

---

## Robert D. Miller Consulting

Environmental Services • Project Management

August 29, 2012

Carol Johnson  
Site Manager  
Department of Ecology  
Toxics Cleanup Program  
Southwest Regional Office  
PO Box 47775  
Olympia, WA 98504-7775

re: East Olympia Grocery - Astro #617  
8245 Rich Road SE  
East Olympia, WA 98501

Ecology Facility #5997  
RDM #WS-UST25

### GROUNDWATER MONITORING REPORT FOR 2012 ANNUAL EVENT

This report documents the annual groundwater monitoring event for 2012 at the East Olympia Grocery aka Astro # 617 site (Ecology Facility # 5997). For this event, field measurements and groundwater sampling occurred on August 23, 2012.

#### Background

In December 1996 a release of petroleum hydrocarbons was discovered at this site during the decommissioning of the Astro #617 underground storage tank (UST) system (tanks T1, T2 and T3). A site investigation followed, which discovered two previously abandoned USTs (tanks T4 and T5). These were also decommissioned. These two tanks predate WSCO Petroleum Company's (WSCO) involvement. All five tanks were visually examined. Tanks T1 and T2 were found to be liquid tight and in good condition. Tanks T3, T4 and T5 were found to be heavily corroded and leaky.

In the initial investigation, WTPH-HCID test results detected gasoline hydrocarbons in the native soil. Diesel and heavy oil were not detected. Gasoline contaminated soil was present beneath each fuel dispenser and in proximity to the fill tube of each UST. Petroleum contamination extended vertically beneath tanks T3, T4 and T5 to about 30 feet below ground surface (bgs), but was only surficial beneath tanks T1 and T2.

Within the Astro tank nest, petroleum contaminated soil beneath T3 was excavated to a depth of 19 feet. At that depth, the WTPH-Gx test result for the native soil was 1100 mg/Kg. A total of 228 tons of gasoline-contaminated soil was excavated from the Astro tank nest, thermally treated and disposed of off-site.

In the vicinity of tanks T4 and T5, contaminated soil was excavated to a depth of 8 feet.

August 29, 2012

Carol Johnson  
Site Manager  
Department of Ecology  
Toxics Cleanup Program  
Southwest Regional Office  
PO Box 47775  
Olympia, WA 98504-7775

re: East Olympia Grocery - Astro #617  
8245 Rich Road SE  
East Olympia, WA 98501

Ecology Facility #5997  
RDM #WS-UST25

## **GROUNDWATER MONITORING REPORT FOR 2012 ANNUAL EVENT**

This report documents the annual groundwater monitoring event for 2012 at the East Olympia Grocery aka Astro # 617 site (Ecology Facility # 5997). For this event, field measurements and groundwater sampling occurred on August 23, 2012.

### **Background**

In December 1996 a release of petroleum hydrocarbons was discovered at this site during the decommissioning of the Astro #617 underground storage tank (UST) system (tanks T1, T2 and T3). A site investigation followed, which discovered two previously abandoned USTs (tanks T4 and T5). These were also decommissioned. These two tanks predate WSCO Petroleum Company's (WSCO) involvement. All five tanks were visually examined. Tanks T1 and T2 were found to be liquid tight and in good condition. Tanks T3, T4 and T5 were found to be heavily corroded and leaky.

In the initial investigation, WTPH-HCID test results detected gasoline hydrocarbons in the native soil. Diesel and heavy oil were not detected. Gasoline contaminated soil was present beneath each fuel dispenser and in proximity to the fill tube of each UST. Petroleum contamination extended vertically beneath tanks T3, T4 and T5 to about 30 feet below ground surface (bgs), but was only surficial beneath tanks T1 and T2.

Within the Astro tank nest, petroleum contaminated soil beneath T3 was excavated to a depth of 19 feet. At that depth, the WTPH-Gx test result for the native soil was 1100 mg/Kg. A total of 228 tons of gasoline-contaminated soil was excavated from the Astro tank nest, thermally treated and disposed of off-site.

In the vicinity of tanks T4 and T5, contaminated soil was excavated to a depth of 8 feet. Further excavation became unsafe. A total of 50 tons of gasoline-contaminated soil was removed, thermally treated and disposed of off-site. The WTPH-Gx test result of the native soil in the floor of this excavation was 3070 mg/Kg.

In January 1997, seven monitor wells (MW1 - MW7) were installed using a direct push drill rig. Groundwater was encountered 27 feet below ground surface (bgs), and probe refusal occurred at 30 feet. Monitor well MW1 was installed in the former location of tank T3. Groundwater samples were collected and analyzed, and were found to be impacted by the hydrocarbon release. Monitor well MW2 was installed to the southeast of MW1, situated between the former locations of T4 and T5 within the pre-Astro tank nest. Subsequent sampling of MW2 revealed that gasoline contamination was present within the groundwater at this location as well. The other five monitoring wells (MW3-MW7) were installed in an array surrounding the former tank nests for determination of the groundwater gradient and extent of the contamination plume. Free product was observed in monitor wells MW4 and MW5 during their construction.

Total petroleum hydrocarbons in the gasoline range (WTPH-Gx), including benzene, toluene, ethyl-benzene and xylenes (BTEX), were detected in five of the seven wells at concentrations above the Ecology groundwater cleanup limits. A trace of total lead (below Ecology's groundwater cleanup limit) was detected in well MW2. Ethylene dibromide (EDB) and ethylene dichloride (EDC) were detected in groundwater samples from monitor well MW4. EDB levels in MW4 slightly exceeded the Ecology groundwater limit. MW2 is located within, and MW4 is located adjacent to the pre-Astro tank nest. The evidence of lead and lead scavengers in the vicinity of T4 and T5 suggest that these tanks previously contained and released leaded gasoline. The release beneath T3 appears to consist of unleaded gasoline.

In 1997 and 1998 seven additional wells (MW8 - MW14) were installed to further characterize the horizontal extent of the petroleum hydrocarbon plume. By the end of 1998, the plume was fully characterized, per Ecology's published guidance documents. MW7, no longer useful, was abandoned in July of 2007 with Ecology's approval.

## **Remedial Activities**

At the East Olympia Grocery store, a groundwater sparging system with venting to the atmosphere began operating in monitor well MW9 in November 23, 1998. In 2001, the system was expanded to include sparging in monitor wells MW1, MW4, MW5 and MW11. MW11 achieved compliance and was disconnected in 2004. At Bluhm's property (directly across Rich Road), a second groundwater remediation system was installed and activated in April 2001. Operationally, both sparge systems utilize active air injection in conjunction with with passive vapor venting to the atmosphere.

This year most of the points have been working, although several inside the monitor wells have been shut off, pending repairs (MW5, MW8, MW10 and MW11).

Just before leaving the site for this event, both sparge systems were reactivated. In addition, bacteria called Orange X and produced by Bio Systemss was placed in monitor wells MW8, MW9 and MW10. Our intent is to treat the source area and selected down gradient wells. Orange X is specifically formulated to reduce petroleum hydrocarbons into harmless organic compounds.

## **Static Water Levels & Gradient**

On August 23, 2012 depths to groundwater were measured in monitor wells MW5, MW8 through MW14. The only exception in the plan was MW13, which was not accessible. MW1 through MW6 do not extend deep enough to reach groundwater during the seasonally dry months, and MW7 was removed in 2007 in order to install a new septic drain field. For this event we were able to locate and unbury monitor wells MW2 and MW9. Data collected from this event and historical data of measured static water levels are considered adequate to determine groundwater direction and gradient. Measurements were made to the nearest 0.01 feet using an electronic water level meter.

Groundwater data is summarized in Table 1 on pages A2 to A7. This table shows a history of depth to groundwater measurements and fluctuations between monitoring events. Since groundwater monitoring began in 1997, static water level depths have averaged between 26.93 feet (02/97) and 32.03 ft (09/06). The average depth to groundwater for this event was 30.67 feet below tops of casings. Compared to last year's event (October 2011), the groundwater level rose an average of 0.51 feet. The water table for this event is typical of the dry summer/fall seasons. We believe the static water levels reported on this date are representative of actual site conditions.

A groundwater gradient map was constructed using the August 23, 2012 field measurements. Figure 1 -Groundwater Map is presented on page A1. This map shows that the apparent groundwater flow direction is roughly north 38° west at a gradient of about 0.021 vertical feet per horizontal foot. The apparent flow direction and slope observed during this event should be regarded as estimates. The measured wells and interpreted gradient fit the overall historical trend for events at this site. Our interpretation of the groundwater data for this event is consistent with past data (including MW1 through MW7, and MW9). The important aspect is that this is the apparent direction of potentially migrating petroleum hydrocarbons. Interestingly, there appears to be a groundwater mound in the vicinity of MW5, which suggests a water line may be leaking beneath the street or beneath the grocery store.

## **Groundwater Sampling and Laboratory Test Results**

On August 23, 2012, groundwater samples were obtained from monitor wells MW8, through MW12, MW14, and Bluhm's on-site water well. All field work was performed by Robert Miller (report author) with assistance by Mike Zirkle of WSCO. Monitor wells MW1 through MW7 and MW13 were not sampled. MW1 through MW6 are typically not sampled, because they extend to only 30 feet and become dry in the summer, and MW7 was abandoned in 2007. During this event, MW2 and MW9 were located and uncovered. Unfortunately, MW13 could not be accessed, because the mini-storage unit over it was locked and the owner could not be contacted.

Prior to sample collection, only one well volume could be purged from wells MW8 and

MW9 using a submersible pump. Other wells were purged the desired three well volumes. Many of the wells have become obstructed with broken sparge points in the bottoms of the wells. However, we were still able to collect groundwater samples using small diameter clear plastic bailers. To reduce the possibility of cross contamination, new individual disposable bailers were used for each well. Most wells contained clear water without petroleum odors. Only MW9 smelled of gasoline. Only MW8 and MW9 contained some suspended black particulate, which appears to be defunct/biodegraded petroleum. Groundwater in MW14 is a light ash grey, which appears to be volcanic ash flour and not a concern for the purpose of this report. Each sample included duplicate 40 ml vials, completely filled with water, then inverted and observed to ensure the absence of air bubbles. The samples were uniquely labeled, placed on ice in a cooler and delivered with chain of custody to Wy'East Environmental Services lab in Portland, Oregon within 4 hours of collection. Wy'East is a NELAP certified laboratory.

Wy'East laboratory analyzed each sample for benzene, ethyl-benzene, toluene and xylenes via EPA method 8021B. Following testing, the surrogate recoveries were good and there were no qualifiers reported. The laboratory test results for this event and previous events are summarized in Table 2 on pages A8 through A13. Wy'East's 21 page Laboratory Report with Chain of Custody follows Table 2.

In brief, monitor wells MW8, MW9 and MW10 contained benzene above the MTCA method A limit of 5 ug/L. The highest concentration (625 ug/L) was located at the point of release, i.e., MW9, whereas, the furthest down gradient well MW10 contained less than 11 ug/L. Other BTEX compounds appear to remain localized in the vicinity of MW9 and MW8.

## **Conclusions**

Given the on-going remedial activities and data collected to date, we conclude:

- The apparent groundwater flow remains to the north at moderate slope, and is consistent with previous events. The static water levels were low, as expected for the dry summer/fall season.
- No free product was expected or observed in any well observed or sampled.
- Benzene is below MTCA Method A limits in all sampled wells except MW8, MW9 and MW10. Regardless, (BTEX) beneath the site appears to be slowly trending cleaner with each passing year.
- Up gradient and far down gradient wells remain "clean" or almost clean (MW10, MW12 through MW14), although MW13 could not be tested.
- Bluhm's domestic well was sampled during this event; and it continues to test free of BTEX compounds.

## Recommendations

Given the data collected to date, we recommend the following:

- Continue annual groundwater monitoring, with the next event scheduled for August 2013. During the monitoring event, measure static water levels in MW8 through MW14 and analyze water samples from these wells for BTEX.
- Clear MW5, MW8, MW10 and MW11 of internal obstructions; and replace all copper line sparge points with flexible plastic lines.
- RDM remains strongly opposed to resuming use of Bluhm's water well for potable use, as it is located within a contaminated groundwater area and previous water samples have shown the well water to be contaminated with BTEX compounds. During this event, Mr Bluhm advised that he continues to use the well for irrigation only. However, RDM's and WSCO's position remains that any use of that well is solely at the user's own risk.

## Limitations

RDM has prepared this report for WSCO Petroleum Company, the Client. This report may be made available to regulatory agencies or other parties designated by the Client. This report shall not be used by anyone except the Client, the current and past property owners and Ecology, unless approved in writing by RDM beforehand. The information contained within this report is not applicable to other sites. The information presented in this report was obtained from discrete water samples. The professional evaluation is limited to petroleum hydrocarbons associated with the UST system discussed herein. RDM makes no warranties, either express or implied, as to conditions in areas that were not sampled or tested, or to information generated or provided by others. The conclusions in this report may not retain their validity in the future as site conditions change or additional information is obtained. This report does not provide or constitute a legal opinion.

If you have any questions or comments regarding the contents of this report, please contact me at 503-523-8836.

Prepared by,

Robert D Miller, LHG  
*President and Hydrogeologist*  
*Certified Washington Site Assessor*

## Attachments

cc: Glenn Zirkle - WSCO Petroleum Co  
William Johnson – Current Property Owner  
Gerald Tousley - Thurston County Public Health  
George Bluhm - Adjacent Property Owner

## Recommendations

Given the data collected to date, we recommend the following:

- Continue annual groundwater monitoring, with the next event scheduled for August 2013. During the monitoring event, measure static water levels in MW8 through MW14 and analyze water samples from these wells for BTEX.
- Clear MW5, MW8, MW10 and MW11 of internal obstructions; and replace all copper line sparge points with flexible plastic lines.
- RDM remains strongly opposed to resuming use of Bluhm's water well for potable use, as it is located within a contaminated groundwater area and previous water samples have shown the well water to be contaminated with BTEX compounds. During this event, Mr Bluhm advised that he continues to use the well for irrigation only. However, RDM's and WSCO's position remains that any use of that well is solely at the user's own risk.

## Limitations

RDM has prepared this report for WSCO Petroleum Company, the Client. This report may be made available to regulatory agencies or other parties designated by the Client. This report shall not be used by anyone except the Client, the current and past property owners and Ecology, unless approved in writing by RDM beforehand. The information contained within this report is not applicable to other sites. The information presented in this report was obtained from discrete water samples. The professional evaluation is limited to petroleum hydrocarbons associated with the UST system discussed herein. RDM makes no warranties, either express or implied, as to conditions in areas that were not sampled or tested, or to information generated or provided by others. The conclusions in this report may not retain their validity in the future as site conditions change or additional information is obtained. This report does not provide or constitute a legal opinion.

If you have any questions or comments regarding the contents of this report, please contact me at 503-523-8836.

Prepared by,



Robert D Miller, LHG  
President and Hydrogeologist  
Certified Washington Site Assessor



## Attachments

cc: Glenn Zirkle - WSCO Petroleum Co  
William Johnson - Current Property Owner  
Gerald Tousley - Thurston County Public Health  
George Bluhm - Adjacent Property Owner

**Table 2 - Contaminant Concentrations in Groundwater**  
**Astro # 617 - East Olympia, WA**

Location/ Collection Data	B	T	E	X	N	Total Lead	EDB	EDC	MTBE	Gx
	----- parts per billion (ug/L) -----									
<b>MW1</b>										
1st Event - 01/20/97	26	330	230	2900		<2	ND	ND		30000
2nd Event - 07/30/97	633	1060	150	2770						
3rd Event - 11/01/97	536	1510	310	5630						
4th Event - 04/22/98	ND	ND	ND	ND						ND
5th Event - 08/20/98	130	210	190	640						
6th Event - 11/23/98	----- Not Sampled -----									
7th Event - 08/04/99	ND	ND	ND	ND						
	Currently Not Monitored per Agreement with Ecology									
<b>MW2</b>										
1st Event - 01/20/97	810	3600	1300	11000		4	ND	ND		61000
2nd Event - 07/30/97	---- Not Sampled (Dry) ----									
3rd Event - 11/01/97	---- Not Sampled (Dry) ----									
4th Event - 04/22/98	-- Not Sampled (See MW9) --									
5th Event - 08/20/98	-- Not Sampled (See MW9) --									
6th Event - 11/23/98	-- Not Sampled (See MW9) --									
7th Event - 08/04/99	-- Not Sampled (See MW9) --									
	Currently Not Monitored per Agreement with Ecology									
<b>MW3</b>										
1st Event - 01/20/97	-----Not Sampled-----									
2nd Event - 07/30/97	4650	20100	2710	27300						
3rd Event - 11/01/97	6930	26800	2700	17500						
4th Event - 04/22/98	1.5	4.1	ND	4.3						ND
5th Event - 08/20/98	2100	7600	1900	12200						
	Currently Not Monitored per Agreement with Ecology									
<b>MW4</b>										
1st Event - 01/21/97	7200	23000	3300	21000			2.1	4.1		83000
2nd Event - 07/30/97	1260	13600	1890	14400						
3rd Event - 11/01/97	5340	22200	3580	29500						
4th Event - 04/22/98	1000	7800	1800	24800						144000
5th Event - 08/20/98	---- Not Sampled (Dry) ----									
	Currently Not Monitored per Agreement with Ecology									
<b>MW5</b>										
1st Event - 01/21/97	2000	270	230	1200			ND	ND		5300
2nd Event - 07/30/97	5300	2300	370	6180						
3rd Event - 11/01/97	7430	6330	2450	12500						
4th Event - 04/22/98	2100	2900	1400	13000						114000
5th Event - 08/20/98	3500	2300	5700	33000						
6th Event - 11/23/98	---- Not Sampled (Dry) ----									
7th Event - 08/04/99	49	45	1930	2430						
	Currently Not Monitored per Agreement with Ecology									
Annual Event - 10/11/11	ND	ND	ND	ND						
<b>MTCA Method A Limits</b>	<b>5</b>	<b>1000</b>	<b>700</b>	<b>1000</b>	<b>160</b>	<b>15</b>	<b>0.01</b>	<b>5</b>	<b>20</b>	<b>800</b>

**Table 2 - Contaminant Concentrations in Groundwater**  
**Astro # 617 - East Olympia, WA**

Location/ Collection Data	B	T	E	X	N	Total Lead	EDB	EDC	MTBE	Gx
	----- parts per billion (ug/L) -----									
<b>MW6</b>										
1st Event - 01/22/97	ND	ND	ND	ND			ND	ND		ND
2nd Event - 07/30/97	---- Not Sampled (Dry) ----									
3rd Event - 11/01/97	---- Not Sampled (Dry) ----									
4th Event - 04/22/98	ND	ND	ND	ND						ND
5th Event - 08/20/98	---- Not Sampled (Dry) ----									
6th Event - 11/23/98	----- Not Accessible -----									
7th Event - 08/04/99	---- Not Sampled (Dry) ----									
	Currently Not Monitored per Agreement with Ecology									
<b>MW7</b>										
1st Event - 01/22/97	ND	ND	ND	ND			ND	ND		ND
2nd Event - 07/30/97	ND	ND	ND	ND						
3rd Event - 11/01/97	ND	2	ND	ND						
4th Event - 04/22/98	ND	ND	ND	ND						ND
	Currently Not Monitored per Agreement with Ecology									
<b>ABANDONED WELL</b>										
<b>MW8</b>										
3rd Event - 11/01/97	7190	27600	4490	27300						
4th Event - 04/22/98	3100	6200	2100	10300			ND	ND		64000
5th Event - 08/20/98	5600	9500	4800	18500						
6th Event - 11/23/98	5020	19200	3610	23700						
7th Event - 08/04/99	3030	12100	2430	18500						
8th Event - 04/05/00	ND	ND	2	19						
8th Event - 04/05/00 (dup)	ND	ND	ND	ND						
9th Event - 08/30/00	30	248	42	351						
10th Event - 07/10/01	1200	12510	3060	25450						
11th Event - 08/29/02	1230	11300	5680	43800						
12th Event - 09/25/03	233	2010	573	7480	193				ND	
13th Event - 09/30/04	68	335	ND	1807	172		ND	ND	ND	ND
14th Event - 08/30/05	163	1164	239	6084	360		ND	ND	ND	
15th Event - 09/14/06	18	58	84	535						
16th Event - 10/11/07	9	107	58	788						
17th Event - 09/03/08	---- Not Sampled (Obstructed) ----									
18th Event - 09/26/09	86	376	1150	8400						
19th Event - 08/10/10	27.2	234	526	3340						
Annual Event - 10/11/11	82.4	610	1320	13760						
Annual Event - 8/23/12	44.9	345	821	5260						
<b>MTCA Method A Limits</b>	<b>5</b>	<b>1000</b>	<b>700</b>	<b>1000</b>	<b>160</b>	<b>15</b>	<b>0.01</b>	<b>5</b>	<b>20</b>	<b>800</b>

**Table 2 - Contaminant Concentrations in Groundwater**  
**Astro # 617 - East Olympia, WA**

Location/ Collection Data	B	T	E	X	N	Total Lead	EDB	EDC	MTBE	Gx
	----- parts per billion (ug/L) -----									
<b>MW9</b>										
4th Event - 04/22/98	1000	3900	900	7100						44000
5th Event - 08/20/98	925	1250	310	2700						
6th Event - 11/23/98	2450	9230	3720	9990						
7th Event - 08/04/99	1340	1570	ND	7890						
8th Event - 04/05/00	658	4521	854	8733						
9th Event - 08/30/00	1440	5500	107	645						
10th Event - 07/10/01	2900	15700	308	16900						
11th Event - 08/29/02	584	8620	75	12000						
12th Event - 09/25/03	2680	20300	715	21300	740				ND	
13th Event - 09/30/04	1220	11252	ND	17478	162		ND	ND	29	
14th Event - 08/30/05	351	2027	ND	6945	315		ND	ND	ND	
15th Event - 09/14/06	851	1390	12200	20500						
16th Event - 10/11/07	581	17080	5070	18560						
17th Event - 09/03/08	745	11000	2440	18700						
18th Event - 09/26/09	344	7680	2130	17900						
19th Event - 08/10/10	Not Sampled (well covered over with gravel)									
Annual Event - 10/11/11	Not Sampled (well covered over with gravel)									
Annual Event - 8/23/12	624	5320	1740	12900						
<b>MW10</b>										
4th Event - 04/22/98	ND	84	ND	53						1200
5th Event - 08/20/98	1000	1200	840	2300						
6th Event - 11/23/98	35	48	19	246						
7th Event - 08/04/99	243	106	18	1250						
8th Event - 04/05/00	ND	ND	ND	ND						
9th Event - 08/30/00	196	54	ND	3100						
10th Event - 07/10/01	ND	ND	ND	1						
11th Event - 08/29/02	141	23	80	88						
12th Event - 09/25/03*	ND	ND	ND	ND	ND				ND	
13th Event - 09/30/04*	40	ND	21	18	ND		ND	ND	9	
14th Event - 08/30/05*	259	32	253	659						
15th Event - 09/14/06*	53	79	3	115						
16th Event - 10/11/07*	--	--	--	--						
17th Event - 09/03/08*	51.1	0.993	90.4	71.1						
18th Event - 09/26/09*	30.9	0.897	104	113						
19th Event - 08/10/10	3.7	ND	13.7	10.3						
Annual Event - 10/11/11	ND	ND	ND	ND						
Annual Event - 8/23/12	10.9	4.4	38.6	39.2						
<b>MTCA Method A Limits</b>	<b>5</b>	<b>1000</b>	<b>700</b>	<b>1000</b>	<b>160</b>	<b>15</b>	<b>0.01</b>	<b>5</b>	<b>20</b>	<b>800</b>

**Table 2 - Contaminant Concentrations in Groundwater**  
**Astro # 617 - East Olympia, WA**

Location/ Collection Data	B	T	E	X	N	Total Lead	EDB	EDC	MTBE	Gx
	----- parts per billion (ug/L) -----									
<b>MW11</b>										
3rd Event - 11/20/97(1)	1960	552	3000	3310						
4th Event - 04/22/98	4.9	ND	0.7	ND						ND
5th Event - 08/20/98	160	0.9	11	21.1						
6th Event - 11/23/98	ND	2	ND	3						
7th Event - 08/04/99	ND	2	3	10						
8th Event - 04/05/00	ND	ND	ND	ND						
9th Event - 08/30/00	ND	4	ND	10						
10th Event - 07/10/01	ND	1	1	4						
11th Event - 08/29/02	2	7	2	10						
12th Event - 09/25/03	ND	ND	ND	ND	ND				ND	
13th Event - 09/30/04	ND	4	ND	10	14		ND	ND	ND	
14th Event - 08/30/05	ND	ND	ND	ND	ND		ND	ND	ND	
15th Event - 09/14/06	ND	ND	ND	3						
16th Event - 10/11/07	4	49	15	214						
17th Event - 09/03/08	ND	ND	ND	ND						
18th Event - 09/26/09	ND	ND	ND	ND						
19th Event - 08/10/10	ND	ND	ND	ND						
Annual Event - 10/11/11	Well obstructed - Sampled MW5 in lieu of MW11									
Annual Event - 8/23/12	ND	1.1	ND	3.4						
<b>MW12</b>										
4th Event - 04/22/98	0.8	ND	ND	ND						ND
5th Event - 08/20/98	<1	4.8	1.7	12.3						
6th Event - 11/23/98	ND	ND	ND	ND						
7th Event - 08/04/99	ND	ND	2	4						
8th Event - 04/05/00	ND	ND	ND	ND						
9th Event - 08/30/00	ND	ND	ND	ND						
10th Event - 07/10/01	ND	1	ND	2						
11th Event - 08/29/02	ND	1	ND	2						
12th Event - 09/25/03	ND	ND	ND	ND	ND				ND	
13th Event - 09/30/04	ND	ND	ND	3	2		ND	ND	ND	
14th Event - 08/30/05	ND	ND	ND	ND	ND		ND	ND	ND	
15th Event - 09/14/06	ND	ND	ND	ND						
16th Event - 10/11/07	ND	4	ND	9						
17th Event - 09/03/08	ND	ND	ND	ND						
18th Event - 09/26/09	ND	ND	ND	ND						
19th Event - 08/10/10	ND	ND	ND	ND						
Annual Event - 10/11/11	ND	ND	ND	ND						
Annual Event - 8/23/12	ND	ND	ND	ND						
<b>MTCA Method A Limits</b>	<b>5</b>	<b>1000</b>	<b>700</b>	<b>1000</b>	<b>160</b>	<b>15</b>	<b>0.01</b>	<b>5</b>	<b>20</b>	<b>800</b>

**Table 2 - Contaminant Concentrations in Groundwater**  
**Astro # 617 - East Olympia, WA**

Location/ Collection Data	B	T	E	X	N	Total Lead	EDB	EDC	MTBE	Gx
	----- parts per billion (ug/L) -----									
<b>MW13</b>										
6th Event - 12/10/98(2)	2	ND	ND	ND						ND
7th Event - 08/04/99	ND	ND	ND	3						
8th Event - 04/05/00	ND	ND	ND	ND						
9th Event - 08/30/00	ND	ND	ND	ND						
10th Event - 07/10/01	ND	1	1	2						
11th Event - 08/29/02	ND	ND	2	2						
12th Event - 09/25/03	ND	ND	ND	ND	ND				ND	
13th Event - 09/30/04	ND	ND	ND	ND	ND		ND	ND	ND	
14th Event - 08/30/05	ND	ND	ND	ND	ND		ND	ND	ND	
15th Event - 09/14/06	ND	ND	ND	ND						
16th Event - 10/11/07	ND	7	1	19						
17th Event - 09/03/08	ND	ND	ND	ND						
18th Event - 09/26/09	ND	ND	ND	ND						
19th Event - 08/10/10	ND	ND	ND	ND						
Annual Event - 10/11/11	ND	ND	ND	ND						
Annual Event - 8/23/12	Well Not Accessible									
<b>MW14</b>										
6th Event - 12/10/98(2)	ND	ND	ND	ND						ND
7th Event - 08/04/99	ND	ND	ND	2						
8th Event - 04/05/00	ND	ND	ND	ND						
9th Event - 08/30/00	ND	ND	ND	ND						
10th Event - 07/10/01	ND	1	ND	1						
11th Event - 08/29/02	ND	ND	ND	ND						
12th Event - 09/25/03	ND	ND	ND	ND	ND				ND	
13th Event - 09/30/04	ND	ND	ND	ND	3	ND				
14th Event - 08/30/05	ND	ND	ND	ND	ND		ND	ND	ND	
15th Event - 09/14/06	ND	ND	ND	ND						
16th Event - 10/11/07	ND	2	ND	6						
17th Event - 09/03/08	ND	ND	ND	ND						
18th Event - 09/26/09	ND	ND	ND	ND						
19th Event - 08/10/10	ND	ND	ND	ND						
Annual Event - 10/11/11	ND	ND	ND	ND						
Annual Event - 8/23/12	Well Missed & Not Sampled									
<b>MTCA Method A Limits</b>	<b>5</b>	<b>1000</b>	<b>700</b>	<b>1000</b>	<b>160</b>	<b>15</b>	<b>0.01</b>	<b>5</b>	<b>20</b>	<b>800</b>

**Table 2 - Contaminant Concentrations in Groundwater**  
**Astro # 617 - East Olympia, WA**

Location/ Collection Data	B	T	E	X	N	Total Lead	EDB	EDC	MTBE	Gx
	----- parts per billion (ug/L) -----									
<b>Bluhm's Domestic Well</b> (hose spigot at well house)										
1st Event - 01/22/97	ND	ND	ND	ND						ND
5th Event - 08/20/98	ND	ND	ND	ND		4.5	ND	ND		
7th Event - 08/05/99	ND	ND	ND	ND		ND	ND	ND		
8th Event - 04/05/00	ND	ND	ND	ND		ND	ND	ND		
9th Event - 08/30/00	ND	ND	ND	ND		ND	ND	ND		
10th Event - 07/10/01	ND	ND	ND	ND		ND	ND	0.3	19	
11th Event - 08/29/02	ND	ND	ND	ND		ND	ND	ND	13	
- 9/13/02	ND	ND	ND	ND		ND	ND	ND	ND	
	Not Monitored per Agreement with Ecology									
16th Event - 10/11/07	ND	1	ND	5						
17th Event - 09/03/08	ND	ND	ND	ND						
18th Event - 09/26/09	Not Sampled									
19th Event - 08/10/10	Not Sampled									
Annual Event - 10/11/11	ND	ND	ND	ND						
Annual Event - 8/23/12	ND	ND	ND	ND						
<b>MTCA Method A Limits</b>	<b>5</b>	<b>1000</b>	<b>700</b>	<b>1000</b>	<b>160</b>	<b>15</b>	<b>0.01</b>	<b>5</b>	<b>20</b>	<b>800</b>

**Notes:**

RED indicates above MTCA Method A groundwater action limit

"ND" means "Not Detected" or below laboratory reporting limits

"B" means benzene "T" means toluene "E" means ethylbenzene "X" means xylenes "N" means naphthalene

"EDB" means 1,2-dibromoethane "EDC" means 1,2-dichloroethane "MTBE" means methyl tert-butyl ether

"Gx" means gasoline range hydrocarbons via method NWTPH-Gx

(1) Monitoring well MW11 was sampled on 11-20-97 rather than 11-01-97 to allow the well to stabilize.

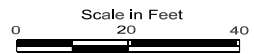
(2) Monitoring wells MW13 and MW14 were installed on 12/10/98.

\* Nearby sparge point SP1 was sampled in lieu of MW10, due to an obstruction lying in the lower portion of the monitor well.

**Legend**

MW# = Monitor Well #  
 TOC = Top of casing elevation (feet)  
 SWL = Static water level (feet)

**Analytical Results**  
 B = Benzene  
 T = Toluene  
 E = Ethylbenzene  
 X = Xylenes  
 ND = Below test method detection limit (<1 ug/L)  
 Analytical results are in ug/L (parts per billion)  
 Red = Exceeds MTCA, method A groundwater cleanup level



Robert D Miller Consulting, Inc  
 Sampled: 8/23/12  
 Drawn by: RDM

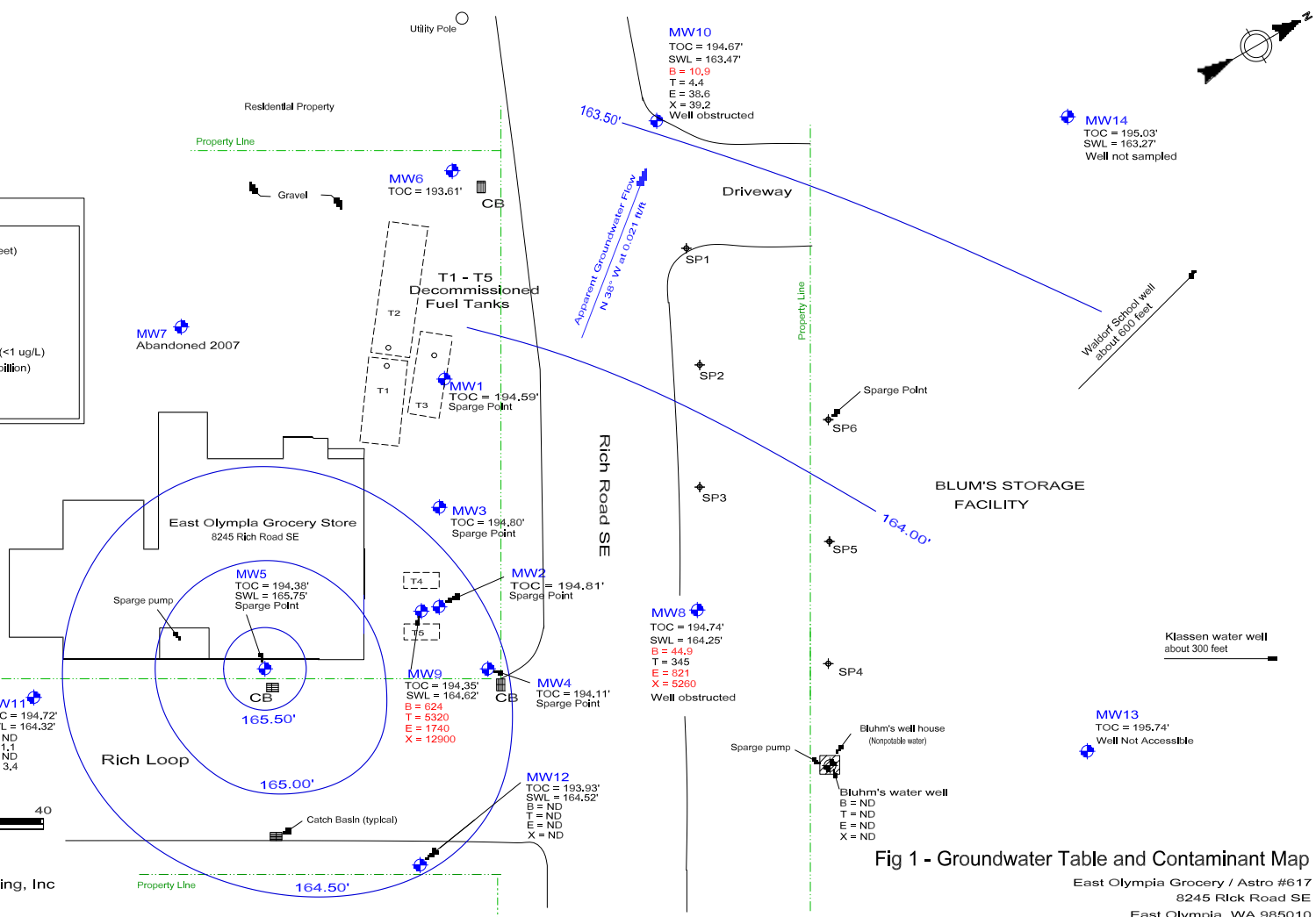


Fig 1 - Groundwater Table and Contaminant Map  
 East Olympia Grocery / Astro #617  
 8245 Rick Road SE  
 East Olympia, WA 985010

8/25/12

R.D. Miller Consulting  
PO Box 514  
West Linn, Or 97068

Re: WS-UST25

Dear R.D. Miller Consulting

Enclosed are the results of analysis for samples received by the laboraory on 8/23/2012  
The results related only to the samples included in this report.  
The project was assigned a report number of 81252R1

If you have any questions concerning this report, please feel free to contact us.

Sincerely,

A handwritten signature in cursive script that reads "C.Y. Chan".

CY Chan

**BTEX LABORATORY REPORT**

R.D. Miller Consulting  
PO Box 514  
West Linn, Or 97068

**PROJECT NAME:** Astro#617 **REPORT NUMBER:** 81252R1  
**SITE LOCATION:** **REPORT DATE:** 8/27/12  
**PROJECT NUMBER:** WS-UST25  
**RUN DATE:** 8/24/12  
**FIELD ID:** MW8 **LAB ID:** E9642

**Analytical Method:** EPA8021B

Preparation Method: EAP 5030B

**Analyte:** Benzen, Toluene, Ethylbenzene and total Xylene in Water

<b>Compound</b>	<b>Sample (ug/L)</b>	<b>Quant. Limit (ug/L)</b>	<b>Qualifier</b>	<b>Dilution</b>
Benzene	44.9	0.3		10
Toluene	345	1.0		200
Ethylbenzene	821	1.0		200
Total Xylene	5260	3.0		200

Surrogate: Percent Recovery  
1-chloro-octadecane 70

**Chemist Initials:**

C.Y. Chan

**Reviewer Initials:**

Aye

Results relate only to samples

This report shall not be reproduced, except in full, without the written approval of WyEast Environmental Sciences, Inc.



---

**Report Narrative**

**Method:** BTEX-8082B  
**Client:** R.D. Miller Consulting

**Report No.** 81252R1  
**Date:** 8/24/2012

**Sample Condition**

pH of sample is less than 2

**Sample Temperature**

Sample(s) arrived within acceptable temperature range

**Sample Hold time**

Sample was analyzed within hold time

**Initial Calibration**

All criteria were within acceptable limits

**Continuing Calibration Check (CCV)**

All criteria were within method limits. Any exceptions will be qualified in the body of the report

**Method Blank**

Method Blank meets method limit. Any exceptions will be qualified in the body of the report

**Laboratory Control Sample (LCS)**

All criteria were within method limits, Any exceptions will be qualified in the body of the report

**Duplicate Sample**

Toluene & Xylene of duplicate were outside method limits

**Matrix Spike**

All criteria were within method limits

**Matrix Spike Duplicate**

No Matrix Spike Duplicate was run on this batch

**Non-Conformance**

No non-conformances were associated with this request except noticed below



**Quality Control Report for BTEX Water By 8021B**

<i>HPID120824-</i>	<i>Benzene</i> (ug/L)	<i>Toluene</i> (ug/L)	<i>Ethylbenz.</i> (ug/L)	<i>Total Xyl.</i> (ug/L)	<i>BFB</i> (Surrogate)
<b>Blank</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>77</b>
Accep. Range	<0.3	<1	<2	<4	70%-130%
<b>CONTROL</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>
<b>LCS</b>	<b>5.69</b>	<b>4.62</b>	<b>4.61</b>	<b>13.45</b>	<b>78</b>
Expected	5.00	5.00	5.00	15.00	
% Recovery	114%	92%	92%	90%	
Accep. Range	70%-130%	70%-130%	70%-130%	70%-130%	70%-130%
<b>CONTROL</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>
<b>Duplicate</b>	<b>0.00</b>	<b>0.57</b>	<b>0.32</b>	<b>1.42</b>	<b>86</b>
Sample	0.10	1.12	0.84	3.44	85
RPD	0%	65%	0%	83%	
Accep. Range	30%	30%	30%	30%	30%-170%
<b>CONTROL</b>	<b>PASS</b>	<b>FAIL</b>	<b>PASS</b>	<b>FAIL</b>	<b>PASS</b>
<b>MS</b>	<b>5.67</b>	<b>4.66</b>	<b>4.61</b>	<b>13.58</b>	<b>83</b>
Sample	0.00	0.13	0.15	0.95	83
% Recovery	113%	91%	89%	84%	
Accep. Range	70%-130%	70%-130%	70%-130%	70%-130%	70%-130%
<b>CONTROL</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>

**BTEX LABORATORY REPORT**

R.D. Miller Consulting  
PO Box 514  
West Linn, Or 97068

**PROJECT NAME:** Astro#617 **REPORT NUMBER:** 81252R1  
**SITE LOCATION:** **REPORT DATE:** 8/27/12  
**PROJECT NUMBER:** WS-UST25  
**RUN DATE:** 8/24/12  
**FIELD ID:** MW9 **LAB ID:** E9643X200

**Analytical Method:** EPA8021B **Preparation Method:** EAP 5030B

**Analyte:** Benzen, Toluene, Ethylbenzene and total Xylene in Water

<b>Compound</b>	<b>Sample (ug/L)</b>	<b>Quant. Limit (ug/L)</b>	<b>Qualifier</b>	<b>Dilution</b>
Benzene	624	0.3		200
Toluene	5320	1.0		2000
Ethylbenzene	1740	1.0		2000
Total Xylene	12900	3.0		2000

**Surrogate:** Percent Recovery  
1-chloro-octadecane 96

**Chemist Initials:** C.Y. Chan

**Reviewer Initials:** Aye

Results relate only to samples

This report shall not be reproduced, except in full, without the written approval of WyEast Environmental Sciences, Inc.

---

## Report Narrative

**Method:** BTEX-8082B  
**Client:** R.D. Miller Consulting

**Report No.** 81252R1  
**Date:** 8/24/2012

### Sample Condition

pH of sample is less than 2

### Sample Temperature

Sample(s) arrived within acceptable temperature range

### Sample Hold time

Sample was analyzed within hold time

### Initial Calibration

All criteria were within acceptable limits

### Continuing Calibration Check (CCV)

All criteria were within method limits. Any exceptions will be qualified in the body of the report

### Method Blank

Method Blank meets method limit. Any exceptions will be qualified in the body of the report

### Laboratory Control Sample (LCS)

All criteria were within method limits, Any exceptions will be qualified in the body of the report

### Duplicate Sample

Toluene & Xylene of duplicate were outside method limits

### Matrix Spike

All criteria were within method limits

### Matrix Spike Duplicate

No Matrix Spike Duplicate was run on this batch

### Non-Conformance

No non-conformances were associated with this request except noticed below



**Quality Control Report for BTEX Water By 8021B**

<i>HPID120824-</i>	<i>Benzene</i> (ug/L)	<i>Toluene</i> (ug/L)	<i>Ethylbenz.</i> (ug/L)	<i>Total Xyl.</i> (ug/L)	<i>BFB</i> (Surrogate)
<b>Blank</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>77</b>
Accep. Range	<0.3	<1	<2	<4	70%-130%
<b>CONTROL</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>
<b>LCS</b>	<b>5.69</b>	<b>4.62</b>	<b>4.61</b>	<b>13.45</b>	<b>78</b>
Expected	5.00	5.00	5.00	15.00	
% Recovery	114%	92%	92%	90%	
Accep. Range	70%-130%	70%-130%	70%-130%	70%-130%	70%-130%
<b>CONTROL</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>
<b>Duplicate</b>	<b>0.00</b>	<b>0.57</b>	<b>0.32</b>	<b>1.42</b>	<b>86</b>
Sample	0.10	1.12	0.84	3.44	85
RPD	0%	65%	0%	83%	
Accep. Range	30%	30%	30%	30%	30%-170%
<b>CONTROL</b>	<b>PASS</b>	<b>FAIL</b>	<b>PASS</b>	<b>FAIL</b>	<b>PASS</b>
<b>MS</b>	<b>5.67</b>	<b>4.66</b>	<b>4.61</b>	<b>13.58</b>	<b>83</b>
Sample	0.00	0.13	0.15	0.95	83
% Recovery	113%	91%	89%	84%	
Accep. Range	70%-130%	70%-130%	70%-130%	70%-130%	70%-130%
<b>CONTROL</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>

**BTEX LABORATORY REPORT**

R.D. Miller Consulting  
PO Box 514  
West Linn, Or 97068

**PROJECT NAME:** Astro#617 **REPORT NUMBER:** 81252R1  
**SITE LOCATION:** **REPORT DATE:** 8/27/12  
**PROJECT NUMBER:** WS-UST25  
**RUN DATE:** 8/24/12  
**FIELD ID:** MW10 **LAB ID:** E9644

**Analytical Method:** EPA8021B **Preparation Method:** EAP 5030B  
**Analyte:** Benzen, Toluene, Ethylbenzene and total Xylene in Water

<b>Compound</b>	<b>Sample (ug/L)</b>	<b>Quant. Limit (ug/L)</b>	<b>Qualifier</b>	<b>Dilution</b>
Benzene	10.9	0.3		10
Toluene	4.4	1.0		1
Ethylbenzene	38.6	1.0		10
Total Xylene	39.2	3.0		10

**Surrogate:** Percent Recovery  
1-chloro-octadecane 105

**Chemist Initials:**

C.Y. Chan

**Reviewer Initials:**

Aye

Results relate only to samples

This report shall not be reproduced, except in full, without the written approval of WyEast Environmental Sciences, Inc.



---

## Report Narrative

**Method:** BTEX-8082B  
**Client:** R.D. Miller Consulting

**Report No.** 81252R1  
**Date:** 8/24/2012

### Sample Condition

pH of sample is less than 2

### Sample Temperature

Sample(s) arrived within acceptable temperature range

### Sample Hold time

Sample was analyzed within hold time

### Initial Calibration

All criteria were within acceptable limits

### Continuing Calibration Check (CCV)

All criteria were within method limits. Any exceptions will be qualified in the body of the report

### Method Blank

Method Blank meets method limit. Any exceptions will be qualified in the body of the report

### Laboratory Control Sample (LCS)

All criteria were within method limits, Any exceptions will be qualified in the body of the report

### Duplicate Sample

Toluene & Xylene of duplicate were outside method limits

### Matrix Spike

All criteria were within method limits

### Matrix Spike Duplicate

No Matrix Spike Duplicate was run on this batch

### Non-Conformance

No non-conformances were associated with this request except noticed below



**Quality Control Report for BTEX Water By 8021B**

<i>HPID120824-</i>	<i>Benzene</i> (ug/L)	<i>Toluene</i> (ug/L)	<i>Ethylbenz.</i> (ug/L)	<i>Total Xyl.</i> (ug/L)	<i>BFB</i> (Surrogate)
<b>Blank</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>77</b>
Accep. Range	<0.3	<1	<2	<4	70%-130%
<b>CONTROL</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>
<b>LCS</b>	<b>5.69</b>	<b>4.62</b>	<b>4.61</b>	<b>13.45</b>	<b>78</b>
Expected	5.00	5.00	5.00	15.00	
% Recovery	114%	92%	92%	90%	
Accep. Range	70%-130%	70%-130%	70%-130%	70%-130%	70%-130%
<b>CONTROL</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>
<b>Duplicate</b>	<b>0.00</b>	<b>0.57</b>	<b>0.32</b>	<b>1.42</b>	<b>86</b>
Sample	0.10	1.12	0.84	3.44	85
RPD	0%	65%	0%	83%	
Accep. Range	30%	30%	30%	30%	30%-170%
<b>CONTROL</b>	<b>PASS</b>	<b>FAIL</b>	<b>PASS</b>	<b>FAIL</b>	<b>PASS</b>
<b>MS</b>	<b>5.67</b>	<b>4.66</b>	<b>4.61</b>	<b>13.58</b>	<b>83</b>
Sample	0.00	0.13	0.15	0.95	83
% Recovery	113%	91%	89%	84%	
Accep. Range	70%-130%	70%-130%	70%-130%	70%-130%	70%-130%
<b>CONTROL</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>

**BTEX LABORATORY REPORT**

R.D. Miller Consulting  
PO Box 514  
West Linn, Or 97068

**PROJECT NAME:** Astro#617 **REPORT NUMBER:** 81252R1  
**SITE LOCATION:** **REPORT DATE:** 8/27/12  
**PROJECT NUMBER:** WS-UST25  
**RUN DATE:** 8/24/12  
**FIELD ID:** MW11 **LAB ID:** E9645

**Analytical Method:** EPA8021B **Preparation Method:** EAP 5030B  
**Analyte:** Benzen, Toluene, Ethylbenzene and total Xylene in Water

<b>Compound</b>	<b>Sample (ug/L)</b>	<b>Quant. Limit (ug/L)</b>	<b>Qualifier</b>	<b>Dilution</b>
Benzene	ND	0.3		1
Toluene	1.1	1.0		1
Ethylbenzene	ND	1.0		1
Total Xylene	3.4	3.0		1

**Surrogate:** Percent Recovery  
1-chloro-octadecane 85

**Chemist Initials:**

C.Y. Chan

**Reviewer Initials:**

Aye

Results relate only to samples

This report shall not be reproduced, except in full, without the written approval of WyEast Environmental Sciences, Inc.

---

## Report Narrative

**Method:** BTEX-8082B  
**Client:** R.D. Miller Consulting

**Report No.** 81252R1  
**Date:** 8/24/2012

### Sample Condition

pH of sample is less than 2

### Sample Temperature

Sample(s) arrived within acceptable temperature range

### Sample Hold time

Sample was analyzed within hold time

### Initial Calibration

All criteria were within acceptable limits

### Continuing Calibration Check (CCV)

All criteria were within method limits. Any exceptions will be qualified in the body of the report

### Method Blank

Method Blank meets method limit. Any exceptions will be qualified in the body of the report

### Laboratory Control Sample (LCS)

All criteria were within method limits, Any exceptions will be qualified in the body of the report

### Duplicate Sample

Toluene & Xylene of duplicate were outside method limits

### Matrix Spike

All criteria were within method limits

### Matrix Spike Duplicate

No Matrix Spike Duplicate was run on this batch

### Non-Conformance

No non-conformances were associated with this request except noticed below



**Quality Control Report for BTEX Water By 8021B**

<i>HPID120824-</i>	<i>Benzene</i> (ug/L)	<i>Toluene</i> (ug/L)	<i>Ethylbenz.</i> (ug/L)	<i>Total Xyl.</i> (ug/L)	<i>BFB</i> (Surrogate)
<b>Blank</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>77</b>
Accep. Range	<0.3	<1	<2	<4	70%-130%
<b>CONTROL</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>
<b>LCS</b>	<b>5.69</b>	<b>4.62</b>	<b>4.61</b>	<b>13.45</b>	<b>78</b>
Expected	5.00	5.00	5.00	15.00	
% Recovery	114%	92%	92%	90%	
Accep. Range	70%-130%	70%-130%	70%-130%	70%-130%	70%-130%
<b>CONTROL</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>
<b>Duplicate</b>	<b>0.00</b>	<b>0.57</b>	<b>0.32</b>	<b>1.42</b>	<b>86</b>
Sample	0.10	1.12	0.84	3.44	85
RPD	0%	65%	0%	83%	
Accep. Range	30%	30%	30%	30%	30%-170%
<b>CONTROL</b>	<b>PASS</b>	<b>FAIL</b>	<b>PASS</b>	<b>FAIL</b>	<b>PASS</b>
<b>MS</b>	<b>5.67</b>	<b>4.66</b>	<b>4.61</b>	<b>13.58</b>	<b>83</b>
Sample	0.00	0.13	0.15	0.95	83
% Recovery	113%	91%	89%	84%	
Accep. Range	70%-130%	70%-130%	70%-130%	70%-130%	70%-130%
<b>CONTROL</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>

**BTEX LABORATORY REPORT**

R.D. Miller Consulting  
PO Box 514  
West Linn, Or 97068

**PROJECT NAME:** Astro#617 **REPORT NUMBER:** 81252R1  
**SITE LOCATION:** **REPORT DATE:** 8/27/12  
**PROJECT NUMBER:** WS-UST25  
**RUN DATE:** 8/24/12  
**FIELD ID:** MW12 **LAB ID:** E9646

**Analytical Method:** EPA8021B **Preparation Method:** EAP 5030B

**Analyte:** Benzen, Toluene, Ethylbenzene and total Xylene in Water

<b>Compound</b>	<b>Sample (ug/L)</b>	<b>Quant. Limit (ug/L)</b>	<b>Qualifier</b>	<b>Dilution</b>
Benzene	ND	0.3		1
Toluene	ND	1.0		1
Ethylbenzene	ND	1.0		1
Total Xylene	ND	3.0		1

**Surrogate:** Percent Recovery  
1-chloro-octadecane 83

**Chemist Initials:** C.Y. Chan

**Reviewer Initials:** Aye

Results relate only to samples

This report shall not be reproduced, except in full, without the written approval of WyEast Environmental Sciences, Inc.



---

## Report Narrative

**Method:** BTEX-8082B  
**Client:** R.D. Miller Consulting

**Report No.** 81252R1  
**Date:** 8/24/2012

### Sample Condition

pH of sample is less than 2

### Sample Temperature

Sample(s) arrived within acceptable temperature range

### Sample Hold time

Sample was analyzed within hold time

### Initial Calibration

All criteria were within acceptable limits

### Continuing Calibration Check (CCV)

All criteria were within method limits. Any exceptions will be qualified in the body of the report

### Method Blank

Method Blank meets method limit. Any exceptions will be qualified in the body of the report

### Laboratory Control Sample (LCS)

All criteria were within method limits, Any exceptions will be qualified in the body of the report

### Duplicate Sample

Toluene & Xylene of duplicate were outside method limits

### Matrix Spike

All criteria were within method limits

### Matrix Spike Duplicate

No Matrix Spike Duplicate was run on this batch

### Non-Conformance

No non-conformances were associated with this request except noticed below



**Quality Control Report for BTEX Water By 8021B**

<i>HPID120824-</i>	<i>Benzene</i> (ug/L)	<i>Toluene</i> (ug/L)	<i>Ethylbenz.</i> (ug/L)	<i>Total Xyl.</i> (ug/L)	<i>BFB</i> (Surrogate)
<b>Blank</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>77</b>
Accep. Range	<0.3	<1	<2	<4	70%-130%
<b>CONTROL</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>
<b>LCS</b>	<b>5.69</b>	<b>4.62</b>	<b>4.61</b>	<b>13.45</b>	<b>78</b>
Expected	5.00	5.00	5.00	15.00	
% Recovery	114%	92%	92%	90%	
Accep. Range	70%-130%	70%-130%	70%-130%	70%-130%	70%-130%
<b>CONTROL</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>
<b>Duplicate</b>	<b>0.00</b>	<b>0.57</b>	<b>0.32</b>	<b>1.42</b>	<b>86</b>
Sample	0.10	1.12	0.84	3.44	85
RPD	0%	65%	0%	83%	
Accep. Range	30%	30%	30%	30%	30%-170%
<b>CONTROL</b>	<b>PASS</b>	<b>FAIL</b>	<b>PASS</b>	<b>FAIL</b>	<b>PASS</b>
<b>MS</b>	<b>5.67</b>	<b>4.66</b>	<b>4.61</b>	<b>13.58</b>	<b>83</b>
Sample	0.00	0.13	0.15	0.95	83
% Recovery	113%	91%	89%	84%	
Accep. Range	70%-130%	70%-130%	70%-130%	70%-130%	70%-130%
<b>CONTROL</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>

**BTEX LABORATORY REPORT**

R.D. Miller Consulting  
PO Box 514  
West Linn, Or 97068

**PROJECT NAME:** Astro#617 **REPORT NUMBER:** 81252R1  
**SITE LOCATION:** **REPORT DATE:** 8/27/12  
**PROJECT NUMBER:** WS-UST25  
**RUN DATE:** 8/24/12  
**FIELD ID:** Bluhm's Well **LAB ID:** E9647

**Analytical Method:** EPA8021B **Preparation Method:** EAP 5030B  
**Analyte:** Benzen, Toluene, Ethylbenzene and total Xylene in Water

<b>Compound</b>	<b>Sample (ug/L)</b>	<b>Quant. Limit (ug/L)</b>	<b>Qualifier</b>	<b>Dilution</b>
Benzene	ND	0.3		1
Toluene	ND	1.0		1
Ethylbenzene	ND	1.0		1
Total Xylene	ND	3.0		1

**Surrogate:** Percent Recovery  
1-chloro-octadecane 83

**Chemist Initials:**

C.Y. Chan

**Reviewer Initials:**

Aye

Results relate only to samples

This report shall not be reproduced, except in full, without the written approval of WyEast Environmental Sciences, Inc.



---

## Report Narrative

**Method:** BTEX-8082B  
**Client:** R.D. Miller Consulting

**Report No.** 81252R1  
**Date:** 8/24/2012

### Sample Condition

pH of sample is less than 2

### Sample Temperature

Sample(s) arrived within acceptable temperature range

### Sample Hold time

Sample was analyzed within hold time

### Initial Calibration

All criteria were within acceptable limits

### Continuing Calibration Check (CCV)

All criteria were within method limits. Any exceptions will be qualified in the body of the report

### Method Blank

Method Blank meets method limit. Any exceptions will be qualified in the body of the report

### Laboratory Control Sample (LCS)

All criteria were within method limits, Any exceptions will be qualified in the body of the report

### Duplicate Sample

Toluene & Xylene of duplicate were outside method limits

### Matrix Spike

All criteria were within method limits

### Matrix Spike Duplicate

No Matrix Spike Duplicate was run on this batch

### Non-Conformance

No non-conformances were associated with this request except noticed below



**Quality Control Report for BTEX Water By 8021B**

<i>HPID120824-</i>	<i>Benzene</i> (ug/L)	<i>Toluene</i> (ug/L)	<i>Ethylbenz.</i> (ug/L)	<i>Total Xyl.</i> (ug/L)	<i>BFB</i> (Surrogate)
<b>Blank</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>77</b>
Accep. Range	<0.3	<1	<2	<4	70%-130%
<b>CONTROL</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>
<b>LCS</b>	<b>5.69</b>	<b>4.62</b>	<b>4.61</b>	<b>13.45</b>	<b>78</b>
Expected	5.00	5.00	5.00	15.00	
% Recovery	114%	92%	92%	90%	
Accep. Range	70%-130%	70%-130%	70%-130%	70%-130%	70%-130%
<b>CONTROL</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>
<b>Duplicate</b>	<b>0.00</b>	<b>0.57</b>	<b>0.32</b>	<b>1.42</b>	<b>86</b>
Sample	0.10	1.12	0.84	3.44	85
RPD	0%	65%	0%	83%	
Accep. Range	30%	30%	30%	30%	30%-170%
<b>CONTROL</b>	<b>PASS</b>	<b>FAIL</b>	<b>PASS</b>	<b>FAIL</b>	<b>PASS</b>
<b>MS</b>	<b>5.67</b>	<b>4.66</b>	<b>4.61</b>	<b>13.58</b>	<b>83</b>
Sample	0.00	0.13	0.15	0.95	83
% Recovery	113%	91%	89%	84%	
Accep. Range	70%-130%	70%-130%	70%-130%	70%-130%	70%-130%
<b>CONTROL</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>

# APEX LABS

# CHAIN OF CUSTODY

Lab # **81252**

COC 1 of 1

12232 S.W. Garden Place, Tigard, OR 97223 Ph: 503-718-2323 Fax: 503-718-0333

Company: **R D Miller Consulting** Project Mgr: **Bob Miller** Project Name: **Asdro # 617** Project # **WS-15725**  
 Address: **503 523-8836** Email:

LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	ANALYSIS REQUEST		RCRA Metals (8)	TCLP Metals (8)	AL, Sb, As, Ba, Be, Cd, Cr, Cu, Fe, Pb, Hg, Mg, Mn, Mo, Ni, K, Se, Ag, Na, TL, V, Zn	TOTAL DISS TCLP	1200-COLS	1200-Z
					NWTPH-HCID	NWTPH-DX						
MW8 29642	8/23	13:45 W										
MW9 29643		14:15										
MW10 29644		13:57										
MW11 29645		12:40										
MW12 29646		12:20										
Blahni's Well 29647		14:20 R										

SPECIAL INSTRUCTIONS:

Normal Turn Around Time (TAT) = 7-10 Business Days

TAT Requested (circle): 1 Day 2 Day 3 Day 4 DAY **5 DAY** Other: \_\_\_\_\_

SAMPLES ARE HELD FOR 30 DAYS

RELINQUISHED BY: **R. D Miller** Date: **8/23/12** Signature: *[Signature]* Company: \_\_\_\_\_

RECEIVED BY: \_\_\_\_\_ Date: \_\_\_\_\_ Signature: *[Signature]* Company: \_\_\_\_\_

Printed Name: \_\_\_\_\_ Time: \_\_\_\_\_

**Sample Condition Check List**

Customer Name: R.D. Milk

COC #: 81252

Method of Delivery: courier client other

Type of ice: Ice Blue None

Cooler Temperature: 3

Matrix: Soil Water Other

- Relinquish signed on Chain of Custody.
- Received by signed on Chain of Custody.
- Chain of Custody filled out.
- Were samples Arrived within Hold Time.
- Rush Turn Around Time Requested. *If yes, how many days* \_\_\_\_\_
- Temperatures measured and written in correct place on COC.
- Correct containers used.
- Sufficient Volume.
- ID on COC and Sample labels match.
- Duplicate jars and vials labeled with a, b, c, d etc.
- All tests logged in checked against the COC.
- The COC scanned into the main office computer.

Yes	No	NA	Comments
/			*
/			*
/			*
/			*
/			*
/			*
/			*
/			*
/			*
/			*
/			*

**FOR WATER SAMPLES:**

Trip Blank: Yes No Waiver on file

Submitted by: \_\_\_\_\_

- Was sufficient volume provided for analysis.
- Was sufficient volume provided for QC samples (at least two).
- HCL Preserved vials.  
HCL LOT Number: Test American Vial
- Were duplicate jars and vials labeled with a, b, c, d etc.
- Headspace in VOA Vials (>6mm).

Yes	No	Comments
/		*
/		*
/		*
/		*
/		*

Client Notification/Resolution: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Reviewed: CEC

Date: 8/23/12

**Table 1 - Static Water Levels (SWL) of Groundwater in Feet**  
**Astro #617 - East Olympia, WA**

Monitor Well Number and Physical Data		Date	Water Condition	Measured Depth to SWL(1)	Calc. SWL Elevation	Rise+/Fall - Between Events
<b>MW1</b>						
Ground Surface Elevation	194.77	02/28/97	--	26.68	168.09	--
Top of Casing Elevation	194.59	07/30/97	--	30.17	164.60	-3.49
Well Bottom Elevation	162.04	11/20/97	--	30.27	164.50	-0.10
Depth of Well (bgs)	32.73	04/22/98	--	27.89	166.88	2.38
		08/20/98	--	30.86	163.73	-3.15
		11/23/98	--	29.85	164.74	1.01
		08/04/99	--	30.23	164.36	-0.38
		04/05/00	Currently Not Monitored per Agreement with Ecology			
<b>MW2</b>						
Ground Surface Elevation	194.98	02/28/97	--	26.92	168.06	--
Top of Casing Elevation	194.81	07/30/97	--	Dry	--	--
Well Bottom Elevation	166.08	11/20/97	--	Dry	--	--
Depth of Well (bgs)	28.90	04/22/98	--	28.11	166.87	--
		08/20/98	--	Not measured	--	--
		11/23/98	--	Not measured	--	--
		08/04/99	--	Dry	--	--
		04/05/00	Currently Not Monitored per Agreement with Ecology			
<b>MW3</b>						
Ground Surface Elevation	194.94	02/28/97	--	26.97	167.97	--
Top of Casing Elevation	194.80	07/30/97	--	30.47	164.47	-3.50
Well Bottom Elevation	162.35	11/20/97	--	30.57	164.37	-0.10
Depth of Well (bgs)	32.59	04/22/98	--	28.19	166.75	2.38
		08/20/98	--	30.98	163.82	-2.93
		11/23/98	--	30.19	164.61	0.79
		08/04/99	--	30.55	164.25	-0.36
		04/05/00	--	Not measured	--	--
		08/30/00	--	Not measured	--	--
		07/10/01	--	Not measured	--	--
		08/29/02	--	31.42	163.38	--
		09/25/03	--	31.82	162.98	-0.40
		09/30/04	Currently Not Monitored per Agreement with Ecology			
<b>MW4</b>						
Ground Surface Elevation	194.29	02/28/97	--	26.43	167.86	--
Top of Casing Elevation	194.11	07/30/97	--	29.62	164.67	-3.19
Well Bottom Elevation	164.30	11/20/97	--	29.41	164.88	0.21
Depth of Well (bgs)	29.99	04/22/98	--	27.68	166.61	1.73
		08/20/98	--	Dry	--	--
		11/23/98	--	29.22	164.89	--
		08/04/99	--	29.53	164.58	-0.31
		04/05/00	--	Not measured	--	--
		08/30/00	--	Not measured	--	--
		07/10/01	--	Not measured	--	--
		08/29/02	--	29.05	165.06	--
		09/25/03	--	29.10 (dry)	165.01	-0.05
		09/30/04	Currently Not Monitored per Agreement with Ecology			
Backup measurements for MW9		10/11/11	--	28.92	165.19	--

**Table 1 - Static Water Levels (SWL) of Groundwater in Feet**  
**Astro #617 - East Olympia, WA**

Monitor Well Number and Physical Data		Date	Water Condition	Measured Depth to SWL(1)	Calc. SWL Elevation	Rise+/Fall - Between Events		
<b>MW5</b>								
Ground Surface Elevation	194.82	02/28/97	--	26.77	168.05	--		
Top of Casing Elevation	194.38	07/30/97	--	28.74	166.08	-1.97		
Well Bottom Elevation	164.66	11/20/97	--	29.17	165.65	-0.43		
Depth of Well (bgs)	30.16	04/22/98	--	27.76	167.06	1.41		
		08/20/98	--	29.07	165.31	-1.75		
		11/23/98	--	Dry	--	--		
		08/04/99	--	26.71	167.67	--		
		04/05/00	--	Not measured	--	--		
		08/30/00	--	Not measured	--	--		
		07/10/01	--	Not measured	--	--		
		08/29/02	--	28.64	165.74	--		
		09/25/03	--	28.66	165.72	-0.02		
		09/30/04 Currently Not Monitored per Agreement with Ecology						
				10/11/11	--	28.48	165.90	--
				08/23/12	--	28.63	165.75	-0.15
		<b>MW6</b>						
		Ground Surface Elevation	193.87	02/28/97	--	25.56	168.31	--
Top of Casing Elevation	193.61	07/30/97	--	Dry	--	--		
Well Bottom Elevation	165.62	11/20/97	--	28.37	165.50	--		
Depth of Well (bgs)	28.25	04/22/98	--	26.80	167.07	1.57		
		08/20/98	--	Dry	--	--		
		11/23/98	--	Not accessible	--	--		
		08/04/99	--	Dry	--	--		
		04/05/00	--	Not measured	--	--		
		08/30/00	--	Not measured	--	--		
		07/10/01	--	Not measured	--	--		
		08/29/02	--	Dry	--	--		
		09/25/03	--	Dry	--	--		
		09/30/04 Currently Not Monitored per Agreement with Ecology						
		<b>MW7</b>						
		Ground Surface Elevation	197.54	02/28/97	--	29.16	168.38	--
		Top of Casing Elevation	197.20	07/30/97	--	32.41	165.13	-3.25
		Well Bottom Elevation	163.72	11/20/97	--	32.76	164.78	-0.35
Depth of Well (bgs)	33.82	04/22/98	--	30.42	167.12	2.34		
		08/20/98	--	32.16	165.04	-2.08		
		11/23/98	--	32.02	165.18	0.14		
		08/04/99	--	32.05	165.15	-0.03		
		04/05/00	--	29.43	167.77	2.62		
		08/30/00	--	31.92	165.28	-2.49		
		07/10/01	--	Below screen	--	--		
		08/29/02	--	33.53	163.67	--		
		09/25/03 Currently Not Monitored per Agreement with Ecology						
		<b>ABANDONED WELL</b>		07/01/07	Well removed by new owner to allow for septic drainfield			

**Table 1 - Static Water Levels (SWL) of Groundwater in Feet**

**Astro #617 - East Olympia, WA**

Monitor Well Number and Physical Data		Date	Water Condition	Measured Depth to SWL(1)	Calc. SWL Elevation	Rise+/Fall - Between Events		
<b>MW8</b>								
Ground Surface Elevation	195.27	11/20/97	--	30.68	164.59	--		
Top of Casing Elevation	194.76	04/22/98	--	28.43	166.84	2.25		
Well Bottom Elevation	155.07	08/20/98	--	31.08	163.68	-3.16		
Depth of Well (bgs)	40.20	11/23/98	--	30.03	164.73	1.05		
		08/04/99	--	30.37	164.39	-0.34		
<i>Resurveyed 04/13/00(2)</i>		04/05/00	--	27.30	167.44	3.05		
Ground Surface Elevation		08/30/00	--	30.49	164.25	-3.19		
Top of Casing Elevation	194.74	07/10/01	--	31.15	163.59	-0.66		
Well Bottom Elevation	155.07	08/29/02	--	31.52	163.22	-0.37		
Depth of Well (bgs)		09/25/03	--	31.48	163.26	0.04		
		09/30/04	Turbid	31.42	163.32	0.06		
		08/30/05	Sheen, Odor	31.16	163.58	0.26		
		09/14/06	Sheen, Odor	31.94	162.80	-0.78		
		10/11/07	Turbid, Black	32.12	162.62	-0.18		
		09/03/08	--	31.37	163.37	0.75		
		09/26/09	Milky Lt. Brown	31.02	163.72	0.35		
		08/10/10	Black	30.25	164.49	0.77		
		10/11/11	Black Organics	31.19	163.55	-0.94		
		08/23/12	No odor, Dk gray	30.49	164.25	0.70		
		<b>MW9</b>						
		Ground Surface Elevation	194.97	04/22/98	--	28.08	166.89	--
Top of Casing Elevation	194.35	08/20/98	--	31.66	162.69	-4.20		
Well Bottom Elevation	154.43	11/23/98	--	35.15	159.20	-3.49		
Depth of Well (bgs)	40.54	08/04/99	--	30.59	163.76	4.56		
		04/05/00	--	26.88	167.47	3.71		
		08/30/00	--	31.02	163.33	-4.14		
		07/10/01	--	31.78	162.57	-0.76		
		08/29/02	--	32.06	162.29	-0.28		
		09/25/03	--	31.12	163.23	0.94		
		09/30/04	Turbid	31.95	162.40	-0.83		
		08/30/05	Gray	31.60	162.75	0.35		
		09/14/06	Sheen	32.27	162.08	-0.67		
		10/11/07	Turbid, Black	31.64	162.71	0.63		
		09/03/08	Turbid, Odor	31.95	162.40	-0.31		
		09/26/09	Dark Gray	31.56	162.79	0.39		
		08/10/10	Covered over - Could not be measured					
		Refer to MW4 data (nearby well)	10/11/11	Covered over - Could not be measured				
			08/23/12	Gas Odor, Dk	30.73	163.62	--	

**Table 1 - Static Water Levels (SWL) of Groundwater in Feet**

**Astro #617 - East Olympia, WA**

Monitor Well Number and Physical Data		Date	Water Condition	Measured Depth to SWL(1)	Calc. SWL Elevation	Rise+/Fall - Between Events
<b>MW10</b>						
Ground Surface Elevation	195.44	04/22/98	--	28.54	166.90	--
Top of Casing Elevation	195.21	08/20/98	--	32.40	162.81	-4.09
Well Bottom Elevation	157.77	11/23/98	--	30.15	165.06	2.25
Depth of Well (bgs)	37.67	08/04/99	--	31.43	163.78	-1.28
		04/05/00	--	27.26	167.41	3.63
<i>Resurveyed 04/13/00(2)</i>		08/30/00	--	31.36	163.31	-4.10
Ground Surface Elevation		07/10/01	--	31.97	162.70	-0.61
Top of Casing Elevation	194.67	08/29/02	--	32.28	162.39	-0.31
Well Bottom Elevation	157.77	09/25/03	--	32.63	162.04	-0.35
Depth of Well (bgs)		09/30/04	Turbid	32.39	162.28	0.24
		08/30/05	Turbid	32.02	162.65	0.37
		09/14/06	Turbid	32.76	161.91	-0.74
		10/11/07	--	32.22	162.45	0.54
		09/03/08	No Odor	32.59	162.08	-0.37
		09/26/09	Milky Lt. Brown	31.91	162.76	0.68
		08/10/10	Clear	30.25	164.42	1.66
		10/11/11	Clear	32.18	162.49	-1.93
		08/23/12	Clear	31.20	163.47	0.98
<b>MW11</b>						
Ground Surface Elevation	195.69	11/20/97	--	30.87	164.82	--
Top of Casing Elevation	195.15	04/22/98	--	28.69	167.00	2.18
Well Bottom Elevation	154.60	08/20/98	--	31.54	163.61	-3.39
Depth of Well (bgs)	41.09	11/23/98	--	30.12	165.03	1.42
		08/04/99	--	30.75	164.40	-0.63
<i>Resurveyed 04/13/00(2)</i>		04/05/00	--	27.17	167.55	3.15
Ground Surface Elevation		08/30/00	--	30.87	163.85	-3.70
Top of Casing Elevation	194.72	07/10/01	--	31.09	163.63	-0.22
Well Bottom Elevation	154.60	08/29/02	--	31.35	163.37	-0.26
Depth of Well (bgs)		09/25/03	--	31.83	162.89	-0.48
		09/30/04	Turbid	31.76	162.96	0.07
		08/30/05	Gray	31.11	163.61	0.65
		09/14/06	Gray	31.93	162.79	-0.82
		10/11/07	Turbid, Brown	31.55	163.17	0.38
		09/03/08	Turbid, No Odor	31.48	163.24	0.07
		09/26/09	Clear	31.27	163.45	0.21
		08/10/10	Very light cloudy	29.54	165.18	1.73
		10/11/11	Turbid, Lt Brown	30.92	163.80	-1.38
		08/23/12	Clear	30.40	164.32	0.52

**Table 1 - Static Water Levels (SWL) of Groundwater in Feet**

**Astro #617 - East Olympia, WA**

Monitor Well Number and Physical Data		Date	Water Condition	Measured Depth to SWL(1)	Calc. SWL Elevation	Rise+/Fall - Between Events
<b>MW12</b>						
Ground Surface Elevation	194.17	04/22/98	--	27.32	166.85	--
Top of Casing Elevation	193.93	08/20/98	--	29.76	164.17	-2.68
Well Bottom Elevation	153.95	11/23/98	--	28.12	165.81	1.64
Depth of Well (bgs)	40.22	08/04/99	--	29.32	164.61	-1.20
		04/05/00	--	26.51	167.42	2.81
		08/30/00	--	29.56	164.37	-3.05
		07/10/01	--	29.48	164.45	0.08
		08/29/02	--	29.80	164.13	-0.32
		09/25/03	--	29.76	164.17	0.04
		09/30/04	Turbid	29.58	164.35	0.18
		08/30/05	Turbid	29.69	164.24	-0.11
		09/14/06	Turbid	29.93	164.00	-0.24
		10/11/07	Turbid, Brown	29.17	164.76	0.76
		09/03/08	Turbid, No Odor	29.48	164.45	-0.31
		09/26/09	Clear	29.51	164.42	-0.03
		08/10/10	Very light cloudy	29.09	164.84	0.42
		10/11/11	Clear	29.45	164.48	-0.36
		08/23/12	Clear	29.41	164.52	0.04
<b>MW13</b>						
Ground Surface Elevation	196.26	08/04/99	--	31.86	163.88	--
Top of Casing Elevation	195.74	04/05/00	--	28.49	167.25	3.37
Well Bottom Elevation		08/30/00	--	32.22	163.52	-3.73
Depth of Well (bgs)	~40.00	07/10/01	--	32.14	163.60	0.08
		08/29/02	--	32.30	163.44	-0.16
		09/25/03	--	32.92	162.82	-0.62
		09/30/04	Turbid	32.35	163.39	0.57
		08/30/05	Turbid	32.25	163.49	0.10
		09/14/06	Turbid	32.37	163.37	-0.12
		10/11/07	Turbid, Brown	32.25	163.49	0.12
		09/03/08	Turbid, No Odor	32.18	163.56	0.07
		09/26/09	Milky Lt. Brown	32.10	163.64	0.08
		08/10/10	Turbid, Lt Brown	31.40	164.34	0.70
		10/11/11	Turbid, Lt Brown	32.15	163.59	-0.75
		08/23/12	Not Accessible	--	--	--

**Table 1 - Static Water Levels (SWL) of Groundwater in Feet**

**Astro #617 - East Olympia, WA**

Monitor Well Number and Physical Data		Date	Water Condition	Measured Depth to SWL(1)	Calc. SWL Elevation	Rise+/Fall - Between Events		
<b>MW14</b>								
Ground Surface Elevation	195.23	08/04/99	--	31.47	163.56	--		
Top of Casing Elevation	195.03	04/05/00	--	27.65	167.38	3.82		
Well Bottom Elevation		08/30/00	--	32.19	162.84	-4.54		
Depth of Well (bgs)	~40.00	07/10/01	--	32.04	162.99	0.15		
		08/29/02	--	32.61	162.42	-0.57		
		09/25/03	--	31.14	163.89	1.47		
		09/30/04	Turbid	32.62	162.41	-1.48		
		08/30/05	Turbid	32.20	162.83	0.42		
		09/14/06	Turbid	33.02	162.01	-0.82		
		10/11/07	Turbid, Brown	32.69	162.34	0.33		
		09/03/08	Turbid, No Odor	32.76	162.27	-0.07		
		09/26/09	Milky Lt. Brown	32.39	162.64	0.37		
		08/10/10	Very light cloudy	31.05	163.98	1.34		
		10/11/11	Turbid, Lt Brown	32.53	162.50	-1.48		
		08/23/12	Lt ash color	31.76	163.27	0.77		
		<b>Site Averages</b>						
				Date		Measured Depth to SWL(1)	Calc. SWL Elevation	Rise+/Fall - Between Events
MW1-7		02/28/97		26.93	168.10	--		
MW1, MW3-5, MW7		07/30/97		30.28	164.99	-3.08		
MW1, MW3-7, MW8, MW11		11/20/97		30.26	164.89	-0.15		
MW1-12		04/22/98		28.16	166.90	2.03		
MW1, MW3, MW5, MW7-12		08/20/98		31.06	163.87	-3.05		
MW1, MW3, MW4, MW7-12		11/23/98		30.54	164.36	0.60		
MW1, MW3-5, MW7-14		08/04/99		30.41	164.53	0.00		
MW7-14		04/05/00		27.59	167.46	3.27		
MW7-14		08/30/00		31.20	163.84	-3.62		
MW8-14		07/10/01		31.38	163.36	-0.28		
MW3-5, MW7-14		08/29/02		31.32	163.56	-0.32		
MW3-5, MW8-14		09/25/03		31.26	163.60	0.05		
MW8-14		09/30/04		31.72	163.02	-0.59		
MW8-14		08/30/05		31.43	163.31	0.29		
MW8-14		09/14/06		32.03	162.71	-0.60		
MW8-14		10/11/07		31.66	163.08	0.37		
MW8-14		09/03/08		31.69	163.05	-0.02		
MW8-14		09/26/09		31.39	163.35	0.29		
MW8, MW10-14		08/10/10		30.26	164.54	1.20		
MW8, MW10-14		10/11/11		31.40	163.40	-1.14		
MW8-12, MW14		08/23/12		30.67	163.91	0.51		

**Notes:**

- Benchmark is storm drain at eastern property corner with a surveyed elevation of 194.01'.
- bgs means "below ground surface".

(1) Measured depth to SWL referenced to ground surface from 02/28/97 - 04/22/98.

Subsequent measurements are referenced to top of casing.

(2) Top of wells MW8, MW10 and MW11 were modified during construction of sparge system during 01/2000.