



May 22, 2019

Mr. Thomas Beeks  
GLAM Commercial Properties I, LLC  
6947 Coal Creek Pkwy SE, Suite 212  
Newcastle, WA 98059

**Re: 2019 Annual Environmental Compliance Report  
Smokey Point Retail Center  
Project No. 150294**

Dear Mr. Beeks:

This letter report was prepared on behalf of GLAM Commercial Properties I, LLC (GLAM), and presents the results of annual compliance monitoring completed by Aspect Consulting, LLC (Aspect) at the Smokey Point Retail Center (the Property) in Marysville, Washington. We conducted one annual monitoring event during GLAM's fourth year of ownership. The purpose of the compliance monitoring was to verify that concentrations of constituents of concern (COCs) in groundwater are stable or decreasing on the Property, as required by the Property's Environmental Covenant (Ecology, 2015). Annual compliance monitoring was conducted according to Sound Earth Strategies, Inc.'s (Sound Earth) "Compliance Monitoring Plan" (CMP; Sound Earth, 2015a), included in the Environmental Covenant.

Pursuant to our scope of work for Year 4, we completed the following work elements:

- Observed protective cap conditions
- Collected annual groundwater samples in April 2019
- Performed plume stability analyses for benzene and gasoline
- Evaluated indoor air compliance based on groundwater data
- Prepared this report for submittal to Washington State Department of Ecology's (Ecology) Voluntary Cleanup Program (VCP)

The results indicate the protective cap is intact, the groundwater plumes are stable or shrinking, and indoor air at the Property is in compliance. This report provides a brief description of the Property and its history, describes sampling events, and discusses our monitoring results and conclusions in further detail.

## **Property Description and History**

The Property is located at 2707 171st Place NE in the City of Marysville, Washington, as shown on Figure 1. The Property is in a commercial area and developed with two retail buildings and a parking lot.



Based on previous explorations completed by GeoScience Management, Inc., soil on the Property generally consists of gravelly, silty sand to at least 15 feet deep (Sound Earth, 2015b).

The north-adjacent property was developed as a retail gas station in the late 1970s and contains petroleum-impacted soil and groundwater due to a past release from underground storage tanks (USTs). The Property contains petroleum-impacted groundwater due to groundwater flow from this north-adjacent source property.

The Property was enrolled in the VCP and underwent an investigation and cleanup by Sound Earth. The cleanup action included injection of oxidizer into groundwater and installation of engineering controls, including a vapor barrier beneath both buildings on the Property to mitigate potential soil vapor concerns, and a 4-inch-thick asphalt cap covering most of the Property to mitigate the potential for direct contact with contaminated material (Sound Earth, 2015b).

Sound Earth presented this information to Ecology in a Cleanup Action Report, and the Property was issued a Property-specific No Further Action (NFA) with Environmental Covenant from Ecology.

### **Protective Cap Condition**

The condition of the asphalt cap and concrete slabs were inspected in April 2019 and consisted of walking the Property to look for evidence of cracking, erosion, animal burrows, ponded water, sloughing, seepage, or other potentially damaging conditions. During the April 2019 inspection, the condition of the cap appeared intact on all areas within the Property boundary. Based on this assessment, the protective cap is still mitigating direct contact with impacted groundwater below the surface.

### **Groundwater Monitoring**

Per the CMP (Sound Earth, 2015a), annual groundwater monitoring is scheduled to take place during the annual period of highest groundwater (typically April). In 2019, groundwater monitoring was completed in April as planned.

Groundwater samples were collected from three existing monitoring wells located within the historical plume area (MW-112, MW-113, and MW-114) and two existing monitoring wells near the downgradient (south) property line (MW-116 and MW-119) (Figure 2). Groundwater sample collection and analysis methods, and analytical results are presented below.

#### ***Groundwater Sample Collection and Analysis Methods***

Groundwater samples were collected by low-flow sampling techniques, using a peristaltic pump and disposable polyethylene tubing. We measured the static water level in each well prior to well purging and sample collection (Table 1). The field parameters—temperature, pH, electrical conductance (specific conductance), dissolved oxygen, and redox potential—were monitored during purging. Purging continued until the field parameters stabilized, defined as three successive readings where the parameters varied by less than 10 percent, or by less than 0.5 milligrams per liter (mg/L) dissolved oxygen if the readings were below 5 mg/L.

Once purging was complete, groundwater samples were collected by directly filling laboratory-supplied containers from the pump discharge tubing. Groundwater samples were placed in an iced

cooler and delivered to Friedman & Bruya, Inc., in Seattle, Washington, under proper chain-of-custody procedures. Samples from all wells were analyzed for the following:

- Gasoline-range total petroleum hydrocarbons (TPH-G) by Method NWTPH-Gx
- Benzene, toluene, ethylbenzene, and xylene (BTEX) compounds by U.S. Environmental Protection Agency (EPA) Method 8260

The results are presented in Table 2, and laboratory certificates of analysis are included in Attachment A.

### ***Groundwater Elevations and Flow Direction***

During Year 4, groundwater elevations ranged from 95.53 to 96.22 feet relative to the Property-specific datum. Groundwater elevation contours are shown on Figure 2. Groundwater flow direction during Year 4 was southwest, which is consistent with historical measurements.

### ***Groundwater Analytical Results***

Year 4 groundwater quality results show continued evidence of natural attenuation and for the first time, petroleum constituent concentrations from each well are below Model Toxics Control Act (MTCA) Method A Cleanup Levels. Groundwater quality results are shown in Table 2, and summarized below.

Constituents and areas in compliance with MCTA Method A Cleanup Levels:

- TPH-G was not detected at any of the monitoring wells sampled.
- Benzene was detected below the 5 µg/L MTCA Method A cleanup level for plume wells MW-114 and MW-115.
- BTEX compounds were not detected at the remaining monitoring wells, including downgradient sentinel wells MW-116 and MW-119.

### **Plume Stability Analyses**

Per the CMP (Sound Earth, 2015a), plume stability analyses were performed to evaluate TPH-G and benzene trends in the groundwater plume. A linear regression analysis was used to determine if each plume was expanding, shrinking, or stable. If the linear regression indicated the plume was stable, the stability of the plume was confirmed using a nonparametric statistical analysis (Mann-Kendall Trend Test [MKTT]). These analyses were performed using Ecology's *Natural Attenuation Analysis Tool Package for Petroleum-Contaminated Groundwater* (Ecology, 2007). Module 2 of this tool package is the linear regression, and module 1 of this tool package is the MKTT. Data inputs and analysis outputs for the TPH-G and benzene plumes are included in Attachments B and C, respectively. The results of these analyses are discussed below.

#### ***TPH-Gasoline Plume***

The TPH-G plume analysis was conducted using groundwater results for samples collected between May 2014 and April 2019. Linear regression analysis of the plume at wells MW-112 and MW-113 indicated the plume is shrinking; therefore, the nonparametric MKTT analysis was not necessary.

Linear regression analysis of the plume at well MW-114 indicated the plume is stable. The nonparametric MKTT analysis confirmed the plume is stable at MW-114<sup>1</sup>.

### ***Benzene Plume***

The benzene plume analysis was conducted using groundwater results for samples collected between May 2014 and April 2019. Linear regression analysis of the plume at wells MW-112, MW-113, and MW-114 indicated the plume is shrinking; therefore, the nonparametric MKTT analysis was not necessary.

### **Indoor Air Compliance Evaluation**

Per the CMP (Sound Earth, 2015a), indoor air compliance is based on the concentrations of TPH-G and benzene at wells MW-113 and MW-114. Section 5.2 of the CMP states, “If the concentrations [...] are greater than two times the historical maximum concentrations for two consecutive sampling events, this will trigger an indoor air sampling event at Building 1.” Year 4 results for MW-113 and MW-114 did not have results meeting this criterion; therefore, an indoor air sampling event was not necessary, and the Property is in compliance.

### **Conclusions and Recommendations**

Annual monitoring results collected during 2019 (Year 4) indicate that the residual TPH-G and BTEX concentrations in groundwater continue to decline and for the first time exhibit property-wide compliance. Analysis of the TPH-G plume at well MW-114 indicates the plume is stable. Analysis of the TPH-G plume at wells MW-112 and MW-113 indicate the plume is shrinking. Analysis of the benzene plume at all plume wells (MW-112, MW-113, and MW-114) indicates the plume is shrinking.

Aspect recommends continuing monitoring in accordance with the CMP in the Environmental Covenant. Year 5 (2020) monitoring will consist of:

- Observing protective cap conditions
- Collecting one round of groundwater samples in April 2020
- Performing plume stability analyses for benzene and gasoline
- Evaluating indoor air compliance based on groundwater data
- Preparing a Year 5 Annual Compliance Report for submittal to Ecology’s Voluntary Cleanup Program (VCP)

Following the Year 5 monitoring event, and Ecology’s 5-year review, the CMP in the Environmental Covenant requires ongoing monitoring every other year as long as groundwater results remain stable or declining. If the groundwater plume is stable or shrinking at the time of the 5-year review period in 2025, it is recommended that the frequency of ongoing monitoring be re-evaluated in cooperation with Ecology.

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<sup>1</sup> The October 2016 concentration for MW-114 is considered anomalous and was not included in this analysis. When the test was performed including the October 2016 concentration, the result came back as “undetermined.”

## References

Sound Earth Strategies, Inc. (Sound Earth), 2015a, Compliance Monitoring Plan, Smokey Point Retail Center, November 11, 2015.

Sound Earth Strategies, Inc. (Sound Earth), 2015b, Cleanup Action Report, Smokey Point Retail Center, June 12, 2015.

Washington State Department of Ecology (Ecology), 2007, Natural Attenuation Analysis Tool Package for Petroleum-Contaminated Groundwater, July 2005, updated for Excel version 2007.

Washington State Department of Ecology (Ecology), 2015, Environmental Covenant, 2707 171<sup>st</sup> Place NE, Marysville, WA, December 4, 2015.

## Limitations

Work for this project was performed for the GLAM Commercial Properties I, LLC (Client), and this letter was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This letter does not represent a legal opinion. No other warranty, expressed or implied, is made.

All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Sincerely,

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## **Attachments**

Table 1 – Groundwater Elevation Data

Table 2 – Groundwater Quality Data

Figure 1 – Vicinity Map

Figure 2 – Site Plan

Attachment A – Laboratory Certificates of Analysis

Attachment B – Gasoline Plume Stability Analysis

Attachment C – Benzene Plume Stability Analysis

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# **TABLES**

**Table 1. Groundwater Elevation Data**Project No.150294, Smokey Point Retail Center  
Marysville, Washington

Well ID	TOC Elevation (feet)	Sample Date	Sampled By	Depth to Water (feet BTOC)	Groundwater Elevation (feet)
MW-111	100.78	9/27/2006	GeoScience	7.69	93.09
		12/6/2008	GeoScience	5.46	95.32
		9/27/2009	GeoScience	7.29	93.49
		4/11/2011	GeoScience	3.50	97.28
		9/14/2012	SoundEarth	4.83	95.95
		4/5/2013	SoundEarth	5.15	95.63
		1/16/2014	SoundEarth	4.19	96.59
		5/20/2015	SoundEarth	6.05	94.73
		7/22/2016	Aspect	6.25	94.53
		10/18/2019	Aspect	6.28	94.50
		1/16/2017	Aspect	4.27	96.51
7/31/2017	Aspect	6.54	94.24		
MW-112	99.50	12/6/2008	GeoScience	4.21	95.29
		9/27/2009	GeoScience	6.11	93.39
		4/11/2011	GeoScience	2.51	96.99
		9/14/2012	SoundEarth	5.39	94.11
		4/5/2013	SoundEarth	4.02	95.48
		1/16/2014	SoundEarth	3.00	96.50
		5/30/2014	SoundEarth	4.04	95.46
		7/1/2014	SoundEarth	5.00	94.50
		8/7/2014	SoundEarth	5.30	94.20
		5/20/2015	SoundEarth	4.86	94.64
		4/13/2016	Aspect	3.54	95.96
		7/22/2016	Aspect	5.06	94.44
		10/18/2016	Aspect	5.03	94.47
		1/16/2017	Aspect	4.00	95.50
		7/31/2017	Aspect	5.37	94.13
4/17/2018	Aspect	1.37	98.13		
4/16/2019	Aspect	3.34	96.16		
MW-113	100.03	12/6/2008	GeoScience	4.86	95.17
		9/27/2009	GeoScience	6.73	93.30
		4/11/2011	GeoScience	3.18	96.85
		9/14/2012	SoundEarth	5.99	94.04
		4/5/2013	SoundEarth	4.71	95.32
		1/16/2014	SoundEarth	3.58	96.45
		5/30/2014	SoundEarth	4.59	95.44
		8/7/2014	SoundEarth	5.97	94.06
		5/20/2015	SoundEarth	5.46	94.57
		4/13/2016	Aspect	4.12	95.91
		7/22/2016	Aspect	5.68	94.35
		10/18/2016	Aspect	5.65	94.38
		1/16/2017	Aspect	4.61	95.42
		7/31/2017	Aspect	6.03	94.00
4/17/2018	Aspect	1.86	98.17		
4/16/2019	Aspect	3.96	96.07		
MW-114	99.62	12/6/2008	GeoScience	4.71	94.91
		9/27/2009	GeoScience	6.55	93.07
		4/11/2011	GeoScience	3.07	96.55
		9/14/2012	SoundEarth	5.92	93.70
		4/5/2013	SoundEarth	4.65	94.97
		1/16/2014	SoundEarth	3.49	96.13
		5/30/2014	SoundEarth	4.47	95.15
		8/7/2014	SoundEarth	5.83	93.79
		5/20/2015	SoundEarth	5.33	94.29
		4/13/2016	Aspect	4.05	95.57
		7/22/2016	Aspect	5.59	94.03
		10/18/2016	Aspect	5.49	94.13
		1/16/2017	Aspect	4.53	95.09
		7/31/2017	Aspect	5.93	93.69
4/17/2018	Aspect	1.74	97.88		
4/16/2019	Aspect	3.85	95.77		
MW-115	99.9	12/6/2008	GeoScience	4.93	94.97
		9/27/2009	GeoScience	6.49	93.41
		4/11/2011	GeoScience	3.15	96.75
		9/14/2012	SoundEarth	6.08	93.82
		4/5/2013	SoundEarth	4.85	95.05
		1/16/2014	SoundEarth	3.67	96.23
		5/30/2014	SoundEarth	4.65	95.25
		8/7/2014	SoundEarth	6.03	93.87
		5/20/2015	SoundEarth	5.52	94.38

## Table 1. Groundwater Elevation Data

Project No.150294, Smokey Point Retail Center  
Marysville, Washington

Well ID	TOC Elevation (feet)	Sample Date	Sampled By	Depth to Water (feet BTOC)	Groundwater Elevation (feet)
		7/22/2016	Aspect	5.79	94.11
		10/18/2016	Aspect	5.70	94.20
		1/16/2017	Aspect	4.74	95.16
		7/31/2017	Aspect	6.11	93.79
		4/17/2018	Aspect	1.87	98.03
		4/16/2019	Aspect	4.04	95.86
MW-116	100.17	12/6/2008	GeoScience	5.30	94.87
		9/27/2009	GeoScience	7.17	93.00
		4/11/2011	GeoScience	3.75	96.42
		9/14/2012	SoundEarth	6.53	93.64
		4/5/2013	SoundEarth	5.28	94.89
		1/16/2014	SoundEarth	4.06	96.11
		5/30/2014	SoundEarth	5.02	95.15
		8/7/2014	SoundEarth	6.42	93.75
		5/20/2015	SoundEarth	5.90	94.27
		4/13/2016	Aspect	4.63	95.54
		7/22/2016	Aspect	6.19	93.98
		10/18/2019	Aspect	6.03	94.14
		1/16/2017	Aspect	5.15	95.02
		7/31/2017	Aspect	6.54	93.63
		4/17/2018	Aspect	2.26	97.91
4/16/2019	Aspect	4.45	95.72		
MW-117	100.65	12/6/2008	GeoScience	5.59	95.06
		9/27/2009	GeoScience	7.45	93.20
		4/11/2011	GeoScience	3.78	96.87
		9/14/2012	SoundEarth	6.78	93.87
		4/5/2013	SoundEarth	5.50	95.15
		1/16/2014	SoundEarth	4.30	96.35
		5/30/2014	SoundEarth	5.27	95.38
		8/7/2014	SoundEarth	6.69	93.96
		5/20/2015	SoundEarth	6.16	94.49
		7/22/2016	Aspect	6.44	94.21
		10/18/2016	Aspect	6.36	94.29
		1/16/2017	Aspect	5.39	95.26
		7/31/2017	Aspect	6.78	93.87
		4/17/2018	Aspect	2.50	98.15
4/16/2019	Aspect	4.69	95.96		
MW-118	100.2	12/6/2008	GeoScience	4.91	95.29
		9/27/2009	GeoScience	6.78	93.42
		4/11/2011	GeoScience	3.19	97.01
		9/14/2012	SoundEarth	6.00	94.20
		4/5/2013	SoundEarth	4.74	95.46
		1/16/2014	SoundEarth	3.61	96.59
		5/30/2014	SoundEarth	4.62	95.58
		8/7/2014	SoundEarth	6.00	94.20
		5/20/2015	SoundEarth	5.50	94.70
		7/22/2016	Aspect	5.73	94.47
		10/18/2016	Aspect	5.72	94.48
		1/16/2017	Aspect	4.65	95.55
		7/31/2017	Aspect	6.63	93.57
		4/17/2018	Aspect	1.87	98.33
4/16/2019	Aspect	3.98	96.22		
MW-119	98.76	5/20/2015	SoundEarth	4.67	94.09
		4/13/2016	Aspect	3.46	95.30
		7/22/2016	Aspect	4.96	93.80
		10/18/2016	Aspect	4.82	93.94
		1/16/2017	Aspect	3.93	94.83
		7/31/2017	Aspect	5.31	93.45
		4/17/2018	Aspect	1.27	97.49
4/16/2019	Aspect	3.23	95.53		

### Notes

Elevations are relative to an arbitrarily chosen site datum.

BTOC = Below top of casing

-- = Not measured

TOC = Top of casing

## Table 2. Groundwater Quality Data

Project No.150294, Smokey Point Retail Center  
Marysville, Washington

Well ID	Sample Date	Sampled by	TPH as Gasoline (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)
<b>MTCA Method A Groundwater Cleanup Level (µg/L)</b>			800 <sup>(1)</sup>	5	1,000	700	1,000
MW-111	9/27/2006	GeoScience	100 U	1 U	1 U	1 U	3 U
	12/6/2008	GeoScience	100 U	1 U	1 U	1 U	3 U
	9/27/2009	GeoScience	100 U	1	1	1 U	3 U
	4/11/2011	GeoScience	<b>4,500</b>	<b>6.9</b>	45	220	130
	9/14/2012	SoundEarth	100 U	1 U	1 U	1 U	3 U
	4/5/2013	SoundEarth	50 U	1 U	1 U	1 U	3 U
MW-112	12/6/2008	GeoScience	100 U	1.5	1.2	1 U	3 U
	9/27/2009	GeoScience	100 U	1 U	1 U	1 U	3 U
	4/11/2011	GeoScience	700	<b>140</b>	54	35	67
	9/14/2012	SoundEarth	180	<b>21</b>	1.6	3.4	5.6
	4/5/2013	SoundEarth	63	<b>25.6</b>	1 U	1 U	2.64
	1/16/2014	SoundEarth	100 U	1 U	1 U	1 U	3 U
	5/30/2014	SoundEarth	<b>4,100</b>	<b>570</b>	280	270	260
	7/1/2014	SoundEarth	<b>1,300</b>	<b>56</b>	22	30	120
	8/7/2014	SoundEarth	<b>5,800</b>	<b>140</b>	97	190	1,000
	5/20/2015	SoundEarth	<b>990</b>	<b>24</b>	10	92	110
	4/13/2016	Aspect	630	2.2	1 U	7.1	2.7
	7/22/2016	Aspect	100 U	0.79	1 U	1 U	2 U
	10/18/2016	Aspect	100 U	0.35 U	1 U	1 U	2 U
	1/16/2017	Aspect	240	<b>17</b>	1 U	1 U	2 U
	7/31/2017	Aspect	120	1	1 U	1 U	2 U
4/17/2018	Aspect	<b>3,200</b>	4.3	73	110	370	
4/16/2019	Aspect	100 U	0.35 U	1 U	1 U	2 U	
MW-113	12/6/2008	GeoScience	250	<b>50</b>	1.8	6.9	3 U
	9/27/2009	GeoScience	130	<b>29</b>	4.7	5.6	7.2
	4/11/2011	GeoScience	<b>4,000</b>	<b>70</b>	110	110	260
	9/14/2012	SoundEarth	180	<b>17</b>	20	3.7	17
	4/5/2013	SoundEarth	<b>4,510</b>	<b>118</b>	209	147	792
	1/16/2014	SoundEarth	140	1.9	2.3	4.8	14
	5/30/2014	SoundEarth	100 U	1.8	6.5	2.2	5.1
	8/7/2014	SoundEarth	380	<b>16</b>	13	18	48
	5/20/2015	SoundEarth	210	<b>11</b>	16	7	32
	4/13/2016	Aspect	340	<b>3</b>	1.2	1 U	22.3
	7/22/2016	Aspect	100 U	0.35 U	1 U	1 U	2 U
	10/18/2016	Aspect	160	1.6	1 U	2.6	2 U
	1/16/2017	Aspect	100 U	0.44	1 U	1 U	2 U
	7/31/2017	Aspect	130	<b>13</b>	1 U	1.4	11.3
4/17/2018	Aspect	100	0.35 U	1.3	1 U	4	
4/16/2019	Aspect	100 U	0.35 U	1 U	1.1	2 U	
MW-114	12/6/2008	GeoScience	250	<b>28</b>	1 U	1 U	3 U
	9/27/2009	GeoScience	160	<b>15</b>	1.9	1.3	3 U
	4/11/2011	GeoScience	100 U	<b>9.2</b>	1 U	4.5	8.3
	9/14/2012	SoundEarth	120	<b>21</b>	1.1	4.1	3 U
	4/5/2013	SoundEarth	288	<b>59</b>	1 U	13	2.5
	1/16/2014	SoundEarth	100	1.8	2.4	6.6	6.9
	5/30/2014	SoundEarth	190	<b>25</b>	2.2	7	3 U
	8/7/2014	SoundEarth	300	<b>43</b>	2.6	23	3 U
	5/20/2015	SoundEarth	100 U	<b>5.4</b>	2	1 U	3 U
	4/13/2016	Aspect	100 U	<b>12</b>	1 U	1 U	2 U
	7/22/2016	Aspect	170	<b>10</b>	1 U	1 U	2 U
	10/18/2016	Aspect	<b>1,400</b>	<b>37</b>	9.5	71	41.5
	1/16/2017	Aspect	140	<b>11</b>	1 U	4.5	2 U
	7/31/2017	Aspect	310	<b>8.3</b>	1 U	6.9	2 U
	4/17/2018	Aspect	100 U	0.35 U	1 U	1 U	2 U
4/16/2019	Aspect	100 U	0.85	1 U	1.7	2 U	

## Table 2. Groundwater Quality Data

Project No.150294, Smokey Point Retail Center  
Marysville, Washington

Well ID	Sample Date	Sampled by	TPH as Gasoline (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	
<b>MTCA Method A Groundwater Cleanup Level (µg/L)</b>			800 <sup>(1)</sup>	5	1,000	700	1,000	
MW-115	12/6/2008	GeoScience	540	<b>120</b>	1.1	14	3 U	
	9/27/2009	GeoScience	100 U	<b>180</b>	1 U	10	3 U	
	4/11/2011	GeoScience	100 U	1 U	1 U	1 U	3 U	
	9/14/2012	SoundEarth	100 U	<b>5.2</b>	1.3	1 U	3 U	
	4/5/2013	SoundEarth	50 U	<b>5.75</b>	1 U	5.34	2 U	
	1/16/2014	SoundEarth	390	<b>18</b>	5.6	10	16	
	5/30/2014	SoundEarth	100 U	1 U	1 U	1 U	3 U	
	8/7/2014	SoundEarth	100 U	1.8	1 U	1 U	3 U	
	5/20/2015	SoundEarth	100 U	1.3	1 U	1 U	3 U	
MW-116	12/6/2008	GeoScience	380	<b>49</b>	1 U	1 U	3 U	
	9/27/2009	GeoScience	100 U	<b>32</b>	1 U	1.2	3 U	
	4/11/2011	GeoScience	100 U	1 U	1 U	1 U	3 U	
	9/14/2012	SoundEarth	100 U	1.1	1 U	1 U	3 U	
	4/5/2013	SoundEarth	50 U	1 U	1 U	1 U	2 U	
	1/16/2014	SoundEarth	100 U	1 U	1 U	1 U	3 U	
	5/30/2014	SoundEarth	100 U	1 U	1 U	1 U	3 U	
	8/7/2014	SoundEarth	100 U	1 U	1 U	1 U	3 U	
		5/20/2015	SoundEarth	100 U	1 U	1 U	1 U	3 U
		4/13/2016	Aspect	100 U	0.35 U	1 U	1 U	2 U
		7/22/2016	Aspect	100 U	0.44	1 U	1 U	2 U
		10/18/2016	Aspect	100 U	1	1 U	1 U	2 U
		1/16/2017	Aspect	100 U	0.35 U	1 U	1 U	2 U
		7/31/2017	Aspect	100 U	0.58	1 U	1 U	2 U
	4/17/2018	Aspect	100 U	0.35 U	1 U	1 U	2 U	
	4/16/2019	Aspect	100 U	0.35 U	1 U	1 U	2 U	
MW-117	12/6/2008	GeoScience	100	12	1.6	1 U	3 U	
	9/27/2009	GeoScience	100 U	1.4	1	1 U	3 U	
	4/11/2011	GeoScience	100 U	1 U	1 U	1 U	3 U	
	9/14/2012	SoundEarth	100 U	1 U	1 U	1 U	3 U	
	4/5/2013	SoundEarth	50 U	1 U	1 U	1 U	2 U	
	8/7/2014	SoundEarth	100 U	1 U	1 U	1 U	3 U	
MW-118	12/6/2008	GeoScience	<b>2,400</b>	<b>290</b>	3	20	5.1	
	9/27/2009	GeoScience	100 U	4.1	21	2	14	
	4/11/2011	GeoScience	100 U	1.1	3.1	1.9	5.8	
	9/14/2012	SoundEarth	100 U	1 U	1 U	1 U	3 U	
	4/5/2013	SoundEarth	50 U	1 U	1 U	1 U	2 U	
	5/30/2014	SoundEarth	100 U	1 U	1 U	1 U	3 U	
MW-119	5/20/2015	SoundEarth	100 U	1 U	1.1	1 U	3 U	
	4/13/2016	Aspect	100 U	0.35 U	1 U	1 U	2 U	
	7/22/2016	Aspect	310	1.7	1 U	1 U	2 U	
	10/18/2016	Aspect	140	0.35 U	1 U	1 U	2 U	
	1/16/2017	Aspect	110	1.7	1 U	1 U	2 U	
	7/31/2017	Aspect	100 U	0.35 U	1 U	1 U	2 U	
	4/17/2018	Aspect	100 U	0.35 U	1 U	1 U	1 U	
	4/16/2019	Aspect	100 U	0.35 U	1 U	1 U	2 U	

### Notes

**Bold** values exceed MTCA Method A Groundwater Cleanup Levels for Unrestricted Land Use.

(1) Cleanup level for gasoline with benzene present.

U = Not detected above laboratory reporting limit.

TPH = Total petroleum hydrocarbons

µg/L = micrograms/liter

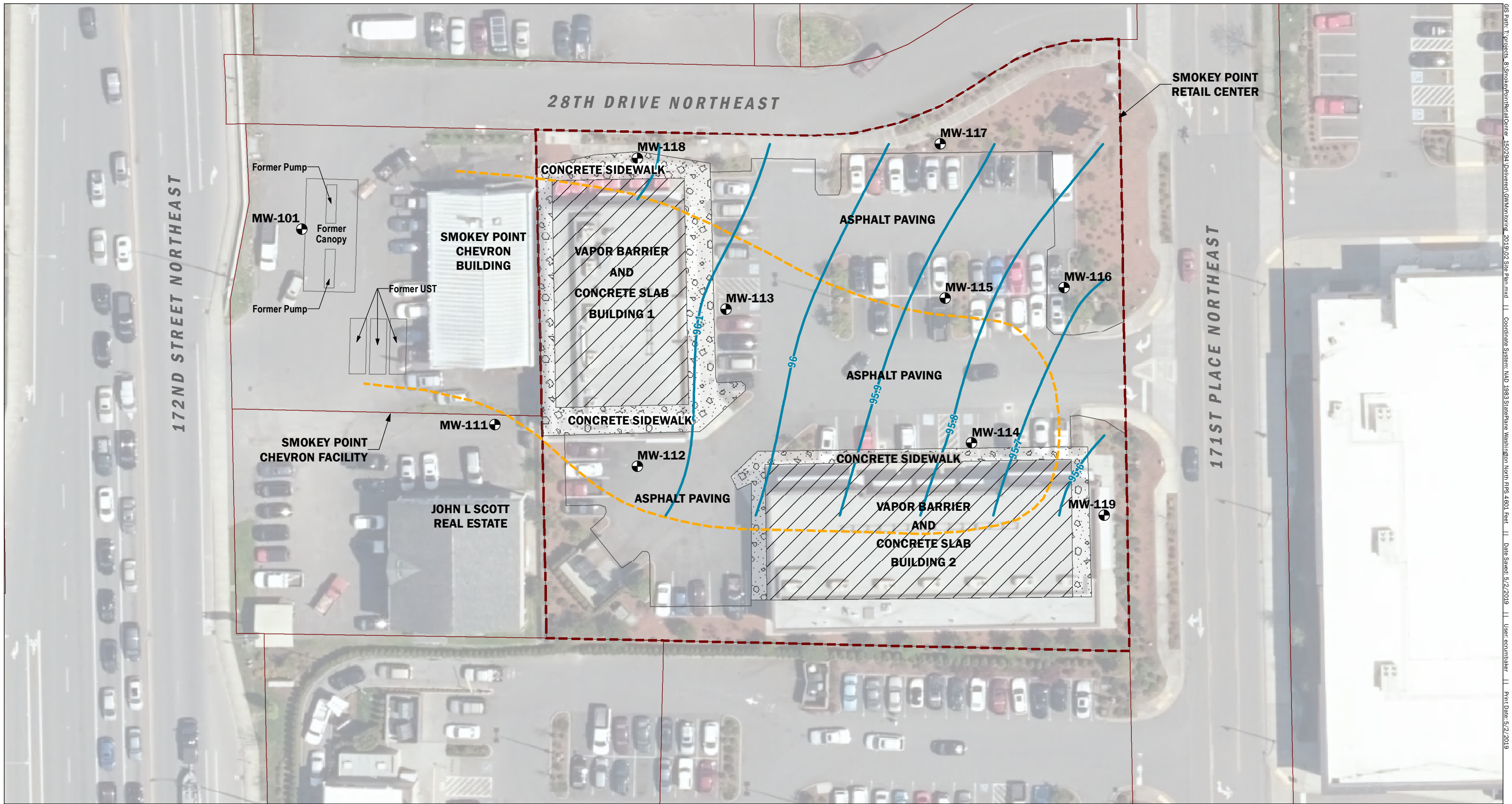
# FIGURES









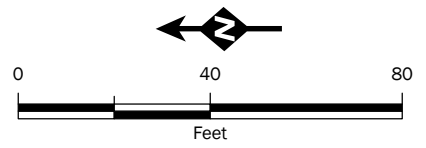
**Vicinity Map**  
 Groundwater Monitoring Report  
 Smokey Point Retail Center  
 Marysville, Washington

	JUL-2018	BY: AET / RAP	FIGURE NO. <b>1</b>
	<small>PROJECT NO. 150294</small>	<small>REVISED BY: EAC</small>	


GIS Path: I:\Projects\_8\SmokePointRetailCenter\_150294\Delivered\GWMonitoring\_2018\01\_Vicinity Map.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4901 Feet || Date Saved: 7/5/2018 || User: acumhaker || Print Date: 7/5/2018



-  Monitoring Well
-  Groundwater Elevation Contour (April 2019)
-  Historical Extent of Petroleum Benzene Contaminated Groundwater Plume Based on 5µg/L MTCA Method A Groundwater Cleanup Level.
-  Vapor Barrier
-  Property Boundary
-  Snohomish County Parcels



**Site Plan**  
Groundwater Monitoring Report  
Smokey Point Retail Center  
Marysville, Washington

	MAY-2019	BY: AET / EAC	FIGURE NO. <b>2</b>
	PROJECT NO. 150294	REVISED BY: AET/EAC	

GIS Path: T:\projects\_8\SmokeyPointRetailCenter\_150294\Deliverables\GIMonitoring\_2019\02\_Site Plan.mxd | Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet | Date Saved: 5/2/2019 | User: ecumbraker | Print Date: 5/2/2019

# **ATTACHMENT A**

## **Laboratory Certificates of Analysis**

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.  
Yelena Aravkina, M.S.  
Michael Erdahl, B.S.  
Arina Podnozova, B.S.  
Eric Young, B.S.

3012 16th Avenue West  
Seattle, WA 98119-2029  
(206) 285-8282  
fbi@isomedia.com  
www.friedmanandbruya.com

April 24, 2019

Amy Tice, Project Manager  
Aspect Consulting, LLC  
710 2<sup>nd</sup> Ave S, Suite 550  
Seattle, WA 98104

Dear Ms Tice:

Included are the results from the testing of material submitted on April 16, 2019 from the Smokey Point 150294, F&BI 904298 project. There are 11 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl  
Project Manager

Enclosures  
c: Data Aspect  
ASP0424R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on April 16, 2019 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC Smokey Point 150294, F&BI 904298 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Aspect Consulting, LLC</u>
904298 -01	MW-112-041619
904298 -02	MW-116-041619
904298 -03	MW-113-041619
904298 -04	MW-114-041619
904298 -05	MW-119-041619

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/24/19  
Date Received: 04/16/19  
Project: Smokey Point 150294, F&BI 904298  
Date Extracted: 04/17/19  
Date Analyzed: 04/17/19 and 04/22/19

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES  
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE  
USING METHOD NWTPH-Gx**  
Results Reported as ug/L (ppb)

<u>Sample ID</u> Laboratory ID	<u>Gasoline Range</u>	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 51-134)
MW-112-041619 904298-01	<100	93
MW-116-041619 904298-02	<100	93
MW-113-041619 904298-03	<100	91
MW-114-041619 904298-04	<100	92
MW-119-041619 904298-05	<100	92
Method Blank 09-803 MB	<100	94

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-112-041619	Client:	Aspect Consulting, LLC
Date Received:	04/16/19	Project:	Smokey Point 150294, F&BI 904298
Date Extracted:	04/18/19	Lab ID:	904298-01
Date Analyzed:	04/18/19	Data File:	041822.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-116-041619	Client:	Aspect Consulting, LLC
Date Received:	04/16/19	Project:	Smokey Point 150294, F&BI 904298
Date Extracted:	04/18/19	Lab ID:	904298-02
Date Analyzed:	04/18/19	Data File:	041833.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	50	150
Toluene-d8	97	50	150
4-Bromofluorobenzene	97	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-113-041619	Client:	Aspect Consulting, LLC
Date Received:	04/16/19	Project:	Smokey Point 150294, F&BI 904298
Date Extracted:	04/18/19	Lab ID:	904298-03
Date Analyzed:	04/18/19	Data File:	041834.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	99	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	1.1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-114-041619	Client:	Aspect Consulting, LLC
Date Received:	04/16/19	Project:	Smokey Point 150294, F&BI 904298
Date Extracted:	04/18/19	Lab ID:	904298-04
Date Analyzed:	04/18/19	Data File:	041835.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	100	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	0.85
Toluene	<1
Ethylbenzene	1.7
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-119-041619	Client:	Aspect Consulting, LLC
Date Received:	04/16/19	Project:	Smokey Point 150294, F&BI 904298
Date Extracted:	04/18/19	Lab ID:	904298-05
Date Analyzed:	04/18/19	Data File:	041836.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	100	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Smokey Point 150294, F&BI 904298
Date Extracted:	04/18/19	Lab ID:	09-782 mb
Date Analyzed:	04/18/19	Data File:	041810.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	98	50	150
Toluene-d8	98	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)
Benzene	<0.35
Toluene	<1
Ethylbenzene	<1
m,p-Xylene	<2
o-Xylene	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/24/19

Date Received: 04/16/19

Project: Smokey Point 150294, F&BI 904298

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER  
SAMPLES FOR TPH AS GASOLINE  
USING METHOD NWTPH-G<sub>x</sub>**

Laboratory Code: 904298-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	86	69-134

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 04/24/19

Date Received: 04/16/19

Project: Smokey Point 150294, F&BI 904298

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER  
SAMPLES FOR VOLATILES BY EPA METHOD 8260C**

Laboratory Code: 904298-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent	Acceptance
				Recovery MS	Criteria
Benzene	ug/L (ppb)	50	<0.35	97	75-114
Toluene	ug/L (ppb)	50	<1	91	73-117
Ethylbenzene	ug/L (ppb)	50	<1	103	66-124
m,p-Xylene	ug/L (ppb)	100	<2	105	63-128
o-Xylene	ug/L (ppb)	50	<1	100	64-129

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent	Percent	Acceptance Criteria	RPD (Limit 20)
			Recovery LCS	Recovery LCSD		
Benzene	ug/L (ppb)	50	98	95	75-116	3
Toluene	ug/L (ppb)	50	92	90	79-115	2
Ethylbenzene	ug/L (ppb)	50	103	101	83-111	2
m,p-Xylene	ug/L (ppb)	100	106	104	84-112	2
o-Xylene	ug/L (ppb)	50	101	99	81-117	2

# FRIEDMAN & BRUYA, INC.

## ENVIRONMENTAL CHEMISTS

### **Data Qualifiers & Definitions**

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht - The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

904,298

SAMPLE CHAIN OF CUSTODY ME 04-16-19

W12

Report To: alice@aspectconsulting.com

Company: Aspect Consulting

Address: 710 2nd Ave Suite 550, Seattle, WA

City, State, ZIP: \_\_\_\_\_

Phone: 316.617.0499 Email: albabcock@aspectconsulting.com

SAMPLERS (signature) <u>David Birk</u>	
PROJECT NAME <u>Smokley Port</u>	PO # <u>150294</u>
REMARKS	INVOICE TO

Page # \_\_\_\_\_ of \_\_\_\_\_

TURNAROUND TIME

Standard Turnaround  
 RUSH  
 Rush charges authorized by: \_\_\_\_\_

SAMPLE DISPOSAL  
 Dispose after 30 days  
 Archive Samples  
 Other

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED										Notes	
						TPH-HCID	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260C	SVOCs by 8270D	PAHs 8270D SIM	BTEX (8260)				
MW-112-041619	D1A-R	4/16/19	1125	GW	6	X	X	X					X				
MW-116-041619	D2		1215	GW	6	X	X	X					X				
MW-113-041619	D3		1255	GW	6	X	X	X					X				
MW-114-041619	D4		1335	GW	6	X	X	X					X				
MW-119-041619	D5 A-E		1420	GW	5	X							X				

Samples received at 14:00

Friedman & Bruya, Inc.  
 3012 16th Avenue West  
 Seattle, WA 98119-2029  
 Ph. (206) 285-8282

Reinquished by: <u>[Signature]</u>	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Reinquished by: <u>[Signature]</u>		<u>David Birk</u>	<u>Aspect</u>	<u>4/16/19</u>	<u>1640</u>
Reinquished by: <u>[Signature]</u>		<u>Eric [Signature]</u>	<u>FR</u>	<u>4/16/19</u>	<u>1640</u>
Received by: _____					

# **ATTACHMENT B**

## **Gasoline Plume Stability Analysis**

**Module1: Mann-Kendall Trend Test for Plume Stability (Non-parametric Statistical Test)**

Site Name: Smokey Point Retail Center

Site Address: Marysville, WA

Additional Description:

Well (Sampling) Location? **MW114**

Level of Confidence (Decision Criteria)? **85%**

**1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.**

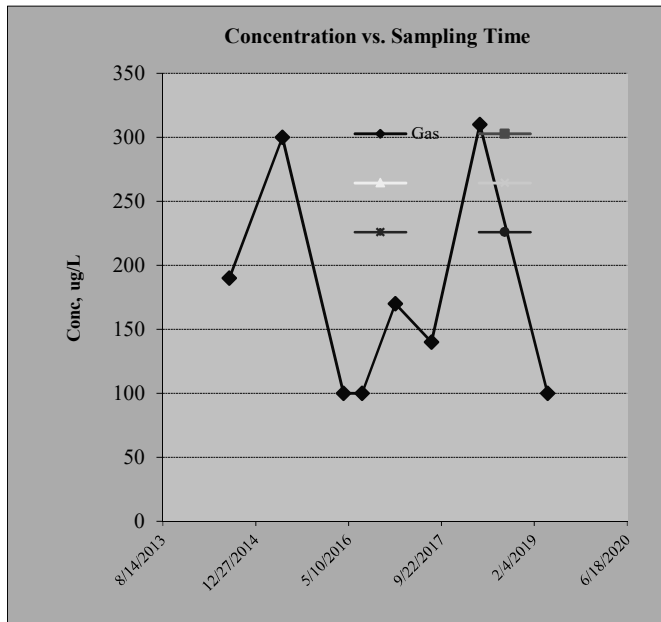
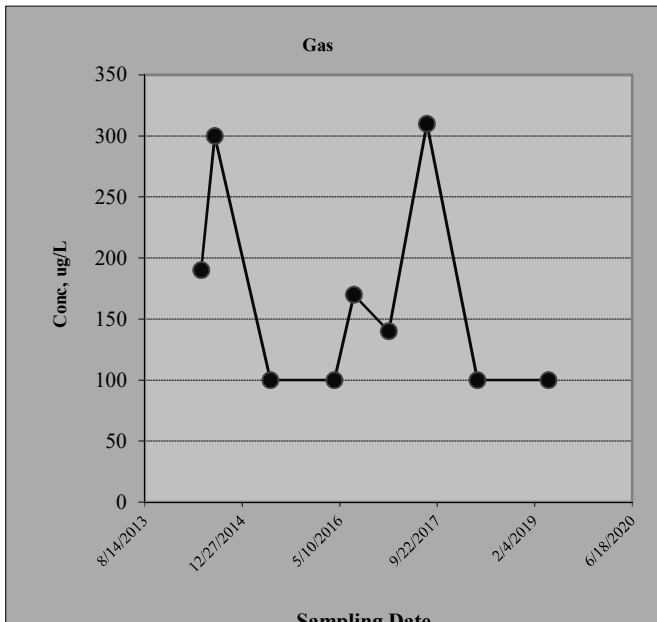
		Hazardous Substances (unit is ug/L)				
Sampling Event	Date Sampled	Gas				
#1	5/30/2014	190				
#2	8/7/2014	300				
#3	5/20/2015	100				
#4	4/13/2016	100				
#5	7/22/2016	170				
#6	1/16/2017	140				
#7	7/31/2017	310				
#8	4/17/2018	100				
#9	4/16/2019	100				
#10						
#11						
#12						
#13						
#14						
#15						
#16						

**2. Mann-Kendall Non-parametric Statistical Test Results**

Hazardous Substance?	Gas					
Confidence Level Calculated?	76.20%	NA	NA	NA	NA	NA
<b>Plume Stability?</b>	Stable	NA	NA	NA	NA	NA
Coefficient of Variation?	CV <= 1	n<4	n<4	n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	-8	0	0	0	0	0
Number of Sampling Rounds?	9	0	0	0	0	0
Average Concentration?	167.78	NA	NA	NA	NA	NA
Standard Deviation?	84.67	NA	NA	NA	NA	NA
Coefficient of Variation?	0.50	NA	NA	NA	NA	NA
Blank if No Errors found		n<4	n<4	n<4	n<4	n<4

**3. Temporal Trend: Plot of Concentration vs. Sampling Time**

Hazardous substance? **Gas**  
 Plume Stability? **Stable**



**sampling Date**

**Sampling Date**

**Module1: Mann-Kendall Trend Test for Plume Stability (Non-parametric Statistical Test)**

Site Name: Smokey Point Retail Center

Site Address: Marysville, WA

Additional Description:

Well (Sampling) Location? **MW114**

Level of Confidence (Decision Criteria)? **85%**

**1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.**

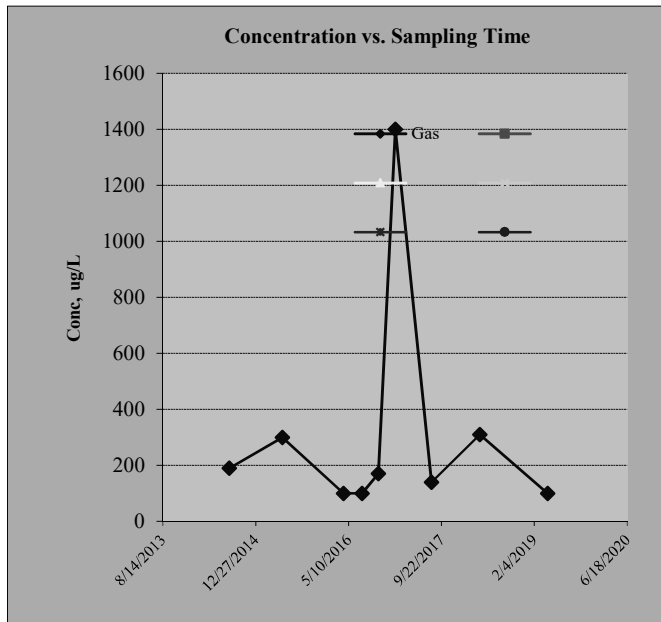
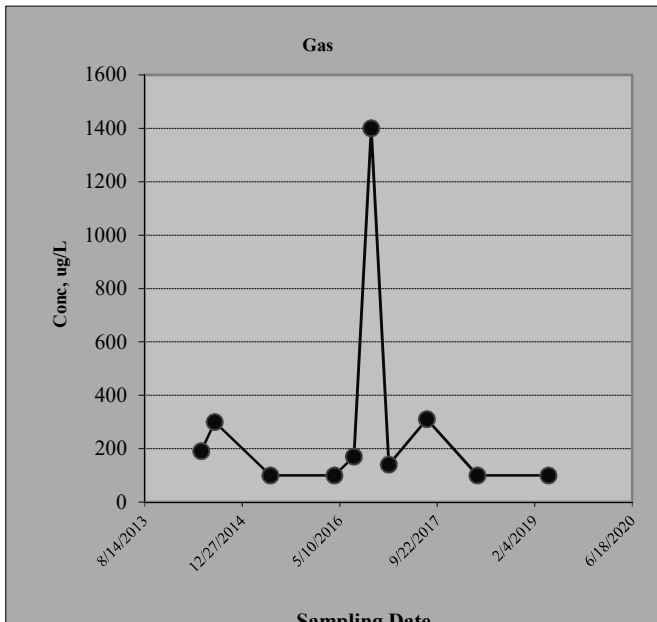
		Hazardous Substances (unit is ug/L)				
Sampling Event	Date Sampled	Gas				
#1	5/30/2014	190				
#2	8/7/2014	300				
#3	5/20/2015	100				
#4	4/13/2016	100				
#5	7/22/2016	170				
#6	10/18/2016	1400				
#7	1/16/2017	140				
#8	7/31/2017	310				
#9	4/17/2018	100				
#10	4/16/2019	100				
#11						
#12						
#13						
#14						
#15						
#16						

**2. Mann-Kendall Non-parametric Statistical Test Results**

Hazardous Substance?	Gas					
Confidence Level Calculated?	70.00%	NA	NA	NA	NA	NA
<b>Plume Stability?</b>	Undetermined	NA	NA	NA	NA	NA
Coefficient of Variation?	CV > 1	n<4	n<4	n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	-7	0	0	0	0	0
Number of Sampling Rounds?	10	0	0	0	0	0
Average Concentration?	291.00	NA	NA	NA	NA	NA
Standard Deviation?	397.76	NA	NA	NA	NA	NA
Coefficient of Variation?	1.37	NA	NA	NA	NA	NA
Blank if No Errors found		n<4	n<4	n<4	n<4	n<4

**3. Temporal Trend: Plot of Concentration vs. Sampling Time**

Hazardous substance? Gas  
 Plume Stability? Undetermined



**sampling Date**

**Sampling Date**





## Module 2: Graphical Presentation of Historical Ground Water Data: (Well to Well Analysis)

Site Name: *Smokey Point Retail Center*

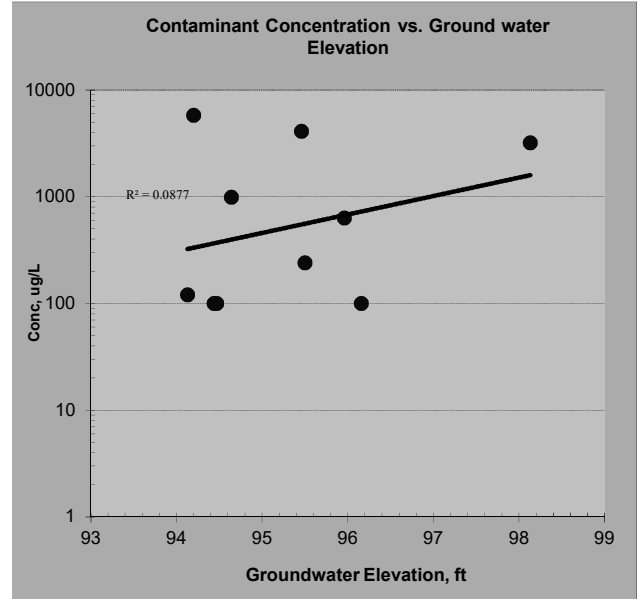
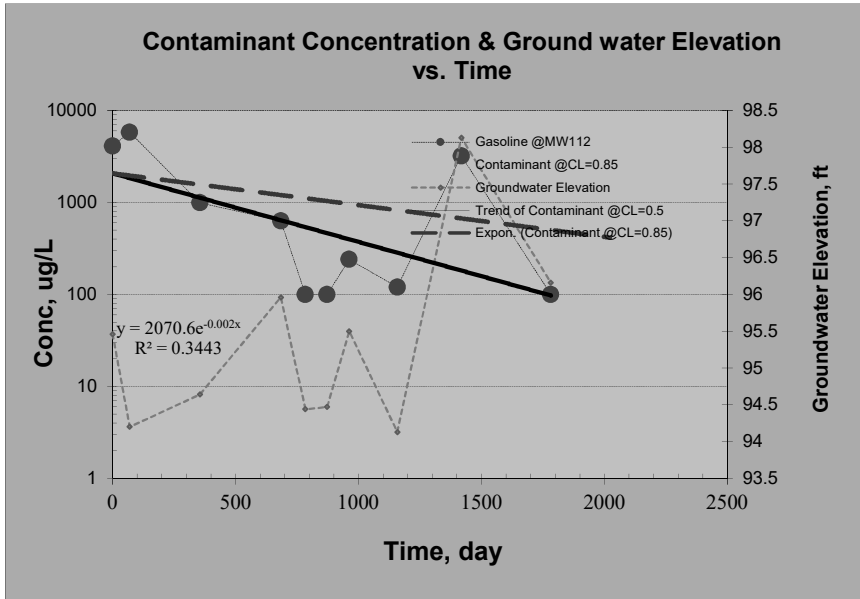
Site Address: *Marysville, WA*

Additional Description: *0*

Hazardous Substance: *Gasoline*

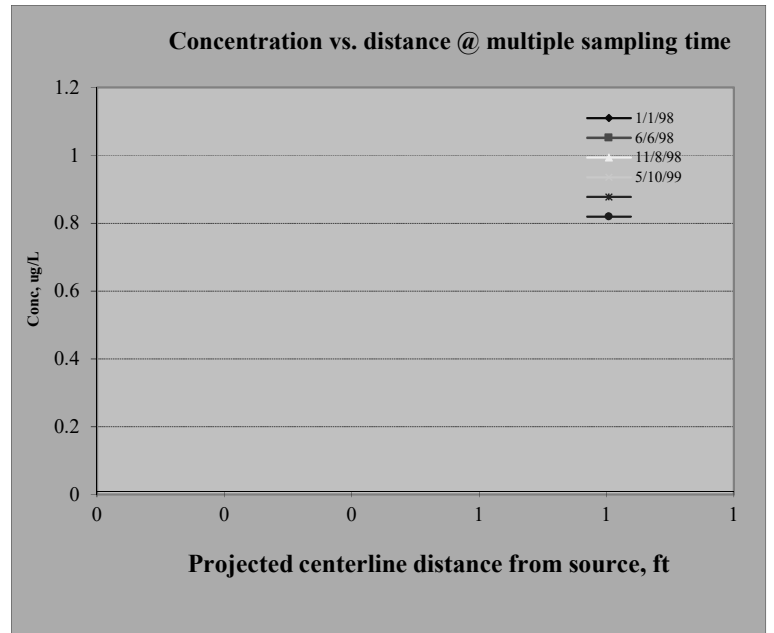
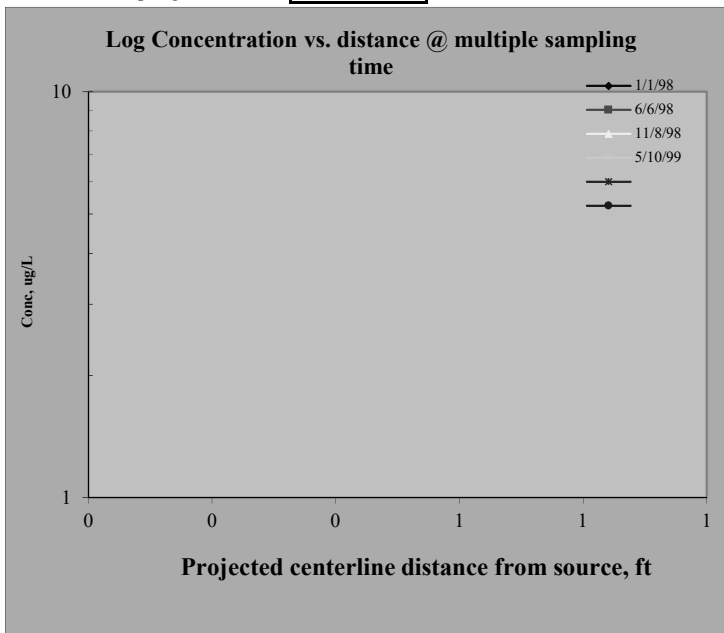
### 1. Temporal Trend at a Well (Concentration vs. Time & Groundwater Elevation : well-to-well analysis)

Name of Sampling Well?	MW112	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	92.542%		
Plume Stability?	Shrinking ; Decision Criteria is 85%.		
Slope: Point decay rate constant ( $k_{point}$ ), yr <sup>-1</sup>	0.626 @50% C.L.;	0.290 @85% C.L.	
Half Life for $k_{point}$ , yr	1.107 @50% C.L.;	2.388 @85% C.L.	



### 2. Spatial and Temporal Trend along Overall Plume Length for Multiple Wells:

Plot #1: Sampling date #1	1-Jan-98
Plot #2: Sampling date #2	6-Jun-98
Plot #3: Sampling date #3	8-Nov-98
Plot #4: Sampling date #4	10-May-99
Plot #5: Sampling date #5	
Plot #6: Sampling date #6	



## Module 2: Graphical Presentation of Historical Ground Water Data: (Well to Well Analysis)

Site Name: *Smokey Point Retail Center*

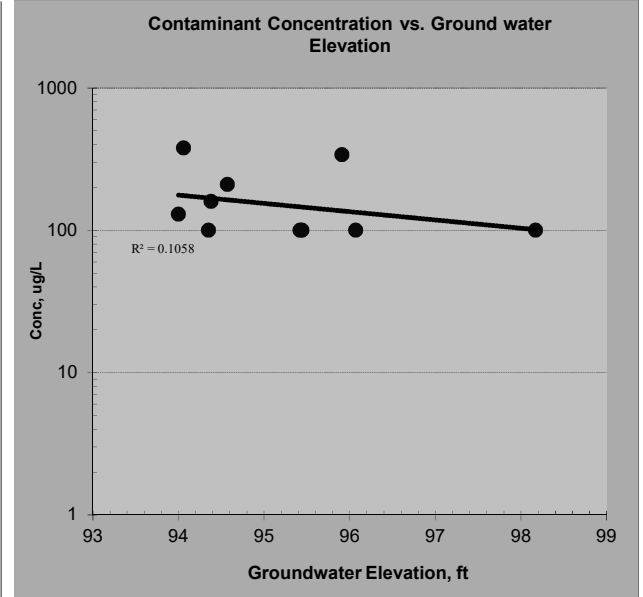
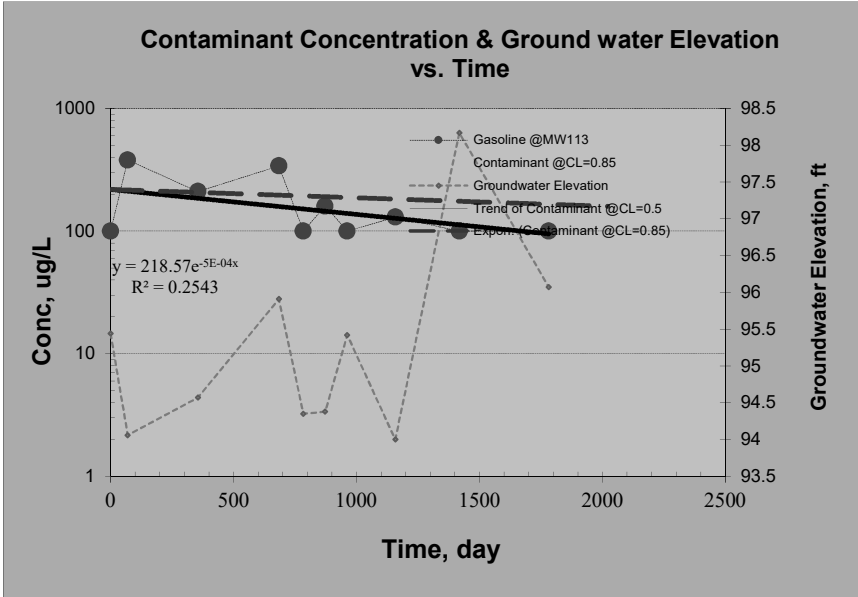
Site Address: *Marysville, WA*

Additional Description: *0*

Hazardous Substance: *Gasoline*

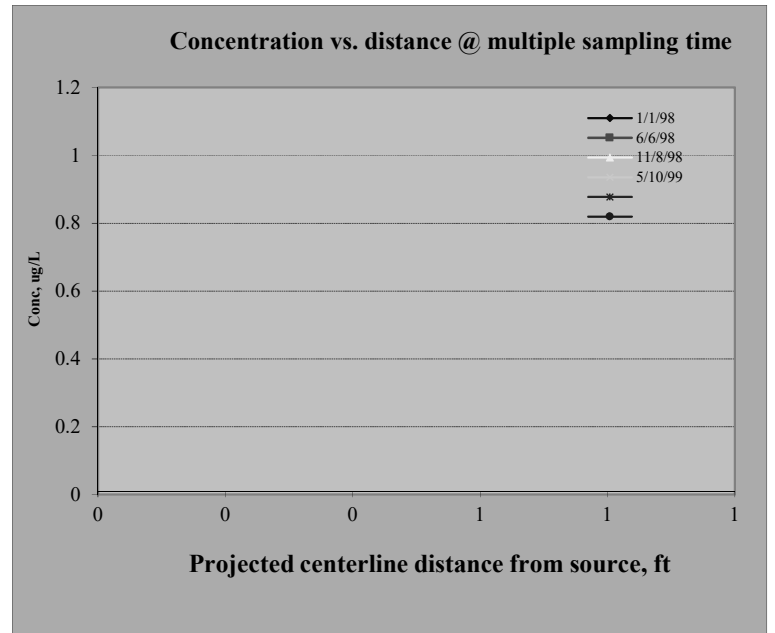
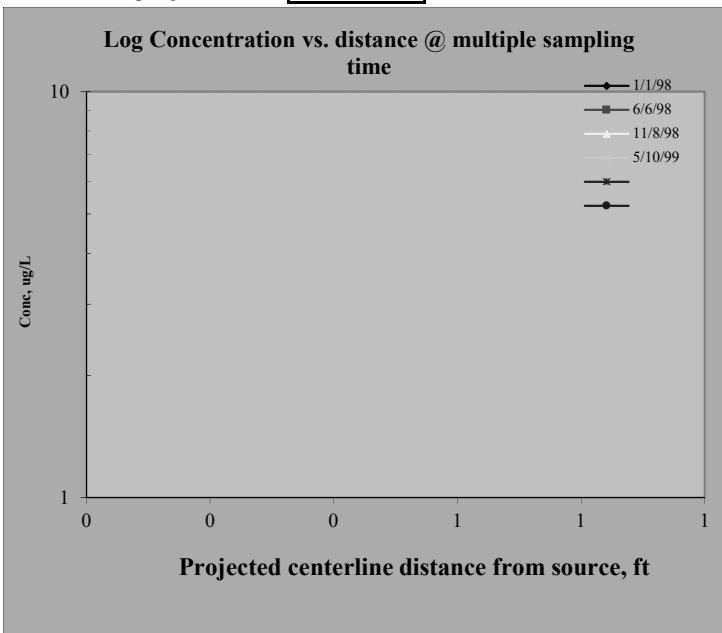
### 1. Temporal Trend at a Well (Concentration vs. Time & Groundwater Elevation : well-to-well analysis)

Name of Sampling Well?	MW113	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	86.284%		
Plume Stability?	Shrinking ; Decision Criteria is 85%.		
Slope: Point decay rate constant ( $k_{point}$ ), yr <sup>-1</sup>	0.171 @50% C.L.;	0.057 @85% C.L.	
Half Life for $k_{point}$ , yr	4.055 @50% C.L.;	12.130 @85% C.L.	



### 2. Spatial and Temporal Trend along Overall Plume Length for Multiple Wells:

Plot #1: Sampling date #1	1-Jan-98
Plot #2: Sampling date #2	6-Jun-98
Plot #3: Sampling date #3	8-Nov-98
Plot #4: Sampling date #4	10-May-99
Plot #5: Sampling date #5	
Plot #6: Sampling date #6	



## Module 2: Graphical Presentation of Historical Ground Water Data: (Well to Well Analysis)

Site Name: *Smokey Point Retail Center*

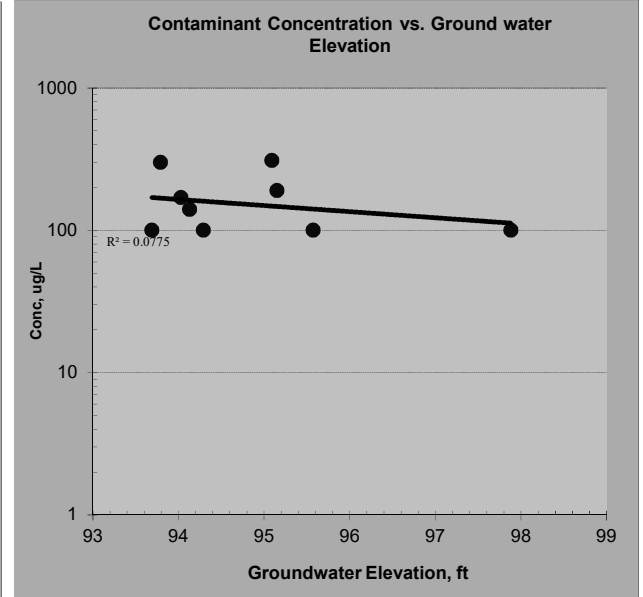
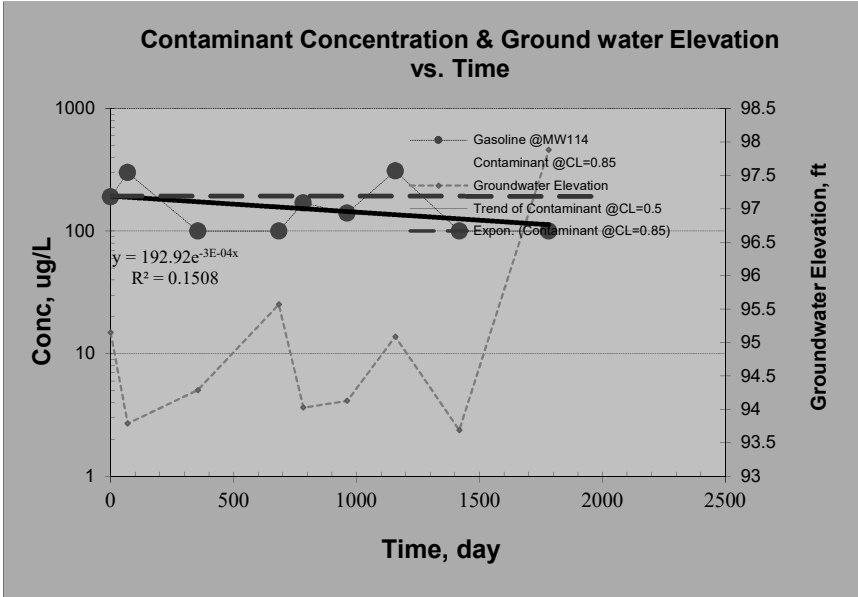
Site Address: *Marysville, WA*

Additional Description: *0*

Hazardous Substance: *Gasoline*

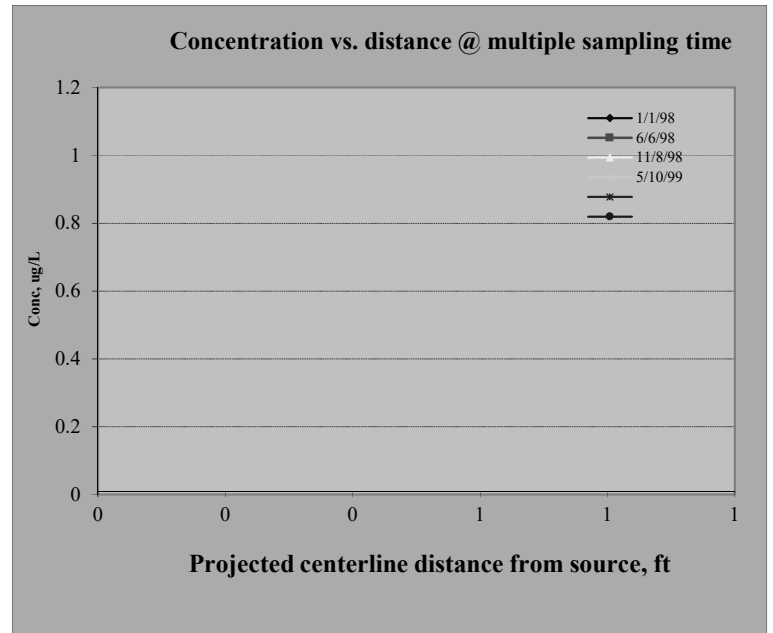
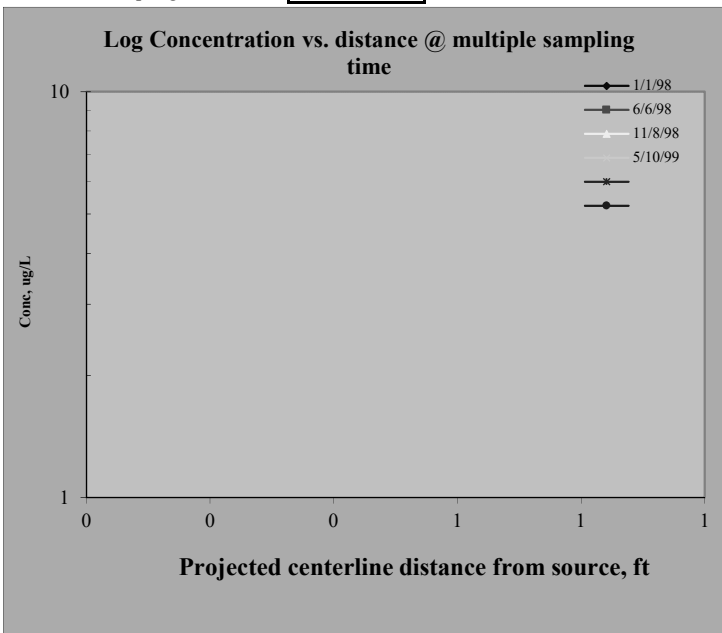
### 1. Temporal Trend at a Well (Concentration vs. Time & Groundwater Elevation : well-to-well analysis)

Name of Sampling Well?	MW114	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	69.834%		
Plume Stability?	Stable	; Decision Criteria is 85%.	
Slope: Point decay rate constant ( $k_{point}$ ), yr <sup>-1</sup>	0.110 @50% C.L.;	0.001 @85% C.L.	
Half Life for $k_{point}$ , yr	6.298 @50% C.L.;	1022.530 @85% C.L.	



### 2. Spatial and Temporal Trend along Overall Plume Length for Multiple Wells:

Plot #1: Sampling date #1	1-Jan-98
Plot #2: Sampling date #2	6-Jun-98
Plot #3: Sampling date #3	8-Nov-98
Plot #4: Sampling date #4	10-May-99
Plot #5: Sampling date #5	
Plot #6: Sampling date #6	



## Module 2: Graphical Presentation of Historical Ground Water Data: (Well to Well Analysis)

Site Name: *Smokey Point Retail Center*

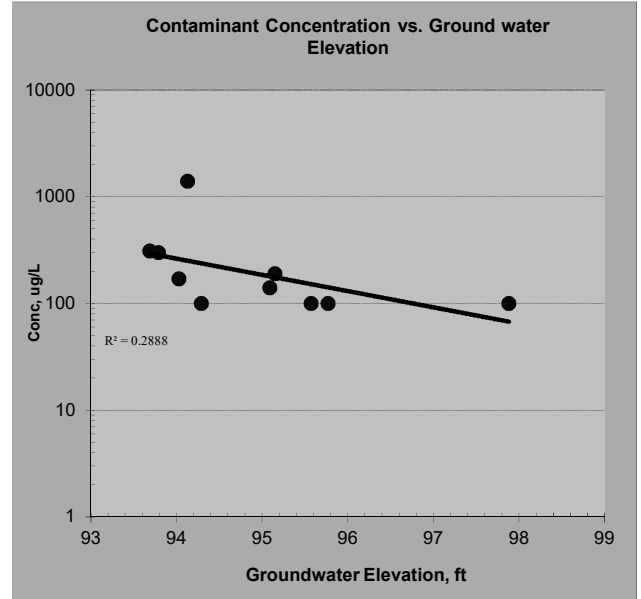
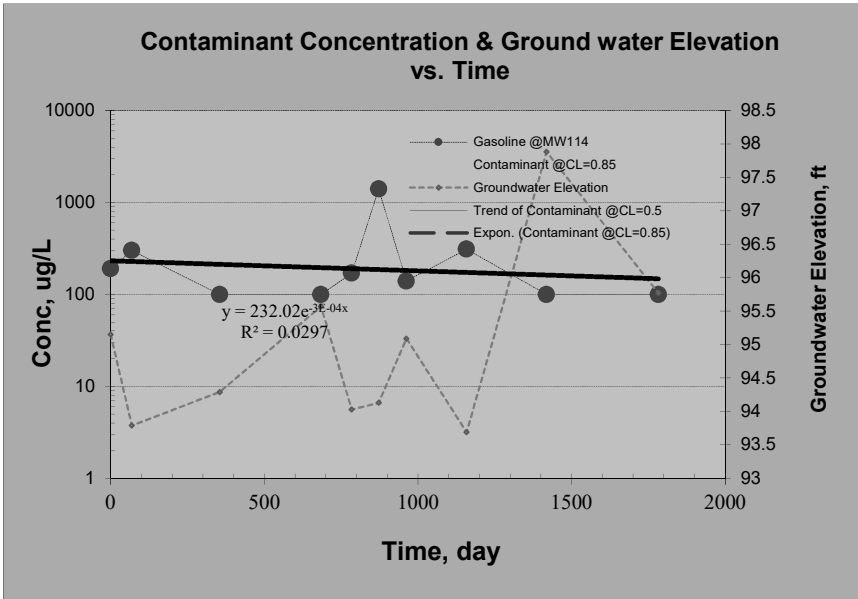
Site Address: *Marysville, WA*

Additional Description: *0*

Hazardous Substance: *Gasoline*

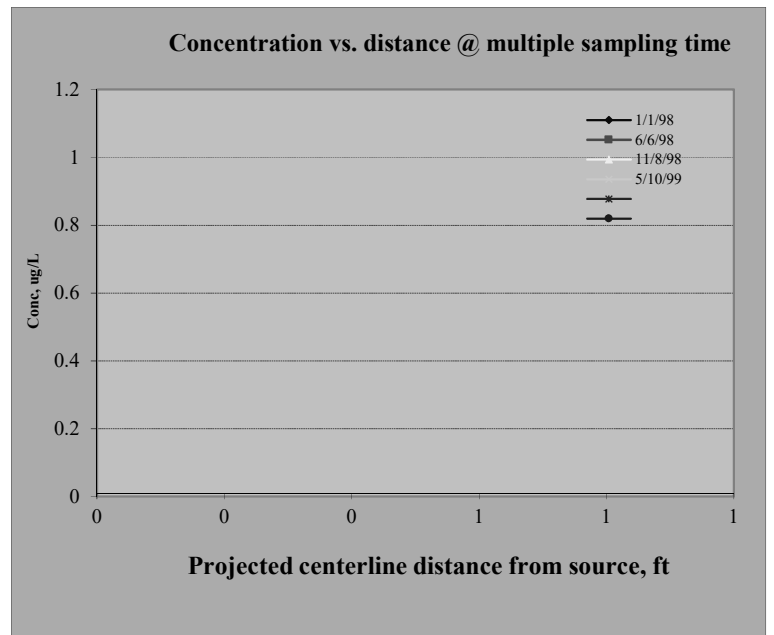
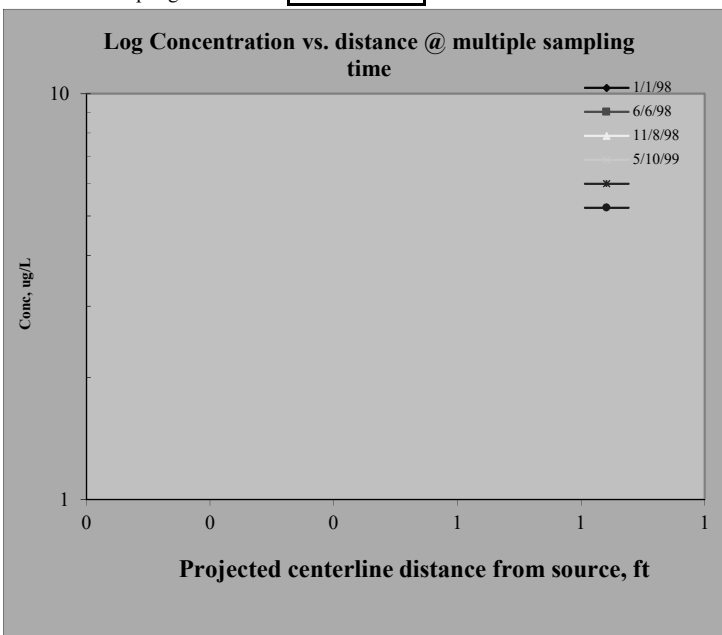
### 1. Temporal Trend at a Well (Concentration vs. Time & Groundwater Elevation : well-to-well analysis)

Name of Sampling Well?	MW114	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	36.598%		
Plume Stability?	UD	; Decision Criteria is 85%.	
Slope: Point decay rate constant ( $k_{point}$ ), $yr^{-1}$	NA @50% C.L.;		NA @85% C.L.
Half Life for $k_{point}$ , yr	NA @50% C.L.;		NA @85% C.L.



### 2. Spatial and Temporal Trend along Overall Plume Length for Multiple Wells:

Plot #1: Sampling date #1	1-Jan-98
Plot #2: Sampling date #2	6-Jun-98
Plot #3: Sampling date #3	8-Nov-98
Plot #4: Sampling date #4	10-May-99
Plot #5: Sampling date #5	
Plot #6: Sampling date #6	



# **ATTACHMENT C**

## **Benzene Plume Stability Analysis**



# Module 2: Graphical Presentation of Historical Ground Water Data: (Well to Well Analysis)

Site Name: *Smokey Point Retail Center*

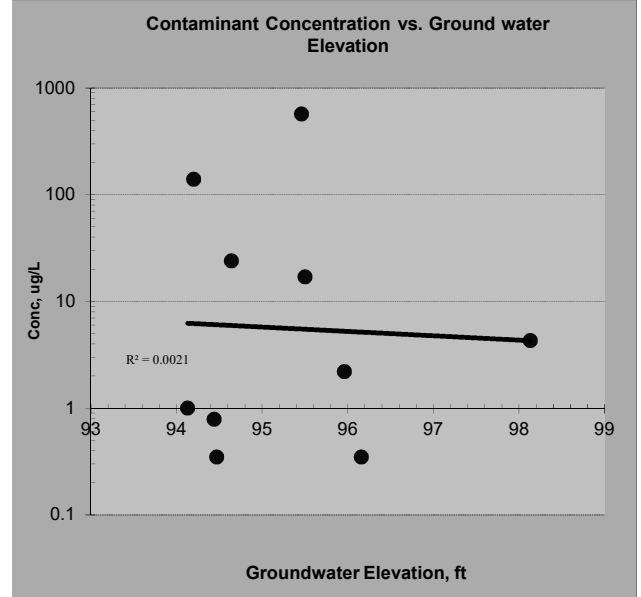
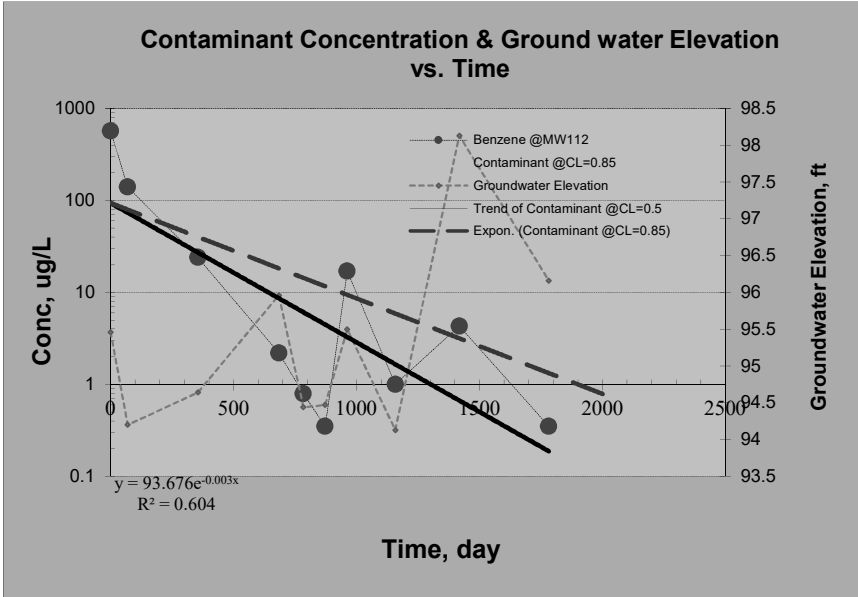
Site Address: *Marysville, WA*

Additional Description: *0*

Hazardous Substance: *Benzene*

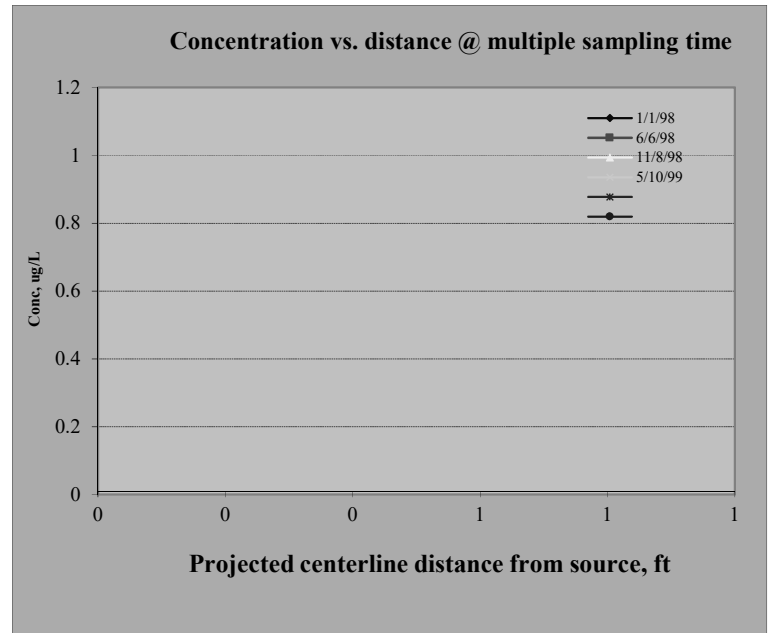
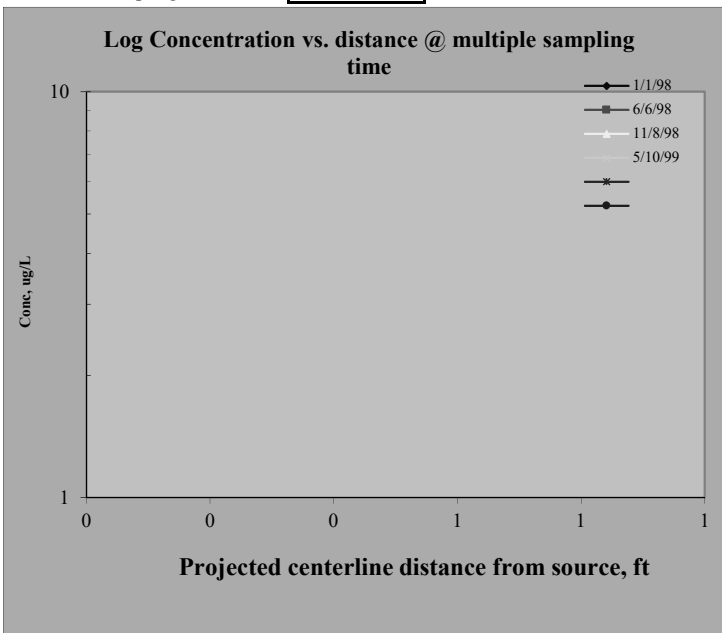
## 1. Temporal Trend at a Well (Concentration vs. Time & Groundwater Elevation : well-to-well analysis)

Name of Sampling Well?	MW112	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	99.184%		
Plume Stability?	Shrinking ; Decision Criteria is 85%.		
Slope: Point decay rate constant ( $k_{point}$ ), $yr^{-1}$	1.273 @50% C.L.;	0.872 @85% C.L.	
Half Life for $k_{point}$ , yr	0.545 @50% C.L.;	0.795 @85% C.L.	



## 2. Spatial and Temporal Trend along Overall Plume Length for Multiple Wells:

Plot #1: Sampling date #1	1-Jan-98
Plot #2: Sampling date #2	6-Jun-98
Plot #3: Sampling date #3	8-Nov-98
Plot #4: Sampling date #4	10-May-99
Plot #5: Sampling date #5	
Plot #6: Sampling date #6	



## Module 2: Graphical Presentation of Historical Ground Water Data: (Well to Well Analysis)

Site Name: *Smokey Point Retail Center*

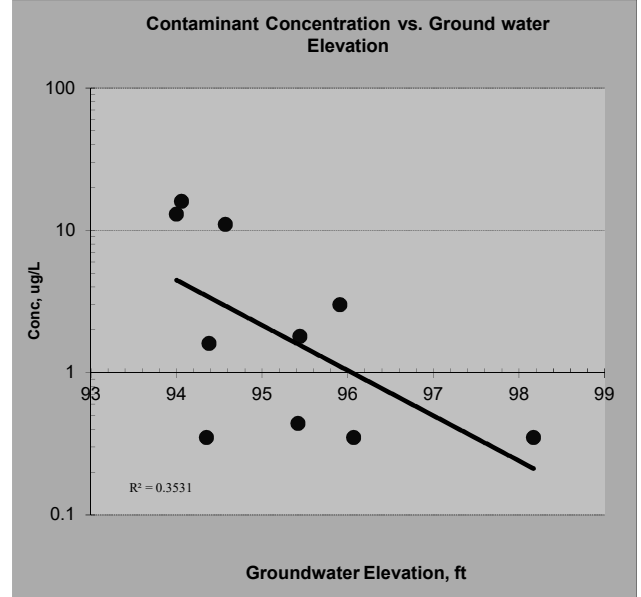
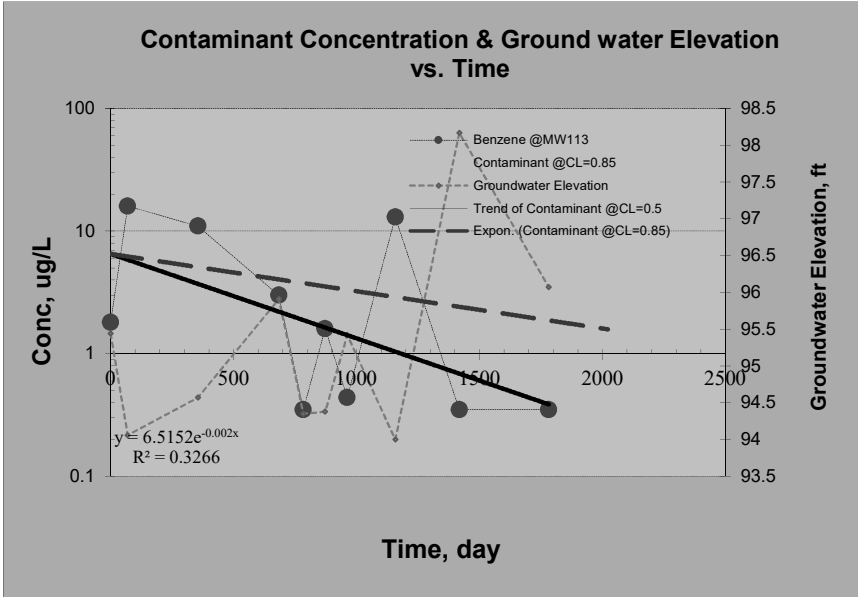
Site Address: *Marysville, WA*

Additional Description: *0*

Hazardous Substance: *Benzene*

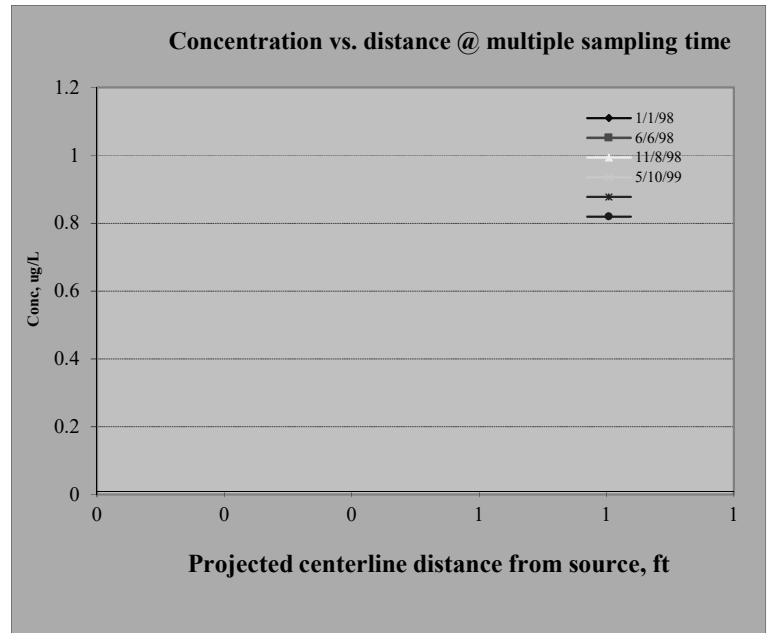
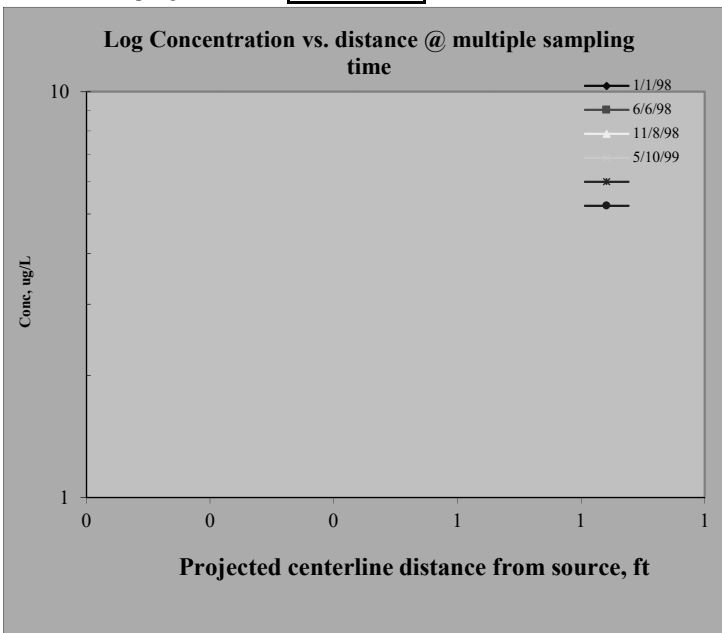
### 1. Temporal Trend at a Well (Concentration vs. Time & Groundwater Elevation : well-to-well analysis)

Name of Sampling Well?	MW113	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	91.563%		
Plume Stability?	Shrinking ; Decision Criteria is 85%.		
Slope: Point decay rate constant ( $k_{point}$ ), yr <sup>-1</sup>	0.579 @50% C.L.;	0.256 @85% C.L.	
Half Life for $k_{point}$ , yr	1.197 @50% C.L.;	2.711 @85% C.L.	



### 2. Spatial and Temporal Trend along Overall Plume Length for Multiple Wells:

Plot #1: Sampling date #1	1-Jan-98
Plot #2: Sampling date #2	6-Jun-98
Plot #3: Sampling date #3	8-Nov-98
Plot #4: Sampling date #4	10-May-99
Plot #5: Sampling date #5	
Plot #6: Sampling date #6	



## Module 2: Graphical Presentation of Historical Ground Water Data: (Well to Well Analysis)

Site Name: *Smokey Point Retail Center*

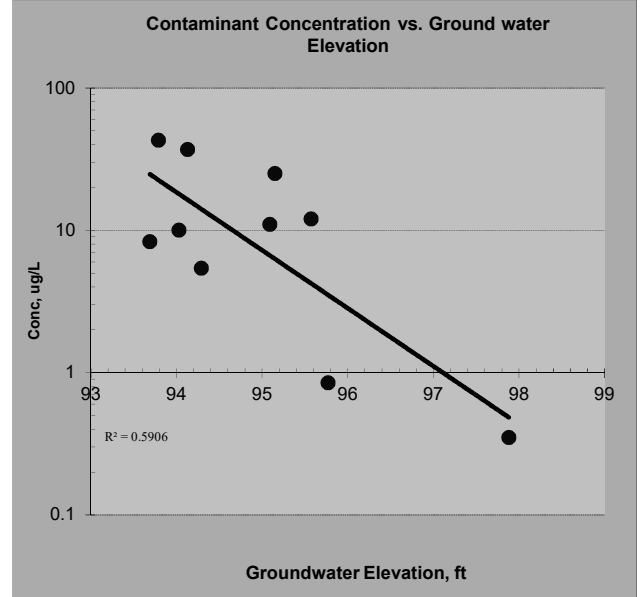
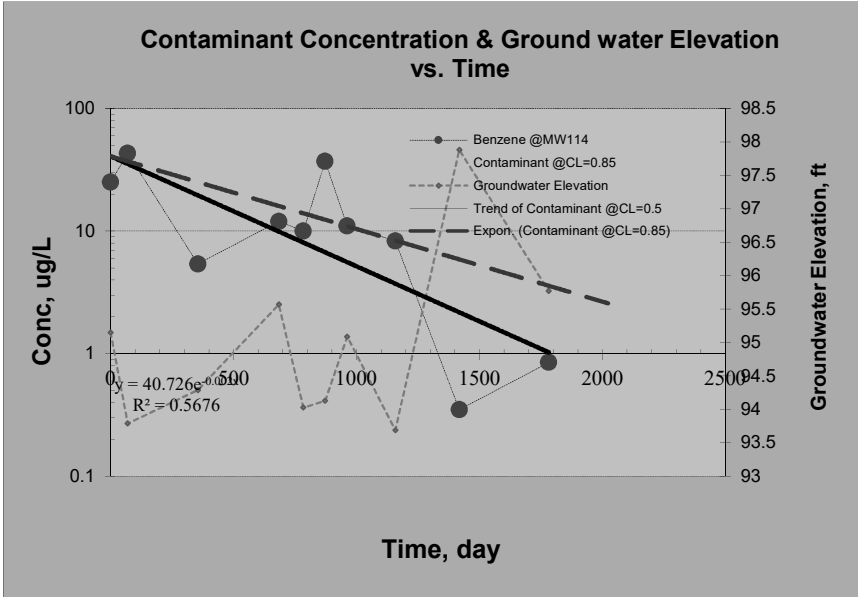
Site Address: *Marysville, WA*

Additional Description: *0*

Hazardous Substance: *Benzene*

### 1. Temporal Trend at a Well (Concentration vs. Time & Groundwater Elevation : well-to-well analysis)

Name of Sampling Well?	MW114	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	98.813%		
Plume Stability?	Shrinking ; Decision Criteria is 85%.		
Slope: Point decay rate constant ( $k_{point}$ ), yr <sup>-1</sup>	0.754 @50% C.L.;	0.498 @85% C.L.	
Half Life for $k_{point}$ , yr	0.919 @50% C.L.;	1.391 @85% C.L.	



### 2. Spatial and Temporal Trend along Overall Plume Length for Multiple Wells:

Plot #1: Sampling date #1	1-Jan-98
Plot #2: Sampling date #2	6-Jun-98
Plot #3: Sampling date #3	8-Nov-98
Plot #4: Sampling date #4	10-May-99
Plot #5: Sampling date #5	
Plot #6: Sampling date #6	

