



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

7171 Cleanwater Lane, Building 8, LH-14 • Olympia, Washington 98504

February 19, 1991

TO: Mike Kuntz
FROM: Dave ^{PS}Serdar and Pam Marti
SUBJECT: Restover Truck Stop Ground Water Monitoring Round Five.

Introduction: The fifth round of ground water monitoring at the Restover Truck Stop was completed by the Toxics Investigations and Ground Water Monitoring Section on August 28 - September 4, 1990. Two domestic supply and five monitoring wells were sampled for benzene, toluene, ethylbenzene, and total xylenes (BTEX) and dissolved iron. Figure 1 shows the locations of sampled wells. Monitoring Well 26A (MW-26A) was not sampled during round five because past results indicate that the well is not contaminated. MW-15A was sampled in place of MW-26A in order to determine the concentration of contaminants north of the source area.

Methods: Prior to sample collection, static water level measurements were obtained from 14 onsite wells using an electric well probe which was rinsed with deionized water and wiped clean between measurements (Table 1). Three or more well volumes were removed prior to sampling using either a centrifugal pump or decontaminated teflon bailer. Wells were purged until pH, temperature, and specific conductance stabilized. Monitoring well samples were collected using decontaminated, bottom-emptying teflon bailers. Supply wells were sampled at the tap nearest the pump.

Sampling equipment was decontaminated using a Liquinox wash, three tap rinses, and a deionized water rinse. Teflon bailers were rinsed with a 10 percent nitric acid/deionized water solution, acetone, and a final deionized water rinse. The peristaltic pump, tubing, and filter bed used for filtration of dissolved iron samples were rinsed between samples using 500 ml of a 10 percent nitric acid/deionized water solution, followed by 500 ml of deionized water. Filters were changed between each sample.

Samples for BTEX analysis were collected in 40 mL amber glass vials with teflon septa caps. The samples were acidified with concentrated HCl and the bottles were filled to eliminate head space. Dissolved iron samples were collected in 1 L cubitainers and preserved with .1 mL concentrated HNO₃.

Restover Truck Stop Sampling Round Five

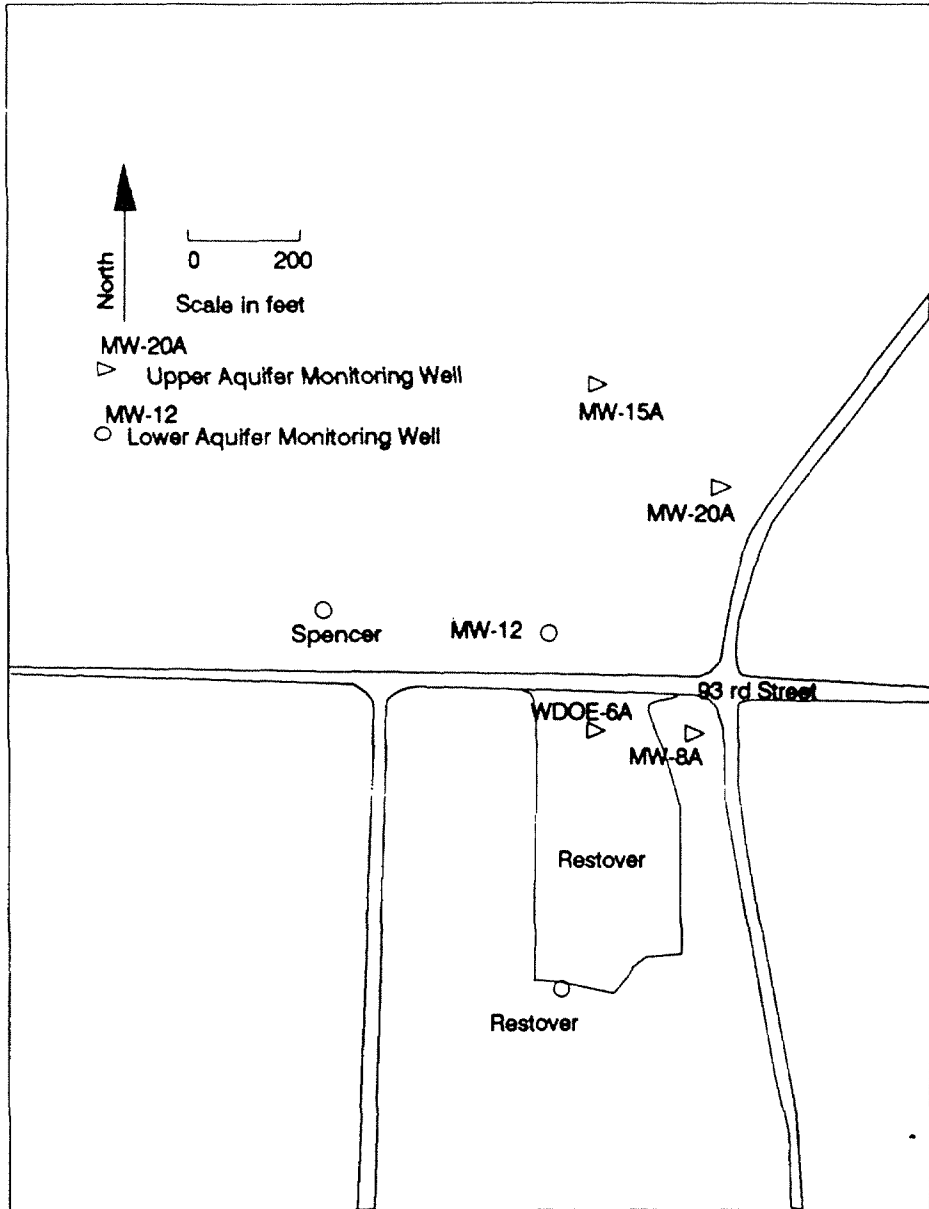


Figure 1: Sampling Locations
August, 1990

Quality Assurance: Quality control samples consisted of a duplicate, a transfer blank, a transport blank, and a filter blank. Duplicate samples were obtained from monitoring well MW-8A. Transfer blanks for BTEX and dissolved iron were obtained by pouring organic free water through the bailer and collecting rinsate in the sample containers. The filter blank was obtained by pumping deionized water through the peristaltic pump and filter bed. In addition to quality control samples collected in the field, matrix spike, matrix spike duplicates and surrogate compound analyses were performed in the laboratory.

All data are considered acceptable for use. The transfer, transport, and method blank results showed no laboratory or field contamination of samples by BTEX. However, air bubbles were present in both the transfer and transport blank samples. Both the Transfer and Filter Blank analytical results showed a trace of iron contamination. However, one of the Method Blank analyses performed by the laboratory also showed trace contamination. Samples containing iron concentrations within a factor of five of the concentrations found in the blanks were flagged with a "B". Matrix spike and surrogate recoveries for BTEX and iron were all within acceptable limits. The relative percent differences between duplicate samples collected from MW-8A are 12.5% for benzene, 9.1% for toluene, 0% for ethylbenzene and total xylenes, and 1.1% for dissolved iron.

Field Observations: A distinct gasoline odor and oily sheen was observed on water collected from WDOE-6A. MW-27A was dry as it has been in the past. Well casings from WDOE-2 and MW-22 had been severed at ground level by vegetation cutters. These wells are no longer suitable for static water level measurements.

Table 1 shows the water level elevations in onsite wells. Figure 2 shows the potentiometric surface in the upper aquifer. Table 2 lists pH, temperature and specific conductance results.

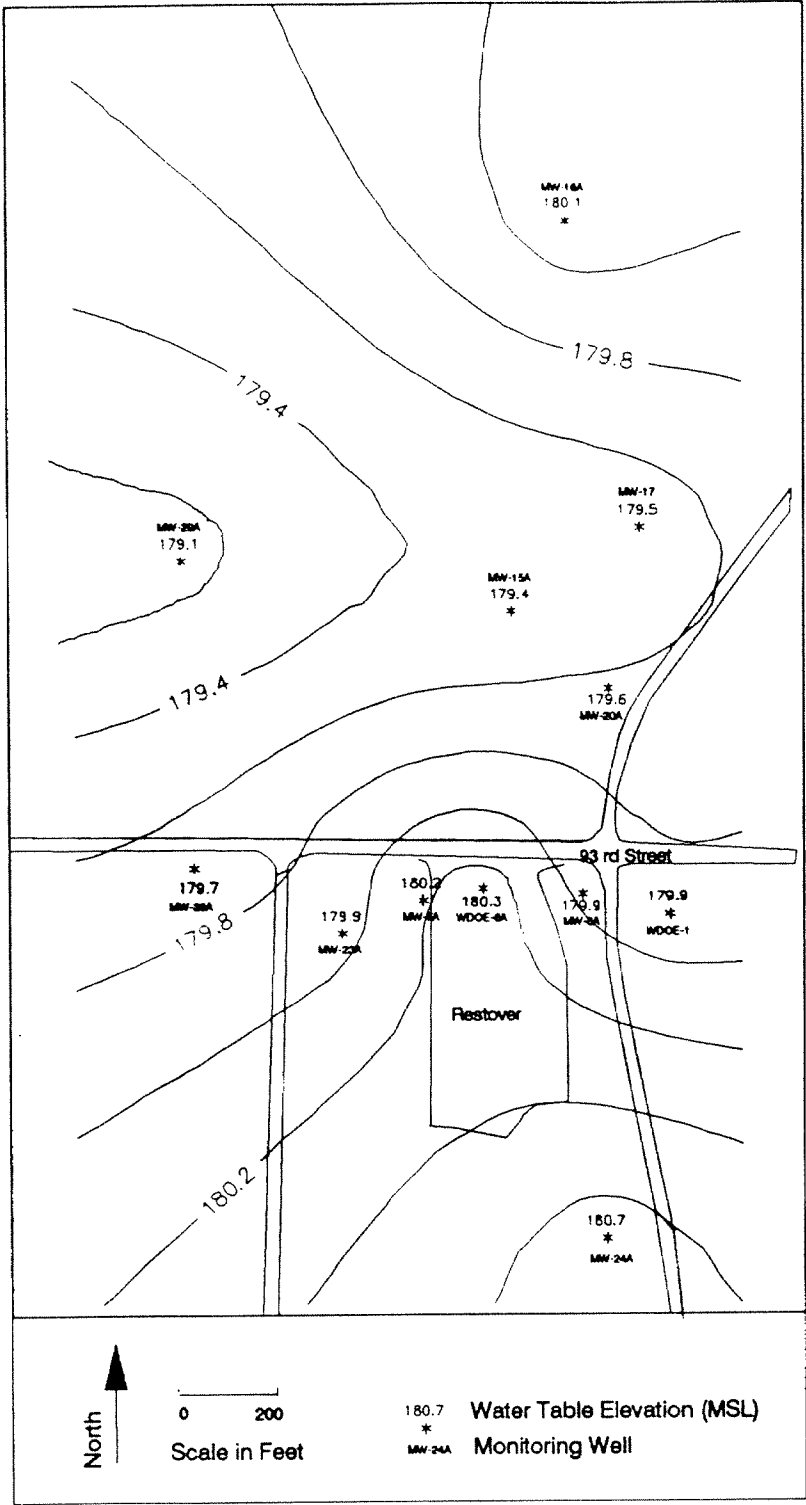


Figure 2: Restover Truck Stop
 Water Table Map, August 1990

Table 1: Water Table Elevations (MSL)

<u>Well ID</u>	<u>Elevation (MSL)</u>
Upper Aquifer	
WDOE-1	179.86
WDOE-2	CASING SEVERED
WDOE-6A	180.30
MW-7A	180.21
MW-8A	179.94
MW-15A	<u>179.41</u>
MW-17	179.48
MW-18A	180.13
MW-20A	179.63
MW-22	CASING SEVERED
MW-23A	179.72
MW-24A	180.70
MW-26A	179.69
MW-27A	DRY
MW-29A	179.12
Lower Aquifer	
MW-12	179.03
MW-16	<u>178.94</u>

8/29/90 - site conditions = raining

8/30/90 - site conditions = raining

9/04/90 - site conditions = sunny and hot (dry weekend)

Table 2: Field Sampling Results (In Order Sampled)

Well ID	pH (standard units)	Specific Conductance (umhos/cm)	Temperature (degrees C)	Purge Volume (gals)	Aquifer (Upper/ Lower)
MW-12	6.32	103	12.5	101	L
Restover	6.31	108	11.3	258	L
Spencer	6.35	84	11.3	380	L
MW-20A	6.17	130	11.4	5	U
MW-8A	6.17	195	13.2	70	U
MW-15A	6.04	122	11.8	8	U
WDOE-6A	6.17	240	14.1	110	U

Sample Analytical Results: Analytical results for BTEX and dissolved iron are presented in Table 3. Table 4 shows BTEX concentrations for sampling events between May 1987 and August 1990.

Table 3: Analytical Results (ug/L)

Well ID	Benzene	Toluene	Ethylbenzene	Total Xylene	Dissolved Iron
MW-12	3 J	ND	3 J	ND	754
Restover	ND	ND	ND	ND	27.3 B
Spencer	ND	ND	ND	ND	9.4 B,J
MW-20A	67	93	240	1000	745
MW-8A	34	23	24	100	5290
Duplicate	30	21	24	100	5230
MW-15A	160	18	55	52	244
WDOE-6A	740	1200	550	2700	5740
Transfer	ND	ND	ND	ND	8.0 B,J
Transport	ND	ND	ND	ND	NA
Filter	NA	NA	NA	NA	5.6 B,J

B: Analyte Detected in Associated Blanks
 J: Concentration is Estimated
 ND: Analyte Not Detected
 NA: Analyte Not Analyzed

Table 4: Historical Restover Truck Stop BTEX Concentrations (ug/L)

Well ID	5/87	9/87	10/88	1/89	7/89	1/90	8/90
Upper Aquifer							
WDOE-6A	6950	1180	5300	28000	7490	9870	5190
MW-8A	230	388	479	334	58	14.1	178
MW-15A	1433	NT	NT	ND	218	NT	285
MW-20A	126	NT	NT	NT	NT	20	1400
Lower Aquifer							
Restover	NT	NT	ND	ND	ND	ND	ND
Spencer	ND	NT	ND	ND	ND	ND	ND
MW-12	53	5	7.7	ND	4	ND	6

ND: Compound Not Detected
 NT: Compound Not Tested

Discussion: Groundwater flow in the upper aquifer appears to be northwesterly as it has been in the past. No contamination was detected in either of the domestic water supplies sampled. Traces of benzene and ethylbenzene were detected in MW-12 as in the past. Dissolved iron in MW-12 may indicate that weathered gasoline is still present. Acetone was also found in the sample from MW-12, but it is most likely a remnant of acetone used in the field equipment decontamination process. The extent of hydrocarbon contamination in the upper aquifer appears to be stable. Monitoring wells WDOE-6A, MW-8A, MW-15A and MW-20A showed detectable concentrations of BTEX. MW-20A showed the greatest change in BTEX levels, up to 1400 ug/L from 20 ug/L in the January 1990 sample. Dissolved iron was found at relatively high concentrations in WDOE-6A and MW-8A, moderate levels in MW-12, MW-15A, and MW-20A, and trace levels in the domestic supply wells.

Conclusions:

1. WDOE-6A continues to show high concentrations of BTEX, although it is the lowest level seen since routine monitoring began in October 1988.
2. Dissolved iron continues to be detected at high levels where BTEX contamination is present. The highest concentrations occur near the contamination source and decrease downgradient from the source.

3. BTEX contamination may still be found at relatively long distances (approximately 600 ft.) from the source as demonstrated by a detectable concentration in MW-15A. The presence of contaminants at MW-15A, combined with the highest concentrations yet observed in MW-20 (approximately 500 ft. from the source), indicate that the plume is spreading to the north in the direction of groundwater movement.

Recommendations:

1. Monitoring wells WDOE-6A, MW-8A, MW-12, MW-15A, MW-20A, the Spencer well, and the Restover supply well should continue to be sampled for BTEX and dissolved iron. In addition, MW-17 should be sampled for dissolved iron and BTEX since it is located near MW-15A which showed elevated BTEX.
2. All of the upper aquifer wells should be sampled for BTEX and dissolved iron to determine the current extent of the contamination plume. This has not been done since September 1987.
3. Monitoring wells WDOE-2 and MW-22, which are no longer useful for monitoring because their casings have been severed, should be properly abandoned or rehabilitated as soon as possible. Wells should be abandoned in accordance with WAC 173-160-560 of Minimum Standards for Construction and Maintenance of Wells.

WDOE-2 is completed in the upper aquifer and according to the as-built diagram a surface seal was not installed in the annular space. To prevent the borehole from acting as a conduit from the surface to the aquifer, it is recommended that the drilling contractor remove the existing casing and re-drill the entire hole. The new hole should then be plugged with grout or bentonite from bottom to surface.

MW-22 is also completed in the upper aquifer. Although it appears to have been properly constructed, the seal is only two feet thick, the minimum allowed for resource protection wells. To prevent continuity between surface and ground water through the borehole, it should be abandoned using the same procedures recommended for WDOE-2.

DS/PM:krc

cc: Bill Yake

==> Transaction #: 10040811 Laboratory: (WE) Ecology, Manchester Lab
 Work Group: (38) Metals - ICP Scan
 Instrument: (ICP) ICP, Jarrell-Ash AtomComp 1100 (DOE)
 Method: (EP1-200.7) Inductively Coupled Plasma Atomic Emissions Analysis
 Chemist: (CQJ) Jackson, Carol DOE Hours Worked: _____

Project: DOE-0240 RESTOVER TRUCK STOP Prg Ele#: D3K01
 Prj Off: Serdar, Dave DOE Analysis Due: 900829 Revised Due:

*** Sample Records in Transaction ***

Parameter Form File: ICP381101 Title: ICP Scan, Water Dissolved

Seq#	Sample #	QA	Date/Time	Description	Alternate Keys
01	90358080		900828	RESTOVER	
02	90358081		900828	SPENCER	
03	90358082		900828	MW-12	
04	90358083		900830	MW-20A	
05	90358084		900904	MW-15A	
06	90358084	LMX1	900904	MW-15A	
07	90358084	LMX2	900904	MW-15A	
08	90358084	LBK1	900904	MW-15A	
09	90358084	LBK2	900904	MW-15A	
10	90358085		900830	MW-8A	
11	90358085	LMX1	900830	MW-8A	
12	90358085	LMX2	900830	MW-8A	
13	90358085	LBK1	900830	MW-8A	
14	90358085	LBK2	900830	MW-8A	
15	90358086		900830	MW-8A(DUP)	
16	90358087		900904	MW-6A	
17	90358089		900830	TRANSFER	
18	90358090		900830	FILTER	

Record Type: TRNIN1 Date Verified: 10/16/90 By: [Signature]
 Transaction Status: Edited Transaction... First Printing... Unverified.
 Processed: 4-OCT-90 09:05:13 Status: E Batch: (In CUR DB)

Transaction #: 10040811 (38) Metals - ICP Scan
Proj Code : DOE-0240 RESTOVER TRUCK STOP PE # : D3K01

Sample Number: 90358080 90358081 90358082 90358083 90358084
Site Description: RESTOVER SPENCER MW-12 MW-20A MW-15A
Matrix: Water-Fil Water-Fil Water-Fil Water-Fil Water-Fil

Units:

% Slds:

QA Code:

Date Extract:

Date Analyz'd: 900906 900906 900906 900906 900912

Element	Unit	900906	900906	900906	900906	900912
1 Aluminum	Al-Diss ug/l					
2 Antimony	Sb-Diss ug/l					
3 Arsenic	As-Diss ug/l					
4 Barium	Ba-Diss ug/l					
5 Beryllium	Be-Diss ug/l					
6 Boron	B -Diss ug/l					
7 Cadmium	Cd-Diss ug/l					
8 Calcium	Ca-Diss mg/l					
9 Chromium	Cr-Diss ug/l					
10 HexChrom	Cr6Diss ug/l					
11 Cobalt	Co-Diss ug/l					
12 Copper	Cu-Diss ug/l					
13 Iron	Fe-Diss ug/l	27.3B	9.4JB	754	745	244
14 Lead	Pb-Diss ug/l					
15 Manganese	Mg-Diss mg/l					
16 Manganese	Mn-Diss ug/l					
17 Molybdenum	Mo-Diss ug/l					
18 Nickel	Ni-Diss ug/l					
19 Potassium	K -Diss mg/l					
20 Selenium	Se-Diss ug/l					
21 Silicon	Si-Diss ug/l					
22 Silver	Ag-Diss ug/l					
23 Sodium	Na-Diss mg/l					
24 Strontium	Sr-Diss ug/l					
25 Thallium	Tl-Diss ug/l					
26 Tin	Sn-Diss ug/l					
27 Titanium	Ti-Diss ug/l					
28 Tungsten	W -Diss ug/l					
29 Vanadium	V -Diss ug/l					
30 Zinc	Zn-Diss ug/l					

Transaction #: 10040811

(38) Metals - ICP Scan

Proj Code : DOE-0240 RESTOVER TRUCK STOP

PE # : D3K01

Blank ID:			PB 37.52	PB 37.53	
Sample Number:	90358084	90358084	90358084	90358084	90358085
Sample Description:	MW-15A	MW-15A	MW-15A	MW-15A	MW-8A
Matrix:	Water-Fil	Water-Fil	Water-Fil	Water-Fil	Water-Fil
Units:	% Recov	% Recov			
% Slds:					
QA Code:	LMX1	LMX2	LBK1	LBK2	
Date Extract:					
Date Analyzd:	900912	900912	900912	900912	900906
1 Aluminum Al-Diss	ug/l				
2 Antimony Sb-Diss	ug/l				
3 Arsenic As-Diss	ug/l				
4 Barium Ba-Diss	ug/l				
5 Beryllium Be-Diss	ug/l				
6 Boron B -Diss	ug/l				
7 Cadmium Cd-Diss	ug/l				
8 Calcium Ca-Diss	mg/l				
9 Chromium Cr-Diss	ug/l				
10 HexChrom Cr6Diss	ug/l				
11 Cobalt Co-Diss	ug/l				
12 Copper Cu-Diss	ug/l				
13 Iron Fe-Diss	ug/l	106	103	2.0U	2.0U
14 Lead Pb-Diss	ug/l				5290
15 Mgnsium Mg-Diss	mg/l				
16 Mangnese Mn-Diss	ug/l				
17 Molybdenm Mo-Diss	ug/l				
18 Nickel Ni-Diss	ug/l				
19 Potassium K -Diss	mg/l				
20 Selenium Se-Diss	ug/l				
21 Silicon Si-Diss	ug/l				
22 Silver Ag-Diss	ug/l				
23 Sodium Na-Diss	mg/l				
24 Strontium Sr-Diss	ug/l				
25 Thallium Tl-Diss	ug/l				
26 Tin Sn-Diss	ug/l				
27 Titanium Ti-Diss	ug/l				
28 Tungsten W -Diss	ug/l				
29 Vanadium V -Diss	ug/l				
30 Zinc Zn-Diss	ug/l				

Transaction #: 10040811

(38) Metals - ICP Scan

Proj Code : DOE-0240 RESTOVER TRUCK STOP

PE # : D3K01

Blank ID:

Sample Number:

Sample Description:

Matrix:

Units:

% Slds:

QA Code:

Date Extract:

Date Analyzd:

Sample Number	Sample Description	Matrix	Units	% Recov	QA Code	Date Analyzd
1	Aluminum Al-Diss	Water-Fil	ug/l		LMX1	900906
2	Antimony Sb-Diss	Water-Fil	ug/l		LMX2	900906
3	Arsenic As-Diss	Water-Fil	ug/l		LBK1	900906
4	Barium Ba-Diss	Water-Fil	ug/l		LBK2	900906
5	Beryllium Be-Diss	Water-Fil	ug/l			
6	Boron B -Diss	Water-Fil	ug/l			
7	Cadmium Cd-Diss	Water-Fil	ug/l			
8	Calcium Ca-Diss	Water-Fil	mg/l			
9	Chromium Cr-Diss	Water-Fil	ug/l			
10	HexChrom Cr6Diss	Water-Fil	ug/l			
11	Cobalt Co-Diss	Water-Fil	ug/l			
12	Copper Cu-Diss	Water-Fil	ug/l			
13	Iron Fe-Diss	Water-Fil	ug/l	95		
14	Lead Pb-Diss	Water-Fil	ug/l	110		
15	Magnesium Mg-Diss	Water-Fil	mg/l	7.5J		
16	Manganese Mn-Diss	Water-Fil	ug/l	2.4J		
17	Molybdenum Mo-Diss	Water-Fil	ug/l	5230		
18	Nickel Ni-Diss	Water-Fil	ug/l			
19	Potassium K -Diss	Water-Fil	mg/l			
20	Selenium Se-Diss	Water-Fil	ug/l			
21	Silicon Si-Diss	Water-Fil	ug/l			
22	Silver Ag-Diss	Water-Fil	ug/l			
23	Sodium Na-Diss	Water-Fil	mg/l			
24	Strontium Sr-Diss	Water-Fil	ug/l			
25	Thallium Tl-Diss	Water-Fil	ug/l			
26	Tin Sn-Diss	Water-Fil	ug/l			
27	Titanium Ti-Diss	Water-Fil	ug/l			
28	Tungsten W -Diss	Water-Fil	ug/l			
29	Vanadium V -Diss	Water-Fil	ug/l			
30	Zinc Zn-Diss	Water-Fil	ug/l			

Sample Number	Sample Description	Matrix	Units	% Recov	QA Code	Date Analyzd
90358085	MW-8A	Water-Fil	ug/l		LMX1	900906
90358085	MW-8A	Water-Fil	ug/l		LMX2	900906
90358085	MW-8A	Water-Fil	ug/l		LBK1	900906
90358085	MW-8A	Water-Fil	ug/l		LBK2	900906
90358086	MW-8A(DUP)	Water-Fil	ug/l			900906

PB 36.40 PB 36.41

90358085 90358085 90358085 90358085 90358086

MW-8A MW-8A MW-8A MW-8A MW-8A(DUP)

Water-Fil Water-Fil Water-Fil Water-Fil Water-Fil

Water-Fil Water-Fil Water-Fil Water-Fil Water-Fil

LMX1

LMX2

LBK1

LBK2

95

110

7.5J

2.4J

5230

Transaction #: 10040811

(38) Metals - ICP Scan

Proj Code : DOE-0240 RESTOVER TRUCK STOP

PE # : D3K01

Sample Number:	90358087	90358089	90358090
Sample Description:	MW-6A	TRANSFER	FILTER
Matrix:	Water-Fil	Water-Fil	Water-Fil
Units:			
% Slds:			
QA Code:			
Date Extract:			
Date Analyzd:	900912	900906	900906
1 Aluminum Al-Diss	ug/l		
2 Antimony Sb-Diss	ug/l		
3 Arsenic As-Diss	ug/l		
4 Barium Ba-Diss	ug/l		
5 Beryllium Be-Diss	ug/l		
6 Boron B -Diss	ug/l		
7 Cadmium Cd-Diss	ug/l		
8 Calcium Ca-Diss	mg/l		
9 Chromium Cr-Diss	ug/l		
10 HexChrom Cr6Diss	ug/l		
11 Cobalt Co-Diss	ug/l		
12 Copper Cu-Diss	ug/l		
13 Iron Fe-Diss	ug/l	5740	8.0JB
14 Lead Pb-Diss	ug/l		5.6JB
15 Mgnsium Mg-Diss	mg/l		
16 Mangnese Mn-Diss	ug/l		
17 Molybdnm Mo-Diss	ug/l		
18 Nickel Ni-Diss	ug/l		
19 Potssium K -Diss	mg/l		
20 Selenium Se-Diss	ug/l		
21 Silicon Si-Diss	ug/l		
22 Silver Ag-Diss	ug/l		
23 Sodium Na-Diss	mg/l		
24 Strntium Sr-Diss	ug/l		
25 Thallium Tl-Diss	ug/l		
26 Tin Sn-Diss	ug/l		
27 Titanium Ti-Diss	ug/l		
28 Tungsten W -Diss	ug/l		
29 Vanadium V -Diss	ug/l		
30 Zinc Zn-Diss	ug/l		

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY
MANCHESTER ENVIRONMENTAL LABORATORY
P.O. Box 307, Manchester WA 98353



DATA REVIEW

October 16, 1990

Project: Restover Truck Stop

Samples: 358080 358081 358083 358085
358086 358088 358089 358082

Laboratory: Pacific Northwest Environmental Laboratory
(Project #2622)

By: Greg Perez 
Through: Stuart Magoon 

CASE SUMMARY

This analysis was reviewed for qualitative and quantitative accuracy, validity and usefulness. Sample analysis was by EPA Methods 624 and 602 using capillary columns.

The forms used to report this data are from the US EPA SOW for the CLP. Where a reference such as "EPA Sample no." is used, take this to mean "DOE Sample no.". This data is from a Washington State Department of Ecology project, not part of an EPA case. References to EPA sample numbers are unintentional.

Additional Data Qualifiers

PNEL has submitted a complete list of qualifiers used by their laboratory. These qualifiers are acceptable with the following modifications.

J - Indicates an estimated value. The calibration criteria for accurate quantitation was not met for the analyte qualified.

VOA FRACTION

Sample #358082 only

Matrix: Water

Holding times

This sample ^{had} ~~have~~ been analyzed within the recommended holding time, however for analytical reasons the sample was reanalyzed after the expiration of the holding time.

Surrogates:

Surrogate recoveries for this sample and the method blank are within the QC recovery limits.

Matrix Spike and Matrix Spike Duplicate (MS/MSD):

Matrix spike and spike duplicate recoveries and precision data are acceptable and within limits.

Sample Data:

This data is acceptable for use.

Contamination from a previous sample run required this sample be reanalysed. This problem affected only the tentative compounds. The tentative data should be reported from the second analysis.

The acetone data has been qualified as an estimate. Calibration problems were experienced for both the initial and repeat analyses. The contamination problem did not affect the acetone result which may be taken from the initial analysis.

BETX ANALYSIS

Matrix: Water

Holding times

These samples have been analyzed within the recommended holding times.

Surrogates:

Surrogate recoveries for these samples and the method blank are within the QC recovery limits.

Matrix Spike and Matrix Spike Duplicate (MS/MSD):

Matrix spike and spike duplicate recoveries and precision data are acceptable and within limits.

Sample Data:

This data is acceptable for use.

Samples 358088 and 358089 contained air bubbles. Most compounds targeted by this method will be adversely affected by the presence of headspace in the vials. For this reason the presence of a compound may not be disproved by not being detected.

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY
MANCHESTER ENVIRONMENTAL LABORATORY
P.O. Box 307, Manchester WA 98353



DATA REVIEW

October 15, 1990

Project: Restover Truck Stop

Samples: 358084 358087

Laboratory: Pacific Northwest Environmental Laboratory
(Project #2633)

By: Greg Perez 
Through: Stuart Magoon 

CASE SUMMARY

This analysis was reviewed for qualitative and quantitative accuracy, validity and usefulness. Sample analysis was by Method 602 using capillary columns.

Additional Data Qualifiers

PNEL has submitted a complete list of qualifiers used by their laboratory. These qualifiers are acceptable and need no additions or qualifications.

BETX ANALYSIS

Matrix: Water

Holding times

These samples have been analyzed within the recommended holding times, however for analytical reasons the samples were reanalyzed after the expiration of the holding times.

Surrogates:

Surrogate recoveries for these samples and the method blank are within the QC recovery limits.

Matrix Spike and Matrix Spike Duplicate (MS/MSD):

Matrix spike and spike duplicate recoveries and precision data are acceptable and within limits.

Sample Data:

This data is acceptable for use.

The reported data was obtained after the expiration of the holding times, as noted above. However the correlation of this data with that of the initial analysis is close enough to indicate that no significant loss of analyte occurred. In my opinion no qualification of the data is necessary.



Pacific Northwest Environmental Laboratory, Inc.
3820 159th Avenue, N.E.
Redmond, WA 98052
(206) 885-0083
FAX (206) 867-2214

September 26, 1990

Stuart Magoon
WDOE
7411 Beach Drive East
Port Orchard WA 98366

NARRATIVE FOR PNEL 2633
Submission from Pacific Northwest Environmental Laboratory

Enclosed are data summary sheets and supporting documentation for the two samples received on September 5, 1990 of the Restover project. The field identification numbers, corresponding lab identification numbers, and dates collected are listed below.

<u>FIELD ID</u>	<u>LAB ID</u>	<u>DATE COLLECTED</u>
358084	2633-01	09-04-90
358087	2633-02	09-04-90

Listed below are anomalies and narratives associated with the receipt and/or analysis of these samples.

Sample Receiving

There were no anomalies associated with the receipt of these samples.

BTEX Analysis

The following anomalies are present with this batch:

The samples were analyzed within holding time; however, the post-analysis continuing calibration check was not within acceptable limits.

The samples were re-analyzed two days after hold time expiration with all calibration checks in spec. Data are reported from these reanalyses. The raw data package contains the analyses from both days.

Samples 2633-01 and 2633-02 required dilution.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Sincerely,

A handwritten signature in cursive script that reads "Rand G. Jenkins". The signature is written in black ink on a white background.

\NAR-0905.633
Enclosures

**PACIFIC NORTHWEST
ENVIRONMENTAL
LABORATORY**

METHOD REFERENCE

Benzene, Toulene, Xylene,
and Ethylbenzene.

Method 602, Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, United States Environmental Protection Agency, 40 CFR PT 136, App A.

PACIFIC NORTHWEST
ENVIRONMENTAL
LABORATORY

Client Number: 22-890905

VOLATILE ORGANICS ANALYSIS

Client Sample ID.	Blank	358084	358087
PNEL Sample ID.	2633-MB	2633-01	2633-02
Matrix	Water	Water	Water
Date Received	NA	09-05-90	09-05-90
Date Analyzed	09-19-90	09-19-90	09-19-90
Units	$\mu\text{g}/\ell$	$\mu\text{g}/\ell$	$\mu\text{g}/\ell$

Compounds

Benzene	0.5 U	160	740
Toluene	0.5 U	18	1200
Ethylbenzene	0.5 U	55	550
Total Xylene	1.0 U	52	2700

Surrogate

% Fluorobenzene	100	97	91
% 2-Chlorotoluene	98	92	90

\602-0905.224

000001

**PACIFIC NORTHWEST
ENVIRONMENTAL
LABORATORY**

VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

PNEL Sample ID.:	2630-06	Client No.:	22-890905
Client Sample ID.:	NA	Sample Matrix:	Water
Date Sample Received:	09-04-90	Date Sample Analyzed:	09-19-90

<u>Compound</u>	<u>SPIKE ADDED (μg/l)</u>	<u>SAMPLE CONC. (μg/l)</u>	<u>MS CONC. (μg/l)</u>	<u>MS % REC[‡]</u>	<u>QC LIMITS REC</u>
Trichloroethene	10	0.5 U	11.0	110	71-120
Benzene	10	0.5 U	10.3	103	76-127
Toluene	10	0.5 U	10.9	109	76-125
Chlorobenzene	10	0.5 U	11.2	112	75-130

<u>Compound</u>	<u>SPIKE ADDED (μg/l)</u>	<u>MSD CONC. (μg/l)</u>	<u>MSD % REC[‡]</u>	<u>% RPD[‡]</u>	<u>QC LIMITS</u>	
					<u>RPD</u>	<u>REC</u>
Trichloroethene	10	10.7	107	2.8	14	71-120
Benzene	10	10.2	102	1.0	11	76-127
Toluene	10	10.8	108	1.0	13	76-125
Chlorobenzene	10	11.0	110	1.8	13	75-130

Column to be used to flag recovery and RPD (Relative % Difference) values with an asterisk.

* Values outside of QC limits

RPD: 0 out of 4 outside limits
Spike Recovery: 0 out of 8 outside limits

\VMS-0905.633

000002

PACIFIC NORTHWEST
ENVIRONMENTAL
LABORATORY

Client Number: 22-890905

VOLATILE ORGANICS ANALYSIS

Client Sample ID.	Blank	358084	358087
PNEL Sample ID.	2633-MB	2633-01	2633-02
Matrix	Water	Water	Water
Date Received	NA	09-05-90	09-05-90
Date Analyzed	09-19-90	09-19-90	09-19-90
Units	$\mu\text{g}/\ell$	$\mu\text{g}/\ell$	$\mu\text{g}/\ell$

Compounds

Benzene	0.5 U	160	740
Toluene	0.5 U	18	1200
Ethylbenzene	0.5 U	55	550
Total Xylene	1.0 U	52	2700

Surrogate

% Fluorobenzene	100	97	91
% 2-Chlorotoluene	98	92	90

\602-0905.224

001001

**PACIFIC NORTHWEST
ENVIRONMENTAL
LABORATORY**

VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

PNEL Sample ID.: 2630-06 Client No.: 22-890905
 Client Sample ID.: NA Sample Matrix: Water
 Date Sample Received: 09-04-90 Date Sample Analyzed: 09-19-90

<u>Compound</u>	<u>SPIKE ADDED ($\mu\text{g}/\ell$)</u>	<u>SAMPLE CONC. ($\mu\text{g}/\ell$)</u>	<u>MS CONC. ($\mu\text{g}/\ell$)</u>	<u>MS % REC[†]</u>	<u>QC LIMITS REC</u>
Trichloroethene	10	0.5 U	11.0	110	71-120
Benzene	10	0.5 U	10.3	103	76-127
Toluene	10	0.5 U	10.9	109	76-125
Chlorobenzene	10	0.5 U	11.2	112	75-130

<u>Compound</u>	<u>SPIKE ADDED ($\mu\text{g}/\ell$)</u>	<u>MSD CONC. ($\mu\text{g}/\ell$)</u>	<u>MSD % REC[†]</u>	<u>% RPD[‡]</u>	<u>QC LIMITS RPD REC</u>
Trichloroethene	10	10.7	107	2.8	14 71-120
Benzene	10	10.2	102	1.0	11 76-127
Toluene	10	10.8	108	1.0	13 76-125
Chlorobenzene	10	11.0	110	1.8	13 75-130

Column to be used to flag recovery and RPD (Relative % Difference) values with an asterisk.

* Values outside of QC limits

RPD: 0 out of 4 outside limits
 Spike Recovery: 0 out of 8 outside limits

\VMS-0905.633

001002



Pacific Northwest Environmental Laboratory, Inc.
 3820 159th Avenue, N.E.
 Redmond, WA 98052
 (206) 885-0083
 FAX (206) 867-2214

September 25, 1990

Stuart Magoon
 WDOE
 7411 Beach Drive East
 Port Orchard WA 98366

NARRATIVE FOR PNEL 2622
Submission from Pacific Northwest Environmental Laboratory

Enclosed are data summary sheets and supporting documentation for the eight samples received on August 31, 1990 of the Restover project. The field identification numbers, corresponding lab identification numbers, and dates collected are listed below.

<u>FIELD ID</u>	<u>LAB ID</u>	<u>DATE COLLECTED</u>
358080	2622-01	08-28-90
358081	2622-02	08-28-90
358083	2622-03	Not Provided
358085	2622-04	08-30-90
358086	2622-05	08-30-90
358088	2622-06	08-30-90
358089	2622-07	08-30-90
358082	2622-08	08-28-90

Listed below are anomalies and narratives associated with the receipt and/or analysis of these samples.

Sample Receiving

The sample 358088 (2622-06) contained an airbubble greater than 1/4" in diameter in one of one vials for volatile analysis. Stuart Magoon of WDOE was notified by memo. The sample was processed as originally requested.

The sample 358089 (2622-07) contained airbubbles in two of two vials for volatile analysis. Stuart Magoon of WDOE was notified by memo. The sample was processed as originally requested.

Volatiles Analysis

The volatile organics for sample 358082 were initially run on September 5, 1990 after a lab blank which showed contamination from late-eluting aromatic hydrocarbons. A similar pattern of late eluting contaminants was also observed in the sample run. In order to demonstrate that these impurities were not present in the field sample, reanalysis of the sample was performed on September 20, 1990 (after the holding time had expired). Data for both the original analysis and the reanalysis are being included in this report. Dilution of the sample was required because the acetone concentration exceeded the calibration range.

Stuart Magoon
WDOE
September 25, 1990
Page 2

Volatiles Analysis cont.

Matrix spike analyses were run on a sample from a separate batch. Recovery data (Form III) are presented in this report.

BTEX Analysis

No anomalies are present with this batch.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Sincerely,

A handwritten signature in cursive script that reads "Rand G. Jenkins". The signature is written in black ink and is positioned below the word "Sincerely,".

\NAR-0905.622
Enclosures

**PACIFIC NORTHWEST
ENVIRONMENTAL
LABORATORY**

METHOD REFERENCE

Analytical Methods for
Volatiles

Environmental Protection Agency, Contract Laboratory Program, Organic
Statement of Work, Exhibit-D, February 1988.

Benzene, Toulene, Xylene,
and Ethylbenzene.

Method 602, Methods for Organic Chemical Analysis of Municipal and
Industrial Wastewater, United States Environmental Protection Agency, 40
CFR PT 136, App A.

NATEX

Pacific Northwest Environmental Laboratory, Inc.
 3820 159th Avenue, N.E.
 Redmond, WA 98052
 (206) 885-0083
 FAX (206) 867-2214

DATA REPORTING QUALIFIERS

Some of these qualifiers may appear in this analytical data report. Soil samples are analyzed and reported on a dry weight basis unless otherwise noted.

ORGANICS QUALIFIERS

- A - This flag indicates that a TIC is a suspected aldol-condensation product.
- B - Indicates compound was found in the associated blank as well as in the sample.
- C - This flag applies to pesticide results where the identification has been confirmed by GC/MS.
- D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.
- E - This flag identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis.
- J - Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicate the presence of a target compound that meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.
- M - Indicates value is taken from a medium level analysis.
- ND- Not detected. Detection limit shown in parentheses.
- NQ- Not quantitated as...
- U - Indicates compound was analyzed for but not detected at the given detection limit. The sample quantitation limit was corrected for dilution and for percent moisture, when applicable.
- X - Other specific flags and footnotes may be required to properly define the results. If more than two qualifiers are required for a sample result, the "X" flag combines several flags, as needed. For instance, the "X" flag might combine the "A," "B," and "D" flags for some sample.
- * - Indicates spiked compounds used for MS/MSD analysis.

INORGANICS QUALIFIERS

- NA- Relative percent difference calculation is not applicable to analytes when not detected.
- NC- Not calculated when analyte is not detected.
- NS- Not calculated when sample concentration of analyte exceeds spike level by a factor of four or more.
- U - Indicates that analyte was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.
- B - Indicates that analyte was analyzed for and detected, but the concentration was less than the CRDL provided in the current SOW for inorganics CLP.

INORGANICS METHOD QUALIFIERS

- CV- Manual Cold Vapor AA
- F - FURNACE AA
- P - ICP

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

358082

Lab Name: PNELI_____ Contract: RESTOVER____

Code: PNELI__ Case No.: 2622__ SAS No.: _____ SDG No.: 358080

Matrix: (soil/water) WATER_ Lab Sample ID: 2622-08_____

Sample wt/vol: __5.0 (g/mL) ML__ Lab File ID: A5049_____

Level: (low/med) LOW___ Date Received: 08/31/90

% Moisture: not dec. ____ Date Analyzed: 09/05/90

Column: (pack/cap) CAP___ Dilution Factor: 1.0_____

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	3300	E
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	3	J
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	3	J
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

000001

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

358082-DL

Lab Name: PNELI_____ Contract: RESTOVER_____

Code: PNELI___ Case No.: 2622___ SAS No.: _____ SDG No.: 358080

Matrix: (soil/water) WATER___ Lab Sample ID: 2622-08DL_____

Sample wt/vol: ___5.0 (g/mL) ML___ Lab File ID: A5053_____

Level: (low/med) LOW___ Date Received: 08/31/90

% Moisture: not dec. _____ Date Analyzed: 09/06/90

Column: (pack/cap) CAP___ Dilution Factor: 25_____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	250	U
74-83-9	Bromomethane	250	U
75-01-4	Vinyl Chloride	250	U
75-00-3	Chloroethane	250	U
75-09-2	Methylene Chloride	120	U
67-64-1	Acetone	4100	J/D
75-15-0	Carbon Disulfide	120	U
75-35-4	1,1-Dichloroethene	120	U
75-34-3	1,1-Dichloroethane	120	U
540-59-0	1,2-Dichloroethene (total)	120	U
67-66-3	Chloroform	120	U
107-06-2	1,2-Dichloroethane	120	U
78-93-3	2-Butanone	250	U
71-55-6	1,1,1-Trichloroethane	120	U
56-23-5	Carbon Tetrachloride	120	U
108-05-4	Vinyl Acetate	250	U
75-27-4	Bromodichloromethane	120	U
78-87-5	1,2-Dichloropropane	120	U
10061-01-5	cis-1,3-Dichloropropene	120	U
79-01-6	Trichloroethene	120	U
124-48-1	Dibromochloromethane	120	U
79-00-5	1,1,2-Trichloroethane	120	U
71-43-2	Benzene	120	U
10061-02-6	Trans-1,3-Dichloropropene	120	U
75-25-2	Bromoform	120	U
108-10-1	4-Methyl-2-Pentanone	250	U
591-78-6	2-Hexanone	250	U
127-18-4	Tetrachloroethene	120	U
79-34-5	1,1,2,2-Tetrachloroethane	120	U
108-88-3	Toluene	120	U
108-90-7	Chlorobenzene	120	U
100-41-4	Ethylbenzene	120	U
100-42-5	Styrene	120	U
1330-20-7	Xylene (total)	120	U

J/P
10/16

000002

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

358082-RE

Lab Name: PNELI_____ Contract: RESTOVER_____

Code: PNELI__ Case No.: 2622__ SAS No.: _____ SDG No.: 358080

Matrix: (soil/water) WATER_____ Lab Sample ID: 2622-08RE_____

Sample wt/vol: __5.0 (g/mL) ML__ Lab File ID: A5130_____

Level: (low/med) LOW___ Date Received: 08/31/90

% Moisture: not dec. _____ Date Analyzed: 09/20/90

Column: (pack/cap) CAP___ Dilution Factor: 1.0_____

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L_

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L_	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	2200	E
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	3	J
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	3	J
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

000003

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

358082

Lab Name: PNELI_____ Contract: RESTOVER____

Code: PNELI__ Case No.: 2622__ SAS No.: _____ SDG No.: 358080

Matrix: (soil/water) WATER_ Lab Sample ID: 2622-08_____

Sample wt/vol: __5.0 (g/mL) ML__ Lab File ID: A5049_____

Level: (low/med) LOW___ Date Received: 08/31/90

% Moisture: not dec. ____ Date Analyzed: 09/05/90

Column (pack/cap) CAP___ Dilution Factor: 1.0_____

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L_

Number TICs found: 13

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	G
1.	UNK CYCLIC HYDROCARBON (MW 48)	6.38	19	J
2.	UNK ALKYL BENZENE (MW 120)	17.04	11	J
3.	UNK ALKYL BENZENE (MW 120)	17.34	13	J
4.	UNK ALKYL BENZENE (MW 134)	18.49	16	J
5.	UNK ALKYL BENZENE (MW 134)	19.09	14	J
6.	UNK ALKYL BENZENE (MW 134)	19.25	16	J
7.	UNKNOWN AROMATIC HYDROCARBON	19.39	12	J
8.	UNKNOWN ALKANE	19.69	12	J
9.	UNK ALKYL BENZENE (MW 134)	20.02	11	J
10.	UNK AROMATIC HC (MW 182)	20.44	370	J
11.	UNK AROMATIC HC (MW 132)	20.67	19	J
12.	UNKNOWN	21.45	65	J
13. 103297	Benzene, 1,1'-(1,2-ethanediy	21.87	14	J

000004

1E
 VOLATILE ORGANICS ANALYSIS DATA SHEET
 TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

358082-DL

Lab Name: PNELI_____ Contract: RESTOVER___

Code: PNELI__ Case No.: 2622__ SAS No.: _____ SDG No.: 358080

Matrix: (soil/water) WATER_ Lab Sample ID: 2622-08DL_____

Sample wt/vol: __5.0 (g/mL) ML__ Lab File ID: A5053_____

Level: (low/med) LOW___ Date Received: 08/31/90

% Moisture: not dec. _____ Date Analyzed: 09/06/90

Column (pack/cap) CAP___ Dilution Factor: 25_____

CONCENTRATION UNITS:
 (ug/L or ug/Kg) UG/L_

Number TICs found: __2

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNK AROMATIC HC (MW 182)	21.14	4500	J
2.	UNKNOWN	21.89	200	J

000005

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

358082-RE

Lab Name: PNELI_____ Contract: RESTOVER_____

o Code: PNELI__ Case No.: 2622__ SAS No.: _____ SDG No.: 358080

Matrix: (soil/water) WATER_ Lab Sample ID: 2622-08RE_____

Sample wt/vol: __5.0 (g/mL) ML__ Lab File ID: A5130_____

Level: (low/med) LOW___ Date Received: 08/31/90

% Moisture: not dec. ____ Date Analyzed: 09/20/90

Column (pack/cap) CAP___ Dilution Factor: 1.0_____

CONCENTRATION UNITS:

Number TICs found: 13 (ug/L or ug/Kg) UG/L_

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 107835	Pentane, 2-methyl- (8CI9CI)	4.67	11	J
2.	UNKNOWN CYCLOALKANE mw 84	6.78	17	J
3.	UNK ALKYL BENZENE mw 120	17.39	9.0	J
4.	UNK ALKYL BENZENE mw 120	17.69	11	J
5.	UNK ALKYL BENZENE mw 134	18.82	16	J
6.	UNK ALKYL BENZENE mw 134	19.42	15	J
7.	UNK ALKYL BENZENE mw 134	19.59	17	J
8.	UNK AROMATIC HYDROCARBON 132	19.74	13	J
9.	UNK ALKYL BENZENE mw 134	20.27	9.0	J
10.	UNK ALKYL BENZENE mw 134	20.34	11	J
11.	UNK AROMATIC HYDROCARBON 132	20.74	9.0	J
12.	UNK AROMATIC HYDROCARBON	20.97	20	J
13.	UNK ALKYL BENZENE mw 148	21.52	6.0	J

000006

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VBLKAR

Lab Name: PNELI_____ Contract: RESTOVER____

Code: PNELI__ Case No.: 2622__ SAS No.: _____ SDG No.: 358080

Matrix: (soil/water) WATER_ Lab Sample ID: VBLKAR_____

Sample wt/vol: __5.0 (g/mL) ML__ Lab File ID: A5039_____

Level: (low/med) LOW___ Date Received: _____

% Moisture: not dec. ____ Date Analyzed: 09/05/90

Column: (pack/cap) CAP___ Dilution Factor: 1.0_____

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

000007

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VBLKAT

Lab Name: PNELI_____ Contract: RESTOVER_____

Lab Code: PNELI__ Case No.: 2622__ SAS No.: _____ SDG No.: 358080

Matrix: (soil/water) WATER_ Lab Sample ID: VBLKAT_____

Sample wt/vol: __5.0 (g/mL) ML__ Lab File ID: A5052_____

Level: (low/med) LOW___ Date Received: _____

% Moisture: not dec. ____ Date Analyzed: 09/06/90

Column: (pack/cap) CAP___ Dilution Factor: 1.0_____

CONCENTRATION UNITS:

CAS NO. COMPOUND (ug/L or ug/Kg) UG/L_ Q

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L_	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

000008

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VBLKAC

Lab Name: PNELI_____ Contract: RESTOVER_____

Code: PNELI___ Case No.: 2622___ SAS No.: _____ SDG No.: 358080

Matrix: (soil/water) WATER___ Lab Sample ID: VBLKAC_____

Sample wt/vol: ___5.0 (g/mL) ML___ Lab File ID: A5128_____

Level: (low/med) LOW___ Date Received: _____

% Moisture: not dec. ____ Date Analyzed: 09/20/90

Column: (pack/cap) CAP___ Dilution Factor: 1.0_____

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

600000

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VBLKAR

Lab Name: PNELI_____ Contract: RESTOVER_____

Code: PNELI__ Case No.: 2622__ SAS No.: _____ SDG No.: 358080

Matrix: (soil/water) WATER_ Lab Sample ID: VBLKAR_____

Sample wt/vol: __5.0 (g/mL) ML__ Lab File ID: A5039_____

Level: (low/med) LOW___ Date Received: _____

% Moisture: not dec. ____ Date Analyzed: 09/05/90

Column (pack/cap) CAP___ Dilution Factor: 1.0_____

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/L_

Number TICs found: __7

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNK ALKYL BENZENE (MW 162)	17.12	350	J
2. 104870	Benzaldehyde, 4-methyl- (9CI)	18.04	49	J
3.	UNK ALKYL BENZENE (MW 162)	18.25	300	J
4.	UNK ALKYL BENZENE (MW 162)	18.65	57	J
5.	UNKNOWN	18.97	6.0	J
6. 39916615	Benzene, (2-methylpentyl)- (19.19	4.0	J
7.	UNKNOWN AROMATIC HYDROCARBON	19.89	20	J

000010

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VBLKAT

Lab Name: PNELI_____ Contract: RESTOVER____

Code: PNELI__ Case No.: 2622__ SAS No.: _____ SDG No.: 358080

Matrix: (soil/water) WATER_ Lab Sample ID: VBLKAT_____

Sample wt/vol: __5.0 (g/mL) ML__ Lab File ID: A5052_____

Level: (low/med) LOW___ Date Received: _____

% Moisture: not dec. ____ Date Analyzed: 09/06/90

Column (pack/cap) CAP___ Dilution Factor: 1.0_____

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L_

Number TICs found: __1

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN	21.02	8.01J	

000011

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VBLKAC

Lab Name: PNELI_____ Contract: RESTOVER___

Code: PNELI__ Case No.: 2622__ SAS No.: _____ SDG No.: 358080

Matrix: (soil/water) WATER_ Lab Sample ID: VBLKAC_____

Sample wt/vol: __5.0 (g/mL) ML__ Lab File ID: A5128_____

Level: (low/med) LOW___ Date Received: _____

% Moisture: not dec. ____ Date Analyzed: 09/20/90

Column (pack/cap) CAP___ Dilution Factor: 1.0_____

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L_

Number TICs found: __0

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====
-----	-----	-----	-----	-----

000012

2A
WATER VOLATILE SURROGATE RECOVERY

Lab Name: FNELI_____ Contract: RESTOVER_____
 Lab Code: FNELI__ Case No.: 2622__ SAS No.: _____ SDG No.: 358080

	EPA SAMPLE NO.	S1 (TOL) #	S2 (BFB) #	S3 (DCE) #	OTHER	TOT OUT
01	358082	102	103	96	0	0
02	358082-DL	97	96	102	0	0
03	358082-RE	97	98	101	0	0
04	VELKAR	101	105	91	0	0
05	VELKAT	94	92	96	0	0
06	VELKAC	100	100	98	0	0

QC LIMITS

S1 (TOL) = Toluene-d8 (88-110)
 S2 (BFB) = Bromofluorobenzene (86-115)
 S3 (DCE) = 1,2-Dichloroethane-d4 (76-114)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: PNELI_____ Contract: ITT_RAINIER _____

Lab Code: PNELI__ Case No.: 2622__ SAS No.: _____ SDG No.: 358080

Matrix Spike - EPA Sample No.: 348030_____

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC #	QC LIMITS REC.
1,1-Dichloroethene_____	50.0	0	49.7	99	61-145
Trichloroethene_____	50.0	0	52.7	105	71-120
Benzene_____	50.0	0	54.3	109	76-127
Toluene_____	50.0	0	53.4	107	76-125
Chlorobenzene_____	50.0	0	50.8	102	75-130

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	% RPD #	QC LIMITS RPD REC.
1,1-Dichloroethene_____	50.0	50.8	102	-3	14 61-145
Trichloroethene_____	50.0	54.7	109	-4	14 71-120
Benzene_____	50.0	55.4	111	-2	11 76-127
Toluene_____	50.0	54.1	108	-1	13 76-125
Chlorobenzene_____	50.0	52.6	105	-3	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: 2624-01 348030
INST.ID:VOA1 5.0ML

000014

4A
VOLATILE METHOD BLANK SUMMARY

Lab Name: PNELI_____ Contract: RESTOVER_____
Lab Code: PNELI__ Case No.: 2622__ SAS No.: _____ SDG No.: 358080
Lab File ID: A5039_____ Lab Sample ID: VBLKAR_____
Date Analyzed: 09/05/90 Time Analyzed: 0934_____
Matrix: (soil/water) WATER_ Level: (low/med) LOW____
Instrument ID: VDA1_____

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

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	358082	2622-08	A5049	1642

COMMENTS: VBLKAR
INST.ID:VDA1 WATER

4A
VOLATILE METHOD BLANK SUMMARY

Lab Name: PNELI_____ Contract: RESTOVER___
Lab Code: PNELI__ Case No.: 2622__ SAS No.: _____ SDG No.: 358080
Lab File ID: A5052_____ Lab Sample ID: VBLKAT_____
Date Analyzed: 09/06/90 Time Analyzed: 0939____
Matrix: (soil/water) WATER_ Level: (low/med) LOW___
Instrument ID: VOA1_____

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

EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01 358082-DL	2622-08DL	A5053	1016

COMMENTS: VBLKAT
INST.ID:VOA1 5ML H2

4A
VOLATILE METHOD BLANK SUMMARY

Lab Name: PNELI_____ Contract: RESTOVER_____
Lab Code: PNELI__ Case No.: 2622__ SAS No.: _____ SDG No.: 358080
Lab File ID: A5128_____ Lab Sample ID: VBLKAC_____
Date Analyzed: 09/20/90 Time Analyzed: 0951_____
Matrix: (soil/water) WATER_ Level: (low/med) LOW____
Instrument ID: VOA1_____

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

	EPA	LAB	LAB	TIME
	SAMPLE NO.	SAMPLE ID	FILE ID	ANALYZED
01	358082-RE	2622-08RE	A5130	1118

COMMENTS:

000017

PACIFIC NORTHWEST
 ENVIRONMENTAL
 LABORATORY

Client Number: 22-890905

VOLATILE ORGANICS ANALYSIS

Client Sample ID.	358080	358081	358083	358085
PNEL Sample ID.	2622-01	2622-02	2622-03	2622-04
Matrix	Water	Water	Water	Water
Date Received	08-31-90	08-31-90	08-31-90	08-31-90
Date Analyzed	09-10-90	09-10-90	09-10-90	09-11-90
Units	µg/l	µg/l	µg/l	µg/l

Compounds

Benzene	1.0 U	1.0 U	67	34
Toluene	1.0 U	1.0 U	93	23
Ethylbenzene	1.0 U	1.0 U	240	24
Total Xylene	2.0 U	2.0 U	1000	100

Surrogate

% Fluorobenzene	102	88	109	72
% 2-Chlorotoluene	100	88	101	73

PACIFIC NORTHWEST
ENVIRONMENTAL
LABORATORY

Client Number: 22-890905

VOLATILE ORGANICS ANALYSIS

Client Sample ID.	358086	358088	358089
PNEL Sample ID.	2622-05	2622-06	2622-07
Matrix	Water	Water	Water
Date Received	08-31-90	08-31-90	08-31-90
Date Analyzed	09-11-90	09-10-90	09-10-90
Units	$\mu\text{g}/\ell$	$\mu\text{g}/\ell$	$\mu\text{g}/\ell$

Compounds

Benzene	30	1.0 U	1.0 U
Toluene	21	1.0 U	1.0 U
Ethylbenzene	24	1.0 U	1.0 U
Total Xylene	100	2.0 U	2.0 U

Surrogate

% Fluorobenzene	84	98	96
% 2-Chlorotoluene	86	88	85

PACIFIC NORTHWEST
ENVIRONMENTAL
LABORATORY

Client Number: 22-890905

VOLATILE ORGANICS ANALYSIS

Client Sample ID.	Blank	Blank	Blank
PNEL Sample ID.	2622-MB	2622-MB	2622-MB
Matrix	Water	Water	Water
Date Received	NA	NA	NA
Date Analyzed	09-10-90	09-10-90	09-11-90
Units	µg/l	µg/l	µg/l

Compounds

Benzene	1.0 U	1.0 U	1.0 U
Toluene	1.0 U	1.0 U	1.0 U
Ethylbenzene	1.0 U	1.0 U	1.0 U
Total Xylene	2.0 U	2.0 U	2.0 U

Surrogate

% Fluorobenzene	110	109	95
% 2-Chlorotoluene	107	108	96

\602-0905.622

000031

PACIFIC NORTHWEST
ENVIRONMENTAL
LABORATORY

VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

PNEL Sample ID.: 2631-01 Client No.: 02-890802
 Client Sample ID.: NA Sample Matrix: Water
 Date Sample Received: 09-05-90 Date Sample Analyzed: 09-10-90

<u>Compound</u>	<u>SPIKE ADDED (μg/l)</u>	<u>SAMPLE CONC. (μg/l)</u>	<u>MS CONC. (μg/l)</u>	<u>MS % REC[#]</u>	<u>QC LIMITS REC</u>
1,1-Dichloroethene	10	1.0 U	6.4	64	61-145
Trichloroethene	10	1.0 U	10.3	103	71-120
Benzene	10	1.0 U	9.4	94	76-127
Toluene	10	1.0 U	9.9	99	76-125
Chlorobenzene	10	1.0 U	10.6	106	75-130

<u>Compound</u>	<u>SPIKE ADDED (μg/l)</u>	<u>MSD CONC. (μg/l)</u>	<u>MSD % REC[#]</u>	<u>% RPD[*]</u>	<u>QC LIMITS RPD REC</u>
1,1-Dichloroethene	10	6.5	65	1.6	14 61-145
Trichloroethene	10	10.2	102	1.0	14 71-120
Benzene	10	9.8	98	4.2	11 76-127
Toluene	10	10.3	103	4.0	13 76-125
Chlorobenzene	10	10.4	104	1.9	13 75-130

Column to be used to flag recovery and RPD (Relative % Difference) values with an asterisk.

* Values outside of QC limits

RPD: 0 out of 5 outside limits
 Spike Recovery: 0 out of 10 outside limits