

**Hilton Seattle Hotel
Second Quarter Groundwater Monitoring Report
Seattle, Washington**

January 17, 2014

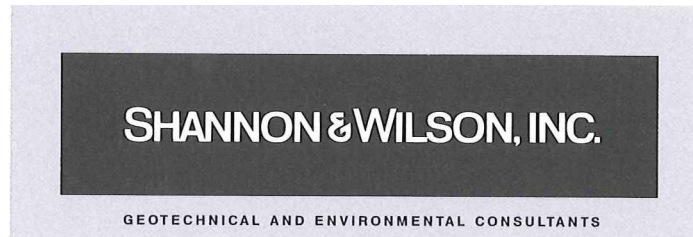


SHANNON & WILSON, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

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Second Quarter Groundwater Monitoring Report
Seattle, Washington**

January 17, 2014



Excellence. Innovation. Service. Value
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**HILTON SEATTLE HOTEL
FIRST QUARTER GROUNDWATER MONITORING REPORT
SEATTLE, WASHINGTON**

1.0 INTRODUCTION

This report summarizes the status of groundwater monitoring activities at the Hilton Seattle Hotel in Seattle, Washington (the Site); facility number 56642815. Cleanup of gasoline-contaminated groundwater is being conducted in response to the rescission of No Further Action (NFA) determination by the Washington State Department of Ecology (Ecology). The cleanup action is being conducted on behalf of the former property owner, R.C. Hedreen Company of Seattle, Washington, as part of a real estate transaction agreement with the purchaser, Stonebridge Companies of Englewood, Colorado. Cleanup activities have been performed in general accordance with our Cleanup Action Plan (CAP), dated July 18, 2012. Cleanup activities have included the installation of a single-phase skimmer pump to recover free-floating petroleum product to the extent practicable from one monitoring well located in the sidewalk right-of-way (ROW) adjacent east of the Site and in-situ groundwater treatment using oxygen release compounds. This report summarizes monitoring activities performed for the period September 2013 to November 2013, considered to be the second quarter of monitoring.

2.0 BACKGROUND

The Site is located at 1301 6th Avenue in downtown Seattle, Washington (Figure 1). The hotel was built over a parking structure in approximately 1970. Two 2,000-gallon gasoline underground storage tanks (USTs) were installed along the eastern property line during construction of the hotel (Figure 2). Approximately two years after installation, it was reported that one of the two USTs developed a leak and was replaced. The two tanks were abandoned in place in 1985 by filling with cement slurry. Although a service station occupied the main level of the parking structure that occupied the site prior to the hotel's construction, no other fuel tanks are known to be present beneath the property.

In the early 1990's, gasoline vapors were encountered in an excavation to extend the hotel's elevator shaft down to the depth of the pedestrian concourse leading toward Rainier Tower. In 1994, Environmental Associates, Inc. drilled a boring adjacent to the abandoned USTs and confirmed the presence of gasoline-related contamination in soil samples from the boring. In 1997 and 1998, Shannon & Wilson conducted site investigations and data evaluations related to closure of the two former USTs beneath the hotel. At the time, no soil contamination was detected in borings advanced at the hotel, but over a foot of gasoline-range petroleum product was observed floating in the up-gradient well MW-5. Gasoline-range hydrocarbons; benzene,

toluene, ethylbenzene, and xylenes (BTEX); and lead were detected in groundwater at down-gradient wells MW-2, MW-3, and MW-4 above Washington Model Toxics Cleanup Act (MTCA) Method A cleanup levels established at the time.

Because groundwater flow was interpreted to be to the west-northwest at a relatively steep gradient and a relatively impermeable layer of clay and silt was observed in borings advanced at the Site, the floating product found up-gradient of the abandoned USTs was attributed to an offsite source. In 1998, Shannon & Wilson also assessed risks and found no complete exposure pathways exist at the Site. Based on the available site information, Ecology issued an NFA letter in October 1998.

In a periodic review conducted in February 2010, Ecology rescinded the NFA, citing the presence of floating petroleum product in MW-5 as a risk to environmental health. In response to Ecology's concern, an investigation was conducted by Shannon & Wilson in August 2011 to assess current groundwater conditions at the Site. The investigation confirmed the presence approximately 2.3 feet of relatively unweathered petroleum product floating in MW-5 and gasoline-range hydrocarbons, BTEX, and lead in groundwater at down-gradient wells MW-2, MW-3, and MW-4. Vacuum extraction using an eductor truck was attempted as an interim cleanup action on January 24 and February 21, 2012; however, the effort had limited success and resulted in the removal of approximately 3 gallons of free product.

In June 2012, the hotel re-entered Ecology's Voluntary Cleanup Program (VCP) and Shannon & Wilson was retained to implement groundwater cleanup action with the goal of re-obtaining NFA determination from Ecology. The preferred cleanup action included the installation of a single-phase product recovery system in MW-5 to remove source product and in-situ groundwater treatment in MW-2, MW-3, MW-4, and MW-5 using oxygen release compounds to degrade residual contamination in groundwater under the Site. The overall objective is to remove source contamination and achieve cleanup levels through monitored natural attenuation.

3.0 GEOLOGIC AND HYDROGEOLOGIC SETTING

3.1 Regional and Site Geologic Conditions

The Site is situated on the Seattle Drift Plain, a gently rolling, elevated plain which formed approximately 13,500 years ago during the last period of continental glaciations. Geologic maps for the site vicinity suggest that much of the material underlying the subject site has been modified extensively by excavation, filling, and/or construction. The Site is situated on a west-facing slope at approximately 175 above mean sea level. An arbitrary site datum was established with the sidewalk elevation at monitoring well MW-5 at 175.6 feet in elevation. This elevation was estimated using King County iMap.

Based on borings advanced by Shannon & Wilson in 1997, the Site is underlain by fill and then layers of silty sand, clayey silt, and silty fine sand. Below the fill, the soil is generally dense and hard, having been glacially overridden. The fill thickness ranges from approximately 3 to 12 feet beneath the basement and sidewalk at the Site. The fill layer is underlain by a silty sand/sandy silt layer that ranges from 1 to 12 feet thick. A hard, silty clay/clayey silt underlies the silty sand layer, ranging from 3 to 15 feet thick. The clayey silt layer was absent in the boring at MW-5 but appears to be continuous beneath the basement and UST area. The clayey silt layer is underlain by a medium to very dense, silty, fine sand layer.

3.2 Groundwater Conditions

Groundwater is present beneath the Site in the lower silty sand layer, below the clayey silt layer. Water level measurements collected at the four monitoring wells indicates that groundwater is at an elevation of approximately 140 feet and flows to the west-northwest. The groundwater level at MW-5 was adjusted to account for the floating product layer, when necessary. Groundwater is approximately 34 feet below ground surface (bgs) at the sidewalk along 6th Avenue and ranges from approximately 15 to 22 feet bgs in the basement garage levels. The flow gradient was calculated to be approximately 0.015 foot/foot in August 2013 (first quarter), 0.018 foot/foot in August 2011, and 0.026 foot/foot in January 1998.

4.0 GROUNDWATER REMEDIATION ACTIVITIES

4.1 Conceptual Site Model

Based on measured water levels, MW-5 is up-gradient of the location of the closed USTs, MW-2 is cross-gradient, and MW-3 and MW-4 are down-gradient. When present, floating product had been observed at MW-5 but not at MW-2, MW-3, or MW-4. Because floating petroleum product was not observed in what are believed to be hydraulically connected wells, the product observed in MW-5 appears to be isolated. While the observed dense clayey silt layer is absent at MW-5, an unknown boundary condition exists that prevents the floating product plume from migrating to down-gradient locations. The material underlying the subject site has been extensively modified by excavation, filling, and/or construction and has likely created a local subsurface depression that contains the product plume. This is further supported by the condition of the leaded gasoline petroleum product, which, based on a laboratory chromatogram of a collected sample, was relatively unweathered after being released into the environment over 40 years ago.

Contaminants of concern (COCs) include gasoline-range hydrocarbons, BTEX, and lead. The contamination plume is approximately 34 feet bgs at MW-5, and dissolved groundwater contamination is approximately 15 to 22 feet bgs in the basement garage levels. The depth of the

contamination below the built environment prevents exposure to contaminated soil and groundwater by human and environmental receptors. Groundwater under downtown Seattle is not likely to be used for drinking water and is not considered a complete exposure pathway. A vapor survey was conducted during our 1998 site evaluation and gasoline vapors were not measured in the hotel's parking garage, suggesting that this exposure pathway is also incomplete.

4.2 Status of Product Recovery System

A product recovery system was installed in general accordance with our CAP and features a pneumatic, single-phase skimmer pump installed in MW-5, with air supply and product extraction tubing routed under the sidewalk ROW to an equipment compound inside the hotel's parking garage. The system was started on November 6, 2012 and operated until August 14, 2013, when the results of a second rebound test showed petroleum product was no longer accumulating in MW-5. Product was not observed during the second quarter monitoring event, and the system remains shut off. Approximately 125 total gallons of product have been removed by the system, and 128 total gallons have been removed when including interim cleanup actions. Additional system performance details can be found in our *First Quarter Groundwater Monitoring Report* (Shannon & Wilson, 2013).

4.3 Status of In-Situ Groundwater Treatment

In-situ groundwater treatment using oxygen release compounds (ORC) was initiated on May 28, 2013 at MW-2, MW-3, and MW-4 and on September 12, 2013 at MW-5 to enhance biodegradation of contamination. Regenesi ORC Advanced™ well socks, containing a mixture of calcium oxyhydroxide and calcium hydroxide, were installed in the wells to deliver oxygen as electron acceptors for the biodegradation of the petroleum compounds. An oil-absorbent sock was also deployed at MW-5 to remove any remaining free product from the groundwater surface as treatment continues.

5.0 GROUNDWATER MONITORING

5.1 Monitoring Program

Quarterly monitoring is being conducted to document groundwater conditions during cleanup actions at the Site. Monitoring events are generally scheduled for the months of February, May, August, and November. While up-gradient of the closed USTs, floating product had been confined to the vicinity of MW-5 and the well is considered to be within the contamination source. Wells MW-2, MW-3, and MW-4 are considered to be down-gradient of the source, within the contaminated groundwater plume. Second quarter monitoring was performed at

monitoring wells MW-2, MW-3, MW-4, and MW-5. Groundwater monitoring parameters include the following:

- COCs
 - Gasoline-Range Hydrocarbons
 - BTEX
 - Total Lead
- Primary Geochemical Indicators
 - Dissolved Oxygen (DO)
 - Oxidation-Reduction Potential (ORP)
 - pH
 - Specific Conductance
 - Temperature
- Secondary Geochemical Indicators
 - Ferrous Iron
 - Nitrate
 - Sulfate

5.2 Groundwater Sampling

On November 21, 2013, groundwater samples were collected from monitoring wells MW-2, MW-3, and MW-4 using a peristaltic pump and low-flow sampling techniques, and from MW-5 using a high-density polyethylene bailer. The bailer was used at MW-5 due to the limitations of the peristaltic pump as well as to better evaluate the presence of potential floating product or sheen. ORC socks in these wells were removed one month prior to sampling and the groundwater was allowed to equilibrate. The absorbent sock was also removed from MW-5 and slight hydrocarbon staining of the sock was observed.

MW-2, MW-3, and MW-4 were purged at a low flow (less than 500 milliliter per minute) pumping rate prior to sampling. The purge water was monitored using a YSI water quality meter until the measured groundwater quality parameters (pH, conductivity, temperature, etc.) stabilized to ± 5 percent for three consecutive readings taken at three- to five-minute intervals. MW-5 was purged by bailing three well volumes and water quality parameters were not monitored. The purge water was collected in a bucket and transferred to the storage tank at the equipment compound for future disposal.

Following purging, groundwater samples were collected in clean, laboratory-supplied containers and placed in a cooler with ice for transport to the laboratory. Purging and sampling data are presented in Table 1.

5.3 Laboratory Analyses

Groundwater samples were submitted under chain-of-custody procedures to Fremont Analytical in Seattle, Washington. The collected samples were analyzed for COCs as well as geochemical indicators for evaluating the potential for natural attenuation. Analyses for COCs included gasoline-range hydrocarbons by the Northwest Total Petroleum Hydrocarbons-Gasoline Method, BTEX by Environmental Protection Agency (EPA) Method 8021B, and total lead by EPA Method 6020/200.8. Analyses for geochemical indicators included ferrous iron by Standard Method 3500B and nitrate and sulfate by EPA Method 300.0.

5.4 Monitoring Results

The second quarter groundwater monitoring results for COCs are shown in Table 2. The data are presented along with previous quarterly results and two historical datasets for comparison. One of the historical datasets is from our initial site assessment in 1997 and the other is from our evaluation of groundwater conditions prior to cleanup activities in 2011. Similarly, second quarter results for geochemical indicators are shown in Table 3, with available historical results shown for comparison. The analytical laboratory report for the second quarter results is provided in Appendix A.

5.4.1 Contaminants of Concern

In the second quarter, the sample collected from MW-5 had detected concentrations of gasoline, BTEX, and lead. Except for toluene, the detected concentrations at MW-5 were above their respective MTCA Method A groundwater cleanup criteria. The sample collected from MW-2 had detected concentrations of gasoline and BTEX. The gasoline concentration at MW-2 was above its MTCA Method A groundwater cleanup criterion. Gasoline was also detected at MW-3 but below the MTCA cleanup criterion. MW-4 did not have any detections.

Concentrations of gasoline, BTEX, and lead at MW-2 decreased in the second quarter over first quarter results. The gasoline detection at MW-3 increased slightly over first quarter results, but concentrations remained relatively stable at this location. All other concentrations have remained the same over first quarter results. Because this is the first groundwater sample collected at MW-5, historical comparisons could not be made.

The estimated extents of gasoline and benzene in groundwater for the four datasets collected are shown in Figures 3 and 4, respectively. The leading edge of groundwater contaminated with gasoline extended past MW-4 in 2011, but had receded with the first quarter result and remains stable with the second quarter result (Figure 3). The estimated extent of gasoline at concentrations above its MTCA cleanup criterion (i.e., 800 micrograms per liter

[µg/L]) is relatively stable in the central portion of the Site. The leading edge of groundwater contaminated with benzene at concentrations above its MTCA cleanup criterion (i.e., 5 µg/L) has receded significantly from levels observed historically, and remains stable with the second quarter result (Figure 4).

5.4.2 Geochemical Indicators

Geochemical indicators are categorized as primary or secondary. Primary indicators were measured in the field during purging using a YSI water quality meter (except at MW-5) and the secondary indicators were analyzed by the laboratory. Low DO concentrations between (e.g., 0 to 1.0 milligrams per liter [mg/L]), measurable ferrous iron, and depleted nitrate and sulfate concentrations generally suggest that active biodegradation of hydrocarbons is occurring. ORP values are a measure of the reducing conditions present and can be correlated to the presence or absence of secondary geochemical indicators to support the identification of biodegradation processes.

In the first quarter, DO ranged from 0.29 to 0.51 mg/L in the sampled wells. Measurable ferrous iron was observed in all wells, with the lowest concentration at MW-4. Nitrate and sulfate concentrations were low or non-detect, except for sulfate at MW-4 and MW-5. The negative ORP values measured correlate well with the observed detections. Additionally, elevated groundwater temperatures were observed in all wells (Table 1). The elevated temperatures, ranging from 19.0 to 20.8 degrees Celsius are likely attributable to the hotel's underground electrical vault in the immediate vicinity of the monitoring wells and may be beneficial to microbial growth.

5.5 Water Level Monitoring

Table 4 presents water level data for the second quarter monitoring event and historical sampling events. Figure 5 shows approximate groundwater elevation contours for the second quarter data. The measurements show the groundwater flow direction to the west-northwest, with a calculated groundwater flow gradient of approximately 0.017 foot/foot. The flow gradient was approximately 0.015 foot/foot in August 2013, 0.018 foot/foot in August 2011, and 0.026 foot/foot in January 1998.

5.6 Investigation-Derived Waste

Investigation-derived waste during the second quarter monitoring event included purge water from groundwater monitoring and disposable sampling equipment (nitrile gloves, bailers, etc.). Approximately 6 gallons of purge water was added to the system storage tank. There is approximately 240 gallons of mixed waste (recovered petroleum and purged groundwater) in the

storage tank pending disposal. Shannon & Wilson will coordinate disposal once the storage tank is full. Disposable sampling equipment was placed in a plastic bag and disposed as solid waste.

6.0 DATA ANALYSIS

Groundwater monitoring data was analyzed using Ecology's natural attenuation guidance for petroleum-contaminated groundwater (Ecology, 2005a,b). The technical guidance package provides six computational tools, or modules, for evaluating the feasibility and performance of natural attenuation as a cleanup action for groundwater. Available data were analyzed using modules that do not incorporate groundwater flow models, including *Module 1: Non-Parametric Analysis for Plume Stability Test*, *Module 2: Graphical and Regression Analysis for Plume Stability & Restoration Time Calculation*, and *Module 3: Evaluation of Geochemical Indicators*. The computational module output is provided in Appendix B.

The data analysis results for Modules 1 and 2 are summarized in Table 5. Module 1 evaluates plume stability using the Mann-Kendall non-parametric statistical method, while Module 2 evaluates plume stability using linear regression. Both evaluations provide evidence that gasoline and BTEX concentrations at MW-2 are stable or shrinking at relatively high levels of confidence. The Mann-Kendall method shows gasoline concentrations as stable and BTEX as undetermined at MW-3, but linear regression indicates that gasoline and BTEX concentrations are shrinking at high levels of confidence. Because concentrations at MW-4 are predominantly non-detect, trend analyses are limited in their application. At MW-4, the Mann-Kendall method shows gasoline as undetermined and BTEX as stable, while linear regression shows all parameters as undetermined.

Point decay rates and half life results at 50 and 85 percent confidence levels were determined using linear regression (Table 5). While the module calculates values for both stable and shrinking plumes as shown, the regression analysis is only appropriate for shrinking plumes. Because of this, the estimated time to meet cleanup criterion for gasoline at MW-2, the only down-gradient location with a concentration in exceedance of cleanup criteria in the second quarter, cannot be determined.

Module 3 calculates assimilative capacity and plots geochemical indicators. Assimilative capacity is the potential capacity of groundwater to biodegrade contaminants and the calculation is based on background concentrations of electron acceptors (i.e., DO, nitrate, sulfate, etc.). Background geochemical values for downtown Seattle groundwater have not been established for this project, therefore, the assimilative capacities calculated by the module are not usable. The plots of geochemical indicators; however, provide evidence that biodegradation is occurring. Biodegradation proceeds according to reactions that are energetically preferred by microbes.

Electron acceptors evaluated for this project, from most preferred to least preferred, are oxygen, nitrate, ferric iron, and sulfate. DO and nitrate were depleted at all locations measured. Ferrous iron, a metabolic by-product of reactions involving ferric iron, was detected at elevated levels in source well MW-5 and in down-gradient wells MW-2 and MW-3. MW-4, the furthest down-gradient well, had a minor ferrous iron detection that was three orders of magnitude lower than levels detected at the other locations. Sulfate was depleted in wells MW-2, MW-3, and MW-5, but elevated in MW-4. Additionally, ORP and pH field measurements correlate well with the observed detections.

7.0 CONCLUSIONS

Based on our review and analysis of the results, we offer the following conclusions regarding remediation at the Site:

- Floating product was not observed at any well location. However, the absorbent sock at MW-5 was slightly stained with petroleum product, suggesting at least a sheen remained on the groundwater at this location.
- Source well MW-5 had detected concentrations of all COCs and, except for toluene, the concentrations exceeded their respective MTCA Method A cleanup criteria. Concentrations are expected to remain elevated in the near-term due to residual product in the formation surrounding the well.
- Down-gradient well MW-2 had detected concentrations of gasoline and BTEX, with the gasoline concentration exceeding the MTCA Method A cleanup criterion. All detected concentrations decreased over first quarter results.
- Gasoline was detected below the cleanup criterion in down-gradient well MW-3 and remained relatively stable over first quarter results. No other COCs were detected in down-gradient wells MW-3 or MW-4.
- Contamination is not migrating off-site and an analysis of the data indicates that the contamination plume is stable and/or shrinking in response to remedial efforts. This trend is expected to continue with the removal of source product to the extent practicable and continued in-situ treatment of the groundwater.
- Geochemical indicators suggest that biodegradation is occurring at the Site. Monitored natural attenuation appears to be a viable long-term remediation alternative and should continue to be evaluated as additional monitoring data is collected.

The third quarter groundwater monitoring event is scheduled to be conducted February 2013. These activities will be the subject of the next quarterly groundwater monitoring report.

8.0 LIMITATIONS

The findings and conclusions documented in this report have been prepared for specific application to this project and have been developed in a manner consistent with the level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area, and in accordance with the terms and conditions set forth in our agreement. The conclusions presented in this report are professional opinions based on interpretation of information currently available to us and are made within the operational scope, budget, and schedule constraints of this project. No warranty, express or implied, is made.

Shannon & Wilson, Inc., has prepared Appendix C, "Important Information About Your Geotechnical/Environmental Report." While not written specifically for this project, this enclosure should assist you and other in understanding the use and limitations of our reports.

We appreciate the opportunity to be of continued service on this project. If you have any questions, please contact the undersigned at (206) 632-8020.

Sincerely,

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TABLE 1
GROUNDWATER SAMPLING LOG

	Monitoring Well			
	MW-2	MW-3	MW-4	MW-5
Water Level Measurement Data				
Date Water Level Measured	11/21/2013	11/21/2013	11/21/2013	11/21/2013
Time Water Level Measured	13:45	12:50	12:00	14:35
Measuring Point (MP) Elevation, Feet	162.55	161.24	154.30	175.63
Depth to Water Below MP, Feet	22.85	21.72	16.25	34.17
Water Level Elevation, Feet	139.70	139.52	138.05	141.46
Purging/Sampling Data				
Date Sampled	11/21/2013	11/21/2013	11/21/2013	11/21/2013
Time Sampled	14:15	13:25	12:35	15:10
Depth to Water Below MP, Feet	22.85	21.72	16.25	34.17
Total Depth of Well Below MP, Feet	35.00	30.00	20.50	39.50
Water Column in Well, Feet	12.15	8.28	4.25	5.33
Gallons per Foot	0.16	0.16	0.16	0.16
Gallons in Well	1.94	1.32	0.68	0.85
Total Gallons Pumped/Bailed	1.0	1.5	1.0	2.5
Purging Method	Peristaltic	Peristaltic	Peristaltic	Bailer
Sampling Method	Peristaltic	Peristaltic	Peristaltic	Bailer
Diameter of Well Casing	2-inch	2-inch	2-inch	2-inch
Water Quality Data				
Temperature, °C	19.0	20.0	20.8	--
Dissolved Oxygen, mg/L	0.29	0.31	0.51	--
Specific Conductance, µS/cm	0.759	0.717	0.602	--
pH, standard units	6.88	6.91	7.69	--
Oxidation-Reduction Potential, mV	-136.2	-152.1	-150.2	--
Remarks	No free product observed. Hydrocarbon odor.	No free product observed. Hydrocarbon odor.	No free product observed. Hydrocarbon odor.	No free product observed. Water quality data not collected.

Notes:

Water quality parameters were measured with YSI instruments.

-- = not applicable or not measured

°C = degrees Celsius

mg/L = milligram per liter

µS/cm = microsiemens per centimeter

mV = millivolt

TABLE 2
GROUNDWATER MONITORING RESULTS

Monitoring Well	Sample Date	Product Thickness (feet)	Sampling Results (µg/L)					
			Gasoline	Benzene	Toluene	Ethylbenzene	Xylenes	Lead
MW-2	9/25/1997	--	4,700	6,700	210	670	590	8.00
	8/25/2011	--	2,950	76.1	2.19	863	22.0	< 1.0
	8/22/2013	--	5,000	3.07	2.01	408	10.8	8.14
	11/21/2013	--	1,760	1.40	1.57	83	6.9	< 1.0
MW-3	9/25/1997	--	700	7,200	10.0	74.0	97.0	9.00
	8/25/2011	--	153	< 1.0	< 1.0	< 1.0	1.35	< 1.0
	8/22/2013	--	209	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0
	11/21/2013	--	235	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0
MW-4	11/14/1997	--	< 50	< 1.0	< 1.0	< 1.0	< 3.0	< 4.0
	8/26/2011	--	135	< 1.0	< 1.0	< 1.0	< 2.0	5.57
	8/22/2013	--	< 50	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0
	11/21/2013	--	< 50	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0
MW-5	12/22/1997	1.69	NS	NS	NS	NS	NS	NS
	8/11/2011	2.33	NS	NS	NS	NS	NS	NS
	8/14/2013	--	NS	NS	NS	NS	NS	NS
	11/21/2013	--	98,100	230	179	1,070	6,100	26.1
MTCA Method A Groundwater Cleanup Levels:			800	5	1,000	700	1,000	15

Notes:

Bold indicates analyte detected above method reporting limit.

Shaded cell indicates detection is above the groundwater cleanup criterion.

-- = no product observed

< = detection below reporting limit shown

µg/L = micrograms per liter

MTCA = Washington State Model Toxics Control Act

NS = not sampled

TABLE 3
GEOCHEMICAL INDICATORS

Monitoring Well	Sample ID	Sample Date	Primary Indicators					Secondary Indicators		
			Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	pH	Specific Conductance (µS/cm)	Temperature (°C)	Nitrate (µg/L)	Sulfate (µg/L)	Ferrous Iron (µg/L)
MW-2	MW2-W-01	9/25/1997	--	--	--	--	--	--	--	--
	MW-2-082511	8/25/2011	0.25	-86.0	6.94	0.701	20.5	--	--	--
	MW-2	8/22/2013	0.10	40.8	8.33	0.833	22.4	< 100	970	980
	MW-2	11/21/2013	0.29	-136.2	6.88	0.759	19.0	< 100	< 300	3,150
MW-3	MW3-W-01	9/25/1997	--	--	--	--	--	--	--	--
	MW-3-082511	8/25/2011	1.87	-92.8	6.95	0.718	20.5	--	--	--
	MW-3	8/22/2013	0.27	-99.8	6.37	0.739	21.5	< 100	< 300	2,430
	MW-3	11/21/2013	0.31	-152.1	6.91	0.717	20.0	< 100	< 300	4,900
MW-4	MW4-W-01	11/14/1997	--	--	--	--	--	--	--	--
	MW-4-082611	8/26/2011	1.26	-85.1	7.56	0.447	21.2	--	--	--
	MW-4	8/22/2013	0.10	51.3	9.22	0.599	21.5	< 100	39,100	80
	MW-4	11/21/2013	0.51	-150.2	7.69	0.602	20.8	< 100	30,900	80
MW-5	MW-5	11/21/2013	--	--	--	--	--	< 100	3,860	5,300

Notes:

°C = degrees Celsius

mg/L = milligrams per liter

mV = millivolt

µg/L = micrograms per liter

µS/cm = microsiemens per centimeter

< = analyte not detected below reporting limit shown

-- = not tested

TABLE 4
WATER LEVEL DATA

Monitoring Well	Date	Top of Casing Elevation (feet)	Depth to Groundwater (feet)	Groundwater Elevation (feet)
MW-2	9/25/1997	162.55	21.36	141.19
	8/25/2011	162.55	22.09	140.46
	8/22/2013	162.55	22.20	140.35
	11/21/2013	162.55	22.85	139.70
MW-3	9/25/1997	161.24	20.49	140.75
	8/25/2011	161.24	21.08	140.16
	8/22/2013	161.24	21.10	140.14
	11/21/2013	161.24	21.72	139.52
MW-4	11/14/1997	154.30	15.31	138.99
	8/26/2011	154.30	15.43	138.87
	8/22/2013	154.30	15.26	139.04
	11/21/2013	154.30	16.25	138.05
MW-5	11/14/1997	175.38	32.79	142.59
	8/26/2011	175.38	34.21	141.17
	8/14/2013	174.35	33.51	140.84
	11/21/2013	174.35	34.17	140.18

Notes:

Elevations were estimated from King County iMap (Aug 2011).

Depth to groundwater in 1997 and 2011 for MW-5 were adjusted to account for floating product.

Top of casing elevation for MW-5 modified during system installation in 2012.

TABLE 5
DATA ANALYSIS SUMMARY

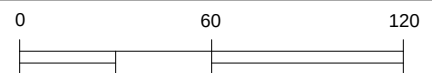
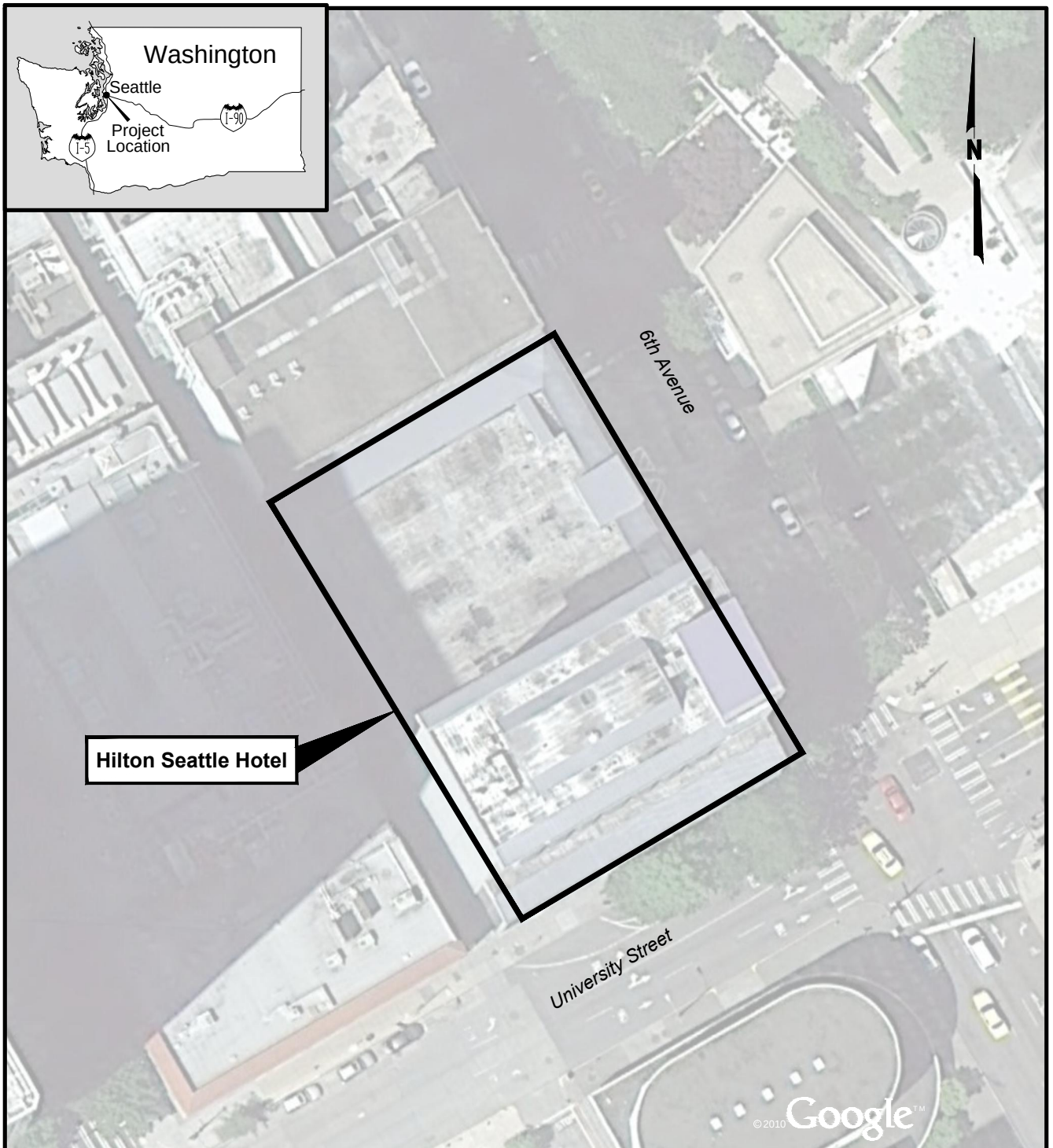
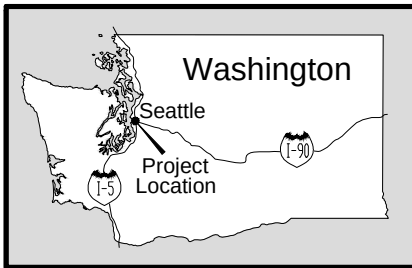
Monitoring Well	Analysis		Parameter				
			Gasoline	Benzene	Toluene	Ethylbenzene	Xylenes
MW-2	Mann-Kendall	Plume Stability	Stable	Shrinking	Shrinking	Stable	Shrinking
		CL	62.5%	95.8%	95.8%	83.3%	95.8%
	Linear Regression	Plume Stability	Stable	Shrinking	Shrinking	Stable	Shrinking
		CL	48.3%	94.4%	99.6%	46.4%	99.3%
		Point Decay Rate at 50% CL, yr ⁻¹	0.030	0.470	0.303	0.063	0.259
		Point Decay Rate at 85% CL, yr ⁻¹	NA	0.325	0.278	NA	0.231
		Half Life at 50% CL, yr	22.875	1.475	2.285	10.986	2.681
		Half Life at 85% CL, yr	NA	2.133	2.489	NA	3.003
MW-3	Mann-Kendall	Plume Stability	Stable	Undetermined	Undetermined	Undetermined	Undetermined
		CL	37.5%	62.5%	62.5%	62.5%	83.3%
	Linear Regression	Plume Stability	Shrinking	Shrinking	Shrinking	Shrinking	Shrinking
		CL	91.9%	99.2%	99.2%	99.2%	99.8%
		Point Decay Rate at 50% CL, yr ⁻¹	0.079	0.614	0.192	0.320	0.289
		Point Decay Rate at 85% CL, yr ⁻¹	0.049	0.543	0.170	0.283	0.272
		Half Life at 50% CL, yr	8.813	1.129	3.609	2.164	2.397
		Half Life at 85% CL, yr	14.214	1.277	4.082	2.447	2.549
MW-4	Mann-Kendall	Plume Stability	Undetermined	Stable	Stable	Stable	Stable
		CL	37.5%	37.5%	37.5%	37.5%	37.5%
	Linear Regression	Plume Stability	Undetermined	Undetermined	Undetermined	Undetermined	Undetermined
		CL	20.9%	NA	NA	NA	NA
		Point Decay Rate at 50% CL, yr ⁻¹	NA	NA	NA	NA	NA
		Point Decay Rate at 85% CL, yr ⁻¹	NA	NA	NA	NA	NA
		Half Life at 50% CL, yr	NA	NA	NA	NA	NA
		Half Life at 85% CL, yr	NA	NA	NA	NA	NA

Notes:

CL = confidence level

NA = not applicable

yr = year



Approximate Scale in Feet

LEGEND

— Approximate Parcel Boundary

NOTE

Aerial imagery provided by Google Earth Pro, reproduced by permission granted by Google Earth™ Mapping Service.

Hilton Seattle Hotel
Seattle, Washington

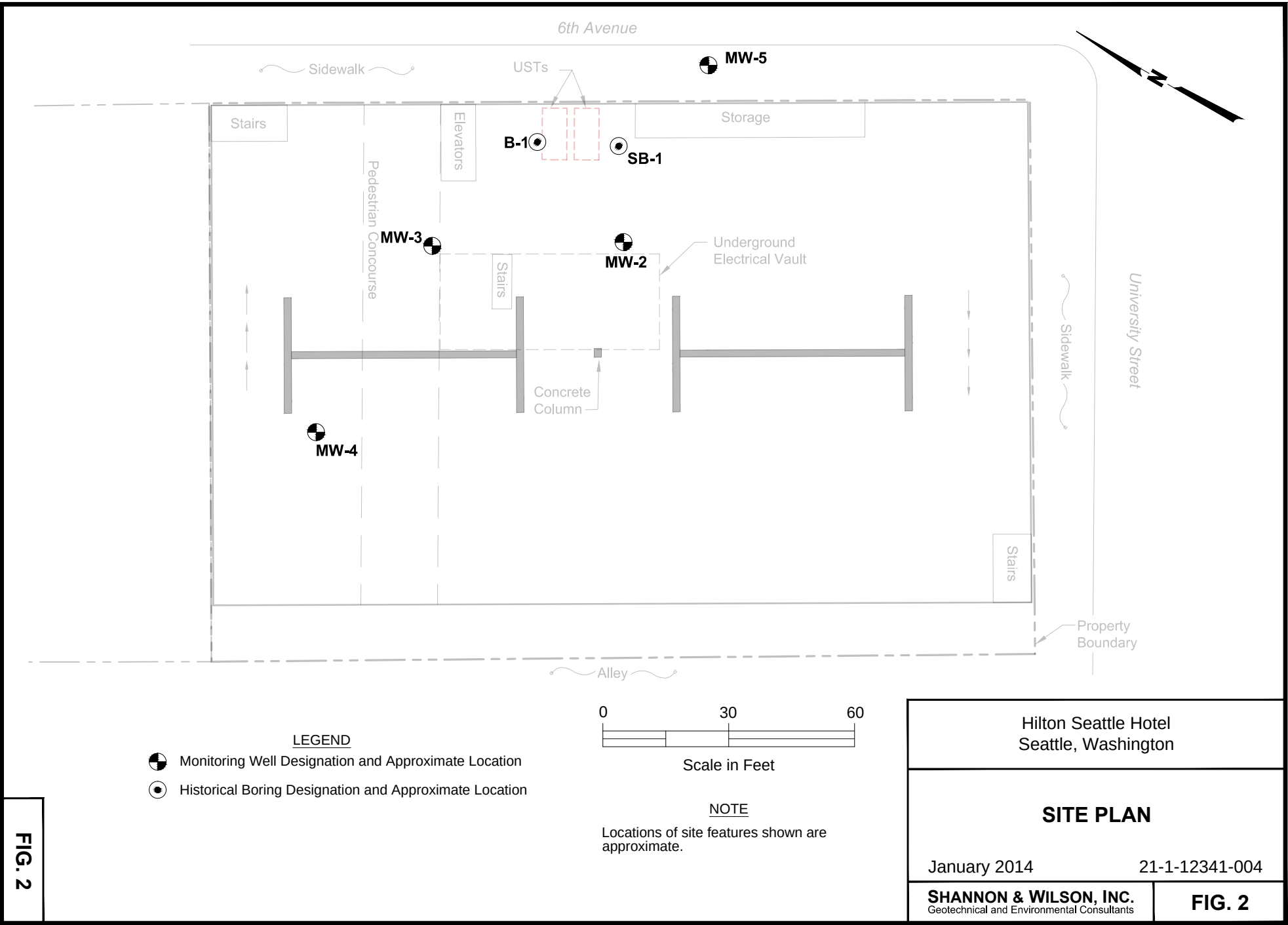
VICINITY MAP

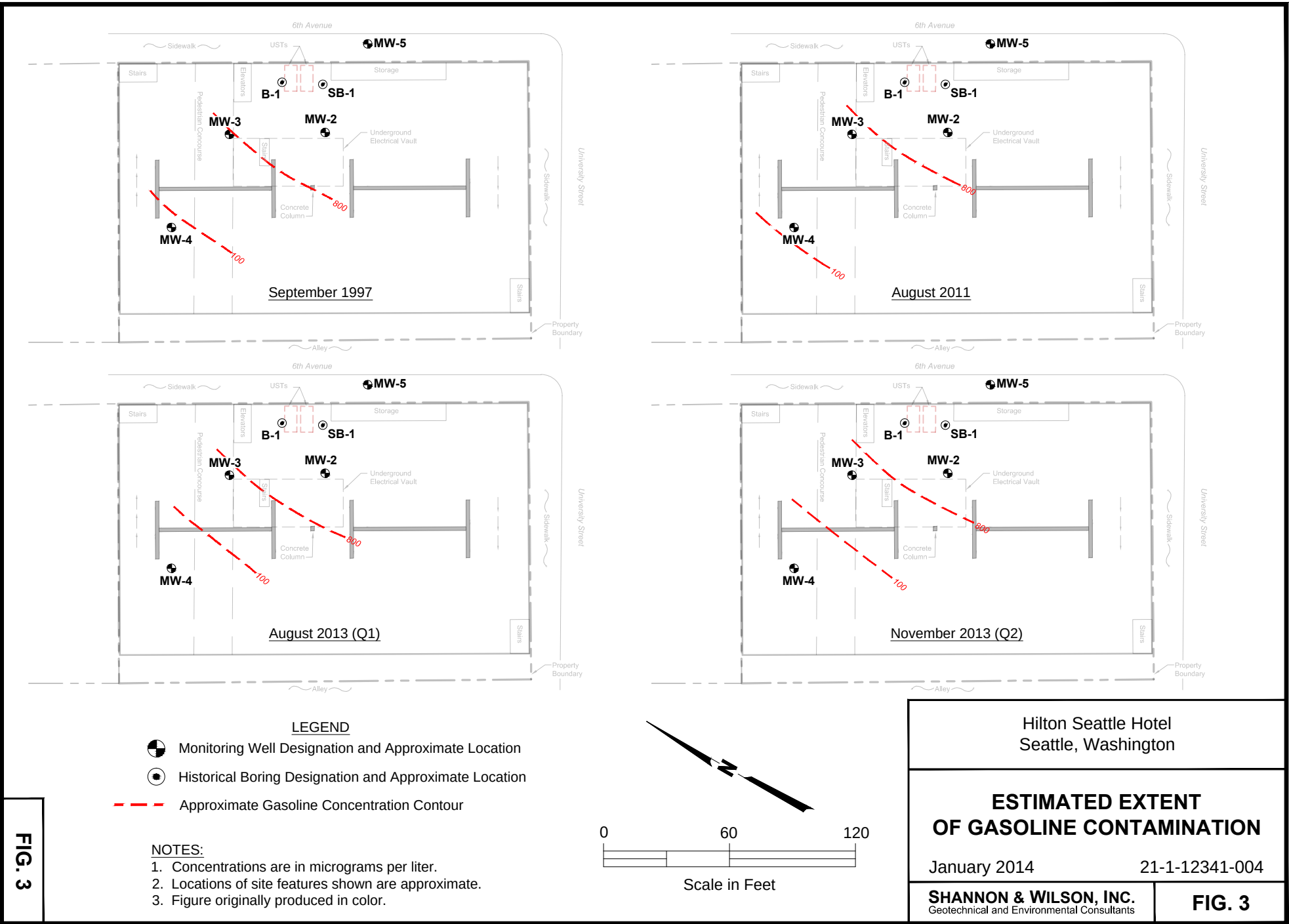
January 2014

21-1-12341-004

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. 1





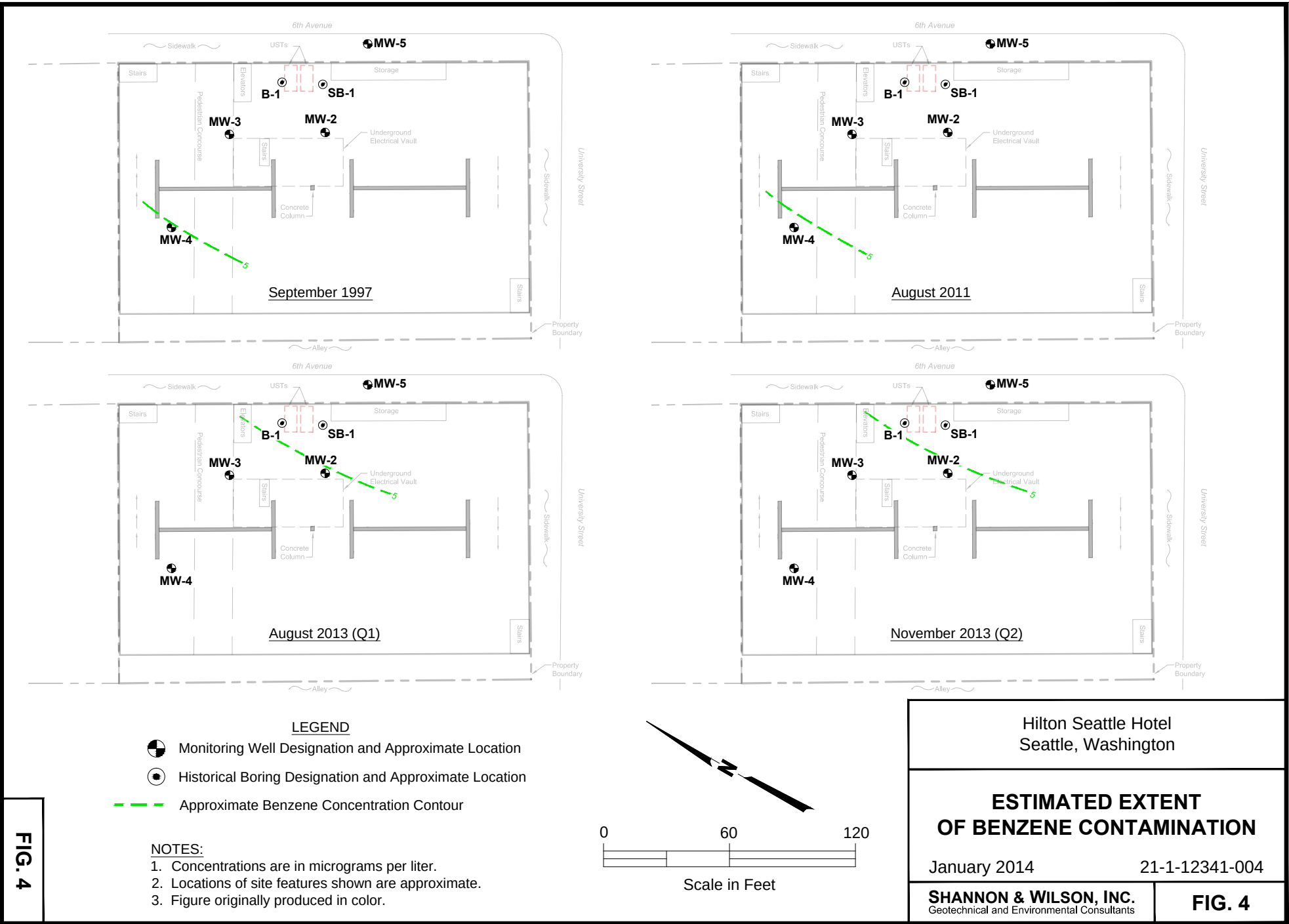
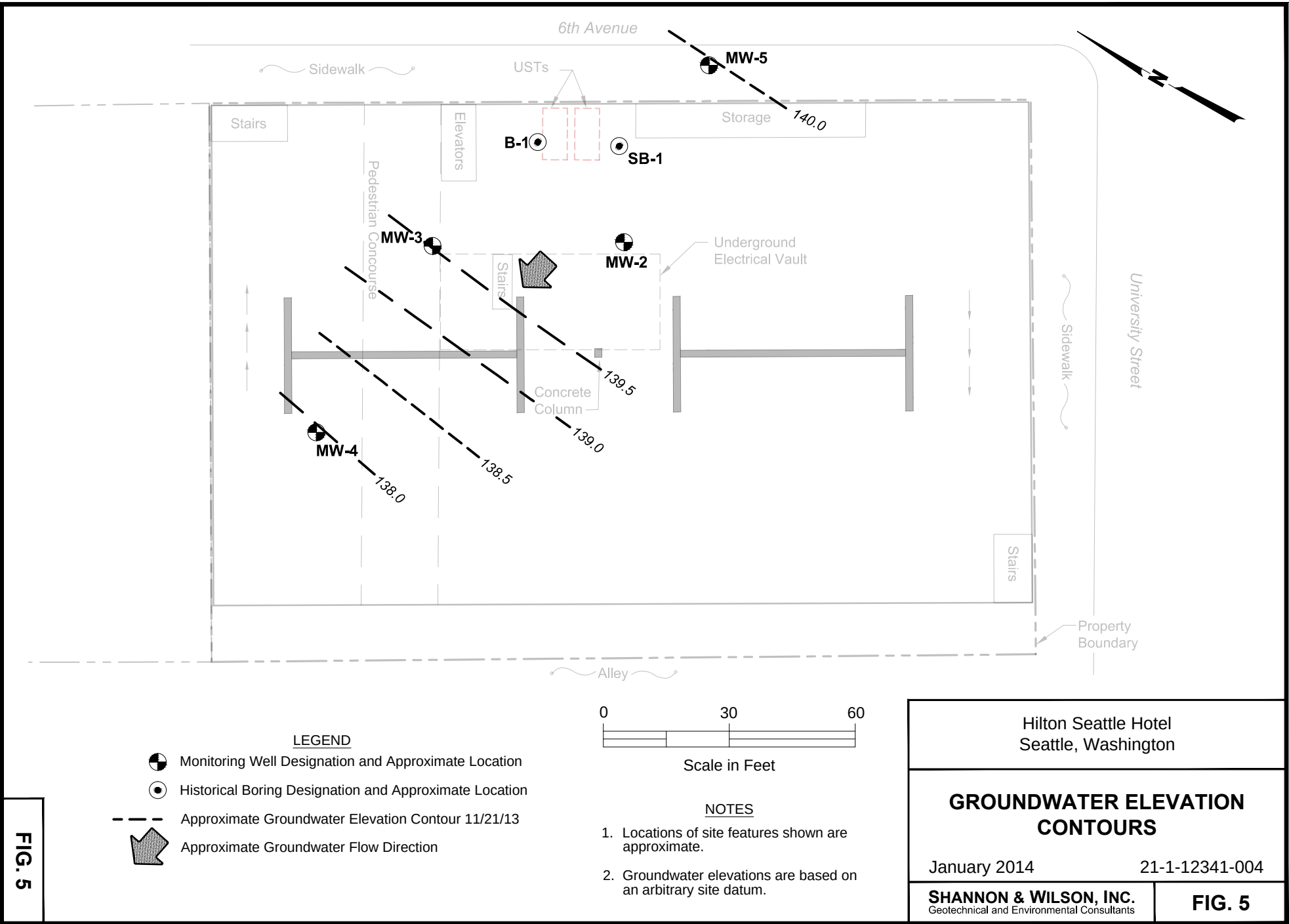


FIG. 4



APPENDIX A
ANALYTICAL LABORATORY REPORT



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Shannon & Wilson

Michael Reynolds
400 N. 34th Street, Suite 100
Seattle, WA 98103

RE: Seattle Hilton

Lab ID: 1311254

December 02, 2013

Attention Michael Reynolds:

Fremont Analytical, Inc. received 4 sample(s) on 11/21/2013 for the analyses presented in the following report.

Ferrous Iron by SM3500-Fe B

Gasoline by NWTPH-Gx

Ion Chromatography by EPA Method 300.0

Total Metals by EPA Method 200.8

Volatile Organic Compounds by EPA Method 8260

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Michelle Clements
Sr. Chemist / Lab Manager



Date: 12/02/2013

CLIENT: Shannon & Wilson
Project: Seattle Hilton
Lab Order: 1311254

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1311254-001	MW-4	11/21/2013 12:35 PM	11/21/2013 4:20 PM
1311254-002	MW-3	11/21/2013 1:25 PM	11/21/2013 4:20 PM
1311254-003	MW-2	11/21/2013 2:15 PM	11/21/2013 4:20 PM
1311254-004	MW-5	11/21/2013 3:10 PM	11/21/2013 4:20 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

CLIENT: Shannon & Wilson
Project: Seattle Hilton

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.



Analytical Report

WO#: 1311254

Date Reported: 12/2/2013

Client: Shannon & Wilson

Collection Date: 11/21/2013 12:35:00 PM

Project: Seattle Hilton

Lab ID: 1311254-001

Matrix: Groundwater

Client Sample ID: MW-4

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
----------	--------	----	------	-------	----	---------------

Gasoline by NWTPH-Gx

Batch ID: R11367 Analyst: EM

Gasoline	ND	50.0		µg/L	1	11/28/2013 3:54:00 AM
Surr: 4-Bromofluorobenzene	120	65-135		%REC	1	11/28/2013 3:54:00 AM
Surr: Toluene-d8	114	65-135		%REC	1	11/28/2013 3:54:00 AM

Volatile Organic Compounds by EPA Method 8260

Batch ID: R11368 Analyst: EM

Benzene	ND	1.00		µg/L	1	11/28/2013 3:54:00 AM
Toluene	ND	1.00		µg/L	1	11/28/2013 3:54:00 AM
Ethylbenzene	ND	1.00		µg/L	1	11/28/2013 3:54:00 AM
m,p-Xylene	ND	1.00		µg/L	1	11/28/2013 3:54:00 AM
o-Xylene	ND	1.00		µg/L	1	11/28/2013 3:54:00 AM
Surr: Dibromofluoromethane	107	72.1-122		%REC	1	11/28/2013 3:54:00 AM
Surr: Toluene-d8	97.5	62.1-129		%REC	1	11/28/2013 3:54:00 AM
Surr: 1-Bromo-4-fluorobenzene	101	66.8-124		%REC	1	11/28/2013 3:54:00 AM

Ion Chromatography by EPA Method 300.0

Batch ID: R11380 Analyst: GH

Nitrate	ND	0.100		mg/L	1	11/22/2013 6:27:00 PM
Sulfate	30.9	0.300		mg/L	1	11/22/2013 6:27:00 PM

Total Metals by EPA Method 200.8

Batch ID: 5943 Analyst: MC

Iron	447	100		µg/L	1	11/22/2013 11:35:13 PM
Lead	ND	1.00		µg/L	1	11/22/2013 11:35:13 PM

Ferrous Iron by SM3500-Fe B

Batch ID: R11316 Analyst: MC

Ferrous Iron	0.0800	0.0300		mg/L	1	11/21/2013 5:35:06 PM
--------------	--------	--------	--	------	---	-----------------------

Qualifiers: B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
RL Reporting Limit

D Dilution was required
H Holding times for preparation or analysis exceeded
ND Not detected at the Reporting Limit
S Spike recovery outside accepted recovery limits



Analytical Report

WO#: 1311254

Date Reported: 12/2/2013

Client: Shannon & Wilson

Collection Date: 11/21/2013 1:25:00 PM

Project: Seattle Hilton

Lab ID: 1311254-002

Matrix: Groundwater

Client Sample ID: MW-3

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
----------	--------	----	------	-------	----	---------------

Gasoline by NWTPH-Gx

Batch ID: R11367 Analyst: EM

Gasoline	235	50.0		µg/L	1	11/28/2013 4:20:00 AM
Surr: 4-Bromofluorobenzene	120	65-135		%REC	1	11/28/2013 4:20:00 AM
Surr: Toluene-d8	115	65-135		%REC	1	11/28/2013 4:20:00 AM

Volatile Organic Compounds by EPA Method 8260

Batch ID: R11368 Analyst: EM

Benzene	ND	1.00		µg/L	1	11/28/2013 4:20:00 AM
Toluene	ND	1.00		µg/L	1	11/28/2013 4:20:00 AM
Ethylbenzene	ND	1.00		µg/L	1	11/28/2013 4:20:00 AM
m,p-Xylene	ND	1.00		µg/L	1	11/28/2013 4:20:00 AM
o-Xylene	ND	1.00		µg/L	1	11/28/2013 4:20:00 AM
Surr: Dibromofluoromethane	106	72.1-122		%REC	1	11/28/2013 4:20:00 AM
Surr: Toluene-d8	97.0	62.1-129		%REC	1	11/28/2013 4:20:00 AM
Surr: 1-Bromo-4-fluorobenzene	101	66.8-124		%REC	1	11/28/2013 4:20:00 AM

Ion Chromatography by EPA Method 300.0

Batch ID: R11380 Analyst: GH

Nitrate	ND	0.100		mg/L	1	11/22/2013 7:35:00 PM
Sulfate	ND	0.300		mg/L	1	11/22/2013 7:35:00 PM

Total Metals by EPA Method 200.8

Batch ID: 5943 Analyst: MC

Iron	7,140	100		µg/L	1	11/22/2013 11:46:33 PM
Lead	ND	1.00		µg/L	1	11/22/2013 11:46:33 PM

Ferrous Iron by SM3500-Fe B

Batch ID: R11316 Analyst: MC

Ferrous Iron	4.90	0.150	D	mg/L	5	11/21/2013 5:39:06 PM
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Qualifiers: B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
RL Reporting Limit

D Dilution was required
H Holding times for preparation or analysis exceeded
ND Not detected at the Reporting Limit
S Spike recovery outside accepted recovery limits



Analytical Report

WO#: 1311254

Date Reported: 12/2/2013

Client: Shannon & Wilson

Collection Date: 11/21/2013 2:15:00 PM

Project: Seattle Hilton

Lab ID: 1311254-003

Matrix: Groundwater

Client Sample ID: MW-2

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Gasoline by NWTPH-Gx

Batch ID: R11367 Analyst: EM

Gasoline	1,760	50.0		µg/L	1	11/28/2013 4:46:00 AM
Surr: 4-Bromofluorobenzene	120	65-135		%REC	1	11/28/2013 4:46:00 AM
Surr: Toluene-d8	115	65-135		%REC	1	11/28/2013 4:46:00 AM

Volatile Organic Compounds by EPA Method 8260

Batch ID: R11368 Analyst: EM

Benzene	1.40	1.00		µg/L	1	11/28/2013 4:46:00 AM
Toluene	1.57	1.00		µg/L	1	11/28/2013 4:46:00 AM
Ethylbenzene	83.3	10.0	D	µg/L	10	12/2/2013 12:45:00 PM
m,p-Xylene	4.78	1.00		µg/L	1	11/28/2013 4:46:00 AM
o-Xylene	2.11	1.00		µg/L	1	11/28/2013 4:46:00 AM
Surr: Dibromofluoromethane	105	72.1-122		%REC	1	11/28/2013 4:46:00 AM
Surr: Toluene-d8	97.0	62.1-129		%REC	1	11/28/2013 4:46:00 AM
Surr: 1-Bromo-4-fluorobenzene	101	66.8-124		%REC	1	11/28/2013 4:46:00 AM

Ion Chromatography by EPA Method 300.0

Batch ID: R11380 Analyst: GH

Nitrate	ND	0.100		mg/L	1	11/22/2013 7:51:00 PM
Sulfate	ND	0.300		mg/L	1	11/22/2013 7:51:00 PM

Total Metals by EPA Method 200.8

Batch ID: 5943 Analyst: MC

Iron	4,230	100		µg/L	1	11/22/2013 11:57:53 PM
Lead	ND	1.00		µg/L	1	11/22/2013 11:57:53 PM

Ferrous Iron by SM3500-Fe B

Batch ID: R11316 Analyst: MC

Ferrous Iron	3.15	0.0300		mg/L	1	11/21/2013 5:43:06 PM
--------------	------	--------	--	------	---	-----------------------

Qualifiers: B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
RL Reporting Limit

D Dilution was required
H Holding times for preparation or analysis exceeded
ND Not detected at the Reporting Limit
S Spike recovery outside accepted recovery limits



Analytical Report

WO#: 1311254

Date Reported: 12/2/2013

Client: Shannon & Wilson

Collection Date: 11/21/2013 3:10:00 PM

Project: Seattle Hilton

Lab ID: 1311254-004

Matrix: Groundwater

Client Sample ID: MW-5

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Gasoline by NWTPH-Gx

Batch ID: R11367 Analyst: EM

Gasoline	98,100	5,000	D	µg/L	100	12/2/2013 1:14:00 PM
Surr: 4-Bromofluorobenzene	129	65-135		%REC	1	11/28/2013 5:13:00 AM
Surr: Toluene-d8	115	65-135		%REC	1	11/28/2013 5:13:00 AM

Volatile Organic Compounds by EPA Method 8260

Batch ID: R11368 Analyst: EM

Benzene	230	100	D	µg/L	100	12/2/2013 1:14:00 PM
Toluene	179	100	D	µg/L	100	12/2/2013 1:14:00 PM
Ethylbenzene	1,070	100	D	µg/L	100	12/2/2013 1:14:00 PM
m,p-Xylene	4,490	100	D	µg/L	100	12/2/2013 1:14:00 PM
o-Xylene	1,610	100	D	µg/L	100	12/2/2013 1:14:00 PM
Surr: Dibromofluoromethane	112	72.1-122		%REC	1	11/28/2013 5:13:00 AM
Surr: Toluene-d8	104	62.1-129		%REC	1	11/28/2013 5:13:00 AM
Surr: 1-Bromo-4-fluorobenzene	108	66.8-124		%REC	1	11/28/2013 5:13:00 AM

Ion Chromatography by EPA Method 300.0

Batch ID: R11380 Analyst: GH

Nitrate	ND	0.100		mg/L	1	11/22/2013 8:08:00 PM
Sulfate	3.86	0.300		mg/L	1	11/22/2013 8:08:00 PM

Total Metals by EPA Method 200.8

Batch ID: 5943 Analyst: MC

Iron	9,080	100		µg/L	1	11/23/2013 12:09:11 AM
Lead	26.1	1.00		µg/L	1	11/23/2013 12:09:11 AM

Ferrous Iron by SM3500-Fe B

Batch ID: R11316 Analyst: MC

Ferrous Iron	5.30	0.150	D	mg/L	5	11/21/2013 5:47:06 PM
--------------	------	-------	---	------	---	-----------------------

Qualifiers: B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
RL Reporting Limit

D Dilution was required
H Holding times for preparation or analysis exceeded
ND Not detected at the Reporting Limit
S Spike recovery outside accepted recovery limits



Date: 12/2/2013

Work Order: 1311254
CLIENT: Shannon & Wilson
Project: Seattle Hilton

QC SUMMARY REPORT
Ferrous Iron by SM3500-Fe B

Sample ID: MB-R11316	SampType: MBLK	Units: mg/L	Prep Date: 11/21/2013	RunNo: 11316							
Client ID: MBLKW	Batch ID: R11316		Analysis Date: 11/21/2013	SeqNo: 225830							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Ferrous Iron ND 0.0300

Sample ID: LCS-R11316	SampType: LCS	Units: mg/L			Prep Date: 11/21/2013			RunNo: 11316			
Client ID: LCSW	Batch ID: R11316				Analysis Date: 11/21/2013			SeqNo: 225831			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Ferrous Iron 0.980 0.0300 1.000 0 98.0 90 110

Sample ID: 1311254-001CDUP	SampType: DUP	Units: mg/L			Prep Date: 11/21/2013			RunNo: 11316			
Client ID: MW-4	Batch ID: R11316				Analysis Date: 11/21/2013			SeqNo: 225833			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Ferrous Iron 0.0700 0.0300 0.08000 13.3 20

Sample ID: 1311254-001CMS		SampType: MS		Units: mg/L		Prep Date: 11/21/2013			RunNo: 11316			
Client ID: MW-4		Batch ID: R11316					Analysis Date: 11/21/2013			SeqNo: 225834		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Ferrous Iron 1.03 0.0300 1.000 0.08000 95.0 85 115

Sample ID: 1311254-001CMSD	SampType: MSD	Units: mg/L			Prep Date: 11/21/2013			RunNo: 11316			
Client ID: MW-4	Batch ID: R11316				Analysis Date: 11/21/2013			SeqNo: 225835			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Ferrous Iron 1.02 0.0300 1.000 0.08000 94.0 85 115 1.030 0.976 20

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits



Date: 12/2/2013

Work Order: 1311254
CLIENT: Shannon & Wilson
Project: Seattle Hilton

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: MB-R11380	SampType: MBLK	Units: mg/L			Prep Date: 11/22/2013			RunNo: 11380			
Client ID: MBLKW	Batch ID: R11380				Analysis Date: 11/22/2013			SeqNo: 227480			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Nitrate	ND	0.100
Sulfate	ND	0.300

Sample ID: LCS-R11380		SampType: LCS			Units: mg/L		Prep Date: 11/22/2013			RunNo: 11380		
Client ID: LCSW		Batch ID: R11380			Analysis Date: 11/22/2013					SeqNo: 227481		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Nitrate	6.28	0.100	6.000	0	105	90	110
Sulfate	29.9	0.300	30.00	0	99.8	90	110

Sample ID: 1311254-001CDUP	SampType: DUP	Units: mg/L				Prep Date: 11/22/2013			RunNo: 11380		
Client ID: MW-4	Batch ID: R11380	Analysis Date: 11/22/2013						SeqNo: 227483			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Nitrate	ND	0.100						0		20
Sulfate	31.0	0.300						30.88	0.320	20

Sample ID: 1311254-001CMS	SampType: MS	Units: mg/L			Prep Date: 11/22/2013			RunNo: 11380			
Client ID: MW-4	Batch ID: R11380	Analysis Date: 11/22/2013						SeqNo: 227484			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Nitrate	6.25	0.100	6.000	0	104	80	120
Sulfate	61.6	0.300	30.00	30.88	102	80	120

Qualifiers:	B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
	R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits



Date: 12/2/2013

Work Order: 1311254
CLIENT: Shannon & Wilson
Project: Seattle Hilton

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: 1311254-001CMSD	SampType: MSD	Units: mg/L				Prep Date: 11/22/2013			RunNo: 11380		
Client ID: MW-4	Batch ID: R11380	Analysis Date: 11/22/2013							SeqNo: 227485		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrate	6.31	0.100	6.000	0	105	80	120	6.249	0.955	20	
Sulfate	61.4	0.300	30.00	30.88	102	80	120	61.56	0.327	20	

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits



Date: 12/2/2013

Work Order: 1311254
CLIENT: Shannon & Wilson
Project: Seattle Hilton

QC SUMMARY REPORT

Total Metals by EPA Method 200.8

Sample ID: MB-5943	SampType: MBLK	Units: µg/L			Prep Date: 11/22/2013			RunNo: 11259			
Client ID: MBLKW	Batch ID: 5943				Analysis Date: 11/22/2013			SeqNo: 224696			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Iron	ND	100									
Lead	ND	1.00									

Sample ID: LCS-5943	SampType: LCS	Units: µg/L			Prep Date: 11/22/2013			RunNo: 11259			
Client ID: LCSW	Batch ID: 5943				Analysis Date: 11/22/2013			SeqNo: 224697			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Iron	954	100	1,000	0	95.4	50	150				
Lead	44.4	1.00	50.00	0	88.8	85	115				

Sample ID: 1311234-001ADUP		SampType: DUP			Units: µg/L		Prep Date: 11/22/2013			RunNo: 11259		
Client ID: BATCH		Batch ID: 5943			Analysis Date: 11/22/2013					SeqNo: 224699		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Iron	160	100						187.7	15.7	30	
Lead	ND	1.00						0		30	

Sample ID: 1311234-001AMS		SampType: MS		Units: µg/L		Prep Date: 11/22/2013			RunNo: 11259		
Client ID: BATCH		Batch ID: 5943		Analysis Date: 11/22/2013			SeqNo: 224700				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Iron	4,970	100	5,000	187.7	95.6	50	150				
Lead	223	1.00	250.0	0	89.1	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits



Date: 12/2/2013

Work Order: 1311254
CLIENT: Shannon & Wilson
Project: Seattle Hilton

QC SUMMARY REPORT
Total Metals by EPA Method 200.8

Sample ID: 1311234-001AMSD	SampType: MSD	Units: µg/L				Prep Date: 11/22/2013			RunNo: 11259		
Client ID: BATCH	Batch ID: 5943	Analysis Date: 11/22/2013							SeqNo: 224701		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Iron	4,870	100	5,000	187.7	93.7	50	150	4,967	1.90	30	
Lead	225	1.00	250.0	0	90.2	70	130	222.9	1.16	30	

Qualifiers:	B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
	R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits



Date: 12/2/2013

Work Order: 1311254
CLIENT: Shannon & Wilson
Project: Seattle Hilton

QC SUMMARY REPORT**Gasoline by NWTPH-Gx**

Sample ID: 1311292-001BDUP		SampType: DUP			Units: µg/L		Prep Date: 11/27/2013			RunNo: 11367		
Client ID: BATCH		Batch ID: R11367			Analysis Date: 11/27/2013			SeqNo: 227252				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Gasoline	ND	50.0						0		30	
Surr: Toluene-d8	58.7		50.00		117	65	135		0	0	
Surr: 4-Bromofluorobenzene	59.6		50.00		119	65	135		0	0	

Sample ID: LCS-R11367		SampType: LCS		Units: µg/L		Prep Date: 11/27/2013		RunNo: 11367			
Client ID: LCSW		Batch ID: R11367				Analysis Date: 11/27/2013		SeqNo: 227262			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Gasoline	560	50.0	500.0	0	112	65	135				
Surr: Toluene-d8	58.7		50.00		117	65	135				
Surr: 4-Bromofluorobenzene	59.3		50.00		119	65	135				

Sample ID: MB-R11367	SampType: MBLK	Units: µg/L			Prep Date: 11/27/2013			RunNo: 11367			
Client ID: MBLKW	Batch ID: R11367				Analysis Date: 11/27/2013			SeqNo: 227263			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Gasoline	ND	50.0									
Surr: Toluene-d8	58.4		50.00		117	65	135				
Surr: 4-Bromofluorobenzene	59.0		50.00		118	65	135				

Sample ID: CCV-R11367D		SampType: CCV		Units: µg/L		Prep Date: 12/2/2013			RunNo: 11367		
Client ID: CCV		Batch ID: R11367					Analysis Date: 12/2/2013			SeqNo: 227519	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Gasoline	576	50.0	500.0	0	115	80	120				
Surr: Toluene-d8	57.2		50.00		114	65	135				
Surr: 4-Bromofluorobenzene	60.4		50.00		121	65	135				

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits



Date: 12/2/2013

Work Order: 1311254
CLIENT: Shannon & Wilson
Project: Seattle Hilton

QC SUMMARY REPORT

Gasoline by NWTPH-Gx

Sample ID: CCV-R11367D	SampType: CCV	Units: µg/L				Prep Date: 12/2/2013				RunNo: 11367		
Client ID: CCV	Batch ID: R11367					Analysis Date: 12/2/2013				SeqNo: 227519		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Qualifiers:	B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
	R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits



Date: 12/2/2013

Work Order: 1311254
CLIENT: Shannon & Wilson
Project: Seattle Hilton

QC SUMMARY REPORT**Volatile Organic Compounds by EPA Method 8260**

Sample ID: 1311292-001BDUP	SampType: DUP	Units: µg/L			Prep Date: 11/27/2013			RunNo: 11368			
Client ID: BATCH	Batch ID: R11368				Analysis Date: 11/27/2013			SeqNo: 227271			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	1.00						0		30	
Toluene	ND	1.00						0		30	
Ethylbenzene	ND	1.00						0		30	
m,p-Xylene	ND	1.00						0		30	
o-Xylene	ND	1.00						0		30	
Surr: Dibromofluoromethane	48.8		50.00		97.7	72.1	122		0		
Surr: Toluene-d8	49.5		50.00		99.1	62.1	129		0		
Surr: 1-Bromo-4-fluorobenzene	50.1		50.00		100	66.8	124		0		

Sample ID: LCS-R11368	SampType: LCS	Units: µg/L				Prep Date: 11/27/2013			RunNo: 11368		
Client ID: LCSW	Batch ID: R11368					Analysis Date: 11/27/2013			SeqNo: 227281		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	18.8	1.00	20.00	0	93.9	76	123				
Toluene	18.9	1.00	20.00	0	94.6	71.5	130				
Ethylbenzene	19.5	1.00	20.00	0	97.5	72	130				
m,p-Xylene	38.7	1.00	40.00	0	96.8	73	131				
o-Xylene	19.5	1.00	20.00	0	97.7	72.1	131				
Surr: Dibromofluoromethane	46.5		50.00		92.9	72.1	122				
Surr: Toluene-d8	49.0		50.00		98.0	62.1	129				
Surr: 1-Bromo-4-fluorobenzene	50.3		50.00		101	66.8	124				

Sample ID: MB-R11368	SampType: MBLK	Units: µg/L				Prep Date: 11/27/2013				RunNo: 11368		
Client ID: MBLKW	Batch ID: R11368					Analysis Date: 11/27/2013				SeqNo: 227282		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Benzene	ND	1.00										
Toluene	ND	1.00										

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits



Date: 12/2/2013

Work Order: 1311254
CLIENT: Shannon & Wilson
Project: Seattle Hilton

QC SUMMARY REPORT

Volatile Organic Compounds by EPA Method 8260

Sample ID: MB-R11368	SampType: MBLK	Units: µg/L			Prep Date: 11/27/2013			RunNo: 11368			
Client ID: MBLKW	Batch ID: R11368				Analysis Date: 11/27/2013			SeqNo: 227282			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Ethylbenzene	ND	1.00									
m,p-Xylene	ND	1.00									
o-Xylene	ND	1.00									
Surr: Dibromofluoromethane	45.7		50.00		91.4	72.1	122				
Surr: Toluene-d8	49.1		50.00		98.2	62.1	129				
Surr: 1-Bromo-4-fluorobenzene	49.6		50.00		99.3	66.8	124				

Sample ID: 1311292-002BMS	SampType: MS	Units: µg/L				Prep Date: 11/27/2013			RunNo: 11368		
Client ID: BATCH	Batch ID: R11368	Analysis Date: 11/27/2013						SeqNo: 227285			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	21.1	1.00	20.00	0	106	65.4	138				
Toluene	21.4	1.00	20.00	0.1700	106	64	139				
Ethylbenzene	21.9	1.00	20.00	0	109	64.5	136				
m,p-Xylene	43.5	1.00	40.00	0	109	63.3	135				
o-Xylene	21.6	1.00	20.00	0	108	65.4	134				
Surr: Dibromofluoromethane	52.2		50.00		104	72.1	122				
Surr: Toluene-d8	49.6		50.00		99.1	62.1	129				
Surr: 1-Bromo-4-fluorobenzene	49.9		50.00		99.8	66.8	124				

Sample ID: CCV-R11368B	SampType: CCV	Units: µg/L				Prep Date: 12/2/2013			RunNo: 11368		
Client ID: CCV	Batch ID: R11368					Analysis Date: 12/2/2013			SeqNo: 227287		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	20.9	1.00	20.00	0	104	80	120				
Toluene	21.4	1.00	20.00	0	107	80	120				
Ethylbenzene	19.0	1.00	20.00	0	95.1	80	120				
m,p-Xylene	39.6	1.00	40.00	0	98.9	80	120				

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits



Date: 12/2/2013

Work Order: 1311254
CLIENT: Shannon & Wilson
Project: Seattle Hilton

QC SUMMARY REPORT
Volatile Organic Compounds by EPA Method 8260

Sample ID: CCV-R11368B	SampType: CCV	Units: µg/L			Prep Date: 12/2/2013			RunNo: 11368			
Client ID: CCV	Batch ID: R11368				Analysis Date: 12/2/2013			SeqNo: 227287			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
o-Xylene	19.3	1.00	20.00	0	96.5	80	120				
Surr: Dibromofluoromethane	46.6		50.00		93.1	72.1	122				
Surr: Toluene-d8	49.7		50.00		99.4	62.1	129				
Surr: 1-Bromo-4-fluorobenzene	46.2		50.00		92.4	66.8	124				

Qualifiers:	B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
	R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Sample Log-In Check List

Client Name: **SW**
 Logged by: **Chelsea Ward**

Work Order Number: **1311254**
 Date Received: **11/21/2013 4:20:00 PM**

Chain of Custody

1. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
 2. How was the sample delivered? Client

Log In

3. Coolers are present? Yes ☒ No ☐ NA ☐
 4. Shipping container/cooler in good condition? Yes ☒ No ☐
 5. Custody seals intact on shipping container/cooler? Yes ☐ No ☐ Not Required ☒
 6. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
 7. Were all coolers received at a temperature of $>0^{\circ}\text{C}$ to 10.0°C ? Yes ☒ No ☐ NA ☐
 8. Sample(s) in proper container(s)? Yes ☒ No ☐
 9. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
 10. Are samples properly preserved? Yes ☒ No ☐
 11. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
 12. Is the headspace in the VOA vials? Yes ☐ No ☒ NA ☐
 13. Did all samples containers arrive in good condition(unbroken)? Yes ☒ No ☐
 14. Does paperwork match bottle labels? Yes ☒ No ☐
 15. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
 16. Is it clear what analyses were requested? Yes ☒ No ☐
 17. Were all holding times able to be met? Yes ☒ No ☐

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified: Date:
 By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
 Regarding:
 Client Instructions:

19. Additional remarks:

Item Information

Item #	Temp °C	Condition
Cooler	6.8	Good
Sample	7.0	Good



Fremont
Analytical

3600 Fremont Ave N.
Seattle, WA 98103

Tel: 206-352-3790
Fax: 206-352-7178

Client:

Sharon & Wilson

Address:

400 N 34th St. Suite 100

City, State, Zip

Seattle, WA 98103 Tel: 206-632-8020

Reports To (PM):

Michael Reynolds Fax: 206-685-6777

Email:

mrc@seawall.com

Project No:

21-112341-004

Project Name:

Seattle Hilton

Location:

Seattle Hilton

Collected by:

EVP

Laboratory Project No (internal):

1311254

Page:

of:

Date:

11/21/13

Chain of Custody Record

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)	VOC (EPA 8260) GC/MS by EPA 8210	BTEX by EPA 8210	Gasoline Range Organics Hydrocarbon Identification (HID)	SEM/EDX Dielectric Heavy Oil Range Organics	PAH (EPA 8270 - SIM)	PCB (EPA 8072)	Chlorinated (EPA 8081)	Metals* (EPA 8214)	Total (T) (EPA 8214)	Amion (IC)** (6020 / 2008)	Amion (IC)** (6020 / 2008)	Comments/Depth
1 MW-4	11/21/13	1235	GW	X											
2 MW-3	11/21/13	1325	GW	X											
3 MW-2	11/21/13	1415	GW	X											
4 MW-5	11/21/13	1510	GW	X											
5															
6															
7															
8															
9															
10															

*Metals Analysis (Circle): Nitrate Nitrite Chloride Sulfate Bromide Fluoride Nitrate-Nitrite

**Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide Fluoride Nitrate-Nitrite

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab (A fee may be assessed if samples are retained after 30 days.)

Refined/Revised: 11/21/13 1620 Date/Time

Refined/Revised: 11/21/13 1020 Date/Time

Special Remarks: Ferric Iron

TAT --> Next Day 2 Day 3 Day 5 Day

APPENDIX B

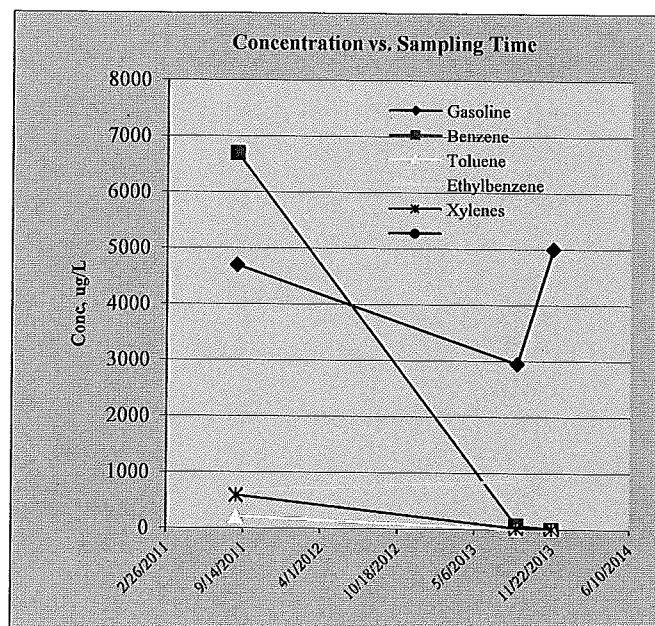
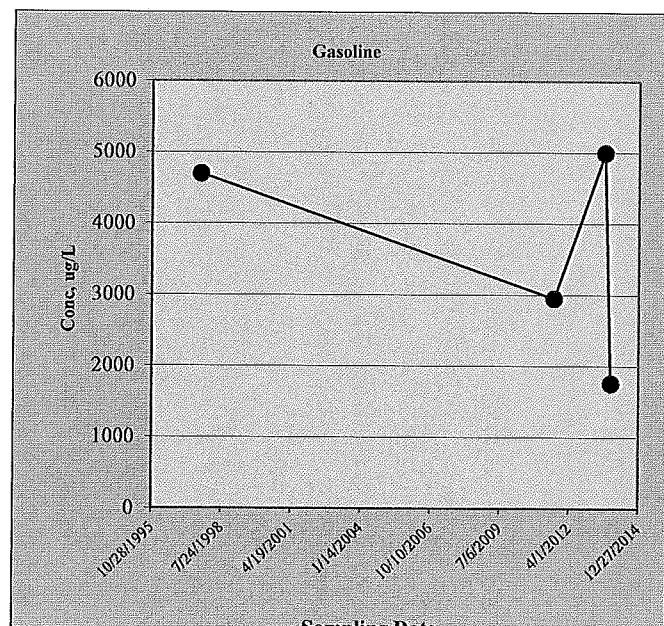
NATURAL ATTENUATION ANALYSIS OUTPUT

Module1: Mann-Kendall Trend Test for Plume Stability (Non-parametric Statistical Test)Site Name: *Hilton Seattle Hotel*Site Address: *Seattle, WA*Additional Description: *NA Evaluation*Well (Sampling) Location? **MW-2**Level of Confidence (Decision Criteria)? **85%****1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.**

Sampling Event	Date Sampled	Hazardous Substances (unit is ug/L)				
		Gasoline	Benzene	Toluene	Ethylbenzene	Xylenes
#1	9/25/1997	4700	6700	210	670	590
#2	8/25/2011	2950	76.1	2.19	863	22
#3	8/22/2013	5000	3.07	2.01	408	10.8
#4	11/21/2013	1760	1.4	1.57	83	6.9
#5						
#6						
#7						
#8						
#9						
#10						
#11						
#12						
#13						
#14						
#15						
#16						

2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Gasoline	Benzene	Toluene	Ethylbenzene	Xylenes	
Confidence Level Calculated?	62.50%	95.80%	95.80%	83.30%	95.80%	NA
Plume Stability?	Stable	Shrinking	Shrinking	Stable	Shrinking	NA
Coefficient of Variation?	CV <= 1			CV <= 1		n<4
Mann-Kendall Statistic "S" value?	-2	-6	-6	-4	-6	0
Number of Sampling Rounds?	4	4	4	4	4	0
Average Concentration?	3602.50	1695.14	53.94	506.00	157.43	NA
Standard Deviation?	1525.13	3336.75	104.04	338.07	288.45	NA
Coefficient of Variation?	0.42	1.97	1.93	0.67	1.83	NA
Blank if No Errors found						n<4

3. Temporal Trend: Plot of Concentration vs. Sampling TimeHazardous substance? **Gasoline**Plume Stability? **Stable**

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

Site Name: *Hilton Seattle Hotel*
 Site Address: *Seattle, WA*
 Additional Description: *NA Evaluation*

Well (Sampling) Location? **MW-3**Level of Confidence (Decision Criteria)? **85%****1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.**

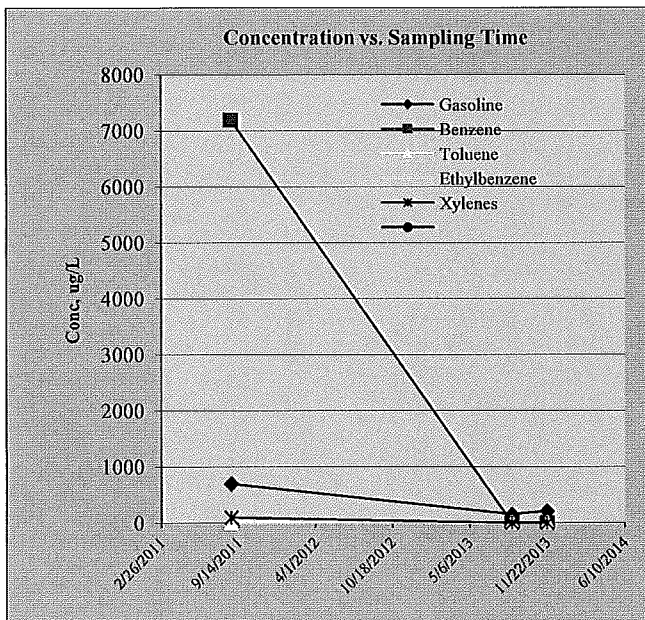
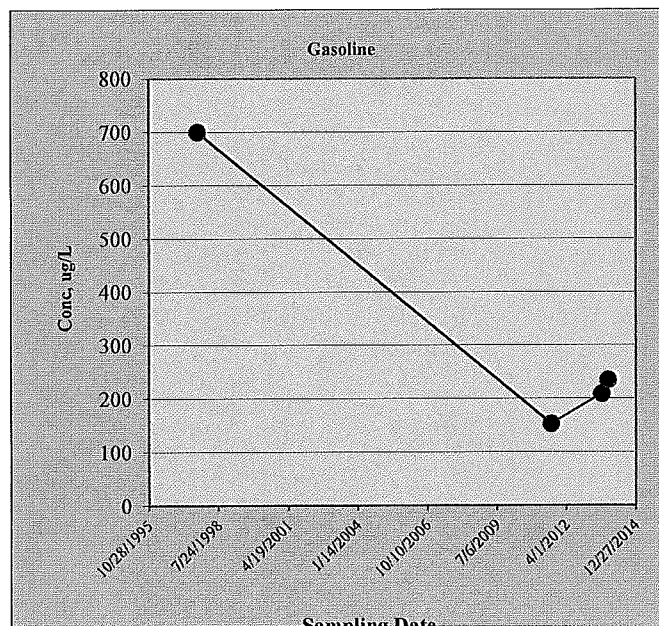
Sampling Event	Date Sampled	Hazardous Substances (unit is ug/L)				
		Gasoline	Benzene	Toluene	Ethylbenzene	Xylenes
#1	9/25/1997	700	7200	10	74	97
#2	8/25/2011	153	0.5	0.5	0.5	1.35
#3	8/22/2013	209	0.5	0.5	0.5	1
#4	11/21/2013	235	0.5	0.5	0.5	1
#5						
#6						
#7						
#8						
#9						
#10						
#11						
#12						
#13						
#14						
#15						
#16						

2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Gasoline	Benzene	Toluene	Ethylbenzene	Xylenes	
Confidence Level Calculated?	37.50%	62.50%	62.50%	62.50%	83.30%	NA
Plume Stability?	Stable	Undetermined	Undetermined	Undetermined	Undetermined	NA
Coefficient of Variation?	CV ≤ 1	CV > 1	CV > 1	CV > 1	CV > 1	n<4
Mann-Kendall Statistic "S" value?	0	-3	-3	-3	-5	0
Number of Sampling Rounds?	4	4	4	4	4	0
Average Concentration?	324.25	1800.38	2.88	18.88	25.09	NA
Standard Deviation?	252.83	3599.75	4.75	36.75	47.94	NA
Coefficient of Variation?	0.78	2.00	1.65	1.95	1.91	NA
Blank if No Errors found						n<4

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

Hazardous substance? **Gasoline**
 Plume Stability? **Stable**

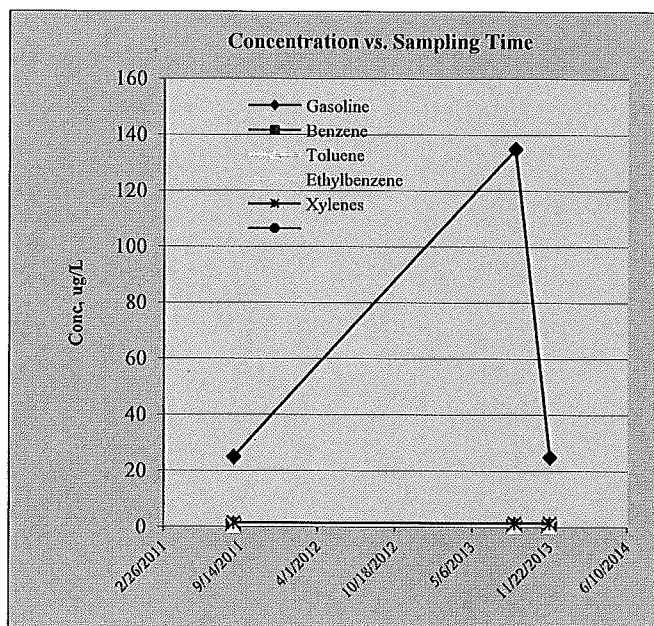
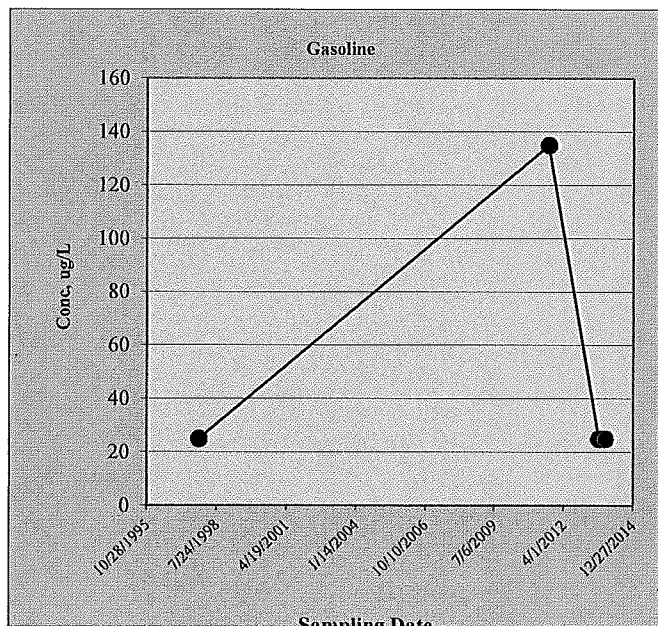


Module1: Mann-Kendall Trend Test for Plume Stability (Non-parametric Statistical Test)Site Name: Hilton Seattle HotelSite Address: Seattle, WAAdditional Description: NA EvaluationWell (Sampling) Location? MW-4Level of Confidence (Decision Criteria)? 85%**1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.**

Sampling Event	Date Sampled	Hazardous Substances (unit is ug/L)				
		Gasoline	Benzene	Toluene	Ethylbenzene	Xylenes
#1	11/14/1997	25	0.5	0.5	0.5	1.5
#2	8/26/2011	135	0.5	0.5	0.5	1.5
#3	8/22/2013	25	0.5	0.5	0.5	1.5
#4	11/21/2013	25	0.5	0.5	0.5	1.5
#5						
#6						
#7						
#8						
#9						
#10						
#11						
#12						
#13						
#14						
#15						
#16						

2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Gasoline	Benzene	Toluene	Ethylbenzene	Xylenes	
Confidence Level Calculated?	37.50%	37.50%	37.50%	37.50%	37.50%	NA
Plume Stability?	Undetermined	Stable	Stable	Stable	Stable	NA
Coefficient of Variation?	CV > 1	CV ≤ 1	CV ≤ 1	CV ≤ 1	CV ≤ 1	n<4
Mann-Kendall Statistic "S" value?	-1	0	0	0	0	0
Number of Sampling Rounds?	4	4	4	4	4	0
Average Concentration?	52.50	0.50	0.50	0.50	1.50	NA
Standard Deviation?	55.00	0.00	0.00	0.00	0.00	NA
Coefficient of Variation?	1.05	0.00	0.00	0.00	0.00	NA
Blank if No Errors found						n<4

3. Temporal Trend: Plot of Concentration vs. Sampling TimeHazardous substance? GasolinePlume Stability? Undetermined

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

Site Name: Hilton Seattle Hotel

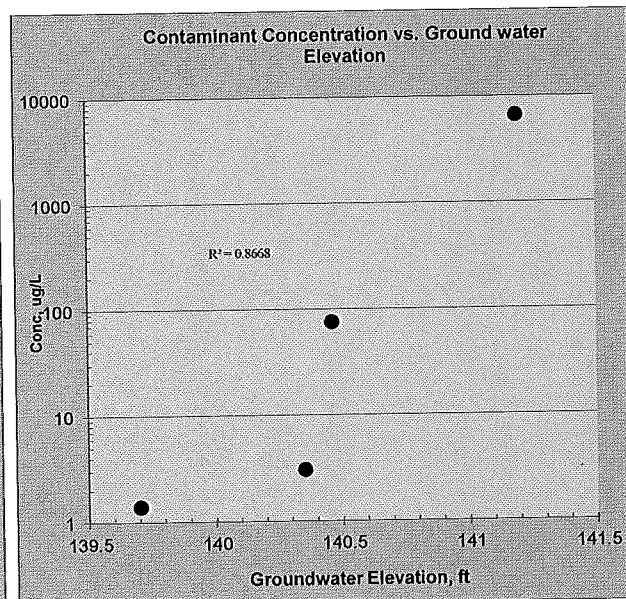
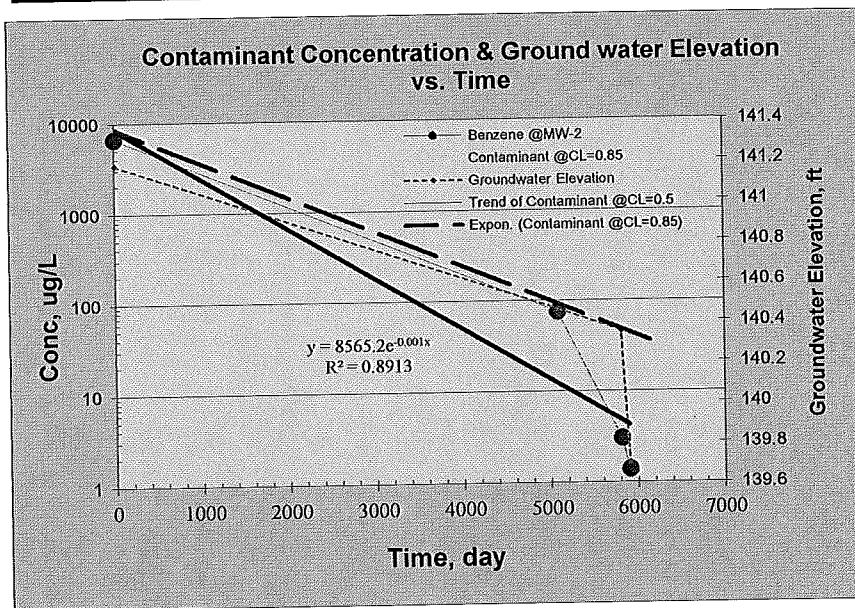
Site Address: Seattle, WA

Additional Description: NA Evaluation

Hazardous Substance Benzene

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

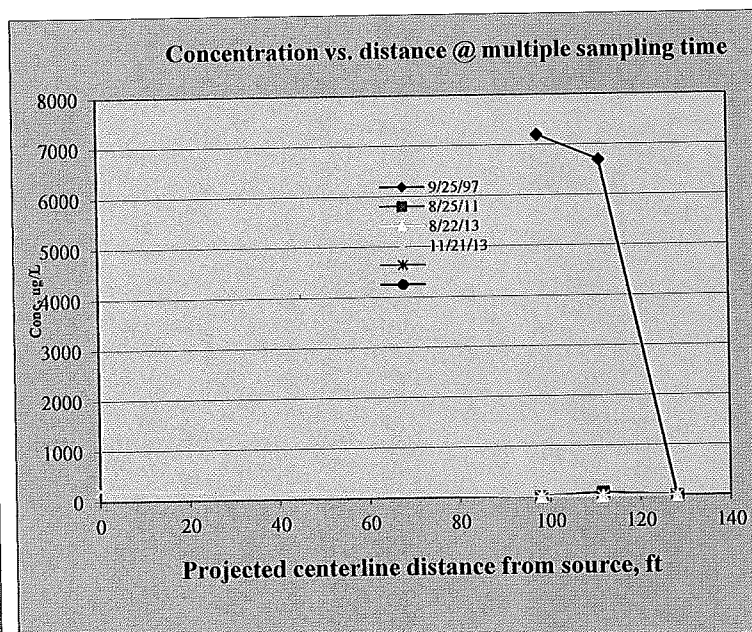
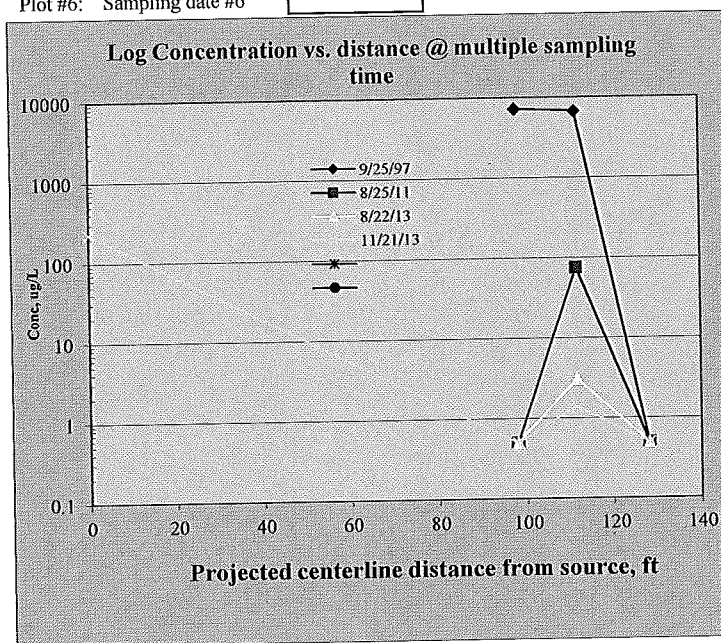
Name of Sampling Well?	MW-2	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	94.407%		
Plume Stability?	Shrinking ; Decision Criteria is 85%.		
Slope: Point decay rate constant (k_{point}), yr ⁻¹	0.470 @50% C.L.;	0.325 @85% C.L.	
Half Life for k_{point} , yr	1.475 @50% C.L.;	2.133 @85% C.L.	



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

Plot #1: Sampling date #1
 Plot #2: Sampling date #2
 Plot #3: Sampling date #3
 Plot #4: Sampling date #4
 Plot #5: Sampling date #5
 Plot #6: Sampling date #6

25-Sep-97
25-Aug-11
22-Aug-13
21-Nov-13



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

Site Name: Hilton Seattle Hotel

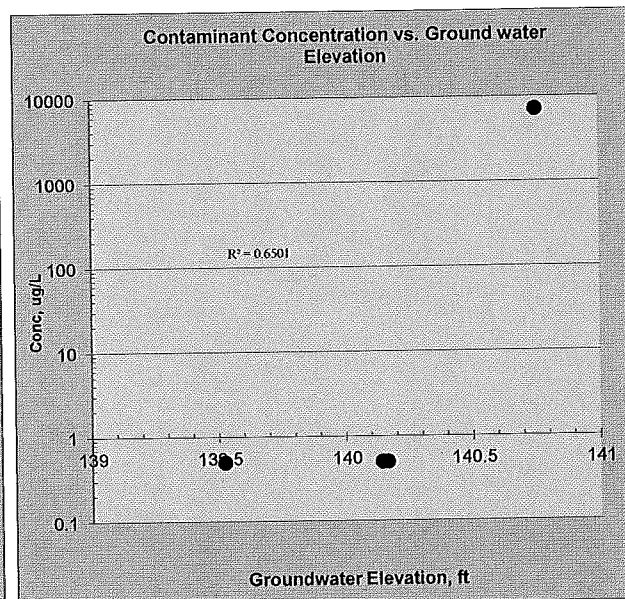
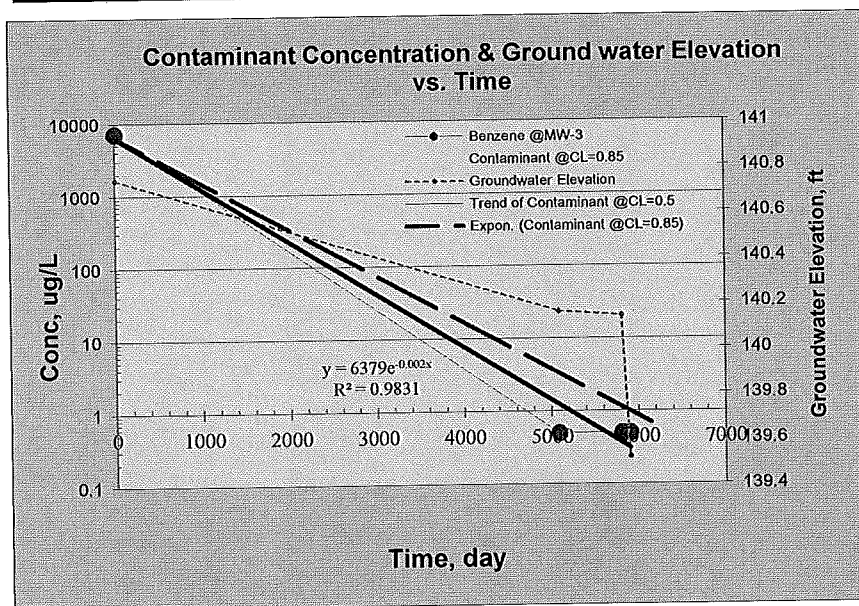
Site Address: Seattle, WA

Additional Description: NA Evaluation

Hazardous Substance: Benzene

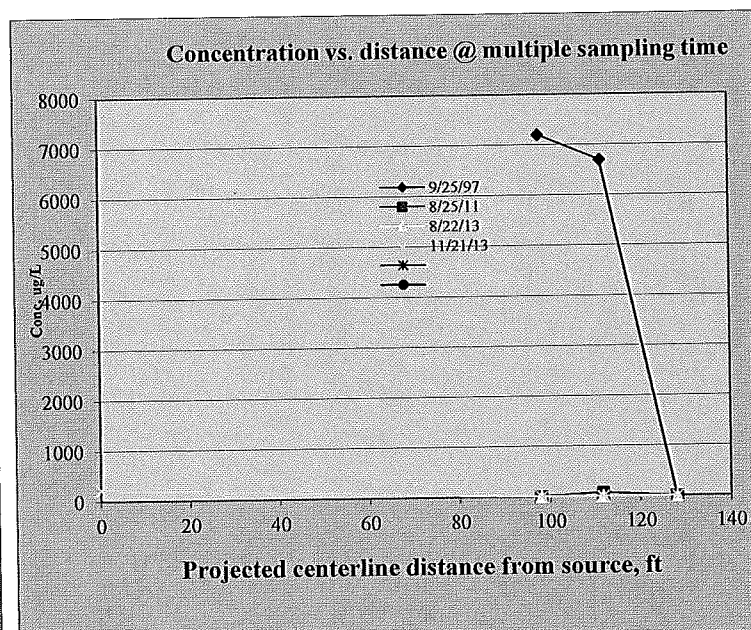
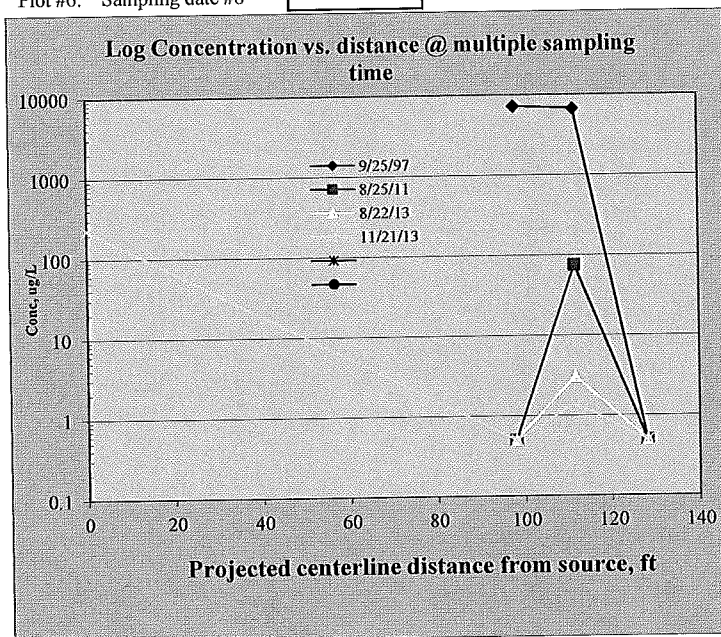
1. Temporal Trend at a Well (Concentration vs. Time & Groundwater Elevation : well-to-well analysis)

Name of Sampling Well?	MW-3	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	99.153%		
Plume Stability?	Shrinking ; Decision Criteria is 85%.		
Slope: Point decay rate constant (k_{point}), yr^{-1}	0.614 @50% C.L.;	0.543 @85% C.L.	
Half Life for k_{point} , yr	1.129 @50% C.L.;	1.277 @85% C.L.	



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

Plot #1: Sampling date #1	25-Sep-97
Plot #2: Sampling date #2	25-Aug-11
Plot #3: Sampling date #3	22-Aug-13
Plot #4: Sampling date #4	21-Nov-13
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: Hilton Seattle Hotel

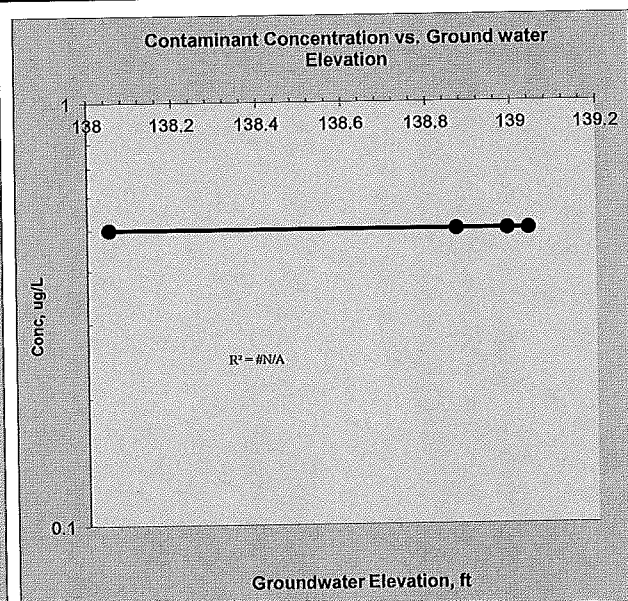
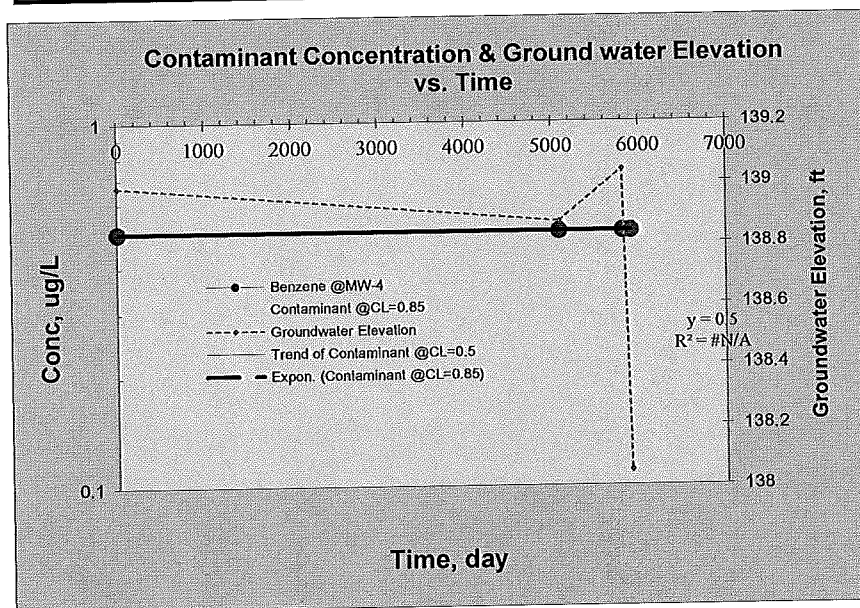
Site Address: Seattle, WA

Additional Description: NA Evaluation

Hazardous Substance Benzene

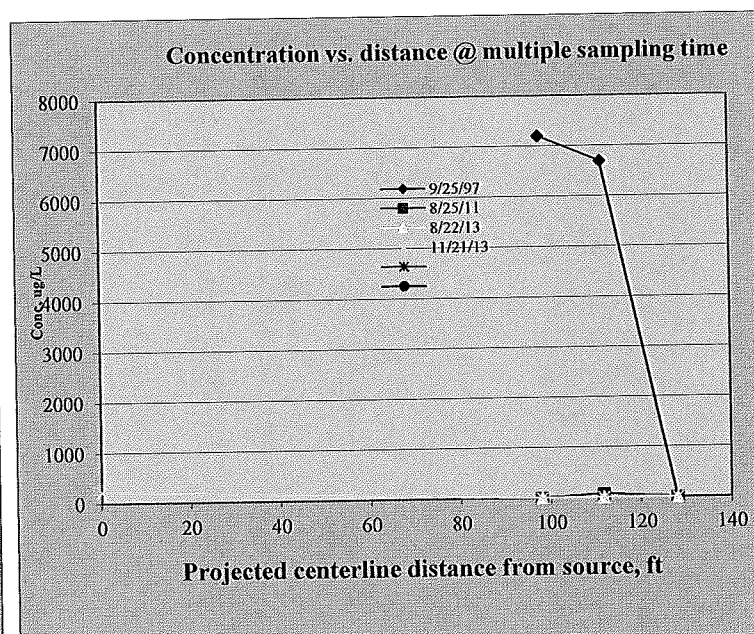
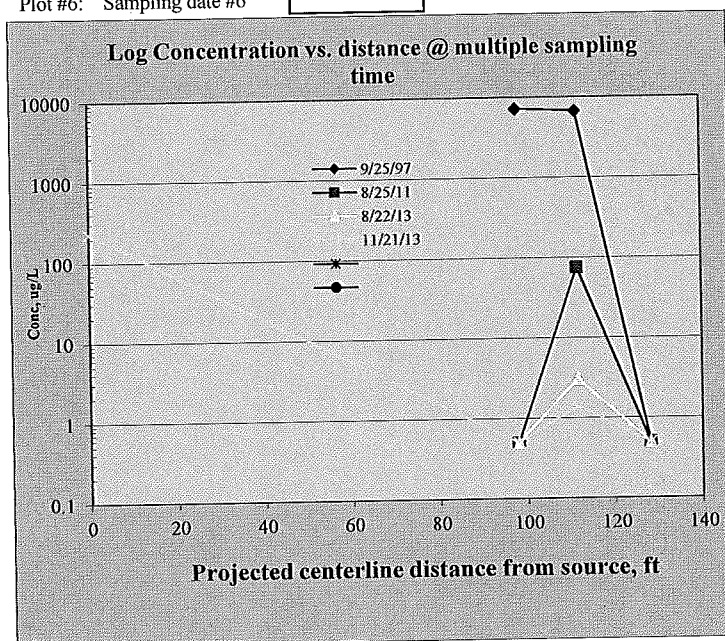
1. Temporal Trend at a Well (Concentration vs. Time & Groundwater Elevation : well-to-well analysis)

Name of Sampling Well?	MW-4	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	NA		
Plume Stability?	NA	; 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	25-Sep-97
Plot #2: Sampling date #2	25-Aug-11
Plot #3: Sampling date #3	22-Aug-13
Plot #4: Sampling date #4	21-Nov-13
Plot #5: Sampling date #5	
Plot #6: Sampling date #6	



Module 2: Temporal Analysis: Concentration of contaminant vs. time (Regression Analysis at each well)Site Name: *Hilton Seattle Hotel*Site Address: *Seattle, WA*Additional Description: *NA Evaluation**Hazardous Substance Benzene*

1. Level of Confidence (Decision Criteria)?												85%	
2. Prediction: Calculation of Restoration Time and Predicted Concentration at Wells													
Well Location	MW-5	MW-2	MW-3	MW-4	NA	NA	NA	NA	NA	NA	NA	NA	NA
A. Cleanup Level (Criterion) to be achieved?	5	5	5	5									
A.1 Average (@50% CL ¹ best-fitting values)													
Time to reach the criterion	NA	15.84	11.65	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Date when the Criterion to be achieved	NA	7/26/13	5/17/09	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
A.2 Boundary (@85% CL)													
Time to reach the criterion ²	NA	22.92	13.18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Date when the Criterion to be achieved	NA	8/20/20	11/24/10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B Date of Prediction?	9/30/14	9/30/14	9/30/14	9/30/14									
B.1 Average conc predicted (@50% CL)	#DIV/0!	2.87	0.18	#DIV/0!	NA	NA	NA	NA	NA	NA	NA	NA	NA
B.2 Boundary conc predicted (@85% CL)	#DIV/0!	33.93	0.62	#DIV/0!	NA	NA	NA	NA	NA	NA	NA	NA	NA

3. Log-Linear Regression Results

Coefficient of Determination r^2	NA	0.891	0.983	NA	NA	NA	NA	NA	NA	NA	NA
Correlation Coefficient r	NA	-0.944	-0.992	NA	NA	NA	NA	NA	NA	NA	NA
Number of data points n	1	4	4	4	NA	NA	NA	NA	NA	NA	NA

4. Statistical Inference on the Slope of the Log-Linear Regression Line with t-statistics

One-tailed Confidence Level calculated, %	NA	94.407%	99.133%	NA	NA	NA	NA	NA	NA	NA	NA
Sufficient evidence to support that the slope of the regression line is significantly different from zero?	NA	YES!	YES!	NA	NA	NA	NA	NA	NA	NA	NA
Coefficient of Variation?	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Plume Stability?	NA	Shrinking	Shrinking	NA	NA	NA	NA	NA	NA	NA	NA

5. Calculation of Point Decay Rate Constant (k_{point})

Slope: Point decay rate constant (k_{point}) yr ⁻¹	NA	0.470	0.614	NA	NA	NA	NA	NA	NA	NA	NA
Half Life for (k_{point}) yr	NA	0.325	0.543	NA	NA	NA	NA	NA	NA	NA	NA
	NA	1.475	1.129	NA	NA	NA	NA	NA	NA	NA	NA
	NA	2.133	1.277	NA	NA	NA	NA	NA	NA	NA	NA

Note: 1. CL : Confidence Level; UD= Undetermined

2. The length of time that will actually be required is estimated to be no more than years calculated (@ 85% of confidence level.)

Site Name:	Hilton Seattle Hotel
Site Address:	Seattle, WA
Additional Description:	NA Evaluation
Hazardous Substance	Ethylbenzene

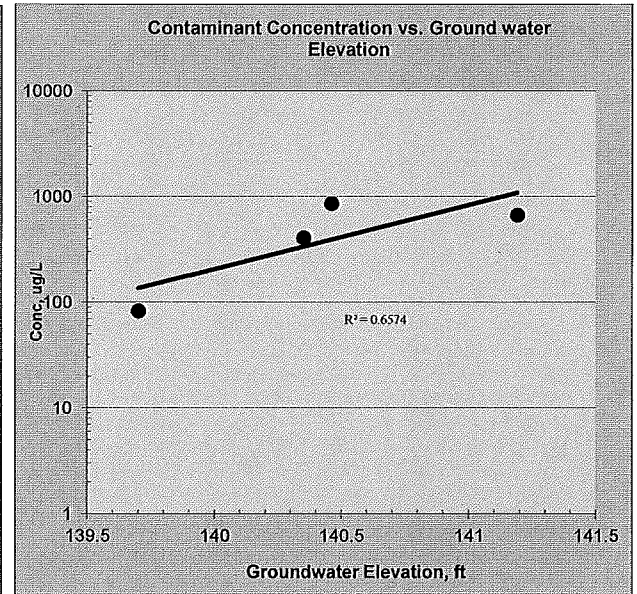
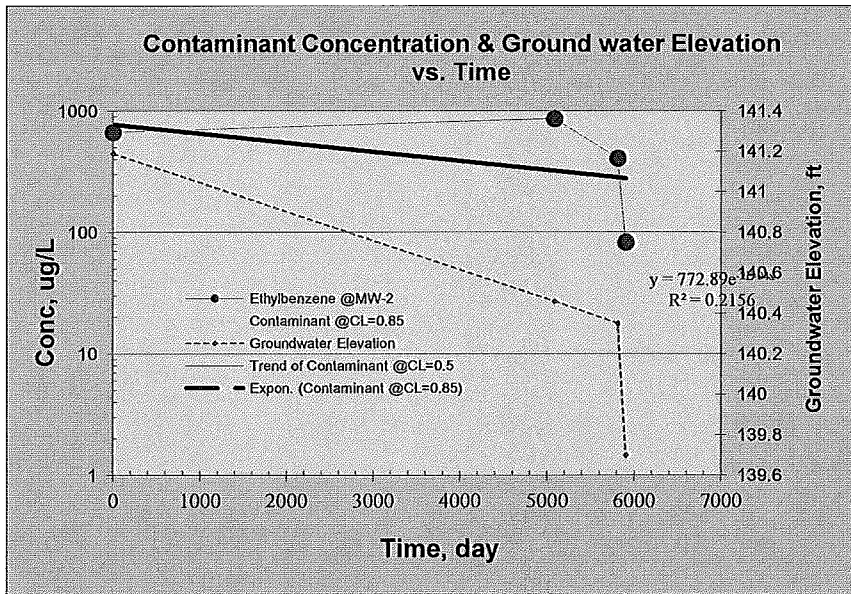
Note: relationship of "y/x $\leq$ 0.33" is preferred

Well Location:							Unit
Dist from source, x-direction						ft	
Off-centerline dist, y-direction						ft	
Sampling Event	Date sampled	day	MW-5	MW-2	MW-3	MW-4	
#1	9/25/97	0		670	74	0.5	
#2	8/25/11	5082		863	0.5	0.5	
#3	8/22/13	5810		408	0.5	0.5	
#4	11/21/13	5901	1070	83	0.5	0.5	
#5							
#6							
#7							
#8							
#9							
#10							
#11							
#12							
#13							
#14							
#15							
#16							
#17							
#18							
#19							
#20							
Average Concentration			1070.0	506.0	18.9	0.5	
Maximum Concentration			1070	863	74	0.5	
Minimum Concentration			1070	83	0.5	0.5	

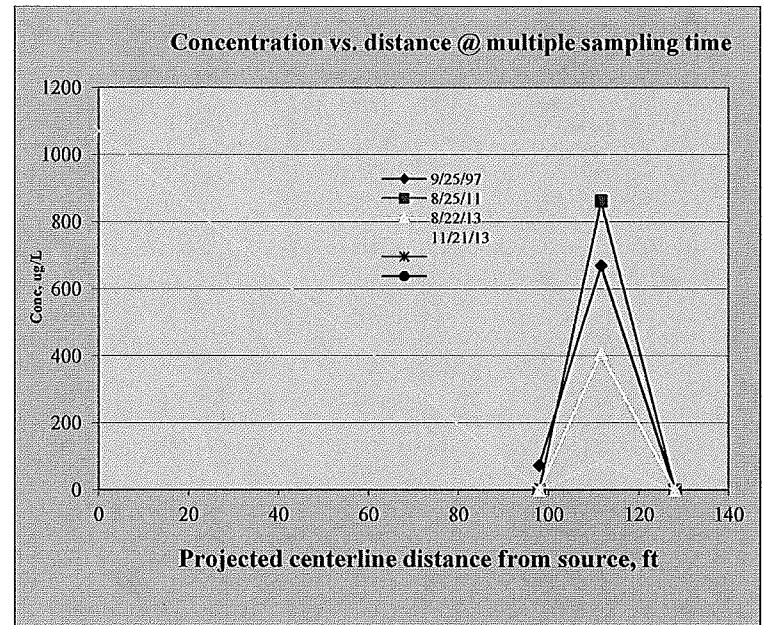
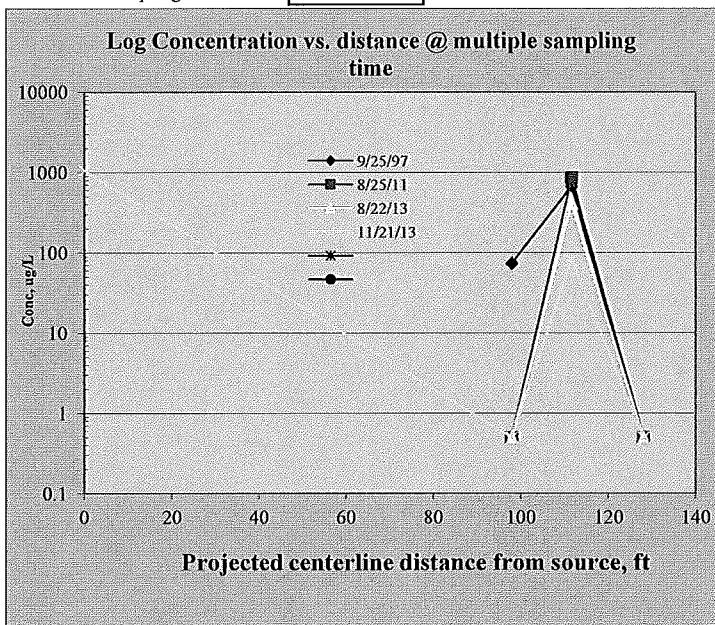
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Module 2: Graphical Presentation of Historical Ground Water Data: (Well to Well Analysis)Site Name: *Hilton Seattle Hotel*Site Address: *Seattle, WA*Additional Description: *NA Evaluation*Hazardous Substance: *Ethylbenzene***1. Temporal Trend at a Well (Concentration vs. Time & Groundwater Elevation : well-to-well analysis)**

Name of Sampling Well?	MW-2	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	46.431%		
Plume Stability?	Stable	; Decision Criteria is 85%.	
Slope: Point decay rate constant (k_{point}), yr^{-1}	0.063 @50% C.L.;	NA @85% C.L.	
Half Life for k_{point} , yr	10.986 @50% C.L.;	NA @85% C.L.	

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

Plot #1: Sampling date #1	25-Sep-97
Plot #2: Sampling date #2	25-Aug-11
Plot #3: Sampling date #3	22-Aug-13
Plot #4: Sampling date #4	21-Nov-13
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: Hilton Seattle Hotel

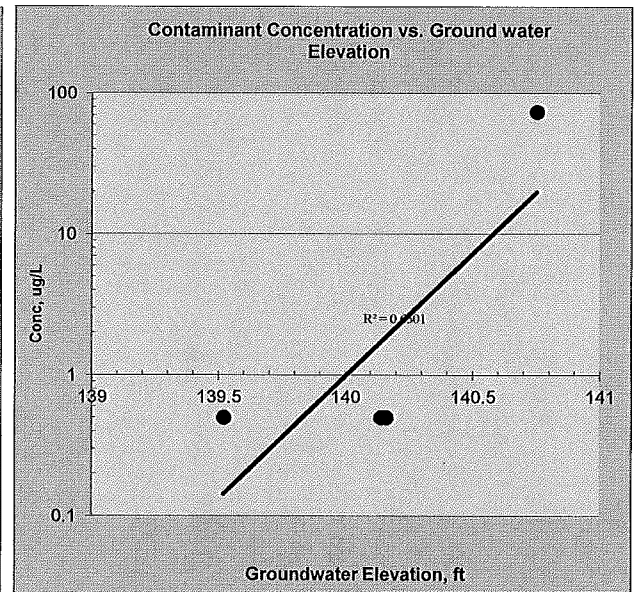
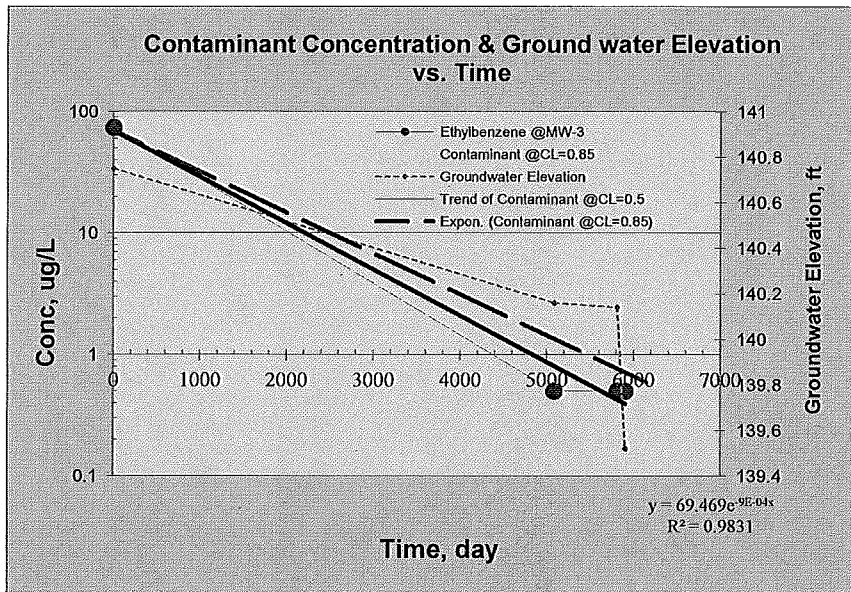
Site Address: Seattle, WA

Additional Description: NA Evaluation

Hazardous Substance Ethylbenzene

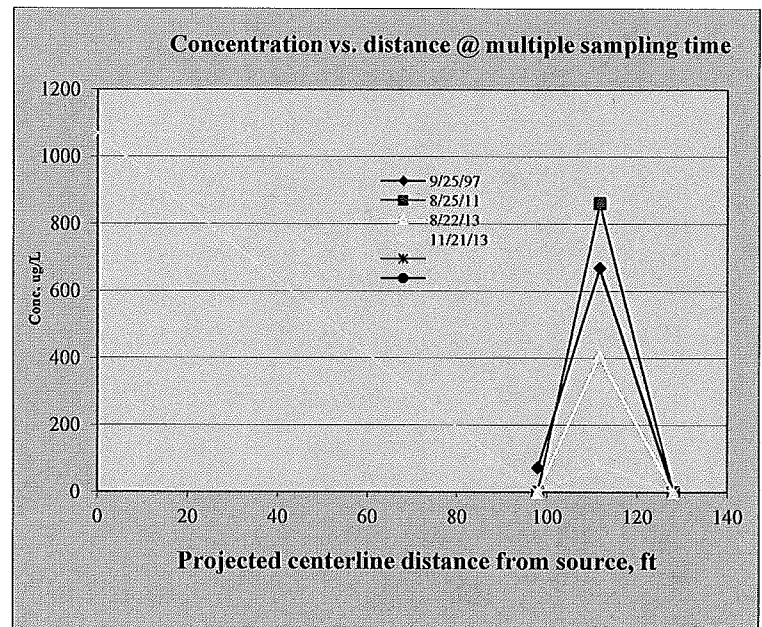
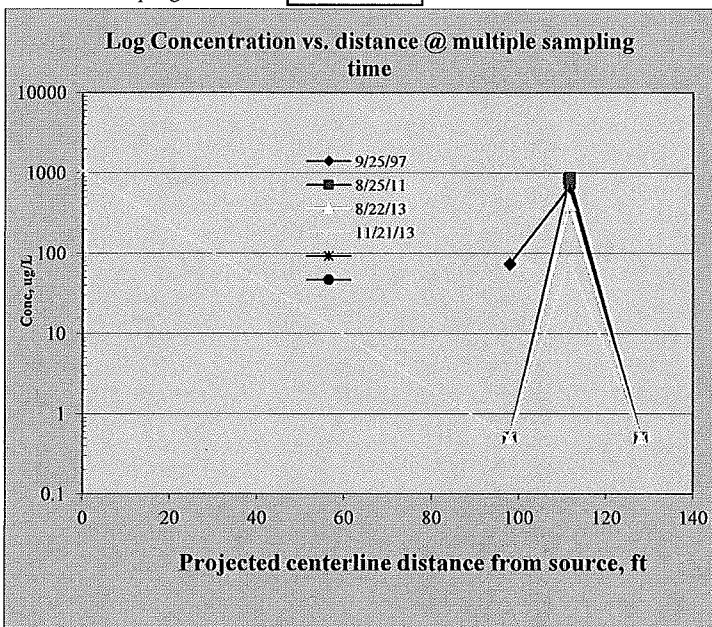
1. Temporal Trend at a Well (Concentration vs. Time & Groundwater Elevation : well-to-well analysis)

Name of Sampling Well?	MW-3	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	99.153%		
Plume Stability?	Shrinking	; Decision Criteria is 85%.	
Slope: Point decay rate constant (k_{point}), yr^{-1}	0.320 @50% C.L.;	0.283 @85% C.L.	
Half Life for k_{point} , yr	2.164 @50% C.L.;	2.447 @85% C.L.	



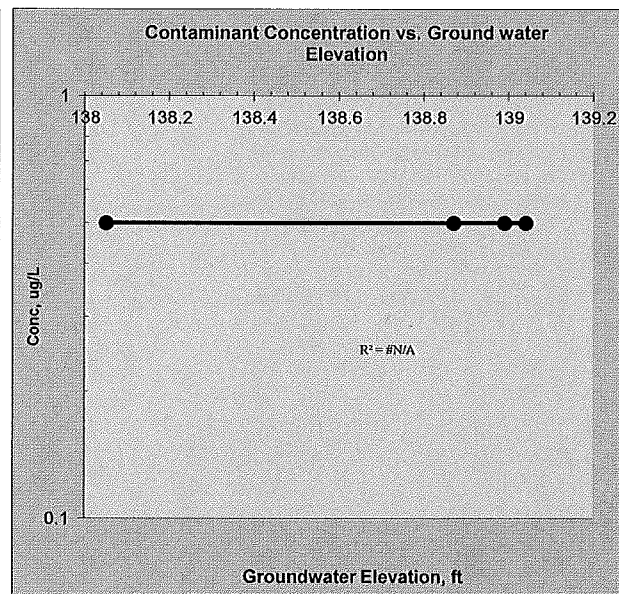
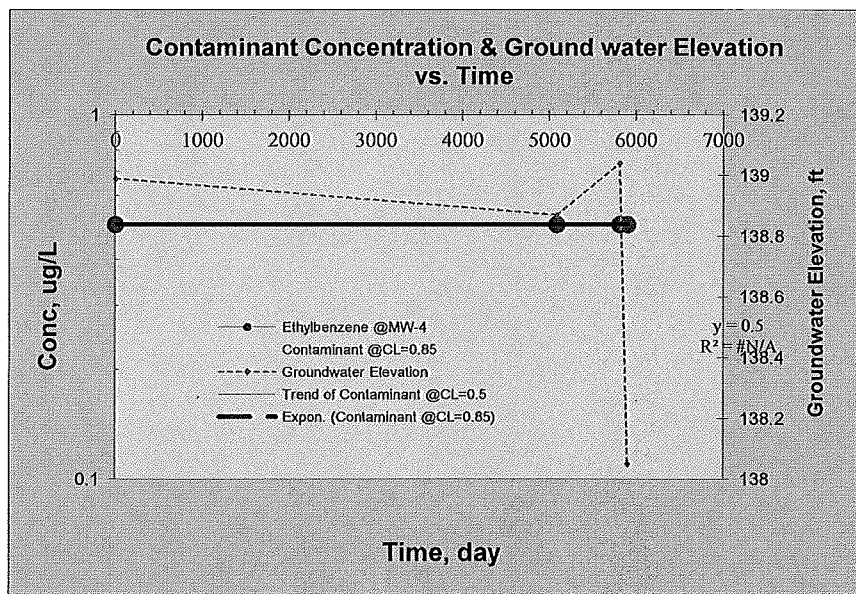
2. Spatial and Temporal Trend along Overall Plume Length for Multiple Wells:

Plot #1: Sampling date #1	25-Sep-97
Plot #2: Sampling date #2	25-Aug-11
Plot #3: Sampling date #3	22-Aug-13
Plot #4: Sampling date #4	21-Nov-13
Plot #5: Sampling date #5	
Plot #6: Sampling date #6	

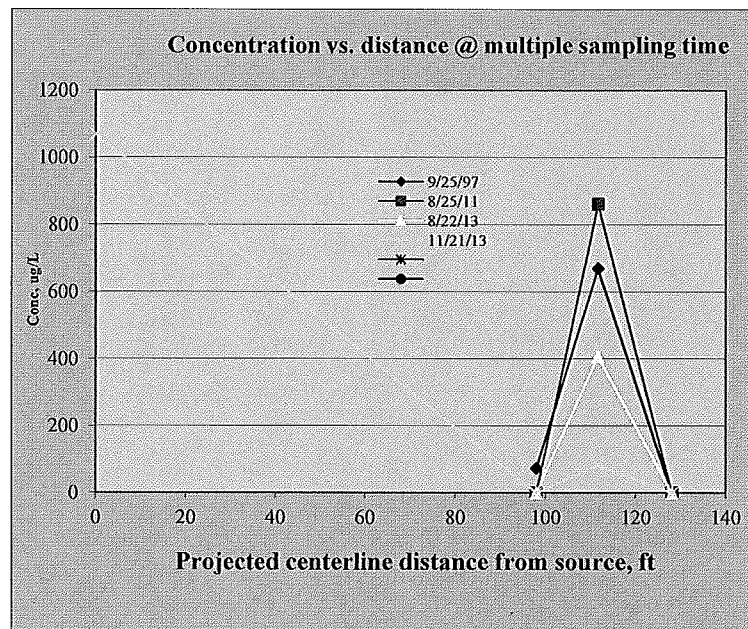
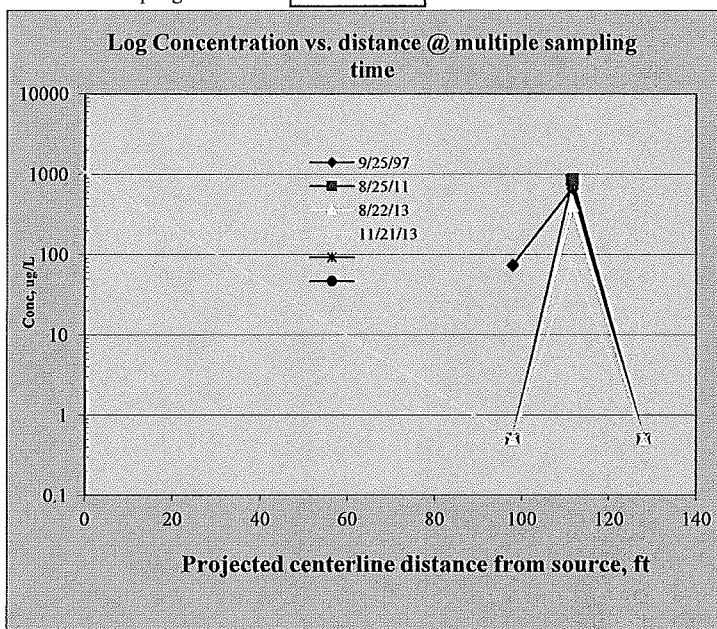


Module 2: Graphical Presentation of Historical Ground Water Data: (Well to Well Analysis)Site Name: *Hilton Seattle Hotel*Site Address: *Seattle, WA*Additional Description: *NA Evaluation*Hazardous Substance *Ethylbenzene***1. Temporal Trend at a Well (Concentration vs. Time & Groundwater Elevation : well-to-well analysis)**

Name of Sampling Well?	MW-4	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	NA		
Plume Stability?	NA	; 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	25-Sep-97
Plot #2: Sampling date #2	25-Aug-11
Plot #3: Sampling date #3	22-Aug-13
Plot #4: Sampling date #4	21-Nov-13
Plot #5: Sampling date #5	
Plot #6: Sampling date #6	

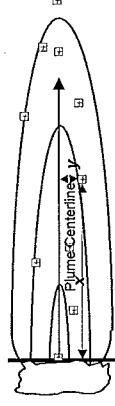


Module 2: Temporal Analysis: Concentration of contaminant vs. time (Regression Analysis at each well)Site Name: *Hilton Seattle Hotel*Site Address: *Seattle, WA*Additional Description: *NA Evaluation**Hazardous Substance Ethylbenzene*

1. Level of Confidence (Decision Criteria)?													85%	
2. Prediction: Calculation of Restoration Time and Predicted Concentration at Wells														
Well Location	MW-5	MW-2	MW-3	MW-4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
A. Cleanup Level (Criterion) to be achieved? ug/L	700	700	700	700										
A.1 Average (@50% CL, best-fitting values)														
Time to reach the criterion yr	NA	NA	-7.21	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Date when the Criterion to be achieved date	NA	NA	7/11/90	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
A.2 Boundary (@85% CL)														
Time to reach the criterion ² yr	NA	NA	-8.16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Date when the Criterion to be achieved date	NA	NA	8/1/89	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B Date of Prediction? date	9/30/14	9/30/14	9/30/14	9/30/14										
B.1 Average conc predicted (@50% CL) ug/L	#DIV/0!	NA	0.30	#DIV/0!	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B.2 Boundary conc predicted (@85% CL) ug/L	#DIV/0!	NA	0.56	#DIV/0!	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Log-Linear Regression Results														
Coefficient of Determination r^2	NA	0.216	0.983	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Correlation Coefficient r	NA	-0.464	-0.992	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Number of data points n	1	4	4	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4. Statistical Inference on the Slope of the Log-Linear Regression Line with t-statistics														
One-tailed Confidence Level calculated, %	NA	46.431%	99.153%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sufficient evidence to support that the slope of the regression line is significantly different from zero?	NA	NO!	YES!	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Coefficient of Variation?	NA	0.668	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Plume Stability?	NA	Stable	Shrinking	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5. Calculation of Point Decay Rate Constant (k_{point})														
Slope: Point decay rate constant (k_{point}) yr^{-1}	NA	0.063	0.320	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
@50% CL yr^{-1}	NA	NA	0.283	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
@85% CL yr^{-1}	NA	10.986	2.164	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Half Life for (k_{point}) yr	NA	NA	2.447	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Note: 1. CL : Confidence Level; UD= Undetermined

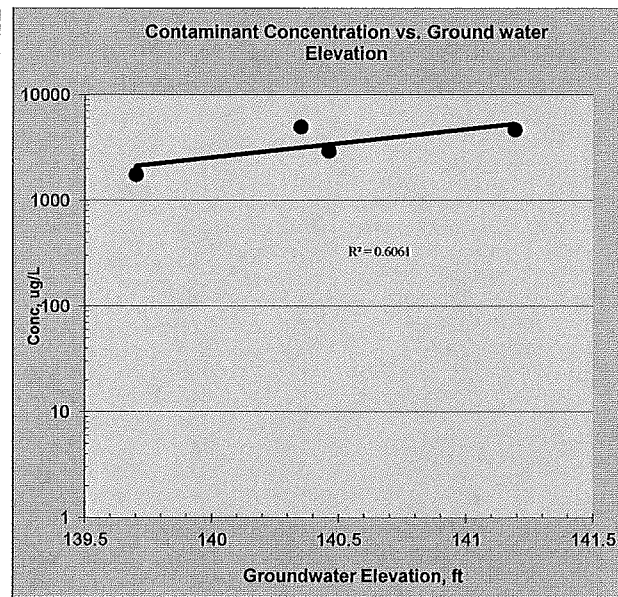
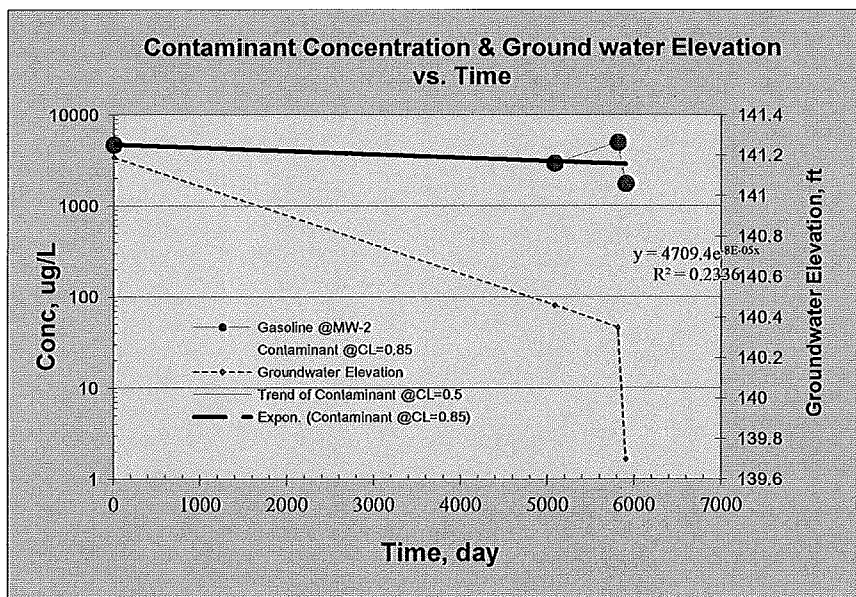
2. The length of time that will actually be required is estimated to be no more than years calculated (@ 85% of confidence level.)



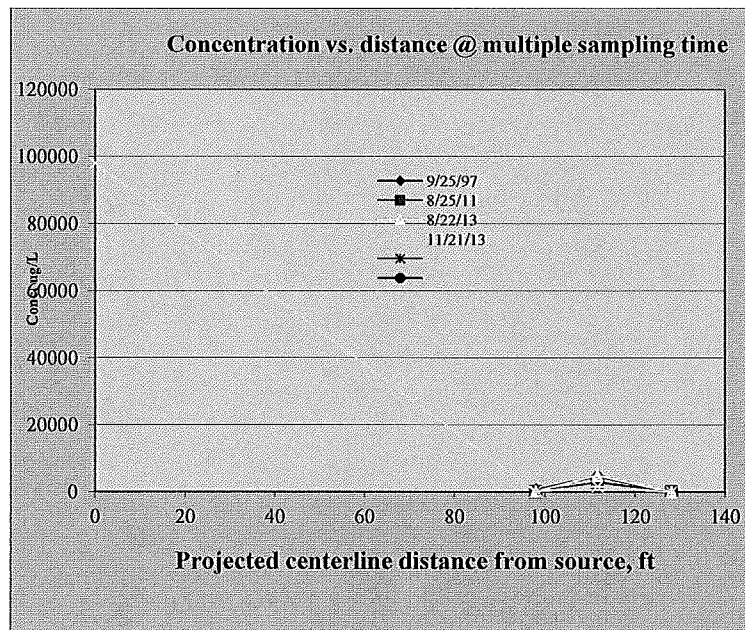
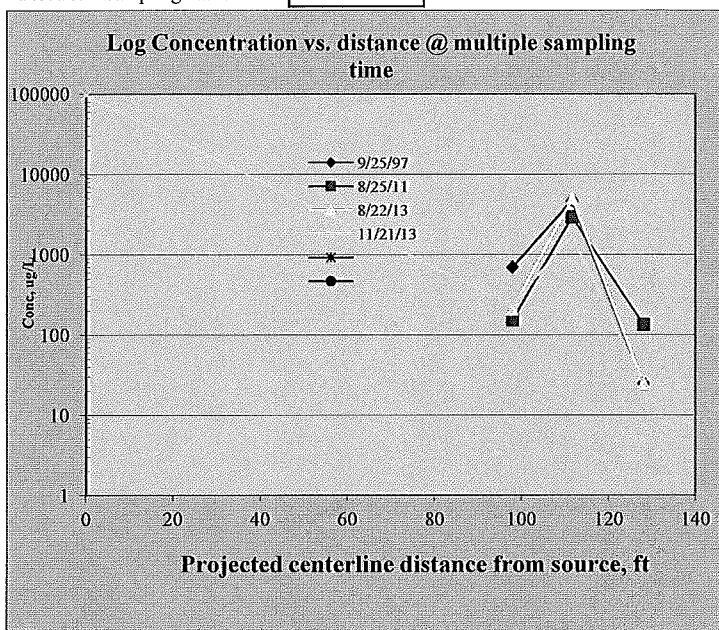
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Module 2: Graphical Presentation of Historical Ground Water Data: (Well to Well Analysis)Site Name: *Hilton Seattle Hotel*Site Address: *Seattle, WA*Additional Description: *NA Evaluation*Hazardous Substance: *Gasoline***1. Temporal Trend at a Well (Concentration vs. Time & Groundwater Elevation : well-to-well analysis)**

Name of Sampling Well?	MW-2	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	48.332%		
Plume Stability?	Stable	; Decision Criteria is 85%.	
Slope: Point decay rate constant (k_{point}), yr^{-1}	0.030 @50% C.L.;	NA @85% C.L.	
Half Life for k_{point} , yr	22.875 @50% C.L.;	NA @85% C.L.	

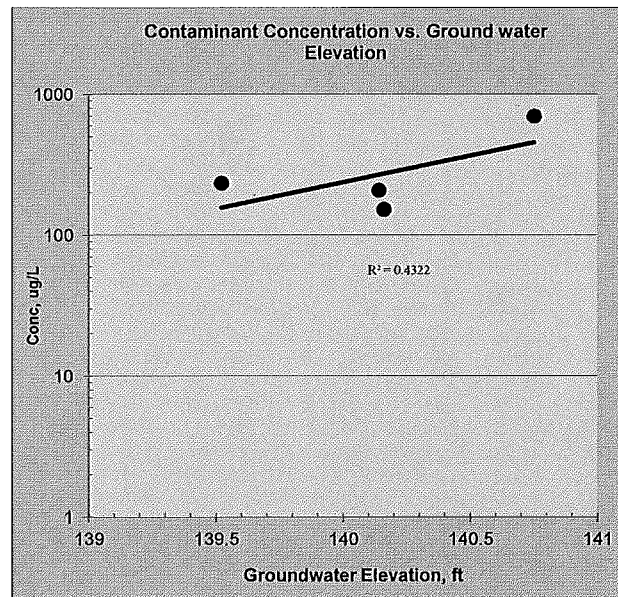
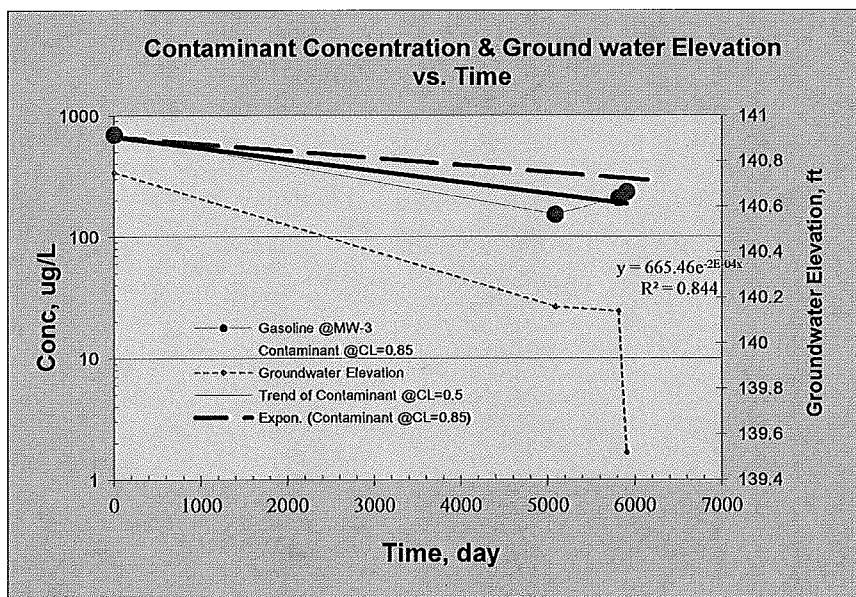
**2. Spatial and Temporal Trend along Overall Plume Length for Multiple Wells:**

Plot #1: Sampling date #1	25-Sep-97
Plot #2: Sampling date #2	25-Aug-11
Plot #3: Sampling date #3	22-Aug-13
Plot #4: Sampling date #4	21-Nov-13
Plot #5: Sampling date #5	
Plot #6: Sampling date #6	

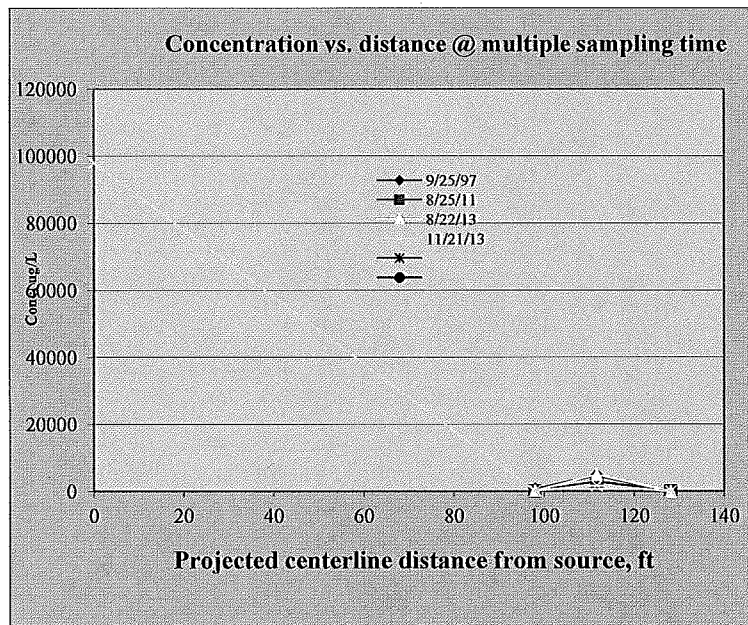
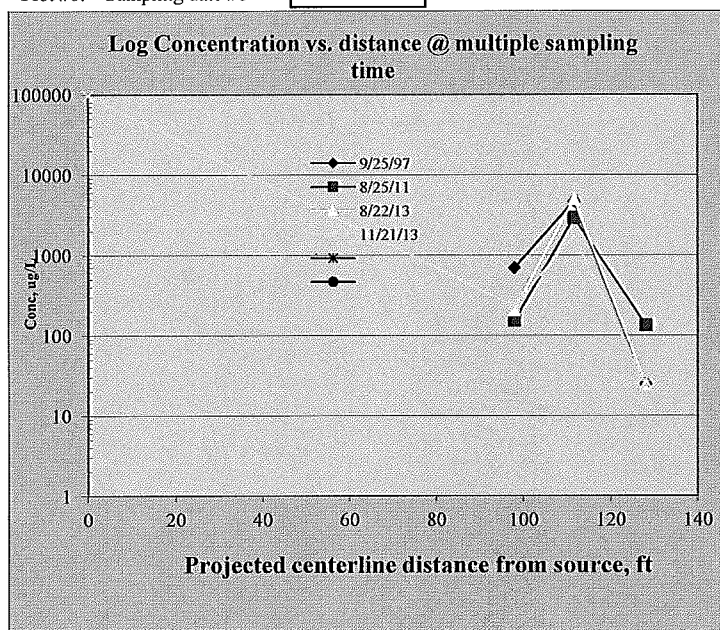


Module 2: Graphical Presentation of Historical Ground Water Data: (Well to Well Analysis)Site Name: *Hilton Seattle Hotel*Site Address: *Seattle, WA*Additional Description: *NA Evaluation*Hazardous Substance: *Gasoline***1. Temporal Trend at a Well (Concentration vs. Time & Groundwater Elevation : well-to-well analysis)**

Name of Sampling Well?	MW-3	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	91.868%		
Plume Stability?	Shrinking ; Decision Criteria is 85%.		
Slope: Point decay rate constant (k_{point}), yr^{-1}	0.079 @50% C.L.;	0.049 @85% C.L.	
Half Life for k_{point} , yr	8.813 @50% C.L.;	14.214 @85% C.L.	

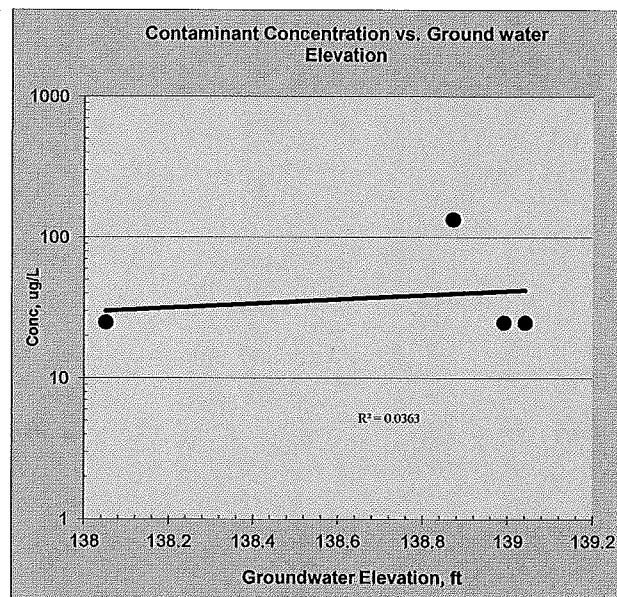
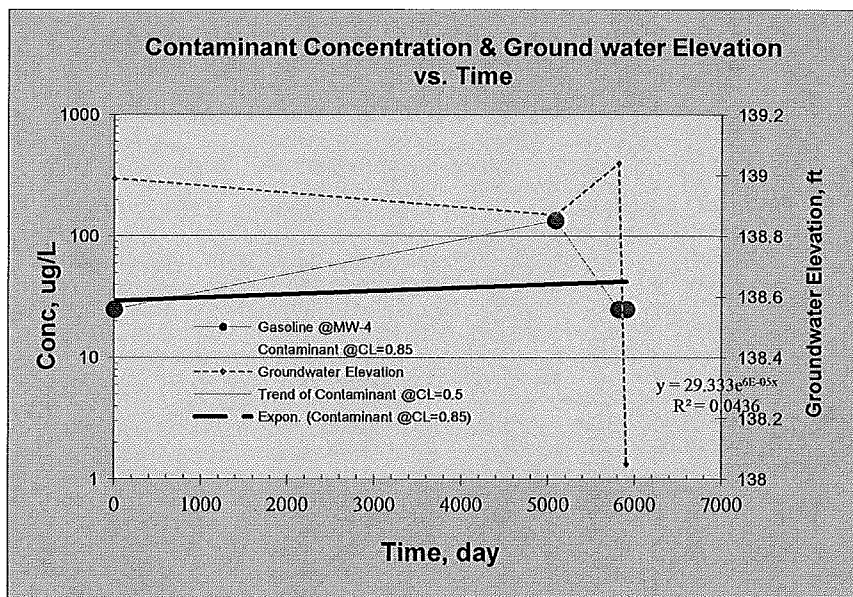
**2. Spatial and Temporal Trend along Overall Plume Length for Multiple Wells:**

Plot #1: Sampling date #1	25-Sep-97
Plot #2: Sampling date #2	25-Aug-11
Plot #3: Sampling date #3	22-Aug-13
Plot #4: Sampling date #4	21-Nov-13
Plot #5: Sampling date #5	
Plot #6: Sampling date #6	

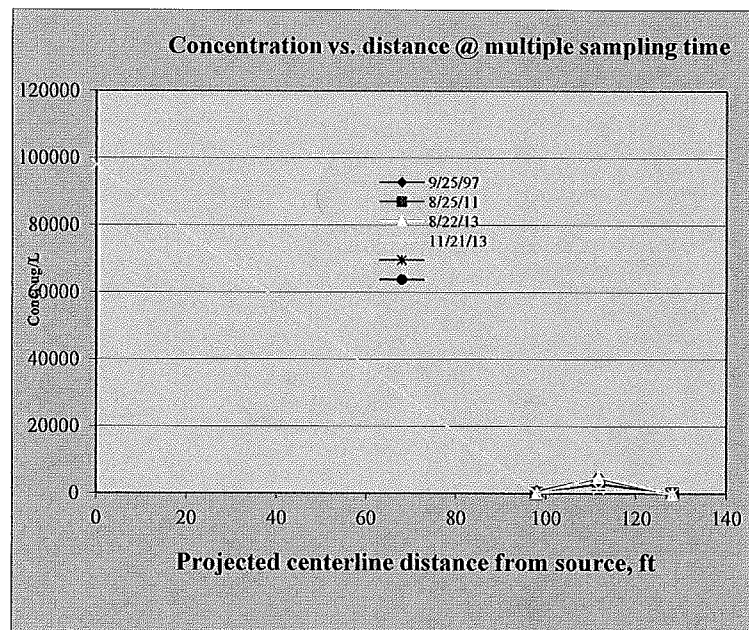
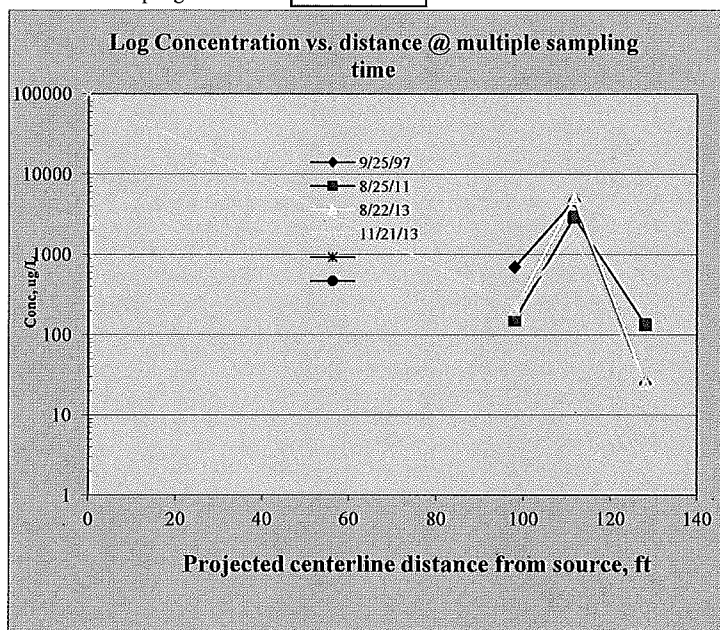


Module 2: Graphical Presentation of Historical Ground Water Data: (Well to Well Analysis)Site Name: *Hilton Seattle Hotel*Site Address: *Seattle, WA*Additional Description: *NA Evaluation*Hazardous Substance: *Gasoline***1. Temporal Trend at a Well (Concentration vs. Time & Groundwater Elevation : well-to-well analysis)**

Name of Sampling Well?	MW-4	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	20.872%		
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	25-Sep-97
Plot #2: Sampling date #2	25-Aug-11
Plot #3: Sampling date #3	22-Aug-13
Plot #4: Sampling date #4	21-Nov-13
Plot #5: Sampling date #5	
Plot #6: Sampling date #6	



Module 2: Temporal Analysis: Concentration of contaminant vs. time (Regression Analysis at each well)

Site Name: Hilton Seattle Hotel

Site Address: Seattle, WA

Additional Description: NA Evaluation

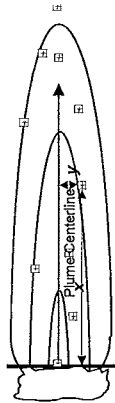
Hazardous Substance Gasoline

1. Level of Confidence (Decision Criteria)?														85%	
2. Prediction: Calculation of Restoration Time and Predicted Concentration at Wells															
Well Location		MW-5	MW-2	MW-3	MW-4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
A. Cleanup Level (Criterion) to be achieved? ug/L		800	800	800	800										
A.1. Average (@50% CL ¹ best-fitting values)															
Time to reach the criterion yr		NA	NA	-2.34	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Date when the Criterion to be achieved date		NA	NA	5/24/95	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
A.2 Boundary (@85% CL)															
Time to reach the criterion ² yr		NA	NA	-3.78	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Date when the Criterion to be achieved date		NA	NA	12/16/93	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B Date of Prediction? date		9/30/14	9/30/14	9/30/14	9/30/14										
B.1 Average conc predicted (@50% CL) ug/L		#DIV/0!	NA	174.43	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B.2 Boundary conc predicted (@85% CL) ug/L		#DIV/0!	NA	290.11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Log-Linear Regression Results															
Coefficient of Determination r^2		NA	0.234	0.844	0.044	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Correlation Coefficient r		NA	-0.483	-0.919	0.209	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Number of data points n		1	4	4	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4. Statistical Inference on the Slope of the Log-Linear Regression Line with t-statistics															
One-tailed Confidence Level calculated, %		NA	48.3322%	91.868%	20.872%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sufficient evidence to support that the slope of the regression line is significantly different from zero?		NA	NO!	YES!	NO!	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Coefficient of Variation?		NA	0.423	NA	1.048	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Plume Stability?		NA	Stable	Shrinking	UD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5. Calculation of Point Decay Rate Constant (k_{point})															
Slope: Point decay rate constant (k_{point}) yr ⁻¹		NA	0.030	0.079	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Half Life for (k_{point}) yr		NA	22.875	8.813	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	14.214	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Note: 1. CL : Confidence Level; UD= Undetermined

2. The length of time that will actually be required is estimated to be no more than years calculated (@ 85% of confidence level.)

Site Name:	Hilton Seattle Hotel
Site Address:	Seattle, WA
Additional Description:	NA Evaluation
Hazardous Substance	Toluene



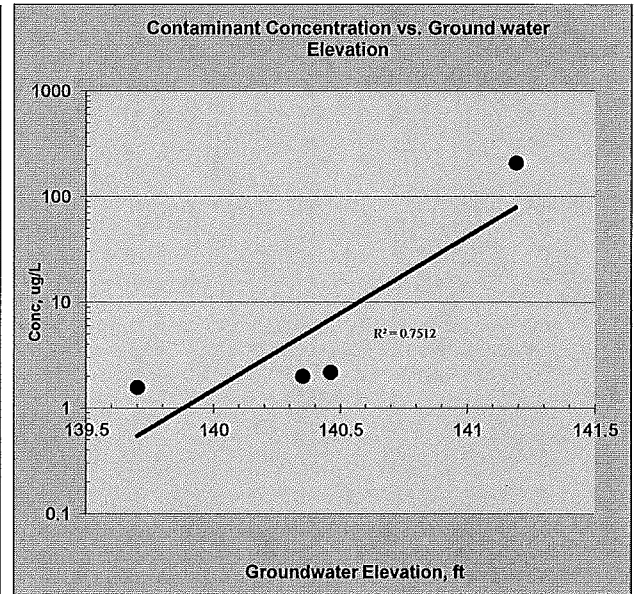
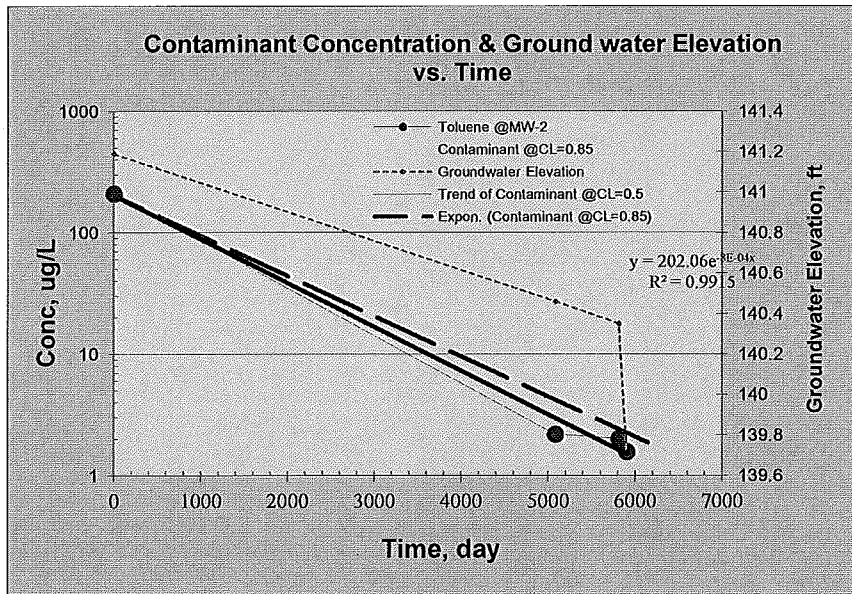
Note: relationship of " $y/x \leq 0.33$ " is preferred

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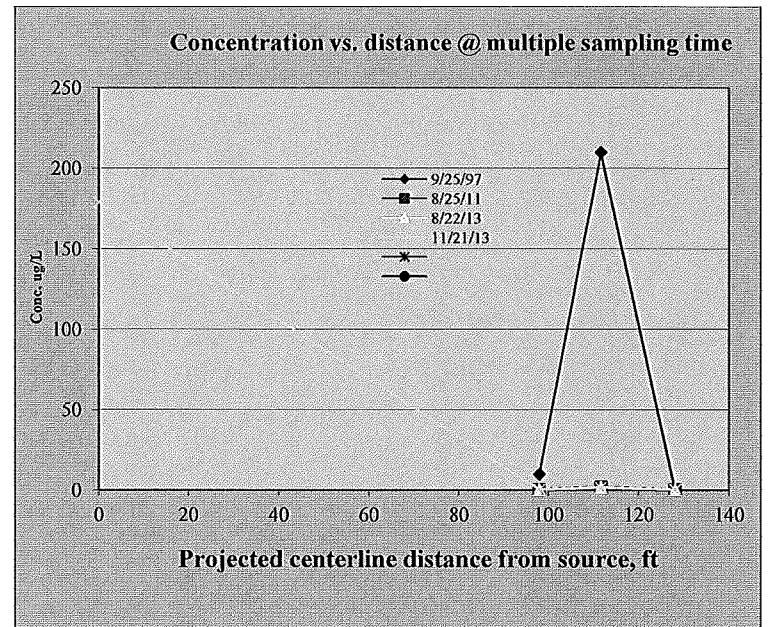
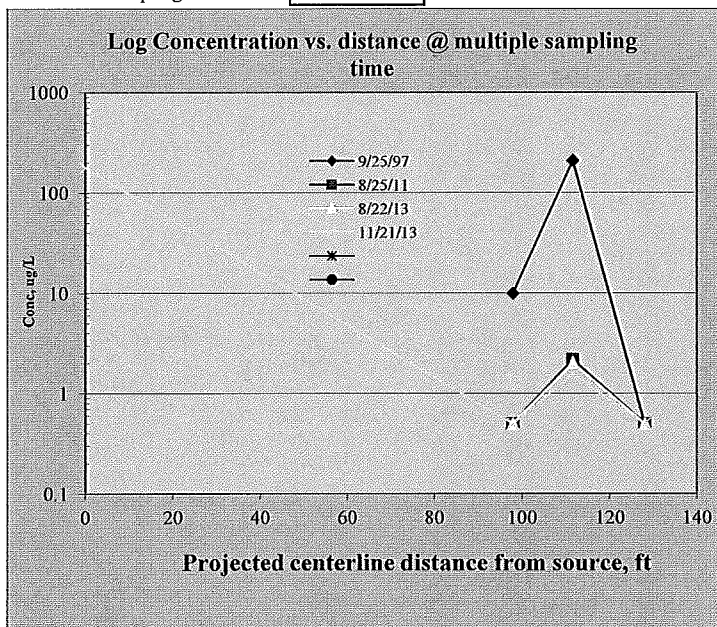
Well Location:					
Sampling Event	Date sampled	Day			
#1	9/25/97	0	142.59	141.19	140.75
#2	8/25/11	5082	141.17	140.46	140.16
#3	8/22/13	5810	140.84	140.35	140.14
#4	11/21/13	5901	140.18	139.7	139.52
#5					138.05
#6					
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Module 2: Graphical Presentation of Historical Ground Water Data: (Well to Well Analysis)Site Name: *Hilton Seattle Hotel*Site Address: *Seattle, WA*Additional Description: *NA Evaluation*Hazardous Substance: *Toluene***1. Temporal Trend at a Well (Concentration vs. Time & Groundwater Elevation : well-to-well analysis)**

Name of Sampling Well?	MW-2	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	99.573%		
Plume Stability?	Shrinking	; Decision Criteria is 85%.	
Slope: Point decay rate constant (k_{point}), yr^{-1}	0.303 @50% C.L.;	0.278 @85% C.L.	
Half Life for k_{point} , yr	2.285 @50% C.L.;	2.489 @85% C.L.	

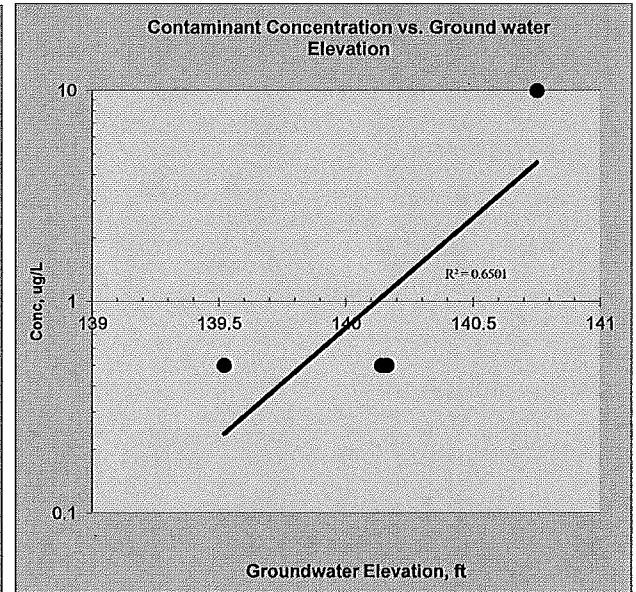
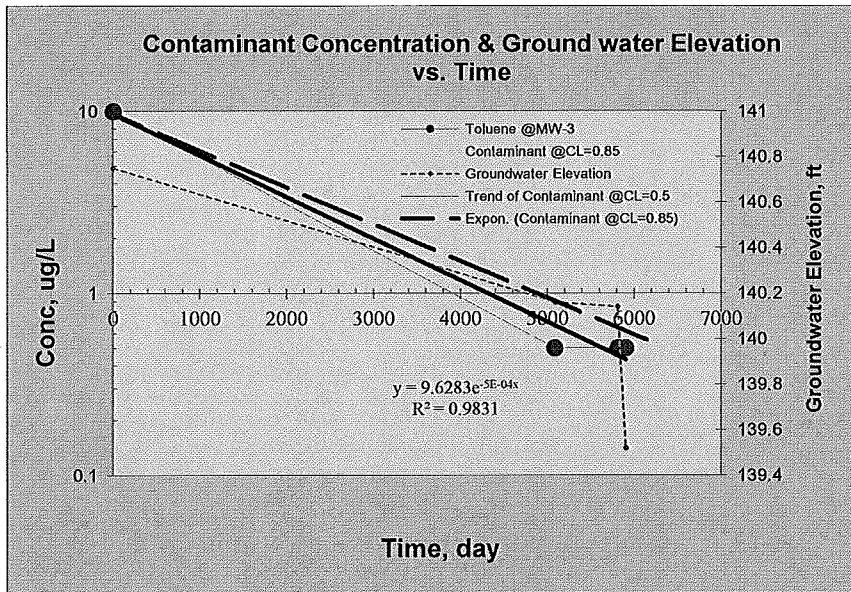
**2. Spatial and Temporal Trend along Overall Plume Length for Multiple Wells:**

Plot #1: Sampling date #1	25-Sep-97
Plot #2: Sampling date #2	25-Aug-11
Plot #3: Sampling date #3	22-Aug-13
Plot #4: Sampling date #4	21-Nov-13
Plot #5: Sampling date #5	
Plot #6: Sampling date #6	

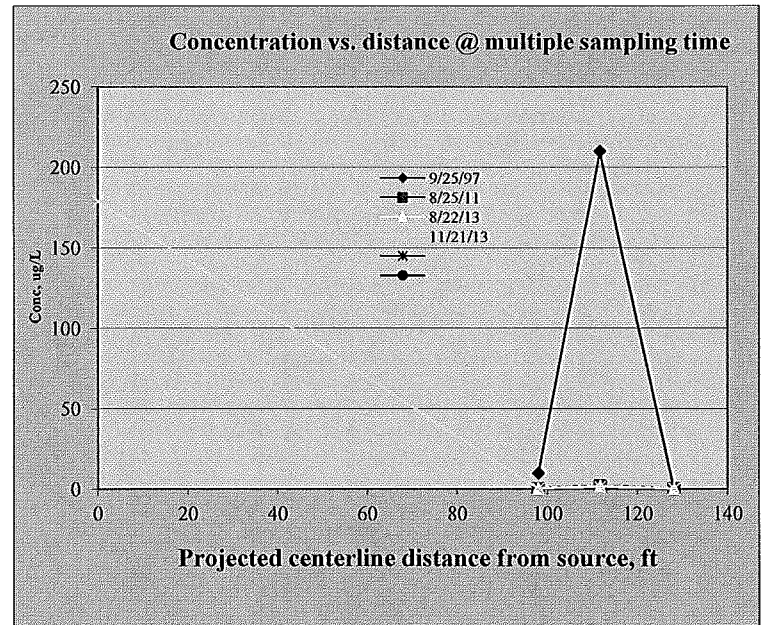
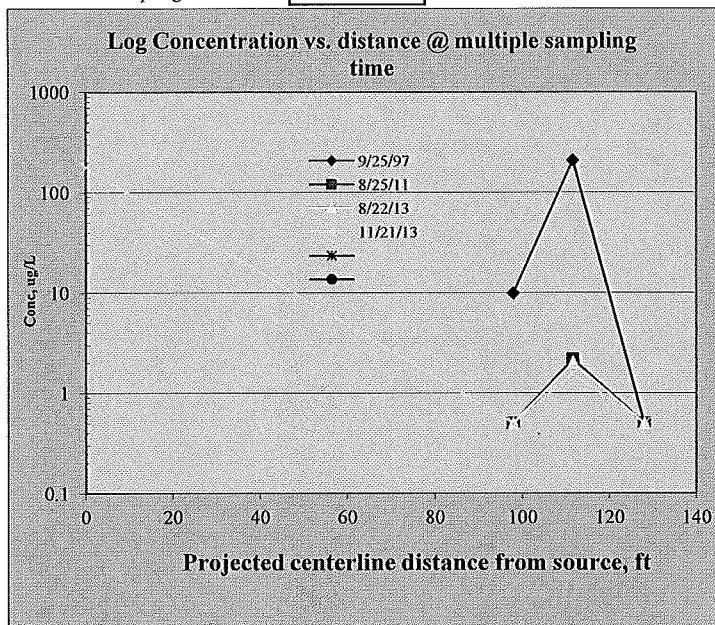


Module 2: Graphical Presentation of Historical Ground Water Data: (Well to Well Analysis)Site Name: *Hilton Seattle Hotel*Site Address: *Seattle, WA*Additional Description: *NA Evaluation*Hazardous Substance: *Toluene***1. Temporal Trend at a Well (Concentration vs. Time & Groundwater Elevation : well-to-well analysis)**

Name of Sampling Well?	MW-3	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	99.153%		
Plume Stability?	Shrinking	; Decision Criteria is 85%.	
Slope: Point decay rate constant (k_{point}), yr^{-1}	0.192 @50% C.L.;	0.170 @85% C.L.	
Half Life for k_{point} , yr	3.609 @50% C.L.;	4.082 @85% C.L.	

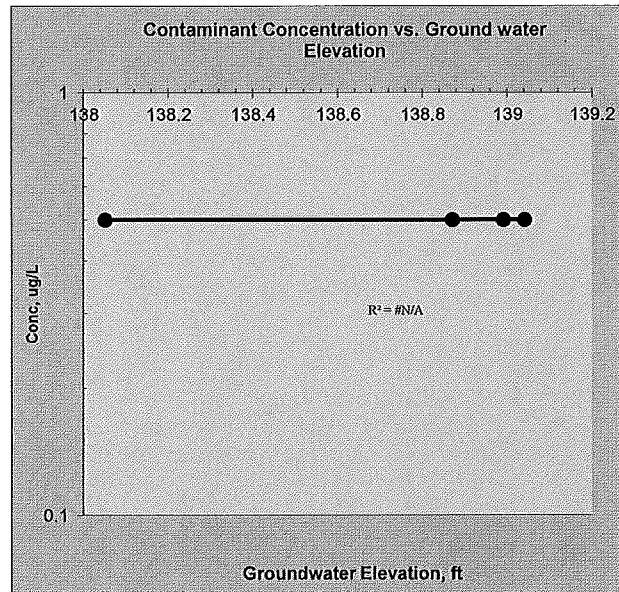
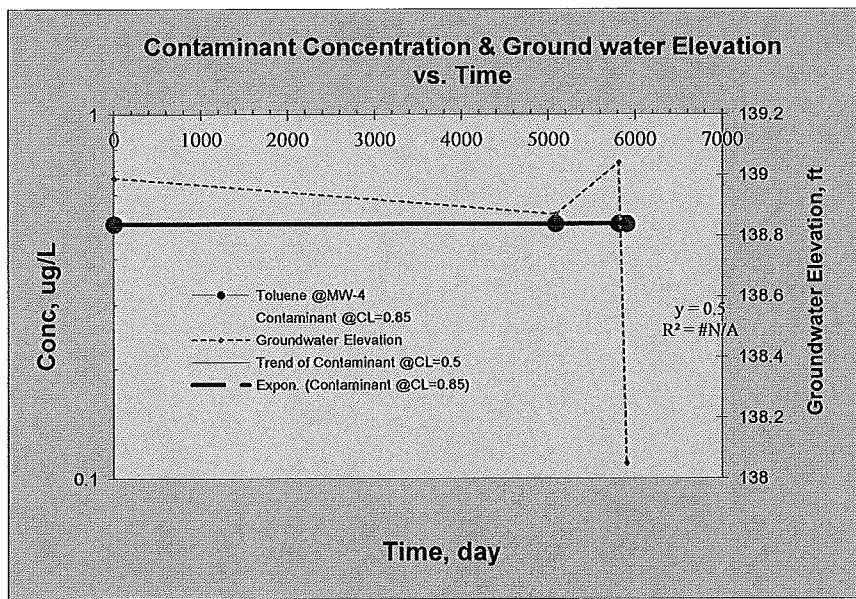
**2. Spatial and Temporal Trend along Overall Plume Length for Multiple Wells:**

Plot #1: Sampling date #1	25-Sep-97
Plot #2: Sampling date #2	25-Aug-11
Plot #3: Sampling date #3	22-Aug-13
Plot #4: Sampling date #4	21-Nov-13
Plot #5: Sampling date #5	
Plot #6: Sampling date #6	

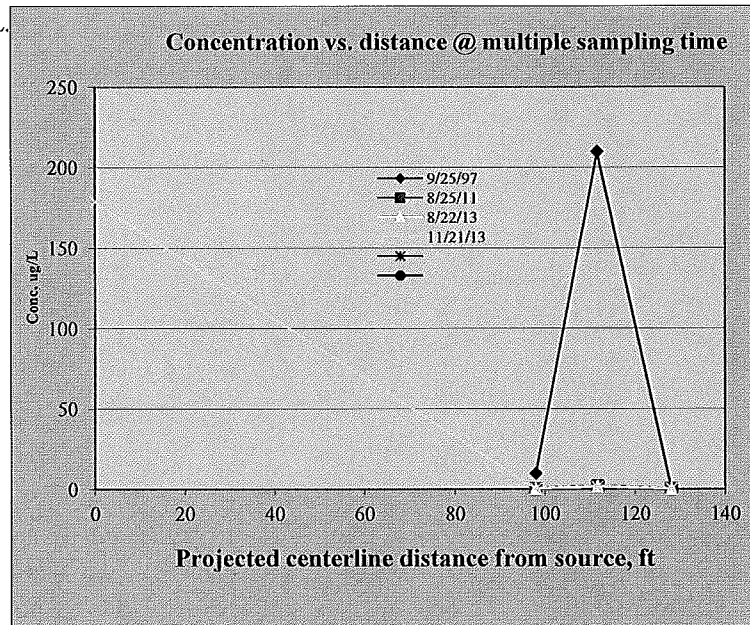
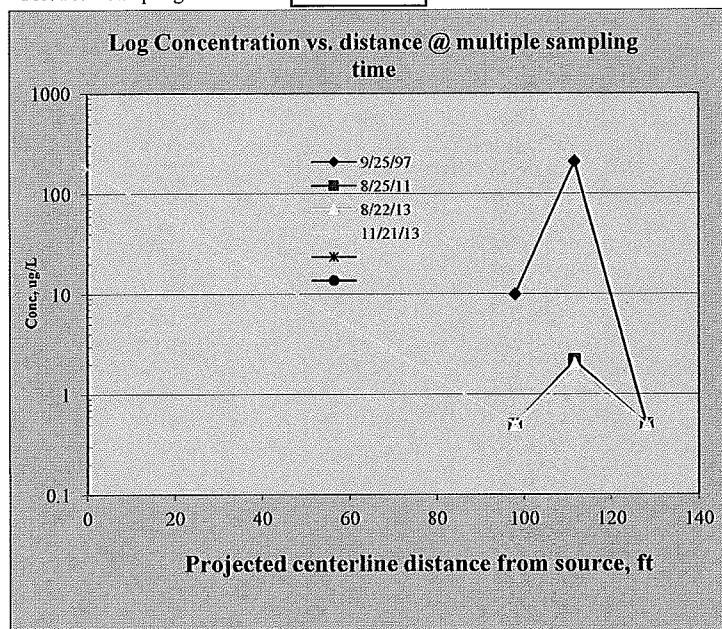


Module 2: Graphical Presentation of Historical Ground Water Data: (Well to Well Analysis)Site Name: *Hilton Seattle Hotel*Site Address: *Seattle, WA*Additional Description: *NA Evaluation*Hazardous Substance: *Toluene***1. Temporal Trend at a Well (Concentration vs. Time & Groundwater Elevation : well-to-well analysis)**

Name of Sampling Well?	MW-4	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	NA		
Plume Stability?	NA	; 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	25-Sep-97
Plot #2: Sampling date #2	25-Aug-11
Plot #3: Sampling date #3	22-Aug-13
Plot #4: Sampling date #4	21-Nov-13
Plot #5: Sampling date #5	
Plot #6: Sampling date #6	



Module 2: Temporal Analysis: Concentration of contaminant vs. time (Regression Analysis at each well)Site Name: *Hilton Seattle Hotel*Site Address: *Seattle, WA*Additional Description: *NA Evaluation**Hazardous Substance Toluene*

1. Level of Confidence (Decision Criteria)?												85%											
2. Prediction: Calculation of Restoration Time and Predicted Concentration at Wells																							
Well Location		MW-5	MW-2	MW-3	MW-4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
A. Cleanup Level (Criterion) to be achieved?		ug/L	1000	1000	1000																		
A.1 Average (@50% CL ¹ best-fitting values)																							
Time to reach the criterion		yr	NA	-5.27	-24.18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Date when the Criterion to be achieved		date	NA	6/18/92	7/28/73	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
A.2 Boundary (@85% CL)																							
Time to reach the criterion ²		yr	NA	-5.74	-27.34	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Date when the Criterion to be achieved		date	NA	12/29/91	5/30/70	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
B Date of Prediction?		date	9/30/14	9/30/14	9/30/14	9/30/14																	
B.1 Average conc predicted (@50% CL)		ug/L	#DIV/0!	1.16	0.37	#DIV/0!	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
B.2 Boundary conc predicted (@85% CL)		ug/L	#DIV/0!	1.77	0.53	#DIV/0!	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	

3. Log-Linear Regression Results

Coefficient of Determination	r^2	NA	0.991	0.983	NA	NA	NA	NA	NA	NA	NA
Correlation Coefficient	r	NA	-0.996	-0.992	NA	NA	NA	NA	NA	NA	NA
Number of data points	n	1	4	4	4	NA	NA	NA	NA	NA	NA

4. Statistical Inference on the Slope of the Log-Linear Regression Line with t-statistics

One-tailed Confidence Level calculated, %	NA	99.573%	99.153%	NA	NA	NA	NA	NA	NA	NA	NA
Sufficient evidence to support that the slope of the regression line is significantly different from zero?	NA	YES!	YES!	NA	NA	NA	NA	NA	NA	NA	NA
Coefficient of Variation?	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Plume Stability?	NA	Shrinking	Shrinking	NA	NA	NA	NA	NA	NA	NA	NA

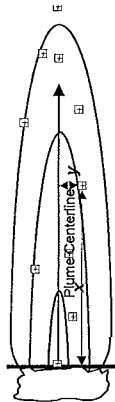
5. Calculation of Point Decay Rate Constant (k_{point})

Slope: Point decay rate constant (k_{point})	@50% CL	yr ⁻¹	NA	0.303	0.192	NA	NA	NA	NA	NA	NA
	@85% CL	yr ⁻¹	NA	0.278	0.170	NA	NA	NA	NA	NA	NA
Half Life for (k_{point})	@50% CL	yr	NA	2.285	3.609	NA	NA	NA	NA	NA	NA
	@85% CL	yr	NA	2.489	4.082	NA	NA	NA	NA	NA	NA

Note: 1. CL : Confidence Level; UD= Undetermined

2. The length of time that will actually be required is estimated to be no more than years calculated (@ 85% of confidence level.)

Site Name:	Hilton Seattle Hotel
Site Address:	Seattle, WA
Additional Description:	NA Evaluation
Hazardous Substance	Xylenes



Note: relationship of " $y/x \leq 0.33$ " is preferred

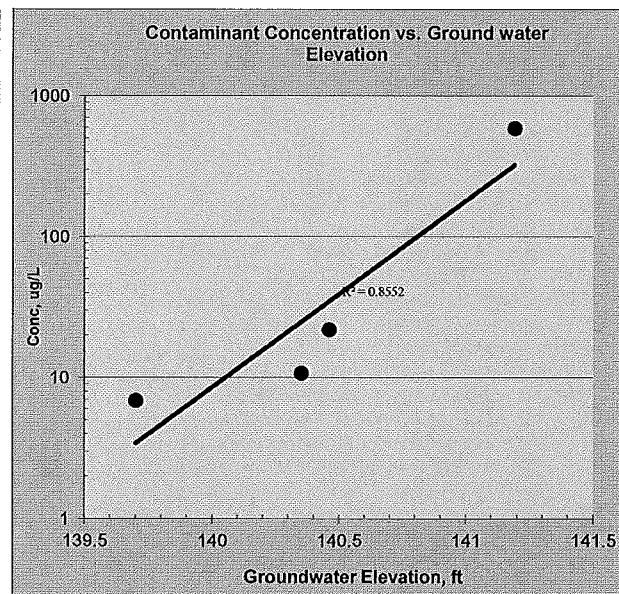
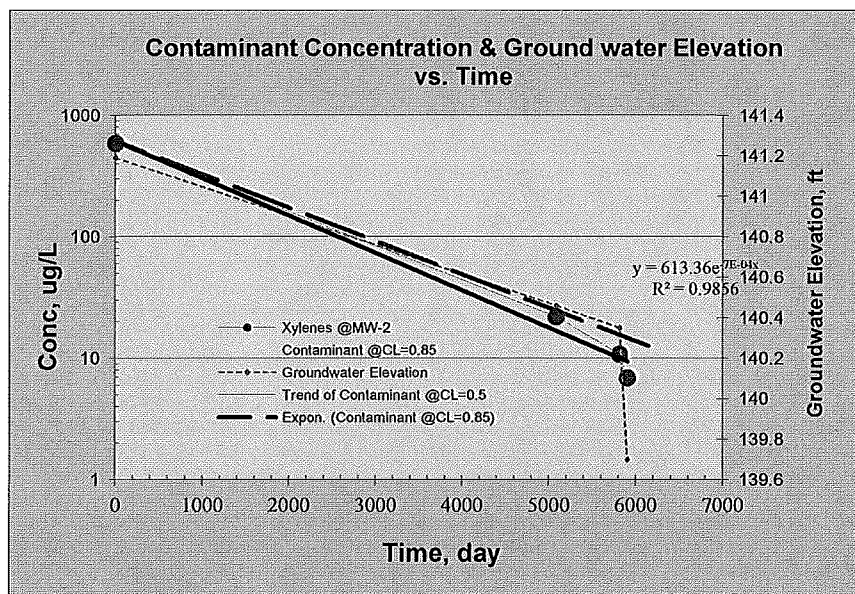
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Well Location:

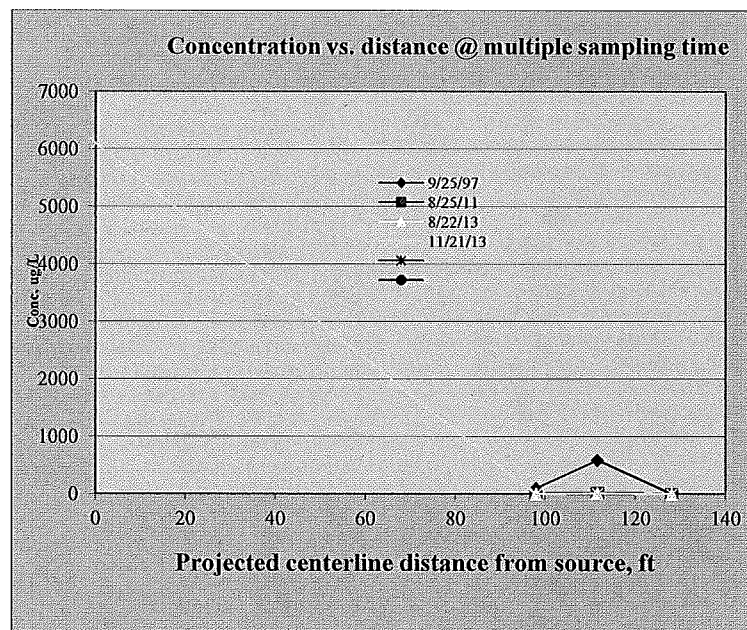
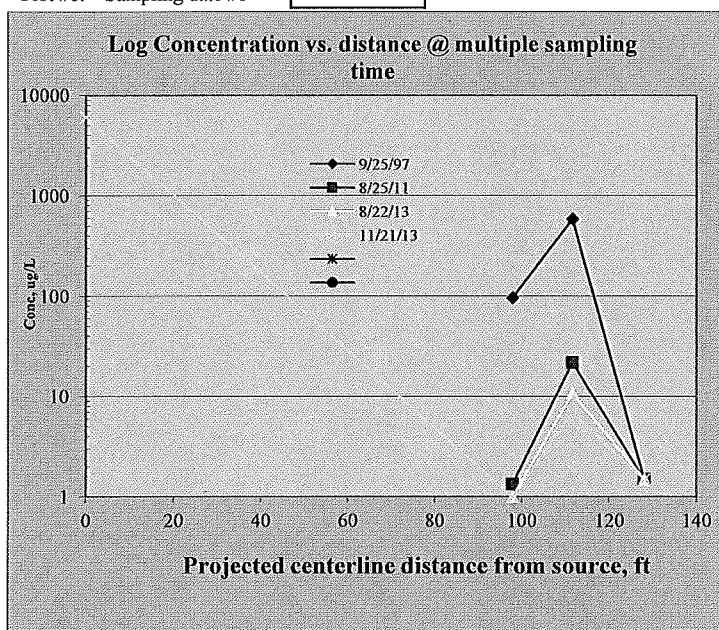
Well Location:						
Sampling Event	Date sampled	Day				
#1	9/25/97	0	142.59	141.19	140.75	138.99
#2	8/25/11	5082	141.17	140.46	140.16	138.87
#3	8/22/13	5810	140.84	140.35	140.14	139.04
#4	11/21/13	5901	140.18	139.7	139.52	138.05
#5						
#6						
#7						
#8						
#9						
#10						
#11						
#12						
#13						
#14						
#15						
#16						
#17						
#18						
#19						
#20						

Module 2: Graphical Presentation of Historical Ground Water Data: (Well to Well Analysis)Site Name: *Hilton Seattle Hotel*Site Address: *Seattle, WA*Additional Description: *NA Evaluation*Hazardous Substance: *Xylenes***1. Temporal Trend at a Well (Concentration vs. Time & Groundwater Elevation : well-to-well analysis)**

Name of Sampling Well?	MW-2	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	99.275%		
Plume Stability?	Shrinking	; Decision Criteria is 85%.	
Slope: Point decay rate constant (k_{point}), yr^{-1}	0.259 @50% C.L.;	0.231 @85% C.L.	
Half Life for k_{point} , yr	2.681 @50% C.L.;	3.003 @85% C.L.	

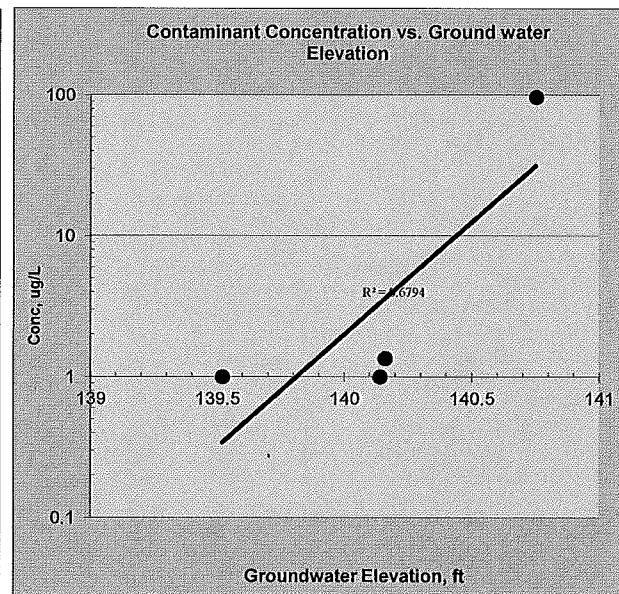
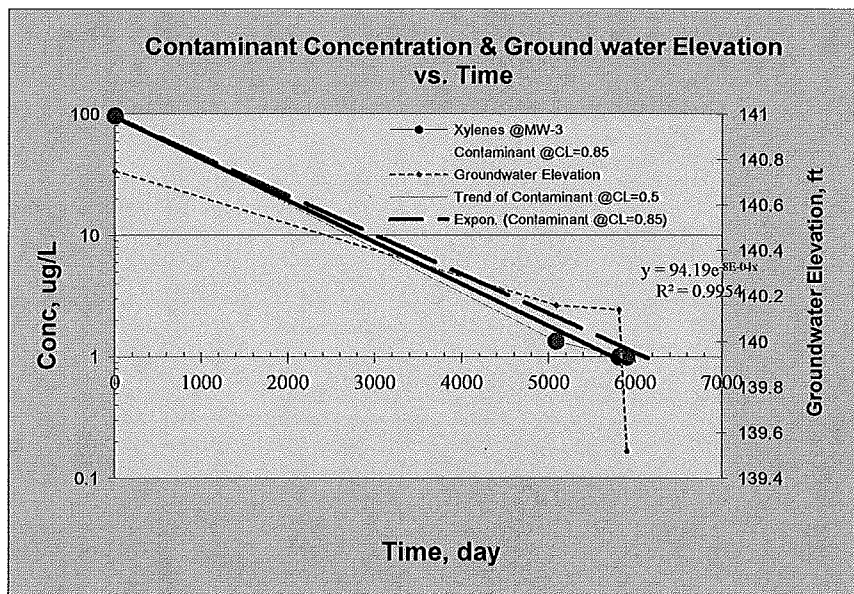
**2. Spatial and Temporal Trend along Overall Plume Length for Multiple Wells:**

Plot #1: Sampling date #1	25-Sep-97
Plot #2: Sampling date #2	25-Aug-11
Plot #3: Sampling date #3	22-Aug-13
Plot #4: Sampling date #4	21-Nov-13
Plot #5: Sampling date #5	
Plot #6: Sampling date #6	

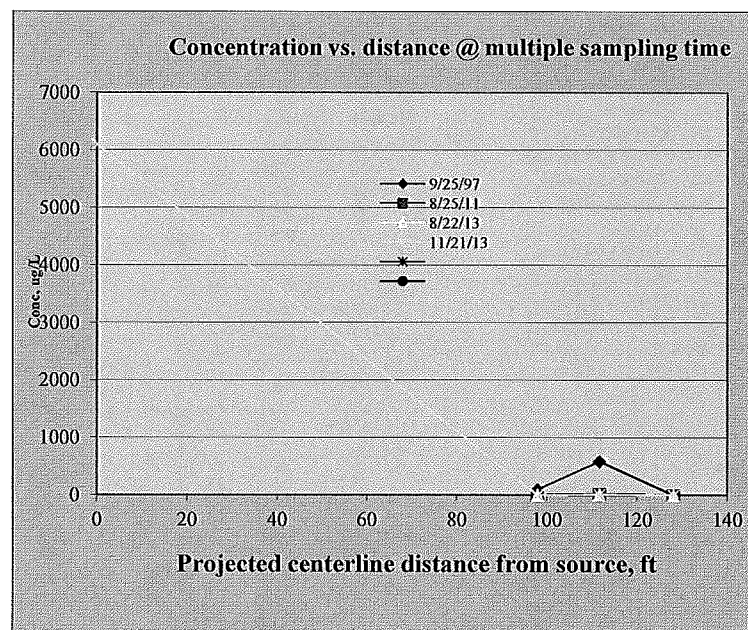
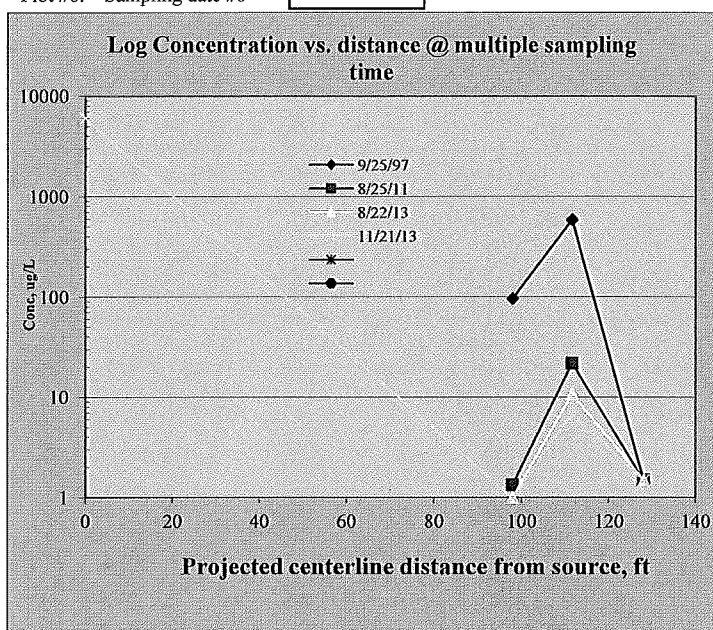


Module 2: Graphical Presentation of Historical Ground Water Data: (Well to Well Analysis)Site Name: *Hilton Seattle Hotel*Site Address: *Seattle, WA*Additional Description: *NA Evaluation*Hazardous Substance *Xylenes***1. Temporal Trend at a Well (Concentration vs. Time & Groundwater Elevation : well-to-well analysis)**

Name of Sampling Well?	MW-3	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	99.771%		
Plume Stability?	Shrinking	; Decision Criteria is 85%.	
Slope: Point decay rate constant (k_{point}), yr^{-1}	0.289 @50% C.L.;	0.272 @85% C.L.	
Half Life for k_{point} , yr	2.397 @50% C.L.;	2.549 @85% C.L.	

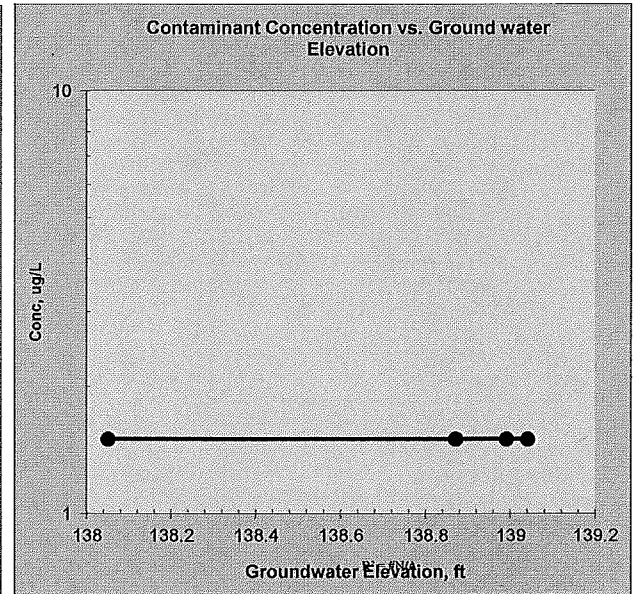
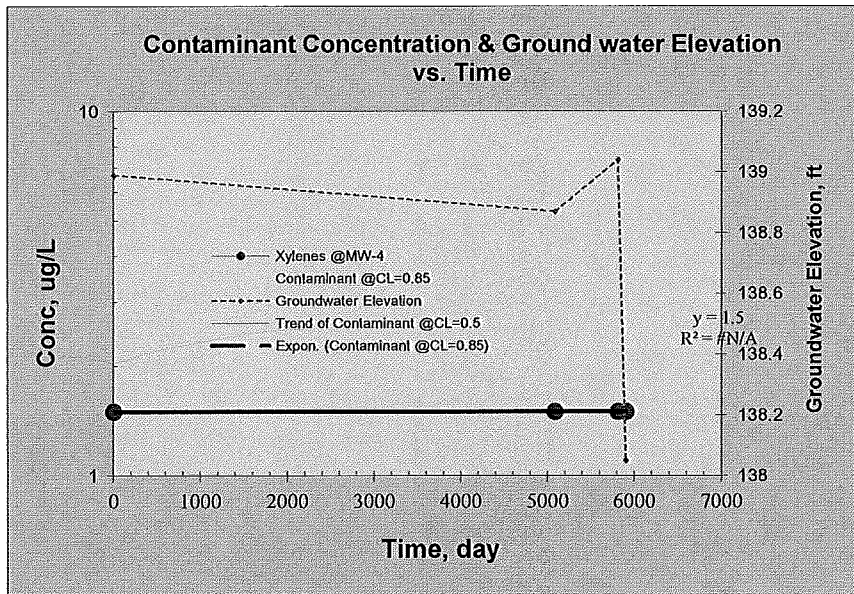
**2. Spatial and Temporal Trend along Overall Plume Length for Multiple Wells:**

Plot #1: Sampling date #1	25-Sep-97
Plot #2: Sampling date #2	25-Aug-11
Plot #3: Sampling date #3	22-Aug-13
Plot #4: Sampling date #4	21-Nov-13
Plot #5: Sampling date #5	
Plot #6: Sampling date #6	

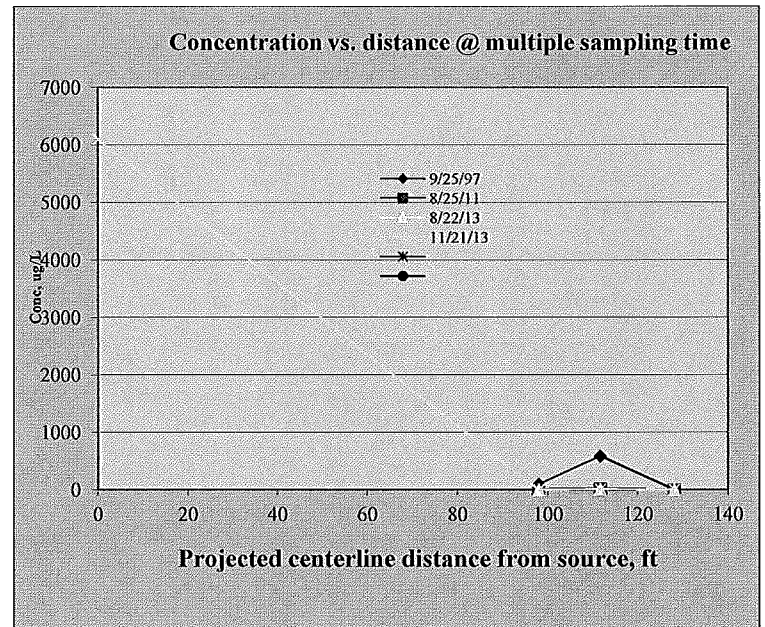
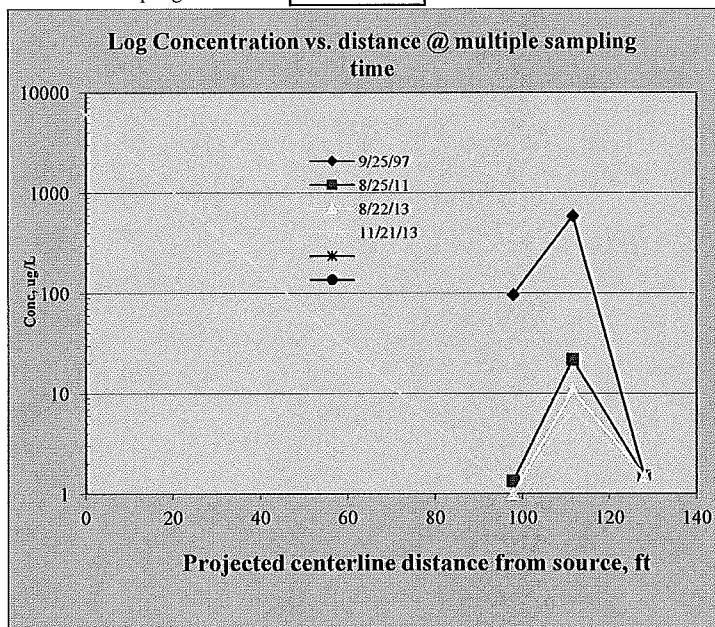


Module 2: Graphical Presentation of Historical Ground Water Data: (Well to Well Analysis)Site Name: *Hilton Seattle Hotel*Site Address: *Seattle, WA*Additional Description: *NA Evaluation*Hazardous Substance: *Xylenes***1. Temporal Trend at a Well (Concentration vs. Time & Groundwater Elevation : well-to-well analysis)**

Name of Sampling Well?	MW-4	Confidence Level (Decision Criteria)?	85.0%
Confidence Level calculated with log-linear regression is?	NA		
Plume Stability?	NA	; 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	25-Sep-97
Plot #2: Sampling date #2	25-Aug-11
Plot #3: Sampling date #3	22-Aug-13
Plot #4: Sampling date #4	21-Nov-13
Plot #5: Sampling date #5	
Plot #6: Sampling date #6	



Module 2: Temporal Analysis: Concentration of contaminant vs. time (Regression Analysis at each well)

Site Name: Hilton Seattle Hotel

Site Address: Seattle, WA

Additional Description: NA Evaluation

Hazardous Substance Xylenes

1. Level of Confidence (Decision Criteria)?												85%	
2. Prediction: Calculation of Restoration Time and Predicted Concentration at Wells													
Well Location		MW-5	MW-2	MW-3	MW-4	NA	NA	NA	NA	NA	NA	NA	NA
A. Cleanup Level (Criterion) to be achieved?		ug/L	1000	1000	1000	NA	NA	NA	NA	NA	NA	NA	NA
A.1 Average (@50% CL best-fitting values)													
Time to reach the criterion		yr	NA	-1.89	-8.17	NA	NA	NA	NA	NA	NA	NA	NA
Date when the Criterion to be achieved		date	NA	11/4/95	7/27/89	NA	NA	NA	NA	NA	NA	NA	NA
A.2 Boundary (@85% CL)													
Time to reach the criterion ²		yr	NA	-2.12	-8.69	NA	NA	NA	NA	NA	NA	NA	NA
Date when the Criterion to be achieved		date	NA	8/14/95	1/18/89	NA	NA	NA	NA	NA	NA	NA	NA
B Date of Prediction?		date	9/30/14	9/30/14	9/30/14	9/30/14							
B.1 Average conc predicted (@50% CL)		ug/L	#DIV/0!	7.52	0.68	#DIV/0!	NA	NA	NA	NA	NA	NA	NA
B.2 Boundary conc predicted (@85% CL)		ug/L	#DIV/0!	12.05	0.92	#DIV/0!	NA	NA	NA	NA	NA	NA	NA
3. Log-Linear Regression Results													
Coefficient of Determination		r^2	NA	0.986	0.995	NA	NA	NA	NA	NA	NA	NA	NA
Correlation Coefficient		r	NA	-0.993	-0.998	NA	NA	NA	NA	NA	NA	NA	NA
Number of data points		n	1	4	4	4	NA	NA	NA	NA	NA	NA	NA
4. Statistical Inference on the Slope of the Log-Linear Regression Line with t-statistics													
One-tailed Confidence Level calculated, %			NA	99.275%	99.771%	NA	NA	NA	NA	NA	NA	NA	NA
Sufficient evidence to support that the slope of the regression line is significantly different from zero?			NA	YES!	YES!	NA	NA	NA	NA	NA	NA	NA	NA
Coefficient of Variation?			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Plume Stability?			NA	Shrinking	Shrinking	NA	NA	NA	NA	NA	NA	NA	NA
5. Calculation of Point Decay Rate Constant (k_{point})													
Slope: Point decay rate constant (k_{point})		yr^{-1}	NA	0.259	0.289	NA	NA	NA	NA	NA	NA	NA	NA
		yr^{-1}	NA	0.231	0.272	NA	NA	NA	NA	NA	NA	NA	NA
Half Life for (k_{point})		yr	NA	2.681	2.397	NA	NA	NA	NA	NA	NA	NA	NA
		yr	NA	3.003	2.549	NA	NA	NA	NA	NA	NA	NA	NA

Note: 1. CL : Confidence Level; UD= Undetermined

2. The length of time that will actually be required is estimated to be no more than years calculated (@ 85% of confidence level.)

Module 3: Assimilative Capacity and Geochemical Indicator PlotSite Name: *Hilton Seattle Hotel*Site Address: *Seattle, WA*Additional Description: *NA Evaluation***1. Monitoring Well information: Enter Average Contaminant Concentrations at the Monitoring Wells**

Sampling Location:	Unit				MW-5	MW-2	MW-3	MW-4						
Centerline Distance from source	ft				0	44	78	128						
Benzene	ug/L				230	1.4	0.5	0.5						
Toluene	ug/L				179	1.57	0.5	0.5						
Ethylbenzene	ug/L				1070	83	0.5	0.5						
Xylenes	ug/L				6100	6.9	1	1						
Gasoline	ug/L				98100	1760	235	25						
User-specified chemical2	ug/L													
User-specified chemical3	ug/L													

2. Enter Average Geochemical Indicator's Concentrations (direct measurement) at the Monitoring Wells.

	Unit	Background	NA	NA	NA	MW-5	MW-2	MW-3	MW-4	NA	NA	NA	NA	NA
Dissolved Oxygen	mg/L						0.29	0.31	0.51					
Nitrate	mg/L	0.05				0.05	0.05	0.05	0.05					
Sulfate	mg/L	3.86				3.86	0.15	0.15	30.9					
Manganese	mg/L													
Ferrous Iron	mg/L	5.3				5.3	3.15	4.9	0.08					
Methane	mg/L													
Redox Potential, E_H	mV						-136.2	-152.1	-150.2					
Alkalinity	mg/L													
pH	unitless						6.88	6.91	7.69					

3. Expressed Assimilative Capacity Calculation: Utilization Factor (UF)

Contaminant for UF Selection

Benzene**Equivalent Contaminant Degradation**

	Unit	UF	NA	NA	NA	MW-5	MW-2	MW-3	MW-4	NA	NA	NA	NA	NA
Dissolved Oxygen utilized	mg/L	0.33	N/A	N/A	N/A	N/A	-0.1	-0.1	-0.2	N/A	N/A	N/A	N/A	N/A
Nitrate utilized	mg/L	0.21	N/A	N/A	N/A	0.0	0.0	0.0	0.0	N/A	N/A	N/A	N/A	N/A
Sulfate utilized	mg/L	0.22	N/A	N/A	N/A	0.0	0.8	0.8	-5.9	N/A	N/A	N/A	N/A	N/A
Manganese produced	mg/L	0.09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ferrous Iron produced	mg/L	0.047	N/A	N/A	N/A	0.0	-0.1	0.0	-0.2	N/A	N/A	N/A	N/A	N/A
Methane produced	mg/L	1.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	mg/L		N/A	N/A	N/A	N/A	0.6	0.7	-6.4	N/A	N/A	N/A	N/A	N/A

4. Geochemical Indicator Plot

Hazardous Substance

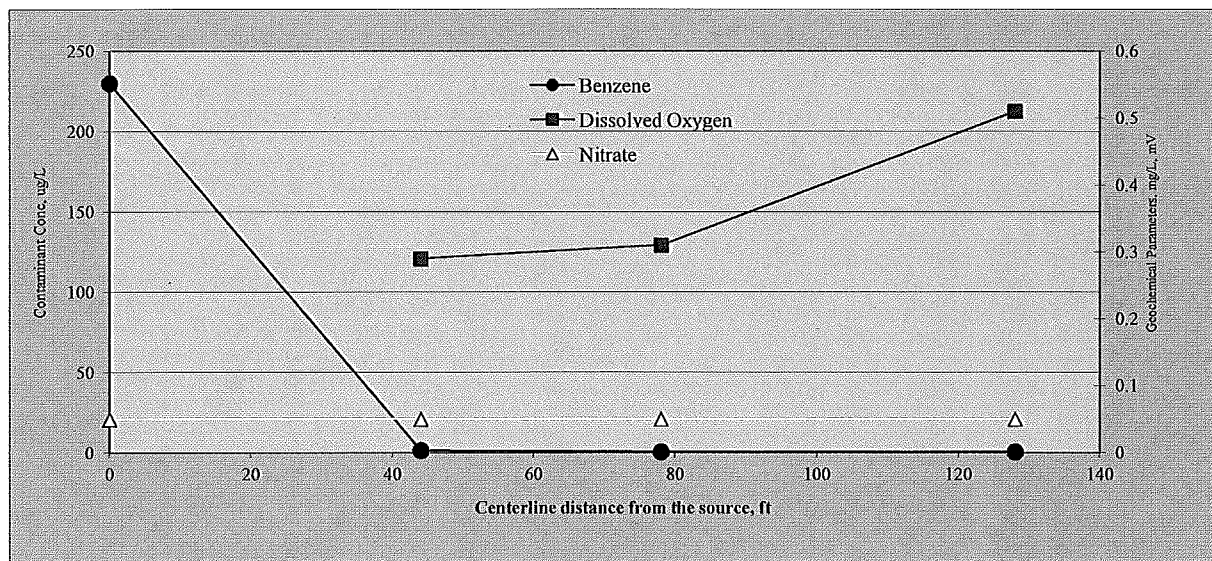
Geochemical Indicator?

Geochemical Indicator?

Benzene

Nitrate

Dissolved Oxygen



Module 3: Assimilative Capacity and Geochemical Indicator PlotSite Name: Hilton Seattle HotelSite Address: Seattle, WAAdditional Description: NA Evaluation**1. Monitoring Well information: Enter Average Contaminant Concentrations at the Monitoring Wells**

Sampling Location:	Unit				MW-5	MW-2	MW-3	MW-4						
Centerline Distance from source	ft				0	44	78	128						
Benzene	ug/L				230	1.4	0.5	0.5						
Toluene	ug/L				179	1.57	0.5	0.5						
Ethylbenzene	ug/L				1070	83	0.5	0.5						
Xylenes	ug/L				6100	6.9	1	1						
Gasoline	ug/L				98100	1760	235	25						
User-specified chemical2	ug/L													
User-specified chemical3	ug/L													

2. Enter Average Geochemical Indicator's Concentrations (direct measurement) at the Monitoring Wells.

	Unit	Background	NA	NA	NA	MW-5	MW-2	MW-3	MW-4	NA	NA	NA	NA	NA
Dissolved Oxygen	mg/L						0.29	0.31	0.51					
Nitrate	mg/L	0.05				0.05	0.05	0.05	0.05					
Sulfate	mg/L	3.86				3.86	0.15	0.15	30.9					
Manganese	mg/L													
Ferrous Iron	mg/L	5.3				5.3	3.15	4.9	0.08					
Methane	mg/L													
Redox Potential, E_H	mV						-136.2	-152.1	-150.2					
Alkalinity	mg/L													
pH	unitless						6.88	6.91	7.69					

3. Expressed Assimilative Capacity Calculation: Utilization Factor (UF)

Contaminant for UF Selection

Benzene**Equivalent Contaminant Degradation**

	Unit	UF	NA	NA	NA	MW-5	MW-2	MW-3	MW-4	NA	NA	NA	NA	NA
Dissolved Oxygen utilized	mg/L	0.33	N/A	N/A	N/A	N/A	-0.1	-0.1	-0.2	N/A	N/A	N/A	N/A	N/A
Nitrate utilized	mg/L	0.21	N/A	N/A	N/A	0.0	0.0	0.0	0.0	N/A	N/A	N/A	N/A	N/A
Sulfate utilized	mg/L	0.22	N/A	N/A	N/A	0.0	0.8	0.8	-5.9	N/A	N/A	N/A	N/A	N/A
Manganese produced	mg/L	0.09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ferrous Iron produced	mg/L	0.047	N/A	N/A	N/A	0.0	-0.1	0.0	-0.2	N/A	N/A	N/A	N/A	N/A
Methane produced	mg/L	1.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	mg/L		N/A	N/A	N/A	N/A	0.6	0.7	-6.4	N/A	N/A	N/A	N/A	N/A

4. Geochemical Indicator Plot

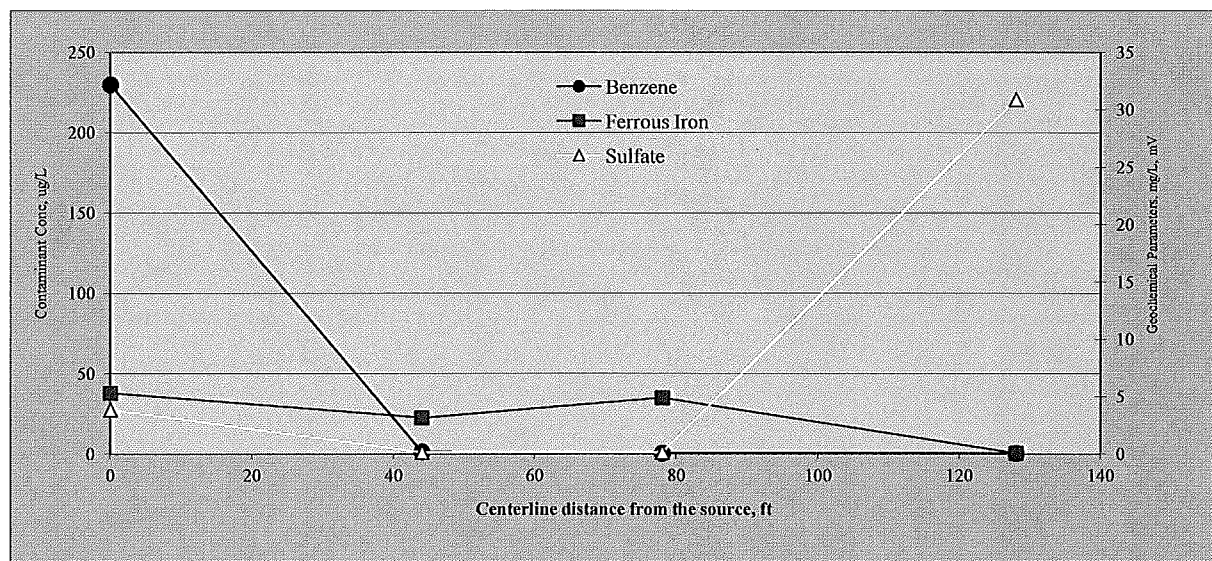
Hazardous Substance

Benzene

Geochemical Indicator?

Sulfate

Geochemical Indicator?

Ferrous Iron

Module 3: Assimilative Capacity and Geochemical Indicator PlotSite Name: *Hilton Seattle Hotel*Site Address: *Seattle, WA*Additional Description: *NA Evaluation***1. Monitoring Well information: Enter Average Contaminant Concentrations at the Monitoring Wells**

Sampling Location:	Unit				MW-5	MW-2	MW-3	MW-4						
Centerline Distance from source	ft				0	44	78	128						
Benzene	ug/L				230	1.4	0.5	0.5						
Toluene	ug/L				179	1.57	0.5	0.5						
Ethylbenzene	ug/L				1070	83	0.5	0.5						
Xylenes	ug/L				6100	6.9	1	1						
Gasoline	ug/L				98100	1760	235	25						
User-specified chemical2	ug/L													
User-specified chemical3	ug/L													

2. Enter Average Geochemical Indicator's Concentrations (direct measurement) at the Monitoring Wells.

	Unit	Background	NA	NA	NA	MW-5	MW-2	MW-3	MW-4	NA	NA	NA	NA	NA
Dissolved Oxygen	mg/L						0.29	0.31	0.51					
Nitrate	mg/L	0.05				0.05	0.05	0.05	0.05					
Sulfate	mg/L	3.86				3.86	0.15	0.15	30.9					
Manganese	mg/L													
Ferrous Iron	mg/L	5.3				5.3	3.15	4.9	0.08					
Methane	mg/L													
Redox Potential, E_H	mV						-136.2	-152.1	-150.2					
Alkalinity	mg/L													
pH	unitless						6.88	6.91	7.69					

3. Expressed Assimilative Capacity Calculation: Utilization Factor (UF)

Contaminant for UF Selection

Benzene**Equivalent Contaminant Degradation**

	Unit	UF	NA	NA	NA	MW-5	MW-2	MW-3	MW-4	NA	NA	NA	NA	NA
Dissolved Oxygen utilized	mg/L	0.33	N/A	N/A	N/A	N/A	-0.1	-0.1	-0.2	N/A	N/A	N/A	N/A	N/A
Nitrate utilized	mg/L	0.21	N/A	N/A	N/A	0.0	0.0	0.0	0.0	N/A	N/A	N/A	N/A	N/A
Sulfate utilized	mg/L	0.22	N/A	N/A	N/A	0.0	0.8	0.8	-5.9	N/A	N/A	N/A	N/A	N/A
Manganese produced	mg/L	0.09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ferrous Iron produced	mg/L	0.047	N/A	N/A	N/A	0.0	-0.1	0.0	-0.2	N/A	N/A	N/A	N/A	N/A
Methane produced	mg/L	1.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	mg/L		N/A	N/A	N/A	N/A	0.6	0.7	-6.4	N/A	N/A	N/A	N/A	N/A

4. Geochemical Indicator Plot

Hazardous Substance

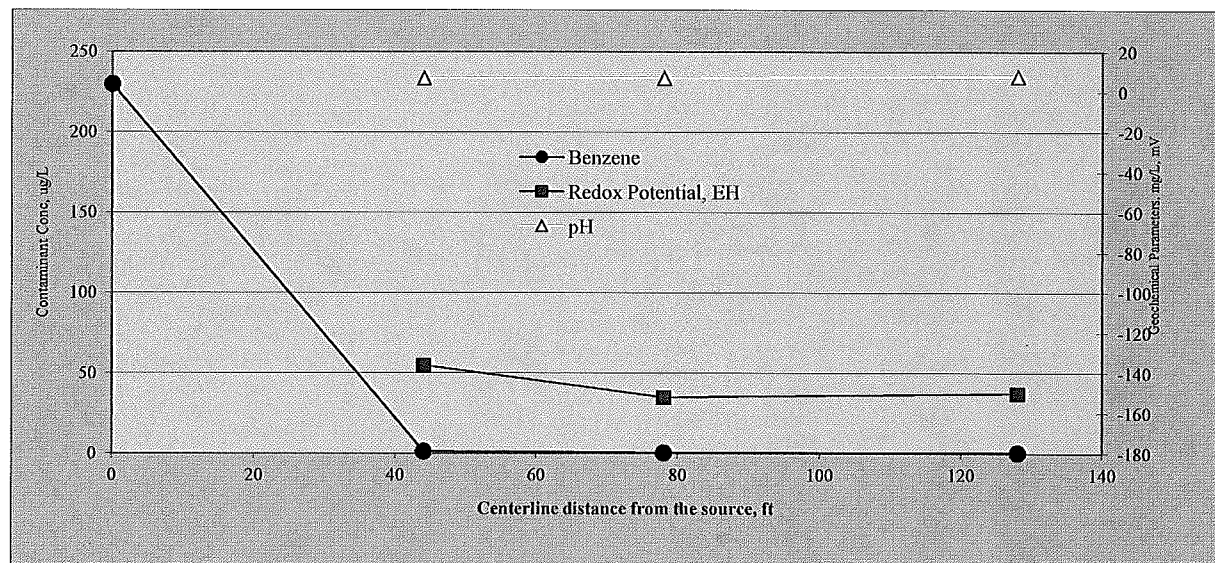
Benzene

Geochemical Indicator?

pH

Geochemical Indicator?

Redox Potential, EH



APPENDIX C

**IMPORTANT INFORMATION ABOUT YOUR
GEOTECHNICAL/ENVIRONMENTAL REPORT**



Date:	January 17, 2014
To:	Mr. Zahoor Ahmed
	R.C. Hedreen Company

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors which were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland