DEPARTMENT OF ECOLOGY

July 12, 1993

TO: Mike Kuntz
Toxics Cleanup Program

FROM: Pam Marti PBM
Environmental Investigations & Laboratory Services

SUBJECT: Restover Truck Stop Long-term Monitoring Round X

The attached report summarizes the findings from the latest sampling at Restover Truck Stop, Round X conducted on January 5 and 6, 1993. BTEX concentrations in the upper aquifer have decreased substantially since 1990. Concentrations increased slightly in wells WDOE-6A and MW-8A since the last sample round in July 1992. Model Toxic Control Act (MTCA) cleanup levels for BTEX were exceeded in these two wells. Sample Round XI will be conducted in July 1993. Results from Round XI should be reported by December 1993. If you have any questions or comments, please call me at 586-8138.

PM:krc
Attachment

cc: Lynn Singleton
Bill Yake
Kathy Reed, TCP Library

# RESTOVER TRUCK STOP
# GROUND WATER MONITORING ROUND X
# JANUARY 5 & 6, 1993

by Pamela B. Marti
July 8, 1993

Washington State Department of Ecology
Environmental Investigations and Laboratory Services Program
Toxics, Compliance and Ground Water Investigations Section
Olympia, Washington 98504-7710

Water Body No. WA-13-0030GW
(Segment No. 06-13-03GW)

## SUMMARY

Ground water samples were collected at the Restover Truck Stop on January 5-6, 1993, as part of routine monitoring. Two water supply and three monitoring wells were sampled for benzene, toluene, ethylbenzene, and total xylenes (BTEX) and dissolved iron. Well MW-20A, a regularly monitored well, was not sampled this round because it was dry. BTEX concentrations in the upper aquifer have decreased substantially since 1990. Concentrations increased slightly in wells WDOE-6A and MW-8A since the last sample Round in July 1992. BTEX concentrations in these two wells exceeded Model Toxic Control Act (MTCA) cleanup levels.

## METHODS

### Ground Water Sampling

Three monitoring wells and two water supply wells were sampled on January 5-6, 1993, (Figure 1). Prior to sample collection, static water level measurements were obtained from 11 on-site wells using an electronic water level indicator. The meter was rinsed with deionized water and wiped clean between measurements. Due to low water levels and small purge volumes, monitoring wells were purged and sampled using decontaminated teflon bailers. Wells were purged until pH, temperature, and specific conductance 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 WDOE-6A was collected and treated by pumping it through a series of activated granulated carbon filters.

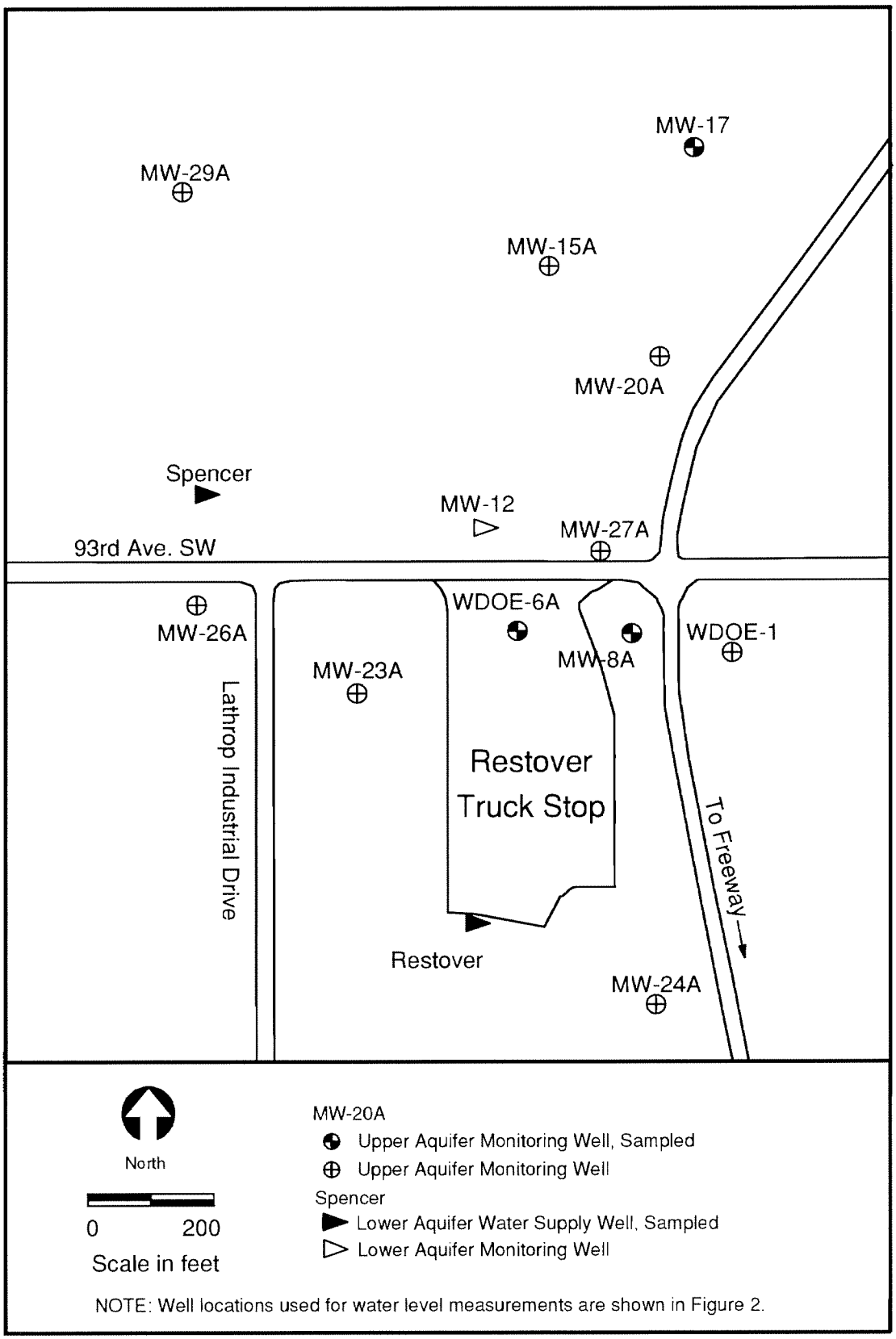


Figure 1: Well Locations, Restover Truck Stop

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. Supply wells were sampled at the tap nearest the pump. Samples for volatile organics analysis were collected free of headspace and preserved with 1:1 hydrochloric acid. Samples for dissolved iron were field-filtered using disposable, in-line, 0.45 $\mu$m polycarbonate membrane filters and preserved with 1 mL of nitric acid to a pH $< 2$. Peristaltic pump tubing used for sample filtration was rinsed with 500 mL of 10% nitric acid then 500 mL of deionized water between samples.

Chain-of-custody procedures were followed in accordance with Manchester Laboratory protocol (Ecology, 1991). All samples were analyzed by the Ecology/EPA Laboratory in Manchester.

**Quality Assurance**

In general, the quality of the data is good and acceptable for use except as qualified. Due to power failure at the laboratory, some of the BTEX samples were analyzed one to three days past the 14-day holding time. These results are qualified with an "H."

Quality control samples collected in the field consisted of a transport blank, transfer blank, a filter blank, and blind field duplicates. A transport blank was carried unopened throughout the sampling event. A transfer blank for BTEX was obtained by running organic-free water through a decontaminated bailer and collecting the rinsate in a sample container. Both the transport and transfer blanks were analyzed past the holding time. A filter blank for dissolved iron analysis was obtained by pumping organic-free water through a peristaltic pump and an in-line filter. Iron results labeled with a "P" indicates the analyte was detected above the instrument detection limit, but below the minimum quantitation limit. Duplicate samples for BTEX and iron (labeled MW-8B) were obtained from monitoring well MW-8A. The BTEX duplicate sample, MW-8B, was analyzed one day past the holding time. The relative percent differences (RPD's) for duplicate samples were 61% for benzene, 126% for toluene, 42% for ethylbenzene, 52% for total xylenes, and 2% for dissolved iron. Delay in the analysis of duplicate sample MW-8B may have contributed to the high RPD's for BTEX. These percentages are also based on values near the quantitation limit, they are probably not representative of precision at higher concentrations. Data quality objectives should be determined for field duplicates so that trends in the data can be evaluated in the future. The sample from WDOE-6A was analyzed three days past the holding time.

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

## RESULTS

### Field Observations

Depth to water measurements and water level elevations for on-site wells are shown in Table 1. Depth to water ranged from 14.67 to 19.67 feet with an elevation range from 178.88 to 176.95 mean sea level (MSL). Wells MW-20A, MW-24A and MW-27A were dry. Table 2 lists stabilized pH, temperature and specific conductance readings. Field measurements ranged as follows: pH from 5.8 to 6.4 standard units, temperature from 9.0 to 12.5°C, and specific conductance from 58 to 350 umhos/cm. Water purged from monitoring wells MW-8A and WDOE-6A had a hydrocarbon odor and cloudy appearance. The odor and cloudy appearance are consistent with previous sample events.

Table 1: Water Table Elevations (MSL)

| Well ID | Depth to Water | Elevation |
|---|---|---|
| Upper Aquifer | (Feet) | (MSL) |
| WDOE-1 | 19.53 | 178.44 |
| WDOE-6A | 17.19 | 178.88 |
| MW-8A | 19.67 | 178.32 |
| MW-17 | 15.79 | 178.01 |
| MW-18A | 14.67 | 178.33 |
| MW-20A | DRY | ---- |
| MW-23A | 17.41 | 178.09 |
| MW-24A | DRY | ---- |
| MW-26A | 15.55* | 177.92 |
| MW-27A | DRY | ---- |
| MW-29A | 15.31 | 176.95 |

* = well casing flooded above rim of well.

Table 2: Field Sampling Results (In Order Sampled)

| Well ID | pH (standard units) | Specific Conductance (umhos/cm) | Temp. (degrees C) | Purge Volume (gals) | Aquifer (Upper/ Lower) |
|---|---|---|---|---|---|
| Spencer | 6.4 | 84 | 9.3 | 46 | Lower |
| Restover | 6.4 | 94 | 9.4 | 113 | Lower |
| MW-17 | 5.9 | 58 | 9.0 | 5 | Upper |
| MW-8A | 5.8 | 244 | 11.4 | 2 | Upper |
| WDOE-6A | 6.2 | 350 | 12.5 | 3.5 | Upper |

**Analytical Results**

Analytical results for BTEX and dissolved iron are shown in Table 3. Detectable concentrations of BTEX were found in two of the five wells sampled; WDOE-6A and MW-8A. Both wells are screened in the upper aquifer. BTEX was not detected in the two water supply wells, which tap the lower aquifer. Samples from WDOE-6A and MW-8A had all four BTEX compounds, with total concentrations of 4784 $\mu$g/L and 53 $\mu$g/L, respectively. Well WDOE-6A continues to have the highest concentration of the wells sampled.

Monitoring well MW-17 was sampled this round due to previous BTEX detections. MW-17 is approximately 1000 feet north of Restover Truck Stop. No BTEX contamination was detected in MW-17.

Dissolved iron concentrations in wells WDOE-6A and MW-8A were 8930 $\mu$g/L and 5720 $\mu$g/L, respectively.

## DISCUSSION

A water-table contour map for the upper aquifer is shown in Figure 2. The map, constructed using water levels measured during this sample round, depicts ground water flow direction. Ground water moves perpendicular to the contour lines from high to low potential. Based on Figure 2, ground water in the upper aquifer flows toward the west and northwest. This is consistent with the flow pattern observed during previous sample events. The water-table was about five feet lower compared to previous years.

BTEX concentrations for sampling events between May 1987 and January 1993 are shown in Table 4. BTEX concentrations in well WDOE-6A decreased substantially from January 1990 (9870 $\mu$g/L) to July 1992 (2990 $\mu$g/L). Concentrations over the last two years ranged between 2840 to 3830 $\mu$g/L. BTEX concentrations for this round of monitoring increased to 4784 $\mu$g/L. In the laboratory QA sheets it was stated that contaminants from this well had a

Table 3: Analytical Results (ug/L) for January 5-6, 1993

| Well Number | Benzene | Toluene | Ethylbenzene | Total Xylene | Total BTEX | Dissolved Iron |
|---|---|---|---|---|---|---|
| **Lower Aquifer** | | | | | | |
| Spencer | 2 U | 2 U | 2 U | 4 U | ND | 287 |
| Restover | 2 U | 2 U | 2 U | 4 U | ND | 14 P |
| **Upper Aquifer** | | | | | | |
| MW-8A | 1.8 | 1.7 | 17.4 | 32.1 | 53 | 5720 |
| MW-8B(dup)* | 3.4 JH | 7.5 JH | 11.4 JH | 18.9 JH | 41.2 JH | 5820 |
| MW-17 | 2 U | 2 U | 2 U | 4 U | ND | 299 |
| WDOE-6A | 688 H | 1294 H | 422 H | 2380 H | 4784 H | 8930 |
| Transfer | 1 UJH | 1 UJH | 1 UJH | 2 UJH | ND | NA |
| Transport | 1 UJH | 1 UJH | 1 UJH | 2 UJH | ND | 5.0 U |
| Filter | NA | NA | NA | NA | NA | 5.0 U |

U : Not detected at detection limit shown.
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.
H : Sample analyzed past holding time.
P : Analyte detected above instrument detection limit but below quantitation limit.
NA : Not analyzed.
ND : Compounds Not Detected

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

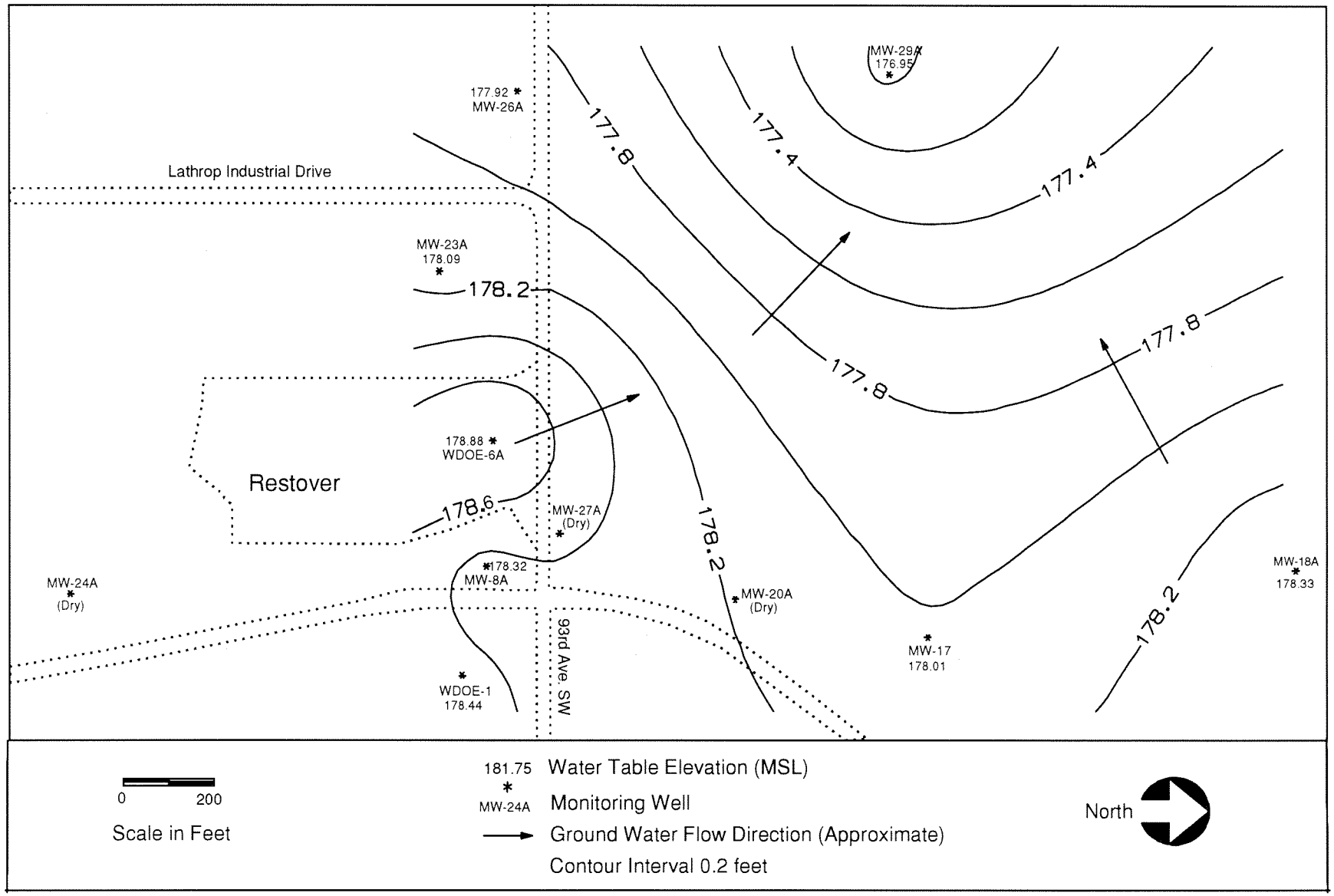


Figure 2: Restover Truck Stop - Water Table Map, January 1993

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

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

ND: Compound Not Detected
NT: Compound Not Tested
[1] : Value is based on one sample.
[2] : Value represents the mean of duplicate samples.

similar appearance to fresh gasoline. Chromatograms from the last two sample rounds were reviewed by Bob Carrell, Manchester Laboratory and found to be comparable in appearance. Therefore, the increase in BTEX concentrations is probably not the result of a new spill/leak.

Since 1990 BTEX concentrations in well MW-20A have fluctuated seasonally. In general, concentrations are low in the winter (5 to 20 $\mu$g/L) and high in the summer (293 to 1400 $\mu$g/L). Well MW-20A was dry this sample round.

Ground water cleanup levels under the Model Toxic Control Act (MTCA) for the BTEX compounds are; benzene (5.0 $\mu$g/L), toluene (40.0 $\mu$g/L), ethylbenzene (30.0 $\mu$g/L), and xylene (20.0 $\mu$g/L). Of the wells sampled during this round, MTCA cleanup levels were exceeded in wells WDOE-6A and MW-8A. Sample results from WDOE-6A exceeded all four MTCA cleanup levels; xylene was exceeded in MW-8A.

## CONCLUSIONS

1. BTEX concentrations continue to be elevated in well WDOE-6A. Concentrations in this well have decreased since 1990, but increased slightly during this round of monitoring. Overall, BTEX concentrations in the upper aquifer have decreased. Concentration decreases are probably due to a combination of plume spreading, dispersion, biodegradation, reduction of source loading and/or seasonal variability. MTCA cleanup levels were exceeded in wells WDOE-6A and MW-8A for BTEX compounds.

2. Dissolved iron continues to be detected at high levels where BTEX contamination is present. The highest concentrations occur near the contamination source.

3. Ground water flows generally toward the northwest, which is consistent with previous sampling events.

## RECOMMENDATIONS

1. Routine monitoring should continue to determine the effectiveness of contaminant removal by vapor extraction. Monitoring wells WDOE-6A, MW-8A, MW-20A, the Spencer well, and the Restover supply well should continue to be sampled for BTEX and dissolved iron. Approval for property access should be obtained to sample MW-15A.

2. Upper aquifer wells (approximately 8 wells) should be sampled for BTEX and dissolved iron to determine the current extent of the contaminant plume. This has not been done since May 1987.

3. Monitoring wells MW-7A, MW-22 and WDOE-2 should be located and properly abandoned.

## REFERENCES

Washington State Department of Ecology, 1991. Manchester Environmental Laboratory - Laboratory Users Manual. Edited by D. Huntamer and J. Hyre.

PM:krc

cc: Bill Yake
Denis Erickson

# APPENDIX A

Analytical Results
Restover Truck Stop
January 5-6, 1993

# MANCHESTER ENVIRONMENTAL LABORATORY

7411 Beach Drive E , Port Orchard Washington 98366

## CASE NARRATIVE

**February 1, 1993**

Subject: Restover Truck Stop - Part B

Samples: 93 - 028050 to - 028054, - 028056, - 028057 and - 028059

Case No. DOE-581Y

Officer: Pam Marti

By: Dickey D. Huntamer
Organics Analysis Unit

## *BETX ANALYSIS*

### ANALYTICAL METHODS:

The samples were analyzed by EPA Method SW-846 - 8020.

### HOLDING TIMES:

Samples 93 - 028050 to - 028053 were analyzed within the recommended holding times. Due to a power failure at the laboratory the remaining samples could not be analyzed before the recommended holding time expired. Additional analysis delays were due to carry over from the contaminated samples to the following samples which resulted in their re-analysis. Sample 93 - 028054 exceeded holding time by one day, sample 93 - 028057 exceeded holding time by two days and samples 93 - 028056 and -028059 were three days over the recommended 14 day holding time. The "J" qualifier was added to the results for sample 93 - 028054, -028057 and -028059 since they were over the holding time and the concentrations were low. No qualifier was added to 93 - 028056 since the possible losses from exceeding the holding times were insignificant compared to the total concentrations found in the sample.

### BLANKS:

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

### SURROGATES:

Surrogate recoveries were within acceptable limits.

## MATRIX SPIKE AND MATRIX SPIKE DUPLICATE:

Matrix spike recoveries and relative percent differences were within acceptable limits.

## SPECIAL ANALYTICAL PROBLEMS:

Holding time problems were encountered due to a power failure. These were compounded by high concentrations in a few samples which necessitated halting analysis while the GC system was cleaned up. It was noted during the analysis that the hydrocarbon peak pattern for sample 93 - 028056 appeared to be fresh gasoline where as samples -028053 and -028054 appeared to be weathered gasoline. The data is acceptable to use as qualified.

## DATA QUALIFIER CODES:

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

*** Lab Analysis Report ***

==> Transaction #: 01271501 Laboratory: (WE) Ecology, Manchester Lab

Work Group: (51) VOA - PP Scan (GCMS)

Instrument: (????????) Unspecified

Method: (EP3-8020 ) GC - Aromatic Volatile Organics

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

Project: DOE-581Y RESTOVER TRUCK STOP Prg Ele#: D3K01

Prj Off: Marti, Pam DOE Analysis Due: 930107 Revised Due:

*** Sample Records in Transaction ***

| Seq# | Sample # | QA | Date/Time | Description | Alternate Keys | | |
|---|---|---|---|---|---|---|---|
| 01 | 93028050 | LBK1 | 930105 | SPENCER | | | |
| 02 | 93028050 | | 930105 | SPENCER | | | |
| 03 | 93028051 | | 930105 | RESTOVER | | | |
| 04 | 93028052 | | 930106 | MW-17 | | | |
| 05 | 93028053 | | 930106 | MW-8A | | | |
| 06 | 93028054 | | 930106 | MW-8B | | | |
| 07 | 93028050 | LBK2 | 930105 | SPENCER | | | |
| 08 | 93028056 | | 930106 | WDOE-6A | | | |
| 09 | 93028057 | | 930106 | TRNASFER | | | |
| 10 | 93028059 | | 930106 | TRANSPORT | | | |
| 11 | 93028050 | LBK3 | 930105 | SPENCER | | | |
| 12 | 93028050 | LMX1 | 930105 | SPENCER | | | |
| 13 | 93028051 | LMX1 | 930105 | RESTOVER | | | |

Record Type: TRNIN3 Date Verified: 2/2/93 By: D Kantas

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

*** Verified and Transferred to VERTRANS ***

Processed: 2-FEB-93 08:58:21 Status: E Batch: A (In CUR DB)

*** Lab Analysis Report ***

Transaction #: 01271501 Seq #: 01 (51) VOA - PP Scan (GCMS)
Proj Code : DOE-581Y RESTOVER TRUCK STOP PE # : D3K01

Blank ID : BW3019P/T
Sample No.: 93 028050 Alternate Keys:

Samp Matrix: (10) Water-Total Units: (11) ug/l %Slds:
QA Code: (LBK1) Lab Blank Sample #1 Peaks Total:
Date Extracted: Date Analyzed: 930119 # Days to Ext/Anal: 0/ 14

| Line | Par # | Parameter Description | Units | Value | |
|---|---|---|---|---|---|
| 1 | 71432 | Benzene | ug/l | 2U | |
| 2 | 108883 | Toluene | ug/l | 2U | |
| 3 | 100414 | Ethylbenzene | ug/l | 2U | |
| 4 | 1330207 | Total Xylenes | ug/l | 4U | |
| 5 | -200003 | Surrog: 1,4-Bromofluorobenze | % Recov | 101.5 | (Surr) PR |

*** Lab Analysis Report ***

Transaction #: 01271501 Seq #: 02 (51) VOA - PP Scan (GCMS)
Proj Code : DOE-581Y RESTOVER TRUCK STOP PE # : D3K01

Sample No.: 93 028050 Alternate Keys:

Samp Matrix: (10) Water-Total Units: (11) ug/l %Slds:
QA Code: ( ) Unspecifed Peaks Total:
Date Extracted: Date Analyzed: 930119 # Days to Ext/Anal: 0/ 14

| Line | Par # | Parameter Description | Units | Value | |
|---|---|---|---|---|---|
| 1 | 71432 | Benzene | ug/l | 2U | |
| 2 | 108883 | Toluene | ug/l | 2U | |
| 3 | 100414 | Ethylbenzene | ug/l | 2U | |
| 4 | 1330207 | Total Xylenes | ug/l | 4U | |
| 5 | -200003 | Surrog: 1,4-Bromofluorobenze | % Recov | 101.4 | (Surr) PR |

Washington State Department of Ecology
*** Lab Analysis Report ***

Transaction #: 01271501 Seq #: 03 (51) VOA - PP Scan (GCMS)
Proj Code : DOE-581Y RESTOVER TRUCK STOP PE # : D3K01

Sample No.: 93 028051 Alternate Keys:

Samp Matrix: (10) Water-Total Units: (11) ug/l %Slds:
QA Code: ( ) Unspecifed Peaks Total:
Date Extracted: Date Analyzed: 930119 # Days to Ext/Anal: 0/ 14

| Line | Par # | Parameter Description | Units | Value | |
|---|---|---|---|---|---|
| 1 | 71432 | Benzene | ug/l | 2U | |
| 2 | 108883 | Toluene | ug/l | 2U | |
| 3 | 100414 | Ethylbenzene | ug/l | 2U | |
| 4 | 1330207 | Total Xylenes | ug/l | 4U | |
| 5 | -200003 | Surrog: 1,4-Bromofluorobenze | % Recov | 101.0 | (Surr) PR |

Washington State Department of Ecology
*** Lab Analysis Report ***

Transaction #: 01271501 Seq #: 04 (51) VOA - PP Scan (GCMS)
Proj Code : DOE-581Y RESTOVER TRUCK STOP PE # : D3K01

Sample No.: 93 028052 Alternate Keys:

Samp Matrix: (10) Water-Total Units: (11) ug/l %Slds:
QA Code: ( ) Unspecifed Peaks Total:
Date Extracted: Date Analyzed: 930119 # Days to Ext/Anal: 0/ 13

| Line | Par # | Parameter Description | Units | Value | |
|---|---|---|---|---|---|
| 1 | 71432 | Benzene | ug/l | 2U | |
| 2 | 108883 | Toluene | ug/l | 2U | |
| 3 | 100414 | Ethylbenzene | ug/l | 2U | |
| 4 | 1330207 | Total Xylenes | ug/l | 4U | |
| 5 | -200003 | Surrog: 1,4-Bromofluorobenze | % Recov | 104.2 | (Surr) PR |

*** Lab Analysis Report ***

Transaction #: 01271501 Seq #: 05 (51) VOA - PP Scan (GCMS)
Proj Code : DOE-581Y RESTOVER TRUCK STOP PE # : D3K01

Sample No.: 93 028053 Alternate Keys:

Samp Matrix: (10) Water-Total Units: (11) ug/l %Slds:
QA Code: ( ) Unspecifed Peaks Total:
Date Extracted: Date Analyzed: 930119 # Days to Ext/Anal: 0/ 13

| Line | Par # | Parameter Description | Units | Value | |
|---|---|---|---|---|---|
| 1 | 71432 | Benzene | ug/l | 1.8 | |
| 2 | 108883 | Toluene | ug/l | 1.7 | |
| 3 | 100414 | Ethylbenzene | ug/l | 17.4 | |
| 4 | 1330207 | Total Xylenes | ug/l | 32.1 | |
| 5 | -200003 | Surrog: 1,4-Bromofluorobenze | % Recov | 131.4 INF | (Surr) PR |

*** Lab Analysis Report ***

Transaction #: 01271501 Seq #: 06 (51) VOA - PP Scan (GCMS)
Proj Code : DOE-581Y RESTOVER TRUCK STOP PE # : D3K01

Sample No.: 93 028054 Alternate Keys:

Samp Matrix: (10) Water-Total Units: (11) ug/l %Slds: ____
QA Code: ( ) Unspecifed Peaks Total: ____
Date Extracted: Date Analyzed: 930121 # Days to Ext/Anal: 0/ 15

| Line | Par # | Parameter Description | Units | Value | |
|---|---|---|---|---|---|
| 1 | 71432 | Benzene | ug/l | 3.4J | |
| 2 | 108883 | Toluene | ug/l | 7.5J | |
| 3 | 100414 | Ethylbenzene | ug/l | 11.4J | |
| 4 | 1330207 | Total Xylenes | ug/l | 18.9J | |
| 5 | -200003 | Surrog: 1,4-Bromofluorobenze | % Recov | 106.9 | (Surr) PR |

*** Lab Analysis Report ***

Transaction #: 01271501 Seq #: 07 (51) VOA - PP Scan (GCMS)
Proj Code : DOE-581Y RESTOVER TRUCK STOP PE # : D3K01

Blank ID : BW3022D
Sample No.: 93 028050 Alternate Keys:

Samp Matrix: (10) Water-Total Units: (11) ug/l %Slds: ____
QA Code: (LBK2) Lab Blank Sample #2 Peaks Total: ____
Date Extracted: Date Analyzed: 930122 # Days to Ext/Anal: 0/ 17

| Line | Par # | Parameter Description | Units | Value | |
|---|---|---|---|---|---|
| 1 | 71432 | Benzene | ug/l | 1U | |
| 2 | 108883 | Toluene | ug/l | 1U | |
| 3 | 100414 | Ethylbenzene | ug/l | 1U | |
| 4 | 1330207 | Total Xylenes | ug/l | 2U | |
| 5 | -200003 | Surrog: 1,4-Bromofluorobenze | % Recov | 110.7 | (Surr) PR |

*** Lab Analysis Report ***

Transaction #: 01271501 Seq #: 08 (51) VOA - PP Scan (GCMS)
Proj Code : DOE-581Y RESTOVER TRUCK STOP PE # : D3K01

Sample No.: 93 028056 Alternate Keys:

Samp Matrix: (10) Water-Total Units: (11) ug/l %Slds:
QA Code: ( ) Unspecifed Peaks Total:
Date Extracted: Date Analyzed: 930123 # Days to Ext/Anal: 0/ 17

| Line | Par # | Parameter Description | Units | Value | |
|---|---|---|---|---|---|
| 1 | 71432 | Benzene | ug/l | 688 | |
| 2 | 108883 | Toluene | ug/l | 1294 | |
| 3 | 100414 | Ethylbenzene | ug/l | 422 | |
| 4 | 1330207 | Total Xylenes | ug/l | 2380 | |
| 5 | -200003 | Surrog: 1,4-Bromofluorobenze | % Recov | 98.9 | (Surr) PR |

*** Lab Analysis Report ***

Transaction #: 01271501 Seq #: 09 (51) VOA - PP Scan (GCMS)
Proj Code : DOE-581Y RESTOVER TRUCK STOP PE # : D3K01

Sample No.: 93 028057 Alternate Keys:

Samp Matrix: (10) Water-Total Units: (11) ug/l %Slds: ____
QA Code: ( ) Unspecifed Peaks Total: ____
Date Extracted: Date Analyzed: 930122 # Days to Ext/Anal: 0/ 16

| Line | Par # | Parameter Description | Units | Value | |
|---|---|---|---|---|---|
| 1 | 71432 | Benzene | ug/l | 1UJ | |
| 2 | 108883 | Toluene | ug/l | 1UJ | |
| 3 | 100414 | Ethylbenzene | ug/l | 1UJ | |
| 4 | 1330207 | Total Xylenes | ug/l | 2UJ | |
| 5 | -200003 | Surrog: 1,4-Bromofluorobenze | % Recov | 108.8 | (Surr) PR |

*** Lab Analysis Report ***

Transaction #: 01271501 Seq #: 10 (51) VOA - PP Scan (GCMS)
Proj Code : DOE-581Y RESTOVER TRUCK STOP PE # : D3K01

Sample No.: 93 028059 Alternate Keys:

Samp Matrix: (10) Water-Total Units: (11) ug/l %Slds: ____
QA Code: ( ) Unspecifed Peaks Total: ____
Date Extracted: Date Analyzed: 930123 # Days to Ext/Anal: 0/ 17

| Line | Par # | Parameter Description | Units | Value | |
|---|---|---|---|---|---|
| 1 | 71432 | Benzene | ug/l | 1UJ | |
| 2 | 108883 | Toluene | ug/l | 1UJ | |
| 3 | 100414 | Ethylbenzene | ug/l | 1UJ | |
| 4 | 1330207 | Total Xylenes | ug/l | 2UJ | |
| 5 | -200003 | Surrog: 1,4-Bromofluorobenze | % Recov | 105.7 | (Surr) PR |

*** Lab Analysis Report ***

Transaction #: 01271501 Seq #: 11 (51) VOA - PP Scan (GCMS)
Proj Code : DOE-581Y RESTOVER TRUCK STOP PE # : D3K01

Blank ID : BW3021DP/T
Sample No.: 93 028050 Alternate Keys:

Samp Matrix: (10) Water-Total Units: (11) ug/l %Slds:
QA Code: (LBK3) Lab Blank Sample #3 Peaks Total:
Date Extracted: Date Analyzed: 930121 # Days to Ext/Anal: 0/ 16

| Line | Par # | Parameter Description | Units | Value | |
|---|---|---|---|---|---|
| 1 | 71432 | Benzene | ug/l | 1U | |
| 2 | 108883 | Toluene | ug/l | 1U | |
| 3 | 100414 | Ethylbenzene | ug/l | 1U | |
| 4 | 1330207 | Total Xylenes | ug/l | 2U | |
| 5 | -200003 | Surrog: 1,4-Bromofluorobenze | % Recov | 98.8 | (Surr) PR |

*** Lab Analysis Report ***

Transaction #: 01271501 Seq #: 12 (51) VOA - PP Scan (GCMS)
Proj Code : DOE-581Y RESTOVER TRUCK STOP PE # : D3K01

Sample No.: 93 028050 Alternate Keys:

Samp Matrix: (10) Water-Total Units: (94) % Recov %Slds:
QA Code: (LMX1) Lab Mtrx Spike #1 (% Rec Peaks Total:
Date Extracted: Date Analyzed: 930121 # Days to Ext/Anal: 0/ 16

| Line | Par # | Parameter Description | Units | Value | |
|---|---|---|---|---|---|
| 1 | 71432 | Benzene | % Recov | 101.7 | |
| 2 | 108883 | Toluene | % Recov | 100.4 | |
| 3 | 100414 | Ethylbenzene | % Recov | 100.7 | |
| 4 | 1330207 | Total Xylenes | % Recov | 100.2 | |
| 5 | -200003 | Surrog: 1,4-Bromofluorobenze | % Recov | 97.6 | (Surr) PR |

*** Lab Analysis Report ***

Transaction #: 01271501 Seq #: 13 (51) VOA - PP Scan (GCMS)
Proj Code : DOE-581Y RESTOVER TRUCK STOP PE # : D3K01

Sample No.: 93 028051 Alternate Keys:

Samp Matrix: (10) Water-Total Units: (94) % Recov %Slds: ____
QA Code: (LMX1) Lab Mtrx Spike #1 (% Rec Peaks Total: ____
Date Extracted: Date Analyzed: 930121 # Days to Ext/Anal: 0/ 16

| Line | Par # | Parameter Description | Units | Value | |
|---|---|---|---|---|---|
| 1 | 71432 | Benzene | % Recov | 113.5 | |
| 2 | 108883 | Toluene | % Recov | 112.2 | |
| 3 | 100414 | Ethylbenzene | % Recov | 112.0 | |
| 4 | 1330207 | Total Xylenes | % Recov | 111.0 | |
| 5 | -200003 | Surrog: 1,4-Bromofluorobenze | % Recov | 97.7 | (Surr) PR |

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
MANCHESTER ENVIRONMENTAL LABORATORY
7411 Beach Drive East • Port Orchard, Washington 98366-8204 • (206) 895-4737 • SCAN 744-4737

January 13, 1993

TO: Pam Marti

FROM: Bill Kammin, Environmental_Lab_Director BK

SUBJECT: Metals Quality Assurance memo for the Restover Project

## SAMPLE INFORMATION

The samples from the Restover project were received by the Manchester Laboratory on 01/07/93 in good condition.

## HOLDING TIMES

All analyses were performed within the USEPA Contract Laboratory Program (CLP) holding times for metals analysis (28 days for mercury, 180 days for all other metals).

## INSTRUMENT CALIBRATION

Instrument calibration was performed before each analytical run and checked by initial calibration verification standards and blanks. Continuing calibration standards and blanks were analyzed at a frequency of 10% during the run and again at the end of the analytical run. All initial and continuing calibration verification standards were within the relevant USEPA (CLP) control limits.

## PROCEDURAL BLANKS

The procedural blanks associated with these samples showed no analytically significant levels of analytes.

## SPIKED SAMPLE ANALYSES

Spike and duplicate spike sample analyses were performed on this data set. All spike recoveries were within the CLP acceptance limits of +/- 25%.

## PRECISION DATA

The results of the spike and duplicate spike samples were used to evaluate precision on this sample set. The Relative Percent Difference (RPD) for all analytes was within the +/- 20% CLP acceptance window for duplicate analysis.

## LABORATORY CONTROL SAMPLE (LCS) ANALYSES

LCS analyses were within the windows established for each parameter.

## SERIAL DILUTION ANALYSES

Serial dilution is used in ICP analyses to examine sample results for potential interferences. The serial dilution results for this sample set met CLP specifications.

## SUMMARY

The data generated by the analysis of these samples can be used noting the data qualifications discussed in this memo.

Please call Bill Kammin at SCAN 744-4737 to further discuss this project.

WRK:wrk

*** Lab Analysis Report ***

==> Transaction #: 01121442 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: (AGH) Hedley, Art DOE Hours Worked:

Project: DOE-581Y RESTOVER TRUCK STOP Prg Ele#: D3K01

Prj Off: Marti, Pam DOE Analysis Due: 930107 Revised Due:

*** Sample Records in Transaction ***

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

| Seq# | Sample # | QA | Date/Time | Description | Alternate Keys | | |
|---|---|---|---|---|---|---|---|
| 01 | 93028050 | LBK1 | 930105 | SPENCER | | | |
| 02 | 93028050 | | 930105 | SPENCER | | | |
| 03 | 93028051 | | 930105 | RESTOVER | | | |
| 04 | 93028052 | | 930106 | MW-17 | | | |
| 05 | 93028053 | | 930106 | MW-8A | | | |
| 06 | 93028054 | | 930106 | MW-8B | | | |
| 07 | 93028056 | | 930106 | WDOE-6A | | | |
| 08 | 93028058 | | 930106 | FILTER | | | |
| 09 | 93028059 | | 930106 | TRANSPORT | | | |
| 10 | 93028050 | LMX1 | 930105 | SPENCER | | | |
| 11 | 93028050 | LMX2 | 930105 | SPENCER | | | |

Record Type: TRNIN1 Date Verified: 1/12/93 By: [illegible]
Transaction Status: New Transaction...First Printing...Unverified.
Processed: 12-JAN-93 15:07:12 Status: N Batch: (In CUR DB)

*** Lab Analysis Report ***

Transaction #: 01121442 (38) Metals - ICP Scan
Proj Code : DOE-581Y RESTOVER TRUCK STOP PE # : D3K01

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Blank ID: | | | EWPB 02.30 | | | | | |
| Sample Number: | | | 93028050 | 93028050 | 93028051 | 93028052 | 93028053 |
| Sample Description: | | | SPENCER | SPENCER | RESTOVER | MW-17 | MW-8A |
| Matrix: | | | Water-Fil | Water-Fil | Water-Fil | Water-Fil | Water-Fil |
| Units: | | | | | | | |
| % Slds: | | | | | | | |
| QA Code: | | | LBK1 | | | | |
| Date Extract: | | | | | | | |
| Date Analyzd: | | | 930111 | 930111 | 930111 | 930111 | 930111 |
| 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 | Berylium | Be-Diss ug/l | | | | | |
| 6 | Boron | B -Diss ug/l | | | | | |
| 7 | Cadmium | Cd-Diss ug/l | | | | | |
| 8 | Calcium | Ca-Diss ug/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 | 5.0U | 287 | 14P | 299 | 5720 |
| 14 | Lead | Pb-Diss ug/l | | | | | |
| 15 | Mgnsium | Mg-Diss ug/l | | | | | |
| 16 | Mangnese | Mn-Diss ug/l | | | | | |
| 17 | Molybdnm | Mo-Diss ug/l | | | | | |
| 18 | Nickel | Ni-Diss ug/l | | | | | |
| 19 | Potassium | K -Diss ug/l | | | | | |
| 20 | Selenium | Se-Diss ug/l | | | | | |
| 21 | Silicon | Si-Diss ug/l | | | | | |
| 22 | Silver | Ag-Diss ug/l | | | | | |
| 23 | Sodium | Na-Diss ug/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 | | | | | |

*** Lab Analysis Report ***

Transaction #: 01121442 (38) Metals - ICP Scan
Proj Code : DOE-581Y RESTOVER TRUCK STOP PE # : D3K01

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Sample Number: | | | 93028054 | 93028056 | 93028058 | 93028059 | 93028050 |
| Sample Description: | | | MW-8B | WDOE-6A | FILTER | TRANSPORT | SPENCER |
| Matrix: | | | Water-Fil | Water-Fil | Water-Fil | Water-Fil | Water-Fil |
| Units: | | | | | | | % Recov |
| % Slds: | | | | | | | |
| QA Code: | | | | | | | LMX1 |
| Date Extract: | | | | | | | |
| Date Analyzd: | | | 930111 | 930111 | 930111 | 930111 | 930111 |
| 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 | Berylium | Be-Diss ug/l | | | | | |
| 6 | Boron | B -Diss ug/l | | | | | |
| 7 | Cadmium | Cd-Diss ug/l | | | | | |
| 8 | Calcium | Ca-Diss ug/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 | 5820 | 8930 | 5.0U | 5.0U | 96 |
| 14 | Lead | Pb-Diss ug/l | | | | | |
| 15 | Mgnsium | Mg-Diss ug/l | | | | | |
| 16 | Mangnese | Mn-Diss ug/l | | | | | |
| 17 | Molybdnm | Mo-Diss ug/l | | | | | |
| 18 | Nickel | Ni-Diss ug/l | | | | | |
| 19 | PotassiumK | -Diss ug/l | | | | | |
| 20 | Selenium | Se-Diss ug/l | | | | | |
| 21 | Silicon | Si-Diss ug/l | | | | | |
| 22 | Silver | Ag-Diss ug/l | | | | | |
| 23 | Sodium | Na-Diss ug/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 | | | | | |

*** Lab Analysis Report ***

Transaction #: 01121442 (38) Metals - ICP Scan
Proj Code : DOE-581Y RESTOVER TRUCK STOP PE # : D3K01

| | | | | |
|---|---|---|---|---|
| Sample Number: | | | | 93028050 |
| Sample Description: | | | | SPENCER |
| Matrix: | | | | Water-Fil |
| Units: | | | | % Recov |
| % Slds: | | | | |
| QA Code: | | | | LMX2 |
| Date Extract: | | | | |
| Date Analyzd: | | | | 930111 |
| 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 | Berylium | Be-Diss | ug/l | |
| 6 | Boron | B -Diss | ug/l | |
| 7 | Cadmium | Cd-Diss | ug/l | |
| 8 | Calcium | Ca-Diss | ug/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 | 97 |
| 14 | Lead | Pb-Diss | ug/l | |
| 15 | Mgnsium | Mg-Diss | ug/l | |
| 16 | Mangnese | Mn-Diss | ug/l | |
| 17 | Molybdnm | Mo-Diss | ug/l | |
| 18 | Nickel | Ni-Diss | ug/l | |
| 19 | PotassiumK | -Diss | ug/l | |
| 20 | Selenium | Se-Diss | ug/l | |
| 21 | Silicon | Si-Diss | ug/l | |
| 22 | Silver | Ag-Diss | ug/l | |
| 23 | Sodium | Na-Diss | ug/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 | |