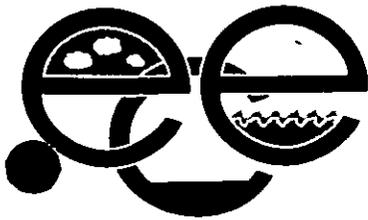


## Environmental Engineering Corporation



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# Environmental Engineering Corporation

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<http://www.envengg.com>

CMRRR # 7000 1670 0008 7637 1951

December 7, 2001

New Jersey Department of Environmental Protection  
Bureau of Underground Storage Tanks  
PO Box 433  
401 East State Street  
Trenton, New Jersey 08625

Attn: Ms. Karen Lesto

Re: Hartley Dodge Memorial Building  
Borough of Madison, Morris County  
NJDEP Case #91-2-20-1657  
UST#0085115

Subject: Semi-annual Groundwater Monitoring Report; RAW addendum and CEA proposal.

Dear Ms. Lesto:

This report provides the results of the semi-annual groundwater monitoring at the referenced site, performed in accordance with the requirements stated in the NJDEP's letters to the Borough of Madison dated January 30, 1997, April 24, 2000, and February 13, 2001. The sampling was performed on September 24, 2001 and included the sampling of five of the monitoring wells (MW-1, MW-2, MW-3, MW-4, and MW-6).

The results from the current round of monitoring are presented in the summary tables attached to this report. Also provided in the attachments are a chronological summary table of all groundwater analytical results to date and chronological data plots depicting results from monitoring wells 1-4. A groundwater contour map (Figure 1) and a NJDEP reporting form are also attached. A complete copy of the laboratory reduced deliverables package is also provided. Finally, per The Technical Requirements for Site Remediation (N.J.A.C. 7:26E), we have enclosed the analytical results for the March, 2000 sampling; the September, 2000 sampling; the December, 2000 sampling; the March, 2001 sampling; and the September, 2001 sampling in electronic format. The files are saved in folders with names that pertain to the date of sampling, such as "Ms092401" for the September 24, 2001 sampling. These, in turn, are filed under a general folder named "MadisonPS". The disk itself is located in Appendix 2 of the Remedial Action Workplan.

## Review of Monitoring Results

The results of the current round of groundwater monitoring are summarized in the attached Table 1, *Physical Well Data*, and Table 2, *Summary of Groundwater Analytical Data*. In addition, Table 3 provides a summary of historic groundwater monitoring data at the site.

## Environmental Engineering Corporation

Ms. Mersereau  
December 7, 2001  
Page 2 of 2

The concentration of benzene and xylene exceeded the Groundwater Quality Standards (GWQS) in monitoring wells 1 and 2. The decreasing trend in BTEX concentration in monitoring wells 1 and 2 was reversed in this sampling period. We suspect this is caused by a limited amount of contaminated soil remaining in the (capped) area of the former 550-gallon underground storage tank. This soil contamination apparently continues to impact groundwater in the area of monitoring wells 1 and 2 due to the very shallow water table.

The BTEX concentrations in monitoring wells 1 and 2 have been higher in the September round of samplings than the March round of samplings, since September, 1996. In view of this fact, we will wait for the results of the March, 2002 sampling to determine if the results of the September, 2001 sampling are an aberration or the contaminated soil at the site is impacting the groundwater to the extent that there is no longer a decreasing trend in the BTEX concentration in monitoring wells 1 and 2. It should be noted that the Oxygen Releasing Compound (ORC) injections performed in May and November, 2000 resulted in significant reductions in the groundwater contamination at MW-1 and MW-2. This sharp decrease in the BTEX concentration in the groundwater could have affected the equilibrium between the BTEX in the soil and in the groundwater and resulted in the desorption of additional BTEX from the soil. In any case, if the results of the March, 2002 sampling do not show a significant reduction and the resumption of the decreasing BTEX concentration trend at monitoring wells 1 and 2, then the Borough of Madison will evaluate more aggressive options for remediating the contaminated soil in the area.

### Classification Exception Area (CEA) proposal & Remedial Action Workplan (RAW) Addendum

As groundwater contamination exists at the site above the applicable criteria, pursuant to the Ground Water Quality Standards (N.J.A.C. 7:9-6 et. Seq.) and the Bureau's letter dated February 13, 2001, we have included a proposal for the establishment of a CEA at the site. We have also included RAW Addendum which provides the basis and background for a CEA to address the groundwater contamination at the site.

Please contact the undersigned if you have any questions or require any additional information.

Sincerely,  
Environmental Engineering Corporation



Pradeep Lamba, PhD, PE, CHMM  
Principal Engineer

cc: Mr. Robert Vogel, Borough of Madison

**Environmental Engineering Corporation**

**ATTACHMENTS**

**TABLE 1**

**Physical Well Data  
September 24, 2001  
Madison Police Station  
Borough of Madison, New Jersey**

Monitoring Well	Elevation of Top of PVC Casing	Depth to Ground Water	Ground Water Elevation	Depth to Top of Screen	Elevation of Top of Screen	Thickness of LNAPL
MW-1	100.45	5.80	94.65	1.8	98.6	Not Present
MW-2	100.00	3.55	96.45	0.5	99.5	Not Present
MW-3	99.40	2.80	96.60	1.0	98.4	Not Present
MW-4	97.84	4.42	93.42	2.5	95.4	Not Present
MW-5	99.38	NS	NS	2.6	96.7	Not Present
MW-6	98.93	10.00	88.93	2.4	96.5	Not Present
MW-7	98.00	NS	NS	4.4	93.6	Not Present

**Notes:**

- Ground water levels measured on September 24, 2001 prior to purging and sampling of wells.
- All values are in feet; elevations relative to site datum = 100.0 on tile floor at entrance to Police Station.

Summary of Groundwater Analytical Data  
 September 24, 2001  
 Madison Police Station  
 Borough of Madison, New Jersey

Parameter	CAS #	Ground Water Quality Standard (GWQS) (ug/l)	Well Number and Screened Depth Interval							Field Blank Analytical Result (ug/l)	Trip Blank Analytical Result (ug/l)	
			MW-1 2.0 to 12.0 ft	MW-2 0.8 to 13.4 ft	MW-3 1.5 to 14.0 ft	MW-4 3.0 to 18.0 ft	MW-5 3.0 to 13.0 ft	MW-6 3.0 to 18.0 ft	MW-7 5.0 to 20.0 ft			
Benzene	71-43-2	1	210	8.4	ND	ND	ND	NS	ND	NS	ND	ND
Toluene	108-88-3	1000	250	47	ND	ND	ND	NS	ND	NS	ND	ND
Ethylbenzene	100-41-4	700	650	620	ND	ND	ND	NS	ND	NS	ND	ND
Total xylenes	330-66-6	1000	3250	1430	ND	ND	ND	NS	ND	NS	ND	ND
Total BTEX		Not specified	4360	2105.4	ND	ND	ND	NS	ND	NS	ND	ND
T-butyl alcohol	75-65-0	100	ND	ND	ND	ND	ND	NS	ND	NS	ND	ND
Methyl t-butyl ether	1634-04-4	interim = 70	ND	ND	ND	52	52	NS	22.0	NS	ND	ND
Dilution Factor			20.0	10.0	1.0	1.0	1.0	NS	1.0	NS	1.0	1.0

Notes:

Shaded values exceed the NJDEP Ground Water Quality Standards.

**TABLE 3**  
**Chronological Well Data**  
**Madison Police Station**  
**Borough of Madison, New Jersey**

MW-1	4/3/91	6/6/91	7/8/92	8/9/95	1/23/96	6/28/96	9/12/96	3/28/97	9/26/97	3/30/98	9/29/98	3/23/99	9/23/99	3/30/00	9/19/00	3/28/01	9/24/01
benzene	350	440	570	18	NS	96	270	130	150	110	130	88	73	85	27	15	210
toluene	1600	2200	1600	37	NS	230	560	320	460	230	170	140	100	160	ND	0.6	250
ethylbenzene	1400	1700	2700	130	NS	1200	1700	1600	1600	1500	1000	130	140	830	12	1.2	650
xylenes	5600	11000	14000	725	NS	6340	9500	6340	6500	4120	270	3490	1980	2430	ND	ND	3250
Total BTEX	8950	15340	18870	910	NS	7866	12030	8390	8710	5960	1570	3848	2293	3505	39	16.8	4360
TBA		ND	ND	NA	NS	ND	ND	ND (480)	ND (480)	ND(96)	ND(9.6)	ND	ND	ND	ND	12	ND
MTBE		ND	ND	NA	NS	ND	ND	ND (210)	ND (210)	ND(42)	ND(4.2)	ND	ND	ND	ND	ND	ND
VOC TICs	22671	22160	18870	NA	NS	NA	2730	NA	NA	NA	NA	NA	NA	750	NA	NA	NA

MW-2	4/3/91	6/6/91	7/8/92	8/9/95	1/23/96	6/28/96	9/12/96	3/28/97	9/26/97	3/30/98	9/29/98	3/23/99	9/23/99	3/30/00	9/19/00	3/28/01	9/24/01
benzene	NI	NI	140	17	NS	ND	49	14	ND	11	20	9.3	13	7.0	7.0	1.5	8.4
toluene	NI	NI	1400	180	NS	410	350	140	820	120	270	62	150	39	90	1.5	47
ethylbenzene	NI	NI	ND	540	NS	1000	650	480	1700	630	180	330	820	340	760	40	620
xylenes	NI	NI	2000	3400	NS	3900	2800	1390	5000	1900	2230	1970	2780	1140	2290	134	1430
Total BTEX	NI	NI	3540	4137	NS	5310	3849	2024	7520	2661	2700	2371	3763	1526	3147	177	2105
TBA	NI	NI	NA	NA	NS	NA	ND	ND	ND (480)	ND(190)	ND(9.6)	ND	ND	ND	ND	ND	ND
MTBE	NI	NI	NA	NA	NS	NA	ND	ND	ND (210)	ND(84)	ND(4.2)	ND	ND	4.4	ND	ND	ND
VOC TICs	NI	NI	4020	NA	NS	NA	2630	2630	NA	NA	NA	NA	NA	1401	NA	NA	NA

MW-3	4/3/91	6/6/91	7/8/92	8/9/95	1/23/96	6/28/96	9/12/96	3/28/97	9/26/97	3/30/98	9/29/98	3/23/99	9/23/99	3/30/00	9/19/00	3/28/01	9/24/01
benzene	NI	NI	ND	ND	NS	ND	0.7	0.2	0.6	ND							
toluene	NI	NI	ND	ND	NS	ND	1.0	ND	0.5	ND							
ethylbenzene	NI	NI	ND	4	NS	54	66	0.7	6.8	ND							
xylenes	NI	NI	ND	ND	NS	11	10.7	1.3	2.1	ND	ND	ND	3.7	ND	ND	ND	ND
Total BTEX	NI	NI	ND	4	NS	65	78.4	2.2	10.0	ND	ND	ND	3.7	ND	ND	ND	ND
TBA	NI	NI	ND	ND	NS	ND											
MTBE	NI	NI	ND	ND	NS	ND											
VOC TICs	NI	NI	ND	NA	NS	NA	148	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA

MW-4	4/3/91	6/6/91	7/8/92	8/9/95	1/23/96	6/28/96	9/12/96	3/28/97	9/26/97	3/30/98	9/29/98	3/23/99	9/23/99	3/30/00	9/19/00	3/28/01	9/24/01
benzene	NA	NA	NA	3000	690	290	140	12.0	7.3	2.4	1.4	ND	0.5	ND	ND	ND	ND
toluene	NA	NA	NA	11000	2000	390	400	4.8	8.6	3.0	0.6	ND	ND	ND	0.6	ND	ND
ethylbenzene	NA	NA	NA	1200	410	380	440	70	89	40	17	3.7	ND	ND	ND	ND	ND
xylenes	NA	NA	NA	8100	3500	1400	1280	27.5	20.5	5.5	ND						
Total BTEX	NA	NA	NA	23300	6600	2460	2260	114.3	125.4	50.9	19	3.7	0.5	ND	0.6	ND	ND
TBA	NA	NA	NA	58000	6000	ND	ND	ND (96)	ND (9.6)	51	ND	ND	47	ND	ND	ND	ND
MTBE	NA	NA	NA	560000	180000	ND	4400	2000	1000	770	1400	250	530	15	ND	ND	52
VOC TICs	NA	NA	NA	698890	NA	NA	NA	NA	NA	NA	NA	NA	NA	5	NA	NA	NA

MW-5	4/3/91	6/6/91	7/8/92	8/9/95	1/23/96	6/28/96	9/12/96	3/28/97	9/26/97	3/30/98	9/29/98	3/23/99	9/23/99	3/30/00	9/19/00	3/28/01	9/24/01
benzene	NI	NI	NI	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
toluene	NI	NI	NI	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
ethylbenzene	NI	NI	NI	ND	NS	ND	NS	ND	NS	0.5	NS	ND	NS	NS	NS	NS	NS
xylenes	NI	NI	NI	ND	NS	ND	NS	ND	NS	0.8	NS	ND	NS	NS	NS	NS	NS
Total BTEX	NI	NI	NI	ND	NS	ND	NS	ND	NS	1.3	NS	ND	NS	NS	NS	NS	NS
TBA	NI	NI	NI	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
MTBE	NI	NI	NI	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
VOC TICs	NI	NI	NI	30	NS	NA	NS	NA	NS	NA	NS	NA	NS	NS	NS	NS	NS

MW-6	4/3/91	6/6/91	7/8/92	8/9/95	1/23/96	6/28/96	9/12/96	3/28/97	9/26/97	3/30/98	9/29/98	3/23/99	9/23/99	3/30/00	9/19/00	3/28/01	9/24/01
benzene	NI	NI	NI	NI	ND	ND	NS	ND	ND	ND	ND	ND	ND	NS	ND	NS	ND
toluene	NI	NI	NI	NI	ND	ND	NS	ND	ND	ND	ND	ND	ND	NS	ND	NS	ND
ethylbenzene	NI	NI	NI	NI	ND	ND	NS	ND	ND	ND	ND	ND	ND	NS	ND	NS	ND
xylenes	NI	NI	NI	NI	ND	ND	NS	ND	ND	ND	ND	ND	ND	NS	ND	NS	ND
Total BTEX	NI	NI	NI	NI	ND	ND	NS	ND	ND	ND	ND	ND	ND	NS	ND	NS	ND
TBA	NI	NI	NI	NI	ND	ND	NS	ND	ND	ND	ND	ND	ND	NS	ND	NS	ND
MTBE	NI	NI	NI	NI	ND	ND	NS	6.4	11	6.4	6.6	ND	4.3	NS	ND	NS	22
VOC TICs	NI	NI	NI	NI	NA	NA	NS	NA	NA	NA	NA	NA	NA	NS	NA	NS	NA

MW-7	4/3/91	6/6/91	7/8/92	8/9/95	1/23/96	6/28/96	9/12/96	3/28/97	9/26/97	3/30/98	9/29/98	3/23/99	9/23/99	3/30/00	9/19/00	3/28/01	9/24/01
benzene	NI	NI	NI	NI	ND	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
toluene	NI	NI	NI	NI	ND	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
ethylbenzene	NI	NI	NI	NI	ND	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
xylenes	NI	NI	NI	NI	ND	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
Total BTEX	NI	NI	NI	NI	ND	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
TBA	NI	NI	NI	NI	ND	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
MTBE	NI	NI	NI	NI	ND	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
VOC TICs	NI	NI	NI	NI	NA	NA	NS	NA	NS	NA	NS	NA	NS	NS	NS	NS	NS

Table 3  
 1815 GW data 24SEPT01

NI = Not installed; NS = Not sampled  
 NA = Not analyzed; ND = Not detected  
 Results are in micrograms/liter  
 Values in parentheses are method detection limits

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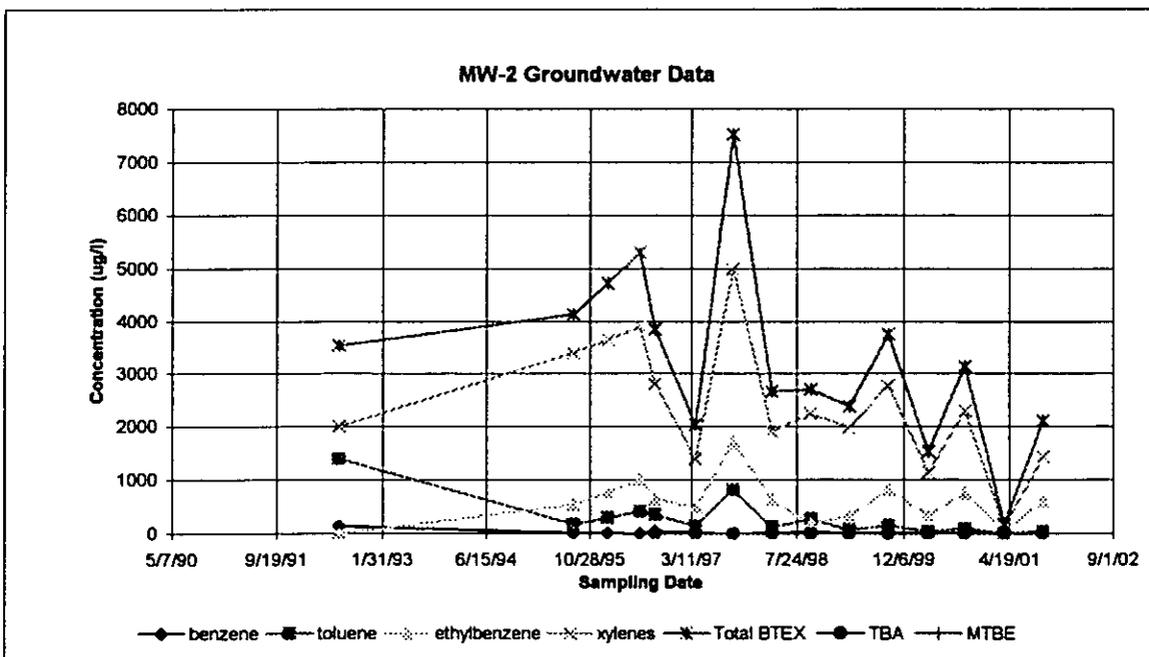
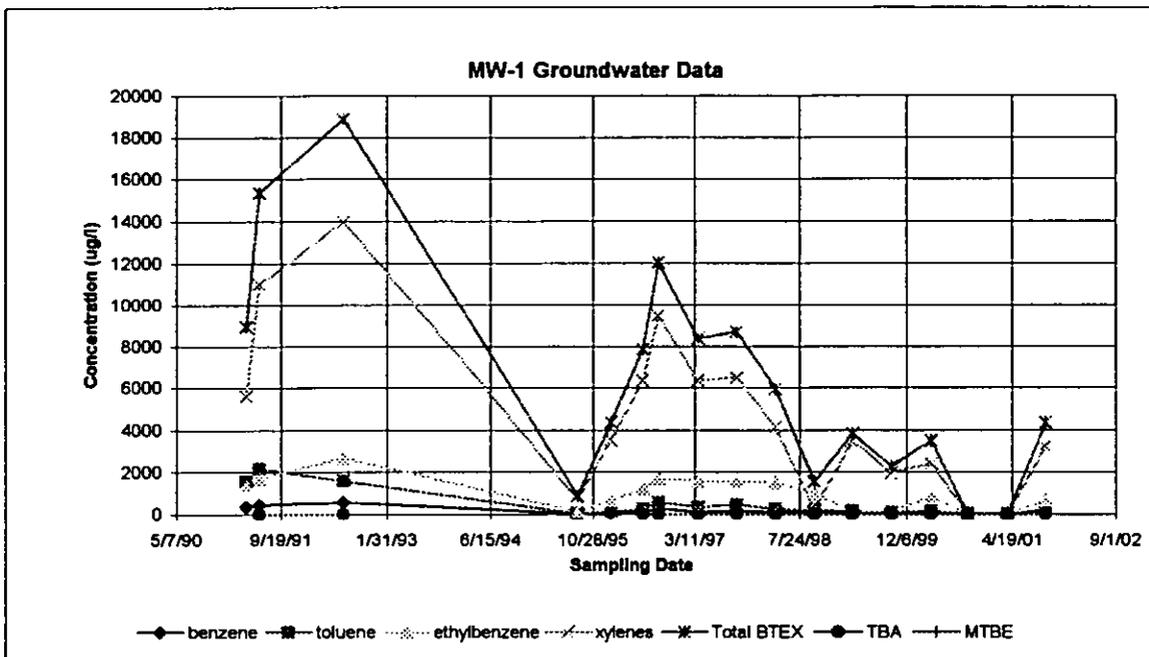
**TABLE 4**

**Groundwater Data  
September 24, 2001  
Madison Police Station  
Borough of Madison, New Jersey**

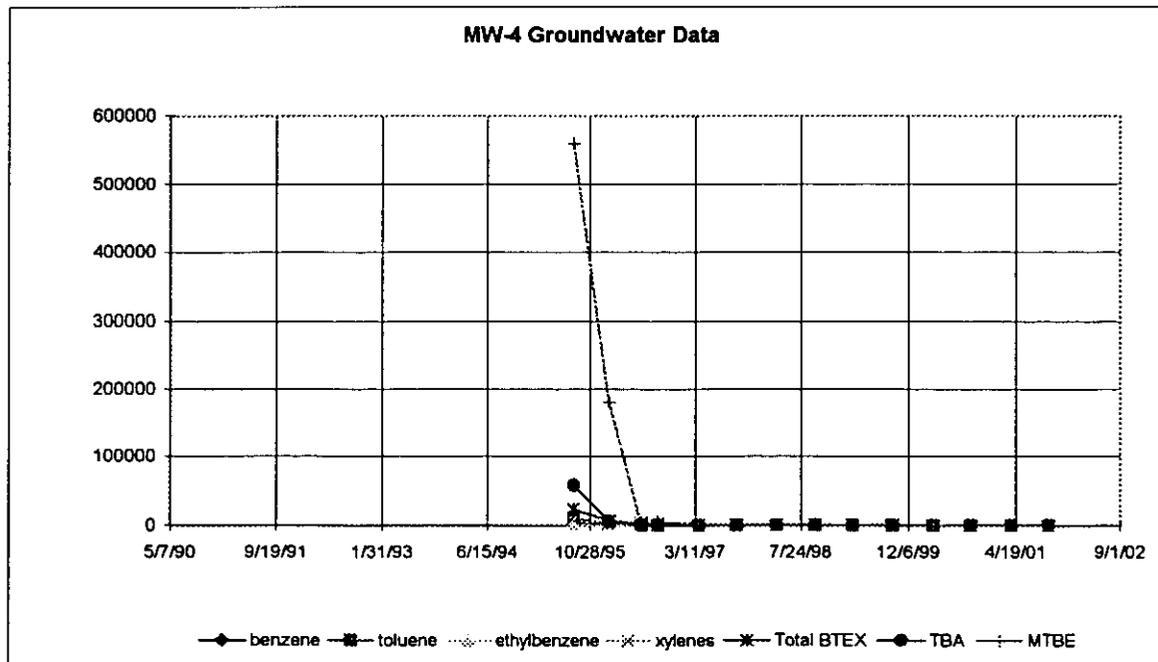
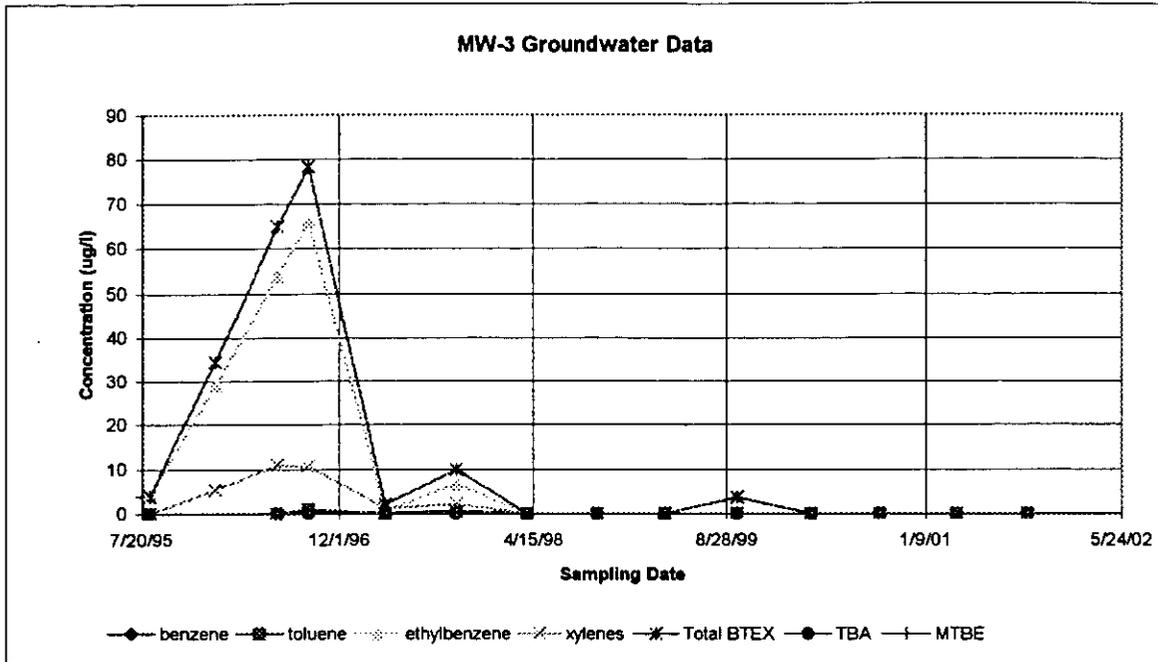
Parameter	Units	Well Number and Screened Depth Interval					
		MW-1	MW-2	MW-3	MW-4	MW-5	
		2.0 to 12.0 ft.	0.9 to 13.4 ft.	1.5 to 14.0	3.0 to 18.0 ft.	3.0 to 18.0 ft.	
Dissolved Oxygen	mg/l	0.00	0.00	2.93	2.58	0.20	
pH	s.u.	9.22	6.76	6.34	6.13	6.08	
Carbon Dioxide, dissolved	mg/l	3.4	9.6	4.2	26.1	ND	
Magnesium	mg/l	102	32.1	22.6	6.6	72	
Microbial Contaminant Degraders	CFU/ml	0	0	NS	NS	NS	

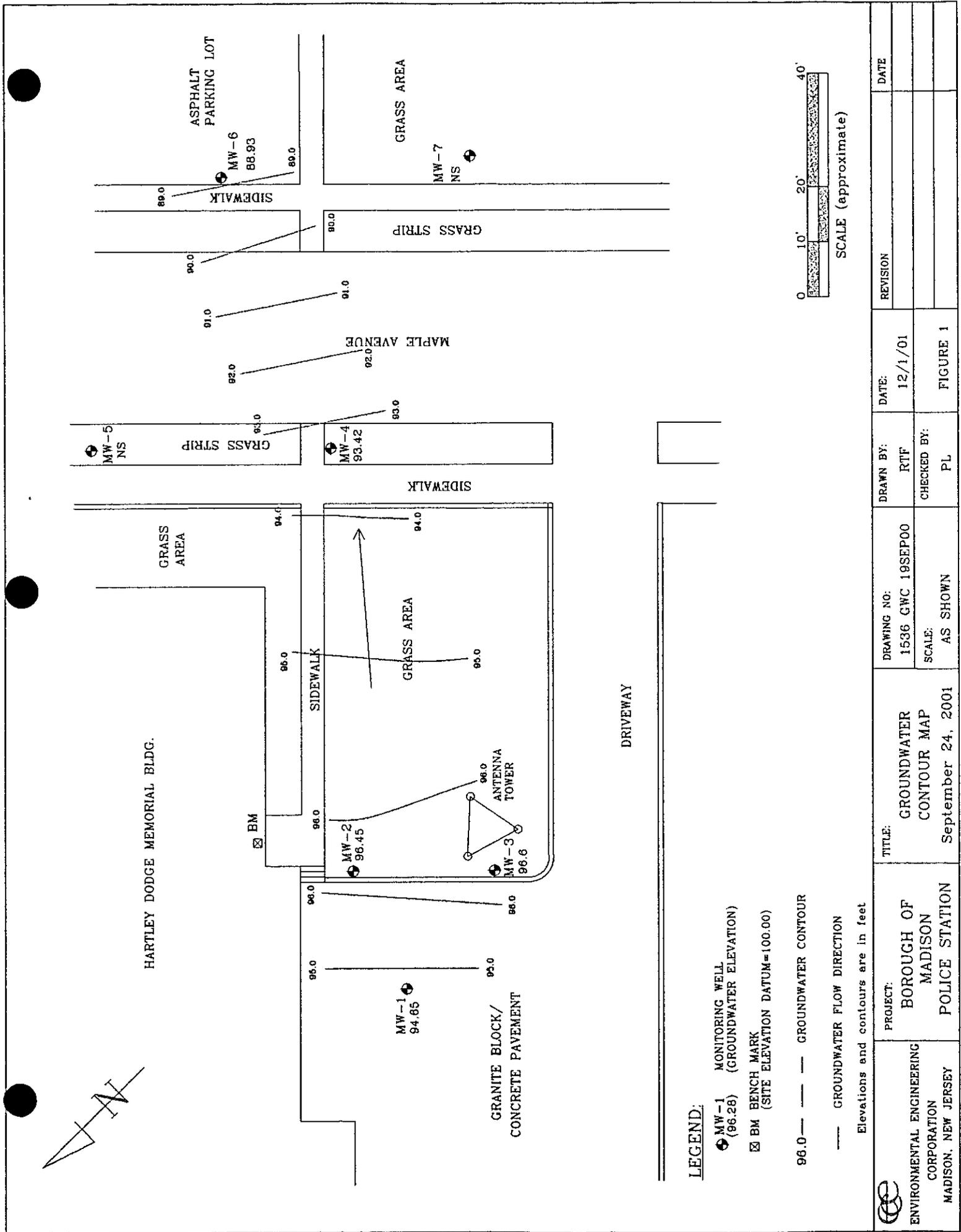
Dissolved oxygen and pH are field measured parameters. ND = Not detected.  
Other parameters are analyzed at Accredited Laboratories, Inc, Carteret, NJ (NJDEP Cert. #12007).

## Madison Police Station Chronological Data Graphs



## Madison Police Station Chronological Data Graphs





 ENVIRONMENTAL ENGINEERING CORPORATION MADISON, NEW JERSEY	PROJECT: BOROUGH OF MADISON POLICE STATION	TITLE: GROUNDWATER CONTOUR MAP September 24, 2001	DRAWING NO: 1536 GWC 19SEP00 SCALE: AS SHOWN	DRAWN BY: RTF CHECKED BY: PL	DATE: 12/1/01 REVISION:	DATE
	FIGURE 1					

Site Name: Madison Police Station  
Site Location: Madison, NJ  
Date of Monitoring: September 24, 2001

### Contour Map Reporting Form

1. Did any surveyed well casing elevations change from the previous sampling event? Yes \_\_\_ No X.  
If yes, attach new "Well Certification - Form B" and identify the reason for the elevation change (damage to casing, installation of recovery system in monitoring well, etc.).
  
2. Are there any monitor wells in unconfined aquifers in which the water table elevation is higher than the top of the well screen? Yes \_\_\_ No X. If yes, identify these wells.
  
3. Are there any monitor wells present at the site but omitted from the contour map? Yes \_\_\_ No X. Unless the omission of the well(s) has been previously approved by the department, justify the omission.
  
4. Are there any monitor wells containing separate phase product during this measuring event? Yes \_\_\_ No X.  
Were any of the monitor wells with separate phase product included in the ground water contour map?  
Yes \_\_\_ No \_\_\_\_\_. If yes, show the formula used to correct the water table elevation.

5. Has the ground water flow direction changed more than 45-degrees from the previous ground water contour map?  
Yes \_\_\_ No X. If yes, discuss the reasons for the change.

6. Has ground water mounding and/or depressions been identified in the ground water contour map?  
Yes \_\_\_ No X. Unless the ground water mounds and/or depressions are caused by the ground water remediation system, discuss the reasons for this occurrence.

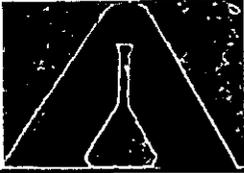
7. Are all the wells used in the contour map screened in the same water-bearing zone?  
Yes X No \_\_\_\_\_. If no, justify inclusion of those wells.

8. Were the ground water contours computer generated \_\_\_\_\_, computer aided \_\_\_\_\_, or hand-drawn X?  
If computer aided or generated, identify the interpolation method(s) used.

Hand drawn and digitized into AutoCAD drawing.

**Environmental Engineering Corporation**

**LABORATORY DELIVERABLES**



**ACCREDITED LABORATORIES, INC.**

*Implementing Tomorrow's Technology, Today!™*

-1-

**Analytical Data Report**

for

**Environmental Engineering Corp**  
335 Main Street  
Madison, NJ 07940

**Project: Madison O R C Injection**

Accredited Laboratories Case No.: 3882  
Date Received: 09/24/01

<u>Field ID</u>	<u>Laboratory Sample #</u>
MW-1	200110549
MW-2	200110550
MW-3	200110551
MW-4	200110552
MW-6	200110553
FB	200110554
TB	200110555

**RECEIVED**

OCT 11 2001

ENVIRONMENTAL  
ENGINEERING CORP.

Accredited Laboratories, Inc. New Jersey Certification  
Number 12007. This data has been reviewed and accepted by:

Theodore C. Gaydos  
Technical Director

(732) 541-2025

**CORPORATE OFFICES**  
20 Pershing Avenue  
Carteret, New Jersey 07008

FAX (732) 541-1383

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Standard Calibrations	
ICP Interference Check Sample	
Blanks	
Spike Sample Recovery	
Sample Duplicate	
Laboratory Control Sample	
ICP Serial Dilution	
General Chemistry:	67
Sample Duplicate	
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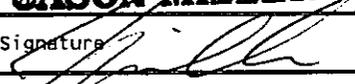


**Accredited Laboratories, Inc.**

**INTERNAL CHAIN OF CUSTODY**

Laboratory Person Breaking Field Seal on Sample Shuttle & Accepting Responsibility for Sample	Laboratory: Accredited Laboratories, Inc. Location: Carteret, N.J. Name: <b>JASON MILLER</b> Title: <u>Sed</u>
Field Sample Seal No. <u>None</u>	Date Broken: ___/___/___ Military Time Seal Broken _____
Case No. 3882	<input type="checkbox"/> Check if No Seal on Sample Shuttle.

Field #	Laboratory #	Test Name	Date Sampled	Date Received
MW-1	200110549	VO	09/24/01	09/24/01
MW-2	200110550	VO	09/24/01	09/24/01
MW-3	200110551	VO	09/24/01	09/24/01
MW-4	200110552	VO	09/24/01	09/24/01
MW-6	200110553	VO	09/24/01	09/24/01
FB	200110554	VO	09/24/01	09/24/01
TB	200110555	VO	09/24/01	09/24/01

DATE	TIME	RELINQUISHED BY	RECEIVED BY	PURPOSE OF CHANGE OF CUSTODY
9/28/01		Printed Name <b>JASON MILLER</b>	Printed Name <u>W. LORENTE</u>	<b>ANALYSIS</b>
		Signature 	Signature 	
		Printed Name	Printed Name	
		Signature	Signature	
		Printed Name	Printed Name	
		Signature	Signature	
		Printed Name	Printed Name	
		Signature	Signature	
		Printed Name	Printed Name	
		Signature	Signature	
		Printed Name	Printed Name	
		Signature	Signature	

FORM: 291COC

**Accredited Laboratories, Inc.**

**INTERNAL CHAIN OF CUSTODY**

Laboratory Person Breaking Field Seal on Sample Shuttle & Accepting Responsibility for Sample	Laboratory: Accredited Laboratories, Inc. Location: Carteret, N.J.
	Name: <b>JASON MILLER</b> Title: <i>SW</i>
Field Sample Seal No. <i>None</i>	Date Broken: ___/___/___ Military Time Seal Broken _____
Case No. 3882	<input type="checkbox"/> Check if No Seal on Sample Shuttle.

Field #	Laboratory #	Test Name	Date Sampled	Date Received
MW-1	200110549	MS	09/24/01	09/24/01
MW-2	200110550	MS	09/24/01	09/24/01
MW-3	200110551	MS	09/24/01	09/24/01
MW-4	200110552	MS	09/24/01	09/24/01
MW-6	200110553	MS	09/24/01	09/24/01

DATE	TIME	RELINQUISHED BY	RECEIVED BY	PURPOSE OF CHANGE OF CUSTODY
		Printed Name <b>JASON MILLER</b> Signature <i>[Signature]</i>	Printed Name <b>L.R. WEDIA</b> Signature <i>L.R.</i>	<i>prep</i>
<i>09/24</i>	<i>1400</i>	Printed Name <b>L.R. WEDIA</b> Signature <i>L.R.</i>	Printed Name <b>JASON MILLER</b> Signature <i>[Signature]</i>	<i>storage</i>
		Printed Name _____ Signature _____	Printed Name _____ Signature _____	
		Printed Name _____ Signature _____	Printed Name _____ Signature _____	
		Printed Name _____ Signature _____	Printed Name _____ Signature _____	
		Printed Name _____ Signature _____	Printed Name _____ Signature _____	

FORM:  
291COC

**Accredited Laboratories, Inc.**

**INTERNAL CHAIN OF CUSTODY**

Laboratory Person Breaking Field Seal on Sample Shuttle & Accepting Responsibility for Sample	Laboratory: Accredited Laboratories, Inc. Location: Carteret, N.J.	Name: <u>JASON MILLER</u> Title: <u>S/O</u>
Field Sample Seal No. <u>None</u>	Date Broken: <u>  </u> / <u>  </u> / <u>  </u>	Military Time Seal Broken <u>  </u>
Case No. 3882	<input type="checkbox"/> Check if No Seal on Sample Shuttle.	

Field #	Laboratory #	Test Name	Date Sampled	Date Received
MW-1	200110549	CO2	09/24/01	09/24/01
MW-2	200110550	CO2	09/24/01	09/24/01
MW-3	200110551	CO2	09/24/01	09/24/01
MW-4	200110552	CO2	09/24/01	09/24/01
MW-6	200110553	CO2	09/24/01	09/24/01

DATE	TIME	RELINQUISHED BY	RECEIVED BY	PURPOSE OF CHANGE OF CUSTODY
09/25		Printed Name: <u>JASON MILLER</u> Signature: <u>[Signature]</u>	Printed Name: <u>J. Mendez</u> Signature: <u>[Signature]</u>	Analysis
09/25		Printed Name: <u>J. Mendez</u> Signature: <u>[Signature]</u>	Printed Name: <u>JASON MILLER</u> Signature: <u>[Signature]</u>	Cold Storage
		Printed Name: <u>  </u> Signature: <u>  </u>	Printed Name: <u>  </u> Signature: <u>  </u>	
		Printed Name: <u>  </u> Signature: <u>  </u>	Printed Name: <u>  </u> Signature: <u>  </u>	
		Printed Name: <u>  </u> Signature: <u>  </u>	Printed Name: <u>  </u> Signature: <u>  </u>	
		Printed Name: <u>  </u> Signature: <u>  </u>	Printed Name: <u>  </u> Signature: <u>  </u>	

FORM:  
291COC

**Accredited Laboratories, Inc.**

**INTERNAL CHAIN OF CUSTODY**

Laboratory Person Breaking Field Seal on Sample Shuttle & Accepting Responsibility for Sample	Laboratory: Accredited Laboratories, Inc. Location: Carteret, N.J. Name: <b>JASON MILLER</b> Title: <u>SAC</u>
Field Sample Seal No. <u>Don</u>	Date Broken: ___/___/___ Military Time Seal Broken ___
Case No. 3882	<input type="checkbox"/> Check if No Seal on Sample Shuttle.

Field #	Laboratory #	Test Name	Date Sampled	Date Received
MW-1	200110549	PLATE COUNT	09/24/01	09/24/01
MW-2	200110550	PLATE COUNT	09/24/01	09/24/01

DATE	TIME	RELINQUISHED BY	RECEIVED BY	PURPOSE OF CHANGE OF CUSTODY
9/18		<b>JASON MILLER</b>	Printed Name	Analysis
		<i>[Signature]</i>	Signature	
		Printed Name	Printed Name	
		Signature	Signature	
		Printed Name	Printed Name	
		Signature	Signature	
		Printed Name	Printed Name	
		Signature	Signature	
		Printed Name	Printed Name	
		Signature	Signature	
		Printed Name	Printed Name	
		Signature	Signature	

FORM: 291COC

## METHODOLOGY SUMMARY

### **BTEX Organics - EPA 624 (aqueous)**

BTEX compounds are purged from a 5 ml sample by bubbling an inert gas through the aqueous sample. The compounds are trapped in a sorbent column. When purging is completed, the sorbent column is heated and back flushed with the inert gas to desorb the purgeables onto a GC column. The GC is temperature programmed to separate the purgeables which are then detected with a mass spectrometer.

### **Metals (aqueous)**

A 100 ml portion of aqueous is digested with nitric acid on a hot plate and evaporated to near dryness cautiously. The digestate is then refluxed with either nitric acid or hydrochloric acid. Diluted hydrochloric acid is used as the final reflux acid for the flame AA or ICAP of Ag, Al, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Ni, Sb, Sn, Tl and Zn. Diluted nitric acid is employed as the final dilution acid for the furnace AA analysis of As, Pb and Se. For the graphite furnace analysis, an aliquot of the digestate is spiked with modifier solution and is placed into the graphite furnace. The aliquot is then slowly evaporated to dryness, charred and atomized. The absorption of the EDL radiation during atomization is proportional to the element concentration. For the flame AA, the digestate is aspirated and atomized into a flame. The absorption of the HCL radiation during atomization is proportional to the element concentration. The basis of the ICAP method is the measurement of the atomic emission by an optical spectroscope technique. The emission spectra are dispersed by a grating spectrometer and the intensities of the line are measured and processed by a computer system. For mercury analysis, a 100 ml portion of sample is digested with potassium permanganate and persulfate at acidic conditions in a water bath at 95°C. The mercury in the sample is reduced to the elemental state and detected by the cold vapor technique in a closed system. The analytical procedures associated with the Atomic Absorption technique are derived from "EPA Methods for Chemical Analysis of Water and Wastes" - EPA Method 200 Series. The analytical procedures associated with ICAP techniques are derived from EPA Method 200.7.

### **Carbon Dioxide - SM 4500-CO<sup>2</sup>D (aqueous)**

The total alkalinity, titrated to pH 4.5, and the pH of sample are determined. The content of CO<sup>2</sup> in the sample is then calculated based on standard method 4500-CO<sup>2</sup>D. When the pH of the sample is lower than 4.5 then the CO<sup>2</sup> content is determined by SM 4500-CO<sup>2</sup>C.

Date: 09/23/01

ACCREDITED LABORATORIES, INC.

Time: 20:20:27

ORGANIC ANALYSIS LABORATORY CHRONICLE

VO = BTEX, MTBE, TBA ONLY; DISK

Client: Environmental Engineering Corp  
Fax Data Due: 10/04/01  
Client Project Name: Madison O R C Injection

Test Date Due: 10/08/01  
Hard Copy Due: 10/04/01

Date Sampled: 09/24/01 Date Received: 09/24/01 Report Package: Reduced

Test: VO  
Test Description: Volatile Organics (VO)

QC#: \_\_\_\_\_

By Method: \_\_\_\_\_

SAMPLE IDENTIFICATION			M	EXTRACTION			ANALYSIS			TIC
Field#	Case#	Sample#	x	Date	Time	Init	Date	Time	Init	FLAG
MW-1	3882	200110549	A				09/28/01	20:42		RA
MW-2	3882	200110550	A				10/01/01	20:46		
MW-3	3882	200110551	A				09/28/01	22:17		
MW-4	3882	200110552	A				09/28/01	23:04		
MW-6	3882	200110553	A					23:52		
FB	3882	200110554	A					16:02		
TB	3882	200110555	A					16:43		

Reviewed by: SP

Date: 10/4/01

Abbreviations: Sample Matrix:

Mtx: A=Aqueous: S=Soil: O=Oil: K=Solid: F=Filters: P=Potable Water: G=Sludge  
X=Other

RPT: Report01

Date: 09/23/01

ACCREDITED LABORATORIES, INC.  
INORGANIC ANALYSIS LABORATORY CHRONICLE

Time: 20:19:53

VO = BTEX, MTBE, TBA ONLY; DISK

Client: Environmental Engineering Corp  
Field#: MW-1  
Client Sample Description:  
Date Sampled: 09/24/01  
Date Received: 09/24/01  
Report Package: Reduced

Test Date Due: 10/08/01  
Hard Copy Due: 10/04/01  
Sample#: 200110549

Fax Data Due: 10/04/01  
Case#: 3882

Test: MS  
Test Description: Metals Screen (MS)  
Project Name: Madison O R C Injection  
Mtx:A=Aqueous:S=Soil:O=Oil:K=Solid:F=Filters:P=Potable Water:G=Sludge:X=Oth  
Sample Comments:

QC#: 01044

						LABORATORY CHRONICLE				
By Method: _____						PREPARATION		ANALYSIS		
MTX	ELEMENT	SYM	RESULT	MDL	UNITS	DATE	INIT	DATE	INIT	REF
A	Magnesium	Mg				09-24	L-R	09-26	L	124-67


Quality control Report Number(s): 010930 A

Reviewed by: 4 Date: \_\_\_\_\_ RPT:Report02





Date: 09/23/01

ACCREDITED LABORATORIES, INC.  
INORGANIC ANALYSIS LABORATORY CHRONICLE

Time: 20:20:05

VO = BTEX, MTBE, TBA ONLY; DISK

Client: Environmental Engineering Corp

Test Date Due: 10/08/01

Fax Data Due: 10/04/01

Hard Copy Due: 10/04/01

Field#: MW-4

Case#: 3882

Sample#: 200110552

Client Sample Description:

Date Sampled: 09/24/01 Date Received: 09/24/01 Report Package: Reduced

Test: MS

QC#: \_\_\_\_\_

Test Description: Metals Screen (MS)

Project Name: Madison O R C Injection

Mtx:A=Aqueous:S=Soil:O=Oil:K=Solid:F=Filters:P=Potable Water:G=Sludge:X=Oth

Sample Comments:

						LABORATORY CHRONICLE				
By Method: _____						PREPARATION		ANALYSIS		
MTX	ELEMENT	SYM	RESULT	MDL	UNITS	DATE	INIT	DATE	INIT	REF
A	Magnesium	Mg				09-26	LR	09-26	W	12467

Quality control Report Number(s): 010920 A

Reviewed by: LT

Date: \_\_\_\_\_

RPT: Report02



Date: 09/23/01

Time: 20:20:37  
Page: 1

Accredited Laboratories, Inc.  
General Chemistry Laboratory Chronicle

VO = BTEX, MTBE, TBA ONLY; DISK

Client Name: Environmental Engineering Corp  
Client Field Number: MW-1  
Client Sample Description:  
Date Sampled: 09/24/01  
Client Project Name: Madison O R C Injection  
Phases:

Sample#: 200110549  
Fax Data Due: 10/04/01  
Hard Copy Due: 10/04/01  
Report Package: Reduced

Case#: 3882  
Date Received: 09/24/01

ANALYTICAL DATA SAMPLE PREP SAMPLE ANALYSIS

Mtx	Analytes	Test Due Date	RESULTS			UNITS			DATE			REF
			MDL	MDL	MDL	INIT	INIT	INIT	DATE	DATE	DATE	
A	CO2	10/08/01	3.40	2.0	mg/l				09-25-01			107-67

Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_

Matrix: A=Aqueous: S=Soil: O=Oil: K=Solid: F=Filters: P=Potable Water: G=Sludge: X=Other: RPT: Report06

Date: 09/23/01

Time: 20:20:43  
Page: 2

Accredited Laboratories, Inc.  
General Chemistry Laboratory Chronicle

VO = BTEX, MTBE, TBA ONLY; DISK

Client Name: Environmental Engineering Corp  
Client Field Number: MW-2  
Client Sample Description:  
Date Sampled: 09/24/01  
Client Project Name: Madison O R C Injection  
Phases:

Case#: 3882

Date Received: 09/24/01

Sample#: 200110550  
Fax Data Due: 10/04/01  
Hard Copy Due: 10/04/01  
Report Package: Reduced

ANALYTICAL DATA SAMPLE PREP SAMPLE ANALYSIS

Mtx	Analytes	Test Due Date	RESULTS			UNITS			DATE			REF
			MDL	MDL	MDL	INIT	INIT	INIT	DATE	DATE	DATE	
A	CO2	10/08/01	<u>0.57</u>	<u>2.0</u>	<u>mg/l</u>							<u>107-67</u>

Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_

Matrix: A=Aqueous: S=Soil: O=Oil: K=Solid: F=Filters: P=Potable Water: G=Sludge: X=Other: RPT: Report06

14

Date: 09/23/01

Time: 20:20:50  
Page: 3

Accredited Laboratories, Inc.  
General Chemistry Laboratory Chronicle

VO = BTEX, MTBE, TBA ONLY; DISK

Client Name: Environmental Engineering Corp  
Client Field Number: MW-3  
Client Sample Description:  
Date Sampled: 09/24/01  
Client Project Name: Madison O R C Injection  
Phases:

Case#: 3882

Date Received: 09/24/01

Sample#: 200110551  
Fax Data Due: 10/04/01  
Hard Copy Due: 10/04/01  
Report Package: Reduced

ANALYTICAL DATA SAMPLE PREP SAMPLE ANALYSIS

Mtx	Analytes	Test Due Date	RESULTS			UNITS			DATE			REF
			MDL	MDL	MDL	INIT	INIT	INIT	DATE	DATE	DATE	
A	CO2	10/08/01	4.20	2.0	mg/l				09-25-01			107-67

Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_

Matrix: A=Aqueous: S=Soil: O=Oil: K=Solid: F=Filters: P=Potable Water: G=Sludge: X=Other: RPT: Report06

5

Date: 09/23/01

Time: 20:20:58  
Page: 4

Accredited Laboratories, Inc.  
General Chemistry Laboratory Chronicle

VO = BTEX, MTBE, TBA ONLY; DISK

Client Name: Environmental Engineering Corp  
Client Field Number: MW-4  
Client Sample Description:  
Date Sampled: 09/24/01  
Client Project Name: Madison O R C Injection  
Phases:

Case#: 3882  
Date Received: 09/24/01  
Sample#: 200110552  
Fax Data Due: 10/04/01  
Hard Copy Due: 10/04/01  
Report Package: Reduced

ANALYTICAL DATA SAMPLE PREP SAMPLE ANALYSIS

Mtx	Analytes	Test Due Date	RESULTS			UNITS			DATE			REF
			MDL	DATE	INIT	MDL	DATE	INIT	MDL	DATE	INIT	
A	CO2	10/08/01	26.1	2.0	mg/L				09-25-01	67	107-67	

Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_  
Matrix: A=Aqueous: S=Soil: O=Oil: K=Solid: F=Filters: P=Potable Water: G=Sludge: X=Other: RPT: Report06

Date: 09/23/01

Time: 20:21:05  
Page: 5

Accredited Laboratories, Inc.  
General Chemistry Laboratory Chronicle

VO = BTEX, MTBE, TBA ONLY; DISK

Client Name: Environmental Engineering Corp  
Client Field Number: MW-6  
Client Sample Description:  
Date Sampled: 09/24/01  
Client Project Name: Madison O R C Injection  
Phases:  
Case#: 3882  
Date Received: 09/24/01  
Sample#: 200110553  
Fax Data Due: 10/04/01  
Hard Copy Due: 10/04/01  
Report Package: Reduced

ANALYTICAL DATA SAMPLE PREP SAMPLE ANALYSIS

Mtx	Analytes	Test Due Date	RESULTS			UNITS			DATE			REF
			MDL	MDL	MDL	INIT	INIT	INIT	DATE	DATE	DATE	
A	CO2	10/08/01	ND	2.D	mg/L							107-67

Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_  
Matrix: A=Aqueous: S=Soil: O=Oil: K=Solid: F=Filters: P=Potable Water: G=Sludge: X=Other: RPT: Report06

Date: 09/23/01

ACCREDITED LABORATORIES, INC.

Time: 20:20:36

ORGANIC ANALYSIS LABORATORY CHRONICLE

O = BTEX, MTBE, TBA ONLY; DISK

Client: Environmental Engineering Corp  
Fax Data Due: 10/04/01  
Client Project Name: Madison O R C Injection

Test Date Due: 10/08/01  
Hard Copy Due: 10/04/01  
Case #: 3882

Date Sampled: 09/24/01 Date Received: 09/24/01 Report Pkg: Reduced

Test: PLATE COUNT Sample Matrix: A  
Test Description: Plate Count, Standard (PLATE COUNT)

Mtx: A=Aqueous: S=Soil: O=Oil: K=Solid By Method:  
: F=Filters: P=Potable Water: G=Sludge: X=Other

SAMPLE IDENTIFICATION		ANALYTICAL DATA			LABORATORY CHRONICLE EXTRACTION		ANALYSIS		
Field#	Sample#	RESULT	MDL	UNITS	DATE	TIME	DATE	TIME	INIT
MW-1	200110549	0		CFU/ml			9/24/01		J
MW-2	200110550	0		↓					J

QUALITY CONTROL:

Method Blank : \_\_\_\_\_  
Mean Percent Spike Recovery : \_\_\_\_\_  
Relative Percent Difference of Duplicate Spikes : \_\_\_\_\_

Reviewed by: \_\_\_\_\_

Date: \_\_\_\_\_

RPT: Report03

CONFORMANCE/NON-CONFORMANCE SUMMARY

Accredited Labs received 7 aqueous samples (Project: Madison ORC Injection - E1815; ALI Case #3882) from Environmental Engineering Corp. on 9/24/01 for the analyses of BTEX, MTBE, TBA, Magnesium, Dissolved Carbon Dioxide and Plate Count.

All analyses were performed within the required holding time.

In the BTEX analyses, the MDL levels were elevated for ALI Sample #0110550 due to matrix interference.

"The laboratory has reviewed the quality assurance and quality control measurements for the sample analysis stated above."

  
Theodore C. Gaydos  
Technical Director

AQUEOUS

10/01/01

WILLIAM

MCL

8.0  
10  
20  
56  
42  
190  
84

STATUS

OK  
OK  
OK

not found in associated blank,  
exceeds highest calibration standard  
specific ground water quality criteria.\*

dated February 1, 1993.

22

*Proving they meet the requirements of the*  
**Regulations Governing The Certification Of**  
**Laboratories And Environmental Measurements N.J.A.C. 7:18 et. seq.**  
*is hereby approved as a*  
**State Certified Environmental Laboratory**  
*To perform the analyses as indicated on the Annual Certified Parameter List*  
*which must accompany this certificate to be valid*  
**Expiration Date June 30, 2002**



*Joseph F. Aiello*  
 Joseph F. Aiello, Chief  
 Office of Quality Assurance

THIS CERTIFICATE IS TO BE CONSPICUOUSLY DISPLAYED AT THE LABORATORY WITH THE ANNUAL CERTIFIED PARAMETER LIST IN A LOCATION ON THE PREMISES VISIBLE TO THE PUBLIC

ACCREDITED LABORATORIES, INC.  
VOLATILE ORGANIC ANALYSIS DATA

CASE NUMBER 3882  
 SAMPLE NUMBER 0110549  
 FILE >C8389  
 CLIENT NAME EEC  
 FIELD ID MW-1

MATRIX Aqueous  
 DILUTION FACTOR 1.0  
 DATE EXTRACTED \_\_\_\_\_  
 DATE ANALYZED 09/28/01  
 ANALYZED BY ROBERT

CAS #	COMPOUND	UG/L	MDL
71432	Benzene	220E W	.4
108883	Toluene	250E	.5
100414	Ethylbenzene	180E	1.0
1330207	m,p-Xylene	170E W	2.8
95476	o-Xylene	140E W	2.1
75650	T-butyl alcohol	U	9.6
1634044	Methyl t-butyl ether	U	4.2

SURROGATE COMPOUNDS	RECOVERY	LIMITS	STATUS
1,2-Dichloroethane-d4	100 %	76-114	OK
Toluene-d8	98 %	88-110	OK
Bromofluorobenzene	108 %	86-115	OK

J - Indicates compound concentration found below MDL.  
 U - Indicates compound analyzed for but not detected,  
 D - Indicates result is based on a dilution.

B - Indicates compound found in associated blank.  
 E - Indicates result exceeds highest calibration standard  
 W - Result exceeds specific ground water quality criteria.\*

\* Flags are based on Specific Ground Water Quality Criteria from New Jersey Register dated February 1, 1993.

ACCREDITED LABORATORIES, INC.  
VOLATILE ORGANIC ANALYSIS DATA

CASE NUMBER 7882  
 SAMPLE NUMBER 0110249DL  
 FILE >C8416  
 CLIENT NAME EEC  
 FIELD ID MW-1

MATRIX Aqueous  
 DILUTION FACTOR 20  
 DATE EXTRACTED \_\_\_\_\_  
 DATE ANALYZED 10/01/01  
 ANALYZED BY WILLIAM

CAS #	COMPOUND	UG/L	MDL
71432	Benzene	210 DW	8.0
108883	Toluene	250 D	10
100414	Ethylbenzene	650 D	20
1330207	m,p-Xylene	2800 DW	56
95476	o-Xylene	450 DW	42
75650	T-butyl alcohol	U	190
1634044	Methyl t-butyl ether	U	84

<u>SURROGATE COMPOUNDS</u>	<u>RECOVERY</u>	<u>LIMITS</u>	<u>STATUS</u>
1,2-Dichloroethane-d4	<u>103 %</u>	76-114	<u>OK</u>
Toluene-d8	<u>88 %</u>	88-110	<u>OK</u>
Bromofluorobenzene	<u>95 %</u>	86-115	<u>OK</u>

J - Indicates compound concentration found below MDL.  
 U - Indicates compound analyzed for but not detected,  
 D - Indicates result is based on a dilution.

B - Indicates compound found in associated blank.  
 E - Indicates result exceeds highest calibration standard  
 W - Result exceeds specific ground water quality criteria.\*

\* Flags are based on Specific Ground Water Quality Criteria from New Jersey Register dated February 1, 1993.

ACCREDITED LABORATORIES, INC.  
VOLATILE ORGANIC ANALYSIS DATA

CASE NUMBER 3882  
 SAMPLE NUMBER 0110550  
 D. FILE >C8415  
 CLIENT NAME EEC  
 FIELD ID MW-2

MATRIX Aqueous  
 DILUTION FACTOR 10  
 DATE EXTRACTED \_\_\_\_\_  
 DATE ANALYZED 10/01/01  
 ANALYZED BY WILLIAM

CAS #	COMPOUND	UG/L	MDL
71432	Benzene	8.4 W	4.0
108883	Toluene	47	5.0
100414	Ethylbenzene	620	10
1330207	m,p-Xylene	1200 W	28
95476	o-Xylene	230 W	21
75650	T-butyl alcohol	U	96
1634044	Methyl t-butyl ether	U	42

SURROGATE COMPOUNDS	RECOVERY	LIMITS	STATUS
1,2-Dichloroethane-d4	100 %	76-114	OK
Toluene-d8	89 %	88-110	OK
Bromofluorobenzene	99 %	86-115	OK

J - Indicates compound concentration found below MDL.  
 U - Indicates compound analyzed for but not detected,  
 D - Indicates result is based on a dilution.

B - Indicates compound found in associated blank.  
 E - Indicates result exceeds highest calibration standard  
 W - Result exceeds specific ground water quality criteria.\*

\* Flags are based on Specific Ground Water Quality Criteria from New Jersey Register dated February 1, 1993.

ACCREDITED LABORATORIES, INC.  
VOLATILE ORGANIC ANALYSIS DATA

CASE NUMBER 3882  
 SAMPLE NUMBER 0110551  
 DATA FILE 208391  
 CLIENT NAME EEC  
 FIELD ID NW-3

MATRIX Aqueous  
 DILUTION FACTOR 1.0  
 DATE EXTRACTED \_\_\_\_\_  
 DATE ANALYZED 09/28/01  
 ANALYZED BY ROBERT

CAS #	COMPOUND	UG/L	MDL
71432	Benzene	U	.4
108883	Toluene	U	.5
100414	Ethylbenzene	U	1.0
1330207	m,p-Xylene	U	2.8
95476	o-Xylene	U	2.1
75650	T-butyl alcohol	U	7.6
1634044	Methyl t-butyl ether	U	4.2

<u>SURROGATE COMPOUNDS</u>	<u>RECOVERY</u>	<u>LIMITS</u>	<u>STATUS</u>
1,2-Dichloroethane-d4	<u>100 %</u>	76-114	<u>OK</u>
Toluene-d8	<u>99 %</u>	88-110	<u>OK</u>
Bromofluorobenzene	<u>92 %</u>	86-115	<u>OK</u>

J - Indicates compound concentration found below MDL.  
 U - Indicates compound analyzed for but not detected,  
 D - Indicates result is based on a dilution.

B - Indicates compound found in associated blank.  
 E - Indicates result exceeds highest calibration standard  
 W - Result exceeds specific ground water quality criteria.\*

\* Flags are based on Specific Ground Water Quality Criteria from New Jersey Register dated February 1, 1993.

ACCREDITED LABORATORIES, INC.  
VOLATILE ORGANIC ANALYSIS DATA

CASE NUMBER 3882  
 SAMPLE NUMBER 0110552  
 DOB FILE >C8392  
 CLIENT NAME EEC  
 FIELD ID MW-4

MATRIX Aqueous  
 DILUTION FACTOR 1.0  
 DATE EXTRACTED \_\_\_\_\_  
 DATE ANALYZED 09/28/01  
 ANALYZED BY ROBERT

CAS #	COMPOUND	UG/L	MDL
71432	Benzene	U	.4
108883	Toluene	U	.5
100414	Ethylbenzene	U	1.0
1330207	m,p-Xylene	U	2.8
95476	o-Xylene	U	2.1
75650	T-butyl alcohol	U	9.6
1634044	Methyl t-butyl ether	52	4.2

SURROGATE COMPOUNDS	RECOVERY	LIMITS	STATUS
1,2-Dichloroethane-d4	<u>102 %</u>	76-114	<u>OK</u>
Toluene-d8	<u>98 %</u>	88-110	<u>OK</u>
Bromofluorobenzene	<u>98 %</u>	86-115	<u>OK</u>

J - Indicates compound concentration found below MDL.  
 U - Indicates compound analyzed for but not detected,  
 D - Indicates result is based on a dilution.

B - Indicates compound found in associated blank.  
 E - Indicates result exceeds highest calibration standard  
 W - Result exceeds specific ground water quality criteria.\*

\* Flags are based on Specific Ground Water Quality Criteria from New Jersey Register dated February 1, 1993.

ACCREDITED LABORATORIES, INC.  
VOLATILE ORGANIC ANALYSIS DATA

CASE NUMBER	<u>3882</u>	MATRIX	<u>Aqueous</u>
SAMPLE NUMBER	<u>0110553</u>	DILUTION FACTOR	<u>1.0</u>
DATE FILED	<u>080393</u>	DATE EXTRACTED	
CLIENT NAME	<u>EEC</u>	DATE ANALYZED	<u>09/28/01</u>
FIELD ID	<u>MW-6</u>	ANALYZED BY	<u>ROBERT</u>

CAS #	COMPOUND	UG/L	MDL
71432	Benzene	U	.4
108883	Toluene	U	.5
100414	Ethylbenzene	U	1.0
1330207	m,p-Xylene	U	2.8
95476	o-Xylene	U	2.1
75650	T-butyl alcohol	U	9.6
1634044	Methyl t-butyl ether	22	4.2

SURROGATE COMPOUNDS	RECOVERY	LIMITS	STATUS
1,2-Dichloroethane-d4	<u>106 %</u>	76-114	<u>OK</u>
Toluene-d8	<u>98 %</u>	88-110	<u>OK</u>
Bromofluorobenzene	<u>88 %</u>	86-115	<u>OK</u>

J - Indicates compound concentration found below MDL.  
 U - Indicates compound analyzed for but not detected,  
 D - Indicates result is based on a dilution.

B - Indicates compound found in associated blank.  
 E - Indicates result exceeds highest calibration standard  
 W - Result exceeds specific ground water quality criteria.\*

\* Flags are based on Specific Ground Water Quality Criteria from New Jersey Register dated February 1, 1993.

ACCREDITED LABORATORIES, INC.  
VOLATILE ORGANIC ANALYSIS DATA

CASE NUMBER 3882  
 SAMPLE NUMBER 0110554  
 FILE >C8383  
 CLIENT NAME EEC  
 FIELD ID FB

MATRIX Aqueous  
 DILUTION FACTOR 1.0  
 DATE EXTRACTED \_\_\_\_\_  
 DATE ANALYZED 09/28/01  
 ANALYZED BY ROBERT

CAS #	COMPOUND	UG/L	MDL
71432	Benzene	U	.4
108883	Toluene	U	.5
100414	Ethylbenzene	U	1.0
1330207	m,p-Xylene	U	2.8
95476	o-Xylene	U	2.1
75650	T-butyl alcohol	U	9.6
1634044	Methyl t-butyl ether	U	4.2

<u>SURROGATE COMPOUNDS</u>	<u>RECOVERY</u>	<u>LIMITS</u>	<u>STATUS</u>
1,2-Dichloroethane-d4	<u>104 %</u>	76-114	<u>OK</u>
Toluene-d8	<u>99 %</u>	88-110	<u>OK</u>
Bromofluorobenzene	<u>94 %</u>	86-115	<u>OK</u>

J - Indicates compound concentration found below MDL.  
 U - Indicates compound analyzed for but not detected,  
 D - Indicates result is based on a dilution.

B - Indicates compound found in associated blank.  
 E - Indicates result exceeds highest calibration standard  
 W - Result exceeds specific ground water quality criteria.\*

\* Flags are based on Specific Ground Water Quality Criteria from New Jersey Register dated February 1, 1993.

ACCREDITED LABORATORIES, INC.  
VOLATILE ORGANIC ANALYSIS DATA

CASE NUMBER 3882  
 SAMPLE NUMBER 0110555  
 DATE FILE 208784  
 CLIENT NAME EEC  
 FIELD ID TB

MATRIX Aqueous  
 DILUTION FACTOR 1.0  
 DATE EXTRACTED \_\_\_\_\_  
 DATE ANALYZED 07/28/01  
 ANALYZED BY ROBERT

CAS #	COMPOUND	UG/L	MDL
71432	Benzene	U	.4
108887	Toluene	U	.5
100414	Ethylbenzene	U	1.0
1570207	m,p-xylene	U	2.8
95476	o-xylene	U	2.1
75650	T-butyl alcohol	U	9.6
1634044	Methyl t-butyl ether	U	4.2

<u>SURROGATE COMPOUNDS</u>	<u>RECOVERY</u>	<u>LIMITS</u>	<u>STATUS</u>
1,2-Dichloroethane-d4	<u>105 %</u>	76-114	<u>OK</u>
Toluene-d8	<u>100 %</u>	88-110	<u>OK</u>
Bromofluorobenzene	<u>92 %</u>	86-115	<u>OK</u>

J - Indicates compound concentration found below MDL.  
 U - Indicates compound analyzed for but not detected,  
 D - Indicates result is based on a dilution.

B - Indicates compound found in associated blank.  
 E - Indicates result exceeds highest calibration standard  
 W - Result exceeds specific ground water quality criteria.\*

\* Flags are based on Specific Ground Water Quality Criteria from New Jersey Register dated February 1, 1993.

ACCREDITED LABORATORIES, INC.  
INORGANIC ANALYSIS DATA SHEET

Case #: 3882  
Sample #: 0110549  
Field ID: MW-1  
Client Name: EEC

Matrix: Aqueous  
Date Received: 09/24/01

CAS No.	Element	Result UG/L	MDL UG/L	Dilution Factor	Method	Date Analyzed
7439-95-4	Magnesium	102000	250	1	P	09/26/01

ND - Element analyzed for but not detected.  
P - Analyzed by ICP                      CV - Analyzed by Cold Vapor  
F - Analyzed by GFA                      A - Analyzed by flame AA

ACCREDITED LABORATORIES, INC.  
INORGANIC ANALYSIS DATA SHEET

Case #: 3882  
Sample #: 0110550  
Field ID: MW-2  
Client Name: EEC

Matrix: Aqueous  
Date Received: 09/26/01

CAS No.	Element	Result UG/L	MDL UG/L	Dilution Factor	Method	Date Analyzed
7439-95-4	Magnesium	32100	250	1	P	09/26/01

ND - Element analyzed for but not detected.  
P - Analyzed by ICP                      CV - Analyzed by Cold Vapor  
F - Analyzed by GFA                      A - Analyzed by flame AA

ACCREDITED LABORATORIES, INC.  
INORGANIC ANALYSIS DATA SHEET

Case #: 3882  
Sample #: 0110551  
Field ID: MW-3  
Client Name: EEC

Matrix: Aqueous  
Date Received: 09/24/01

CAS No.	Element	Result UG/L	MDL UG/L	Dilution Factor	Method	Date Analyzed
7439-95-4	Magnesium	22600	250	1	P	09/26/01

ND - Element analyzed for but not detected.

P - Analyzed by ICP  
F - Analyzed by GFA

CV - Analyzed by Cold Vapor  
A - Analyzed by flame AA

ACCREDITED LABORATORIES, INC.  
INORGANIC ANALYSIS DATA SHEET

Case #: 3882  
Sample #: 0110552  
Field ID: MW-4  
Client Name: EEC

Matrix: Aqueous  
Date Received: 09/24/01

CAS No.	Element	Result UG/L	MDL UG/L	Dilution Factor	Method	Date Analyzed
7439-95-4	Magnesium	6560	250	1	P	09/26/01

ND - Element analyzed for but not detected.  
P - Analyzed by ICP                      CV - Analyzed by Cold Vapor  
F - Analyzed by GFA                      A - Analyzed by flame AA

ACCREDITED LABORATORIES, INC.  
INORGANIC ANALYSIS DATA SHEET

Case #: 3882  
Sample #: 0110553  
Field ID: MW-6  
Client Name: EEC

Matrix: Aqueous  
Date Received: 09/24/01

CAS No.	Element	Result UG/L	MDL UG/L	Dilution Factor	Method	Date Analyzed
7439-95-4	Magnesium	72000	250	1	P	09/26/01

ND - Element analyzed for but not detected.  
P - Analyzed by ICP                      CV - Analyzed by Cold Vapor  
F - Analyzed by GFA                      A - Analyzed by flame AA

ACCREDITED LABORATORIES, INC.  
GENERAL CHEMISTRY ANALYSIS DATA

Case #: 3882  
Sample #: 0110549  
Client Name: EEC  
Field Number: MW-1

Matrix: Aqueous  
Date Received: 09/24/01

ANALYTES	RESULTS	MDL	UNITS	DILUTION FACTOR	METHOD RESULTS	BLANK MDL	ANALYSIS DATE
Carbon Dioxide, Dissolved	3.40	2.0	mg/L	.	ND	2.0	09/25/01

ACCREDITED LABORATORIES, INC.  
GENERAL CHEMISTRY ANALYSIS DATA

Case #: 3882  
Sample #: 0110550  
Client Name: EEC  
Field Number: MW-2

Matrix: Aqueous  
Date Received: 09/24/01

ANALYTES	RESULTS	MDL	UNITS	DILUTION FACTOR	METHOD BLANK		ANALYSIS DATE
					RESULTS	MDL	
Carbon Dioxide, Dissolved	9.57	2.0	mg/L	1.	ND	2.0	09/25/01

ACCREDITED LABORATORIES, INC.  
GENERAL CHEMISTRY ANALYSIS DATA

Case #: 3882  
Sample #: 0110551  
Client Name: EEC  
Field Number: MW-3

Matrix: Aqueous  
Date Received: 09/24/01

ANALYTES	RESULTS	MDL	UNITS	DILUTION FACTOR	METHOD BLANK		ANALYSIS DATE
					RESULTS	MDL	
Carbon Dioxide, Dissolved	4.20	4.20	mg/L	1.	ND	2.0	09/25/01

ACCREDITED LABORATORIES, INC.  
GENERAL CHEMISTRY ANALYSIS DATA

Case #: 3882  
Sample #: 0110552  
Client Name: EEC  
Field Number: MW-4

Matrix: Aqueous  
Date Received: 09/24/01

ANALYTES	RESULTS	MDL	UNITS	DILUTION FACTOR	METHOD RESULTS	BLANK MDL	ANALYSIS DATE
Carbon Dioxide, Dissolved	26.1	2.0	mg/L	1.	ND	2.0	09/25/01

ACCREDITED LABORATORIES, INC.  
GENERAL CHEMISTRY ANALYSIS DATA

Case #: 3882  
Sample #: 0110553  
Client Name: EEC  
Field Number: MW-6

Matrix: Aqueous  
Date Received: 09/24/01

ANALYTES	RESULTS	MDL	UNITS	DILUTION FACTOR	METHOD BLANK		ANALYSIS DATE
					RESULTS	MDL	
Carbon Dioxide, Dissolved	ND	2.0	mg/L	1.	ND	2.0	09/25/01

ACCREDITED LABORATORIES, INC.  
MICROBIOLOGY ANALYSIS DATA

Heterotrophic Plate Count  
(9215B)

Case #: 3882  
Client Name: EEC

Matrix: Aqueous  
Date Received: 09/24/01  
Date Analyzed: 09/24/01

FIELD ID	SAMPLE #	RESULTS	UNIT*
MW-1	0110549	0	CFU/ml
MW-2	0110550	0	CFU/ml

5A  
VOLATILE ORGANIC GC/MS TUNING AND MASS CALIBRATION  
BROMOFLUOROBENZENE (BFB)

Lab Name: ACCREDITED LABORATORIES, INC.

Contract: \_\_\_\_\_

Lab File ID: >C8375

BFB Injection Date: 09/28/01

Instrument ID: HP5970BC

BFB Injection Time: 09:53

GC Column: RTX-502

Column ID: 0.53

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	19.6
75	30.0 - 60.0% of mass 95	46.4
95	Base peak, 100% relative abundance	100.
96	5.0 - 9.0% of mass 95	6.8
173	Less than 2.0% of mass 174	0.0( 0.0 )1
174	Greater than 50.0% of mass 95	71.5
175	5.0 - 9.0% of mass 174	4.8( 6.7 )1
176	95.0 - 101.0% of mass 174	69.2( 96.8 )1
177	5.0 - 9.0% of mass 176	4.6( 6.6 )2

1-Value is % mass 174

2-Value is % mass 176

THIS TUNE APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS AND STANDARDS:

EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	VSTD020	>C8376	09/28/01	10:21
02	VSTD010	>C8377	09/28/01	11:00
03	VSTD002	>C8378	09/28/01	11:47
04	VSTD200	>C8379	09/28/01	12:27
05	VBLKC57	>C8381	09/28/01	14:32
06	0110516	>C8382	09/28/01	15:22
07	0110554	>C8383	09/28/01	16:02
08	0110555	>C8384	09/28/01	16:43
09	0110560	>C8385	09/28/01	17:31
10	0110561	>C8386	09/28/01	18:19
11	0110352	>C8387	09/28/01	19:06
12	0110519	>C8388	09/28/01	19:55
13	0110549	>C8389	09/28/01	20:42
14	0110550	>C8390	09/28/01	21:29
15	0110551	>C8391	09/28/01	22:17
16	0110552	>C8392	09/28/01	23:04
17	0110553	>C8393	09/28/01	23:52
18	0110553MS	>C8394	09/29/01	00:39
19	0110553MSD	>C8395	09/29/01	01:26
20	0110557	>C8396	09/29/01	02:13
21	0110559	>C8397	09/29/01	03:00
22				

5A  
VOLATILE ORGANIC GC/MS TUNING AND MASS CALIBRATION  
BROMOFLUOROBENZENE (BFB)

Lab Name: ACCREDITED LABORATORIES, INC.

Contract: \_\_\_\_\_

Lab File ID: >C8402

BFB Injection Date: 10/01/01

Instrument ID: HP5970BC

BFB Injection Time: 08:58

GC Column: RTX-502      Column ID: 0.53

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	16.6
75	30.0 - 60.0% of mass 95	43.9
95	Base peak, 100% relative abundance	100.
96	5.0 - 9.0% of mass 95	6.6
173	Less than 2.0% of mass 174	0.0( 0.0 )1
174	Greater than 50.0% of mass 95	75.9
175	5.0 - 9.0% of mass 174	5.3( 6.9 )1
176	95.0 - 101.0% of mass 174	76.3( 100.5 )1
177	5.0 - 9.0% of mass 176	4.6( 6.0 )2

1-Value is % mass 174

2-Value is % mass 176

THIS TUNE APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS AND STANDARDS:

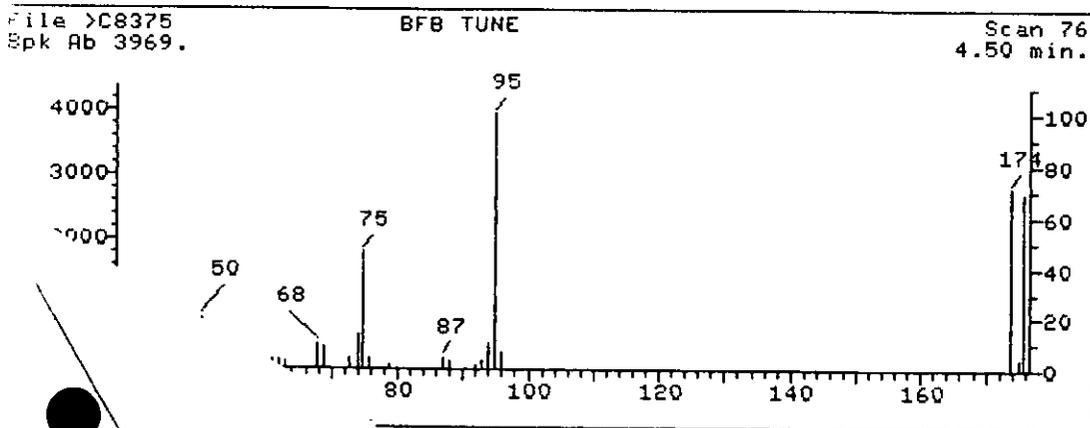
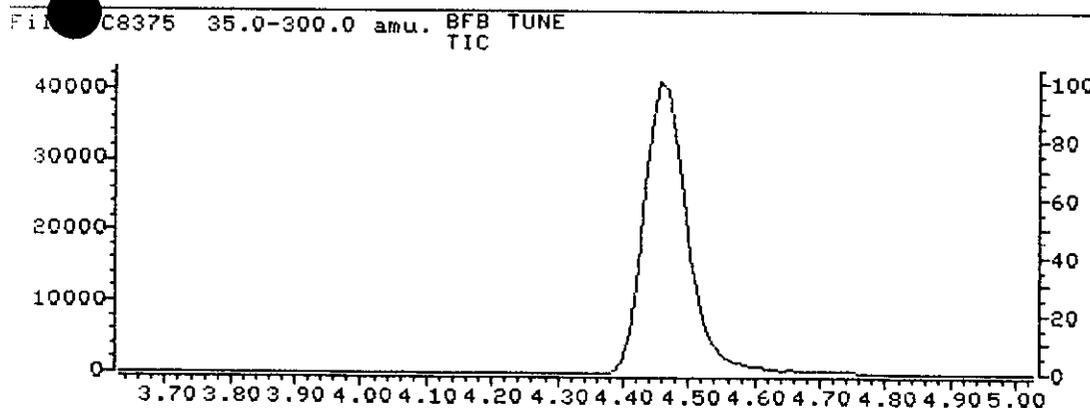
EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	VSTD020	>C8403	10/01/01	09:22
02	VSTD010	>C8404	10/01/01	10:02
03	VSTD002	>C8405	10/01/01	10:42
04	VSTD200	>C8406	10/01/01	11:23
05	VBLKC58	>C8408	10/01/01	13:27
06	0110516	>C8409	10/01/01	16:23
07	0110560	>C8410	10/01/01	17:04
08	0110561	>C8411	10/01/01	17:44
09	0110557	>C8412	10/01/01	18:24
10	0110558	>C8413	10/01/01	19:12
11	0110559	>C8414	10/01/01	19:59
12	0110550	>C8415	10/01/01	20:46
13	0110549DL	>C8416	10/01/01	21:34
14	0110519DL	>C8417	10/01/01	22:22
15	0110521	>C8418	10/01/01	23:09
16	0110522	>C8419	10/01/01	23:55
17	0110523	>C8420	10/02/01	00:42
18	0110524	>C8421	10/02/01	01:29
19	0110525	>C8422	10/02/01	02:16
20	0110526	>C8423	10/02/01	03:04
21	0110527	>C8424	10/02/01	03:52
22	0110528	>C8425	10/02/01	04:39

GC/MS PERFORMANCE STANDARD

Bromofluorobenzene (BFB)

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	Appropriate Peak	Status
50	15-40% of mass 95	19.58	19.58	OK
75	30-60% of mass 95	46.36	46.36	OK
95	Base peak, 100% relative abundance	100.00	100.00	OK
96	5-9% of mass 95	6.75	6.75	OK
173	Less than 2% of mass 174	0.00	0.00	OK
174	Greater than 50% of mass 95	71.50	71.50	OK
175	5-9% of mass 174	4.79	6.70	OK
176	95-101% of mass 174	69.21	96.79	OK
177	5-9% of mass 176	4.56	6.59	OK

Injection Date: 09/28/01  
 Injection Time: 09:53  
 Data File: >C8375  
 Scan: 76



>C8375  
76

BFB\_TUNE

Fi ● >C8375 Scan #: 76 Retn. time: 4.50

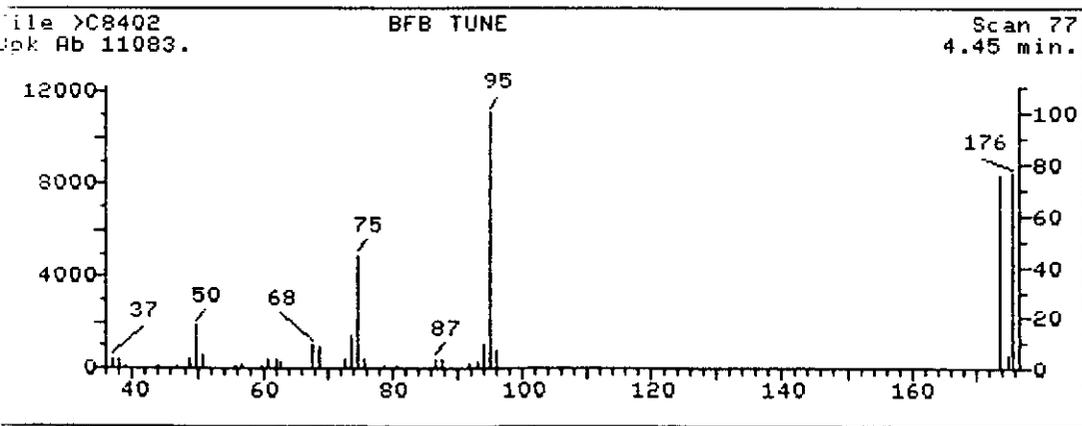
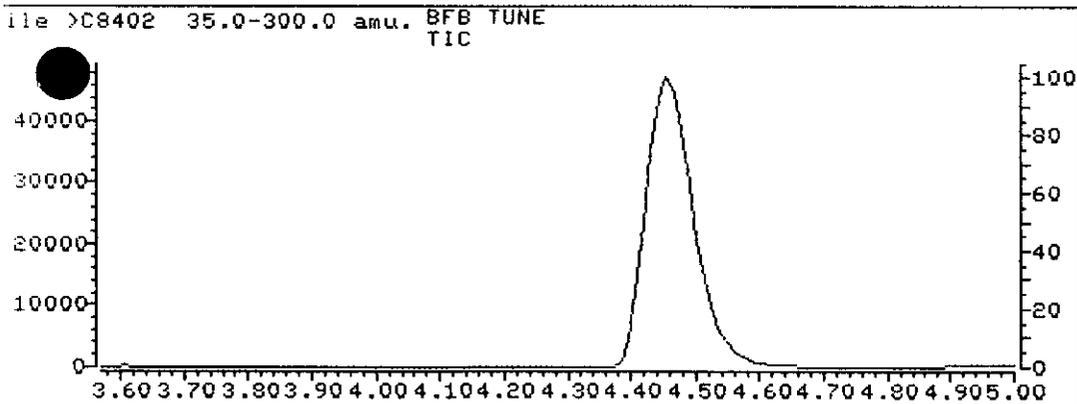
m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
36.85	151.00	61.85	132.00	73.95	542.00	87.95	131.00	96.00	268.00
37.95	133.00	62.85	104.00	74.85	1840.00	91.85	87.00	173.85	2838.00
48.85	129.00	67.85	388.00	75.85	162.00	92.85	147.00	174.95	190.00
49.85	777.00	68.85	332.00	78.75	60.00	94.00	417.00	175.85	2747.00
50.95	212.00	72.85	176.00	86.85	185.00	94.90	3969.00	176.85	181.00
60.95	149.00								

GC/MS PERFORMANCE STANDARD

Bromofluorobenzene (BFB)

z	Ion Abundance Criteria	% Relative Abundance		Status
		Base Peak	Appropriate Peak	
50	15-40% of mass 95	16.60	16.60	OK
75	30-60% of mass 95	43.91	43.91	OK
95	Base peak, 100% relative abundance	100.00	100.00	OK
96	5-9% of mass 95	6.58	6.58	OK
173	Less than 2% of mass 174	0.00	0.00	OK
174	Greater than 50% of mass 95	75.95	75.95	OK
175	5-9% of mass 174	5.28	6.95	OK
176	95-101% of mass 174	76.33	100.51	OK
177	5-9% of mass 176	4.61	6.04	OK

Injection Date: 10/01/01  
 Injection Time: 08:58  
 Data File: >C8402  
 Scan: 77



>C8402  
77

BFB\_TUNE

Fi ● >C8402 Scan #: 77 Retn. time: 4.45

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
35.95	65.0	48.95	355.0	62.85	293.0	76.95	70.0	93.90	1079.0
36.85	418.0	49.85	1840.0	67.85	1017.0	78.75	142.0	94.90	11083.0
37.85	383.0	50.85	540.0	68.85	924.0	80.75	158.0	96.00	729.0
38.85	147.0	55.85	149.0	72.85	394.0	86.85	436.0	173.85	8417.0
43.85	84.0	56.85	254.0	73.85	1378.0	87.75	357.0	174.95	585.0
44.75	51.0	59.85	80.0	74.85	4866.0	91.85	220.0	175.85	8460.0
44.95	54.0	60.85	409.0	75.85	431.0	92.85	338.0	176.85	511.0
46.95	130.0	61.95	402.0						

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Initial Calibration Data  
HSL Compounds

Case No: \_\_\_\_\_ Instrument ID: HP5790BC  
 Contractor: Accredited Labs Inc. Calibration Date: 09/28/01  
 Contract No: CAC618

Minimum RF for SPCC is \_\_\_\_\_ Maximum % RSD for CCC is 35%

Compound	Laboratory ID: >C8378 >C8377 >C8376 >C8379				RRT	RF	% RSD	CCC	SPCC
	RF	RF	RF	RF					
	2.00	10.00	20.00	200.00					
Acrolein	.04900	.06957	.07141	.08906	.595	.06976	23.498		(Conc=20.0,100.0,200.0,2000.0)
Acrylonitrile	.18059	.18625	.18175	.21760	.748	.19155	9.155		(Conc=20.0,100.0,200.0,2000.0)
Dichlorodifluoromethane	.87950	1.24068	1.34380	1.18712	.325	1.16277	17.177		
Chloromethane	.77027	.85235	.84551	.82738	.362	.82388	4.522	*	
Bromomethane	1.17694	1.12811	1.18605	1.11317	.448	1.15107	3.115	*	
Vinyl Chloride	.85027	.92541	.98284	.84297	.380	.90037	7.377	*	
Chloroethane	.79822	.76408	.81278	.77796	.465	.78826	2.732	*	
Methylene Chloride	5.61343	2.00990	1.27265	1.19311	.720	2.52227	82.994	*	
Acetone	.19539	.14875	.13358	.16099	.609	.15967	16.481		
Carbon Disulfide	1.06822	1.19449	1.24444	1.25669	.715	1.19096	7.232		
Trichlorofluoromethane	3.82058	3.68074	3.89889	3.56445	.507	3.74117	3.967	*	
1,1-Dichloroethene	1.41233	1.43942	1.48388	1.50376	.626	1.45985	2.847	*	
1,1-Dichloroethane	1.82285	1.86146	1.87958	1.95813	.849	1.88050	3.026	*	
t-butyl alcohol	.03839	.05193	.05145	.06386	.652	.05140	20.244		(Conc=20.0,100.0,200.0,2000.0)
cis-1,2-Dichloroethene	1.43182	1.51171	1.49656	1.58245	.949	1.50564	4.107		
trans-1,2-Dichloroethene	1.48054	1.50015	1.50931	1.54632	.774	1.50908	1.827	*	
Chloroform	2.43261	2.30852	2.29723	2.33698	.975	2.34384	2.624	*	
1,2-Dichloroethane-d4	1.20771	1.18355	1.14683	1.17368	1.086	1.17794	2.138		(Conc=1.2,6.0,12.0,120.0)
1,2-Dichloroethane	1.42284	1.34781	1.34635	1.37766	1.101	1.37367	2.608	*	
2-Butanone	.04935	.07432	.06586	.07904	.807	.06714	19.440		
Methyl t-butyl ether	.49446	.47803	.50377	.46143	.656	.48442	3.852		(Conc=10.0,50.0,100.0,1000.0)
1,1,1-Trichloroethane	.44419	.44506	.46790	.46916	.906	.45658	3.026	*	
Carbon Tetrachloride	.42024	.40658	.42351	.44002	.940	.42259	3.252	*	
Vinyl Acetate	.30159	.33341	.33510	.43470	.746	.35120	16.446		
Bromodichloromethane	.48020	.49481	.51162	.54581	1.096	.50811	5.554	*	
1,2-Dichloropropane	.32454	.30386	.30109	.33090	1.066	.31510	4.713	*	
cis-1,3-Dichloropropene	.34548	.39590	.40990	.49336	1.167	.41116	14.930	*	
Trichloroethene	.39837	.39622	.40632	.40220	1.042	.40078	1.110	*	
Benzene	.92692	.89856	.90326	.91354	.963	.91057	1.380	*	
Dibromochloromethane	.38043	.42367	.44176	.47176	1.319	.42940	8.896	*	

- RF - Response Factor (Subscript is amount in ug/l)
- RRT - Average Relative Retention Time (RT Std/RT Istd)
- RF - Average Response Factor
- %RSD - Percent Relative Standard Deviation
- CCC - Calibration Check Compounds (\*) SPCC - System Performance Check Compounds (\*\*)

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Initial Calibration Data  
HSL Compounds

Case No: \_\_\_\_\_ Instrument ID: HP5790BC  
 Contractor: Accredited Labs Inc. Calibration Date: 09/28/01  
 Contract No: CAC618

Minimum RF for SPCC is \_\_\_\_\_ Maximum % RSD for CCC is 35%

Compound	Laboratory ID: >C8376 >C8377 >C8376 >C8379				RRT	RF	% RSD	CCC	SPCC
	RF	RF	RF	RF					
	2.00	10.00	20.00	200.00					
1,1,2-Trichloroethane	.28565	.29280	.28392	.30964	1.251	.29300	4.006	*	
trans-1,3-Dichloropropene	.22843	.28348	.30584	.40731	1.231	.30627	24.426	*	
2-Chloroethylvinylether	.11812	.06976	.14118	.19480	1.136	.13097	39.650	*	(Conc=2.0,10.0,20.0,200.0)
Bromoform	.23610	.28809	.30224	.34845	1.526	.29372	15.749	*	
2-Hexanone	.07331	.11478	.10767	.16156	.897	.11433	31.771	*	
4-Methyl-2-pentanone	.34903	.28793	.33053	.42128	.816	.34719	16.021	*	
Tetrachloroethene	.60969	.58568	.59713	.53659	.925	.58227	5.495	*	
1,1,2,2-Tetrachloroethane	.42489	.46969	.45965	.50580	1.107	.46501	7.158	*	
Toluene-d8	1.37283	1.20440	1.19940	1.22729	.858	1.25098	6.566	*	(Conc=1.2,6.0,12.0,120.0)
Toluene	1.38172	1.26279	1.29680	1.28995	.865	1.30782	3.931	*	
Chlorobenzene	.91717	.92600	.95515	.95015	1.004	.93712	1.964	*	
Bromofluorobenzene	.61517	.65273	.66029	.72540	1.115	.66340	6.904	*	(Conc=1.2,6.0,12.0,120.0)
Ethylbenzene	1.59095	1.54759	1.64701	1.45268	1.008	1.55956	5.261	*	
Styrene	.67280	.78823	.84153	.88769	1.059	.79756	11.607	*	
m,p-Xylene	1.45667	1.30667	1.26961	1.26840	1.015	1.32534	6.741	*	(Conc=2.0,10.0,20.0,200.0)
o-Xylene	1.36880	1.29324	1.24315	1.22325	1.056	1.28211	5.059	*	
1,3-Dichlorobenzene	.52247	.63693	.68064	.72297	1.268	.64075	13.472	*	
1,3-Dichlorobenzene	.57332	.61300	.67823	.80415	1.225	.66718	15.144	*	
1,4-Dichlorobenzene	.60500	.72069	.74835	.80987	1.232	.72098	11.905	*	
Naphthalene	-	-	-	-	-	-	-	-	
Diisopropyl ether	1.12649	1.05049	1.06613	1.12691	.522	1.09250	3.661	*	

- RF - Response Factor (Subscript is amount in ug/l)
- RRT - Average Relative Retention Time (RT Std/RT Istd)
- RF - Average Response Factor
- %RSD - Percent Relative Standard Deviation
- CCC - Calibration Check Compounds (\*) SPCC - System Performance Check Compounds (\*\*)

Initial Calibration Data  
HSL Compounds

Case No: \_\_\_\_\_ Instrument ID: HP57908C  
 Contractor: Accredited Labs Inc. Calibration Date: 10/01/01  
 Contract No: CAC619

Minimum RF for SPCC is \_\_\_\_\_ Maximum % RSD for CCC is 35%

Compound	Laboratory ID: >C8405 >C8404 >C8403 >C8406				RRT	RF	% RSD	CCC	SPCC
	RF	RF	RF	RF					
	2.00	10.00	20.00	200.00					
Acrolein	.06463	.07068	.06249	.09101	.594	.07220	18.020		(Conc=20.0,100.0,200.0,2000.0)
Acrylonitrile	.19879	.19713	.14778	.22108	.746	.19120	16.179		(Conc=20.0,100.0,200.0,2000.0)
Dichlorodifluoromethane	.89851	1.18477	1.50996	1.15428	.324	1.18688	21.125		
Chloromethane	.96804	.91750	1.04274	.87125	.359	.94988	7.733	*	
Bromomethane	1.28725	1.19377	1.42028	1.20661	.447	1.27698	8.153	*	
Vinyl Chloride	.97339	.98618	1.24135	.90874	.377	1.02742	14.268	*	
Chloroethane	.80253	.79990	.99839	.85867	.464	.86487	10.759	*	
Methylene Chloride	3.86316	1.53606	1.53069	1.22662	.720	2.03913	60.054	*	
Acetone	.35074	.21092	.16691	.16369	.608	.22306	39.361		
Carbon Disulfide	1.37592	1.26738	1.64611	1.35873	.715	1.41204	11.555		
Trichlorofluoromethane	4.13283	3.82498	4.69341	3.75063	.506	4.10046	10.451	*	
1,1-Dichloroethene	1.58732	1.48436	1.85959	1.61546	.626	1.63668	9.711	*	
1,1-Dichloroethane	2.26683	2.05448	2.39751	2.08019	.849	2.19975	7.377	*	
t-butyl alcohol	.16906	.05631	.04812	.06728	.652	.08519	66.276		(Conc=20.0,100.0,200.0,2000.0)
cis-1,2-Dichloroethene	1.79196	1.63870	1.83637	1.66550	.949	1.73313	5.535		
trans-1,2-Dichloroethene	1.75987	1.61974	1.95534	1.65802	.774	1.74824	8.591	*	
Chloroform	2.70314	2.42580	2.78552	2.40103	.974	2.57887	7.533	*	
1,2-Dichloroethane-d4	1.24278	1.16067	1.20052	1.21378	1.086	1.20444	2.831		(Conc=1.2,6.0,12.0,120.0)
1,2-Dichloroethane	1.53609	1.40448	1.40543	1.40385	1.100	1.43746	4.574	*	
2-Butanone	.04307	.07261	.05222	.08059	.807	.06212	28.068		
Methyl t-butyl ether	.70895	.51759	.47157	.48348	.657	.54540	20.309		(Conc=10.0,50.0,100.0,1000.0)
1,1,1-Trichloroethane	.51457	.47197	.51408	.46306	.907	.49092	5.555	*	
Carbon Tetrachloride	.45976	.41296	.45539	.42560	.940	.43842	5.195	*	
Vinyl Acetate	.33755	.36086	.28953	.40750	.747	.34886	14.073		
Bromodichloromethane	.53140	.50668	.52421	.55027	1.097	.52814	3.416	*	
1,2-Dichloropropane	.36464	.32347	.32222	.34450	1.067	.33871	5.929	*	
cis-1,3-Dichloropropene	.42758	.42493	.43089	.51056	1.167	.44849	9.242	*	
Trichloroethene	.44045	.41290	.43308	.40732	1.042	.42344	3.742	*	
Benzene	1.04575	.96410	.99520	.92681	.963	.98297	5.121	*	
Dibromochloromethane	.43366	.42363	.40891	.47150	1.319	.43443	6.151	*	

- RF - Response Factor (Subscript is amount in ug/l)
- RRT - Average Relative Retention Time (RT Std/RT Istd)
- RF - Average Response Factor
- %RSD - Percent Relative Standard Deviation
- CCC - Calibration Check Compounds (\*) SPCC - System Performance Check Compounds (\*\*)

Initial Calibration Data  
HSL Compounds

Case No: \_\_\_\_\_ Instrument ID: HP5790BC  
 Contractor: Accredited Labs Inc. Calibration Date: 10/01/01  
 Contract No: CAC619

Minimum RF for SPCC is \_\_\_\_\_ Maximum % RSD for CCC is 35%

Compound	Laboratory ID: >C8405 >C8404 >C8403 >C8406				RRT	RF	% RSD	CCC	SPCC
	RF	RF	RF	RF					
	2.00	10.00	20.00	200.00					
1,1,2-Trichloroethane	.32673	.29971	.26113	.30257	1.252	.29753	9.118	*	
trans-1,3-Dichloropropene	.26209	.30798	.29421	.40653	1.232	.31770	19.598	*	
2-Chloroethylvinylether	.15057	.14907	.11405	.19237	1.137	.15152	21.146	*	(Conc=2.0,10.0,20.0,200.0)
Bromoform	.25283	.27827	.24097	.32872	1.526	.27520	14.145	*	
2-Hexanone	.09361	.11968	.08294	.15399	.898	.11255	28.113	*	
4-Methyl-2-pentanone	.37073	.36197	.26896	.42136	.817	.35576	17.852	*	
Tetrachloroethene	.72333	.61377	.67319	.55396	.926	.64106	11.438	*	
1,1,2,2-Tetrachloroethane	.44946	.47039	.37655	.48523	1.108	.44541	10.820	*	
Toluene-d8	1.44521	1.28621	1.35723	1.25308	.858	1.33543	6.373	*	(Conc=1.2,6.0,12.0,120.0)
Toluene	1.58006	1.38491	1.47133	1.31234	.866	1.43716	8.024	*	
Chlorobenzene	1.08464	.98465	1.05289	.96304	1.004	1.02130	5.581	*	
Bromofluorobenzene	.73295	.63651	.72290	.72826	1.115	.70516	6.516	*	(Conc=1.2,6.0,12.0,120.0)
Ethylbenzene	1.75953	1.62918	1.75156	1.46172	1.008	1.65050	8.438	*	
Styrene	.74367	.80535	.91776	.89569	1.060	.84062	9.622	*	
m,p-Xylene	1.56025	1.40304	1.48088	1.25620	1.015	1.42509	9.094	*	(Conc=2.0,10.0,20.0,200.0)
o-Xylene	1.55004	1.30546	1.36856	1.23150	1.057	1.36389	9.983	*	
1-Chlorobenzene	.69814	.66121	.66080	.72153	1.269	.68542	4.343	*	
1,3-Dichlorobenzene	.64486	.64559	.67963	.79247	1.223	.69064	10.106	*	
1,4-Dichlorobenzene	.74200	.75839	.80425	.82622	1.233	.78271	5.006	*	
Naphthalene	-	-	-	-	-	-	-	-	
Diisopropyl ether	1.28145	1.14105	1.14575	1.16406	.523	1.18308	5.607	*	

RF - Response Factor (Subscript is amount in ug/l)

RRT - Average Relative Retention Time (RT Std/RT Istd)

RF - Average Response Factor

%RSD - Percent Relative Standard Deviation

CCC - Calibration Check Compounds (\*) SPCC - System Performance Check Compounds (\*\*)

ACCREDITED LABORATORIES, INC.  
WATER/SOIL VOLATILE SURROGATE RECOVERY

	ALI Sample No.	Mtx	S1 (DCE-d4)	S2 (TOL-d8)	S3 ( BFB )	TOTAL OUT
	=====	===	=====	=====	=====	===
1	VBLKC57	W	102	100	97	0
2	VBLKC58	W	100	94	95	0
3	0110549	W	100	98	108	0
4	0110549DL	W	103	88	95	0
5	0110550	W	100	89	99	0
6	0110551	W	100	99	92	0
7	0110552	W	102	98	98	0
8	0110553	W	106	98	88	0
9	0110554	W	104	99	94	0
10	0110555	W	105	100	92	0
11	0110553MS	W	103	98	93	0
12	0110553MSD	W	105	100	98	0

EPA CLP QC Limits for:

	<u>WATER</u>	<u>SOIL</u>
S1 (DCE-d4) = 1,2-Dichloroethane-d4	(76-114)	(70-121)
S2 (TOL-d8) = Toluene-d8	(88-110)	(81-117)
S3 ( BFB ) = Bromofluorobenzene	(86-115)	(74-121)

\* Values outside of EPA contract laboratory QC limits

8A  
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: ACCREDITED LABORATORIES, Contract:  
 Lab Code: \_\_\_\_\_ Case No.: SAS No.: \_\_\_\_\_ SDG No.:  
 Lab File ID (Standard): >C8376 Date Analyzed: 09/28/01  
 Instrument ID: HP5970BC Time Analyzed: 10:21  
 GC Column: RTX-502 ID: 0.53 (mm) Heated Purge: (Y/N) N

		IS1(BCM)		IS2(DFB)		IS3(CBZ)	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
12 HOUR STD		61055	15.94	237650	18.26	193238	25.46
UPPER LIMIT		122110	16.44	475300	18.76	386476	25.96
LOWER LIMIT		30528	15.44	118825	17.76	96619	24.96
-----							
LAB SAMPLE NO.							
-----							
01	VBLKC57	53725	15.97	211558	18.29	169317	25.49
02	0110549	50934	15.98	201649	18.30	174063	25.50
03	0110551	51243	15.97	202580	18.25	165809	25.50
04	0110552	52185	15.98	206154	18.30	167904	25.50
05	0110553	46771	15.93	183396	18.25	150468	25.49
06	0110554	49090	15.98	191598	18.26	155760	25.50
07	0110555	52086	15.97	207521	18.30	165311	25.49
08	0110553MS	51990	15.97	204565	18.30	169782	25.50
09	0110553MSD	50617	15.98	204735	18.30	166143	25.50
10							
11							
12							
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19							
20							
21							
22							

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.

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8A  
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: ACCREDITED LABORATORIES, Contract: \_\_\_\_\_  
 Lab Code: \_\_\_\_\_ Case No.: 3882 SAS No.: \_\_\_\_\_ SDG No.: \_\_\_\_\_  
 Lab File ID (Standard): >C8403 Date Analyzed: 10/01/01  
 Instrument ID: HP5970BC Time Analyzed: 09:22  
 GC Column: RTX-502 ID: 0.53 (mm) Heated Purge: (Y/N) N

	IS1(BCM)		IS2(DFB)		IS3(CBZ)	
	AREA #	RT #	AREA #	RT #	AREA #	RT #
=====	=====	=====	=====	=====	=====	=====
12 HOUR STD	49410	15.98	217950	18.25	174956	25.50
UPPER LIMIT	98820	16.48	435900	18.75	349912	26.00
LOWER LIMIT	24705	15.48	108975	17.75	87478	25.00
=====	=====	=====	=====	=====	=====	=====
LAB SAMPLE						
NO.						
=====	=====	=====	=====	=====	=====	=====
01   VBLKC58	51056	15.99	205865	18.27	165235	25.51
02   0110549DL	50605	15.97	200706	18.30	173022	25.49
03   0110550	50574	15.97	203800	18.30	172182	25.50
04						
05						
06						
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17						
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19						
20						
21						
22						

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.

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## WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: Accredited Labs, Inc. Contract: \_\_\_\_\_

Lab Code: GC/MS Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: \_\_\_\_\_

Matrix Spike - ALI Sample No.: 0110553

COMPOUND	SPIKE ADDED (UG/L)	SAMPLE CONCENTRATION (UG/L)	MS CONCENTRATION (UG/L)	MS % REC #	QC LIMITS REC.
1,1-Dichloroethene	50	0	50	99	61-145
Trichloroethene	50	0	49	97	71-120
Benzene	50	0	51	102	76-127
Toluene	50	0	50	100	76-125
Chlorobenzene	50	0	51	101	75-130

COMPOUND	SPIKE ADDED (UG/L)	MSD CONCENTRATION (UG/L)	MSD % REC #	% RPD #	QC LIMITS RPD	REC.
1,1-Dichloroethene	50	50	101	1	14	61-145
Trichloroethene	50	49	97	0	14	71-120
Benzene	50	50	101	1	11	76-127
Toluene	50	51	102	2	13	76-125
Chlorobenzene	50	50	100	1	13	75-130

# Column to be used to flag recovery and RPD values with an asterisk

\* Values outside of qc limits

RPD: 0 out of 5 outside limits

Spike Recovery: 0 out of 10 outside limits

COMMENTS: \_\_\_\_\_

ACCREDITED LABORATORIES, INC.  
VOLATILE ORGANIC ANALYSIS DATA

CASE NUMBER \_\_\_\_\_  
 SAMPLE NUMBER VBLKC57  
 OFFICE FILE >C8381  
 CLIENT NAME \_\_\_\_\_  
 FIELD ID \_\_\_\_\_

MATRIX \_\_\_\_\_  
 DILUTION FACTOR 1.0  
 DATE EXTRACTED \_\_\_\_\_  
 DATE ANALYZED 09/28/01  
 ANALYZED BY ROBERT

CAS #	COMPOUND	UG/L	MDL
71432	Benzene	U	.4
108883	Toluene	U	.5
100414	Ethylbenzene	U	1.0
1330207	m,p-Xylene	U	2.8
95476	o-Xylene	U	2.1
75650	T-butyl alcohol	U	9.6
1634044	Methyl t-butyl ether	U	4.2

<u>SURROGATE COMPOUNDS</u>	<u>RECOVERY</u>	<u>LIMITS</u>	<u>STATUS</u>
1,2-Dichloroethane-d4	<u>102 %</u>	76-114	<u>OK</u>
Toluene-d8	<u>100 %</u>	88-110	<u>OK</u>
Bromofluorobenzene	<u>97 %</u>	86-115	<u>OK</u>

J - Indicates compound concentration found below MDL.  
 U - Indicates compound analyzed for but not detected,  
 D - Indicates result is based on a dilution.

B - Indicates compound found in associated blank.  
 E - Indicates result exceeds highest calibration standard  
 W - Result exceeds specific ground water quality criteria.\*

\* Flags are based on Specific Ground Water Quality Criteria from New Jersey Register dated February 1, 1993.

ACCREDITED LABORATORIES, INC.  
VOLATILE ORGANIC ANALYSIS DATA

CASE NUMBER \_\_\_\_\_  
 SAMPLE NUMBER VBLKC58  
 DRUG FILE >C8408  
 CLIENT NAME \_\_\_\_\_  
 FIELD ID \_\_\_\_\_

MATRIX \_\_\_\_\_  
 DILUTION FACTOR 1.0  
 DATE EXTRACTED \_\_\_\_\_  
 DATE ANALYZED 10/01/01  
 ANALYZED BY WILLIAM

CAS #	COMPOUND	UG/L	MDL
71432	Benzene	U	.4
108883	Toluene	U	.5
100414	Ethylbenzene	U	1.0
1330207	m,p-Xylene	U	2.8
95476	o-Xylene	U	2.1
75650	T-butyl alcohol	U	9.6
1634044	Methyl t-butyl ether	U	4.2

SURROGATE COMPOUNDS	RECOVERY	LIMITS	STATUS
1,2-Dichloroethane-d4	<u>100 %</u>	76-114	<u>OK</u>
Toluene-d8	<u>94 %</u>	88-110	<u>OK</u>
Bromofluorobenzene	<u>95 %</u>	86-115	<u>OK</u>

J - Indicates compound concentration found below MDL.  
 U - Indicates compound analyzed for but not detected,  
 D - Indicates result is based on a dilution.

B - Indicates compound found in associated blank.  
 E - Indicates result exceeds highest calibration standard  
 W - Result exceeds specific ground water quality criteria.\*

\* Flags are based on Specific Ground Water Quality Criteria from New Jersey Register dated February 1, 1993.

4A  
VOLATILE METHOD BLANK SUMMARY

EPA SAMPLE NO.

Lab Name: ACCREDITED LABS, INC.

Contract: \_\_\_\_\_

Lab Code: \_\_\_\_\_

Case No.: \_\_\_\_\_

SAS No.: \_\_\_\_\_

SDG No.: \_\_\_\_\_

Lab File ID: >C8381

Lab Sample ID: VBLKC57

Date Analyzed: 09/28/01

Time Analyzed: 14:32

GC Column: RTX-502 ID: 0.53(mm)

Heated Purge: (Y/N) N

Instrument ID: HP5970C

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

#	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01		0110549	>C8389	20:42
02		0110551	>C8391	22:17
03		0110552	>C8392	23:04
04		0110553	>C8393	23:52
05		0110554	>C8383	16:02
06		0110555	>C8384	16:43
07		0110553MS	>C8394	00:39
08		0110553MSD	>C8395	01:26
09				
10				
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12				
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29				
30				

COMMENTS: \_\_\_\_\_

4A  
VOLATILE METHOD BLANK SUMMARY

EPA SAMPLE NO.

Lab Name: ACCREDITED LABS, INC.

Contract: \_\_\_\_\_

Lab Code:

Case No.: 3882

SAS No.: \_\_\_\_\_

SDG No.:

Lab File ID: >C8408

Lab Sample ID: VBLKC58

Date Analyzed: 10/01/01

Time Analyzed: 13:27

GC Column: RTX-502 ID: 0.53(mm)

Heated Purge: (Y/N) N

Instrument ID: HP5970C

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
	=====	=====	=====	=====
01		0110549DL	>C8416	21:34
02		0110550	>C8415	20:46
03				
04				
05				
06				
07				
08				
09				
10				
11				
12				
13				
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30				

COMMENTS: \_\_\_\_\_

57

ACCREDITED LABORATORIES, INC.  
INITIAL CALIBRATION

Initial Calibration Source: PE/LEEMAN

Concentration Units: µg/L

Analyte	True	Initial Calibration		Date	Method
		Found	% Rec		
Magnesium	7500.0	7470.00	99.6	09/26/01	P

Control Limits:

Mercury 80-120; ICP Metals 90-110; GFA 80-120; CN 85-115

ALI FORM II (Part I) - INORGANICS

ACCREDITED LABORATORIES, INC.  
CONTINUING CALIBRATION VERIFICATION

Initial Calibration Source: PE/LEEMAN

Continuing Calibration Source: ALI

Concentration Units: µg/L

Analyte	True	Continuing Calibration(s)						M
		Found 1	% Rec	Date 1	Found 2	% Rec	Date 2	
Magnesium	5000.0	5000.00	100.0	09/26/01	5160.00	103.2	09/26/01	P

Control Limits: Mercury 80-120; ICP Metals 90-110; GFA 80-120; CN 85-115

ALI FORM II (Part II) - INORGANICS

ACCREDITED LABORATORIES, INC.  
INITIAL CALIBRATION & PREPARATORY BLANKS

Preparation Blank Matrix: Water

Analyte	Initial Calibration Blank ( $\mu\text{g/L}$ )		Preparation Blank ( $\mu\text{g/L}$ )		Method
	Result	Date	Result	Date	
Magnesium	< 250.0	09/26/01	< 250.0	09/26/01	P

ALI FORM III (Part I) - INORGANICS

ACCREDITED LABORATORIES, INC.  
CONTINUING CALIBRATION BLANKS

Concentration Units: µg/L

Analyte	Continuing Calibration Blank(s)						Method
	Result 1	Date 1	Result 2	Date 2	Result 3	Date 3	
Magnesium	< 250.0	09/26/01	< 250.0	09/26/01	_____	_____	P

ALI FORM III (Part II) - INORGANICS

ACCREDITED LABORATORIES, INC.  
ICP INTERFERENCE CHECK SAMPLE

ICP ID Number: ES-2000

ICS Source: SPEX-3-129AS

Concentration Units: µg/L

Analyte	True		Initial Found			Final Found		
	Sol A	Sol AB	Sol A	Sol AB	% Rec	Sol A	Sol AB	% Rec
Magnesium	0.	500000.	542000.	503000.0	100.6	523000.	488000.0	97.6

ALI FORM IV - INORGANICS

ACCREDITED LABORATORIES, INC.  
SPIKE SAMPLE RECOVERY

Sample #: 0110297

Matrix: Aqueous

Concentration Units: µg/l

Analyte	Spike Added	Sample Result	Spiked Sample Result	% Recovery	QC Limits %Rec	Date Analyzed	M
Magnesium	2000.00	93700	90600	-155.0		09/21/01	P

Comments:

ND - Element analyzed for but not detected.  
P - Analyzed by ICP                      CV - Analyzed by cold vapor  
F - Analyzed by GFA                      A - Analyzed by flame AA

ALI FORM V (Part I) - INORGANICS

ACCREDITED LABORATORIES, INC.  
DUPLICATES

Sample #: 0110297

Matrix: Aqueous

Concentration Units ( $\mu\text{G/L}$ ,  $\text{MG/L}$  or  $\text{MG/KG}$  dry weight):  $\mu\text{G/L}$

Analyte	Control Limit	Sample Result	Duplicate Result	RPD	Q	Date Analyzed	M
Magnesium		93700	92700	1.1	-	09/21/01	P

ND - Element analyzed for but not detected or detected below MDL.

ALI FORM VI - INORGANICS

ACCREDITED LABORATORIES, INC.  
LABORATORY CONTROL SAMPLE

Solid LCS Source: ALI

Aqueous LCS Source: ALI

Analyte	Aqueous ( $\mu\text{g/L}$ )					Solid (mg/kg)				
	True	Found	%Rec	Q	M	True	Found	%Rec	Q	M
Magnesium	2000.0	1980.0	99.0		P					

ALI FORM VII - INORGANICS

ACCREDITED LABORATORIES, INC.  
ICP SERIAL DILUTION SUMMARY

Sample #: 0110297

Matrix: Aqueous

Concentration Units: µg/L

Analyte	MDL	Initial Sample Result	Serial Dilution Result	% Difference	Date Analyzed	M
Magnesium	250	93700	78500	16.2	09/21/01	P

ND - Element analyzed for but not detected or detected below MDL.

ALI FORM IX - INORGANICS

ACCREDITED LABORATORIES, INC.  
GENERAL CHEMISTRY DUPLICATE SAMPLE RESULTS SUMMARY

Matrix: Aqueous

ANALYTES	SAMPLE #	ORIGINAL SAMPLE CONCENTRATION	UNITS	DUPLICATE SAMPLE CONCENTRATION	RPD	QC LIMITS
Carbon Dioxide, Dissolved	0110333	64.2	mg/L	64.3	.2	20%

QUANT REPORT

Operator ID: ROBERT  
 Output File: ^C8381::D2  
 Data File: >C8381::C2  
 Name: VBLKC57  
 Misc:

Quant Rev: 6      Quant Time: 010928 15:06  
                   Injected at: 010928 14:32  
                   Dilution Factor: 1.00000

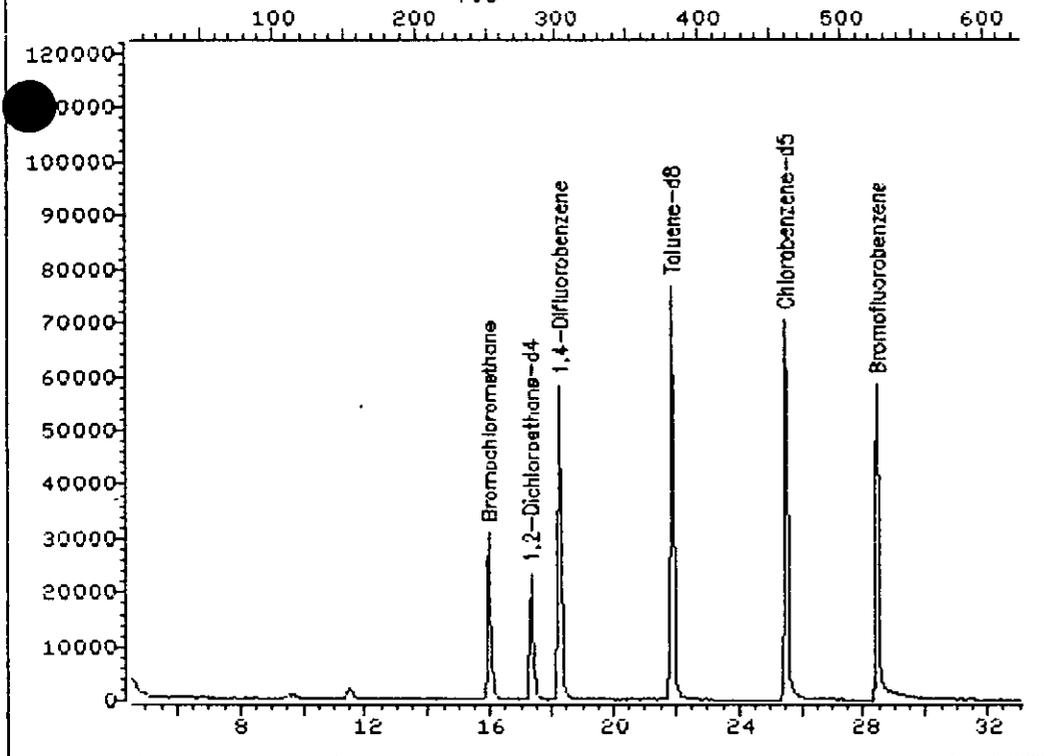
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 Title: Accredited Labs Volatile Identity File  
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1) *Bromochloromethane	15.97	252	53725	30.00	ug/l	95
19) 1,2-Dichloroethane-d4	17.34	282	64389	30.52	ug/l	91
21) *1,4-Difluorobenzene	18.29	303	211558	30.00	ug/l	100
37) *Chlorobenzene-d5	25.49	461	169317	30.00	ug/l	100
42) Toluene-d8	21.89	382	211541	29.96	ug/l	99
45) Bromofluorobenzene	28.45	526	108742	29.04	ug/l	88

\* Compound is ISTD

TOTAL ION CHROMATOGRAM

File >C8381 35.0-300.0 amu. VBLKC57  
TIC



Data File: >C8381::C2

Quant Output File: ^C8381::D2

Name: VBLKC57

Misc:

Id File: IDC618::SC

Title: Accredited Labs Volatile Identity File

Last Calibration: 010928 13:30

Operator ID: ROBERT

Quant Time: 010928 15:06

Injected at: 010928 14:32

QUANT REPORT

Operator ID: WILLIAM  
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 Name: VBLKC58  
 Misc:

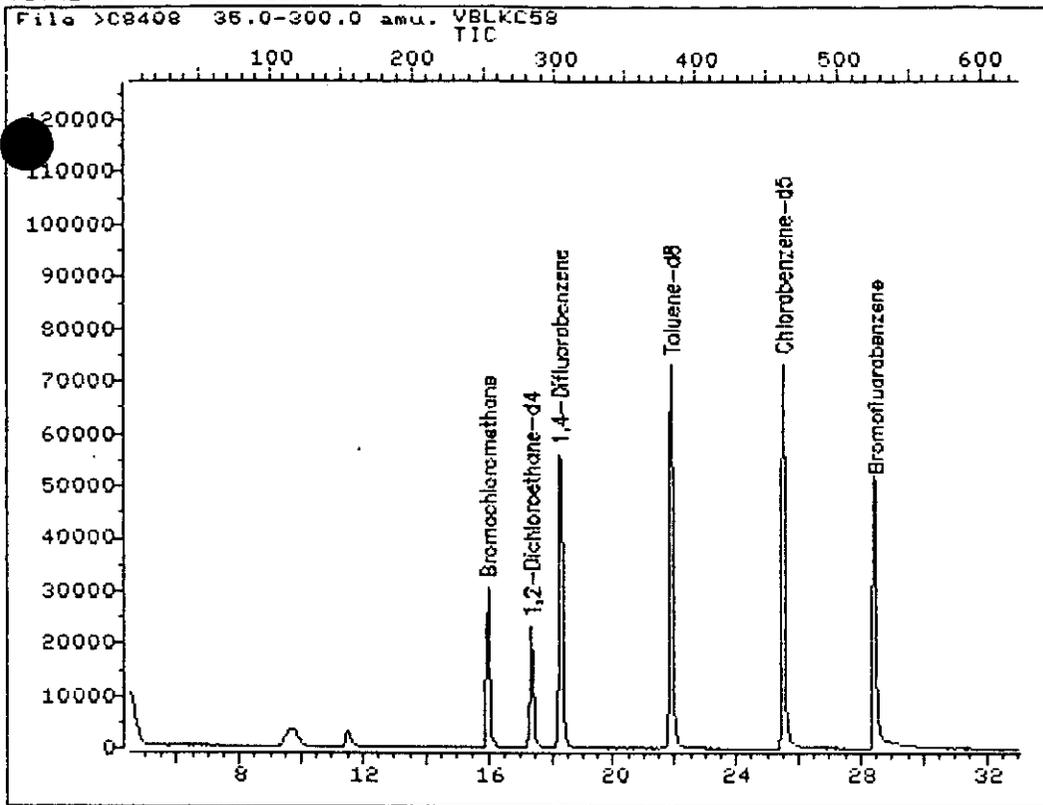
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                   Injected at: 011001 13:27  
                   Dilution Factor: 1.00000

ID File: IDC619::SC  
 Title: Accredited Labs Volatile Identity File  
 Last Calibration: 011001 12:28

Compound	R.T.	Scan#	Area	Conc	Units	q
1) *Bromochloromethane	15.99	253	51056	30.00	ug/l	93
19) 1,2-Dichloroethane-d4	17.36	283	61651	30.08	ug/l	90
21) *1,4-Difluorobenzene	18.27	303	205865	30.00	ug/l	100
37) *Chlorobenzene-d5	25.51	462	165235	30.00	ug/l	100
42) Toluene-d8	21.91	383	206558	28.08	ug/l	99
45) Bromofluorobenzene	28.47	527	110733	28.51	ug/l	87

\* Compound is ISTD

TOTAL ION CHROMATOGRAM



Data File: >C8408::C2  
Name: VBLKC58  
Misc:

Quant Output File: ^C8408::QT

Id File: IDC619::SC  
Title: Accredited Labs Volatile Identity File  
Last Calibration: 011001 12:28

Operator ID: WILLIAM  
Quant Time: 011001 14:01  
Injected at: 011001 13:27

QUANT REPORT

Operator ID: ROBERT  
 Output File: ^C8389::QT  
 Data File: >C8389::C2  
 Name: 0110549  
 Misc: 3882

Quant Rev: 6      Quant Time: 010928 21:22  
 Injected at: 010928 20:42  
 Dilution Factor: 1.00000

EEC

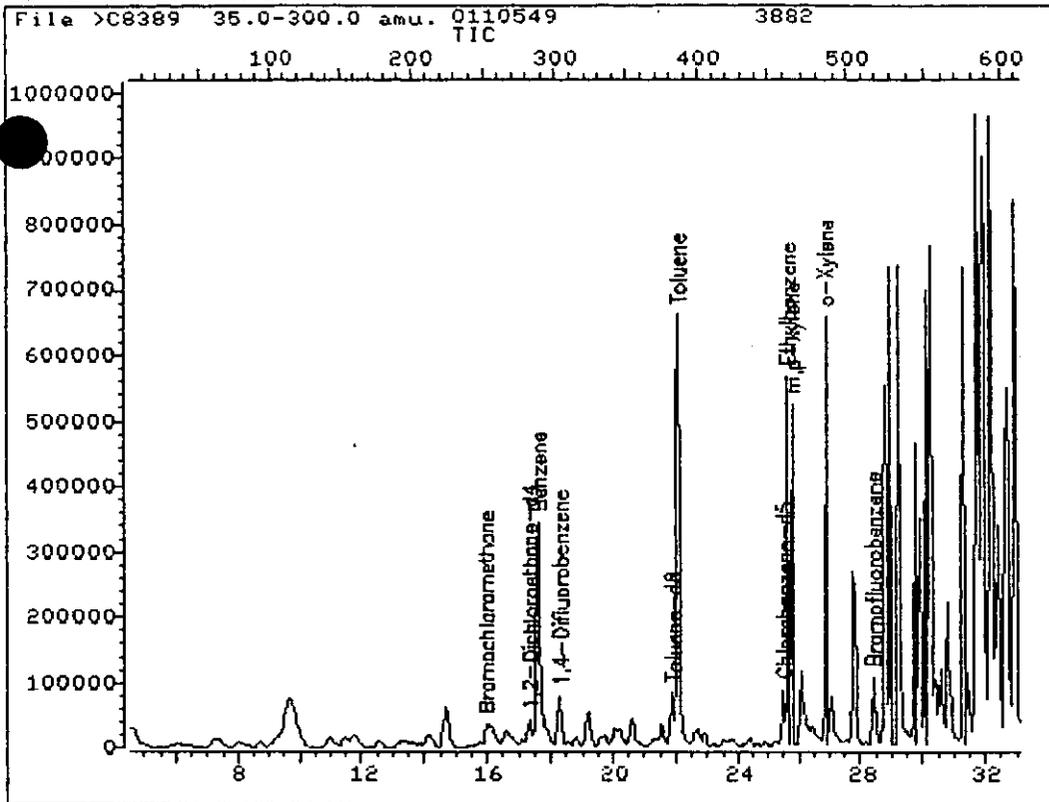
MW-1

ID File: IDC618::SC  
 Title: Accredited Labs Volatile Identity File  
 Last Calibration: 010928 13:30

Compound	R.T.	Scan#	Area	Conc	Units	q
1) *Bromochloromethane	15.98	252	50934	30.00	ug/l	95
19) 1,2-Dichloroethane-d4	17.34	282	60286	30.14	ug/l	86
21) *1,4-Difluorobenzene	18.30	303	201649	30.00	ug/l	100
31) Benzene	17.62	288	1323836	216.29	ug/l	100
37) *Chlorobenzene-d5	25.50	461	174063	30.00	ug/l	100
42) Toluene-d8	21.90	382	214296	29.52	ug/l	98
43) Toluene	22.08	386	1867809	246.15	ug/l	80
45) Bromofluorobenzene	28.42	519	124746	32.41	ug/l	92
46) Ethylbenzene	25.64	464	1640805M	181.33	ug/l	75
48) m,p-Xylene	25.80	466	1281096M	166.60	ug/l	95
49) o-Xylene	26.90	487	1031194M	138.62	ug/l	84

\* Compound is ISTD

TOTAL ION CHROMATOGRAM



Data File: >C8389::C2

Quant Output File: ^C8389::QT

Name: 0110549

Misc: 3882

EEC

MW-1

Id File: IDC618::SC

Title: Accredited Labs Volatile Identity File

Last Calibration: 010928 13:30

Operator ID: ROBERT

Quant Time: 010928 21:22

Injected at: 010928 20:42

QUANT REPORT

Operator ID: WILLIAM  
 Output File: ^C8416::QT  
 Data File: >C8416::C2  
 Name: 0110549DL  
 Misc: 3882

EEC

Quant Rev: 6      Quant Time: 011001 22:14  
 Injected at: 011001 21:34  
 Dilution Factor: 1.00000

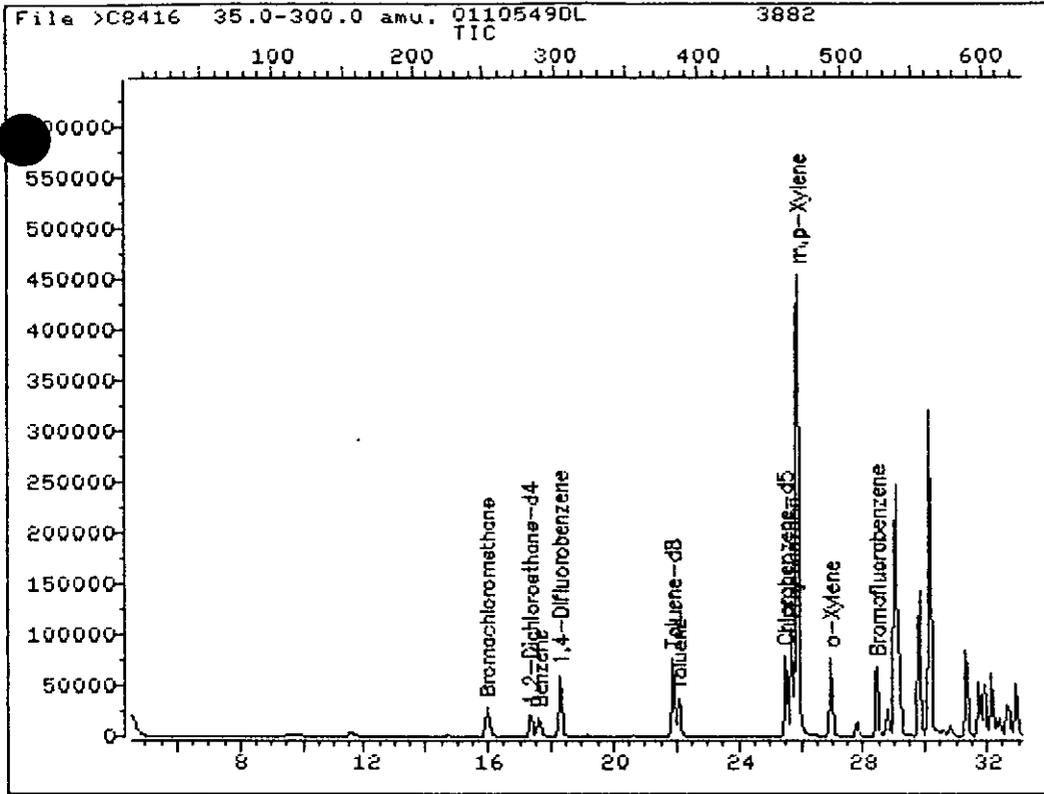
MW-1

ID File: IDC619::SC  
 Title: Accredited Labs Volatile Identity File  
 Last Calibration: 011001 12:28

Compound	R.T.	Scan#	Area	Conc	Units	q
1) *Bromochloromethane	15.97	252	50605	30.00	ug/l	94
19) 1,2-Dichloroethane-d4	17.34	282	62487	30.76	ug/l	90
21) *1,4-Difluorobenzene	18.30	303	200706	30.00	ug/l	100
31) Benzene	17.61	288	69183	10.52	ug/l	100
37) *Chlorobenzene-d5	25.49	461	173022	30.00	ug/l	100
42) Toluene-d8	21.90	382	204405	26.54	ug/l	99
43) Toluene	22.08	386	103268	12.46	ug/l	90
45) Bromofluorobenzene	28.46	526	116443	28.63	ug/l	87
46) Ethylbenzene	25.72	466	311629M	32.74	ug/l	69
48) m,p-Xylene	25.91	470	1161433	141.31	ug/l	97
49) o-Xylene	26.95	493	178714	22.72	ug/l	95

\* Compound is ISTD

TOTAL ION CHROMATOGRAM



Data File: >C8416::C2  
Name: 0110549DL  
Misc: 3882

Quant Output File: ^C8416::QT

EEC

MW-1

Id File: IDC619::SC  
Title: Accredited Labs Volatile Identity File  
Last Calibration: 011001 12:28

Operator ID: WILLIAM  
Quant Time: 011001 22:14  
Injected at: 011001 21:34

QUANT REPORT

Operator ID: WILLIAM  
 Output File: ^C8415::QT  
 Data File: >C8415::C2  
 Name: 0110550  
 Misc: 3882

Quant Rev: 6      Quant Time: 011001 21:26  
 Injected at: 011001 20:46  
 Dilution Factor: 1.00000

EEC

MW-2

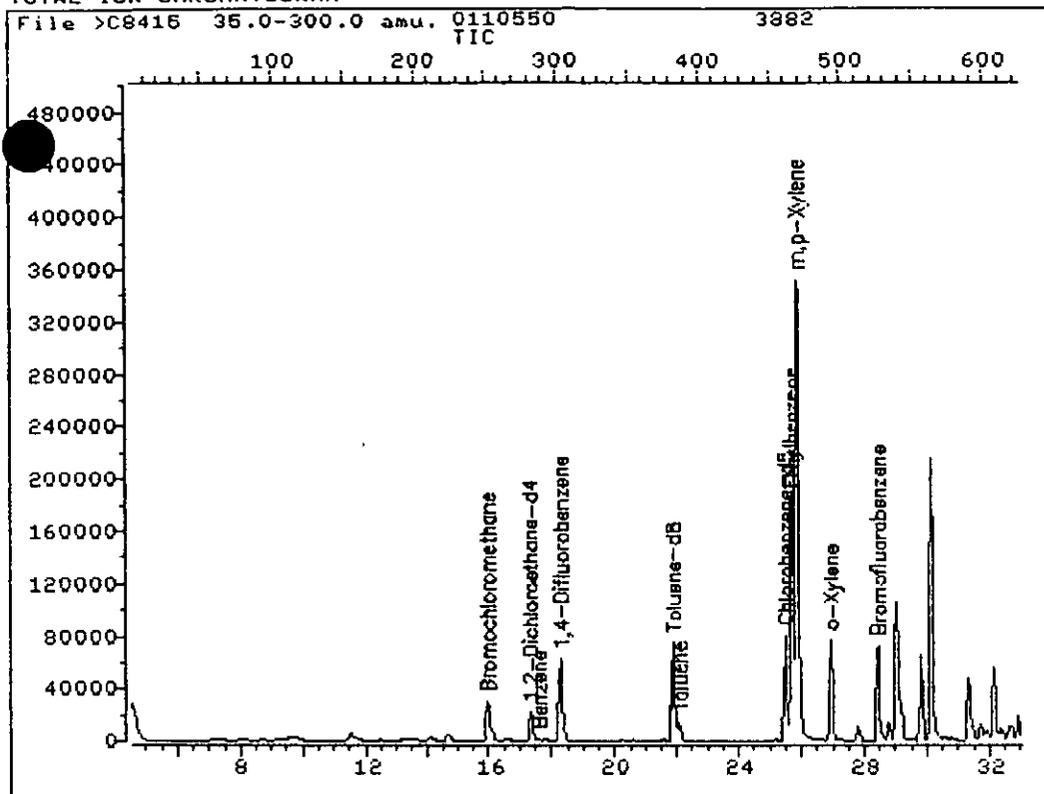
ID File: IDC619::SC  
 Title: Accredited Labs Volatile Identity File  
 Last Calibration: 011001 12:28

Compound	R.T.	Scan#	Area	Conc	Units	q
1) *Bromochloromethane	15.97	252	50574	30.00	ug/l	97
19) 1,2-Dichloroethane-d4	17.34	282	61176	30.13	ug/l	88
21) *1,4-Difluorobenzene	18.30	303	203800	30.00	ug/l	100
31) Benzene	17.61	288	5604	.84	ug/l	100
37) *Chlorobenzene-d5	25.50	461	172182	30.00	ug/l	100
42) Toluene-d8	21.90	382	203961	26.61	ug/l	99
43) Toluene	22.08	386	38957	4.72	ug/l	89
45) Bromofluorobenzene	28.46	526	119985	29.65	ug/l	87
46) Ethylbenzene	25.68	465	587217M	61.99	ug/l	64
48) m,p-Xylene	25.86	469	948141	115.92	ug/l	93
49) o-Xylene	26.95	493	179789	22.97	ug/l	95

\* Compound is ISTD

76

TOTAL ION CHROMATOGRAM



Data File: >C8415::C2

Quant Output File: ^C8415::QT

Name: 0110550

Misc: 3882

EEC

MW-2

Id File: IDC619::SC

Title: Accredited Labs Volatile Identity File

Last Calibration: 011001 12:28

Operator ID: WILLIAM

Quant Time: 011001 21:26

Injected at: 011001 20:46

QUANT REPORT

Operator ID: ROBERT  
 Output File: ^C8391::QT  
 Data File: >C8391::C2  
 Name: 0110551  
 Misc: 3882

Quant Rev: 6      Quant Time: 010928 22:57  
 Injected at: 010928 22:17  
 Dilution Factor: 1.00000

EEC

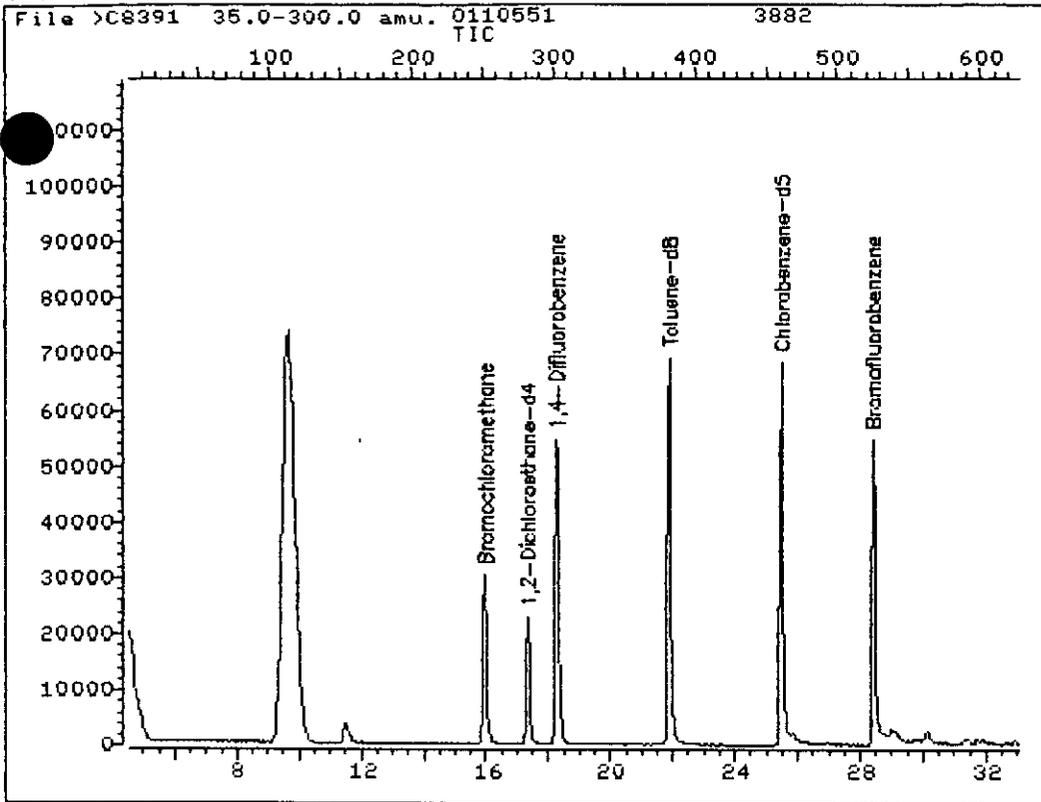
MW-3

ID File: IDC618::SC  
 Title: Accredited Labs Volatile Identity File  
 Last Calibration: 010928 13:30

Compound	R.T.	Scan#	Area	Conc	Units	q
1) *Bromochloromethane	15.97	252	51243	30.00	ug/l	96
19) 1,2-Dichloroethane-d4	17.34	282	60236	29.94	ug/l	87
21) *1,4-Difluorobenzene	18.25	302	202580	30.00	ug/l	100
37) *Chlorobenzene-d5	25.50	461	165809	30.00	ug/l	100
42) Toluene-d8	21.90	382	206282	29.83	ug/l	98
45) Bromofluorobenzene	28.41	525	101026	27.55	ug/l	95

\* Compound is ISTD

TOTAL ION CHROMATOGRAM



Data File: >C8391::C2

Quant Output File: ^C8391::QT

Name: 0110551

Misc: 3882

EEC

MW-3

Id File: IDC618::5C

Title: Accredited Labs Volatile Identity File

Last Calibration: 010928 13:30

Operator ID: ROBERT

Quant Time: 010928 22:57

Injected at: 010928 22:17

79

QUANT REPORT

Operator ID: ROBERT  
 Output File: ^C8392::QT  
 Data File: >C8392::C2  
 Name: 0110552  
 Misc: 3882

Quant Rev: 6      Quant Time: 010928 23:44  
 Injected at: 010928 23:04  
 Dilution Factor: 1.00000

EEC

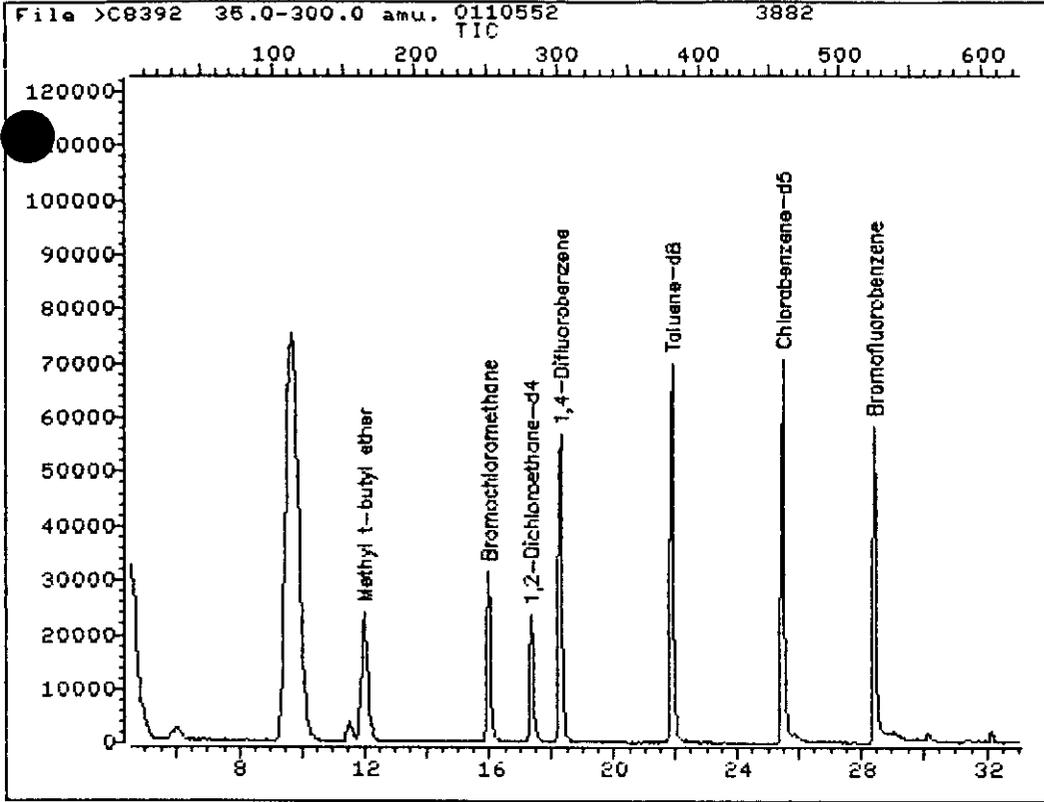
MW-4

ID File: IDC618::SC  
 Title: Accredited Labs Volatile Identity File  
 Last Calibration: 010928 13:30

Compound	R.T.	Scan#	Area	Conc	Units	q
1) *Bromochloromethane	15.98	252	52185	30.00	ug/l	97
19) 1,2-Dichloroethane-d4	17.34	282	62900	30.70	ug/l	88
21) *1,4-Difluorobenzene	18.30	303	206154	30.00	ug/l	100
23) Methyl t-butyl ether	12.01	165	174592	52.45	ug/l	95
37) *Chlorobenzene-d5	25.50	461	167904	30.00	ug/l	100
42) Toluene-d8	21.90	382	206374	29.48	ug/l	99
45) Bromofluorobenzene	28.41	525	108934	29.34	ug/l	90

\* Compound is ISTD

TOTAL ION CHROMATOGRAM



Data File: >C8392::C2  
Name: 0110552  
Misc: 3882

Quant Output File: ^C8392::QT

EEC

MW-4

Id File: IDC618::SC  
Title: Accredited Labs Volatile Identity File  
Last Calibration: 010928 13:30

Operator ID: ROBERT  
Quant Time: 010928 23:44  
Injected at: 010928 23:04

QUANT REPORT

Operator ID: ROBERT  
 Output File: ^C8393::QT  
 Data File: >C8393::C2  
 Name: 0110553  
 Misc: 3882

Quant Rev: 6      Quant Time: 010929 00:32  
 Injected at: 010928 23:52  
 Dilution Factor: 1.00000

EEC

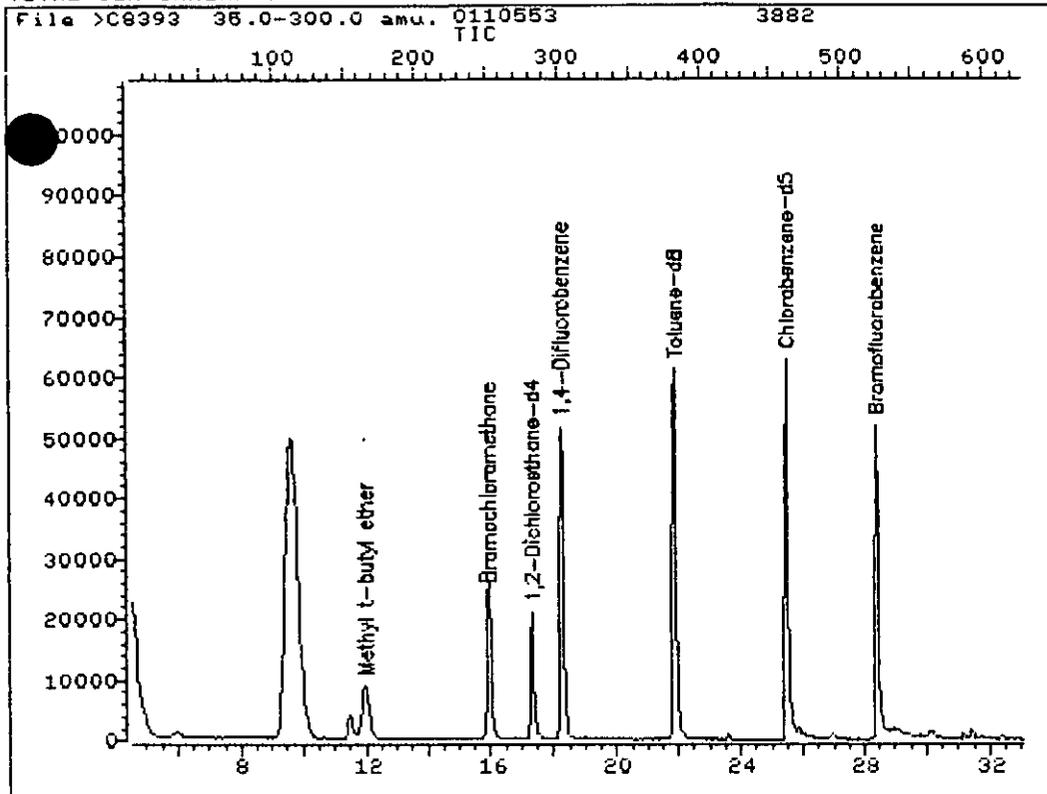
MW-6

ID File: IDC618::SC  
 Title: Accredited Labs Volatile Identity File  
 Last Calibration: 010928 13:30

Compound	R.T.	Scan#	Area	Conc	Units	q
1) *Bromochloromethane	15.93	251	46771	30.00	ug/l	95
19) 1,2-Dichloroethane-d4	17.34	282	58411	31.81	ug/l	89
21) *1,4-Difluorobenzene	18.25	302	183396	30.00	ug/l	100
23) Methyl t-butyl ether	11.96	164	65696	22.18	ug/l	95
37) *Chlorobenzene-d5	25.49	461	150468	30.00	ug/l	100
42) Toluene-d8	21.90	382	184944	29.48	ug/l	99
45) Bromofluorobenzene	28.41	525	87752	26.37	ug/l	93

\* Compound is ISTD

TOTAL ION CHROMATOGRAM



Data File: >C8393::C2

Quant Output File: ^C8393::QT

Name: 0110553

Misc: 3882

EEC

MW-6

Id File: IDC618::SC

Title: Accredited Labs Volatile Identity File

Last Calibration: 010928 13:30

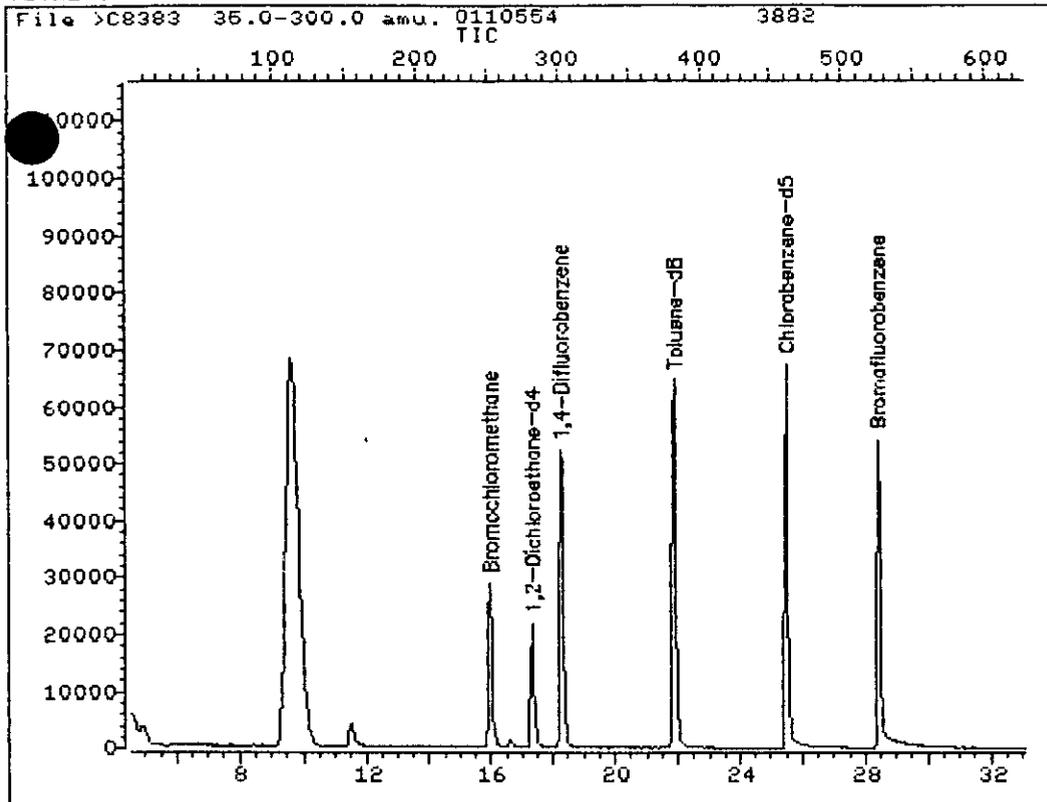
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Quant Time: 010929 00:32

Injected at: 010928 23:52



TOTAL ION CHROMATOGRAM



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Quant Output File: ^C8383::QT

Name: 0110554

Misc: 3882

EEC

FB

Id File: IDC618::SC

Title: Accredited Labs Volatile Identity File

Last Calibration: 010928 13:30

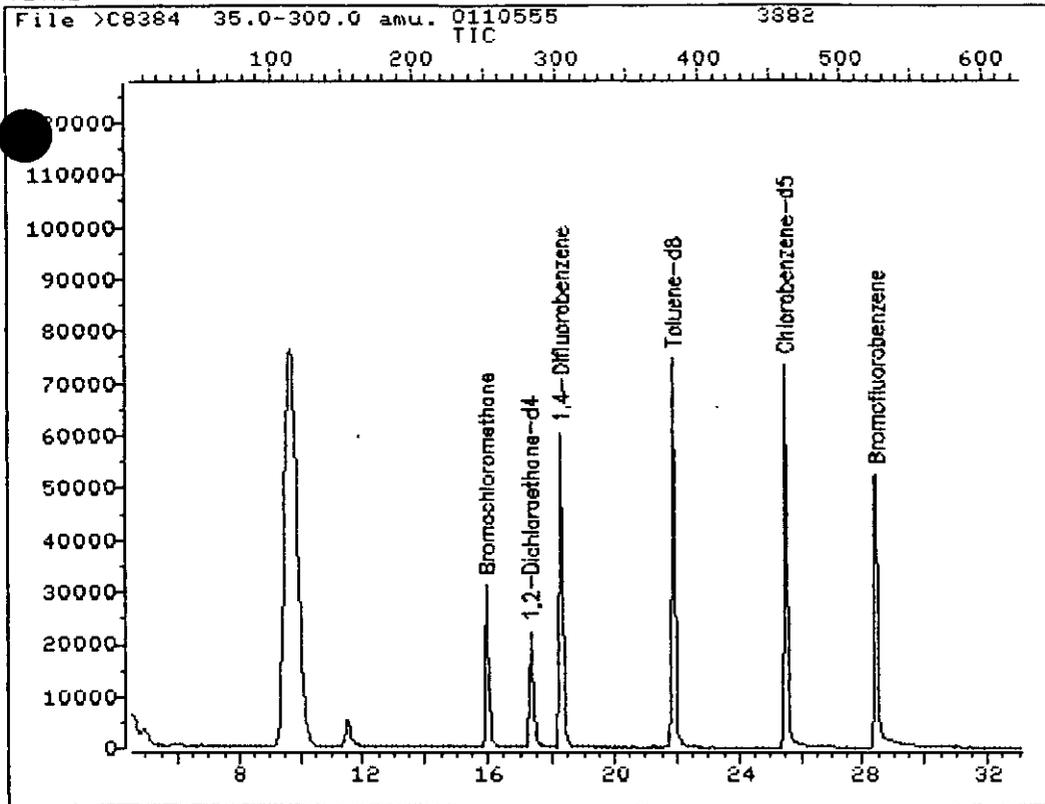
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Injected at: 010928 16:02



TOTAL ION CHROMATOGRAM



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Quant Output File: ^C8384::QT

Name: 0110555

Misc: 3882

EEC

TB

Id File: IDC618::SC

Title: Accredited Labs Volatile Identity File

Last Calibration: 010928 13:30

Operator ID: ROBERT

Quant Time: 010928 17:23

Injected at: 010928 16:43

# **Environmental Engineering Corporation**

## **REMEDIAL ACTION WORKPLAN**

**Borough of Madison Police Station  
Hartley Dodge Memorial Building  
Madison, New Jersey  
UST# 0085115  
NJDEP Case #91-02-20-1607  
December 7, 2001**

**Prepared By:  
Environmental Engineering Corporation  
UST Certification # 0700296**

**Robert Fenz, PG  
UST Certification # 0010503**

**Pradeep Lamba, PhD, PE, CHMM  
Principal Engineer**

# Environmental Engineering Corporation

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# Environmental Engineering Corporation

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Appendix 2	GIS Information
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# **Environmental Engineering Corporation**

## **1.0 INTRODUCTION**

This Remedial Action Workplan (RAW) Addendum has been prepared by Environmental Engineering Corporation (EEC) for the Borough of Madison Police Station site located at the Hartley Dodge Memorial Building, Kings Road, Borough of Madison, Morris County, New Jersey 07940. The objective of this RAW Addendum is to provide a basis and background for a Classification Exception Area proposal to address groundwater contamination resulting from a release of gasoline from a former underground storage tank system.

This RAW Addendum was prepared in accordance with the Technical Requirements for Site Remediation found at N.J.A.C. 7:26E-6.2. A summary of the previous Remedial Investigations and Remedial Actions conducted on this site is provided in Section 2. Proposed remedial actions including a Classification Exception Area (CEA) proposal and Well Restriction Area (WRA) are provided in Section 3. A Quality Assurance Project Plan is included in Section 5. Supporting documentation for this RAW Addendum is provided in the Appendices attached to this Report.

# Environmental Engineering Corporation

## 2.0 PREVIOUS REMEDIAL INVESTIGATIONS AND REMEDIAL ACTION SUMMARY

### 2.1 Site Location

The project site is located on Kings Road in the Borough of Madison, Morris County, New Jersey at approximately N 40° 45' 24" and W 74° 24' 59" (NAD 83) as shown in Figure 1. The property is approximately one acre in area and is identified as Lot 1 of Block 2802 on the Borough of Madison Tax Map as shown on Figure 2. The property is owned by the Borough of Madison and contains the Borough's administrative offices, courts, fire department, and police department. The municipal building is identified as the Hartley Dodge Memorial Building.

The property is situated between a residential area immediately to the south and west, and Madison's commercial district to the north and east. The New Jersey Transit train station at Madison is located immediately to the east, on the opposite side of Kings Road.

The area of concern (AOC) is located within a paved area at the rear (west) of the municipal building, adjacent to the portion of the building occupied by the police department. A site plan showing significant site features relevant to this RAW is provided in Figure 3.

### 2.2 Physical Setting

The project site is located in the Newark Basin of the Piedmont Province of the Eastern United States. The Newark Basin is a northeast-southwest trending belt of sedimentary and volcanic rock units of primarily Triassic age. Bedrock in the vicinity of the site is identified as fine-grained sedimentary rocks of the Boonton Formation.

The site is located on the terminal moraine of the most recent glacial epoch of the Pleistocene age. The site, and Madison in general, is situated in an area of rolling hills of slight to moderate relief, characteristic of the glacial terminal moraine. Ground surface elevations on the project site are approximately +244 feet Mean Sea Level. In the immediate area of the site, the terrain rises abruptly to the north and west, as well as locally towards the railroad embankment to the east. Surface drainage is towards the southeast, consistent with the groundwater flow direction.

The Pleistocene deposits in the Madison area are heterogeneous glacial till soils consisting of varying proportions of clay/silt to boulder size particles, with a predominantly fine-grained matrix of low hydraulic conductivity. Subsurface logs developed from the installation of monitoring wells at the site indicate that a continuous layer of stiff varved clay/silt exists beneath the glacial till from a depth of approximately 13 feet to the maximum depth explored of 22 feet at MW-7. This stratum becomes increasingly clayey with depth. Bedrock was not encountered in the soil borings.

Groundwater in the vicinity of the AOC is generally encountered within five feet of the ground surface. The groundwater flow direction has been determined within this aquifer unit to be in a southeast direction. This aquifer unit is believed to be a thin water table aquifer over the described clay/silt confining layer with a saturated thickness of approximately 7 to 10 feet. Previous investigations have found water levels in a former (abandoned) monitoring well located on the north side of the property and in an up-gradient groundwater direction from the AOC to be lower in elevation by more than thirty feet. The shallow perched groundwater condition in the vicinity of the AOC may be receiving continual recharge from landscaped areas or leaky shallow storm sewers in the immediate area.

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## **2.3 Project Background**

The Hartley Dodge Memorial Building property is approximately one acre in area and has been continuously used as the Borough of Madison administrative offices since the 1920's. The grounds surrounding the building are landscaped. A cobblestone access driveway is located on the west side of the building. The police station occupies the ground floor of the southern portion of the building adjoining Maple Avenue.

Two former UST systems were previously located on the property immediately west of the police station portion of the building. These UST systems were used to store motor fuel for municipal vehicles and included a 550-gallon gasoline UST located beneath the pavement area and a 4000-gallon gasoline UST located in a landscaped area to the south of the paved driveway. (See Figure 3) The UST's were registered with the NJDEP under Facility ID 0085115.

The 550-gallon gasoline UST was removed by Killiam Associates in 1991 under Closure Approval Number C90-0059. During closure operations, a release of gasoline was observed in the excavation area and the spill was reported to the NJDEP. Case Number 91-2-20-1657-19 was assigned to the site. The 4000-gallon gasoline UST was removed by EEC in 1996 under Closure Approval C93-1079. Evidence of a minor release of petroleum product was detected during the closure operations performed on the 4000-gallon UST. Impacted soils were removed from the UST excavation area.

Following the closure of the 550-gallon gasoline UST, a series of Remedial Investigations and Remedial Actions were initiated at the project site. The results of these investigations/actions have been reported to the NJDEP in previous submissions. A summary of the completed activities and significant findings are provided here.

## **2.4 Technical Overview**

All of EEC's field activities related to the remedial investigation at the subject site were performed by or under the supervision of individuals with NJDEP UST certification. All soil and groundwater samples were obtained in accordance with N.J.A.C. 7:26E and the NJDEP Field Sampling Procedures Manual dated May 1992. The compounds which were analyzed for in each sample media were as required in the May 10, 1995 NJDEP correspondence. All laboratory and field analyses were performed by New Jersey certified laboratories, and all samples were analyzed within the specified holding times. The analytical data packages for the completed remedial investigations have been previously submitted to the NJDEP.

## **2.5 Soil Investigations**

Soil contamination was observed in the excavation during the closure of the 550-gallon UST in 1991. Concentrations of benzene, toluene, ethylbenzene, and xylenes (BTEX) exceeding the NJDEP's most stringent soil cleanup criteria (Site Remediation News, February 1994) were detected in two of the four post-excavation soil samples. Subsequently, the excavation was backfilled and the pavement section was repaired to its original condition.

The areal extent of the soil contamination surrounding the AOC was delineated by EEC in July 1995 through a series of soil borings and probes. The extent of soil contamination was found to be limited to the area immediately surrounding the former 550-gallon gasoline UST as shown in Figure 4. This area of the site is effectively capped with a thick cobblestone and concrete pavement.

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## 2.6 Groundwater Investigations

The Site Assessment Summary Report prepared by Killiam in 1991 did not indicate whether or not groundwater was encountered in the excavation of the 550-gallon UST. The results of the post-excavation soil analyses for the 550-gallon UST closure in 1991 indicated soil contamination exceeding soil cleanup criteria. To investigate potential impacts to groundwater, Killiam installed and sampled monitoring well MW-1 adjacent to the former UST excavation area in March 1991. No free product was observed in MW-1. Elevated concentrations of BTEX (8.95 ppm total BTEX) were detected in the groundwater sample.

EEC obtained a second groundwater sample from MW-1 on June 6, 1991. 15.3 ppm total BTEX were detected. The results of this second sample were reported in a Discharge Investigation and Corrective Action Report (DICAR) submitted to the NJDEP in February 1992. The submitted DICAR also included the results of a well search performed for a half-mile radius from the site. The nearest potable supply well in the vicinity of the site was identified as approximately 4000 feet east of the site.

Further investigation of the groundwater contamination was undertaken in 1992, with the installation of two additional monitoring wells, MW-2 and MW-3. Monitoring wells MW-1, MW-2 and MW-3 were sampled by EEC on July 8, 1992. BTEX contamination was detected in wells MW-1 and MW-2 at 18.87 ppm and 3.54 ppm respectively. The results of this sampling round were submitted to the NJDEP in a Site Investigation/Remedial Investigation Report (SI/RIR) prepared by EEC in November 1992.

In January 1995, NJDEP requested additional information regarding the site. Following submittal of the requested items, the NJDEP responded with the May 10, 1995 correspondence, requiring further soil and groundwater RI activities and the submittal of a RAW.

Monitoring wells MW-4 and MW-5 were installed in July 1995 and sampled for volatile organic compounds including MTBE and t-butyl alcohol (TBA) on August 9, 1995. Analytical results from the sample collected from MW-4 detected total BTEX, MTBE and TBA concentrations of 23.3 ppm, 560 ppm and 58.0 ppm, respectively. The detected contamination appeared to be related to the existing 4000-gallon UST, which was out of service and scheduled for removal. Results at MW-5 were non-detect for all compounds analyzed for with the exception of chloroform, at a concentration below GWQS and suspected to be a lab introduced contaminant.

A series of slug tests were performed on September 1995 in monitoring wells MW-2, MW-4, and MW-5. Slug test data were analyzed by the Bouwer-Rice method for unconfined aquifer conditions, using IBM-PC software (Aqtesolv). Slug test results ranged from 5.8E-6 cm/sec at MW-2 to 2.5E-4 cm/sec at MW-4.

In October 1995, EEC submitted a Remedial Investigation Workplan (RIW) to scope additional investigations on the site. The RIW was subsequently approved and the additional investigations were implemented in November 1995. Two additional monitoring wells, MW-6 and MW-7, were installed at down-gradient locations in December 1995. On January 23, 1996, monitoring wells MW-6 and MW-7 were sampled along with a second sampling round conducted at MW-4. Volatile organic compounds were not detected in monitoring wells MW-6 and MW-7. BTEX, MTBE, and TBA were detected at MW-4 at concentrations of 6.6 ppm, 180 ppm, and 6.0 ppm, respectively.

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In addition to the well search conducted in 1992, EEC completed the Receptor Evaluation for the site, which included a screening of subsurface utility basins and manways in the vicinity of the site and discussions with representatives of the Madison Board of Health regarding water supply systems in the Borough. No elevated volatile organic readings were detected during the screening of subsurface utility basins and manways. Health Department officials advised EEC that the Madison water utility provided all potable supply within the Borough. EEC was also advised that there is no planned groundwater usage in the vicinity of the site for the foreseeable future.

From January 1996 to the present, groundwater samples have been collected and analyzed from each of the monitoring wells installed for the project. The results of these sampling activities have been reported to the NJDEP in quarterly and semi-annual groundwater monitoring reports. In general, the analytical results indicate an overall decrease in the dissolved phase groundwater contaminants of concern. Based on current data, the amount of groundwater impacted on the site is limited to the vicinity of monitoring wells MW-1 and MW-2 located near and down-gradient of the former 550-gallon UST excavation area.

### **2.7 Additional Remedial Actions**

In June 1996, the remaining 4000-gallon gasoline UST was closed by removal under Closure Approval Number C93-1079. Evidence of a minor release from this UST was confirmed and impacted soils were removed from the excavation area. The UST closure was documented in a Site Investigation Summary Report dated October 29, 1996.

In March 2000, EEC prepared a RAW Addendum which included an application to inject ORC (Oxygen Release Compound) in the vicinity of the former 550-gallon UST. This application was subsequently approved by the NJDEP in April 2000. ORC was injected into the subsurface surrounding the former 550-gallon UST in May 2000. The ORC treatment was repeated in November 2000.

Following the injections of the ORC, groundwater monitoring was continued on a semi-annual basis in September 2000, March 2001 and September 2001. Groundwater analytical results from the September 2000 and March 2001 sampling events indicated a general decrease in contaminant concentrations in groundwater samples collected at monitoring well MW-1 and MW-2 accompanied by an increase in dissolved oxygen concentrations and microbial activity. In the latest groundwater sampling round conducted in September 2001, an increase in contaminant concentrations in groundwater were observed in groundwater samples collected from the monitoring well locations MW-1 and MW-2 along with a decrease in dissolved oxygen concentrations and microbial activity. Additional sampling rounds will be required to evaluate the ORC treatment.

### **2.8 Summary of Remedial Investigation and Remedial Action Findings**

- A release of petroleum product was confirmed during the closure of a 550-gallon unleaded gasoline UST conducted in 1991.
- Evidence of a minor release of petroleum product was detected during the closure of a 4000-gallon unleaded gasoline UST conducted in 1996.
- Soil and groundwater contamination exceeding applicable standards and criteria were confirmed.
- No free product has been observed on the groundwater.

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- The site is located in a mixed commercial/residential section of Madison.
- The Madison water utility supplies all potable water within the Borough of Madison.
- There is no planned groundwater usage in the vicinity of the site for the foreseeable future.
- The closest potable supply well is located approximately 4000 feet east of the site.
- No volatile organics were detected in subsurface utilities surrounding the site.
- Subsurface soils at the site include glacial till overlying a varved silt/clay stratum encountered at a depth of 13 to 15 feet bgs.
- Bedrock has not been encountered in the subsurface investigations completed to date.
- Groundwater has been observed in a water table condition at a depth of approximately 5 feet bgs.
- This shallow aquifer unit is limited in vertical extent by the varved silt/clay stratum encountered at a depth of 13 to 15 feet bgs.
- Groundwater flow within this shallow aquifer is in a general southeast direction from the site.
- Hydraulic conductivity of the shallow aquifer unit was determined to be  $10E-4$  to  $10E-6$  cm/sec.
- An additional deep aquifer unit has been identified at a depth of approximately 30 feet bgs.
- The horizontal and vertical extent of the soil contamination surrounding the former 550-gallon UST has been delineated and is limited to the immediate vicinity of the former UST.
- The horizontal and vertical extent of the groundwater contamination has been delineated.
- The groundwater contamination has been observed to decrease in concentration since periodic groundwater sampling was initiated in June 1996.
- The results of the ORC injection pilot test are inconclusive. Additional groundwater monitoring is required.
- Remaining compounds of concern impacting groundwater include benzene and total xylenes. The extent of groundwater contamination is limited to the immediate vicinity of the former 500-gallon UST as observed in monitoring wells MW-1 and MW-2 installed in this area of the site.

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## 3.0 PROPOSED REMEDIAL ACTION

### 3.1 Remediation of Contaminated Soil

We note that the physical site conditions during the 1991 closure of the 550-gallon UST (thick cobblestone and concrete pavement and proximity to the building) prevented the excavation of the impacted soils in the UST excavation area to uncontaminated materials. As a result, contaminated soils remain in the vicinity of the former UST area and these materials appear to be a continuing source of petroleum contamination to groundwater. At the present time, additional excavation of the source area to remove contaminated soils does not appear to be an option acceptable to the Borough of Madison.

Soil contamination has been confirmed and delineated both horizontally and vertically within the immediate vicinity of the former 550-gallon UST. A granite block and concrete surface pavement covers this area of the site effectively capping the contaminated soils. Since the area is capped, and the contamination is delineated, Madison initially proposed to execute a Declaration of Environmental Restrictions (DER) for the area of concern. A draft DER was included in an April 1996 RAW Addendum for NJDEP review. It is our understanding that the Department has not approved the DER proposal for this area of concern.

At the present time, no remedial actions are proposed for the contaminated soils identified in the vicinity of the former 550-gallon UST. Pending the results of continued groundwater monitoring, some remedial action to address soil contamination may be required in the future. The Borough of Madison will evaluate options for remedial actions for the soil contamination as may be required in the future.

### 3.2 Remediation of Contaminated Groundwater

#### 3.2.1 Proposal to Complete All Requirements of NJAC 7:26E-6

During the implementation of the proposed remedial action, all requirements of NJAC 7:26E-6 will be completed.

#### 3.2.2 Identification of Remediation Standards

The groundwater cleanup goals for this remediation are the Ground Water Quality Standards (GWQS) in accordance with N.J.A.C. 7:9-6. Specific groundwater quality criteria for Class IIA aquifers will be applied for the relevant compounds currently detected in groundwater as follows:

Benzene: 1 ug/l  
Total Xylenes 1000 ug/l

#### 3.2.3 Description of Remedial Action

Remediation of the impacted groundwater by natural attenuation is proposed for the site. A Classification Exception Area (CEA) and a Well restriction Area (WRA) will be established on the property surrounding the impacted portion of the aquifer identified during the investigation activities conducted. Monitoring points within the CEA include monitoring wells MW-1 and MW-2. Monitoring well MW-3, which is located side-gradient to the identified dissolved phase groundwater plume, will also be monitored. Monitoring wells MW-4 and MW-6, located down-gradient of the proposed CEA, will be utilized as a sentinel wells. Periodic groundwater sampling of the monitoring wells within and surrounding the CEA will be conducted on a semi-annual basis in accordance with the schedule provided in Section 3.2.13 of this report.

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## 3.2.4 Location of Remedial Action Area

The proposed CEA is generally located in the southwest corner of the Hartley Dodge Memorial Building property. The location of the CEA is further described and graphically depicted in the following sections of this RAW Addendum.

## 3.2.5 Quality Assurance Project Plan

A Quality Assurance Project Plan, which includes a Sample Summary Table describing the compliance sampling for the CEA, is described in Section 4 of this RAW Addendum.

## 3.2.6 Permits

No permits will be required for the implementation of the CEA.

## 3.2.7 Construction Activities

No construction activities will be required for the implementation of the CEA.

## 3.2.8 Soil and Sediment Erosion Control

Implementation of the CEA will not disturb the ground surface or site features. A Soil Erosion and Sediment Control Plan is not required for the implementation of the CEA.

## 3.2.9 Health and Safety Plan

## 3.2.10 Site Restoration

Existing site features will not be disturbed during the term of the CEA. No site restoration activities are planned.

## 3.2.11 Site Demobilization

Upon confirmed compliance with the GWQS and receipt of NJDEP approval, the existing monitoring wells on and surrounding the site will be abandoned in accordance with NJDEP requirements.

## 3.2.12 Cost

## 3.2.13 Schedule

The schedule of activities related to the proposed CEA is provided below.

<u>Activity</u>	<u>Completion Date</u>
Submittal of Remedial Action Plan Addendum (RAW)	December 2001
NJDEP Approval of RAW Addendum	March 2002
Sampling/Analysis of Monitoring Wells MW-1, 2, 3, 4	March 2002
Notification of CEA to Local Agencies	April 2002
Submittal of Monitoring Results to NJDEP	April 2002
Sampling/Analysis of Monitoring Wells MW-1, 2, 3, 4, 6	September 2002
Submittal of Monitoring Results to NJDEP	October 2002
* Verification Rounds of Well Monitoring	**
Submittal of Monitoring Results (Verification Round) to NJDEP	**
Request for Termination of CEA & Unconditional NFA	**

\*Additional semi-annual rounds of monitoring as necessary until GWQS are achieved at all wells.

\*\*Dates dependent on well monitoring results.

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## 3.3 Classification Exception Area Description

### 3.3.1 Fate of Contaminant Plume

The results of the groundwater investigations conducted to date indicate that natural attenuation processes are actively mitigating the dissolved phase petroleum contamination in the groundwater. This condition is supported by data indicating a general decreasing trend in the contaminant concentrations detected in the groundwater, a reduction in the extent of the groundwater contaminant plume and an increase in dissolved oxygen concentrations in down and side gradient monitoring wells.

In 1991, petroleum related groundwater contamination was initially observed at monitoring well MW-1 in the vicinity of the former 550-gallon UST at an initial concentration of total BTEX of 15 ppm. The latest sampling round analytical results from monitoring well MW-1 detected total BTEX at a concentration of 4 ppm. A similar trend in total BTEX concentrations has also been observed in monitoring well MW-2. Total BTEX concentrations in monitoring well MW-2 have decreased from 7.5 ppm in September 1997 to 2 ppm as observed during the last sampling round.

Petroleum related groundwater contamination was also initially detected in monitoring wells MW-3, 4, and 5, installed at locations down-gradient from the source area. Since periodic groundwater monitoring was initiated in 1996, dissolved phase petroleum contamination detected in these down-gradient monitoring wells have decreased to below the method detection limits, indicating a reduction in the extent of the dissolved phase contaminant plume. This reduction in the extent of the contaminant plume has also been accompanied by a general increase in the dissolved oxygen concentrations observed in these monitoring wells.

At the present time, groundwater contamination is only detected in the source area monitoring well MW-1 and monitoring well MW-2 located immediately down-gradient from the source area. Compounds exceeding the GWQS in both wells currently include benzene and total xylenes.

### 3.3.2 CEA Calculations

The analytical solution described in the NJDEP's Final Guidance Document for CEAs (updated in November 1998) was used to determine the boundaries and longevity of the CEA. The CEA calculations are presented in a spreadsheet format in Appendix 1. Assumptions used in the CEA calculations include the following:

- The compounds of concern include benzene and total xylenes which have been consistently detected at concentrations exceeding the GWQS in monitoring wells MW-1 and MW-2.
- September 16, 1996 analytical data were used as initial contaminant concentrations.
- September 2001 sampling round analytical data were used in the evaluation to establish current conditions.
- Hydraulic conductivity was determined at monitoring well MW-2:  $5.7E10^{-6}$  cm/sec (0.016 feet per day).
- Seepage velocity was calculated at 0.00204 feet per day.
- Bulk density, effective porosity, and organic carbon concentration were estimated.
- Half-life coefficients were determined from site data.

The results of the CEA calculations for monitoring wells MW-1 and MW-2 indicate that benzene has a greater transport distance and degradation time than total xylenes in both cases. The results of the benzene calculations were therefore used in establishing the duration and limits of the CEA. The calculations based on monitoring well MW-1 data indicate that benzene has a

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degradation time of 230.1 months and a transport distance of 13.8 feet. The CEA calculations for the conditions at monitoring well MW-2 indicate that benzene has a degradation time of 116.3 months and a transport distance of 7 feet.

The source area of contamination has been identified near MW-1. Monitoring well MW-2 is within the groundwater contaminant plume at a location down-gradient of MW-1. The calculated transport distance for benzene from MW-2 (7 feet) was used to establish the down-gradient limit for the CEA. Side-gradient limits for the CEA are estimated using the horizontal extent of source area soil contamination shown in Figure 4 plus 14 feet which is the calculated benzene transport distance in groundwater from MW-1. Up-gradient limits for the CEA are established at the identified limits of soil contamination as shown in Figure 4. The resulting boundaries for the CEA are presented in Figure 5.

### 3.3.3 Proposed CEA Expiration Date

The degradation time for benzene (230.3 months) calculated at monitoring well MW-1 will be used in evaluating the term for the CEA. The term of the CEA was initiated on September 16, 1996 based on the highest concentration of benzene detected at monitoring well MW-1. Assuming a calculated degradation time of 230.3 months, the CEA expiration date for the source area at MW-1 is 19.2 years or approximately November 10, 2015.

### 3.3.4 Map of the Proposed CEA

A map of the proposed CEA is provided in Figures 5. A similar map is provided in Geographic Information System (GIS) format on the attached disk. A hard copy of the GIS information provided on the disk is included in Appendix 2.

### 3.3.5 Evaluation of the Site as a Groundwater Use Area

Information obtained during the well search indicates that no potable supply wells are located in the immediate vicinity of the site. Based on an interview with the local Health Department official, all potable water in the area is supplied by the local utility and no groundwater usage within the immediate vicinity of the site currently exists or is contemplated in the foreseeable future. In establishing this CEA, a Well Restriction Area (WRA) will also be implemented.

### 3.3.6 Notifications

A draft letter of notification to the appropriate entities is provided in Appendix 3. These notification letters will be finalized following the NJDEP review and approval of this RAW Addendum and this CEA proposal.

### 3.3.7 CEA Maintenance and Evaluation

The CEA will be evaluated on a semi-annual basis in accordance with the attached schedule shown in Section 3.2.13. Maintenance and evaluation will include semi-annual groundwater sampling to evaluate the extent of contamination and the effectiveness of the CEA. Periodic progress reports will be limited to submittal of the groundwater monitoring reports for each of the semi-annual sampling events. The CEA will be modified as site conditions indicate and proposals for CEA modifications will be submitted to the NJDEP on an as-required basis.

To monitor the effectiveness of the natural remediation, Madison will sample site wells according to the following schedule:

<u>Wells</u>	<u>Frequency of Sampling</u>	<u>Analytes</u>
MW-1, MW-2, MW-3, MW-4	Semi-annually	BTEX, TBA, MTBE
MW-6	Annually	BTEX, TBA, MTBE

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All samples will be analyzed at a NJDEP certified laboratory with EPA Method 624.  
Water levels will be measured at all wells during each sampling event.

After the first year of well monitoring, if analytical results at the contaminated wells indicate contaminant attenuation is occurring as expected, the sampling frequency may be reduced or terminated with NJDEP approval.

# **Environmental Engineering Corporation**

## **4.0 QUALITY ASSURANCE PROJECT PLAN**

A Quality Assurance Project Plan for the proposed periodic monitoring of site wells was previously submitted to NJDEP in the RAW dated April 22, 1996.



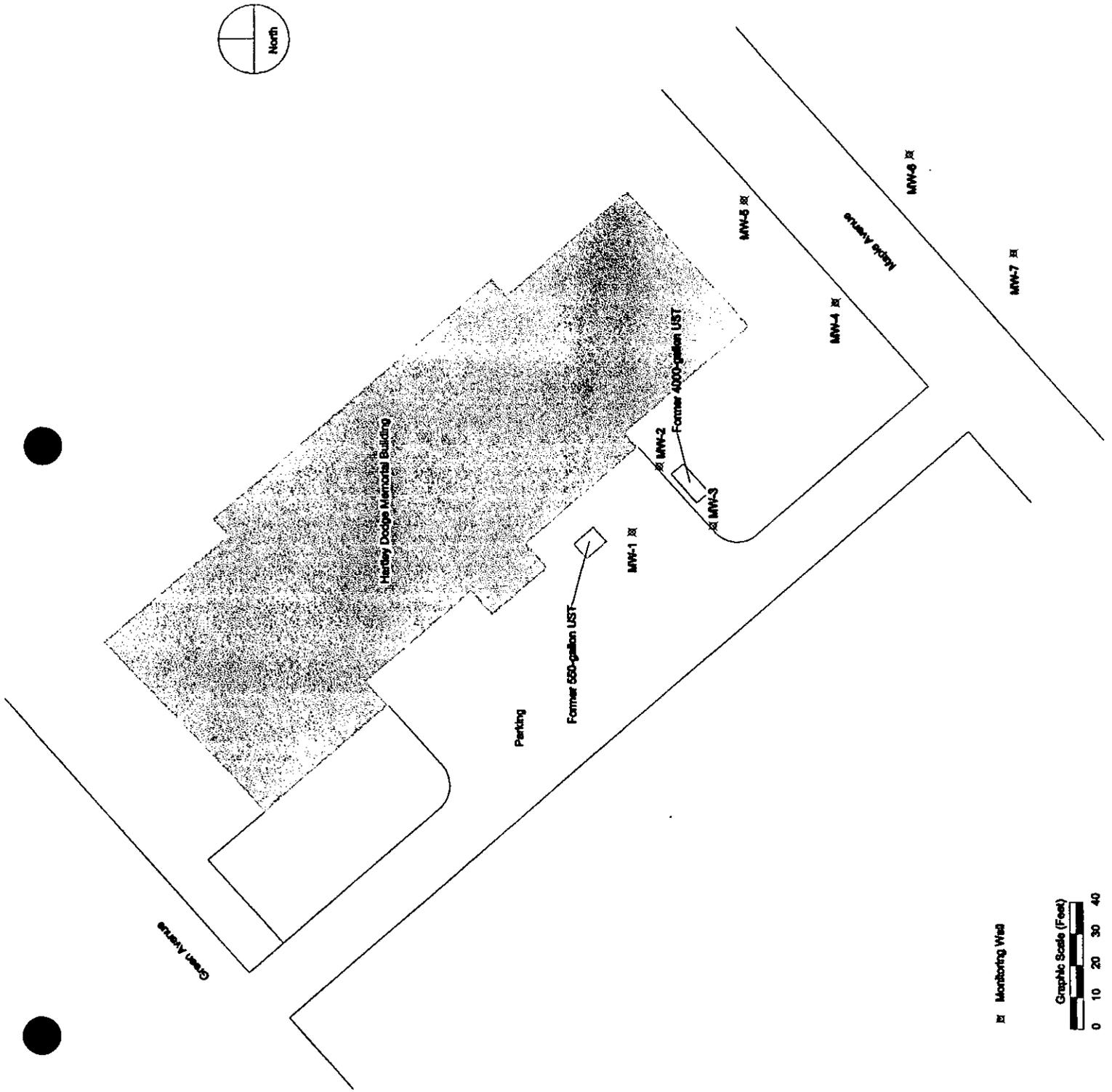
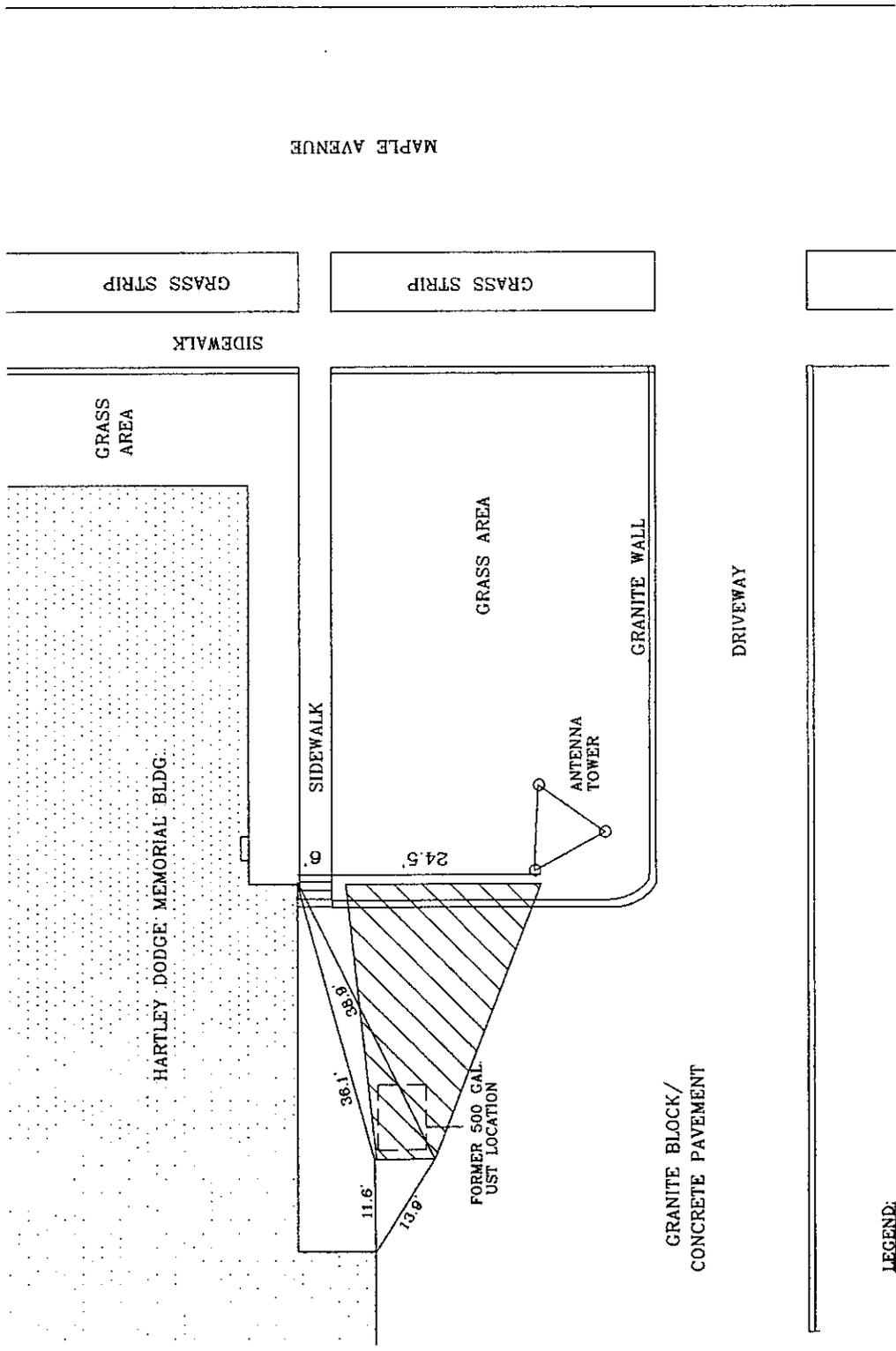
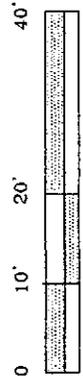
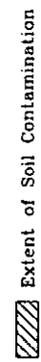


Figure 3  
 Site Plan  
 Harley Dodge Memorial Building  
 Kings Road, Madison, New Jersey  
 12/1/01  
 Scale: As Shown



LEGEND:



APPROXIMATE SCALE

 ENVIRONMENTAL ENGINEERING CORPORATION MADISON, NEW JERSEY	PROJECT:	BOROUGH OF MADISON POLICE STATION	TITLE:	SOIL CONTAMINATION	DRAWING NO:	1434DER1 (Rev)	DRAWN BY:	MB/RTF	DATE:	04/09/96	REVISION	General Revision	DATE	12/1/01
					SCALE:	AS SHOWN	CHECKED BY:	BT		FIGURE 4				

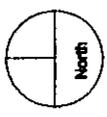
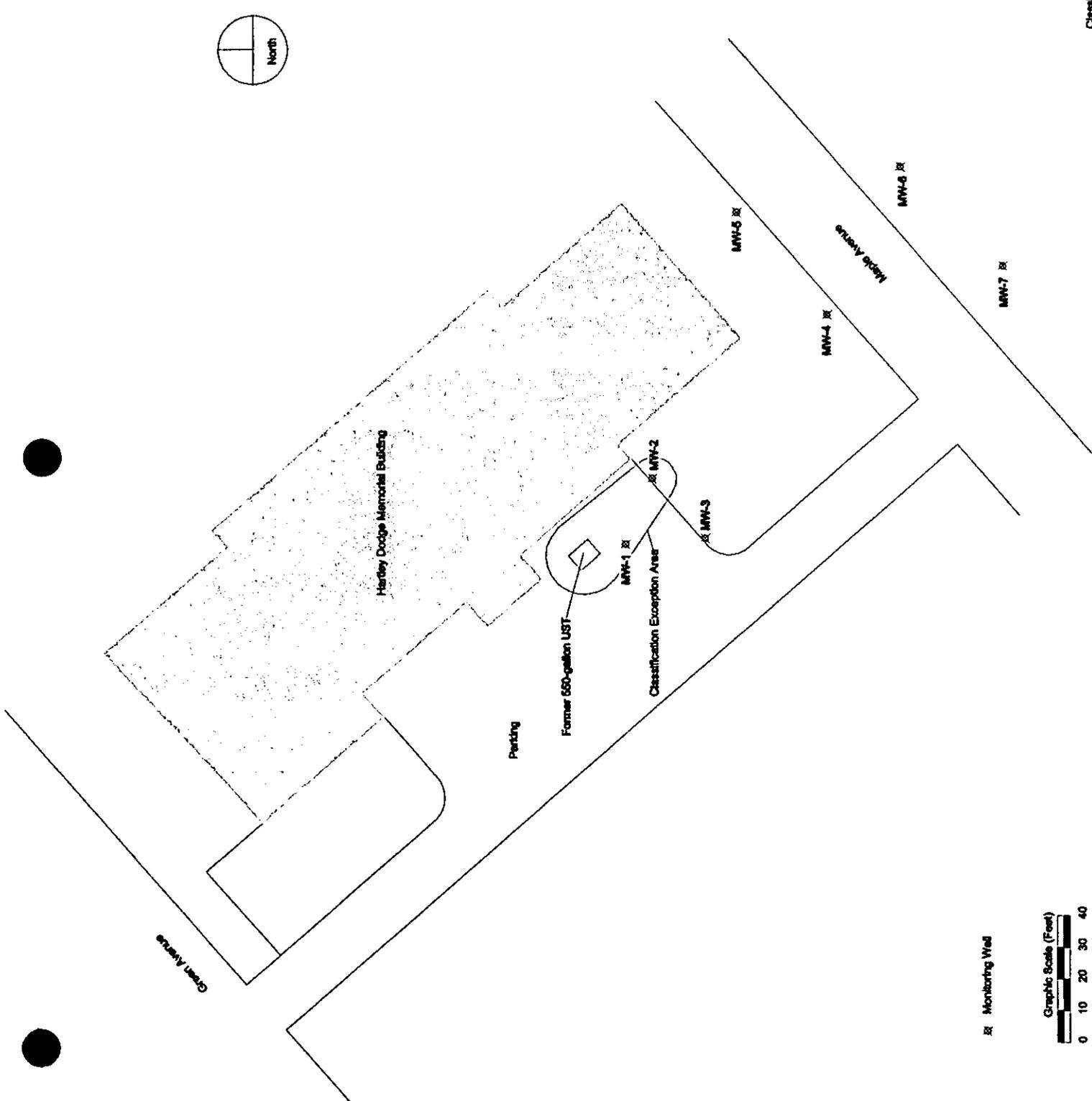


Figure 6  
 Classification Exception Area  
 Harley Dodge Memorial Building  
 Kings Road, Madison, New Jersey  
 12/1/01 Scale: As Shown

Monitoring Well



**TABLE 1**  
**Chronological Well Data**  
**Madison Police Station**  
**Borough of Madison, New Jersey**

MW-1	4/3/91	6/6/91	7/8/92	8/9/95	1/23/96	6/28/96	9/12/96	3/28/97	9/26/97	3/30/98	9/29/98	3/23/99	9/23/99	3/30/00	9/19/00	3/28/01	9/24/01
benzene	350	440	570	18	NS	96	270	130	150	110	130	88	73	85	27	15	210
toluene	1600	2200	1600	37	NS	230	560	320	460	230	170	140	100	160	ND	0.6	250
ethylbenzene	1400	1700	2700	130	NS	1200	1700	1600	1600	1500	1000	130	140	830	12	1.2	650
xylenes	5600	11000	14000	725	NS	6340	9500	6340	6500	4120	270	3490	1980	2430	ND	ND	3250
Total BTEX	8950	15340	18870	910	NS	7866	12030	8390	8710	5960	1570	3848	2293	3505	39	16.8	4360
TBA		ND	ND	NA	NS	ND	ND	ND (480)	ND (480)	ND(96)	ND(9.6)	ND	ND	ND	ND	12	ND
MTBE		ND	ND	NA	NS	ND	ND	ND (210)	ND (210)	ND(42)	ND(4.2)	ND	ND	ND	ND	ND	ND
VOC TICs	22671	22160	18870	NA	NS	NA	2730	NA	NA	NA	NA	NA	NA	750	NA	NA	NA

MW-2	4/3/91	6/6/91	7/8/92	8/9/95	1/23/96	6/28/96	9/12/96	3/28/97	9/26/97	3/30/98	9/29/98	3/23/99	9/23/99	3/30/00	9/19/00	3/28/01	9/28/01
benzene	NI	NI	140	17	NS	ND	49	14	ND	11	20	9.3	13	7.0	7.0	1.5	8.4
toluene	NI	NI	1400	180	NS	410	350	140	820	120	270	62	150	39	90	1.5	47
ethylbenzene	NI	NI	ND	540	NS	1000	650	480	1700	630	180	330	820	340	760	40	620
xylenes	NI	NI	2000	3400	NS	3900	2800	1390	5000	1900	2230	1970	2780	1140	2290	134	1430
Total BTEX	NI	NI	3540	4137	NS	5310	3849	2024	7520	2661	2700	2371	3763	1526	3147	177	2105
TBA	NI	NI	NA	NA	NS	NA	ND	ND	ND (480)	ND(190)	ND(9.6)	ND	ND	ND	ND	ND	ND
MTBE	NI	NI	NA	NA	NS	NA	ND	ND	ND (210)	ND(84)	ND(4.2)	ND	ND	4.4	ND	ND	ND
VOC TICs	NI	NI	4020	NA	NS	NA	2630	2630	NA	NA	NA	NA	NA	1401	NA	NA	NA

MW-3	4/3/91	6/6/91	7/8/92	8/9/95	1/23/96	6/28/96	9/12/96	3/28/97	9/26/97	3/30/98	9/29/98	3/23/99	9/23/99	3/30/00	9/19/00	3/28/01	9/24/01
benzene	NI	NI	ND	ND	NS	ND	0.7	0.2	0.6	ND							
toluene	NI	NI	ND	ND	NS	ND	1.0	ND	0.5	ND							
ethylbenzene	NI	NI	ND	4	NS	54	66	0.7	6.8	ND							
xylenes	NI	NI	ND	ND	NS	11	10.7	1.3	2.1	ND	ND	ND	3.7	ND	ND	ND	ND
Total BTEX	NI	NI	ND	4	NS	65	78.4	2.2	10.0	ND	ND	ND	3.7	ND	ND	ND	ND
TBA	NI	NI	ND	ND	NS	ND											
MTBE	NI	NI	ND	ND	NS	ND											
VOC TICs	NI	NI	ND	NA	NS	NA	148	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA

MW-4	4/3/91	6/6/91	7/8/92	8/9/95	1/23/96	6/28/96	9/12/96	3/28/97	9/26/97	3/30/98	9/29/98	3/23/99	9/23/99	3/30/00	9/19/00	3/28/01	9/24/01
benzene	NA	NA	NA	3000	690	290	140	12.0	7.3	2.4	1.4	ND	0.5	ND	ND	ND	ND
toluene	NA	NA	NA	11000	2000	390	400	4.8	8.6	3.0	0.6	ND	ND	ND	0.6	ND	ND
ethylbenzene	NA	NA	NA	1200	410	380	440	70	89	40	17	3.7	ND	ND	ND	ND	ND
xylenes	NA	NA	NA	8100	3500	1400	1280	27.5	20.5	5.5	ND						
Total BTEX	NA	NA	NA	23300	6600	2460	2260	114.3	125.4	50.9	19	3.7	0.5	ND	0.6	ND	ND
TBA	NA	NA	NA	58000	6000	ND	ND	ND (96)	ND (9.6)	51	ND	ND	47	ND	ND	ND	ND
MTBE	NA	NA	NA	560000	180000	ND	4400	2000	1000	770	1400	250	530	15	ND	ND	52
VOC TICs	NA	NA	NA	698890	NA	NA	NA	NA	NA	NA	NA	NA	NA	5	NA	NA	NA

MW-5	4/3/91	6/6/91	7/8/92	8/9/95	1/23/96	6/28/96	9/12/96	3/28/97	9/26/97	3/30/98	9/29/98	3/23/99	9/23/99	3/30/00	9/19/00	3/28/01	9/24/01
benzene	NI	NI	NI	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
toluene	NI	NI	NI	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
ethylbenzene	NI	NI	NI	ND	NS	ND	NS	ND	NS	0.5	NS	ND	NS	NS	NS	NS	NS
xylenes	NI	NI	NI	ND	NS	ND	NS	ND	NS	0.8	NS	ND	NS	NS	NS	NS	NS
Total BTEX	NI	NI	NI	ND	NS	ND	NS	ND	NS	1.3	NS	ND	NS	NS	NS	NS	NS
TBA	NI	NI	NI	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
MTBE	NI	NI	NI	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
VOC TICs	NI	NI	NI	30	NS	NA	NS	NA	NS	NA	NS	NA	NS	NS	NS	NS	NS

MW-6	4/3/91	6/6/91	7/8/92	8/9/95	1/23/96	6/28/96	9/12/96	3/28/97	9/26/97	3/30/98	9/29/98	3/23/99	9/23/99	3/30/00	9/19/00	3/28/01	9/24/01
benzene	NI	NI	NI	NI	ND	ND	NS	ND	ND	ND	ND	ND	ND	NS	ND	NS	ND
toluene	NI	NI	NI	NI	ND	ND	NS	ND	ND	ND	ND	ND	ND	NS	ND	NS	ND
ethylbenzene	NI	NI	NI	NI	ND	ND	NS	ND	ND	ND	ND	ND	ND	NS	ND	NS	ND
xylenes	NI	NI	NI	NI	ND	ND	NS	ND	ND	ND	ND	ND	ND	NS	ND	NS	ND
Total BTEX	NI	NI	NI	NI	ND	ND	NS	ND	ND	ND	ND	ND	ND	NS	ND	NS	ND
TBA	NI	NI	NI	NI	ND	ND	NS	ND	ND	ND	ND	ND	ND	NS	ND	NS	ND
MTBE	NI	NI	NI	NI	ND	ND	NS	6.4	11	6.4	6.6	ND	4.3	NS	ND	NS	22
VOC TICs	NI	NI	NI	NI	NA	NA	NS	NA	NA	NA	NA	NA	NA	NS	NA	NS	NA

MW-7	4/3/91	6/6/91	7/8/92	8/9/95	1/23/96	6/28/96	9/12/96	3/28/97	9/26/97	3/30/98	9/29/98	3/23/99	9/23/99	3/30/00	9/19/00	3/28/01	9/24/01
benzene	NI	NI	NI	NI	ND	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
toluene	NI	NI	NI	NI	ND	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
ethylbenzene	NI	NI	NI	NI	ND	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
xylenes	NI	NI	NI	NI	ND	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
Total BTEX	NI	NI	NI	NI	ND	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
TBA	NI	NI	NI	NI	ND	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
MTBE	NI	NI	NI	NI	ND	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	NS	NS
VOC TICs	NI	NI	NI	NI	NA	NA	NS	NA	NS	NA	NS	NA	NS	NS	NS	NS	NS

NI = Not installed; NS = Not sampled  
 NA = Not analyzed; ND = Not detected  
 Results are in micrograms/liter  
 Values in parentheses are method detection limits

Table 1  
 1815 GW data 24SEPT01

Environmental  
 Engineering  
 Corporation

**Environmental Engineering Corporation**

**Appendix 1  
CEA Calculations**

**Borough of Madison Police Station  
Hartley Dodge Memorial Building  
Madison, New Jersey  
UST# 0085115  
NJDEP Case #91-02-20-1607  
December, 2001**

## CEA Calculations

**Site: Madison Police Station**  
**Location: Madison, Morris County, New Jersey**

**Estimated Degradation Times and Transport Distances**

Contaminants which exceed Ground Water Quality Standards (GWQS):

Benzene, Xylenes

Basis of CEA determination:

NJDEP November 1998 "Final Guidance on Designation of Classification Exception Areas"

Analytical solution in Appendix A, Section III.C.2

Definitions	Known & Estimated Values
K = Hydraulic conductivity (ft/day)	K = 5.75E-06 cm/sec <span style="float: right;">Slug test results @ MW-2</span>
l = Hydraulic gradient	= 0.016 ft/day
n = Effective porosity	l = 0.05 ft/ft <span style="float: right;">averaged from GW contours</span>
Koc = organic carbon partition coefficient	n = 0.40 <span style="float: right;">estimated effective porosity</span>
foc = fraction of organic material in matrix	D = 1.60 g/ml <span style="float: right;">estimated bulk density</span>
Kd = Distribution coefficient	foc = 0.005 <span style="float: right;">estimated fraction of organics</span>
D = Bulk density (g/ml)	
Rd = Retardation factor	
Vs = Seepage velocity (ft/sec)	
Vpt = Pollutant transport velocity (ft/sec)	
C = Final contaminant concentration (ug/ml)	
Co = Initial contaminant concentration (ug/ml)	
days = Elapsed time in days	
k = Half-life coefficient (from plotted site data)	
d = Contaminant transport distance (feet)	
	<b>Equations</b>
	$Rd = 1 + (Koc \times foc \times D) / n$
	$Vs = (K \times l) / n$
	$Vpt = Vs / Rd$
	time (days) = $-\ln(C / Co) / k$
	distance (ft.) = $Vpt / \text{time (days)}$
	Koc coefficient values obtained from RBCA Chemical Database prepared by Groundwater Services Inc. (GSI), 1995-1997.

Contaminant	Koc	foc	D	n	Rd	Vs	Vpt
Benzene	1.58	0.005	1.60	0.40	1.03160	0.00204	0.00198
Total xylenes	2.38	0.005	1.60	0.40	1.04760	0.00204	0.00195
MTBE	1.08	0.005	1.60	0.40	1.02160	0.00204	0.00200

Contaminant	C(GWQS)	Co	k	t (days)	t (months)
Benzene	1	270	0.0008	6998	230.07
Total xylenes	1000	9500	0.0007	3216	105.74
MTBE	70	4400	0.0032	1294	42.54

Contaminant	Vpt	t (days)	d (feet)
Benzene	0.00198	6998	13.8
Total xylenes	0.00195	3216	6.3
MTBE	0.00200	1294	2.6

Maximum Degradation Time =	230.1 Months
Maximum Transport Distance =	13.8 Feet

**Notes:**

MW-1 data for benzene, xylenes  
 MW-4 data for MTBE  
 "k" values from data plot of Ln data vs. time (trendline slope)  
 All compounds exceeding GWQS as of September 2001 are included in the CEA calculations.

# CEA Calculations

(Enter information in boxes)

Date of highest benzene at MW-1:

9/12/1996

35320

Calculated term of CEA (days):

6998

Estimated end date of CEA term:

42318

11/10/15

## CEA Calculations

**Site: Madison Police Station**  
**Location: Madison, Morris County, New Jersey**

### Estimated Degradation Times and Transport Distances

Contaminants which exceed Ground Water Quality Standards (GWQS):

Benzene, Xylenes

Basis of CEA determination:

NJDEP November 1998 "Final Guidance on Designation of Classification Exception Areas"

Analytical solution in Appendix A, Section III.C.2

Definitions	Known & Estimated Values
K = Hydraulic conductivity (ft/day)	K = 5.75E-06 cm/sec      Slug test results @ MW-2
i = Hydraulic gradient	= 0.016 ft/day
n = Effective porosity	i = 0.05 ft/ft      averaged from GW contours
Koc = organic carbon partition coefficient	n = 0.40      estimated effective porosity
foc = fraction of organic material in matrix	D = 1.60 g/ml      estimated bulk density
Kd = Distribution coefficient	foc = 0.005      estimated fraction of organics
D = Bulk density (g/ml)	
Rd = Retardation factor	
Vs = Seepage velocity (ft/sec)	
Vpt = Pollutant transport velocity (ft/sec)	
C = Final contaminant concentration (ug/ml)	
Co = Initial contaminant concentration (ug/ml)	
days = Elapsed time in days	
k = Half-life coefficient (from plotted site data)	
d = Contaminant transport distance (feet)	
	<b>Equations</b>
	$Rd = 1 + (Koc \times foc \times D) / n$
	$Vs = (K \times i) / n$
	$Vpt = Vs / Rd$
	$time \text{ (days)} = -Ln(C / Co) / k$
	$distance \text{ (ft.)} = Vpt / time \text{ (days)}$
	Koc coefficient values obtained from RBCA Chemical Database prepared by Groundwater Services Inc. (GSI), 1995-1997.

Estimated Retardation Factors and Contaminant Transport Velocities							
Contaminant	Koc	foc	D	n	Rd	Vs	Vpt
Benzene	1.58	0.005	1.60	0.40	1.03160	0.00204	0.00198
Total xylenes	2.38	0.005	1.60	0.40	1.04760	0.00204	0.00195
MTBE	1.08	0.005	1.60	0.40	1.02160	0.00204	0.00200

Estimated Degradation Times					
Contaminant	C(GWQS)	Co	k	t (days)	t (months)
Benzene	1	49	0.0011	3538	116.32
Total xylenes	1000	2800	0.0008	1287	42.31
MTBE	70	4400	0.0032	1294	42.54

Estimated Transport Distances			
Contaminant	Vpt	t (days)	d (feet)
Benzene	0.00198	3538	7.0
Total xylenes	0.00195	1287	2.5
MTBE	0.00200	1294	2.6

<b>Maximum Degradation Time =</b>	<b>116.3 Months</b>
<b>Maximum Transport Distance =</b>	<b>7.0 Feet</b>

**Notes:**

MW-2 data for benzene, xylenes  
 MW-4 data for MTBE  
 "k" values from data plot of Ln data vs. time (trendline slope)  
 All compounds exceeding GWQS as of September 2001 are included in the CEA calculations.

# CEA Calculations

(Enter information in boxes)

Date of highest benzene at MW-2:

9/12/1996

35320

Calculated term of CEA (days):

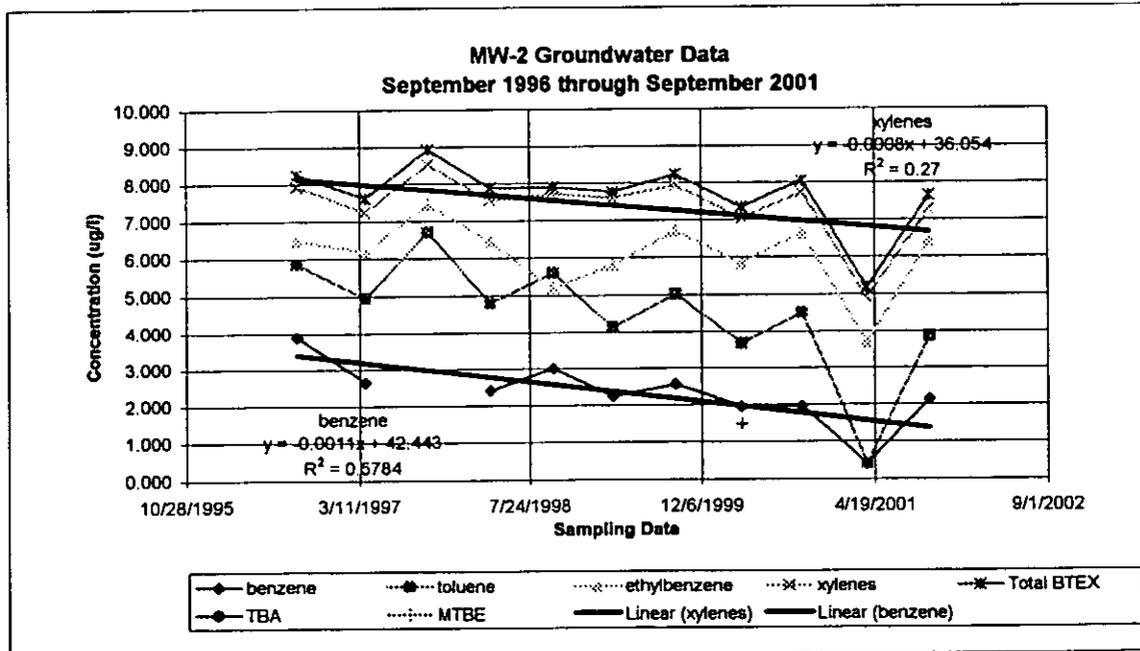
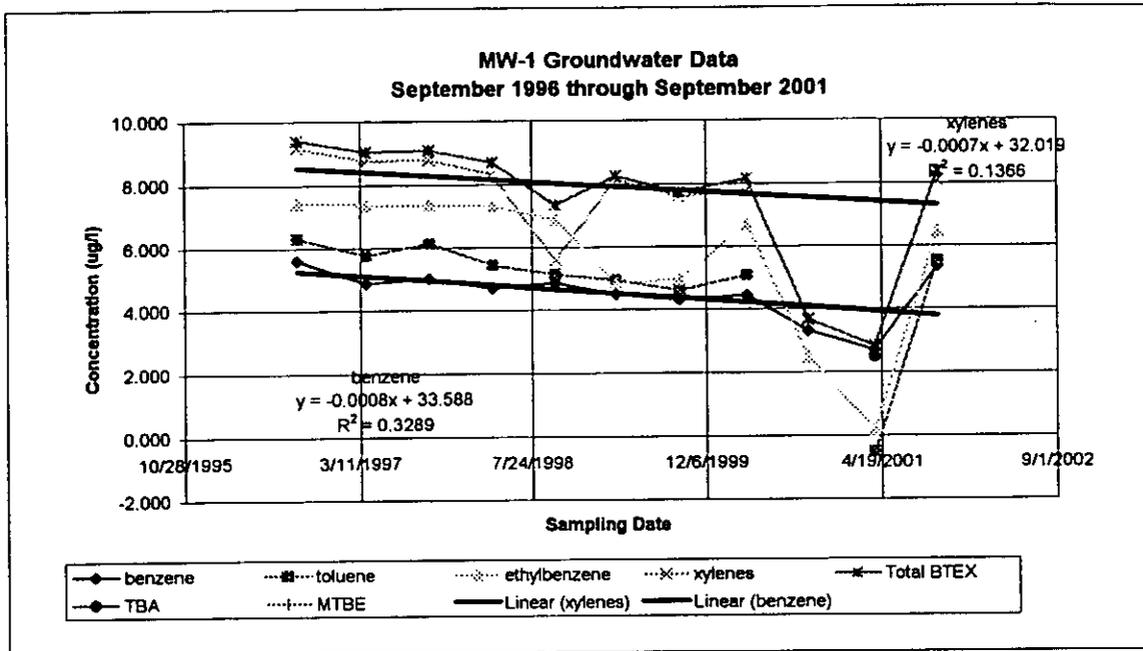
3538

Estimated end date of CEA term:

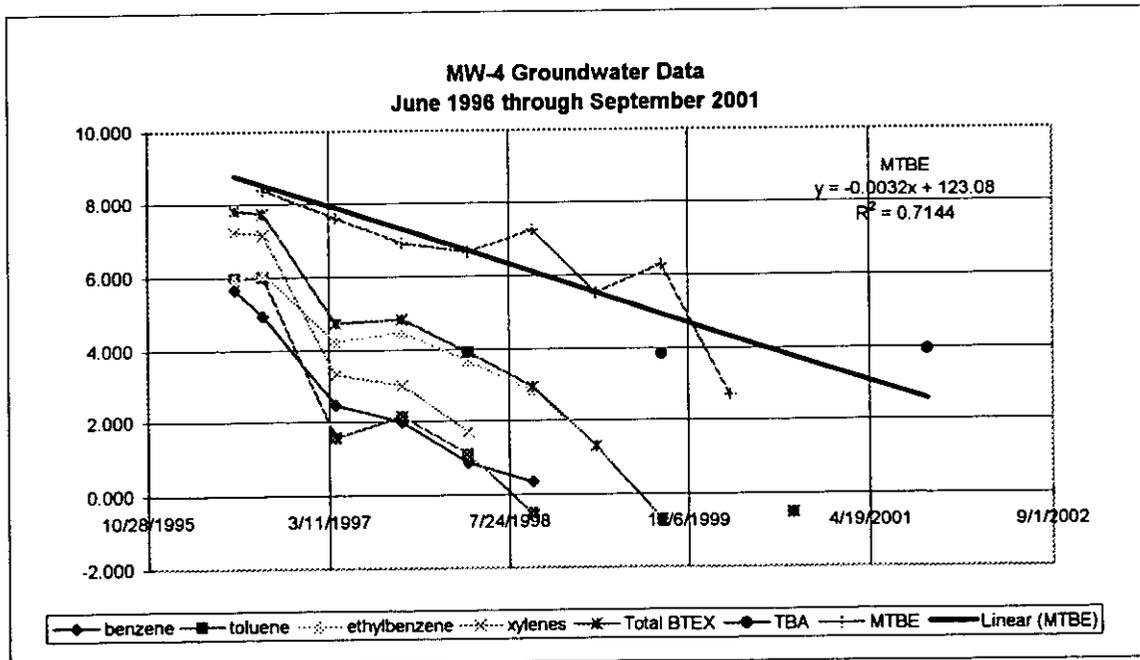
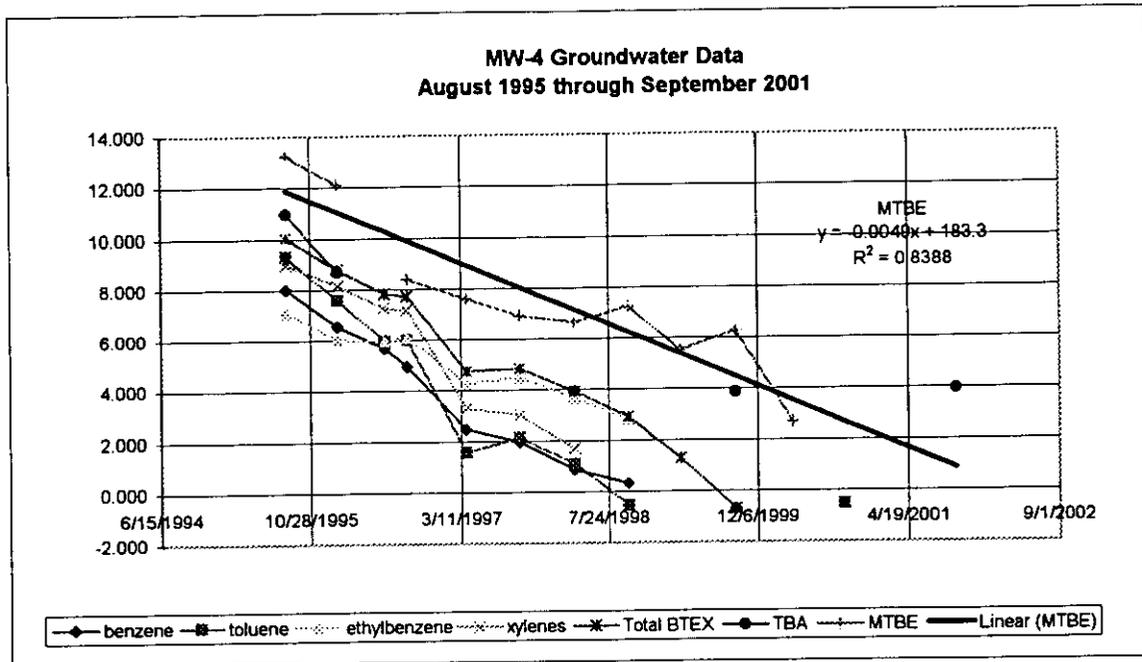
38858

05/21/06

Madison Police Station  
Chronological Data Graphs



Madison Police Station  
Chronological Data Graphs



**Environmental Engineering Corporation**

**Appendix 2  
GIS Information**

**Borough of Madison Police Station  
Hartley Dodge Memorial Building  
Madison, New Jersey  
UST# 0085115  
NJDEP Case #91-02-20-1607  
December, 2001**

# **Environmental Engineering Corporation**

## **Classification Exception Area/ Well restriction Area (CEA/WRA) Fact Sheet**

### **Site Name:**

Borough of Madison Police Station

### **Site Location:**

Hartley Dodge Memorial Building  
Kings Road  
Madison, New Jersey, 07940  
Block: 2802, Lot 1  
(See Exhibit A – Site Location Map)

### **Site Contact Person:**

Mr. Robert Vogel, Borough Engineer  
Borough of Madison  
Hartley Dodge Memorial Building  
Madison, New Jersey 07940  
Telephone: 973-593-3061

### **Site Identification:**

- NJDEP Case Numbers:  
Spill Case ID: 92-02-20-1607  
UST Facility ID: 0085115  
UST Closure Numbers: C90-0059, C93-1079
- Lead Program:  
Bureau of Underground Storage Tanks  
Karen Lesto, Case Manager  
Telephone: 609-292-5184

### **Description of CEA:**

- Identification of impacted aquifer

The impacted geologic formation is glacial till of the Wisconsin-age terminal moraine consisting of fine-grained soils with low hydraulic conductivity. The affected aquifer unit is an unconfined, unconsolidated aquifer. Groundwater is typically encountered within 5 feet of the ground surface and groundwater flow has been consistently determined to be in a southeast direction. The vertical extent of this aquifer unit is approximately 13 feet below ground surface where an aquitard, a stiff gray and brown varved silt and clay stratum, has been encountered in soil borings.

## Environmental Engineering Corporation

There are no current or proposed groundwater supply wells within the vicinity of the site. Pursuant to N.J.A.C. 7:9-6.5, this area is presently designated as a Class II-A aquifer. The primary designated use for Class II-A groundwater is potable water supply; secondary uses include agricultural and industrial water supply. Any proposed groundwater use within the CEA will require Department review for the feasibility of well installations and modifications to ensure protection from any impacts from the contaminants of concern for the duration of the CEA.

- Contaminants exceeding constituent and applicable standards

The following contaminants of concern are currently detected at concentrations exceeding constituent and applicable standards in the affected aquifer at this site:

<u>Contaminant</u>	<u>Groundwater Quality Standards (ppb)</u>
Benzene	1
Total Xylenes	1000

Please refer to the Semi-annual Groundwater Monitoring Reports issued for an assessment of the current and historical contaminant concentrations detected in groundwater.

- CEA boundaries

The horizontal boundaries proposed for the CEA are shown in Exhibit B (Classification Exception Area Location Map). The source of the contamination detected in the groundwater is a former 550-gallon UST located in the paved driveway area to the rear of the building. The contaminants of concern exceeding the Ground Water Quality Standards have been detected in two existing groundwater monitoring wells: MW-1 located adjacent to the source area and MW-2 located at a down-gradient location from the source area. The proposed horizontal boundaries for the CEA have been calculated for benzene using the hydraulic properties of the aquifer unit measured in the field and published values for the half-life of benzene under aerobic conditions.

The CEA boundary is projected as an arc encompassing the former 550-gallon gasoline UST and both existing monitoring wells MW-1 and MW-2. The down-gradient boundary of the CEA from MW-2 is established at a distance of 7 feet.

The vertical boundaries proposed for the CEA are estimated at a depth of 13 feet below ground surface where a varved silt and clay stratum was encountered in the soil borings.

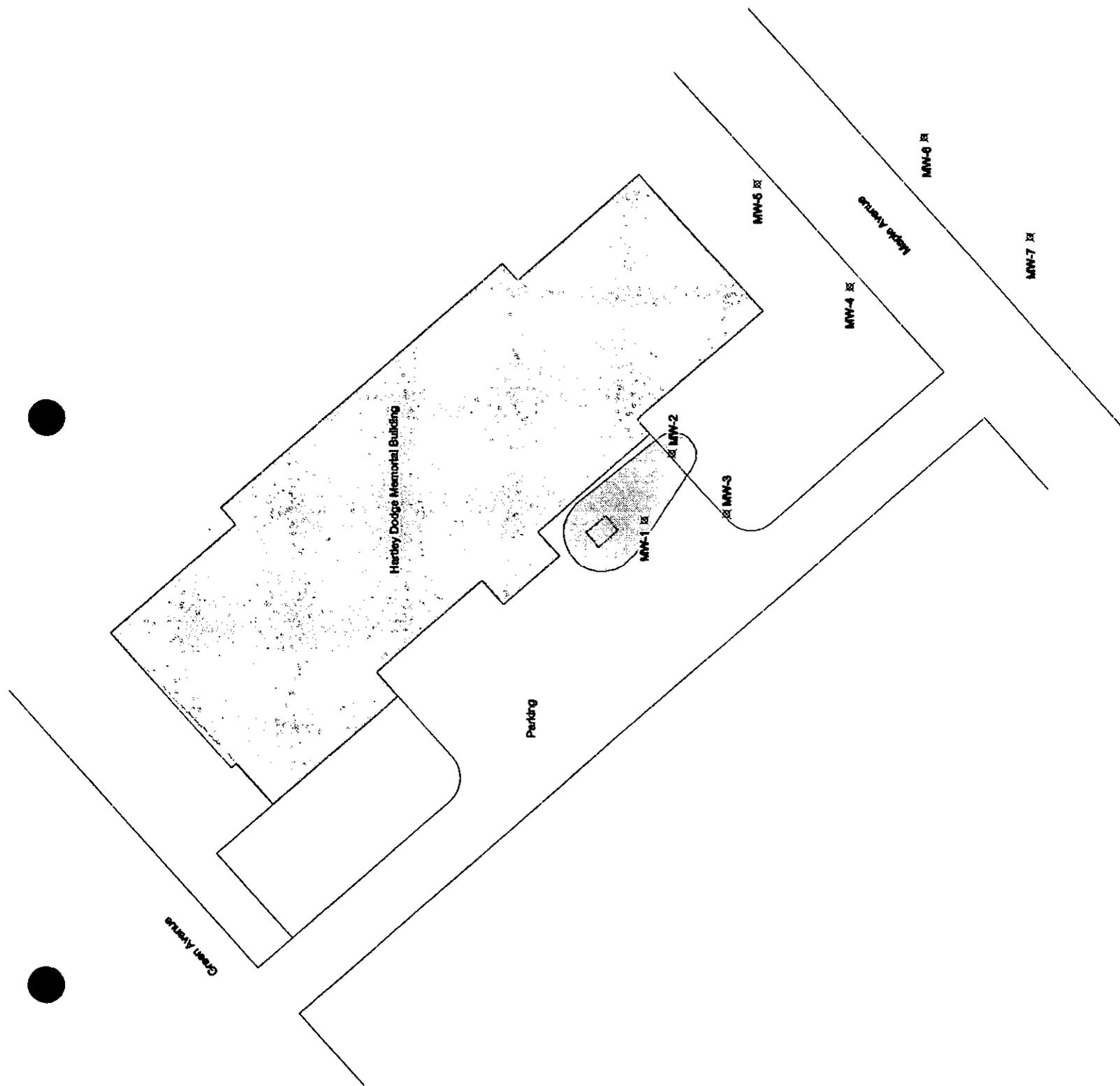
## **Environmental Engineering Corporation**

- Projected term of CEA

The estimated longevity of the CEA is 230.1 months based on the contaminant characteristics at monitoring well MW-1. The duration of the CEA has been calculated using site data to determine the half-life of the contaminants of concern under aerobic conditions to achieve compliance with the Ground Water Quality Standards.

### **Proposed Well Restriction Area:**

Since the groundwater quality data indicate the exceedance of contaminant concentrations above the Primary Drinking Water Standards and the designated uses of Class II-A aquifers include potable use, the CEA established for this site is also a Well Restriction Area. The extent of the WRA shall coincide with the boundaries of the CEA. The subject area of this CEAWRA will be restricted from any potable, industrial, or agricultural use of groundwater for the term of the CEA. The existing monitoring wells located on the property within and surrounding the CEA boundaries will be used for monitoring purposes during the term of the CEA.



Site Plan and  
Classification Exception Area  
Hartley - Dodge Memorial Building  
Madison, New Jersey

12/1/01

Scale: 1" = 1'

Case ID: 01-02-20-1807

Environmental Engineering Corporation

The drawing is prepared to NJDEP 19261957

Digital Imagery Series 1, Volume 2 (Photocast 3M)

Project #: 01-02-20-1807 (12/1/01)

# Environmental Engineering Corporation

## Metadata

### Classification Exception Area

#### Site Name/Location

Hartley Dodge Memorial Building

Kings Road

Borough of Madison, NJ 07940

Contact: Pradeep Lamba

Phone: 973-360-9111 (Environmental Engineering Corporation)

#### Site Identification

Case No. 91-02-20-1607

UST No. 0085115

TMS No. C90-0059, C93-1070

#### Metadata Information

##### 1. Identification Information

Description - CEA area

Abstract - one set polygon representing the CEA area

Purpose/Brief Description - to illustrate the CEA area

Supplemental Information - N/A

Currentness Reference - data based on 2001 site information

##### 2. Data Quality Information

Attribute Accuracy - + or - 10 feet

Quantitative Attribute Accuracy Assessment - comparison of scaled CAD site drawing overlaid on NJDEP GIS CD-ROM series 3 volume 2 1995/97 Orthophoto 394

Completeness Report - CAD data approximately aligns with Orthophoto

Lineage - conversion from surveyor site plan. CAD file was converted to Shape File using ARC View 3.2a. The CAD drawing was oriented and geo-referenced using Orthophoto quad prior to conversion.

Source Scale Denominator - 1" = 10'

Type of Source Media - paper

Source Currentness Reference - unknown

Process Date - November 30, 2001

##### 3. Spatial Data Organization

Direct Spatial Reference Material - Vectors (points, lines, and polygons)

##### 4. Spatial Reference

Grid Coordinate System - NJ State Plane Feet

Horizontal Datum Name - NAD 83

##### 5. Attribute Information

Attribute Label - monitoring well designations and NJ State Plane Coordinates

##### 6. Metadata Reference Information

Metadata Date - November 30, 2001

Metadata Contact - Environmental Engineering Corporation

##### 7. Citation Information

Originator - Environmental Engineering Corporation

Title - Carbon Express Inc. CEA Shape File

Author's Notes - N/A

##### 8. Contact Information

Contact Person(s) Primary - Pradeep Lamba

Contact Organization - Environmental Engineering Corporation

Contact Address - 335 main Street, Madison, NJ 07940

Contact Voice Telephone - (973)360-9111

**Environmental Engineering Corporation**

**Appendix 3  
CEA Draft Notification**

**Borough of Madison Police Station  
Hartley Dodge Memorial Building  
Madison, New Jersey  
UST# 0085115  
NJDEP Case #91-02-20-1607  
December, 2001**

# Environmental Engineering Corporation

CMRRR #

Date

Name

Address

Attention:

Subject: Notification of Classification Exception Area Proposal  
Hartley Dodge Memorial Building  
Kings Road  
Madison, New Jersey 07940  
NJDEP Case Number: 91-02-20-1607  
Closure #C90-0059, C93-1079  
UST #0085115

To whom it may concern:

Please be advised that the Borough of Madison, the owner of the property identified as the Hartley Dodge Memorial Building and located at Kings Road, Madison, New Jersey has submitted a "Classification Exception Area" proposal (CEA) to the New Jersey Department of Environmental Protection (NJDEP). This CEA proposal has been prepared in accordance with N.J.A.C. 7:26E 6.2(a)17 to address detected groundwater contamination exceeding the New Jersey Ground Water Quality Standards (GWQS) at the referenced site. The GWQS are found at N.J.A.C 7:9-6 et seq. A fact sheet further describing the CEA is attached to this notification.

Since the groundwater quality data indicate the exceedance of contaminant concentrations above the Primary Drinking Water Standards and the designated uses of Class II-A aquifers include potable use, the CEA established for this site is also a Well Restriction Area. The extent of the WRA shall coincide with the boundaries of the CEA.

The following information is provided in accordance with NJDEP requirements:

Site Name

Hartley Dodge Memorial Building  
Kings Road  
Madison, New Jersey 07940  
Block 2802  
Lot 1

## **Environmental Engineering Corporation**

Contact:

Mr. Robert Vogel, P.E.  
Borough Engineer  
Borough of Madison  
Kings Road  
Madison, New Jersey 07940  
973-593-3061

Site Identification:

NJDEP Case Number: 91-02-20-1607

NJDEP Case Manager

Karen Lesto, Case Manager  
Bureau of Underground Storage Tanks  
PO Box 433  
401 East State Street  
Trenton, New Jersey 08625-0433  
609-292-5184

Please contact the NJDEP Case Manager if you should have any questions or comments.

Sincerely,  
Environmental Engineering Corporation

Pradeep Lamba, PhD, PE, CHMM  
Principal Engineer

cc. Borough of Madison Health Officer  
Borough of Madison Town Council  
Borough of Madison Planning Board

# Environmental Engineering Corporation

## Classification Exception Area/ Well restriction Area (CEA/WRA) Fact Sheet

### Site Name:

Borough of Madison Police Station

### Site Location:

Hartley Dodge Memorial Building  
Kings Road  
Madison, New Jersey, 07940  
Block: 2802, Lot 1  
(See Exhibit A – Site Location Map)

### Site Contact Person:

Mr. Robert Vogel, Borough Engineer  
Borough of Madison  
Hartley Dodge Memorial Building  
Madison, New Jersey 07940  
Telephone: 973-593-3061

### Site Identification:

- NJDEP Case Numbers:  
Spill Case ID: 92-02-20-1607  
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UST Closure Numbers: C90-0059, C93-1079
- Lead Program:  
Bureau of Underground Storage Tanks  
Karen Lesto, Case Manager  
Telephone: 609-292-5184

### Description of CEA:

- Identification of impacted aquifer

The impacted geologic formation is glacial till of the Wisconsin-age terminal moraine consisting of fine-grained soils with low hydraulic conductivity. The affected aquifer unit is an unconfined, unconsolidated aquifer. Groundwater is typically encountered within 5 feet of the ground surface and groundwater flow has been consistently determined to be in a southeast direction. The vertical extent of this aquifer unit is approximately 13 feet below ground surface where an aquitard, a stiff gray and brown varved silt and clay stratum, has been encountered in soil borings.

## Environmental Engineering Corporation

There are no current or proposed groundwater supply wells within the vicinity of the site. Pursuant to N.J.A.C. 7:9-6.5, this area is presently designated as a Class II-A aquifer. The primary designated use for Class II-A groundwater is potable water supply; secondary uses include agricultural and industrial water supply. Any proposed groundwater use within the CEA will require Department review for the feasibility of well installations and modifications to ensure protection from any impacts from the contaminants of concern for the duration of the CEA.

- Contaminants exceeding constituent and applicable standards

The following contaminants of concern are currently detected at concentrations exceeding constituent and applicable standards in the affected aquifer at this site:

<u>Contaminant</u>	<u>Groundwater Quality Standards (ppb)</u>
Benzene	1
Total Xylenes	1000

Please refer to the Semi-annual Groundwater Monitoring Reports issued for an assessment of the current and historical contaminant concentrations detected in groundwater.

- CEA boundaries

The horizontal boundaries proposed for the CEA are shown in Exhibit B (Classification Exception Area Location Map). The source of the contamination detected in the groundwater is a former 550-gallon UST located in the paved driveway area to the rear of the building. The contaminants of concern exceeding the Ground Water Quality Standards have been detected in two existing groundwater monitoring wells: MW-1 located adjacent to the source area and MW-2 located at a down-gradient location from the source area. The proposed horizontal boundaries for the CEA have been calculated for benzene using the hydraulic properties of the aquifer unit measured in the field and published values for the half-life of benzene under aerobic conditions.

The CEA boundary is projected as an arc encompassing the former 550-gallon gasoline UST and both existing monitoring wells MW-1 and MW-2. The down-gradient boundary of the CEA from MW-2 is established at a distance of 7 feet.

The vertical boundaries proposed for the CEA are estimated at a depth of 13 feet below ground surface where a varved silt and clay stratum was encountered in the soil borings.

## **Environmental Engineering Corporation**

- Projected term of CEA

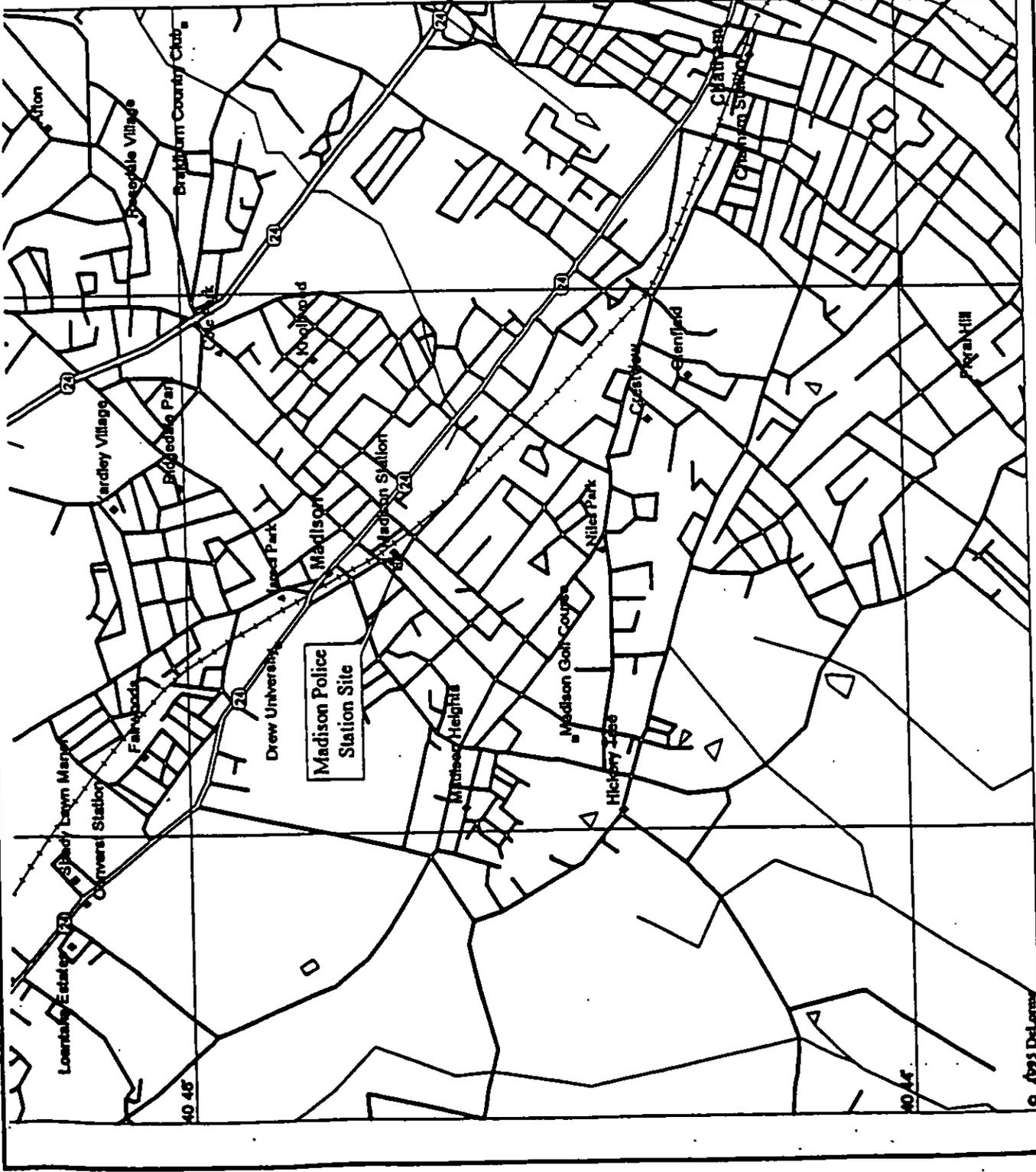
The estimated longevity of the CEA is 230.1 months based on the contaminant characteristics at monitoring well MW-1. The duration of the CEA has been calculated using site data to determine the half-life of the contaminants of concern under aerobic conditions to achieve compliance with the Ground Water Quality Standards.

### **Proposed Well Restriction Area:**

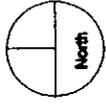
Since the groundwater quality data indicate the exceedance of contaminant concentrations above the Primary Drinking Water Standards and the designated uses of Class II-A aquifers include potable use, the CEA established for this site is also a Well Restriction Area. The extent of the WRA shall coincide with the boundaries of the CEA. The subject area of this CEA/WRA will be restricted from any potable, industrial, or agricultural use of groundwater for the term of the CEA. The existing monitoring wells located on the property within and surrounding the CEA boundaries will be used for monitoring purposes during the term of the CEA.

# EXHIBIT A

Scale 1:31,250 (at center)  
 2000 Feet  
 1000 Meters



PROJECT: BOROUGH OF MADISON POLICE STATION	TITLE: SITE LOCATION MAP		DRAWING NO: 1434SLM	DRAWN BY: MB	DATE: 04/09/96	REVISION
	SCALE: AS SHOWN		CHECKED BY: BT	FIGURE: 1		DATE



# EXHIBIT B

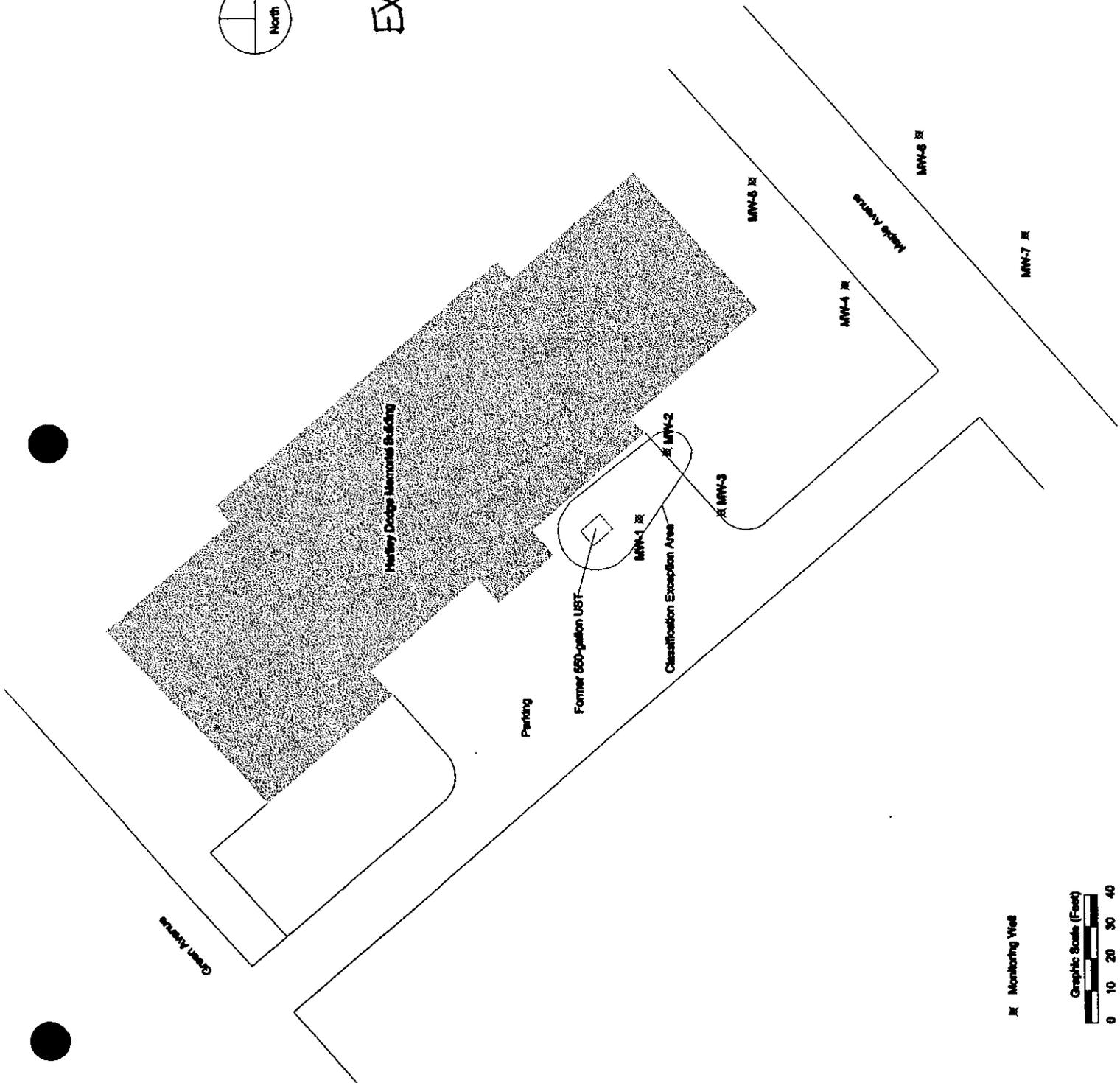


Figure 6  
Classification Exception Area  
Hersey Dodge Memorial Building  
Kings Road, Madison, New Jersey  
12/1/01 Scale: As Shown

X Monitoring Well

