

**Post-Construction Groundwater Monitoring
Report – Year 6**

Skagit County Port Site
(Taxiway F Skagit County Regional Airport)
Burlington, Washington
Consent Decree No. 11-2-01536-2
Facility ID No. 6757634
Cleanup Site ID No. 1671

for

**Washington State Department of Ecology
on Behalf of Port of Skagit County**

March 14, 2019



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File No. 5364-013-09

March 14, 2019

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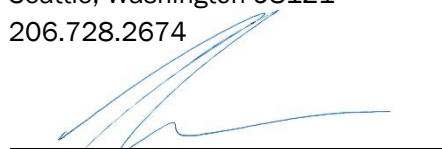
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INTRODUCTION

This document presents the results of long-term semi-annual post-construction compliance groundwater monitoring completed for the Skagit County Port (Taxiway F Skagit County Regional Airport) Site (herein referred to as “Site”). The Site is located generally within the western portion of the Skagit Regional Airport, east of Taxiway F in Burlington, Washington (Figure 1). Pursuant to Washington State Department of Ecology (Ecology) Consent Decree No. 11-2-01536-2 (Consent Decree; Ecology 2011), the Cleanup Action Plan (CAP; GeoEngineers 2011a) and Engineering Design Report (EDR; GeoEngineers 2011b), the Port of Skagit County (Port) is monitoring for indicator hazardous substances in groundwater to evaluate the effectiveness of the 2011 cleanup action that was completed to remove pesticide and herbicide contaminated soil from the Site (Figure 2). The Facility Site Identification Number is 67457634 and the Cleanup Site Identification Number is 1671.

In accordance with the Compliance Monitoring Plan (CMP; GeoEngineers 2011c), four initial post-construction rounds (Rounds 1 through 4) of groundwater monitoring were completed by the Port between December 2012 and September 2013 (GeoEngineers 2014). Based on a review of the chemical analytical data for these monitoring events, Ecology determined that compliance with the groundwater cleanup objectives had not been achieved and that four additional rounds of quarterly monitoring were merited to further evaluate post-construction groundwater conditions. Additional groundwater monitoring (Rounds 5 through 8) were completed by the Port between June 2014 and March 2015 (GeoEngineers 2015). Results of the additional groundwater monitoring showed that chlorinated pesticides (aldrin, dieldrin, heptachlor, and heptachlor epoxide) met the groundwater performance criteria established for the Site. However, concentrations of chlorinated herbicides (2-methyl-4-chlorophenoxy-acetic acid [MCPA] and dinoseb) remained above the performance criteria. To further evaluate post-construction groundwater conditions at the Site, Ecology required that additional groundwater monitoring be completed at the Site on a semi-annual basis during March and December to provide long-term data that would inform evaluation of the post-construction compliance at the Site. The results of the semi-annual monitoring are presented in this report along with the previously collected data.

Post-construction groundwater monitoring activities for the semi-annual sampling events (Rounds 9 through 15) are summarized in the following sections. Environmental data summarized in this report and for previous groundwater monitoring events have been uploaded to Ecology’s Environmental Information Management (EIM) database under Study ID - FS67457634 and Study Name – Skagit County Port (Taxiway F Skagit County Regional Airport) Burlington, Washington.

The results of the monitoring have been shared with Ecology and based on the sampling completed to date, Ecology has indicated that no further monitoring will be required at the Site. A formal determination will be documented by Ecology following approval of this report.

GROUNDWATER MONITORING PROGRAM

Performance Criteria

In accordance with the CMP, the Site is considered to be in compliance when contaminant concentrations for indicator hazardous substances for groundwater established by the CAP including dinoseb, bentazon, 2,4-D, MCPA, aldrin, dieldrin, heptachlor, and heptachlor epoxide are less than site-specific cleanup levels

at the point of compliance for four consecutive monitoring events. For groundwater, the point of compliance is located throughout the Site from the uppermost level of the saturated zone extending vertically to the lowermost depth which could potentially be affected by Site contaminants. Previous investigation results indicated that the deep groundwater zone beneath the Site has not been affected by the contamination in shallow soils and perched groundwater. Accordingly, monitoring of the deep groundwater zone is not required as part of the cleanup action.

Monitoring Activities

Long-term groundwater conditions are being evaluated at monitoring wells MW-9 through MW-12 on a semi-annual basis to further evaluate post-construction groundwater conditions at the Site. The network of post-construction groundwater monitoring wells is shown relative to the cleanup action area on Figure 2. Specific activities that were completed as part of the groundwater monitoring included:

- Measuring depth to groundwater at monitoring well locations MW-9 through MW-12 prior to groundwater sample collection.
- Collecting groundwater samples from monitoring wells MW-9 through MW-12 using low-flow/low-turbidity sampling techniques using a peristaltic pump and disposable polyethylene tubing.
- Placing groundwater samples in laboratory prepared jars for chemical analysis. Groundwater samples are being evaluated for indicator hazardous substances including chlorinated herbicides (dinoseb and MCPA) which exceeded the performance criteria during one or more groundwater monitoring events completed between June 2014 and March 2015 (Rounds 5 through 8).
- Storing purge water generated by the sampling activities in sealed and labeled 55-gallon drums at the Site pending characterization for disposal.
- Comparing the chemical analytical results to the site-specific cleanup levels established by the CAP.

Field procedures for groundwater monitoring activities are presented in Appendix A. Monitoring well completion logs for MW-9 through MW-12 are presented in Appendix B. The monitoring events and results are summarized below.

Monitoring Events

The schedule for groundwater monitoring activities are summarized in the following table. As indicated above, monitoring wells MW-9 through MW-12 were sampled on a semi-annual basis between December 2015 and December 2018 (Rounds 9 through 15) to further evaluate post-construction groundwater conditions at the Site following two years of initial quarterly monitoring (Rounds 1 through 8).

Observed groundwater conditions and chemical analytical results for semi-annual groundwater monitoring (i.e., Rounds 9 through 15) are further discussed in below.

Monitoring Results

Groundwater Conditions

Depth to groundwater was measured from the top of the well casing in monitoring wells MW-9 through MW-12 prior to sampling during each post-construction groundwater monitoring event. Measured groundwater elevations for each monitoring event are summarized in Table 1 and shown on Figures 3

through 9. Based on the measured groundwater elevations and previous groundwater investigations (GeoEngineers 2009), the inferred predominant groundwater flow direction is from the taxiway to the southeast toward the wetland area.

During each post-construction groundwater monitoring event, monitoring wells MW-9 through MW-12 were purged at a rate not exceeding 0.5 liters per minute using low-flow sampling techniques until the water quality parameters (i.e., electrical conductivity, dissolved oxygen, pH, total dissolved solids, turbidity, and temperature) stabilized to within 10 percent on three consecutive readings or until the well was purged dry. In the event that the well became dry during purging, groundwater was allowed to recharge and a water sample obtained.

Water quality parameters measured during each semi-annual sampling event (Rounds 9 through 15) at the time of sample collection are summarized in Table 2.

Chemical Analytical Results

Groundwater samples collected during the long-term semi-annual groundwater monitoring events (Rounds 9 through 15) were submitted to OnSite Environmental, Inc. of Redmond, Washington (OnSite), for chemical analysis of the chlorinated herbicides including dinoseb and MCPA using US Environmental Protection Agency (EPA) method 8081A GC/ECD. Chlorinated herbicides either were not detected or were detected at concentrations less than site-specific groundwater cleanup levels in each of the wells sampled with the following exceptions:

- **MCPA** – MCPA exceeded the site-specific groundwater cleanup level in monitoring wells MW-10 and MW-11 during the December 15, 2015 and March 23, 2016 monitoring events. However, MCPA was not detected at these locations in subsequent five monitoring events.
- **Dinoseb** – Dinoseb exceeded the site-specific groundwater cleanup level in monitoring wells MW-10 during the December 14, 2016 monitoring event. However, dinoseb either was not detected or was detected at concentrations less than cleanup levels at this location in subsequent four monitoring events.

Post-construction groundwater analytical results are summarized in Table 3 and shown on Figures 3 through 9. Copies of laboratory reports for each semi-annual groundwater monitoring event are presented in Appendix B. Laboratory data presented in Appendix C were subjected to an EPA level 2A validation and were determined to be acceptable for its intended use as qualified. Data validation reports are presented in Appendix D. The validated analytical data has been uploaded to Ecology's Environmental Information Management (EIM) database.

Trend Analysis

Historical concentrations chlorinated herbicides for monitoring wells MW-9 through MW-12 are shown on Figures 10 and 11. A review of chlorinated hydrocarbon results for MCPA and dinoseb over the first eight rounds (Rounds 1 through 8) of groundwater monitoring indicated no apparent clear trend in contaminant concentrations. As a result, Ecology determined that a longer monitoring period was merited to help better evaluate contaminant attenuation at the Site. Based on the results of the subsequent semi-annual groundwater monitoring (Rounds 9 through 15), the trend analysis for chlorinated herbicides including MCPA and dinoseb now show a stable and decreasing trend in contaminant concentrations. During the last

four monitoring events (Rounds 11 through 15), concentrations of MCPA and dinoseb either were not detected or were detected less than the cleanup levels established for the Site.

CONCLUSIONS

Cleanup actions completed by the Port in 2011 resulted in the removal and off-site disposal of 6,612 tons of soil containing pesticide and herbicide contamination resulting from historical Site use. Confirmation of the contaminated soil removal completeness was verified by soil sampling and analysis at the final limits of excavation. Following the completion of the cleanup construction, 15 groundwater monitoring events were completed by the Port to evaluate the effectiveness of the cleanup action. The performance criteria for dinoseb and MCPA has been achieved for all sampling locations at the Site for a minimum of four consecutive monitoring events. A trend analysis for MCPA and dinoseb for the semi-annual groundwater monitor events (Rounds 9 through 15) show a stable and decreasing trend in contaminant concentrations at the Site – thus demonstrating the effectiveness of the removal action over-time. Because the performance monitoring criteria for the Site has been achieved and trend analysis of the results show a stable or decrease in contaminant concentrations, additional groundwater monitoring for the Site is not warranted. The results of the monitoring have been shared with Ecology and based on the sampling completed to date, Ecology has indicated that no further monitoring will be required at the Site.

LIMITATIONS

We have prepared this Post-Construction Groundwater Compliance Monitoring Report for use by the Port of Skagit County, their authorized agents and regulatory agencies for the Taxiway F Site located in Burlington, Washington. No other party may rely on the product of our services unless we agree in advance and in writing to such reliance.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

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REFERENCES

GeoEngineers, Inc., “Final Work Plan, Remedial Investigation/Feasibility Study, Taxiway F Site, Skagit Regional Airport, Ecology Agreed Order No. 6158.” GEI File No. 5364-013-00, dated July 31, 2009.

GeoEngineers, Inc. (2011a), “Draft Cleanup Action Plan, Taxiway F Site, Skagit Regional Airport.” GEI File No. 5364-013-03, dated February 28, 2011.

GeoEngineers, Inc. (2011b), “Engineering Design Report, Taxiway F Site, Skagit Regional Airport, Burlington, Washington.” GEI File No. 5364-013-03, dated July 15, 2011.

GeoEngineers, Inc. (2011c), "Compliance Monitoring Plan, Taxiway F Site, Skagit Regional Airport, Ecology Agreed Order No. 6158." GEI File No. 5364-013-02, dated January 10, 2011.

GeoEngineers, Inc., "Post-Construction Compliance Groundwater Monitoring Report, Round 1 through Round 4, Taxiway F Site, Skagit Regional Airport, Ecology Agreed Order No. 6158." GEI File No. 5364-013-05, dated March 5, 2014.

GeoEngineers, Inc., "Post-Construction Compliance Groundwater Monitoring Report, Round 5 through Round 8, Taxiway F Site, Skagit Regional Airport, Ecology Agreed Order No. 6158." GEI File No. 5364-013-05, dated July 23, 2015.

Washington State Department of Ecology (Ecology), Consent Decree 11-2-01536-2. State of Washington Department of Ecology v. Port of Skagit County, a municipal corporation. Filed August 1, 2011.

Washington State Department of Ecology (Ecology), "Minimum Standards for Construction and Maintenance of Wells", Chapter 173-160 WAC, update November 2006.

Table 1
Post-Construction Groundwater Monitoring Elevation Data
Skagit County Port (Taxiway F Skagit County Regional Airport)
Burlington, Washington

Groundwater Monitoring Well ¹	Groundwater Monitoring Event	Date Measured	Top of Casing Elevation ² (feet)	Depth to Water from Top of Casing (feet)	Groundwater Elevation ² (feet)
MW-9	Round 1	12/19/12	122.42	0.91	121.51
	Round 2	03/26/13		2.50	119.92
	Round 3	06/26/13		2.11	120.31
	Round 4	09/26/13		4.40	118.02
	Round 5	06/30/14		4.33	118.09
	Round 6	10/09/14		Dry	Dry
	Round 7	12/18/14		1.25	121.17
	Round 8	03/19/15		0.98	121.44
	Round 9	12/15/15		1.22	121.20
	Round 10	03/23/16		1.39	121.03
	Round 11	12/14/16		1.67	120.75
	Round 12	03/27/17		1.25	121.17
	Round 13	12/18/17		1.18	121.24
	Round 14	03/21/18		1.08	121.34
	Round 15	12/18/18		1.17	121.25
MW-10	Round 1	12/19/12	120.76	1.15	119.61
	Round 2	03/26/13		1.50	119.26
	Round 3	06/26/13		1.66	119.10
	Round 4	09/26/13		0.92	119.84
	Round 5	06/30/14		2.11	118.65
	Round 6	10/09/14		3.79	116.97
	Round 7	12/18/14		1.12	119.64
	Round 8	03/19/15		1.18	119.58
	Round 9	12/15/15		0.75	120.01
	Round 10	03/23/16		0.71	120.05
	Round 11	12/14/16		0.50	120.26
	Round 12	03/27/17		1.34	119.42
	Round 13	12/18/17		0.11	120.65
	Round 14	03/21/18		0.07	120.69
	Round 15	12/18/18		0.55	120.21

Groundwater Monitoring Well ¹	Groundwater Monitoring Event	Date Measured	Top of Casing Elevation ² (feet)	Depth to Water from Top of Casing (feet)	Groundwater Elevation ² (feet)
MW-11	Round 1	12/19/12	120.88	1.91	118.97
	Round 2	03/26/13		0.7	120.18
	Round 3	06/26/13		2.03	118.85
	Round 4	09/26/13		0.93	119.95
	Round 5	06/30/14		3.68	117.20
	Round 6	10/09/14		4.08	116.80
	Round 7	12/18/14		0.50	120.38
	Round 8	03/19/15		1.82	119.06
	Round 9	12/15/15		1.24	119.64
	Round 10	03/23/16		1.82	119.06
	Round 11	12/14/16		1.10	119.78
	Round 12	03/27/17		1.43	119.45
	Round 13	12/18/17		0.23	120.65
	Round 14	03/21/18		0.06	120.82
	Round 15	12/18/18		0.99	119.89
MW-12	Round 1	12/19/12	120.97	3.38	117.59
	Round 2	03/26/13		3.55	117.42
	Round 3	06/26/13		3.56	117.41
	Round 4	09/26/13		3.41	117.56
	Round 5	06/30/14		3.79	117.18
	Round 6	10/09/14		4.15	116.82
	Round 7	12/18/14		3.07	117.90
	Round 8	03/19/15		4.82	116.15
	Round 9	12/15/15		3.26	117.71
	Round 10	03/23/16		3.44	117.53
	Round 11	12/14/16		5.16	115.81
	Round 12	03/27/17		3.19	117.78
	Round 13	12/18/17		3.76	117.21
	Round 14	03/21/18		3.61	117.36
	Round 15	12/18/18		3.11	117.86

Notes:

¹ Monitoring well locations and groundwater elevation data are shown on Figure 1.

² Elevation is referenced to Mean Lower Low Water (MLLW).

Table 2
Post-Construction Groundwater Monitoring Field Parameters
Skagit County Port (Taxiway F Skagit County Regional Airport)
Burlington, Washington

Groundwater Monitoring Well ¹	Groundwater Monitoring Event	Date Measured	pH	Cond. (S/m)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Total Dissolved Solids (g/L)	Oxidation Reduction Potential (mV)
MW-9	Round 1	12/19/12	6.12	0.32	14.8	5.2	7.8	2.0	114.0
	Round 2 ²	03/26/13	--	--	--	--	--	--	--
	Round 3	06/26/13	6.24	2.16	11.2	12.0	17.5	1.39	188.0
	Round 4 ²	09/26/13	--	--	--	--	--	--	--
	Round 5	06/30/14	6.50	1.28	10.5	18.0	20.6	4.90	18.1
	Round 6	10/09/14	Dry	Dry	Dry	Dry	Dry	Dry	Dry
	Round 7	12/18/14	6.79	1.65	29.1	6.9	9.7	1.06	90.0
	Round 8	03/19/15	6.69	1.38	4.3	3.9	10.1	0.89	-41.8
	Round 9	12/15/15	6.21	1.38	6.0	1.9	8.1	0.90	171
	Round 10	03/23/16	6.49	0.90	7.3	0.6	8.3	0.86	-19.0
	Round 11	12/14/16	6.17	0.85	7.6	0.3	8.1	0.83	56.5
	Round 12	03/27/17	6.45	1.32	3.0	1.7	8.1	--	72.2
	Round 13	12/18/18	6.79	0.70	1.9	0.6	7.9	0.67	177.1
	Round 14	03/21/18	6.51	0.72	0.5	0.3	6.9	0.70	137.8
	Round 15	12/18/18	6.35	0.84	3.7	0.0	8.3	0.55	117.4
MW-10	Round 1	12/19/12	6.10	0.51	26.5	5.4	9.0	3.20	130.0
	Round 2	03/26/13	6.16	4.85	113	12.7	12.0	--	-18.0
	Round 3	06/26/13	6.32	4.77	18.1	10.4	18.4	3.05	133.0
	Round 4 ²	09/26/13	--	--	--	--	--	--	--
	Round 5	06/30/14	6.43	2.14	10.3	19.8	17.3	7.70	130.1
	Round 6	10/09/14	6.88	2.31	5.8	6.4	15.2	1.52	253.7
	Round 7	12/18/14	5.90	1.07	39.3	8.3	10.5	0.69	124.0
	Round 8	03/19/15	6.71	1.23	11.1	4.4	10.2	0.80	108.9
	Round 9	12/15/15	6.37	1.81	10.8	1.2	8.2	1.17	141.9
	Round 10	03/23/16	6.80	0.80	9.4	2.9	8.0	0.75	23.6
	Round 11	12/14/16	6.28	0.82	12.8	0.3	7.4	0.87	210.1
	Round 12	03/27/17	6.55	1.20	3.9	0.3	8.2	--	149.1
	Round 13	12/18/18	6.73	0.74	5.0	0.5	7.0	0.71	219.6
	Round 14	03/21/18	5.99	0.46	1.8	0.2	6.9	0.46	128.0
	Round 15	12/18/18	6.16	0.67	3.1	0.0	7.7	0.43	139.1

Groundwater Monitoring Well ¹	Groundwater Monitoring Event	Date Measured	pH	Cond. (S/m)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Total Dissolved Solids (g/L)	Oxidation Reduction Potential (m/V)
MW-11	Round 1	12/19/12	5.92	0.21	23.7	4.3	8.0	1.30	140.0
	Round 2	03/26/13	5.63	1.53	150	9.0	10.4	--	9.0
	Round 3	06/26/13	7.00	1.51	24.0	8.6	17.0	0.96	167.0
	Round 4 ²	09/26/13	--	--	--	--	--	--	--
	Round 5	06/30/14	5.94	1.21	3.1	13.3	16.8	25.9	85.5
	Round 6	10/09/14	6.86	1.19	3.4	15.4	7.7	7.74	165.5
	Round 7	12/18/14	6.30	0.58	20.8	10.1	9.8	0.38	134.0
	Round 8	03/19/15	6.86	0.91	18.1	8.6	9.7	0.59	121.4
	Round 9	12/15/15	6.30	1.0	5.2	1.3	8.1	0.64	105.9
	Round 10	03/23/16	6.60	0.62	8.2	1.0	8.3	0.59	-47.9
	Round 11	12/14/16	6.06	0.47	8.2	0.8	7.5	0.46	334.6
	Round 12	03/27/17	6.19	0.61	4.6	0.4	7.9	--	217.2
	Round 13	12/18/18	6.54	0.49	5.4	3.2	8.1	0.52	245.1
	Round 14	03/21/18	6.41	0.58	1.1	0.2	7.4	0.50	157.1
	Round 15	12/18/18	6.07	0.49	7.5	1.3	8.3	0.32	152.3
MW-12	Round 1	12/19/12	7.45	0.15	156	6.8	6.8	1.0	21.0
	Round 2	03/26/13	8.45	0.98	120	12.3	11.7	--	-139.0
	Round 3	06/26/13	6.33	1.62	15.9	13.0	18.0	1.03	205.0
	Round 4 ²	09/26/13	--	--	--	--	--	--	--
	Round 5	06/30/14	6.26	2.19	9.1	3.2	16.7	8.9	103.2
	Round 6	10/09/14	6.80	1.89	7.1	1.5	15.7	12.28	22.8
	Round 7	12/18/14	6.10	1.84	23.8	9.8	9.2	1.18	122.0
	Round 8	03/19/15	6.67	1.93	9.1	3.9	10.6	1.25	169.7
	Round 9	12/15/15	6.78	1.66	2.6	1.2	8.1	1.08	121.3
	Round 10	03/23/16	7.02	1.01	6.9	1.2	8.8	0.94	-8.9
	Round 11	12/14/16	6.52	0.79	1.2	0.1	6.8	0.79	-29.3
	Round 12	03/27/17	6.61	1.03	3.4	0.9	7.8	--	-26.3
	Round 13	12/18/18	6.90	0.79	28.3	3.2	7.8	0.77	255.6
	Round 14	03/21/18	6.45	0.56	2.4	1.2	7.7	0.55	158.4
	Round 15	12/18/18	6.25	0.88	9.7	1.0	7.9	0.32	122.1

Notes:

¹ Monitoring well locations are shown on Figure 1.

² Water quality parameters were not measured due to the limited water volume present and slow recovery rate observed.

-- = not measured

Table 3
Post-Construction Groundwater Monitoring Chemical Analytical Data
Skagit County Port (Taxiway F Skagit County Regional Airport)
Burlington, Washington

Groundwater Monitoring Well ¹	Groundwater Monitoring Event	Sample Date	Total Chlorinated Pesticides ^{2,3} (µg/L)				Total Chlorinated Herbicides ⁴ (µg/L)	
			Heptachlor	Aldrin	Heptachlor Epoxide	Dieldrin	MCPA	Dinoseb
MW-9	Round 1	12/19/12	0.0048 UJ	0.0048 UJ	0.0048 UJ	0.0048 UJ	4.4 UJ	0.39 J
	Round 2	03/26/13	0.0047 U	0.020 NJ	0.0047 U	0.0047 U	71	0.64
	Round 3	06/26/13	0.060 U	0.060 U	0.060 U	0.060 U	0.080 UJ	0.080 UJ
	Round 4	09/26/13	0.010 U	0.056	0.010 U	0.010 U	24 NJ	0.051 U
	Round 5	06/30/14	0.0047 U	0.0047 U	0.0047 U	0.0047 U	44 J	0.045
	Round 6 ⁵	10/09/14	--	--	--	--	--	--
	Round 7	12/18/14	0.0047 U	0.0047 U	0.0047 U	0.0047 U	13	0.044 U
	Round 8	03/19/15	0.0047 U	0.0047 U	0.0047 U	0.0047 NJ	6.6	0.044 U
	Round 9	12/15/15	--	--	--	--	6.7 U	0.045 U
	Round 10	03/23/16	--	--	--	--	6.6 U	0.044 U
	Round 11	12/14/16	--	--	--	--	6.7 U	0.045 U
	Round 12	03/27/17	--	--	--	--	6.7 U	0.045 U
	Round 13	12/18/17	--	--	--	--	6.6 U	0.077
	Round 14	03/21/18	--	--	--	--	5.0 U	0.05 U
	Round 15	12/18/18	--	--	--	--	6.7 U	0.045 U
MW-10	Round 1	12/19/12	0.0047 UJ	0.0047 UJ	0.0047 UJ	0.0088 J	4.4 U	140 J
	Round 2	03/26/13	0.0048 U	0.0048 U	0.0048 U	0.039 NJ	360	160
	Round 3	06/26/13	0.060 U	0.060 U	0.060 U	0.060 U	0.40 U	260
	Round 4	09/26/13	0.0047 U	0.0047 U	0.0047 U	0.0047 U	6.7 U	34
	Round 5	06/30/14	0.0048 U	0.0048 U	0.0048 U	0.0048 U	110 J	120
	Round 6	10/09/14	0.0047 U	0.0047 U	0.0047 U	0.0047 U	80 NJ	150
	Round 7	12/18/14	0.0048 U	0.0048 U	0.0048 U	0.0048 U	14	2.1
	Round 8	03/19/15	0.0047 U	0.0047 U	0.0047 U	0.0047 U	75	3.4
	Round 9	12/15/15	--	--	--	--	50	5.5
	Round 10	03/23/16	--	--	--	--	24	5.9
	Round 11	12/14/16	--	--	--	--	6.6 U	8.7
	Round 12	03/27/17	--	--	--	--	6.6 U	0.7
	Round 13	12/18/17	--	--	--	--	6.6 U	4.4
	Round 14	03/21/18	--	--	--	--	5.0 U	1.3
	Round 15	12/18/18	--	--	--	--	6.6 U	2.8
Site-Specific Cleanup Level ⁶			0.05	0.05	0.05	0.05	8	7

Groundwater Monitoring Well ¹	Groundwater Monitoring Event	Sample Date	Total Chlorinated Pesticides ^{2,3} (µg/L)				Total Chlorinated Herbicides ⁴ (µg/L)	
			Heptachlor	Aldrin	Heptachlor Epoxide	Dieldrin	MCPA	Dinoseb
MW-11	Round 1	12/19/12	0.0048 U	0.0048 U	0.011 NJ	0.014 NJ	4.4 U	1.1 J
	Round 2	03/26/13	0.0048 U	0.0048 U	0.28 NJ	0.0048 U	420	1.6
	Round 3	06/26/13	0.060 U	0.060 U	0.060 U	0.060 U	0.40 U	3.7
	Round 4	09/26/13	0.0048 U	0.0048 U	0.0048 U	0.0048 U	6.7 U	1.1
	Round 5	06/30/14	0.0047 U	0.0047 U	0.0047 U	0.0047 U	67 J	0.75
	Round 6	10/09/14	0.0047 U	0.0047 U	0.0047 U	0.0047 U	6.6 U	0.73
	Round 7	12/18/14	0.0047 U	0.0047 U	0.0047 U	0.0047 U	270	0.55
	Round 8	03/19/15	0.0047 U	0.0047 U	0.0047 U	0.0047 U	210	0.3
	Round 9	12/15/15	--	--	--	--	8.1 J	0.17
	Round 10	03/23/16	--	--	--	--	24	0.79
	Round 11	12/14/16	--	--	--	--	6.6 U	0.19
	Round 12	03/27/17	--	--	--	--	6.8 U	0.21
	Round 13	12/18/17	--	--	--	--	6.6 U	0.34
	Round 14	03/21/18	--	--	--	--	5.0 U	0.05 U
	Round 15	12/18/18	--	--	--	--	6.6 U	0.53
MW-12	Round 1	12/19/12	0.0048 UJ	0.022 J	0.0048 UJ	0.029 J	4.4 U	14
	Round 2	03/26/13	0.0048 U	0.011	0.0048 U	0.0048 U	4.8 U	4.0 J
	Round 3	06/26/13	0.060 U	0.060 U	0.060 U	0.060 U	0.56	38
	Round 4	09/26/13	0.0047 U	0.0047 U	0.0047 U	0.0047 U	6.7 U	1.4 J
	Round 5	06/30/14	0.0047 U	0.0047 U	0.0047 U	0.0047 U	6.6 U	2.2
	Round 6	10/09/14	0.0047 UJ	0.0047 UJ	0.0047 UJ	0.0047 UJ	6.6 U	2.3 J
	Round 7	12/18/14	0.0048 U	0.0048 U	0.0048 U	0.0048 U	6.7 U	2.1
	Round 8	03/19/15	0.0047 U	0.0047 U	0.0047 U	0.0047 U	7.4 J	19 J
	Round 9	12/15/15	--	--	--	--	6.6 U	0.57
	Round 10	03/23/16	--	--	--	--	6.6 U	0.19
	Round 11	12/14/16	--	--	--	--	6.6 U	0.045 U
	Round 12	03/27/17	--	--	--	--	6.6 U	0.083
	Round 13	12/18/17	--	--	--	--	6.6 U	0.13
	Round 14	03/21/18	--	--	--	--	5.0 U	0.05 U
	Round 15	12/18/18	--	--	--	--	6.6 U	0.045 U
Site-Specific Cleanup Level ⁶			0.05	0.05	0.05	0.05	8	7

Groundwater Monitoring Well ¹	Groundwater Monitoring Event	Sample Date	Total Chlorinated Pesticides ^{2,3} (µg/L)				Total Chlorinated Herbicides ⁴ (µg/L)	
			Heptachlor	Aldrin	Heptachlor Epoxide	Dieldrin	MCPA	Dinoseb
MW-12 (Duplicate)	Round 1	12/19/12	0.0047 UJ	0.0078 J	0.0047 UJ	0.0047 UJ	4.4 U	11
	Round 2	03/26/13	0.0048 U	0.011	0.0048 U	0.0048 U	4.7 U	2.4 J
	Round 3	06/26/13	0.060 U	0.060 U	0.060 U	0.060 U	0.59	44
	Round 4	09/26/13	0.0048 U	0.0048 U	0.0048 U	0.0048 U	6.7 U	2.3 J
	Round 5	06/30/14	0.0047 U	0.0047 U	0.0047 U	0.0047 U	6.6 U	2.6
	Round 6	10/09/14	0.0047 UJ	0.0047 UJ	0.0047 UJ	0.0047 UJ	6.6 U	8.9 J
	Round 7	12/18/14	0.0048 UJ	0.0048 UJ	0.0048 UJ	0.0048 UJ	6.7 U	1.5
	Round 8	03/19/15	0.0047 U	0.0047 U	0.0047 U	0.0047 U	6.6 U	7.6 J
	Round 9	12/15/15	--	--	--	--	6.6 U	0.63
	Round 10	03/23/16	--	--	--	--	6.6 U	0.16
	Round 11	12/14/16	--	--	--	--	6.6 U	0.044 U
	Round 12	03/27/17	--	--	--	--	6.8 U	0.075
	Round 13	12/18/17	--	--	--	--	6.6 U	0.19
	Round 14	03/21/18	--	--	--	--	5.0 U	0.05 U
	Round 15	12/18/18	--	--	--	--	6.6 U	0.045 U
Site-Specific Cleanup Level ⁶			0.05	0.05	0.05	0.05	8	7

Notes:

¹ Groundwater monitoring well locations are shown on Figure 1.

² Chlorinated Pesticides analyzed using EPA 8081B.

³ Chlorinated pesticides not analyzed following the March 19, 2015, monitoring event in accordance with the Ecology-approved Post-Construction Groundwater Monitoring Report (GeoEngineers, 2015).

⁴ Chlorinated Herbicides analyzed using EPA 8151A.

⁵ Well purged dry during sampling and did not recover.


⁶ Site-specific groundwater cleanup level is referenced from Table 2 of the Taxiway F Site Cleanup Action Plan (CAP; GeoEngineers, 2011).

J = The analyte was positively identified and the associated numerical value is the approximate concentration (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the CRQL).

NJ = The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

U = The analyte not detected at level above practical quantitation limit (PQL).

 Blue shading indicates the laboratory reporting limit exceeded the site-specific cleanup level.

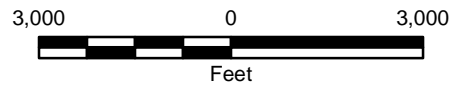
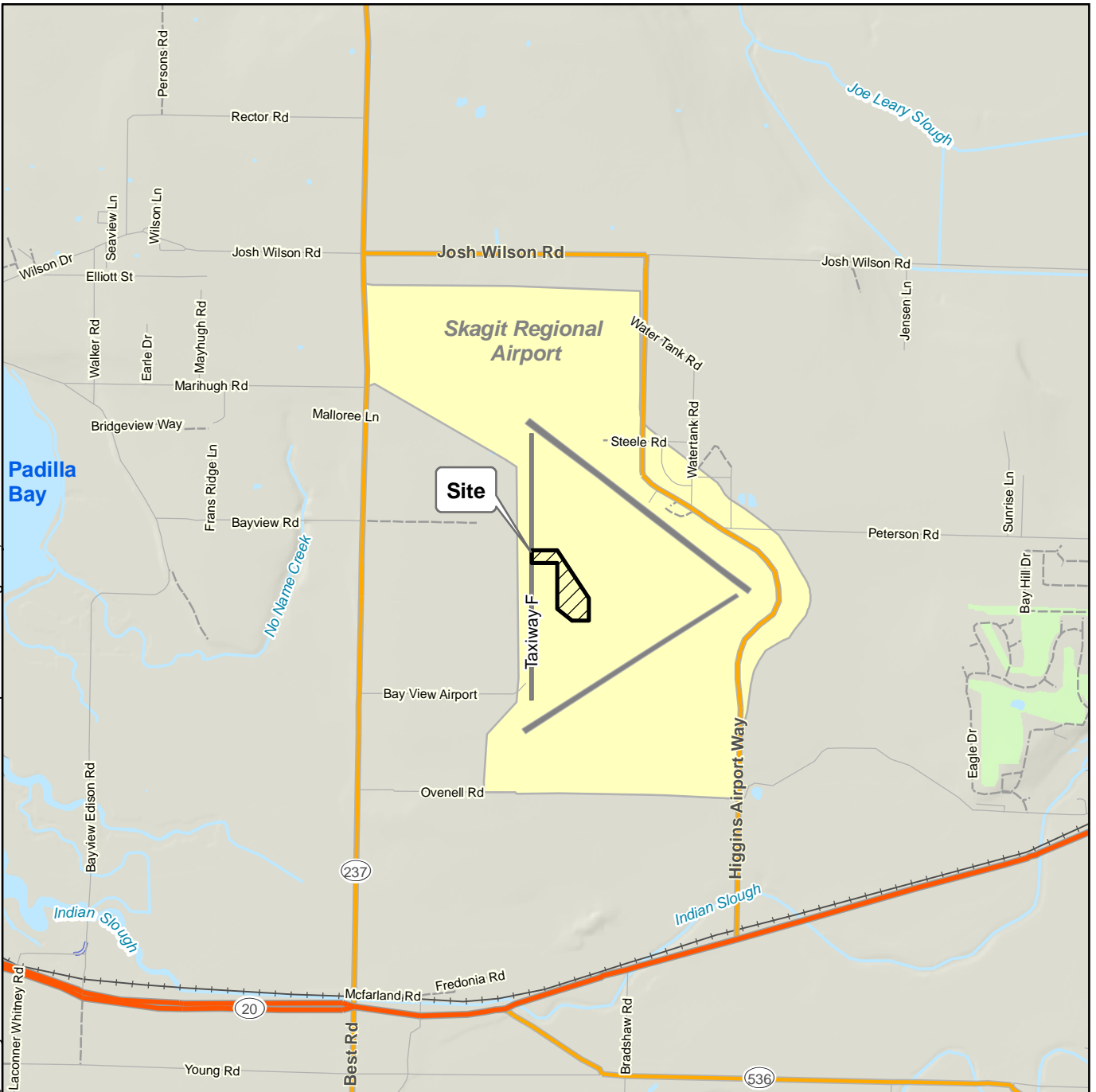
 Green shading indicates analyte detected at a concentration exceeding the site-specific cleanup level.

Chemical analyses performed by OnSite Environmental Inc. of Redmond, Washington.

Map Revised: August 9, 2010 ZAS:KKS:CRC

Path: P:\5364013\GIS\536401302_FIG-1_Vicinity.mxd

Office: SEA



Notes:

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Data Sources: ESRI Data & Maps, Street Maps 2005
 Transverse Mercator, Zone 10 N North, North American Datum 1983
 North arrow oriented to grid north

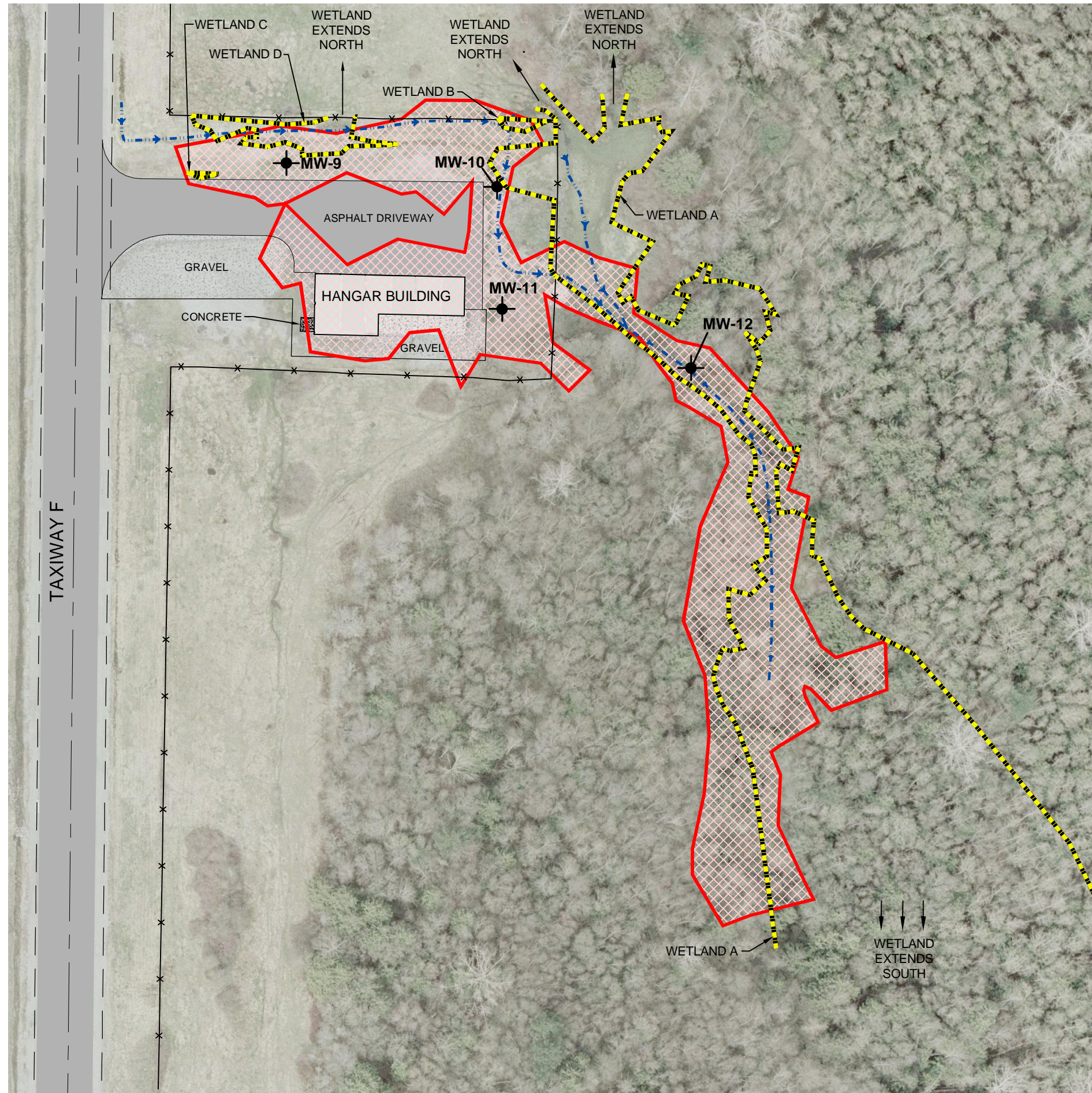
Vicinity Map

Taxiway F Site
 Burlington, Washington








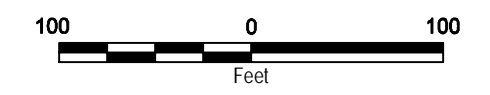
Figure 1

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Legend

-  Wetland Boundary
(Based on Hart Crowser 2007 Survey)
-  Cleanup Action Area
-  Post-Construction Groundwater Monitoring Well
-  Fence Line
-  Drainage Channel
(Approximate Rainwater Runoff Flow Direction)

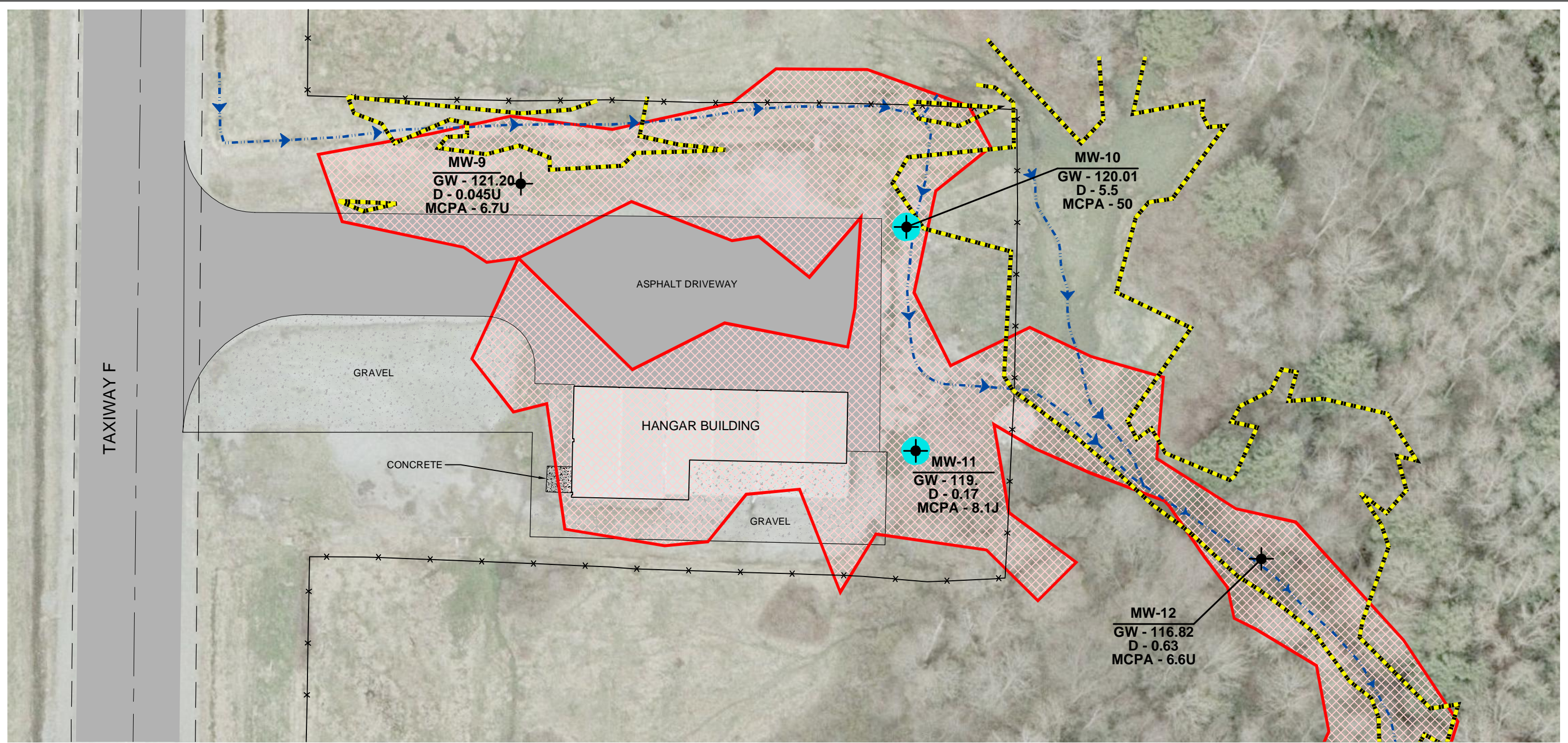


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Site Plan	
Taxiway F Site Burlington, Washington	
	Figure 2

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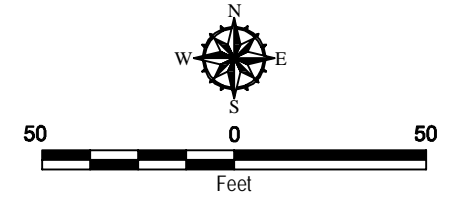


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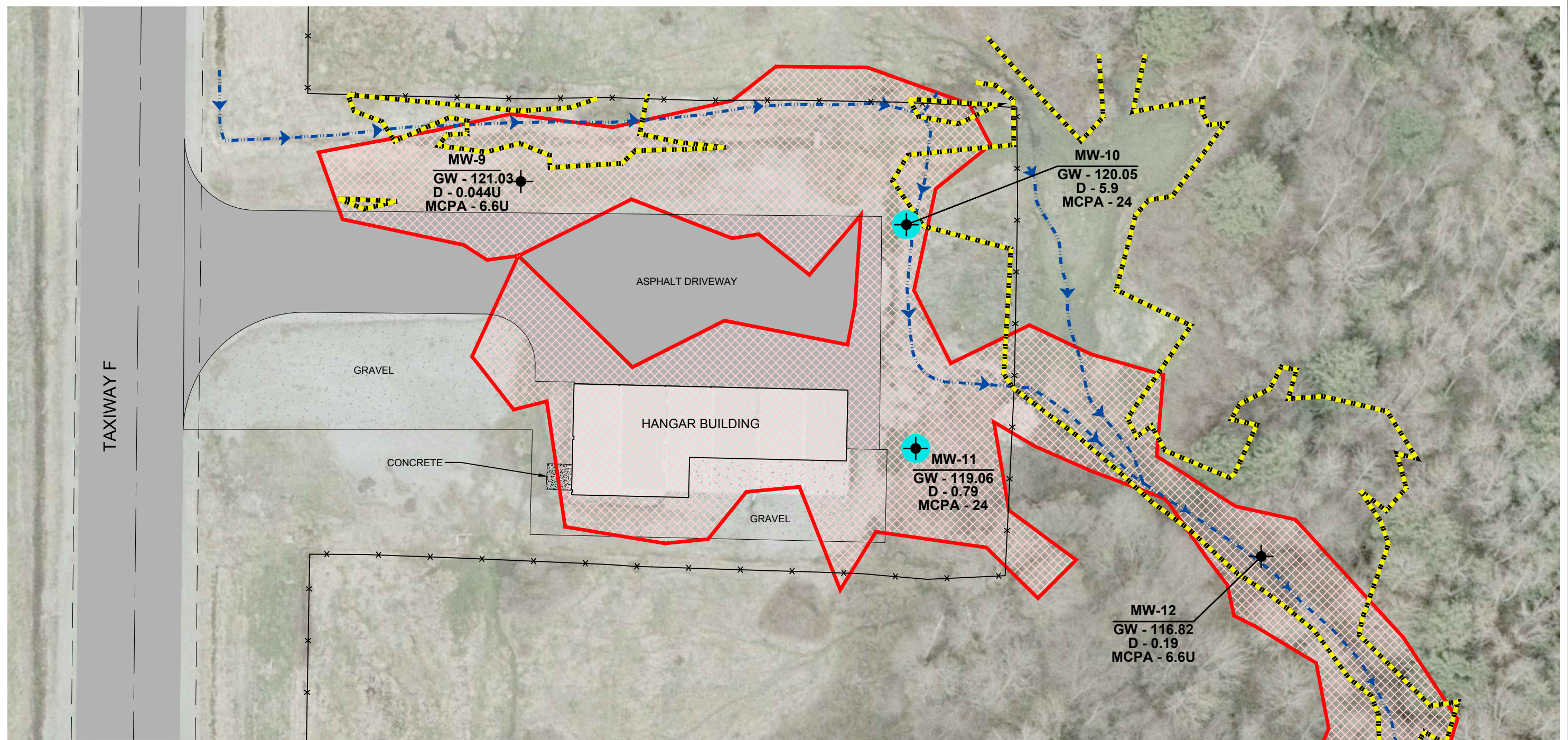
Legend

- Wetland Boundary (Based on Hart Crowser 2007 Survey)
- Cleanup Action Area
- Post-Construction Groundwater Monitoring Well
Groundwater Elevation (Feet MLLW)
Dinoseb Concentration (µg/L)
MCPA Concentration (µg/L)
- Fence Line
- Drainage Channel (Approximate Rainwater Runoff Flow Direction)
- MLLW Mean Lower Low Water
- µg/L Micrograms per Liter
- J Estimated Result
- U Not Detected Above the Reporting Limit
- Dinoseb Concentration Exceeds Groundwater Cleanup Level of 7 µg/L (Pesticide/Herbicide Results Summarized in Table 3)
- MCPA Concentration Exceeds Groundwater Cleanup Level of 8 µg/L (Pesticide/Herbicide Results Summarized in Table 3)



December 2015 Groundwater Monitoring Results	
Taxiway F Site Burlington, Washington	
	Figure 3

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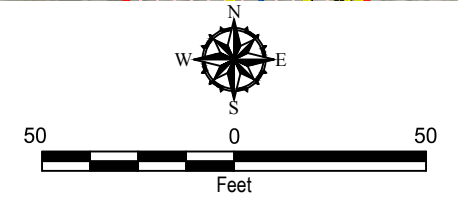
Notes

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Legend

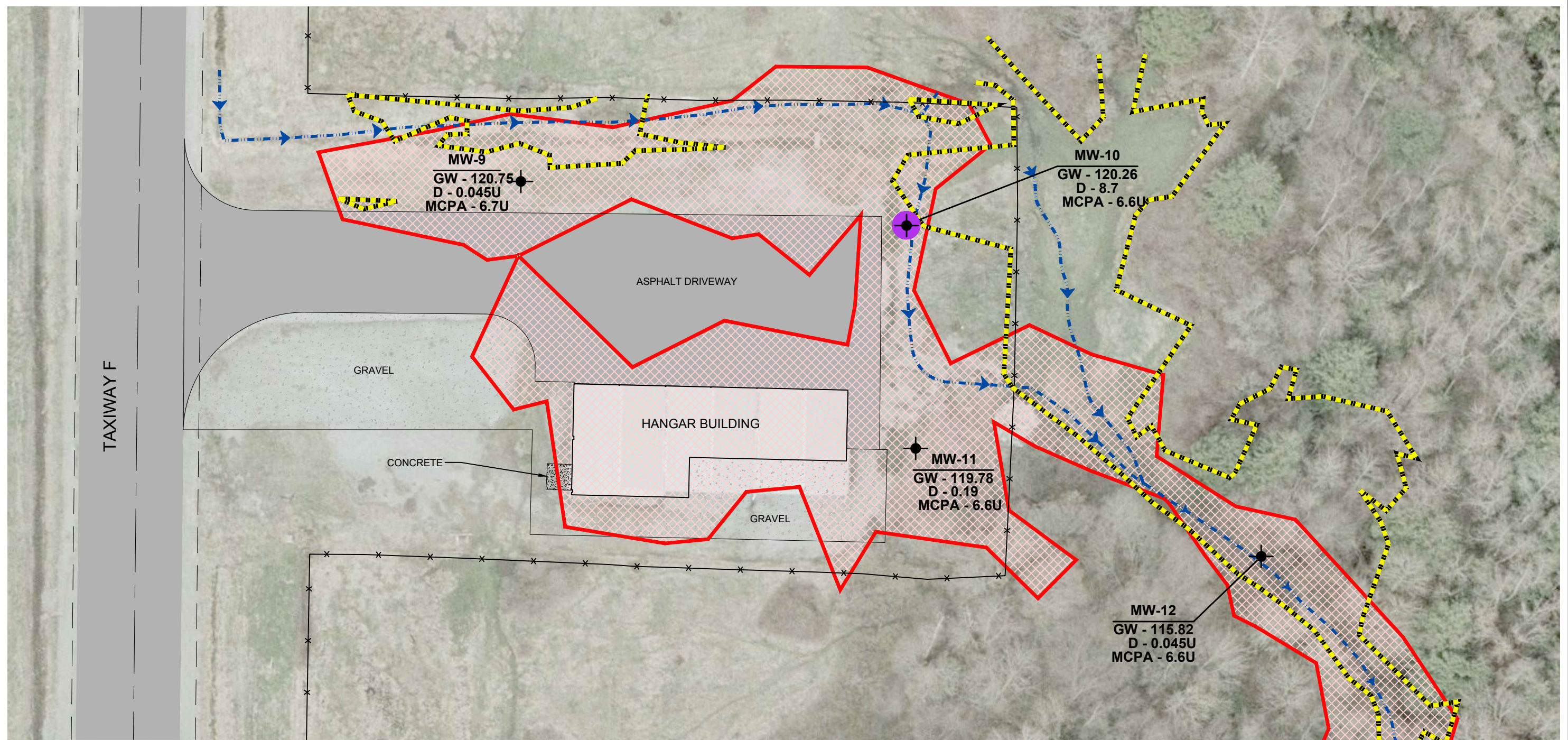
- Wetland Boundary (Based on Hart Crowser 2007 Survey)
- Cleanup Action Area
- Post-Construction Groundwater Monitoring Well
Groundwater Elevation (Feet MLLW)
Dinoseb Concentration (µg/L)
MCPA Concentration (µg/L)
- Fence Line
- Drainage Channel (Approximate Rainwater Runoff Flow Direction)

- MLLW Mean Lower Low Water
- µg/L Micrograms per Liter
- J Estimated Result
- U Not Detected Above the Reporting Limit
- Dinoseb Concentration Exceeds Groundwater Cleanup Level of 7 µg/L (Pesticide/Herbicide Results Summarized in Table 3)
- MCPA Concentration Exceeds Groundwater Cleanup Level of 8 µg/L (Pesticide/Herbicide Results Summarized in Table 3)



March 2016 Groundwater Monitoring Results	
Taxiway F Site Burlington, Washington	
	Figure 4

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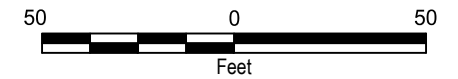
Notes

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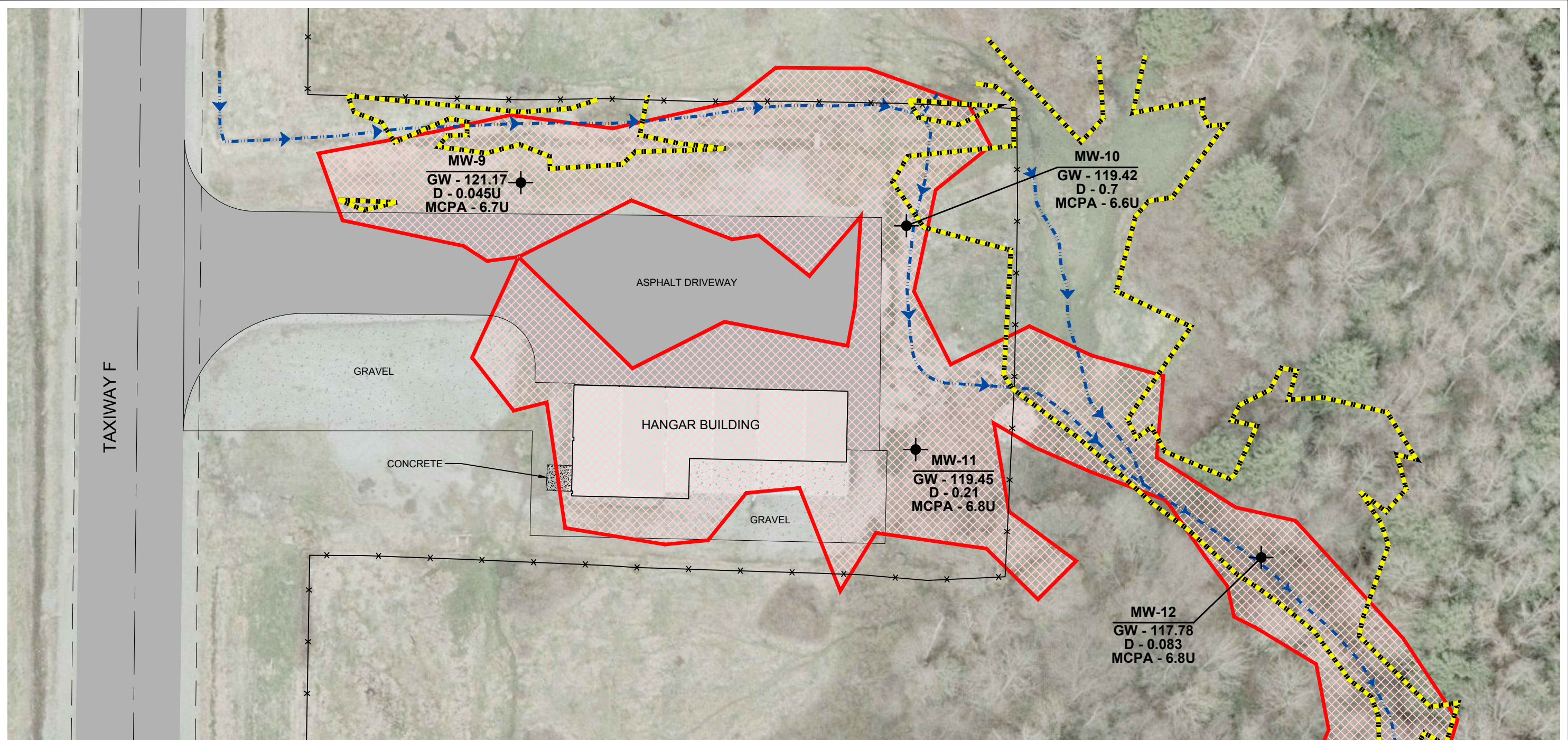
Legend

- Wetland Boundary (Based on Hart Crowser 2007 Survey)
- Cleanup Action Area
- Post-Construction Groundwater Monitoring Well
Groundwater Elevation (Feet MLLW)
Dinoseb Concentration (µg/L)
MCPA Concentration (µg/L)
- Fence Line
- Drainage Channel (Approximate Rainwater Runoff Flow Direction)

- MLLW Mean Lower Low Water
- µg/L Micrograms per Liter
- J Estimated Result
- U Not Detected Above the Reporting Limit
- Dinoseb Concentration Exceeds Groundwater Cleanup Level of 7 µg/L (Pesticide/Herbicide Results Summarized in Table 3)
- MCPA Concentration Exceeds Groundwater Cleanup Level of 8 µg/L (Pesticide/Herbicide Results Summarized in Table 3)



December 2016 Groundwater Monitoring Results	
Taxiway F Site Burlington, Washington	
	Figure 5



Notes

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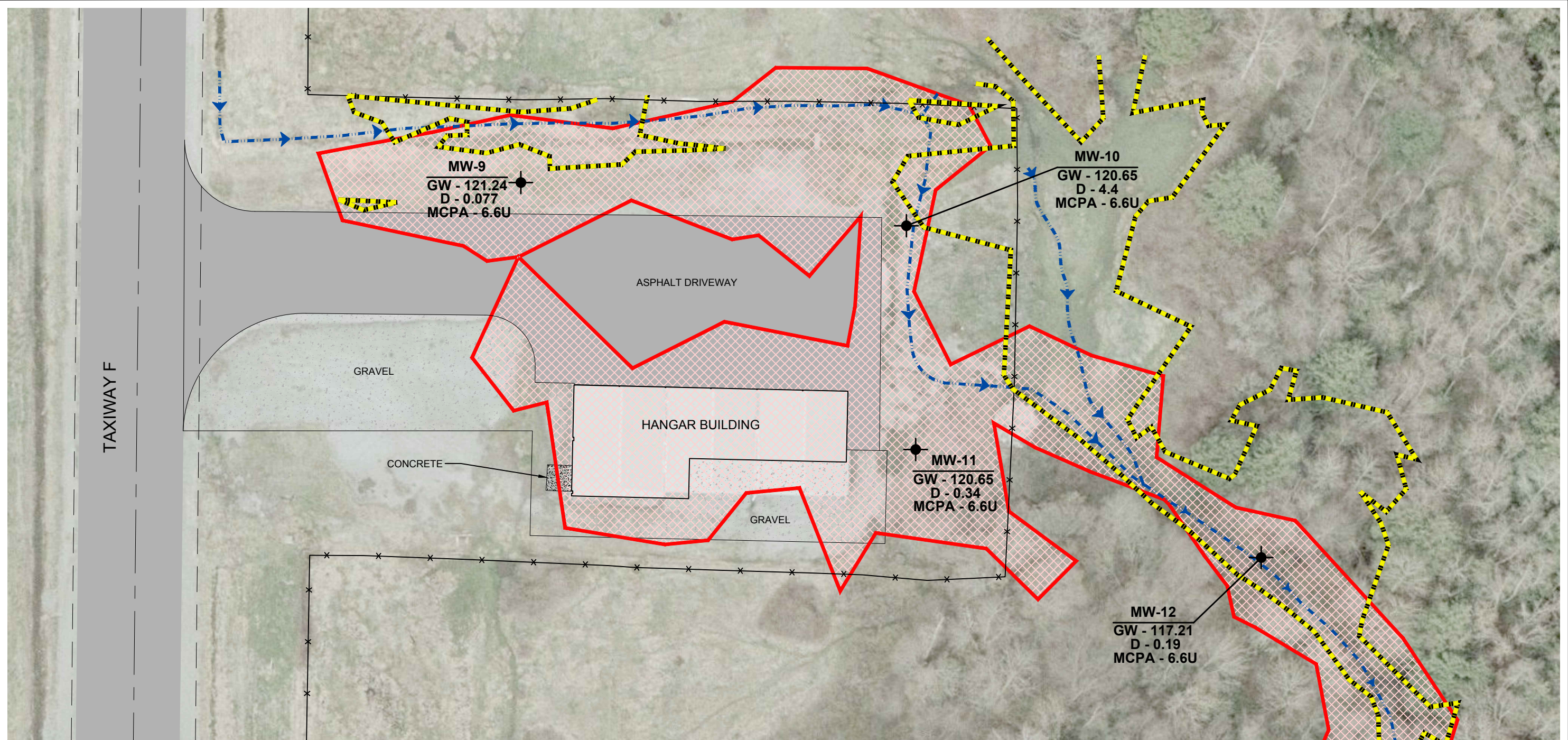
Legend

- Wetland Boundary (Based on Hart Crowser 2007 Survey)
- Cleanup Action Area
- Post-Construction Groundwater Monitoring Well
Groundwater Elevation (Feet MLLW)
Dinoseb Concentration (µg/L)
MCPA Concentration (µg/L)
- Fence Line
- Drainage Channel (Approximate Rainwater Runoff Flow Direction)

- MLLW Mean Lower Low Water
- µg/L Micrograms per Liter
- J Estimated Result
- U Not Detected Above the Reporting Limit
- Dinoseb Concentration Exceeds Groundwater Cleanup Level of 7 µg/L (Pesticide/Herbicide Results Summarized in Table 3)
- MCPA Concentration Exceeds Groundwater Cleanup Level of 8 µg/L (Pesticide/Herbicide Results Summarized in Table 3)



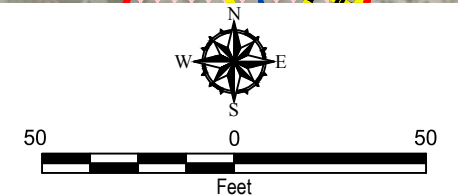
March 2017	
Groundwater Monitoring Results	
Taxiway F Site Burlington, Washington	
	Figure 6



Legend

- Wetland Boundary (Based on Hart Crowser 2007 Survey)
- Cleanup Action Area
- Post-Construction Groundwater Monitoring Well
Groundwater Elevation (Feet MLLW)
Dinoseb Concentration (µg/L)
MCPA Concentration (µg/L)
- Fence Line
- Drainage Channel (Approximate Rainwater Runoff Flow Direction)

- MLLW Mean Lower Low Water
- µg/L Micrograms per Liter
- J Estimated Result
- U Not Detected Above the Reporting Limit
- Dinoseb Concentration Exceeds Groundwater Cleanup Level of 7 µg/L (Pesticide/Herbicide Results Summarized in Table 3)
- MCPA Concentration Exceeds Groundwater Cleanup Level of 8 µg/L (Pesticide/Herbicide Results Summarized in Table 3)

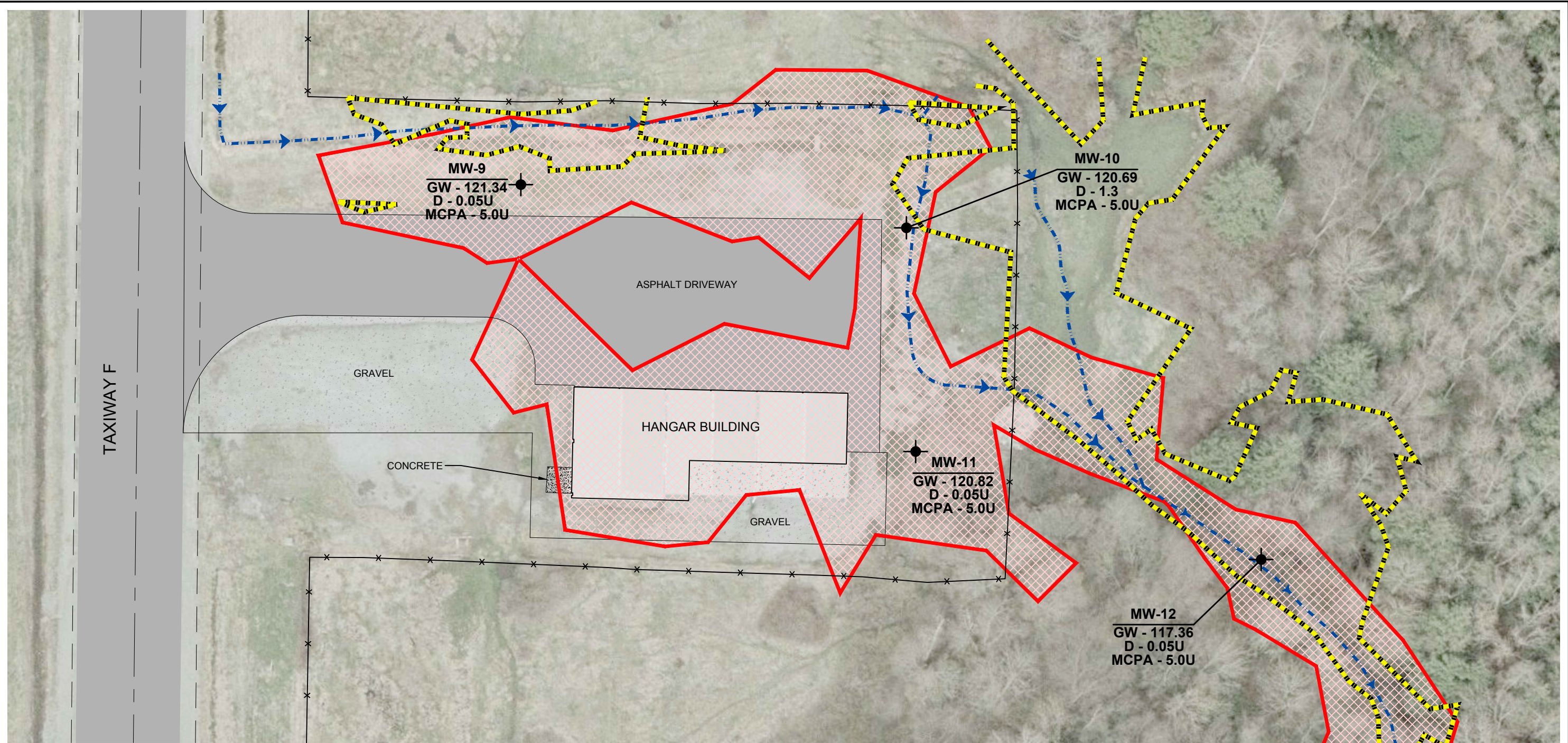


Notes

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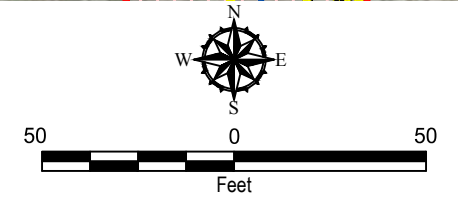
December 2017	
Groundwater Monitoring Results	
Taxiway F Site Burlington, Washington	
	Figure 7

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Legend

- Wetland Boundary (Based on Hart Crowser 2007 Survey)
- Cleanup Action Area
- Post-Construction Groundwater Monitoring Well
Groundwater Elevation (Feet MLLW)
Dinoseb Concentration (µg/L)
MCPA Concentration (µg/L)
- Fence Line
- Drainage Channel (Approximate Rainwater Runoff Flow Direction)
- MLLW Mean Lower Low Water
- µg/L Micrograms per Liter
- J Estimated Result
- U Not Detected Above the Reporting Limit
- Dinoseb Concentration Exceeds Groundwater Cleanup Level of 7 µg/L (Pesticide/Herbicide Results Summarized in Table 3)
- MCPA Concentration Exceeds Groundwater Cleanup Level of 8 µg/L (Pesticide/Herbicide Results Summarized in Table 3)

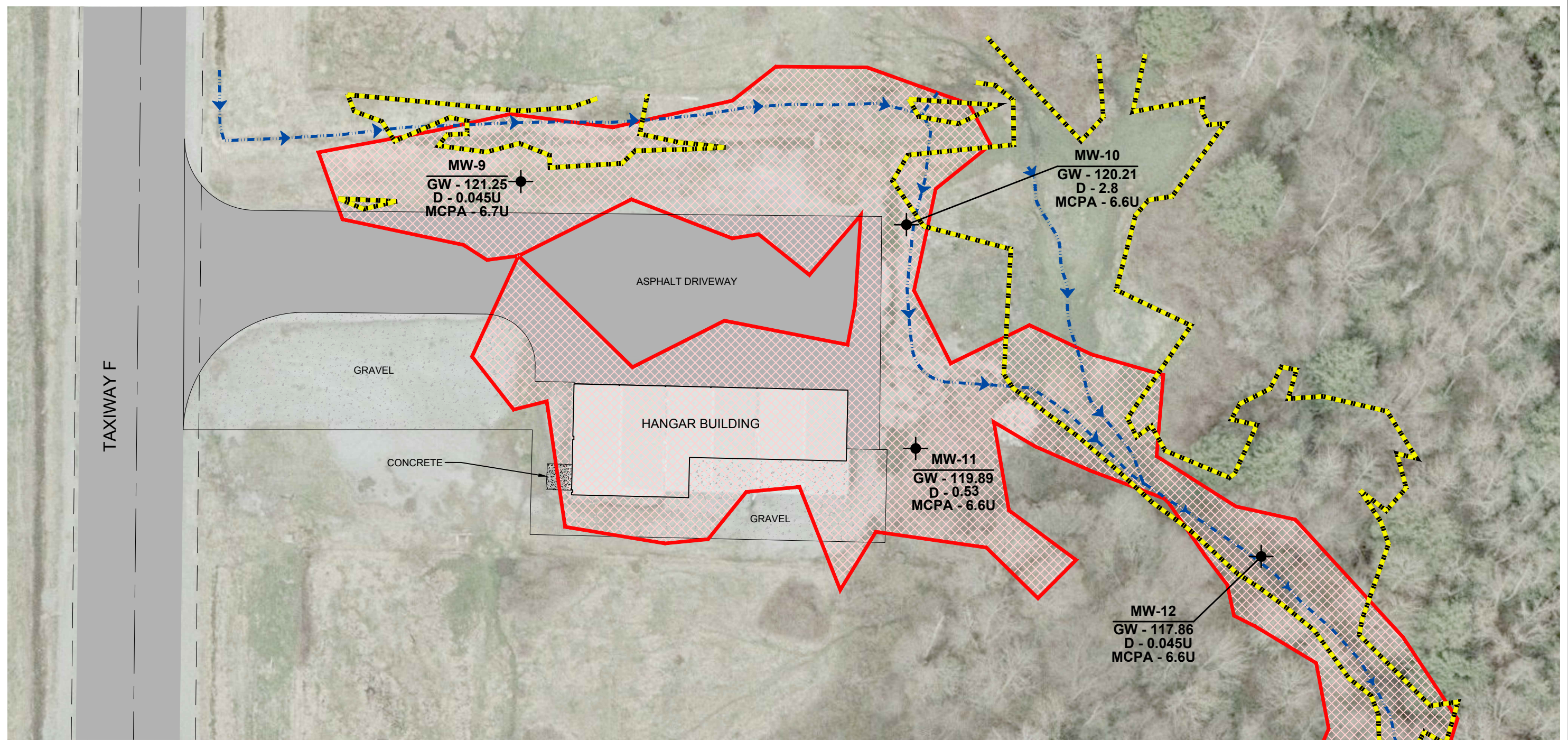


Notes

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March 2018	
Groundwater Monitoring Results	
Taxiway F Site Burlington, Washington	
	Figure 8

P:\51536401309\CAD\51536401309 Fig 4 GW Monitoring Feb 2017.dwg\TAB:layout modified by tmichaud on Apr 03, 2017 - 13:18



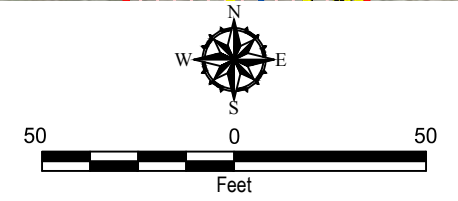
Notes

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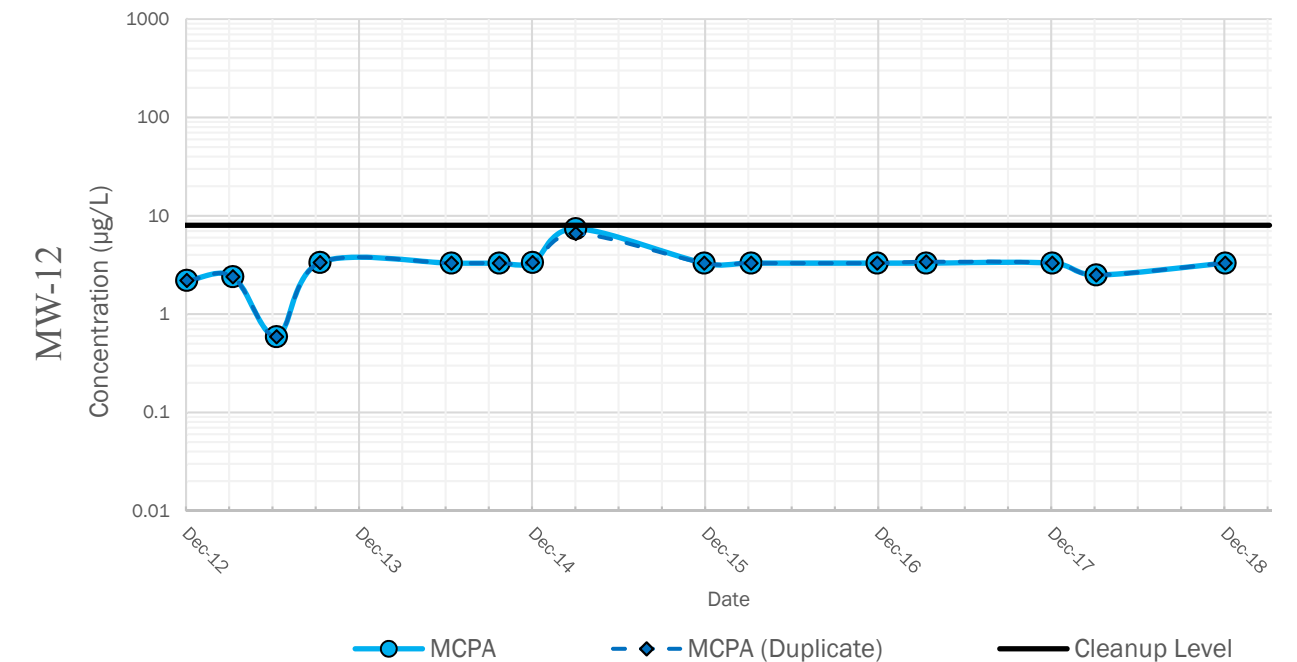
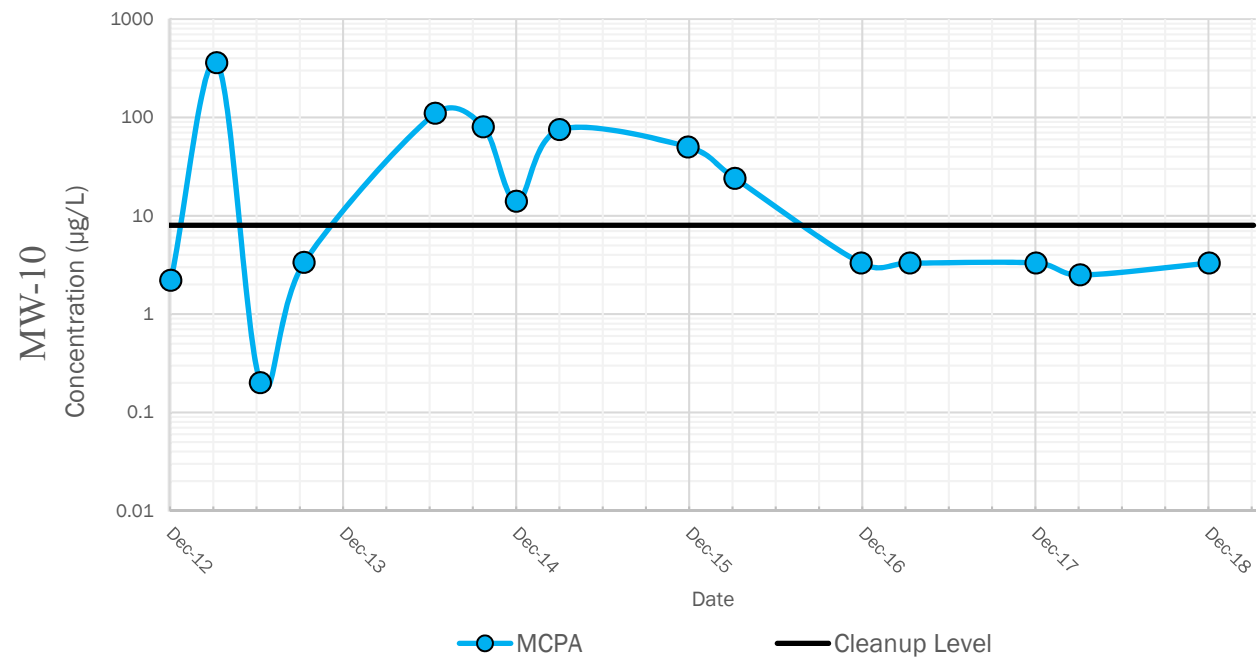
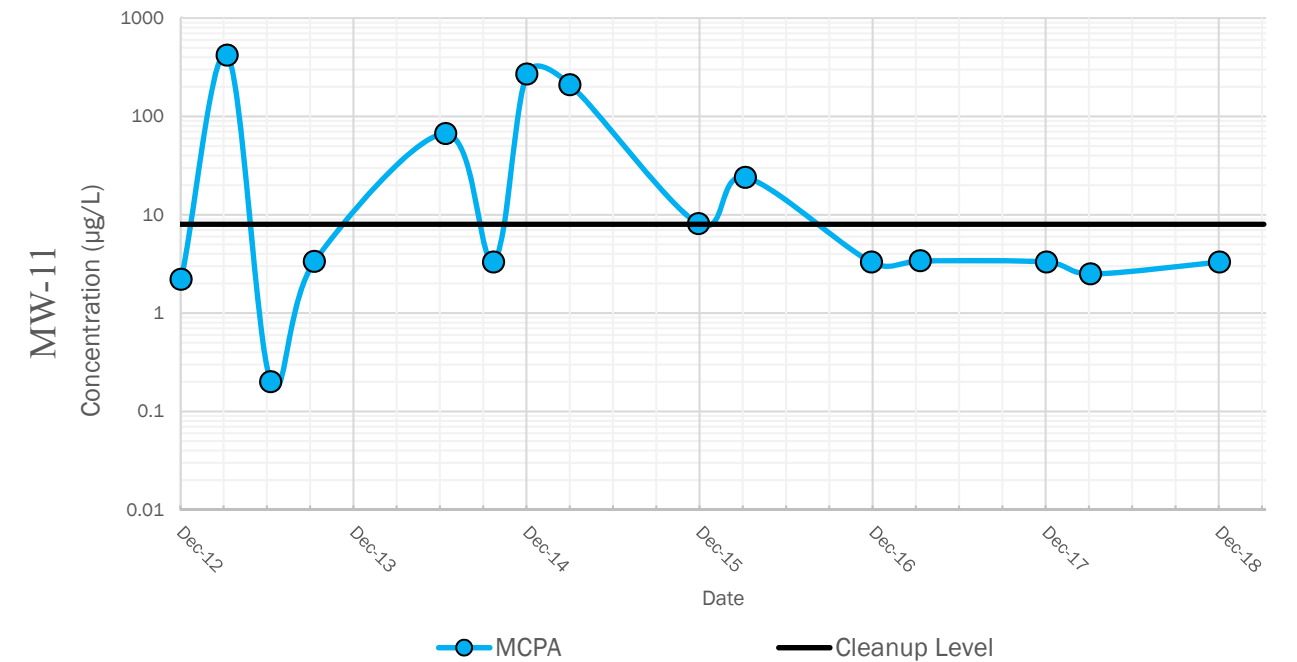
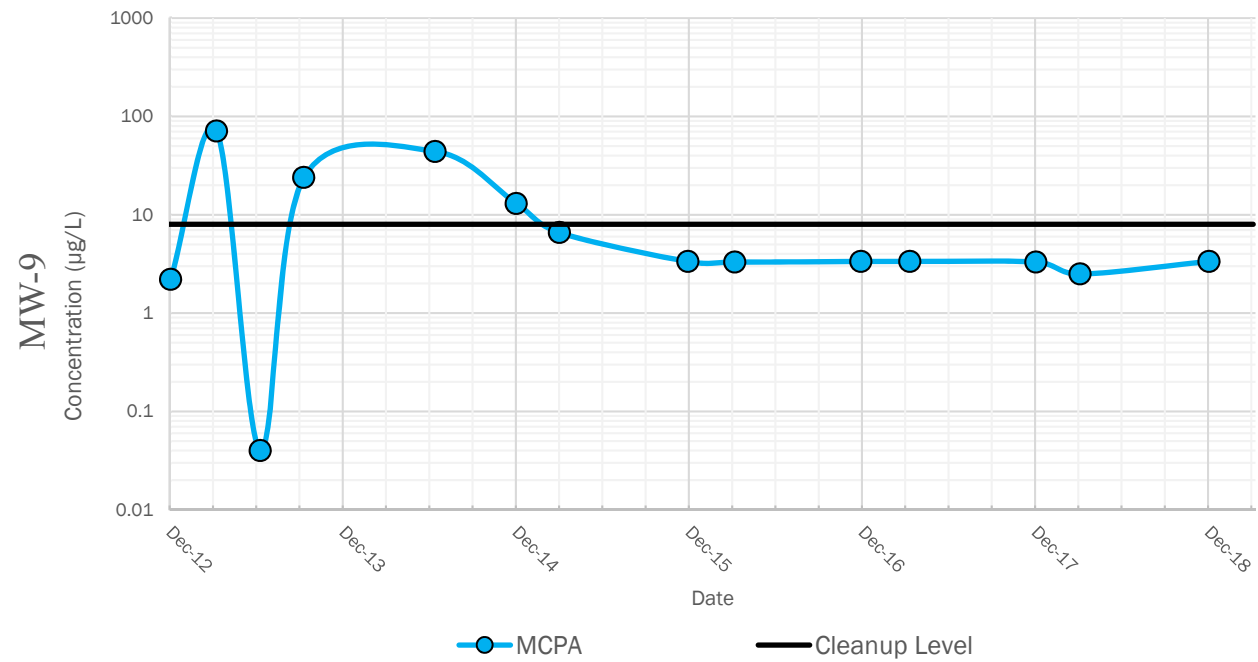
Legend

- Wetland Boundary (Based on Hart Crowser 2007 Survey)
- Cleanup Action Area
- Post-Construction Groundwater Monitoring Well
Groundwater Elevation (Feet MLLW)
Dinoseb Concentration (µg/L)
MCPA Concentration (µg/L)
- Fence Line
- Drainage Channel (Approximate Rainwater Runoff Flow Direction)

- MLLW Mean Lower Low Water
- µg/L Micrograms per Liter
- J Estimated Result
- U Not Detected Above the Reporting Limit
- Dinoseb Concentration Exceeds Groundwater Cleanup Level of 7 µg/L (Pesticide/Herbicide Results Summarized in Table 3)
- MCPA Concentration Exceeds Groundwater Cleanup Level of 8 µg/L (Pesticide/Herbicide Results Summarized in Table 3)



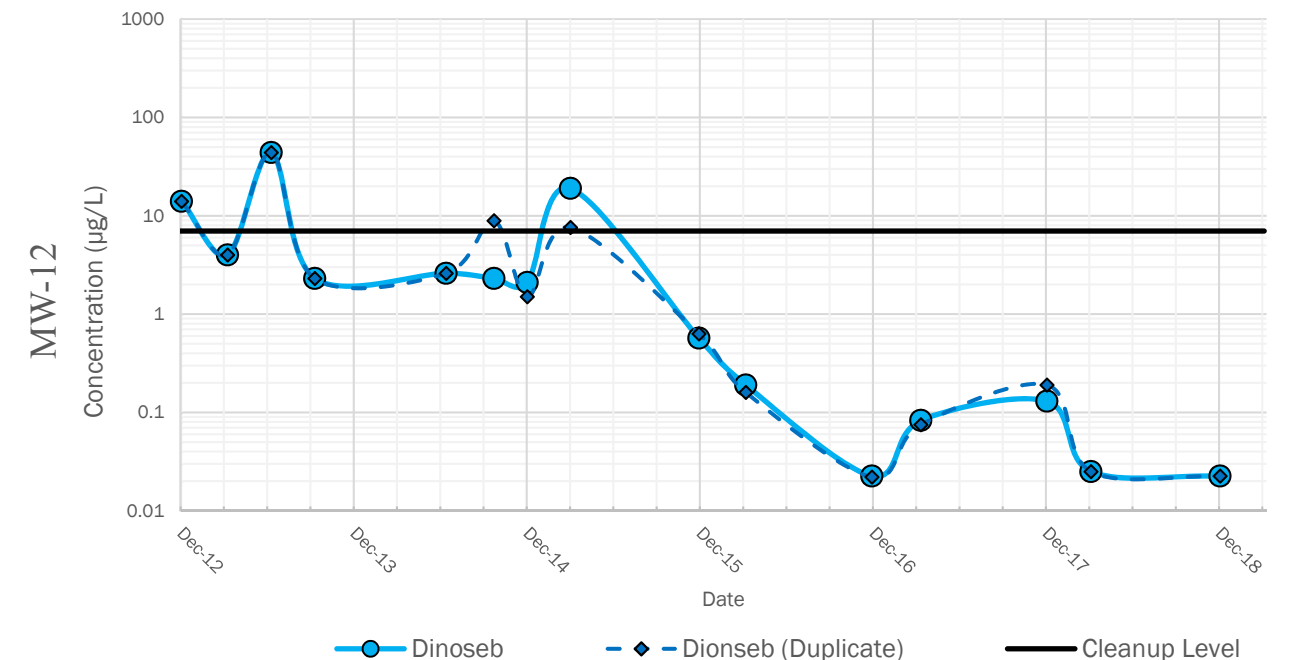
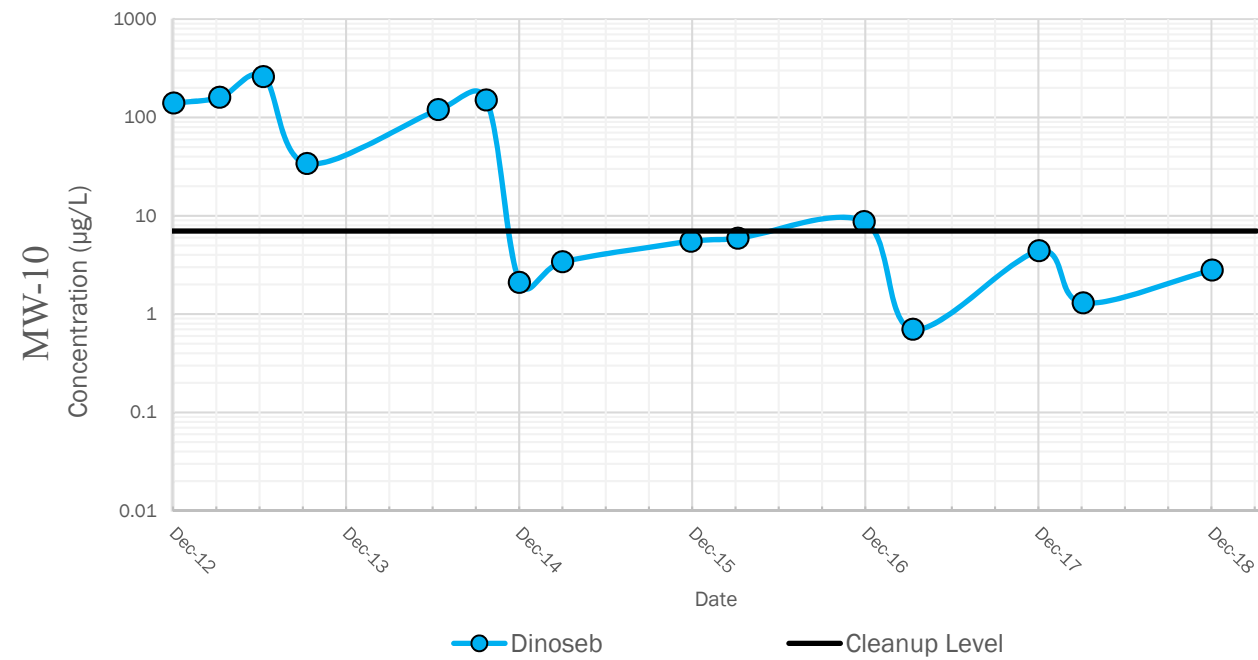
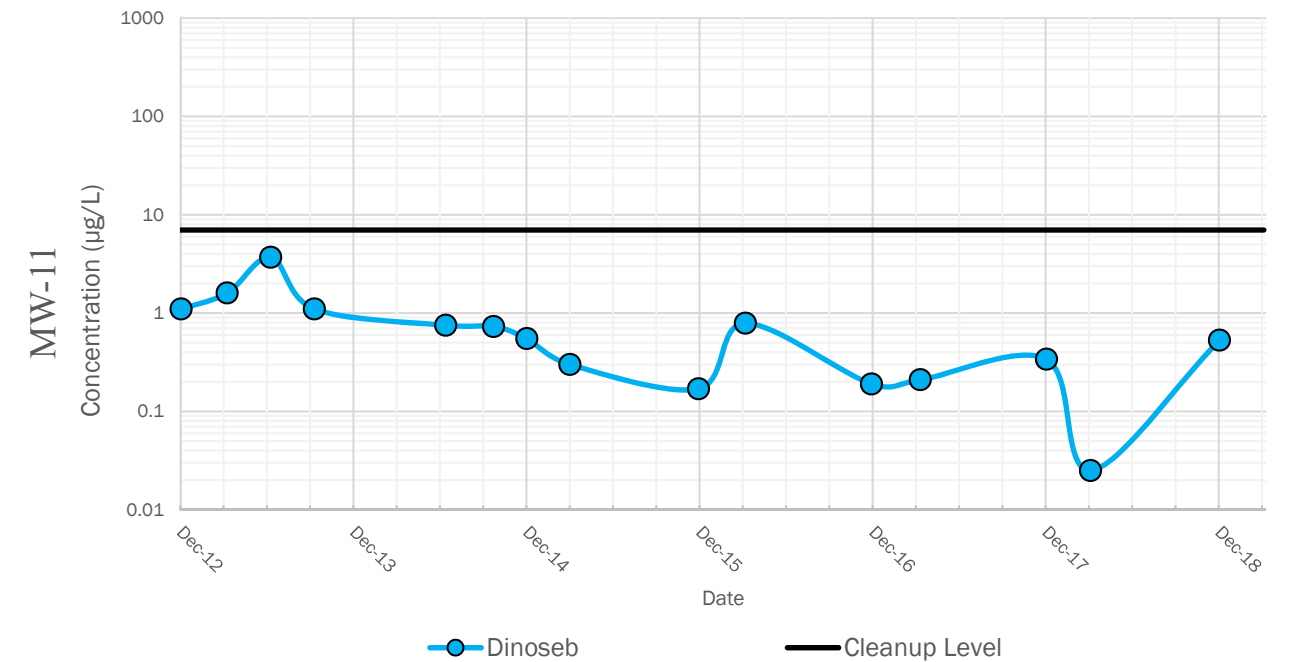
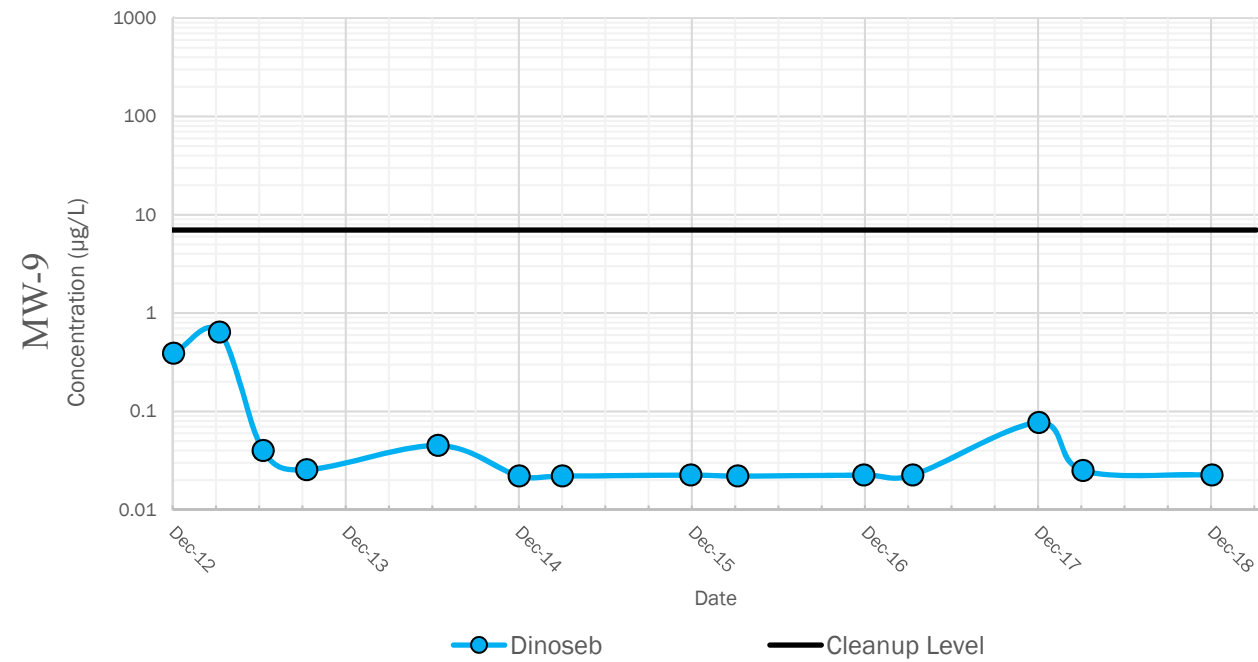
December 2018 Groundwater Monitoring Results	
Taxiway F Site Burlington, Washington	
	Figure 9



Notes:


1. Non-detect result reported as 1/2 the reporting limit.
 2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
- Data Source: Dakota Creek Industries Site groundwater monitoring results (see Table 4).

Groundwater Monitoring Results	
MCPA	
Taxiway F Burlington, Washington	
	Figure 10



Notes:

1. Non-detect result reported as 1/2 the reporting limit.
 2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
- Data Source: Dakota Creek Industries Site groundwater monitoring results (see Table 4).

Groundwater Monitoring Results	
Dinoseb	
Taxiway F	
Burlington, Washington	
	Figure 11

APPENDIX A

Field Procedures

APPENDIX A FIELD PROCEDURES

General

Monitoring wells MW-9 through MW-12 were installed at the Taxiway F Site (Site) in November 2013 by a Washington State licensed driller in accordance with the Minimum Standards for Construction and Maintenance of Wells (Chapter 173-160 Washington Administrative Code [WAC]). Installation of the monitoring wells was observed by a GeoEngineers representative, who maintained detailed logs of the materials and depths encountered at each location. Monitoring wells were completed using a limited access, track mounted hollow-stem auger rig or similar equipment. Well construction and development details for MW-9 through MW-12 are presented in the Rounds 1 through 4 Post-Construction Compliance Groundwater Monitoring Report (GeoEngineers 2013). Copies of the well completion logs are presented in Appendix B.

Depth to Groundwater Measurements

The depth to groundwater was measured relative to the top of the well casings using an electric water level indicator (e-tape). Water level measurement equipment was washed in a Liqui-Nox® solution, followed by a distilled water rinse prior to use in the well. Groundwater elevations were calculated by subtracting the depth to water from the casing rim elevation. Top of casing elevations were surveyed by GeoEngineers using a laser level, which has an accuracy of 0.01 feet.

The vertical datum for the Site will be derived from running levels to the US Engineers Office Survey Marker Disk set in concrete 79 feet north of the projected centerline of the hanger access ramp (National Geodetic Survey designation – P Pot TXY 3 [PID – TR0222]; North American Vertical Datum [NAVD 88] – Elevation 123.97 feet).

Groundwater Sample Collection and Handling

Groundwater samples were obtained from monitoring wells using a peristaltic pump and dedicated polyethylene tubing. Groundwater was pumped at 0.5 liter per minute or less using a peristaltic pump through tubing placed within the screened interval. A Horiba U-22 water quality measuring system (with flow-through cell) or equivalent was used to monitor the following water quality parameters during purging:

- Electrical conductivity (EC);
- Dissolved oxygen (DO);
- Acidity (pH);
- Total dissolved solids (TDS);
- Turbidity;
- Oxygen reduction potential (ORP); and
- Temperature (°C).

Groundwater samples were obtained once ambient groundwater conditions were reached. Groundwater conditions were considered ambient once the measured parameters varied by less than 10 percent on three consecutive measurements taken approximately 3 to 5 minutes apart. In the event that the well became dry during purging, groundwater was allowed to recharge and a water sample obtained. The stabilized field measurements at the time of sampling are summarized in Table 2.

Groundwater samples obtained were transferred to laboratory-prepared sample jars. Sample containers were filled to minimize headspace. The samples were placed in a cooler with ice pending transport to the analytical laboratory. Chain-of-custody procedures were followed in transporting the samples to the laboratory.

Investigative Wastes

Decontamination rinse and purge water generated during each monitoring event are stored on Site in sealed and labeled 55-gallon drums located within the Hangar Building (Figure 2).

Incidental waste generated during sampling activities includes items such as gloves, plastic sheeting, sample tubing, paper towels and other discarded field supplies. These materials are considered *de minimis* (Ecology, 2006) and were disposed of in a local trash receptacle or county disposal facility.

APPENDIX B
Monitoring Well Construction Logs

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% RETAINED ON NO. 200 SIEVE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS <small>(LITTLE OR NO FINES)</small>		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		CLEAN SANDS <small>(LITTLE OR NO FINES)</small>		SW	WELL-GRADED SANDS, GRAVELLY SANDS
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		SP	POORLY-GRADED SANDS, GRAVELLY SAND
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	CLEAN GRAVELS <small>(LITTLE OR NO FINES)</small>		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
		GRAVELS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		SM	SILTY SANDS, SAND - SILT MIXTURES
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY	
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS	
			CH	INORGANIC CLAYS OF HIGH PLASTICITY	
			OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY	
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS	

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

Sampler Symbol Descriptions

	2.4-inch I.D. split barrel
	Standard Penetration Test (SPT)
	Shelby tube
	Piston
	Direct-Push
	Bulk or grab

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS		TYPICAL DESCRIPTIONS
GRAPH	LETTER	
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/Quarry Spalls
	TS	Topsoil/Forest Duff/Sod

Groundwater Contact



Measured groundwater level in exploration, well, or piezometer



Measured free product in well or piezometer

Graphic Log Contact



Distinct contact between soil strata or geologic units



Approximate location of soil strata change within a geologic soil unit

Material Description Contact



Distinct contact between soil strata or geologic units



Approximate location of soil strata change within a geologic soil unit

Laboratory / Field Tests

%F	Percent fines
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PP	Pocket penetrometer
PPM	Parts per million
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

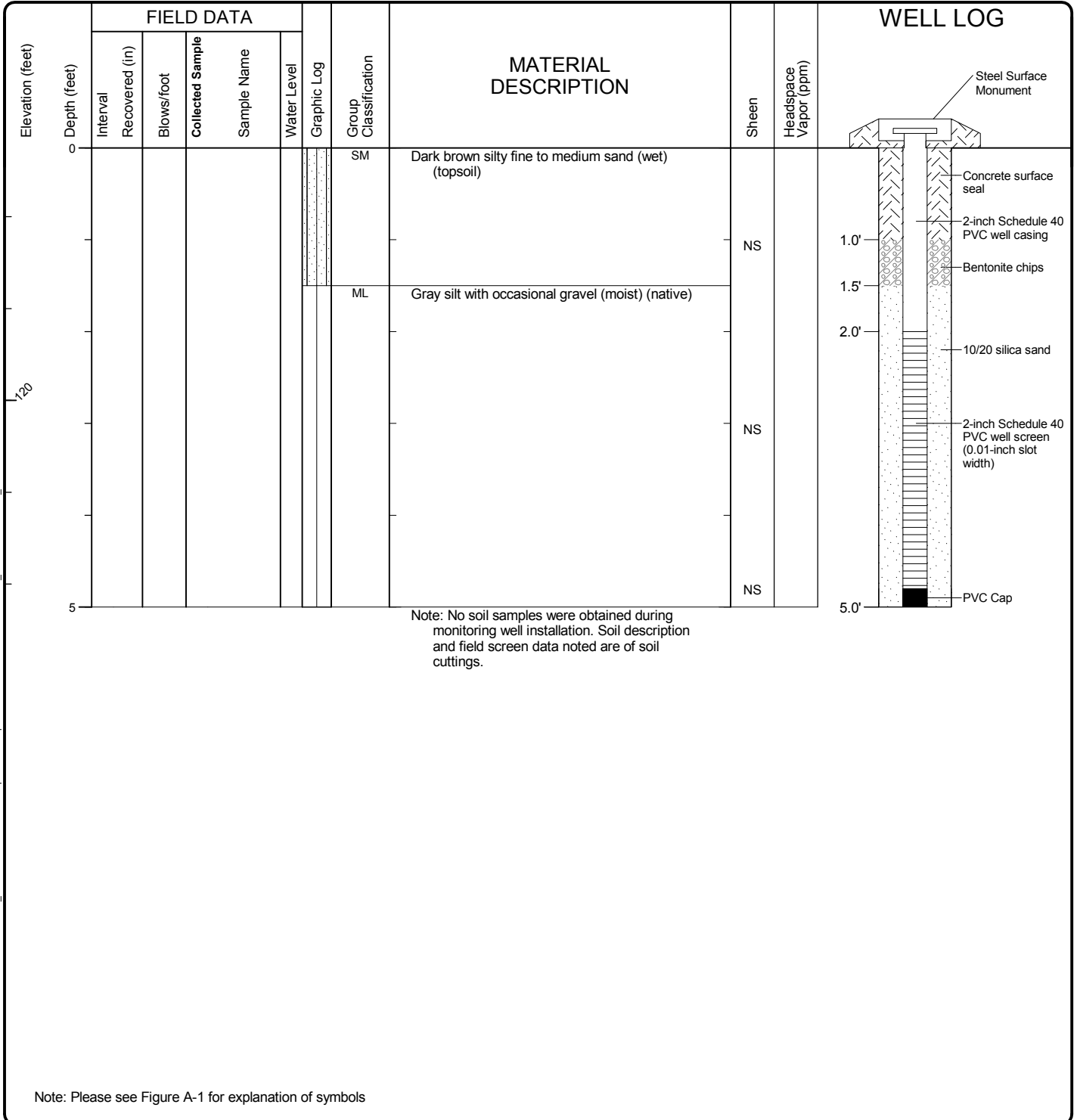
Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen
NT	Not Tested

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

KEY TO EXPLORATION LOGS

Drilled	Start 11/29/2013	End 11/29/2013	Total Depth (ft)	5	Logged By Checked By	Driller Cascade Drilling	Drilling Method	Hollow Stem Auger
Hammer Data	N/A			Drilling Equipment	CME-75		DOE Well I.D.: BHS 644 A 2 (in) well was installed on 11/29/2013 to a depth of 5 (ft).	
Surface Elevation (ft) Vertical Datum	122.75			Top of Casing Elevation (ft)				
Easting (X) Northing (Y)	1253174.211 540505.081			Horizontal Datum				
Notes:					Auger Data: 4¼" internal diameter, 8¼" outer diameter			



Log of Monitoring Well GEI-MW-9

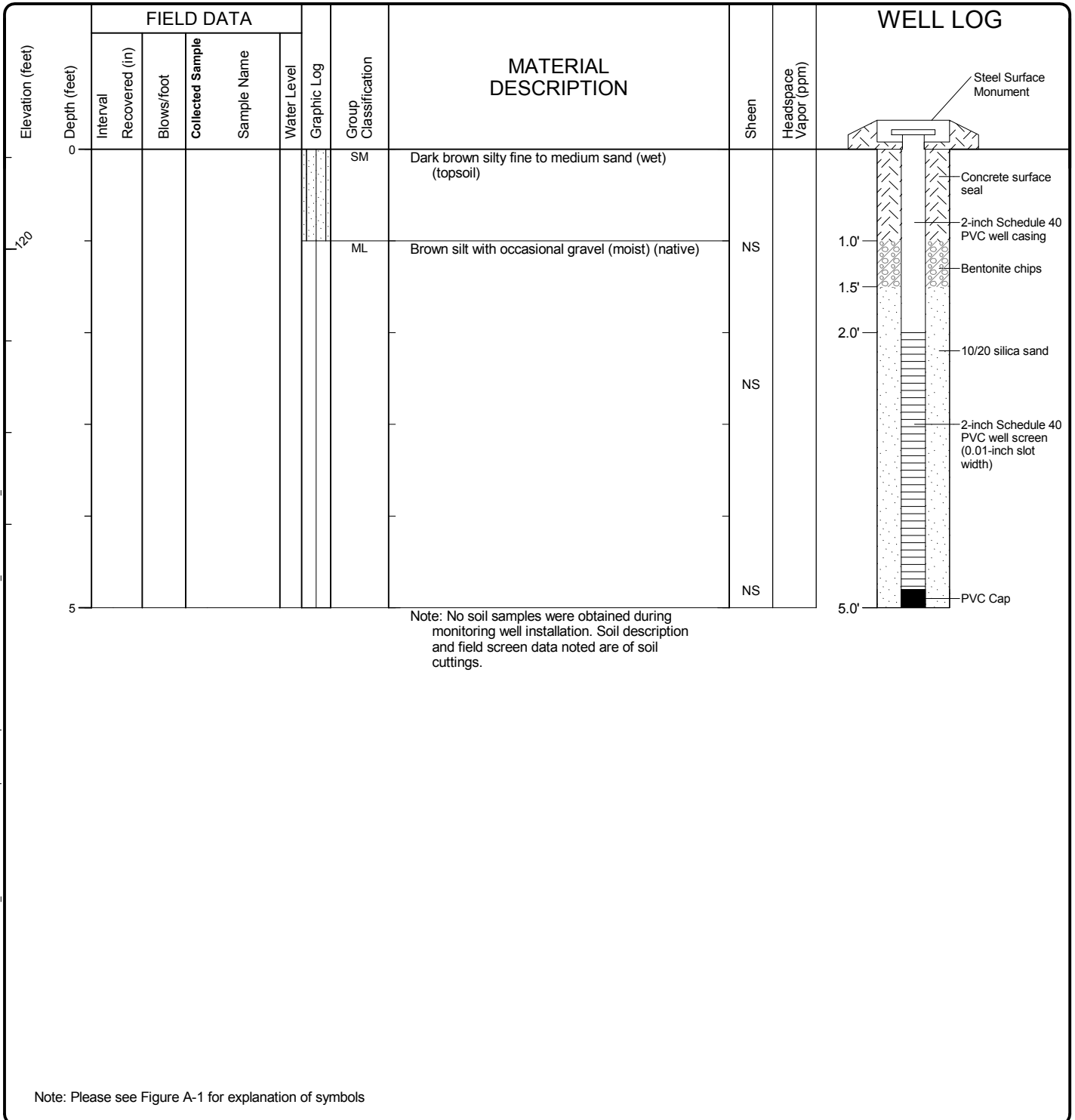


Project: Taxiway F Remedial Investigation
 Project Location: Burlington, Washington
 Project Number: 5364-013-05

Figure B-2
 Sheet 1 of 1

Seattle: Date: 12/14 Path: W:\SEATTLE\PROJECTS\5364-013\05\GINT\5364-01305_WELL_LOGS.GPJ DB Template: Lib Template: GEOENGINEERS.GDT\GEI8_ENVIRONMENTAL_WELL

Drilled	<u>Start</u> 11/29/2013	<u>End</u> 11/29/2013	Total Depth (ft)	5	Logged By Checked By	Driller Cascade Drilling	Drilling Method	Hollow Stem Auger
Hammer Data	N/A			Drilling Equipment	CME-75		DOE Well I.D.: BHS 645 A 2 (in) well was installed on 11/29/2013 to a depth of 5 (ft).	
Surface Elevation (ft) Vertical Datum	121.09			Top of Casing Elevation (ft)				
Easting (X) Northing (Y)	1253364.35 540483.81			Horizontal Datum				
Notes:					Auger Data: 4¼" internal diameter, 8¼" outer diameter			



Log of Monitoring Well GEI-MW-10

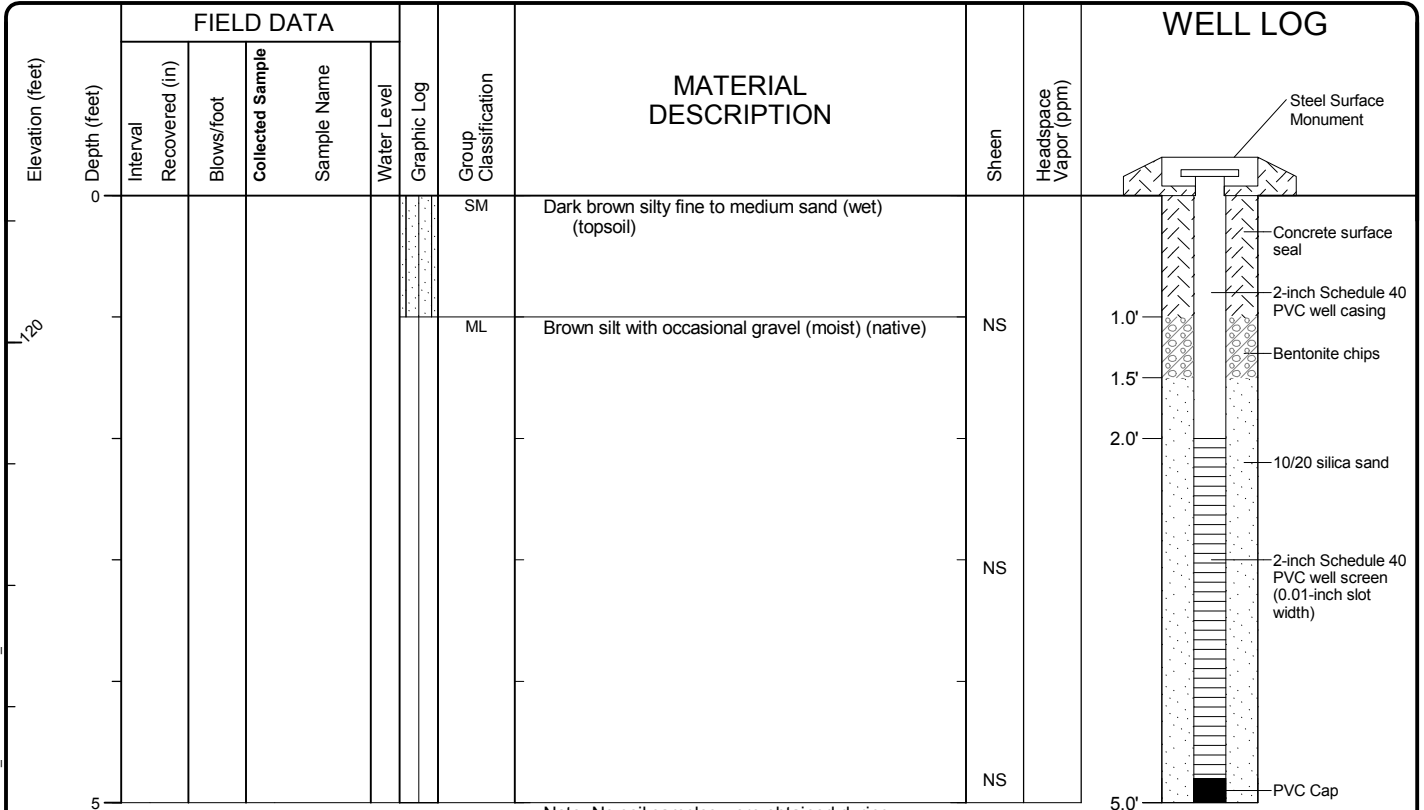


Project: Taxiway F Remedial Investigation
 Project Location: Burlington, Washington
 Project Number: 5364-013-05

Figure B-3
 Sheet 1 of 1

Seattle: Date: 12/14 Path: W:\SEATTLE\PROJECTS\5364-013\05\GINT\5364-01305_WELL_LOGS.GPJ DB Template: Lib Template: GEOENGINEERS_GDT\GEI8_ENVIRONMENTAL_WELL

Drilled	Start 11/29/2013	End 11/29/2013	Total Depth (ft)	5	Logged By Checked By	Driller Cascade Drilling	Drilling Method	Hollow Stem Auger
Hammer Data	N/A			Drilling Equipment	CME-75		DOE Well I.D.: BHS 646 A 2 (in) well was installed on 11/29/2013 to a depth of 5 (ft).	
Surface Elevation (ft) Vertical Datum	121.21			Top of Casing Elevation (ft)				
Easting (X) Northing (Y)	1253538.99 540320.38			Horizontal Datum				
Notes:					Auger Data: 4¼" internal diameter, 8¼" outer diameter			



Note: No soil samples were obtained during monitoring well installation. Soil description and field screen data noted are of soil cuttings.

Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well GEI-MW-11

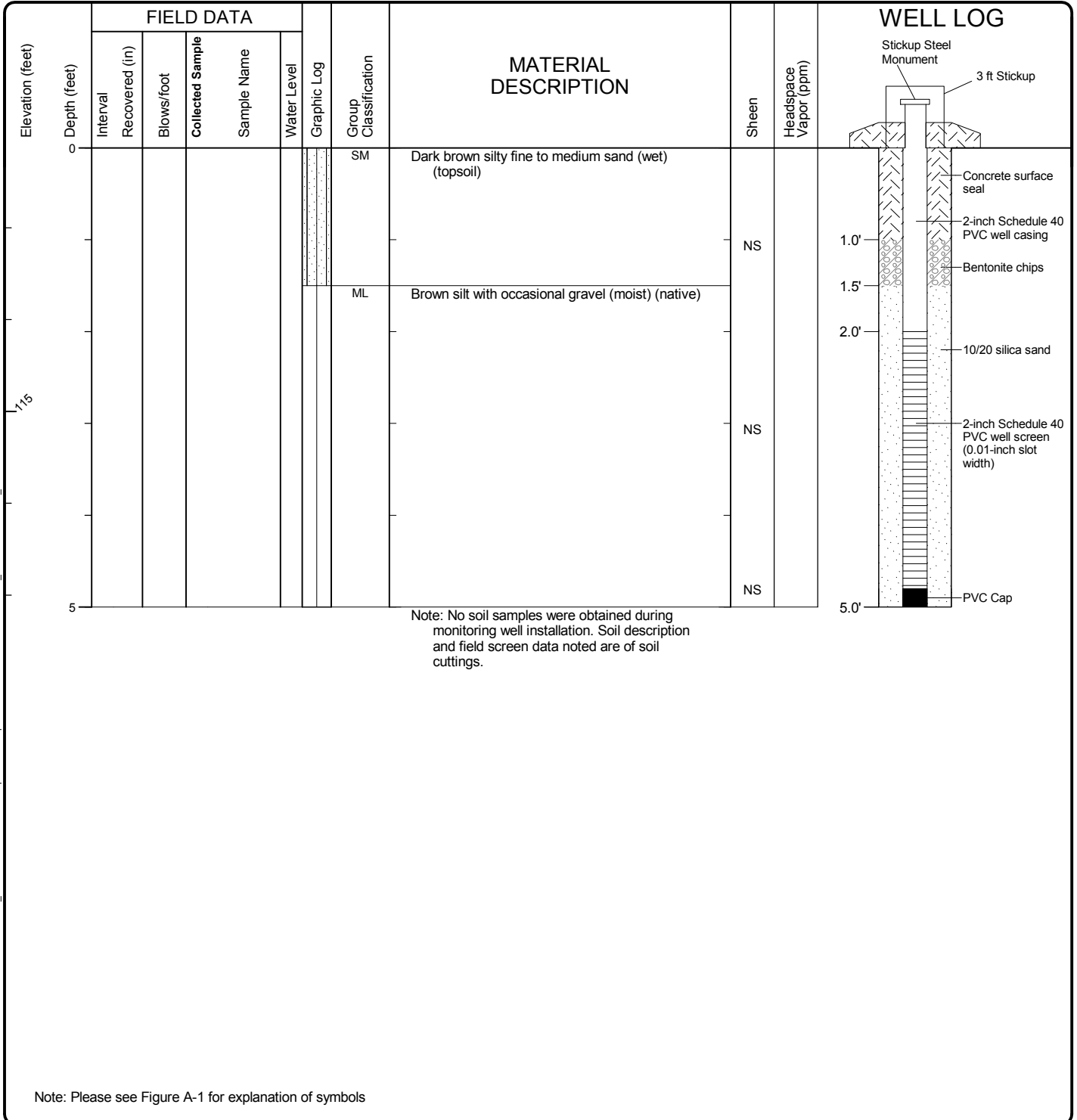


Project: Taxiway F Remedial Investigation
 Project Location: Burlington, Washington
 Project Number: 5364-013-05

Figure B-4
 Sheet 1 of 1

Seattle: Date: 12/14 Path: W:\SEATTLE\PROJECTS\5364-013\05\GINT\5364-01305_WELL_LOGS.GPJ DB Template: Lib Template: GEOENGINEERS.GDT\GEI8_ENVIRONMENTAL_WELL

Drilled	Start 11/29/2013	End 11/29/2013	Total Depth (ft)	5	Logged By Checked By	Driller Cascade Drilling	Drilling Method	Hollow Stem Auger
Hammer Data	N/A			Drilling Equipment	CME-75		DOE Well I.D.: BHS 647 A 2 (in) well was installed on 11/29/2013 to a depth of 5 (ft).	
Surface Elevation (ft) Vertical Datum	117.87			Top of Casing Elevation (ft)				
Easting (X) Northing (Y)	1253369.05 540373.43			Horizontal Datum				
		Groundwater Date Measured		Depth to Water (ft)		Elevation (ft)		
Notes: Auger Data: 4¼" internal diameter, 8¼" outer diameter								



Seattle: Date: 12/14/14 Path: W:\SEATTLE\PROJECTS\5364-013\05\GINT\5364-01305_WELL_LOGS.GPJ DB Template: Lib Template: GEOENGINEERS.GDT Template: ENVIRONMENTAL_WELL

Log of Monitoring Well GEI-MW-12



Project: Taxiway F Remedial Investigation
 Project Location: Burlington, Washington
 Project Number: 5364-013-05

Figure B-5
Sheet 1 of 1

APPENDIX C
Chemical Analytical Data



14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

December 24, 2015

Robert Trahan
GeoEngineers, Inc.
600 Stewart, Suite 1700
Seattle, WA 98101-1233

Re: Analytical Data for Project 5364-013-09
Laboratory Reference No. 1512-168

Dear Robert:

Enclosed are the analytical results and associated quality control data for samples submitted on December 16, 2015.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

A handwritten signature in black ink, appearing to read "DB", with a long horizontal flourish extending to the right.

David Baumeister
Project Manager

Enclosures

Date of Report: December 24, 2015
Samples Submitted: December 16, 2015
Laboratory Reference: 1512-168
Project: 5364-013-09

Case Narrative

Samples were collected on December 15, 2015 and received by the laboratory on December 16, 2015. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: December 24, 2015
Samples Submitted: December 16, 2015
Laboratory Reference: 1512-168
Project: 5364-013-09

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
MW-09_121515	12-168-01	Water	12-15-15	12-16-15	
MW-10_121515	12-168-02	Water	12-15-15	12-16-15	
MW-11_121515	12-168-03	Water	12-15-15	12-16-15	
MW-12_121515	12-168-04	Water	12-15-15	12-16-15	
DUP_121515	12-168-05	Water	12-15-15	12-16-15	

Date of Report: December 24, 2015
 Samples Submitted: December 16, 2015
 Laboratory Reference: 1512-168
 Project: 5364-013-09

**CHLORINATED ACID
 HERBICIDES EPA 8151A**

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	MW-09_121515					
Laboratory ID:	12-168-01					
MCPA	ND	6.7	EPA 8151A	12-17-15	12-18-15	
Dinoseb	ND	0.045	EPA 8151A	12-17-15	12-18-15	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	56	30-111				
Client ID:	MW-10_121515					
Laboratory ID:	12-168-02					
MCPA	50	6.6	EPA 8151A	12-17-15	12-18-15	
Dinoseb	5.5	0.45	EPA 8151A	12-17-15	12-21-15	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	44	30-111				
Client ID:	MW-11_121515					
Laboratory ID:	12-168-03					
MCPA	8.1	6.6	EPA 8151A	12-17-15	12-18-15	P(69%)
Dinoseb	0.17	0.044	EPA 8151A	12-17-15	12-18-15	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	34	30-111				
Client ID:	MW-12_121515					
Laboratory ID:	12-168-04					
MCPA	ND	6.6	EPA 8151A	12-17-15	12-18-15	
Dinoseb	0.57	0.044	EPA 8151A	12-17-15	12-18-15	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	41	30-111				
Client ID:	DUP_121515					
Laboratory ID:	12-168-05					
MCPA	ND	6.6	EPA 8151A	12-17-15	12-18-15	
Dinoseb	0.63	0.044	EPA 8151A	12-17-15	12-18-15	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	53	30-111				

Date of Report: December 24, 2015
 Samples Submitted: December 16, 2015
 Laboratory Reference: 1512-168
 Project: 5364-013-09

**CHLORINATED ACID
 HERBICIDES EPA 8151A
 QUALITY CONTROL**

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1217W2					
MCPA	ND	7.0	EPA 8151A	12-17-15	12-18-15	
Dinoseb	ND	0.047	EPA 8151A	12-17-15	12-18-15	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	42	30-111				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	12-168-04										
	MS	MSD	MS	MSD		MS	MSD				
Dinoseb	1.41	1.17	0.940	0.939	0.570	89	64	60-140	19	20	
<i>Surrogate:</i>											
DCAA						57	56	30-111			



Data Qualifiers and Abbreviations

- A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.
 - B - The analyte indicated was also found in the blank sample.
 - C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.
 - E - The value reported exceeds the quantitation range and is an estimate.
 - F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.
 - H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.
 - I - Compound recovery is outside of the control limits.
 - J - The value reported was below the practical quantitation limit. The value is an estimate.
 - K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.
 - L - The RPD is outside of the control limits.
 - M - Hydrocarbons in the gasoline range are impacting the diesel range result.
 - M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.
 - N - Hydrocarbons in the lube oil range are impacting the diesel range result.
 - N1 - Hydrocarbons in diesel range are impacting lube oil range results.
 - O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.
 - P - The RPD of the detected concentrations between the two columns is greater than 40.
 - Q - Surrogate recovery is outside of the control limits.
 - S - Surrogate recovery data is not available due to the necessary dilution of the sample.
 - T - The sample chromatogram is not similar to a typical _____.
 - U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
 - U1 - The practical quantitation limit is elevated due to interferences present in the sample.
 - V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.
 - W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.
 - X - Sample extract treated with a mercury cleanup procedure.
 - X1 - Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.
 - Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.
 - Z -
- ND - Not Detected at PQL
 PQL - Practical Quantitation Limit
 RPD - Relative Percent Difference

Sample/Cooler Receipt and Acceptance Checklist

Client: GES

Client Project Name/Number: 5364-013-09

OnSite Project Number: 12-168

Initiated by: MM

Date Initiated: 12/16/15

1.0 Cooler Verification

1.1 Were there custody seals on the outside of the cooler?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A	1 2 3 4
1.2 Were the custody seals intact?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A	1 2 3 4
1.3 Were the custody seals signed and dated by last custodian?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A	1 2 3 4
1.4 Were the samples delivered on ice or blue ice?	<input checked="" type="radio"/> Yes	<input type="radio"/> No		1 2 3 4
1.5 Were samples received between 0-6 degrees Celsius?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	Temperature: <u>4</u>	
1.6 Have shipping bills (if any) been attached to the back of this form?	<input checked="" type="radio"/> Yes	<input checked="" type="radio"/> N/A		
1.7 How were the samples delivered?	<input checked="" type="radio"/> Client	<input type="radio"/> Courier	<input type="radio"/> UPS/FedEx	<input type="radio"/> OSE Pickup <input type="radio"/> Other

2.0 Chain of Custody Verification

2.1 Was a Chain of Custody submitted with the samples?	<input checked="" type="radio"/> Yes	<input type="radio"/> No		1 2 3 4
2.2 Was the COC legible and written in permanent ink?	<input checked="" type="radio"/> Yes	<input type="radio"/> No		1 2 3 4
2.3 Have samples been relinquished and accepted by each custodian?	<input checked="" type="radio"/> Yes	<input type="radio"/> No		1 2 3 4
2.4 Did the sample labels (ID, date, time, preservative) agree with COC?	<input checked="" type="radio"/> Yes	<input type="radio"/> No		1 2 3 4
2.5 Were all of the samples listed on the COC submitted?	<input checked="" type="radio"/> Yes	<input type="radio"/> No		1 2 3 4
2.6 Were any of the samples submitted omitted from the COC?	<input type="radio"/> Yes	<input checked="" type="radio"/> No		1 2 3 4

3.0 Sample Verification

3.1 Were any sample containers broken or compromised?	<input type="radio"/> Yes	<input checked="" type="radio"/> No		1 2 3 4
3.2 Were any sample labels missing or illegible?	<input type="radio"/> Yes	<input checked="" type="radio"/> No		1 2 3 4
3.3 Have the correct containers been used for each analysis requested?	<input checked="" type="radio"/> Yes	<input type="radio"/> No		1 2 3 4
3.4 Have the samples been correctly preserved?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A	1 2 3 4
3.5 Are volatiles samples free from headspace and bubbles greater than 6mm?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A	1 2 3 4
3.6 Is there sufficient sample submitted to perform requested analyses?	<input checked="" type="radio"/> Yes	<input type="radio"/> No		1 2 3 4
3.7 Have any holding times already expired or will expire in 24 hours?	<input type="radio"/> Yes	<input checked="" type="radio"/> No		1 2 3 4
3.8 Was method 5035A used?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A	1 2 3 4
3.9 If 5035A was used, which sampling option was used (#1, 2, or 3).	<input type="radio"/> #		<input checked="" type="radio"/> N/A	1 2 3 4

Explain any discrepancies:

1 - Discuss issue in Case Narrative

2 - Process Sample As-is

3 - Client contacted to discuss problem

4 - Sample cannot be analyzed or client does not wish to proceed



14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

April 1, 2016

Robert Trahan
GeoEngineers, Inc.
600 Stewart, Suite 1700
Seattle, WA 98101-1233

Re: Analytical Data for Project 5364-013-09
Laboratory Reference No. 1603-224

Dear Robert:

Enclosed are the analytical results and associated quality control data for samples submitted on March 24, 2016.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

A handwritten signature in black ink, appearing to read "DB", with a long horizontal stroke extending to the right.

David Baumeister
Project Manager

Enclosures

Date of Report: April 1, 2016
Samples Submitted: March 24, 2016
Laboratory Reference: 1603-224
Project: 5364-013-09

Case Narrative

Samples were collected on March 23, 2016 and received by the laboratory on March 24, 2016. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: April 1, 2016
Samples Submitted: March 24, 2016
Laboratory Reference: 1603-224
Project: 5364-013-09

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
MW-9_032316	03-224-01	Water	3-23-16	3-24-16	
MW-10_032316	03-224-02	Water	3-23-16	3-24-16	
MW-11_032316	03-224-03	Water	3-23-16	3-24-16	
MW-12_032316	03-224-04	Water	3-23-16	3-24-16	
DUP_032316	03-224-05	Water	3-23-16	3-24-16	

Date of Report: April 1, 2016
 Samples Submitted: March 24, 2016
 Laboratory Reference: 1603-224
 Project: 5364-013-09

**CHLORINATED ACID
 HERBICIDES EPA 8151A**

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	MW-9_032316					
Laboratory ID:	03-224-01					
MCPA	ND	6.6	EPA 8151A	3-28-16	3-29-16	
Dinoseb	ND	0.044	EPA 8151A	3-28-16	3-29-16	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	80	30-111				
Client ID:	MW-10_032316					
Laboratory ID:	03-224-02					
MCPA	24	6.6	EPA 8151A	3-28-16	3-29-16	
Dinoseb	5.9	0.44	EPA 8151A	3-28-16	4-1-16	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	97	30-111				
Client ID:	MW-11_032316					
Laboratory ID:	03-224-03					
MCPA	24	6.6	EPA 8151A	3-28-16	3-29-16	
Dinoseb	0.79	0.045	EPA 8151A	3-28-16	3-29-16	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	43	30-111				
Client ID:	MW-12_032316					
Laboratory ID:	03-224-04					
MCPA	ND	6.6	EPA 8151A	3-28-16	3-29-16	
Dinoseb	0.19	0.045	EPA 8151A	3-28-16	3-29-16	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	46	30-111				
Client ID:	DUP_032316					
Laboratory ID:	03-224-05					
MCPA	ND	6.6	EPA 8151A	3-28-16	3-29-16	
Dinoseb	0.16	0.045	EPA 8151A	3-28-16	3-29-16	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	44	30-111				

Date of Report: April 1, 2016
 Samples Submitted: March 24, 2016
 Laboratory Reference: 1603-224
 Project: 5364-013-09

**CHLORINATED ACID
 HERBICIDES EPA 8151A
 QUALITY CONTROL**

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0328W1					
MCPA	ND	7.0	EPA 8151A	3-28-16	3-29-16	
Dinoseb	ND	0.047	EPA 8151A	3-28-16	3-29-16	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	70	30-111				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS											
Laboratory ID:	SB0328W1										
	SB	SBD	SB	SBD		SB	SBD				
Dinoseb	0.793	0.702	1.00	1.00	N/A	79	70	17-111	12	16	
<i>Surrogate:</i>											
DCAA						81	61	30-111			



Data Qualifiers and Abbreviations

- A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.
 - B - The analyte indicated was also found in the blank sample.
 - C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.
 - E - The value reported exceeds the quantitation range and is an estimate.
 - F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.
 - H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.
 - I - Compound recovery is outside of the control limits.
 - J - The value reported was below the practical quantitation limit. The value is an estimate.
 - K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.
 - L - The RPD is outside of the control limits.
 - M - Hydrocarbons in the gasoline range are impacting the diesel range result.
 - M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.
 - N - Hydrocarbons in the lube oil range are impacting the diesel range result.
 - N1 - Hydrocarbons in diesel range are impacting lube oil range results.
 - O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.
 - P - The RPD of the detected concentrations between the two columns is greater than 40.
 - Q - Surrogate recovery is outside of the control limits.
 - S - Surrogate recovery data is not available due to the necessary dilution of the sample.
 - T - The sample chromatogram is not similar to a typical _____.
 - U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
 - U1 - The practical quantitation limit is elevated due to interferences present in the sample.
 - V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.
 - W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.
 - X - Sample extract treated with a mercury cleanup procedure.
 - X1 - Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.
 - Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.
 - Z -
- ND - Not Detected at PQL
 PQL - Practical Quantitation Limit
 RPD - Relative Percent Difference

Sample/Cooler Receipt and Acceptance Checklist

Client: GES

Client Project Name/Number: 5364-013-09

OnSite Project Number: 03-224

Initiated by: AMV

Date Initiated: 3/24/16

1.0 Cooler Verification

1.1 Were there custody seals on the outside of the cooler?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A	1 2 3 4
1.2 Were the custody seals intact?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A	1 2 3 4
1.3 Were the custody seals signed and dated by last custodian?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A	1 2 3 4
1.4 Were the samples delivered on ice or blue ice?	<input checked="" type="radio"/> Yes	<input type="radio"/> No		1 2 3 4
1.5 Were samples received between 0-6 degrees Celsius?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	Temperature: <u>0</u>	
1.6 Have shipping bills (if any) been attached to the back of this form?	<input checked="" type="radio"/> Yes	<input type="radio"/> N/A		
1.7 How were the samples delivered?	<input checked="" type="radio"/> Client	<input type="radio"/> Courier	<input type="radio"/> UPS/FedEx	<input type="radio"/> OSE Pickup <input type="radio"/> Other

2.0 Chain of Custody Verification

2.1 Was a Chain of Custody submitted with the samples?	<input checked="" type="radio"/> Yes	<input type="radio"/> No		1 2 3 4
2.2 Was the COC legible and written in permanent ink?	<input checked="" type="radio"/> Yes	<input type="radio"/> No		1 2 3 4
2.3 Have samples been relinquished and accepted by each custodian?	<input checked="" type="radio"/> Yes	<input type="radio"/> No		1 2 3 4
2.4 Did the sample labels (ID, date, time, preservative) agree with COC?	<input checked="" type="radio"/> Yes	<input type="radio"/> No		1 2 3 4
2.5 Were all of the samples listed on the COC submitted?	<input checked="" type="radio"/> Yes	<input type="radio"/> No		1 2 3 4
2.6 Were any of the samples submitted omitted from the COC?	<input checked="" type="radio"/> Yes	<input type="radio"/> No		1 2 3 4

3.0 Sample Verification

3.1 Were any sample containers broken or compromised?	<input type="radio"/> Yes	<input checked="" type="radio"/> No		1 2 3 4
3.2 Were any sample labels missing or illegible?	<input type="radio"/> Yes	<input checked="" type="radio"/> No		1 2 3 4
3.3 Have the correct containers been used for each analysis requested?	<input checked="" type="radio"/> Yes	<input type="radio"/> No		1 2 3 4
3.4 Have the samples been correctly preserved?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A	1 2 3 4
3.5 Are volatile samples free from headspace and bubbles greater than 6mm?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A	1 2 3 4
3.6 Is there sufficient sample submitted to perform requested analyses?	<input checked="" type="radio"/> Yes	<input type="radio"/> No		1 2 3 4
3.7 Have any holding times already expired or will expire in 24 hours?	<input type="radio"/> Yes	<input checked="" type="radio"/> No		1 2 3 4
3.8 Was method 5035A used?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A	1 2 3 4
3.9 If 5035A was used, which sampling option was used (#1, 2, or 3).	<input type="radio"/> #		<input type="radio"/> N/A	1 2 3 4

Explain any discrepancies:

2.4) Sample 1) MW-9-032316 3.23.16 1020 on COC
MW-09-032316 " " on labels
Sample 2) MW-10-032316 3.23.16 1050 on COC 1140 on 1-1L
Sample 3) MW-11-032316 3.23.16 1140 on COC 1050 on 1-1L

1 - Discuss issue in Case Narrative

2 - Process Sample As-is

3 - Client contacted to discuss problem

4 - Sample cannot be analyzed or client does not wish to proceed



14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

December 27, 2016

Robert Trahan
GeoEngineers, Inc.
600 Stewart, Suite 1700
Seattle, WA 98101-1233

Re: Analytical Data for Project 05364-013-08
Laboratory Reference No. 1612-108

Dear Robert:

Enclosed are the analytical results and associated quality control data for samples submitted on December 14, 2016.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

A handwritten signature in black ink, appearing to read "DB", with a long horizontal flourish extending to the right.

David Baumeister
Project Manager

Enclosures



OnSite Environmental, Inc. 14648 NE 95th Street, Redmond, WA 98052 (425) 883-3881

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: December 27, 2016
Samples Submitted: December 14, 2016
Laboratory Reference: 1612-108
Project: 05364-013-08

Case Narrative

Samples were collected on December 14, 2016 and received by the laboratory on December 14, 2016. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.



Date of Report: December 27, 2016
Samples Submitted: December 14, 2016
Laboratory Reference: 1612-108
Project: 05364-013-08

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
GEI-MW-9	12-108-01	Water	12-14-16	12-14-16	
GEI-MW-10	12-108-02	Water	12-14-16	12-14-16	
GEI-MW-11	12-108-03	Water	12-14-16	12-14-16	
GEI-MW-12	12-108-04	Water	12-14-16	12-14-16	
GEI-DUP-1	12-108-05	Water	12-14-16	12-14-16	



Date of Report: December 27, 2016
 Samples Submitted: December 14, 2016
 Laboratory Reference: 1612-108
 Project: 05364-013-08

**CHLORINATED ACID
 HERBICIDES EPA 8151A**

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	GEI-MW-9					
Laboratory ID:	12-108-01					
MCPA	ND	6.7	EPA 8151A	12-19-16	12-20-16	
Dinoseb	ND	0.045	EPA 8151A	12-19-16	12-20-16	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	54	30-132				
Client ID:	GEI-MW-10					
Laboratory ID:	12-108-02					
MCPA	ND	6.6	EPA 8151A	12-19-16	12-23-16	
Dinoseb	8.7	0.45	EPA 8151A	12-19-16	12-23-16	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	46	30-132				
Client ID:	GEI-MW-11					
Laboratory ID:	12-108-03					
MCPA	ND	6.6	EPA 8151A	12-19-16	12-20-16	
Dinoseb	0.19	0.045	EPA 8151A	12-19-16	12-20-16	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	57	30-132				
Client ID:	GEI-MW-12					
Laboratory ID:	12-108-04					
MCPA	ND	6.6	EPA 8151A	12-19-16	12-20-16	
Dinoseb	ND	0.045	EPA 8151A	12-19-16	12-20-16	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	33	30-132				
Client ID:	GEI-DUP-1					
Laboratory ID:	12-108-05					
MCPA	ND	6.6	EPA 8151A	12-19-16	12-20-16	
Dinoseb	ND	0.044	EPA 8151A	12-19-16	12-20-16	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	42	30-132				



Date of Report: December 27, 2016
 Samples Submitted: December 14, 2016
 Laboratory Reference: 1612-108
 Project: 05364-013-08

**CHLORINATED ACID
 HERBICIDES EPA 8151A
 QUALITY CONTROL**

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1219W1					
MCPA	ND	7.0	EPA 8151A	12-19-16	12-20-16	
Dinoseb	ND	0.047	EPA 8151A	12-19-16	12-20-16	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	45	30-132				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS											
Laboratory ID:	SB1219W1										
	SB	SBD	SB	SBD		SB	SBD				
Dinoseb	0.395	0.340	1.00	1.00	N/A	39	34	17-102	15	18	
<i>Surrogate:</i>											
DCAA						47	42	30-132			





Data Qualifiers and Abbreviations

- A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.
 - B - The analyte indicated was also found in the blank sample.
 - C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.
 - E - The value reported exceeds the quantitation range and is an estimate.
 - F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.
 - H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.
 - I - Compound recovery is outside of the control limits.
 - J - The value reported was below the practical quantitation limit. The value is an estimate.
 - K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.
 - L - The RPD is outside of the control limits.
 - M - Hydrocarbons in the gasoline range are impacting the diesel range result.
 - M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.
 - N - Hydrocarbons in the lube oil range are impacting the diesel range result.
 - N1 - Hydrocarbons in diesel range are impacting lube oil range results.
 - O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.
 - P - The RPD of the detected concentrations between the two columns is greater than 40.
 - Q - Surrogate recovery is outside of the control limits.
 - S - Surrogate recovery data is not available due to the necessary dilution of the sample.
 - T - The sample chromatogram is not similar to a typical _____.
 - U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
 - U1 - The practical quantitation limit is elevated due to interferences present in the sample.
 - V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.
 - W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.
 - X - Sample extract treated with a mercury cleanup procedure.
 - X1 - Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.
 - Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.
 - Z -
- ND - Not Detected at PQL
 PQL - Practical Quantitation Limit
 RPD - Relative Percent Difference





Onsite Environmental Inc.
 Analytical Laboratory Testing Services
 14648 NE 95th Street • Redmond, WA 98052
 Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Turnaround Request (in working days)
 (Check One)

- Same Day 1 Day
- 2 Days 3 Days
- Standard (7 Days) (TPH analysis 5 Days)
- _____ (other)

Laboratory Number: **12-108**

Company: GEDENGENIERS INC.
 Project Number: 05304-013-08
 Project Name: TAKIWA F SITE
 Project Manager: ROBERT TRAVEL
 Sampled By: Nathan Socoland

Lab ID | Sample Identification | Date Sampled | Time Sampled | Matrix

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix
1	GE1-MW-9	12.14.16	1105	WATER
2	GE1-MW-10		1135	
3	GE1-MW-11		1205	
4	GE1-MW-12		1300	
5	GE1-DUP-1		1200	

Number of Containers

Parameter	1	2	3	4	5
NWTPH-HCID					
NWTPH-Gx/BTEX					
NWTPH-Gx					
NWTPH-Dx (Acid / SG Clean-up)					
Volatiles 8260C					
Halogenated Volatiles 8260C					
EDB EPA 8011 (Waters Only)					
Semivolatiles 8270D/SIM (with low-level PAHs)					
PAHs 8270D/SIM (low-level)					
PCBs 8082A					
Organochlorine Pesticides 8081B					
Organophosphorus Pesticides 8270D/SIM					
Chlorinated Acid Herbicides 8151A		X	X	X	X
Total RCRA Metals					
Total MTCA Metals					
TCLP Metals					
HEM (oil and grease) 1664A					
CHLORINATED PESTICIDE		X	X	X	X
MS/MSD			X		
% Moisture					

Signature | Company | Date | Time | Comments/Special Instructions

Relinquished | [Signature] | GE1 | 12.14.16 | 1515 | * MCPA + DINOSORB ONLY

Received | Relinquished | Received | Relinquished | Received | Relinquished | Received | Relinquished | Received | Relinquished | Reviewed/Date

Data Package: Standard Level III Level IV

Chromatograms with final report Electronic Data Deliverables (EDDs)



14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

March 31, 2017

Robert Trahan
GeoEngineers, Inc.
600 Stewart, Suite 1700
Seattle, WA 98101-1233

Re: Analytical Data for Project 5364-013-09
Laboratory Reference No. 1703-262

Dear Robert:

Enclosed are the analytical results and associated quality control data for samples submitted on March 27, 2017.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

A handwritten signature in black ink, appearing to read "DB", with a long horizontal flourish extending to the right.

David Baumeister
Project Manager

Enclosures



OnSite Environmental, Inc. 14648 NE 95th Street, Redmond, WA 98052 (425) 883-3881

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 31, 2017
Samples Submitted: March 27, 2017
Laboratory Reference: 1703-262
Project: 5364-013-09

Case Narrative

Samples were collected on March 27, 2017 and received by the laboratory on March 27, 2017. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.



Date of Report: March 31, 2017
Samples Submitted: March 27, 2017
Laboratory Reference: 1703-262
Project: 5364-013-09

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
MW-09_032717	03-262-01	Water	3-27-17	3-27-17	
MW-10_032717	03-262-02	Water	3-27-17	3-27-17	
MW-11_032717	03-262-03	Water	3-27-17	3-27-17	
MW-12_032717	03-262-04	Water	3-27-17	3-27-17	
DUP_032717	03-262-05	Water	3-27-17	3-27-17	



Date of Report: March 31, 2017
 Samples Submitted: March 27, 2017
 Laboratory Reference: 1703-262
 Project: 5364-013-09

**CHLORINATED ACID
 HERBICIDES EPA 8151A**

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	MW-09_032717					
Laboratory ID:	03-262-01					
MCPA	ND	6.7	EPA 8151A	3-29-17	3-30-17	
Dinoseb	ND	0.045	EPA 8151A	3-29-17	3-30-17	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	52	30-132				
Client ID:	MW-10_032717					
Laboratory ID:	03-262-02					
MCPA	ND	6.6	EPA 8151A	3-29-17	3-30-17	
Dinoseb	0.70	0.045	EPA 8151A	3-29-17	3-30-17	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	47	30-132				
Client ID:	MW-11_032717					
Laboratory ID:	03-262-03					
MCPA	ND	6.8	EPA 8151A	3-29-17	3-30-17	
Dinoseb	0.21	0.046	EPA 8151A	3-29-17	3-30-17	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	70	30-132				
Client ID:	MW-12_032717					
Laboratory ID:	03-262-04					
MCPA	ND	6.6	EPA 8151A	3-29-17	3-30-17	
Dinoseb	0.083	0.045	EPA 8151A	3-29-17	3-30-17	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	49	30-132				
Client ID:	DUP_032717					
Laboratory ID:	03-262-05					
MCPA	ND	6.7	EPA 8151A	3-29-17	3-30-17	
Dinoseb	0.075	0.045	EPA 8151A	3-29-17	3-30-17	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	50	30-132				



Date of Report: March 31, 2017
 Samples Submitted: March 27, 2017
 Laboratory Reference: 1703-262
 Project: 5364-013-09

**CHLORINATED ACID
 HERBICIDES EPA 8151A
 QUALITY CONTROL**

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0329W1					
MCPA	ND	7.0	EPA 8151A	3-29-17	3-30-17	
Dinoseb	ND	0.047	EPA 8151A	3-29-17	3-30-17	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	49	30-132				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	03-262-04										
	MS	MSD	MS	MSD		MS	MSD				
Dinoseb	0.556	0.502	0.934	0.943	0.0827	51	44	17-102	10	20	
<i>Surrogate:</i>											
DCAA						58	63	30-132			





Data Qualifiers and Abbreviations

- A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.
 - B - The analyte indicated was also found in the blank sample.
 - C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.
 - E - The value reported exceeds the quantitation range and is an estimate.
 - F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.
 - H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.
 - I - Compound recovery is outside of the control limits.
 - J - The value reported was below the practical quantitation limit. The value is an estimate.
 - K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.
 - L - The RPD is outside of the control limits.
 - M - Hydrocarbons in the gasoline range are impacting the diesel range result.
 - M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.
 - N - Hydrocarbons in the lube oil range are impacting the diesel range result.
 - N1 - Hydrocarbons in diesel range are impacting lube oil range results.
 - O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.
 - P - The RPD of the detected concentrations between the two columns is greater than 40.
 - Q - Surrogate recovery is outside of the control limits.
 - S - Surrogate recovery data is not available due to the necessary dilution of the sample.
 - T - The sample chromatogram is not similar to a typical _____.
 - U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
 - U1 - The practical quantitation limit is elevated due to interferences present in the sample.
 - V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.
 - W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.
 - X - Sample extract treated with a mercury cleanup procedure.
 - X1 - Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.
 - Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.
 - Z -
- ND - Not Detected at PQL
 PQL - Practical Quantitation Limit
 RPD - Relative Percent Difference





14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

January 2, 2018

Robert Trahan
GeoEngineers, Inc.
600 Stewart, Suite 1700
Seattle, WA 98101-1233

Re: Analytical Data for Project 5364-013-09
Laboratory Reference No. 1712-192

Dear Robert:

Enclosed are the analytical results and associated quality control data for samples submitted on December 18, 2017.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

A handwritten signature in black ink, appearing to read "DB", with a long horizontal flourish extending to the right.

David Baumeister
Project Manager

Enclosures



OnSite Environmental, Inc. 14648 NE 95th Street, Redmond, WA 98052 (425) 883-3881

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: January 2, 2018
Samples Submitted: December 18, 2017
Laboratory Reference: 1712-192
Project: 5364-013-09

Case Narrative

Samples were collected on December 18, 2017 and received by the laboratory on December 18, 2017. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.



Date of Report: January 2, 2018
Samples Submitted: December 18, 2017
Laboratory Reference: 1712-192
Project: 5364-013-09

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
MW-09-121817	12-192-01	Water	12-18-17	12-18-17	
MW-10-121817	12-192-02	Water	12-18-17	12-18-17	
MW-11-121817	12-192-03	Water	12-18-17	12-18-17	
MW-12-121817	12-192-04	Water	12-18-17	12-18-17	
Dup-121817	12-192-05	Water	12-18-17	12-18-17	



Date of Report: January 2, 2018
 Samples Submitted: December 18, 2017
 Laboratory Reference: 1712-192
 Project: 5364-013-09

**CHLORINATED ACID
 HERBICIDES EPA 8151A**

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	MW-09-121817					
Laboratory ID:	12-192-01					
MCPA	ND	6.6	EPA 8151A	12-21-17	12-29-17	
Dinoseb	0.077	0.045	EPA 8151A	12-21-17	12-29-17	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	40	17-122				
Client ID:	MW-10-121817					
Laboratory ID:	12-192-02					
MCPA	ND	6.6	EPA 8151A	12-21-17	12-29-17	
Dinoseb	4.4	0.044	EPA 8151A	12-21-17	12-29-17	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	64	17-122				
Client ID:	MW-11-121817					
Laboratory ID:	12-192-03					
MCPA	ND	6.6	EPA 8151A	12-21-17	12-29-17	
Dinoseb	0.34	0.044	EPA 8151A	12-21-17	12-29-17	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	57	17-122				
Client ID:	MW-12-121817					
Laboratory ID:	12-192-04					
MCPA	ND	6.6	EPA 8151A	12-21-17	12-29-17	
Dinoseb	0.13	0.045	EPA 8151A	12-21-17	12-29-17	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	30	17-122				
Client ID:	Dup-121817					
Laboratory ID:	12-192-05					
MCPA	ND	6.6	EPA 8151A	12-21-17	12-29-17	
Dinoseb	0.19	0.045	EPA 8151A	12-21-17	12-29-17	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	48	17-122				



Date of Report: January 2, 2018
 Samples Submitted: December 18, 2017
 Laboratory Reference: 1712-192
 Project: 5364-013-09

**CHLORINATED ACID
 HERBICIDES EPA 8151A
 QUALITY CONTROL**

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1221W1					
MCPA	ND	7.0	EPA 8151A	12-21-17	12-29-17	
Dinoseb	ND	0.047	EPA 8151A	12-21-17	12-29-17	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	44	17-122				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	12-192-04										
	MS	MSD	MS	MSD		MS	MSD				
Dinoseb	0.618	0.521	0.946	0.944	0.133	51	41	14-106	17	20	
<i>Surrogate:</i>											
DCAA						39	27	17-122			





Data Qualifiers and Abbreviations

- A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.
 - B - The analyte indicated was also found in the blank sample.
 - C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.
 - E - The value reported exceeds the quantitation range and is an estimate.
 - F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.
 - H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.
 - I - Compound recovery is outside of the control limits.
 - J - The value reported was below the practical quantitation limit. The value is an estimate.
 - K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.
 - L - The RPD is outside of the control limits.
 - M - Hydrocarbons in the gasoline range are impacting the diesel range result.
 - M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.
 - N - Hydrocarbons in the lube oil range are impacting the diesel range result.
 - N1 - Hydrocarbons in diesel range are impacting lube oil range results.
 - O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.
 - P - The RPD of the detected concentrations between the two columns is greater than 40.
 - Q - Surrogate recovery is outside of the control limits.
 - S - Surrogate recovery data is not available due to the necessary dilution of the sample.
 - T - The sample chromatogram is not similar to a typical _____.
 - U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
 - U1 - The practical quantitation limit is elevated due to interferences present in the sample.
 - V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.
 - W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.
 - X - Sample extract treated with a mercury cleanup procedure.
 - X1 - Sample extract treated with a sulfuric acid/silica gel cleanup procedure.
 - Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.
 - Z -
- ND - Not Detected at PQL
 PQL - Practical Quantitation Limit
 RPD - Relative Percent Difference





14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

April 11, 2018

Robert Trahan
GeoEngineers, Inc.
600 Stewart, Suite 1700
Seattle, WA 98101-1233

Re: Analytical Data for Project 5364-013-09
Laboratory Reference No. 1803-206

Dear Robert:

Enclosed are the analytical results and associated quality control data for samples submitted on March 21, 2018.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

A handwritten signature in black ink, appearing to read "DB", with a long horizontal flourish extending to the right.

David Baumeister
Project Manager

Enclosures



OnSite Environmental, Inc. 14648 NE 95th Street, Redmond, WA 98052 (425) 883-3881

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: April 11, 2018
Samples Submitted: March 21, 2018
Laboratory Reference: 1803-206
Project: 5364-013-09

Case Narrative

Samples were collected on March 21, 2018 and received by the laboratory on March 21, 2018. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.



Date of Report: April 11, 2018
Samples Submitted: March 21, 2018
Laboratory Reference: 1803-206
Project: 5364-013-09

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
MW-09-032118	03-206-01	Water	3-21-18	3-21-18	
MW-10-032118	03-206-02	Water	3-21-18	3-21-18	
MW-11-032118	03-206-03	Water	3-21-18	3-21-18	
MW-12-032118	03-206-04	Water	3-21-18	3-21-18	
DUP-1-032118	03-206-05	Water	3-21-18	3-21-18	





Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664

Professional
Analytical
Services

Apr 11 2018
On-Site Environmental
14648 NE 95th ST
Redmond, WA 98052
Attention: David Baumeister

Dear David Baumeister:

Enclosed please find the analytical data for your TAXIWAY-F PORT OF SKAGIT project.

The following is a cross correlation of client and laboratory identifications for your convenience.

CLIENT ID	MATRIX	AMTEST ID	TEST
MW-09-032118	Water	18-A004959	w615
MW-10-032118	Water	18-A004960	w615
MW-11-032118	Water	18-A004961	w615
MW-12-032118	Water	18-A004962	w615
DUP-1-032118	Water	18-A004963	w615

Your samples were received on Friday, March 23, 2018. At the time of receipt, the samples were logged in and properly maintained prior to the subsequent analysis.

The analytical procedures used at AmTest are well documented and are typically derived from the protocols of the EPA, USDA, FDA or the Army Corps of Engineers.

Following the analytical data you will find the Quality Control (QC) results.

Please note that the detection limits that are listed in the body of the report refer to the Practical Quantitation Limits (PQL's), as opposed to the Method Detection Limits (MDL's).

If you should have any questions pertaining to the data package, please feel free to contact me.

Sincerely,


Aaron W. Young
Laboratory Manager

Project #: 5364-013-09
PO Number: 03-206

BACT = Bacteriological
CONV = Conventionals

MET = Metals
ORG = Organics

NUT=Nutrients
DEM=Demand

MIN=Minerals

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664
www.amtestlab.com



Professional
Analytical
Services

ANALYSIS REPORT

On-Site Environmental
14648 NE 95th ST
Redmond, WA 98052
Attention: David Baumeister
Project Name: TAXIWAY-F PORT OF SKAGIT
Project #: 5364-013-09
PO Number: 03-206
All results reported on an as received basis.

Date Received: 03/23/18
Date Reported: 4/11/18

AMTEST Identification Number 18-A004959
Client Identification MW-09-032118
Sampling Date 03/21/18

Herbicides

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
MCPA	< 5	ug/l	N	4.6	EPA 615	NNL	04/10/18
Dinoseb	< 0.05	ug/l	N	0.05	EPA 615	NNL	04/10/18
Sep Funnel Ext.	Y				EPA 3510	DP	03/26/18

Herbicide Surrogates

ANALYTE	% RECOVERY	LIMITS
24-Dichlorophenylacetic	51.6 %	30.0 - 140.

AMTEST Identification Number **18-A004960**
Client Identification **MW-10-032118**
Sampling Date **03/21/18**

Herbicides

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
MCPA	< 5	ug/l	N	4.6	EPA 615	NNL	04/10/18
Dinoseb	1.3	ug/l	N	0.05	EPA 615	NNL	04/10/18
Sep Funnel Ext.	Y				EPA 3510	DP	03/26/18

Herbicide Surrogates

ANALYTE	% RECOVERY	LIMITS
24-Dichlorophenylacetic	348. %	30.0 - 140.

AMTEST Identification Number **18-A004961**
Client Identification **MW-11-032118**
Sampling Date **03/21/18**

Herbicides

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
MCPA	< 5	ug/l	N	4.6	EPA 615	NNL	04/10/18
Dinoseb	< 0.05	ug/l	N	0.05	EPA 615	NNL	04/10/18
Sep Funnel Ext.	Y				EPA 3510	DP	03/26/18

Herbicide Surrogates

ANALYTE	% RECOVERY	LIMITS
24-Dichlorophenylacetic	514. %	30.0 - 140.

AMTEST Identification Number 18-A004962
Client Identification MW-12-032118
Sampling Date 03/21/18

Herbicides

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
MCPA	< 5	ug/l	N	4.6	EPA 615	NNL	04/10/18
Dinoseb	< 0.05	ug/l	N	0.05	EPA 615	NNL	04/10/18
Sep Funnel Ext.	Y				EPA 3510	DP	03/26/18

Herbicide Surrogates

ANALYTE	% RECOVERY	LIMITS
24-Dichlorophenylacetic	11.5 %	30.0 - 140.

AMTEST Identification Number 18-A004963
Client Identification DUP-1-032118
Sampling Date 03/21/18

Herbicides

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
MCPA	< 5	ug/l	N	4.6	EPA 615	NNL	04/10/18
Dinoseb	< 0.05	ug/l	N	0.05	EPA 615	NNL	04/10/18
Sep Funnel Ext.	Y				EPA 3510	DP	03/26/18

Herbicide Surrogates

ANALYTE	% RECOVERY	LIMITS
24-Dichlorophenylacetic	197. %	30.0 - 140.


Case Narrative:

The temperature of the samples upon arrival at the laboratory was 4.3 degrees Celcius.

These samples were concentrated 10x to reach the client requested reporting limits. The samples had a huge matrix impact on the analysis even after florisil cleaning. The surrogates had major matrix interferences as well as the matrix spikes.

No further corrective action was taken.

On-Site Environmental
Project Name: TAXIWAY-F PORT OF SKAGIT
AmTest ID: 18-A004963


Aaron W. Young
Laboratory Manager

QC Summary for sample numbers: 18-A004959 to 18-A004963

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
Blank	MCPA	ug/l	< 5	43.0	50.0	86.00 %
Blank	MCPA	ug/l	< 5	39.4	50.0	78.80 %
18-A004961	MCPA	ug/l	< 5	93.4	50.0	186.80 %
18-A004961	MCPA	ug/l	< 5	101.	50.0	202.00 %
Blank	Dinoseb	ug/l	< 0.05	0.55	1.0	55.00 %
Blank	Dinoseb	ug/l	< 0.05	0.87	1.0	87.00 %
18-A004961	Dinoseb	ug/l	< 0.05	1.6	1.0	160.00 %
18-A004961	Dinoseb	ug/l	< 0.05	2.7	1.0	270.00 %

MATRIX SPIKE DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE + SPK	MSD VALUE	RPD
Spike	MCPA	ug/l	43.0	39.4	8.7
Spike	MCPA	ug/l	93.4	101.	7.8
Spike	Dinoseb	ug/l	0.55	0.87	45.
Spike	Dinoseb	ug/l	1.6	2.7	51.

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
MCPA	ug/l	25.0	25.6	102. %
MCPA	ug/l	25.0	25.5	102. %
Dinoseb	ug/l	0.25	0.26	104. %
Dinoseb	ug/l	0.25	0.27	108. %

BLANKS

ANALYTE	UNITS	RESULT
MCPA	ug/l	< 5
24-Dichlorophenylacetic	%	75.4
Dinoseb	ug/l	< 0.05



Analytical Laboratory Testing Services
 14648 NE 95th Street • Redmond, WA 98052
 Phone: (425) 863-3881 • www.onsite-env.com

Chain of Custody

Laboratory Number: 03-206

Turnaround Request
 (in working days)

(Check One)

Same Day
 2 Days
 RUSH Day
 3 Days

Standard (7 Days)
 High Priority (5 Days)

3100
 (other)

Company: **GEOTECHNICALS INC.**
 Project Number: **5304-013-09**
 Project Name: **TAXIWAY - F PORT OF SEACIT**
 Project Manager: **ROBERT TRANTAL**
 Sampled by: **NATHAN SALMER**

Lab ID Sample Identification

Lab ID	Date Sampled	Time Sampled	Matrix	Number of Containers
1	03-21-18	11:10	WATER	2
2		11:40		2
3		12:55		4
4		13:20		2
5		12:10		2

P flag 90

HOLD TIME
3/28
11:00

NWTPH-HCID	NWTPH-GX/BTEX	NWTPH-GX	NWTPH-Dx (Acid / SG Clean-up)	Volatiles 8260C	Halogenated Volatiles 8260C	EDB EPA 8011 (Water Only)	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total PCRA Metals	Total MCA Metals	TCLP Metals	HEM (oil and grease) 1664A	MS/MSD	DINOSCH	MCPA	% Moisture	
																		X	X	X	
																		X	X	X	
																		X	X	X	
																		X	X	X	
																		X	X	X	

Comments/Special Instructions

Date

Time

Company

Signature	Date	Time	Company
	03-21-18	15:30	GEOTECHNICALS
	3/21/18	15:30	CODE
	3/21/18	13:09	PAH
	3/23/18	13:09	ACPHA
Relinquished			
Received			
Relinquished			
Received			
Relinquished			
Received			
Reviewed/Date			

Data Package: Standard Level III Level IV

Chromatograms with final report Electronic Data Deliverables (EDDs)

Sample/Cooler Receipt and Acceptance Checklist

Client: GES
 Client Project Name/Number: 5364-013-09
 OnSite Project Number: 03-206

Initiated by: AM
 Date Initiated: 3/21/18

1.0 Cooler Verification

1.1 Were there custody seals on the outside of the cooler?	Yes	<input checked="" type="radio"/> No	N/A	1	2	3	4
1.2 Were the custody seals intact?	Yes	No	<input checked="" type="radio"/> N/A	1	2	3	4
1.3 Were the custody seals signed and dated by last custodian?	Yes	No	<input checked="" type="radio"/> N/A	1	2	3	4
1.4 Were the samples delivered on ice or blue ice?	<input checked="" type="radio"/> Yes	No		1	2	3	4
1.5 Were samples received between 0-6 degrees Celsius?	Yes	<input checked="" type="radio"/> No	Temperature: <u>10, 5°C</u>				
1.6 Have shipping bills (if any) been attached to the back of this form?	Yes	<input checked="" type="radio"/> N/A					
1.7 How were the samples delivered?	<input checked="" type="radio"/> Client	<input type="radio"/> Courier	<input type="radio"/> UPS/FedEx	<input type="radio"/> OSE Pickup	<input type="radio"/> Other		

2.0 Chain of Custody Verification

2.1 Was a Chain of Custody submitted with the samples?	<input checked="" type="radio"/> Yes	No		1	2	3	4
2.2 Was the COC legible and written in permanent ink?	<input checked="" type="radio"/> Yes	No		1	2	3	4
2.3 Have samples been relinquished and accepted by each custodian?	<input checked="" type="radio"/> Yes	No		1	2	3	4
2.4 Did the sample labels (ID, date, time, preservative) agree with COC?	<input checked="" type="radio"/> Yes	No		1	2	3	4
2.5 Were all of the samples listed on the COC submitted?	<input checked="" type="radio"/> Yes	No		1	2	3	4
2.6 Were any of the samples submitted omitted from the COC?	Yes	<input checked="" type="radio"/> No		1	2	3	4

3.0 Sample Verification

3.1 Were any sample containers broken or compromised?	Yes	<input checked="" type="radio"/> No		1	2	3	4
3.2 Were any sample labels missing or illegible?	Yes	<input checked="" type="radio"/> No		1	2	3	4
3.3 Have the correct containers been used for each analysis requested?	<input checked="" type="radio"/> Yes	No		1	2	3	4
3.4 Have the samples been correctly preserved?	Yes	No	<input checked="" type="radio"/> N/A	1	2	3	4
3.5 Are volatile samples free from headspace and bubbles greater than 6mm?	Yes	No	<input checked="" type="radio"/> N/A	1	2	3	4
3.6 Is there sufficient sample submitted to perform requested analyses?	<input checked="" type="radio"/> Yes	No		1	2	3	4
3.7 Have any holding times already expired or will expire in 24 hours?	Yes	<input checked="" type="radio"/> No		1	2	3	4
3.8 Was method 5035A used?	Yes	No	<input checked="" type="radio"/> N/A	1	2	3	4
3.9 If 5035A was used, which sampling option was used (#1, 2, or 3).	#		<input checked="" type="radio"/> N/A	1	2	3	4

Explain any discrepancies:

- 1 - Discuss issue in Case Narrative
- 2 - Process Sample As-is

- 3 - Client contacted to discuss problem
- 4 - Sample cannot be analyzed or client does not wish to proceed



14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

December 31, 2018

Robert Trahan
GeoEngineers, Inc.
2101 4th Avenue, Suite 950
Seattle, WA 98121

Re: Analytical Data for Project 5364-013-09
Laboratory Reference No. 1812-191

Dear Robert:

Enclosed are the analytical results and associated quality control data for samples submitted on December 19, 2018.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

A handwritten signature in black ink, appearing to read "DB", with a long horizontal stroke extending to the right.

David Baumeister
Project Manager

Enclosures



OnSite Environmental, Inc. 14648 NE 95th Street, Redmond, WA 98052 (425) 883-3881

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: December 31, 2018
Samples Submitted: December 19, 2018
Laboratory Reference: 1812-191
Project: 5364-013-09

Case Narrative

Samples were collected on December 18, 2018 and received by the laboratory on December 19, 2018. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.



Date of Report: December 31, 2018
Samples Submitted: December 19, 2018
Laboratory Reference: 1812-191
Project: 5364-013-09

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
MW-09_121818	12-191-01	Water	12-18-18	12-19-18	
MW-10_121818	12-191-02	Water	12-18-18	12-19-18	
MW-11_121818	12-191-03	Water	12-18-18	12-19-18	
MW-12_121818	12-191-04	Water	12-18-18	12-19-18	
DUP-GW_121818	12-191-05	Water	12-18-18	12-19-18	



Date of Report: December 31, 2018
 Samples Submitted: December 19, 2018
 Laboratory Reference: 1812-191
 Project: 5364-013-09

**CHLORINATED ACID
 HERBICIDES EPA 8151A**

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	MW-09_121818					
Laboratory ID:	12-191-01					
MCPA	ND	6.7	EPA 8151A	12-20-18	12-27-18	
Dinoseb	ND	0.045	EPA 8151A	12-20-18	12-27-18	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	57	17-94				
Client ID:	MW-10_121818					
Laboratory ID:	12-191-02					
MCPA	ND	6.6	EPA 8151A	12-20-18	12-27-18	
Dinoseb	2.8	0.044	EPA 8151A	12-20-18	12-27-18	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	65	17-94				
Client ID:	MW-11_121818					
Laboratory ID:	12-191-03					
MCPA	ND	6.6	EPA 8151A	12-20-18	12-27-18	
Dinoseb	0.53	0.045	EPA 8151A	12-20-18	12-27-18	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	67	17-94				
Client ID:	MW-12_121818					
Laboratory ID:	12-191-04					
MCPA	ND	6.6	EPA 8151A	12-20-18	12-27-18	
Dinoseb	ND	0.045	EPA 8151A	12-20-18	12-27-18	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	70	17-94				
Client ID:	DUP-GW_121818					
Laboratory ID:	12-191-05					
MCPA	ND	6.6	EPA 8151A	12-20-18	12-27-18	
Dinoseb	ND	0.045	EPA 8151A	12-20-18	12-27-18	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	69	17-94				



Date of Report: December 31, 2018
 Samples Submitted: December 19, 2018
 Laboratory Reference: 1812-191
 Project: 5364-013-09

**CHLORINATED ACID
 HERBICIDES EPA 8151A
 QUALITY CONTROL**

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1220W1					
MCPA	ND	7.0	EPA 8151A	12-20-18	12-27-18	
Dinoseb	ND	0.047	EPA 8151A	12-20-18	12-27-18	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
DCAA	43	17-94				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	12-191-04										
	MS	MSD	MS	MSD		MS	MSD				
MCPA	139	146	239	236	ND	58	62	40-140	5	25	
Dinoseb	1.78	1.93	2.39	2.36	ND	75	82	40-140	8	25	
<i>Surrogate:</i>											
DCAA						69	77	17-94			





Data Qualifiers and Abbreviations

- A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.
 - B - The analyte indicated was also found in the blank sample.
 - C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.
 - E - The value reported exceeds the quantitation range and is an estimate.
 - F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.
 - H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.
 - I - Compound recovery is outside of the control limits.
 - J - The value reported was below the practical quantitation limit. The value is an estimate.
 - K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.
 - L - The RPD is outside of the control limits.
 - M - Hydrocarbons in the gasoline range are impacting the diesel range result.
 - M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.
 - N - Hydrocarbons in the lube oil range are impacting the diesel range result.
 - N1 - Hydrocarbons in diesel range are impacting lube oil range results.
 - O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.
 - P - The RPD of the detected concentrations between the two columns is greater than 40.
 - Q - Surrogate recovery is outside of the control limits.
 - S - Surrogate recovery data is not available due to the necessary dilution of the sample.
 - T - The sample chromatogram is not similar to a typical _____.
 - U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
 - U1 - The practical quantitation limit is elevated due to interferences present in the sample.
 - V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.
 - W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.
 - X - Sample extract treated with a mercury cleanup procedure.
 - X1 - Sample extract treated with a sulfuric acid/silica gel cleanup procedure.
 - Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.
 - Z -
- ND - Not Detected at PQL
 PQL - Practical Quantitation Limit
 RPD - Relative Percent Difference





Onsite Environmental Inc.

Analytical Laboratory / Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Terraround Request
(In working days)

(Check One)

Same Day 1 Day

2 Days 3 Days

Standard (7 Days)

(other)

Laboratory Number: **12-191**

Company: Geo Engineers

Project Number: 5364-013-09

Project Name: Taxiway F

Project Manager: Robert Trahan

Sampled by: Robert Trahan

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers
1	MW-09-121818	12/18	1440	W	2
2	MW-10-121818	1	1400	W	2
3	MW-11-121818	1	13:30	W	2
4	MW-12-121818	1	12:15	W	4
5	DUP-MW-121818	1	-	W	2

Parameter	1	2	3	4	5
NWTPH-HCID					
NWTPH-Gx/BTEX					
NWTPH-Gx					
NWTPH-Dx (<input type="checkbox"/> Acid / SG Clean-up)					
Volatiles 8260C					
Halogenated Volatiles 8260C					
EDB EPA 8011 (Waters Only)					
Semivolatiles 8270D/SIM (with low-level PAHs)					
PAHs 8270D/SIM (low-level)					
PCBs 8082A					
Organochlorine Pesticides 8081B					
Organophosphorus Pesticides 8270D/SIM					
Chlorinated Acid Herbicides 8151A					
Total RCRA Metals					
Total MTCA Metals					
TCLP Metals					
HEM (oil and grease) 1664A					
MS/MSD					
% Moisture					

Signature	Company	Date	Time	Comments/Special Instructions
	U/EI	12/19/18	9:10	
	O/E	12/19/18	9:15	
Received				
Relinquished				
Received				
Relinquished				
Received				
Relinquished				
Reviewed/Date	Reviewed/Date			

Data Package: Standard Level III Level IV

Chromatograms with final report Electronic Data Deliverables (EDDs)

APPENDIX D
Data Validation Reports

Project: Taxiway F Site, Skagit County Regional Airport
Continued Groundwater Monitoring (Round 9)

GEI File No: 05364-013-09

Date: February 2, 2016

This report documents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2A data validation (USEPA Document 540-R-08-005; USEPA, 2009) of analytical data from the analyses of groundwater samples collected as part of the December 2015 (Round 9) sampling event, and the associated laboratory and field quality control (QC) samples. The samples were obtained from the Skagit County Regional Airport, Taxiway F Site located in Burlington, Washington.

OBJECTIVE AND QUALITY CONTROL ELEMENTS

GeoEngineers, Inc. (GeoEngineers) completed the data validation consistent with USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (USEPA, 2008) (National Functional Guidelines) to determine if the laboratory analytical results meet the project objectives and are usable for their intended purpose. Data usability was assessed by determining if:

- The samples were analyzed using well-defined and acceptable methods that provide reporting limits below applicable regulatory criteria;
- The precision and accuracy of the data are well-defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

The data validation included review of the following QC elements:

- Data Package Completeness
- Chain-of-Custody Documentation
- Holding Times and Sample Preservation
- Surrogate Recoveries
- Method Blanks
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Control Samples/Laboratory Control Sample Duplicates
- Field Duplicates
- Column Confirmation RPD Values

VALIDATED SAMPLE DELIVERY GROUPS

This data validation included review of the sample delivery group (SDG) listed below in Table 1.

TABLE 1: SUMMARY OF VALIDATED SAMPLE DELIVERY GROUPS

Laboratory SDG	Samples Validated
1512-168	MW-09_121515, MW-10_121515, MW-11_121515, MW-12_121515, DUP_121515

CHEMICAL ANALYSIS PERFORMED

OnSite Environmental, Inc. (OnSite), located in Redmond, Washington, performed laboratory analysis on the groundwater samples using the following method:

- Chlorinated Acid Herbicides by USEPA Method 8151A

DATA VALIDATION SUMMARY

The results for each of the QC elements are summarized below.

Data Package Completeness

OnSite provided the required deliverables for the data validation according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and the identified anomalies were discussed in the relevant laboratory case narrative.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. The COCs were accurate and complete when submitted to the lab.

Holding Times and Sample Preservation

The sample holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for each analysis. The sample cooler arrived at the laboratory within the appropriate temperatures of between two and six degrees Celsius.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the organic analytes of interest, but unlikely to be found in an environmental sample. Surrogates are used for organic analyses and are added to the samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added to the samples at a known concentration and percent recoveries are calculated following analysis. The surrogate percent recoveries for field samples were within the laboratory control limits.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. A method blank was analyzed with each batch of samples, at a frequency of 1 per 20 samples. For each sample batch, method blanks were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in the method blanks.

Matrix Spikes/Matrix Spike Duplicates

Since the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis on one sample from the associated batch, known as the parent sample. One aliquot of the sample is analyzed in the normal manner and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery is calculated. Matrix spike duplicate (MSD) analyses are generally performed for organic analyses as a precision check and analyzed in the same sequence as a matrix spike. Using the result values from the MS and MSD, the relative percent difference (RPD) is calculated. The percent recovery control limits for MS and MSD analyses are specified in the laboratory documents, as are the RPD control limits for MS/MSD sample sets.

One MS/MSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for each analysis and the percent recovery and RPD values were within the proper control limits.

Laboratory Control Samples/Laboratory Control Sample Duplicates

A laboratory control sample (LCS) is a blank sample that is spiked with a known amount of analyte and then analyzed. An LCS is similar to an MS, but without the possibility of matrix interference. Given that matrix interference is not an issue, the LCS/LCSD control limits for accuracy and precision are usually more rigorous than for MS/MSD analyses. Additionally, data qualification based on LCS/LCSD analyses would apply to each sample in the associated batch, instead of just the parent sample. The percent recovery control limits for LCS and LCSD analyses are specified in the laboratory documents, as are the RPD control limits for LCS/LCSD sample sets.

An MS/MSD sample set was performed in lieu of an LCS/LCSD sample set.

Field Duplicates

In order to assess precision, field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. Precision is determined by calculating the RPD between each pair of samples. If one or more of the sample analytes has a concentration greater than five times the reporting limit for that sample, then the absolute difference is used instead of the RPD. The RPD control limit for water samples is 35 percent.

SDG 1512-168: One field duplicate sample pair, MW-12_121515 and DUP_121515, was submitted with this SDG. The precision criteria for the target analytes were met for this sample pair.

Column Confirmation RPD Values

The laboratory analyzed the samples submitted for analysis by SW8151A. These methods require the sample results to be reported from a dual-column electron capture detector (ECD) system. Since this system requires the use of two columns, it produces two results simultaneously. The laboratory is required to report the precision of these results in the form of a relative percent difference (RPD) value, one column being considered primary and the other column being considered as a secondary check.

If the RPD value is greater than 40%, the analytical result is qualified as estimated (J). If the RPD value is greater than 100%, the analytical result is qualified as tentatively identified (NJ).

Sample ID	Analyte	Qualifier
MW-11_121515	MCPA	J

OVERALL ASSESSMENT

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate and MS/MSD percent recovery values. Precision was acceptable, as demonstrated by the MS/MSD, field duplicate, and column confirmation RPD values, with exception noted above.

The data are acceptable for the intended use, with the following qualification listed below in Table 2.

TABLE 2: SUMMARY OF QUALIFIED SAMPLES

Sample ID	Analyte	Qualifier	Reason
MW-11_121515	MCPA	J	Column Confirmation RPD

REFERENCES

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," EPA-540-R-08-01. June 2008.

Project: Taxiway F Site, Skagit County Regional Airport
Continued Groundwater Monitoring (Round 11)

GEI File No: 05364-013-09

Date: April 11, 2018

This report documents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2A data validation (USEPA Document 540-R-08-005; USEPA, 2009) of analytical data from the analyses of groundwater samples collected as part of the December 2016 (Round 11) sampling event, and the associated laboratory and field quality control (QC) samples. The samples were obtained from the Skagit County Regional Airport, Taxiway F Site located in Burlington, Washington.

OBJECTIVE AND QUALITY CONTROL ELEMENTS

GeoEngineers, Inc. (GeoEngineers) completed the data validation consistent with USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (USEPA, 2008) (National Functional Guidelines) to determine if the laboratory analytical results meet the project objectives and are usable for their intended purpose. Data usability was assessed by determining if:

- The samples were analyzed using well-defined and acceptable methods that provide reporting limits below applicable regulatory criteria;
- The precision and accuracy of the data are well-defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

The data validation included review of the following QC elements:

- Data Package Completeness
- Chain-of-Custody Documentation
- Holding Times and Sample Preservation
- Surrogate Recoveries
- Method Blanks
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Control Samples/Laboratory Control Sample Duplicates
- Field Duplicates
- Column Confirmation RPD Values

VALIDATED SAMPLE DELIVERY GROUPS

This data validation included review of the sample delivery group (SDG) listed below in Table 1.

TABLE 1: SUMMARY OF VALIDATED SAMPLE DELIVERY GROUPS

Laboratory SDG	Samples Validated
1612-108	GEI-MW-9, GEI-MW-10, GEI-MW-11, GEI-MW-12, and GEI-DUP-1

CHEMICAL ANALYSIS PERFORMED

OnSite Environmental, Inc. (OnSite), located in Redmond, Washington, performed laboratory analysis on the groundwater samples using the following method:

- Chlorinated Acid Herbicides by USEPA Method 8151A

DATA VALIDATION SUMMARY

The results for each of the QC elements are summarized below.

Data Package Completeness

OnSite provided the required deliverables for the data validation according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and the identified anomalies were discussed in the relevant laboratory case narrative.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. The COCs were accurate and complete when submitted to the lab.

Holding Times and Sample Preservation

The sample holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for each analysis. The sample cooler arrived at the laboratory within the appropriate temperatures of between two and six degrees Celsius.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the organic analytes of interest, but unlikely to be found in an environmental sample. Surrogates are used for organic analyses and are added to the samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added to the samples at a known concentration and percent recoveries are calculated following analysis. The surrogate percent recoveries for field samples were within the laboratory control limits.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. A method blank was analyzed with each batch of samples, at a frequency of 1 per 20 samples. For each sample batch, method blanks were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in the method blanks.

Matrix Spikes/Matrix Spike Duplicates

Since the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis on one sample from the associated batch, known as the parent sample. One aliquot of the sample is analyzed in the normal manner and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery is calculated. Matrix spike duplicate (MSD) analyses are generally performed for organic analyses as a precision check and analyzed in the same sequence as a matrix spike. Using the result values from the MS and MSD, the relative percent difference (RPD) is calculated. The percent recovery control limits for MS and MSD analyses are specified in the laboratory documents, as are the RPD control limits for MS/MSD sample sets.

One MS/MSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for each analysis and the percent recovery and RPD values were within the proper control limits.

Laboratory Control Samples/Laboratory Control Sample Duplicates

A laboratory control sample (LCS) is a blank sample that is spiked with a known amount of analyte and then analyzed. An LCS is similar to an MS, but without the possibility of matrix interference. Given that matrix interference is not an issue, the LCS/LCSD control limits for accuracy and precision are usually more rigorous than for MS/MSD analyses. Additionally, data qualification based on LCS/LCSD analyses would apply to each sample in the associated batch, instead of just the parent sample. The percent recovery control limits for LCS and LCSD analyses are specified in the laboratory documents, as are the RPD control limits for LCS/LCSD sample sets.

An MS/MSD sample set was performed in lieu of an LCS/LCSD sample set.

Field Duplicates

In order to assess precision, field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. Precision is determined by calculating the RPD between each pair of samples. If one or more of the sample analytes has a concentration less than five times the reporting limit for that sample, then the absolute difference is used instead of the RPD. The RPD control limit for water samples is 35 percent while the absolute difference control limit is defined as the lowest of the two sample reporting limits.

SDG 1612-108: One field duplicate sample pair, GEI-MW-12 and GEI-DUP-1, was submitted with this SDG. The precision criteria for the target analytes were met for this sample pair.

Column Confirmation RPD Values

The laboratory analyzed the samples submitted for analysis by SW8151A. These methods require the sample results to be reported from a dual-column electron capture detector (ECD) system. Since this system requires the use of two columns, it produces two results simultaneously. The laboratory is required to report the precision of these results in the form of a relative percent difference (RPD) value, one column being considered primary and the other column being considered as a secondary check.

The RPD values between columns were all less than 40%, which is the criteria for internal column confirmations to be met for all samples.

OVERALL ASSESSMENT

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate and LCS %R values. Precision was acceptable, as demonstrated by the field duplicate RPD values.

The data are acceptable for the intended use, no data were qualified for any reason.

REFERENCES

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," EPA-540-R-08-01. June 2008.

Project: Taxiway F Site, Skagit County Regional Airport
Continued Groundwater Monitoring (Round 13)

GEI File No: 05364-013-09

Date: April 11, 2018

This report documents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2A data validation (USEPA Document 540-R-08-005; USEPA, 2009) of analytical data from the analyses of groundwater samples collected as part of the December 2017 (Round 13) sampling event, and the associated laboratory and field quality control (QC) samples. The samples were obtained from the Skagit County Regional Airport, Taxiway F Site located in Burlington, Washington.

OBJECTIVE AND QUALITY CONTROL ELEMENTS

GeoEngineers, Inc. (GeoEngineers) completed the data validation consistent with USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (USEPA, 2008) (National Functional Guidelines) to determine if the laboratory analytical results meet the project objectives and are usable for their intended purpose. Data usability was assessed by determining if:

- The samples were analyzed using well-defined and acceptable methods that provide reporting limits below applicable regulatory criteria;
- The precision and accuracy of the data are well-defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

The data validation included review of the following QC elements:

- Data Package Completeness
- Chain-of-Custody Documentation
- Holding Times and Sample Preservation
- Surrogate Recoveries
- Method Blanks
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Control Samples/Laboratory Control Sample Duplicates
- Field Duplicates
- Column Confirmation RPD Values

VALIDATED SAMPLE DELIVERY GROUPS

This data validation included review of the sample delivery group (SDG) listed below in Table 1.

TABLE 1: SUMMARY OF VALIDATED SAMPLE DELIVERY GROUPS

Laboratory SDG	Samples Validated
1712-192	MW-09-121817, MW-10-121817, MW-11-121817, MW-12-121817, and DUP-121817

CHEMICAL ANALYSIS PERFORMED

OnSite Environmental, Inc. (OnSite), located in Redmond, Washington, performed laboratory analysis on the groundwater samples using the following method:

- Chlorinated Acid Herbicides by USEPA Method 8151A

DATA VALIDATION SUMMARY

The results for each of the QC elements are summarized below.

Data Package Completeness

OnSite provided the required deliverables for the data validation according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and the identified anomalies were discussed in the relevant laboratory case narrative.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. The COCs were accurate and complete when submitted to the lab.

Holding Times and Sample Preservation

The sample holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for each analysis. The sample cooler arrived at the laboratory within the appropriate temperatures of between two and six degrees Celsius.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the organic analytes of interest, but unlikely to be found in an environmental sample. Surrogates are used for organic analyses and are added to the samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added to the samples at a known concentration and percent recoveries are calculated following analysis. The surrogate percent recoveries for field samples were within the laboratory control limits.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. A method blank was analyzed with each batch of samples, at a frequency of 1 per 20 samples. For each sample batch, method blanks were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in the method blanks.

Matrix Spikes/Matrix Spike Duplicates

Since the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis on one sample from the associated batch, known as the parent sample. One aliquot of the sample is analyzed in the normal manner and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery is calculated. Matrix spike duplicate (MSD) analyses are generally performed for organic analyses as a precision check and analyzed in the same sequence as a matrix spike. Using the result values from the MS and MSD, the relative percent difference (RPD) is calculated. The percent recovery control limits for MS and MSD analyses are specified in the laboratory documents, as are the RPD control limits for MS/MSD sample sets.

One MS/MSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for each analysis and the percent recovery and RPD values were within the proper control limits.

Laboratory Control Samples/Laboratory Control Sample Duplicates

A laboratory control sample (LCS) is a blank sample that is spiked with a known amount of analyte and then analyzed. An LCS is similar to an MS, but without the possibility of matrix interference. Given that matrix interference is not an issue, the LCS/LCSD control limits for accuracy and precision are usually more rigorous than for MS/MSD analyses. Additionally, data qualification based on LCS/LCSD analyses would apply to each sample in the associated batch, instead of just the parent sample. The percent recovery control limits for LCS and LCSD analyses are specified in the laboratory documents, as are the RPD control limits for LCS/LCSD sample sets.

An MS/MSD sample set was performed in lieu of an LCS/LCSD sample set.

Field Duplicates

In order to assess precision, field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. Precision is determined by calculating the RPD between each pair of samples. If one or more of the sample analytes has a concentration less than five times the reporting limit for that sample, then the absolute difference is used instead of the RPD. The RPD control limit for water samples is 35 percent while the absolute difference control limit is defined as the lowest of the two sample reporting limits.

SDG 1712-192: One field duplicate sample pair, MW-12-121817 and DUP-121817, was submitted with this SDG. The absolute difference value for dinoseb exceeded the control limit described above. The positive results for both samples were qualified as estimated (J).

Column Confirmation RPD Values

The laboratory analyzed the samples submitted for analysis by SW8151A. These methods require the sample results to be reported from a dual-column electron capture detector (ECD) system. Since this system requires the use of two columns, it produces two results simultaneously. The laboratory is required to report the precision of these results in the form of a relative percent difference (RPD) value, one column being considered primary and the other column being considered as a secondary check.

The RPD values between columns were all less than 40%, which is the criteria for internal column confirmations to be met for all samples.

OVERALL ASSESSMENT

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate and LCS %R values. Precision was acceptable, as demonstrated by the field duplicate and matrix spike RPD values.

Data points were qualified because of field duplicate precision outliers.

The data set for this monitoring event has been properly validated using a Stage 2A assessment provided in the Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use. It is our professional judgment that the data is acceptable for the intended purposes described in the QAPP/Sampling analysis plan.

REFERENCES

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," EPA-540-R-08-01. June 2008.

Project: Taxiway F Site, Skagit County Regional Airport
Continued Groundwater Monitoring (Round 14)

GEI File No: 05364-013-09

Date: January 25, 2018

This report documents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2A data validation (USEPA Document 540-R-08-005; USEPA, 2009) of analytical data from the analyses of groundwater samples collected as part of the December 2018 (Round 15) sampling event, and the associated laboratory and field quality control (QC) samples. The samples were obtained from the Skagit County Regional Airport, Taxiway F Site located in Burlington, Washington.

OBJECTIVE AND QUALITY CONTROL ELEMENTS

GeoEngineers, Inc. (GeoEngineers) completed the data validation consistent with USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (USEPA, 2008) (National Functional Guidelines) to determine if the laboratory analytical results meet the project objectives and are usable for their intended purpose. Data usability was assessed by determining if:

- The samples were analyzed using well-defined and acceptable methods that provide reporting limits below applicable regulatory criteria;
- The precision and accuracy of the data are well-defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

The data validation included review of the following QC elements:

- Data Package Completeness
- Chain-of-Custody Documentation
- Holding Times and Sample Preservation
- Surrogate Recoveries
- Method Blanks
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Control Samples/Laboratory Control Sample Duplicates
- Field Duplicates
- Column Confirmation RPD Values

VALIDATED SAMPLE DELIVERY GROUPS

This data validation included review of the sample delivery group (SDG) listed below in Table 1.

TABLE 1: SUMMARY OF VALIDATED SAMPLE DELIVERY GROUPS

Laboratory SDG	Samples Validated
1812-191	MW-09-121818, MW-10-121818, MW-11-121818, MW-12-121818, and DUP-1-121818

CHEMICAL ANALYSIS PERFORMED

OnSite Environmental, Inc. (OnSite), located in Redmond, Washington, was contracted to conduct laboratory analysis on the groundwater samples using the following method:

- Chlorinated Acid Herbicides by USEPA Method SW8151A

However, OnSite subcontracted the laboratory work to AM Test Inc. (AMTEST), located in Kirkland, Washington to conduct analysis of the groundwater samples using the following method:

- Chlorinated Acid Herbicides by USEPA Method for waste water W615

DATA VALIDATION SUMMARY

The results for each of the QC elements are summarized below.

Data Package Completeness

OnSite provided the required deliverables for the data validation according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and the identified anomalies were discussed in the relevant laboratory case narrative.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. The COCs were accurate and complete when submitted to the lab.

Holding Times and Sample Preservation

The sample holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for each analysis. The sample cooler arrived at the laboratory within the appropriate temperatures of between two and six degrees Celsius.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the organic analytes of interest, but unlikely to be found in an environmental sample. Surrogates are used for organic analyses and are added to the samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added to the samples at a known concentration and percent recoveries are calculated following analysis. The surrogate percent recoveries (%R) values for field samples were within the laboratory control limits.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. A method blank was analyzed with each batch of

samples, at a frequency of 1 per 20 samples. For each sample batch, method blanks were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in the method blanks.

Matrix Spikes/Matrix Spike Duplicates

Since the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis on one sample from the associated batch, known as the parent sample. One aliquot of the sample is analyzed in the normal manner and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery is calculated. Matrix spike duplicate (MSD) analyses are generally performed for organic analyses as a precision check and analyzed in the same sequence as a matrix spike. Using the result values from the MS and MSD, the relative percent difference (RPD) is calculated. The percent recovery control limits for MS and MSD analyses are specified in the laboratory documents, as are the RPD control limits for MS/MSD sample sets.

One MS/MSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for each analysis and the %R and RPD values were within the proper control limits.

Laboratory Control Samples/Laboratory Control Sample Duplicates

A laboratory control sample (LCS) is a blank sample that is spiked with a known amount of analyte and then analyzed. An LCS is similar to an MS, but without the possibility of matrix interference. Given that matrix interference is not an issue, the LCS/LCSD control limits for accuracy and precision are usually more rigorous than for MS/MSD analyses. Additionally, data qualification based on LCS/LCSD analyses would apply to each sample in the associated batch, instead of just the parent sample. The percent recovery control limits for LCS and LCSD analyses are specified in the laboratory documents, as are the RPD control limits for LCS/LCSD sample sets.

An MS/MSD sample set was performed in lieu of an LCS/LCSD sample set.

Field Duplicates

In order to assess precision, field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. Precision is determined by calculating the RPD between each pair of samples. If one or more of the sample analytes has a concentration less than five times the reporting limit for that sample, then the absolute difference is used instead of the RPD. The RPD control limit for water samples is 35 percent while the absolute difference control limit is defined as the lowest of the two sample reporting limits.

SDG 1803-206: One field duplicate sample pair, MW-12-121818 and DUP-1-121818, was submitted with this SDG. The precision criteria for the target analytes were met for this sample pair.

Column Confirmation RPD Values

The laboratory analyzed the samples submitted for analysis by SW8151A. These methods require the sample results to be reported from a dual-column electron capture detector (ECD) system. Since this system requires the use of two columns, it produces two results simultaneously. The laboratory is required to report the precision of these results in the form of a relative percent difference (RPD) value, one column being considered primary and the other column being considered as a secondary check.

The RPD values between columns were all less than 40%, which is the criteria for internal column confirmations to be met for all samples.

OVERALL ASSESSMENT

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate and LCS %R values. Precision was acceptable, as demonstrated by the field duplicate and matrix spike RPD values.

Data points were qualified because of surrogate %R outliers.

The data set for this monitoring event has been properly validated using a Stage 2A assessment provided in the Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use. It is our professional judgment that the data is acceptable for the intended purposes described in the QAPP/Sampling analysis plan.

REFERENCES

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," EPA-540-R-08-01. June 2008.

Project: Taxiway F Site, Skagit County Regional Airport
Continued Groundwater Monitoring (Round 10)

GEI File No: 05364-013-09

Date: April 13, 2016

This report documents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2A data validation (USEPA Document 540-R-08-005; USEPA, 2009) of analytical data from the analyses of groundwater samples collected as part of the March 2016 (Round 10) sampling event, and the associated laboratory and field quality control (QC) samples. The samples were obtained from the Skagit County Regional Airport, Taxiway F Site located in Burlington, Washington.

OBJECTIVE AND QUALITY CONTROL ELEMENTS

GeoEngineers, Inc. (GeoEngineers) completed the data validation consistent with USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (USEPA, 2008) (National Functional Guidelines) to determine if the laboratory analytical results meet the project objectives and are usable for their intended purpose. Data usability was assessed by determining if:

- The samples were analyzed using well-defined and acceptable methods that provide reporting limits below applicable regulatory criteria;
- The precision and accuracy of the data are well-defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

The data validation included review of the following QC elements:

- Data Package Completeness
- Chain-of-Custody Documentation
- Holding Times and Sample Preservation
- Surrogate Recoveries
- Method Blanks
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Control Samples/Laboratory Control Sample Duplicates
- Field Duplicates
- Column Confirmation RPD Values

VALIDATED SAMPLE DELIVERY GROUPS

This data validation included review of the sample delivery group (SDG) listed below in Table 1.

TABLE 1: SUMMARY OF VALIDATED SAMPLE DELIVERY GROUPS

Laboratory SDG	Samples Validated
1603-224	MW-9_032316, MW-10_032316, MW-11_032316, MW-12_032316, and DUP_032316

CHEMICAL ANALYSIS PERFORMED

OnSite Environmental, Inc. (OnSite), located in Redmond, Washington, performed laboratory analysis on the groundwater samples using the following method:

- Chlorinated Acid Herbicides by USEPA Method 8151A

DATA VALIDATION SUMMARY

The results for each of the QC elements are summarized below.

Data Package Completeness

OnSite provided the required deliverables for the data validation according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and the identified anomalies were discussed in the relevant laboratory case narrative.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. The COCs were accurate and complete when submitted to the lab.

Holding Times and Sample Preservation

The sample holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for each analysis. The sample cooler arrived at the laboratory within the appropriate temperatures of between two and six degrees Celsius.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the organic analytes of interest, but unlikely to be found in an environmental sample. Surrogates are used for organic analyses and are added to the samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added to the samples at a known concentration and percent recoveries are calculated following analysis. The surrogate percent recoveries for field samples were within the laboratory control limits.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. A method blank was analyzed with each batch of samples, at a frequency of 1 per 20 samples. For each sample batch, method blanks were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in the method blanks.

Matrix Spikes/Matrix Spike Duplicates

Since the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis on one sample from the associated batch, known as the parent sample. One aliquot of the sample is analyzed in the normal manner and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery is calculated. Matrix spike duplicate (MSD) analyses are generally performed for organic analyses as a precision check and analyzed in the same sequence as a matrix spike. Using the result values from the MS and MSD, the relative percent difference (RPD) is calculated. The percent recovery control limits for MS and MSD analyses are specified in the laboratory documents, as are the RPD control limits for MS/MSD sample sets.

One MS/MSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for each analysis and the percent recovery and RPD values were within the proper control limits.

Laboratory Control Samples/Laboratory Control Sample Duplicates

A laboratory control sample (LCS) is a blank sample that is spiked with a known amount of analyte and then analyzed. An LCS is similar to an MS, but without the possibility of matrix interference. Given that matrix interference is not an issue, the LCS/LCSD control limits for accuracy and precision are usually more rigorous than for MS/MSD analyses. Additionally, data qualification based on LCS/LCSD analyses would apply to each sample in the associated batch, instead of just the parent sample. The percent recovery control limits for LCS and LCSD analyses are specified in the laboratory documents, as are the RPD control limits for LCS/LCSD sample sets.

An MS/MSD sample set was performed in lieu of an LCS/LCSD sample set.

Field Duplicates

In order to assess precision, field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. Precision is determined by calculating the RPD between each pair of samples. If one or more of the sample analytes has a concentration less than five times the reporting limit for that sample, then the absolute difference is used instead of the RPD. The RPD control limit for water samples is 35 percent while the absolute difference control limit is defined as the lowest of the two sample reporting limits.

SDG 1603-224: One field duplicate sample pair, MW-12_032316 and DUP_032316, was submitted with this SDG. The precision criteria for the target analytes were met for this sample pair.

Column Confirmation RPD Values

The laboratory analyzed the samples submitted for analysis by SW8151A. These methods require the sample results to be reported from a dual-column electron capture detector (ECD) system. Since this system requires the use of two columns, it produces two results simultaneously. The laboratory is required to report the precision of these results in the form of a relative percent difference (RPD) value, one column being considered primary and the other column being considered as a secondary check.

The RPD values between columns were all less than 40%, which is the criteria for internal column confirmations to be met for all samples.

OVERALL ASSESSMENT

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate and LCS %R values. Precision was acceptable, as demonstrated by the field duplicate RPD values.

The data are acceptable for the intended use, no data were qualified for any reason.

REFERENCES

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," EPA-540-R-08-01. June 2008.

Project: Taxiway F Site, Skagit County Regional Airport
Continued Groundwater Monitoring (Round 12)

GEI File No: 05364-013-09

Date: April 11, 2018

This report documents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2A data validation (USEPA Document 540-R-08-005; USEPA, 2009) of analytical data from the analyses of groundwater samples collected as part of the March 2017 (Round 12) sampling event, and the associated laboratory and field quality control (QC) samples. The samples were obtained from the Skagit County Regional Airport, Taxiway F Site located in Burlington, Washington.

OBJECTIVE AND QUALITY CONTROL ELEMENTS

GeoEngineers, Inc. (GeoEngineers) completed the data validation consistent with USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (USEPA, 2008) (National Functional Guidelines) to determine if the laboratory analytical results meet the project objectives and are usable for their intended purpose. Data usability was assessed by determining if:

- The samples were analyzed using well-defined and acceptable methods that provide reporting limits below applicable regulatory criteria;
- The precision and accuracy of the data are well-defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

The data validation included review of the following QC elements:

- Data Package Completeness
- Chain-of-Custody Documentation
- Holding Times and Sample Preservation
- Surrogate Recoveries
- Method Blanks
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Control Samples/Laboratory Control Sample Duplicates
- Field Duplicates
- Column Confirmation RPD Values

VALIDATED SAMPLE DELIVERY GROUPS

This data validation included review of the sample delivery group (SDG) listed below in Table 1.

TABLE 1: SUMMARY OF VALIDATED SAMPLE DELIVERY GROUPS

Laboratory SDG	Samples Validated
1703-262	MW-09_032717, MW-10_032717, MW-11_032717, MW-12_032717, and DUP_032717

CHEMICAL ANALYSIS PERFORMED

OnSite Environmental, Inc. (OnSite), located in Redmond, Washington, performed laboratory analysis on the groundwater samples using the following method:

- Chlorinated Acid Herbicides by USEPA Method 8151A

DATA VALIDATION SUMMARY

The results for each of the QC elements are summarized below.

Data Package Completeness

OnSite provided the required deliverables for the data validation according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and the identified anomalies were discussed in the relevant laboratory case narrative.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. The COCs were accurate and complete when submitted to the lab.

Holding Times and Sample Preservation

The sample holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for each analysis. The sample cooler arrived at the laboratory within the appropriate temperatures of between two and six degrees Celsius.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the organic analytes of interest, but unlikely to be found in an environmental sample. Surrogates are used for organic analyses and are added to the samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added to the samples at a known concentration and percent recoveries are calculated following analysis. The surrogate percent recoveries for field samples were within the laboratory control limits.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. A method blank was analyzed with each batch of samples, at a frequency of 1 per 20 samples. For each sample batch, method blanks were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in the method blanks.

Matrix Spikes/Matrix Spike Duplicates

Since the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis on one sample from the associated batch, known as the parent sample. One aliquot of the sample is analyzed in the normal manner and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery is calculated. Matrix spike duplicate (MSD) analyses are generally performed for organic analyses as a precision check and analyzed in the same sequence as a matrix spike. Using the result values from the MS and MSD, the relative percent difference (RPD) is calculated. The percent recovery control limits for MS and MSD analyses are specified in the laboratory documents, as are the RPD control limits for MS/MSD sample sets.

One MS/MSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for each analysis and the percent recovery and RPD values were within the proper control limits.

Laboratory Control Samples/Laboratory Control Sample Duplicates

A laboratory control sample (LCS) is a blank sample that is spiked with a known amount of analyte and then analyzed. An LCS is similar to an MS, but without the possibility of matrix interference. Given that matrix interference is not an issue, the LCS/LCSD control limits for accuracy and precision are usually more rigorous than for MS/MSD analyses. Additionally, data qualification based on LCS/LCSD analyses would apply to each sample in the associated batch, instead of just the parent sample. The percent recovery control limits for LCS and LCSD analyses are specified in the laboratory documents, as are the RPD control limits for LCS/LCSD sample sets.

An MS/MSD sample set was performed in lieu of an LCS/LCSD sample set.

Field Duplicates

In order to assess precision, field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. Precision is determined by calculating the RPD between each pair of samples. If one or more of the sample analytes has a concentration greater than five times the reporting limit for that sample, then the absolute difference is used instead of the RPD. The RPD control limit for water samples is 35 percent.

SDG 1703-262: One field duplicate sample pair, MW-12_032717 and DUP_032717, was submitted with this SDG. The precision criteria for the target analytes were met for this sample pair.

Column Confirmation RPD Values

The laboratory analyzed the samples submitted for analysis by SW8151A. These methods require the sample results to be reported from a dual-column electron capture detector (ECD) system. Since this system requires the use of two columns, it produces two results simultaneously. The laboratory is required to report the precision of these results in the form of a relative percent difference (RPD) value, one column being considered primary and the other column being considered as a secondary check.

The RPD values between columns were all less than 40%, which is the criteria for internal column confirmations to be met for all samples.

OVERALL ASSESSMENT

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate and LCS %R values. Precision was acceptable, as demonstrated by the field duplicate RPD values.

The data are acceptable for the intended use, no data were qualified for any reason.

REFERENCES

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," EPA-540-R-08-01. June 2008.

Project: Taxiway F Site, Skagit County Regional Airport
Continued Groundwater Monitoring (Round 14)

GEI File No: 05364-013-09

Date: April 16, 2018

This report documents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2A data validation (USEPA Document 540-R-08-005; USEPA, 2009) of analytical data from the analyses of groundwater samples collected as part of the March 2018 (Round 14) sampling event, and the associated laboratory and field quality control (QC) samples. The samples were obtained from the Skagit County Regional Airport, Taxiway F Site located in Burlington, Washington.

OBJECTIVE AND QUALITY CONTROL ELEMENTS

GeoEngineers, Inc. (GeoEngineers) completed the data validation consistent with USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (USEPA, 2008) (National Functional Guidelines) to determine if the laboratory analytical results meet the project objectives and are usable for their intended purpose. Data usability was assessed by determining if:

- The samples were analyzed using well-defined and acceptable methods that provide reporting limits below applicable regulatory criteria;
- The precision and accuracy of the data are well-defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

The data validation included review of the following QC elements:

- Data Package Completeness
- Chain-of-Custody Documentation
- Holding Times and Sample Preservation
- Surrogate Recoveries
- Method Blanks
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Control Samples/Laboratory Control Sample Duplicates
- Field Duplicates
- Column Confirmation RPD Values

VALIDATED SAMPLE DELIVERY GROUPS

This data validation included review of the sample delivery group (SDG) listed below in Table 1.

TABLE 1: SUMMARY OF VALIDATED SAMPLE DELIVERY GROUPS

Laboratory SDG	Samples Validated
1803-206	MW-09-032118, MW-10-032118, MW-11-032118, MW-12-032118, and DUP-1-032118

CHEMICAL ANALYSIS PERFORMED

OnSite Environmental, Inc. (OnSite), located in Redmond, Washington, was contracted to conduct laboratory analysis on the groundwater samples using the following method:

- Chlorinated Acid Herbicides by USEPA Method SW8151A

However, OnSite subcontracted the laboratory work to AM Test Inc. (AMTEST), located in Kirkland, Washington to conduct analysis of the groundwater samples using the following method:

- Chlorinated Acid Herbicides by USEPA Method for waste water W615

DATA VALIDATION SUMMARY

The results for each of the QC elements are summarized below.

Data Package Completeness

OnSite provided the required deliverables for the data validation according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and the identified anomalies were discussed in the relevant laboratory case narrative.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. The COCs were accurate and complete when submitted to the lab.

Holding Times and Sample Preservation

The sample holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for each analysis. The sample cooler arrived at the laboratory within the appropriate temperatures of between two and six degrees Celsius.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the organic analytes of interest, but unlikely to be found in an environmental sample. Surrogates are used for organic analyses and are added to the samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added to the samples at a known concentration and percent recoveries are calculated following analysis. The surrogate percent recoveries (%R) values for field samples were within the laboratory control limits, with the exceptions below:

SDG 1803-206: The %R values for 2,4-Dichlorophenylacetic acid were greater than the control limit of 140% in Samples MW-10-032118, MW-11-032118, and DUP-1-032118. These outliers were indicative

of a high bias in these samples, therefore only the positive results were affected. The positive result for Dinoseb was qualified as estimated (J) in Sample MW-10-032118.

The %R value for 2,4-Dichlorophenylacetic acid was less than the control limit of 30% in Sample MW-12-032118. These outliers were indicative of a low bias in this sample, therefore even target analytes that were not detected were affected. The reporting limits for Dinoseb and MCPA were qualified as estimated (UJ) in Sample MW-12-032118.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. A method blank was analyzed with each batch of samples, at a frequency of 1 per 20 samples. For each sample batch, method blanks were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in the method blanks.

Matrix Spikes/Matrix Spike Duplicates

Since the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis on one sample from the associated batch, known as the parent sample. One aliquot of the sample is analyzed in the normal manner and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery is calculated. Matrix spike duplicate (MSD) analyses are generally performed for organic analyses as a precision check and analyzed in the same sequence as a matrix spike. Using the result values from the MS and MSD, the relative percent difference (RPD) is calculated. The percent recovery control limits for MS and MSD analyses are specified in the laboratory documents, as are the RPD control limits for MS/MSD sample sets.

One MS/MSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for each analysis and the %R and RPD values were within the proper control limits, with the exceptions mentioned below:

SDG 1803-206: The laboratory performed an MS/MSD on Sample MW-11-032118. The %R values for MCPA and Dinoseb were greater than the control limits in the MSD. However, the corresponding %R values for these compounds were both within the control limits in the MS. No qualifiers were required for these outliers.

The RPD values for MCPA and Dinoseb were greater than the control limits in this same sample set. However, there were no positive results for these target analytes in the parent sample. No qualifiers were required.

Laboratory Control Samples/Laboratory Control Sample Duplicates

A laboratory control sample (LCS) is a blank sample that is spiked with a known amount of analyte and then analyzed. An LCS is similar to an MS, but without the possibility of matrix interference. Given that matrix interference is not an issue, the LCS/LCSD control limits for accuracy and precision are usually more rigorous than for MS/MSD analyses. Additionally, data qualification based on LCS/LCSD analyses would apply to each sample in the associated batch, instead of just the parent sample. The percent recovery control limits for LCS and LCSD analyses are specified in the laboratory documents, as are the RPD control limits for LCS/LCSD sample sets.

An MS/MSD sample set was performed in lieu of an LCS/LCSD sample set.

Field Duplicates

In order to assess precision, field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. Precision is determined by calculating the RPD between each pair of samples. If one or more of the sample analytes has a concentration less than five times the reporting limit for that sample, then the absolute difference is used instead of the RPD. The RPD control limit for water samples is 35 percent while the absolute difference control limit is defined as the lowest of the two sample reporting limits.

SDG 1803-206: One field duplicate sample pair, MW-12-032118 and DUP-1-032118, was submitted with this SDG. The precision criteria for the target analytes were met for this sample pair.

Column Confirmation RPD Values

The laboratory analyzed the samples submitted for analysis by SW8151A. These methods require the sample results to be reported from a dual-column electron capture detector (ECD) system. Since this system requires the use of two columns, it produces two results simultaneously. The laboratory is required to report the precision of these results in the form of a relative percent difference (RPD) value, one column being considered primary and the other column being considered as a secondary check.

The RPD values between columns were all less than 40%, which is the criteria for internal column confirmations to be met for all samples.

OVERALL ASSESSMENT

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate and LCS %R values. Precision was acceptable, as demonstrated by the field duplicate and matrix spike RPD values.

Data points were qualified because of surrogate %R outliers.

The data set for this monitoring event has been properly validated using a Stage 2A assessment provided in the Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use. It is our professional judgment that the data is acceptable for the intended purposes described in the QAPP/Sampling analysis plan.

REFERENCES

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," EPA-540-R-08-01. June 2008.

