

## DEPARTMENT OF ECOLOGY

March 19, 1997

TO: Mike Kuntz, Toxics Cleanup Program

FROM: Pam Marti<sup>PBM</sup>, Environmental Investigations & Laboratory Services

SUBJECT: Restover Truck Stop Long-term Monitoring, August and November 1996

The attached document summarizes the findings from two sampling events at Restover Truck Stop, conducted in August and November 1996. As you requested, ground water monitoring was expanded to quarterly sampling in July 1993 to determine the effectiveness of the vapor extraction system (VES). The VES operated steadily from February 1994 to June 1995. Since June 1995 the VES has been shut down due to high winter table and to convert the system from carbon adsorption to biofiltration.

Since monitoring began in 1987, BTEX concentrations have decreased substantially. Well WDOE-6A is the only well in which BTEX concentrations continue to be elevated. In August and November, Model Toxic Control Act (MTCA) cleanup levels were exceeded in WDOE-6A for benzene, ethylbenzene, and total xylene; as well as for TPH in MW-8A and WDOE-6A.

An expanded sample round was conducted in February 1997. Results from this event will be forwarded to you soon. If you have any questions or comments please call me at 407-6768.

PM:jl

cc: Larry Goldstein



## Restover Truck Stop Ground Water Monitoring August and November 1996

### Summary

This progress report is one in a series describing the results of quarterly ground water sampling at Restover Truck Stop. This report describes the results of samples collected for benzene, toluene, ethylbenzene and total xylenes (BTEX), and total petroleum hydrocarbons as gasoline (TPH-G) in August and November 1996. Ecology has conducted ground water sampling at this 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 operated steadily from February 1994 to June 1995. Since June 1995 the VES has been shut down to convert the system from carbon adsorption to biofiltration.

Since monitoring began in 1987, BTEX concentrations have decreased substantially. Well WDOE-6A (Figure 1) is the only well in which BTEX concentrations continue to be elevated. In August and November 1996, Model Toxic Control Act (MTCA) cleanup levels were exceeded in WDOE-6A for benzene, ethylbenzene, and total xylene; as well as for TPH in MW-8A and WDOE-6A. Data review and laboratory reporting sheets are presented in Appendix A.

### Results

In August and November 1996 ground water samples were collected from four upper aquifer wells (Figure 1). 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.

## Field Observations

Depth-to-water measurements, purge volume, pH, specific conductance, and temperature results for both sample events are listed in Table 1. In August, depth-to-water in the upper aquifer ranged from 10.63 to 14.23 feet below ground surface (bgs). In November, depth-to-water ranged from 12.47 to 16.02 feet bgs. Well MW-31 was dry in both August and November.

Water purged from monitoring well WDOE-6A continues to have a strong hydrocarbon odor and cloudy appearance, while MW-30 continues to have a slight hydrocarbon odor. A rust colored sediment was removed from the bottom of MW-30 during both sample events.

## Analytical Results

Analytical results for BTEX and TPH-G, and MTCA ground water cleanup levels are shown in Table 2 for both sample events. A duplicate sample (MW-6A) was collected from well WDOE-6A. Results for WDOE-6A listed in this memo represent the average concentration of the analytes detected.

In August, samples were collected from four monitoring wells: MW-8A, MW-20A, MW-30, and WDOE-6A. All four BTEX compounds were detected in WDOE-6A with an average total concentration of 488  $\mu\text{g/L}$ . Benzene was detected in MW-20A at a concentration of 1.3  $\mu\text{g/L}$ . TPH-G concentrations in wells MW-30, MW-8A and WDOE-6A were 280  $\mu\text{g/L}$ , 1000  $\mu\text{g/L}$  and 12,000  $\mu\text{g/L}$ , respectively.

In November, samples were collected from monitoring wells: MW-8A, MW-20A, MW-30, and WDOE-6A. All four BTEX compounds were detected in WDOE-6A with an average total concentration of 664  $\mu\text{g/L}$ . Well WDOE-6A continues to show the highest volatile organics concentrations of the wells sampled. Benzene, toluene, ethylbenzene and xylene were detected near or below the detection limit in wells MW-8A, MW-20A and MW-30. TPH-G concentrations in wells MW-20A, MW-8A and WDOE-6A were 845  $\mu\text{g/L}$ , 1400  $\mu\text{g/L}$  and 13,500  $\mu\text{g/L}$ , respectively.

BTEX concentrations for select monitoring wells from May 1987 to November 1996 are listed in Table 3. Figure 3 shows BTEX concentrations for wells WDOE-6A and MW-8A for the same time period. Concentrations were relatively stable for both wells from August 1991 to February 1995. Since February 1995 BTEX concentrations have been gradually decreasing. In April 1996, high BTEX concentrations were detected in WDOE-6A. There is no apparent explanation for this increase. The next sample round is scheduled for February 1997.

## Conclusions

1. Overall, BTEX concentrations appear to be gradually decreasing.
2. In August and November, Model Toxic Control Act (MTCA) cleanup levels were exceeded in WDOE-6A for benzene, ethylbenzene, and total xylene; as well as for TPH in MW-8A and WDOE-6A.
3. The vapor extraction system operated steadily from February 1994 to June 1995. Since June 1995 the VES has been shut down due to the high winter water table and to convert the system from carbon adsorption to biofiltration. The VES operating period and related monitoring have not been long enough to determine whether the VES has improved the ground water quality.

## Recommendations

1. Monitoring wells WDOE-6A, MW-8A, MW-9A, MW-20A, MW-30, and MW-31 should continue to be sampled for BTEX and TPH-G. Although the VES has been shut down since June 1995, it is scheduled to be restarted in the spring of 1997 as a carbon adsorption system once the high winter water table drops below the extraction line.
2. Wells MW-12A, MW-15A and MW-16 should continue to be sampled periodically for as long as property access is granted. Historically, BTEX has been detected in MW-15A. More recently, a low concentration of benzene was detected in this well in August 1995.

## 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 and November, samples for benzene, toluene, ethylbenzene, and xylene (BTEX) and total petroleum hydrocarbons as gasoline (TPH-G) were collected from four upper aquifer monitoring wells.

Prior to sampling, static water level measurements were obtained from monitoring wells using an electronic water level probe. The probe was rinsed with deionized water and

wiped clean between measurements. Based on the purge volume, wells were purged with either a teflon bailer or submersible pump. Wells were purged until pH, specific conductance and temperature readings stabilized, and a minimum of three well volumes had been removed. 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 waste in the enclosed tank area. This waste will be transported and disposed of in accordance with State of Washington regulations (Chapter 173-340-400 WAC).

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. BTEX samples were analyzed using EPA SW-846 Method 8020 (U.S. EPA, 1986) and WTPH-G samples were analyzed using Washington State Method WTPH-G (Ecology, 1994).

Quality control samples collected in the field consisted of a blind field duplicate. Duplicate samples for BTEX and TPH-G were obtained from monitoring well WDOE-6A. Duplicate samples collected at WDOE-6A provide an estimate of combined sampling and laboratory precision. The numeric comparison of duplicate results is expressed as the relative percent difference or RPD. RPDs are the ratio of the difference and the mean of the duplicate results expressed as a percentage. The RPDs for both the August and November duplicate samples were within 7%.

In addition to field quality control samples, a matrix spike, a matrix spike duplicate and surrogate compound recoveries were performed in the laboratory. All surrogate spike recoveries were within the control limits of 50 - 150%. Matrix spikes for BTEX and TPH-G were all within acceptable limits. Myrna McIntosh of the Manchester Laboratory conducted the quality assurance review, which has been included in Appendix A.

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## Contacts

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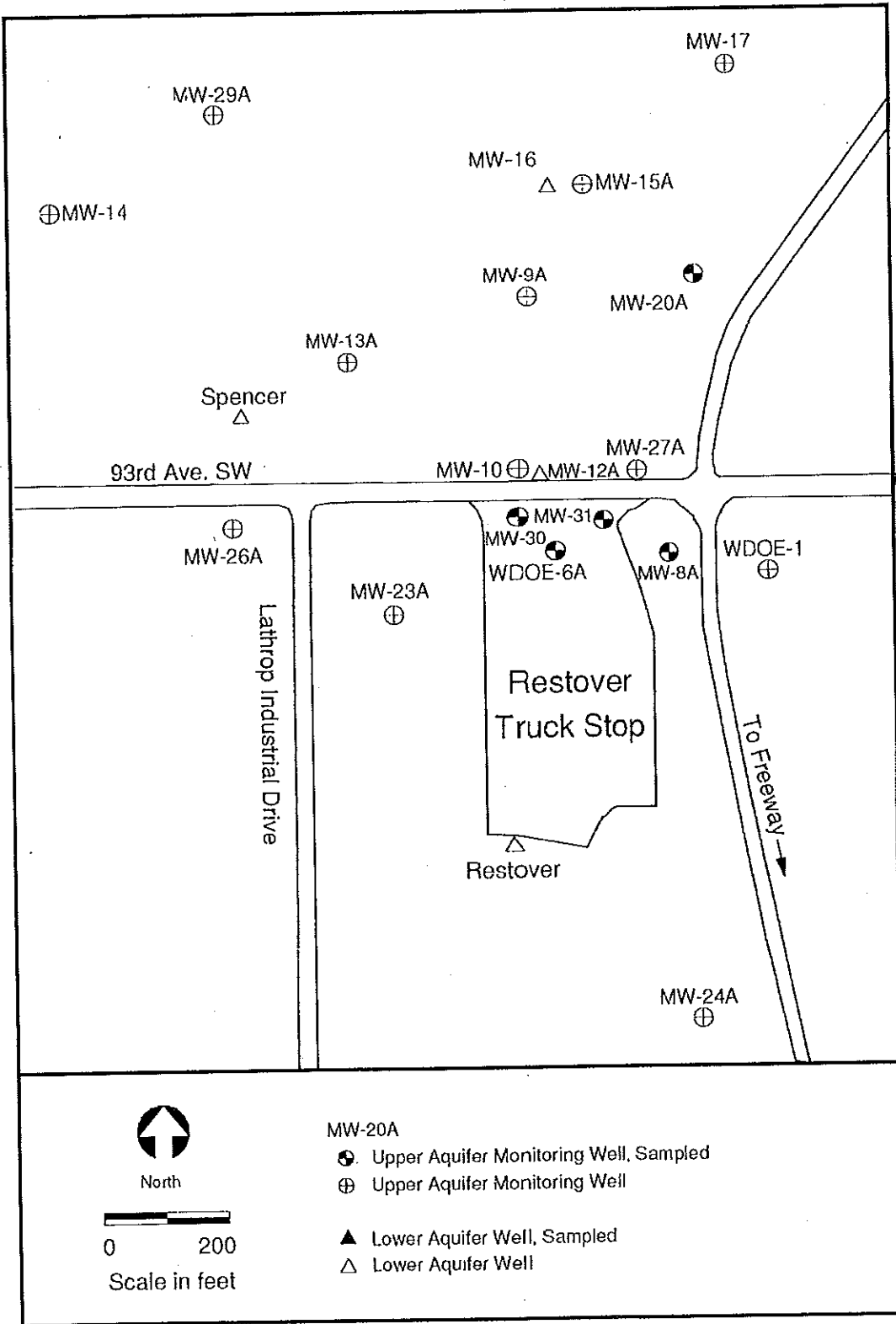


Figure 1: Well Locations, Restover Truck Stop

Table 1: Field Parameter Results for August 28 and November 6, 1996

Monitoring Well	Total Depth (Feet)	Aquifer	Depth to Water (Feet)	pH (standard units)	Specific Conductance (umhos/cm)	Temperature (°C)	Purge Volume (gallons)
<b>August 1996</b>							
MW-8A	21.10	Upper	13.73	5.1	145	11.6	5
MW-20A	13.95	Upper	10.63	5.7	70	11	1.5
MW-30	16.78	Upper	12.17	6.3	191	15.3	12
MW-31	13.47	Upper	Dry				
WDOE-6A	21.68	Upper	14.23	6.2	210	13.4	5
<b>November 1996</b>							
MW-8A	21.10	Upper	15.55	NM	410	11.1	6
MW-20A	13.95	Upper	12.47	NM	112	9.3	0.5
MW-30	16.78	Upper	14.17	NM	215	12.7	5
MW-31	13.47	Upper	Dry				
WDOE-6A	21.68	Upper	16.02	NM	198	11.4	3.5

NM = Not Measured due to instrument malfunction.

Table 2: Analytical Results (ug/L) for August 28 and November 6, 1996

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
<b>August 1996</b>						
MW-8A	1.0 U	1.0 U	1.0 U	3.0 U	ND	1000
MW-20A	1.3	1.0 U	1.0 U	3.0 U	1.3	120 U
MW-30	1.0 U	1.0 U	1.0 U	3.0 U	ND	280
WDOE-6A	19	15	86	380	500	12,000
MW-6A(dup)*	19	15	81	360	475	12,000
<b>November 1996</b>						
MW-8A	1.1	1.7	1.8	0.72 J	5.3	1,400
MW-20A	4.3	0.81 J	0.47 J	1.0 U	5.6	845
MW-30	0.58 J	0.24 J	1.0 U	2.0 U	0.82	120 U
WDOE-6A	50	39	110	470	669	14,000
MW-6A(dup)*	48	40	110	460	658	13,000

U : Not detected at detection limit shown.

UJ: The analyte was not detected at or above the reported estimated result.

ND: Compounds Not Detected

\* : MW-6A is a duplicate sample of WDOE-6A.

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	July 1993	November 1993
Upper Aquifer														
WDOE-6A	6950	1180	5300	28000	7490	9870	5190	3460	2840	3830	2990	4784	2620	3070
MW-8A	230 <sup>1</sup>	388 <sup>1</sup>	479 <sup>1</sup>	334 <sup>1</sup>	64 <sup>2</sup>	20 <sup>2</sup>	178 <sup>2</sup>	19 <sup>2</sup>	20 <sup>2</sup>	9 <sup>2</sup>	53 <sup>2</sup>	47 <sup>2</sup>	30 <sup>2</sup>	41 <sup>2</sup>
MW-15A	1433	NT	NT	ND	218	NT	285	122	NT	NT	NT	NT	NT	NT
MW-17	ND	ND	ND	ND	ND	NT	NT	ND	ND	NT	2.7	ND	NT	NT
MW-20A	126	NT	NT	NT	20	20	1400	5	293	11	452	NT(Dry)	162	NT(Dry)
MW-30	-	-	-	-	-	-	-	-	-	-	-	-	-	NT
MW-9A	727	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Lower Aquifer														
Restover	NT	NT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.4	NT
Spencer	ND	ND	NT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NT
MW-12	53	5	8	ND	4	ND	6	ND	NT	NT	NT	NT	1.7	NT

Well Number	January 1994	April 1994	August 1994	November 1994	February 1995	April 1995	August 1995	October 1995	February 1996	April 1996	August 1996	November 1996
Upper Aquifer												
WDOE-6A	6360	5242	3214	4624	2120	1829	638	646	61	5900	488 <sup>2</sup>	664 <sup>2</sup>
MW-8A	36 <sup>2</sup>	4 <sup>2</sup>	8 <sup>1</sup>	32 <sup>2</sup>	ND	ND	ND	ND	ND	ND	ND	5
MW-15A	NT	NT	NT	NT	ND	NT	2	NT	ND	NT	NT	NT
MW-17	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-20A	ND	59	NT(Dry)	ND	ND	ND	18	NT(Dry)	ND	ND	1	6
MW-30	NT(Dry)	2400	NT(Dry)	NT(Dry)	8	8	7	ND	5	19	ND	1
MW-9A	NT(Dry)	366	NT	NT	ND	NT	1	NT	ND	NT	NT	NT
Lower Aquifer												
Restover	ND	NT	NT	NT	NT	NT	ND	NT	NT	NT	NT	NT
Spencer	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
MW-12	NT	NT	NT	NT	1.1	NT	Well Decommissioned					
MW-12A	-	-	-	-	-	-	0.5	NT	ND	NT	NT	NT

ND: Compound Not Detected

NT: Compound Not Tested

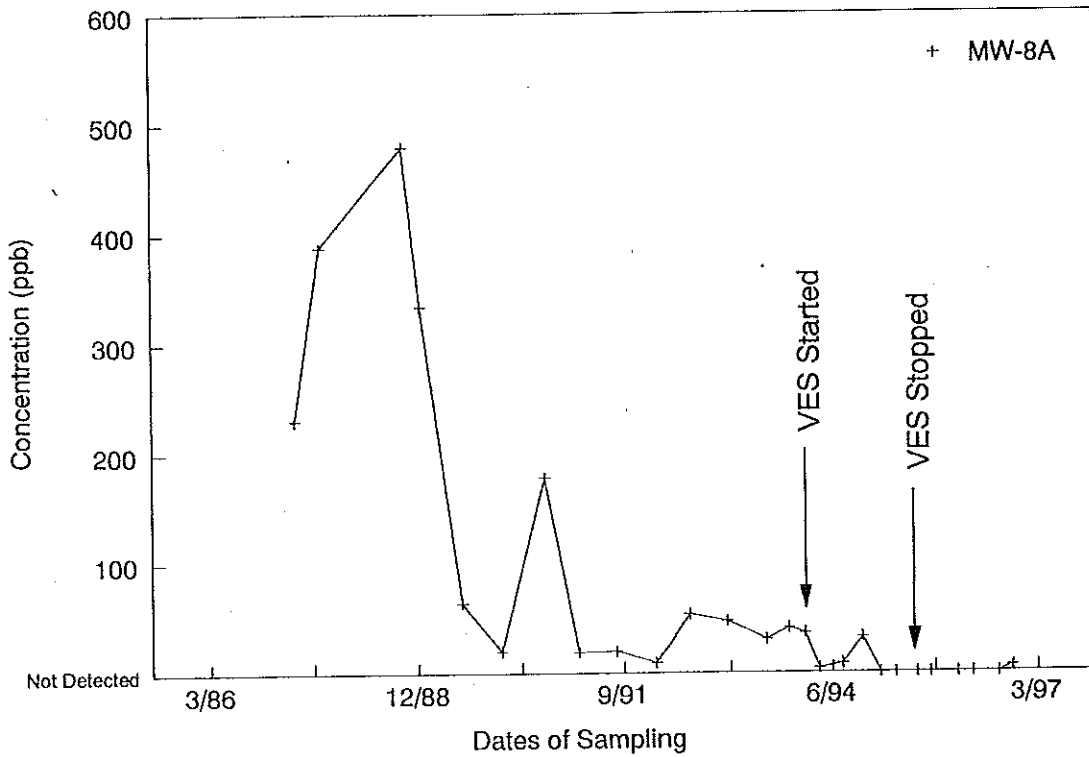
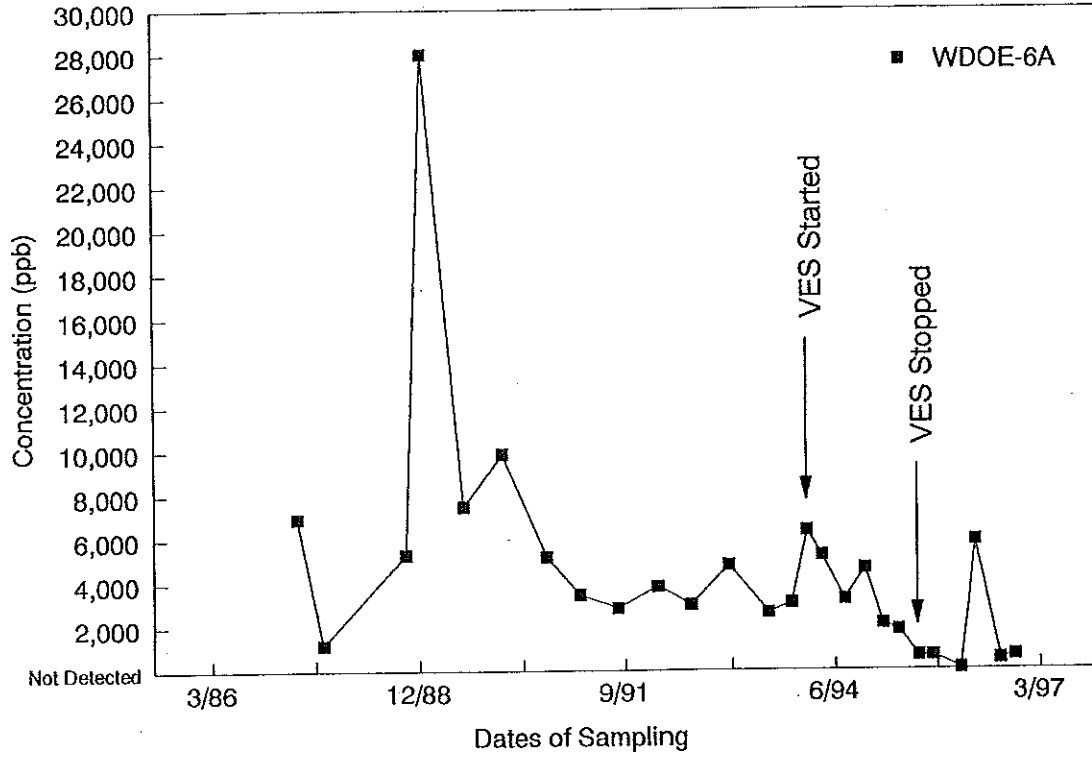
<sup>1</sup>: Value is based on one sample.

<sup>2</sup>: 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 1996



# APPENDIX A

Analytical Results  
Restover Truck Stop  
August 28, 1996 and November 6, 1996

## Manchester Environmental Laboratory

7411 Beach Dr E, Port Orchard Washington 98366

### CASE NARRATIVE

October 8, 1996

Subject: Restover Truck Stop  
Samples: 96358041 - 96358245  
Case No. 157696  
Officer: Pam Marti  
By: Myrna McIntosh *mm*  
Organics Analysis Unit

### BTEX Analysis of Restover Truck Stop

#### SUMMARY:

Samples 96358041 - 96358045 were analyzed for BTEX. Samples 96358044 and 96358045 were diluted because the concentration of the analytes detected exceeded the calibration range. Use results for benzene and toluene from the second dilution (DIL2) of each of these samples. Use results for ethylbenzene and total xylenes from the first dilution (DIL1).

#### METHODS:

These water samples were analyzed by purge and trap GC-PID.

#### BLANKS:

No analytes of interest were detected in the blanks.

#### SURROGATES:

All surrogate recoveries were within the control limits of 50 - 150%.

#### HOLDING TIMES:

Samples were analyzed within recommended holding times.

#### SPIKED SAMPLES:

An aliquot of sample 96358041 was spiked in duplicate. All spike recoveries were within the control limits of 75 - 125%.

**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.
- 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.
- bold** - The analyte was present in the sample. (Visual Aid to locate detected compound on report sheet.)



# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Benzene, Ethylbenzene, Toluene, Xylenes

Project Name: Restover Truck Stop

LIMS Project ID: 1576-96

Sample: BLN63284

Method: SW8020

Blank ID: BW6253A

Date Prepared: 09/09/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 09/09/96

Units: ug/L

Analyte	Result	Qualifier
Benzene	1.0	U
Toluene	1.0	U
Ethylbenzene	1.0	U
Total Xylenes	3.0	U

### Surrogate Recoveries

1,4-Difluorobenzene	87	%
---------------------	----	---

Authorized By: *Pam Marti*

Release Date: 10/18/96

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# Manchester Environmental Laboratory

## Department of Ecology

### Analysis Report for

### Benzene, Ethylbenzene, Toluene, Xylenes

Project Name: Restover Truck Stop

LIMS Project ID: 1576-96

Sample: 96358041 Date Received: 08/29/96 Method: SW8020

Field ID: MW-8A Date Prepared: 09/09/96 Matrix: Water

Project Officer: Pam Marti Date Analyzed: 09/09/96 Units: ug/L

Analyte	Result	Qualifier
---------	--------	-----------

Benzene	1.0	U
Toluene	1.0	U
Ethylbenzene	1.0	U
Total Xylenes	3.0	U

#### Surrogate Recoveries

1,4-Difluorobenzene	109	%
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# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Benzene, Ethylbenzene, Toluene, Xylenes

Project Name: Restover Truck Stop

LIMS Project ID: 1576-96

Sample: 96358041

Date Received: 08/29/96

Method: SW8020

Field ID: MW-8A

Date Prepared: 09/09/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 09/09/96

Units: ug/L

Analyte	Result	Qualifier
---------	--------	-----------

Benzene	1.0	U
Toluene	1.2	UJ
Ethylbenzene	1.0	U
Total Xylenes	3.0	U

### Surrogate Recoveries

1,4-Difluorobenzene	109	%
---------------------	-----	---

Authorized By: *Ka-fdd*

Release Date: 10/8/96

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# Manchester Environmental Laboratory

## Department of Ecology

### Analysis Report for

### Benzene, Ethylbenzene, Toluene, Xylenes

Project Name: Restover Truck Stop

LIMS Project ID: 1576-96

Sample: 96358041 (Matrix Spike - LMX1)

Date Received: 08/29/96

Method: SW8020

Field ID: MW-8A

Date Prepared: 09/09/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 09/09/96

Units: % Recovery

Analyte	Result	Qualifier
---------	--------	-----------

Benzene	101	
---------	-----	--

Toluene	101	
---------	-----	--

Ethylbenzene	103	
--------------	-----	--

Total Xylenes	98	
---------------	----	--

#### Surrogate Recoveries

1,4-Difluorobenzene	101	%
---------------------	-----	---

Authorized By: *Pam Marti*

Release Date: 10/8/96

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# Manchester Environmental Laboratory

Department of Ecology

## Analysis Report for

**Benzene, Ethylbenzene, Toluene, Xylenes**

Project Name: Restover Truck Stop

LIMS Project ID: 1576-96

Sample: 96358041 (Matrix Spike - LMX2) Date Received: 08/29/96 Method: SW8020

Field ID: MW-8A

Date Prepared: 09/09/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 09/09/96

Units: % Recovery

Analyte	Result	Qualifier
---------	--------	-----------

Benzene	101	
---------	-----	--

Toluene	101	
---------	-----	--

Ethylbenzene	103	
--------------	-----	--

Total Xylenes	98	
---------------	----	--

### Surrogate Recoveries

1,4-Difluorobenzene	102	%
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Authorized By: *Ka. T. ...*

Release Date: 10/8/96

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# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Benzene, Ethylbenzene, Toluene, Xylenes

Project Name: Restover Truck Stop

LIMS Project ID: 1576-96

Sample: 96358042

Date Received: 08/29/96

Method: SW8020

Field ID: MW-20A

Date Prepared: 09/09/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 09/09/96

Units: ug/L

Analyte	Result	Qualifier
---------	--------	-----------

Benzene	1.3	
Toluene	1.0	U
Ethylbenzene	1.0	U
Total Xylenes	3.0	U

Surrogate Recoveries

1,4-Difluorobenzene	88	%
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Authorized By: Kari Felt

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# Manchester Environmental Laboratory

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Analysis Report for

Benzene, Ethylbenzene, Toluene, Xylenes

Project Name: Restover Truck Stop

LIMS Project ID: 1576-96

Sample: 96358043

Date Received: 08/29/96

Method: SW8020

Field ID: MW-30

Date Prepared: 09/09/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 09/09/96

Units: ug/L

Analyte	Result	Qualifier
---------	--------	-----------

Benzene	1.0	U
Toluene	1.0	U
Ethylbenzene	1.0	U
Total Xylenes	3.0	U

### Surrogate Recoveries

1,4-Difluorobenzene	138	%
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# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Benzene, Ethylbenzene, Toluene, Xylenes

Project Name: Restover Truck Stop

LIMS Project ID: 1576-96

Sample: 96358044 (Dilution - DIL1)

Date Received: 08/29/96

Method: SW8020

Field ID: WDOE-6A

Date Prepared: 09/10/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 09/10/96

Units: ug/L

Analyte	Result	Qualifier
---------	--------	-----------

Benzene	20	U
Toluene	20	U
Ethylbenzene	86	
Total Xylenes	380	

Surrogate Recoveries

1,4-Difluorobenzene	115	%
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**Manchester Environmental Laboratory**

**Department of Ecology**

**Analysis Report for**

**Benzene, Ethylbenzene, Toluene, Xylenes**

**Project Name: Restover Truck Stop**

**LIMS Project ID: 1576-96**

**Sample: 96358044 (Dilution - DIL2) Date Received: 08/29/96 Method: SW8020**

**Field ID: WDOE-6A Date Prepared: 09/10/96 Matrix: Water**

**Project Officer: Pam Marti Date Analyzed: 09/10/96 Units: ug/L**

Analyte	Result	Qualifier
---------	--------	-----------

Benzene	19	
Toluene	15	
Ethylbenzene	89	
Total Xylenes	380	

**Surrogate Recoveries**

1,4-Difluorobenzene	132	%
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Authorized By: *Pam Marti*

Release Date: 10/8/96

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# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Benzene, Ethylbenzene, Toluene, Xylenes

Project Name: Restover Truck Stop

LIMS Project ID: 1576-96

Sample: 96358045 (Dilution - DIL1)

Date Received: 08/29/96

Method: SW8020

Field ID: MW-6A

Date Prepared: 09/10/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 09/10/96

Units: ug/L

Analyte	Result	Qualifier
Benzene	20	U
Toluene	20	U
Ethylbenzene	81	
Total Xylenes	360	

### Surrogate Recoveries

1,4-Difluorobenzene	113	%
---------------------	-----	---

Authorized By: *Pam Marti*

Release Date: 10/8/96

Page: 2

# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Benzene, Ethylbenzene, Toluene, Xylenes

Project Name: Restover Truck Stop	LIMS Project ID: 1576-96	
Sample: 96358045 (Dilution - DIL2)	Date Received: 08/29/96	Method: SW8020
Field ID: MW-6A	Date Prepared: 09/10/96	Matrix: Water
Project Officer: Pam Marti	Date Analyzed: 09/10/96	Units: ug/L

Analyte	Result	Qualifier
Benzene	19	
Toluene	15	
Ethylbenzene	85	
Total Xylenes	360	

Surrogate Recoveries

1,4-Difluorobenzene	138	%
---------------------	-----	---

Authorized By: *Kari L. Colby*

Release Date: 10/8/96


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## Manchester Environmental Laboratory

7411 Beach Dr E, Port Orchard Washington 98366

### CASE NARRATIVE

September 27, 1996

Subject: Restover Truckstop  
Samples: 96358041- 96358045  
Case No. 157696  
Officer: Pam Marti  
By: Myrna McIntosh   
Organics Analysis Unit

### WTPH-G Analysis of Restover Truckstop

#### SUMMARY:

Samples 96358041 - 96358045 were analyzed for gasoline. Data are usable as reported.

#### METHODS:

These water samples were analyzed by purge and trap GC-FID.

#### BLANKS:

No analytes of interest were detected in the blanks.

#### SURROGATES:

All surrogate recoveries were within the control limits of 50 - 150%.

#### HOLDING TIMES:

Samples were analyzed within the recommended holding time of 14 days.

#### DUPLICATE SAMPLE:

Sample 96358043 was analyzed in duplicate. The relative percent difference (RPD) between the samples is 23%.

**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.
- 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.
- bold** - The analyte was present in the sample. (Visual Aid to locate detected compound on report sheet.)

# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Gasoline

Project Name: Restover Truck Stop

LIMS Project ID: 1576-96

Sample: BLN63233

Method: WTPH-G

Blank ID: BW6253A

Date Prepared: 09/09/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 09/09/96

Units: mg/L

Analyte	Result	Qualifier
---------	--------	-----------

Gasoline	0.12	U
----------	------	---

Surrogate Recoveries

1,4-Difluorobenzene	79	%
---------------------	----	---

Authorized By: Karin Tedde

Release Date: 9/26/96

Page: 1

**Manchester Environmental Laboratory**  
**Department of Ecology**  
**Analysis Report for**  
**TPH as Gasoline**

**Project Name:** Restover Truck Stop

**LIMS Project ID:** 1576-96

**Sample:** 96358041

**Date Received:** 08/29/96

**Method:** WTPH-G

**Field ID:** MW-8A

**Date Prepared:** 09/09/96

**Matrix:** Water

**Project Officer:** Pam Marti

**Date Analyzed:** 09/09/96

**Units:** mg/L

Analyte	Result	Qualifier
---------	--------	-----------

Gasoline	1.0	
----------	-----	--

Surrogate Recoveries

1,4-Difluorobenzene	102	%
---------------------	-----	---

Authorized By: Karin Fiddis

Release Date: 9/26/96

Page: 1

# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Gasoline

Project Name: Restover Truck Stop

LIMS Project ID: 1576-96

Sample: 96358042

Date Received: 08/29/96

Method: WTPH-G

Field ID: MW-20A

Date Prepared: 09/09/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 09/09/96

Units: mg/L

Analyte	Result	Qualifier
---------	--------	-----------

Gasoline	0.12	U
----------	------	---

Surrogate Recoveries

1,4-Difluorobenzene	81	%
---------------------	----	---

Authorized By: Kari Tedder

Release Date: 9/26/96

Page: 1



# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Gasoline

Project Name: Restover Truck Stop

LIMS Project ID: 1576-96

Sample: 96358043

Date Received: 08/29/96

Method: WTPH-G

Field ID: MW-30

Date Prepared: 09/09/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 09/09/96

Units: mg/L

Analyte	Result	Qualifier
---------	--------	-----------

Gasoline	0.25	
----------	------	--

Surrogate Recoveries

1,4-Difluorobenzene	135	%
---------------------	-----	---

Authorized By: Karin Sedden

Release Date: 9/26/96

Page: 1

# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Gasoline

Project Name: Restover Truck Stop

LIMS Project ID: 1576-96

Sample: 96358043 (Duplicate - LDP1)

Date Received: 08/29/96

Method: WTPH-G

Field ID: MW-30

Date Prepared: 09/09/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 09/09/96

Units: mg/L

Analyte	Result	Qualifier
---------	--------	-----------

Gasoline	0.31	
----------	------	--

Surrogate Recoveries

1,4-Difluorobenzene	133	%
---------------------	-----	---

Authorized By: *Pam Zedler*

Release Date: 9/26/96

Page: 2

# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Gasoline

Project Name: Restover Truck Stop

LIMS Project ID: 1576-96

Sample: 96358044

Date Received: 08/29/96

Method: WTPH-G

Field ID: WDOE-6A

Date Prepared: 09/09/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 09/09/96

Units: mg/L

Analyte	Result	Qualifier
---------	--------	-----------

Gasoline	12	
----------	----	--

Surrogate Recoveries

1,4-Difluorobenzene	103	%
---------------------	-----	---

Authorized By: Karin Fiddler

Release Date: 9/26/96

Page: 1

# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Gasoline

Project Name: Restover Truck Stop

LIMS Project ID: 1576-96

Sample: 96358045

Date Received: 08/29/96

Method: WTPH-G

Field ID: MW-6A

Date Prepared: 09/09/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 09/09/96

Units: mg/L

Analyte	Result	Qualifier
---------	--------	-----------

Gasoline	12	
----------	----	--

Surrogate Recoveries

1,4-Difluorobenzene	104	%
---------------------	-----	---

Authorized By: Karin Fedden

Release Date: 9/26/96

Page: 1

## Manchester Environmental Laboratory

7411 Beach Dr E, Port Orchard Washington 98366

### CASE NARRATIVE

November 13, 1996

Subject: Restover Truck Stop  
Samples: 96458020 - 96458024  
Case No. 172196  
Officer: Pam Marti  
By: Myrna McIntosh *Mc*  
Organics Analysis Unit

### WTPH-G and BTEX Analysis of Restover Truck Stop

#### SUMMARY:

Samples 96458020 - 96458024 were analyzed for WTPH-G and BTEX. Data are usable as reported.

#### METHODS:

These samples were analyzed by Purge and Trap GC-FID and GC-PID.

#### BLANKS:

No analytes of interest were detected in the blanks.

#### SURROGATES:

All surrogate recoveries were within the control limits of 50 - 150%.

#### HOLDING TIMES:

Samples were extracted and analyzed within recommended holding times.

#### DUPLICATE AND SPIKED SAMPLES:

A duplicate gasoline analysis was performed on sample 96458022. The relative percent difference (RPD) between the samples is 4%. Replicate samples of 96458020 were spiked with the BTEX compounds. All recoveries are within the range of 50 - 150 % and are acceptable for BTEX analysis.

**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.
- 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.
- bold** - The analyte was present in the sample. (Visual Aid to locate detected compound on report sheet.)

# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Gasoline

Project Name: Restover Truck Stop

LIMS Project ID: 1721-96

Sample: 96458020

Date Received: 11/08/96

Method: WTPH-G

Field ID: MW-8A

Date Prepared: 11/08/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 11/08/96

Units: mg/L

Analyte	Result	Qualifier
---------	--------	-----------

Gasoline	1.4	
----------	-----	--

Surrogate Recoveries

1,4-Difluorobenzene	90	%
---------------------	----	---

Authorized By: *Pam Marti*

Release Date: 11/13/96

Page:

1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Benzene, Ethylbenzene, Toluene, Xylenes

Project Name: Restover Truck Stop

LIMS Project ID: 1721-96

Sample: 96458020 (Matrix Spike - LMX1) Date Received: 11/08/96 Method: SW8020  
Field ID: MW-8A Date Prepared: 11/07/96 Matrix: Water  
Project Officer: Pam Marti Date Analyzed: 11/07/96 Units: % Recovery

Analyte	Result	Qualifier
Benzene	106	
Toluene	107	
Ethylbenzene	94	
m & p-Xylene	88	
o-Xylene	90	

Surrogate Recoveries

1,4-Difluorobenzene	130	%
---------------------	-----	---

Authorized By: 

Release Date: 11/20/96

Page: 2



# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Benzene, Ethylbenzene, Toluene, Xylenes

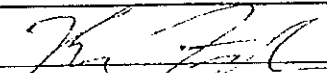
Project Name: Restover Truck Stop	LIMS Project ID: 1721-96	
Sample: 96458020 (Matrix Spike - LMX2)	Date Received: 11/08/96	Method: SW8020
Field ID: MW-8A	Date Prepared: 11/07/96	Matrix: Water
Project Officer: Pam Marti	Date Analyzed: 11/07/96	Units: % Recovery

Analyte	Result	Qualifier
Benzene	101	
Toluene	104	
Ethylbenzene	91	
m & p-Xylene	86	
o-Xylene	88	

Surrogate Recoveries

1,4-Difluorobenzene	128	%
---------------------	-----	---

Authorized By: 

Release Date: 11/20/96

# Manchester Environmental Laboratory

## Department of Ecology

### Analysis Report for

### TPH as Gasoline

Project Name: Restover Truck Stop

LIMS Project ID: 1721-96

Sample: 96458021

Date Received: 11/08/96

Method: WTPH-G

Field ID: MW-30

Date Prepared: 11/08/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 11/08/96

Units: mg/L

Analyte	Result	Qualifier
---------	--------	-----------

Gasoline	0.12	U
----------	------	---

#### Surrogate Recoveries

1,4-Difluorobenzene	102	%
---------------------	-----	---

Authorized By: [Signature]

Release Date: 11/13/96

Page: 1

# Manchester Environmental Laboratory

## Department of Ecology

### Analysis Report for

### TPH as Gasoline

Project Name: Restover Truck Stop

LIMS Project ID: 1721-96

Sample: 96458022

Date Received: 11/08/96

Method: WTPH-G

Field ID: MW-20A

Date Prepared: 11/07/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 11/07/96

Units: mg/L

Analyte	Result	Qualifier
---------	--------	-----------

Gasoline	0.83	
----------	------	--

#### Surrogate Recoveries

1,4-Difluorobenzene	113	%
---------------------	-----	---

Authorized By: *Pam Marti*

Release Date: 11/13/96

Page: 1

# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Gasoline

Project Name: Restover Truck Stop

LIMS Project ID: 1721-96

Sample: 96458022 (Duplicate - LDPI)

Date Received: 11/08/96

Method: WTPH-G

Field ID: MW-20A

Date Prepared: 11/07/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 11/07/96

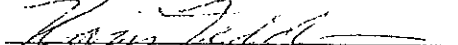
Units: mg/L

Analyte	Result	Qualifier
---------	--------	-----------

Gasoline	0.86	
----------	------	--

Surrogate Recoveries

1,4-Difluorobenzene	113	%
---------------------	-----	---

Authorized By: 

Release Date: 11/13/96

Page:

2

# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Gasoline

Project Name: Restover Truck Stop

LIMS Project ID: 1721-96

Sample: 96458023

Date Received: 11/08/96

Method: WTPH-G

Field ID: WDOE-6A

Date Prepared: 11/07/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 11/07/96

Units: mg/L

Analyte	Result	Qualifier
---------	--------	-----------

Gasoline	14	
----------	----	--

Surrogate Recoveries

1,4-Difluorobenzene	128	%
---------------------	-----	---

Authorized By: *Karin Todd*

Release Date: 11/13/96

Page: 1

# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Gasoline

Project Name: Restover Truck Stop

LIMS Project ID: 1721-96

Sample: 96458024

Date Received: 11/08/96

Method: WTPH-G

Field ID: MW-6A

Date Prepared: 11/07/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 11/07/96

Units: mg/L

Analyte	Result	Qualifier
---------	--------	-----------

Gasoline	13	
----------	----	--

Surrogate Recoveries

1,4-Difluorobenzene	127	%
---------------------	-----	---

Authorized By: *Kari Fiedler*

Release Date: 11/13/96

Page:

1

# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Gasoline

Project Name: Restover Truck Stop

LIMS Project ID: 1721-96

Sample: BLN63975

Method: WTPH-G

Blank ID: OBW63121A

Date Prepared: 11/07/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 11/07/96

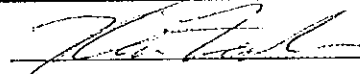
Units: mg/L

Analyte	Result	Qualifier
---------	--------	-----------

Gasoline	0.12	U
----------	------	---

Surrogate Recoveries

1,4-Difluorobenzene	79	%
---------------------	----	---

Authorized By: 

Release Date: 11-13-96

Page:

1

# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Gasoline

Project Name: Restover Truck Stop

LIMS Project ID: 1721-96

Sample: BLN63976

Method: WTPH-G

Blank ID: OBW63131A

Date Prepared: 11/08/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 11/08/96

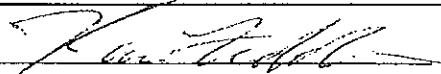
Units: mg/L

Analyte	Result	Qualifier
---------	--------	-----------

Gasoline	0.12	U
----------	------	---

Surrogate Recoveries

1,4-Difluorobenzene	123	%
---------------------	-----	---

Authorized By: 

Release Date: 11/13/96

Page: 1



# Manchester Environmental Laboratory

## Department of Ecology

### Analysis Report for

### Benzene, Ethylbenzene, Toluene, Xylenes

Project Name: Restover Truck Stop

LIMS Project ID: 1721-96

Sample: 96458020

Date Received: 11/08/96

Method: SW8020

Field ID: MW-8A

Date Prepared: 11/07/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 11/07/96

Units: ug/L

Analyte	Result	Qualifier
---------	--------	-----------

Benzene	1.1	
Toluene	1.7	
Ethylbenzene	1.8	
m & p-Xylene	0.41	J
o-Xylene	0.31	J

#### Surrogate Recoveries

1,4-Difluorobenzene	124	%
---------------------	-----	---

Authorized By: *Karen T. [Signature]*

Release Date: 11/13/96

Page: 1

# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Benzene, Ethylbenzene, Toluene, Xylenes

Project Name: Restover Truck Stop

LIMS Project ID: 1721-96

Sample: 96458021

Date Received: 11/08/96

Method: SW8020

Field ID: MW-30

Date Prepared: 11/07/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 11/07/96

Units: ug/L

Analyte	Result	Qualifier
Benzene	0.58	J
Toluene	0.24	J
Ethylbenzene	1.0	U
m & p-Xylene	2.0	U
o-Xylene	1.0	U

#### Surrogate Recoveries

1,4-Difluorobenzene	97	%
---------------------	----	---

Authorized By: 

Release Date: 11/13/96

Page: 1

# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Benzene, Ethylbenzene, Toluene, Xylenes

Project Name: Restover Truck Stop

LIMS Project ID: 1721-96

Sample: 96458022

Date Received: 11/08/96

Method: SW8020

Field ID: MW-20A

Date Prepared: 11/07/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 11/07/96

Units: ug/L

Analyte	Result	Qualifier
---------	--------	-----------

Benzene	4.3	
---------	-----	--

Toluene	0.81	J
---------	------	---

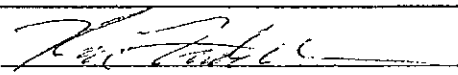
Ethylbenzene	0.47	J
--------------	------	---

m & p-Xylene	1.0	U
--------------	-----	---

o-Xylene	1.0	U
----------	-----	---

Surrogate Recoveries

1,4-Difluorobenzene	125	%
---------------------	-----	---

Authorized By: 

Release Date: 11/13/96

Page: 1

# Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Benzene, Ethylbenzene, Toluene, Xylenes

Project Name: Restover Truck Stop

LIMS Project ID: 1721-96

Sample: 96458023

Date Received: 11/08/96

Method: SW8020

Field ID: WDOE-6A

Date Prepared: 11/07/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 11/07/96

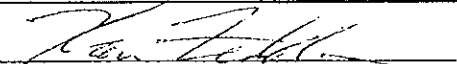
Units: ug/L

Analyte	Result	Qualifier
---------	--------	-----------

Benzene	50	
Toluene	39	
Ethylbenzene	110	
m & p-Xylene	360	
o-Xylene	110	

Surrogate Recoveries

1,4-Difluorobenzene	128	%
---------------------	-----	---

Authorized By: 

Release Date: 11/13/96

Page:

1

# Manchester Environmental Laboratory

Department of Ecology

## Analysis Report for

### Benzene, Ethylbenzene, Toluene, Xylenes

Project Name: Restover Truck Stop

LIMS Project ID: 1721-96

Sample: 96458024

Date Received: 11/08/96

Method: SW8020

Field ID: MW-6A

Date Prepared: 11/07/96

Matrix: Water

Project Officer: Pam Marti

Date Analyzed: 11/07/96

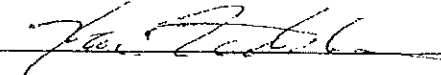
Units: ug/L

Analyte	Result	Qualifier
---------	--------	-----------

Benzene	48	
Toluene	40	
Ethylbenzene	110	
m & p-Xylene	350	
o-Xylene	110	

#### Surrogate Recoveries

1,4-Difluorobenzene	127	%
---------------------	-----	---

Authorized By: 

Release Date: 11/13/96

Page: 1

# Manchester Environmental Laboratory

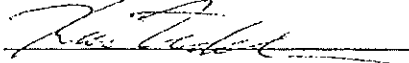
Department of Ecology

Analysis Report for

Benzene, Ethylbenzene, Toluene, Xylenes

Project Name: Restover Truck Stop	LIMS Project ID: 1721-96
Sample: BLN63975	Method: SW8020
Blank ID: OBW63121A	Date Prepared: 11/07/96
Project Officer: Pam Marti	Date Analyzed: 11/07/96
	Matrix: Water
	Units: ug/L

Analyte	Result	Qualifier
Benzene	1.0	U
Toluene	1.0	U
Ethylbenzene	1.0	U
m & p-Xylene	2.0	U
o-Xylene	1.0	U
Surrogate Recoveries		
1,4-Difluorobenzene	84	%

Authorized By: 

Release Date: 11/15/96