

Restover Truck Stop Ground Water Monitoring August and November 1994

Summary

This document is one in a series describing the results of ground water sampling at Restover Truck Stop. Ecology has conducted ground water sampling at the site from 1987 to the present. To remediate soil and ground water contamination a vapor extraction system (VES) was constructed in the summer of 1993. The VES has been operating steadily since February 1994. To help determine the effectiveness of the cleanup, ground water monitoring was expanded from semiannual to quarterly sampling in the fall of 1993. This technical document describes the results of samples collected in August and November, 1994.

In August, water levels which are used to determine ground water flow direction were measured in ten wells, and samples were collected from two wells. In November, three wells were sampled. Few wells were sampled due to the unusually low water levels; most of the regularly sampled wells were dry. Regularly sampled wells are listed in Table 1; locations of the wells sampled are shown in Figure 1. All collected samples were analyzed for benzene, toluene, ethylbenzene, total xylenes (BTEX), and total petroleum hydrocarbons as gasoline (TPH-G).

Overall, BTEX concentrations in the upper aquifer have decreased substantially since 1989. Concentration decreases are probably due to a combination of plume spreading, dispersion, biodegradation and reduction of source loading. Since August 1991 concentrations have been relatively stable. Since the installation of the VES, the monitoring period has been too short to determine whether the VES has improved the ground water quality. BTEX concentrations continue to be elevated in well WDOE-6A. In August, Model Toxic Control Act (MTCA) cleanup levels were exceeded for all the BTEX compounds in WDOE-6A and for TPH in both WDOE-6A and MW-8A. In November, cleanup levels continued to be exceeded in WDOE-6A for BTEX and TPH, and benzene in MW-8A. Laboratory reporting sheets are presented in Appendix B.

Results

Field Observations

Depth-to-water measurements, water level elevations, stabilized pH, and temperature results for both sample events are listed in Table 1. Specific conductance measurements were not recorded due to equipment failure in the field. In August, static water level measurements were obtained from ten on-site wells. Wells MW-20A, MW-27A and MW-30 were dry. Depth-to-water ranged from 14.45 to 18.57 feet with a water-table elevation ranging from 185.81 to 182.04 mean sea level. The ground water flow direction in the upper aquifer was toward the north and northwest, which was consistent with flow patterns observed during previous sample events (Figure 2).

In November, well MW-30 was dry. MW-20A was not purged due to the low water level and small purge volume. This well purges dry under these conditions and is slow to recover. Water purged from monitoring wells MW-8A and WDOE-6A continues to have a hydrocarbon odor and cloudy appearance. In November, the purge water from WDOE-6A had a very strong hydrocarbon odor and had a thick floating layer which appeared to be free product. This is attributed to the unusually low water levels in this well.

Analytical Results

Analytical results for BTEX and TPH-G, and MTCA ground water cleanup levels are shown in Table 2 for both sample events.

In August, samples were collected from two monitoring wells: MW-8A and WDOE-6A. Wells MW-20A and MW-30 were not sampled because they were dry. All four BTEX compounds were detected in WDOE-6A with a total concentration of 3214 µg/L. Ethylbenzene and toluene were detected in MW-8A at concentrations near the detection limit. Well WDOE-6A continues to have the highest concentration of the wells sampled. TPH-G concentrations in wells MW-8A and WDOE-6A were 6800 µg/L and 20,200 µg/L, respectively.

In November, samples were collected from monitoring wells: MW-8A, MW-20A, and WDOE-6A. Wells MW-30 and MW-9A were not sampled because MW-30 was dry and MW-9A was presumed to be dry. All four BTEX compounds were detected in MW-8A and WDOE-6A. Total BTEX concentrations in these wells were approximately 32 µg/L and 4624 µg/L, respectively. TPH-G concentrations in wells MW-8A and WDOE-6A were 9900 µg/L and 32,100 µg/L, respectively.

BTEX concentrations for select monitoring wells from May 1987 to November 1994 are listed in Table 3. Figure 3 shows BTEX concentrations for wells WDOE-6A and MW-8A

for the same time period. BTEX concentrations in both wells decreased substantially from January 1989 to August 1991. Since August 1991 concentrations have been relatively stable. BTEX concentrations continue to be elevated in well WDOE-6A.

Conclusions

1. Results for August and November are consistent with results from previous sampling events.
2. MTCA cleanup levels were exceeded in WDOE-6A for BTEX compounds and TPH during both sample events. In August, cleanup levels for TPH were also exceeded in MW-8A. In November, benzene cleanup levels were exceeded in MW-8A.
3. The vapor extraction system has only been operating steadily since February 1994. The monitoring period has been too short to determine whether the VES has improved the ground water quality.

Recommendations

1. Routine monitoring should continue to determine the effectiveness of contaminant removal by vapor extraction. Monitoring wells WDOE-6A, MW-8A, MW-9A, MW-20A, and MW-30 should continue to be sampled for BTEX. Approval for property access should be obtained to sample wells MW-15A and MW-16. The Restover and Spencer supply wells should also continue to be sampled annually for BTEX.
2. I will continue to try to remove the obstruction in well MW-12. If this is accomplished MW-12 should be included in the routine monitoring to determine if the lower aquifer is contaminated. If the obstruction cannot be removed, the well should be properly decommissioned.
3. Continue to collect samples for total petroleum hydrocarbon as gasoline (TPH-G) analyses. Elevated concentrations of TPH-G were detected in most of the wells sampled in August and November 1994.
4. Monitoring wells MW-7A, MW-22 and WDOE-2 should be located and properly decommissioned.

Methods

Ground Water Sampling

Ground water samples were collected from the upper aquifer. The upper aquifer consists of recessional outwash. This unit is underlain by the Vashon Till, which is a regional aquitard, and advance outwash deposits which form a lower aquifer. In August, static water level measurements were obtained from ten on-site wells to determine ground water flow direction in the upper aquifer (Table 1). Samples for benzene, toluene, ethylbenzene, and xylene (BTEX) and total petroleum hydrocarbons as gasoline (TPH-G) were also collected from two shallow monitoring wells. November samples were collected from three shallow monitoring wells. Few wells were sampled during both sample events due to the unusually low water levels. Most of the regularly sampled wells were dry. See Table 1 for a list of the regularly sampled wells. The sampled wells were near the vapor extraction system to help determine the effectiveness of the cleanup.

Prior to sampling, static water level measurements were obtained from monitoring wells using an electronic water level indicator. The meter was rinsed with deionized water and wiped clean between measurements. Well purge volumes were small due to low water levels. Therefore, all of the monitoring wells for both sample rounds were purged and sampled using decontaminated teflon bailers. Wells were purged until pH and temperature readings stabilized, and a minimum of three well volumes had been removed. Specific conductance measurements were not recorded due to equipment failure in the field. Purge water was discharged onto the ground near each well, except for well WDOE-6A. Purge water from this well was collected in a 55-gallon barrel and stored with other vapor extraction system (VES) waste in the enclosed tank area. This waste will be transported and disposed of in accordance with State of Washington regulations (WAC 173-340-400).

Monitoring well samples were collected using decontaminated, bottom-emptying teflon bailers. Bailers were pre-cleaned with sequential washes of Liquinox®, hot tap water, 10% nitric acid, distilled-deionized water and pesticide-grade acetone. After cleaning, bailers were air-dried and wrapped in aluminum foil. Samples for BTEX and TPH-G analysis were collected free of headspace and preserved with 1:1 hydrochloric acid.

Chain-of-custody procedures were followed in accordance with Manchester Laboratory protocol (Ecology, 1994). All samples were analyzed by the Ecology/EPA Laboratory in Manchester.

Quality Assurance

In general the quality of the data is acceptable for use for both sample rounds, except as qualified.

Quality control samples collected in the field consisted of a transfer blank and blind field duplicates. A transfer blank for BTEX was obtained by running organic-free water through a decontaminated bailer and collecting the rinsate in a sample container. Analytical results for the November transfer blank showed low levels of toluene. Duplicate samples for BTEX and TPH-G were obtained from monitoring well MW-8A. The relative percent differences (RPDs) for the August duplicate samples was 3% for TPH-G. The RPD for the November duplicate samples were 6% for benzene, 9% for toluene, 3% for ethylbenzene, 6% for total xylenes and 0% for TPH-G.

In addition to field quality assurance samples, a matrix spike, a matrix spike duplicate and surrogate compound recoveries were performed in the laboratory. Matrix spike and surrogate recoveries for BTEX and TPH-G were all within acceptable limits. Dickey Huntamer of the Manchester Laboratory conducted the quality assurance review, which has been included in Appendix A.

References

Enviros, Inc. 1993. Groundwater Sampling and Analysis Restover Truck Stop Thurston County, Washington. E1/921205.06.

Washington State Department of Ecology. 1994. Manchester Environmental Laboratory - Laboratory Users Manual.

Contacts

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 Toxics Investigations Section
 (360) 407-6768

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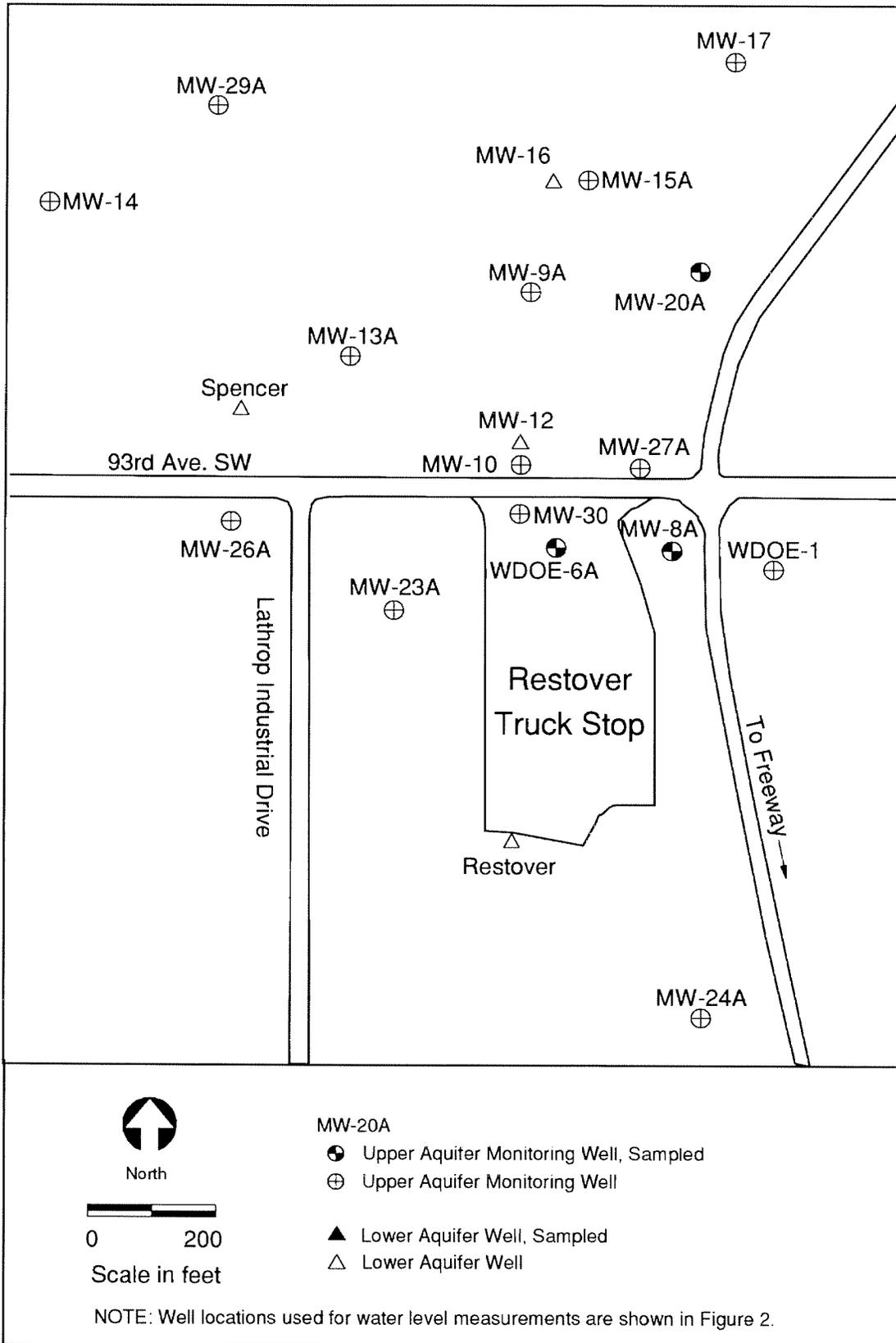


Figure 1: Well Locations, Restover Truck Stop

Table 1: Field Parameter Results for August and November, 1994

Well ID	Total Depth From Top of PVC Casing	Aquifer	Depth to Water	Elevation (MSL)	pH (st. units)	Specific Conductance (umhos/cm)	Temperature (°C)	Purge Volume (gallons)
<u>August 1994</u>								
<u>Water Levels</u>								
MW-13A	19.54	Upper	16.16	183.10				
MW-17	25.50	Upper	15.61	182.04				
MW-18A	23.22	Upper	16.64	182.10				
MW-23A	22.10	Upper	16.24	183.06				
MW-24A	15.32	Upper	14.96	185.81				
MW-26A	24.55	Upper	16.64	182.57				
MW-27A	16.32	Upper	DRY					
MW-29A	23.39	Upper	14.45	182.03				
WDOE-1	24.67	Upper	21.34	182.37				
<u>Sampled Wells</u>								
MW-8A	21.10	Upper	18.14	183.20	5.1	--	13.0	3
MW-9A	16.23	Upper	++					
MW-20A	13.95	Upper	DRY					
MW-30	16.78	Upper	DRY					
WDOE-6A	21.68	Upper	18.57	183.24	5.8	--	14.2	3
<u>November 1994</u>								
MW-8A	21.10	Upper	18.91	182.43	5.5	--	13.7	2.0
MW-9A	16.23	Upper	++					
MW-20A	13.95	Upper	13.47	184.60	NM	NM	NM	0
MW-30	16.78	Upper	DRY					
WDOE-6A	21.68	Upper	19.68	182.13	5.8	--	15.8	1.5

++ = No water-level measurement collected.

NM = Not Measured. Insufficient water to collect field parameters.

-- = Not measured due to probe malfunction.

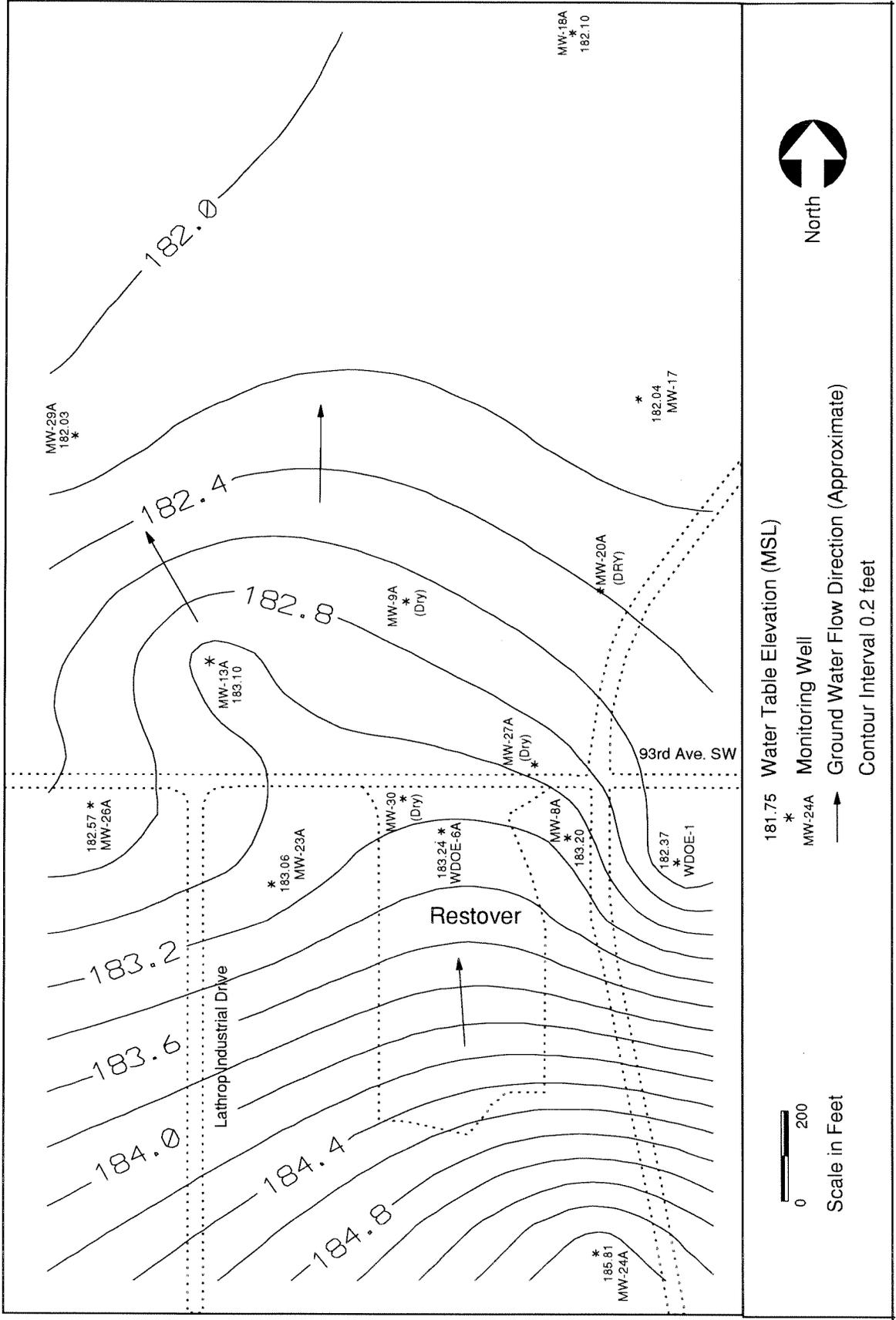


Figure 2: Restover Truck Stop - Water Table Map, August 1994

Table 2: Analytical Results (ug/L) for August 2, 1994 and November 7, 1994

Well Number	Benzene	Toluene	Ethylbenzene	Total Xylene	Total BTEX	TPH-G (Total TPH)
MTCA Cleanup Levels	5.0	40.0	30.0	20.0		1000.0
August 1994						
MW-8A	2.0 U	2.0 U	3.2	5.4	8.6	6900
MW-8B(dup)*	2.0 U	2.0 U	2.0 U	6.0 U	ND	6700
WDOE-6A	524	618	482	1590	3214	20200
Transfer	0.2 U	0.2 U	0.2 U	0.6 U	ND	60 U
November 1994						
MW-8A	6.4	8.0	6.6	9.8	30.8	9900
MW-8B(dup)*	6.8	8.8	6.8	10.4	32.8	9900
MW-20A	0.2 U	0.2 U	0.2 U	0.6 U	ND	60 U
WDOE-6A	100	908	412	3204	4624	32100
Transfer	0.2 UJ	0.38 J	0.2 UJ	0.6 UJ	ND	NA

U : Not detected at detection limit shown.

J : The analyte was positively identified. The associated numerical value is an estimate.

NA: Not analyzed.

ND: Compounds Not Detected

* : MW-8B is a duplicate sample of MW-8A.

Table 3: Historical Restover Truck Stop BTEX Concentrations (ug/L)

Well Number	May 1987	September 1987	October 1988	January 1989	July 1989	January 1990	August 1990	February 1991	August 1991	February 1992	July 1992	January 1993
Upper Aquifer												
WDOE-6A	6950	1180	5300	28000	7490	9870	5190	3460	2840	3830	2990	4784
MW-8A	230 ¹	388 ¹	479 ¹	334 ¹	64 ²	20 ²	178 ²	19 ²	20 ²	9 ²	53 ²	47 ²
MW-15A	1433	NT	NT	ND	218	NT	285	122	NT	NT	NT	NT
MW-17	ND	ND	ND	ND	ND	NT	NT	ND	ND	NT	2.7	ND
MW-20A	126	NT	NT	NT	NT	20	1400	5	293	11	452	NT(Dry)
Lower Aquifer												
Restover	NT	NT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Spencer	ND	ND	NT	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-12	53	5	8	ND	4	ND	6	ND	NT	NT	NT	NT

Well Number	July 1993	November 1993	January 1994	April 1994	August 1994	November 1994
Upper Aquifer						
WDOE-6A	2620	3070	6360	5242	3214	4624
MW-8A	30 ²	41 ²	36 ²	4 ²	8 ¹	32 ²
MW-15A	NT	NT	NT	NT	NT	NT
MW-17	NT	NT	NT	NT	NT	NT
MW-20A	162	NT(Dry)	ND	59	NT(Dry)	ND
MW-30	NT	NT(Dry)	NT(Dry)	2400	NT(Dry)	NT(Dry)
MW-9A	NT	NT	NT(Dry)	366	NT	NT
Lower Aquifer						
Restover	0.4	NT	ND	NT	NT	NT
Spencer	ND	NT	NT	NT	NT	NT
MW-12	1.7	NT	NT	NT	NT	NT

ND: Compound Not Detected

NT: Compound Not Tested

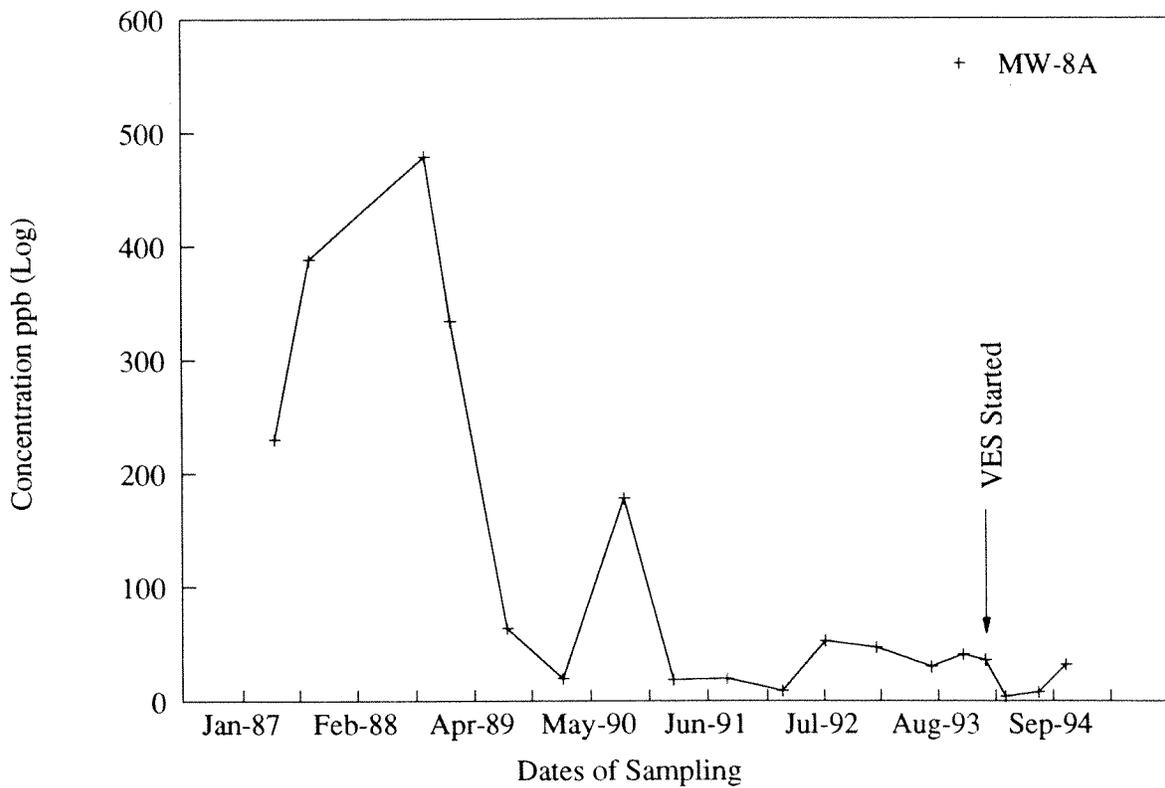
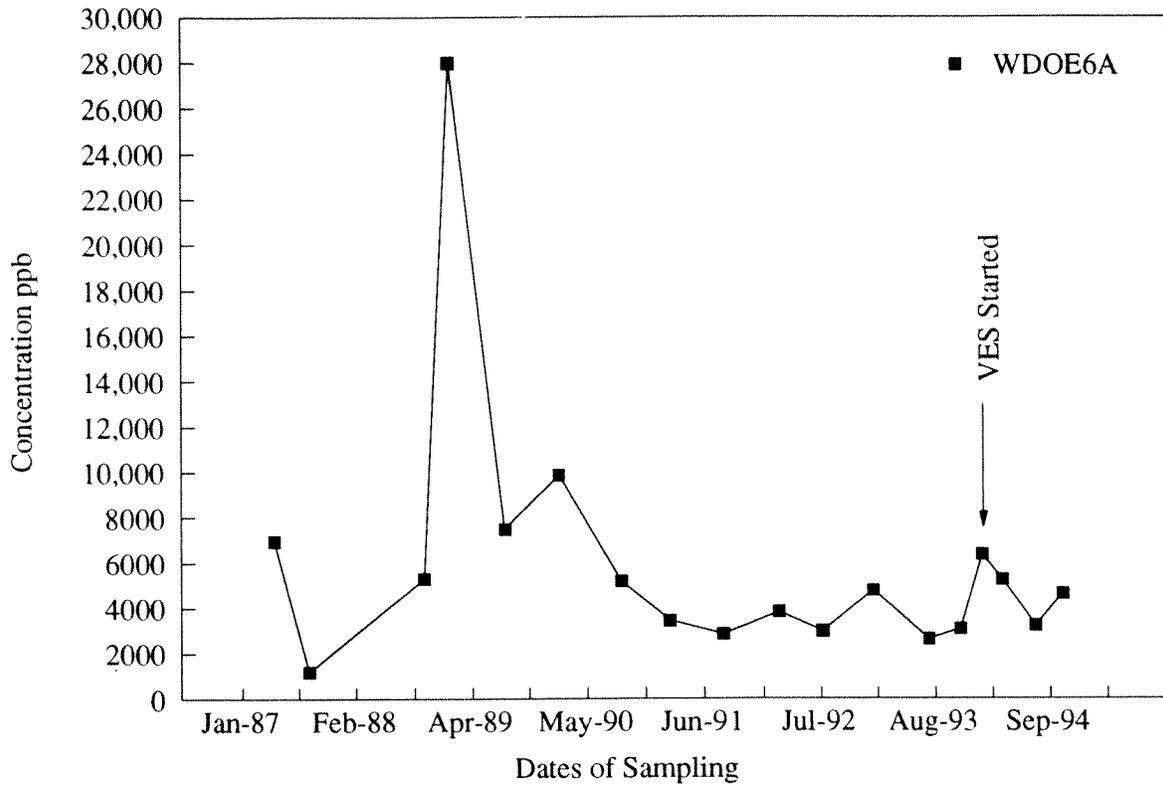
¹ : Value is based on one sample.

² : Value represents the mean of duplicate samples.

The upper and lower aquifers consist of recessional outwash and advance outwash, respectively. These units are separated by the Vashon Till which is a regional aquitard.

Figure 3

BTEX Concentrations in WDOE-6A and MW-8A from May 1987 to November 1994



APPENDIX A

Analytical Results
Restover Truck Stop
August 2, 1994 and November 7, 1994

MANCHESTER ENVIRONMENTAL LABORATORY

7411 Beach Drive E , Port Orchard Washington 98366

CASE NARRATIVE

August 17, 1994

Subject: Restover Truck Stop
Samples: 94 - 318050 to -318053
Case No. DOE-066W
Officer: Pam Marti
By: Dickey D. Huntamer
Organics Analysis Unit

BETX ANALYSIS

ANALYTICAL METHODS:

The samples were analyzed by EPA Method SW-846 - 8020. Normal laboratory QA/QC procedures were performed with the analyses.

HOLDING TIMES:

The samples were analyzed within the recommended holding times.

BLANKS:

The EPA five times rule was applied to all target compounds which were found in the blank. Compounds that were found in the sample and in the blank were considered real and not the result of contamination if the levels in the sample are greater than or equal to five times the amount of compounds in the associated method blank. No target compounds were detected in the laboratory blank.

SURROGATES:

Surrogate recoveries of fluorobenzene ranged from 77.8% to 136.5%. No recovery limits have been established for this compound. No qualifiers were added to the sample results because of surrogate recoveries.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE:

A matrix spike and spike duplicate was analyzed using sample -318051. Recoveries ranged from 85.3% to 108.3% and the Relative Percent Differences ranged from 14.7% to 20.2%. Both recovery and precision data were within acceptable limits.

ANALYTICAL COMMENTS:

No problems were encountered in the analysis of these samples. The data is acceptable for use as qualified.

DATA QUALIFIER CODES:

- U - The analyte was not detected at or above the reported value.
- J - The analyte was positively identified. The associated numerical value is an estimate.
- UJ - The analyte was not detected at or above the reported estimated result.
- REJ - The data are unusable for all purposes.
- EXP - The result is equal to the number before EXP times 10 to the power of the number after EXP. As an example 3EXP6 equals 3×10^6 .
- NAF - Not analyzed for.
- N - For organic analytes there is evidence the analyte is present in this sample.
- NJ - There is evidence that the analyte is present. The associated numerical result is an estimate.
- E - This qualifier is used when the concentration of the associated value exceeds the known calibration range.
- * - The analyte was present in the sample. (Visual Aid to locate detected compound on report sheet.)

==> Transaction #: 08160923

Laboratory: (WE) Ecology, Manchester Lab

Work Group: (51) VOA - PP Scan

Instrument: (PEPIDFID) Perkin-Elmer PID/FID

Method: (?????????) Unspecified

Chemist: (BLC) Carrell, Bob DOE Hours Worked: _____

Project: DOE-066W RESTOVER TRUCK STOP

Prg Ele#: D3K01

Prj Off: Marti, Pam DOE Analysis Due: 940803 Revised Due:

*** Sample Records in Transaction ***

Seq#	Sample #	QA	Date/Time	Description	Alternate Keys
01	94318050	LBK1	940802	MW-8A	
02	94318050		940802	MW-8A	
03	94318052		940802	WDOE-6A	
04	94318053		940802	TRANSFER	
05	94318050	LBK2	940802	MW-8A	
06	94318051		940802	MW-8B	
07	94318051	LMX1	940802	MW-8B	
08	94318051	LMX2	940802	MW-8B	

Record Type: TRNIN3

Date Verified: Aug 16, 1994

By: Carrell

Transaction Status: Edited Transaction... First Printing... Unverified.

Processed: 16-AUG-94 09:29:28

Status: E

Batch:

(In CUR DB)

Transaction #: 08160923 Seq #: 01 (51) VOA - PP Scan
Proj Code : DOE-066W RESTOVER TRUCK STOP

PE # : D3K01

Blank ID : BW4222

Sample No.: 94 318050

Alternate Keys:

Samp Matrix: (10) Water-Total

Units: (11) ug/l

%Slds:

QA Code: (LBK1) Lab Blank Sample #1

Peaks Total:

Date Extracted:

Date Analyzed: 940810

Days to Ext/Anal: 0/ 8

Line	Par #	Parameter Description	Units	Value	
1	71432	Benzene	ug/l	0.2U	
2	108883	Toluene	ug/l	0.2U	
3	100414	Ethylbenzene	ug/l	0.2U	
4	1330207	Total Xylenes	ug/l	0.6U	
5	-462066	FLUOROBENZENE	% Recov	97.3	(Surr) PR

Transaction #: 08160923 Seq #: 02 (51) VOA - PP Scan
Proj Code : DOE-066W RESTOVER TRUCK STOP PE # : D3K01

Sample No.: 94 318050 Alternate Keys:

Samp Matrix: (10) Water-Total Units: (11) ug/l %Slids:
QA Code: () Unspecified Peaks Total:
Date Extracted: Date Analyzed: 940810 # Days to Ext/Anal: 0/ 8

Line	Par #	Parameter Description	Units	Value	
1	71432	Benzene	ug/l	2.0U	
2	108883	Toluene	ug/l	2.0U	
3	100414	Ethylbenzene	ug/l	3.2	
4	1330207	Total Xylenes	ug/l	5.4	
5	-462066	FLUOROBENZENE	% Recov	127.1	(Surr) PR

Transaction #: 08160923 Seq #: 03 (51) VOA - PP Scan
Proj Code : DOE-066W RESTOVER TRUCK STOP PE # : D3K01

Sample No.: 94 318052 ~~10706-CA~~ Alternate Keys:

Samp Matrix: (10) Water-Total Units: (11) ug/l %Slds:
QA Code: () Unspecified Peaks Total:
Date Extracted: Date Analyzed: 940810 # Days to Ext/Anal: 0/ 8

Line	Par #	Parameter Description	Units	Value	
1	71432	Benzene	ug/l	524	
2	108883	Toluene	ug/l	618	
3	100414	Ethylbenzene	ug/l	482	
4	1330207	Total Xylenes	ug/l	1590	
5	-462066	FLUOROBENZENE	% Recov	96.8	(Surr) PR

6-AUG-94

Washington State Department of Ecology

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*** Lab Analysis Report ***

Transaction #: 08160923 Seq #: 04 (51) VOA - PP Scan
Proj Code : DOE-066W RESTOVER TRUCK STOP

PE # : D3K01

Sample No.: 94 318053 Alternate Keys:

Samp Matrix: (10) Water-Total Units: (11) ug/l %Slds:
QA Code: () Unspecified Peaks Total:
Date Extracted: Date Analyzed: 940810 # Days to Ext/Anal: 0/ 8

Line	Par #	Parameter Description	Units	Value	
1	71432	Benzene	ug/l	0.2U	
2	108883	Toluene	ug/l	0.2U	
3	100414	Ethylbenzene	ug/l	0.2U	
4	1330207	Total Xylenes	ug/l	0.6U	
5	-462066	FLUOROBENZENE	% Recov	77.8	(Surr) PR

*** Lab Analysis Report ***

Transaction #: 08160923 Seq #: 05 (51) VOA - PP Scan

Proj Code : DOE-066W RESTOVER TRUCK STOP

PE # : D3K01

Blank ID : BW4223

Sample No.: 94 318050

Alternate Keys:

Samp Matrix: (10) Water-Total

Units: (11) ug/l

%Slids: _____

QA Code: (LBK2) Lab Blank Sample #2

Peaks Total: _____

Date Extracted:

Date Analyzed: 940811

Days to Ext/Anal: 07 9

Line	Par #	Parameter Description	Units	Value	
1	71432	Benzene	ug/l	0.2U	
2	108883	Toluene	ug/l	0.2U	
3	100414	Ethylbenzene	ug/l	0.2U	
4	1330207	Total Xylenes	ug/l	0.6U	
5	-462066	FLUOROBENZENE	% Recov	99.2	(Surr) PR

Transaction #: 08160923 Seq #: 06 (51) VOA - PP Scan
 Proj Code : DOE-066W RESTOVER TRUCK STOP

PE # : D3K01

Sample No.: 94 318051 - NO 32 Alternate Keys:

Samp Matrix: (10) Water-Total

Units: (11) ug/l

%Slids: _____

QA Code: () Unspecified

Peaks Total: _____

Date Extracted:

Date Analyzed: 940811

Days to Ext/Anal: 07 9

Line	Par #	Parameter Description	Units	Value
1	71432	Benzene	ug/l	2.0U
2	108883	Toluene	ug/l	2.0U
3	100414	Ethylbenzene	ug/l	2.0U
4	1330207	Total Xylenes	ug/l	6.0U
5	-462066	FLUOROBENZENE	% Recov	134.2 (Surr) PR

Transaction #: 08160923 Seq #: 07 (51) VOA - PP Scan
Proj Code : DOE-066W RESTOVER TRUCK STOP

PE # : D3K01

Sample No.: 94 318051

Alternate Keys:

Samp Matrix: (10) Water-Total Units: (94) % Recov %Slds:
QA Code: (LMX1) Lab Mtrx Spike #1 (% Rec Peaks Total:
Date Extracted: Date Analyzed: 940811 # Days to Ext/Anal: 0/ 9

Line	Par #	Parameter Description	Units	Value	
1	71432	Benzene	% Recov	106.0	
2	108883	Toluene	% Recov	104.5	
3	100414	Ethylbenzene	% Recov	108.3	
4	1330207	Total Xylenes	% Recov	107.3	
5	-462066	FLUOROBENZENE	% Recov	136.5	(Surr) PR

Transaction #: 08160923 Seq #: 08 (51) VOA - PP Scan
Proj Code : DOE-066W RESTOVER TRUCK STOP

PE # : D3K01

Sample No.: 94 318051 Alternate Keys:

Samp Matrix: (10) Water-Total Units: (94) % Recov %Slds:
QA Code: (LMX2) Lab Mtrx Spike #2 (% Rec Peaks Total:
Date Extracted: Date Analyzed: 940811 # Days to Ext/Anal: 0/ 9

Line	Par #	Parameter Description	Units	Value	
1	71432	Benzene	% Recov	87.3	
2	108883	Toluene	% Recov	85.3	
3	100414	Ethylbenzene	% Recov	92.3	
4	1330207	Total Xylenes	% Recov	92.6	
5	-462066	FLUOROBENZENE	% Recov	112.4	(Surr) PR

==> Transaction #: 08121530 Laboratory: (WE) Ecology, Manchester Lab

Work Group: (70) Misc GC Specified

Instrument: (GCHPFIDD) Hewlett Packard GC; FID Detector (DO

Method: (WTPH-G) Washington Total Petroleum Hydrocarbon-Gas

Chemist: (BLC) Carrell, Bob DOE Hours Worked:

Project: DOE-066W RESTOVER TRUCK STOP Prg Ele#: D3K01

Prj Off: Marti, Pam DOE Analysis Due: 940803 Revised Due:

*** Sample Records in Transaction ***

Seq#	Sample #	QA	Date/Time	Description	Alternate Keys
01	94318050		940802	MW-8A	
02	94318051		940802	MW-8B	
03	94318052		940802	WDOE-6A	
04	94318053		940802	TRANSFER	
05	94318050	LDP1	940802	MW-8A	
06	94318050	LBK1	940802	MW-8A	
07	94318050	LBK2	940802	MW-8A	

Record Type: TRNIN3 Date Verified: Aug 15, 1994 By: Carrell
Transaction Status: New Transaction...First Printing...Unverified.
Processed: 12-AUG-94 15:38:08 Status: N Batch: (In CUR DB)

Transaction #: 08121530 Seq #: 01 (70) Misc GC Specified
Proj Code : DOE-066W RESTOVER TRUCK STOP PE # : D3K01

Sample No.: 94 318050 Alternate Keys:

Samp Matrix: (10) Water-Total Units: (10) mg/l %Slds:
QA Code: () Unspecified Peaks Total:
Date Extracted: Date Analyzed: 940810 # Days to Ext/Anal: 0/ 8

Line	Par #	Parameter Description	Units	Value	
1	-400004	WTPH-G/Gasoline	mg/l	6.9	
2	-540363	p-Difluorobenzene	% Recov	146.1	(Surr) PR

Transaction #: 08121530 Seq #: 02 (70) Misc GC Specified
Proj Code : DOE-066W RESTOVER TRUCK STOP PE # : D3K01

Sample No.: 94 318051 Alternate Keys:

Samp Matrix: (10) Water-Total Units: (10) mg/l %Slids:
QA Code: () Unspecified Peaks Total:
Date Extracted: Date Analyzed: 940810 # Days to Ext/Anal: 0/ 8

Line	Par #	Parameter Description	Units	Value	
1	-400004	WTPH-G/Gasoline	mg/l	6.7	
2	-540363	p-Difluorobenzene	% Recov	115.4	(Surr) PR

Transaction #: 08121530 Seq #: 03 (70) Misc GC Specified
Proj Code : DOE-066W RESTOVER TRUCK STOP PE # : D3K01

Sample No.: 94 318052 Alternate Keys:

Samp Matrix: (10) Water-Total Units: (10) mg/1 %Slds:
QA Code: () Unspecified Peaks Total:
Date Extracted: Date Analyzed: 940811 # Days to Ext/Anal: 0/ 9

Line	Par #	Parameter Description	Units	Value	
1	-400004	WTPH-G/Gasoline	mg/1	20.2	
2	-540363	p-Difluorobenzene	% Recov	129.6	(Surr) PR

*** Lab Analysis Report ***

Transaction #: 08121530 Seq #: 04 (70) Misc GC Specified
Proj Code : DOE-066W RESTOVER TRUCK STOP PE # : D3K01

Sample No.: 94 318053 Alternate Keys:

Samp Matrix: (10) Water-Total Units: (10) mg/1 %Slids:
QA Code: () Unspecified Peaks Total:
Date Extracted: Date Analyzed: 940811 # Days to Ext/Anal: 0/ 9

Line	Par #	Parameter Description	Units	Value
1	-400004	WTPH-G/Gasoline	mg/1	0.06U
2	-540363	p-Difluorobenzene	% Recov	93.3 (Surr) PR

Transaction #: 08121530 Seq #: 05 (70) Misc GC Specified
Proj Code : DOE-066W RESTOVER TRUCK STOP PE # : D3K01

Sample No.: 94 318050 Alternate Keys:

Samp Matrix: (10) Water-Total Units: (10) mg/1 %Slds:
QA Code: (LDP1) Lab Duplicate Sample #1 Peaks Total:
Date Extracted: Date Analyzed: 940811 # Days to Ext/Anal: 0/ 9

Line	Par #	Parameter Description	Units	Value	
1	-400004	WTPH-G/Gasoline	mg/1	6.6	
2	-540363	p-Difluorobenzene	% Recov	147.5	(Surr) PR

Transaction #: 08121530 Seq #: 07 (70) Misc GC Specified
Proj Code : DOE-066W RESTOVER TRUCK STOP PE # : D3K01

Blank ID : BW4223
Sample No.: 94 318050

Alternate Keys:

Samp Matrix: (10) Water-Total Units: (10) mg/1 %Slids:
QA Code: (LBK2) Lab Blank Sample #2 Peaks Total:
Date Extracted: Date Analyzed: 940811 # Days to Ext/Anal: 0/ 9

Line	Par #	Parameter Description	Units	Value
1	-400004	WTPH-G/Gasoline	mg/1	0.06U
2	-540363	p-Difluorobenzene	% Recov	111.2 (Surr) PR

MANCHESTER ENVIRONMENTAL LABORATORY
7411 Beach Drive E , Port Orchard Washington 98366

CASE NARRATIVE

December 7, 1994

Subject: Restover Truck Stop
Samples: 94 - 458080 to -458084
Case No. DOE-267Y
Officer: Pam Marti
By: Dickey D. Huntamer 
Organics Analysis Unit

BETX ANALYSIS

ANALYTICAL METHODS:

The samples were analyzed by EPA Method SW-846 - 8020. Normal laboratory QA/QC procedures were performed with the analyses.

HOLDING TIMES:

The samples were analyzed within the recommended holding times.

BLANKS:

The EPA five times rule was applied to all target compounds which were found in the blank. Compounds that were found in the sample and in the blank were considered real and not the result of contamination if the levels in the sample are greater than or equal to five times the amount of compounds in the associated method blank. No target compounds were detected in the laboratory blank.

SURROGATES:

Surrogate recoveries of p-difluorobenzene ranged from 78.4% to 118% except for sample -458084 which had 30.5% recovery. No recovery limits have been established for this compound however all results for sample -458084 were qualified "J" due to the low surrogate recovery.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE:

A matrix spike and spike duplicate was analyzed using sample -458080. Recoveries ranged from 75.3% to 97.7% and the Relative Percent Differences ranged from 11.2% to 22.4%. Both recovery and precision data were within acceptable limits.

ANALYTICAL COMMENTS:

No problems were encountered in the analysis of these samples. The data is acceptable for use as qualified.

DATA QUALIFIER CODES:

- U - The analyte was not detected at or above the reported value.
- J - The analyte was positively identified. The associated numerical value is an estimate.
- UJ - The analyte was not detected at or above the reported estimated result.
- REJ - The data are unusable for all purposes.
- EXP - The result is equal to the number before EXP times 10 to the power of the number after EXP. As an example 3EXP6 equals 3×10^6 .
- NAF - Not analyzed for.
- N - For organic analytes there is evidence the analyte is present in this sample.
- NJ - There is evidence that the analyte is present. The associated numerical result is an estimate.
- E - This qualifier is used when the concentration of the associated value exceeds the known calibration range.
- * - The analyte was present in the sample. (Visual Aid to locate detected compound on report sheet.)

Project: DOE-267Y RESTOVER TRUCK STOP

Officer: PZM

Account: D3K01

Laboratory: Ecology, Manchester

Sample No: 94 458080

Description: MW-8A

Source: Well (Test/Observation)

Begin Date: 94/11/07 :

Organics - General	Water-Total Result	Units
WTPH-G	9.9	* mg/L

VOA - PP Scan	Water-Total Result	Units
Benzene	6.4	* ug/l
Ethylbenzene	6.6	* ug/l
Toluene	8.0	* ug/l
Total Xylenes	9.8	* ug/l
p-Difluorobenzene	100.6	† Recov

VOA - PP Scan	Water-Total Result	Units
Matrix Spike #1		
Benzene	94.2	† Recov
Ethylbenzene	95.2	† Recov
Toluene	95.1	† Recov
Total Xylenes	97.7	† Recov
p-Difluorobenzene	112.9	† Recov

VOA - PP Scan	Water-Total Result	Units
Matrix Spike #2		
Benzene	75.3	† Recov
Ethylbenzene	81.0	† Recov
Toluene	76.1	† Recov
Total Xylenes	87.3	† Recov
p-Difluorobenzene	88.1	† Recov

Project: DOE-267Y RESTOVER TRUCK STOP
Laboratory: Ecology, Manchester

Officer: PZM Account: D3K01

Sample No: 94 458081 Description: MW-8B

Source: Well (Test/Observation)

Begin Date: 94/11/07

Organics - General	Water-Total Result	Units
WTPH-G	9.9	*

VOA - PP Scan	Water-Total Result	Units
Benzene	6.8	* ug/l
Ethylbenzene	6.8	* ug/l
Toluene	8.8	* ug/l
Total Xylenes	10.4	* ug/l
p-Difluorobenzene	118.2	* & Recov

(Sample Complete)

Project: DOE-267Y RESTOVER TRUCK STOP

Officer: PZM Account: D3K01

Laboratory: Ecology, Manchester

Sample No: 94 458082 Description: MW-20A

Source: Well (Test/Observation)

Begin Date: 94/11/07 :

Organics - General	Water-Total Result	Units
WTPH-G	0.6U	

VOA - PP Scan	Water-Total Result	Units
Benzene	0.2U	ug/l
Ethylbenzene	0.2U	ug/l
Toluene	0.2U	ug/l
Total Xylenes	0.6U	ug/l
p-Difluorobenzene	99.4	% Recov

Project: DOE-267Y RESTOVER TRUCK STOP

Officer: PZM Account: D3K01

Laboratory: Ecology, Manchester

Sample No: 94 458083

Source: Well (Test/Observation)

Description: WDOE-6A

Begin Date: 94/11/07

Organics - General	Water-Total Result	Units
WTPH-G	32.1	*
Organics - General	Water-Total Result	Units
Duplicate #1	10.1	*
WTPH-G		
VOC - PP Scan	Water-Total Result	Units
Benzene	100	* ug/l
Ethylbenzene	412	* ug/l
Toluene	908	* ug/l
Total Xylenes	3204	* ug/l
p-Difluorobenzene	103.5	* Recov

(Sample Complete)

Project: DOE-267Y RESTOVER TRUCK STOP

Officer: PZM Account: DJK01

Laboratory: Ecology, Manchester

Sample No: 94 458084 Description: TRANSFER

Source: Water (General)

Begin Date: 94/11/07 :

VOA - PP Scan	Water-Total Result	Units
Benzene	0.20J	ug/l
Ethylbenzene	0.20J	ug/l
Toluene	0.38J*	ug/l
Total Xylenes	0.60J	ug/l
p-Difluorobenzene	30.5	% Recov

Project: DOE-267Y RESTOVER TRUCK STOP

Officer: PZM

Account: D3K01

Blank ID: BW4313

Organics - General	Water-Total
Blank #1	Result Units
WTPH-G	0.06U

VOA - PP Scan	Water-Total
Blank #1	Result Units
Benzene	0.2U ug/l
Ethylbenzene	0.2U ug/l
Toluene	0.2U ug/l
Total Xylenes	0.6U ug/l
p-Difluorobenzene	78.4 % Recov

(Sample Complete)

Project: DOB-267Y RESTOVER TRUCK STOP
Blank ID: BW4314

Officer: PZM Account: D3K01

VOA - PP Scan	Water-Total
Blank #1	Result Units
Benzene	0.2U ug/l
Ethylbenzene	0.2U ug/l
Toluene	0.2U ug/l
Total Xylenes	0.6U ug/l
p-Difluorobenzene	103 % Recov

(Sample Complete)