# Post-Construction Groundwater Compliance Monitoring Report Round 1 through Round 4

Taxiway F Site, Skagit Regional Airport
Burlington, Washington
Ecology Consent Decree No. 11-2-01536-2

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

March 5, 2014

GeoEngineers
Earth Science + Technology

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## Taxiway F Site, Skagit Regional Airport
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**File No. 5364-013-05**

**March 5, 2014**

Prepared for:

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## APPENDICES

# 1.0 INTRODUCTION

This Groundwater Compliance Monitoring Report has been prepared to document post-construction groundwater conditions for the Taxiway F Site (Site) located at the Skagit County Regional Airport in Burlington, Washington (see Figure 1). The Port of Skagit County (Port) is monitoring groundwater conditions after completion of the soil removal actions at the Site pursuant to Consent Decree No. 11-2-01536-2 (Consent Decree; Ecology, 2011) to evaluate the effectiveness of the cleanup action. The Site is formally referenced in the Ecology database as the "Skagit County Port Site" (Ecology Facility Identification No. 67457634, Cleanup Site Identification No. 1671).

Post-construction groundwater monitoring is being completed in general accordance the Compliance Monitoring Plan (CMP; GeoEngineers, 2011a). Monitoring well installation and the results of the four completed consecutive quarterly groundwater monitoring events (Rounds 1 through 4) are summarized in this report.

# 2.0 BACKGROUND INFORMATION

## 2.1. Historical Operation and Site Use

In 1933, a single runway was constructed for light airplanes at the Skagit Regional Airport. This original runway later became Taxiway F. In 1943 the U.S. Navy constructed the airport's current two-runway system as an alternate training field for the Whidbey Island Naval Air Station. After World War II, the federal government continued to operate the airport, primarily for the Civil Air Patrol, until the facility was transferred to Skagit County in 1958. In 1965 the airport was conveyed to the joint ownership of Port of Anacortes and Port of Skagit County. The Port of Skagit County assumed full ownership and operation of the airport in 1975. Prior to 1978, the Site and the surrounding property were used for cattle grazing and farm equipment storage. Between 1978 and 2000, the Port leased the portion of the Site immediately adjacent to the Taxiway F to a series of individuals and companies engaged in the business of crop dusting. During this period, pesticides and herbicides were reported to have been stored in the hangar building and loaded onto aircraft for use in the general vicinity of the hangar. In 2000, Port discontinued leasing the Site. Since that time, the hangar and paved area has been used by the Port for storage of maintenance equipment.

A detailed description of the previous Site use and operations are presented in the Ecology-approved Final Remedial Investigation/Feasibility Study (RI/FS) Work Plan (Work Plan; GeoEngineers, 2009) for the Site and Remedial Investigation/Feasibility Study Report (RI/FS Report; GeoEngineers, 2011b). Site features, including Taxiway F, the hangar building and surrounding wetland areas are shown on Figure 2.

## 2.2. Previous Environmental Investigations

Multiple environmental investigations have been completed at the Site, beginning with an initial soil investigation in 2000 (EAI, 2000) following the Port's discovery of stained soil in the vicinity of the hangar building, and culminating in the 2011 waste characterization study presented as an attachment to the Engineering Design Report (EDR; GeoEngineers, 2011c). Soil sampling

completed between 2000 and 2010 indicated that shallow soil, approximately 0 to 2 feet below ground surface (bgs) contain concentrations of pesticides (aldrin, total chlordane, DDT, dieldrin, endosulfan heptachlor toxaphene) and herbicides (atrazine, chlorothalonil, dinoseb, pentachlorophenol, terbutryn, trifluralin, vernolate) exceeding the cleanup levels established for the Site. Additionally, groundwater sampling and analysis completed during 2009 and 2010 showed that shallow (perched) groundwater in the vicinity of the hangar building exceeded Site cleanup levels for pesticides (heptachlor epoxide) and herbicides (2,4-dichlorophenoxyacetic acid [2,4-D], bentazon, dinoseb and 2-methyl-4-chlorophenoxy-acetic acid [MCPA]).

Detailed information regarding previous Site investigations conducted prior to 2009 is presented in the Work Plan. Detailed information regarding investigations completed in 2009 and 2010 are presented in the RI/FS Report.

### 2.3. Cleanup Action

Cleanup actions to remove soil containing concentrations of pesticides and herbicides exceeding cleanup levels established for the Site were completed between October 3 and November 9, 2011 in accordance with the Cleanup Action Plan (CAP; GeoEngineers, 2011c) and the EDR. Based on field screening results, visual observations and the results of verification samples obtained during remedial excavation activities, a total of 6,612 tons of contaminated soil and debris was removed from the Site for permitted landfill disposal. Contaminated soil and debris generated from the Site were designated as Washington State-only dangerous waste under toxic and persistent waste criteria and therefore were managed pursuant to WAC 173-303 on Site and during transport to the landfill.

Following the excavation and backfilling activities, surface restoration was completed to restore asphalt, concrete and gravel surfaces that were demolished or disturbed during the cleanup action. Additionally, re-vegetation and wetland restoration was completed at the Site following the backfilling of the excavated area to restore vegetated/forested areas that were excavated and/or disturbed during the cleanup action construction. Monitoring of the wetland restoration is ongoing as required by the US Army Corps of Engineers permit for the project.

The approximate extent of the removal action is shown on Figure 2. Detailed descriptions of the cleanup action are presented in the Ecology-approved Construction Completion As-Built Report (GeoEngineers, 2013).

## 3.0 POST-CONSTRUCTION GROUNDWATER MONITORING

### 3.1. Monitoring Well Installation

#### *3.1.1. Underground Utility Locate*

Prior to drilling, an underground utility locate was conducted in the area of the proposed boring locations to identify any subsurface utilities and/or potential underground physical hazards.

### *3.1.2. Monitoring Well Construction and Development*

Monitoring wells MW-9 through MW-12 were installed at the locations shown on Figure 2 in general accordance with the CMP. Monitoring wells MW-9 through MW-12 were installed at the approximate location of former monitoring wells GEI-MW4, GEI-MW6, GEI-MW7, and GEI-MW8, locations where the previous site investigation had identified concentrations of pesticides and/or herbicides exceeding groundwater cleanup levels. The former monitoring wells were decommissioned and removed during the cleanup to facilitate more complete removal of contaminated soils. The new monitoring wells were installed by Cascade Drilling, Inc. (Washington State Licensed Well Driller) of Woodinville, Washington under subcontract to GeoEngineers on November 29, 2012.

Wells were constructed of 2-inch-diameter, flush-threaded Schedule 40 polyvinyl chloride (PVC) casing with machine-slotted PVC screen (0.010-inch slot). The top of the well screens are located approximately 2 below the ground surface and have screen lengths of approximately 3 feet.

Following placement of the well screen and casing in the borehole, a filter pack was installed around the well screen. The filter pack extends from the bottom of the well to approximately 0.5 feet above the top of the screen. Filter pack material consists of commercially prepared 10/20 silica sand. A bentonite seal approximately 0.5-feet thick was placed above the sand pack to about 1 foot below ground surface (bgs). The surface of each well was completed with a concrete seal and surface pad extending from the top of the bentonite seal to slightly above the ground surface. Steel flush-mount monuments were cemented in place from the surface to a depth of about 1 foot bgs at monitoring well locations MW-9 through MW-11. A steel stick-up monument was cemented in place from the surface to a depth of about 1 foot bgs at monitoring well location MW-12.

Following installation, each of the monitoring wells was developed to stabilize the filter pack and formation materials surrounding the well screen and to help restore the hydraulic connection between the well screen and the surrounding soil. Well development was completed on November 30, 2012 in advance of collecting groundwater samples. Well development involved gently surging the well screens with a decontaminated slug rod multiple times in each monitoring well. Development continued until a minimum of 3 casing volumes of water were removed from each monitoring well and the turbidity of the discharged water was measured to be low. The goal of well development was to reduce the turbidity of the water to approximately 25 nephelometric turbidity units (NTUs). Wells were purged dry in an effort to attain the 25 NTU goal. Purge water generated during the well development activities was transferred to labeled and sealed 55-gallon drums located inside the Hangar Building pending characterization and disposal.

Soils encountered during drilling were examined and visually classified by a GeoEngineers representative in general accordance with American Society for Testing and Materials (ASTM) D 2488-94. Descriptions of soil encountered, field screening results and well construction details for monitoring wells MW-9 through MW-12 are presented in Appendix A.

### *3.1.3. Surveying*

An existing permanent survey benchmark established by the Port for the project was used to determine the elevation of the post-construction groundwater monitoring wells. The vertical datum

for the survey benchmark was 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]; NAVD 88 – Elevation 123.97 feet).

Monument rim and casing rim elevations were surveyed by GeoEngineers field personnel using a laser level, which has an accuracy of 0.01 feet. GeoEngineers also recorded the monitoring well locations using a hand-held Trimble GeoXT global positioning system (GPS) unit. The horizontal survey data are referenced to the Washington State Plane North Coordinate System (NAD83) and in latitude and longitude.

Monitoring well monument rim and casing rim elevations are summarized in Table 1. Monitoring well coordinates are summarized in Table 2.

#### *3.1.4. Decontamination*

Drilling and well development equipment used for monitoring well installation was decontaminated before beginning each exploration using the procedures described in the CMP. Wash water used to decontaminate the reusable sampling equipment is stored on Site in a labeled and sealed 55-gallon drum located inside the Hangar Building pending characterization and disposal.

### 3.2. Groundwater Sampling and Analysis

Groundwater levels were measured from the surveyed casing rim elevation at each monitoring well location during each monitoring event to the nearest 0.01 foot prior to sampling using an electric water level indicator (e-tape). Measured water levels for each monitoring event are summarized in Table 3.

Groundwater samples were obtained using low-flow/low-turbidity sampling techniques during each monitoring event to minimize the suspension of sediment in groundwater samples. Groundwater samples were obtained from monitoring wells using a peristaltic pump and disposable polyethylene tubing. Groundwater was pumped at a rate of 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) was used to monitor the following water quality parameters during purging:

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

Samples were obtained after these parameters were observed to vary by less than 10 percent on three consecutive measurements. The stabilized field measurements for each monitoring event

are summarized in Table 4. Purge water generated during these activities is stored on Site in labeled 55-gallon drums for pending characterization and offsite disposal.

Groundwater samples were obtained on a quarterly basis no less than three months apart in which groundwater was observed in each monitoring well. Observed groundwater conditions and chemical analytical results for Rounds 1 through 4 are discussed in the following Sections (Sections 3.2.1 and 3.2.2).

#### *3.2.1. Groundwater Conditions*

Groundwater levels were measured in each monitoring well on December 19, 2012 (Round 1), March 26, 2013 (Round 2), June 26, 2013 (Round 3), and August 26, 2013 (Round 4). Measured groundwater elevations in monitoring wells MW-9 through MW-12 ranged between 121.5 and 117.41 feet. Based on the measured groundwater elevations and previous groundwater investigations (GeoEngineers, 2009), the inferred predominant groundwater flow direction is to the southeast toward the wetland area.

Groundwater elevations measured during each sampling event (Rounds 1 through 4) are summarized in Table 3 and shown on Figure 3. Stabilized groundwater water quality parameters measured during each sampling event (Rounds 1 through 4) are summarized in Table 4.

#### *3.2.2. Chemical Analytical Results*

Groundwater samples obtained from each of the monitoring wells were submitted to OnSite Environmental, Inc. in Redmond, Washington for chemical analysis of the indicator hazardous substances established in the CMP including dinoseb, bentazon, 2,4-D, MCPA, aldrin, dieldrin, heptachlor, and heptachlor epoxide using Environmental Protection Agency (EPA) method 8081A-GC/ECD. Indicator hazardous substances 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:

- Round 1 Monitoring Event: Aldrin and/or dinoseb was detected at a concentration greater than the site-specific cleanup level in groundwater samples obtained from monitoring wells MW-9, MW-10 and MW-12.
- Round 2 Monitoring Event: MCPA, heptachlor epoxide and/or dinoseb were detected at concentrations greater than the site-specific cleanup levels in groundwater samples obtained from monitoring wells MW-9 through MW-11.
- Round 3 Monitoring Event: Heptachlor, aldrin, heptachlor epoxide, MCPA and/or dinoseb were detected at concentrations greater than the site-specific cleanup levels in groundwater samples obtained from monitoring wells MW-9 through MW-12.
- Round 4 Monitoring Event: MCPA and/or dinoseb were detected at concentrations greater than the site-specific cleanup levels in groundwater samples obtained from monitoring wells MW-9 and MW-10.

In consultation with Ecology, filtered samples were obtained from monitoring wells MW-9 through MW-12 during the Round 2 monitoring event to evaluate whether suspended particulate material in the groundwater samples was affecting the chemical analytical result. Analysis of the filtered

samples resulted in lower detected contaminant concentrations indicating that particulate matter may be contributing to the detected chemical concentrations. The detected contaminant concentrations of the filtered samples were however, greater than the site-specific cleanup levels.

Post-construction groundwater analytical results are summarized in Table 5. Copies of laboratory reports for each monitoring event are presented in Appendix B. Laboratory data presented in Appendix B were subjected to a United States Environmental Protection Agency (USEPA) level 2A validation and were determined to be acceptable for its intended use as qualified. Data validation reports are presented in Appendix C. The validated analytical data has been uploaded to Ecology's Environmental Information Management (EIM) database.

## 4.0 CONCLUSIONS AND RECOMONDATIONS

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, four consecutive groundwater monitoring events, no less than three months apart were completed by the Port to evaluate the effectiveness of the cleanup action.

Based on groundwater chemical analytical results, indicator hazardous substances including heptachlor, aldrin, heptachlor epoxide, MCPA and/or dinoseb were detected at concentrations exceeding Site-specific cleanup levels in one or more wells during the four rounds of post-construction groundwater monitoring at the Site. The detected concentration of these contaminants was observed to generally decrease by the fourth round of monitoring; however, the cleanup objective of measuring no exceedances of the Site-specific groundwater cleanup levels in each monitoring wells over four consecutive monitoring events has not been achieved. Based on the results measured to date, further monitoring of the Site is warranted to determine if the trend in decreasing concentrations will meet the cleanup objective over-time.

Based on consultation with Ecology, continued groundwater compliance monitoring at each of the established monitoring well locations is recommended. The recommended additional compliance monitoring will include:

- Completion of an additional four rounds of sample collection and analysis at each of the established monitoring well locations in general accordance with the Ecology-approved Compliance Monitoring Plan (GeoEngineers, 2011a).
- Complete an addition four quarterly rounds of groundwater sampling in March 2014, June 2014, September 2014, and December 2014.
- Analyze the groundwater samples collected for only the indicator hazardous substances that exceeded, or in which the laboratory reporting limit exceeded the site-specific cleanup levels during one or more of the initial four monitoring events. The hazardous substances to be analyzed are heptachlor, aldrin, heptachlor epoxide, dieldrin, MCPA, and dinoseb. Analysis of indicator hazardous substances for which indicator hazardous substances either were not

detected or were detected at concentrations less that Site-specific cleanup levels, including 2,4 D and bentazon will be discontinued.

The results of the compliance groundwater monitoring will be provided to Ecology following each of the monitoring events as part of the project progress reporting. The results will be uploaded to Ecology's EIM database following completion of data review and validation. An updated Post-Construction Groundwater Compliance Monitoring Report will be prepared for Ecology review following completion of the eighth round of monitoring. At that time, the completeness of the cleanup action will be evaluated. Consistent with the CMP, if chemical analytical results show that contaminants of concern at one or more well locations are less than the Site-specific cleanup levels on four consecutive monitoring events, then additional groundwater sampling will not be required at that monitoring well location and the cleanup action objective will be considered met at that location.

If the four consecutive rounds (Rounds 5 through 8) of groundwater monitoring show that the cleanup objective is not met, the Port will work with Ecology to determine what additional actions will be required at the Site. At a minimum, continued quarterly groundwater monitoring will be required for the chemicals that exceed their respective cleanup levels in one or more quarters.

## 5.0 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.

Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

## 6.0 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), "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. (2011b), "Draft Final Remedial Investigation/Feasibility Study, Taxiway F Site, Skagit Regional Airport, Ecology Agreed Order No. 6158." GEI File No. 5364-013-02, dated January 10, 2011.

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

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

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

TABLES

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# Table 1

## Summary of Post-Construction Groundwater Monitoring Well Completion Data

**Taxiway F Site**
**Burlington, Washington**

| Monitoring Well[1] | Date Installed | Ecology Well Identification | Ground Elevation (feet) | Top of Casing Elevation (feet) | Bottom of Casing Elevation (feet) | Total Well Depth (feet bgs) | Casing Diameter (inches) | Screen Interval (feet bgs) | Screen Specifications |
|---|---|---|---|---|---|---|---|---|---|
| MW-9 | 11/29/2012 | BHS-644 | 122.75 | 122.42 | 117.75 | 5 | 2 | 2 to 5 | 2-inch Schedule 40 PVC 0.010-inch slot |
| MW-10 | 11/29/2012 | BHS-645 | 121.09 | 120.76 | 116.09 | 5 | 2 | 2 to 5 | 2-inch Schedule 40 PVC 0.010-inch slot |
| MW-11 | 11/29/2012 | BHS-646 | 121.21 | 120.88 | 116.21 | 5 | 2 | 2 to 5 | 2-inch Schedule 40 PVC 0.010-inch slot |
| MW-12 | 11/29/2012 | BHS-647 | 117.87 | 120.97 | 112.87 | 5 | 2 | 2 to 5 | 2-inch Schedule 40 PVC 0.010-inch slot |

**Notes:**

[1] Monitoring well locations are shown on Figure 2.

All borings were installed using hollow-stem auger (HAS) drilling methods.

All elevations referenced to Mean Lower Low Water (MLLW).

PVC = polyvinyl chloride

bgs = below ground surface

# Table 2

## Summary of Post-Construction Groundwater Monitoring Well Coordinates

Taxiway F Site

Burlington, Washington

| Monitoring Well[1] | Date Installed | Ecology Well Identification | Latitude and Longitude Coodinates | | Washington State Planes North Coordinates (NAD83) | |
|---|---|---|---|---|---|---|
| | | | Latitude (DMS) | Longitude (DMS) | Northing (feet) | Easting (feet) |
| MW-9 | 11/29/2012 | BHS-644 | 48°28'14.6282" | -122°25'47.0724" | 540505.08 | 1253174.21 |
| MW-10 | 11/29/2012 | BHS-645 | 48°28'14.5166" | -122°25'39.9421" | 540483.81 | 1253654.35 |
| MW-11 | 11/29/2012 | BHS-646 | 48°28'12.8806" | -122°25'41.6034" | 540320.38 | 1253538.99 |
| MW-12 | 11/29/2012 | BHS-647 | 48°28'13.3697" | -122°25'44.1411" | 540373.48 | 1253369.05 |

**Notes:**

[1] Monitoring well locations are shown on Figure 2.

NAD83 = North American Datum 1983

# Table 3

## Summary of Post-Construction Groundwater Monitoring Elevation Data

**Taxiway F Site**

**Burlington, Washington**

| Sample Identification[1] | Quarterly 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 | 12/19/2012 | 122.42 | 0.91 | 121.51 |
| | Round 2 | 3/26/2013 | | 2.5 | 119.92 |
| | Round 3 | 6/26/2013 | | 2.11 | 120.31 |
| | Round 4 | 9/26/2013 | | 4.4 | 118.02 |
| MW-10 | Round 1 | 12/19/2012 | 120.76 | 1.15 | 119.61 |
| | Round 2 | 3/26/2013 | | 1.5 | 119.26 |
| | Round 3 | 6/26/2013 | | 1.66 | 119.1 |
| | Round 4 | 9/26/2013 | | 0.92 | 119.84 |
| MW-11 | Round 1 | 12/19/2012 | 120.88 | 1.91 | 118.97 |
| | Round 2 | 3/26/2013 | | 0.7 | 120.18 |
| | Round 3 | 6/26/2013 | | 2.03 | 118.85 |
| | Round 4 | 9/26/2013 | | 0.93 | 119.95 |
| MW-12 | Round 1 | 12/19/2012 | 120.97 | 3.38 | 117.59 |
| | Round 2 | 3/26/2013 | | 3.55 | 117.42 |
| | Round 3 | 6/26/2013 | | 3.56 | 117.41 |
| | Round 4 | 9/26/2013 | | 3.41 | 117.56 |

**Notes:**

[1] Monitoiring well locations and grounwater elevation data are shown on Figure 3.

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

# Table 4

## Summary of Post-Construction Groundwater Monitoring Field Parameters

**Taxiway F Site**

**Burlington, Washington**

| Monitoring Well Identification[1] | Quarterly Groundwater Monitoring Event | Date Measured | pH | Conductivity (S/m) | Turbidity (NTU) | Dissolved Oxygen (mg/L) | Temp. (°C) | Total Dissolved Solids (g/L) | Oxidation Reduction Potential (m/V) |
|---|---|---|---|---|---|---|---|---|---|
| MW-9 | Round 1 | 12/19/2012 | 6.12 | 0.32 | 14.8 | 5.24 | 7.8 | 2 | 114 |
| | Round 2[2] | 3/26/2013 | -- | -- | -- | -- | -- | -- | -- |
| | Round 3 | 6/26/2013 | 6.24 | 2.16 | 11.2 | 12.01 | 17.5 | 1.39 | 188 |
| | Round 4[2] | 9/26/2013 | -- | -- | -- | -- | -- | -- | -- |
| MW-10 | Round 1 | 12/19/2012 | 6.10 | 0.51 | 26.5 | 5.41 | 9.0 | 3.2 | 130 |
| | Round 2 | 3/26/2013 | 6.16 | 4.85 | 113 | 12.7 | 12.03 | -- | -18 |
| | Round 3 | 6/26/2013 | 6.32 | 4.77 | 18.1 | 10.44 | 18.4 | 3.05 | 133 |
| | Round 4[2] | 9/26/2013 | -- | -- | -- | -- | -- | -- | -- |
| MW-11 | Round 1 | 12/19/2012 | 5.92 | 0.21 | 23.7 | 4.29 | 8.0 | 1.3 | 140 |
| | Round 2 | 3/26/2013 | 5.63 | 1.53 | 150 | 8.99 | 10.42 | -- | 9 |
| | Round 3 | 6/26/2013 | 7.0 | 1.51 | 24.0 | 8.64 | 16.99 | 0.957 | 167 |
| | Round 4[2] | 9/26/2013 | -- | -- | -- | -- | -- | -- | -- |
| MW-12 | Round 1 | 12/19/2012 | 7.45 | 0.15 | 156.0 | 6.81 | 6.8 | 1 | 21 |
| | Round 2 | 3/26/2013 | 8.45 | 0.98 | 120 | 12.3 | 11.7 | -- | -139 |
| | Round 3 | 6/26/2013 | 6.33 | 1.62 | 15.9 | 12.98 | 17.99 | 1.03 | 205 |
| | Round 4[2] | 9/26/2013 | -- | -- | -- | -- | -- | -- | -- |

**Notes:**

[1] Monitoiring well locations are shown on Figure 3.

[2] Due to the limited volume of water present within the well and slow revovery rate, water quality parameters were not measured during this sampling event.

-- = not measured

# Table 5

## Summary of Post-Construction Groundwater Monitoring Chemical Analytical Data

Taxiway F Site

Burlington, Washington

| Groundwater Monitoring Well[1] | Quarterly Groundwater Monitoring Event | Sample Date | Total Chlorinated Pesticides[2] (µg/L) | | | | Total Chlorinated Herbicides[3] (µg/L) | | | | Dissolved Chlorinated Pesticides[2] (µg/L) | | | | Dissolved Chlorinated Herbicides[3] (µg/L) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Heptachlor | Aldrin | Heptachlor Epoxide | Dieldrin | MCPA | 2,4-D | Bentazon | Dinoseb | Heptachlor | Aldrin | Heptachlor Epoxide | Dieldrin | MCPA | 2,4-D | Bentazon | Dinoseb |
| MW-9 | Round 1 | 12/19/2012 | 0.0048 UJ | 0.0048 UJ | 0.0048 UJ | 0.0048 UJ | 4.4 UJ | 0.040 NJ | 3.4 J | 0.39 J | -- | -- | -- | -- | -- | -- | -- | -- |
| | Round 2 | 3/26/2013 | 0.0047 U | 0.020 J | 0.0047 U | 0.0047 U | **71** | 0.15 | 31 | 0.64 | 0.0048 U | 0.029 J | 0.014 J | 0.0064 J | **53** | 1 | 33 | 0.66 |
| | Round 3 | 6/26/2013 | 0.06 U | 0.06 U | 0.06 U | 0.06 U | 0.08 U | 0.92 | 210 | 0.08 U | -- | -- | -- | -- | -- | -- | -- | -- |
| | Round 4 | 9/26/2013 | 0.01 U | **0.056** | 0.01 U | 0.01 U | **24** | 0.88 | 36 | 0.051 U | -- | -- | -- | -- | -- | -- | -- | -- |
| MW-10 | Round 1 | 12/19/2012 | 0.0047 UJ | 0.0047 UJ | 0.0047 UJ | 0.0088 J | 4.4 U | 140 J | 66 NJ | **140 J** | -- | -- | -- | -- | -- | -- | -- | -- |
| | Round 2 | 3/26/2013 | 0.0048 U | 0.0048 U | 0.0048 U | 0.039 J | **360** | 0.024 U | 42 | **160** | 0.01 U | 0.01 U | 0.01 U | 0.01 U | **140** | 110 | 25 | **70** |
| | Round 3 | 6/26/2013 | 0.06 U | 0.06 U | 0.06 U | 0.06 U | 0.4 U | 10 | 120 | **260** | -- | -- | -- | -- | -- | -- | -- | -- |
| | Round 4 | 9/26/2013 | 0.0047 U | 0.0047 U | 0.0047 U | 0.0047 U | 6.7 U | 37 | 7.3 | **34** | -- | -- | -- | -- | -- | -- | -- | -- |
| MW-11 | Round 1 | 12/19/2012 | 0.0048 U | 0.0048 U | 0.011 NJ | 0.014 NJ | 4.4 U | 0.33 NJ | 66 NJ | 1.1 J | -- | -- | -- | -- | -- | -- | -- | -- |
| | Round 2 | 3/26/2013 | 0.0048 U | 0.0048 U | **0.28 J** | 0.0048 U | **420** | 0.024 U | 2.0 U | 1.6 | 0.0048 U | 0.0048 U | **0.28 J** | 0.0048 U | **300** | 35 | 1.4 U | 1.1 |
| | Round 3 | 6/26/2013 | 0.06 U | 0.06 U | 0.06 U | 0.06 U | 0.4 U | 0.4 U | 2.2 | 3.7 | -- | -- | -- | -- | -- | -- | -- | -- |
| | Round 4 | 9/26/2013 | 0.0048 U | 0.0048 U | 0.0048 U | 0.0048 U | 6.7 U | 13 | 1 | 1.1 | -- | -- | -- | -- | -- | -- | -- | -- |
| MW-12[4] | Round 1 | 12/19/2012 | 0.0048 UJ | 0.022 J | 0.0048 UJ | 0.029 J | 4.4 U | 2.5 | 5.2 NJ | **14** | -- | -- | -- | -- | -- | -- | -- | -- |
| | Round 2 | 3/26/2013 | 0.0048 U | 0.011 | 0.0048 U | 0.0048 U | 4.8 U | 0.024 U | 1.2 U | 4 | -- | -- | -- | -- | -- | -- | -- | -- |
| | Round 3 | 6/26/2013 | 0.06 U | 0.06 U | 0.06 U | 0.06 U | 0.59 | 0.08 U | 19 | **44** | -- | -- | -- | -- | -- | -- | -- | -- |
| | Round 4 | 9/26/2013 | 0.0047 U | 0.0047 U | 0.0047 U | 0.0047 U | 6.7 U | 0.51 | 0.45 U | 2.3 | -- | -- | -- | -- | -- | -- | -- | -- |
| Site-Specific Cleanup Level[5] | | | 0.05 | 0.05 | 0.05 | 0.05 | 8 | 160 | 480 | 7 | 0.05 | 0.05 | 0.05 | 0.05 | 8 | 160 | 480 | 7 |

**Notes:**

[1] Groundwater monitoring well locations and contaminant exceedances are shown on Figure 4.

[2] Chlorinated Pesticides analyzed using EPA 8081B.

[3] Chlorinated Herbicides analyzed using EPA 8151A.

[4] A field duplicate groundwater sample was obtained from this monitoring well. Higher of the two concentrations (parent and field duplicate) is reported for each of the analyte.

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

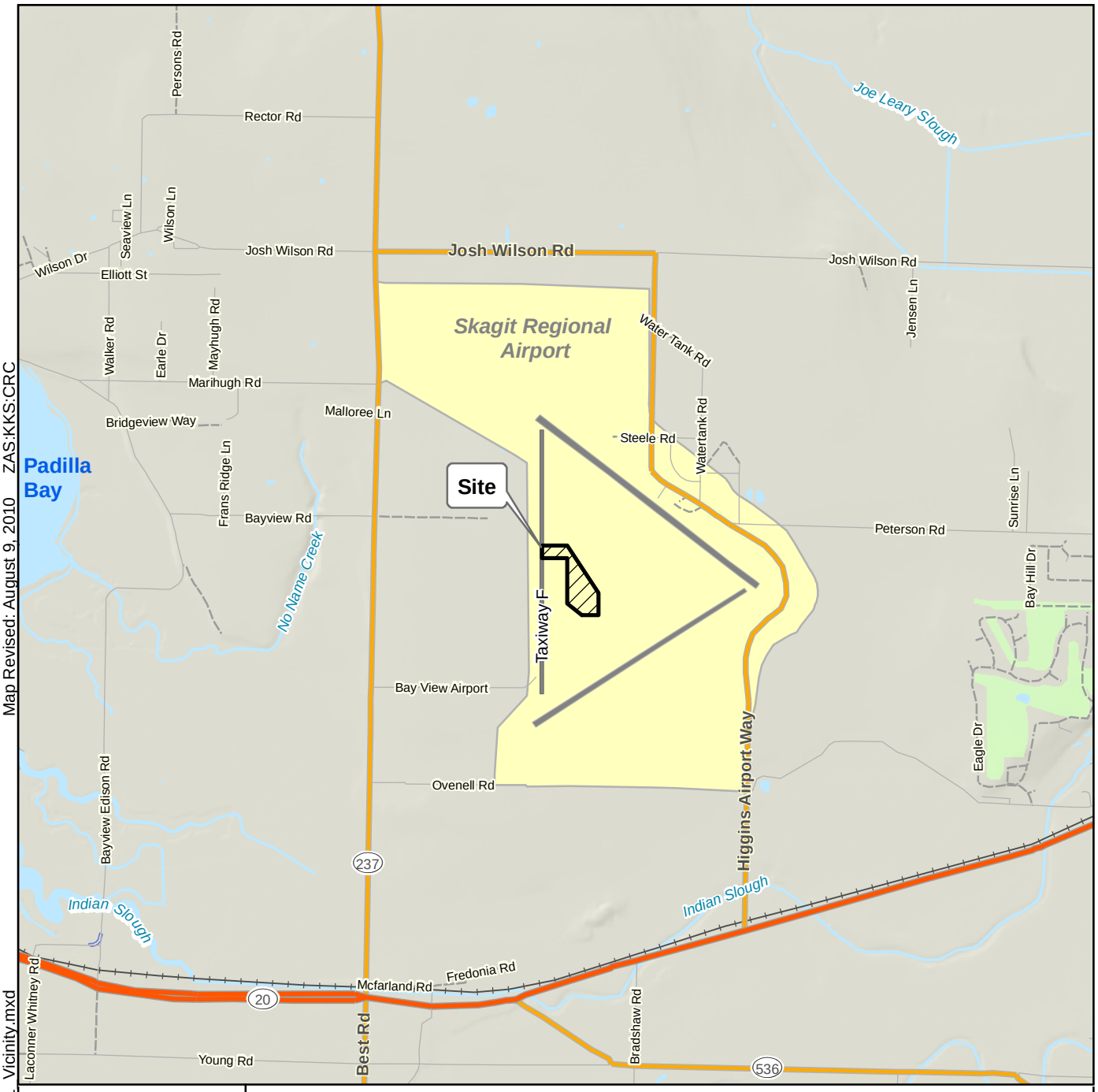
Blue shading indicates the laboratory reporting limit exceeded the site-specific cleanup level.

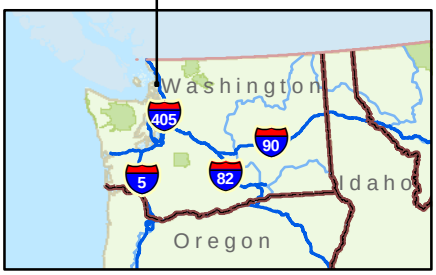
Green shading indicates analyte detected at a concentration exceeding the site-specific cleanup level.

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

FIGURES

GeoEngineers




N
W E
S

3,000 0 3,000
Feet

Notes:
1. The locations of all features shown are approximate.
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.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps, Street Maps 2005

Transverse Mercator, Zone 10 N North, North American Datum 1983
North arrow oriented to grid north

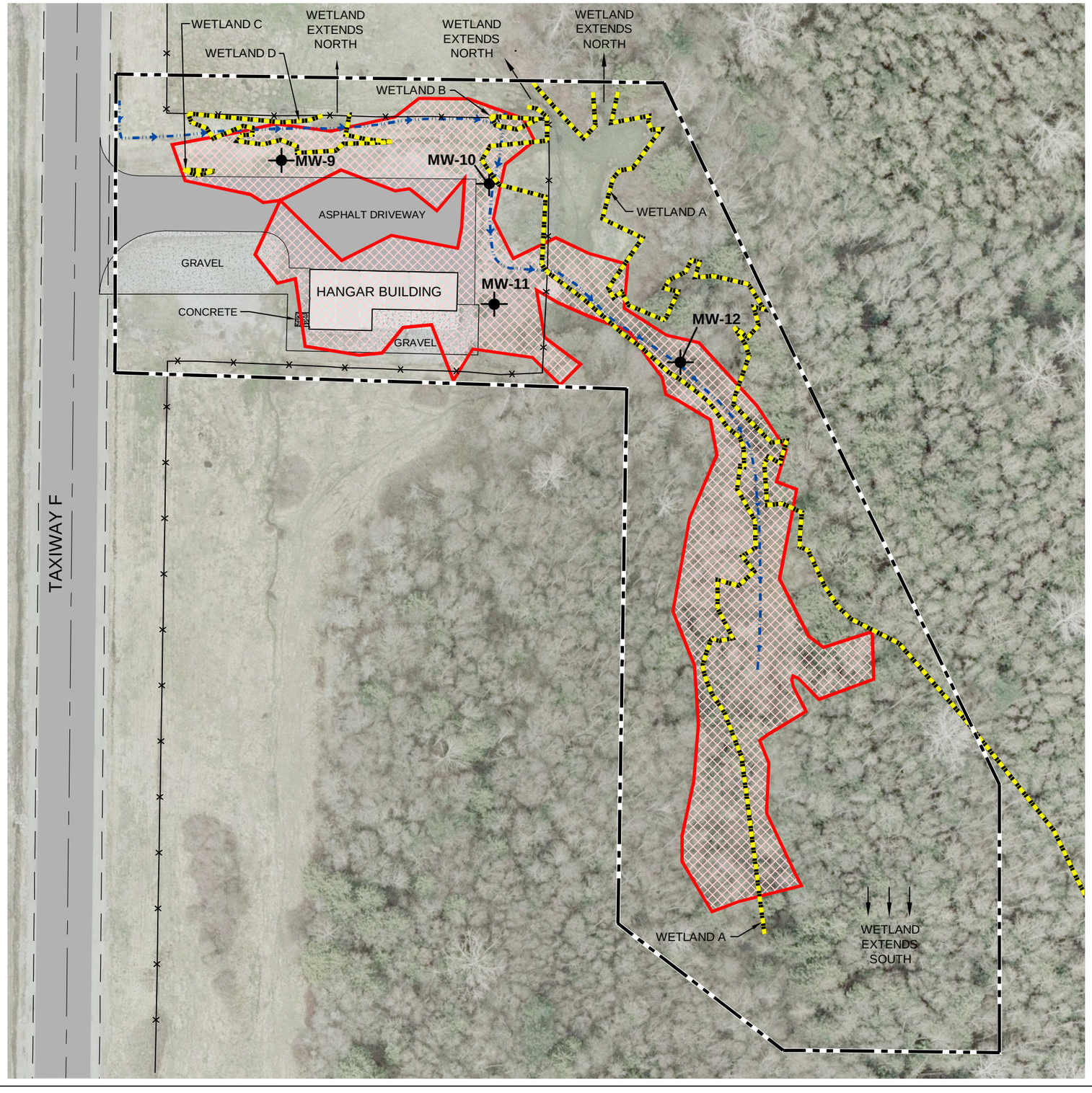
# Vicinity Map

Taxiway F Site
Burlington, Washington

GeoEngineers

**Figure 1**

Office: SEA Path: P:\536401\GIS\536401302 FIG-1 Vicinity.mxd Map Revised: August 9, 2010 ZAS:KKS:CRC




## Legend

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

N
W E
S

100 0 100
Feet

## Notes

1. The locations of all features shown are approximate.
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.

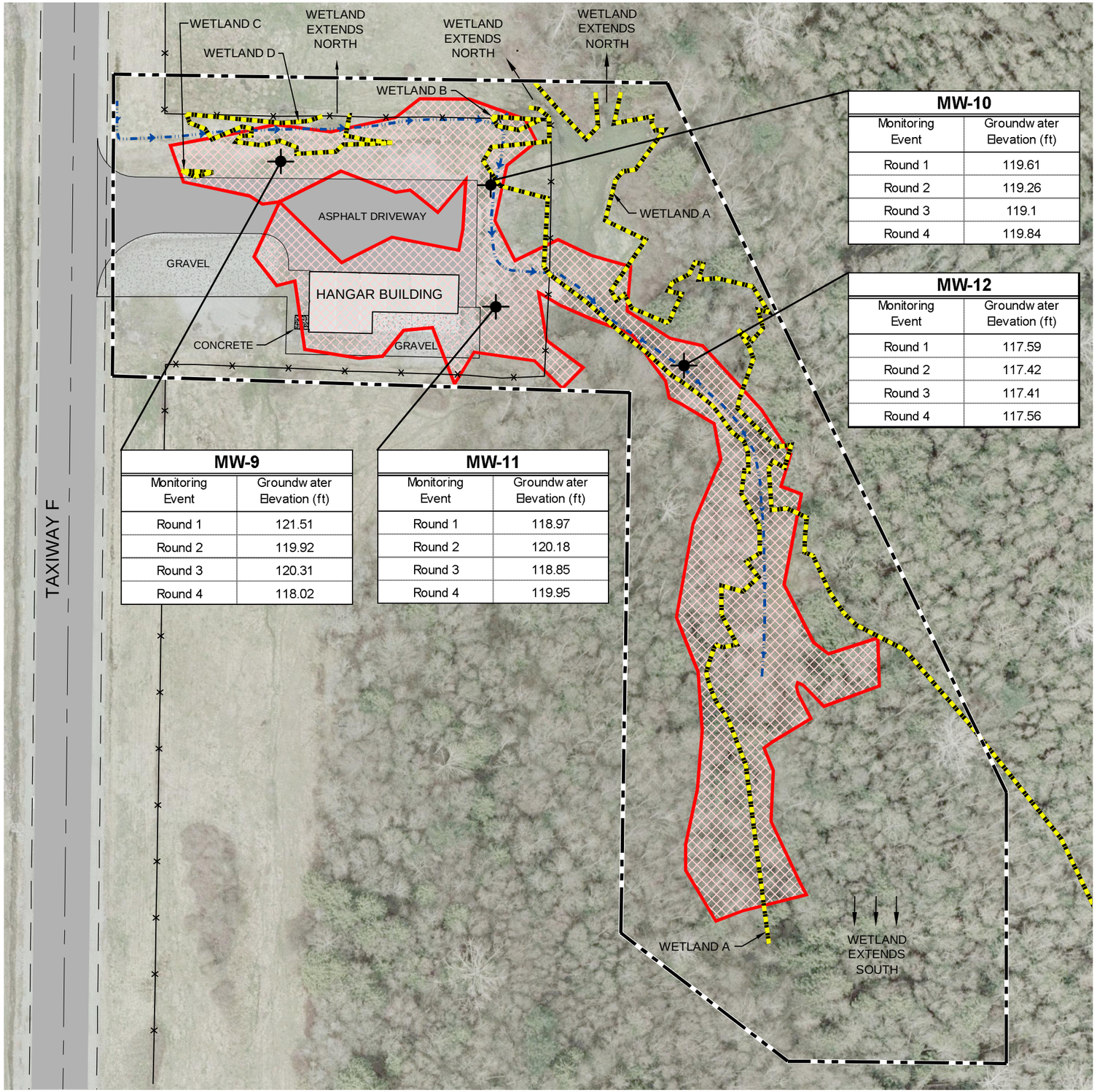
**Site Plan**

Taxiway F Site
Burlington, Washington

GeoEngineers

**Figure 2**

P:\5\536401305\CAD\536401305 Fig2 Site Plan.dwg\TAB:layout modified by tmichaud on Jan 07, 2014 - 10:58




**MW-10**

| Monitoring Event | Groundwater Elevation (ft) |
|---|---|
| Round 1 | 119.61 |
| Round 2 | 119.26 |
| Round 3 | 119.1 |
| Round 4 | 119.84 |

**MW-12**

| Monitoring Event | Groundwater Elevation (ft) |
|---|---|
| Round 1 | 117.59 |
| Round 2 | 117.42 |
| Round 3 | 117.41 |
| Round 4 | 117.56 |

**MW-9**

| Monitoring Event | Groundwater Elevation (ft) |
|---|---|
| Round 1 | 121.51 |
| Round 2 | 119.92 |
| Round 3 | 120.31 |
| Round 4 | 118.02 |

**MW-11**

| Monitoring Event | Groundwater Elevation (ft) |
|---|---|
| Round 1 | 118.97 |
| Round 2 | 120.18 |
| Round 3 | 118.85 |
| Round 4 | 119.95 |

## Legend

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

N
W E
S

100 0 100
Feet

## Notes

1. The locations of all features shown are approximate.
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.

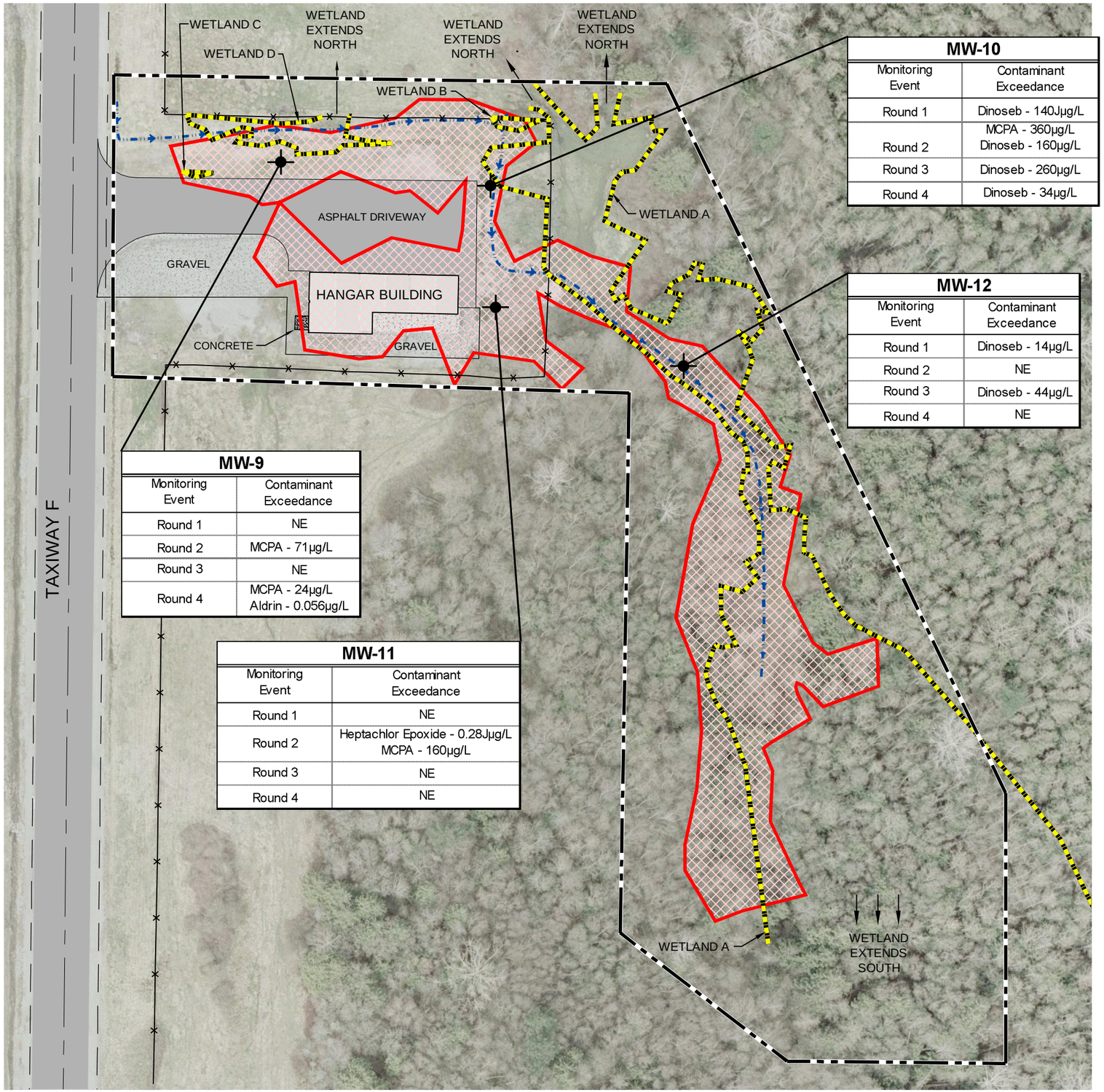
**Groundwater Elevations**
**Round 1 through Round 4**

Taxiway F Site
Burlington, Washington

GeoEngineers

**Figure 3**

P:\5\536401305\CAD\536401305 Fig3 GW Elevations.dwg\TAB:layout modified by tmichaud on Jan 17, 2014 - 9:12




**MW-10**

| Monitoring Event | Contaminant Exceedance |
|---|---|
| Round 1 | Dinoseb - 140Jµg/L |
| Round 2 | MCPA - 360µg/L<br>Dinoseb - 160µg/L |
| Round 3 | Dinoseb - 260µg/L |
| Round 4 | Dinoseb - 34µg/L |

**MW-12**

| Monitoring Event | Contaminant Exceedance |
|---|---|
| Round 1 | Dinoseb - 14µg/L |
| Round 2 | NE |
| Round 3 | Dinoseb - 44µg/L |
| Round 4 | NE |

**MW-9**

| Monitoring Event | Contaminant Exceedance |
|---|---|
| Round 1 | NE |
| Round 2 | MCPA - 71µg/L |
| Round 3 | NE |
| Round 4 | MCPA - 24µg/L<br>Aldrin - 0.056µg/L |

**MW-11**

| Monitoring Event | Contaminant Exceedance |
|---|---|
| Round 1 | NE |
| Round 2 | Heptachlor Epoxide - 0.28Jµg/L<br>MCPA - 160µg/L |
| Round 3 | NE |
| Round 4 | NE |

## Legend

- Site Boundary
- Wetland Areas (Based on Hart Crowser 2007 Survey)
- Cleanup Action Area
- Post-Construction Groundwater Monitoring Well
- Fence Line
- Drainage Channel (Approximate Rainwater Runoff Flow Direction)
- NE — No Exceedance
- J — Estimated Result (See Table 5)

N W E S

100 0 100

Feet

## Notes

1. The locations of all features shown are approximate.
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.

**Summary of Groundwater Contaminant Exceedances**

Taxiway F Site
Burlington, Washington

GeoEngineers

**Figure 4**

P:\5\536401305\CAD\536401305 Fig4 Contaminants Exceedance.dwg\TAB:layout modified by tmichaud on Mar 05, 2014 - 12:40

APPENDICES

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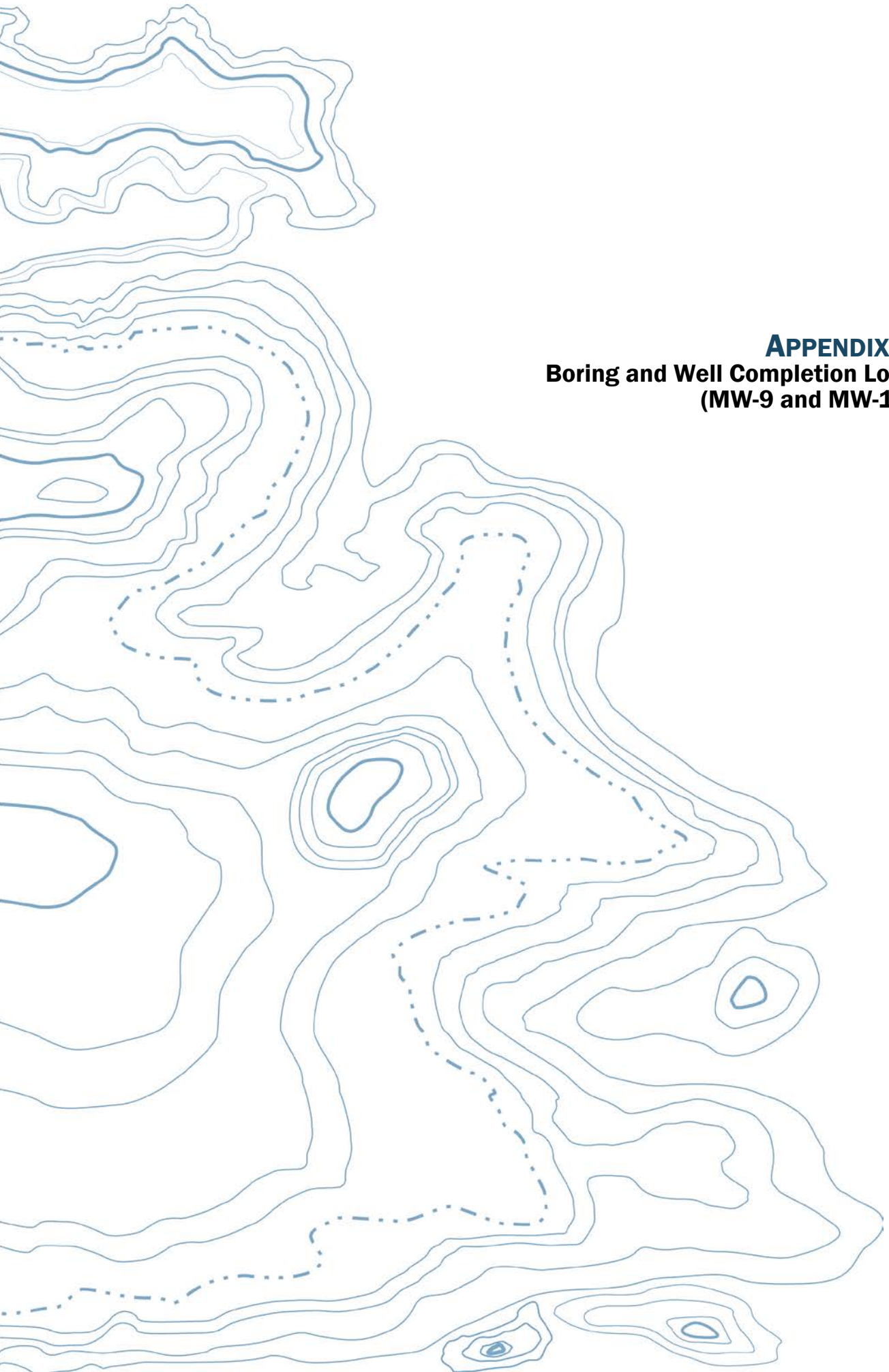

# APPENDIX A
## Boring and Well Completion Logs (MW-9 and MW-12)

## SOIL CLASSIFICATION CHART

| MAJOR DIVISIONS | | | SYMBOLS GRAPH | SYMBOLS LETTER | TYPICAL DESCRIPTIONS |
|---|---|---|---|---|---|
| COARSE GRAINED SOILS | GRAVEL AND GRAVELLY SOILS | CLEAN GRAVELS (LITTLE OR NO FINES) | | GW | WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES |
| | | | | GP | POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES |
| | MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE | GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES) | | GM | SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES |
| | | | | GC | CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES |
| MORE THAN 50% RETAINED ON NO. 200 SIEVE | SAND AND SANDY SOILS | CLEAN SANDS (LITTLE OR NO FINES) | | SW | WELL-GRADED SANDS, GRAVELLY SANDS |
| | | | | SP | POORLY-GRADED SANDS, GRAVELLY SAND |
| | MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE | SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES) | | SM | SILTY SANDS, SAND - SILT MIXTURES |
| | | | | SC | CLAYEY SANDS, SAND - CLAY MIXTURES |
| FINE GRAINED SOILS | 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 |
| MORE THAN 50% PASSING NO. 200 SIEVE | 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

## ADDITIONAL MATERIAL SYMBOLS

| SYMBOLS GRAPH | SYMBOLS LETTER | TYPICAL DESCRIPTIONS |
|---|---|---|
| | 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**

### 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.**

### 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**

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**FIGURE A-1**

| Drilled Start | End | Total Depth (ft) | Logged By / Checked By | Driller | Drilling Method |
|---|---|---|---|---|---|
| 11/29/2013 | 11/29/2013 | 5 | | Cascade Drilling | Hollow Stem Auger |

| | | | |
|---|---|---|---|
| Hammer Data | N/A | Drilling Equipment | CME-75 |
| Surface Elevation (ft) Vertical Datum | 122.75 | Top of Casing Elevation (ft) | |
| Easting (X) | 1253174.211 | Horizontal Datum | |
| Northing (Y) | 540505.081 | | |

DOE Well I.D.: BHS 644
A 2 (in) well was installed on 11/29/2013 to a depth of 5 (ft).

| Groundwater Date Measured | Depth to Water (ft) | Elevation (ft) |
|---|---|---|

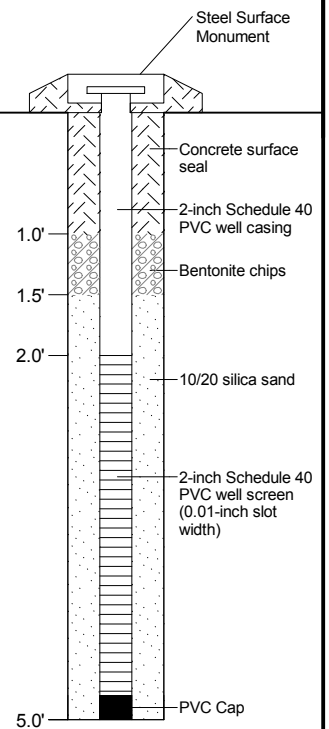
Notes: Auger Data: 4¼" internal diameter, 8¼" outer diameter

| Depth (feet) | Interval Recovered (in) | Blows/foot | Collected Sample | Sample Name | Water Level | Graphic Log | Group Classification | MATERIAL DESCRIPTION | Sheen | Headspace Vapor (ppm) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | SM | Dark brown silty fine to medium sand (wet) (topsoil) | NS | |
| | | | | | | | ML | Gray silt with occasional gravel (moist) (native) | | |
| 5 | | | | | | | | | NS | |

Elevation (feet): 120

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

WELL LOG




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

## Log of Monitoring Well GEI-MW-9

GeoEngineers

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

Figure A-2
Sheet 1 of 1

| Drilled Start | End | Total Depth (ft) | Logged By / Checked By | Driller | Drilling Method |
|---|---|---|---|---|---|
| 11/29/2013 | 11/29/2013 | 5 | | Cascade Drilling | Hollow Stem Auger |

| | | | |
|---|---|---|---|
| Hammer Data | N/A | Drilling Equipment | CME-75 |
| Surface Elevation (ft) Vertical Datum | 121.09 | Top of Casing Elevation (ft) | |
| Easting (X) | 1253364.35 | Horizontal Datum | |
| Northing (Y) | 540483.81 | | |

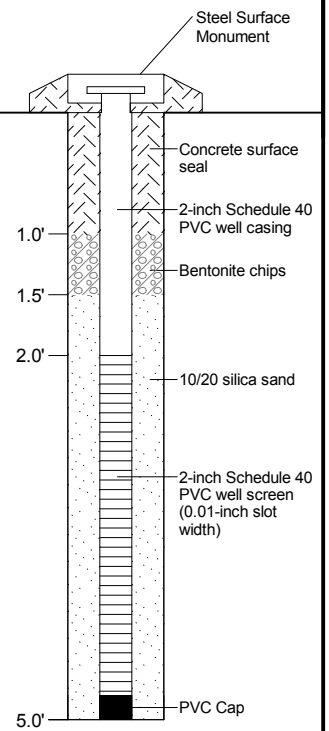
DOE Well I.D.: BHS 645
A 2 (in) well was installed on 11/29/2013 to a depth of 5 (ft).

| Groundwater Date Measured | Depth to Water (ft) | Elevation (ft) |
|---|---|---|

Notes: Auger Data: 4¼" internal diameter, 8¼" outer diameter

| Elevation (feet) | Depth (feet) | Interval Recovered (in) | Blows/foot | Collected Sample | Sample Name | Water Level | Graphic Log | Group Classification | MATERIAL DESCRIPTION | Sheen | Headspace Vapor (ppm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 120 | 0 | | | | | | | SM | Dark brown silty fine to medium sand (wet) (topsoil) | | |
| | | | | | | | | ML | Brown silt with occasional gravel (moist) (native) | NS | |
| | | | | | | | | | | NS | |
| | 5 | | | | | | | | | NS | |

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-10

GeoEngineers

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

Figure A-3
Sheet 1 of 1

| Drilled Start | End | Total Depth (ft) | Logged By / Checked By | Driller | Drilling Method |
|---|---|---|---|---|---|
| 11/29/2013 | 11/29/2013 | 5 | | Cascade Drilling | Hollow Stem Auger |

| | | | |
|---|---|---|---|
| Hammer Data | N/A | Drilling Equipment | CME-75 |
| Surface Elevation (ft) Vertical Datum | 121.21 | Top of Casing Elevation (ft) | |
| Easting (X) / Northing (Y) | 1253538.99 / 540320.38 | Horizontal Datum | |

DOE Well I.D.: BHS 646
A 2 (in) well was installed on 11/29/2013 to a depth of 5 (ft).

Groundwater

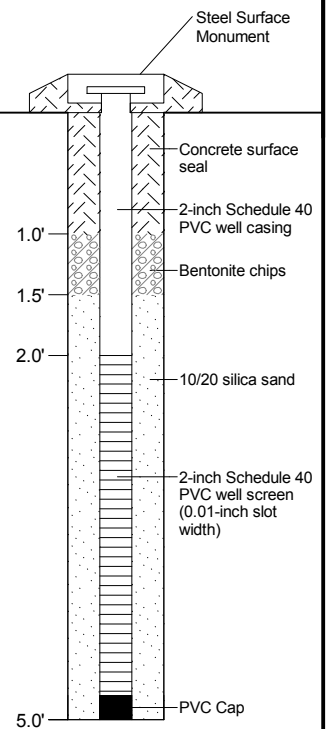
| Date Measured | Depth to Water (ft) | Elevation (ft) |
|---|---|---|

Notes: Auger Data: 4¼" internal diameter, 8¼" outer diameter

| Elevation (feet) | Depth (feet) | Interval Recovered (in) | Blows/foot | Collected Sample | Sample Name | Water Level | Graphic Log | Group Classification | MATERIAL DESCRIPTION | Sheen | Headspace Vapor (ppm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 120 | 0 | | | | | | | SM | Dark brown silty fine to medium sand (wet) (topsoil) | | |
| | | | | | | | | ML | Brown silt with occasional gravel (moist) (native) | NS | |
| | | | | | | | | | | NS | |
| | 5 | | | | | | | | | NS | |

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

WELL LOG




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

# Log of Monitoring Well GEI-MW-11

GeoEngineers

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

Figure A-4
Sheet 1 of 1

| Drilled Start | End | Total Depth (ft) | Logged By / Checked By | Driller | Drilling Method |
|---|---|---|---|---|---|
| 11/29/2013 | 11/29/2013 | 5 | | Cascade Drilling | Hollow Stem Auger |

| | | | |
|---|---|---|---|
| Hammer Data | N/A | Drilling Equipment | CME-75 |
| Surface Elevation (ft) Vertical Datum | 117.87 | Top of Casing Elevation (ft) | |
| Easting (X) | 1253369.05 | Horizontal Datum | |
| Northing (Y) | 540373.43 | | |

DOE Well I.D.: BHS 647
A 2 (in) well was installed on 11/29/2013 to a depth of 5 (ft).

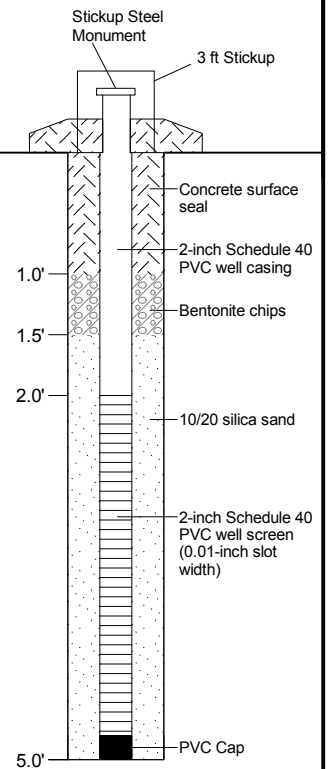
| Groundwater Date Measured | Depth to Water (ft) | Elevation (ft) |
|---|---|---|

Notes: Auger Data: 4¼" internal diameter, 8¼" outer diameter

| Elevation (feet) | Depth (feet) | Interval Recovered (in) | Blows/foot | Collected Sample | Sample Name | Water Level | Graphic Log | Group Classification | MATERIAL DESCRIPTION | Sheen | Headspace Vapor (ppm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 115 | 0 | | | | | | | SM | Dark brown silty fine to medium sand (wet) (topsoil) | NS | |
| | | | | | | | | ML | Brown silt with occasional gravel (moist) (native) | | |
| | | | | | | | | | | NS | |
| | 5 | | | | | | | | | NS | |

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

WELL LOG




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

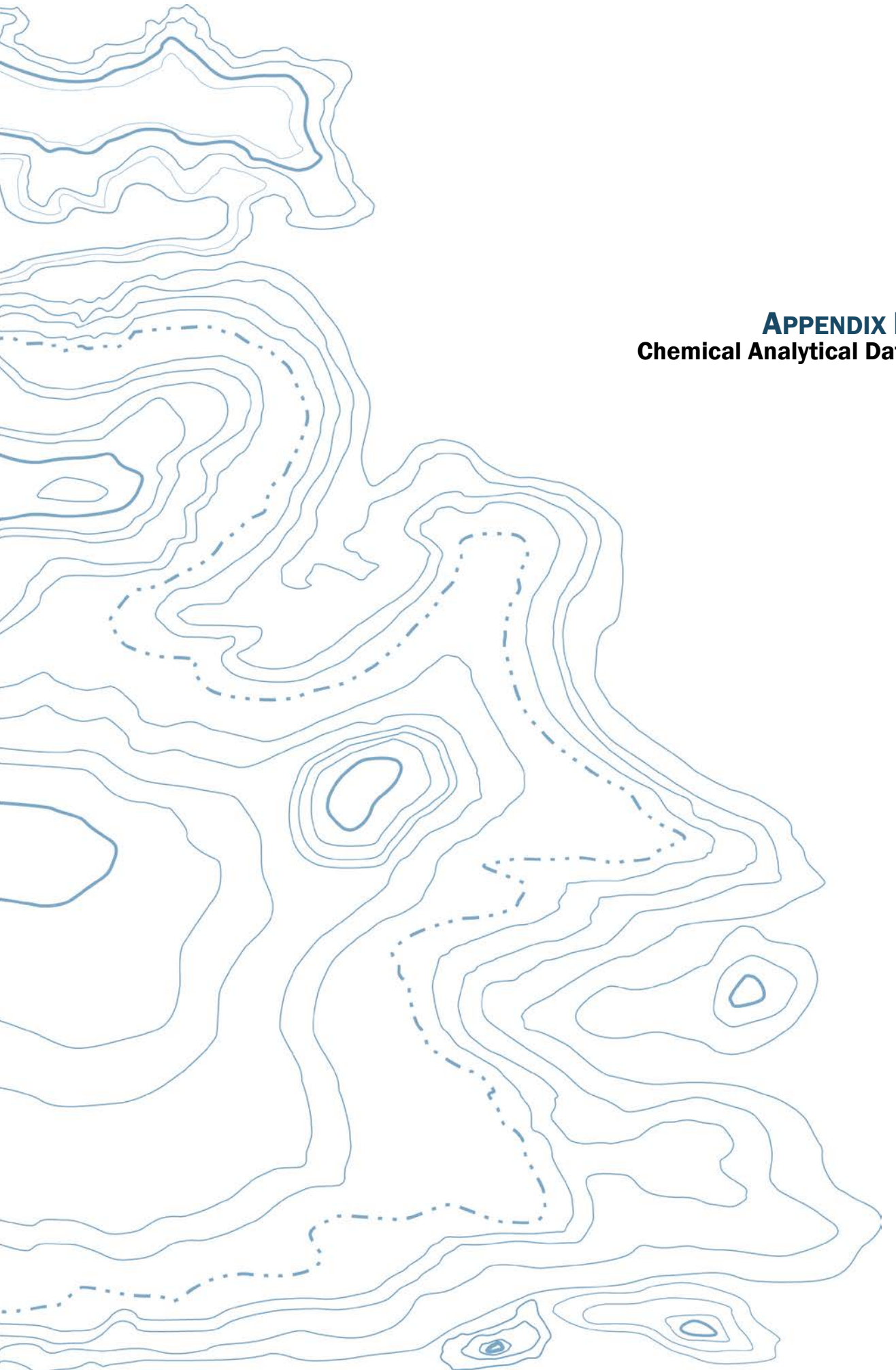
## Log of Monitoring Well GEI-MW-12

GeoEngineers

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

Figure A-5
Sheet 1 of 1

Seattle: Date:1/2/14 Path:W:\SEATTLE\PROJECTS\5\5364013\05\GINT\536401305_WELL LOGS.GPJ DBTemplate\LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL



# APPENDIX B
## Chemical Analytical Data

OnSite Environmental Inc.

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

October 4, 2013

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

Re: Analytical Data for Project 5364-013-05
Laboratory Reference No. 1309-251

Dear Robert:

Enclosed are the analytical results and associated quality control data for samples submitted on September 26, 2013.

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,

David Baumeister
Project Manager

Enclosures

Date of Report: October 4, 2013
Samples Submitted: September 26, 2013
Laboratory Reference: 1309-251
Project: 5364-013-05

**Case Narrative**

Samples were collected on September 26, 2013 and received by the laboratory on September 26, 2013. They were maintained at the laboratory at a temperature of 2°C to 6°C.

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: October 4, 2013
Samples Submitted: September 26, 2013
Laboratory Reference: 1309-251
Project: 5364-013-05

**ANALYTICAL REPORT FOR SAMPLES**

| Client ID | Laboratory ID | Matrix | Date Sampled | Date Received | Notes |
|---|---|---|---|---|---|
| GEI-MW9 | 09-251-01 | Water | 9-26-13 | 9-26-13 | |
| GEI-MW10 | 09-251-02 | Water | 9-26-13 | 9-26-13 | |
| GEI-MW11 | 09-251-03 | Water | 9-26-13 | 9-26-13 | |
| GEI-MW12 | 09-251-04 | Water | 9-26-13 | 9-26-13 | |
| DUP-09262013 | 09-251-05 | Water | 9-26-13 | 9-26-13 | |

Date of Report: October 4, 2013
Samples Submitted: September 26, 2013
Laboratory Reference: 1309-251
Project: 5364-013-05

**ORGANOCHLORINE PESTICIDES EPA 8081B**

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | PQL | Method | Date Prepared | Date Analyzed | Flags |
|---|---|---|---|---|---|---|
| **Client ID:** | **GEI-MW9** | | | | | |
| Laboratory ID: | 09-251-01 | | | | | |
| Heptachlor | **ND** | 0.010 | EPA 8081B | 9-30-13 | 9-30-13 | |
| Aldrin | **0.056** | 0.010 | EPA 8081B | 9-30-13 | 9-30-13 | |
| Heptachlor Epoxide | **ND** | 0.010 | EPA 8081B | 9-30-13 | 9-30-13 | |
| Dieldrin | **ND** | 0.010 | EPA 8081B | 9-30-13 | 9-30-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *65* | *39-93* | | | | |
| *DCB* | *52* | *31-108* | | | | |
| **Client ID:** | **GEI-MW10** | | | | | |
| Laboratory ID: | 09-251-02 | | | | | |
| Heptachlor | **ND** | 0.0047 | EPA 8081B | 9-30-13 | 10-3-13 | |
| Aldrin | **ND** | 0.0047 | EPA 8081B | 9-30-13 | 10-3-13 | |
| Heptachlor Epoxide | **ND** | 0.0047 | EPA 8081B | 9-30-13 | 10-3-13 | |
| Dieldrin | **ND** | 0.0047 | EPA 8081B | 9-30-13 | 10-3-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *92* | *39-93* | | | | |
| *DCB* | *48* | *31-108* | | | | |
| **Client ID:** | **GEI-MW11** | | | | | |
| Laboratory ID: | 09-251-03 | | | | | |
| Heptachlor | **ND** | 0.0048 | EPA 8081B | 9-30-13 | 9-30-13 | |
| Aldrin | **ND** | 0.0048 | EPA 8081B | 9-30-13 | 9-30-13 | |
| Heptachlor Epoxide | **ND** | 0.0048 | EPA 8081B | 9-30-13 | 9-30-13 | |
| Dieldrin | **ND** | 0.0048 | EPA 8081B | 9-30-13 | 9-30-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *46* | *39-93* | | | | |
| *DCB* | *44* | *31-108* | | | | |
| **Client ID:** | **GEI-MW12** | | | | | |
| Laboratory ID: | 09-251-04 | | | | | |
| Heptachlor | **ND** | 0.0047 | EPA 8081B | 9-30-13 | 10-1-13 | |
| Aldrin | **ND** | 0.0047 | EPA 8081B | 9-30-13 | 10-1-13 | |
| Heptachlor Epoxide | **ND** | 0.0047 | EPA 8081B | 9-30-13 | 10-1-13 | |
| Dieldrin | **ND** | 0.0047 | EPA 8081B | 9-30-13 | 10-1-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *46* | *39-93* | | | | |
| *DCB* | *41* | *31-108* | | | | |

Date of Report: October 4, 2013
Samples Submitted: September 26, 2013
Laboratory Reference: 1309-251
Project: 5364-013-05

**ORGANOCHLORINE PESTICIDES EPA 8081B**

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | PQL | Method | Date Prepared | Date Analyzed | Flags |
|---|---|---|---|---|---|---|
| **Client ID:** | **DUP-09262013** | | | | | |
| Laboratory ID: | 09-251-05 | | | | | |
| Heptachlor | **ND** | 0.0048 | EPA 8081B | 9-30-13 | 10-1-13 | |
| Aldrin | **ND** | 0.0048 | EPA 8081B | 9-30-13 | 10-1-13 | |
| Heptachlor Epoxide | **ND** | 0.0048 | EPA 8081B | 9-30-13 | 10-1-13 | |
| Dieldrin | **ND** | 0.0048 | EPA 8081B | 9-30-13 | 10-1-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *40* | *39-93* | | | | |
| *DCB* | *52* | *31-108* | | | | |

Date of Report: October 4, 2013
Samples Submitted: September 26, 2013
Laboratory Reference: 1309-251
Project: 5364-013-05

**CHLORINATED ACID HERBICIDES EPA 8151A**

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | PQL | Method | Date Prepared | Date Analyzed | Flags |
|---|---|---|---|---|---|---|
| **Client ID:** | **GEI-MW9** | | | | | |
| Laboratory ID: | 09-251-01 | | | | | |
| MCPA | **24** | 7.5 | EPA 8151A | 9-30-13 | 9-30-13 | P (134%) |
| 2,4-D | **0.88** | 0.050 | EPA 8151A | 9-30-13 | 9-30-13 | |
| Bentazon | **36** | 10 | EPA 8151A | 9-30-13 | 10-3-13 | |
| Dinoseb | **ND** | 0.051 | EPA 8151A | 9-30-13 | 9-30-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *65* | *30-96* | | | | |
| **Client ID:** | **GEI-MW10** | | | | | |
| Laboratory ID: | 09-251-02 | | | | | |
| MCPA | **ND** | 6.7 | EPA 8151A | 9-30-13 | 9-30-13 | |
| 2,4-D | **37** | 0.90 | EPA 8151A | 9-30-13 | 10-3-13 | |
| Bentazon | **7.3** | 4.5 | EPA 8151A | 9-30-13 | 10-3-13 | P (191%) |
| Dinoseb | **34** | 0.90 | EPA 8151A | 9-30-13 | 10-3-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *35* | *30-96* | | | | |
| **Client ID:** | **GEI-MW11** | | | | | |
| Laboratory ID: | 09-251-03 | | | | | |
| MCPA | **ND** | 6.7 | EPA 8151A | 9-30-13 | 9-30-13 | |
| 2,4-D | **13** | 0.45 | EPA 8151A | 9-30-13 | 10-3-13 | |
| Bentazon | **1.0** | 0.45 | EPA 8151A | 9-30-13 | 9-30-13 | P (194%) |
| Dinoseb | **1.1** | 0.045 | EPA 8151A | 9-30-13 | 9-30-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *50* | *30-96* | | | | |
| **Client ID:** | **GEI-MW12** | | | | | |
| Laboratory ID: | 09-251-04 | | | | | |
| MCPA | **ND** | 6.7 | EPA 8151A | 9-30-13 | 9-30-13 | |
| 2,4-D | **0.51** | 0.045 | EPA 8151A | 9-30-13 | 9-30-13 | |
| Bentazon | **ND** | 0.45 | EPA 8151A | 9-30-13 | 9-30-13 | |
| Dinoseb | **1.4** | 0.045 | EPA 8151A | 9-30-13 | 9-30-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *33* | *30-96* | | | | |
| **Client ID:** | **DUP-09262013** | | | | | |
| Laboratory ID: | 09-251-05 | | | | | |
| MCPA | **ND** | 6.7 | EPA 8151A | 9-30-13 | 9-30-13 | |
| 2,4-D | **0.49** | 0.045 | EPA 8151A | 9-30-13 | 9-30-13 | |
| Bentazon | **ND** | 0.45 | EPA 8151A | 9-30-13 | 9-30-13 | |
| Dinoseb | **2.3** | 0.045 | EPA 8151A | 9-30-13 | 9-30-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *51* | *30-96* | | | | |

Date of Report: October 4, 2013
Samples Submitted: September 26, 2013
Laboratory Reference: 1309-251
Project: 5364-013-05

**ORGANOCHLORINE PESTICIDES EPA 8081B METHOD BLANK QUALITY CONTROL**

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | PQL | Method | Date Prepared | Date Analyzed | Flags |
|---|---|---|---|---|---|---|
| **METHOD BLANK** | | | | | | |
| Laboratory ID: | MB0930W1 | | | | | |
| Heptachlor | **ND** | 0.0050 | EPA 8081B | 9-30-13 | 9-30-13 | |
| Aldrin | **ND** | 0.0050 | EPA 8081B | 9-30-13 | 9-30-13 | |
| Heptachlor Epoxide | **ND** | 0.0050 | EPA 8081B | 9-30-13 | 9-30-13 | |
| Dieldrin | **ND** | 0.0050 | EPA 8081B | 9-30-13 | 9-30-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *60* | *39-93* | | | | |
| *DCB* | *78* | *31-108* | | | | |

Date of Report: October 4, 2013
Samples Submitted: September 26, 2013
Laboratory Reference: 1309-251
Project: 5364-013-05

**ORGANOCHLORINE PESTICIDES EPA 8081B SB/SBD QUALITY CONTROL**

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | | Spike Level | | Source Result | Percent Recovery | | Recovery Limits | RPD | RPD Limit | Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SPIKE BLANKS** | | | | | | | | | | | |
| Laboratory ID: | SB0930W1 | | | | | | | | | | |
| | SB | SBD | SB | SBD | | SB | SBD | | | | |
| Heptachlor | **0.0375** | **0.0380** | 0.0500 | 0.0500 | N/A | **75** | **76** | 50-124 | 1 | 15 | |
| Aldrin | **0.0375** | **0.0382** | 0.0500 | 0.0500 | N/A | **75** | **76** | 43-133 | 2 | 15 | |
| Dieldrin | **0.0982** | **0.0986** | 0.125 | 0.125 | N/A | **79** | **79** | 48-128 | 0 | 15 | |
| Surrogate: | | | | | | | | | | | |
| *TCMX* | | | | | | *75* | *81* | *39-93* | | | |
| *DCB* | | | | | | *87* | *86* | *31-108* | | | |

Date of Report: October 4, 2013
Samples Submitted: September 26, 2013
Laboratory Reference: 1309-251
Project: 5364-013-05

**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: | MB0930W2 | | | | | |
| MCPA | **ND** | 7.0 | EPA 8151A | 9-30-13 | 9-30-13 | |
| 2,4-D | **ND** | 0.047 | EPA 8151A | 9-30-13 | 9-30-13 | |
| Bentazon | **ND** | 0.47 | EPA 8151A | 9-30-13 | 9-30-13 | |
| Dinoseb | **ND** | 0.047 | EPA 8151A | 9-30-13 | 9-30-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *54* | *30-96* | | | | |

| Analyte | Result | | Spike Level | | Source Result | Percent Recovery | | Recovery Limits | RPD | RPD Limit | Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SPIKE BLANKS** | | | | | | | | | | | |
| Laboratory ID: | SB0930W2 | | | | | | | | | | |
| | SB | SBD | SB | SBD | | SB | SBD | | | | |
| 2,4-D | **0.400** | **0.442** | 1.00 | 1.00 | N/A | **40** | **44** | 35-75 | 10 | 17 | |
| Dinoseb | **0.538** | **0.496** | 1.00 | 1.00 | N/A | **54** | **50** | 26-120 | 8 | 16 | |
| *Surrogate:* | | | | | | | | | | | |
| *DCAA* | | | | | | *68* | *68* | *30-96* | | | |

OnSite Environmental Inc.

**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-napthalene) 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

# Chain of Custody

Page 1 of 1

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

Company: GEOENGINEERS
Project Number: 5364-013-05
Project Name: TAXIWAY F SITE
Project Manager: ROBERT TRAHAN
Sampled by: ABHIJIT/NATE

**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:** 09-251

| Lab ID | Sample Identification | Date Sampled | Time Sampled | Matrix | Number of Containers | NWTPH-HCID | NWTPH-Gx/BTEX | NWTPH-Gx | NWTPH-Dx | Volatiles 8260C | Halogenated Volatiles 8260C | 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/ MTCA Metals (circle one) | TCLP Metals | HEM (oil and grease) 1664A | Dinoseb, MCPA | Aldrin, Dieldrin | Heptachlor | Heptachlor Epoxide | 2,4-D, Benzen | % Moisture |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | GEI-MW9 | 9/26/13 | 840 | WATER | 2 | | | | | | | | | | | | | | | | X | X | X | X | X | |
| 2 | GEI-MW10 | | 920 | | 4 | | | | | | | | | | | | | | | | | | | | | |
| 3 | GEI-MW11 | | 855 | | 4 | | | | | | | | | | | | | | | | | | | | | |
| 4 | GEI-MW12 | | 945 | | 4 | | | | | | | | | | | | | | | | | | | | | |
| 5 | DUP-09262013 | | 950 | | 4 | | | | | | | | | | | | | | | | | | | | | |

| | Signature | Company | Date | Time |
|---|---|---|---|---|
| Relinquished | | GEI | 9/26/13 | 1528 |
| Received | | CDE | 9/26/13 | 1528 |
| Relinquished | | | | |
| Received | | | | |
| Relinquished | | | | |
| Received | | | | |

**Comments/Special Instructions**

Reviewed/Date

Reviewed/Date

Chromatograms with final report ☐

Data Package: Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ _____

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

November 27, 2013

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

Re: Analytical Data for Project 5364-013-05
Laboratory Reference No. 1306-240

Dear Robert:

Enclosed are the analytical results and associated quality control data for samples submitted on June 26, 2013.

**Please note that this is a *revised* report and replaces the original dated July 17, 2013, due to changes made to the analytical results.**

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,

David Baumeister
Project Manager

Enclosures

Pacific Agricultural Laboratory
12505 N.W. Cornell Rd. • Portland, OR 97229-5651 • Ph 503.626.7943 • Fx 503.641.0644

**OnSite Environmental, Inc.**
14648 NE 95th Street
Redmond, WA 98052

**Report Number:** P130707
**Report Date:** November 26, 2013
**Client Project ID:** 5364-013-05

# Analytical Report

**Client Sample ID:** MW-9
**Matrix:** water

**PAL Sample ID:** P130707-01
**Sample Date:** 6/26/13

| Extraction Date | Analysis Date | Analyte | Amount Detected | Limit of Quantitation | Notes |
|---|---|---|---|---|---|
| **Method:** EPA Method 8321B, Phenoxy Herbicides (HPLC-MS) | | | | | |
| 7/02/13 | 7/5/13 | 2,4-D | 0.92 ug/L | 0.40 ug/L | |
| 7/02/13 | 7/5/13 | Bentazon | 210 ug/L | 8.0 ug/L | |
| 7/02/13 | 7/5/13 | Dinoseb | Not Detected | 0.080 ug/L | |
| 7/02/13 | 7/5/13 | MCPA | Not Detected | 0.080 ug/L | |
| **Surrogate Recovery:** 17 % | | | | | S2 |
| **Surrogate Recovery Range:** 22-111 | | | | | |
| (DCPAA used as Surrogate) | | | | | |
| **Method:** Modified EPA 8081B (GC-ECD) | | | | | |
| 7/02/13 | 7/9/13 | Aldrin | Not Detected | 0.060 ug/L | |
| 7/02/13 | 7/9/13 | Dieldrin | Not Detected | 0.060 ug/L | |
| 7/02/13 | 7/9/13 | Heptachlor | Not Detected | 0.060 ug/L | |
| 7/02/13 | 7/9/13 | Heptachlor epoxide | Not Detected | 0.060 ug/L | |
| **Surrogate Recovery:** 78 % | | | | | |
| **Surrogate Recovery Range:** 32-160 | | | | | |
| (DCBP used as Surrogate) | | | | | |

Rick Jordan, Laboratory Manager

Pacific Agricultural Laboratory
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**OnSite Environmental, Inc.**
14648 NE 95th Street
Redmond, WA 98052

**Report Number:** P130707
**Report Date:** November 26, 2013
**Client Project ID:** 5364-013-05

# Analytical Report

**Client Sample ID:** MW-10
**Matrix:** water

**PAL Sample ID:** P130707-02
**Sample Date:** 6/26/13

| Extraction Date | Analysis Date | Analyte | Amount Detected | Limit of Quantitation | Notes |
|---|---|---|---|---|---|
| **Method:** EPA Method 8321B, Phenoxy Herbicides (HPLC-MS) | | | | | |
| 7/02/13 | 7/6/13 | 2,4-D | 10 ug/L | 0.40 ug/L | |
| 7/02/13 | 7/6/13 | Bentazon | 120 ug/L | 8.0 ug/L | |
| 7/02/13 | 7/6/13 | Dinoseb | 260 ug/L | 8.0 ug/L | |
| 7/02/13 | 7/6/13 | MCPA | Not Detected | 0.40 ug/L | RL1 |
| **Surrogate Recovery:** 42 % | | | | | |
| **Surrogate Recovery Range:** 22-111 | | | | | |
| (DCPAA used as Surrogate) | | | | | |
| **Method:** Modified EPA 8081B (GC-ECD) | | | | | |
| 7/02/13 | 7/9/13 | Aldrin | Not Detected | 0.060 ug/L | |
| 7/02/13 | 7/9/13 | Dieldrin | Not Detected | 0.060 ug/L | |
| 7/02/13 | 7/9/13 | Heptachlor | Not Detected | 0.060 ug/L | |
| 7/02/13 | 7/9/13 | Heptachlor epoxide | Not Detected | 0.060 ug/L | |
| **Surrogate Recovery:** 91 % | | | | | |
| **Surrogate Recovery Range:** 32-160 | | | | | |
| (DCBP used as Surrogate) | | | | | |

Rick Jordan, Laboratory Manager

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**OnSite Environmental, Inc.**
14648 NE 95th Street
Redmond, WA 98052

**Report Number:** P130707
**Report Date:** November 26, 2013
**Client Project ID:** 5364-013-05

# Analytical Report

**Client Sample ID:** MW-11
**Matrix:** water

**PAL Sample ID:** P130707-03
**Sample Date:** 6/26/13

| Extraction Date | Analysis Date | Analyte | Amount Detected | Limit of Quantitation | Notes |
|---|---|---|---|---|---|
| **Method:** EPA Method 8321B, Phenoxy Herbicides (HPLC-MS) | | | | | |
| 7/02/13 | 7/6/13 | 2,4-D | Not Detected | 0.40 ug/L | RL1 |
| 7/02/13 | 7/6/13 | Bentazon | 2.2 ug/L | 0.40 ug/L | |
| 7/02/13 | 7/6/13 | Dinoseb | 3.7 ug/L | 0.40 ug/L | |
| 7/02/13 | 7/6/13 | MCPA | Not Detected | 0.40 ug/L | RL1 |
| **Surrogate Recovery:** 88 % | | | | | |
| **Surrogate Recovery Range:** 22-111 | | | | | |
| (DCPAA used as Surrogate) | | | | | |
| **Method:** Modified EPA 8081B (GC-ECD) | | | | | |
| 7/02/13 | 7/9/13 | Aldrin | Not Detected | 0.060 ug/L | |
| 7/02/13 | 7/9/13 | Dieldrin | Not Detected | 0.060 ug/L | |
| 7/02/13 | 7/9/13 | Heptachlor | Not Detected | 0.060 ug/L | |
| 7/02/13 | 7/9/13 | Heptachlor epoxide | Not Detected | 0.060 ug/L | |
| **Surrogate Recovery:** 86 % | | | | | |
| **Surrogate Recovery Range:** 32-160 | | | | | |
| (DCBP used as Surrogate) | | | | | |

Rick Jordan, Laboratory Manager

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**OnSite Environmental, Inc.**
14648 NE 95th Street
Redmond, WA 98052

**Report Number:** P130707
**Report Date:** November 26, 2013
**Client Project ID:** 5364-013-05

# Analytical Report

**Client Sample ID:** MW-12
**Matrix:** water

**PAL Sample ID:** P130707-04
**Sample Date:** 6/26/13

| Extraction Date | Analysis Date | Analyte | Amount Detected | Limit of Quantitation | Notes |
|---|---|---|---|---|---|
| **Method:** EPA Method 8321B, Phenoxy Herbicides (HPLC-MS) | | | | | |
| 7/02/13 | 7/6/13 | 2,4-D | Not Detected | 0.080 ug/L | |
| 7/02/13 | 7/6/13 | Bentazon | 17 ug/L | 4.0 ug/L | |
| 7/02/13 | 7/6/13 | Dinoseb | 38 ug/L | 4.0 ug/L | |
| 7/02/13 | 7/6/13 | MCPA | 0.56 ug/L | 0.40 ug/L | |
| **Surrogate Recovery:** 33 % | | | | | |
| **Surrogate Recovery Range:** 22-111 | | | | | |
| (DCPAA used as Surrogate) | | | | | |
| **Method:** Modified EPA 8081B (GC-ECD) | | | | | |
| 7/02/13 | 7/9/13 | Aldrin | Not Detected | 0.060 ug/L | |
| 7/02/13 | 7/9/13 | Dieldrin | Not Detected | 0.060 ug/L | |
| 7/02/13 | 7/9/13 | Heptachlor | Not Detected | 0.060 ug/L | |
| 7/02/13 | 7/9/13 | Heptachlor epoxide | Not Detected | 0.060 ug/L | |
| **Surrogate Recovery:** 80 % | | | | | |
| **Surrogate Recovery Range:** 32-160 | | | | | |
| (DCBP used as Surrogate) | | | | | |

Rick Jordan, Laboratory Manager

Pacific Agricultural Laboratory
12505 N.W. Cornell Rd. • Portland, OR 97229-5651 • Ph 503.626.7943 • Fx 503.641.0644

**OnSite Environmental, Inc.**
14648 NE 95th Street
Redmond, WA 98052

**Report Number:** P130707
**Report Date:** November 26, 2013
**Client Project ID:** 5364-013-05

# Analytical Report

**Client Sample ID:** DUP-062613
**Matrix:** water

**PAL Sample ID:** P130707-05
**Sample Date:** 6/26/13

| Extraction Date | Analysis Date | Analyte | Amount Detected | Limit of Quantitation | Notes |
|---|---|---|---|---|---|
| **Method:** EPA Method 8321B, Phenoxy Herbicides (HPLC-MS) | | | | | |
| 7/02/13 | 7/6/13 | 2,4-D | Not Detected | 0.080 ug/L | |
| 7/02/13 | 7/6/13 | Bentazon | 19 ug/L | 4.0 ug/L | |
| 7/02/13 | 7/6/13 | Dinoseb | 44 ug/L | 4.0 ug/L | |
| 7/02/13 | 7/6/13 | MCPA | 0.59 ug/L | 0.40 ug/L | |
| **Surrogate Recovery:** 36 % | | | | | |
| **Surrogate Recovery Range:** 22-111 | | | | | |
| (DCPAA used as Surrogate) | | | | | |
| **Method:** Modified EPA 8081B (GC-ECD) | | | | | |
| 7/02/13 | 7/9/13 | Aldrin | Not Detected | 0.060 ug/L | |
| 7/02/13 | 7/9/13 | Dieldrin | Not Detected | 0.060 ug/L | |
| 7/02/13 | 7/9/13 | Heptachlor | Not Detected | 0.060 ug/L | |
| 7/02/13 | 7/9/13 | Heptachlor epoxide | Not Detected | 0.060 ug/L | |
| **Surrogate Recovery:** 81 % | | | | | |
| **Surrogate Recovery Range:** 32-160 | | | | | |
| (DCBP used as Surrogate) | | | | | |

Rick Jordan, Laboratory Manager

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Redmond, WA 98052

**Report Number:** P130707
**Report Date:** November 26, 2013
**Client Project ID:** 5364-013-05

# Quality Assurance

**Method Blank Data** **Matrix:** water

| Extraction Date | Analysis Date | Batch QC Sample # | Analyte | % Recovery | Expected % Recovery | Notes |
|---|---|---|---|---|---|---|
| 7/2/13 | 7/8/13 | 3070201-BLK1 | Aldrin | Not Detected | < 0.060 ug/L | |
| 7/2/13 | 7/8/13 | 3070201-BLK1 | Dieldrin | Not Detected | < 0.060 ug/L | |
| 7/2/13 | 7/8/13 | 3070201-BLK1 | Heptachlor | Not Detected | < 0.060 ug/L | |
| 7/2/13 | 7/8/13 | 3070201-BLK1 | Heptachlor epoxide | Not Detected | < 0.060 ug/L | |

**Method Blank Data** **Matrix:** water

| Extraction Date | Analysis Date | Batch QC Sample # | Analyte | % Recovery | Expected % Recovery | Notes |
|---|---|---|---|---|---|---|
| 7/2/13 | 7/6/13 | 3070202-BLK1 | 2,4-D | Not Detected | < 0.080 ug/L | |
| 7/2/13 | 7/6/13 | 3070202-BLK1 | Bentazon | Not Detected | < 0.080 ug/L | |
| 7/2/13 | 7/6/13 | 3070202-BLK1 | Dinoseb | Not Detected | < 0.080 ug/L | |
| 7/2/13 | 7/6/13 | 3070202-BLK1 | MCPA | Not Detected | < 0.080 ug/L | |

Rick Jordan, Laboratory Manager

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Redmond, WA 98052

**Report Number:** P130707
**Report Date:** November 26, 2013
**Client Project ID:** 5364-013-05

**Blank Spike Data** **Matrix:** water

| Extraction Date | Analysis Date | Batch QC Sample # | Analyte | % Recovery | Expected % Recovery | Notes |
|---|---|---|---|---|---|---|
| 7/2/13 | 7/8/13 | 3070201-BS1 | Aldrin | 67 | 58-110 | |
| 7/2/13 | 7/8/13 | 3070201-BSD1 | Aldrin | 68 | 58-110 | |
| 7/2/13 | 7/8/13 | 3070201-BS1 | Dieldrin | 84 | 44-162 | |
| 7/2/13 | 7/8/13 | 3070201-BSD1 | Dieldrin | 87 | 44-162 | |
| 7/2/13 | 7/8/13 | 3070201-BS1 | Heptachlor | 66 | 63-126 | |
| 7/2/13 | 7/8/13 | 3070201-BSD1 | Heptachlor | 66 | 63-126 | |
| 7/2/13 | 7/8/13 | 3070201-BS1 | Heptachlor epoxide | 82 | 40-120 | |
| 7/2/13 | 7/8/13 | 3070201-BSD1 | Heptachlor epoxide | 86 | 40-120 | |

**Blank Spike Data** **Matrix:** water

| Extraction Date | Analysis Date | Batch QC Sample # | Analyte | % Recovery | Expected % Recovery | Notes |
|---|---|---|---|---|---|---|
| 7/2/13 | 7/16/13 | 3070202-BS1 | 2,4-D | 111 | 41-133 | |
| 7/2/13 | 7/16/13 | 3070202-BSD1 | 2,4-D | 121 | 41-133 | |
| 7/2/13 | 7/16/13 | 3070202-BS1 | Bentazon | 97 | 46-122 | |
| 7/2/13 | 7/16/13 | 3070202-BSD1 | Bentazon | 104 | 46-122 | |
| 7/2/13 | 7/16/13 | 3070202-BS1 | Dinoseb | 93 | 23-110 | |
| 7/2/13 | 7/16/13 | 3070202-BSD1 | Dinoseb | 106 | 23-110 | |
| 7/2/13 | 7/16/13 | 3070202-BS1 | MCPA | 100 | 34-113 | |
| 7/2/13 | 7/16/13 | 3070202-BSD1 | MCPA | 111 | 34-113 | |

## Analyte Information

Method: EPA Method 8321B, Phenoxy Herbicides (HPLC-MS)
Chlorinated acids were converted to free acids. Residues were quantitated as free acids.

## Project Notes

| Notes | Definition |
|---|---|
| S2 | Surrogate recovery is outside of control limits. |
| RL1 | Method reporting limit raised due to the complexity of the sample matrix. |

Rick Jordan, Laboratory Manager

130707

Page 1 of 1

**OnSite Environmental Inc.**

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

Subcontract Laboratory: Pacific Ag

Attention: _____

Address: _____

Phone Number: _____

Date/Time: _____

Turnaround Request:

1 Day 2 Day 3 Day

(Standard)

Other: _____

Laboratory Reference #: 06-240

Project Manager: David Baumeister

email: dbaumeister@onsite-env.com

Project Number: 5364-013-05

Project Name: _____

| Lab ID | Sample Identification | Date Sampled | Time Sampled | Matrix | # of Cont | Requested Analysis |
|---|---|---|---|---|---|---|
| | MW-9 PAL-130707-01 | 6/26/13 | 1200 | L | 2 | Dinoseb, Bentazon, Heptachlor, Aldrin, Heptachlor Epoxide, Dieldrin, MCPA, 2,4-D |
| | MW-10 02 | | 1215 | | | |
| | MW-11 03 | | 1230 | | | |
| | MW-12 -04 | | 1245 | | | |
| | DUP-062613 -05 | | 1246 | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| | Signature | Company | Date | Time | Comments/Special Instructions |
|---|---|---|---|---|---|
| Relinquished by: | | OSE | 6/27/13 | 1600 | EDDs RUSH |
| Received by: | Sara McDonnell | UPS | | | |
| Relinquished by: | | UPS | | | |
| Received by: | Sara McDonnell | PAL | 6/28/13 | 1240 | |
| Relinquished by: | | | | | |
| Received by: | | | | | |

# Chain of Custody

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



Company: GeoEngineers
Project Number: 5364-013-05
Project Name: Taxiway F
Project Manager: Robert Trahn
Sampled by: RST

**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:** 06-240

| Lab ID | Sample Identification | Date Sampled | Time Sampled | Matrix | Number of Containers | NWTPH-HCID | NWTPH-Gx/BTEX | NWTPH-Gx | NWTPH-Dx | Volatiles 8260C | Halogenated Volatiles 8260C | 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/ MTCA Metals (circle one) | TCLP Metals | HEM (oil and grease) 1664A | Dinoseb | Bentazon | Heptachlor | Aldrin | Heptachlor Epoxide | Dieldrin | MCPA | 2,4-D | % Moisture |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | MW-9 | 6/26/13 | 12:00 | L | 2 | | | | | | | | | | | | | | X | X | X | X | X | X | X | X | X | X | |
| 2 | MW-10 | | 12:15 | | 1 | | | | | | | | | | | | | | X | X | X | X | X | X | X | X | X | X | |
| 3 | MW-11 | | 12:30 | | | | | | | | | | | | | | | | X | X | X | X | X | X | X | X | X | X | |
| 4 | MW-12 | | 12:45 | | | | | | | | | | | | | | | | X | X | X | X | X | X | X | X | X | X | |
| 5 | Dup-062613 | | 12:46 | | | | | | | | | | | | | | | | X | X | X | X | X | X | X | X | X | X | |

| | Signature | Company | Date | Time |
|---|---|---|---|---|
| Relinquished | | GEI | 6/26/13 | 15:50 |
| Received | | OASE | 6/26/13 | 1550 |
| Relinquished | | | | |
| Received | | | | |
| Relinquished | | | | |
| Received | | | | |
| Reviewed/Date | | Reviewed/Date | | |

**Comments/Special Instructions**

To Pacific AG
Steve Thun

Chromatograms with final report ☐

Data Package: Level III ☐ Level IV ☐

Electronic Data Deliverables (EDDs) ☒ _____

OnSite Environmental Inc.

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

April 19, 2013

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

Re: Analytical Data for Project 5364-013-05
Laboratory Reference No. 1303-217B

Dear Robert:

Enclosed are the analytical results and associated quality control data for samples submitted on March 26, 2013.

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,

David Baumeister
Project Manager

Enclosures

Date of Report: April 19, 2013
Samples Submitted: March 26, 2013
Laboratory Reference: 1303-217B
Project: 5364-013-05

**Case Narrative**

Samples were collected on March 26, 2013 and received by the laboratory on March 26, 2013. They were maintained at the laboratory at a temperature of 2°C to 6°C.

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.

Chlorinated Acid Herbicides EPA 8151A Analysis

Client requested re-analysis of the samples GEI-MW-9, GEI-MW10, and GEI-MW11 fourteen days outside of holding time. Due to limited volume, only 500 mL of sample GEI-MW10 was extracted. Samples were filtered through a .45um filter paper per client's request prior to extraction.

Organochlorine Pesticides by EPA 8081B Analysis

Client requested re-analysis of the samples GEI-MW-9, GEI-MW10, and GEI-MW11 thirteen days outside of holding time. Due to limited volume, only 500 mL of sample GEI-MW10 was extracted. Samples were filtered through a .45um filter paper per client's request prior to extraction.

**Please note that any other QA/QC issues associated with these extractions and analyses will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.**

Date of Report: April 19, 2013
Samples Submitted: March 26, 2013
Laboratory Reference: 1303-217B
Project: 5364-013-05

**ANALYTICAL REPORT FOR SAMPLES**

| Client ID | Laboratory ID | Matrix | Date Sampled | Date Received | Notes |
|---|---|---|---|---|---|
| GEI-MW9 | 03-217-01 | Water | 3-26-13 | 3-26-13 | |
| GEI-MW10 | 03-217-02 | Water | 3-26-13 | 3-26-13 | |
| GEI-MW11 | 03-217-03 | Water | 3-26-13 | 3-26-13 | |

Date of Report: April 19, 2013
Samples Submitted: March 26, 2013
Laboratory Reference: 1303-217B
Project: 5364-013-05

**CHLORINATED ACID HERBICIDES by EPA 8151A**

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | PQL | Method | Date Prepared | Date Analyzed | Flags |
|---|---|---|---|---|---|---|
| **Client ID:** | **GEI-MW9** | | | | | |
| Laboratory ID: | 03-217-01 | | | | | |
| MCPA | **53** | 5.5 | EPA 8151A | 4-16-13 | 4-18-13 | P (74%) |
| 2,4-D | **1.0** | 0.028 | EPA 8151A | 4-16-13 | 4-18-13 | |
| Bentazon | **33** | 17 | EPA 8151A | 4-16-13 | 4-18-13 | |
| Dinoseb | **0.66** | 0.028 | EPA 8151A | 4-16-13 | 4-18-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *47* | *30-98* | | | | |
| **Client ID:** | **GEI-MW10** | | | | | |
| Laboratory ID: | 03-217-02 | | | | | |
| MCPA | **140** | 8.8 | EPA 8151A | 4-16-13 | 4-18-13 | P (61%) |
| 2,4-D | **110** | 0.88 | EPA 8151A | 4-16-13 | 4-18-13 | |
| Bentazon | **25** | 14 | EPA 8151A | 4-16-13 | 4-18-13 | P (176%) |
| Dinoseb | **70** | 0.90 | EPA 8151A | 4-16-13 | 4-18-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *40* | *30-98* | | | | |
| **Client ID:** | **GEI-MW11** | | | | | |
| Laboratory ID: | 03-217-03 | | | | | |
| MCPA | **300** | 4.6 | EPA 8151A | 4-16-13 | 4-18-13 | |
| 2,4-D | **35** | 0.46 | EPA 8151A | 4-16-13 | 4-18-13 | |
| Bentazon | **ND** | 1.4 | EPA 8151A | 4-16-13 | 4-18-13 | |
| Dinoseb | **1.1** | 0.023 | EPA 8151A | 4-16-13 | 4-18-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *55* | *30-98* | | | | |

Date of Report: April 19, 2013
Samples Submitted: March 26, 2013
Laboratory Reference: 1303-217B
Project: 5364-013-05

**ORGANOCHLORINE PESTICIDES by EPA 8081B**

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | PQL | Method | Date Prepared | Date Analyzed | Flags |
|---|---|---|---|---|---|---|
| **Client ID:** | **GEI-MW9** | | | | | |
| Laboratory ID: | 03-217-01 | | | | | |
| Heptachlor | **ND** | 0.0048 | EPA 8081B | 4-15-13 | 4-17-13 | Z |
| Aldrin | **0.029** | 0.0048 | EPA 8081B | 4-15-13 | 4-17-13 | Z, P (116%) |
| Heptachlor Epoxide | **0.014** | 0.0048 | EPA 8081B | 4-15-13 | 4-17-13 | Z, P (63%) |
| Dieldrin | **0.0064** | 0.0048 | EPA 8081B | 4-15-13 | 4-17-13 | Z, P (141%) |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *44* | *34-88* | | | | |
| *DCB* | *63* | *48-115* | | | | |
| **Client ID:** | **GEI-MW10** | | | | | |
| Laboratory ID: | 03-217-02 | | | | | |
| Heptachlor | **ND** | 0.010 | EPA 8081B | 4-15-13 | 4-17-13 | Z |
| Aldrin | **ND** | 0.010 | EPA 8081B | 4-15-13 | 4-17-13 | Z |
| Heptachlor Epoxide | **ND** | 0.010 | EPA 8081B | 4-15-13 | 4-17-13 | Z |
| Dieldrin | **ND** | 0.010 | EPA 8081B | 4-15-13 | 4-17-13 | Z |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *43* | *34-88* | | | | |
| *DCB* | *71* | *48-115* | | | | |
| **Client ID:** | **GEI-MW11** | | | | | |
| Laboratory ID: | 03-217-03 | | | | | |
| Heptachlor | **ND** | 0.0048 | EPA 8081B | 4-15-13 | 4-17-13 | Z |
| Aldrin | **ND** | 0.0048 | EPA 8081B | 4-15-13 | 4-17-13 | Z |
| Heptachlor Epoxide | **0.28** | 0.0048 | EPA 8081B | 4-15-13 | 4-17-13 | Z, P (165%) |
| Dieldrin | **ND** | 0.0048 | EPA 8081B | 4-15-13 | 4-17-13 | Z |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *35* | *34-88* | | | | |
| *DCB* | *72* | *48-115* | | | | |

Date of Report: April 19, 2013
Samples Submitted: March 26, 2013
Laboratory Reference: 1303-217B
Project: 5364-013-05

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

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | PQL | Method | Date Prepared | Date Analyzed | Flags |
|---|---|---|---|---|---|---|
| **METHOD BLANK** | | | | | | |
| Laboratory ID: | MB0416W1 | | | | | |
| MCPA | **ND** | 4.7 | EPA 8151A | 4-16-13 | 4-18-13 | |
| 2,4-D | **ND** | 0.024 | EPA 8151A | 4-16-13 | 4-18-13 | |
| Bentazon | **ND** | 1.4 | EPA 8151A | 4-16-13 | 4-18-13 | |
| Dinoseb | **ND** | 0.024 | EPA 8151A | 4-16-13 | 4-18-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *43* | *30-98* | | | | |

| Analyte | Result | | Spike Level | | Source Result | Percent Recovery | | Recovery Limits | RPD | RPD Limit | Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SPIKE BLANKS** | | | | | | | | | | | |
| Laboratory ID: | SB0416W1 | | | | | | | | | | |
| | SB | SBD | SB | SBD | | SB | SBD | | | | |
| 2,4-D | **0.431** | **0.452** | 1.00 | 1.00 | N/A | **43** | **45** | 30-81 | 5 | 17 | |
| Dinoseb | **0.499** | **0.477** | 1.00 | 1.00 | N/A | **50** | **48** | 35-116 | 5 | 16 | |
| *Surrogate:* | | | | | | | | | | | |
| *DCAA* | | | | | | *57* | *57* | *30-98* | | | |

Date of Report: April 19, 2013
Samples Submitted: March 26, 2013
Laboratory Reference: 1303-217B
Project: 5364-013-05

**ORGANOCHLORINE PESTICIDES by EPA 8081B QUALITY CONTROL**

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | PQL | Method | Date Prepared | Date Analyzed | Flags |
|---|---|---|---|---|---|---|
| **METHOD BLANK** | | | | | | |
| Laboratory ID: | MB0415W1 | | | | | |
| Heptachlor | **ND** | 0.0048 | EPA 8081B | 4-15-13 | 4-15-13 | |
| Aldrin | **ND** | 0.0048 | EPA 8081B | 4-15-13 | 4-15-13 | |
| Heptachlor Epoxide | **ND** | 0.0048 | EPA 8081B | 4-15-13 | 4-15-13 | |
| Dieldrin | **ND** | 0.0048 | EPA 8081B | 4-15-13 | 4-15-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *66* | *34-88* | | | | |
| *DCB* | *70* | *48-115* | | | | |
| Laboratory ID: | MB0415W1 | | | | | |
| Heptachlor | **ND** | 0.0048 | EPA 8081B | 4-15-13 | 4-17-13 | Z |
| Aldrin | **ND** | 0.0048 | EPA 8081B | 4-15-13 | 4-17-13 | Z |
| Heptachlor Epoxide | **ND** | 0.0048 | EPA 8081B | 4-15-13 | 4-17-13 | Z |
| Dieldrin | **ND** | 0.0048 | EPA 8081B | 4-15-13 | 4-17-13 | Z |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *60* | *34-88* | | | | |
| *DCB* | *62* | *48-115* | | | | |

| Analyte | Result | | Spike Level | | Source Result | Percent Recovery | | Recovery Limits | RPD | RPD Limit | Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SPIKE BLANKS** | | | | | | | | | | | |
| Laboratory ID: | SB0415W1 | | | | | | | | | | |
| | SB | SBD | SB | SBD | | SB | SBD | | | | |
| Heptachlor | **0.0350** | **0.0359** | 0.0475 | 0.0472 | N/A | **74** | **76** | 55-104 | 3 | 15 | |
| Aldrin | **0.0362** | **0.0372** | 0.0475 | 0.0472 | N/A | **76** | **79** | 54-99 | 3 | 15 | |
| Dieldrin | **0.0911** | **0.0927** | 0.119 | 0.118 | N/A | **77** | **79** | 60-100 | 2 | 15 | |
| Surrogate: | | | | | | | | | | | |
| *TCMX* | | | | | | *67* | *69* | *34-88* | | | |
| *DCB* | | | | | | *52* | *74* | *48-115* | | | |

OnSite Environmental Inc.

**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-napthalene) 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.

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 - Sample extract treated with a Florisil clean up procedure.

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

# Chain of Custody

Page 1 of 1

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

**Laboratory Number:** 03-217

Company: GEOENGINEERS
Project Number: 5364-013-05
Project Name: TAXIWAY F SITE
Project Manager: ROBERT TRAHAN
Sampled by: ABHIJIT JOSHI

**Turnaround Request (in working days)**

(Check One)

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

| Lab ID | Sample Identification | Date Sampled | Time Sampled | Matrix | No. of Cont. | NWTPH-HCID | ~~NWTPH-Gx/BTEX~~ HERBICIDES * | ~~NWTPH-Gx~~ OC-PESTICIDES * | NWTPH-Dx | Volatiles 8260B | Halogenated Volatiles 8260B | Semivolatiles 8270D/SIM (with low-level PAHs) | PAHs 8270D/SIM (low-level) | PCBs 8082 | Organochlorine Pesticides 8081A | Organophosphorus Pesticides 8270D/SIM | Chlorinated Acid Herbicides 8151A | Total RCRA Metals | Total MTCA Metals | TCLP Metals | Dinoseb, MCPA | Aldrin, Dieldrin | Heptachlor | Heptachlor Epoxide | 2,4-D, Bentazon | % Moisture |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | GEI-MW9 | 03/26/13 | 1245 | WATER | | | X | X | | | | | | | | | | | | | X | X | X | X | X | |
| 2 | GEI-MW10 | | 1200 | | | | X | X | | | | | | | | | | | | | | | | | | |
| 3 | GEI-MW11 | | 1130 | | | | X | X | | | | | | | | | | | | | | | | | | |
| 4 | GEI-MW12 | | 1015 | | | | X | X | NO DX | | | | | | | | | | | | | | | | | |
| 5 | DUP | ↓ | 1016 | ↓ | | | | | | | | | | | | | | | | | | | | | | |

| | Signature | Company | Date | Time |
|---|---|---|---|---|
| Relinquished | | GEI | 03/26/13 | 1618 |
| Received | | | 3/26/13 | 1618 |
| Relinquished | | | | |
| Received | | | | |
| Relinquished | | | | |
| Received | | | | |
| Reviewed/Date | | Reviewed/Date | | |

**Comments/Special Instructions**

* Filter through a 0.45 um filter
Limited compound list

⊗ Added 4/10/13. DB (STA)

Chromatograms with final report ☐

Data Package: Level III ☐ Level IV ☐

Electronic Data Deliverables (EDDs) ☐ _____

OnSite Environmental Inc.

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

April 8, 2013

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

Re: Analytical Data for Project 5364-013-05
Laboratory Reference No. 1303-217

Dear Robert:

Enclosed are the analytical results and associated quality control data for samples submitted on March 26, 2013.

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,

David Baumeister
Project Manager

Enclosures

Date of Report: April 8, 2013
Samples Submitted: March 26, 2013
Laboratory Reference: 1303-217
Project: 5364-013-05

**Case Narrative**

Samples were collected on March 26, 2013 and received by the laboratory on March 26, 2013. They were maintained at the laboratory at a temperature of 2°C to 6°C.

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 8, 2013
Samples Submitted: March 26, 2013
Laboratory Reference: 1303-217
Project: 5364-013-05

**ANALYTICAL REPORT FOR SAMPLES**

| Client ID | Laboratory ID | Matrix | Date Sampled | Date Received | Notes |
|---|---|---|---|---|---|
| GEI-MW9 | 03-217-01 | Water | 3-26-13 | 3-26-13 | |
| GEI-MW10 | 03-217-02 | Water | 3-26-13 | 3-26-13 | |
| GEI-MW11 | 03-217-03 | Water | 3-26-13 | 3-26-13 | |
| GEI-MW12 | 03-217-04 | Water | 3-26-13 | 3-26-13 | |
| DUP | 03-217-05 | Water | 3-26-13 | 3-26-13 | |

Date of Report: April 8, 2013
Samples Submitted: March 26, 2013
Laboratory Reference: 1303-217
Project: 5364-013-05

**ORGANOCHLORINE PESTICIDES by EPA 8081B**

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | PQL | Method | Date Prepared | Date Analyzed | Flags |
|---|---|---|---|---|---|---|
| **Client ID:** | **GEI-MW9** | | | | | |
| Laboratory ID: | 03-217-01 | | | | | |
| Heptachlor | **ND** | 0.0047 | EPA 8081B | 3-28-13 | 4-7-13 | Z |
| Aldrin | **0.020** | 0.0047 | EPA 8081B | 3-28-13 | 4-7-13 | Z, P (102%) |
| Heptachlor Epoxide | **ND** | 0.0047 | EPA 8081B | 3-28-13 | 4-7-13 | Z |
| Dieldrin | **ND** | 0.0047 | EPA 8081B | 3-28-13 | 4-7-13 | Z |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *48* | *34-88* | | | | |
| *DCB* | *52* | *48-115* | | | | |
| **Client ID:** | **GEI-MW10** | | | | | |
| Laboratory ID: | 03-217-02 | | | | | |
| Heptachlor | **ND** | 0.0048 | EPA 8081B | 4-1-13 | 4-7-13 | Z |
| Aldrin | **ND** | 0.0048 | EPA 8081B | 4-1-13 | 4-7-13 | Z |
| Heptachlor Epoxide | **ND** | 0.0048 | EPA 8081B | 4-1-13 | 4-7-13 | Z |
| Dieldrin | **0.039** | 0.0048 | EPA 8081B | 4-1-13 | 4-7-13 | Z, P (90%) |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *34* | *34-88* | | | | |
| *DCB* | *49* | *48-115* | | | | |
| **Client ID:** | **GEI-MW11** | | | | | |
| Laboratory ID: | 03-217-03 | | | | | |
| Heptachlor | **ND** | 0.0048 | EPA 8081B | 3-28-13 | 4-7-13 | Z |
| Aldrin | **ND** | 0.0048 | EPA 8081B | 3-28-13 | 4-7-13 | Z |
| Heptachlor Epoxide | **0.28** | 0.0048 | EPA 8081B | 3-28-13 | 4-7-13 | Z, P (186%) |
| Dieldrin | **ND** | 0.0048 | EPA 8081B | 3-28-13 | 4-7-13 | Z |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *48* | *34-88* | | | | |
| *DCB* | *54* | *48-115* | | | | |
| **Client ID:** | **GEI-MW12** | | | | | |
| Laboratory ID: | 03-217-04 | | | | | |
| Heptachlor | **ND** | 0.0048 | EPA 8081B | 3-28-13 | 4-7-13 | Z |
| Aldrin | **0.011** | 0.0048 | EPA 8081B | 3-28-13 | 4-7-13 | Z |
| Heptachlor Epoxide | **ND** | 0.0048 | EPA 8081B | 3-28-13 | 4-7-13 | Z |
| Dieldrin | **ND** | 0.0048 | EPA 8081B | 3-28-13 | 4-7-13 | Z |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *58* | *34-88* | | | | |
| *DCB* | *63* | *48-115* | | | | |

Date of Report: April 8, 2013
Samples Submitted: March 26, 2013
Laboratory Reference: 1303-217
Project: 5364-013-05

**ORGANOCHLORINE PESTICIDES by EPA 8081B**

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | PQL | Method | Date Prepared | Date Analyzed | Flags |
|---|---|---|---|---|---|---|
| **Client ID:** | **DUP** | | | | | |
| Laboratory ID: | 03-217-05 | | | | | |
| Heptachlor | **ND** | 0.0048 | EPA 8081B | 3-28-13 | 4-7-13 | Z |
| Aldrin | **0.011** | 0.0048 | EPA 8081B | 3-28-13 | 4-7-13 | Z |
| Heptachlor Epoxide | **ND** | 0.0048 | EPA 8081B | 3-28-13 | 4-7-13 | Z |
| Dieldrin | **ND** | 0.0048 | EPA 8081B | 3-28-13 | 4-7-13 | Z |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *49* | *34-88* | | | | |
| *DCB* | *49* | *48-115* | | | | |

Date of Report: April 8, 2013
Samples Submitted: March 26, 2013
Laboratory Reference: 1303-217
Project: 5364-013-05

**CHLORINATED ACID HERBICIDES by EPA 8151A**

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | PQL | Method | Date Prepared | Date Analyzed | Flags |
|---|---|---|---|---|---|---|
| **Client ID:** | **GEI-MW9** | | | | | |
| Laboratory ID: | 03-217-01 | | | | | |
| MCPA | **71** | 4.7 | EPA 8151A | 3-28-13 | 4-3-13 | |
| 2,4-D | **0.15** | 0.023 | EPA 8151A | 3-28-13 | 4-3-13 | |
| Bentazon | **31** | 9.4 | EPA 8151A | 3-28-13 | 4-4-13 | |
| Dinoseb | **0.64** | 0.024 | EPA 8151A | 3-28-13 | 4-3-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *54* | *30-98* | | | | |
| **Client ID:** | **GEI-MW10** | | | | | |
| Laboratory ID: | 03-217-02 | | | | | |
| MCPA | **360** | 4.7 | EPA 8151A | 3-28-13 | 4-3-13 | |
| 2,4-D | **ND** | 0.024 | EPA 8151A | 3-28-13 | 4-3-13 | |
| Bentazon | **42** | 19 | EPA 8151A | 3-28-13 | 4-4-13 | |
| Dinoseb | **160** | 4.8 | EPA 8151A | 3-28-13 | 4-4-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *98* | *30-98* | | | | |
| **Client ID:** | **GEI-MW11** | | | | | |
| Laboratory ID: | 03-217-03 | | | | | |
| MCPA | **420** | 4.7 | EPA 8151A | 3-28-13 | 4-3-13 | |
| 2,4-D | **ND** | 0.024 | EPA 8151A | 3-28-13 | 4-3-13 | |
| Bentazon | **ND** | 2.0 | EPA 8151A | 3-28-13 | 4-3-13 | |
| Dinoseb | **1.6** | 0.024 | EPA 8151A | 3-28-13 | 4-3-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *47* | *30-98* | | | | |
| **Client ID:** | **GEI-MW12** | | | | | |
| Laboratory ID: | 03-217-04 | | | | | |
| MCPA | **ND** | 4.8 | EPA 8151A | 3-28-13 | 4-3-13 | |
| 2,4-D | **ND** | 0.024 | EPA 8151A | 3-28-13 | 4-3-13 | |
| Bentazon | **ND** | 1.2 | EPA 8151A | 3-28-13 | 4-3-13 | |
| Dinoseb | **4.0** | 0.024 | EPA 8151A | 3-28-13 | 4-3-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *44* | *30-98* | | | | |
| **Client ID:** | **DUP** | | | | | |
| Laboratory ID: | 03-217-05 | | | | | |
| MCPA | **ND** | 4.7 | EPA 8151A | 3-28-13 | 4-3-13 | |
| 2,4-D | **ND** | 0.024 | EPA 8151A | 3-28-13 | 4-3-13 | |
| Bentazon | **ND** | 0.95 | EPA 8151A | 3-28-13 | 4-3-13 | |
| Dinoseb | **2.4** | 0.024 | EPA 8151A | 3-28-13 | 4-3-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *32* | *30-98* | | | | |

Date of Report: April 8, 2013
Samples Submitted: March 26, 2013
Laboratory Reference: 1303-217
Project: 5364-013-05

**ORGANOCHLORINE PESTICIDES by EPA 8081B QUALITY CONTROL**

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | PQL | Method | Date Prepared | Date Analyzed | Flags |
|---|---|---|---|---|---|---|
| **METHOD BLANK** | | | | | | |
| Laboratory ID: | MB0328W2 | | | | | |
| Heptachlor | **ND** | 0.0050 | EPA 8081B | 3-28-13 | 4-3-13 | |
| Aldrin | **ND** | 0.0050 | EPA 8081B | 3-28-13 | 4-3-13 | |
| Heptachlor Epoxide | **ND** | 0.0050 | EPA 8081B | 3-28-13 | 4-3-13 | |
| Dieldrin | **ND** | 0.0050 | EPA 8081B | 3-28-13 | 4-3-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *60* | *34-88* | | | | |
| *DCB* | *78* | *48-115* | | | | |
| Laboratory ID: | MB0328W2 | | | | | |
| Heptachlor | **ND** | 0.0050 | EPA 8081B | 3-28-13 | 4-7-13 | Z |
| Aldrin | **ND** | 0.0050 | EPA 8081B | 3-28-13 | 4-7-13 | Z |
| Heptachlor Epoxide | **ND** | 0.0050 | EPA 8081B | 3-28-13 | 4-7-13 | Z |
| Dieldrin | **ND** | 0.0050 | EPA 8081B | 3-28-13 | 4-7-13 | Z |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *63* | *34-88* | | | | |
| *DCB* | *83* | *48-115* | | | | |

| Analyte | Result | | Spike Level | | Source Result | Percent Recovery | | Recovery Limits | RPD | RPD Limit | Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SPIKE BLANKS** | | | | | | | | | | | |
| Laboratory ID: | SB0328W2 | | | | | | | | | | |
| | SB | SBD | SB | SBD | | SB | SBD | | | | |
| Heptachlor | **0.0343** | **0.0343** | 0.0500 | 0.0500 | N/A | **69** | **69** | 55-104 | 0 | 15 | |
| Aldrin | **0.0337** | **0.0335** | 0.0500 | 0.0500 | N/A | **67** | **67** | 54-99 | 1 | 15 | |
| Dieldrin | **0.0923** | **0.0936** | 0.125 | 0.125 | N/A | **74** | **75** | 60-100 | 1 | 15 | |
| Surrogate: | | | | | | | | | | | |
| *TCMX* | | | | | | *63* | *62* | *34-88* | | | |
| *DCB* | | | | | | *79* | *80* | *48-115* | | | |
| Laboratory ID: | SB0401W1 | | | | | | | | | | |
| | SB | SBD | SB | SBD | | SB | SBD | | | | |
| Heptachlor | **0.0383** | **0.0386** | 0.0500 | 0.0500 | N/A | **77** | **77** | 55-104 | 1 | 15 | |
| Aldrin | **0.0406** | **0.0404** | 0.0500 | 0.0500 | N/A | **81** | **81** | 54-99 | 0 | 15 | |
| Dieldrin | **0.101** | **0.101** | 0.125 | 0.125 | N/A | **80** | **81** | 60-100 | 0 | 15 | |
| Surrogate: | | | | | | | | | | | |
| *TCMX* | | | | | | *68* | *69* | *34-88* | | | |
| *DCB* | | | | | | *85* | *86* | *48-115* | | | |

Date of Report: April 8, 2013
Samples Submitted: March 26, 2013
Laboratory Reference: 1303-217
Project: 5364-013-05

**CHLORINATED ACID HERBICIDES by 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** | 4.7 | EPA 8151A | 3-28-13 | 4-3-13 | |
| 2,4-D | **ND** | 0.024 | EPA 8151A | 3-28-13 | 4-3-13 | |
| Bentazon | **ND** | 0.94 | EPA 8151A | 3-28-13 | 4-3-13 | |
| Dinoseb | **ND** | 0.024 | EPA 8151A | 3-28-13 | 4-3-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *50* | *30-98* | | | | |

| 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 | | | | |
| 2,4-D | **0.432** | **0.464** | 1.00 | 1.00 | N/A | **43** | **46** | 30-81 | 7 | 17 | |
| Dinoseb | **0.566** | **0.566** | 1.00 | 1.00 | N/A | **57** | **57** | 35-116 | 0 | 16 | |
| *Surrogate:* | | | | | | | | | | | |
| *DCAA* | | | | | | *56* | *42* | *30-98* | | | |

OnSite Environmental Inc.

**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-napthalene) 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.

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 - Sample extract treated with a Florisil clean up procedure.

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

# Chain of Custody

Page 1 of 1

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

**Laboratory Number:** 03-217

Company: GEOENGINEERS
Project Number: 5364-013-05
Project Name: TAXIWAY F SITE
Project Manager: ROBERT TRAHAN
Sampled by: ABHIJIT JOSHI

**Turnaround Request (in working days)**

(Check One)

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

| Lab ID | Sample Identification | Date Sampled | Time Sampled | Matrix | No. of Cont. | NWTPH-HCID | NWTPH-Gx/BTEX | NWTPH-Gx | NWTPH-Dx | Volatiles 8260B | Halogenated Volatiles 8260B | Semivolatiles 8270D/SIM (with low-level PAHs) | PAHs 8270D/SIM (low-level) | PCBs 8082 | Organochlorine Pesticides 8081A | Organophosphorus Pesticides 8270D/SIM | Chlorinated Acid Herbicides 8151A | Total RCRA Metals | Total MTCA Metals | TCLP Metals | Dinoseb, MCPA | Aldrin, Dieldrin | Heptachlor | Heptachlor Epoxide | 2,4-D, Bentazon | % Moisture |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | GEI-MW9 | 03/26/13 | 1245 | WATER | | | | | | | | | | | | | | | | | X | X | X | X | X | |
| 2 | GEI-MW10 | | 1200 | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | GEI-MW11 | | 1130 | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | GEI-MW12 | | 1015 | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | DUP | ↓ | 1016 | ↓ | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | Signature | Company | Date | Time |
|---|---|---|---|---|
| Relinquished | | GEI | 03/26/13 | 1618 |
| Received | | | 3/26/13 | 1618 |
| Relinquished | | | | |
| Received | | | | |
| Relinquished | | | | |
| Received | | | | |
| Reviewed/Date | | Reviewed/Date | | |

**Comments/Special Instructions**

Chromatograms with final report ☐

Data Package: Level III ☐ Level IV ☐

Electronic Data Deliverables (EDDs) ☐ _____

OnSite Environmental Inc.

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

January 7, 2013

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

Re: Analytical Data for Project 5364-013-05
Laboratory Reference No. 1212-149

Dear Robert:

Enclosed are the analytical results and associated quality control data for samples submitted on December 20, 2012.

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,

David Baumeister
Project Manager

Enclosures

Date of Report: January 7, 2013
Samples Submitted: December 20, 2012
Laboratory Reference: 1212-149
Project: 5364-013-05

**Case Narrative**

Samples were collected on December 19, 2012 and received by the laboratory on December 20, 2012. They were maintained at the laboratory at a temperature of 2°C to 6°C.

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.

Organochlorine Pesticides by EPA 8081B Analysis

Due to matrix effects, the surrogate recoveries of DCB for the samples GEI-MW9, GEI-MW10, GEI-MW12, and DUP were below the quality control limits of 48-115%. Because of limited sample, only GEI-MW10 and DUP could be re-extracted and showed similar results. No further action was performed.

Chlorinated Acid Herbicides EPA 8151A Analysis

Due to matrix effects, the surrogate recovery of DCAA for the sample GEI-MW9 was below the quality control limits of 48-115%. It was re-extracted and showed similar results. Due to sample interferences, surrogate recoveries for the samples GEI-MW10 and GEI-MW11 were elevated and unable to be re-extracted because of insufficient sample. No further action was performed.

**Please note that any other QA/QC issues associated with these extractions and analyses will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.**

Date of Report: January 7, 2013
Samples Submitted: December 20, 2012
Laboratory Reference: 1212-149
Project: 5364-013-05

**ANALYTICAL REPORT FOR SAMPLES**

| Client ID | Laboratory ID | Matrix | Date Sampled | Date Received | Notes |
|---|---|---|---|---|---|
| GEI-MW9 | 12-149-01 | Water | 12-19-12 | 12-20-12 | |
| GEI-MW10 | 12-149-02 | Water | 12-19-12 | 12-20-12 | |
| GEI-MW11 | 12-149-03 | Water | 12-19-12 | 12-20-12 | |
| GEI-MW12 | 12-149-04 | Water | 12-19-12 | 12-20-12 | |
| DUP | 12-149-05 | Water | 12-19-12 | 12-20-12 | |

Date of Report: January 7, 2013
Samples Submitted: December 20, 2012
Laboratory Reference: 1212-149
Project: 5364-013-05

**ORGANOCHLORINE PESTICIDES by EPA 8081B**

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | PQL | Method | Date Prepared | Date Analyzed | Flags |
|---|---|---|---|---|---|---|
| **Client ID:** | **GEI-MW9** | | | | | |
| Laboratory ID: | 12-149-01 | | | | | |
| Heptachlor | **ND** | 0.0048 | EPA 8081B | 12-21-12 | 12-28-12 | Z |
| Aldrin | **ND** | 0.0048 | EPA 8081B | 12-21-12 | 12-28-12 | Z |
| Heptachlor Epoxide | **ND** | 0.0048 | EPA 8081B | 12-21-12 | 12-28-12 | Z |
| Dieldrin | **ND** | 0.0048 | EPA 8081B | 12-21-12 | 12-28-12 | Z |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *61* | *34-88* | | | | |
| *DCB* | *34* | *48-115* | | | | Q |
| **Client ID:** | **GEI-MW10** | | | | | |
| Laboratory ID: | 12-149-02 | | | | | |
| Heptachlor | **ND** | 0.0047 | EPA 8081B | 12-21-12 | 12-28-12 | Z |
| Aldrin | **ND** | 0.0047 | EPA 8081B | 12-21-12 | 12-28-12 | Z |
| Heptachlor Epoxide | **ND** | 0.0047 | EPA 8081B | 12-21-12 | 12-28-12 | Z |
| Dieldrin | **0.0088** | 0.0047 | EPA 8081B | 12-21-12 | 12-28-12 | Z |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *50* | *34-88* | | | | |
| *DCB* | *35* | *48-115* | | | | Q |
| **Client ID:** | **GEI-MW11** | | | | | |
| Laboratory ID: | 12-149-03 | | | | | |
| Heptachlor | **ND** | 0.0048 | EPA 8081B | 12-21-12 | 12-28-12 | Z |
| Aldrin | **ND** | 0.0048 | EPA 8081B | 12-21-12 | 12-28-12 | Z |
| Heptachlor Epoxide | **0.011** | 0.0048 | EPA 8081B | 12-21-12 | 12-28-12 | P,Z (P=185%) |
| Dieldrin | **0.014** | 0.0048 | EPA 8081B | 12-21-12 | 12-28-12 | P,Z (P=166%) |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *63* | *34-88* | | | | |
| *DCB* | *48* | *48-115* | | | | |
| **Client ID:** | **GEI-MW12** | | | | | |
| Laboratory ID: | 12-149-04 | | | | | |
| Heptachlor | **ND** | 0.0048 | EPA 8081B | 12-21-12 | 12-28-12 | Z |
| Aldrin | **0.022** | 0.0048 | EPA 8081B | 12-21-12 | 12-28-12 | Z |
| Heptachlor Epoxide | **ND** | 0.0048 | EPA 8081B | 12-21-12 | 12-28-12 | Z |
| Dieldrin | **0.029** | 0.0048 | EPA 8081B | 12-21-12 | 12-28-12 | P,Z (P=82%) |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *54* | *34-88* | | | | |
| *DCB* | *45* | *48-115* | | | | Q |

Date of Report: January 7, 2013
Samples Submitted: December 20, 2012
Laboratory Reference: 1212-149
Project: 5364-013-05

**ORGANOCHLORINE PESTICIDES by EPA 8081B**

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | PQL | Method | Date Prepared | Date Analyzed | Flags |
|---|---|---|---|---|---|---|
| **Client ID:** | **DUP** | | | | | |
| Laboratory ID: | 12-149-05 | | | | | |
| Heptachlor | **ND** | 0.0047 | EPA 8081B | 12-21-12 | 12-28-12 | Z |
| Aldrin | **0.0078** | 0.0047 | EPA 8081B | 12-21-12 | 12-28-12 | P,Z (P=86%) |
| Heptachlor Epoxide | **ND** | 0.0047 | EPA 8081B | 12-21-12 | 12-28-12 | Z |
| Dieldrin | **ND** | 0.0047 | EPA 8081B | 12-21-12 | 12-28-12 | Z |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *53* | *34-88* | | | | |
| *DCB* | *46* | *48-115* | | | | Q |

Date of Report: January 7, 2013
Samples Submitted: December 20, 2012
Laboratory Reference: 1212-149
Project: 5364-013-05

**CHLORINATED ACID HERBICIDES by EPA 8151A**

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | PQL | Method | Date Prepared | Date Analyzed | Flags |
|---|---|---|---|---|---|---|
| **Client ID:** | **GEI-MW9** | | | | | |
| Laboratory ID: | 12-149-01 | | | | | |
| MCPA | **ND** | 4.4 | EPA 8151A | 12-21-12 | 1-3-13 | |
| 2,4-D | **0.040** | 0.022 | EPA 8151A | 12-21-12 | 1-3-13 | P(136%) |
| Bentazon | **3.4** | 0.045 | EPA 8151A | 12-21-12 | 1-3-13 | |
| Dinoseb | **0.39** | 0.022 | EPA 8151A | 12-21-12 | 1-3-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *10* | *30-98* | | | | Q |
| **Client ID:** | **GEI-MW10** | | | | | |
| Laboratory ID: | 12-149-02 | | | | | |
| MCPA | **ND** | 4.4 | EPA 8151A | 12-20-12 | 1-4-13 | |
| 2,4-D | **140** | 2.2 | EPA 8151A | 12-20-12 | 1-3-13 | P(70%) |
| Bentazon | **66** | 4.5 | EPA 8151A | 12-20-12 | 1-3-13 | P(175%) |
| Dinoseb | **140** | 2.2 | EPA 8151A | 12-20-12 | 1-3-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *172* | *30-98* | | | | Q |
| **Client ID:** | **GEI-MW11** | | | | | |
| Laboratory ID: | 12-149-03 | | | | | |
| MCPA | **ND** | 4.4 | EPA 8151A | 12-20-12 | 12-28-12 | |
| 2,4-D | **0.33** | 0.022 | EPA 8151A | 12-20-12 | 12-28-12 | P(196%) |
| Bentazon | **2.2** | 0.045 | EPA 8151A | 12-20-12 | 12-28-12 | P(180%) |
| Dinoseb | **1.1** | 0.022 | EPA 8151A | 12-20-12 | 12-28-12 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *120* | *30-98* | | | | Q |
| **Client ID:** | **GEI-MW12** | | | | | |
| Laboratory ID: | 12-149-04 | | | | | |
| MCPA | **ND** | 4.4 | EPA 8151A | 12-21-12 | 12-27-12 | |
| 2,4-D | **2.5** | 0.022 | EPA 8151A | 12-21-12 | 12-27-12 | |
| Bentazon | **5.2** | 0.45 | EPA 8151A | 12-21-12 | 1-3-13 | P(197%) |
| Dinoseb | **14** | 0.22 | EPA 8151A | 12-21-12 | 1-3-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *92* | *30-98* | | | | |
| **Client ID:** | **DUP** | | | | | |
| Laboratory ID: | 12-149-05 | | | | | |
| MCPA | **ND** | 4.4 | EPA 8151A | 12-20-12 | 12-28-12 | |
| 2,4-D | **2.0** | 0.022 | EPA 8151A | 12-20-12 | 12-28-12 | |
| Bentazon | **5.0** | 0.45 | EPA 8151A | 12-20-12 | 1-3-13 | P(196%) |
| Dinoseb | **11** | 0.22 | EPA 8151A | 12-20-12 | 1-3-13 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *75* | *30-98* | | | | |

Date of Report: January 7, 2013
Samples Submitted: December 20, 2012
Laboratory Reference: 1212-149
Project: 5364-013-05

**ORGANOCHLORINE PESTICIDES by EPA 8081B**
**METHOD BLANK QUALITY CONTROL**

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | PQL | Method | Date Prepared | Date Analyzed | Flags |
|---|---|---|---|---|---|---|
| **METHOD BLANK** | | | | | | |
| Laboratory ID: | MB1221W1 | | | | | |
| Heptachlor | **ND** | 0.0050 | EPA 8081B | 12-21-12 | 12-27-12 | |
| Aldrin | **ND** | 0.0050 | EPA 8081B | 12-21-12 | 12-27-12 | |
| Heptachlor Epoxide | **ND** | 0.0050 | EPA 8081B | 12-21-12 | 12-27-12 | |
| Dieldrin | **ND** | 0.0050 | EPA 8081B | 12-21-12 | 12-27-12 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *60* | *34-88* | | | | |
| *DCB* | *60* | *48-115* | | | | |
| Laboratory ID: | MB1221W1 | | | | | |
| Heptachlor | **ND** | 0.0050 | EPA 8081B | 12-21-12 | 12-28-12 | Z |
| Aldrin | **ND** | 0.0050 | EPA 8081B | 12-21-12 | 12-28-12 | Z |
| Heptachlor Epoxide | **ND** | 0.0050 | EPA 8081B | 12-21-12 | 12-28-12 | Z |
| Dieldrin | **ND** | 0.0050 | EPA 8081B | 12-21-12 | 12-28-12 | Z |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *TCMX* | *55* | *34-88* | | | | |
| *DCB* | *65* | *48-115* | | | | |

Date of Report: January 7, 2013
Samples Submitted: December 20, 2012
Laboratory Reference: 1212-149
Project: 5364-013-05

**ORGANOCHLORINE PESTICIDES by EPA 8081B SB/SBD QUALITY CONTROL**

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | | Spike Level | | Source Result | Percent Recovery | | Recovery Limits | RPD | RPD Limit | Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SPIKE BLANKS** | | | | | | | | | | | |
| Laboratory ID: | SB1221W1 | | | | | | | | | | |
| | SB | SBD | SB | SBD | | SB | SBD | | | | |
| Heptachlor | **0.0380** | **0.0356** | 0.0500 | 0.0500 | N/A | **76** | **71** | 55-104 | 7 | 15 | |
| Aldrin | **0.0347** | **0.0321** | 0.0500 | 0.0500 | N/A | **69** | **64** | 54-99 | 8 | 15 | |
| Dieldrin | **0.0927** | **0.0900** | 0.125 | 0.125 | N/A | **74** | **72** | 60-100 | 3 | 15 | |
| Surrogate: | | | | | | | | | | | |
| *TCMX* | | | | | | *65* | *59* | *34-88* | | | |
| *DCB* | | | | | | *63* | *60* | *48-115* | | | |

Date of Report: January 7, 2013
Samples Submitted: December 20, 2012
Laboratory Reference: 1212-149
Project: 5364-013-05

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

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | PQL | Method | Date Prepared | Date Analyzed | Flags |
|---|---|---|---|---|---|---|
| **METHOD BLANK** | | | | | | |
| Laboratory ID: | MB1220W2 | | | | | |
| MCPA | **ND** | 4.7 | EPA 8151A | 12-20-12 | 12-27-12 | |
| 2,4-D | **ND** | 0.024 | EPA 8151A | 12-20-12 | 12-27-12 | |
| Bentazon | **ND** | 0.047 | EPA 8151A | 12-20-12 | 12-27-12 | |
| Dinoseb | **ND** | 0.024 | EPA 8151A | 12-20-12 | 12-27-12 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *47* | *30-98* | | | | |
| Laboratory ID: | MB1221W2 | | | | | |
| MCPA | **ND** | 4.7 | EPA 8151A | 12-21-12 | 12-27-12 | |
| 2,4-D | **ND** | 0.024 | EPA 8151A | 12-21-12 | 12-27-12 | |
| Bentazon | **ND** | 0.047 | EPA 8151A | 12-21-12 | 12-27-12 | |
| Dinoseb | **ND** | 0.024 | EPA 8151A | 12-21-12 | 12-27-12 | |
| *Surrogate:* | *Percent Recovery* | *Control Limits* | | | | |
| *DCAA* | *54* | *30-98* | | | | |

| Analyte | Result | | Spike Level | | Source Result | Percent Recovery | | Recovery Limits | RPD | RPD Limit | Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SPIKE BLANKS** | | | | | | | | | | | |
| Laboratory ID: | SB1220W2 | | | | | | | | | | |
| | SB | SBD | SB | SBD | | SB | SBD | | | | |
| 2,4-D | **0.535** | **0.485** | 1.00 | 1.00 | N/A | **53** | **49** | 30-81 | 10 | 17 | |
| Dinoseb | **0.410** | **0.369** | 1.00 | 1.00 | N/A | **41** | **37** | 35-116 | 11 | 16 | |
| *Surrogate:* | | | | | | | | | | | |
| *DCAA* | | | | | | *41* | *55* | *30-98* | | | |
| Laboratory ID: | SB1221W2 | | | | | | | | | | |
| | SB | SBD | SB | SBD | | SB | SBD | | | | |
| 2,4-D | **0.635** | **0.645** | 1.00 | 1.00 | N/A | **63** | **65** | 30-81 | 2 | 17 | |
| Dinoseb | **0.579** | **0.540** | 1.00 | 1.00 | N/A | **58** | **54** | 35-116 | 7 | 16 | |
| *Surrogate:* | | | | | | | | | | | |
| *DCAA* | | | | | | *64* | *68* | *30-98* | | | |

OnSite Environmental Inc.

**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-napthalene) 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.

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 - Sample extract treated with a Florisil clean up procedure.

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

# Chain of Custody

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



Company: GEI
Project Number: 5364-013-05
Project Name: ROBERT TRAHAN
Project Manager: TAXIWAY F SITE
Sampled by: ABHIJIT

**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:** 12-149

| Lab ID | Sample Identification | Date Sampled | Time Sampled | Matrix | Number of Containers | NWTPH-HCID | NWTPH-Gx/BTEX | NWTPH-Gx | NWTPH-Dx | Volatiles 8260C | Halogenated Volatiles 8260C | 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/ MTCA Metals (circle one) | TCLP Metals | HEM (oil and grease) 1664A | Aldrin, Dieldrin | Heptachlor | Heptachlor Epoxide | Dinoseb, MCPA | 2,4-D, Bentazon | % Moisture |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | GEI-MW9 | 12/19/12 | 1330 | WATER | 3 | | | | | | | | | | | | | | | | X | X | X | X | X | |
| 2 | GEI-MW10 | " | 1220 | " | 3 | | | | | | | | | | | | | | | | " | " | " | " | " | |
| 3 | GEI-MW11 | " | 1140 | " | 2 | | | | | | | | | | | | | | | | " | " | " | " | " | |
| 4 | GEI-MW12 | " | 1515 | " | 3 | | | | | | | | | | | | | | | | " | " | " | " | " | |
| 5 | DUP | " | 1520 | " | 3 | | | | | | | | | | | | | | | | " | " | " | " | " | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | Signature | Company | Date | Time |
|---|---|---|---|---|
| Relinquished | | GEI | 12/20/12 | 1017 |
| Received | | Speedy Messenger | 12/20/12 | 1017 |
| Relinquished | | | | |
| Received | | GSE | 12/20/12 | 1415 |
| Relinquished | | | | |
| Received | | | | |

**Comments/Special Instructions**

Reviewed/Date

Reviewed/Date

Chromatograms with final report ☐

Data Package: Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ _____

# APPENDIX C
## Data Validation Report

GeoEngineers

# Data Validation Report

Plaza 600 Building, 600 Stewart Street, Suite 1700, Seattle, WA 98101, Telephone: 206.728.2674, Fax: 206.728.2732 www.geoengineers.com

| | |
|---|---|
| **Project:** | Skagit County Regional Airport, Taxiway F Site – Post-Construction Groundwater Monitoring (Rounds 1 through 4) |
| **GEI File No:** | 005364-013-05 |
| **Date:** | December 2, 2013 |

## GENERAL

This report presents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2A validation (USEPA Document 540-R-08-005; USEPA, 2009) of analytical data from the analyses of groundwater samples obtained from the Skagit County Regional Airport, Taxiway F Site located in Burlington, Washington.

### Objective and Quality Control (QC) Elements

The objective of the data quality assessment was to review laboratory analytical procedures and QC results to evaluate whether:

- The samples were analyzed using well-defined and acceptable methods that provide quantitation 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 verification and validation checks of the following QC elements:

- 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

### Chemical Analysis Performed

Twenty (20) groundwater samples, including four duplicates, obtained during the post-construction groundwater sampling event were submitted to OnSite Environmental (OnSite) of Redmond, WA for the following analyses:

- Pesticides by USEPA Method 8081B; and
- Herbicides by USEPA Method 8151A/8321B

### OnSite Sample Delivery Groups (SDGs)

The following laboratory SDGs were delivered by OnSite and were reviewed by GeoEngineers for the QC elements listed above:

- 1212-149
- 1303-217
- 1303-217B
- 1306-240R
- 1309-251

## DATA QUALITY ASSESSMENT SUMMARY

The results for each of the QC elements are summarized below. The data assessment was performed using guidance in USEPA document: USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (USEPA, 2008).

### Chain-of-Custody Documentation

Chain-of-custody forms were provided with the laboratory analytical reports. No transcription errors were found and the appropriate signatures were applied. There were no anomalies mentioned in the sample receipt forms, as the samples were transported to the laboratory at the appropriate temperatures of between 2 and 6 degrees Celsius.

### Holding Times and Sample Preservation

The holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria and sample preservation 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. Recommended holding time and sample preservation was met for all analyses, with the following exceptions:

- SDG 1303-217B: (Pesticides) The 7-day holding time for Samples GEI-MW-9, GEI-MW-10, and GEI-MW-11 was exceeded by 13 days. A filtered analysis was requested and the samples required re-extraction outside of holding time. The positive results and reporting limits for the target analyte pesticide compounds were qualified as estimated (J/UJ) in these samples.

  (Herbicides) The 7-day holding time for Samples GEI-MW-9, GEI-MW-10, and GEI-MW-11 was exceeded by 14 days. A filtered analysis was requested and the samples required re-extraction outside of holding time. The positive results and reporting limits for the target analyte herbicide compounds were qualified as estimated (J/UJ) in these samples.

### Surrogate Recoveries

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

- SDG 1212-149: (Pesticides) The %R values for DCB were less than the established control limit for Samples GEI-MW9, GEI-MW10, GEI-MW-12, and DUP. For this reason, the positive results and reporting limits for the target analyte pesticide compounds were qualified as estimated (J/UJ) in each of these samples.

  (Herbicides) The %R value for DCAA was less than the established control limit for Sample GEI-MW9. For this reason, the positive results and reporting limits for the target analyte herbicide compounds were qualified as estimated (J/UJ) in this sample. Also, the %R values for DCAA were greater than the established control limit for Samples GEI-MW10 and GEI-MW11. For this reason, the positive results for the target analyte herbicide compounds were qualified as estimated (J) in these samples.

- SDG 1306-240: (Herbicides) The %R value for DCPAA was less than the established control limit for Sample MW-9. For this reason, the positive results and reporting limits for the target analyte herbicide compounds were qualified as estimated (J/UJ) in this sample.

### Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest into project samples. Method blanks were analyzed with each batch of samples, at a frequency of one per twenty samples. In cases were target analytes are qualified as non-detected because of blank contamination, the new reporting limit is elevated to the level of the former concentration reported in the sample. No method blank detections were reported by the testing laboratory.

### 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 (%R) 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 %R from the MS and MSD, the relative percent difference (RPD) is calculated. The %R control limits for MS and MSD analyses are specified in the laboratory documents, as are the RPD control limits for MS/MSD sample sets.

Due to the field sampling limitations of the groundwater portion of this sampling event, a laboratory control sample/laboratory control sample duplicate (LCS/LCSD) sample set was analyzed in lieu of an MS/MSD analysis. LCS/LCSD analyses are discussed in the next section.

### 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 all samples in the associated batch, instead of just the parent sample. The %R control limits for LCS and LCSD analyses are specified in the laboratory documents, as are the RPD control limits for LCS/LCSD sample sets.

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

### Field Duplicates

Field duplicate samples are obtained and analyzed along with the primary project samples. The duplicate samples are analyzed for the same parameters as the associated primary samples. The RPD between the primary and duplicate samples is used to assess sample heterogeneity and laboratory precision, unless one or more of the samples used has a concentration greater than five times the method reporting limit for that sample. In such cases, the absolute difference is used instead of the RPD. The RPD control limit for water samples is 35 percent.

Field duplicate results were within control limits, with the following exceptions:

- SDG 1212-149: One field duplicate sample pair was analyzed: GEI-MW12/DUP. In this sample pair, the precision criteria were exceeded for aldrin and dieldrin. For this reason, the positive results and reporting limits for these compounds were qualified as estimated (J/UJ) in both samples.
- SDG 1303-217: One field duplicate sample pair was analyzed: GEI-MW12/DUP. In this sample pair, the precision criteria was exceeded for dinoseb. For this reason, the positive results for this compound were qualified as estimated (J) in both samples.
- SDG 1306-240: One field duplicate sample pair was analyzed: MW-12/Dup-062613. In this sample pair, the precision criteria above were met for all target analytes in both samples.
- SDG 1309-251: One field duplicate sample pair was analyzed: GEI-MW-12/DUP-09262013. In this sample pair, the precision criteria was exceeded for dinoseb. For this reason, the positive results for this compound were qualified as estimated (J) in both samples.

### Column Confirmation RPD Values

The laboratory analyzed all samples submitted for analysis by SW8081B and SW8151A/8321B. With the exception of 8321B, 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 values were greater than 100%, then the analytical result is qualified as tentatively identified (NJ). The tables below summarize any RPD exceedances.

- SDG 1212-149: Pesticides and Herbicides

| Sample ID | Analyte | Qualifier |
|---|---|---|
| GEI-MW9 | 2,4-D | NJ |
| GEI-MW10 | 2,4-D<br>Bentazon | J<br>NJ |

| | | |
|---|---|---|
| GEI-MW11 | Heptachlor Epoxide<br>Dieldrin<br>2,4-D<br>Bentazon | NJ<br>NJ<br>NJ<br>NJ |
| GEI-MW12 | Dieldrin<br>Bentazon | J<br>NJ |
| DUP | Aldrin<br>Bentazon | J<br>NJ |

- SDG 1303-217: Pesticides and Herbicides

| Sample ID | Analyte | Qualifier |
|---|---|---|
| GEI-MW9 | Aldrin | NJ |
| GEI-MW10 | Dieldrin | J |
| GEI-MW11 | Heptachlor Epoxide | NJ |

- SDG 1303-217B: Pesticides and Herbicides

| Sample ID | Analyte | Qualifier |
|---|---|---|
| GEI-MW9 | Aldrin<br>Heptachlor Epoxide<br>Dieldrin<br>MCPA | NJ<br>J<br>NJ<br>J |
| GEI-MW10 | MCPA<br>Bentazon | J<br>NJ |
| GEI-MW11 | Heptachlor Epoxide | NJ |

- SDG 1309-251: Pesticides and Herbicides

| Sample ID | Analyte | Qualifier |
|---|---|---|
| GEI-MW9 | MCPA | NJ |
| GEI-MW10 | Bentazon | NJ |
| GEI-MW11 | Bentazon | NJ |

## OVERALL ASSESSMENT

The results of this Stage 2A data validation indicate that the laboratory followed the specified analytical methods. The accuracy of the data are acceptable, as demonstrated by the surrogate and LCS/LCSD %R values, with the exceptions noted above. The precision of the data also are acceptable, as demonstrated by the LCS/LCSD, field duplicate, and column confirmation RPD values, with the exceptions noted above.

Selected data were qualified as follows:

- Estimated because of holding time, surrogate, field duplicate, and column confirmation outliers.
- Tentatively identified because of column confirmation outliers.

However, based on the data quality review, it is our opinion that the analytical data, including data qualified as noted above, are of acceptable quality for their intended use.

## REFERENCES

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.

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

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