

WASHINGTON STATE DEPARTMENT OF ECOLOGY
ENVIRONMENTAL INVESTIGATIONS AND LABORATORY SERVICES

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SUBJECT: Results for Monitoring Round 3

Introduction

The third round of quarterly ground water sampling at the Restover Truck Stop was completed by Ecology on July 24-26, 1989. Nine monitoring wells and two water supply wells were sampled for volatile organic compounds (VOC) and dissolved iron. In addition, a hydrocarbon identification analysis was done on monitoring well MW-12 to determine the source of a strong hydrocarbon odor. Figure 1 shows the locations of wells sampled.

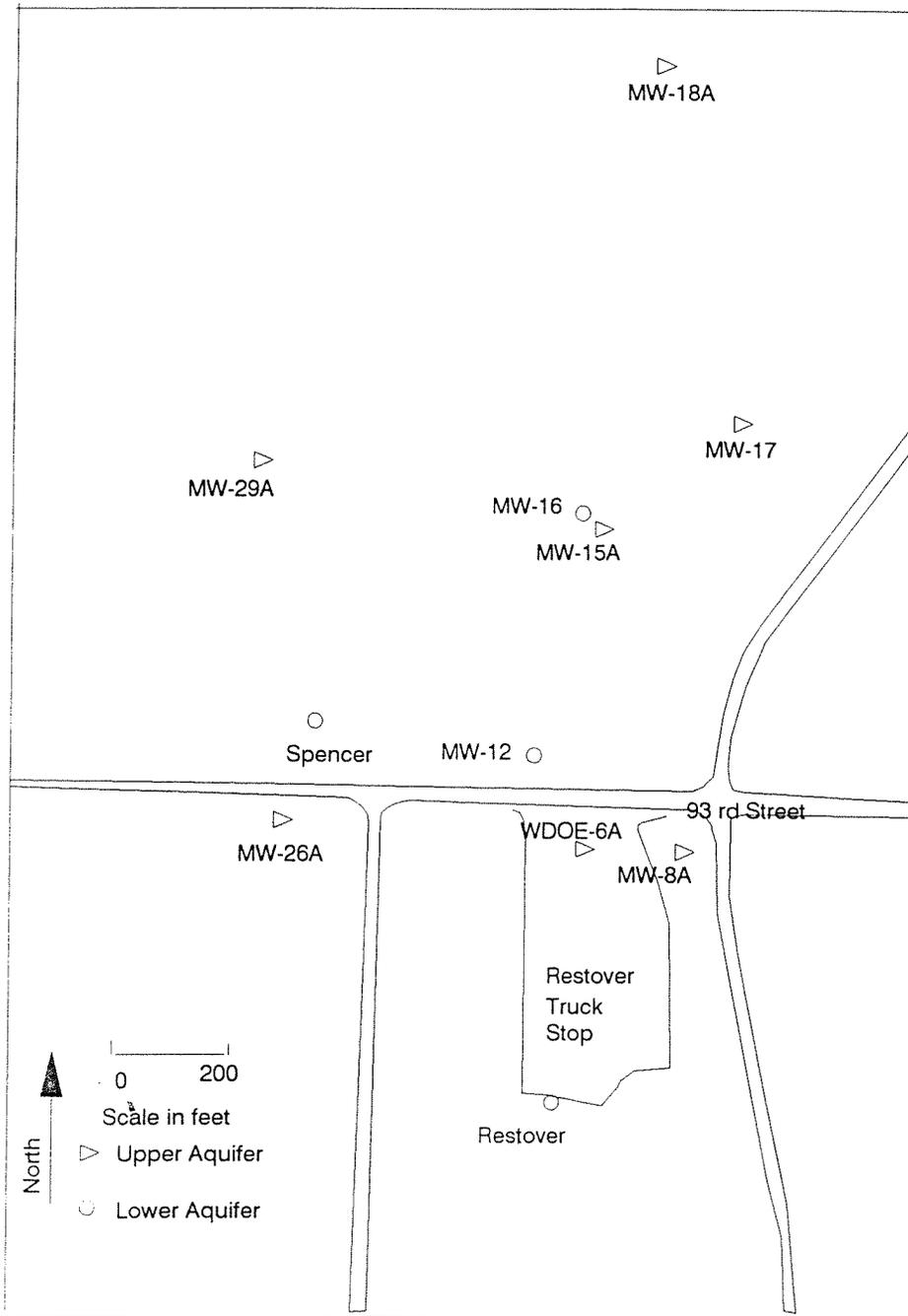
Methods

Prior to sample collection, static water level measurements were obtained from all monitoring wells sampled using an electric probe (see Table 1). Three or more well volumes were purged using either a centrifugal pump or decontaminated teflon bailer. Wells were purged until pH, temperature and conductivity measurements were stable. Samples were collected using a dedicated, bottom-emptying teflon bailer. Sampling equipment was decontaminated using a Liquinox wash, three tap rinses, and one deionized water rinse. Teflon bailers were rinsed with a 10% nitric acid/deionized water solution, methylene chloride, and acetone. Bailer decontamination in Round 3 included a final rinse with organic free water to ensure that methylene chloride and acetone were removed. The peristaltic pump, tubing, and filter bed used for iron filtration were rinsed between samples using 500 ml of a 10% nitric acid solution, followed by 500 ml of deionized water. Filters were changed between each sample.

Quality Assurance Samples

Five quality control samples were collected including a duplicate, matrix spike, and transfer, transport, and filter blanks. Duplicate samples were obtained from monitoring well MW-8A. Benzene, toluene, ethyl benzene, and xylene have been detected in MW-8A previously. Transfer blanks for VOCs and dissolved iron were obtained by pouring organic free water through the bailer and collecting rinsate in the sample containers. A separate filter blank for dissolved iron was obtained by pumping deionized water through the peristaltic pump and filter bed.

Figure 1: Restover Truck Stop
Monitoring Round 3
Well Locations
July 24-26, 1989



Field Observations

Figure 2 shows the potentiometric surface in the upper aquifer. Hydrocarbon odor and sheens were observed in purge water from WDOE-6A, MW-8A, and MW-12. Table 1 lists field observation data in the order wells were sampled.

Table 1. Field Sampling Results

Well ID	pH	Specific Conductance	Temperature Degrees (C)	Elevation Feet above (MSL)	Purge** Volume (gal)	Aquifer (Upper/Lower)
Restover	6.09	95	10.8	-*	70	L
Spencer	6.04	80	10.7	-*	80	L
MW-18A	5.54	40	10.3	175.52	45	U
MW-17	5.62	53	10.2	177.06	30	U
MW-26A	5.71	79	11.1	179.77	25	U
MW-29A	6.09	94	10.6	177.17	50	U
MW-12	5.94	139	11.9	178.55	52	L
MW-8A	6.29	189	11.7	177.01	9	U
WDOE-6A	6.30	221	15.5	180.28	10	U
MW-16	6.02	63	10.8	177.35	90	L
MW-15A	5.88	133	12.1	177.30	5	U

* Measurements were not obtained at these sites.

** At least three well volumes purged.

Sample Analytical Results

Analytical results for benzene, toluene, ethyl benzene, and total xylene (BTEX) are presented in Table 2; Appendix A lists the detection limits and matrix spike recoveries.

Table 2. Volatile Organic Compounds and Dissolved Iron Analytical Results (ug/L)

Well ID	Benzene	Toluene	Ethyl Benzene	Total Xylene	Dissolved Iron
Lower Aquifer					
Restover	ND	ND	ND	ND	7.9
Spencer	ND	ND	ND	ND	10
MW-12	ND	ND	1J	3J	905
MW-16	ND	ND	ND	ND	ND
Upper Aquifer					
MW-18A	ND	ND	ND	ND	ND
MW-17	ND	ND	ND	ND	ND
MW-29A	ND	ND	ND	ND	5.8
MW-26A	ND	ND	ND	ND	11
MW-15A	170	14	ND	34	12
MW-8A	ND	ND	ND	58	4440
WDOE-6A	1300	2200	590	3400	5890

J - Estimated concentration; compound present below detection limit.

ND - Not present above detection limits.

Figure 2: Restover Truck Stop
 Potentiometric surface of the Upper Aquifer
 July 24-26, 1989

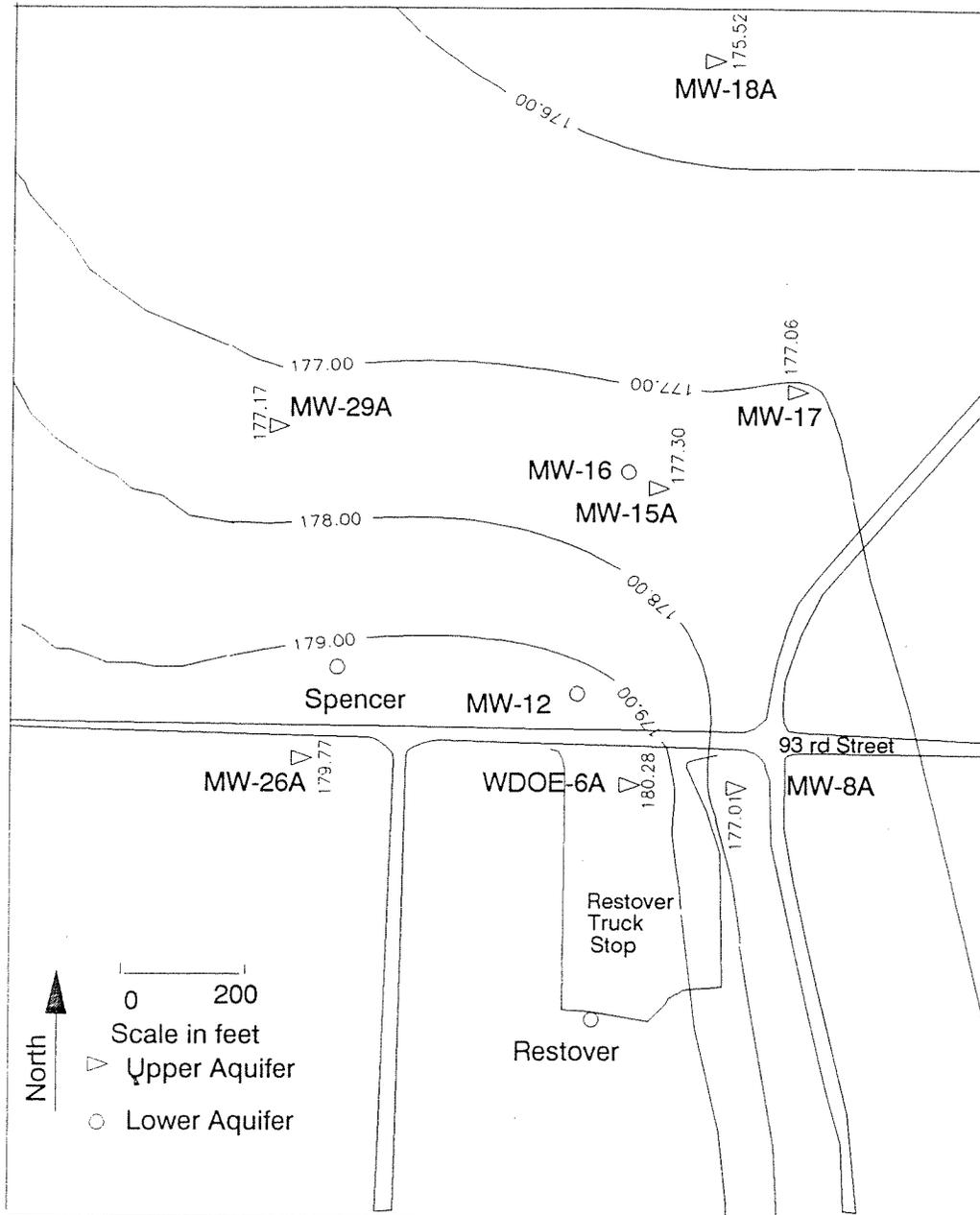


Table 3 shows the sum of benzene, toluene, ethly benzene, and total xylene (BTEX) concentrations for sampling events between May 1987 and July 1989.

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

Well ID	May 1987	September 1987	October 1988	January 1989	July 1989
Upper Aquifer					
WDOE-6A	6950	1180	5300	28000	7490
MW-8A	230	388	479	334	58
MW-17	ND	ND	ND	ND	ND
MW-18A	5	ND	ND	ND	ND
MW-26A	ND	ND	ND	ND	ND
MW-29A	ND	0.8	1.3	ND	ND
MW-15A	1433	NT	NT	ND	218
Lower Aquifer					
MW-12	53	5	7.7	ND	4
MW-16	ND	0.5	ND	0.9	ND
Restover	NT	NT	ND	ND	ND

NT - Not Tested

ND - Not present above detection limits.

Discussion

Contamination in the lower aquifer is still present in low concentrations. An estimated concentration of 4 ppb BTEX was detected in monitoring well MW-12, screened in the lower aquifer. MW-16, also screened in the lower aquifer, showed no BTEX contamination in sample round three. In the past, MW-12 and MW-16 have shown low concentrations of BTEX. One sample was collected from MW-12 for hydrocarbon identification analyses. Results of the analysis identified weathered gasoline as the source of hydrocarbon odor. The extent of contamination in the upper aquifer remains stable. Monitoring wells MW-17, MW-18A, MW-26A and MW-29A continue to show no detectable volatile organic compounds. Samples collected from MW-15A showed benzene (170 ppb), toluene (17 ppb), and total xylene (34 ppb) during sampling round three. No detectable contamination was found in MW-15A during sampling round two. Contamination maybe the result of seasonal changes in ground water flow.

Quality Assurance Analytical Results

Methylene chloride was detected in monitoring well MW-16 at 7 ppb. Methylene chloride and acetone were detected in transfer and transport blanks. Both compounds are common laboratory contaminants and were used for bailer decontamination. The relative percent difference between duplicate samples collected from MW-8A was 10 percent.

Conclusions

1. WDOE-6A continues to show high concentrations of BTEX. This may be attributed to a continuing source located near the gas pumps.
2. Contamination in monitoring well MW-12 consists of weathered gasoline. It may be necessary to do a semi-volatile organic compound analysis on samples from this well in order to determine the concentrations of contaminants present.

Recommendations

1. A semi-volatile organic compound analysis should be run on MW-12 samples to determine the concentrations of contaminants present in the lower aquifer.
2. Monitoring wells WDOE-6A, MW-8A, MW-12, MW-15A, MW-16, the Spencer domestic well, and the Restover supply well should continue to be sampled.
3. Samples should be collected and analyzed for benzene, toluene, ethyl benzene, and total xylene at detection limits of 5 ug/L or lower and dissolved iron at a detection limit of 10 ug/L. The BTEX analysis would replace method 624 for volatile organic compounds.
4. Sampling should be temporarily discontinued at monitoring wells MW-17, MW-18A, MW-26A, and MW-29A. These wells have shown no detectable levels of volatile organic compounds since May of 1987. Future sampling of these wells should be considered if increased contamination is indicated in wells sampled semi-annually.
5. All wells located on property owned by the Crystal Ice Company should be marked to ensure they are not damaged during impending construction at the site. Damaged monitoring wells could contribute to further contamination of the aquifer and increased future costs.

LC:sk

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