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WA State Department
of Ecology (SWRO)

GROUNDWATER MONITORING STATUS REPORT DECEMBER 2010

FORMER CUMMINGS OIL LEASE SITE
908 NORTHWEST KERRON AVENUE
WINLOCK, WASHINGTON
VCP NO. SW0775

Farallon Consulting, L.L.C.
975 5th Avenue Northwest
Issaquah, Washington 98027
Farallon PN: 283-005

For:



2454 Occidental Avenue South, Suite 1A
Seattle, Washington

May 4, 2011

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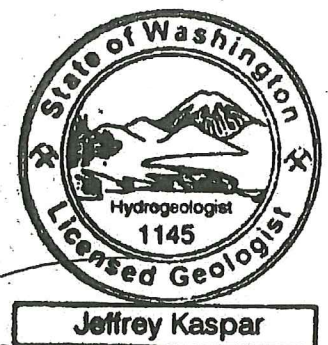
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ACRONYMS AND ABBREVIATIONS

BNSF	BNSF Railway Company
BTEX	benzene, toluene, ethylbenzene, and xylenes
DRO	total petroleum hydrocarbons as diesel-range organics
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
Farallon	Farallon Consulting, L.L.C.
GRO	total petroleum hydrocarbons as gasoline-range organics
µg/l	micrograms per liter
mg/l	milligrams per liter
MTCA	Washington State Model Toxics Control Act Cleanup Regulation
ORO	total petroleum hydrocarbons as oil-range organics
ORP	oxidation-reduction potential
PQLs	practical quantitation limits
Site	Former Cummings Oil Lease Site at 908 Northwest Kerron Avenue, Winlock, Washington
VCP	Voluntary Cleanup Program



1.0 INTRODUCTION

This Groundwater Monitoring Status Report has been prepared on behalf of BNSF Railway Company (BNSF) to summarize the results of the groundwater monitoring and sampling event conducted on December 27, 2010 at the former Cummings Oil Lease Site at 908 Northwest Kerron Avenue in Winlock, Lewis County, Washington (herein referred to as the Site) (Figure 1). Prior investigations and a tank removal and soil excavation cleanup action have confirmed that concentrations of total petroleum hydrocarbons as gasoline-range organics (GRO), as diesel-range organics (DRO), and as oil-range organics (ORO); and benzene, toluene, ethylbenzene, and xylenes (BTEX) were released to the subsurface as a result of historical activities at the Site. The groundwater monitoring and sampling is being performed to monitor concentrations of petroleum hydrocarbon constituents previously detected in groundwater above the Washington State Model Toxics Control Act Cleanup Regulation (MTCA) Method A cleanup levels, assess the effectiveness of the cleanup action, and determine whether natural attenuation of residual petroleum hydrocarbon constituents is occurring.

The cleanup action at the Site was performed under the Washington State Department of Ecology (Ecology) Voluntary Cleanup Program (VCP) in accordance with MTCA as established in Chapter 173-340 of the Washington Administrative Code (WAC 173-340); and the *Cleanup Action Work Plan, Former Cummings Oil Lease Site, 908 Northwest Kerron Avenue, Winlock, Washington* dated December 18, 2008, prepared by Farallon (2008) (Work Plan). The Site was entered into the VCP in 2006 and assigned VCP Identification No. SW0775 under the Ecology Toxics Cleanup Program.

The Work Plan presented the selected cleanup approach and specified the cleanup standards and associated requirements for the cleanup action. The selected cleanup action for the Site was executed in conjunction with tank closure activities conducted at the Site between March 10 and August 1, 2008. The tank closure and cleanup action included removal of two underground storage tanks and four aboveground storage tanks; excavation and off-Site disposal of soil with petroleum hydrocarbon concentrations above MTCA cleanup levels; and installation of monitoring wells to delineate the nature and extent of petroleum hydrocarbon constituents in groundwater and to assess the progress of groundwater cleanup by natural attenuation processes. The results of the tank closure and cleanup action are summarized in the *Tank Closure Report, Former Cummings Oil Lease Site, 908 Northwest Kerron Avenue, Winlock, Washington* dated March 11, 2010, prepared by Farallon (2010).



2.0 MONITORING ACTIVITIES AND RESULTS

The monitoring activities conducted at the Site by Farallon on December 27, 2010 included measuring groundwater levels and collecting groundwater quality data and samples for laboratory analysis. The monitoring activities and results are summarized in the following sections.

2.1 GROUNDWATER MONITORING ACTIVITIES

The groundwater monitoring and sampling event included the following events:

- Measuring the depth to groundwater in monitoring wells MW-1 through MW-5;
- Purging and sampling monitoring wells MW-1 through MW-5 using U.S. Environmental Protection Agency (EPA) low-flow sampling methods;
- Measuring water quality parameters during monitoring well purging to assess the potential for natural attenuation processes to mitigate the residual petroleum hydrocarbons present in groundwater; and
- Submitting the groundwater samples for laboratory analysis.

Farallon opened monitoring wells MW-1 through MW-5 to allow the water levels to equilibrate with atmospheric pressure for a minimum of 15 minutes prior to obtaining groundwater level measurements. Groundwater levels in the monitoring wells were measured to an accuracy of 0.01 foot using an electronic water-level meter.

Following collection of groundwater level measurements, monitoring wells MW-1 through MW-5 were purged and sampled using a peristaltic pump and polyethylene tubing. The purging was conducted at flow rates ranging from 100 to 300 milliliters per minute, with the intake tubing placed a maximum of 3 feet below the water table in each monitoring well. During purging, water quality was monitored using a Yellow Springs Instruments water-quality meter equipped with a flow-through cell. Water quality parameters monitored and recorded during purging and sampling included temperature, pH, specific conductance, dissolved oxygen, and oxidation-reduction potential (ORP). The monitoring wells were purged until the water quality parameters stabilized in accordance with EPA guidelines for low-flow sampling. The groundwater samples were transferred directly from the tubing into laboratory-prepared containers. The containers from each sampling event were placed on ice in a cooler and transported to an Ecology-accredited laboratory under standard chain-of-custody protocols. The groundwater samples were analyzed for DRO and ORO by Northwest Method NWTPH-Dx; GRO by Northwest Method NWTPH-Gx; BTEX by EPA Method 5030B/8260; methane by Method RSK 175; nitrate and sulfate by EPA Method 300.0; and ferrous iron by SM 3500.

Purge water generated during groundwater sampling was stored in a 35-gallon drum on the Site. The purge water will be scheduled for disposal during a future groundwater monitoring and sampling event.



2.2 GROUNDWATER MONITORING RESULTS

Groundwater level measurements and elevations are summarized in Table 1. Figure 2 provides a groundwater elevation contour map illustrating the estimated groundwater flow direction and gradient for the groundwater monitoring and sampling event conducted on December 27, 2010. The December 2010 groundwater level measurements indicate a groundwater flow direction to the west, and an average hydraulic gradient at the Site of approximately 0.04 foot per foot. The groundwater flow direction during previous groundwater monitoring events has varied from northwest to southwest.

Groundwater analytical results are summarized in Table 2. The analytical data for the groundwater samples collected on December 27, 2010 are shown on Figure 3.

The laboratory analytical results for the December 27, 2010 groundwater monitoring and sampling event are summarized as follows:

- With the exception of monitoring well MW-2, GRO was not detected at concentrations at or above the laboratory practical quantitation limit (PQL). GRO was detected at monitoring well MW-2 at a concentration of 130 micrograms per liter ($\mu\text{g/l}$), which is below the MTCA Method A cleanup level of 800 $\mu\text{g/l}$ for GRO in groundwater.
- Concentrations of DRO exceeded the MTCA Method A cleanup level for DRO of 500 $\mu\text{g/l}$ in groundwater samples collected from monitoring wells MW-1 and MW-3.
- Concentrations of ORO were not detected above the MTCA Method A cleanup level for ORO of 500 $\mu\text{g/l}$ in the groundwater samples collected.
- With the exception of monitoring well MW-2, BTEX constituents were not detected at concentrations at or above the PQL. Benzene was detected in monitoring well MW-2 at a concentration of 18.6 $\mu\text{g/l}$, which exceeds the MTCA Method A cleanup level of 5 $\mu\text{g/l}$ for benzene in groundwater.

The laboratory analytical report for the groundwater monitoring event is provided in Appendix A.

2.3 NATURAL ATTENUATION ASSESSMENT RESULTS

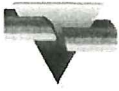
An assessment of the potential for natural attenuation via biodegradation processes to reduce the concentrations of residual petroleum hydrocarbon constituents in groundwater was conducted during the December 27, 2010 groundwater monitoring and sampling event. The assessment included laboratory analyses and measurement of field parameters that provide data to assess if and by what processes biodegradation is occurring. The laboratory analyses and field measurements for the assessment included the following:

- Primary electron receptors that are potential energy sources for native bacteria capable of biodegradation of petroleum compounds, and indicators of groundwater geochemistry:
 - Dissolved oxygen (O_2);
 - Nitrate (NO_3^-); and

- 
- Sulfate (SO_4^{-2}).
 - Metabolic byproducts of biodegradation and indicators of groundwater geochemistry:
 - Ferrous iron (Fe^{+2});
 - Nitrite (NO_2^-); and
 - Methane (CH_4).
 - Geochemical indicators of whether the subsurface environment is amenable to biodegradation of petroleum compounds:
 - ORP;
 - Temperature; and
 - pH.

Laboratory analytical results and field measurements for the natural attenuation parameters and geochemical indicators are summarized in Table 3. To assess whether natural attenuation is occurring in groundwater monitoring wells at the Site, the concentrations of primary electron receptors, the concentrations of metabolic by-products of biodegradation, and the geochemical indicators for wells MW-1 through MW-3 within the petroleum hydrocarbon plume were compared to these data for down-gradient monitoring well MW-5, which is and outside the petroleum hydrocarbon plume. The results of the natural attenuation assessment for the December 27, 2010 sampling event are summarized as follows:

- **Dissolved Oxygen**—Measurements of less than 1 milligram per liter (mg/l) of available oxygen within the petroleum hydrocarbon plume indicate that groundwater is trending toward more anaerobic conditions. The concentrations of dissolved oxygen in groundwater at monitoring wells MW-1 through MW-3 ranged from 0.29 to 0.45 mg/l during the December 27, 2010 monitoring and sampling event. These dissolved oxygen measurements indicate that the available oxygen likely is being used as an energy source for biodegradation in areas with residual petroleum hydrocarbons. The available oxygen was 5.62 mg/l in monitoring well MW-5, which indicates aerobic conditions outside the petroleum hydrocarbon plume.
- **Nitrate/Nitrite**—Nitrite is formed by anaerobic microbial nitrate reduction during biodegradation of petroleum hydrocarbon constituents, referred to as de-nitrification. The anaerobic respiratory process reduces nitrate (NO_3^-) to nitrite (NO_2^-). Concentrations of nitrate were not detected in monitoring wells MW-1 through MW-3, indicating that the available nitrate has been depleted by biodegradation and there is no nitrate available for anaerobic microbial respiration through de-nitrification at these wells. Detectable concentrations of nitrate were present at monitoring well MW-5; however, nitrite was not detected at a concentration at or above the laboratory PQL at this monitoring well.
- **Ferrous Iron**—Ferrous iron is formed by anaerobic microbial ferric iron reduction during the biodegradation of petroleum hydrocarbon constituents. Concentrations of ferrous iron in the groundwater samples collected from monitoring wells MW-1 through MW-3 ranged from 15 to 30.2 mg/l during the December 27, 2010 monitoring and sampling event conducted at the Site. The elevated concentrations of ferrous iron indicate that ferric iron is being reduced through anaerobic microbial respiration in these



monitoring wells. Ferrous iron was not detected at concentrations at or above the PQL in monitoring well MW-5; therefore, anaerobic microbial respiration by ferric iron reduction was not occurring in this monitoring well.

- **Sulfate**—Concentrations of sulfate greater than 1 mg/l indicate a favorable environment for sulfate-reducing conditions. The concentrations of sulfate in groundwater samples collected from monitoring wells MW-1 through MW-3 and MW-5 ranged from 3.9 to 38.3 mg/l. Sulfate was present at the monitoring well locations both inside and outside the petroleum hydrocarbon plume; therefore, microbial respiration via sulfate reduction is not occurring at a detectable rate in these monitoring wells.
- **Methane**—Methane is metabolic byproduct of biodegradation of petroleum hydrocarbon constituents. Concentrations of methane in the groundwater samples collected from monitoring wells MW-1 through MW-3 ranged from 339 to 2,980 µg/l during the monitoring and sampling event conducted at the Site. Methane was not detected at concentrations at or above the PQL in monitoring well MW-5. The elevated concentrations of methane at monitoring wells MW-1 through MW-3 relative to monitoring well MW-5 indicate that biodegradation of petroleum hydrocarbons is occurring in these monitoring wells.
- **ORP**—The ORP measured in monitoring wells MW-1 through MW-3 during the monitoring event ranged from -1.2 to -78.5 millivolts, which indicates an anaerobic environment. The ORP measured in monitoring well MW-5 during the monitoring event was 140.7 millivolts, which is within a range typically considered indicative of moderately aerobic conditions. These results correspond with the trend in dissolved-oxygen measurements. Dissolved oxygen was present in monitoring well MW-5 outside the plume, and was degraded in monitoring wells MW-1 through MW-3 inside the plume where biodegradation of petroleum hydrocarbons is occurring.
- **Temperature**—The groundwater temperature measured at monitoring wells MW-1 through MW-3 and MW-5 ranged from 10.39 to 11.09° Celsius during the groundwater monitoring and sampling event. Biodegradation processes occur at these temperatures but typically are accelerated at higher temperatures approaching 20° Celsius or greater.
- **pH**—The values for pH measured at monitoring wells MW-1 through MW-3 and MW-5 ranged from 5.72 to 6.60, with 7 as a neutral value. These pH values are within a range amenable to the bacteria capable of petroleum hydrocarbon biodegradation.

2.4 EVALUATION OF NATURAL ATTENUATION

The rate of natural attenuation was evaluated using the natural attenuation guidance package provided by Ecology which includes the following:

- *Guidance on Remediation of Petroleum-Contaminated Ground Water by Natural Attenuation*, July 2005, Ecology (2005a) Publication No. 05-09-091 (Guidance Document);



- *User's Manual: Natural Attenuation Analysis Tool Package for Petroleum-Contaminated Ground Water*, July 2005, Ecology (2005b) Publication No. 05-09-091A (Users Manual); and
- *Workbooks: Data Analysis Tool Package*: (two Microsoft Excel spreadsheets) from *The Natural Attenuation Analysis Tool Package for Petroleum-Contaminated Ground Water* (Ecology 2005c).

Modules 1 and 2 of Package A: Natural Attenuation Analysis Tool from the Data Analysis Tool Package were used to evaluate whether concentrations of ORO, DRO, and benzene were decreasing at each well, the rate of decrease, and the time frame in which the contaminant concentrations would meet groundwater cleanup levels. Establishing stable to decreasing contaminant trends and evaluating groundwater geochemistry provide two lines of evidence that natural attenuation is occurring at a Site.

Module 1 uses the Mann-Kendall non-parametric statistical test to determine if a plume is expanding, stable, or shrinking at each well location. Module 2 uses a regression analysis to determine plume stability and the time frame in which the contaminants would meet groundwater cleanup levels if shrinking plume conditions exist. Module 2 is sensitive to scatter in the monitoring data (increasing and decreasing contaminant concentrations around the log-linear regression line) and will not calculate a cleanup level time frame for wells that have contaminant concentrations with a variation coefficient greater than 1 and/or concentrations outside the 85 percent confidence interval of the slope of the log-linear regression line. This limits the uncertainty around the point of decay constant and the projected restoration time frame to reach the cleanup goal.

Modules 1 and 2 were used to evaluate the concentrations of DRO, ORO, and benzene above MTCA Method A cleanup levels at monitoring wells MW-1 through MW-3. DRO and/or ORO concentrations were evaluated at monitoring wells MW-1 through MW-3, and benzene was evaluated at monitoring well MW-2. The module data tables are provided in Appendix B. The results are discussed below and summarized in Table 4:

- **Monitoring Well MW-1:** Concentrations of DRO currently exceed the MTCA Method A cleanup level for groundwater in monitoring well MW-1. Concentrations of DRO are decreasing based on both the Mann-Kendall test and the log-linear regression analysis. Based on the temporal analysis in Module 2, there is an 85 percent confidence level that the cleanup level of 500 µg/l for DRO will be reached by January 2012.

The concentration of ORO is decreasing based on both the Mann-Kendall test and the log-linear regression analysis. The cleanup level of 500 µg/l for ORO was achieved in June 2010, and groundwater ORO concentrations remained below 500 µg/l through the December 2010 sampling event.

- **Monitoring Well MW-2:** Concentrations of benzene currently exceed the MTCA Method A cleanup level for groundwater in monitoring well MW-2. Concentrations of benzene are decreasing based on the Mann-Kendall test. Although concentrations of benzene are stable based on the log-linear regression analysis, there is insufficient



evidence to indicate a linear correlation between sampling time and log contaminant concentration at the well due to the increase in concentrations of benzene between October and December 2010. Additional sampling is required before a statistically valid shrinking trend can be determined.

Concentrations of DRO and ORO are stable based on both the Mann-Kendall test and the log-linear regression analysis in monitoring well MW-2. There is insufficient evidence to indicate decreasing concentrations of DRO and ORO due to the increase in DRO and ORO concentrations in October 2010. Additional sampling will be required to support a statistically valid trend and to determine when the cleanup criterion will be achieved. Concentrations of both DRO and ORO were below the cleanup level of 500 µg/l in December 2010.

- **Monitoring Well MW-3:** Concentrations of DRO currently exceed the MTCA Method A cleanup level for groundwater at monitoring well MW-3. Concentrations of DRO are decreasing based on both the Mann-Kendall test and the log-linear regression analysis. Based on the temporal analysis in Module 2 there is an 85 percent confidence level that the cleanup level will be reached by March 2013.

Concentrations of ORO are stable based on both the Mann-Kendall test and the log-linear regression analysis. Additional sampling will be required to support a statistically valid shrinking trend. Concentrations of ORO were below the cleanup level of 500 µg/l in June 2010 and have remained below 500 µg/l through the December 2010 sampling event.



3.0 CONCLUSIONS

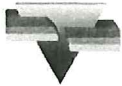
The groundwater flow direction for the December 27, 2010 groundwater monitoring event was to the west at an average estimated hydraulic gradient of approximately 0.04 foot per foot. During previous monitoring events, the groundwater flow direction has ranged from northwest to southwest.

Analysis of groundwater samples collected from monitoring wells MW-4 and MW-5 during the December 2010 groundwater monitoring and sampling event did not detect concentrations of GRO, DRO, ORO, or the BTEX constituents at or above the laboratory PQLs. Concentrations of DRO and/or benzene above MTCA Method A cleanup levels were detected in samples collected from monitoring wells MW-1 and MW-2 located directly west of the former underground storage tank excavation area on the western portion of the Site. Concentrations of DRO above the MTCA Method A cleanup level were detected in samples collected from monitoring well MW-3 west of the former aboveground storage tank excavation area on the western portion of the Site.

The assessment of natural attenuation in groundwater using geochemical indicators at monitoring wells where petroleum hydrocarbon constituents are present indicate that biodegradation of petroleum hydrocarbons is occurring under anaerobic conditions, in contrast to monitoring well MW-5, where no petroleum hydrocarbon are present. The electron receptors dissolved oxygen and nitrate appear to be depleted at monitoring wells MW-1 through MW-3, indicating that the available oxygen and nitrate are being used as energy sources for biodegradation. Concentrations of the metabolic by-product indicators ferrous iron and methane have been detected in groundwater at higher concentrations at monitoring wells MW-1 through MW-3 than at monitoring well MW-5, further indicating that biodegradation of petroleum hydrocarbons is occurring.

Biodegradation of ORO, DRO, and benzene in groundwater was evaluated using the Ecology Guidance Document for natural attenuation. Based on the evaluation results, concentrations of DRO, ORO, and benzene are stable or shrinking, which supports the geochemical evidence that biodegradation is occurring at monitoring wells MW-1 through MW-3 where residual petroleum hydrocarbon constituents are present. In addition, the evaluation results project with an 85 percent confidence level that concentrations of DRO currently exceeding MTCA Method A cleanup levels in monitoring wells MW-1 and MW-3 will reach cleanup levels through natural attenuation by January 2012 and March 2013, respectively. The time frame in which concentrations of benzene currently exceeding MTCA Method A cleanup levels in monitoring well MW-2 will reach cleanup levels could not be determined using log linear regression analysis. However, the Mann-Kendal non-parametric statistical test determined that concentrations of benzene are decreasing. In addition, evidence of biodegradation within the plume is supported by geochemical indicators.

Annual groundwater monitoring for DRO, GRO, ORO, benzene, and the geochemical parameters will be conducted in 2011 and 2012 to assess the progress of natural attenuation at the Site and evaluate the need for and frequency of subsequent sampling events.



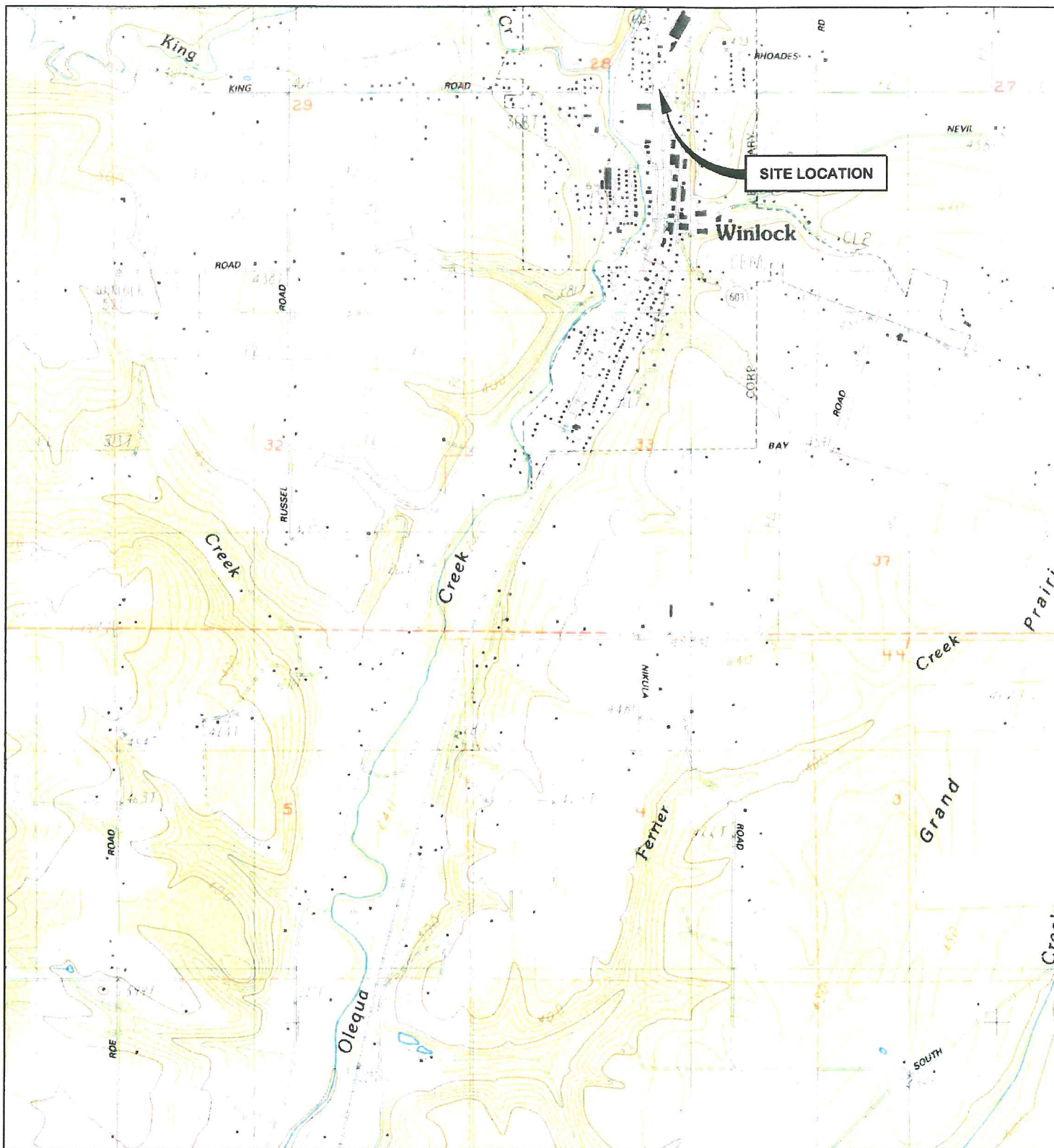
4.0 REFERENCES

- Farallon Consulting, L.L.C. (Farallon). 2006. *Supplemental Subsurface Investigation, BNSF Winlock, 908 Northwest Kerron Avenue, Winlock, Washington*. Prepared for BNSF Railway Company, Seattle, Washington. May 31.
- . 2008. *Cleanup Action Work Plan, Former Cummings Oil Lease Site, 908 Northwest Kerron Avenue, Winlock, Washington*. Prepared for BNSF Railway Company, Seattle, Washington. December 18.
- . 2010. *Tank Closure Report, Former Cummings Oil Lease Site, 908 Northwest Kerron Avenue, Winlock, Washington*. Prepared for BNSF Railway Company, Seattle, Washington. March 11.
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- . 2005b. *User's Manual: Natural Attenuation Analysis Tool Package for Petroleum-Contaminated Ground Water*. Publication No. 05-09-091A. July.
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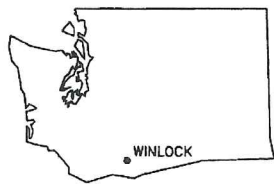
FIGURES

**DECEMBER 2010
GROUNDWATER MONITORING STATUS REPORT
Former Cummings Oil Lease Site
908 Northwest Kerron Avenue
Winlock, Washington
VCP No. SW0775**

Farallon PN: 283-005



REFERENCE: 7.5 MINUTE USGS QUADRANGLE WINLOCK, WASHINGTON. DATED 1985



WASHINGTON



FARALLON CONSULTING
975 5th Avenue Northwest
Issaquah, WA 98027

FIGURE 1

SITE VICINITY MAP
FORMER CUMMINGS OIL LEASE SITE
908 NORTHWEST KERRON AVENUE
WINLOCK, WASHINGTON

FARALLON PN: 283-005

Drawn By: DEW

Checked By: SP

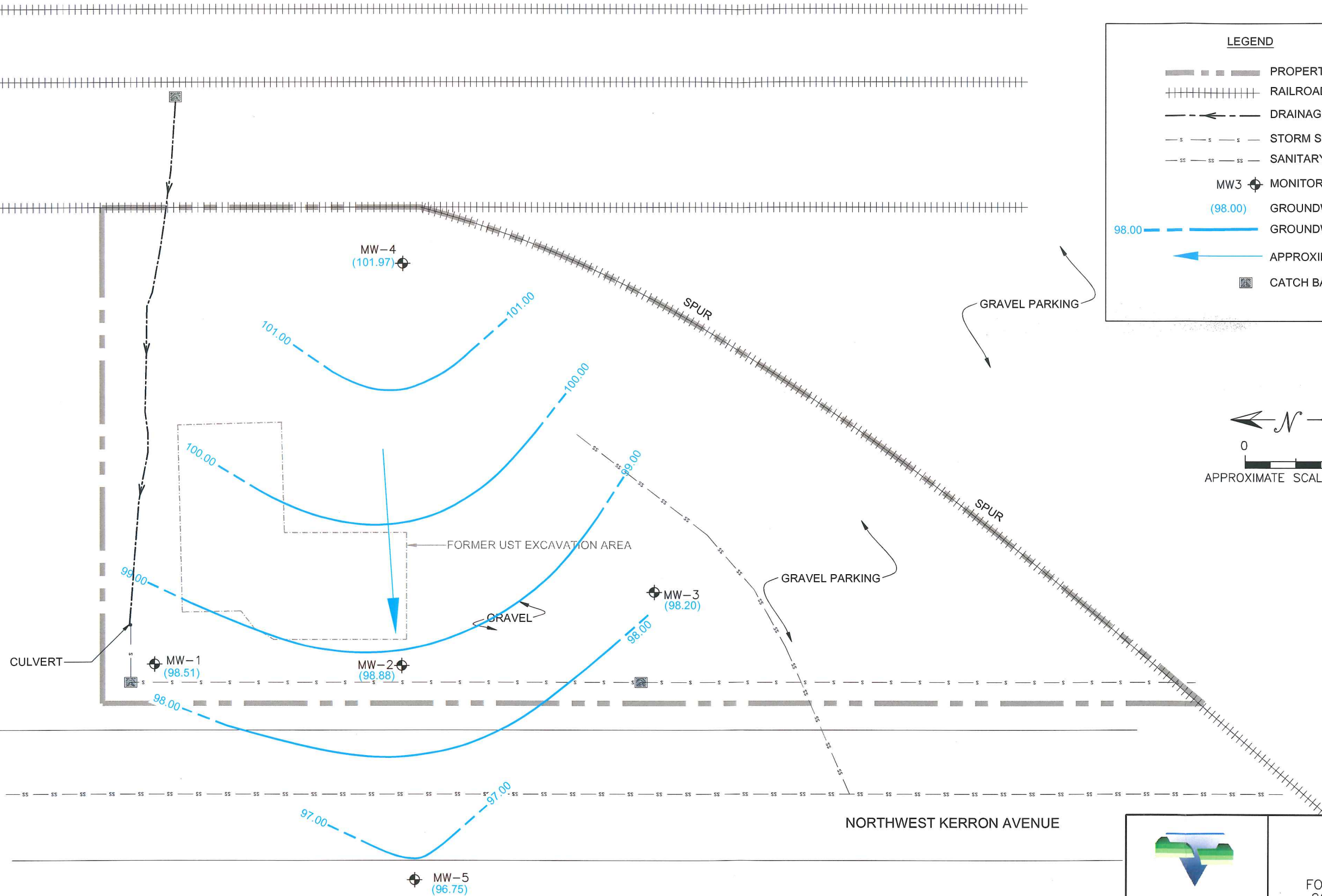
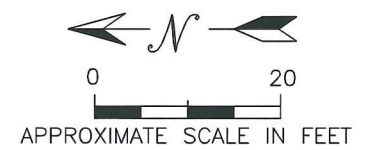
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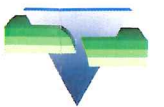
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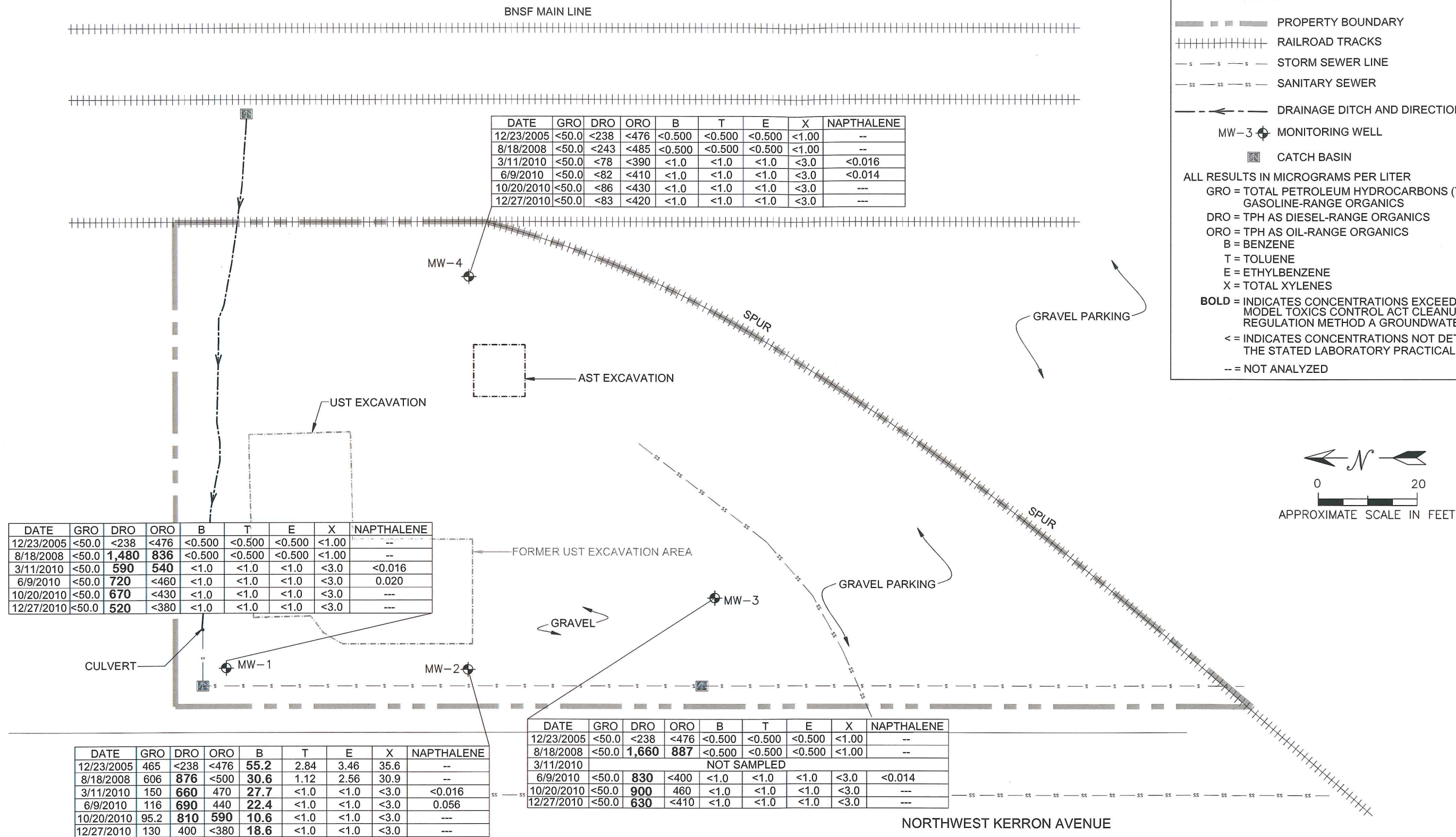
BNSF MAIN LINE

LEGEND

- PROPERTY BOUNDARY
- ++++ RAILROAD TRACKS
- - - -> DRAINAGE DITCH AND DIRECTION OF FLOW
- s - s - STORM SEWER LINE
- ss - ss - SANITARY SEWER
- MW3 + MONITORING WELL (FARALLON 2006)
- (98.00) GROUNDWATER ELEVATION (DECEMBER 2010)
- 98.00 - - - GROUNDWATER ELEVATION CONTOUR
- ← APPROXIMATE DIRECTION OF GROUNDWATER FLOW
- ▣ CATCH BASIN



 FARALLON CONSULTING 975 5th Avenue Northwest Issaquah, WA 98027	FIGURE 2 GROUNDWATER CONTOUR MAP FOR DECEMBER 27, 2010 FORMER CUMMINGS OIL LEASE SITE 908 NORTHWEST KERRON AVENUE WINLOCK, WASHINGTON FARALLON PN: 283-005	
	Drawn By: DEW	Checked By: SP
	Date: 5/5/11	Disk Reference: 283005



TABLES

**DECEMBER 2010
GROUNDWATER MONITORING STATUS REPORT
Former Cummings Oil Lease Site
908 Northwest Kerron Avenue
Winlock, Washington
VCP No. SW0775**

Farallon PN: 283-005

Table 1
Summary of Groundwater Elevation Data
Former Cummings Oil Lease Site
Winlock, Washington
Farallon PN: 283-005

Well Identification	Monitoring Date	Depth of Monitoring Well (feet)	Monitoring Well Screened Interval (feet bgs)	Wellhead Elevation ¹ (feet)	Depth to Water (feet bgs)	Groundwater Elevation (feet)
MW-1	12/23/2005	12	5-12	100.46	2.13	98.33
	8/18/2008				4.50	95.96
	3/11/2010				3.00	97.46
	6/8/2010				4.20	96.26
	10/20/2010				3.00	97.46
	12/27/2010				1.95	98.51
MW-2	12/23/2005	11	5-11	100.4	2.50	97.90
	8/18/2008				4.67	95.73
	3/11/2010				1.88	98.52
	6/8/2010				2.28	98.12
	10/20/2010				2.65	97.75
	12/27/2010				1.52	98.88
MW-3	12/23/2005	10	5-10	100.18	2.21	97.97
	8/18/2008				4.40	95.78
	3/11/2010				--	--
	6/8/2010				2.26	97.92
	10/20/2010				2.68	97.50
	12/27/2010				1.98	98.20
MW-4	12/23/2005	12	5-12	102.45	0.50	101.95
	8/18/2008				5.02	97.43
	3/11/2010				1.90	100.55
	6/8/2010				1.45	101.00
	10/20/2010				2.40	100.05
	12/27/2010				0.48	101.97
MW-5	8/18/2008	10	5-10	99.92	5.54	94.38
	3/11/2010				3.29	96.63
	6/8/2010				4.00	95.92
	10/20/2010				5.25	94.67
	12/27/2010				3.17	96.75

NOTES:

¹Elevations based on survey conducted by Farallon Consulting, L.L.C. to a benchmark of 105.59.

bgs = below ground surface

-- denotes depth not measured

Table 2
Cumulative Summary of Groundwater Analytical Results for Total Petroleum Hydrocarbons
Former Cummings Oil Lease Site
Winlock, Washington
Farallon PN: 283-005

Sample Identification	Well Identification	Sample Date	Analytical Results (micrograms per liter)						
			GRO ¹	DRO ²	ORO ²	Benzene ³	Toluene ³	Ethylbenzene ³	Total Xylenes ³
MW1-122305	MW-1	12/23/2005	<50.0	<238	<476	<0.500	<0.500	<0.500	<1.00
MW1-081808		8/18/2008	<50.0	1,480	836	<0.500	<0.500	<0.500	<1.00
MW1-031110		3/11/2010	<50.0	590	540	<1.0	<1.0	<1.0	<6.0
MW1-060910		6/9/2010	<50.0	720	<460	<1.0	<1.0	<1.0	<3.0
MW1-102010		10/20/2010	<50.0	670	<430	<1.0	<1.0	<1.0	<3.0
MW1-122710		12/27/2010	<50.0	520	<380	<1.0	<1.0	<1.0	<3.0
MW2-122305	MW-2	12/23/2005	465	<238	<476	55.2	2.84	3.46	35.6
MW2-081808		8/18/2008	606	876	<500	30.6	1.12	2.56	30.9
MW2-031110		3/11/2010	150	660	470	27.7	<1.0	<1.0	<6.0
MW2-060910		6/9/2010	116	690	440	22.4	<1.0	<1.0	<3.0
MW2-102010		10/20/2010	95.2	810	590	10.6	<1.0	<1.0	<3.0
MW2-122710		12/27/2010	130	400	<380	18.6	<1.0	<1.0	<3.0
MW3-122305	MW-3	12/23/2005	<50.0	<238	<476	<0.500	<0.500	<0.500	<1.00
MW3-081808		8/18/2008	<50.0	1,660	887	<0.500	<0.500	<0.500	<1.00
Not Sampled		3/11/2010	--	--	--	--	--	--	--
MW3-060910		6/9/2010	<50.0	830	<400	<1.0	<1.0	<1.0	<3.0
MW3-102010		10/20/2010	<50.0	900	460	<1.0	<1.0	<1.0	<3.0
MW3-122710		12/27/2010	<50.0	630	<410	<1.0	<1.0	<1.0	<3.0
MW4-122305	MW-4	12/23/2005	<50.0	<238	<476	<0.500	<0.500	<0.500	<1.00
MW4-081808		8/18/2008	<50.0	<243	<485	<0.500	<0.500	<0.500	<1.00
MW4-031110		3/11/2010	<50.0	<78	<390	<1.0	<1.0	<1.0	<6.0
MW4-060910		6/9/2010	<50.0	<82	<410	<1.0	<1.0	<1.0	<3.0
MW4-102010		10/20/2010	<50.0	<86	<430	<1.0	<1.0	<1.0	<3.0
MW4-122710		12/27/2010	<50.0	<83	<420	<1.0	<1.0	<1.0	<3.0
MW5-081808	MW-5	8/18/2008	<50.0	433	<481	<0.500	<0.500	<0.500	<1.00
MW5-031110		3/11/2010	<50.0	<82	<410	<1.0	<1.0	<1.0	<6.0
MW5-060910		6/9/2010	<50.0	<84	<420	<1.0	<1.0	<1.0	<3.0
MW5-102010		10/20/2010	<50.0	<85	<430	<1.0	<1.0	<1.0	<3.0
MW5-122710		12/27/2010	<50.0	<87	<430	<1.0	<1.0	<1.0	<3.0
MTCA Method A Cleanup Levels ⁴			800	500	500	5	1,000	700	1,000

NOTES:

Results in **bold** denote concentrations above applicable cleanup levels.

< denotes analyte not detected at or above the reporting limit listed.

-- denotes sample not analyzed.

¹ Analyzed by Northwest Method NWTPH-Gx.

² Analyzed by Northwest Method NWTPH-Dx.

³ Analyzed by U.S. Environmental Protection Agency (EPA) Methods 8260B and 5030B/8260.

⁴ Washington State Model Toxics Control Act Cleanup Regulation (MTCA) Method A Cleanup Levels for Groundwater, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, as revised November 2007.

DRO = total petroleum hydrocarbons (TPH) as diesel-range organics

GRO = TPH as gasoline-range organics

ORO = TPH as oil-range organics

Table 3
Cumulative Summary of Groundwater Geochemical Parameters
Former Cummings Oil Lease Site
Winlock, Washington
Farallon PN: 283-005

Well Identification	Sample Date	Geochemical Results									
		Temperature (°C)	Specific Conductance (mS/cm)	pH (pH units)	Dissolved Oxygen (mg/l)	Oxidation-Reduction Potential (mV)	Sulfate (mg/l)	Nitrate (mg/l as Nitrogen)	Nitrite (mg/l)	Methane (µg/l)	Ferrous Iron (mg/l)
MW-1	8/18/2008	17.60	0.221	6.03	0.92	-7.70	—	—	—	—	—
	3/11/2010	10.08	0.289	6.70	0.47	117.7	74.4	<0.20	<0.20	289	—
	6/9/2010	14.21	0.348	6.21	0.42	11.1	59.4	<0.050	0.012	520	9.8
	10/20/2010	16.20	0.234	6.13	0.64	12.1	59.1	<0.20	<0.10	388	2.3
	12/27/2010	10.65	0.28	6.16	0.29	-1.2	38.3	<0.20	<0.10	668	15.3
MW-2	8/18/2008	17.65	0.316	6.64	0.99	-77.20	0.420	<0.200	—	1,660	—
	3/11/2010	9.93	0.247	7.28	0.77	101.2	30.31	<0.20	<0.10	1,620	—
	6/9/2010	14.48	0.277	6.84	1.00	75.8	7.9	<0.050	<0.010	3,500	3.2
	10/20/2010	16.76	0.279	6.61	0.91	-50.3	11.2	<0.20	<0.10	6,320	1.3
	12/27/2010	10.39	0.305	6.60	0.39	-78.5	12.5	<0.20	<0.10	2,980	30.2
MW-3	8/18/2008	17.38	0.382	6.34	1.08	-75.60	—	—	—	—	—
	3/11/2010	—	—	—	—	—	—	—	—	—	—
	6/9/2010	13.87	0.387	6.36	0.50	-6.80	13.4	<0.050	<0.010	380	3.90
	10/20/2010	17.26	0.321	6.57	0.87	-33.4	14.6	<0.20	<0.10	338	1.50
	12/27/2010	11.09	0.378	6.48	0.45	-50.8	13.9	<0.20	<0.10	339	23.2
MW-4	8/18/2008	13.78	0.241	6.75	0.97	-74.90	16.7	<0.200	—	22.8	—
	3/11/2010	9.59	0.255	7.92	0.57	85.60	17.6	<0.20	<0.20	47.6	—
	6/9/2010	12.42	0.260	7.16	0.51	85.5	12.5	<0.050	0.011	93	1.2
	10/20/2010	12.96	0.206	7.42	0.66	-77.8	14.1	<0.20	<0.10	16.9	0.52
	12/27/2010	10.84	0.205	6.11	0.49	53.5	9.1	<0.20	<0.10	51.6	19.5
MW-5	8/18/2008	17.57	0.466	6.62	1.45	-31.60	8.03	<0.200	—	40.6	—
	3/11/2010	10.30	0.067	7.63	5.66	107.9	3.2	0.61	<0.10	<10.0	—
	6/9/2010	14.74	0.074	5.76	2.27	213.5	4.7	0.87	<0.010	<2.3	<0.17
	10/20/2010	17.59	0.085	6.03	1.34	75.5	6.3	0.65	<0.10	<10.0	<0.20
	12/27/2010	10.69	0.073	5.72	5.62	140.7	3.9	1.2	<0.10	<10.0	<0.20

NOTES

— = not measured/analyzed

°C = degrees Celsius

µg/l = micrograms per liter

mg/l = milligrams per liter

mS/cm = millisiemens per centimeter

mV = millivolts

Table 4
Module Data Tables
Former Cummings Oil Lease Site
Winlock, Washington
Farallon PN: 283-005

Monitoring Well	Contaminant	Cleanup Level (Criterion) to be Achieved (µ/L) ¹	Mann-Kendall Plume Stability ²	Log-Linear Regression - Plume Stability ³	50 Percent CL When Criterion (to be) Achieved ³	85 Percent CL When Criterion (to be) Achieved ³
MW-1	DRO	500	Shrinking	Shrinking	3/1/2011	1/18/2012
	ORO	500	Shrinking	Shrinking	8/13/2009	1/3/2010
MW-2	DRO	500	Stable	Stable ⁴	Not Calculated	Not Calculated
	ORO	500	Stable	Stable ⁴	Not Calculated	Not Calculated
	Benzene	5	Shrinking	Stable ⁴	Not Calculated	Not Calculated
MW-3	DRO	500	Shrinking	Shrinking	12/18/2011	3/30/2013
	ORO	500	Stable	Stable ⁴	Not Calculated	Not Calculated

NOTES:

¹Washington State Model Toxics Control Act Cleanup Regulation (MTCA) Method A Cleanup Levels for Groundwater, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, as revised November 2007.

²Module 1: Mann-Kendall Trend Test for Plume Stability (non-parametric statistical test)

³Module 2: Temporal Analysis: Concentration of Contaminant vs. Time (Regression Analysis)

⁴Based on Module 2 there is not enough evidence to support that the slope of the regression line is significantly different from zero

CL = confidence level

DRO = total petroleum hydrocarbons (TPH) as diesel-range organics

ORO = TPH as oil-range organics

**APPENDIX A
LABORATORY ANALYTICAL REPORT**

DECEMBER 2010

GROUNDWATER MONITORING STATUS REPORT

Former Cummings Oil Lease Site

908 Northwest Kerron Avenue

Winlock, Washington

VCP No. SW0775

Farallon PN: 283-005

January 11, 2011

Stacy Patterson
Farallon Consulting LLC
975 5th Avenue Northwest
Issaquah, WA 98027

RE: Project: Winlock
Pace Project No.: 256135

Dear Stacy Patterson:

Enclosed are the analytical results for sample(s) received by the laboratory on December 27, 2010. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

Please note that on the chain of custody, the sample collection dates are written as 12/27/10 for the samples and 12/17/10 for the trip blank. The laboratory considers the trip blank to have the same sampling date as the samples they accompany in the field. The final report reflects this correction.

The ferrous iron samples had past hold before receipt in lab.

Due to a temporary technical malfunction, the RPD Max limits are not showing on the report for the MS/MSD Gx, MS/MSD Ferrous Iron, MS/MSD Nitrate, MS/MSD Nitrite and MS/MSD Sulfate. Upon review the values shown on this report are within required limits.

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

Sincerely,



Melanie Miller

melanie.miller@pacelabs.com
Project Manager

REPORT OF LABORATORY ANALYSIS

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January 11, 2011

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Enclosures

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CERTIFICATIONS

Project: Winlock

Pace Project No.: 256135

Minnesota Certification IDs

1700 Elm Street SE Suite 200, Minneapolis, MN 55414

Alaska Certification #: UST-078

Alaska Certification #MN00064

Arizona Certification #: AZ-0014

Arkansas Certification #: 88-0680

California Certification #: 01155CA

EPA Region 8 Certification #: Pace

Florida/NELAP Certification #: E87605

Georgia Certification #: 959

Idaho Certification #: MN00064

Illinois Certification #: 200011

Iowa Certification #: 368

Kansas Certification #: E-10167

Louisiana Certification #: 03086

Louisiana Certification #: LA080009

Maine Certification #: 2007029

Maryland Certification #: 322

Michigan DEQ Certification #: 9909

Minnesota Certification #: 027-053-137

Mississippi Certification #: Pace

Montana Certification #: MT CERT0092

Nevada Certification #: MN_00064

Nebraska Certification #: Pace

New Jersey Certification #: MN-002

New Mexico Certification #: Pace

New York Certification #: 11647

North Carolina Certification #: 530

North Dakota Certification #: R-036

North Dakota Certification #: R-036A

Ohio VAP Certification #: CL101

Oklahoma Certification #: D9921

Oklahoma Certification #: 9507

Oregon Certification #: MN200001

Pennsylvania Certification #: 68-00563

Puerto Rico Certification

Tennessee Certification #: 02818

Texas Certification #: T104704192

Washington Certification #: C754

Wisconsin Certification #: 999407970

Washington Certification IDs

940 South Harney Street, Seattle, WA 98108

Alaska CS Certification #: UST-025

Alaska Drinking Water VOC Certification #: WA01230

Alaska Drinking Water Micro Certification #: WA01230

California Certification #: 01153CA

Florida/NELAP Certification #: E87617

Oregon Certification #: WA200007

Washington Certification #: C1229

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: Winlock

Pace Project No.: 256135

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
256135001	MW4-122710	RSK 175	CJR	3	PASI-M
		NWTPH-Dx	AY1	4	PASI-S
		NWTPH-Gx	CC	3	PASI-S
		EPA 5030B/8260	LPM	8	PASI-S
		SM 3500-Fe B#4	CMS	1	PASI-S
		EPA 300.0	CMS	2	PASI-S
		EPA 300.0	CMS	1	PASI-S
256135002	MW5-122710	RSK 175	CJR	3	PASI-M
		NWTPH-Dx	AY1	4	PASI-S
		NWTPH-Gx	CC	3	PASI-S
		EPA 5030B/8260	LPM	8	PASI-S
		SM 3500-Fe B#4	CMS	1	PASI-S
		EPA 300.0	CMS	2	PASI-S
		EPA 300.0	CMS	1	PASI-S
256135003	MW1-122710	RSK 175	CJR	3	PASI-M
		NWTPH-Dx	AY1	4	PASI-S
		NWTPH-Gx	CC	3	PASI-S
		EPA 5030B/8260	LPM	8	PASI-S
		SM 3500-Fe B#4	CMS	1	PASI-S
		EPA 300.0	CMS	2	PASI-S
		EPA 300.0	CMS	1	PASI-S
256135004	MW2-122710	RSK 175	CJR	3	PASI-M
		NWTPH-Dx	AY1	4	PASI-S
		NWTPH-Gx	CC	3	PASI-S
		EPA 5030B/8260	LPM	8	PASI-S
		SM 3500-Fe B#4	CMS	1	PASI-S
		EPA 300.0	CMS	2	PASI-S
		EPA 300.0	CMS	1	PASI-S
256135005	MW3-122710	RSK 175	CJR	3	PASI-M
		NWTPH-Dx	AY1	4	PASI-S
		NWTPH-Gx	CC	3	PASI-S
		EPA 5030B/8260	LPM	8	PASI-S
		SM 3500-Fe B#4	CMS	1	PASI-S
		EPA 300.0	CMS	2	PASI-S
		EPA 300.0	CMS	1	PASI-S
256135006	Trip Blank	NWTPH-Gx	CC	3	PASI-S
		EPA 5030B/8260	LPM	8	PASI-S

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Winlock

Pace Project No.: 256135

Method: RSK 175

Description: RSK 175 AIR Headspace

Client: BNSF_Farallon - WA

Date: January 11, 2011

General Information:

5 samples were analyzed for RSK 175. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Internal Standards:

All internal standards were within QC limits with any exceptions noted below.

Surrogates:

All surrogates were within QC limits with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Winlock

Pace Project No.: 256135

Method: NWTPH-Dx

Description: NWTPH-Dx GCS

Client: BNSF_Farallon - WA

Date: January 11, 2011

General Information:

5 samples were analyzed for NWTPH-Dx. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3510 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Surrogates:

All surrogates were within QC limits with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Winlock

Pace Project No.: 256135

Method: NWTPH-Gx

Description: NWTPH-Gx GCV

Client: BNSF_Farallon - WA

Date: January 11, 2011

General Information:

6 samples were analyzed for NWTPH-Gx. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Internal Standards:

All internal standards were within QC limits with any exceptions noted below.

Surrogates:

All surrogates were within QC limits with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Winlock

Pace Project No.: 256135

Method: EPA 5030B/8260

Description: 8260 MSV

Client: BNSF_Farallon - WA

Date: January 11, 2011

General Information:

6 samples were analyzed for EPA 5030B/8260. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Internal Standards:

All internal standards were within QC limits with any exceptions noted below.

Surrogates:

All surrogates were within QC limits with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: Winlock

Pace Project No.: 256135

Method: SM 3500-Fe B#4

Description: Iron, Ferrous

Client: BNSF_Farallon - WA

Date: January 11, 2011

General Information:

5 samples were analyzed for SM 3500-Fe B#4. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

H6: Analysis initiated more than 15 minutes after sample collection.

- MW1-122710 (Lab ID: 256135003)
- MW2-122710 (Lab ID: 256135004)
- MW3-122710 (Lab ID: 256135005)
- MW4-122710 (Lab ID: 256135001)
- MW5-122710 (Lab ID: 256135002)

Method Blank:

All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Winlock

Pace Project No.: 256135

Method: EPA 300.0

Description: 300.0 IC Anions

Client: BNSF_Farallon - WA

Date: January 11, 2011

General Information:

5 samples were analyzed for EPA 300.0. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Winlock

Pace Project No.: 256135

Method: EPA 300.0

Description: 300.0 IC Anions 28 Days

Client: BNSF_Farallon - WA

Date: January 11, 2011

General Information:

5 samples were analyzed for EPA 300.0. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Winlock

Pace Project No.: 256135

Sample: MW4-122710		Lab ID: 256135001	Collected: 12/27/10 10:30	Received: 12/27/10 16:50	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
RSK 175 AIR Headspace		Analytical Method: RSK 175						
Ethane	ND ug/L		10.0	1		12/29/10 13:41	74-84-0	
Ethene	ND ug/L		10.0	1		12/29/10 13:41	74-85-1	
Methane	51.6 ug/L		10.0	1		12/29/10 13:41	74-82-8	
NWTPH-Dx GCS		Analytical Method: NWTPH-Dx Preparation Method: EPA 3510						
Diesel Range	ND mg/L		0.083	1	01/03/11 09:50	01/03/11 22:15		
Motor Oil Range	ND mg/L		0.42	1	01/03/11 09:50	01/03/11 22:15	64742-65-0	
n-Octacosane (S)	79 %		50-150	1	01/03/11 09:50	01/03/11 22:15	630-02-4	
o-Terphenyl (S)	83 %		50-150	1	01/03/11 09:50	01/03/11 22:15	84-15-1	
NWTPH-Gx GCV		Analytical Method: NWTPH-Gx						
Gasoline Range Organics	ND ug/L		50.0	1		12/30/10 16:48		
a,a,a-Trifluorotoluene (S)	101 %		50-150	1		12/30/10 16:48	98-08-8	
4-Bromofluorobenzene (S)	85 %		50-150	1		12/30/10 16:48	460-00-4	
8260 MSV		Analytical Method: EPA 5030B/8260						
Benzene	ND ug/L		1.0	1		12/30/10 13:50	71-43-2	
Ethylbenzene	ND ug/L		1.0	1		12/30/10 13:50	100-41-4	
Toluene	ND ug/L		1.0	1		12/30/10 13:50	108-88-3	
Xylene (Total)	ND ug/L		3.0	1		12/30/10 13:50	1330-20-7	
4-Bromofluorobenzene (S)	113 %		80-120	1		12/30/10 13:50	460-00-4	
Dibromofluoromethane (S)	103 %		80-122	1		12/30/10 13:50	1868-53-7	
1,2-Dichloroethane-d4 (S)	102 %		80-124	1		12/30/10 13:50	17060-07-0	
Toluene-d8 (S)	115 %		80-123	1		12/30/10 13:50	2037-26-5	
Iron, Ferrous		Analytical Method: SM 3500-Fe B#4						
Iron, Ferrous	19.5 mg/L		0.40	1		01/06/11 16:50		H6
300.0 IC Anions		Analytical Method: EPA 300.0						
Nitrate as N	ND mg/L		0.20	1		12/28/10 20:30	14797-55-8	
Nitrite as N	ND mg/L		0.10	1		12/28/10 20:30	14797-65-0	
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0						
Sulfate	9.1 mg/L		1.0	1		01/04/11 00:20	14808-79-8	

ANALYTICAL RESULTS

Project: Winlock

Pace Project No.: 256135

Sample: MW5-122710		Lab ID: 256135002	Collected: 12/27/10 11:05	Received: 12/27/10 16:50	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
RSK 175 AIR Headspace		Analytical Method: RSK 175						
Ethane	ND ug/L		10.0	1		12/29/10 14:07	74-84-0	
Ethene	ND ug/L		10.0	1		12/29/10 14:07	74-85-1	
Methane	ND ug/L		10.0	1		12/29/10 14:07	74-82-8	
NWTPH-Dx GCS		Analytical Method: NWTPH-Dx Preparation Method: EPA 3510						
Diesel Range	ND mg/L		0.087	1	01/03/11 09:50	01/03/11 22:31		
Motor Oil Range	ND mg/L		0.43	1	01/03/11 09:50	01/03/11 22:31	64742-65-0	
n-Octacosane (S)	77 %		50-150	1	01/03/11 09:50	01/03/11 22:31	630-02-4	
o-Terphenyl (S)	81 %		50-150	1	01/03/11 09:50	01/03/11 22:31	84-15-1	
NWTPH-Gx GCV		Analytical Method: NWTPH-Gx						
Gasoline Range Organics	ND ug/L		50.0	1		12/30/10 17:11		
a,a,a-Trifluorotoluene (S)	100 %		50-150	1		12/30/10 17:11	98-08-8	
4-Bromofluorobenzene (S)	85 %		50-150	1		12/30/10 17:11	460-00-4	
8260 MSV		Analytical Method: EPA 5030B/8260						
Benzene	ND ug/L		1.0	1		12/30/10 14:11	71-43-2	
Ethylbenzene	ND ug/L		1.0	1		12/30/10 14:11	100-41-4	
Toluene	ND ug/L		1.0	1		12/30/10 14:11	108-88-3	
Xylene (Total)	ND ug/L		3.0	1		12/30/10 14:11	1330-20-7	
4-Bromofluorobenzene (S)	110 %		80-120	1		12/30/10 14:11	460-00-4	
Dibromofluoromethane (S)	106 %		80-122	1		12/30/10 14:11	1868-53-7	
1,2-Dichloroethane-d4 (S)	99 %		80-124	1		12/30/10 14:11	17060-07-0	
Toluene-d8 (S)	112 %		80-123	1		12/30/10 14:11	2037-26-5	
Iron, Ferrous		Analytical Method: SM 3500-Fe B#4						
Iron, Ferrous	ND mg/L		0.20	1		01/06/11 16:50		H6
300.0 IC Anions		Analytical Method: EPA 300.0						
Nitrate as N	1.2 mg/L		0.20	1		12/28/10 21:25	14797-55-8	
Nitrite as N	ND mg/L		0.10	1		12/28/10 21:25	14797-65-0	
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0						
Sulfate	3.9 mg/L		1.0	1		01/04/11 01:15	14808-79-8	

ANALYTICAL RESULTS

Project: Winlock

Pace Project No.: 256135

Sample: MW1-122710		Lab ID: 256135003	Collected: 12/27/10 11:55	Received: 12/27/10 16:50	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
RSK 175 AIR Headspace		Analytical Method: RSK 175						
Ethane	ND	ug/L	10.0	1		12/29/10 14:32	74-84-0	
Ethene	ND	ug/L	10.0	1		12/29/10 14:32	74-85-1	
Methane	668	ug/L	10.0	1		12/29/10 14:32	74-82-8	
NWTPH-Dx GCS		Analytical Method: NWTPH-Dx Preparation Method: EPA 3510						
Diesel Range	0.52	mg/L	0.076	1	01/03/11 09:50	01/03/11 22:47		
Motor Oil Range	ND	mg/L	0.38	1	01/03/11 09:50	01/03/11 22:47	64742-65-0	
n-Octacosane (S)	75	%	50-150	1	01/03/11 09:50	01/03/11 22:47	630-02-4	
o-Terphenyl (S)	79	%	50-150	1	01/03/11 09:50	01/03/11 22:47	84-15-1	
NWTPH-Gx GCV		Analytical Method: NWTPH-Gx						
Gasoline Range Organics	ND	ug/L	50.0	1		12/30/10 17:57		
a,a,a-Trifluorotoluene (S)	104	%	50-150	1		12/30/10 17:57	98-08-8	
4-Bromofluorobenzene (S)	88	%	50-150	1		12/30/10 17:57	460-00-4	
8260 MSV		Analytical Method: EPA 5030B/8260						
Benzene	ND	ug/L	1.0	1		12/30/10 14:32	71-43-2	
Ethylbenzene	ND	ug/L	1.0	1		12/30/10 14:32	100-41-4	
Toluene	ND	ug/L	1.0	1		12/30/10 14:32	108-88-3	
Xylene (Total)	ND	ug/L	3.0	1		12/30/10 14:32	1330-20-7	
4-Bromofluorobenzene (S)	111	%	80-120	1		12/30/10 14:32	460-00-4	
Dibromofluoromethane (S)	111	%	80-122	1		12/30/10 14:32	1868-53-7	
1,2-Dichloroethane-d4 (S)	104	%	80-124	1		12/30/10 14:32	17060-07-0	
Toluene-d8 (S)	112	%	80-123	1		12/30/10 14:32	2037-26-5	
Iron, Ferrous		Analytical Method: SM 3500-Fe B#4						
Iron, Ferrous	15.3	mg/L	0.40	1		01/06/11 16:50		H6
300.0 IC Anions		Analytical Method: EPA 300.0						
Nitrate as N	ND	mg/L	0.20	1		12/28/10 21:43	14797-55-8	
Nitrite as N	ND	mg/L	0.10	1		12/28/10 21:43	14797-65-0	
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0						
Sulfate	38.3	mg/L	5.0	5		01/04/11 01:52	14808-79-8	

ANALYTICAL RESULTS

Project: Winlock

Pace Project No.: 256135

Sample: MW2-122710		Lab ID: 256135004	Collected: 12/27/10 12:40	Received: 12/27/10 16:50	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
RSK 175 AIR Headspace		Analytical Method: RSK 175						
Ethane	ND	ug/L	10.0	1		12/29/10 14:58	74-84-0	
Ethene	ND	ug/L	10.0	1		12/29/10 14:58	74-85-1	
Methane	2980	ug/L	10.0	1		12/29/10 14:58	74-82-8	
NWTPH-Dx GCS		Analytical Method: NWTPH-Dx Preparation Method: EPA 3510						
Diesel Range	0.40	mg/L	0.077	1	01/03/11 09:50	01/03/11 23:37		
Motor Oil Range	ND	mg/L	0.38	1	01/03/11 09:50	01/03/11 23:37	64742-65-0	
n-Octacosane (S)	77	%	50-150	1	01/03/11 09:50	01/03/11 23:37	630-02-4	
o-Terphenyl (S)	82	%	50-150	1	01/03/11 09:50	01/03/11 23:37	84-15-1	
NWTPH-Gx GCV		Analytical Method: NWTPH-Gx						
Gasoline Range Organics	130	ug/L	50.0	1		12/30/10 19:07		
a,a,a-Trifluorotoluene (S)	99	%	50-150	1		12/30/10 19:07	98-08-8	
4-Bromofluorobenzene (S)	85	%	50-150	1		12/30/10 19:07	460-00-4	
8260 MSV		Analytical Method: EPA 5030B/8260						
Benzene	18.6	ug/L	1.0	1		12/30/10 14:53	71-43-2	
Ethylbenzene	ND	ug/L	1.0	1		12/30/10 14:53	100-41-4	
Toluene	ND	ug/L	1.0	1		12/30/10 14:53	108-88-3	
Xylene (Total)	ND	ug/L	3.0	1		12/30/10 14:53	1330-20-7	
4-Bromofluorobenzene (S)	110	%	80-120	1		12/30/10 14:53	460-00-4	
Dibromofluoromethane (S)	109	%	80-122	1		12/30/10 14:53	1868-53-7	
1,2-Dichloroethane-d4 (S)	106	%	80-124	1		12/30/10 14:53	17060-07-0	
Toluene-d8 (S)	111	%	80-123	1		12/30/10 14:53	2037-26-5	
Iron, Ferrous		Analytical Method: SM 3500-Fe B#4						
Iron, Ferrous	30.2	mg/L	0.40	1		01/06/11 16:50		H6
300.0 IC Anions		Analytical Method: EPA 300.0						
Nitrate as N	ND	mg/L	0.20	1		12/28/10 22:01	14797-55-8	
Nitrite as N	ND	mg/L	0.10	1		12/28/10 22:01	14797-65-0	
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0						
Sulfate	12.5	mg/L	1.0	1		01/04/11 02:10	14808-79-8	

ANALYTICAL RESULTS

Project: Winlock

Pace Project No.: 256135

Sample: MW3-122710		Lab ID: 256135005		Collected: 12/27/10 13:50		Received: 12/27/10 16:50		Matrix: Water	
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual	
RSK 175 AIR Headspace		Analytical Method: RSK 175							
Ethane	ND ug/L		10.0	1		12/29/10 15:24	74-84-0		
Ethene	ND ug/L		10.0	1		12/29/10 15:24	74-85-1		
Methane	339 ug/L		10.0	1		12/29/10 15:24	74-82-8		
NWTPH-Dx GCS		Analytical Method: NWTPH-Dx Preparation Method: EPA 3510							
Diesel Range	0.63 mg/L		0.082	1	01/03/11 09:50	01/03/11 23:53			
Motor Oil Range	ND mg/L		0.41	1	01/03/11 09:50	01/03/11 23:53	64742-65-0		
n-Octacosane (S)	65 %		50-150	1	01/03/11 09:50	01/03/11 23:53	630-02-4		
o-Terphenyl (S)	71 %		50-150	1	01/03/11 09:50	01/03/11 23:53	84-15-1		
NWTPH-Gx GCV		Analytical Method: NWTPH-Gx							
Gasoline Range Organics	ND ug/L		50.0	1		12/30/10 18:21			
a,a,a-Trifluorotoluene (S)	103 %		50-150	1		12/30/10 18:21	98-08-8		
4-Bromofluorobenzene (S)	86 %		50-150	1		12/30/10 18:21	460-00-4		
8260 MSV		Analytical Method: EPA 5030B/8260							
Benzene	ND ug/L		1.0	1		12/30/10 15:14	71-43-2		
Ethylbenzene	ND ug/L		1.0	1		12/30/10 15:14	100-41-4		
Toluene	ND ug/L		1.0	1		12/30/10 15:14	108-88-3		
Xylene (Total)	ND ug/L		3.0	1		12/30/10 15:14	1330-20-7		
4-Bromofluorobenzene (S)	112 %		80-120	1		12/30/10 15:14	460-00-4		
Dibromofluoromethane (S)	109 %		80-122	1		12/30/10 15:14	1868-53-7		
1,2-Dichloroethane-d4 (S)	106 %		80-124	1		12/30/10 15:14	17060-07-0		
Toluene-d8 (S)	113 %		80-123	1		12/30/10 15:14	2037-26-5		
Iron, Ferrous		Analytical Method: SM 3500-Fe B#4							
Iron, Ferrous	23.2 mg/L		0.40	1		01/06/11 16:50		H6	
300.0 IC Anions		Analytical Method: EPA 300.0							
Nitrate as N	ND mg/L		0.20	1		12/28/10 22:20	14797-55-8		
Nitrite as N	ND mg/L		0.10	1		12/28/10 22:20	14797-65-0		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Sulfate	13.9 mg/L		1.0	1		01/04/11 02:28	14808-79-8		

ANALYTICAL RESULTS

Project: Winlock

Pace Project No.: 256135

Sample: Trip Blank		Lab ID: 256135006	Collected: 12/17/10 00:00	Received: 12/27/10 16:50	Matrix: Water			
Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
NWTPH-Gx GCV		Analytical Method: NWTPH-Gx						
Gasoline Range Organics	ND	ug/L	50.0	1		12/30/10 16:24		
a,a,a-Trifluorotoluene (S)	101	%	50-150	1		12/30/10 16:24	98-08-8	
4-Bromofluorobenzene (S)	85	%	50-150	1		12/30/10 16:24	460-00-4	
8260 MSV		Analytical Method: EPA 5030B/8260						
Benzene	ND	ug/L	1.0	1		12/30/10 13:31	71-43-2	
Ethylbenzene	ND	ug/L	1.0	1		12/30/10 13:31	100-41-4	
Toluene	ND	ug/L	1.0	1		12/30/10 13:31	108-88-3	
Xylene (Total)	ND	ug/L	3.0	1		12/30/10 13:31	1330-20-7	
4-Bromofluorobenzene (S)	112	%	80-120	1		12/30/10 13:31	460-00-4	
Dibromofluoromethane (S)	106	%	80-122	1		12/30/10 13:31	1868-53-7	
1,2-Dichloroethane-d4 (S)	101	%	80-124	1		12/30/10 13:31	17060-07-0	
Toluene-d8 (S)	110	%	80-123	1		12/30/10 13:31	2037-26-5	

QUALITY CONTROL DATA

Project: Winlock

Pace Project No.: 256135

QC Batch: AIR/11519

Analysis Method: RSK 175

QC Batch Method: RSK 175

Analysis Description: RSK 175 AIR HEADSPACE

Associated Lab Samples: 256135001, 256135002, 256135003, 256135004, 256135005

METHOD BLANK: 912638

Matrix: Water

Associated Lab Samples: 256135001, 256135002, 256135003, 256135004, 256135005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Ethane	ug/L	ND	10.0	12/29/10 13:16	
Ethene	ug/L	ND	10.0	12/29/10 13:16	
Methane	ug/L	ND	10.0	12/29/10 13:16	

LABORATORY CONTROL SAMPLE & LCSD: 912639

912640

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Ethane	ug/L	114	94.7	113	83	99	70-130	17	30	
Ethene	ug/L	106	90.1	104	85	98	70-130	15	30	
Methane	ug/L	60.7	48.6	57.0	80	94	70-130	16	30	

QUALITY CONTROL DATA

Project: Winlock

Pace Project No.: 256135

QC Batch: OEXT/3135

Analysis Method: NWTPH-Dx

QC Batch Method: EPA 3510

Analysis Description: NWTPH-Dx GCS

Associated Lab Samples: 256135001, 256135002, 256135003, 256135004, 256135005

METHOD BLANK: 53607

Matrix: Water

Associated Lab Samples: 256135001, 256135002, 256135003, 256135004, 256135005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Diesel Range	mg/L	ND	0.080	01/03/11 21:42	
Motor Oil Range	mg/L	ND	0.40	01/03/11 21:42	
n-Octacosane (S)	%	50	50-150	01/03/11 21:42	
o-Terphenyl (S)	%	50	50-150	01/03/11 21:42	

LABORATORY CONTROL SAMPLE: 53608

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Diesel Range	mg/L	5	4.0	81	51-147	
Motor Oil Range	mg/L	5	4.4	88	20-160	
n-Octacosane (S)	%			76	50-150	
o-Terphenyl (S)	%			92	50-150	

QUALITY CONTROL DATA

Project: Winlock

Pace Project No.: 256135

QC Batch: GCV/2096 Analysis Method: NWTPH-Gx
QC Batch Method: NWTPH-Gx Analysis Description: NWTPH-Gx GCV Water
Associated Lab Samples: 256135001, 256135002, 256135003, 256135004, 256135005, 256135006

METHOD BLANK: 53594

Matrix: Water

Associated Lab Samples: 256135001, 256135002, 256135003, 256135004, 256135005, 256135006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Gasoline Range Organics	ug/L	ND	50.0	12/30/10 16:01	
4-Bromofluorobenzene (S)	%	70	50-150	12/30/10 16:01	
a,a,a-Trifluorotoluene (S)	%	79	50-150	12/30/10 16:01	

LABORATORY CONTROL SAMPLE: 53595

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Gasoline Range Organics	ug/L	250	219	88	50-163	
4-Bromofluorobenzene (S)	%			86	50-150	
a,a,a-Trifluorotoluene (S)	%			84	50-150	

SAMPLE DUPLICATE: 53642

Parameter	Units	256135002 Result	Dup Result	RPD	Qualifiers
Gasoline Range Organics	ug/L	ND	ND		
4-Bromofluorobenzene (S)	%	85	85	.1	
a,a,a-Trifluorotoluene (S)	%	100	100	.0009	

SAMPLE DUPLICATE: 53643

Parameter	Units	256123002 Result	Dup Result	RPD	Qualifiers
Gasoline Range Organics	ug/L	ND	ND		
4-Bromofluorobenzene (S)	%	84	82	3	
a,a,a-Trifluorotoluene (S)	%	102	99	2	

QUALITY CONTROL DATA

Project: Winlock

Pace Project No.: 256135

QC Batch: MSV/3665 Analysis Method: EPA 5030B/8260
QC Batch Method: EPA 5030B/8260 Analysis Description: 8260 MSV Water 10 mL Purge
Associated Lab Samples: 256135001, 256135002, 256135003, 256135004, 256135005, 256135006

METHOD BLANK: 53536

Matrix: Water

Associated Lab Samples: 256135001, 256135002, 256135003, 256135004, 256135005, 256135006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Benzene	ug/L	ND	1.0	12/30/10 12:50	
Ethylbenzene	ug/L	ND	1.0	12/30/10 12:50	
Toluene	ug/L	ND	1.0	12/30/10 12:50	
Xylene (Total)	ug/L	ND	3.0	12/30/10 12:50	
1,2-Dichloroethane-d4 (S)	%	101	80-124	12/30/10 12:50	
4-Bromofluorobenzene (S)	%	111	80-120	12/30/10 12:50	
Dibromofluoromethane (S)	%	108	80-122	12/30/10 12:50	
Toluene-d8 (S)	%	109	80-123	12/30/10 12:50	

LABORATORY CONTROL SAMPLE: 53537

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Benzene	ug/L	20	18.1	91	76-127	
Ethylbenzene	ug/L	20	18.0	90	72-125	
Toluene	ug/L	20	17.4	87	69-125	
Xylene (Total)	ug/L	60	52.3	87	74-124	
1,2-Dichloroethane-d4 (S)	%			99	80-124	
4-Bromofluorobenzene (S)	%			115	80-120	
Dibromofluoromethane (S)	%			106	80-122	
Toluene-d8 (S)	%			112	80-123	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 53605

53606

Parameter	Units	256135001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
Benzene	ug/L	ND	20	20	16.4	20.2	82	101	75-124	20	
Ethylbenzene	ug/L	ND	20	20	16.2	19.9	81	99	76-124	20	
Toluene	ug/L	ND	20	20	15.9	19.5	80	98	75-124	20	
Xylene (Total)	ug/L	ND	60	60	46.3	57.6	77	96	76-123	22	
1,2-Dichloroethane-d4 (S)	%						104	103	80-124		
4-Bromofluorobenzene (S)	%						111	112	80-120		
Dibromofluoromethane (S)	%						111	109	80-122		
Toluene-d8 (S)	%						113	113	80-123		

QUALITY CONTROL DATA

Project: Winlock

Pace Project No.: 256135

QC Batch: WET/2491 Analysis Method: SM 3500-Fe B#4

QC Batch Method: SM 3500-Fe B#4 Analysis Description: Iron, Ferrous

Associated Lab Samples: 256135001, 256135002, 256135003, 256135004, 256135005

METHOD BLANK: 53466

Matrix: Water

Associated Lab Samples: 256135001, 256135002, 256135003, 256135004, 256135005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Iron, Ferrous	mg/L	ND	0.10	01/06/11 16:50	H6

LABORATORY CONTROL SAMPLE: 53467

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron, Ferrous	mg/L	2	2.1	105	80-120	H6

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 53468

53469

Parameter	Units	256135002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
Iron, Ferrous	mg/L	ND	4	4	4.5	4.3	110	105	50-150	4	H6

QUALITY CONTROL DATA

Project: Winlock

Pace Project No.: 256135

QC Batch: WETA/1833 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 256135001, 256135002, 256135003, 256135004, 256135005

METHOD BLANK: 53480 Matrix: Water
Associated Lab Samples: 256135001, 256135002, 256135003, 256135004, 256135005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrate as N	mg/L	ND	0.20	12/28/10 20:12	
Nitrite as N	mg/L	ND	0.10	12/28/10 20:12	

LABORATORY CONTROL SAMPLE: 53481

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrate as N	mg/L	2.5	2.5	101	90-110	
Nitrite as N	mg/L	2.5	2.5	102	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 53482 53483

Parameter	Units	256135001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
Nitrate as N	mg/L	ND	2.5	2.5	2.5	2.4	100	97	90-110	3	
Nitrite as N	mg/L	ND	2.5	2.5	2.4	2.3	96	93	90-110	3	

QUALITY CONTROL DATA

Project: Winlock

Pace Project No.: 256135

QC Batch: WETA/1836 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 256135001, 256135002, 256135003, 256135004, 256135005

METHOD BLANK: 53646 Matrix: Water
Associated Lab Samples: 256135001, 256135002, 256135003, 256135004, 256135005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/L	ND	1.0	01/03/11 21:18	

LABORATORY CONTROL SAMPLE: 53647

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	15	14.9	99	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 53648 53649

Parameter	Units	256135001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
Sulfate	mg/L	9.1	15	15	24.5	25.7	103	110	90-110	5	

QUALIFIERS

Project: Winlock

Pace Project No.: 256135

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel Clean-Up

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is NELAP accredited. Contact your Pace PM for the current list of accredited analytes.

LABORATORIES

PASI-M Pace Analytical Services - Minneapolis

PASI-S Pace Analytical Services - Seattle

ANALYTE QUALIFIERS

H6 Analysis initiated more than 15 minutes after sample collection.

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Winlock

Pace Project No.: 256135

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
256135001	MW4-122710	RSK 175	AIR/11519		
256135002	MW5-122710	RSK 175	AIR/11519		
256135003	MW1-122710	RSK 175	AIR/11519		
256135004	MW2-122710	RSK 175	AIR/11519		
256135005	MW3-122710	RSK 175	AIR/11519		
256135001	MW4-122710	EPA 3510	OEXT/3135	NWTPH-Dx	GCSV/2171
256135002	MW5-122710	EPA 3510	OEXT/3135	NWTPH-Dx	GCSV/2171
256135003	MW1-122710	EPA 3510	OEXT/3135	NWTPH-Dx	GCSV/2171
256135004	MW2-122710	EPA 3510	OEXT/3135	NWTPH-Dx	GCSV/2171
256135005	MW3-122710	EPA 3510	OEXT/3135	NWTPH-Dx	GCSV/2171
256135001	MW4-122710	NWTPH-Gx	GCV/2096		
256135002	MW5-122710	NWTPH-Gx	GCV/2096		
256135003	MW1-122710	NWTPH-Gx	GCV/2096		
256135004	MW2-122710	NWTPH-Gx	GCV/2096		
256135005	MW3-122710	NWTPH-Gx	GCV/2096		
256135006	Trip Blank	NWTPH-Gx	GCV/2096		
256135001	MW4-122710	EPA 5030B/8260	MSV/3665		
256135002	MW5-122710	EPA 5030B/8260	MSV/3665		
256135003	MW1-122710	EPA 5030B/8260	MSV/3665		
256135004	MW2-122710	EPA 5030B/8260	MSV/3665		
256135005	MW3-122710	EPA 5030B/8260	MSV/3665		
256135006	Trip Blank	EPA 5030B/8260	MSV/3665		
256135001	MW4-122710	SM 3500-Fe B#4	WET/2491		
256135002	MW5-122710	SM 3500-Fe B#4	WET/2491		
256135003	MW1-122710	SM 3500-Fe B#4	WET/2491		
256135004	MW2-122710	SM 3500-Fe B#4	WET/2491		
256135005	MW3-122710	SM 3500-Fe B#4	WET/2491		
256135001	MW4-122710	EPA 300.0	WETA/1833		
256135002	MW5-122710	EPA 300.0	WETA/1833		
256135003	MW1-122710	EPA 300.0	WETA/1833		
256135004	MW2-122710	EPA 300.0	WETA/1833		
256135005	MW3-122710	EPA 300.0	WETA/1833		
256135001	MW4-122710	EPA 300.0	WETA/1836		
256135002	MW5-122710	EPA 300.0	WETA/1836		
256135003	MW1-122710	EPA 300.0	WETA/1836		
256135004	MW2-122710	EPA 300.0	WETA/1836		
256135005	MW3-122710	EPA 300.0	WETA/1836		

Sample Container Count

256135

Farallon

CLIENT:

COC PAGE 1 of 1
COC ID# 1438054



Sample Line Item	VG9H	AG1H	AG1U	BG1H	BP1U	BP2U	BP3U	BP2N	BP2S	WG9U	WGKU	Comments
1	6	2										
2	1	1										
3	1	1										
4	1	1										
5	1	1										
6	3											
7												
8												
9												
10												
11												
12												Trip Blank?

AG1H	1 liter HCL amber glass											
AG1U	1 liter unpreserved amber glass											
AG2S	500mL H2SO4 amber glass											
AG2U	500mL unpreserved amber glass											
AG3S	250mL H2SO4 amber glass											
BG1H	1 liter HCL clear glass											
BG1U	1 liter unpreserved glass											
BP1N	1 liter HNO3 plastic											
BP1S	1 liter H2SO4 plastic											
BP1U	1 liter unpreserved plastic											
BP1Z	1 liter NaOH, Zn, Ac											
BP2N	500mL HNO3 plastic											
BP2O	500mL NaOH plastic											
BP2S	500mL H2SO4 plastic											
BP2U	500mL unpreserved plastic											
BP2Z	500mL NaOH, Zn Ac											
BP3C	250mL NaOH plastic											
BP3N	250mL HNO3 plastic											
BP3S	250mL H2SO4 plastic											
BP3U	250mL unpreserved plastic											
DG9B	40mL Na Bisulfate amber vial											
DG9H	40mL HCL amber vial											
DG9M	40mL MeOH clear vial											
DG9T	40mL Na Thio amber vial											
DG9U	40mL unpreserved amber vial											
JG9U	40mL unpreserved clear vial											
VG9H	40mL HCL clear vial											
VG9T	40mL Na Thio. clear vial											
VG9W	40mL glass vial preweighted (EPA 5035)											
VSG	Headspace septa vial & HCL											
WG9U	4oz clear soil jar											
WGFX	4oz wide jar w/hexane wipe											
ZPLC	Ziploc Bag											
4oz unpreserved amber wide	terra core kit											
Summa Can												

**Sample Condition Upon Receipt**Client Name: FarallonProject # 256135Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☒ Client ☐ Commercial ☐ Pace Other _____

Tracking #: _____

Custody Seal on Cooler/Box Present: ☒ Yes ☐ No Seals intact: ☒ Yes ☐ NoPacking Material: ☐ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other _____ Temp. Blank ☒ Yes ☐ NoThermometer Used 132013 or 101731962 or 226099 Type of Ice: ☒ Wet ☐ Blue ☐ None ☐ Samples on ice, cooling process has begunCooler Temperature 0.2, 3.6, 4.6 Biological Tissue is Frozen: Yes NoTemp should be above freezing $\leq 5^{\circ}\text{C}$

Comments:

Date and Initials of person examining contents: NBS 12/27/10

Chain of Custody Present:	☒ Yes ☐ No ☐ N/A	1.
Chain of Custody Filled Out:	☒ Yes ☐ No ☐ N/A	2.
Chain of Custody Relinquished:	☒ Yes ☐ No ☐ N/A	3.
Sampler Name & Signature on COC:	☒ Yes ☐ No ☐ N/A	4.
Samples Arrived within Hold Time:	☒ Yes ☐ No ☐ N/A	5.
Short Hold Time Analysis (<72hr):	☒ Yes ☐ No ☐ N/A	6. <u>Nitrate/Nitrite, ferrous.</u>
Rush Turn Around Time Requested:	☐ Yes ☒ No ☐ N/A	7.
Sufficient Volume:	☒ Yes ☐ No ☐ N/A	8.
Correct Containers Used:	☒ Yes ☐ No ☐ N/A	9.
-Pace Containers Used:	☒ Yes ☐ No ☐ N/A	
Containers Intact:	☒ Yes ☐ No ☐ N/A	10.
Filtered volume received for Dissolved tests	☐ Yes ☐ No ☒ N/A	11.
Sample Labels match COC:	☒ Yes ☐ No ☐ N/A	12.
-Includes date/time/ID/Analysis Matrix:	<u>Water</u>	
All containers needing preservation have been checked.	☒ Yes ☐ No ☐ N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	☒ Yes ☐ No ☐ N/A	
Exceptions: <u>VOA</u> , coliform, TOC, O&G		
Samples checked for dechlorination:	☐ Yes ☐ No ☒ N/A	14.
Headspace in VOA Vials (>6mm):	☐ Yes ☒ No ☐ N/A	15.
Trip Blanks Present:	☒ Yes ☐ No ☐ N/A	16.
Trip Blank Custody Seals Present	☒ Yes ☐ No ☐ N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution:

Field Data Required?

Y / N

Person Contacted: Stacy P via email Date/Time: 12/28/10 1359

Comments/ Resolution:

Do not know what to do with the one on COC or one issued from
BOSE TT3193-KOI -> if BOSE PO, ferrous iron is not on it.
Please advise -> also called Javan

Project Manager Review: MLDate: 12/28/10

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

F-SEA-C-021-rev.00 03Aug2010

Pace Analytical Services, Inc - SEA Lab

EMAIL STACY if Javan answers?

APPENDIX B
PACKAGE A NATURAL ATTENUATION ANALYSIS TOOL, MODULES
1 AND 2

DECEMBER 2010
GROUNDWATER MONITORING STATUS REPORT

Former Cummings Oil Lease Site
908 Northwest Kerron Avenue
Winlock, Washington
VCP No. SW0775

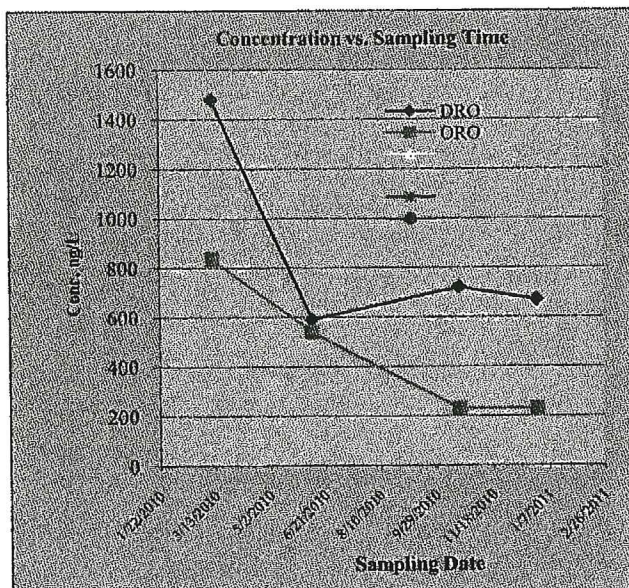
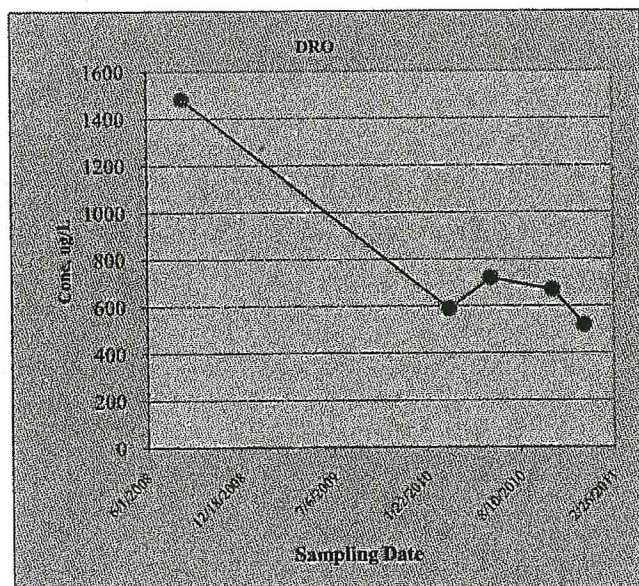
Farallon PN: 283-005

Module1: Mann-Kendall Trend Test for Plume Stability (Non-parametric Statistical Test)Site Name: *Former Cummings Oil Lease Site*Site Address: *Winlock, WA*Additional Description: *MW -1 DRO and ORO*Well (Sampling) Location? **MW-1**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)					
		DRO	ORO				
#1	8/18/2008	1480	836				
#2	3/11/2010	590	540				
#3	6/9/2010	720	230				
#4	10/20/2010	670	230				
#5	12/27/2010	520	230				
#6							
#7							
#8							
#9							
#10							
#11							
#12							
#13							
#14							
#15							
#16							

2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	DRO	ORO				
Confidence Level Calculated?	88.30%	88.30%	NA	NA	NA	NA
Plume Stability?	Shrinking	Shrinking	NA	NA	NA	NA
Coefficient of Variation?			n<4	n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	-6	-7	0	0	0	0
Number of Sampling Rounds?	5	5	0	0	0	0
Average Concentration?	796.00	413.20	NA	NA	NA	NA
Standard Deviation?	389.91	271.81	NA	NA	NA	NA
Coefficient of Variation?	0.49	0.66	NA	NA	NA	NA
Blank if No Errors found			n<4	n<4	n<4	n<4

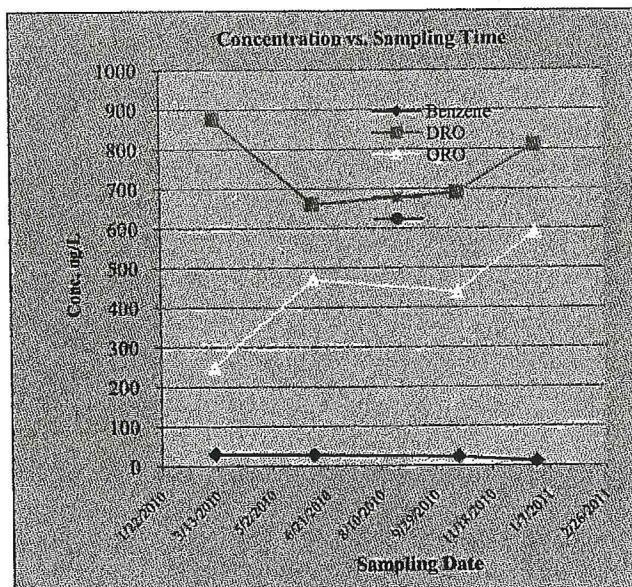
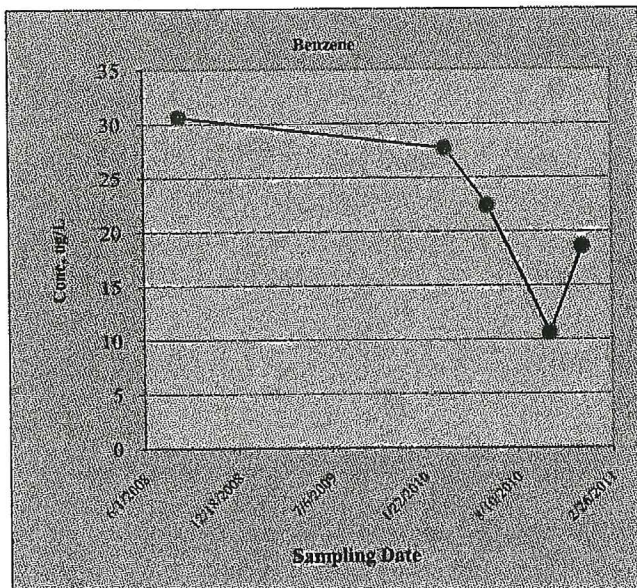
3. Temporal Trend: Plot of Concentration vs. Sampling TimeHazardous substance? **DRO**Plume Stability? **Shrinking**

Module1: Mann-Kendall Trend Test for Plume Stability (Non-parametric Statistical Test)Site Name: Former Cummings Oil Lease SiteSite Address: Winlock, WAAdditional Description: MW-2 Benzene, ORO, and DROWell (Sampling) Location? MW-2Level of Confidence (Decision Criteria)? 85%**1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.**

		Hazardous Substances (unit is ug/L)				
Sampling Event	Date Sampled	Benzene	DRO	ORO		
#1	8/18/2008	30.6	876	250		
#2	3/11/2010	27.7	660	470		
#3	6/9/2010	22.4	690	440		
#4	10/20/2010	10.6	810	590		
#5	12/27/2010	18.6	400	250		
#6						
#7						
#8						
#9						
#10						
#11						
#12						
#13						
#14						
#15						
#16						

2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	Benzene	DRO	ORO			
Confidence Level Calculated?	95.80%	75.80%	40.80%	NA	NA	NA
Plume Stability?	Shrinking	Stable	Stable	NA	NA	NA
Coefficient of Variation?		CV <= 1	CV <= 1	n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	-8	-4	1	0	0	0
Number of Sampling Rounds?	5	5	5	0	0	0
Average Concentration?	21.98	687.20	400.00	NA	NA	NA
Standard Deviation?	7.88	183.00	147.99	NA	NA	NA
Coefficient of Variation?	0.36	0.27	0.37	NA	NA	NA
Blank if No Errors found				n<4	n<4	n<4

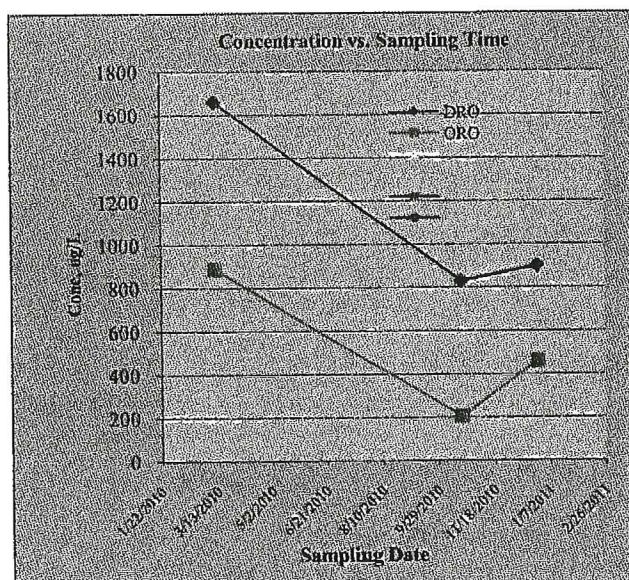
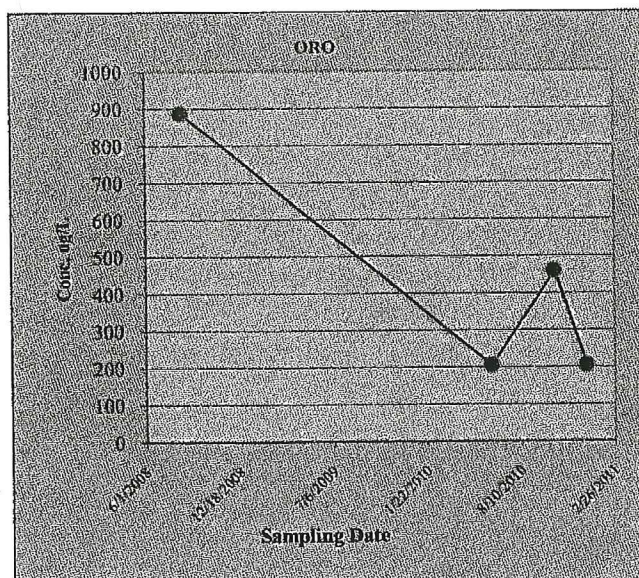
3. Temporal Trend: Plot of Concentration vs. Sampling TimeHazardous substance? BenzenePlume Stability? Shrinking

Module1: Mann-Kendall Trend Test for Plume Stability (Non-parametric Statistical Test)Site Name: Former Cummings Oil Lease SiteSite Address: Winlock, WAAdditional Description: MW-3 DRO and OROWell (Sampling) Location? MW-3Level of Confidence (Decision Criteria)? 85%**1. Monitoring Well Information: Contaminant Concentration at a well: Quarterly sampling recommended.**

		Hazardous Substances (unit is ug/L)					
Sampling Event	Date Sampled	DRO	ORO				
#1	8/18/2008	1660	887				
#2	3/11/2010						
#3	6/9/2010	830	205				
#4	10/20/2010	900	460				
#5	12/27/2010	630	205				
#6							
#7							
#8							
#9							
#10							
#11							
#12							
#13							
#14							
#15							
#16							

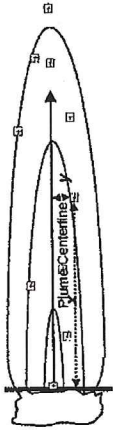
2. Mann-Kendall Non-parametric Statistical Test Results

Hazardous Substance?	DRO	ORO				
Confidence Level Calculated?	83.30%	62.50%	NA	NA	NA	NA
Plume Stability?	Stable	Stable	NA	NA	NA	NA
Coefficient of Variation?	CV <= 1	CV <= 1	n<4	n<4	n<4	n<4
Mann-Kendall Statistic "S" value?	-4	-3	0	0	0	0
Number of Sampling Rounds?	4	4	0	0	0	0
Average Concentration?	1005.00	439.25	NA	NA	NA	NA
Standard Deviation?	451.41	321.80	NA	NA	NA	NA
Coefficient of Variation?	0.45	0.73	NA	NA	NA	NA
Blank if No Errors found			n<4	n<4	n<4	n<4

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

Module 2: Inputs: Enter Historical Ground Water Data

Site Name: Former Cummings Oil Lease Site
Site Address: Winlock, Washington
Additional Description: MW-1 MW-2 MW-3
Hazardous Substance: DRO



Note: relationship of "y/x ≤ 0.33" is preferred

1. Monitoring Well Information: Contaminant Concentration at a well:

Well Location:	Unit	MW-1	MW-2	MW-3
Dist from source, x-direction	ft	0.001	0.001	0.001
Off-centerline dist, y-direction	ft	0.001	0.001	0.001
Sampling Event	Date sampled	day	Unit of concentration is ug/L	
#1	8/18/08	0	1480	876 1660
#2	3/11/10	570	590	660
#3	6/9/10	660	720	690 830
#4	10/20/10	793	670	810 900
#5	12/27/10	861	520	400 630
#6				
#7				
#8				
#9				
#10				
#11				
#12				
#13				
#14				
#15				
#16				
#17				
#18				
#19				
#20				
Average Concentration			796.0	687.2 1005.0 N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A
Maximum Concentration			1480	876 1660 N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A
Minimum Concentration			520	400 630 N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A N/A

2. Groundwater Elevation:

Well Location:	Date sampled	Day
Sampling Event		
#1	8/18/08	0
#2	3/11/10	570
#3	6/9/10	660
#4	10/20/10	793
#5	12/27/10	861
#6		
#7		
#8		
#9		
#10		
#11		
#12		
#13		
#14		
#15		
#16		
#17		
#18		
#19		
#20		

Module 2: Temporal Analysis: Concentration of contaminant vs. time (Regression Analysis at each well)Site Name: *Former Cummings Oil Lease Site*Site Address: *Winlock, Washington*Additional Description: *MW-1 MW-2 MW-3**Hazardous Substance DRO*

1. Level of Confidence (Decision Criteria)?		85%									
2. Prediction: Calculation of Restoration Time and Predicted Concentration at Wells											
Well Location		MW-1	MW-2	MW-3							
A. Cleanup Level (Criterion) to be achieved?	ug/L	500	500	500							
A.1 Average (@50% CL, best-fitting values)											
Time to reach the criterion	yr	2.53	NA	3.34	NA	NA	NA	NA	NA	NA	NA
Date when the Criterion to be achieved	date	3/1/11	NA	12/18/11	NA	NA	NA	NA	NA	NA	NA
A.2 Boundary (@85% CL)											
Time to reach the criterion ²	yr	3.42	NA	4.62	NA	NA	NA	NA	NA	NA	NA
Date when the Criterion to be achieved	date	1/18/12	NA	3/30/13	NA	NA	NA	NA	NA	NA	NA
B Date of Prediction?	date	3/15/11	3/15/11	3/15/11							
B.1 Average conc predicted (@50% CL)	ug/L	492.31	NA	658.43	#VALUE!	#DIV/0!	NA	NA	#DIV/0!	#DIV/0!	NA
B.2 Boundary conc predicted (@85% CL)	ug/L	646.00	NA	851.77	#VALUE!	#DIV/0!	NA	NA	#DIV/0!	#DIV/0!	NA
3. Log-Linear Regression Results											
Coefficient of Determination	r^2	0.876	0.379	0.910	NA	NA	NA	NA	NA	NA	NA
Correlation Coefficient	r	-0.936	-0.616	-0.954	NA	NA	NA	NA	NA	NA	NA
Number of data points	n	5	5	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, %		98.065%	73.127%	95.406%	NA	NA	NA	NA	NA	NA	NA
Sufficient evidence to support that the slope of the regression line is significantly different from zero?		YES!	NO!	YES!	NA	NA	NA	NA	NA	NA	NA
Coefficient of Variation?		NA	0.266	NA	NA	NA	NA	NA	NA	NA	NA
Plume Stability?		Shrinking	Stable	Shrinking	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	0.408	0.201	0.361	NA	NA	NA	NA	NA	NA	NA
	yr ⁻¹	0.302	0.024	0.261	NA	NA	NA	NA	NA	NA	NA
Half Life for (k_{point})	yr	1.699	3.443	1.922	NA	NA	NA	NA	NA	NA	NA
	yr	2.292	28.367	2.660	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:	Former Cummings Oil Lease Site
Site Address:	Winlock, Washington
Additional Description:	MW-1 MW-2 MW-3
Hazardous Substance	ORO

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

I. Monitoring Well Information:					
Well Location:	Date sampled	Unit	MW-1	MW-2	MW-3
Dist from source, x-direction		ft	0.001	0.001	0.001
Off-centerline dist, y-direction		ft	0.001	0.001	0.001
Sampling Event	Data sampled	day	Unit of concentration is ug/L		
#1	8/18/08	0	836	250	887
#2	3/11/10	570	540	470	
#3	6/9/10	660	230	440	205
#4	10/7/010	793	230	590	460
#5	12/27/10	861	230	250	205
#6					
#7					
#8					
#9					
#10					
#11					
#12					
#13					
#14					
#15					
#16					
#17					
#18					
#19					
#20					
Average Concentration			413.2	400.0	439.3
Maximum Concentration			836	590	887
Minimum Concentration			230	250	205

2. Groundwater Elevation:

Well Location:					
Sampling Event	Date sampled	Day			
#1	8/18/08	0	95.96	95.73	95.78
#2	3/11/10	570	97.46	98.52	96.63
#3	6/9/10	660	96.26	98.12	97.92
#4	10/20/10	793	97.46	97.75	97.5
#5	12/27/10	861	98.51	98.88	98.2
#6					
#7					
#8					
#9					
#10					
#11					
#12					
#13					
#14					
#15					
#16					
#17					
#18					
#19					
#20					

Module 2: Temporal Analysis: Concentration of contaminant vs. time (Regression Analysis at each well)Site Name: *Former Cummings Oil Lease Site*Site Address: *Winlock, Washington*Additional Description: *MW-1 MW-2 MW-3*Hazardous Substance *ORO*

1. Level of Confidence (Decision Criteria)?											85%
2. Prediction: Calculation of Restoration Time and Predicted Concentration at Wells											
Well Location		MW-1	MW-2	MW-3	NA	NA	NA	NA	NA	NA	NA
A. Cleanup Level (Criterion) to be achieved?		ug/L	500	500							
A.1 Average (@50% CL best-fitting values)											
Time to reach the criterion		yr	0.99	NA	NA	NA	NA	NA	NA	NA	NA
Date when the Criterion to be achieved		date	8/13/09	NA	NA	NA	NA	NA	NA	NA	NA
A.2 Boundary (@85% CL)											
Time to reach the criterion ²		yr	1.46	NA	NA	NA	NA	NA	NA	NA	NA
Date when the Criterion to be achieved		date	2/2/10	NA	NA	NA	NA	NA	NA	NA	NA
B Date of Prediction?		date	3/15/11	3/15/11							
B.1 Average conc predicted (@50% CL)											
		ug/L	197.41	NA	NA	NA	#DIV/0!	#DIV/0!	#DIV/0!	NA	NA
B.2 Boundary conc predicted (@85% CL)											
		ug/L	322.30	NA	NA	NA	#DIV/0!	#DIV/0!	#DIV/0!	NA	NA

3. Log-Linear Regression Results

Coefficient of Determination	r^2	0.817	0.183	0.645	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Correlation Coefficient	r	-0.904	0.428	-0.803	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Number of data points	n	5	5	4	NA	NA	NA	NA	NA	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, %	96.473%	52.738%	80.330%	NA	NA	NA	NA	NA	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?	YES!	NO!	NO!	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Coefficient of Variation?	NA	0.370	0.733	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Plume Stability?	Shrinking	Stable	Stable	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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

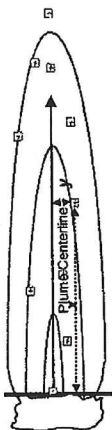
Slope: Point decay rate constant (k_{point})	@50% CL	yr ⁻¹	0.586	0.178	0.527	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	@85% CL	yr ⁻¹	0.396	NA	0.182	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Half Life for (k_{point})	@50% CL	yr	1.183	3.885	1.316	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	@85% CL	yr	1.752	NA	3.817	NA	NA	NA	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.)

Module 2: Inputs: Enter Historical Ground Water Data

Site Name:	Former Cummings Oil Lease Site
Site Address:	Winlock, Washington
Additional Description:	MW-2
Hazardous Substance	Benzene



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

1. Monitoring Well information: Contaminant Concentration at a well:

1. MONITORING WITH INFORMATIONAL CONCENTRATION AT THE POINT									
Well Location:		MW-2							
Unit	ft	0.001							
Dist from source, x-direction	ft	0.001							
Off-centerline dist. y-direction	ft								
Sampling Event	Date sampled	Unit of concentration is ug/L							
#1	8/18/08	30.6							
#2	3/11/10	27.7							
#3	6/9/10	22.4							
#4	10/20/10	10.6							
#5	12/27/10	18.6							
#6									
#7									
#8									
#9									
#10									
#11									
#12									
#13									
#14									
#15									
#16									
#17									
#18									
#19									
#20									
Average Concentration		22.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Maximum Concentration		30.6	NA	NA	NA	NA	NA	NA	NA
Minimum Concentration		10.6	NA	NA	NA	NA	NA	NA	NA

2. Groundwater Elevation:

Well Location:					
Sampling Event	Date sampled	Day			
#1	8/18/08	0	95.96		
#2	3/11/10	570	97.46		
#3	6/9/10	660	96.26		
#4	10/20/10	793	97.46		
#5	12/27/10	861	98.51		
#6					
#7					
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#20					

Module 2: Temporal Analysis: Concentration of contaminant vs. time (Regression Analysis at each well)Site Name: *Former Cummings Oil Lease Site*Site Address: *Winlock, Washington*Additional Description: *MW-2**Hazardous Substance Benzene*

		85%									
1. Level of Confidence (Decision Criteria)?											
2. Prediction: Calculation of Restoration Time and Predicted Concentration at Wells											
Well Location	MW-2										
A. Cleanup Level (Criterion) to be achieved? ug/L	5										
A.1 Average (@50% CL ¹ best-fitting values) Time to reach the criterion yr	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Date when the Criterion to be achieved date	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	NA	NA	NA	NA	NA	NA	NA	NA	NA
Date when the Criterion to be achieved date	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B Date of Prediction? date	3/15/11										
B.1 Average conc predicted (@50% CL) ug/L	NA	#VALUE!	#VALUE!	NA	#DIV/0!	NA	NA	#DIV/0!	#DIV/0!	NA	NA
B.2 Boundary conc predicted (@85% CL) ug/L	NA	#VALUE!	#VALUE!	NA	#DIV/0!	NA	NA	#DIV/0!	#DIV/0!	NA	NA

3. Log-Linear Regression Results

Coefficient of Determination r^2	0.477	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Correlation Coefficient r	-0.691	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Number of data points n	5	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, %	80.350%	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?	NO!	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Coefficient of Variation?	0.358	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Plume Stability?	Stable	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})	@50% CL yr ⁻¹	0.309	NA	NA	NA	NA	NA	NA	NA	NA	NA
	@85% CL yr ⁻¹	0.087	NA	NA	NA	NA	NA	NA	NA	NA	NA
Half Life for (k_{point})	@50% CL yr	2.241	NA	NA	NA	NA	NA	NA	NA	NA	NA
	@85% CL yr	7.967	NA	NA	NA	NA	NA	NA	NA	NA	NA

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

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