191

Manifest #:

NJA 30600542

This land disposal restriction (LDR) notification must be submitted with the initial shipment of all new waste streams. Due to revised LDR notification requirements effective after August 23, 1998, previously approved waste streams will require re-notification on this form with the first shipment after that date. Subsequent notification is not required unless the waste stream changes.

(1) WASTE STREAM INFORMATION

Box A: Check this box if this LDR certification has been supplied with a previous shipment. Additional information and certification is not required on this form.

Box B: Indicate if waste stream is a wastewater (WW) or non-wastewater (NWW) (aqueous waste streams containing < 1% total organic carbon (TOC) and < 1% total suspended solids (TSS) are wastewaters. All other streams are non-wastewaters).

Box C: List all EPA waste codes and subcategory reference letters (if applicable). Alternatively, attach or reference additional pages (e.g. profiles or lab pack slips) containing required information.

	A	B	C
Line #	Previously shipped LDR on file	NWW/WW	EPA Waste Codes and subcategory reference letter (if applicable)
A		NWW	D015, D039
B			
C			
D			

Subcategory Reference Letters (EPA codes not listed here do not have subcategories)

D001	A	Ignitable characteristic wastes, except high TOC ignitable liquids subcategory
D001	B	High TOC (> 10%) ignitable liquid subcategory
D003	A	Reactive sulfide subcategory
D003	B	Reactive cyanide subcategory
D003	C	Water reactive subcategory
D003	D	Other reactive subcategory
D006	A	Cadmium non-battery subcategory
D006	B	Cadmium containing batteries subcategory
D008	A	Lead non-battery subcategory
D008	B	Lead acid batteries subcategory
D009	A	High mercury organic subcategory (> 260 PPM Total Mercury)
D009	B	High mercury inorganic subcategory (> 260 PPM Total Mercury)
D009	C	Low mercury subcategory (< 260 PPM Total Mercury)
D009	D	Mercury wastewater subcategory

(2) SPENT SOLVENT WASTE CONSTITUENTS

Circle applicable waste code(s) and constituent(s) for each manifest line item containing EPA spent solvent waste codes F001-F005.

A B C D _____ F001

A B C D _____ F002

A B C D _____ F003

A B C D _____ F004

A B C D _____ F005

A B C D _____ -acetone
A B C D _____ -benzene
A B C D _____ -n-butyl alcohol
A B C D _____ -iso-butyl alcohol
A B C D _____ -carbon disulfide
A B C D _____ -carbon tetrachloride
A B C D _____ -chlorobenzene
A B C D _____ -m-cresol
A B C D _____ -o-cresol
A B C D _____ -p-cresol
A B C D _____ -cresylic acid
A B C D _____ -cyclohexanone
A B C D _____ -o-dichlorobenzene
A B C D _____ -ethyl acetate
A B C D _____ -ethyl benzene

A B C D _____ -ethyl ether
A B C D _____ -methanol
A B C D _____ -methylene chloride
A B C D _____ -methyl ethyl ketone
A B C D _____ -methyl isobutyl ketone
A B C D _____ -nitrobenzene
A B C D _____ -pyridine
A B C D _____ -tetrachloroethylene
A B C D _____ -toluene
A B C D _____ -1,1,1-trichloroethane
A B C D _____ -1,1,2-trichloroethane
A B C D _____ -trichloroethylene
A B C D _____ -trichloromono-fluoromethane
A B C D _____ -1,1,2-trichloro-1,2,2-trifluoroethane
A B C D _____ -xylenes

(3) UNDERLYING HAZARDOUS CONSTITUENTS

For characteristically hazardous waste streams (EPA codes D001-D043), please list all underlying hazardous constituents as defined in 40 CFR 268.2(i) that are present at concentrations exceeding the universal treatment standards listed in 40 CFR 268.48 (F001-F005 constituents identified in section (2) and specific constituents for EP, U-, P-, and D004-D043 codes listed in Section (1) do not need to be listed in this section).

A. _____
B. _____
C. _____
D. _____

_____ None Present
_____ None Present
_____ None Present
_____ None Present

HOW MUST THESE WASTE STREAMS BE MANAGED?

For each manifest line item, circle applicable treatment/requirement. For contaminated soil, circle applicable choice as indicated.

A B C D _____ This waste is non-hazardous per 40 CFR 261, and is not restricted from land disposal under 40 CFR 268 subpart D.

A B C D _____ This is an EPA hazardous waste that is not a contaminated soil or hazardous debris. Waste must be treated to the appropriate treatment standard set forth in 40 CFR subpart D prior to land disposal.

A B C D _____ This is a hazardous debris and is subject to the alternative treatment standards of 40 CFR 268.45.

(A B C D) A This is a hazardous waste contaminated soil. This contaminated soil does/does not ^(circle one) contain listed hazardous wastes and does/does not ^(circle one) exhibit a characteristic of hazardous waste and is subject to complies with ^(circle one) the soil treatment standards as provided by 268.49(c) or the universal treatment standards.

A B C D _____ This is an EPA hazardous waste that meets all applicable treatment standards set forth in 40 CFR 268 subpart D, and can be landfilled without further treatment. I certify under penalty of law that I have personally examined and am familiar with the waste through analysis and testing or thorough knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR Part 268 Subpart D and all applicable prohibitions set forth in 40 CFR 268.32 or RCRA Section 3004(d). I believe that the information I submitted is true, accurate and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

(5) CERTIFICATION

I certify that all information on this and all associated documents is complete and accurate to the best of my knowledge.

Signature: Thomas Robinson

Printed Name: THOMAS ROBINSON

Title: Field Tech Malcolm Prince

Date: 10/4/01

09/12/2001

Malcolm Pirnie, Inc.
17-17 Route 208 North
2nd Floor
Fair Lawn, NJ 07410

Attention: Mr. John Ifkovitz

**SEVERN
TRENT
SERVICES**

STL Edison
777 New Durham Road
Edison, NJ 08817

Tel: 732-549-3900
Fax: 732-549-3679
www.stl-inc.com

Laboratory Results
Job No. O033 - Dover New Jersey

Dear Mr. Ifkovitz:

Enclosed are the results you requested for the following sample(s) received at our laboratory on August 23, 2001.

<u>Lab No.</u>	<u>Client ID</u>	<u>Analysis Required</u>
296288	HB-01	PP VOA
296426	HB-01-Soil	PP VOA TCLP VOA

An invoice for our services is also enclosed. If you have any questions please contact your Project Manager, Dan Glenn, at (732) 549-3900.

Very Truly Yours,


Michael J. Urban
Laboratory Director



STL Edison is a part of Severn Trent Laboratories, Inc.

100277

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Analytical Results Summary

100279

Client ID: HB-01
Site: Dover New Jersey

Lab Sample No: 296288
Lab Job No: 0033

Date Sampled: 08/23/01
Date Received: 08/23/01
Date Analyzed: 08/26/01
GC Column: DB624
Instrument ID: VOAMS7.i
Lab File ID: v33948.d

Matrix: WATER
Level: LOW
Purge Volume: 5.0 ml
Dilution Factor: 1.0

VOLATILE ORGANICS - GC/MS
METHOD 624

<u>Parameter</u>	<u>Analytical Result</u> <u>Units: ug/l</u>	<u>Method Detection</u> <u>Limit</u> <u>Units: ug/l</u>
Chloromethane	ND	0.3
Bromomethane	ND	0.2
Vinyl Chloride	2.5	0.2
Chloroethane	ND	0.3
Methylene Chloride	ND	1.0
Trichlorofluoromethane	ND	0.4
1,1-Dichloroethene	ND	0.2
1,1-Dichloroethane	ND	0.2
trans-1,2-Dichloroethene	ND	0.2
cis-1,2-Dichloroethene	9.8	0.2
Chloroform	ND	0.2
1,2-Dichloroethane	ND	0.2
1,1,1-Trichloroethane	ND	0.3
Carbon Tetrachloride	ND	0.2
Bromodichloromethane	ND	0.2
1,2-Dichloropropane	ND	0.2
cis-1,3-Dichloropropene	ND	0.2
Trichloroethene	1.7	0.3
Dibromochloromethane	ND	0.1
1,1,2-Trichloroethane	ND	0.2
Benzene	ND	0.2
trans-1,3-Dichloropropene	ND	0.2
2-Chloroethyl Vinyl Ether	ND	0.4
Bromoform	ND	0.2
Tetrachloroethene	11	0.3
1,1,2,2-Tetrachloroethane	ND	0.1
Toluene	2.1	0.2
Chlorobenzene	ND	0.2
Ethylbenzene	ND	0.2
Xylene (Total)	ND	0.2

Client ID: HB-01-Soil
Site: Dover New Jersey

Lab Sample No: 296426
Lab Job No: 0033

Date Sampled: 08/23/01
Date Received: 08/23/01
Date Prepped: 08/24/01
Date Analyzed: 08/27/01
Lab File ID: d22110.d

Leachate Volume: 5.0 ml
Dilution Factor: 1.0
GC Column: DB624
Instrument ID: VOAMS4.i

TOXICITY CHARACTERISTIC LEACHING PROCEDURE

VOLATILE ORGANICS - GC/MS

<u>Parameter</u>	<u>Analytical Result Units: mg/l</u>	<u>Regulatory Level Units: mg/l</u>	<u>Quantitation Limit Units: mg/l</u>
Vinyl Chloride	ND	0.2	0.0050
1,1-Dichloroethene	ND	0.7	0.0020
Chloroform	ND	6.0	0.0050
1,2-Dichloroethane	ND	0.5	0.0020
Methyl Ethyl Ketone	ND	200	0.0050
Carbon Tetrachloride	ND	0.5	0.0020
Trichloroethene	ND	0.5	0.0010
Benzene	0.0030	0.5	0.0010
Tetrachloroethene	ND	0.7	0.0010
Chlorobenzene	ND	100	0.0050

Client ID: HB-01-Soil
Site: Dover New Jersey

Lab Sample No: 296426
Lab Job No: 0033

Date Sampled: 08/23/01
Date Received: 08/23/01
Date Analyzed: 08/27/01
GC Column: DB624
Instrument ID: VOAMS8.i
Lab File ID: j20787.d

Matrix: SOIL
Level: LOW
Sample Weight: 5.0 g
Purge Volume: 5.0 ml
% Moisture: 43

VOLATILE ORGANICS - GC/MS
METHOD 8260B

<u>Parameter</u>	<u>Analytical Results</u>		<u>Quantitation</u>
	<u>Units: ug/kg</u> <u>(Dry Weight)</u>		<u>Limit</u> <u>Units: ug/kg</u>
Chloromethane	ND		8.8
Bromomethane	ND		8.8
Vinyl Chloride	1.9J		8.8
Chloroethane	ND		8.8
Methylene Chloride	1.0JB		5.2
Trichlorofluoromethane	ND		8.8
1,1-Dichloroethene	ND		3.5
1,1-Dichloroethane	ND		8.8
trans-1,2-Dichloroethene	ND		8.8
cis-1,2-Dichloroethene	10		8.8
Chloroform	ND		8.8
1,2-Dichloroethane	ND		3.5
1,1,1-Trichloroethane	ND		8.8
Carbon Tetrachloride	ND		3.5
Bromodichloromethane	ND		1.8
1,2-Dichloropropane	ND		1.8
cis-1,3-Dichloropropene	ND		8.8
Trichloroethene	ND		1.8
Dibromochloromethane	ND		8.8
1,1,2-Trichloroethane	ND		5.2
Benzene	ND		1.8
trans-1,3-Dichloropropene	ND		8.8
2-Chloroethyl Vinyl Ether	ND		8.8
Bromoform	ND		7.0
Tetrachloroethene	9.5		1.8
1,1,2,2-Tetrachloroethane	ND		1.8
Toluene	ND		8.8
Chlorobenzene	ND		8.8
Ethylbenzene	ND		7.0
Xylene (Total)	ND		8.8

General Information

Chain of Custody

100283

Name (for report and invoice) JOHN TERVITS		Samplers Name (Printed) I. CRIGINE / Z. MAIN		Site/Project Identification DOVER	
Company Malcolm Pirnie, Inc.		P.O. # 0285780		State (Location of site): NJ: ☒ NY: ☐ Other: ☐	
Address #17-17 12th 208 N.		Analyte Turnaround Time Standard ☐ Rush Charges Authorized For: 2 Week ☐ 1 Week ☐ Other ☒ 3 days		ANALYSIS REQUESTED (ENTER 'X' BELOW TO INDICATE REQUEST)	
City FAIR LAWN		State NJ		LAB USE ONLY Project No: Job No: 0033 Sample Numbers	
Phone 201-797-7400		Fax 201-398-4379			
Sample Identification	Date	Time	Matrix	No. of Cont.	
HB-01	8/23/01	1200	Aq/sol	7.5	X X X X
HB-01 - SOIL	8/23/01	1200	SOIL	4.2 mm	X X
				8-29-01	
Preservation Used: 1 = ICE, 2 = HCl, 3 = H ₂ SO ₄ , 4 = HNO ₃ , 5 = NaOH					Soil:
6 = Other _____, 7 = Other _____					Water:

Special Instructions

Relinquished by	Company	Date / Time	Received by	Company
1) ~~Ken Chaloka~~	MPI	8/23/01 4:00 PM	1) K. CHALOKA	STL
2) K. CHALOKA	Company Edison Ken Chaloka	8/23/01 4:00 PM	2) UPandya	STL
3)	Company	Date / Time	Received by	Company
4)	Company	Date / Time	Received by	Company

Laboratory Certifications: New Jersey (12028), New York (11452), Pennsylvania (68-522), Connecticut (PH-0200), Rhode Island (132).

13-01

100284

Laboratory Chronicles

100285

INTERNAL CUSTODY RECORD
AND
LABORATORY CHRONICLE
STL Edison

777 New Durham Road, Edison, New Jersey
08817

Job No: 0033

Site: Dover New Jersey

Client: Malcolm Pirnie, Inc.

VOAMS

LEACHATE - 8260B

Lab Sample ID	Date Sampled	Date Received	Preparation Date	Technician's Name	Analysis Date	Analyst's Name	QA Batch
296426	8/23/2001	8/23/2001			8/27/01	C2	5971

SOLID - 8260B

Lab Sample ID	Date Sampled	Date Received	Preparation Date	Technician's Name	Analysis Date	Analyst's Name	QA Batch
296426	8/23/2001	8/23/2001			8/26/01	LD	3020

WATER - 624

Lab Sample ID	Date Sampled	Date Received	Preparation Date	Technician's Name	Analysis Date	Analyst's Name	QA Batch
296288	8/23/2001	8/23/2001			8/26/01	DRL	5945

100286

**INTERNAL CUSTODY RECORD
AND
LABORATORY CHRONICLE
STL Edison**

**777 New Durham Road, Edison, New Jersey
08817**

Job No: 0033

Site: Dover New Jersey

Client: Malcolm Pirnie, Inc.

WET CHEM

ZHE PREP

SOLID

Lab Sample ID	Date Sampled	Date Received	Preparation Date	Technician's Name	Analysis Date	Analyst's Name	QA Batch
296426	8/23/2001	8/23/2001					

100287

0033

Methodology Review

100288

Analytical Methodology Summary

Volatile Organics:

Unless otherwise specified, water samples are analyzed for volatile organics by purge and trap GC/MS as specified in EPA Method 624. Drinking water samples are analyzed by EPA Method 524.2. Solid samples are analyzed for volatile organics as specified in the EPA publication "Test Methods for Evaluating Solid Waste" (SW-846, 3rd Edition) Method 8260B. Water samples are analyzed for volatile organics by purge and trap GC/PID and GC/ELCD as specified in EPA Methods 601 and 602. Solid samples are analyzed by GC/PID and GC/ELCD in accordance with SW-846, 3rd Edition Method 8021B.

Acid and Base/Neutral Extractable Organics:

Unless otherwise specified, water samples are analyzed for acid and/or base/neutral extractable organics by GC/MS in accordance with EPA Method 625. Solids are analyzed for acid and/or base/neutral extractable organics as specified in the EPA publication "Test Methods for Evaluating Solid Waste" (SW-846, 3rd Edition) Method 8270C.

GC/MS Nontarget Compound Analysis:

Analysis for nontarget compounds is conducted, upon request, in conjunction with GC/MS analyses by EPA Methods 624, 625, 8260B and 8270C. Nontarget compound analysis is conducted using a forward library search of the EPA/NIH/NBS mass spectral library of compounds at the greatest apparent concentration (10% or greater of the nearest internal standard) in each organic fraction (15 for volatile, 15 for base/neutrals and 10 for acid extractables).

Organochlorine Pesticides and PCBs:

Unless otherwise specified, water samples are analyzed for organochlorine pesticides and PCBs by dual column gas chromatography with electron capture detectors as specified in EPA Method 608. Solid samples are analyzed as specified in the EPA publication "Test Methods for Evaluating Solid Waste" (SW-846, 3rd Edition) Method 8081A for organochlorine pesticides and Method 8082 for PCBs.

Total Petroleum Hydrocarbons:

Water samples are analyzed for petroleum hydrocarbons by I.R. using EPA Method 418.1. Solid samples are prepared for analysis by soxhlet extraction consistent with the March 1990 N.J. DEP "Remedial Investigation Guide" Appendix A, page 52, and analyzed by U.S. EPA Method 418.1

Metals Analysis:

Metals analyses are performed by any of four techniques specified by a Method Code provided on each data report page, as follows:

- P - Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP)
- A - Flame Atomic Absorption
- F - Furnace Atomic Absorption
- CV - Manual Cold Vapor (Mercury)

Water samples are digested and analyzed using EPA methods provided in "Methods for Chemical Analysis of Water and Wastewater" (EPA 600/4-79-020). Solid samples are analyzed as specified in the EPA publication "Test Methods for Evaluating Solid Waste" (SW-846, 3rd Edition); samples are digested according to Method 3050B "Acid Digestion of Soil, Sediments and Sludges."

Specific method references for ICP analyses are water Method 200.7 and solid Method 6010B. Mercury analyses are conducted by the manual cold vapor technique specified by water Method 245.1 and solid Method 7471A. Other specific Atomic Absorption method references are as follows:

Element	Water Test Method		Solid Test Method	
	Flame	Furnace	Flame	Furnace
Aluminum	202.1	202.2	7020	--
Antimony	204.1	204.2	7040	7041
Arsenic	--	206.2	--	7060
Barium	208.1	--	7080	--
Beryllium	210.1	210.2	7090	7091
Cadmium	213.1	213.2	7130	7131
Calcium	215.1	--	7140	--
Chromium, Total	218.1	218.2	7190	7191
Chromium, (+6)	218.4	218.5	7197	7195
Cobalt	219.1	219.2	7200	7201
Copper	220.1	220.2	7210	--
Iron	236.1	236.2	7380	--
Lead	239.1	239.2	7420	7421
Magnesium	242.1	--	7450	--
Manganese	243.1	243.2	7460	--
Nickel	249.1	249.2	7520	--
Potassium	258.1	--	7610	--
Selenium	--	270.2	--	7740
Silver	272.1	272.2	7760	--
Sodium	273.1	--	7770	--
Tin	283.1	283.2	7870	--
Thallium	279.1	279.2	7840	7841
Vanadium	286.1	286.2	7910	7911
Zinc	289.1	289.2	7950	--

Cyanide:

Water samples are analyzed for cyanide using EPA Method 335.3. Cyanide is determined in solid samples as specified in the EPA Contract Laboratory Program IFB dated July 1988, revised February 1989.

Phenols:

Water samples are analyzed for total phenols using EPA Method 420.2. Total phenols are determined in solid samples by preparing the sample as outlined in the EPA Contract Laboratory Program IFB for cyanide, followed by a phenols determination using EPA Method 420.1.

Cleanup of Semivolatile Extracts:

Upon request Method 3611B Alumina Column Cleanup and/or Method 3650B Acid-Base Partition Cleanup are performed to improve detection limits by the removal of saturated hydrocarbon interferences.

Hazardous Waste Characteristics:

Samples for hazardous waste characteristics are analyzed as specified in the U.S. EPA publication "Test Methods for Evaluating Solid Waste" (SW-846, 3rd Edition). Specific method references are as follows:

- Ignitability - Method 1020A
- Corrosivity - Water pH Method 9040B
Soil pH Method 9045C
- Reactivity - Chapter 7, Section 7.3.3 and 7.3.4
respectively for hydrogen cyanide and
hydrogen sulfide release
- Toxicity - TCLP Method 1311

Miscellaneous Parameters:

Additional analyses performed on both aqueous and solid samples are in accordance with methods published in the following references:

- Test Methods for Evaluating Solid Wastes, SW-846 3rd Edition, November 1986.
- Standard Methods for the Examination of Water and Wastewater, 17th Edition.
- Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, 1979.

Data Reporting Qualifiers

100292

DATA REPORTING QUALIFIERS

- ND - The compound was not detected at the indicated concentration.
- J - Mass spectral data indicates the presence of a compound that meets the identification criteria. The result is less than the specified detection limit but greater than zero. The concentration given is an approximate value.
- B - The analyte was found in the laboratory blank as well as the sample. This indicates possible laboratory contamination of the environmental sample.
- P - For dual column analysis, the percent difference between the quantitated concentrations on the two columns is greater than 40%.
- * - For dual column analysis, the lowest quantitated concentration is being reported due to coeluting interference.

Non-Conformance Summary

100294

NON-CONFORMANCE SUMMARY

STL Edison Job Number: 0033

Volatile Organics Analysis:

All data conforms with method requirements ☒; or
Analysis was not requested ☐; or
Non-conformance for the specific samples listed is as follows:

See continuation page if checked (☐)

Base/Neutral and/or Acid Extractable Organics:

All data conforms with method requirements ☐; or
Analysis was not requested ☒; or
Non-conformance for the specific samples listed is as follows:

See continuation page if checked (☐)

PCBs and/or Organochlorine Pesticides:

All data conforms with method requirements ☐; or
Analysis was not requested ☒; or
Non-conformance for the specific samples listed is as follows:

See continuation page if checked (☐)

Non-conformance Summary, Page 2 of 2
STL Edison Job Number: 0033

Metals Analysis:

All data conforms with method requirements ____; or
Analysis was not requested ✓; or
Non-conformance for the specific samples listed is as follows:

See continuation page if checked ()

Total Petroleum Hydrocarbons:

All data conforms with method requirements ____; or
Analysis was not requested ✓; or
Non-conformance for the specific samples listed is as follows:

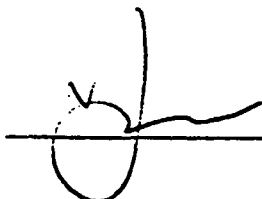
See continuation page if checked ()

General Chemistry/Disposal Parameters:

All data conforms with method requirements ____; or
Analysis was not requested ✓; or
Non-conformance for the specific samples listed is as follows:

See continuation page if checked ()

Signature of
Laboratory Manager:



Date:

9/12/01

100296

GC/MS Forms and Data (Volatiles)

Results Summary and Chromatograms

100297

Client ID: HB-01
Site: Dover New Jersey

Lab Sample No: 296288
Lab Job No: 0033

Date Sampled: 08/23/01
Date Received: 08/23/01
Date Analyzed: 08/26/01
GC Column: DB624
Instrument ID: VOAMS7.i
Lab File ID: v33948.d

Matrix: WATER
Level: LOW
Purge Volume: 5.0 ml
Dilution Factor: 1.0

VOLATILE ORGANICS - GC/MS
METHOD 624

<u>Parameter</u>	<u>Analytical Result</u> <u>Units: ug/l</u>	<u>Method Detection</u> <u>Limit</u> <u>Units: ug/l</u>
Chloromethane	ND	0.3
Bromomethane	ND	0.2
Vinyl Chloride	2.5	0.2
Chloroethane	ND	0.3
Methylene Chloride	ND	1.0
Trichlorofluoromethane	ND	0.4
1,1-Dichloroethene	ND	0.2
1,1-Dichloroethane	ND	0.2
trans-1,2-Dichloroethene	ND	0.2
cis-1,2-Dichloroethene	9.8	0.2
Chloroform	ND	0.2
1,2-Dichloroethane	ND	0.2
1,1,1-Trichloroethane	ND	0.3
Carbon Tetrachloride	ND	0.2
Bromodichloromethane	ND	0.2
1,2-Dichloropropane	ND	0.2
cis-1,3-Dichloropropene	ND	0.2
Trichloroethene	1.7	0.3
Dibromochloromethane	ND	0.1
1,1,2-Trichloroethane	ND	0.2
Benzene	ND	0.2
trans-1,3-Dichloropropene	ND	0.2
2-Chloroethyl Vinyl Ether	ND	0.4
Bromoform	ND	0.2
Tetrachloroethene	11	0.3
1,1,2,2-Tetrachloroethane	ND	0.1
Toluene	2.1	0.2
Chlorobenzene	ND	0.2
Ethylbenzene	ND	0.2
Xylene (Total)	ND	0.2

100298

Data File: /chem/VOAMS7.i/624/08-24-01/25aug01.b/v33948.d
Report Date: 26-Aug-2001 13:10

STL Edison

VOLATILE ORGANIC COMPOUND ANALYSIS

Data file : /chem/VOAMS7.i/624/08-24-01/25aug01.b/v33948.d
Lab Smp Id: 296288 Client Smp ID: HB-01
Inj Date : 26-AUG-2001 00:38
Operator : VOAMS 7 Inst ID: VOAMS7.i
Smp Info : 296288;
Misc Info : 0033;5963;;DRL
Comment :
Method : /chem/VOAMS7.i/624/08-24-01/25aug01.b/624 01.m
Meth Date : 25-Aug-2001 17:10 davidl Quant Type: ISTD
Cal Date : 24-AUG-2001 13:08 Cal File: v33878.d
Als bottle: 29
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: PPVOAv.sub
Target Version: 3.50

Concentration Formula: Amt * DF * 5/Vo * CpndVariable

Name	Value	Description
DF	1.00000	Dilution Factor
Vo	5.00000	Sample Volume

Cpnd Variable

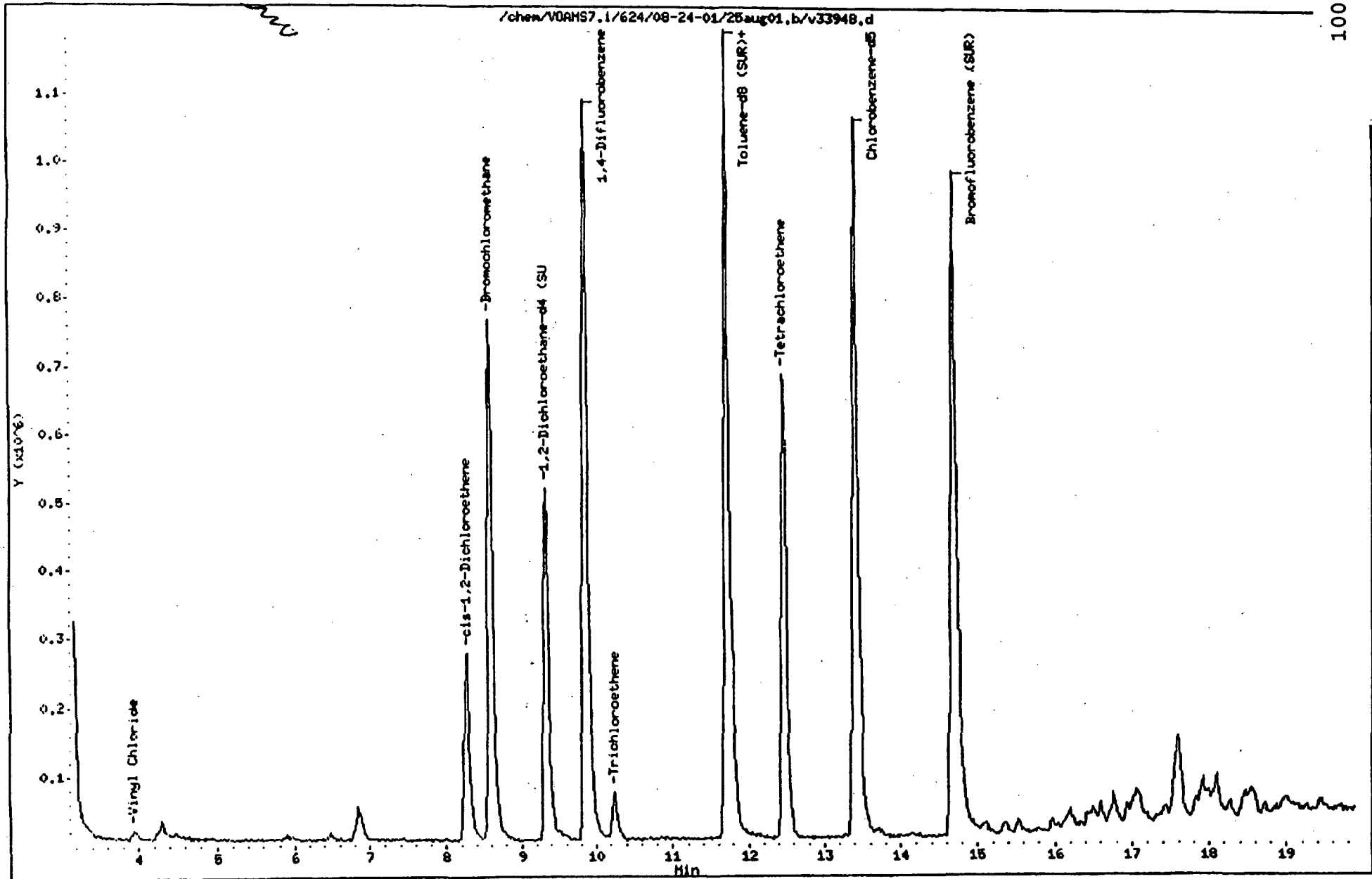
Local Compound Variable

Compounds	QUANT SIG	CONCENTRATIONS					
		MASS	RT	EXP RT	REL RT	RESPONSE	ON-COLUMN (ug/L)
4 Vinyl Chloride	62	3.948	3.933	(0.460)	38241	2.47541	2.5
13 cis-1,2-Dichloroethene	96	8.268	8.253	(0.964)	301333	9.81911	9.8
* 2 Bromochloromethane	128	8.580	8.565	(1.000)	528489	30.0000	
\$ 16 1,2-Dichloroethane-d4 (SUR)	104	9.322	9.307	(0.946)	132155	29.8409	30
* 19 1,4-Difluorobenzene	114	9.856	9.842	(1.000)	2075318	30.0000	
25 Trichloroethene	95	10.257	10.228	(1.041)	58266	1.73070	1.7
\$ 37 Toluene-d8 (SUR)	98	11.697	11.698	(0.873)	1944939	28.8520	29
38 Toluene	91	11.801	11.772	(0.880)	185749	2.12244	2.1
35 Tetrachloroethene	166	12.469	12.455	(0.930)	549168	11.4811	11
* 32 Chlorobenzene-d5	117	13.405	13.375	(1.000)	1713714	30.0000	
\$ 41 Bromofluorobenzene (SUR)	174	14.681	14.652	(1.095)	913615	27.0094	27

100299

Data File: /chem/VOAMS7.1/624/08-24-01/26aug01.b/v33948.d
Date : 26-AUG-2001 00:38
Client ID: HB-01
Sample Info: 296268;
Purge Volume: 5.0
Column phase: DB624

Instrument: VOAMS7.1
Operator: VOAMS 7
Column diameter: 0.63



100300

Data File: /chem/V04MS7.1/624/08-24-01/25aug01.b/v33948.d

Date : 26-AUG-2001 00:38

Client ID: HE-01

Instrument: V04MS7.i

Sample Info: 296288;

Purge Volume: 5.0

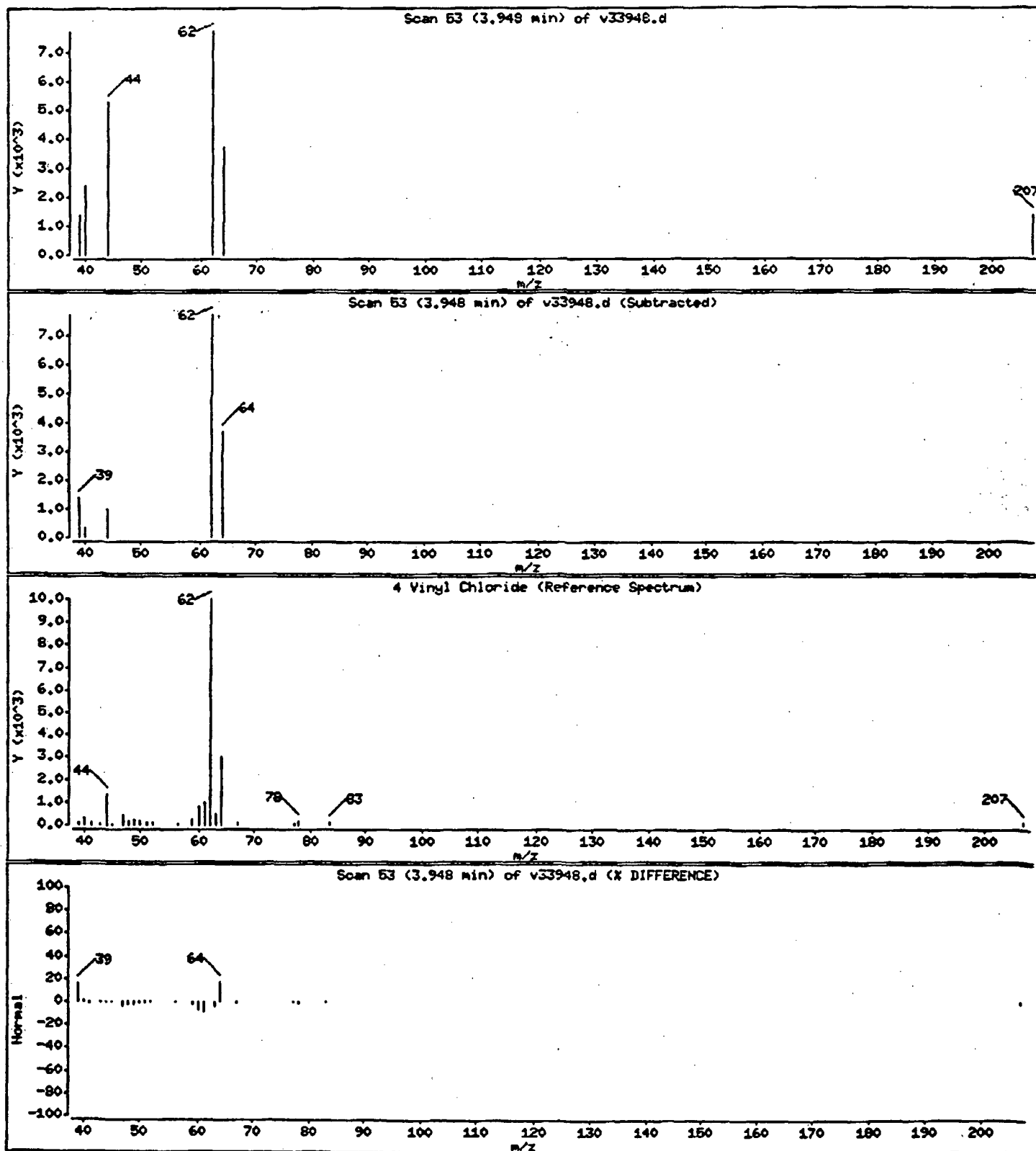
Operator: V04MS 7

Column phase: DB624

Column diameter: 0.53

4 Vinyl Chloride

Concentration: 2.5 ug/L



100301

Data File: /chem/VOAMS7.i/624/08-24-01/25aug01.b/v33948.d

Date : 26-AUG-2001 00:38

Client ID: MB-01

Instrument: VOAMS7.i

Sample Info: 296288;

Purge Volume: 5.0

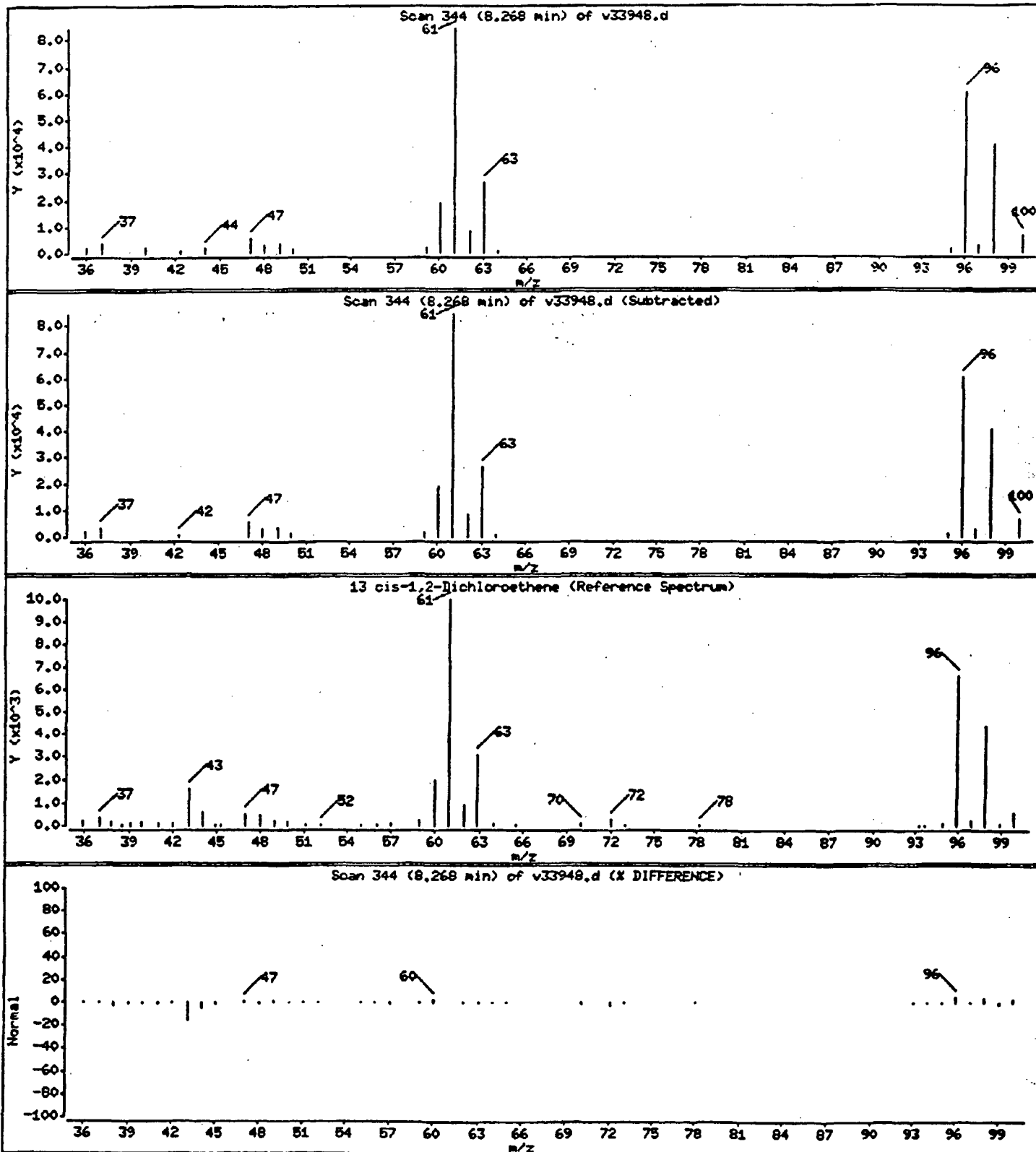
Operator: VOAMS 7

Column phase: DB624

Column diameter: 0.53

13 cis-1,2-Dichloroethene

Concentration: 9.8 ug/L



100302

Data File: /chem/VOAMS7.i/624/08-24-01/25aug01.b/v33948.d

Date : 26-AUG-2001 00:36

Client ID: HR-01

Instrument: VOAMS7.i

Sample Info: 236288;

Operator: VOAMS 7

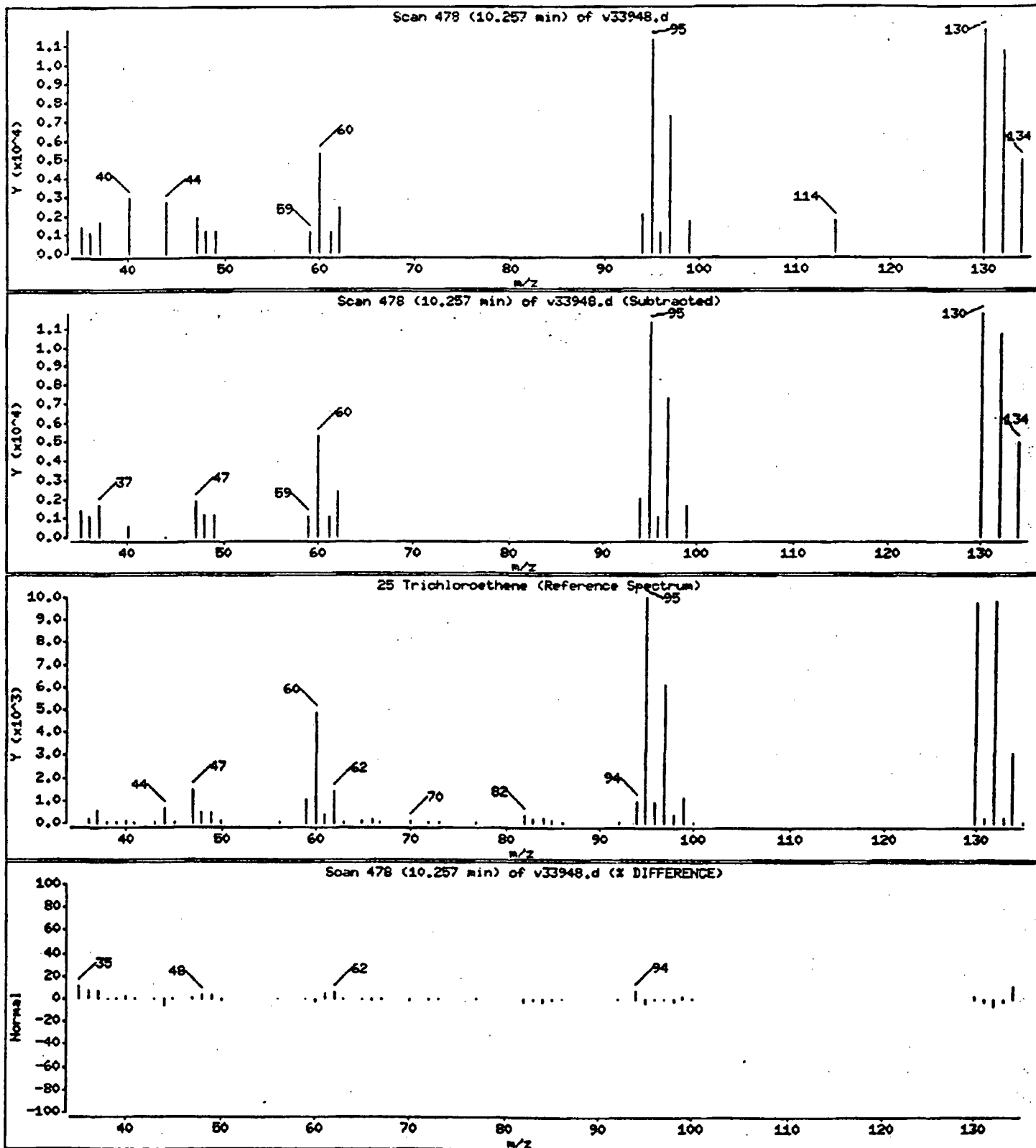
Purge Volume: 5.0

Column diameter: 0.53

Column phase: DB624

25 Trichloroethene

Concentration: 1.7 ug/L



100303

Data File: /chem/V00MS7.i/624/08-24-01/25aug01.b/v33948.d

Date: 26-AUG-2001 00:38

Client ID: HK-01

Instrument: V00MS7.i

Sample Info: 296288;

Purge Volume: 5.0

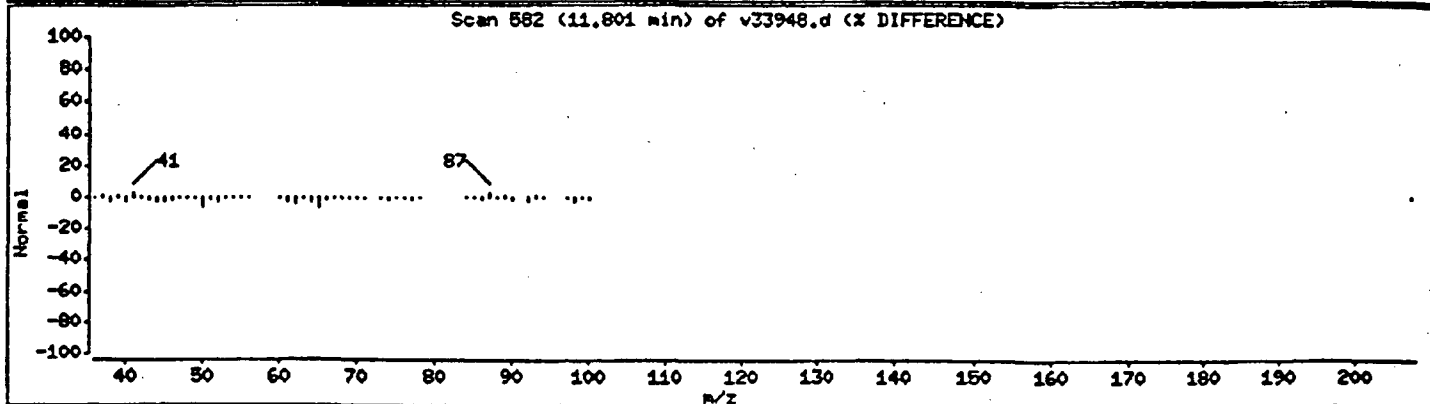
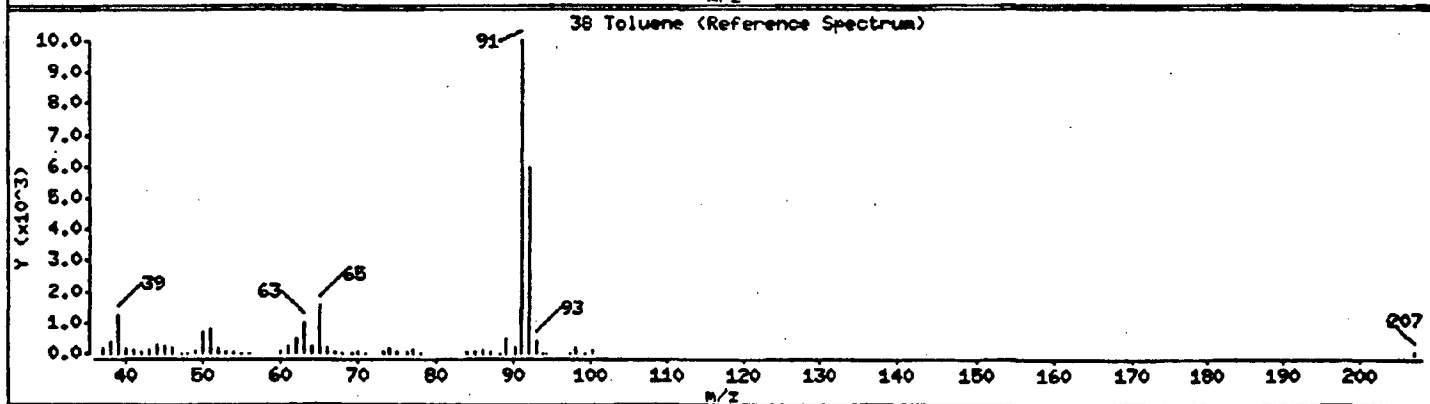
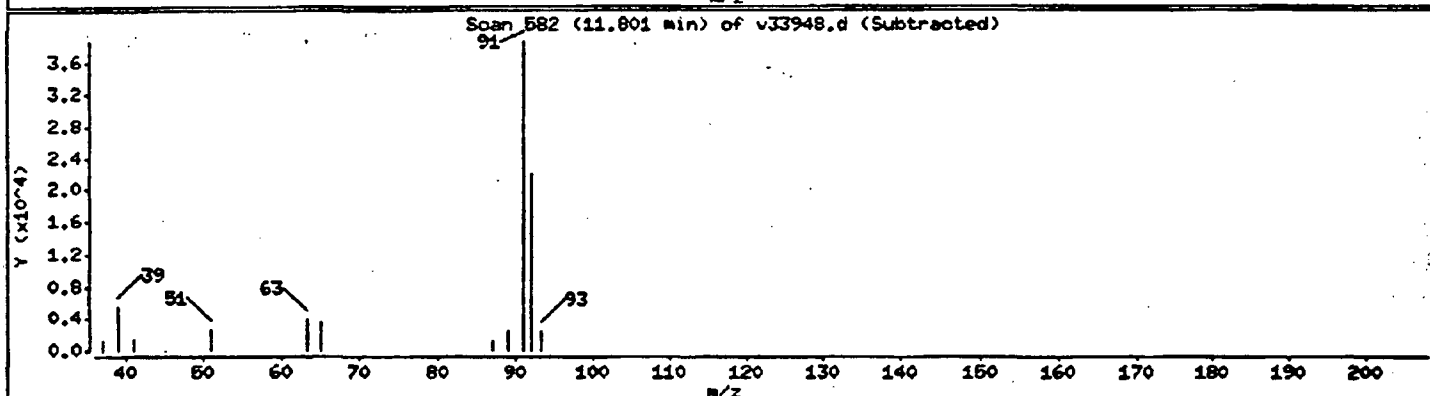
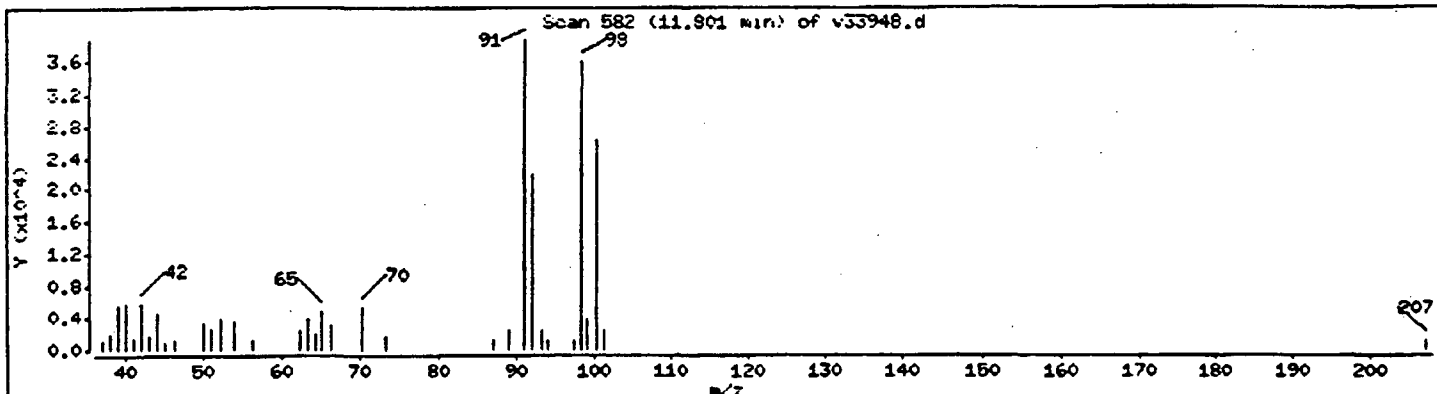
Operator: V00MS7

Column phase: DB624

Column diameter: 0.53

38 Toluene

Concentration: 2.1 ug/L



100304

Data File: /chem/VOAMS7.i/624/08-24-01/25aug01.b/v33948.d

Date : 26-AUG-2001 00:38

Client ID: HP-01

Instrument: VOAMS7.i

Sample Info: 296298;

Operator: VOAMS 7

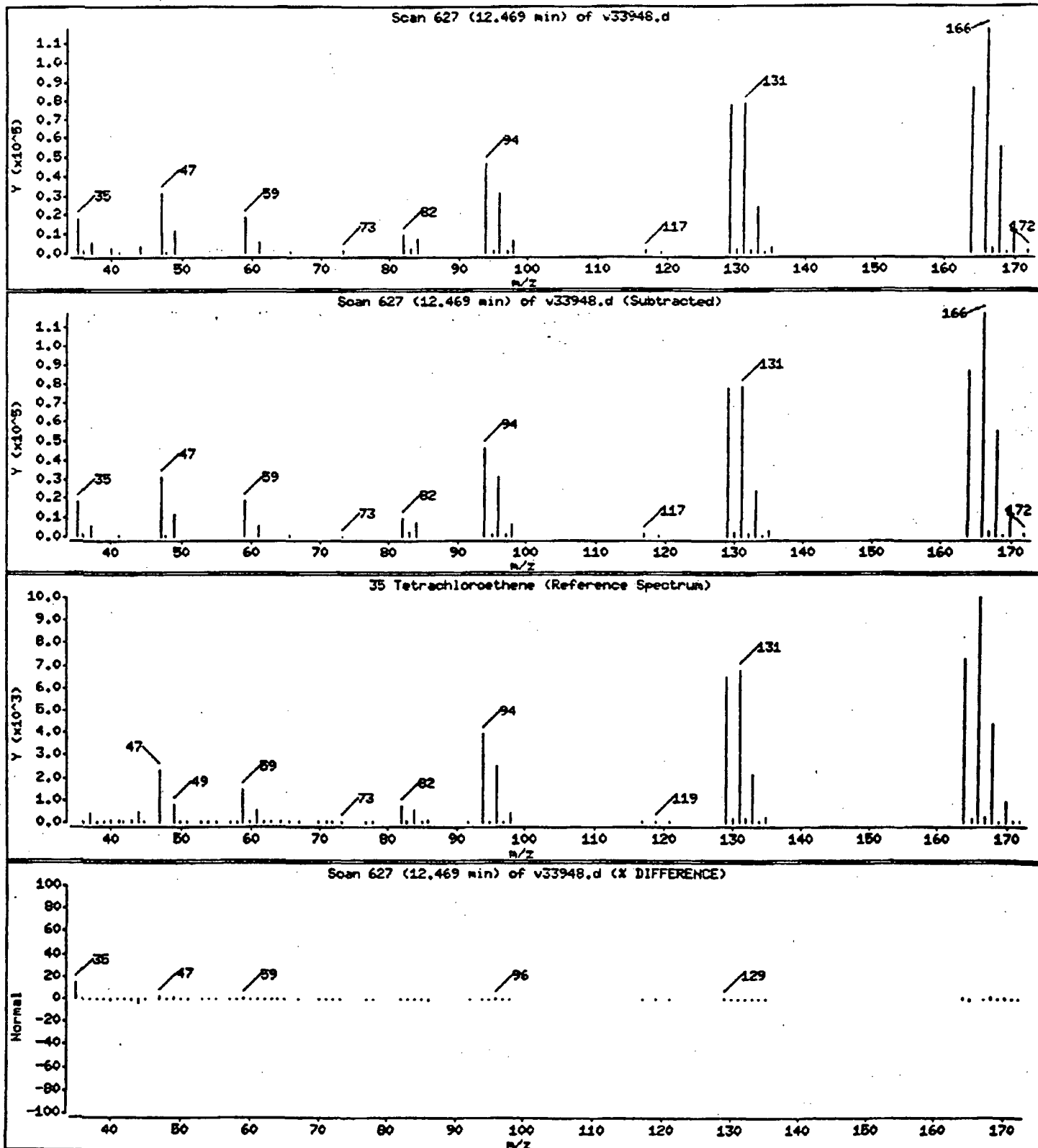
Purge Volume: 5.0

Column diameter: 0.53

Column phase: DB624

35 Tetrachloroethene

Concentration: 11 ug/L



100305

Client ID: HB-01-Soil
Site: Dover New Jersey

Lab Sample No: 296426
Lab Job No: 0033

Date Sampled: 08/23/01
Date Received: 08/23/01
Date Prepped: 08/24/01
Date Analyzed: 08/27/01
Lab File ID: d22110.d

Leachate Volume: 5.0 ml
Dilution Factor: 1.0
GC Column: DB624
Instrument ID: VOAMS4.i

TOXICITY CHARACTERISTIC LEACHING PROCEDURE

VOLATILE ORGANICS - GC/MS

<u>Parameter</u>	<u>Analytical Result</u> <u>Units: mg/l</u>	<u>Regulatory Level</u> <u>Units: mg/l</u>	<u>Quantitation Limit</u> <u>Units: mg/l</u>
Vinyl Chloride	ND	0.2	0.0050
1,1-Dichloroethene	ND	0.7	0.0020
Chloroform	ND	6.0	0.0050
1,2-Dichloroethane	ND	0.5	0.0020
Methyl Ethyl Ketone	ND	200	0.0050
Carbon Tetrachloride	ND	0.5	0.0020
Trichloroethene	ND	0.5	0.0010
Benzene	0.0030	0.5	0.0010
Tetrachloroethene	ND	0.7	0.0010
Chlorobenzene	ND	100	0.0050

Data File: /chem/VOAMS8.i/8260LOW_SP/07-09-01/27aug01.b/j20787.d
Report Date: 31-Aug-2001 15:01

STL Edison

VOLATILE ORGANIC COMPOUND ANALYSIS

Data file : /chem/VOAMS8.i/8260LOW_SP/07-09-01/27aug01.b/j20787.d
Lab Smp Id: 296426 Client Smp ID: HB-01-Soil
Inj Date : 27-AUG-2001 12:59
Operator : VOAMS 8 Inst ID: VOAMS8.i
Smp Info : 296426;;;5.03;5
Misc Info : 0033;3020;;LD;3
Comment :
Method : /chem/VOAMS8.i/8260LOW_SP/07-09-01/27aug01.b/8260L_01.m
Meth Date : 27-Aug-2001 16:05 lily Quant Type: ISTD
Cal Date : 09-JUL-2001 21:11 Cal File: j19659.d
Als bottle: 5
Dil Factor: 1.00000
Integrator: HP RTE
Target Version: 3.50

Compound Sublist: PPVOA.sub

Concentration Formula: $\text{Amt} * \text{DF} * ((\text{Vt}/\text{Ws}) / ((100-\text{M})/100)) * \text{CpndVariable}$

Name	Value	Description
DF	1.00000	Dilution Factor
Vt	5.00000	Volume of final extract (mL)
Ws	5.03000	Weight of sample extracted (g)
M	43.30000	% Moisture (not decanted)

Cpnd Variable.

Local Compound Variable

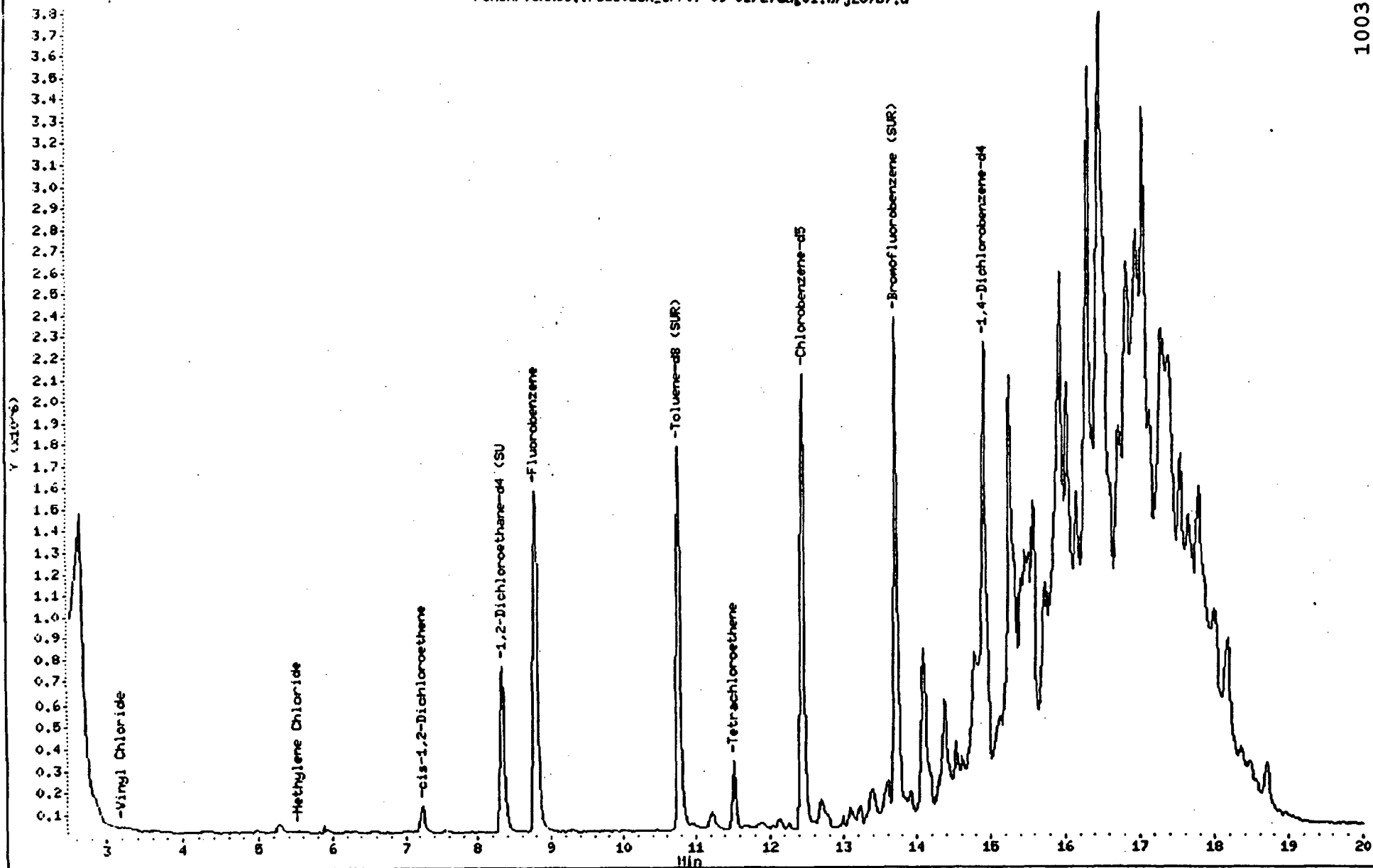
Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
						ON-COLUMN (ug/L)	FINAL (ug/Kg)
4 Vinyl Chloride	62	3.331	3.331	(0.379)	13224	1.08662	1.9(a)
6 Methylene Chloride	84	5.560	5.583	(0.632)	8792	0.54718	0.96(a)
13 cis-1,2-Dichloroethene	96	7.244	7.262	(0.824)	119471	5.70688	10
\$ 16 1,2-Dichloroethane-d4 (SUR)	65	8.340	8.360	(0.949)	1180029	51.2826	90
* 19 Fluorobenzene	96	8.790	8.820	(1.000)	2980946	50.0000	
\$ 37 Toluene-d8 (SUR)	98	10.761	10.793	(0.864)	2181053	42.1462	74
35 Tetrachloroethene	166	11.533	11.542	(0.926)	194953	5.43056	9.5
* 32 Chlorobenzene-d5	117	12.448	12.476	(1.000)	2357978	50.0000	
\$ 41 Bromofluorobenzene (SUR)	174	13.707	13.741	(0.919)	1237692	48.8047	86
* 91 1,4-Dichlorobenzene-d4	152	14.919	14.934	(1.000)	1104700	50.0000	

QC Flag Legend

a - Target compound detected but, quantitated amount
Below Limit Of Quantitation(BLOQ).

100307

/chem/VOAHS8.1/8260LOW_SP/07-09-01/27aug01.b/j20787.d



100308

Data File: /chem/VOAMS8.i/8260LOW_SF/07-09-01/27aug01.b/j20787.d

Date : 27-AUG-2001 12:59

Client ID: MR-01-Soil

Instrument: VOAMS8.i

Sample Info: 296426;;;5.03;5

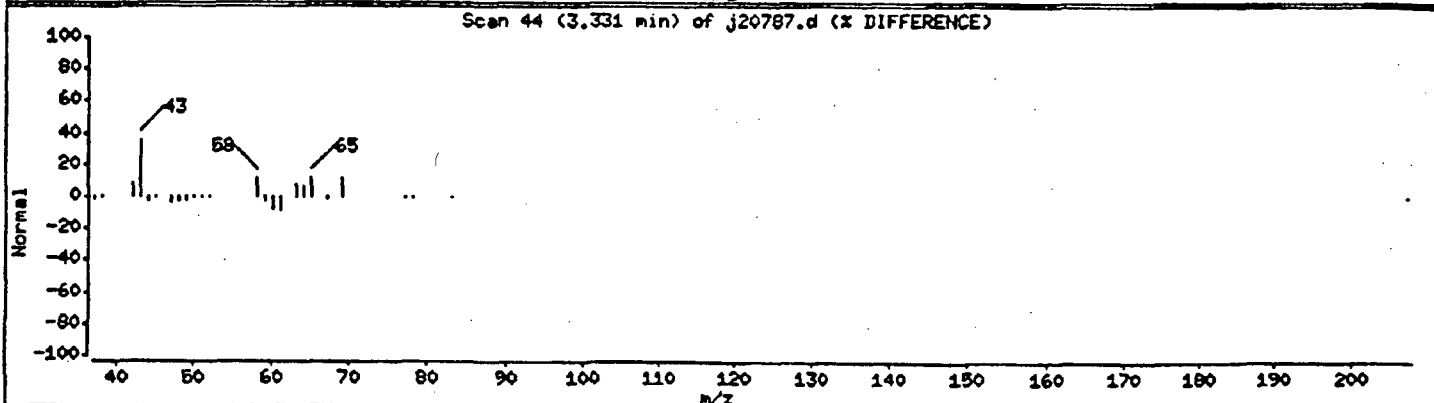
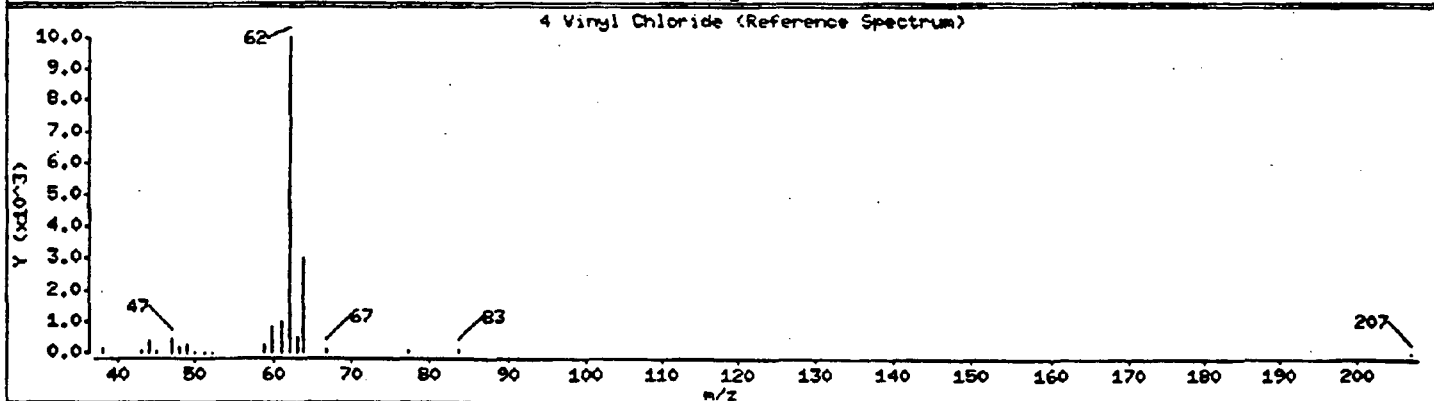
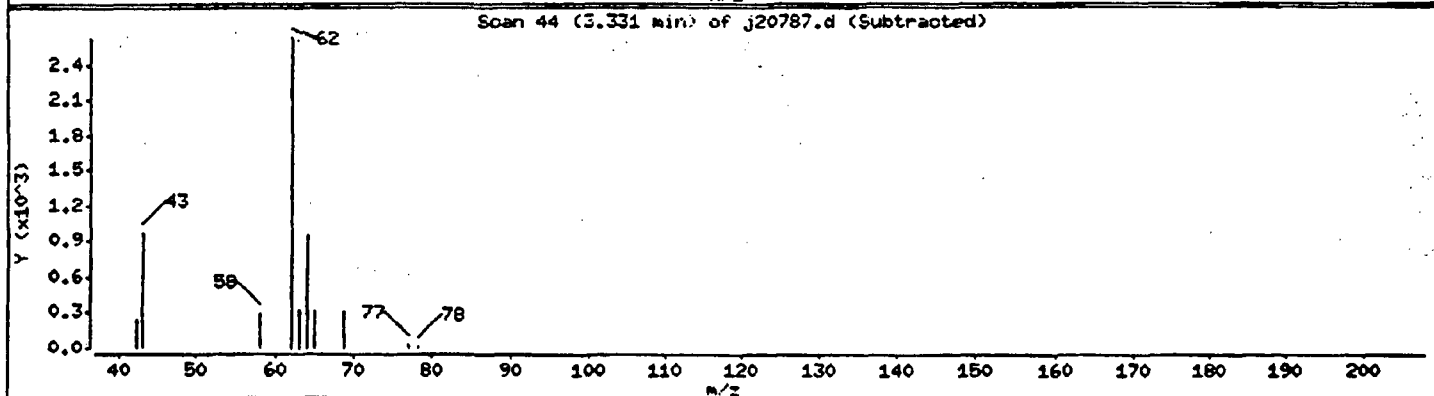
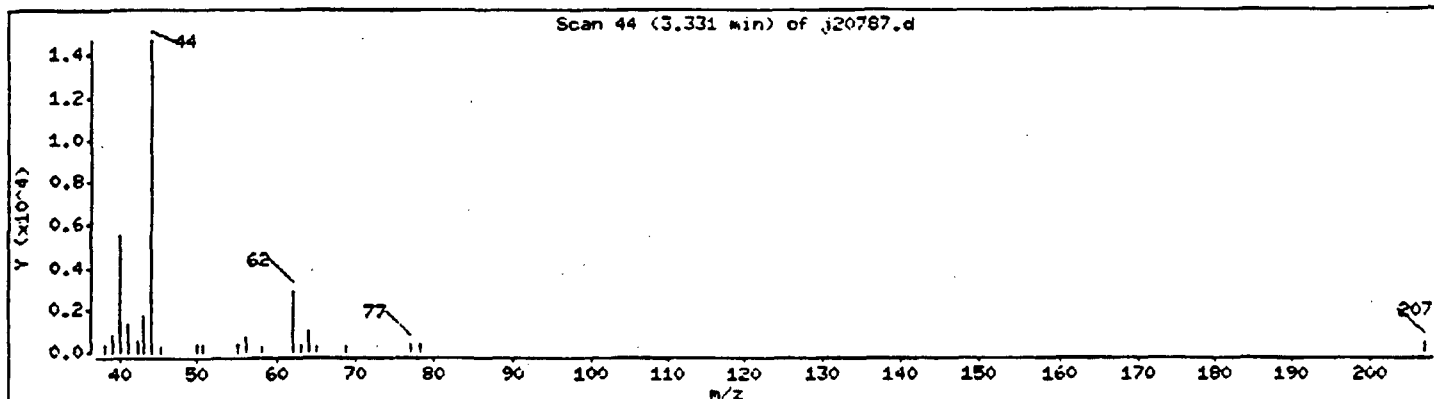
Operator: VOAMS 8

Column phase: DB624

Column diameter: 0.53

4 Vinyl Chloride

Concentration: 1.9 ug/Kg



100309

Data File: /chem/VOAMS8.1/8260LOW_SF/07-09-01/27Aug01.b/j20787.d

Date : 27-AUG-2001 12:59

Client ID: HB-01-Soil

Sample Info: 296426;;;5.03;5

Instrument: VOAMS.1

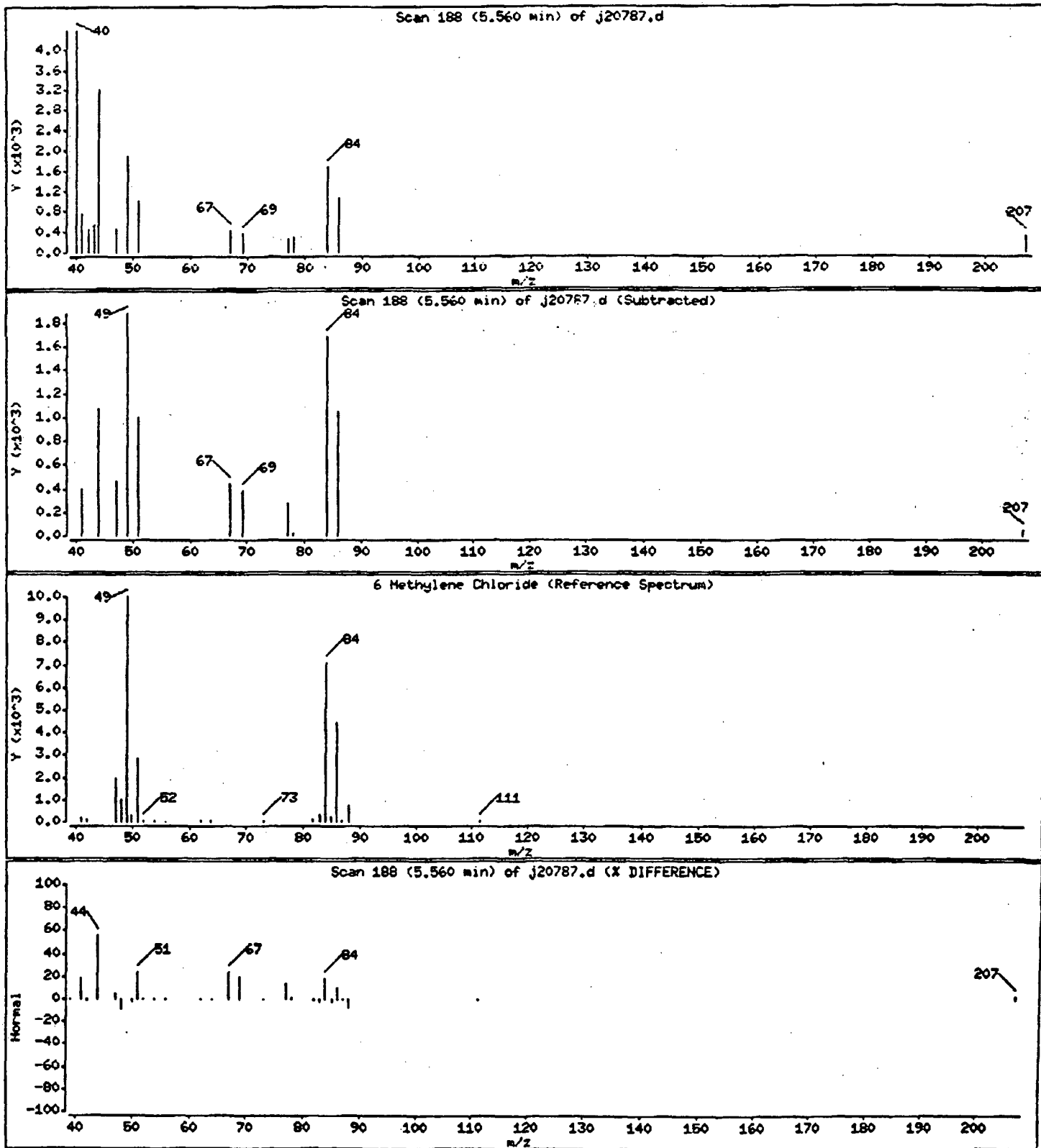
Operator: VOAMS 8

Column diameter: 0.53

Column phase: DB624

6 Methylene Chloride

Concentration: 0.96 ug/Kg



100310

Data File: /chem/V04HSS.i/8260LOW_SP/07-09-01/27aug01.b/j20787.d

Date : 27-AUG-2001 12:59

Client ID: ME-01-Soil

Sample Info: 296426;;;5.03;5

Instrument: V04HSS.i

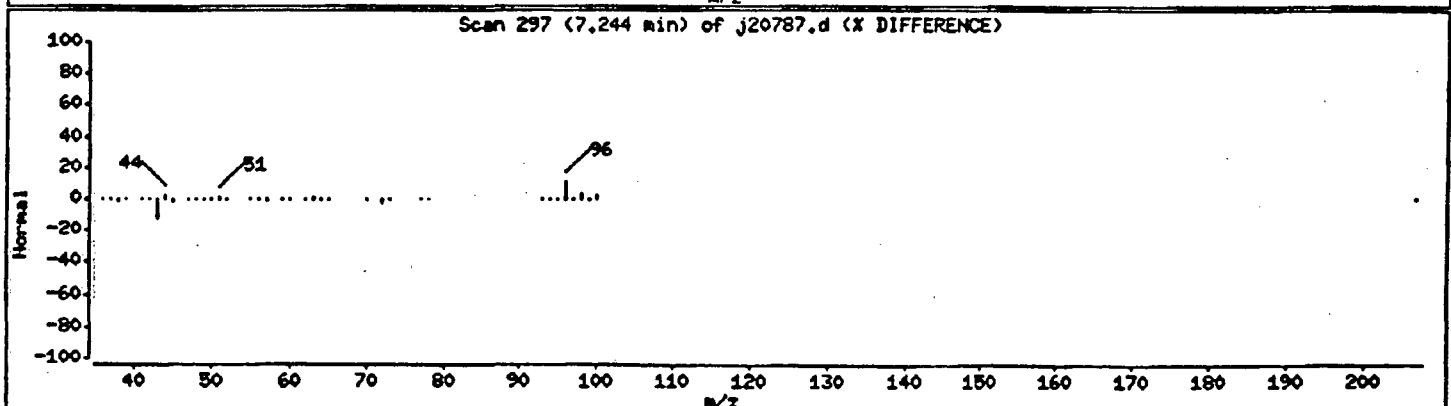
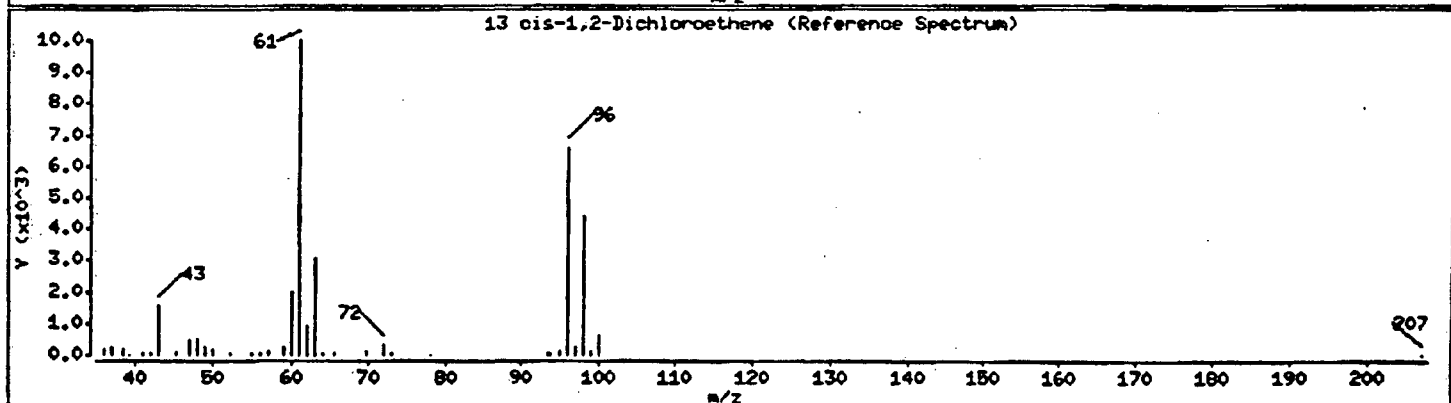
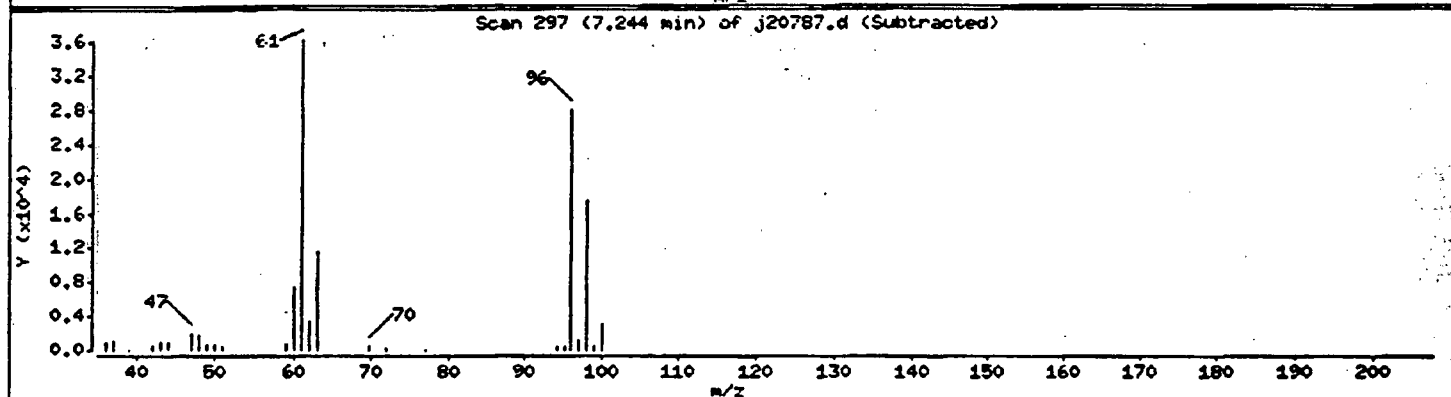
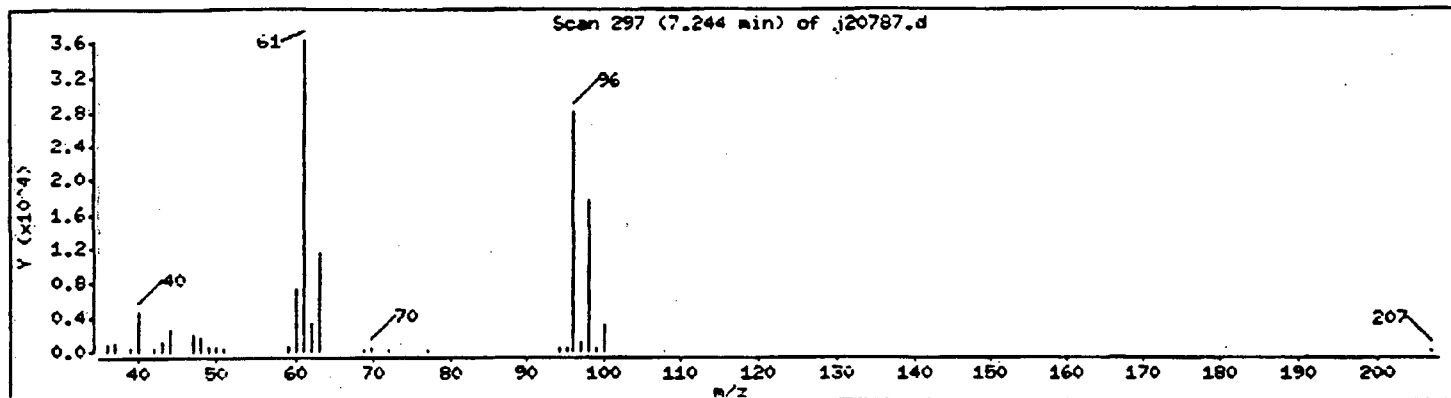
Operator: V04HSS 8

Column phase: DB624

Column diameter: 0.53

13 cis-1,2-Dichloroethene

Concentration: 10 ug/Kg



100311

Data File: /chem/VOAMS8.i/8260LDN.SP/07-09-01/27aug01.b/j20787.d

Date : 27-AUG-2001 12:59

Client ID: HB-01-Soil

Sample Info: 296426;;;5.03;5

Instrument: VOAMS8.i

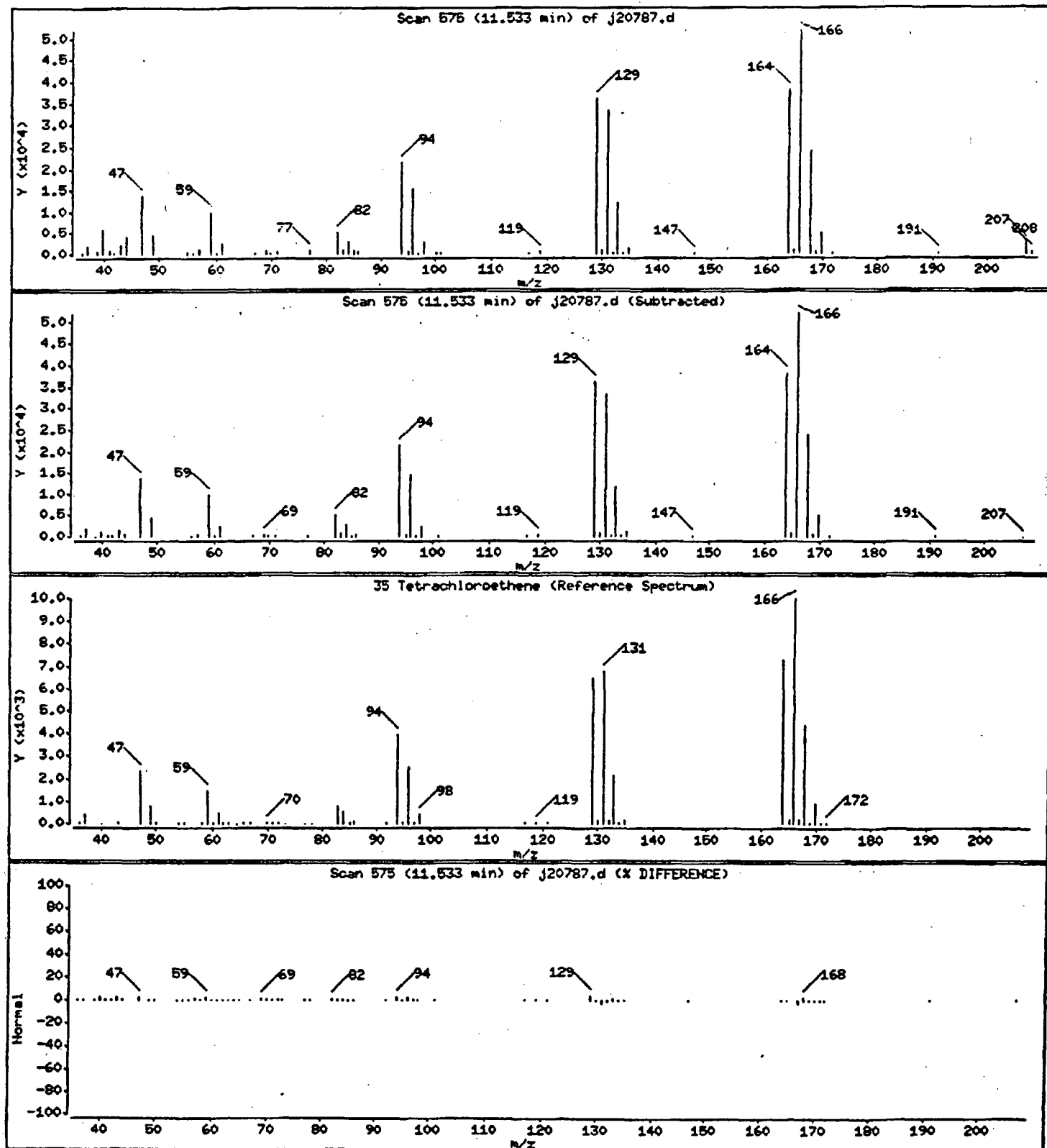
Operator: VOAMS 8

Column diameter: 0.53

Column phase: DRG24

Concentration: 9.5 ug/Kg

35 Tetrachloroethene



100312

Client ID: HB-01-Soil
Site: Dover New Jersey

Lab Sample No: 296426
Lab Job No: 0033

Date Sampled: 08/23/01
Date Received: 08/23/01
Date Analyzed: 08/27/01
GC Column: DB624
Instrument ID: VOAMS8.i
Lab File ID: j20787.d

Matrix: SOIL
Level: LOW
Sample Weight: 5.0 g
Purge Volume: 5.0 ml
% Moisture: 43

VOLATILE ORGANICS - GC/MS
METHOD 8260B

<u>Parameter</u>	<u>Analytical Results</u>		<u>Quantitation</u>
	<u>Units: ug/kg</u> <u>(Dry Weight)</u>		<u>Limit</u> <u>Units: ug/kg</u>
Chloromethane	ND		8.8
Bromomethane	ND		8.8
Vinyl Chloride	1.9J		8.8
Chloroethane	ND		8.8
Methylene Chloride	1.0JB		5.2
Trichlorofluoromethane	ND		8.8
1,1-Dichloroethene	ND		3.5
1,1-Dichloroethane	ND		8.8
trans-1,2-Dichloroethene	ND		8.8
cis-1,2-Dichloroethene	10		8.8
Chloroform	ND		8.8
1,2-Dichloroethane	ND		3.5
1,1,1-Trichloroethane	ND		8.8
Carbon Tetrachloride	ND		3.5
Bromodichloromethane	ND		1.8
1,2-Dichloropropane	ND		1.8
cis-1,3-Dichloropropene	ND		8.8
Trichloroethene	ND		1.8
Dibromochloromethane	ND		8.8
1,1,2-Trichloroethane	ND		5.2
Benzene	ND		1.8
trans-1,3-Dichloropropene	ND		8.8
2-Chloroethyl Vinyl Ether	ND		8.8
Bromoform	ND		7.0
Tetrachloroethene	9.5		1.8
1,1,2,2-Tetrachloroethane	ND		1.8
Toluene	ND		8.8
Chlorobenzene	ND		8.8
Ethylbenzene	ND		7.0
Xylene (Total)	ND		8.8

100313

Data File: /chem/VOAMS4.i/8260HIGH_SP/08-23-01/27aug01.b/d22110.d
Report Date: 28-Aug-2001 14:46

STL Edison

VOLATILE ORGANIC COMPOUND ANALYSIS

Data file : /chem/VOAMS4.i/8260HIGH_SP/08-23-01/27aug01.b/d22110.d
Lab Smp Id: 296426 Client Smp ID: HB-01-Soil
Inj Date : 27-AUG-2001 13:08
Operator : VOAMS 4 Inst ID: VOAMS4.i
Smp Info : 296426
Misc Info : 0033;5971;;CZ
Comment :
Method : /chem/VOAMS4.i/8260HIGH_SP/08-23-01/27aug01.b/8260H_01.m
Meth Date : 28-Aug-2001 09:02 czhao Quant Type: ISTD
Cal Date : 23-AUG-2001 17:08 Cal File: d22051.d
Als bottle: 17
Dil Factor: 1.00000
Integrator: HP RTE
Target Version: 3.50

Compound Sublist: TCLP.sub

Concentration Formula: Amt * DF * 5/Vo * CpndVariable

Name	Value	Description
DF	1.00000	Dilution Factor
Vo	5.00000	SampleVolume

Cpnd Variable

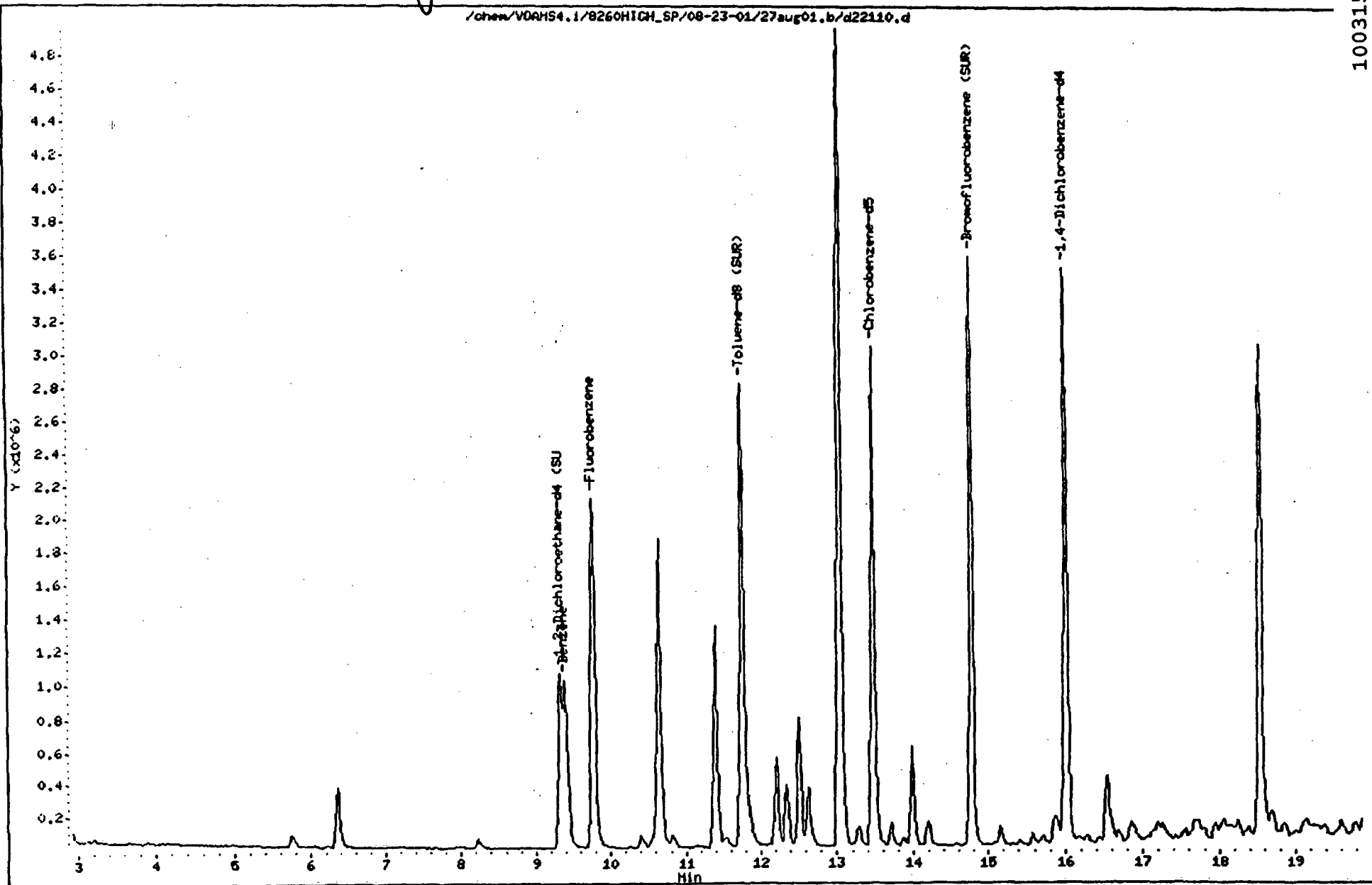
Local Compound Variable

Compounds	QUANT SIG	MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN (ug/L)	FINAL (ug/L)
\$ 16 1,2-Dichloroethane-d4 (SUR)	65	9.333	9.319	(0.956)	1460597	51.0807	51	
28 Benzene	78	9.437	9.422	(0.967)	222674	2.98525	3.0	
\$ 37 Toluene-d8 (SUR)	98	11.751	11.737	(0.872)	3663597	48.1894	48	
* 32 Chlorobenzene-d5	117	13.472	13.472	(1.000)	3341899	50.0000		
\$ 41 Bromofluorobenzene (SUR)	174	14.763	14.763	(0.922)	2030328	47.5277	48	
* 19 Fluorobenzene	96	9.764	9.764	(1.000)	3892405	50.0000		
* 91 1,4-Dichlorobenzene-d4	152	16.009	16.009	(1.000)	2102406	50.0000		

100314

Data File: /chem/VOAMS4.1/8260HIGH_SP/08-23-01/27aug01.b/d22110.d
Date: 27-AUG-2001 13:08
Client ID: HB-01-Soil
Sample Info: 296426
Purge Volume: 5.0
Column phase: DB624

Instrument: VOAMS4.1
Operator: VOAMS 4
Column diameter: 0.53



100315

0033

Data File: /chem/VOAMS4.i/6260HIGH_SF/08-23-01/27aug01.d/d22110.d

Date: 27-AUG-2001 13:08

Client ID: HB-01-Soil

Instrument: VOAMS4.i

Sample Info: 296426

Purge Volume: 5.0

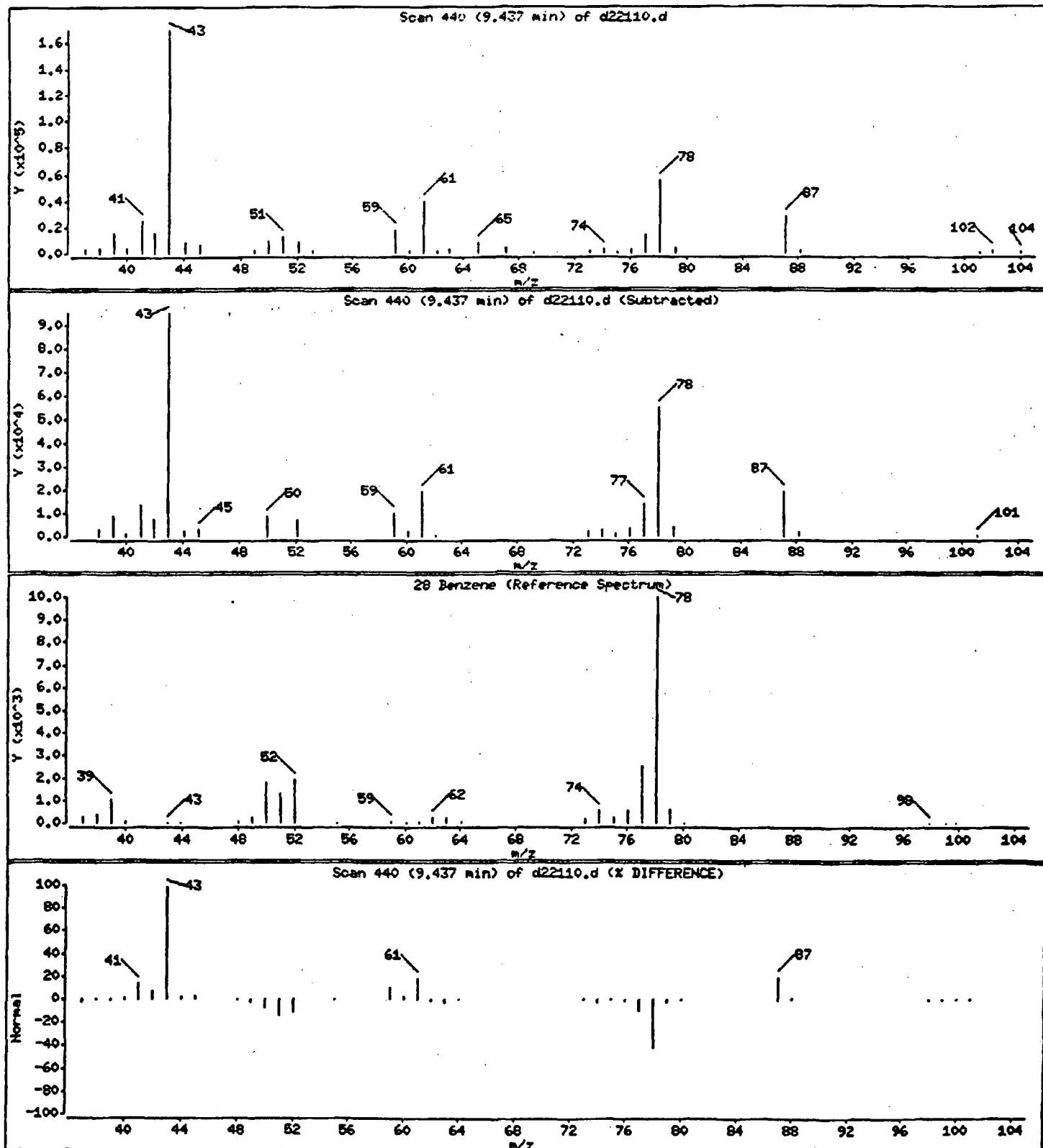
Operator: VOAMS 4

Column phase: DB624

Column diameter: 0.53

28 Benzene

Concentration: 3.0 ug/L



100316

Tuning Results Summary

100317

VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab File ID: D22043

BFB Injection Date: 08/23/01

Instrument ID: VOAMS4

BFB Injection Time: 0846

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	17.3
75	30.0 - 60.0% of mass 95	48.6
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	7.0
173	Less than 2.0% of mass 174	0.4 (0.5)1
174	50.0 - 100.0% of mass 95	76.8
175	5.0 - 9.0% of mass 174	5.9 (7.7)1
176	95.0 - 101.0% of mass 174	74.8 (97.3)1
177	5.0 - 9.0% of mass 176	5.1 (6.8)2

1-Value is % mass 174

2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	CLIENT ID	LAB SAMPLE No.	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	DSTD005	DSTD005	D22047	08/23/01	1200
02	DSTD020	DSTD020	D22048	08/23/01	1534
03	DSTD050	DSTD050	D22049	08/23/01	1605
04	DSTD100	DSTD100	D22050	08/23/01	1636
05	DSTD200	DSTD200	D22051	08/23/01	1708
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

Date : 23-AUG-2001 08:46

Client ID:

Instrument: V04HS4.i

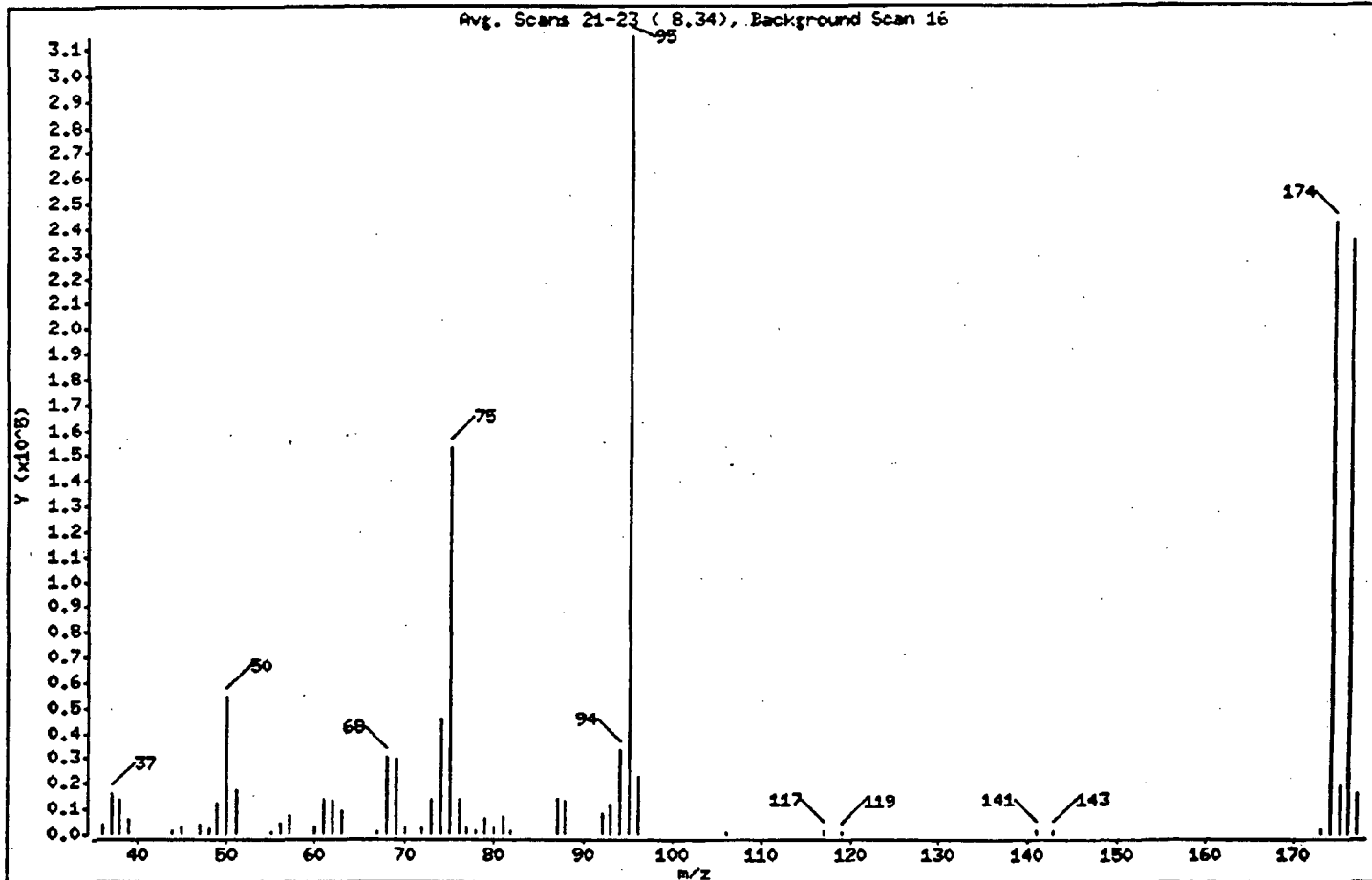
Sample Info: DBFE235 50ng

Operator: V04HS 1

Column phase: DB-624

Column diameter: 0.53

1 Bromofluorobenzene



m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
95	Base Peak, 100% relative abundance	100.00
50	15.00 - 40.00% of mass 95	17.34
75	30.00 - 60.00% of mass 95	48.61
96	5.00 - 9.00% of mass 95	7.04
173	Less than 2.00% of mass 174	0.39 (0.50)
174	50.00 - 100.00% of mass 95	76.79
175	5.00 - 9.00% of mass 174	8.88 (7.66)
176	95.00 - 101.00% of mass 174	74.76 (97.35)
177	5.00 - 9.00% of mass 176	8.05 (6.76)

Date : 23-AUG-2001 08:46

Client ID:

Instrument: VOAMS4.i

Sample Info: DBFB235 50ng

Operator: VOAMS 1

Column phase: DB-624

Column diameter: 0.53

Data File: d22043.d

Spectrum: Avg. Scans 21-23 (8.34), Background Scan 16

Location of Maximum: 95.00

Number of points: 50

m/z	Y	m/z	Y	m/z	Y	m/z	Y
36.00	3506	57.00	7096	76.00	13792	96.00	22144
37.00	16205	60.00	3150	77.00	2219	106.00	447
38.00	13487	61.00	13437	78.00	1713	117.00	1104
39.00	5618	62.00	13210	79.00	6205	119.00	457
44.00	1169	63.00	9247	80.00	2007	141.00	1530
45.00	2757	67.00	504	81.00	6694	143.00	1583
47.00	3559	68.00	30312	82.00	1646	173.00	1213
48.00	1988	69.00	29792	87.00	13535	174.00	241408
49.00	12627	70.00	2260	88.00	12970	175.00	18480
50.00	54512	72.00	1856	92.00	7734	176.00	235008
51.00	17304	73.00	13679	93.00	11512	177.00	15881
55.00	939	74.00	45200	94.00	33176		
56.00	4112	75.00	152768	95.00	314368		

Date : 23-AUG-2001 08:46

Client ID:

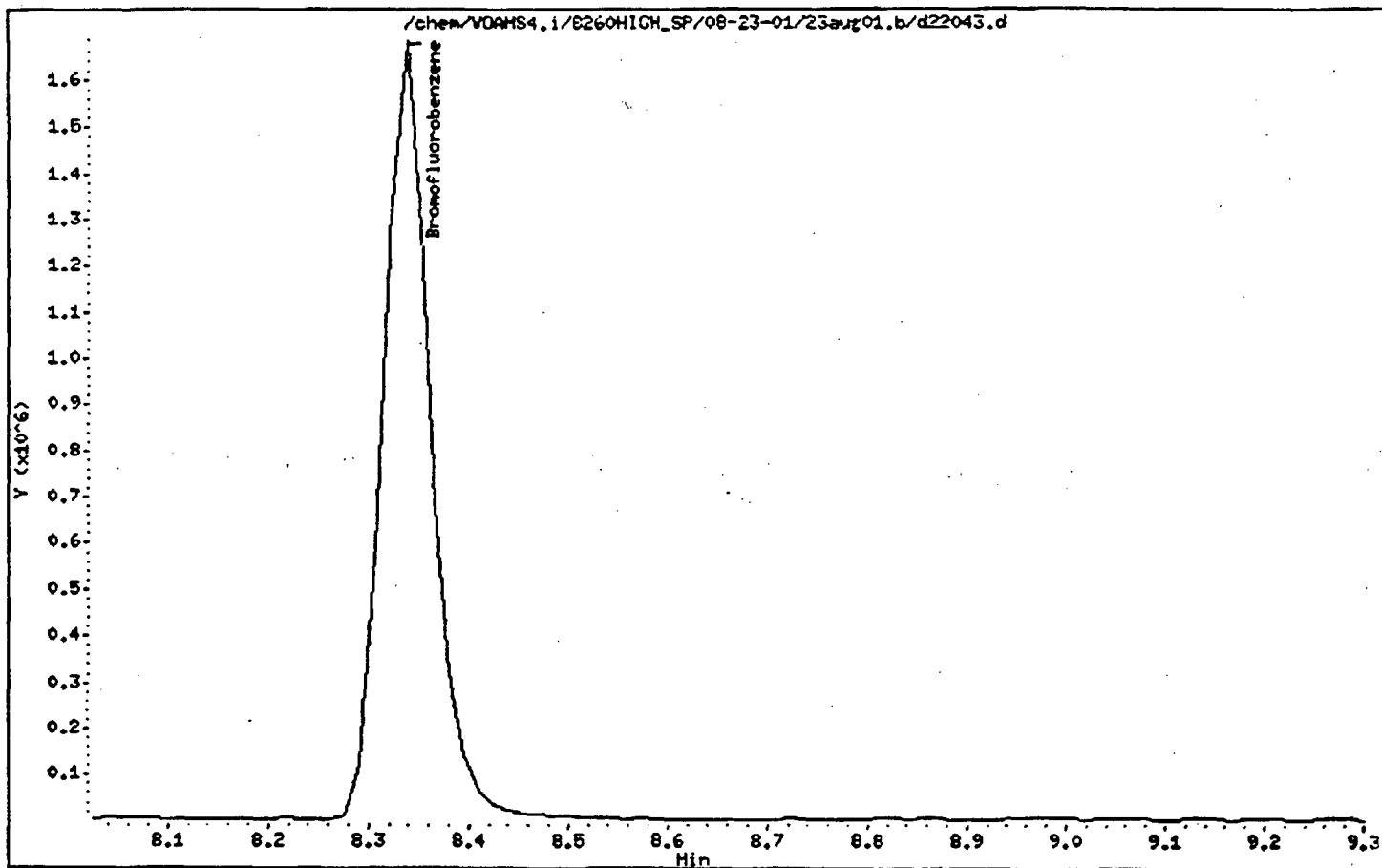
Instrument: VOAMS4.1

Sample Info: DBFB235 50ng

Operator: VOAMS 1

Column phase: DB-624

Column diameter: 0.53



100321

VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab File ID: D22104A

BFB Injection Date: 08/27/01

Instrument ID: VOAMS4

BFB Injection Time: 0928

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	17.5
75	30.0 - 60.0% of mass 95	49.3
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	7.3
173	Less than 2.0% of mass 174	0.4 (0.6)1
174	50.0 - 100.0% of mass 95	74.5
175	5.0 - 9.0% of mass 174	5.8 (7.9)1
176	95.0 - 101.0% of mass 174	73.1 (98.1)1
177	5.0 - 9.0% of mass 176	5.3 (7.2)2

1-Value is % mass 174

2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	CLIENT ID	LAB SAMPLE No.	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	DSTD239A	DSTD239A	D22105A	08/27/01	1005
02	DV239A	DV239A	D22108A	08/27/01	1201
03	HB-01-SOIL	296426	D22110	08/27/01	1308
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

Date : 27-AUG-2001 09:28

Client ID:

Instrument: VOAMS4.1

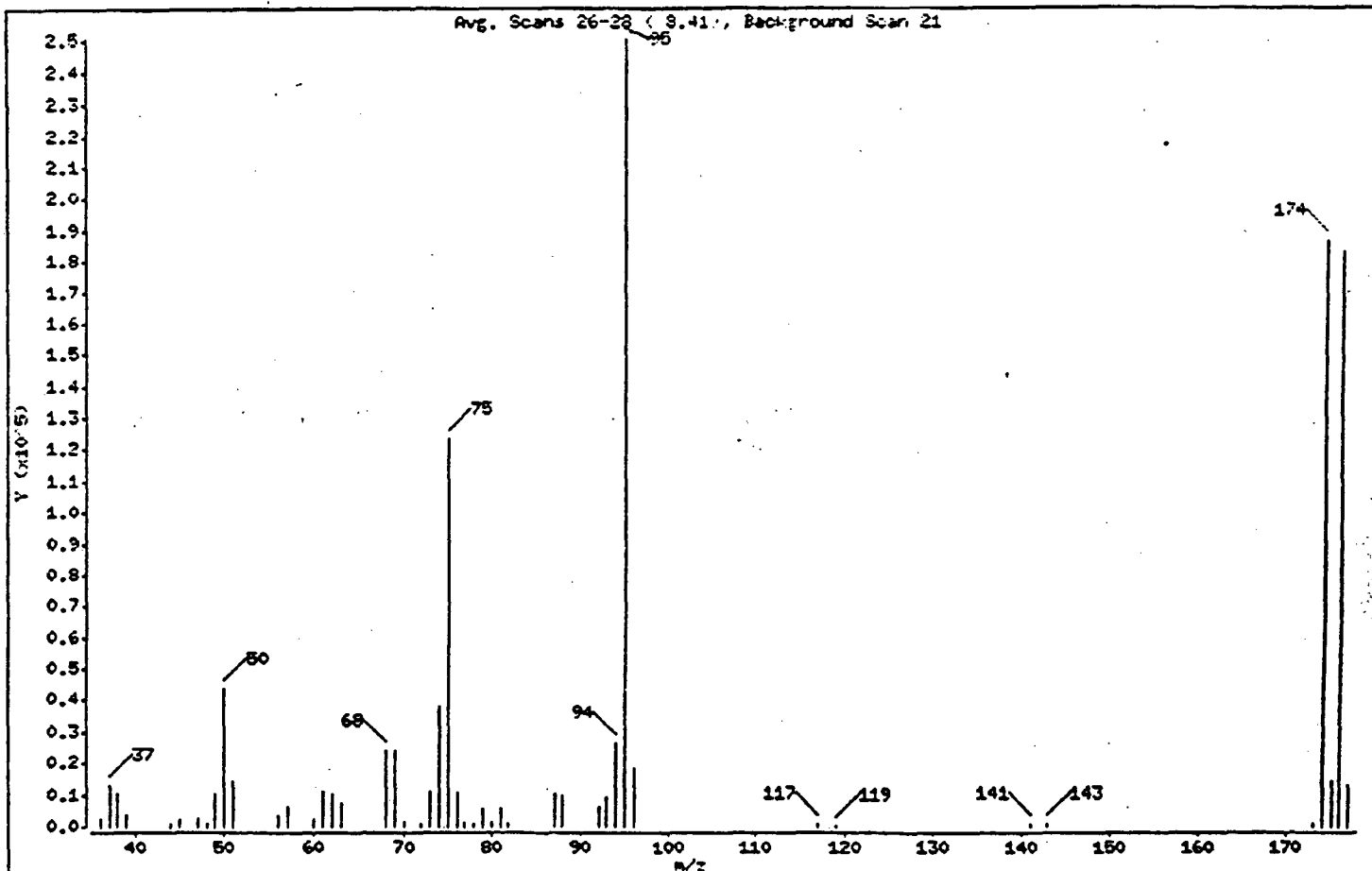
Sample Info: DBF2239a 50ng

Operator: VOAMS 1

Column phase: DB-624

Column diameter: 0.53

1 Bromofluorobenzene



m/e	ION ABUNDANCE CRITERIA	X RELATIVE ABUNDANCE
95	Base Peak, 100% relative abundance	100.00
50	15.00 - 40.00% of mass 95	17.49
75	30.00 - 60.00% of mass 95	49.29
96	5.00 - 9.00% of mass 95	7.28
173	Less than 2.00% of mass 174	0.41 (0.55)
174	50.00 - 100.00% of mass 95	74.47
175	5.00 - 9.00% of mass 174	5.85 (7.85)
176	95.00 - 101.00% of mass 174	73.07 (98.12)
177	5.00 - 9.00% of mass 176	6.27 (7.22)

Date : 27-AUG-2001 09:29

Client ID:

Instrument: VOAMS4.i

Sample Info: DBF8239a 50ng

Operator: VOAMS 1

Column phase: DB-624

Column diameter: 0.53

Data File: d22104a.d

Spectrum: Avg. Scans 26-28 (8.41), Background Scan 21

Location of Maximum: 95.00

Number of points: 47

m/z	Y	m/z	Y	m/z	Y	m/z	Y
36.00	2969	57.00	6158	76.00	10897	95.00	250304
37.00	12949	60.00	2527	77.00	1555	96.00	18208
38.00	10629	61.00	11200	78.00	940	117.00	981
39.00	3938	62.00	10339	79.00	5729	119.00	435
44.00	1116	63.00	7536	80.00	1713	141.00	1021
45.00	2328	68.00	24016	81.00	5531	143.00	1050
47.00	2839	69.00	23960	82.00	905	173.00	1034
48.00	1187	70.00	1784	87.00	10464	174.00	186368
49.00	10581	72.00	958	88.00	9833	175.00	14634
50.00	43784	73.00	10873	92.00	6304	176.00	182848
51.00	14616	74.00	38264	93.00	9447	177.00	13202
56.00	3650	75.00	123376	94.00	26376		

Data File: /chem/VOAMS4.i/8260HIGH_SP/08-23-01/27aug01.b/d22104a.d

Page 2

Date : 27-AUG-2001 09:28

Client ID:

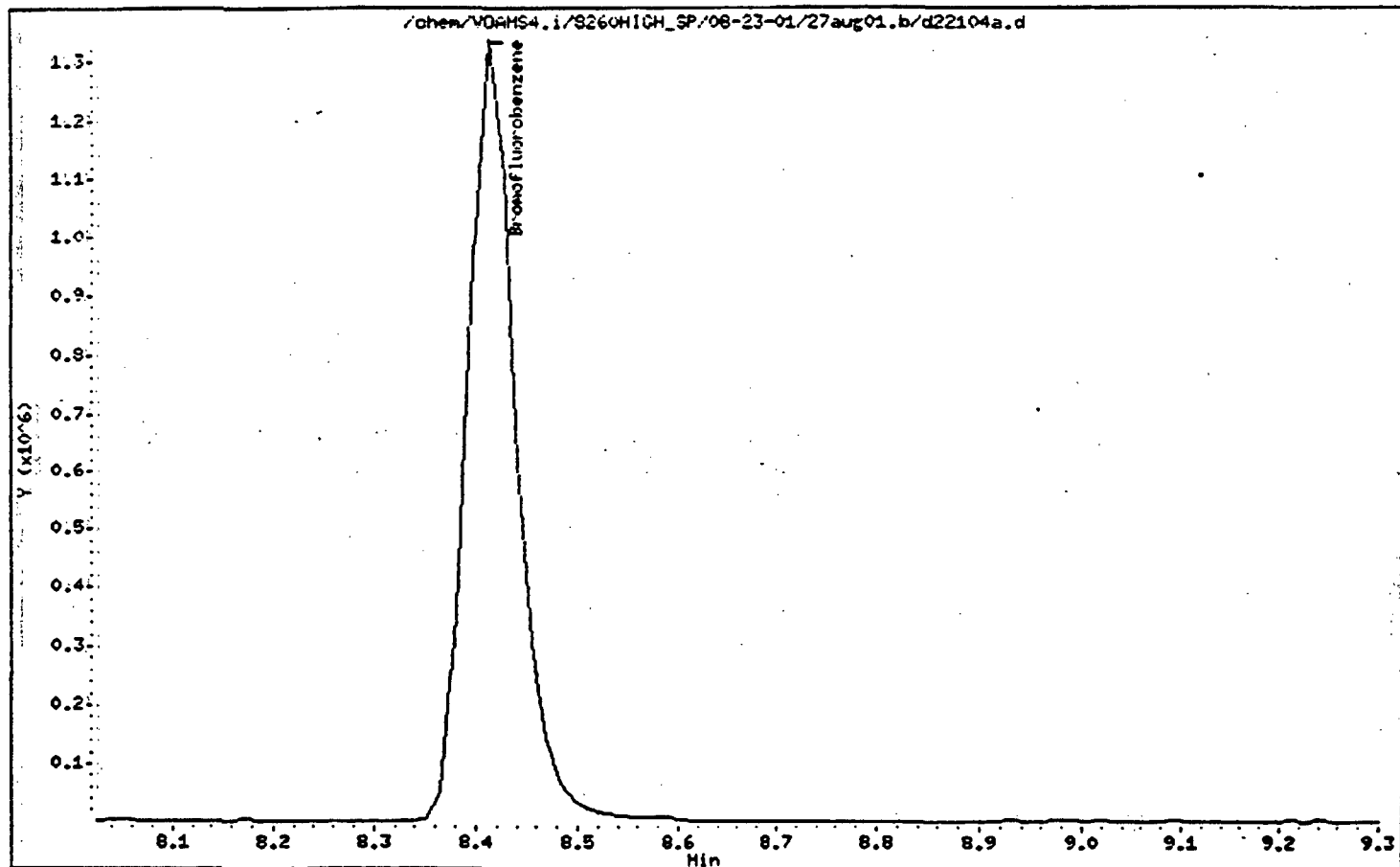
Instrument: VOAMS4.i

Sample Info: DBFB239a 50ng

Operator: VOAMS 1

Column phase: DB-624

Column diameter: 0.53



100325

VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab File ID: V33872

BFB Injection Date: 08/24/01

Instrument ID: VOAMS7

BFB Injection Time: 0901

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	24.0
75	30.0 - 60.0% of mass 95	52.7
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	7.3
173	Less than 2.0% of mass 174	0.0 (0.0)1
174	50.0 - 100.0% of mass 95	66.1
175	5.0 - 9.0% of mass 174	5.1 (7.8)1
176	95.0 - 101.0% of mass 174	66.2 (100.2)1
177	5.0 - 9.0% of mass 176	3.9 (6.0)2

1-Value is % mass 174 2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	CLIENT ID	LAB SAMPLE No.	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	VSTD200	VSTD200	V33874	08/24/01	1116
02	VSTD050	VSTD050	V33875	08/24/01	1144
03	VSTD020	VSTD020	V33876	08/24/01	1212
04	VSTD010	VSTD010	V33877	08/24/01	1240
05	VSTD005	VSTD005	V33878	08/24/01	1308
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

Data File: /chem/VOAMS7.i/624/08-24-01/24aug01.b/v33872.d

Date : 24-AUG-2001 09:01

Client ID: VBF5236 50ng

Sample Info: VBF5236 50ng

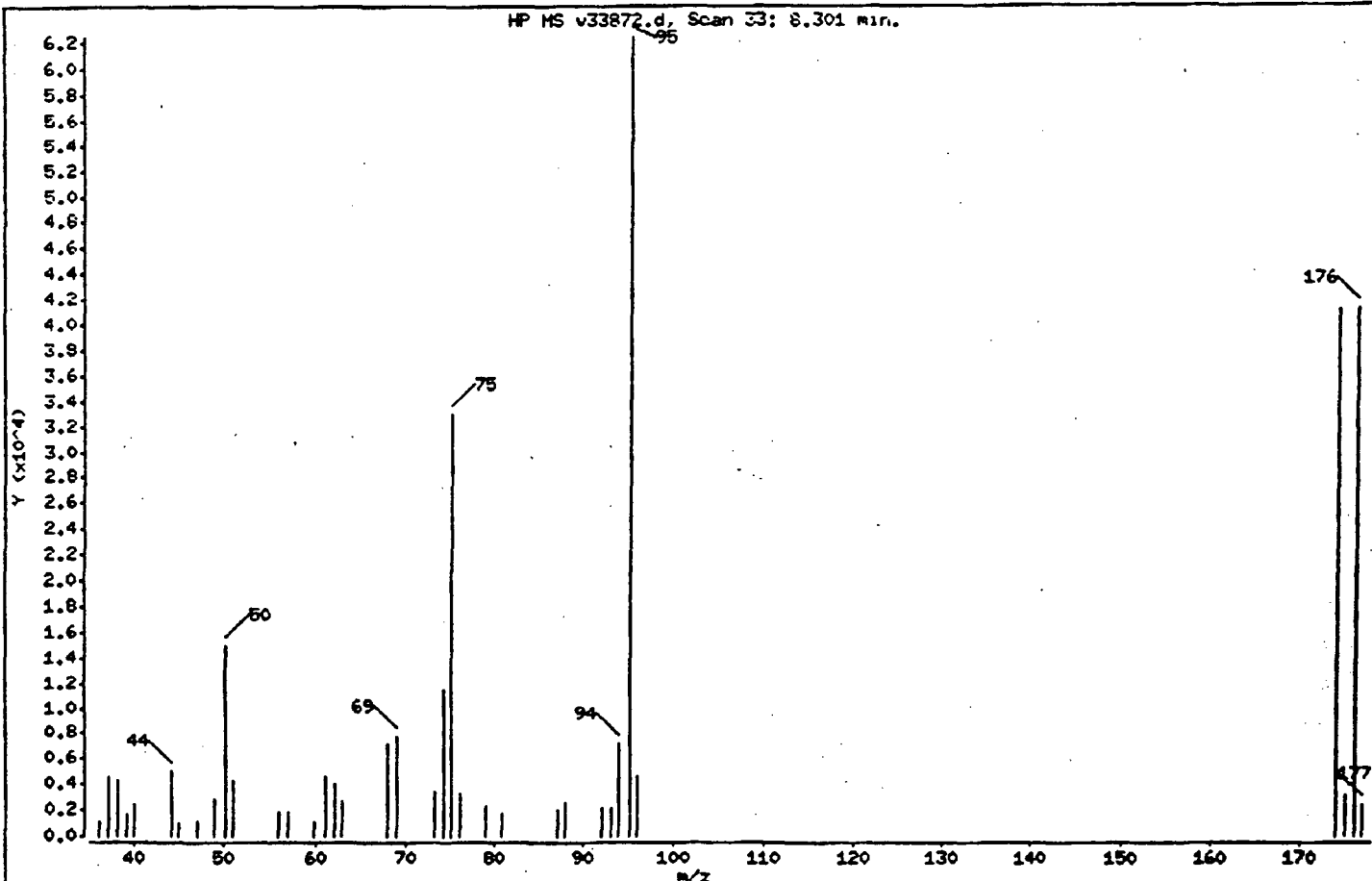
Instrument: VOAMS7.i

Operator: VOAMS 1

Column phase: DB-624

Column diameter: 0.53

1 Bromofluorobenzene



m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
95	Base Peak, 100% relative abundance	100.00
50	15.00 - 40.00% of mass 95	24.01
75	30.00 - 60.00% of mass 95	52.68
96	5.00 - 9.00% of mass 95	7.31
173	Less than 2.00% of mass 174	0.00 (0.00)
174	50.00 - 100.00% of mass 95	66.09
175	5.00 - 9.00% of mass 174	5.14 (7.78)
176	95.00 - 101.00% of mass 174	66.22 (100.19)
177	5.00 - 9.00% of mass 176	3.94 (5.96)

100327

Data File: /chem/V00157.1/624/08-24-01/24aug01.b/v33872.d

Date : 24-AUG-2001 09:01

Client ID: VBFB236 50ng

Sample Info: VBFB236 50ng

Instrument: V00157.1

Operator: V00157.1

Column phase: DB-624

Column diameter: 0.53

Data File: v33872.d

Spectrum: HP MS v33872.d, Scan 33: 8.301 min.

Location of Maximum: 95.05

Number of points: 36

m/z	Y	m/z	Y	m/z	Y	m/z	Y
36.00	1091	51.05	4343	74.10	11536	95.05	62448
37.10	4619	55.95	1841	75.10	32696	96.05	4567
38.10	4319	57.05	1855	76.10	3356	173.95	41272
39.20	1690	59.95	1193	78.90	2255	174.95	3210
40.00	2503	61.05	4591	80.90	1717	175.95	41352
44.10	4967	62.15	3968	87.05	1976	176.85	2463
44.90	1078	63.05	2786	87.95	2553		
47.00	1160	68.00	7159	92.05	2096		
48.95	2904	69.10	7727	93.05	2179		
50.05	14991	73.10	3494	93.95	7195		

Data File: /chem/VOAMS7.i/624/08-24-01/24aug01.b/v33872.d

Date : 24-AUG-2001 09:01

Client ID: VBFB236 50ng

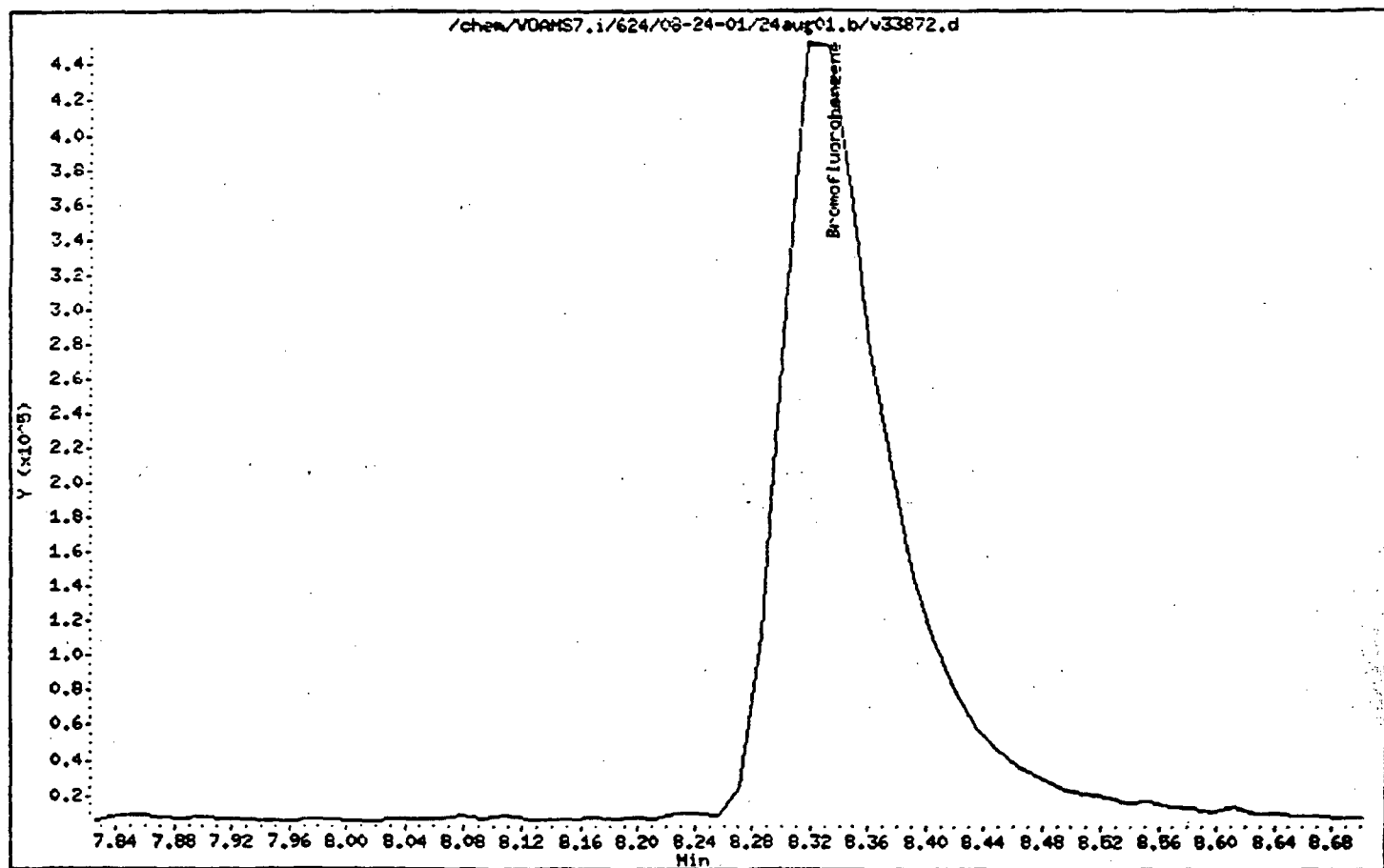
Sample Info: VBFB236 50ng

Instrument: VOAMS7.i

Operator: VOAMS 1

Column phase: DB-624

Column diameter: 0.53



100329

VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab File ID: V33914

BFB Injection Date: 08/25/01

Instrument ID: VOAMS7

BFB Injection Time: 0834

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	21.3
75	30.0 - 60.0% of mass 95	52.1
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	7.2
173	Less than 2.0% of mass 174	0.0 (0.0)1
174	50.0 - 100.0% of mass 95	80.3
175	5.0 - 9.0% of mass 174	6.2 (7.7)1
176	95.0 - 101.0% of mass 174	80.9 (100.7)1
177	5.0 - 9.0% of mass 176	5.7 (7.1)2

1-Value is % mass 174

2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	CLIENT ID	LAB SAMPLE No.	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	VSTD237	VSTD237	V33916	08/25/01	0935
02	VV237B	VV237B	V33944	08/25/01	2247
03	HB-01	296288	V33948	08/26/01	0038
04					
05					
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13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

Data File: /chem/VOAMS7.1/624/08-24-01/25aug01.b/v33914.d

Date : 25-AUG-2001 08:34

Client ID: VBFE237 50ng

Instrument: VOAMS7.1

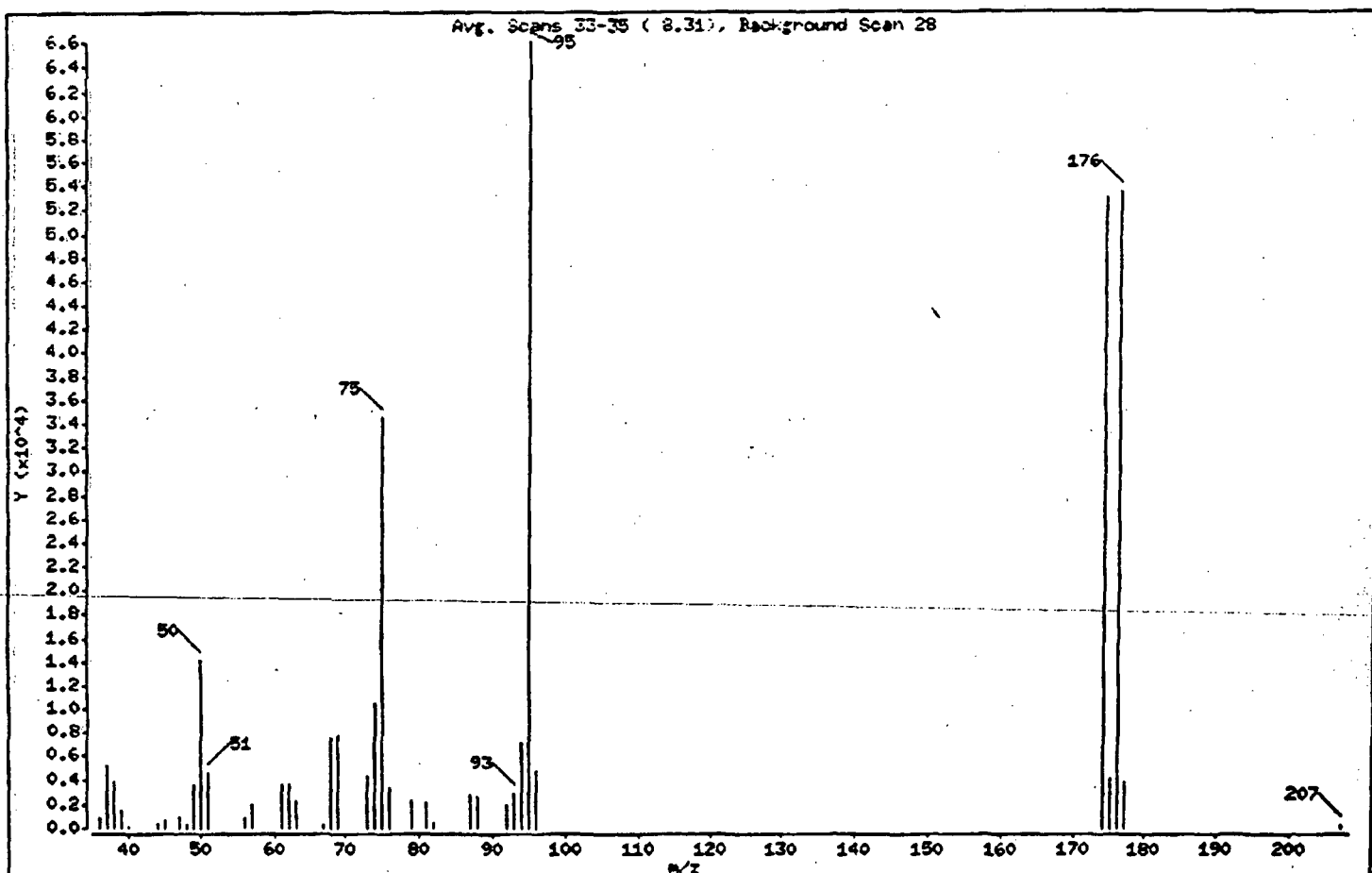
Sample Info: VBFE237 50ng

Operator: VOAMS 1

Column phase: DB-624

Column diameter: 0.53

1 Bromofluorobenzene



m/z		ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
95		Base Peak, 100% relative abundance	100.00
50		15.00 - 40.00% of mass 95	21.27
75		30.00 - 60.00% of mass 95	52.15
96		5.00 - 9.00% of mass 95	7.19
173		Less than 2.00% of mass 174	0.00 (0.00)
174		50.00 - 100.00% of mass 95	90.27
175		5.00 - 9.00% of mass 174	6.17 (7.69)
176		95.00 - 101.00% of mass 174	90.85 (100.73)
177		5.00 - 9.00% of mass 176	5.73 (7.08)

100331

Data File: /chem/VOAMS7.1/624/08-24-01/25aug01.b/v33914.d

Date : 25-AUG-2001 08:34

Client ID: VBFB237 50ng

Instrument: VOAMS7.i

Sample Info: VBFB237 50ng

Operator: VOAMS 1

Column phase: DB-624

Column diameter: 0.53

Data File: v33914.d

Spectrum: Avg. Scans 33-35 (8.31), Background Scan 28

Location of Maximum: 95.00

Number of points: 39

m/z	Y	m/z	Y	m/z	Y	m/z	Y
36.00	898	50.00	14045	73.00	4200	93.00	2939
37.00	5147	51.00	4539	74.00	10527	94.00	7156
38.00	3768	56.00	973	75.00	34432	95.00	66032
39.00	1536	57.00	1913	76.00	3330	96.00	4749
40.00	120	61.00	3606	79.00	2345	174.00	53000
44.00	300	62.00	3663	81.00	2143	175.00	4075
45.00	556	63.00	2328	82.00	404	176.00	53392
47.00	981	67.00	343	87.00	2694	177.00	3782
48.00	363	68.00	7561	88.00	2613	207.00	350
49.00	3530	69.00	7704	92.00	2045		

100332

Data File: /chem/VOAMS7.i/624/08-24-01/25aug01.b/v33914.d

Date : 25-AUG-2001 08:34

Client ID: VBFB237 Song

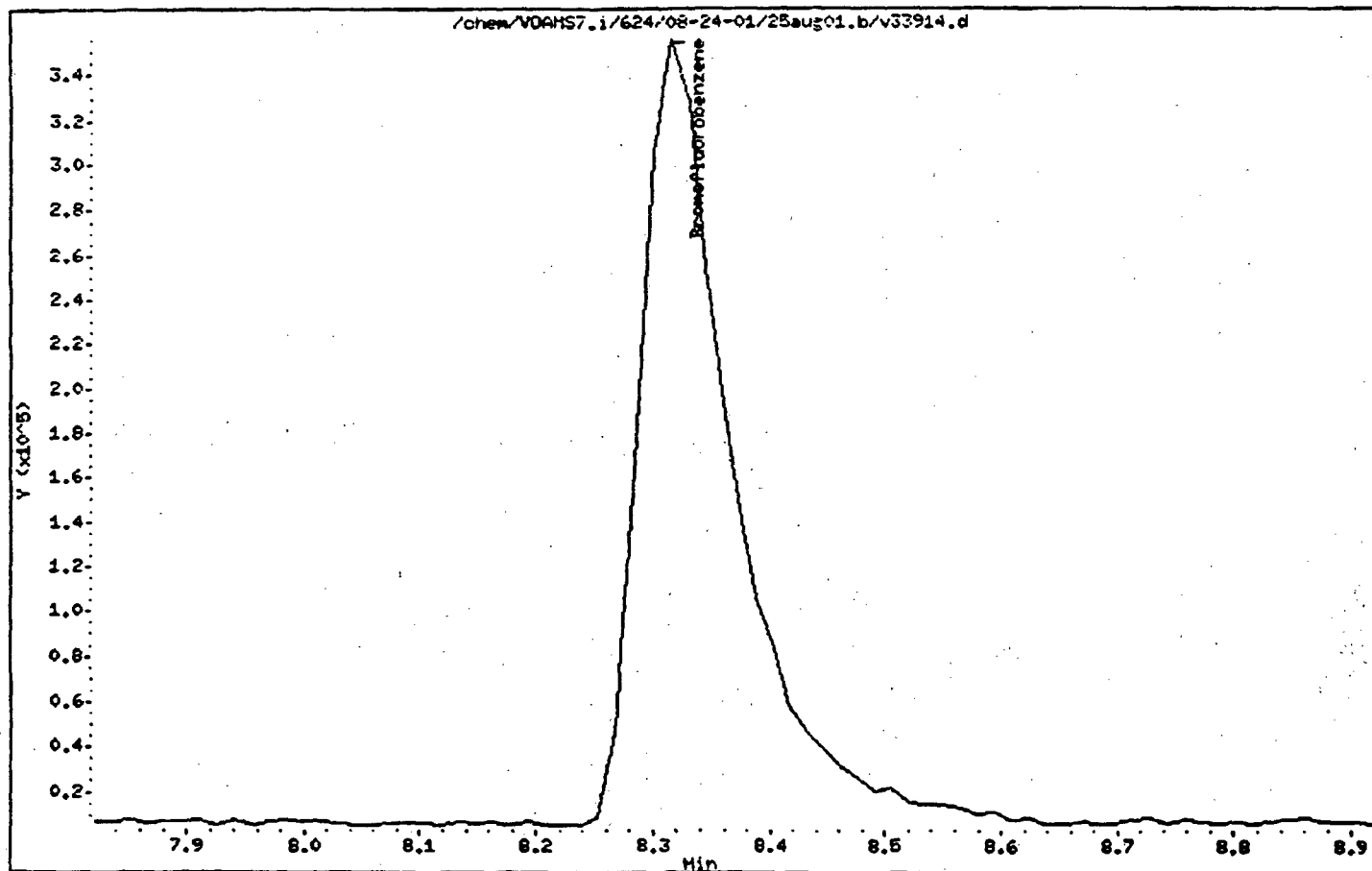
Sample Info: VBFB237 50ng

Instrument: VOAMS7.i

Operator: VOAMS 1

Column phase: DB-624

Column diameter: 0.53



100333

VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab File ID: J19653

BFB Injection Date: 07/09/01

Instrument ID: VOAMS8

BFB Injection Time: 1804

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	21.9
75	30.0 - 60.0% of mass 95	51.7
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	7.5
173	Less than 2.0% of mass 174	0.5 (0.6)1
174	50.0 - 100.0% of mass 95	75.3
175	5.0 - 9.0% of mass 174	4.9 (6.5)1
176	95.0 - 101.0% of mass 174	74.9 (99.4)1
177	5.0 - 9.0% of mass 176	4.9 (6.5)2

1-Value is % mass 174 2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	CLIENT ID	LAB SAMPLE No.	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	JSTD005	JSTD005	J19655	07/09/01	1905
02	JSTD020	JSTD020	J19656	07/09/01	1937
03	JSTD050	JSTD050	J19657	07/09/01	2008
04	JSTD100	JSTD100	J19658	07/09/01	2040
05	JSTD200	JSTD200	J19659	07/09/01	2111
06					
07					
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18					
19					
20					
21					
22					

Date : 09-JUL-2001 18:04

Client ID:

Instrument: VOAMS8.i

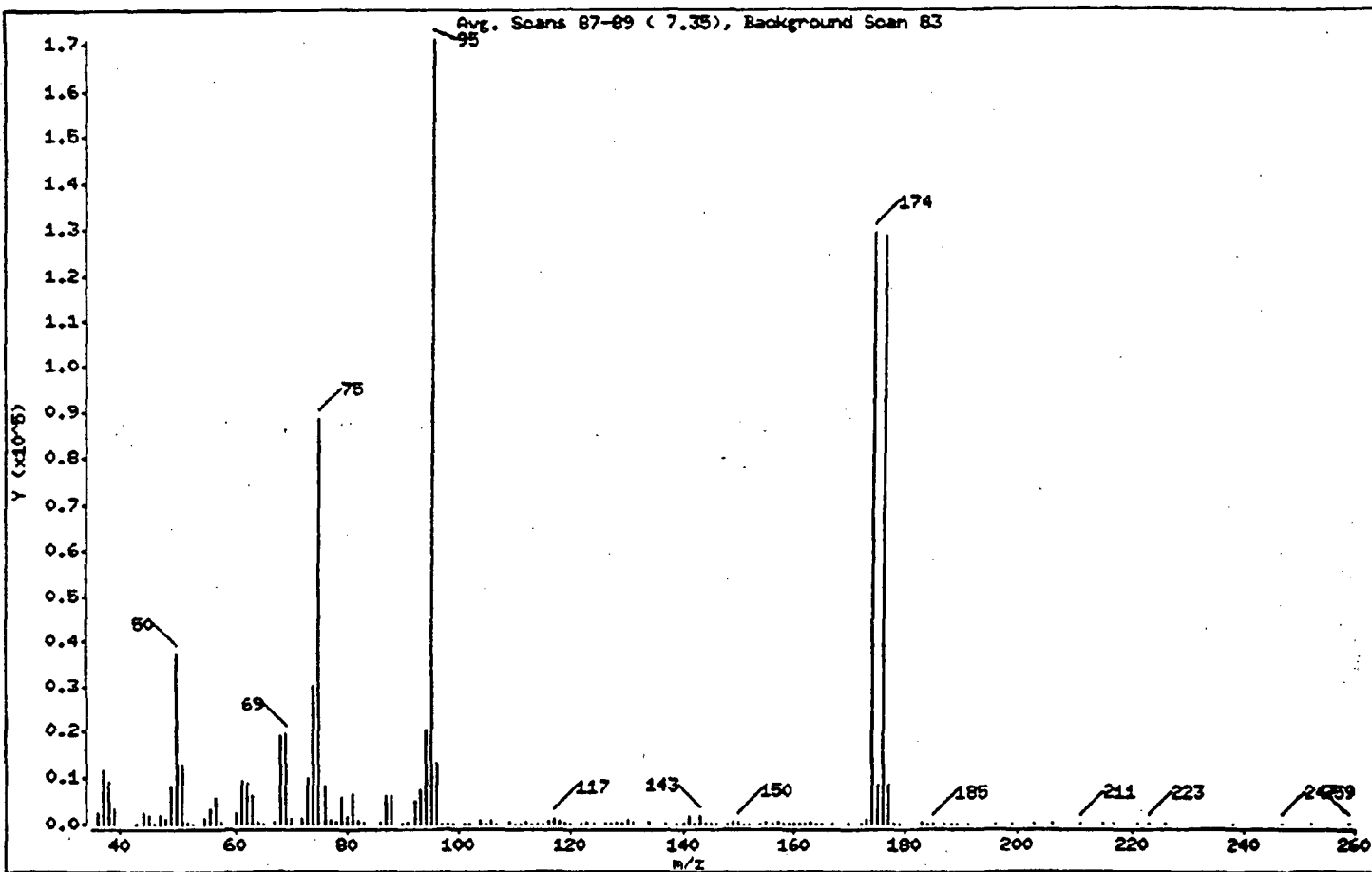
Sample Info: JBFB190

Operator: VOAMS 1

Column phase: DB-624

Column diameter: 0.53

1 Bromofluorobenzene



m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
95	Base Peak, 100% relative abundance	100.00
50	15.00 - 40.00% of mass 95	21.94
75	30.00 - 60.00% of mass 95	51.74
96	5.00 - 9.00% of mass 95	7.53
173	Less than 2.00% of mass 174	0.49 (0.65)
174	50.00 - 100.00% of mass 95	75.32
175	5.00 - 9.00% of mass 174	4.91 (6.52)
176	95.00 - 101.00% of mass 174	74.86 (99.39)
177	5.00 - 9.00% of mass 176	4.87 (6.50)

Date : 09-JUL-2001 18:04

Client ID:

Instrument: VOAMS8.i

Sample Info: JBFB190

Operator: VOAMS 1

Column phase: DB-624

Column diameter: 0.53

Data File: j19653.d

Spectrum: Avg. Scans 87-89 (7.35), Background Scan 83

Location of Maximum: 95.00

Number of points: 139

m/z	Y	m/z	Y	m/z	Y	m/z	Y
36.00	2208	78.00	380	119.00	535	163.00	268
37.00	11323	79.00	5589	120.00	66	164.00	82
38.00	8913	80.00	1517	122.00	111	165.00	38
39.00	3143	81.00	6130	123.00	238	167.00	189
43.00	172	82.00	730	124.00	157	170.00	118
44.00	2447	83.00	269	126.00	151	172.00	114
45.00	1837	86.00	210	127.00	60	173.00	831
46.00	72	87.00	5740	128.00	555	174.00	128720
47.00	1815	88.00	5971	129.00	93	175.00	8390
48.00	1118	90.00	53	130.00	594	176.00	127944
49.00	8034	91.00	282	131.00	458	177.00	8317
50.00	37488	92.00	4756	134.00	233	178.00	125
51.00	12491	93.00	7172	137.00	76	179.00	163
52.00	296	94.00	20080	139.00	180	183.00	217
53.00	51	95.00	170880	140.00	12	184.00	100
55.00	992	96.00	12875	141.00	1569	185.00	90
56.00	3084	97.00	180	142.00	191	187.00	76
57.00	5422	98.00	130	143.00	1605	188.00	36
58.00	222	99.00	24	144.00	136	189.00	73
60.00	2196	101.00	89	145.00	147	191.00	16
61.00	8992	102.00	146	146.00	182	196.00	40
62.00	8636	104.00	714	148.00	14	199.00	41
63.00	5917	105.00	89	149.00	219	203.00	29
64.00	398	106.00	676	150.00	362	206.00	34
65.00	75	107.00	84	151.00	124	211.00	82
67.00	421	109.00	261	152.00	58	215.00	36
68.00	18840	110.00	75	154.00	138	217.00	42
69.00	19344	111.00	124	155.00	309	221.00	79
70.00	1100	112.00	198	156.00	38	223.00	108
72.00	1063	113.00	154	157.00	342	226.00	40
73.00	9283	114.00	116	158.00	47	238.00	35
74.00	29664	115.00	195	159.00	34	247.00	42
75.00	88432	116.00	706	160.00	39	252.00	37
76.00	7700	117.00	1084	161.00	158	259.00	49
77.00	763	118.00	638	162.00	4		

Date : 09-JUL-2001 18:04

Client ID:

Instrument: VOAMS8.i

Sample Info: JBFB190

Operator: VOAMS 1

Column phase: DB-624

Column diameter: 0.53

Data File: j19653.d

Spectrum: Avg. Scans 87-89 (7.35), Background Scan 83

Location of Maximum: 95.00

Number of points: 139

m/z	Y	m/z	Y	m/z	Y	m/z	Y

Date : 09-JUL-2001 18:04

Client ID:

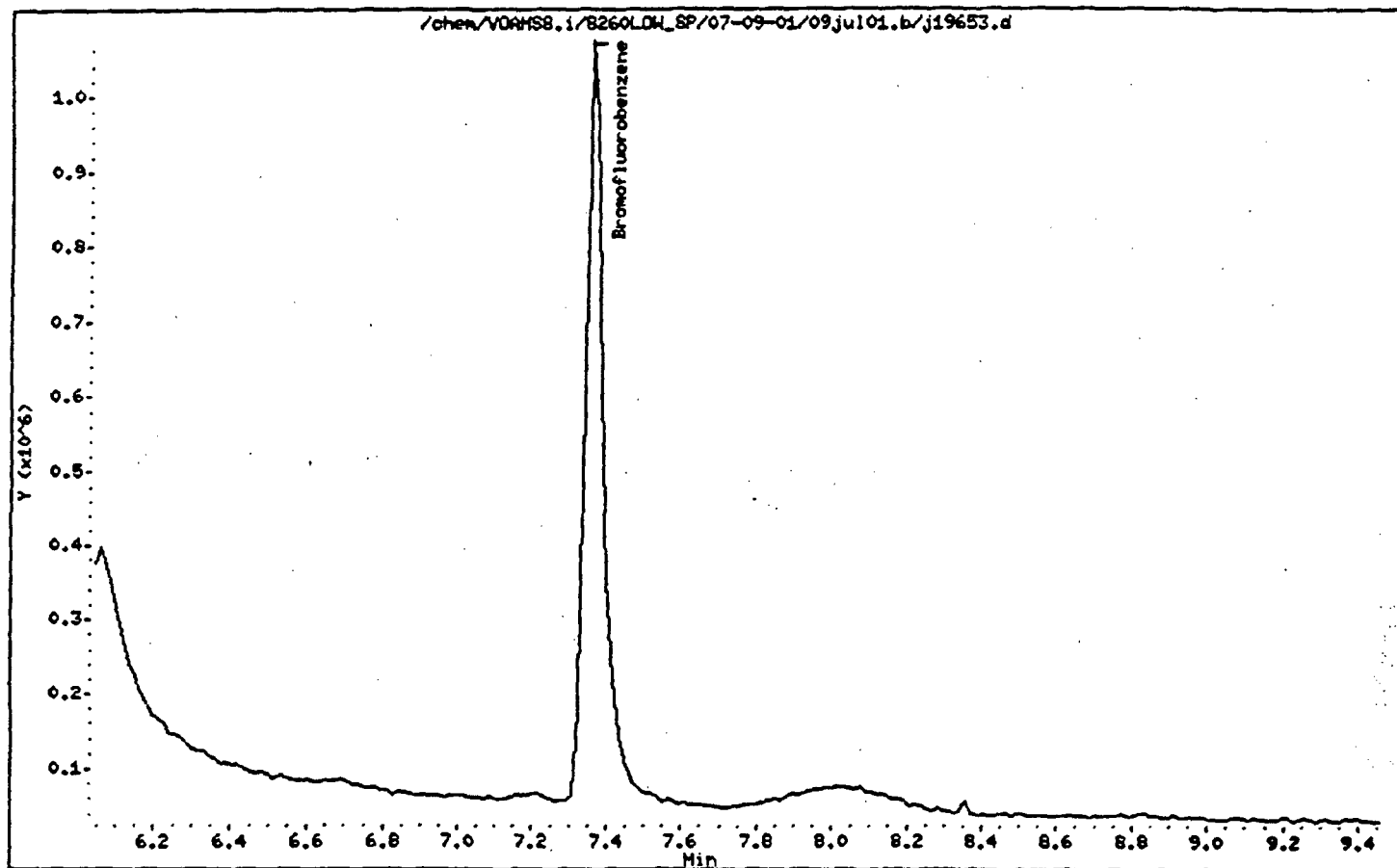
Instrument: VOAHS8.1

Sample Info: JBFB190

Operator: VOAHS 1

Column phase: DB-624

Column diameter: 0.53



100338

VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab File ID: J20781

BFB Injection Date: 08/27/01

Instrument ID: VOAMS8

BFB Injection Time: 0841

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	19.4
75	30.0 - 60.0% of mass 95	46.3
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	6.4
173	Less than 2.0% of mass 174	0.5 (0.6)1
174	50.0 - 100.0% of mass 95	78.4
175	5.0 - 9.0% of mass 174	5.2 (6.6)1
176	95.0 - 101.0% of mass 174	78.4 (100.0)1
177	5.0 - 9.0% of mass 176	5.0 (6.4)2

1-Value is % mass 174

2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	CLIENT ID	LAB SAMPLE No.	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	JSTD239	JSTD239	J20782	08/27/01	0859
02	JV239	JV239	J20786	08/27/01	1229
03	HB-01-SOIL	296426	J20787	08/27/01	1259
04	HB-01-SOILMS	296426MS	J20799	08/27/01	1912
05	HB-01-SOILMS	296426MSD	J20800	08/27/01	1943
06					
07					
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11					
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14					
15					
16					
17					
18					
19					
20					
21					
22					

Date : 27-AUG-2001 08:41

Client ID:

Instrument: VOAMS8.i

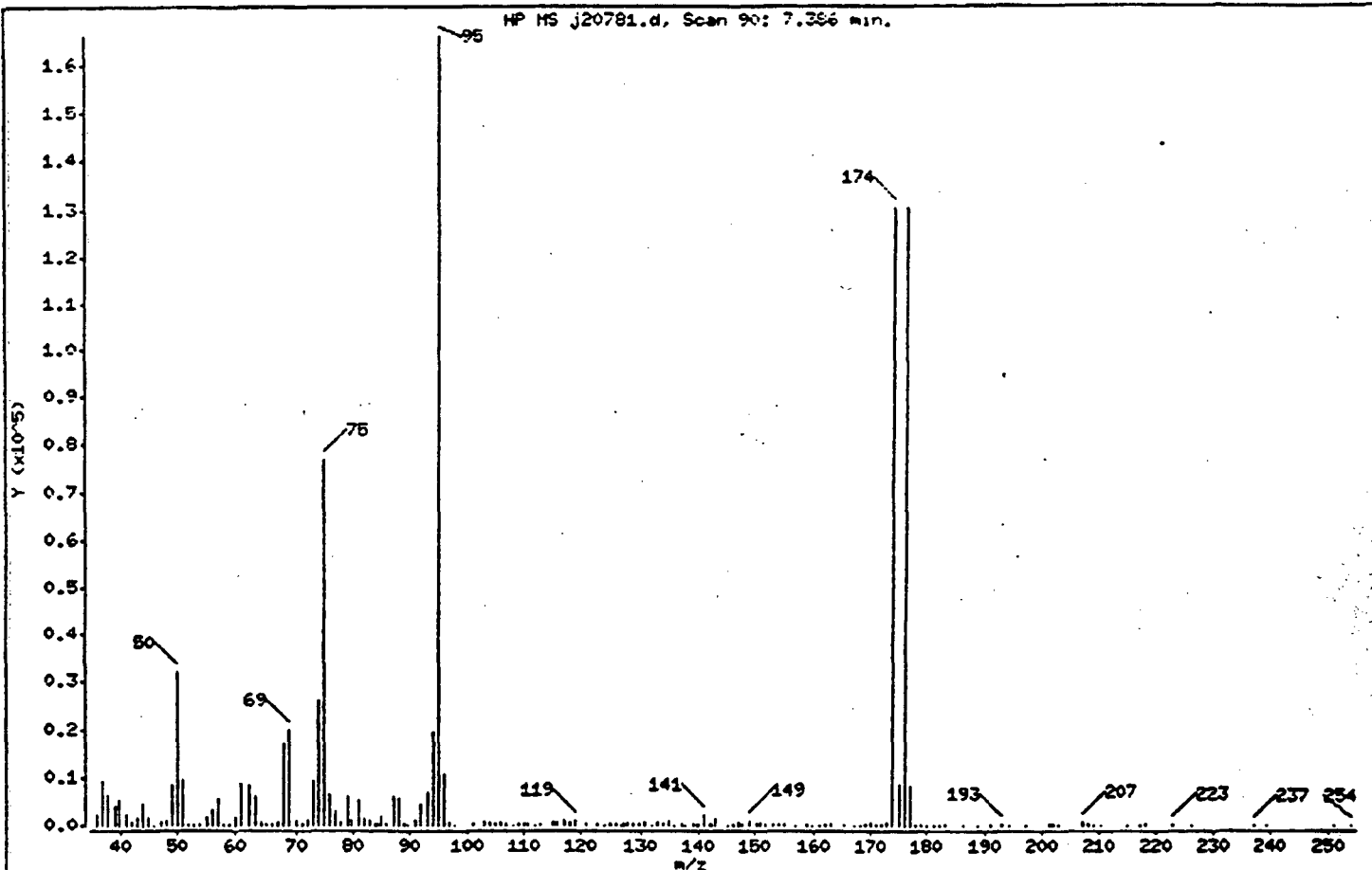
Sample Info: JBFB239. 50ng

Operator: VOAMS 1

Column phase: DB-624

Column diameter: 0.53

1 Bromofluorobenzene



m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
95	Base Peak, 100% relative abundance	100.00
50	15.00 - 40.00% of mass 95	19.41
75	30.00 - 60.00% of mass 95	46.30
96	5.00 - 9.00% of mass 95	6.43
173	Less than 2.00% of mass 174	0.50 (0.63)
174	50.00 - 100.00% of mass 95	78.36
175	5.00 - 9.00% of mass 174	5.20 (6.64)
176	95.00 - 101.00% of mass 174	78.36 (100.00)
177	5.00 - 9.00% of mass 176	4.98 (6.35)

Date : 27-MIG-2001 08:41

Client ID:

Instrument: VOAMS8.1

Sample Info: JREF239. 5mg

Operator: VOAMS 1

Column phase: DB-624

Column diameter: 0.53

Data File: j20781.d

Spectrum: HP MS j20781.d, Scan 90: 7.386 min.

Location of Maximum: 94.95

Number of points: 165

m/z	Y	m/z	Y	m/z	Y	m/z	Y
36.00	2202	77.80	821	124.90	353	168.05	130
37.00	8983	78.90	6216	125.90	279	168.95	373
38.00	6626	79.90	1090	126.80	159	170.05	673
39.00	4039	80.90	5259	127.20	231	170.95	279
39.90	5186	81.80	1382	127.95	694	171.85	237
41.00	2202	83.00	1005	128.95	243	172.95	826
42.10	705	83.90	421	129.85	440	173.95	130136
43.00	1536	84.10	399	130.85	928	174.95	8642
44.00	4715	84.90	1756	131.85	143	175.95	130136
45.00	1982	85.80	252	132.95	747	176.95	8269
45.75	119	86.95	6096	133.95	306	178.05	362
47.05	790	87.85	5847	134.95	1223	178.90	224
47.95	1005	89.05	217	135.95	177	180.00	168
48.95	8477	89.45	165	137.05	504	181.00	165
49.95	32232	90.95	1034	137.60	117	182.10	120
50.95	9597	91.95	4495	137.80	117	183.10	517
52.05	394	92.95	6812	139.10	458	186.10	180
52.85	385	93.95	19304	139.80	270	188.95	134
53.95	332	94.95	166080	140.00	233	190.95	411
54.95	1959	95.95	10684	140.90	2424	192.95	541
55.95	3487	96.90	857	141.90	287	194.15	143
57.00	5623	97.80	169	142.20	240	196.95	133
58.00	338	100.90	532	142.90	1635	197.15	159
58.80	406	103.00	593	145.00	153	201.10	280
59.90	1858	104.00	826	145.90	326	202.00	246
60.90	8811	104.80	519	147.00	742	202.80	136
62.00	8571	105.90	595	147.65	240	207.00	946
63.00	6285	106.90	251	148.85	1050	208.00	201
63.90	928	107.95	126	150.05	266	209.05	101
65.00	421	109.05	343	150.95	684	210.15	128
65.90	353	109.95	234	151.75	196	214.95	167
66.95	713	110.75	356	152.95	370	217.05	111
67.95	17120	111.75	177	153.95	332	218.15	208
68.95	19896	112.95	397	155.05	524	222.90	222
69.95	1073	115.05	717	156.95	152	226.00	146

Date : 27-AUG-2001 08:41

Client ID:

Instrument: VOAMS.i

Sample Info: JBFB239 50ng

Operator: VOAMS 1

Column phase: DB-624

Column diameter: 0.53

Data File: j20781.d

Spectrum: HP MS j20781.d, Scan 90: 7.386 min.

Location of Maximum: 94.95

Number of points: 165

m/z	Y	m/z	Y	m/z	Y	m/z	Y
70.95	490	115.95	862	158.80	360	236.95	177
71.95	1084	116.95	1011	159.80	116	239.15	120
72.95	9310	117.90	893	160.90	135	251.05	126
73.95	25776	118.90	1249	162.00	195	253.85	117
74.95	76888	120.90	293	162.90	327		
75.95	6338	122.90	318	165.30	233		
76.90	3130	124.10	119	167.00	148		

Method Blank Results Summary

100343

VOLATILE METHOD BLANK SUMMARY

LAB SAMPLE NO.

DV239A

Matrix: WATER

Date Analyzed: 08/27/01

Level: LOW

Time Analyzed: 1201

Lab File ID: D22108A

Instrument ID: VOAMS4

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	CLIENT ID.	LAB SAMPLE NO	LAB FILE ID	TIME ANALYZED
	=====	=====	=====	=====
01	HB-01-SOIL	296426	D22110	1308
02				
03				
04				
05				
06				
07				
08				
09				
10				
11				
12				
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29				
30				

COMMENTS:

Client ID: DV239A
Site:

Lab Sample No: DV239A
Lab Job No: 0033

Date Sampled: _____
Date Received: _____
Date Prepped: _____
Date Analyzed: 08/27/01
Lab File ID: d22108a.d

Leachate Volume: 5.0 ml
Dilution Factor: 1.0
GC Column: DB624
Instrument ID: VOAMS4.i

TOXICITY CHARACTERISTIC LEACHING PROCEDURE

VOLATILE ORGANICS - GC/MS

<u>Parameter</u>	<u>Analytical Result Units: mg/l</u>	<u>Regulatory Level Units: mg/l</u>	<u>Quantitation Limit Units: mg/l</u>
Vinyl Chloride	ND	0.2	0.0050
1,1-Dichloroethene	ND	0.7	0.0020
Chloroform	ND	6.0	0.0050
1,2-Dichloroethane	ND	0.5	0.0020
Methyl Ethyl Ketone	ND	200	0.0050
Carbon Tetrachloride	ND	0.5	0.0020
Trichloroethene	ND	0.5	0.0010
Benzene	ND	0.5	0.0010
Tetrachloroethene	ND	0.7	0.0010
Chlorobenzene	ND	100	0.0050

100345

Data File: /chem/VOAMS4.i/8260HIGH_SP/08-23-01/27aug01.b/d22108a.d
Report Date: 28-Aug-2001 14:46

STL Edison

VOLATILE ORGANIC COMPOUND ANALYSIS

Data file : /chem/VOAMS4.i/8260HIGH_SP/08-23-01/27aug01.b/d22108a.d
Lab Smp Id: DV239A Client Smp ID: DV239A
Inj Date : 27-AUG-2001 12:01
Operator : VOAMS 4 Inst ID: VOAMS4.i
Smp Info : DV239a
Misc Info :
Comment :
Method : /chem/VOAMS4.i/8260HIGH_SP/08-23-01/27aug01.b/8260H_01.m
Meth Date : 28-Aug-2001 09:02 czhao Quant Type: ISTD
Cal Date : 23-AUG-2001 17:08 Cal File: d22051.d
Als bottle: 29 QC Sample: BLANK
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: all.sub
Target Version: 3.50

Concentration Formula: Amt * DF * 5/Vo * CpndVariable

Name	Value	Description
DF	1.00000	Dilution Factor
Vo	5.00000	SampleVolume

Cpnd Variable

Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
						ON-COLUMN (ug/L)	FINAL (ug/L)
16 1,2-Dichloroethane-d4 (SUR)	65	9.316	9.319	(0.954)	1471157	49.1647	49
19 Fluorobenzene	96	9.761	9.764	(1.000)	4073333	50.0000	
37 Toluene-d8 (SUR)	98	11.749	11.737	(0.872)	3677119	46.8295	47
32 Chlorobenzene-d5	117	13.470	13.472	(1.000)	3451641	50.0000	
41 Bromofluorobenzene (SUR)	174	14.760	14.763	(0.922)	2058987	47.3192	47
91 1,4-Dichlorobenzene-d4	152	16.007	16.009	(1.000)	2141476	50.0000	

100346

Data File: /chem/VOAMS4.i/8260HIGH_SP/08-23-01/27aug01.b/d22108a.d
Report Date: 28-Aug-2001 14:46

STL Edison

VOLATILE ORGANIC COMPOUND ANALYSIS

Data file : /chem/VOAMS4.i/8260HIGH_SP/08-23-01/27aug01.b/d22108a.d
Lab Smp Id: DV239A Client Smp ID: DV239A
Inj Date : 27-AUG-2001 12:01
Operator : VOAMS 4 Inst ID: VOAMS4.i
Smp Info : DV239a
Misc Info :
Comment :
Method : /chem/VOAMS4.i/8260HIGH_SP/08-23-01/27aug01.b/8260H_01.m
Meth Date : 28-Aug-2001 09:02 czhao Quant Type: ISTD
Cal Date : 23-AUG-2001 17:08 Cal File: d22051.d
Als bottle: 29 QC Sample: BLANK
Dil Factor: 1.00000
Integrator: HP RTE Compound Sublist: all.sub
Target Version: 3.50

Concentration Formula: Amt * DF * 5/Vo * CpndVariable

Name	Value	Description
DF	1.00000	Dilution Factor
Vo	5.00000	SampleVolume

Cpnd Variable

Local Compound Variable

Compounds	QUANT SIG	MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
							ON-COLUMN	FINAL
							(ug/L)	(ug/L)
\$ 16 1,2-Dichloroethane-d4 (SUR)	65	9.316	9.319	(0.954)	1471157	49.1647	49	
* 19 Fluorobenzene	96	9.761	9.764	(1.000)	4073333	50.0000		
\$ 37 Toluene-d8 (SUR)	98	11.749	11.737	(0.872)	3677119	46.8295	47	
* 32 Chlorobenzene-d5	117	13.470	13.472	(1.000)	3451641	50.0000		
\$ 41 Bromofluorobenzene (SUR)	174	14.760	14.763	(0.922)	2058987	47.3192	47	
* 91 1,4-Dichlorobenzene-d4	152	16.007	16.009	(1.000)	2141476	50.0000		

100347

Data File: /chem/VOAH54.1/8260HIGH_SP/08-23-01/27aug01.b/d22108s.d

Date : 27-AUG-2001 12:01

Client ID: DV239A

Sample Info: DV239A

Purge Volume: 5.0

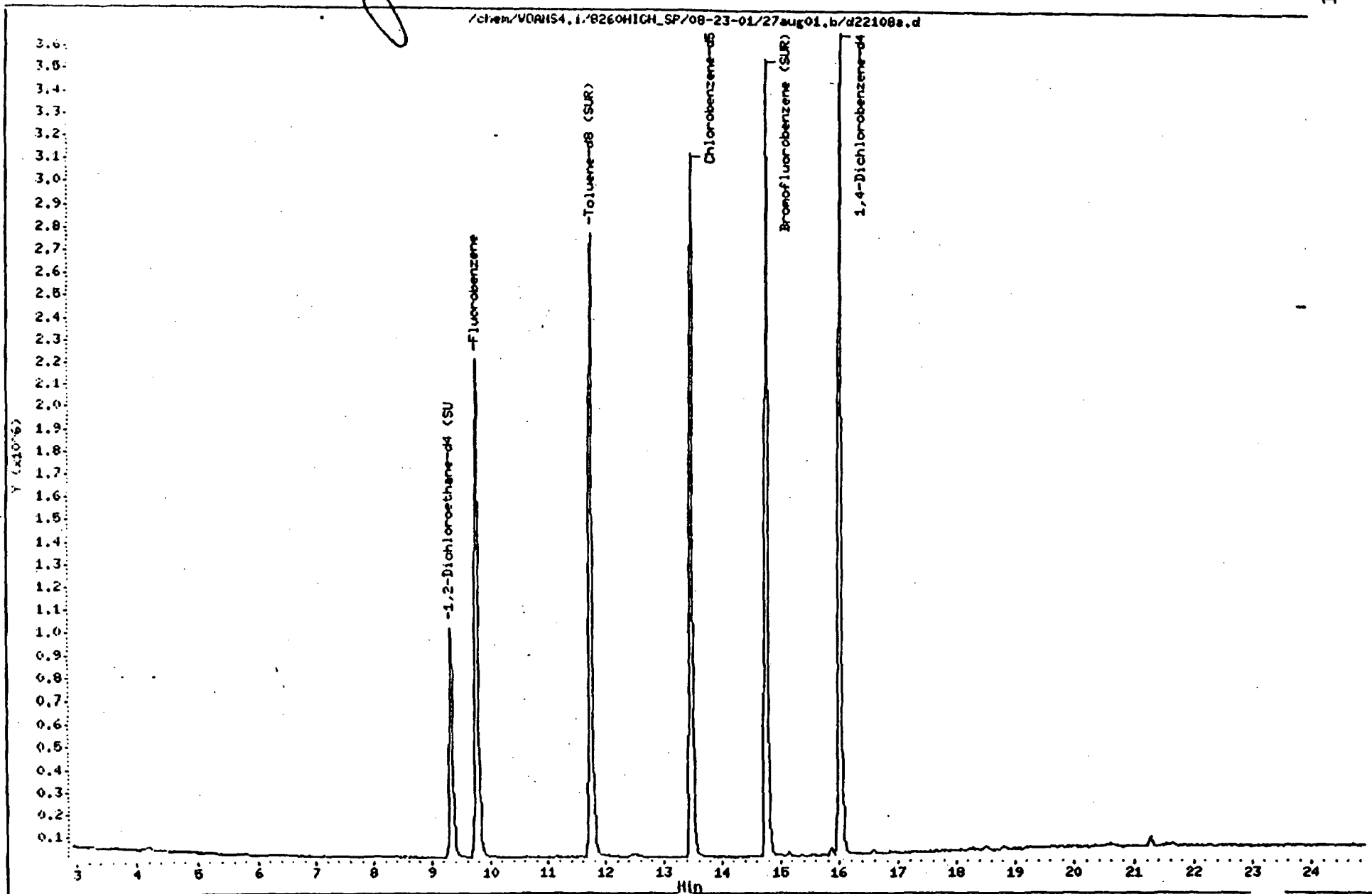
Column Phase: DB624

Instrument: VOAH54.1

Operator: VOAH5 4

Column diameter: 0.53

100348



VOLATILE METHOD BLANK SUMMARY

LAB SAMPLE NO.

VV237B

Matrix: WATER

Date Analyzed: 08/25/01

Level: LOW

Time Analyzed: 2247

Lab File ID: V33944

Heated Purge (Y/N) N

Instrument ID: VOAMS7

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	CLIENT ID.	LAB SAMPLE NO	LAB FILE ID	TIME ANALYZED
	=====	=====	=====	=====
01	HB-01	296288	V33948	0038
02				
03				
04				
05				
06				
07				
08				
09				
10				
11				
12				
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27				
28				
29				
30				

COMMENTS:

Client ID: VV237B
Site:

Lab Sample No: VV237B
Lab Job No: 0033

Date Sampled: _____
Date Received: _____
Date Analyzed: 08/25/01
GC Column: DB624
Instrument ID: VOAMS7.i
Lab File ID: v33944.d

Matrix: WATER
Level: LOW
Purge Volume: 5.0 ml
Dilution Factor: 1.0

VOLATILE ORGANICS - GC/MS
METHOD 624

<u>Parameter</u>	<u>Analytical Result</u> <u>Units: ug/l</u>	<u>Method Detection</u>
		<u>Limit</u> <u>Units: ug/l</u>
Chloromethane	ND	0.3
Bromomethane	ND	0.2
Vinyl Chloride	ND	0.2
Chloroethane	ND	0.3
Methylene Chloride	ND	1.0
Acetone	ND	1.5
Carbon Disulfide	ND	0.2
Trichlorofluoromethane	ND	0.4
1,1-Dichloroethene	ND	0.2
1,1-Dichloroethane	ND	0.2
trans-1,2-Dichloroethene	ND	0.2
cis-1,2-Dichloroethene	ND	0.2
Chloroform	ND	0.2
1,2-Dichloroethane	ND	0.2
2-Butanone	ND	0.6
1,1,1-Trichloroethane	ND	0.3
Carbon Tetrachloride	ND	0.2
Bromodichloromethane	ND	0.2
1,2-Dichloropropane	ND	0.2
cis-1,3-Dichloropropene	ND	0.2
Trichloroethene	ND	0.3
Dibromochloromethane	ND	0.1
1,1,2-Trichloroethane	ND	0.2
Benzene	ND	0.2
trans-1,3-Dichloropropene	ND	0.2
2-Chloroethyl Vinyl Ether	ND	0.4
Bromoform	ND	0.2
4-Methyl-2-Pentanone	ND	0.2
2-Hexanone	ND	0.4
Tetrachloroethene	ND	0.3
1,1,2,2-Tetrachloroethane	ND	0.1
Toluene	ND	0.2
Chlorobenzene	ND	0.2
Ethylbenzene	ND	0.2

100350

Client ID: VV237B
Site:

Lab Sample No: VV237B
Lab Job No: 0033

Date Sampled: _____
Date Received: _____
Date Analyzed: 08/25/01
GC Column: DB624
Instrument ID: VOAMS7.i
Lab File ID: v33944.d

Matrix: WATER
Level: LOW
Purge Volume: 5.0 ml
Dilution Factor: 1.0

VOLATILE ORGANICS - GC/MS (cont'd)
METHOD 624

<u>Parameter</u>	<u>Analytical Result</u> <u>Units: ug/l</u>	<u>Method Detection</u> <u>Limit</u> <u>Units: ug/l</u>
Styrene	ND	0.1
Xylene (Total)	ND	0.2
Ethyl Ether	ND	0.2
Acrolein	ND	7.7
Freon TF	ND	0.3
Isopropanol	ND	500
Acetonitrile	ND	100
TBA	ND	5.8
Acrylonitrile	ND	2.8
MTBE	ND	0.2
Hexane	ND	0.5
DIPE	ND	0.2
Ethyl Acetate	ND	0.8
Vinyl Acetate	ND	5.0
Tetrahydrofuran	ND	5.0
Cyclohexane	ND	0.3
Isobutanol	ND	500
Isopropyl Acetate	ND	0.9
n-Heptane	ND	1.0
n-Butanol	ND	250
Propyl Acetate	ND	0.4
Butyl Acetate	ND	0.5
1,2-Dibromoethane	ND	0.2
1,3-Dichlorobenzene	ND	0.2
1,4-Dichlorobenzene	ND	0.2
1,2-Dichlorobenzene	ND	0.1
Naphthalene	ND	0.3
Methylnaphthalene (total)	ND	1.0
Dimethylnaphthalene (total)	ND	1.0
Dichlorodifluoromethane	ND	0.5
1,4-Dioxane	ND	67
n-Pentane	ND	0.6
5-Methyl-2-Hexanone	ND	5.0
Isopropylbenzene	ND	0.2

100351

Client ID: VV237B
Site:

Lab Sample No: VV237B
Lab Job No: 0033

Date Sampled: _____
Date Received: _____
Date Analyzed: 08/25/01
GC Column: DB624
Instrument ID: VOAMS7.i
Lab File ID: v33944.d

Matrix: WATER
Level: LOW
Purge Volume: 5.0 ml
Dilution Factor: 1.0

VOLATILE ORGANICS - GC/MS (cont'd)
METHOD 624

<u>Parameter</u>	<u>Analytical Result</u> <u>Units: ug/l</u>	<u>Method Detection</u> <u>Limit</u> <u>Units: ug/l</u>
1,2,4-Trimethylbenzene	ND	0.2
Cyclohexanone	ND	100
1,2,4-Trichlorobenzene	ND	0.2
Methyl Methacrylate	ND	0.3
Allyl Alcohol	ND	1000
Epichlorohydrin	ND	3.8
Allyl Chloride	ND	5.0
Benzyl Chloride	ND	0.5
Isoprene	ND	0.3
1,1,1,2-Tetrachloroethane	ND	0.2
Camphene (total)	ND	20
Camphor	ND	20
1,3,5-Trimethylbenzene	ND	0.2
1,2,3-Trichlorobenzene	ND	0.3
n-Butylbenzene	ND	1.0
sec-Butylbenzene	ND	1.0
tert-Butylbenzene	ND	1.0
p-Isopropyltoluene	ND	1.0
n-Propylbenzene	ND	1.0
m+p-Ethyltoluene	ND	1.0
o-Ethyltoluene	ND	1.0
Methyl Acetate	ND	0.4
Methyl cyclohexane	ND	0.3
1,2-Dibromo-3-chloropropane	ND	0.4
Cyclohexene	ND	1.0
1,2-Dichlorotrifluoroethane	ND	1.0
n-Propanol	ND	250
3-Methyl-1-Pentyn-3-ol	ND	250
Propylene Oxide	ND	50
Ethanol	ND	500
Chlorotrifluoroethane	ND	1.0
Dichlorofluoromethane	ND	1.0
Ethylene Oxide	ND	500
Methyl Formate	ND	500

100352

Client ID: VV237B
Site:

Lab Sample No: VV237B
Lab Job No: 0033

Date Sampled: _____
Date Received: _____
Date Analyzed: 08/25/01
GC Column: DB624
Instrument ID: VOAMS7.i
Lab File ID: v33944.d

Matrix: WATER
Level: LOW
Purge Volume: 5.0 ml
Dilution Factor: 1.0

VOLATILE ORGANICS - GC/MS (cont'd)
METHOD 624

<u>Parameter</u>	<u>Analytical Result</u> <u>Units: ug/l</u>	<u>Method Detection</u> <u>Limit</u> <u>Units: ug/l</u>
Isobutyraldehyde	ND	5.0
Amyl Acetate	ND	5.0

100353

Client ID: VV237B
Site:

Lab Sample No: VV237B
Lab Job No: 0033

Date Sampled: _____
Date Received: _____
Date Analyzed: 08/25/01
GC Column: DB624
Instrument ID: VOAMS7.i
Lab File ID: v33944.d

Matrix: WATER
Level: LOW
Purge Volume: 5.0 ml
Dilution Factor: 1.0

VOLATILE ORGANICS - GC/MS
TENTATIVELY IDENTIFIED COMPOUNDS
METHOD 624

COMPOUND NAME	RT	EST. CONC. ug/l	Q
=====	=====	=====	=====
1. NO VOLATILE ORGANIC COMPOUNDS FOUND			
2.			
3.			
4.			
5.			
6.			
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30.			

TOTAL ESTIMATED CONCENTRATION

0.0

100354

Data File: /chem/VOAMS7.i/624/08-24-01/25aug01.b/v33944.d
Report Date: 26-Aug-2001 13:09

STL Edison

VOLATILE ORGANIC COMPOUND ANALYSIS

Data file : /chem/VOAMS7.i/624/08-24-01/25aug01.b/v33944.d
Lab Smp Id: VV237B
Inj Date : 25-AUG-2001 22:47
Operator : VOAMS 7
Smp Info : VV237B;
Misc Info :
Comment :
Method : /chem/VOAMS7.i/624/08-24-01/25aug01.b/624 01.m
Meth Date : 25-Aug-2001 17:10 davidl
Cal Date : 24-AUG-2001 13:08
Als bottle: 25
Dil Factor: 1.00000
Integrator: HP RTE
Target Version: 3.50
Inst ID: VOAMS7.i
Quant Type: ISTD
Cal File: v33878.d
QC Sample: BLANK
Compound Sublist: all.sub

Concentration Formula: Amt * DF * 5/Vo * CpndVariable

Name	Value	Description
DF	1.00000	Dilution Factor
Vo	5.00000	Sample Volume

Cpnd Variable

Local Compound Variable

Compounds	QUANT SIG	CONCENTRATIONS					
		MASS	RT	EXP RT	REL RT	RESPONSE	ON-COLUMN FINAL (ug/L) (ug/L)
• 2 Bromochloromethane	128	8.576	8.565	(1.000)	545678	30.0000	
\$ 16 1,2-Dichloroethane-d4 (SUR)	104	9.319	9.307	(0.946)	146979	31.1842	31
• 19 1,4-Difluorobenzene	114	9.853	9.842	(1.000)	2208684	30.0000	
\$ 37 Toluene-d8 (SUR)	98	11.709	11.698	(0.874)	2032138	29.4652	29
• 32 Chlorobenzene-d5	117	13.401	13.375	(1.000)	1753284	30.0000	
\$ 41 Bromofluorobenzene (SUR)	174	14.678	14.652	(1.095)	957821	27.6772	28

100355

Date : 25-AUG-2001 22:47

Client ID:

Sample Info: V02375;

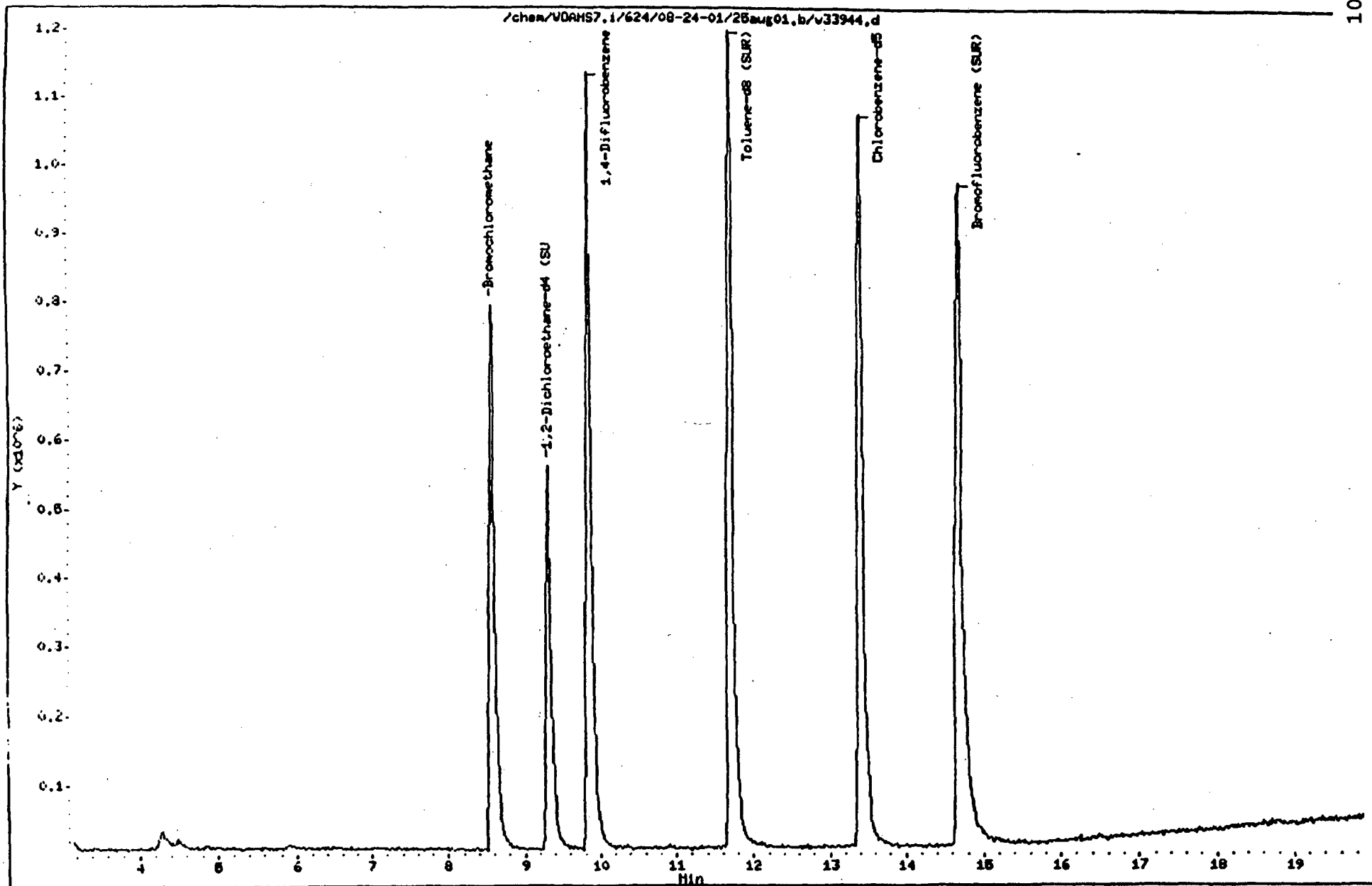
Purge Volume: 5.0

Column phase: DB624

Instrument: V04MS7.1

Operator: V04MS 7

Column diameter: 0.53



100356

0033

VOLATILE METHOD BLANK SUMMARY

LAB SAMPLE NO.

JV239

Matrix: SOIL

Date Analyzed: 08/27/01

Level: LOW

Time Analyzed: 1229

Lab File ID: J20786

Heated Purge (Y/N) Y

Instrument ID: VOAMS8

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	CLIENT ID.	LAB SAMPLE NO	LAB FILE ID	TIME ANALYZED
	=====	=====	=====	=====
01	HB-01-SOIL	296426	J20787	1259
02	HB-01-SOILMS	296426MS	J20799	1912
03	HB-01-SOILMSD	296426MSD	J20800	1943
04				
05				
06				
07				
08				
09				
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COMMENTS:

page 1 of 1

100357

Client ID: JV239
Site:

Lab Sample No: JV239
Lab Job No: 0033

Date Sampled: _____
Date Received: _____
Date Analyzed: 08/27/01
GC Column: DB624
Instrument ID: VOAMS8.i
Lab File ID: j20786.d

Matrix: SOIL
Level: LOW
Sample Weight: 5.0 g
Purge Volume: 5.0 ml
% Moisture: 0

VOLATILE ORGANICS - GC/MS
METHOD 8260B

<u>Parameter</u>	<u>Analytical Results</u>		<u>Quantitation</u>
	<u>Units: ug/kg</u> <u>(Dry Weight)</u>		<u>Limit</u> <u>Units: ug/kg</u>
Chloromethane	ND		5.0
Bromomethane	ND		5.0
Vinyl Chloride	ND		5.0
Chloroethane	ND		5.0
Methylene Chloride	1.9J		3.0
Acetone	ND		5.0
Carbon Disulfide	ND		5.0
Trichlorofluoromethane	ND		5.0
1,1-Dichloroethene	ND		2.0
1,1-Dichloroethane	ND		5.0
trans-1,2-Dichloroethene	ND		5.0
cis-1,2-Dichloroethene	ND		5.0
Chloroform	ND		5.0
1,2-Dichloroethane	ND		2.0
2-Butanone	ND		5.0
1,1,1-Trichloroethane	ND		5.0
Carbon Tetrachloride	ND		2.0
Bromodichloromethane	ND		1.0
1,2-Dichloropropane	ND		1.0
cis-1,3-Dichloropropene	ND		5.0
Trichloroethene	ND		1.0
Dibromochloromethane	ND		5.0
1,1,2-Trichloroethane	ND		3.0
Benzene	ND		1.0
trans-1,3-Dichloropropene	ND		5.0
2-Chloroethyl Vinyl Ether	ND		5.0
Bromoform	ND		4.0
4-Methyl-2-Pentanone	ND		5.0
2-Hexanone	ND		5.0
Tetrachloroethene	ND		1.0
1,1,2,2-Tetrachloroethane	ND		1.0
Toluene	ND		5.0
Chlorobenzene	ND		5.0
Ethylbenzene	ND		4.0

100358

Client ID: JV239
Site:

Lab Sample No: JV239
Lab Job No: 0033

Date Sampled: _____
Date Received: _____
Date Analyzed: 08/27/01
GC Column: DB624
Instrument ID: VOAMS8.i
Lab File ID: j20786.d

Matrix: SOIL
Level: LOW
Sample Weight: 5.0 g
Purge Volume: 5.0 ml
% Moisture: 0

VOLATILE ORGANICS - GC/MS (cont'd)
METHOD 8260B

Parameter	Analytical Results	Quantitation
	Units: ug/kg (Dry Weight)	Limit Units: ug/kg
Styrene	ND	5.0
Xylene (Total)	ND	5.0
Ethyl Ether	ND	5.0
Acrolein	ND	100
Freon TF	ND	5.0
Isopropanol	ND	1000
Acetonitrile	ND	100
TBA	ND	100
Acrylonitrile	ND	50
MTBE	ND	5.0
Hexane	ND	5.0
DIPE	ND	5.0
Ethyl Acetate	ND	10
Vinyl Acetate	ND	5.0
Tetrahydrofuran	ND	5.0
Cyclohexane	ND	5.0
Isobutanol	ND	500
Isopropyl Acetate	ND	10
n-Heptane	ND	5.0
n-Butanol	ND	500
Propyl Acetate	ND	10
Butyl Acetate	ND	10
1,2-Dibromoethane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
Naphthalene	ND	5.0
Methylnaphthalene (total)	ND	5.0
Dimethylnaphthalene (total)	ND	5.0
Dichlorodifluoromethane	ND	5.0
1,1-Dichloropropene	ND	5.0
1,2,4-Trichlorobenzene	ND	5.0
Hexachlorobutadiene	ND	5.0
1,4-Dioxane	ND	1000

100359

Client ID: JV239
Site:

Lab Sample No: JV239
Lab Job No: 0033

Date Sampled: _____
Date Received: _____
Date Analyzed: 08/27/01
GC Column: DB624
Instrument ID: VOAMS8.i
Lab File ID: j20786.d

Matrix: SOIL
Level: LOW
Sample Weight: 5.0 g
Purge Volume: 5.0 ml
& Moisture: 0

VOLATILE ORGANICS - GC/MS (cont'd)
METHOD 8260B

Parameter	Analytical Results	Quantitation
	Units: ug/kg (Dry Weight)	Limit Units: ug/kg
Methyl Acrylate	ND	5.0
1,1,1,2-Tetrachloroethane	ND	5.0
1,2,3-Trichlorobenzene	ND	5.0
1,2,3-Trichloropropane	ND	5.0
1,2,4-Trimethylbenzene	ND	5.0
1,2-Dibromo-3-chloropropane	ND	5.0
1,3,5-Trimethylbenzene	ND	5.0
1,3-Dichloropropane	ND	5.0
2,2-Dichloropropane	ND	5.0
2-Chlorotoluene	ND	5.0
4-Chlorotoluene	ND	5.0
Bromobenzene	ND	5.0
Bromochloromethane	ND	5.0
Dibromomethane	ND	5.0
Isopropylbenzene	ND	5.0
n-Butylbenzene	ND	5.0
n-Propylbenzene	ND	5.0
p-Isopropyltoluene	ND	5.0
sec-Butylbenzene	ND	5.0
tert-Butylbenzene	ND	5.0
Allyl chloride	ND	5.0
Benzyl chloride	ND	5.0
Epichlorohydrin	ND	100
Isoprene	ND	5.0
Methyl methacrylate	ND	5.0
n-Pentane	ND	5.0
Allyl alcohol	ND	1000
Cyclohexene	ND	5.0
Ethyl methacrylate	ND	5.0
Methyl acetate	ND	5.0
Methylcyclohexane	ND	5.0
Ethanol	ND	500
p-Ethyltoluene	ND	5.0
1,4-Diethylbenzene	ND	5.0

100360

Client ID: JV239
Site:

Lab Sample No: JV239
Lab Job No: 0033

Date Sampled: _____
Date Received: _____
Date Analyzed: 08/27/01
GC Column: DB624
Instrument ID: VOAMS8.i
Lab File ID: j20786.d

Matrix: SOIL
Level: LOW
Sample Weight: 5.0 g
Purge Volume: 5.0 ml
% Moisture: 0

VOLATILE ORGANICS - GC/MS (cont'd)
METHOD 8260B

<u>Parameter</u>	<u>Analytical Results</u> Units: ug/kg (Dry Weight)	<u>Quantitation</u> Limit Units: ug/kg
1,2,4,5-Tetramethylbenzene	ND	5.0
Isobutyl Acetate	ND	5.0
Chlorodifluoromethane	ND	5.0

100361

Client ID: JV239
Site:

Lab Sample No: JV239
Lab Job No: 0033

Date Sampled: _____
Date Received: _____
Date Analyzed: 08/27/01
GC Column: DB624
Instrument ID: VOAMS8.i
Lab File ID: j20786.d

Matrix: SOIL
Level: LOW
Sample Weight: 5.0 g
Purge Volume: 5.0 ml
% Moisture: 0.0

VOLATILE ORGANICS - GC/MS
TENTATIVELY IDENTIFIED COMPOUNDS
METHOD 8260B

COMPOUND NAME	RT	EST. CONC. ug/kg	Q
-----	-----	-----	-----
1. NO VOLATILE ORGANIC COMPOUNDS FOUND			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
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23.			
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27.			
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29.			
30.			

TOTAL ESTIMATED CONCENTRATION

0.0

100362

Data File: /chem/VOAMS8.i/8260LOW_SP/07-09-01/27aug01.b/j20786.d
Report Date: 27-Aug-2001 15:09

STL Edison

VOLATILE ORGANIC COMPOUND ANALYSIS

Data file : /chem/VOAMS8.i/8260LOW_SP/07-09-01/27aug01.b/j20786.d
Lab Smp Id: JV239
Inj Date : 27-AUG-2001 12:29
Operator : VOAMS 8
Smp Info : JV239
Misc Info :
Comment :
Method : /chem/VOAMS8.i/8260LOW_SP/07-09-01/27aug01.b/8260L_01.m
Meth Date : 27-Aug-2001 09:45 lily
Cal Date : 09-JUL-2001 21:11
Als bottle: 5
Dil Factor: 1.00000
Integrator: HP RTE
Target Version: 3.50

Inst ID: VOAMS8.i

Quant Type: ISTD

Cal File: j19659.d

QC Sample: BLANK

Compound Sublist: all.sub

Concentration Formula: Amt * DF * ((Vt/Ws)/((100-M)/100)) * CpndVariable

Name	Value	Description
DF	1.00000	Dilution Factor
Vt	5.00000	Volume of final extract (mL)
Ws	5.00000	Weight of sample extracted (g)
M	0.00000	% Moisture (not decanted)

Cpnd Variable

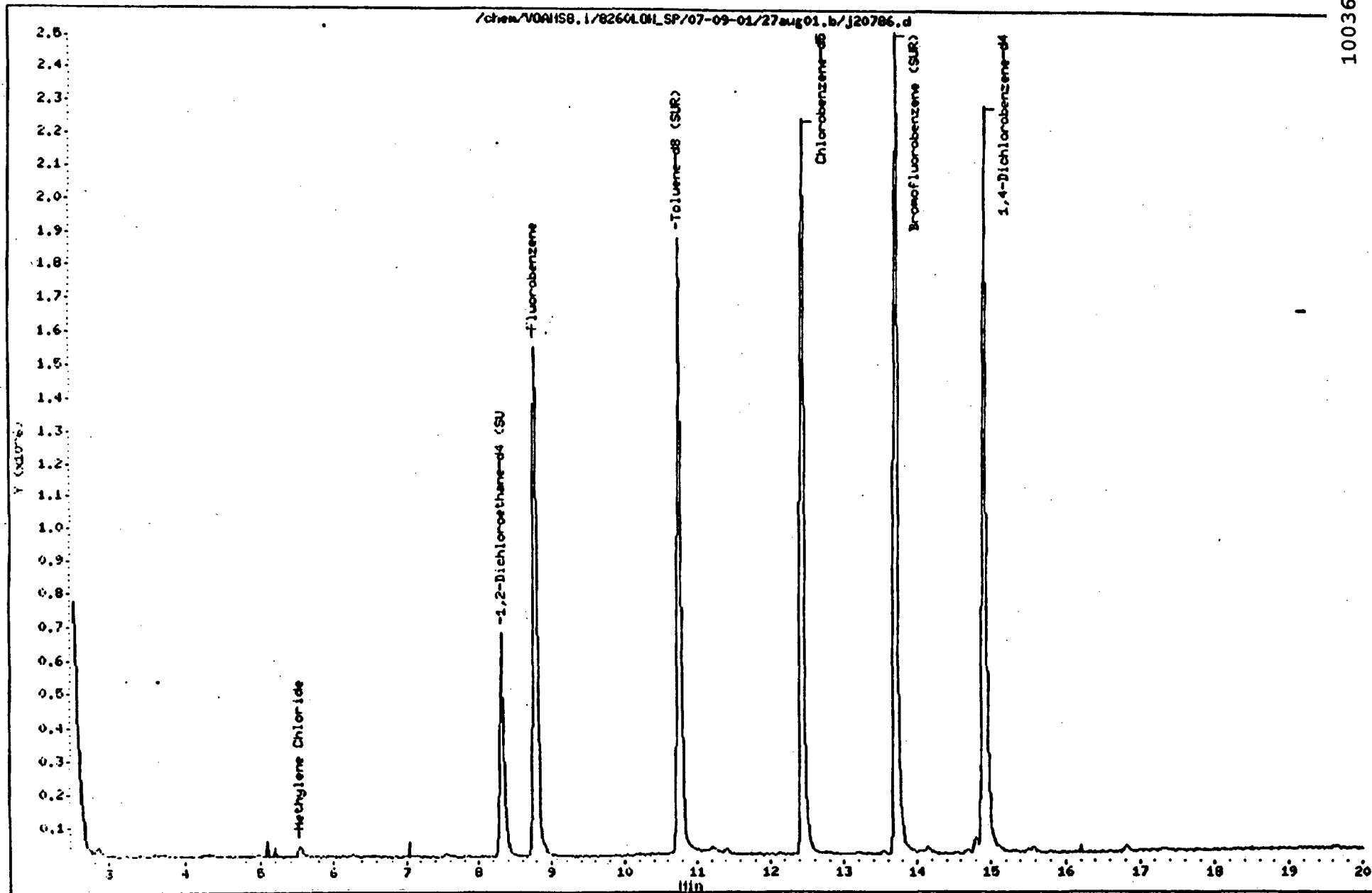
Local Compound Variable

Compounds	QUANT SIG MASS	RT	EXP RT	REL RT	RESPONSE	CONCENTRATIONS	
						ON-COLUMN (ug/L)	FINAL (ug/Kg)
6 Methylene Chloride	84	5.538	5.583	(0.631)	29950	1.92000	1.9(a)
\$ 16 1,2-Dichloroethane-d4 (SUR)	65	8.318	8.360	(0.948)	1021629	45.8230	46
* 19 Fluorobenzene	96	8.778	8.820	(1.000)	2893947	50.0000	
\$ 37 Toluene-d8 (SUR)	98	10.752	10.793	(0.865)	2381145	45.2201	45
* 32 Chlorobenzene-d5	117	12.435	12.476	(1.000)	2399308	50.0000	
\$ 41 Bromofluorobenzene (SUR)	174	13.701	13.741	(0.918)	1416336	45.2809	45
* 91 1,4-Dichlorobenzene-d4	152	14.916	14.934	(1.000)	1362527	50.0000	

QC Flag Legend

a - Target compound detected but, quantitated amount
Below Limit Of Quantitation(BLOQ).

100363



100364

0033

Calibration Summary

100365

VOLATILE ORGANICS INITIAL CALIBRATION DATA
METHOD 8260B

Instrument ID: VOAMS4

Calibration Date(s): 08/23/01 08/23/01

Heated Purge: (Y/N) N

Calibration Time(s): 1200 1708

LAB FILE ID:	RRF5: D22047	RRF20: D22048	RRF50: D22049
	RRF100: D22050	RRF200: D22051	

COMPOUND	RRF5	RRF20	RRF50	RRF100	RRF200
Chloromethane	0.180	0.166	0.143	0.195	0.171
Bromomethane	0.262	0.245	0.216	0.277	0.222
Vinyl Chloride	0.229	0.224	0.207	0.269	0.224
Chloroethane	0.163	0.168	0.139	0.178	0.157
Methylene Chloride	0.364	0.330	0.303	0.317	0.312
Acetone	0.073	0.071	0.056	0.059	0.052
Carbon Disulfide	0.963	0.902	0.891	0.819	0.791
Trichlorofluoromethane	0.585	0.596	0.541	0.622	0.554
1,1-Dichloroethene	0.379	0.333	0.301	0.307	0.294
1,1-Dichloroethane	0.612	0.562	0.519	0.567	0.554
trans-1,2-Dichloroethene	0.389	0.357	0.328	0.340	0.329
cis-1,2-Dichloroethene	0.408	0.376	0.348	0.363	0.354
Chloroform	0.742	0.687	0.629	0.659	0.654
1,2-Dichloroethane	0.484	0.422	0.387	0.401	0.389
2-Butanone	0.034	0.031	0.031	0.033	0.029
1,1,1-Trichloroethane	0.655	0.623	0.575	0.600	0.588
Carbon Tetrachloride	0.589	0.580	0.523	0.556	0.540
Bromodichloromethane	0.705	0.710	0.652	0.710	0.708
1,2-Dichloropropane	0.463	0.374	0.350	0.371	0.365
cis-1,3-Dichloropropene	0.584	0.577	0.536	0.578	0.567
Trichloroethene	0.526	0.457	0.419	0.444	0.435
Dibromochloromethane	0.702	0.788	0.744	0.786	0.779
1,1,2-Trichloroethane	0.420	0.415	0.382	0.400	0.391
Benzene	1.154	0.956	0.870	0.912	0.899
trans-1,3-Dichloropropene	0.550	0.598	0.563	0.617	0.602
2-Chloroethyl Vinyl Ether	0.102	0.128	0.138	0.153	0.143
Bromoform	0.508	0.618	0.578	0.630	0.607
4-Methyl-2-Pentanone	0.299	0.275	0.284	0.302	0.273
2-Hexanone	0.203	0.216	0.223	0.237	0.204
Tetrachloroethene	0.726	0.714	0.612	0.630	0.603
1,1,2,2-Tetrachloroethane	1.413	1.237	1.188	1.299	1.247
Toluene	1.341	1.364	1.229	1.261	1.233
Chlorobenzene	1.085	1.077	0.966	1.006	0.980
Ethylbenzene	0.512	0.525	0.463	0.476	0.447
Styrene	0.878	1.018	0.921	0.931	0.905
Xylene (Total)	0.610	0.639	0.558	0.574	0.550
Ethyl Ether	0.218	0.208	0.195	0.193	0.184
Acrolein	0.032	0.031	0.030	0.033	0.028
Freon TF	0.717	0.690	0.640	0.603	0.582

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VOLATILE ORGANICS INITIAL CALIBRATION DATA (cont'd)
METHOD 8260B

Instrument ID: VOAMS4

Calibration Date(s): 08/23/01 08/23/01

Heated Purge: (Y/N) N

Calibration Time(s): 1200 1708

LAB FILE ID:	RRF5: D22047	RRF20: D22048	RRF50: D22049		
	RRF100: D22050	RRF200: D22051			
COMPOUND	RRF5	RRF20	RRF50	RRF100	RRF200
Isopropanol					
Acetonitrile	0.016	0.014	0.015	0.016	0.014
TBA	0.024	0.021	0.023	0.024	0.021
Acrylonitrile	0.062	0.058	0.061	0.067	0.062
MTBE	0.845	0.790	0.768	0.756	0.717
Hexane					
DIPE	1.089	1.026	1.005	1.013	0.997
Ethyl Acetate	0.352	0.329	0.329	0.349	0.307
Vinyl Acetate	1.041	1.029	1.012	1.021	0.935
Tetrahydrofuran					
Cyclohexane	0.525	0.491	0.478	0.466	0.465
Isobutanol					
Isopropyl Acetate	0.595	0.580	0.584	0.617	0.566
n-Heptane					
n-Butanol					
Propyl Acetate	0.494	0.452	0.463	0.490	0.438
Butyl Acetate	0.594	0.655	0.657	0.688	0.640
1,2-Dibromoethane	0.684	0.719	0.667	0.714	0.682
1,3-Dichlorobenzene	1.609	1.624	1.418	1.479	1.545
1,4-Dichlorobenzene	2.017	1.733	1.648	1.766	1.665
1,2-Dichlorobenzene	1.623	1.501	1.379	1.482	1.474
Naphthalene	2.104	2.052	1.939	2.075	1.904
Methylnaphthalene (total)					
Dimethylnaphthalene (total)					
Dichlorodifluoromethane	0.362	0.359	0.320	0.455	0.391
1,1-Dichloropropene	0.570	0.534	0.488	0.505	0.486
1,2,4-Trichlorobenzene	1.349	1.291	1.196	1.235	1.182
Hexachlorobutadiene	1.050	1.000	0.861	0.890	0.873
1,4-Dioxane	0.002	0.002	0.002	0.002	0.002
Methyl Acrylate					
1,1,1,2-Tetrachloroethane	0.546	0.575	0.519	0.545	0.527
1,2,3-Trichlorobenzene	1.242	1.179	1.097	1.120	1.068
1,2,3-Trichloropropane	1.012	0.946	0.899	0.977	0.925
1,2,4-Trimethylbenzene	2.403	2.341	2.144	2.228	2.182
1,2-Dibromo-3-chloropropane	0.289	0.282	0.273	0.309	0.273
1,3,5-Trimethylbenzene	2.426	2.347	2.150	2.269	2.201
1,3-Dichloropropane	0.721	0.707	0.647	0.674	0.654
2,2-Dichloropropane	0.584	0.576	0.518	0.520	0.448
2-Chlorotoluene	2.381	2.344	2.055	2.224	2.160

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VOLATILE ORGANICS INITIAL CALIBRATION DATA (cont'd)
METHOD 8260B

Instrument ID: VOAMS4

Calibration Date(s): 08/23/01 08/23/01

Heated Purge: (Y/N) N

Calibration Time(s): 1200 1708

LAB FILE ID:	RRF5: D22047 RRF100: D22050	RRF20: D22048 RRF200: D22051	RRF50: D22049		
COMPOUND	RRF5	RRF20	RRF50	RRF100	RRF200
4-Chlorotoluene	2.424	2.364	2.215	2.249	2.255
Bromobenzene	1.102	1.034	0.944	0.996	0.988
Bromochloromethane	0.284	0.266	0.245	0.257	0.253
Dibromomethane	0.407	0.377	0.343	0.360	0.347
Isopropylbenzene	1.766	1.840	1.630	1.670	1.539
n-Butylbenzene	2.546	2.516	2.292	2.430	2.367
n-Propylbenzene	3.398	3.284	2.978	3.171	2.814
p-Isopropyltoluene	2.813	2.741	2.448	2.567	2.438
sec-Butylbenzene	3.527	3.421	3.061	3.230	2.952
tert-Butylbenzene	2.542	2.448	2.189	2.304	2.268
Allyl chloride					
Benzyl chloride	1.260	1.474	1.476	1.506	1.167
Epichlorohydrin					
Isoprene	0.332	0.326	0.304	0.292	0.280
Methyl methacrylate	0.276	0.260	0.269	0.284	0.275
n-Pentane	0.057	0.061	0.054	0.049	0.050
Allyl alcohol					
2-Octanol					
2-Octanone					
Ethyl Acrylate	0.533	0.504	0.486	0.479	0.474
Butyl Acrylate					
Butyl Methacrylate	0.034	0.037	0.032	0.034	0.032
Ethyl methacrylate					
Ethanol					
Methyl Acetate	0.253	0.216	0.216	0.222	0.197
Methyl Cyclohexane	0.583	0.563	0.538	0.528	0.525
Cyclohexanone					
p-Ethyltoluene					
1,4-Diethylbenzene					
1,2,4,5-Tetramethylbenzene					
Propylene Oxide					
Camphene (total)					
Camphor					
Amyl Acetate					
2-Methylnaphthalene					
1-Chlorohexane					
a-methylstyrene					
1,2-Dichloroethane-d4 (SUR)	0.391	0.380	0.358	0.353	0.354

VOLATILE ORGANICS INITIAL CALIBRATION DATA (cont'd)
METHOD 8260B

Instrument ID: VOAMS4

Calibration Date(s): 08/23/01 08/23/01

Heated Purge: (Y/N) N

Calibration Time(s): 1200 1708

LAB FILE ID:		RRF5: D22047	RRF20: D22048	RRF50: D22049
		RRF100: D22050	RRF200: D22051	

COMPOUND	RRF5	RRF20	RRF50	RRF100	RRF200
=====	=====	=====	=====	=====	=====
Toluene-d8 (SUR)_____	1.185	1.202	1.101	1.103	1.096
Bromofluorobenzene (SUR)_____	1.096	1.043	0.964	0.980	0.996

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VOLATILE ORGANICS INITIAL CALIBRATION DATA (cont'd)
METHOD 8260B

Instrument ID: VOAMS4

Calibration Date(s): 08/23/01 08/23/01

Heated Purge: (Y/N) N

Calibration Time(s): 1200 1708

COMPOUND	CURVE	COEFFICIENT A1	%RSD OR R ²
Chloromethane	AVRG	0.17111055	11.1**
Bromomethane	AVRG	0.24431958	10.6*
Vinyl Chloride	AVRG	0.23066037	10.0*
Chloroethane	AVRG	0.16113938	8.9*
Methylene Chloride	AVRG	0.32540659	7.4*
Acetone	AVRG	0.06234785	15.0*
Carbon Disulfide	AVRG	0.87313800	7.9*
Trichlorofluoromethane	AVRG	0.57936083	5.6*
1,1-Dichloroethene	AVRG	0.32309258	10.7*
1,1-Dichloroethane	AVRG	0.56275486	5.9**
trans-1,2-Dichloroethene	AVRG	0.34866185	7.3*
cis-1,2-Dichloroethene	AVRG	0.36975033	6.5*
Chloroform	AVRG	0.67424703	6.4*
1,2-Dichloroethane	AVRG	0.41668153	9.6*
2-Butanone	AVRG	0.03172250	5.5*
1,1,1-Trichloroethane	AVRG	0.60817445	5.2*
Carbon Tetrachloride	AVRG	0.55793387	4.9*
Bromodichloromethane	AVRG	0.69707701	3.6*
1,2-Dichloropropane	AVRG	0.38442829	11.6*
cis-1,3-Dichloropropene	AVRG	0.56832761	3.4*
Trichloroethene	AVRG	0.45615650	9.1*
Dibromochloromethane	AVRG	0.75960150	4.9*
1,1,2-Trichloroethane	AVRG	0.40180492	4.0*
Benzene	AVRG	0.95816627	11.9*
trans-1,3-Dichloropropene	AVRG	0.58602272	4.8*
2-Chloroethyl Vinyl Ether	AVRG	0.13287559	14.7*
Bromoform	AVRG	0.58825069	8.2**
4-Methyl-2-Pentanone	AVRG	0.28664649	4.6*
2-Hexanone	AVRG	0.21652499	6.6*
Tetrachloroethene	AVRG	0.65673243	8.9*
1,1,2,2-Tetrachloroethane	AVRG	1.27680958	6.7**
Toluene	AVRG	1.28557069	4.9*
Chlorobenzene	AVRG	1.02288151	5.4**
Ethylbenzene	AVRG	0.48466742	6.8*
Styrene	AVRG	0.93051468	5.7*
Xylene (Total)	AVRG	0.58638757	6.4*
Ethyl Ether	AVRG	0.19944948	6.7*
Acrolein	AVRG	0.03062900	6.7*
Freon TF	AVRG	0.64627212	8.8*

* Compound with required maximum % RSD value.

** Compound with required minimum RRF value.

VOLATILE ORGANICS INITIAL CALIBRATION DATA (cont'd)
METHOD 8260B

Instrument ID: VOAMS4

Calibration Date(s): 08/23/01 08/23/01

Heated Purge: (Y/N) N

Calibration Time(s): 1200 1708

COMPOUND	CURVE	COEFFICIENT A1	%RSD OR R ²
Isopropanol	AVRG		
Acetonitrile	AVRG	0.01504895	7.1*
TBA	AVRG	0.02272769	7.4*
Acrylonitrile	AVRG	0.06214496	5.3*
MTBE	AVRG	0.77518366	6.1*
Hexane	AVRG		
DIPE	AVRG	1.02617103	3.6*
Ethyl Acetate	AVRG	0.33331765	5.4*
Vinyl Acetate	AVRG	1.00756637	4.2*
Tetrahydrofuran	AVRG		
Cyclohexane	AVRG	0.48481501	5.1*
Isobutanol	AVRG		
Isopropyl Acetate	AVRG	0.58847888	3.3*
n-Heptane	AVRG		
n-Butanol	AVRG		
Propyl Acetate	AVRG	0.46724768	5.2*
Butyl Acetate	AVRG	0.64687026	5.3*
1,2-Dibromoethane	AVRG	0.69315478	3.2*
1,3-Dichlorobenzene	AVRG	1.53506208	5.7*
1,4-Dichlorobenzene	AVRG	1.76581068	8.4*
1,2-Dichlorobenzene	AVRG	1.49201450	5.8*
Naphthalene	AVRG	2.01496746	4.4*
Methylnaphthalene (total)	AVRG		
Dimethylnaphthalene (total)	AVRG		
Dichlorodifluoromethane	AVRG	0.37727528	13.3*
1,1-Dichloropropene	AVRG	0.51640154	6.8*
1,2,4-Trichlorobenzene	AVRG	1.25079258	5.5*
Hexachlorobutadiene	AVRG	0.93496327	9.1*
1,4-Dioxane	AVRG	0.00192926	13.4*
Methyl Acrylate	AVRG		
1,1,1,2-Tetrachloroethane	AVRG	0.54252103	4.0*
1,2,3-Trichlorobenzene	AVRG	1.14114386	6.1*
1,2,3-Trichloropropane	AVRG	0.95194625	4.6*
1,2,4-Trimethylbenzene	AVRG	2.25958177	4.8*
1,2-Dibromo-3-chloropropane	AVRG	0.28514203	5.3*
1,3,5-Trimethylbenzene	AVRG	2.27869990	4.8*
1,3-Dichloropropane	AVRG	0.68048059	4.8*
2,2-Dichloropropane	AVRG	0.52908686	10.4*
2-Chlorotoluene	AVRG	2.23257974	6.0*

* Compound with required maximum % RSD value.

** Compound with required minimum RRF value.

VOLATILE ORGANICS INITIAL CALIBRATION DATA (cont'd)
METHOD 8260B

Instrument ID: VOAMS4

Calibration Date(s): 08/23/01 08/23/01

Heated Purge: (Y/N) N

Calibration Time(s): 1200 1708

COMPOUND	CURVE	COEFFICIENT A1	%RSD OR R^2
4-Chlorotoluene	AVRG	2.30149517	3.8*
Bromobenzene	AVRG	1.01296232	5.8*
Bromochloromethane	AVRG	0.26083140	5.7*
Dibromomethane	AVRG	0.36695912	7.1*
Isopropylbenzene	AVRG	1.68892438	7.0*
n-Butylbenzene	AVRG	2.42997304	4.3*
n-Propylbenzene	AVRG	3.12901513	7.5*
p-Isopropyltoluene	AVRG	2.60126850	6.5*
sec-Butylbenzene	AVRG	3.23829194	7.4*
tert-Butylbenzene	AVRG	2.35003741	6.1*
Allyl chloride	AVRG		
Benzyl chloride	AVRG	1.37670459	11.1*
Epichlorohydrin	AVRG		
Isoprene	AVRG	0.30679276	7.1*
Methyl methacrylate	AVRG	0.27284391	3.3*
n-Pentane	AVRG	0.05408340	9.6*
Allyl alcohol	AVRG		
2-Octanol	AVRG		
2-Octanone	AVRG		
Ethyl Acrylate	AVRG	0.49530859	4.8*
Butyl Acrylate	AVRG		
Butyl Methacrylate	AVRG	0.03405924	6.0*
Ethyl methacrylate	AVRG		
Ethanol	AVRG		
Methyl Acetate	AVRG	0.22092674	9.1*
Methyl Cyclohexane	AVRG	0.54737668	4.5*
Cyclohexanone	AVRG		
p-Ethyltoluene	AVRG		
1,4-Diethylbenzene	AVRG		
1,2,4,5-Tetramethylbenzene	AVRG		
Propylene Oxide	AVRG		
Camphene (total)	AVRG		
Camphor	AVRG		
Amyl Acetate	AVRG		
2-Methylnaphthalene	AVRG		
1-Chlorohexane	AVRG		
α-methylstyrene	AVRG		
1,2-Dichloroethane-d4 (SUR)	AVRG	0.36730403	4.7*

* Compound with required maximum % RSD value.

** Compound with required minimum RRF value.

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VOLATILE ORGANICS INITIAL CALIBRATION DATA (cont'd)
METHOD 8260B

Instrument ID: VOAMS4

Calibration Date(s): 08/23/01 08/23/01

Heated Purge: (Y/N) N

Calibration Time(s): 1200 1708

COMPOUND	CURVE	COEFFICIENT A1	%RSD OR R ²
Toluene-d8 (SUR)	AVRG	1.13745085	4.5*
Bromofluorobenzene (SUR)	AVRG	1.01595202	5.2*

* Compound with required maximum % RSD value.

** Compound with required minimum RRF value.

100373

VOLATILE ORGANICS CONTINUING CALIBRATION CHECK
METHOD 8260B

Instrument ID: VOAMS4

Calibration Date: 08/27/01 Time: 1005

Lab File ID: D22105A

Init. Calib. Date(s): 08/23/01 08/23/01

Heated Purge: (Y/N) N

Init. Calib. Times: 1200 1708

COMPOUND	RRF	RRF50	MIN RRF	%D	MAX %D
Chloromethane	0.171	0.147	0.1	14.0	50.0
Bromomethane	0.244	0.232		4.9	50.0
Vinyl Chloride	0.231	0.195		15.6	20.0
Chloroethane	0.161	0.154		4.3	50.0
Methylene Chloride	0.325	0.335		-3.1	50.0
Acetone	0.062	0.055		11.3	50.0
Carbon Disulfide	0.873	0.907		-3.9	50.0
Trichlorofluoromethane	0.580	0.618		-6.6	50.0
1,1-Dichloroethene	0.323	0.348		-7.7	20.0
1,1-Dichloroethane	0.563	0.553	0.1	1.8	50.0
trans-1,2-Dichloroethene	0.349	0.367		-5.2	50.0
cis-1,2-Dichloroethene	0.370	0.379		-2.4	50.0
Chloroform	0.674	0.709		-5.2	20.0
1,2-Dichloroethane	0.417	0.431		-3.4	50.0
2-Butanone	0.032	0.030		6.2	50.0
1,1,1-Trichloroethane	0.608	0.643		-5.8	50.0
Carbon Tetrachloride	0.558	0.586		-5.0	50.0
Bromodichloromethane	0.697	0.690		1.0	50.0
1,2-Dichloropropane	0.385	0.346		10.1	20.0
cis-1,3-Dichloropropene	0.568	0.541		4.8	50.0
Trichloroethene	0.456	0.456		0.0	50.0
Dibromochloromethane	0.760	0.782		-2.9	50.0
1,1,2-Trichloroethane	0.402	0.392		2.5	50.0
Benzene	0.958	0.896		6.5	50.0
trans-1,3-Dichloropropene	0.586	0.567		3.2	50.0
2-Chloroethyl Vinyl Ether	0.133	0.158		-18.8	50.0
Bromoform	0.588	0.620	0.1	-5.4	50.0
4-Methyl-2-Pentanone	0.287	0.256		10.8	50.0
2-Hexanone	0.217	0.196		9.7	50.0
Tetrachloroethene	0.657	0.717		-9.1	50.0
1,1,2,2-Tetrachloroethane	1.277	1.114	0.3	12.8	50.0
Toluene	1.286	1.277		0.7	20.0
Chlorobenzene	1.023	1.046	0.3	-2.2	50.0
Ethylbenzene	0.485	0.490		-1.0	20.0
Styrene	0.931	0.970		-4.2	50.0
Xylene (Total)	0.586	0.598		-2.0	50.0
Ethyl Ether	0.200	0.202		-1.0	50.0

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VOLATILE ORGANICS CONTINUING CALIBRATION CHECK(cont'd)
METHOD 8260B

Instrument ID: VOAMS4

Calibration Date: 08/27/01 Time: 1005

Lab File ID: D22105A

Init. Calib. Date(s): 08/23/01 08/23/01

Heated Purge: (Y/N) N

Init. Calib. Times: 1200 1708

COMPOUND	RRF	RRF50	MIN RRF	%D	MAX %D
Acrolein	0.031	0.028		9.7	50.0
Freon TF	0.646	0.734		-13.6	50.0
Isopropanol					50.0
Acetonitrile	0.015	0.014		6.7	50.0
TBA	0.023	0.021		8.7	50.0
Acrylonitrile	0.062	0.058		6.4	50.0
MTBE	0.775	0.809		-4.4	50.0
DIPE	1.026	0.992		3.3	50.0
Ethyl Acetate	0.333	0.306		8.1	50.0
Vinyl Acetate	1.008	0.947		6.0	50.0
Tetrahydrofuran					50.0
Cyclohexane	0.485	0.452		6.8	50.0
Isobutanol					50.0
Isopropyl Acetate	0.588	0.536		8.8	50.0
n-Heptane					50.0
n-Butanol					50.0
Propyl Acetate	0.467	0.416		10.9	50.0
Butyl Acetate	0.647	0.588		9.1	50.0
1,2-Dibromoethane	0.693	0.687		0.9	50.0
1,3-Dichlorobenzene	1.535	1.523		0.8	50.0
1,4-Dichlorobenzene	1.766	1.682		4.8	50.0
1,2-Dichlorobenzene	1.492	1.437		3.7	50.0
Naphthalene	2.015	1.891		6.2	50.0
Methylnaphthalene (total)					50.0
Dimethylnaphthalene (total)					50.0
Dichlorodifluoromethane	0.377	0.343		9.0	50.0
1,1-Dichloropropene	0.517	0.517		0.0	50.0
1,2,4-Trichlorobenzene	1.251	1.270		-1.5	50.0
Hexachlorobutadiene	0.935	1.016		-8.7	50.0
1,4-Dioxane	0.002	0.002		0.0	50.0
Methyl Acrylate					50.0
1,1,1,2-Tetrachloroethane	0.542	0.566		-4.4	50.0
1,2,3-Trichlorobenzene	1.141	1.155		-1.2	50.0
1,2,3-Trichloropropane	0.952	0.848		10.9	50.0
1,2,4-Trimethylbenzene	2.260	2.149		4.9	50.0
1,2-Dibromo-3-chloropropane	0.285	0.255		10.5	50.0
1,3,5-Trimethylbenzene	2.279	2.148		5.7	50.0

VOLATILE ORGANICS CONTINUING CALIBRATION CHECK(cont'd)
METHOD 8260B

Instrument ID: VOAMS4

Calibration Date: 08/27/01 Time: 1005

Lab File ID: D22105A

Init. Calib. Date(s): 08/23/01 08/23/01

Heated Purge: (Y/N) N

Init. Calib. Times: 1200 1708

COMPOUND	RRF	RRF50	MIN RRF	%D	MAX %D
1,3-Dichloropropane	0.681	0.659		3.2	50.0
2,2-Dichloropropane	0.529	0.559		-5.7	50.0
2-Chlorotoluene	2.233	2.151		3.7	50.0
4-Chlorotoluene	2.301	2.206		4.1	50.0
Bromobenzene	1.013	1.007		0.6	50.0
Bromochloromethane	0.261	0.265		-1.5	50.0
Dibromomethane	0.367	0.371		-1.1	50.0
Isopropylbenzene	1.689	1.746		-3.4	50.0
n-Butylbenzene	2.430	2.308		5.0	50.0
n-Propylbenzene	3.129	3.023		3.4	50.0
p-Isopropyltoluene	2.601	2.576		1.0	50.0
sec-Butylbenzene	3.238	3.115		3.8	50.0
tert-Butylbenzene	2.350	2.306		1.9	50.0
Allyl chloride					50.0
Benzyl chloride	1.377	1.347		2.2	50.0
Epichlorohydrin					50.0
Isoprene	0.307	0.322		-4.9	50.0
Methyl methacrylate	0.273	0.256		6.2	50.0
n-Pentane	0.054	0.058		-7.4	50.0
Allyl alcohol					50.0
2-Octanol					50.0
2-Octanone					50.0
Ethyl Acrylate	0.495	0.472		4.6	50.0
Butyl Acrylate					50.0
Butyl Methacrylate	0.034	0.033		2.9	50.0
Ethyl methacrylate					50.0
Ethanol					50.0
Methyl Acetate	0.221	0.218		1.4	50.0
Methyl Cyclohexane	0.547	0.538		1.6	50.0
Cyclohexanone					50.0
p-Ethyltoluene					50.0
1,4-Diethylbenzene					50.0
1,2,4,5-Tetramethylbenzene					50.0
Propylene Oxide					50.0
Camphene (total)					50.0
Camphor					50.0
Amyl Acetate					50.0

VOLATILE ORGANICS CONTINUING CALIBRATION CHECK(cont'd)
METHOD 8260B

Instrument ID: VOAMS4

Calibration Date: 08/27/01 Time: 1005

Lab File ID: D22105A

Init. Calib. Date(s): 08/23/01 08/23/01

Heated Purge: (Y/N) N

Init. Calib. Times: 1200 1708

COMPOUND	RRF	RRF50	MIN RRF	%D	MAX %D
=====	=====	=====	=====	=====	=====
2-Methylnaphthalene					50.0
1-Chlorohexane					50.0
a-methylstyrene					50.0
=====	=====	=====	=====	=====	=====
1,2-Dichloroethane-d4 (SUR)	0.367	0.387		-5.4	50.0
Toluene-d8 (SUR)	1.137	1.161		-2.1	50.0
Bromofluorobenzene (SUR)	1.016	1.044		-2.8	50.0

VOLATILE ORGANICS INITIAL CALIBRATION DATA
METHOD 624

Instrument ID: VOAMS7

Calibration Date(s): 08/24/01 08/24/01

Heated Purge: (Y/N) N

Calibration Time(s): 1116 1308

LAB FILE ID: RRF5: V33878 RRF10: V33877 RRF20: V33876
RRF50: V33875 RRF200: V33874

COMPOUND	RRF5	RRF10	RRF20	RRF50	RRF200
Chloromethane	0.716	0.714	0.730	0.704	0.576
Bromomethane	1.128	1.170	1.158	1.172	1.034
Vinyl Chloride	0.892	0.901	0.924	0.921	0.746
Chloroethane	0.744	0.749	0.770	0.756	0.653
Methylene Chloride	1.260	1.380	1.432	1.423	1.246
Acetone	0.216	0.326	0.213	0.183	0.190
Carbon Disulfide	2.968	3.321	3.520	3.701	3.225
Trichlorofluoromethane	2.498	2.719	2.764	2.848	2.504
1,1-Dichloroethene	1.185	1.257	1.266	1.242	1.059
1,1-Dichloroethane	2.715	2.689	2.754	2.791	2.439
trans-1,2-Dichloroethene	1.545	1.575	1.664	1.638	1.410
cis-1,2-Dichloroethene	1.724	1.758	1.814	1.816	1.599
Chloroform	3.453	3.381	3.522	3.557	3.184
1,2-Dichloroethane	0.505	0.510	0.522	0.522	0.509
2-Butanone	0.050	0.076	0.086	0.093	0.086
1,1,1-Trichloroethane	2.977	2.854	3.008	3.068	2.691
Carbon Tetrachloride	2.603	2.816	2.930	3.008	2.665
Bromodichloromethane	0.767	0.790	0.833	0.858	0.857
1,2-Dichloropropane	0.391	0.404	0.422	0.419	0.385
cis-1,3-Dichloropropene	0.588	0.616	0.637	0.658	0.653
Trichloroethene	0.468	0.487	0.513	0.502	0.464
Dibromochloromethane	0.633	0.780	0.866	0.943	0.940
1,1,2-Trichloroethane	0.353	0.416	0.419	0.437	0.412
Benzene	0.954	0.964	1.005	1.005	0.917
trans-1,3-Dichloropropene	0.565	0.628	0.681	0.737	0.735
2-Chloroethyl Vinyl Ether	0.166	0.195	0.204	0.204	0.219
Bromoform	0.392	0.464	0.531	0.581	0.616
4-Methyl-2-Pentanone	0.148	0.190	0.197	0.202	0.214
2-Hexanone	0.065	0.083	0.113	0.137	0.157
Tetrachloroethene	0.784	0.829	0.870	0.911	0.791
1,1,2,2-Tetrachloroethane	0.482	0.564	0.591	0.609	0.601
Toluene	1.411	1.524	1.571	1.670	1.484
Chlorobenzene	1.124	1.185	1.246	1.320	1.189
Ethylbenzene	0.445	0.543	0.561	0.590	0.517
Styrene	0.778	0.964	1.061	1.149	1.095
Xylene (Total)	0.607	0.701	0.748	0.784	0.706
Ethyl Ether	0.739	0.862	0.844	0.825	0.758
Acrolein	0.058	0.068	0.072	0.068	0.068
Freon TF	2.760	2.922	2.899	2.895	2.531

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VOLATILE ORGANICS INITIAL CALIBRATION DATA (cont'd)
METHOD 624

Instrument ID: VOAMS7

Calibration Date(s): 08/24/01 08/24/01

Heated Purge: (Y/N) N

Calibration Time(s): 1116 1308

LAB FILE ID:	RRF5: V33878 RRF50: V33875	RRF10: V33877 RRF200: V33874	RRF20: V33876		
COMPOUND	RRF5	RRF10	RRF20	RRF50	RRF200
Isopropanol					
Acetonitrile	0.006	0.010	0.010	0.007	0.008
TBA	0.048	0.054	0.057	0.053	0.051
Acrylonitrile	0.144	0.152	0.165	0.160	0.168
MTBE	2.942	3.112	3.214	3.098	2.940
Hexane	0.776	0.899	0.868	0.884	0.778
DIPE	4.369	4.674	4.845	4.812	4.480
Ethyl Acetate	0.957	0.968	1.026	1.032	1.014
Vinyl Acetate	3.424	4.012	4.109	4.116	4.036
Tetrahydrofuran					
Cyclohexane	1.816	1.888	1.978	1.976	1.702
Isobutanol					
Isopropyl Acetate	0.443	0.514	0.517	0.512	0.546
n-Heptane					
n-Butanol					
Propyl Acetate	0.322	0.374	0.378	0.368	0.394
Butyl Acetate	0.384	0.473	0.517	0.555	0.594
1,2-Dibromoethane	0.524	0.663	0.698	0.740	0.738
1,3-Dichlorobenzene	0.715	0.781	0.944	1.034	0.970
1,4-Dichlorobenzene	1.087	1.231	1.217	1.300	1.256
1,2-Dichlorobenzene	0.807	0.890	0.950	0.995	0.950
Naphthalene	0.612	0.683	0.758	0.791	0.532
Methylnaphthalene (total)					
Dimethylnaphthalene (total)					
Dichlorodifluoromethane	1.546	1.640	1.706	1.709	1.506
1,4-Dioxane	0.001	0.001	0.001	0.001	0.001
n-Pentane	0.273	0.262	0.258	0.266	0.231
5-Methyl-2-Hexanone					
Isopropylbenzene	1.724	1.958	2.053	2.178	1.914
1,2,4-Trimethylbenzene	1.220	1.405	1.533	1.613	1.538
Cyclohexanone					
1,2,4-Trichlorobenzene	0.510	0.612	0.681	0.693	0.541
Methyl Methacrylate	0.059	0.073	0.083	0.086	0.090
Allyl Alcohol					
Epichlorohydrin	0.017	0.020	0.022	0.021	0.023
Allyl Chloride					
Benzyl Chloride	0.340	0.484	0.563	0.652	0.722
Isoprene	1.054	1.155	1.220	1.243	1.076
1,1,1,2-Tetrachloroethane	0.577	0.647	0.704	0.746	0.690

VOLATILE ORGANICS INITIAL CALIBRATION DATA (cont'd)
METHOD 624

Instrument ID: VOAMS7

Calibration Date(s): 08/24/01 08/24/01

Heated Purge: (Y/N) N

Calibration Time(s): 1116 1308

LAB FILE ID:	RRF5: V33878 RRF50: V33875	RRF10: V33877 RRF200: V33874	RRF20: V33876		
COMPOUND	RRF5	RRF10	RRF20	RRF50	RRF200
=====	=====	=====	=====	=====	=====
Camphene (total)					
Camphor					
1,3,5-Trimethylbenzene	1.309	1.519	1.594	1.721	1.565
1,2,3-Trichlorobenzene	0.434	0.516	0.567	0.550	0.346
n-Butylbenzene					
sec-Butylbenzene					
tert-Butylbenzene					
p-Isopropyltoluene					
n-Propylbenzene					
m+p-Ethyltoluene					
o-Ethyltoluene					
Methyl Acetate	0.557	0.542	0.563	0.568	0.576
Methyl cyclohexane	0.514	0.569	0.572	0.576	0.526
1,2-Dibromo-3-chloropropane	0.088	0.089	0.095	0.098	0.090
Cyclohexene					
1,2-Dichlorotrifluoroethane					
n-Propanol					
3-Methyl-1-Pentyn-3-ol					
Propylene Oxide					
Ethanol					
Chlorotrifluoroethane					
Dichlorofluoromethane					
Ethylene Oxide					
Methyl Formate					
Isobutyraldehyde					
Amyl Acetate					
=====	=====	=====	=====	=====	=====
1,2-Dichloroethane-d4 (SUR)	0.056	0.066	0.067	0.065	0.066
Toluene-d8 (SUR)	1.094	1.164	1.182	1.246	1.213
Bromofluorobenzene (SUR)	0.513	0.574	0.601	0.635	0.637

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VOLATILE ORGANICS INITIAL CALIBRATION DATA (cont'd)
METHOD 624

Instrument ID: VOAMS7

Calibration Date(s): 08/24/01 08/24/01

Heated Purge: (Y/N) N

Calibration Time(s): 1116 1308

COMPOUND	CURVE	COEFFICIENT A1	%RSD OR R ²
=====	=====	=====	=====
Chloromethane	AVRG	0.68808418	9.2*
Bromomethane	AVRG	1.13255876	5.1*
Vinyl Chloride	AVRG	0.87693520	8.5*
Chloroethane	AVRG	0.73443330	6.3*
Methylene Chloride	AVRG	1.34819323	6.6*
Acetone	AVRG	0.22566800	25.7*
Carbon Disulfide	AVRG	3.34698398	8.4*
Trichlorofluoromethane	AVRG	2.66654556	5.9*
1,1-Dichloroethene	AVRG	1.20191272	7.1*
1,1-Dichloroethane	AVRG	2.67788253	5.2*
trans-1,2-Dichloroethene	AVRG	1.56630397	6.4*
cis-1,2-Dichloroethene	AVRG	1.74204700	5.1*
Chloroform	AVRG	3.41923381	4.3*
1,2-Dichloroethane	AVRG	0.51363143	1.5*
2-Butanone	AVRG	0.07822788	21.6*
1,1,1-Trichloroethane	AVRG	2.91984645	5.1*
Carbon Tetrachloride	AVRG	2.80428623	6.1*
Bromodichloromethane	AVRG	0.82102025	5.0*
1,2-Dichloropropane	AVRG	0.40426709	4.0*
cis-1,3-Dichloropropene	AVRG	0.63042525	4.6*
Trichloroethene	AVRG	0.48666524	4.4*
Dibromochloromethane	AVRG	0.83275152	15.6*
1,1,2-Trichloroethane	AVRG	0.40740630	7.9*
Benzene	AVRG	0.96901503	3.8*
trans-1,3-Dichloropropene	AVRG	0.66918382	11.0*
2-Chloroethyl Vinyl Ether	AVRG	0.19760912	10.0*
Bromoform	AVRG	0.51720985	17.4*
4-Methyl-2-Pentanone	AVRG	0.19046277	13.2*
2-Hexanone	AVRG	0.11110162	34.0*
Tetrachloroethene	AVRG	0.83734543	6.4*
1,1,2,2-Tetrachloroethane	AVRG	0.56957895	9.0*
Toluene	AVRG	1.53205389	6.3*
Chlorobenzene	AVRG	1.21268557	6.1*
Ethylbenzene	AVRG	0.53105034	10.3*
Styrene	AVRG	1.00941639	14.4*
Xylene (Total)	AVRG	0.70908593	9.4*
Ethyl Ether	AVRG	0.80570419	6.8*
Acrolein	AVRG	0.06665433	7.7*
Freon TF	AVRG	2.80151242	5.9*

* Compound with required maximum % RSD value.

** Compound with required minimum RRF value.

VOLATILE ORGANICS INITIAL CALIBRATION DATA (cont'd)
METHOD 624

Instrument ID: VOAMS7

Calibration Date(s): 08/24/01 08/24/01

Heated Purge: (Y/N) N

Calibration Time(s): 1116 1308

COMPOUND	CURVE	COEFFICIENT A1	%RSD OR R^2
Isopropanol	AVRG		
Acetonitrile	AVRG	0.00829681	22.4*
TBA	AVRG	0.05266244	6.8*
Acrylonitrile	AVRG	0.15806654	6.3*
MTBE	AVRG	3.06120645	3.9*
Hexane	AVRG	0.84088061	7.1*
DIPE	AVRG	4.63598992	4.5*
Ethyl Acetate	AVRG	0.99953033	3.4*
Vinyl Acetate	AVRG	3.93924733	7.4*
Tetrahydrofuran	AVRG		
Cyclohexane	AVRG	1.87212389	6.2*
Isobutanol	AVRG		
Isopropyl Acetate	AVRG	0.50640462	7.5*
n-Heptane	AVRG		
n-Butanol	AVRG		
Propyl Acetate	AVRG	0.36734210	7.4*
Butyl Acetate	AVRG	0.50437174	16.0*
1,2-Dibromoethane	AVRG	0.67261752	13.2*
1,3-Dichlorobenzene	AVRG	0.88879510	15.2*
1,4-Dichlorobenzene	AVRG	1.21813235	6.6*
1,2-Dichlorobenzene	AVRG	0.91822225	7.9*
Naphthalene	AVRG	0.67528364	15.6*
Methylnaphthalene (total)	AVRG		
Dimethylnaphthalene (total)	AVRG		
Dichlorodifluoromethane	AVRG	1.62158821	5.7**
1,4-Dioxane	AVRG	0.00134326	3.4*
n-Pentane	AVRG	0.25795431	6.2**
5-Methyl-2-Hexanone	AVRG		
Isopropylbenzene	AVRG	1.96540621	8.6*
1,2,4-Trimethylbenzene	AVRG	1.46197542	10.6**
Cyclohexanone	AVRG		
1,2,4-Trichlorobenzene	AVRG	0.60731376	13.4**
Methyl Methacrylate	AVRG	0.07817521	16.0*
Allyl Alcohol	AVRG		
Epichlorohydrin	AVRG	0.02054279	10.7**
Allyl Chloride	AVRG		
Benzyl Chloride	AVRG	0.55215493	27.0**
Isoprene	AVRG	1.14968894	7.3**
1,1,1,2-Tetrachloroethane	AVRG	0.67269088	9.6**

* Compound with required maximum % RSD value.

** Compound with required minimum RRF value.

VOLATILE ORGANICS INITIAL CALIBRATION DATA (cont'd)
METHOD 624

Instrument ID: VOAMS7

Calibration Date(s): 08/24/01 08/24/01

Heated Purge: (Y/N) N

Calibration Time(s): 1116 1308

COMPOUND	CURVE	COEFFICIENT A1	%RSD OR R ²
=====	=====	=====	=====
Camphene (total)	AVRG		
Camphor	AVRG		
1,3,5-Trimethylbenzene	AVRG	1.54156444	9.7**
1,2,3-Trichlorobenzene	AVRG	0.48290613	19.0*
n-Butylbenzene	AVRG		
sec-Butylbenzene	AVRG		
tert-Butylbenzene	AVRG		
p-Isopropyltoluene	AVRG		
n-Propylbenzene	AVRG		
m+p-Ethyltoluene	AVRG		
o-Ethyltoluene	AVRG		
Methyl Acetate	AVRG	0.56121835	2.3*
Methyl cyclohexane	AVRG	0.55152862	5.2*
1,2-Dibromo-3-chloropropane	AVRG	0.09192987	4.8**
Cyclohexene	AVRG		
1,2-Dichlorotrifluoroethane	AVRG		
n-Propanol	AVRG		
3-Methyl-1-Pentyn-3-ol	AVRG		
Propylene Oxide	AVRG		
Ethanol	AVRG		
Chlorotrifluoroethane	AVRG		
Dichlorofluoromethane	AVRG		
Ethylene Oxide	AVRG		
Methyl Formate	AVRG		
Isobutyraldehyde	AVRG		
Amyl Acetate	AVRG		
=====	=====	=====	=====
1,2-Dichloroethane-d4 (SUR)	AVRG	0.06401891	6.6*
Toluene-d8 (SUR)	AVRG	1.18008563	4.8*
Bromofluorobenzene (SUR)	AVRG	0.59214948	8.6*

* Compound with required maximum % RSD value.

** Compound with required minimum RRF value.

VOLATILE ORGANICS CONTINUING CALIBRATION CHECK
METHOD 624

Instrument ID: VOAMS7

Calibration Date: 08/25/01 Time: 0935

Lab File ID: V33916

Init. Calib. Date(s): 08/24/01 08/24/01

Heated Purge: (Y/N) N

Init. Calib. Times: 1116 1308

COMPOUND	RRF	RRF20	MIN RRF	%D	MAX %D
=====	=====	=====	=====	=====	=====
Chloromethane	0.688	0.569		17.3	104
Bromomethane	1.132	1.061		6.3	86.0
Vinyl Chloride	0.877	0.735		16.2	96.0
Chloroethane	0.734	0.660		10.1	62.0
Methylene Chloride	1.348	1.269		5.9	39.5
Acetone	0.226	0.207		8.4	40.0
Carbon Disulfide	3.347	2.989		10.7	40.0
Trichlorofluoromethane	2.667	2.583		3.1	52.0
1,1-Dichloroethene	1.202	1.113		7.4	49.5
1,1-Dichloroethane	2.678	2.399		10.4	27.5
trans-1,2-Dichloroethene	1.566	1.443		7.8	30.5
cis-1,2-Dichloroethene	1.742	1.586		9.0	40.0
Chloroform	3.419	3.287		3.9	32.5
1,2-Dichloroethane	0.514	0.476		7.4	32.0
2-Butanone	0.078	0.077		1.3	40.0
1,1,1-Trichloroethane	2.920	2.788		4.5	25.0
Carbon Tetrachloride	2.804	2.769		1.2	27.0
Bromodichloromethane	0.821	0.770		6.2	34.5
1,2-Dichloropropane	0.404	0.356		11.9	66.0
cis-1,3-Dichloropropene	0.630	0.560		11.1	76.0
Trichloroethene	0.487	0.436		10.5	33.5
Dibromochloromethane	0.832	0.763		8.3	32.5
1,1,2-Trichloroethane	0.407	0.366		10.1	29.0
Benzene	0.969	0.853		12.0	36.0
trans-1,3-Dichloropropene	0.669	0.593		11.4	50.0
2-Chloroethyl Vinyl Ether	0.198	0.165		16.7	124
Bromoform	0.517	0.452		12.6	29.0
4-Methyl-2-Pentanone	0.190	0.156		17.9	40.0
2-Hexanone	0.111	0.085		23.4	40.0
Tetrachloroethene	0.837	0.763		8.8	26.5
1,1,2,2-Tetrachloroethane	0.569	0.481		15.5	39.5
Toluene	1.532	1.361		11.2	25.5
Chlorobenzene	1.213	1.086		10.5	34.0
Ethylbenzene	0.531	0.472		11.1	41.0
Styrene	1.009	0.904		10.4	40.0
Xylene (Total)	0.709	0.640		9.7	40.0
Ethyl Ether	0.806	0.734		8.9	40.0

VOLATILE ORGANICS CONTINUING CALIBRATION CHECK(cont'd)
METHOD 624

Instrument ID: VOAMS7

Calibration Date: 08/25/01 Time: 0935

Lab File ID: V33916

Init. Calib. Date(s): 08/24/01 08/24/01

Heated Purge: (Y/N) N

Init. Calib. Times: 1116 1308

COMPOUND	RRF	RRF20	MIN RRF	%D	MAX %D
Acrolein	0.067	0.055		17.9	40.0
Freon TF	2.801	2.776		0.9	40.0
Isopropanol					40.0
Acetonitrile	0.008	0.008		0.0	40.0
TBA	0.053	0.046		13.2	40.0
Acrylonitrile	0.158	0.134		15.2	40.0
MTBE	3.061	2.863		6.5	40.0
Hexane	0.841	0.785		6.6	40.0
DIPE	4.636	4.219		9.0	40.0
Ethyl Acetate	0.999	0.796		20.3	40.0
Vinyl Acetate	3.939	3.498		11.2	40.0
Tetrahydrofuran					40.0
Cyclohexane	1.872	1.715		8.4	40.0
Isobutanol					40.0
Isopropyl Acetate	0.506	0.425		16.0	40.0
n-Heptane					40.0
n-Butanol					40.0
Propyl Acetate	0.367	0.309		15.8	40.0
Butyl Acetate	0.505	0.423		16.2	40.0
1,2-Dibromoethane	0.673	0.603		10.4	40.0
1,3-Dichlorobenzene	0.889	0.782		12.0	27.0
1,4-Dichlorobenzene	1.218	1.034		15.1	37.0
1,2-Dichlorobenzene	0.918	0.782		14.8	37.0
Naphthalene	0.675	0.372		44.9	40.0
Methylnaphthalene (total)					40.0
Dimethylnaphthalene (total)					40.0
Dichlorodifluoromethane	1.621	1.513	0.01	6.7	40.0
1,4-Dioxane	0.001	0.001		0.0	40.0
n-Pentane	0.258	0.239	0.01	7.4	40.0
5-Methyl-2-Hexanone			0.01		40.0
Isopropylbenzene	1.965	1.767		10.1	40.0
1,2,4-Trimethylbenzene	1.462	1.308	0.01	10.5	40.0
Cyclohexanone			0.0001		40.0
1,2,4-Trichlorobenzene	0.607	0.422	0.01	30.5	40.0
Methyl Methacrylate	0.078	0.069		11.5	40.0
Allyl Alcohol					40.0
Epichlorohydrin	0.021	0.017	0.01	19.0	40.0

VOLATILE ORGANICS CONTINUING CALIBRATION CHECK(cont'd)
METHOD 624

Instrument ID: VOAMS7

Calibration Date: 08/25/01 Time: 0935

Lab File ID: V33916

Init. Calib. Date(s): 08/24/01 08/24/01

Heated Purge: (Y/N) N

Init. Calib. Times: 1116 1308

COMPOUND	RRF	RRF20	MIN RRF	%D	MAX %D
=====	=====	=====	=====	=====	=====
Allyl Chloride			0.01		40.0
Benzyl Chloride	0.552	0.455	0.01	17.6	40.0
Isoprene	1.150	1.050	0.01	8.7	40.0
1,1,1,2-Tetrachloroethane	0.673	0.627	0.01	6.8	40.0
Camphene (total)					40.0
Camphor					40.0
1,3,5-Trimethylbenzene	1.542	1.394	0.01	9.6	40.0
1,2,3-Trichlorobenzene	0.483	0.272		43.7	40.0
n-Butylbenzene					40.0
sec-Butylbenzene					40.0
tert-Butylbenzene					40.0
p-Isopropyltoluene					40.0
n-Propylbenzene					40.0
m+p-Ethyltoluene					40.0
o-Ethyltoluene					40.0
Methyl Acetate	0.561	0.517		7.8	40.0
Methyl cyclohexane	0.551	0.494		10.3	40.0
1,2-Dibromo-3-chloropropane	0.092	0.063	0.01	31.5	40.0
Cyclohexene					40.0
1,2-Dichlorotrifluoroethane					40.0
n-Propanol					40.0
3-Methyl-1-Pentyn-3-ol					40.0
Propylene Oxide					40.0
Ethanol					40.0
Chlorotrifluoroethane					40.0
Dichlorofluoromethane					40.0
Ethylene Oxide					40.0
Methyl Formate					40.0
Isobutyraldehyde					40.0
Amyl Acetate					40.0
=====	=====	=====	=====	=====	=====
1,2-Dichloroethane-d4 (SUR)	0.064	0.064		0.0	
Toluene-d8 (SUR)	1.180	1.189		-0.8	
Bromofluorobenzene (SUR)	0.592	0.585		1.2	

VOLATILE ORGANICS INITIAL CALIBRATION DATA
METHOD 8260B

Instrument ID: VOAMS8

Calibration Date(s): 07/09/01 07/09/01

Heated Purge: (Y/N) Y

Calibration Time(s): 1905 2111

LAB FILE ID:	RRF5: J19655	RRF20: J19656	RRF50: J19657		
	RRF100: J19658	RRF200: J19659			
COMPOUND	RRF5	RRF20	RRF50	RRF100	RRF200
=====	=====	=====	=====	=====	=====
Chloromethane	0.179	0.169	0.163	0.180	0.171
Bromomethane	0.312	0.267	0.254	0.284	0.274
Vinyl Chloride	0.212	0.202	0.190	0.214	0.202
Chloroethane	0.153	0.138	0.126	0.144	0.135
Methylene Chloride	0.307	0.265	0.246	0.274	0.256
Acetone	0.099	0.057	0.048	0.045	0.044
Carbon Disulfide	0.824	0.763	0.716	0.783	0.727
Trichlorofluoromethane	0.922	0.811	0.755	0.834	0.802
1,1-Dichloroethene	0.326	0.293	0.278	0.319	0.311
1,1-Dichloroethane	0.590	0.558	0.529	0.576	0.544
trans-1,2-Dichloroethene	0.350	0.336	0.314	0.354	0.332
cis-1,2-Dichloroethene	0.354	0.358	0.336	0.362	0.347
Chloroform	0.795	0.757	0.701	0.763	0.728
1,2-Dichloroethane	0.418	0.421	0.396	0.434	0.402
2-Butanone	0.022	0.020	0.021	0.022	0.021
1,1,1-Trichloroethane	0.815	0.789	0.736	0.799	0.756
Carbon Tetrachloride	0.851	0.773	0.764	0.832	0.774
Bromodichloromethane	0.796	0.786	0.757	0.787	0.748
1,2-Dichloropropane	0.336	0.316	0.307	0.332	0.299
cis-1,3-Dichloropropene	0.525	0.502	0.488	0.523	0.482
Trichloroethene	0.502	0.439	0.438	0.470	0.445
Dibromochloromethane	0.890	0.919	0.873	0.998	0.933
1,1,2-Trichloroethane	0.322	0.319	0.307	0.346	0.320
Benzene	0.853	0.761	0.735	0.788	0.743
trans-1,3-Dichloropropene	0.534	0.534	0.517	0.586	0.546
2-Chloroethyl Vinyl Ether					
Bromoform	0.615	0.650	0.632	0.725	0.676
4-Methyl-2-Pentanone	0.200	0.212	0.197	0.224	0.219
2-Hexanone	0.159	0.166	0.170	0.191	0.180
Tetrachloroethene	0.831	0.729	0.717	0.802	0.727
1,1,2,2-Tetrachloroethane	0.999	0.970	0.985	1.040	0.996
Toluene	1.349	1.153	1.147	1.234	1.157
Chlorobenzene	1.062	0.964	0.939	1.041	0.958
Ethylbenzene	0.457	0.440	0.424	0.468	0.429
Styrene	0.878	0.849	0.854	0.945	0.860
Xylene (Total)	0.577	0.542	0.518	0.571	0.532
Ethyl Ether					
Acrolein	0.006	0.007	0.007	0.007	0.007
Freon TF	0.800	0.727	0.694	0.725	0.700

100387

VOLATILE ORGANICS INITIAL CALIBRATION DATA (cont'd)
METHOD 8260B

Instrument ID: VOAMS8

Calibration Date(s): 07/09/01 07/09/01

Heated Purge: (Y/N) Y

Calibration Time(s): 1905 2111

LAB FILE ID:	RRF5: J19655	RRF20: J19656	RRF50: J19657
	RRF100: J19658	RRF200: J19659	

COMPOUND	RRF5	RRF20	RRF50	RRF100	RRF200
Isopropanol					
Acetonitrile	0.006	0.007	0.007	0.009	0.008
TBA	0.022	0.022	0.021	0.022	0.022
Acrylonitrile	0.032	0.035	0.034	0.037	0.038
MTBE	0.670	0.606	0.564	0.627	0.583
Hexane					
DIPE	0.887	0.814	0.759	0.842	0.790
Ethyl Acetate	0.213	0.198	0.195	0.199	0.187
Vinyl Acetate	0.702	0.630	0.583	0.658	0.611
Tetrahydrofuran					
Cyclohexane	0.397	0.361	0.336	0.360	0.337
Isobutanol					
Isopropyl Acetate	0.454	0.428	0.404	0.421	0.388
n-Heptane					
n-Butanol					
Propyl Acetate	0.365	0.316	0.285	0.287	0.253
Butyl Acetate	0.475	0.416	0.410	0.430	0.390
1,2-Dibromoethane	0.632	0.650	0.608	0.700	0.658
1,3-Dichlorobenzene	1.534	1.533	1.417	1.484	1.511
1,4-Dichlorobenzene	1.837	1.694	1.708	1.804	1.690
1,2-Dichlorobenzene	1.368	1.392	1.347	1.421	1.406
Naphthalene	1.456	1.390	1.396	1.538	1.566
Methylnaphthalene (total)					
Dimethylnaphthalene (total)					
Dichlorodifluoromethane	0.511	0.484	0.462	0.523	0.512
1,1-Dichloropropene	0.560	0.528	0.495	0.527	0.485
1,2,4-Trichlorobenzene	0.983	1.002	0.989	1.069	1.085
Hexachlorobutadiene	0.843	0.818	0.814	0.847	0.849
1,4-Dioxane	0.002	0.002	0.002	0.002	0.002
Methyl Acrylate					
1,1,1,2-Tetrachloroethane	0.640	0.596	0.565	0.621	0.569
1,2,3-Trichlorobenzene	0.855	0.876	0.858	0.921	0.928
1,2,3-Trichloropropane	0.843	0.797	0.757	0.794	0.745
1,2,4-Trimethylbenzene	2.108	2.062	1.948	2.049	1.956
1,2-Dibromo-3-chloropropane	0.219	0.232	0.229	0.254	0.248
1,3,5-Trimethylbenzene	2.116	2.008	1.956	2.016	1.925
1,3-Dichloropropane	0.595	0.565	0.532	0.588	0.550
2,2-Dichloropropane	0.601	0.568	0.521	0.551	0.506
2-Chlorotoluene	1.984	1.970	1.904	1.949	1.885

100388

VOLATILE ORGANICS INITIAL CALIBRATION DATA (cont'd)
METHOD 8260B

Instrument ID: VOAMS8

Calibration Date(s): 07/09/01 07/09/01

Heated Purge: (Y/N) Y

Calibration Time(s): 1905 2111

LAB FILE ID:	RRF5: J19655	RRF20: J19656	RRF50: J19657
	RRF100: J19658	RRF200: J19659	

COMPOUND	RRF5	RRF20	RRF50	RRF100	RRF200
=====	=====	=====	=====	=====	=====
4-Chlorotoluene	2.360	2.315	2.317	2.324	2.271
Bromobenzene	1.072	1.033	0.985	1.030	0.986
Bromochloromethane	0.260	0.251	0.234	0.265	0.242
Dibromomethane	0.360	0.389	0.361	0.393	0.363
Isopropylbenzene	1.648	1.545	1.548	1.668	1.554
n-Butylbenzene	2.322	2.182	2.170	2.303	2.231
n-Propylbenzene	3.188	3.140	3.004	3.166	3.063
p-Isopropyltoluene	2.574	2.427	2.370	2.431	2.362
sec-Butylbenzene	3.180	2.996	2.956	3.043	2.956
tert-Butylbenzene	2.452	2.227	2.115	2.240	2.162
Allyl chloride					
Benzyl chloride	1.229	1.138	1.103	1.153	1.121
Epichlorohydrin					
Isoprene	0.280	0.248	0.240	0.250	0.231
Methyl methacrylate	0.170	0.199	0.188	0.266	0.252
n-Pentane	0.056	0.049	0.045	0.050	0.046
Allyl alcohol					
Cyclohexene					
Ethyl methacrylate					
Methyl acetate	0.131	0.126	0.122	0.118	0.111
Methylcyclohexane	0.486	0.439	0.411	0.440	0.405
Ethanol					
p-Ethyltoluene					
1,4-Diethylbenzene					
1,2,4,5-Tetramethylbenzene					
Isobutyl Acetate					
Chlorodifluoromethane					
=====	=====	=====	=====	=====	=====
1,2-Dichloroethane-d4 (SUR)	0.406	0.394	0.360	0.404	0.366
Toluene-d8 (SUR)	1.170	1.068	1.019	1.177	1.052
Bromofluorobenzene (SUR)	1.282	1.090	1.065	1.189	1.112

100389

VOLATILE ORGANICS INITIAL CALIBRATION DATA (cont'd)
METHOD 8260B

Instrument ID: VOAMS8

Calibration Date(s): 07/09/01 07/09/01

Heated Purge: (Y/N) Y

Calibration Time(s): 1905 2111

COMPOUND	CURVE	COEFFICIENT A1	%RSD OR R^2
Chloromethane	AVRG	0.17242070	4.0**
Bromomethane	AVRG	0.27823311	7.9*
Vinyl Chloride	AVRG	0.20412693	4.5*
Chloroethane	AVRG	0.13924423	7.3*
Methylene Chloride	AVRG	0.26950990	8.7*
Acetone	AVRG	0.05841357	39.5*
Carbon Disulfide	AVRG	0.76259725	5.8*
Trichlorofluoromethane	AVRG	0.82483156	7.4*
1,1-Dichloroethene	AVRG	0.30529235	6.4*
1,1-Dichloroethane	AVRG	0.55959806	4.4**
trans-1,2-Dichloroethene	AVRG	0.33724231	4.7*
cis-1,2-Dichloroethene	AVRG	0.35113943	2.9*
Chloroform	AVRG	0.74879465	4.8*
1,2-Dichloroethane	AVRG	0.41424997	3.6*
2-Butanone	AVRG	0.02132670	4.8*
1,1,1-Trichloroethane	AVRG	0.77914958	4.1*
Carbon Tetrachloride	AVRG	0.79889922	5.0*
Bromodichloromethane	AVRG	0.77499254	2.7*
1,2-Dichloropropane	AVRG	0.31794952	5.0*
cis-1,3-Dichloropropene	AVRG	0.50395023	3.9*
Trichloroethene	AVRG	0.45878114	6.0*
Dibromochloromethane	AVRG	0.92269603	5.2*
1,1,2-Trichloroethane	AVRG	0.32303342	4.4*
Benzene	AVRG	0.77599726	6.1*
trans-1,3-Dichloropropene	AVRG	0.54330255	4.8*
2-Chloroethyl Vinyl Ether	AVRG		
Bromoform	AVRG	0.65982222	6.5**
4-Methyl-2-Pentanone	AVRG	0.21033367	5.6*
2-Hexanone	AVRG	0.17315404	7.1*
Tetrachloroethene	AVRG	0.76122880	6.8*
1,1,2,2-Tetrachloroethane	AVRG	0.99790936	2.6**
Toluene	AVRG	1.20798378	7.2*
Chlorobenzene	AVRG	0.99284832	5.5**
Ethylbenzene	AVRG	0.44335975	4.2*
Styrene	AVRG	0.87710458	4.5*
Xylene (Total)	AVRG	0.54785358	4.6*
Ethyl Ether	AVRG		
Acrolein	AVRG	0.00690447	4.4*
Freon TF	AVRG	0.72920464	5.8*

* Compound with required maximum % RSD value.

** Compound with required minimum RRF value.

VOLATILE ORGANICS INITIAL CALIBRATION DATA (cont'd)
METHOD 8260B

Instrument ID: VOAMS8

Calibration Date(s): 07/09/01 07/09/01

Heated Purge: (Y/N) Y

Calibration Time(s): 1905 2111

COMPOUND	CURVE	COEFFICIENT A1	%RSD OR R^2
Isopropanol	AVRG		
Acetonitrile	AVRG	0.00765788	10.5*
TBA	AVRG	0.02202932	3.1*
Acrylonitrile	AVRG	0.03497838	6.6*
MTBE	AVRG	0.61023766	6.7*
Hexane	AVRG		
DIPE	AVRG	0.81839608	6.0*
Ethyl Acetate	AVRG	0.19846829	4.7*
Vinyl Acetate	AVRG	0.63715016	7.2*
Tetrahydrofuran	AVRG		
Cyclohexane	AVRG	0.35838316	6.9*
Isobutanol	AVRG		
Isopropyl Acetate	AVRG	0.41911363	5.9*
n-Heptane	AVRG		
n-Butanol	AVRG		
Propyl Acetate	AVRG	0.30122530	14.0*
Butyl Acetate	AVRG	0.42424710	7.6*
1,2-Dibromoethane	AVRG	0.64969072	5.3*
1,3-Dichlorobenzene	AVRG	1.49589251	3.2*
1,4-Dichlorobenzene	AVRG	1.74661258	3.9*
1,2-Dichlorobenzene	AVRG	1.38669551	2.1*
Naphthalene	AVRG	1.46940844	5.5*
Methylnaphthalene (total)	AVRG		
Dimethylnaphthalene (total)	AVRG		
Dichlorodifluoromethane	AVRG	0.49824261	5.0*
1,1-Dichloropropene	AVRG	0.51914580	5.8*
1,2,4-Trichlorobenzene	AVRG	1.02572908	4.7*
Hexachlorobutadiene	AVRG	0.83410546	2.0*
1,4-Dioxane	AVRG	0.00211147	4.7*
Methyl Acrylate	AVRG		
1,1,1,2-Tetrachloroethane	AVRG	0.59838162	5.4*
1,2,3-Trichlorobenzene	AVRG	0.88760672	3.9*
1,2,3-Trichloropropane	AVRG	0.78722109	4.9*
1,2,4-Trimethylbenzene	AVRG	2.02463420	3.4*
1,2-Dibromo-3-chloropropane	AVRG	0.23650591	6.0*
1,3,5-Trimethylbenzene	AVRG	2.00439130	3.6*
1,3-Dichloropropane	AVRG	0.56597592	4.6*
2,2-Dichloropropane	AVRG	0.54947874	6.9*
2-Chlorotoluene	AVRG	1.93843321	2.2*

* Compound with required maximum % RSD value.

** Compound with required minimum RRF value.

VOLATILE ORGANICS INITIAL CALIBRATION DATA (cont'd)
METHOD 8260B

Instrument ID: VOAMS8

Calibration Date(s): 07/09/01 07/09/01

Heated Purge: (Y/N) Y

Calibration Time(s): 1905 2111

COMPOUND	CURVE	COEFFICIENT A1	%RSD OR R ²
=====	=====	=====	=====
4-Chlorotoluene	AVRG	2.31739519	1.4*
Bromobenzene	AVRG	1.02130686	3.6*
Bromochloromethane	AVRG	0.25055147	5.0*
Dibromomethane	AVRG	0.37339541	4.3*
Isopropylbenzene	AVRG	1.59267115	3.8*
n-Butylbenzene	AVRG	2.24157756	3.1*
n-Propylbenzene	AVRG	3.11238778	2.5*
p-Isopropyltoluene	AVRG	2.43273489	3.5*
sec-Butylbenzene	AVRG	3.02634422	3.1*
tert-Butylbenzene	AVRG	2.23905351	5.8*
Allyl chloride	AVRG		
Benzyl chloride	AVRG	1.14899561	4.2*
Epichlorohydrin	AVRG		
Isoprene	AVRG	0.24965545	7.4*
Methyl methacrylate	AVRG	0.21475398	19.4*
n-Pentane	AVRG	0.04939816	8.6*
Allyl alcohol	AVRG		
Cyclohexene	AVRG		
Ethyl methacrylate	AVRG		
Methyl acetate	AVRG	0.12147702	6.4*
Methylcyclohexane	AVRG	0.43627043	7.3*
Ethanol	AVRG		
p-Ethyltoluene	AVRG		
1,4-Diethylbenzene	AVRG		
1,2,4,5-Tetramethylbenzene	AVRG		
Isobutyl Acetate	AVRG		
Chlorodifluoromethane	AVRG		
=====	=====	=====	=====
1,2-Dichloroethane-d4 (SUR)	AVRG	0.38595667	5.6*
Toluene-d8 (SUR)	AVRG	1.09733320	6.6*
Bromofluorobenzene (SUR)	AVRG	1.14782709	7.7*

* Compound with required maximum % RSD value.

** Compound with required minimum RRF value.

VOLATILE ORGANICS CONTINUING CALIBRATION CHECK
METHOD 8260B

Instrument ID: VOAMS8

Calibration Date: 08/27/01 Time: 0859

Lab File ID: J20782

Init. Calib. Date(s): 07/09/01 07/09/01

Heated Purge: (Y/N) Y

Init. Calib. Times: 1905 2111

COMPOUND	RRF	RRF50	MIN RRF	%D	MAX %D
Chloromethane	0.172	0.175	0.1	-1.7	50.0
Bromomethane	0.278	0.259		6.8	50.0
Vinyl Chloride	0.204	0.188		7.8	20.0
Chloroethane	0.139	0.140		-0.7	50.0
Methylene Chloride	0.270	0.274		-1.5	50.0
Acetone	0.059	0.058		1.7	50.0
Carbon Disulfide	0.763	0.840		-10.1	50.0
Trichlorofluoromethane	0.825	0.805		2.4	50.0
1,1-Dichloroethene	0.305	0.293		3.9	20.0
1,1-Dichloroethane	0.559	0.551	0.1	1.4	50.0
trans-1,2-Dichloroethene	0.337	0.336		0.3	50.0
cis-1,2-Dichloroethene	0.351	0.339		3.4	50.0
Chloroform	0.749	0.742		0.9	20.0
1,2-Dichloroethane	0.414	0.396		4.3	50.0
2-Butanone	0.021	0.021		0.0	50.0
1,1,1-Trichloroethane	0.779	0.755		3.1	50.0
Carbon Tetrachloride	0.799	0.754		5.6	50.0
Bromodichloromethane	0.775	0.777		-0.2	50.0
1,2-Dichloropropane	0.318	0.329		-3.4	20.0
cis-1,3-Dichloropropene	0.504	0.509		-1.0	50.0
Trichloroethene	0.459	0.432		5.9	50.0
Dibromochloromethane	0.923	0.828		10.3	50.0
1,1,2-Trichloroethane	0.323	0.301		6.8	50.0
Benzene	0.776	0.769		0.9	50.0
trans-1,3-Dichloropropene	0.543	0.517		4.8	50.0
2-Chloroethyl Vinyl Ether					50.0
Bromoform	0.660	0.564	0.1	14.5	50.0
4-Methyl-2-Pentanone	0.210	0.197		6.2	50.0
2-Hexanone	0.173	0.150		13.3	50.0
Tetrachloroethene	0.761	0.652		14.3	50.0
1,1,2,2-Tetrachloroethane	0.998	0.868	0.3	13.0	50.0
Toluene	1.208	1.050		13.1	20.0
Chlorobenzene	0.993	0.923	0.3	7.0	50.0
Ethylbenzene	0.444	0.398		10.4	20.0
Styrene	0.877	0.822		6.3	50.0
Xylene (Total)	0.548	0.496		9.5	50.0
Ethyl Ether					50.0

VOLATILE ORGANICS CONTINUING CALIBRATION CHECK(cont'd)
METHOD 8260B

Instrument ID: VOAMS8

Calibration Date: 08/27/01 Time: 0859

Lab File ID: J20782

Init. Calib. Date(s): 07/09/01 07/09/01

Heated Purge: (Y/N) Y

Init. Calib. Times: 1905 2111

COMPOUND	RRF	RRF50	MIN RRF	%D	MAX %D
=====	=====	=====	=====	=====	=====
Acrolein	0.007	0.016		-128.6	50.0
Freon TF	0.729	0.726		0.4	50.0
Isopropanol					50.0
Acetonitrile	0.007	0.009		-28.6	50.0
TBA	0.022	0.018		18.2	50.0
Acrylonitrile	0.035	0.034		2.8	50.0
MTBE	0.610	0.626		-2.6	50.0
Hexane					50.0
DIPE	0.818	0.899		-9.9	50.0
Ethyl Acetate	0.198	0.218		-10.1	50.0
Vinyl Acetate	0.637	0.817		-28.2	50.0
Tetrahydrofuran					50.0
Cyclohexane	0.358	0.384		-7.3	50.0
Isobutanol					50.0
Isopropyl Acetate	0.419	0.439		-4.8	50.0
n-Heptane					50.0
n-Butanol					50.0
Propyl Acetate	0.301	0.328		-9.0	50.0
Butyl Acetate	0.424	0.458		-8.0	50.0
1,2-Dibromoethane	0.650	0.589		9.4	50.0
1,3-Dichlorobenzene	1.496	1.317		12.0	50.0
1,4-Dichlorobenzene	1.747	1.615		7.6	50.0
1,2-Dichlorobenzene	1.387	1.228		11.5	50.0
Naphthalene	1.469	1.227		16.5	50.0
Methylnaphthalene (total)					50.0
Dimethylnaphthalene (total)					50.0
Dichlorodifluoromethane	0.498	0.417		16.3	50.0
1,1-Dichloropropene	0.519	0.498		4.0	50.0
1,2,4-Trichlorobenzene	1.026	1.035		-0.9	50.0
Hexachlorobutadiene	0.834	0.838		-0.5	50.0
1,4-Dioxane	0.002	0.001		50.0	50.0
Methyl Acrylate					50.0
1,1,1,2-Tetrachloroethane	0.598	0.557		6.8	50.0
1,2,3-Trichlorobenzene	0.888	0.849		4.4	50.0
1,2,3-Trichloropropane	0.787	0.667		15.2	50.0
1,2,4-Trimethylbenzene	2.025	1.877		7.3	50.0
1,2-Dibromo-3-chloropropane	0.236	0.198		16.1	50.0

VOLATILE ORGANICS CONTINUING CALIBRATION CHECK(cont'd)
METHOD 8260B

Instrument ID: VOAMS8

Calibration Date: 08/27/01 Time: 0859

Lab File ID: J20782

Init. Calib. Date(s): 07/09/01 07/09/01

Heated Purge: (Y/N) Y

Init. Calib. Times: 1905 2111

COMPOUND	RRF	RRF50	MIN RRF	%D	MAX %D
1,3,5-Trimethylbenzene	2.004	1.857		7.3	50.0
1,3-Dichloropropane	0.566	0.516		8.8	50.0
2,2-Dichloropropane	0.549	0.551		-0.4	50.0
2-Chlorotoluene	1.938	1.902		1.8	50.0
4-Chlorotoluene	2.317	2.174		6.2	50.0
Bromobenzene	1.021	0.898		12.0	50.0
Bromochloromethane	0.250	0.239		4.4	50.0
Dibromomethane	0.373	0.363		2.7	50.0
Isopropylbenzene	1.593	1.481		7.0	50.0
n-Butylbenzene	2.242	2.066		7.8	50.0
n-Propylbenzene	3.112	2.814		9.6	50.0
p-Isopropyltoluene	2.433	2.241		7.9	50.0
sec-Butylbenzene	3.026	2.745		9.3	50.0
tert-Butylbenzene	2.239	2.060		8.0	50.0
Allyl chloride					50.0
Benzyl chloride	1.149	1.151		-0.2	50.0
Epichlorohydrin					50.0
Isoprene	0.250	0.254		-1.6	50.0
Methyl methacrylate	0.215	0.189		12.1	50.0
n-Pentane	0.049	0.047		4.1	50.0
Allyl alcohol					50.0
Cyclohexene					50.0
Ethyl methacrylate					50.0
Methyl acetate	0.122	0.133		-9.0	50.0
Methylcyclohexane	0.436	0.435		0.2	50.0
Ethanol					50.0
p-Ethyltoluene			0.01		50.0
1,4-Diethylbenzene			0.01		50.0
1,2,4,5-Tetramethylbenzene			0.01		50.0
Isobutyl Acetate					50.0
Chlorodifluoromethane					50.0
1,2-Dichloroethane-d4 (SUR)	0.386	0.341		11.6	50.0
Toluene-d8 (SUR)	1.097	0.922		16.0	50.0
Bromofluorobenzene (SUR)	1.148	0.934		18.6	50.0

Surrogate Compound Recovery Summary

100396

VOLATILE SYSTEM MONITORING COMPOUND RECOVERY
METHOD 8260B

Matrix: LEACHATE Level: LOW

Lab Job No: 0033

	LAB SAMPLE NO.	S1 #	S2 #	S3 #	OTHER	TOT OUT
	=====	=====	=====	=====	=====	=====
01	DV239A	98	94	95		0
02	296426	102	96	95		0
03						
04						
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QC LIMITS

S1 = 1,2-Dichloroethane-d4 (47-138)
 S2 = Toluene-d8 (63-146)
 S3 = Bromofluorobenzene (75-124)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D System Monitoring Compound diluted out

VOLATILE SYSTEM MONITORING COMPOUND RECOVERY
METHOD 8260B

Matrix: SOIL

Level: LOW

Lab Job No: 0033

	LAB SAMPLE NO.	S1 #	S2 #	S3 #	OTHER	TOT OUT
01	JV239	92	90	90		0
02	296426	102	84	98		0
03	296426MS	99	95	114		0
04	296426MSD	103	95	109		0
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QC LIMITS

S1 = 1,2-Dichloroethane-d4 (60-145)
 S2 = Toluene-d8 (59-144)
 S3 = Bromofluorobenzene (67-164)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D System Monitoring Compound diluted out

VOLATILE SYSTEM MONITORING COMPOUND RECOVERY
METHOD 624

Matrix: WATER

Level: LOW

Lab Job No: 0033

	LAB SAMPLE NO.	S1 #	S2 #	S3 #	OTHER	TOT OUT
01	VV237B	104	98	92		0
02	296288	99	96	90		0
03						
04						
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QC LIMITS

S1 = 1,2-Dichloroethane-d4 (72-122)
 S2 = Toluene-d8 (80-125)
 S3 = Bromofluorobenzene (65-128)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D System Monitoring Compound diluted out

Spike Recovery Summary

100400

VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
METHOD 8260B

Matrix: LEACHATE

Matrix Spike - Lab Sample No.: S082301

Level: LOW

MS Sample from Lab Job No: No 0

QA Batch: 5971

Compound	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC #	QC. LIMITS REC.
Vinyl Chloride	50	0.00	48	96	68-123
1,1-Dichloroethene	50	0.00	50	100	71-136
Chloroform	50	0.00	50	100	72-136
1,2-Dichloroethane	50	0.00	50	100	76-126
2-Butanone	50	0.00	39	78	48-120
Carbon Tetrachloride	50	0.00	52	104	75-138
Trichloroethene	50	0.00	48	96	73-124
Benzene	50	0.00	45	90	79-121
Tetrachloroethene	50	0.00	50	100	75-126
Chlorobenzene	50	0.00	47	94	78-124

Compound	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	% RPD #	QC LIMITS RPD	REC.
Vinyl Chloride	50	46	92	4	40	68-123
1,1-Dichloroethene	50	48	96	4	40	71-136
Chloroform	50	50	100	0	40	72-136
1,2-Dichloroethane	50	49	98	2	40	76-126
2-Butanone	50	37	74	5	40	48-120
Carbon Tetrachloride	50	51	102	2	40	75-138
Trichloroethene	50	46	92	4	40	73-124
Benzene	50	44	88	2	40	79-121
Tetrachloroethene	50	49	98	2	40	75-126
Chlorobenzene	50	46	92	2	40	78-124

Column to be used to flag recovery and RPD values with an asterik

* Values outside of QC limits

RPD: 0 out of 10 outside limits

Spike Recovery: 0 out of 20 outside limits

COMMENTS:

VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
METHOD 8260B

Matrix: SOIL

Matrix Spike - Lab Sample No.: 296426

Level: LOW

MS Sample from Lab Job No: 0033

QA Batch: 3020

Compound	SPIKE ADDED (ug/Kg)	SAMPLE CONCENTRATION (ug/Kg)	MS CONCENTRATION (ug/Kg)	MS % REC #	QC. LIMITS REC.
=====	=====	=====	=====	=====	=====
1,1-Dichloroethene	74	0.00	72	97	72-120
Trichloroethene	74	0.00	71	96	72-121
Benzene	74	0.00	77	104	77-120
Toluene	74	0.00	74	100	73-130
Chlorobenzene	74	0.00	70	95	77-120

Compound	SPIKE ADDED (ug/Kg)	MSD CONCENTRATION (ug/Kg)	MSD % REC #	% RPD #	QC LIMITS	
=====	=====	=====	=====	=====	RPD	REC.
1,1-Dichloroethene	79	77	97	0	40	72-120
Trichloroethene	79	78	99	3	40	72-121
Benzene	79	83	105	1	40	77-120
Toluene	79	80	101	1	40	73-130
Chlorobenzene	79	77	97	3	40	77-120

Column to be used to flag recovery and RPD values with an asterik

* Values outside of QC limits

RPD: 0 out of 5 outside limits

Spike Recovery: 0 out of 10 outside limits

COMMENTS:

VOLATILE SPIKE RECOVERY SUMMARY
METHOD 624

Matrix: WATER

Matrix Spike - Lab Sample No.: 295507

Level: LOW

MS Sample from Lab Job No: N878

QA Batch: 5945

Compound	MS % REC.	BS % REC.	LIMITS
Chloromethane	98	85	0-273
Bromomethane	118	110	0-242
Vinyl Chloride	98	85	0-251
Chloroethane	105	100	14-230
Methylene Chloride	100	100	0-221
Trichlorofluoromethane	125	115	17-181
1,1-Dichloroethene	108	95	0-234
1,1-Dichloroethane	110	105	59-155
trans-1,2-Dichloroethene	105	95	54-156
Chloroform	115	110	51-138
1,2-Dichloroethane	105	110	49-155
1,1,1-Trichloroethane	123	115	52-162
Carbon Tetrachloride	130	120	70-140
Bromodichloromethane	112	115	35-155
1,2-Dichloropropane	98	95	0-210
cis-1,3-Dichloropropene	98	90	0-227
Trichloroethene	125	100	71-157
Dibromochloromethane	100	95	53-149
1,1,2-Trichloroethane	95	90	52-150
Benzene	102	100	37-151
trans-1,3-Dichloropropene	98	95	17-183
2-Chloroethyl Vinyl Ether	0	46	0-305
Bromoform	90	90	45-169
Tetrachloroethene	113	100	64-148
1,1,2,2-Tetrachloroethane	90	85	46-157
Toluene	105	95	47-150
Chlorobenzene	105	100	37-160
Ethylbenzene	108	100	37-162
1,3-Dichlorobenzene	102	100	59-156
1,4-Dichlorobenzene	95	90	18-190

* Values outside of QC limits

100403

VOLATILE SPIKE RECOVERY SUMMARY
METHOD 624

Matrix: WATER

Matrix Spike - Lab Sample No.: 295507

Level: LOW

MS Sample from Lab Job No: N878

QA Batch: 5945

Compound	MS % REC.	BS % REC.	LIMITS
1,2-Dichlorobenzene	95	95	18-190

* Values outside of QC limits

Spike Recovery: 0 out of 62 outside limits

COMMENTS:

100404

Internal Standard Area and RT Summary

100405

VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab File ID (Standard): D22105A

Date Analyzed: 08/27/01

Instrument ID: VOAMS4

Time Analyzed: 1005

	IS1 AREA #	RT #	IS2 (CBZ) AREA #	RT #	IS3 (DCB) AREA #	RT #
=====	=====	=====	=====	=====	=====	=====
12. HOUR STD	4159700	9.76	3439148	13.47	2201184	16.01
UPPER LIMIT	8319400	10.26	6878296	13.97	4402368	16.51
LOWER LIMIT	2079850	9.26	1719574	12.97	1100592	15.51
=====	=====	=====	=====	=====	=====	=====
LABORATORY SAMPLE NO.						
=====	=====	=====	=====	=====	=====	=====
01 DV239A	4073333	9.76	3451641	13.47	2141476	16.01
02 296426	3892405	9.76	3341899	13.47	2102406	16.01
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IS1 = Fluorobenzene
 IS2 (CBZ) = Chlorobenzene-d5
 IS3 (DCB) = 1,4-Dichlorobenzene-d4

AREA UPPER LIMIT = +100% of internal standard area
 AREA LOWER LIMIT = - 50% of internal standard area
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
 * Values outside of QC limits.

VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab File ID (Standard): V33916

Date Analyzed: 08/25/01

Instrument ID: VOAMS7

Time Analyzed: 0935

	IS1 (BCM)		IS2 (DFB)		IS3 (CBZ)	
	AREA #	RT #	AREA #	RT #	AREA #	RT #
=====	=====	=====	=====	=====	=====	=====
12 HOUR STD	636158	8.57	2672786	9.84	2098387	13.38
UPPER LIMIT	1272316	9.07	5345572	10.34	4196774	13.88
LOWER LIMIT	318079	8.07	1336393	9.34	1049194	12.88
=====	=====	=====	=====	=====	=====	=====
LABORATORY						
SAMPLE NO.						
=====	=====	=====	=====	=====	=====	=====
01 VV237B	545678	8.58	2208684	9.85	1753284	13.40
02 296288	528489	8.58	2075318	9.86	1713714	13.40
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IS1 (BCM) = Bromochloromethane
 IS2 (DFB) = 1,4-Difluorobenzene
 IS3 (CBZ) = Chlorobenzene-d5

AREA UPPER LIMIT = +100% of internal standard area
 AREA LOWER LIMIT = - 50% of internal standard area
 RT UPPER LIMIT = + 0.50 minutes of internal standard RT
 RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
 * Values outside of QC limits.

VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab File ID (Standard): J20782

Date Analyzed: 08/27/01

Instrument ID: VOAMS8

Time Analyzed: 0859

		IS1 AREA #	RT #	IS2 (CBZ) AREA #	RT #	IS3 (DCB) AREA #	RT #
	=====	=====	=====	=====	=====	=====	=====
	12 HOUR STD	2879069	8.82	2401502	12.48	1454771	14.93
	UPPER LIMIT	5758138	9.32	4803004	12.98	2909542	15.43
	LOWER LIMIT	1439534	8.32	1200751	11.98	727386	14.43
	=====	=====	=====	=====	=====	=====	=====
	LABORATORY SAMPLE NO.						
	=====	=====	=====	=====	=====	=====	=====
01	JV239	2893947	8.78	2399308	12.44	1362527	14.92
02	296426	2980946	8.79	2357978	12.45	1104700	14.92
03	296426MS	3594662	8.74	2705425	12.40	1163354	14.86
04	296426MSD	3599929	8.74	2682795	12.41	1197334	14.87
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21							
22							

IS1 = Fluorobenzene

IS2 (CBZ) = Chlorobenzene-d5

IS3 (DCB) = 1,4-Dichlorobenzene-d4

AREA UPPER LIMIT = +100% of internal standard area

AREA LOWER LIMIT = - 50% of internal standard area

RT UPPER LIMIT = + 0.50 minutes of internal standard RT

RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.

* Values outside of QC limits.

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