Quarterly report, second quarter 2019

RCRA Corrective Action Program
Boeing Renton Facility
Project # 0088880100.2019 The Boeing Company

Prepared for:

The Boeing Company
Seattle, Washington

August 15, 2019

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Prepared by:

Wood Environment & Infrastructure Solutions, Inc.
600 University Street, Suite 600
Seattle, Washington 98101
USA
T: 206-342-1760

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This report was prepared by the staff of Wood Environment & Infrastructure Solutions, Inc., under the supervision of the Hydrogeologist whose seal and signature appear hereon.

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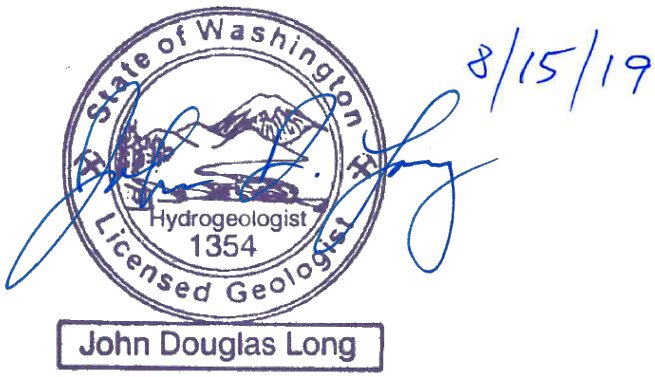

John Long, L.G. L. Hg.
Licensed Geologist/Hydrogeologist #1354
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1.0 Introduction

This report provides progress reporting in conformance with Section VII.B.1 of Agreed Order No. 8191 (Order) and summarizes cleanup actions and monitoring conducted at the Boeing Renton Facility (the Facility) during the second quarter 2019. This work is required under the Resource Conservation and Recovery Act (RCRA) Corrective Action Program being performed at the Facility. Corrective action activities are performed for those solid waste management units (SWMUs), areas of concern (AOCs), and other areas where cleanup actions are ongoing. Monitoring, cleanup activities, and reporting are being conducted as part of the final remedy implementation described in the Engineering Design Report (EDR) (AMEC, 2014). The groundwater monitoring program is detailed in the Addendum to the Compliance Monitoring Plan (Wood, 2019), which contains changes to the revised Compliance Monitoring Plan (Amec Foster Wheeler, 2016a) that superseded the original plan presented in Appendix D of the EDR (AMEC, 2014).

Groundwater monitoring and final cleanup action implementation are being conducted at the following areas (the ongoing remedies for each of these areas are noted in parentheses):

- SWMU-168: (monitored natural attenuation [MNA]);
- SWMU-172 and SWMU-174: (bioremediation, soil vapor extraction [SVE] and monitored attenuation [MA]);
- Building 4-78/79 SWMU/AOC Group: (bioremediation, SVE, MNA, and MA);
- Former Fuel Farm AOC Group: (MNA);
- AOC-001 and AOC-002: (bioremediation and MA);
- AOC-003: (bioremediation and MA);
- AOC-004: (bioremediation and MA);
- AOC-060: (bioremediation and MA);
- AOC-090: (bioremediation and MA);
- Building 4-70: (bioremediation and MA);
- Lot 20/Former Building 10-71 Parcel: (bioremediation and MA); and
- Apron A: (bioremediation and MA).

The background and investigation history for each affected unit or group of units is described in the Cleanup Action Plan (CAP) (AMEC, 2012) and/or EDR (AMEC, 2014). It should be noted that monitoring for the Building 10-71 area and Building 4-70 area is included in this monitoring report to maintain continuity with the monitoring program that has been conducted for these areas for several years and as approved by the Washington State Department of Ecology (Ecology); these two areas are not addressed explicitly in the Compliance Monitoring Plan but are being addressed per Ecology's December 30, 2015, email to Boeing with comments on the revised Compliance Monitoring Plan. Monitoring for Apron A is also included, as semiannual monitoring began in this area starting in the fourth quarter 2016, as reported in the Apron A Investigation Results report (Amec Foster Wheeler, 2016b).

The goals for cleanup of groundwater at the Facility, as described in the CAP, include protection of groundwater for drinking water beneficial use at all areas of the site, and demonstration of protection of surface water beneficial uses at the conditional points of compliance (CPOCs) for each SWMU and AOC. Cleanup goals are discussed for each SWMU and AOC below. Discussions include comparisons to

protection of groundwater for drinking water beneficial uses by comparing concentrations to the Model Toxics Control Act (MTCA) or United States Environmental Protection Agency Maximum Contaminant Level (MCL), as well as to site specific cleanup levels (CULs), which are based on protection of surface water beneficial uses. Analytical data for groundwater presented in the tables are compared to the AOC/SWMU specific CULs established for the respective points of compliance.

This quarterly report:

- Describes work completed during the reporting quarter;
- Describes any deviations from corrective action tasks required under the Order and/or CAP;
- Describes revisions to the corrective action schedule;
- Describes work projected to occur during the next quarter, including any planned deviation from the CAP;
- Discusses remediation operation and maintenance activities conducted at the Facility during the reporting period;
- Documents monitoring activities conducted during the quarter;
- Describes and discusses trends in monitoring data;
- Assesses remediation at each area; and
- Assesses attainment CULs at the CPOCs.

This report presents this information for the second quarter 2019, the period from April through June 2019.

1.1 Quarterly progress reporting

In accordance with the requirements of the Order, corrective action activities were conducted at the Facility, as described in this report. As approved by Ecology in their letter dated November 18, 2015, progress reporting is conducted on a quarterly basis in conjunction with monitoring, operations, and maintenance activities conducted under the CAP.

1.1.1 Work completed in the second quarter 2019

The following work was completed during the second quarter 2019, the period from April through June 2019:

- Groundwater monitoring for the second quarter 2019 was completed during May 2019.
- On behalf of Boeing, Wood submitted the first quarter 2019 report to Ecology on May 15, 2019.
- On May 8, 2019, CALIBRE Systems, Inc. (CALIBRE) collected groundwater samples from Building 4-78/79 monitoring wells (GW031S and GW244S) and injection wells (B78-11, B78-13, B78-17, B78-18, and B78-20) as part of the nitrate study.
- On June 13 and 14, 2019, CALIBRE completed the soil investigation at Building 4-78/79, as described in the work plan submitted to Ecology on May 8, 2019.

1.1.2 Deviations from required tasks

No deviations from tasks required in the Order occurred during this activity period.

1.1.3 Deviations from CAP

There were no deviations from the CAP during this activity period, and there are no planned deviations from the CAP expected for the next activity period.

1.1.4 Schedule revisions

There were no significant revisions to the schedule for this reporting period and no revisions are expected for the next activity period.

1.1.5 Work projected for the next quarter

The following work is projected for the third quarter 2019:

- Reporting will be completed in accordance with the Order, CAP, EDR, and any changes approved by Ecology.
- Groundwater sampling and analysis will be completed.
- Nitrate and sulfate injections may be performed for the Building 4-78/79 area, depending on performance monitoring results.
- Soil with TPH exceeding cleanup levels within unsaturated and smear zones is planned for excavation on the east side of building 4-79. Groundwater elevations are currently being monitored to determine if water levels will be low enough to allow for sufficient excavations to occur this year.
- Performance monitoring to support the benzene plume study is currently scheduled to be conducted.

2.0 Groundwater sampling methodology

Groundwater was sampled and analyzed as described in Appendix A. These procedures are in accordance with the methods specified in the revised Compliance Monitoring Plan (Amec Foster Wheeler, 2016a). Table A-1 summarizes the current groundwater monitoring program and constituents of concern (COCs) specified in the CAP and revised in the Addendum to the Compliance Monitoring Plan (Wood, 2019) for all Facility corrective action areas. Table A-2 summarizes the current groundwater monitoring program for the corrective action areas that include MNA or MA as part of the cleanup remedy specified in the CAP. Tables A-1 and A-2 also include Building 4-70, Lot 20/Former Building 10-71, and Apron A, which were not included in the CAP. Any changes or exceptions to the sampling or analytical methods cited in Appendix A during the quarter are described in the applicable subsections in Section 3. The field data sheets, which document the groundwater sample collection and field parameter monitoring for each well sampled during this quarter, are included in Appendix B.

The analytical methods, field duplicate, lab duplicate, and matrix spike/matrix spike duplicate frequencies are specified in the Quality Assurance Project Plan (Amec Foster Wheeler, 2016c). The full analytical reports provided by the laboratory are provided separately on compact disc. The data validation memoranda are included in Appendix C.

3.0 Corrective action activities completed during quarter

This section describes the corrective action activities conducted at the Facility during the second quarter 2019. Operation of the SVE system at SWMU-172/174 continued during the second quarter, as discussed in Section 3.2.1.2. Quarterly compliance monitoring was conducted in accordance with the Addendum to the Compliance Monitoring Plan (Wood, 2019).

3.1 SWMU-168

SWMU-168 is monitored semiannually during the first and third quarters; therefore, no monitoring was conducted for this area during the second quarter 2019.

3.2 SWMU-172 and SWMU-174

This section describes corrective action activities conducted at these two SWMUs. The cleanup remedy for SWMU-172 and SWMU-174 is a combination of bioremediation, SVE, and MA. Figure 1 shows the layout of the groundwater monitoring wells and the remediation system for these SWMUs.

3.2.1 Cleanup action activities

3.2.1.1 Installation/construction activities

No installation/construction activities were conducted for these SWMUs during the second quarter.

3.2.1.2 Soil vapor extraction and bioremediation operations

The SVE system at SWMU-172 and SWMU-174 operated normally during the second quarter. Details for system operations are included in the SVE operations and monitoring report prepared by CALIBRE and included as Appendix D.

3.2.2 Compliance monitoring plan deviations

No deviations from the Compliance Monitoring Plan occurred for this area during the second quarter.

3.2.3 Water levels

Groundwater elevations for the SWMU-172 and SWMU-174 area measured during the second quarter 2019 are summarized in Table 1 and shown on Figure 1. The contoured data for May 2019 show that groundwater generally flows east from SWMU-172 and SWMU-174 toward the Cedar River Waterway, with an approximate horizontal gradient of 0.01.

3.2.4 Groundwater monitoring results

Groundwater in this area is monitored following the schedules presented in Tables A-1 and A-2 in Appendix A. Results for primary geochemical indicators are presented in Table 2; results for the SWMU-172 and SWMU-174 area COCs are presented in Table 3.

3.2.4.1 Monitored attenuation/geochemical indicators

The geochemical indicator results are presented in Table 2. Total organic carbon (TOC) concentrations ranged from 0.90 milligrams per liter (mg/L) to 7.10 mg/L for all SWMU-172 and SWMU-174 monitoring wells. The pH measurements in the source area monitoring wells were slightly depressed and near neutral in the downgradient and CPOC area wells. The other natural attenuation parameter results indicate that geochemical conditions were generally uniform and appropriate for reductive dechlorination of

chlorinated volatile organic compounds; the dissolved oxygen and oxidation/reduction potential results indicate reducing conditions were present.

3.2.4.2 COC results for source and downgradient plume areas

Table 3 lists second quarter 2019 analytical results for the SWMU-172 and SWMU-174 COCs. Figures 2 and 3 show historical trend plots for tetrachloroethene (PCE), trichloroethene (TCE), vinyl chloride (VC), and cis-1,2-dicholoethene (cis-1,2-DCE) in source area wells GW152S and GW153S, and in downgradient plume area wells GW172S and GW173S. Flow generally moves from the vicinity of source area well GW152S to downgradient plume area well GW172S, and from source area well GW153S to downgradient plume area well GW173S. PCE and TCE are the chlorinated solvents that were used at the Facility, and cis-1,2-DCE and VC are breakdown products resulting from biodegradation processes.

As shown in Table 3, cis-1,2-DCE, TCE, PCE, and VC concentrations exceeded the CPOC CULs in the groundwater from both source area and downgradient plume area wells. As shown in Figures 2 and 3, the concentrations of COCs in groundwater from source area wells GW152S and GW 153S and downgradient wells GW172S and GW173S generally remained stable during the second quarter, except for PCE, which shows decreasing concentrations in the groundwater from both source area wells.

Arsenic was detected above the CUL in the groundwater from all source area and downgradient plume area wells. As shown in Figure 4, the arsenic concentrations in the groundwater from both source area and downgradient wells either decreased or remained stable during the second quarter sampling event. Copper was detected in the groundwater from source area and downgradient plume area wells, but concentrations were below the CUL. Lead was detected above the CUL in the groundwater from source area well GW152S, but was not in the groundwater from the downgradient plume area wells.

While concentrations of select COCs in groundwater from source area and downgradient plume area wells exceed the CULs established at the CPOC, COC concentrations are below the applicable MCLs/MTCA criteria for potable water supply.

3.2.4.3 COC results for conditional point of compliance area

Results from the CPOC area wells are presented in Table 3 and trend charts for cis-1,2-DCE, TCE, and VC for all CPOC area wells are presented in Figure 5. As shown in Table 3, cis-1,2-DCE was detected at concentrations above the CUL, ranging from 0.0281 to 0.319 micrograms per liter (µg/L) in the groundwater from all CPOC area wells; TCE was detected above the CUL in the groundwater from all CPOC area wells except for GW234S; and VC was detected above the CUL in the groundwater from monitoring well GW232S. PCE was not detected in the groundwater from the CPOC wells and is not shown in Figure 5. As shown on Figure 5, concentrations of cis-1,2-DCE have exceeded the CUL in the CPOC wells since compliance monitoring began, but are generally stable. The concentrations of both TCE and VC generally appear to be stable.

Arsenic was detected above the CUL in the groundwater from all CPOC area wells except for GW233I and GW235I. Copper was not detected above the CUL in the groundwater from CPOC wells. Lead was detected above the CUL in the groundwater from CPOC well GW236S (Table 3). Figure 6 shows arsenic, copper, and lead trends since the beginning of compliance monitoring in groundwater from the CPOC area wells. As shown in Figure 6, though arsenic, copper and lead concentrations appear to vary over time, there are no apparent long-term increasing or decreasing trends in the groundwater from CPOC area wells.

While select COC concentrations exceed the CUL in the groundwater from select CPOC wells, as detailed above, COC concentrations are below the applicable MCLs/MTCA criteria for potable water supply in all CPOC wells.

3.3 Building 4-78/79 SWMU/AOC group

This section describes corrective action activities conducted at the Building 4-78/79 SWMU/AOC Group during the second quarter 2019. The cleanup remedy for this SMWU/AOC group is bioremediation, SVE, MNA, and MA. Figure 7 shows the location of groundwater monitoring wells, bioremediation wells, and SVE wells for this area.

3.3.1 Cleanup action activities

3.3.1.1 Installation/construction activities

No installation/construction activities were conducted for these SWMUs during the second quarter.

3.3.1.2 Soil vapor extraction and bioremediation operations

As previously reported during 2018 monitoring events, the SVE system at Building 4-78/79 SWMU/AOC Group was shut down during the first quarter 2018, during which rebound testing was implemented. Soil samples were collected during the second quarter 2018 to assess the attainment of soil CULs, and results were reported in the second quarter monitoring report (Wood, 2018). The CULs were attained with one exception: the sample from 4.5 feet below ground surface at well PP13 had a concentration of total petroleum hydrocarbons as gasoline (TPH-G) of 147 milligrams per kilogram (mg/kg), and the field duplicate was 131 mg/kg, above the CUL of 30 mg/kg. A revised work plan (CALIBRE, 2019) for excavating the soils near PP13 and GW013S was submitted to Ecology on May 8, 2019, in response to a request from Ecology. The investigation described in the work plan was conducted on June 13 and 14, 2019, and the results will be presented to Ecology in a separate report.

As reported in the first quarter 2019 report, a sixth round of nitrate/sulfate injections was performed in March 2019. Groundwater samples were collected in February and May 2019. The results of the performance monitoring are shown in Table 3-1 of Appendix D. Concentrations of benzene and cis-1,2-DCE in the groundwater from all injection wells related to ongoing benzene treatment in this area are shown in Figure 8. As shown in Figure 8, benzene concentrations in groundwater from injection wells ranged from below the reporting limit of 0.20 µg/L to 16.30 µg/L. in the second quarter. The May 2019 benzene concentration in the source area well GW031S in was 7.13 ug/L. Trend charts for TCE and VC in the injection wells are presented in Figure 9.

Details regarding injection concentrations for each event are provided in Appendix D.

3.3.2 Compliance monitoring plan deviations

No deviations from the compliance monitoring plan occurred for this area during the second quarter.

3.3.3 Water levels

Table 4 presents the groundwater elevations measured during the second quarter 2019 groundwater monitoring event at the Building 4-78/79 SWMU/AOC group. As shown in Figure 7, the observed direction of groundwater flow from the source area during May 2019 is generally to the west, with a hydraulic gradient of 0.0002.

3.3.4 Groundwater monitoring results

Results for primary geochemical indicators are presented in Table 5; results for the COCs for Building 4-78/79 SWMU/AOC Group are presented in Table 6. Groundwater at this area is monitored following the schedule presented in Tables A-1 and A-2 in Appendix A.

3.3.4.1 Natural attenuation/geochemical indicators

The geochemical indicator results are presented in Table 5. In general, source area, downgradient, and CPOC area wells had low levels of dissolved oxygen and oxidation/reduction potential, indicating that reducing conditions are present over the area and are generally favorable for reductive dechlorination of chlorinated volatile organic compounds. The pH in all monitoring wells was above 6.0 standard units during the second quarter monitoring period. Results for the other primary geochemical indicators were fairly consistent throughout this area. TOC concentrations in source area wells ranged from 4.80 to 28.09 mg/L.

3.3.4.2 COC results for source and downgradient plume areas

Table 6 lists second quarter 2019 analytical results for the Building 4-78/79 SWMU/AOC Group COCs. The CULs established in the CAP for the CPOC are also presented on Table 6. Figures 10 and 11 are trend charts showing historical trends for COCs for four groundwater monitoring wells that have a history of frequent detections. Trend charts have not been prepared for groundwater monitoring wells or COCs that do not have a history of frequent detections.

As shown in Table 6, benzene, cis-1,2-DCE, and VC were detected in groundwater from several source area wells at concentrations above the CPOC CULs. In source area wells GW034S, GW039S, and GW243I, all COCs were below CULs. TCE was not detected in the groundwater from source area wells. TPH-G was detected in the groundwater from source area well GW031S, at a concentration of 1,020 µg/L (the field duplicate concentration was 848 µg/L),. TPH-G was also detected in the groundwater from source area wells GW033S at a concentration below the CPOC CUL. No COCs were detected in the groundwater from the downgradient plume area wells.

Figure 10 shows trends for selected COCs for source area wells GW031S and GW033S, and Figure 11 shows trends for selected COCs for source area well GW034S and downgradient plume area well GW209S. COC concentrations in the groundwater from GW031S and GW033S are generally consistent with historical results and trends, though the concentration of VC decreased significantly during the second quarter in source area well GW033S. Groundwater from GW033S historically had the highest concentrations of cis-1,2-DCE and VC prior to the Duct Bank dewatering project.

COC concentrations in groundwater from source area well GW034S and downgradient plume area well GW209S (Figure 11) remain stable with concentrations below detection during the second quarter. Nitrate and sulfate injections described in Appendix D are continuing, in order to address remaining benzene present between GW210S and GW244S.

Concentrations of COCs in the groundwater from select source area wells remain above the MCLs/MTCA standard for potable water supply (specifically for benzene, VC, and TPH-G). Active treatment is ongoing. Concentrations of COCs in downgradient monitoring wells are below the applicable MCLs/MTCA criteria for potable water supply.

3.3.4.3 COC results for conditional point of compliance area

Groundwater monitoring results from the second quarter for the CPOC area are summarized in Table 6. Trends for CPOC wells GW143S, GW237S, and GW240D are shown in Figures 12 through 14. Benzene was detected at a concentration of 2.20 µg/L, above the CUL, in the groundwater from CPOC area well GW237S; all other benzene results for the CPOC area were below detection (Table 6). As shown in Figure 12, benzene has been sporadically detected in the groundwater from CPOC area well GW237S but has not been detected above the CUL in the groundwater from any other CPOC wells. The benzene concentrations in the groundwater from CPOC well GW237S have remained lower than the concentrations observed during the first quarter. The only other COCs detected in the groundwater from the CPOC area

during the second quarter was VC at a concentration of 0.27 µg/L in the groundwater from CPOC well GW240D.

3.4 Former Fuel Farm AOC group

The Former Fuel Farm AOC group is monitored semiannually in May and November. The final remedy for the Former Fuel Farm is MNA.

3.4.1 Cleanup action activities

No installation/construction activities were conducted for this cleanup action area during the second quarter.

3.4.2 Compliance monitoring plan deviations

No deviations from the compliance monitoring plan occurred for this area during the second quarter.

3.4.3 Water levels

Groundwater elevations for the Former Fuel Farm AOC Group measured during the second quarter 2019 are summarized in Table 7 and shown on Figure 15. Groundwater elevation contours are not shown on Figure 15 due to anomalous measurements.

3.4.4 Groundwater monitoring results

Results for primary geochemical indicators are presented in Table 8; results for COCs for the Former Fuel Farm AOC Group are presented in Table 9. Groundwater in this area is monitored following the schedule presented in Tables A-1 and A-2 in Appendix A.

3.4.4.1 Monitored natural attenuation indicators

The geochemical indicator results are presented in Table 8. Results in Table 8 indicate that geochemical conditions are generally consistent throughout the Former Fuel Farm AOC Group. The pH in CPOC area wells GW212S and GW257S was below 6.0 standard units; low pH may interfere with biological degradation of site COCs. However, COCs are below CULs at these wells. The other geochemical indicators indicate that conditions are generally conducive to natural attenuation of the COCs for the Former Fuel Farm AOC Group.

3.4.4.2 COC results for source area

Table 9 lists second quarter 2019 analytical results for the Former Fuel Farm AOC Group COCs. The CULs established in the CAP are also presented on Table 9. As shown in Table 9, TPH in the diesel and Jet A ranges was not detected above the reporting limit in the groundwater from source area well GW255S.

3.4.4.3 COC results for conditional point of compliance area

CPOC area monitoring results are presented in Table 9. Figure 16 shows trend data for CPOC area wells GW211S, GW221S, and GW224S. TPH in the diesel range exceeded the CUL in the groundwater from CPOC area wells GW221S and GW224S, and was detected below the CUL in CPOC well GW211S. TPH in the Jet A range exceeded the CUL in the groundwater from CPOC area well GW224S, and was detected below the CUL in CPOC wells GW211S and GW221S. Figure 16 shows that the second quarter results for these wells are consistent with the historical monitoring results since late 2013.

Samples were analyzed for TPH in the diesel and Jet A ranges both with and without a silica gel cleanup which can be performed on samples to remove non-petroleum based biogenic interferences. As shown in Table 9, concentrations of TPH as diesel and Jet A were both lower after silica gel cleanup had been performed (except for sample GW221S). We propose to analyze samples GW211S, GW221S and GW224S with the silica gel procedure for future sampling events starting in the fourth quarter 2019.

3.5 AOC-001 and AOC-002

This section describes corrective action activities conducted at these AOCs during the second quarter 2019. The cleanup remedy for this corrective action area is bioremediation and MA. Bioremediation commenced for this area in late 2004, following source area excavation. Figure 17 shows the location of groundwater monitoring wells and the bioremediation injection system for AOC-001 and AOC 002, as well as the groundwater elevations measured during this monitoring event.

3.5.1 Cleanup action activities

No installation/construction activities were conducted for this cleanup action area during the second quarter.

3.5.2 Compliance monitoring plan deviations

No deviations from the compliance monitoring plan occurred for this area during the second quarter.

3.5.3 Water levels

Table 10 presents the groundwater elevations measured during the second quarter 2019 monitoring event at AOC-001 and AOC-002. Figure 17 shows the groundwater elevations from this event. Groundwater flow directions cannot be determined from the available groundwater elevation data.

3.5.4 Groundwater monitoring results

Groundwater in this area is monitored following the schedule presented in Tables A-1 and A-2 in Appendix A. Results for primary geochemical indicators are presented in Table 11; results for the AOC-001 and AOC-002 COCs are presented in Table 12. The COCs detected (cis-1,2-DCE and VC) are present at levels below the applicable MCLs/MTCA criteria for potable water supply in all wells.

3.5.4.1 Monitored attenuation/geochemical indicators

The geochemical indicator results are presented in Table 11. The pH was near neutral in all CPOC wells and is conducive to microbial activity. Table 11 also suggests that geochemical conditions are appropriate for reductive dechlorination of the COCs in the AOC-001 and AOC-002 CPOC area, as indicated by the reducing conditions, low dissolved oxygen levels, and generally appropriate TOC concentrations.

3.5.4.2 COC results for source and downgradient plume areas

Source area and downgradient wells are monitored semiannually in the first and third quarters; therefore, no monitoring for source area or downgradient plume area wells was conducted in the second quarter.

3.5.4.3 COC results for conditional point of compliance area

As shown in Table 12, 1,1-dichloroethene, benzene, and TCE concentrations in the groundwater from CPOC area wells were either below detection or below the CUL. Concentrations of cis-1,2-DCE were above the CUL in the groundwater from all CPOC area wells except for GW194S. VC was detected at

concentrations above the CUL in the groundwater from CPOC area wells 185S and 197S, and was detected at a concentration below the CUL in well 196D.

As shown in Figure 18, aside from the increase in concentrations of cis-1,2-DCE and VC observed in the in the groundwater from GW185S in the second and third quarters of 2016; concentrations of cis-1,2-DCE and VC in the CPOC area monitoring wells have been generally stable since compliance monitoring began. CPOC area wells GW194S and GW245S are not shown on Figure 18 because COCs are generally not detected in the groundwater from these wells. Similarly, the remaining COCs are generally below the CUL in the CPOC area monitoring wells and are not included on Figure 18.

As previously noted, CULs may need to be re-evaluated based on overly conservative COC concentration assumptions that were made prior to remedial action implementation, but that have changed over time, resulting in an over-estimation of total site risk based on current relative concentrations of individual COCs.

3.6 AOC-003

This section describes corrective action activities conducted at AOC-003 for the second quarter 2019. The cleanup remedy for this AOC is bioremediation and MA. Figure 19 shows the location of groundwater monitoring and bioremediation wells at AOC-003, as well as the groundwater elevations measured during this monitoring event.

3.6.1 Cleanup action activities

No installation/construction activities were conducted for this cleanup action area during the second quarter.

3.6.2 Compliance monitoring plan deviations

Groundwater samples were collected from the source and downgradient area wells during the second quarter. Following the schedule presented in Table A-1, source and downgradient area wells are sampled semiannually in the first and third quarters.

3.6.3 Water levels

Table 13 presents the groundwater elevations measured during the second quarter 2019 monitoring event at AOC-003 and AOC-092. Figure 19 shows the groundwater elevations from this event. Groundwater flow directions cannot be determined from the available groundwater elevation data.

3.6.4 Groundwater monitoring results

Groundwater at AOC-003 is monitored following the schedule presented in Tables A-1 and A-2 in Appendix A. Results for geochemical indicators are presented in Table 14; results for the AOC-003 COCs are presented in Table 15.

3.6.4.1 Monitored attenuation//geochemical indicators

The geochemical indicator results are presented in Table 14. Results in Table 14 indicate that geochemical conditions are generally consistent throughout this AOC and are generally conducive to biodegradation of the COCs for this AOC.

3.6.4.2 COC results for source and downgradient plume areas

Source area and downgradient wells are monitored semiannually in May and November; therefore, no monitoring for source area or downgradient plume wells was conducted in the second quarter.

3.6.4.3 COC results for conditional point of compliance area

Groundwater from the two CPOC area wells had no detections of PCE, TCE or cis-1,2-DCE above their respective CULs. VC was detected at concentrations above the CUL in the groundwater from both CPOC wells (GW247S and GW248I), at concentrations of 0.497 and 0.551 µg/L, respectively.

While VC concentrations exceed the CUL in the groundwater from CPOC wells, as detailed above, VC concentrations are below the applicable MCLs/MTCA criteria for potable water supply in both CPOC wells.

3.7 AOC-004

AOC-004 is monitored semiannually during the first and third quarters; therefore, no monitoring was conducted for this area during the second quarter 2019.

3.8 AOC-060

AOC-060 is monitored semiannually during the first and third quarters; therefore, no monitoring was conducted for this area during the second quarter 2019.

3.9 AOC-090

AOC-090 is monitored semiannually during the first and third quarters; therefore, no monitoring was conducted for this area during the second quarter 2019.

3.10 Building 4-70 area

The Building 4-70 Area is monitored semiannually during the first and third quarters; therefore, no monitoring was conducted for this area during the second quarter 2019.

3.11 Lot 20/Former Building 10-71 Parcel

This section describes corrective action activities conducted for this area during the second quarter 2019. Figure 20 shows the locations of the groundwater monitoring wells and the bioremediation injection system at the Lot 20/Former Building 10-71 Parcel, as well as the groundwater elevations measured during the second quarter. The Lot 20/Former Building 10-71 Parcel was not included in the EDR, but was later added to the Compliance Monitoring Plan (Amec Foster Wheeler, 2016a) and has been regularly monitored in conjunction with the Facility corrective action areas. The cleanup remedy for the Lot 20/Former Building 10-71 Parcel is bioremediation and MA. This area is monitored semiannually in the second and fourth quarters, in accordance with Table A-1 in Appendix A.

3.11.1 Cleanup action activities

No construction or operations work was conducted for the Lot 20/Former Building 10-71 Parcel during the second quarter.

3.11.2 Water levels

The groundwater elevations measured during the second quarter at the Lot 20/Former Building 10-71 Parcel are presented in Table 16 and on Figure 20. Groundwater contours are not shown on Figure 20 because the three monitoring wells measured are arranged nearly in a straight line and do not provide

enough water level data to prepare contours. Based on the second quarter water level measurements, the apparent groundwater flow appears to be generally to the northwest.

3.11.3 Groundwater monitoring results

Results for primary geochemical indicators for groundwater from the Lot 20/Former Building 10-71 Parcel monitoring wells are presented in Table 17; results for COCs for the Lot 20/Former Building 10-71 Parcel monitoring wells are presented in Table 18. Groundwater in this area is monitored following the schedule presented in Tables A-1 in Appendix A.

3.11.3.1 Monitored attenuation/geochemical indicators

The geochemical indicator results are presented in Table 17. The pH in groundwater from two of the Lot 20/Former Building 10-71 Parcel monitoring wells (10-71-MW1 and 10-71-MW2) was below 6 standard units. All remaining parameters in the groundwater from these monitoring wells appear uniform.

3.11.3.2 COC results

Second quarter analytical results for the Lot 20/Former Building 10-71 Parcel COCs are presented in Table 18. The concentrations of all of the COCs—cis-1,2-DCE, toluene, TCE, and VC—in the groundwater from Lot 20/Former Building 10-71 Parcel monitoring wells were below detection, and hence below the applicable MCLs/MTCA criteria for potable water supply.

3.12 Apron A area

This section describes corrective action activities conducted at the Apron A area during the second quarter 2019. The cleanup remedy proposed for the Apron A area is bioremediation and MA. Figure 21 shows the locations of the groundwater monitoring wells in the Apron A area.

3.12.1 Cleanup action activities

No construction or operations work was conducted in the Apron A area during the second quarter.

3.12.2 Water levels

The depth to groundwater measured during the second quarter at Apron A are presented in Table 19 and on Figure 12. Groundwater elevations are not available because the top of casing elevations were never surveyed.

3.12.3 Groundwater monitoring results

Results for primary geochemical indicators for groundwater from groundwater monitoring wells GW262S and GW264S are presented in Table 20; results for COCs from these wells are presented in Table 21. Groundwater in this area is monitored following the schedule presented in Tables A-1 and A-2 in Appendix A.

3.12.3.1 Monitored attenuation/geochemical indicators

Geochemical parameters are presented in Table 20. TOC concentrations in the monitoring wells were slightly elevated during the second quarter 2019 monitoring event. The other primary geochemical indicators show that reducing conditions were present and that conditions were conducive to biological degradation of the chlorinated volatile organic compounds.

3.12.3.2 COC results

Second quarter analytical results for the Apron A COCs (cis-1,2-DCE and VC) are presented in Table 21. Cis-1,2-DCE was not detected in the groundwater from either GW262S or GW264S. VC was detected in the groundwater from monitoring well GW264S at a concentration of 1.39 µg/L. VC was not detected in the groundwater from monitoring well GW262S.

4.0 References

AMEC Environment & Infrastructure, Inc. (AMEC), 2012, Draft Cleanup Action Plan, Boeing Renton Facility, Renton, Washington: Prepared for The Boeing Company, September.

AMEC, 2014, Draft Engineering Design Report, Boeing Renton Cleanup Plan Implementation, Boeing Renton Facility, Renton, Washington: Prepared for The Boeing Company, July.

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler), 2016a, Compliance Monitoring Plan, Boeing Renton Facility, Renton, Washington: Prepared for The Boeing Company, February.

Amec Foster Wheeler, 2016b, Apron A Investigation Results, Renton Municipal Airport – Boeing Apron A Renton, Washington, June.

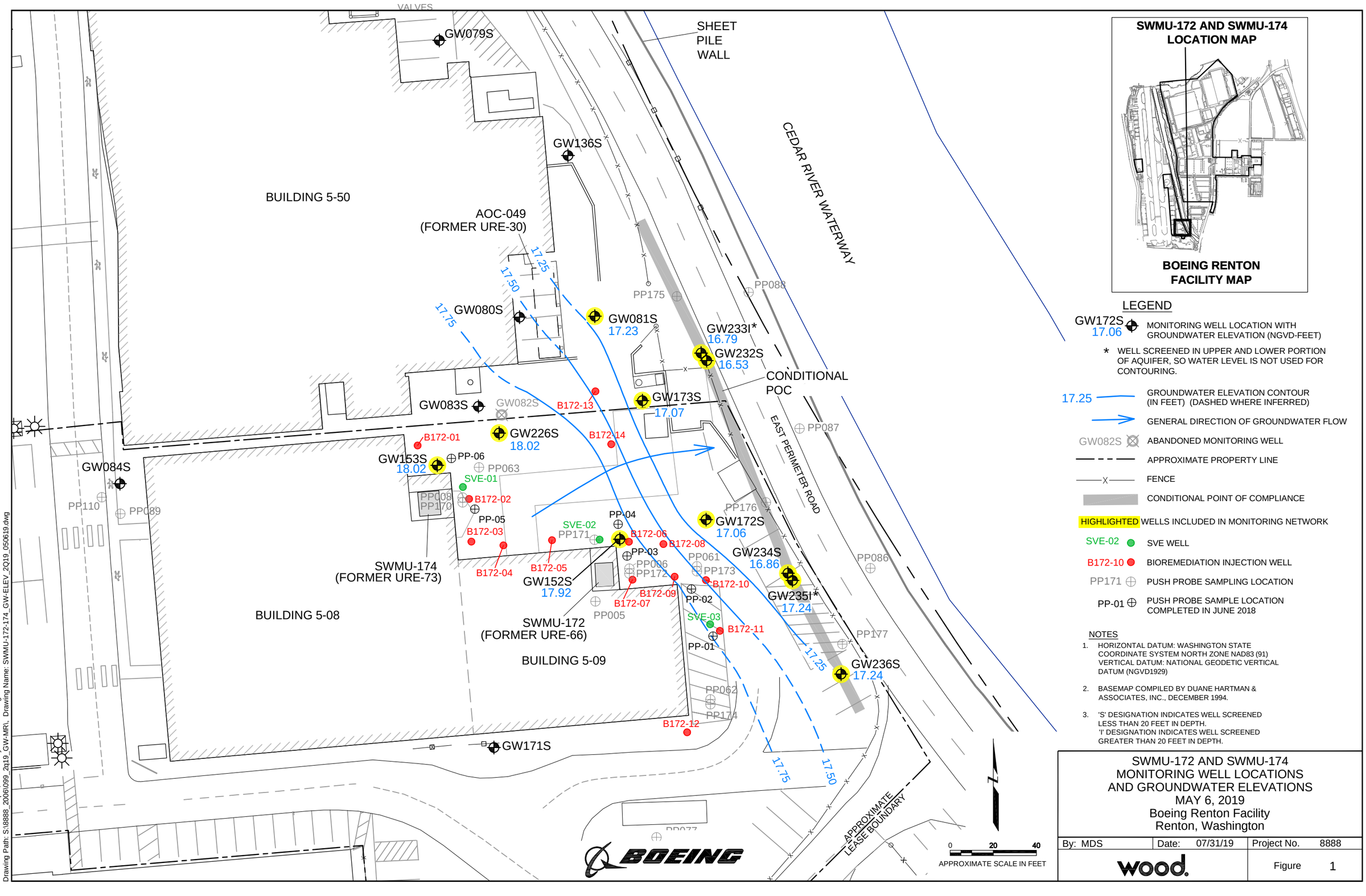
Amec Foster Wheeler, 2016c, Quality Assurance Project Plan, Boeing Renton Facility, Renton, Washington: Prepared for The Boeing Company, February.

CALIBRE Systems, Inc. (CALIBRE), 2019, Plan for Evaluation of Soils around Probe PP13 at Building 4-78/4-79 SWMU/AOC Group; Boeing Renton Site, April 29.

Wood Environment & Infrastructure Solutions, Inc. (Wood), 2018, Quarterly report, second quarter 2018, RCRA Corrective Action Program, Boeing Renton Facility.

Wood, 2019, Addendum to the Compliance Monitoring Plan, Boeing Renton Facility, Renton, Washington: Prepared for the Boeing Company, April.

Figures



SWMU-172 AND SWMU-174 LOCATION MAP

BOEING RENTON FACILITY MAP

LEGEND

- GW172S 17.06 — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION (NGVD-FEET)
- * — WELL SCREENED IN UPPER AND LOWER PORTION OF AQUIFER, SO WATER LEVEL IS NOT USED FOR CONTOURING.
- 17.25 — GROUNDWATER ELEVATION CONTOUR (IN FEET) (DASHED WHERE INFERRED)
- GENERAL DIRECTION OF GROUNDWATER FLOW
- GW082S — ABANDONED MONITORING WELL
- APPROXIMATE PROPERTY LINE
- FENCE
- CONDITIONAL POINT OF COMPLIANCE
- HIGHLIGHTED — WELLS INCLUDED IN MONITORING NETWORK
- SVE-02 — SVE WELL
- B172-10 — BIOREMEDIATION INJECTION WELL
- PP171 — PUSH PROBE SAMPLING LOCATION
- PP-01 — PUSH PROBE SAMPLE LOCATION COMPLETED IN JUNE 2018

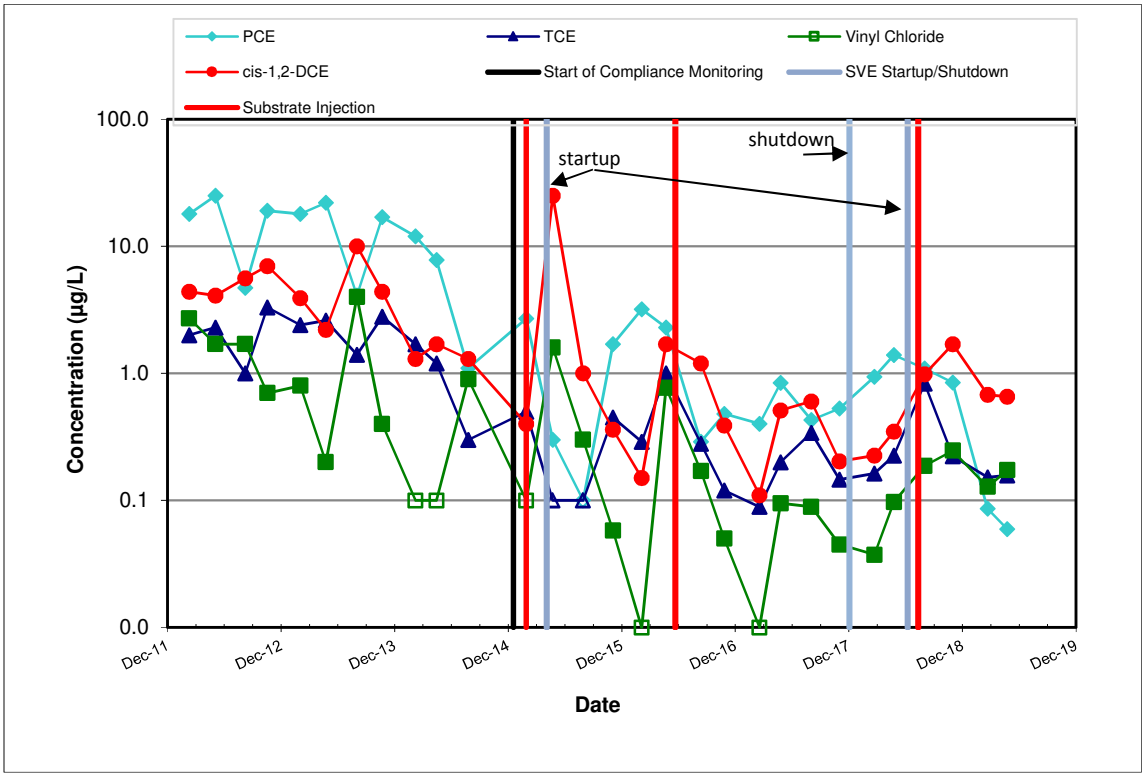
NOTES

1. HORIZONTAL DATUM: WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE NAD83 (91)
   VERTICAL DATUM: NATIONAL GEODETIC VERTICAL DATUM (NGVD1929)
2. BASEMAP COMPILED BY DUANE HARTMAN & ASSOCIATES, INC., DECEMBER 1994.
3. 'S' DESIGNATION INDICATES WELL SCREENED LESS THAN 20 FEET IN DEPTH.
   'I' DESIGNATION INDICATES WELL SCREENED GREATER THAN 20 FEET IN DEPTH.

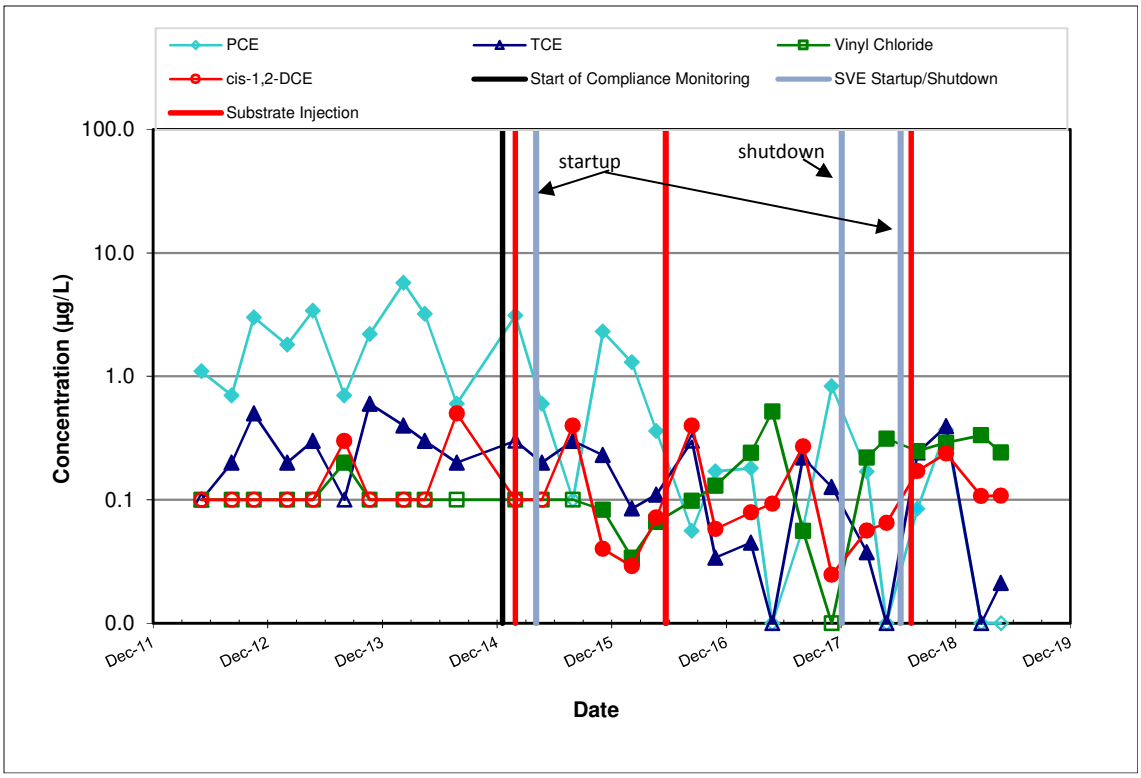
SWMU-172 AND SWMU-174 MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS MAY 6, 2019 Boeing Renton Facility Renton, Washington

By: MDS	Date: 07/31/19	Project No. 8888
wood.		Figure 1

Plot Date: 07/31/19 - 3:57pm, Plotted by: adam.stenberg
Drawing Path: S:\8888_2006099_2q19_GW-MR\, Drawing Name: SWMU-172-174_GW-ELEV_2Q19_050619.dwg



SOURCE AREA WELL GW152S

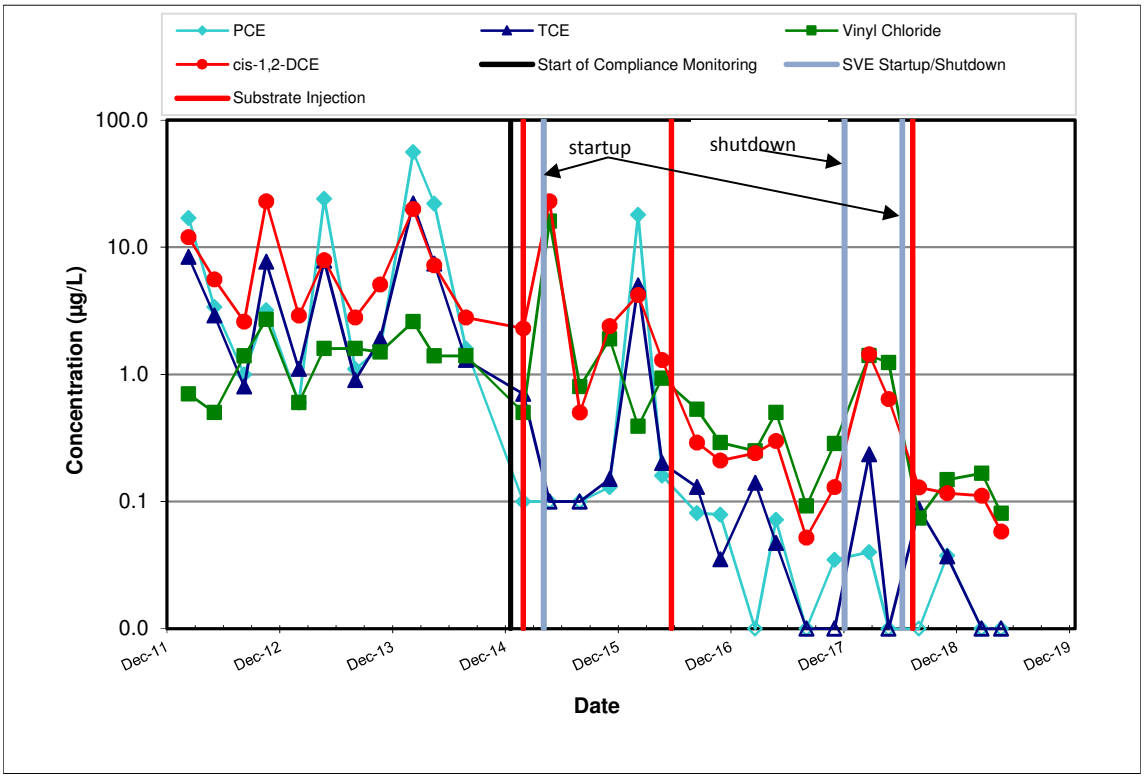


SOURCE AREA WELL GW153S

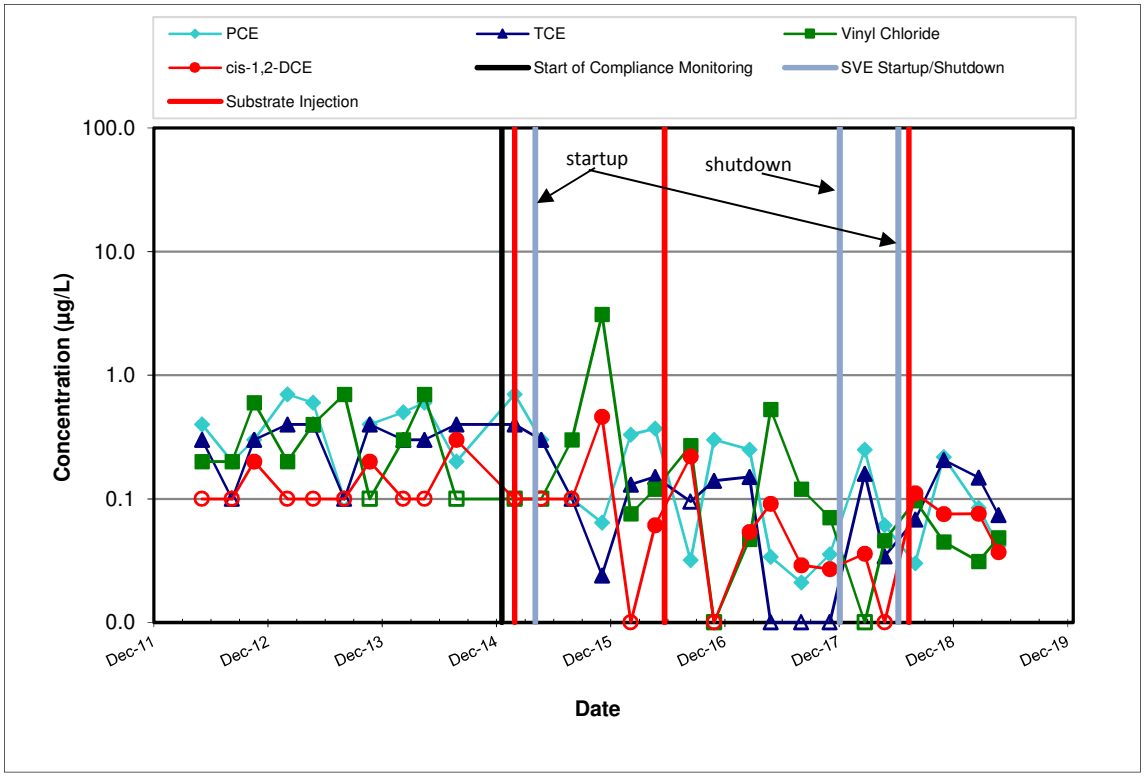
Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

wood.	SWMU-172 AND SWMU-174 TREND PLOTS FOR SOURCE AREA WELLS GW152S AND GW153S Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 2

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figures 3 to 7_ SWMU_172-174 Trend Plots.xlsx



DOWNGRADIENT PLUME AREA WELL GW172S



DOWNGRADIENT PLUME AREA WELL GW173S

Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

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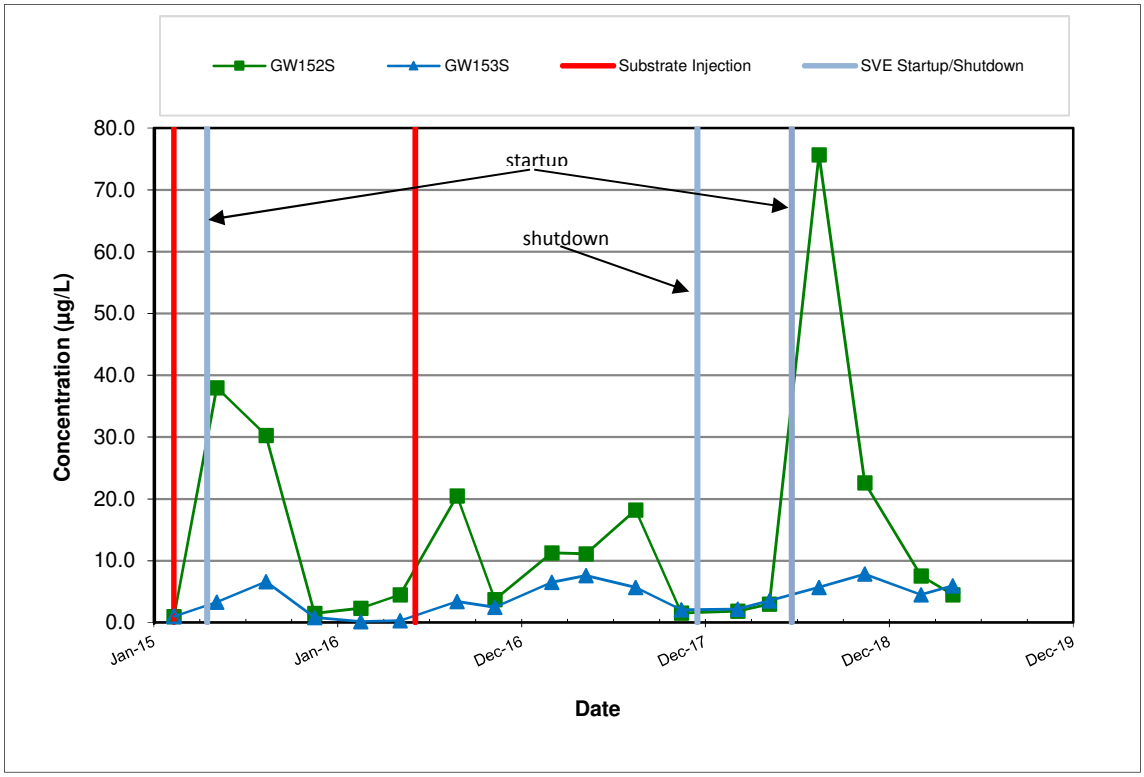
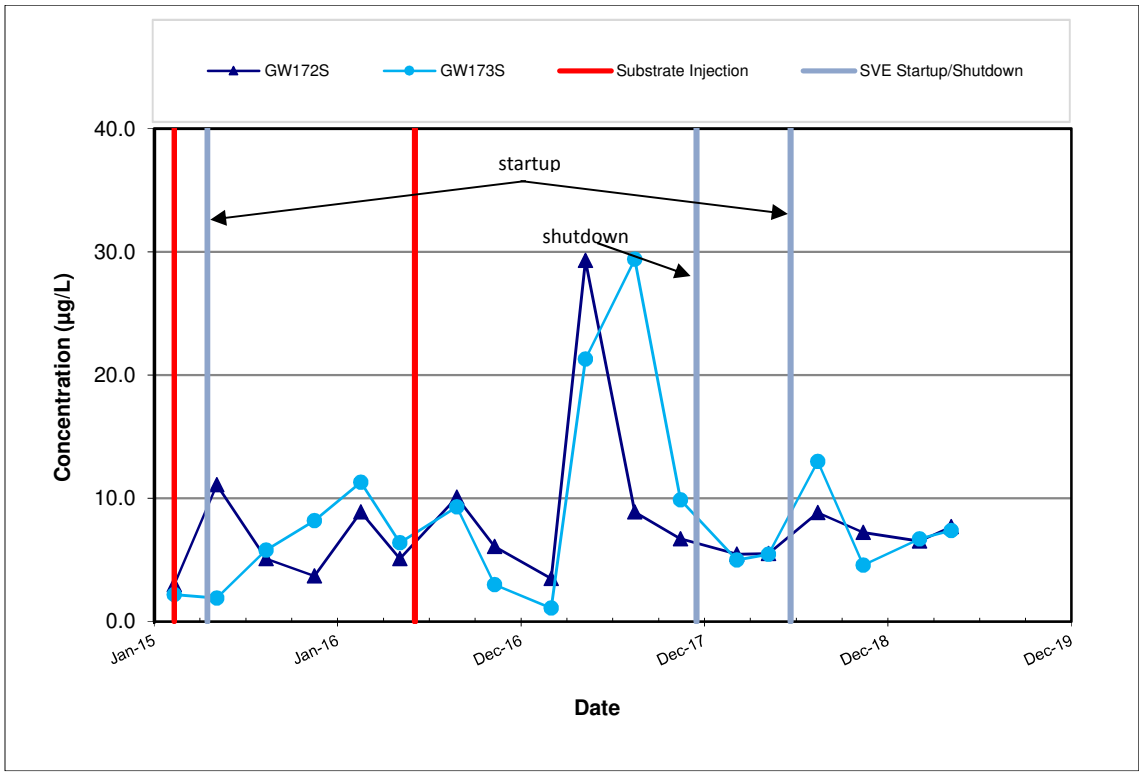
wood.	SWMU-172 AND SWMU-174 TREND PLOTS FOR DOWNGRADIENT PLUME AREA WELLS GW172S AND GW173S Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 3



TOTAL ARSENIC IN SOURCE AREA WELLS



TOTAL ARSENIC IN DOWNGRADIENT PLUME AREA WELLS

Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

wood.	SWMU-172 AND SWMU-174 TREND PLOTS FOR ARSENIC IN SELECT SOURCE AREA AND DOWNGRADIENT PLUME AREA WELLS Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 4

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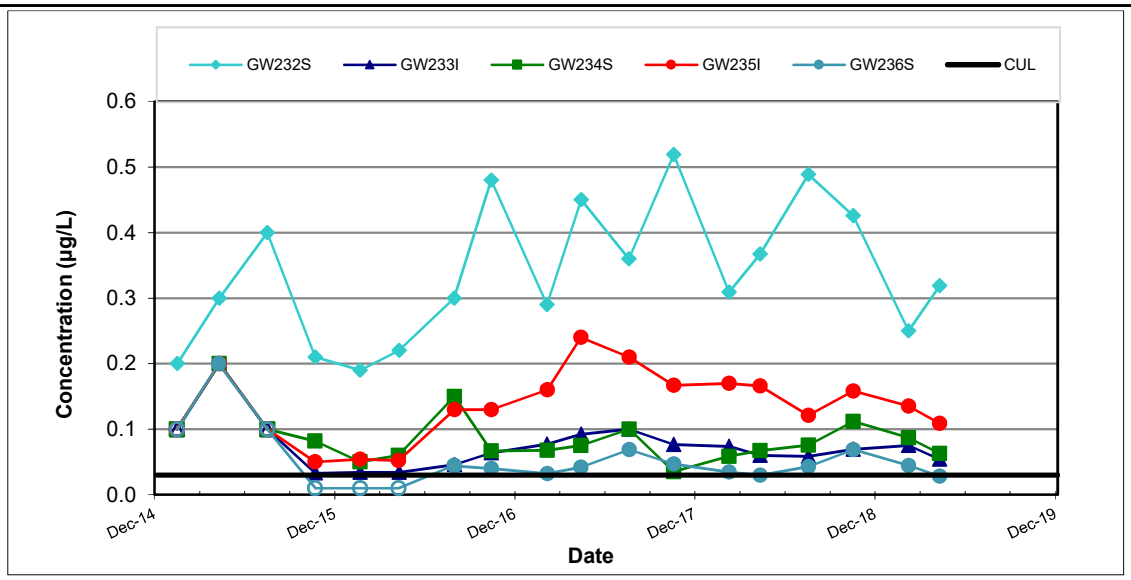
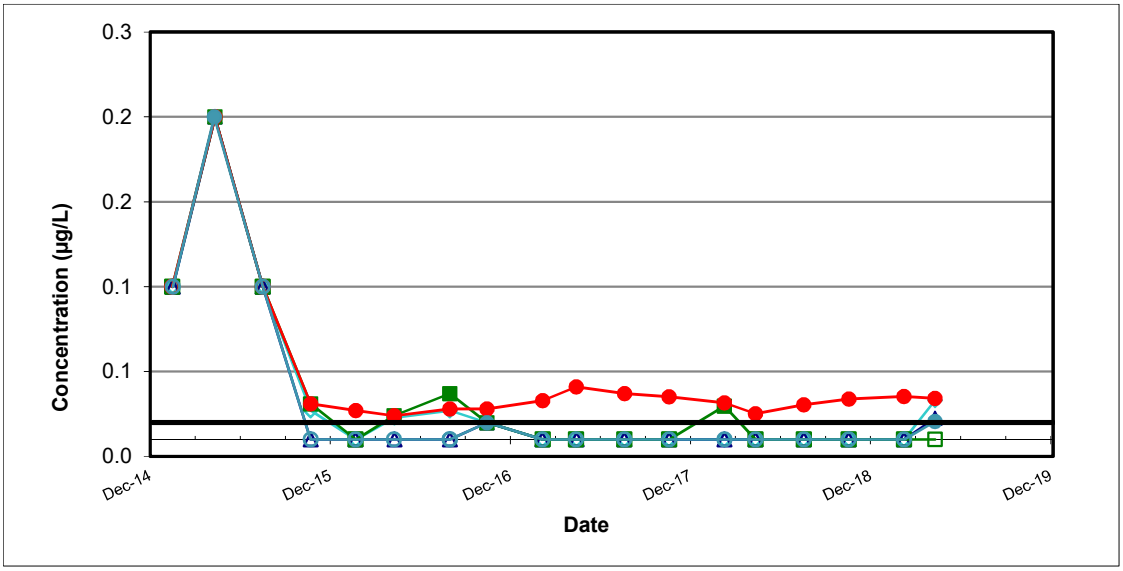
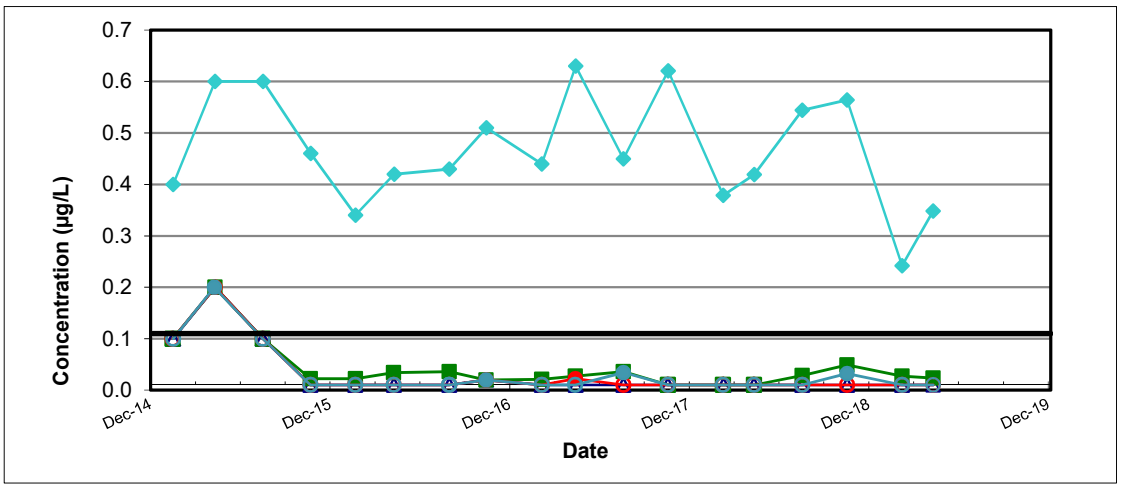


cis-1,2-Dichloroethene



Trichloroethene



Vinyl Chloride

Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

wood.	SWMU-172 AND SWMU-174 TREND PLOTS FOR CIS-1,2-DICHLROETHENE, TRICHLOROETHENE, AND VINYL CHLORIDE IN CPOC AREA WELLS Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 5

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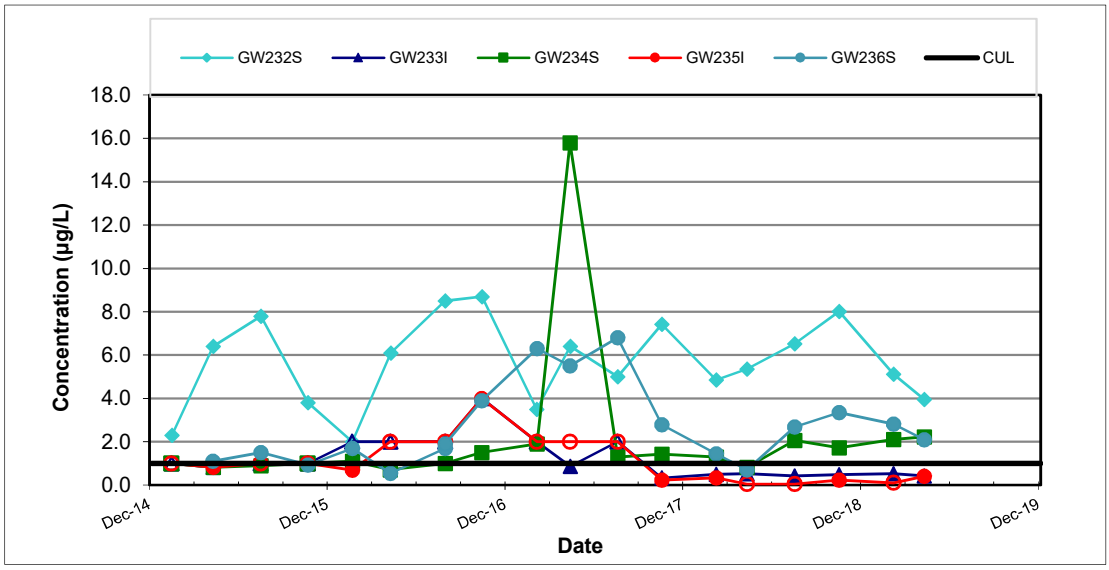
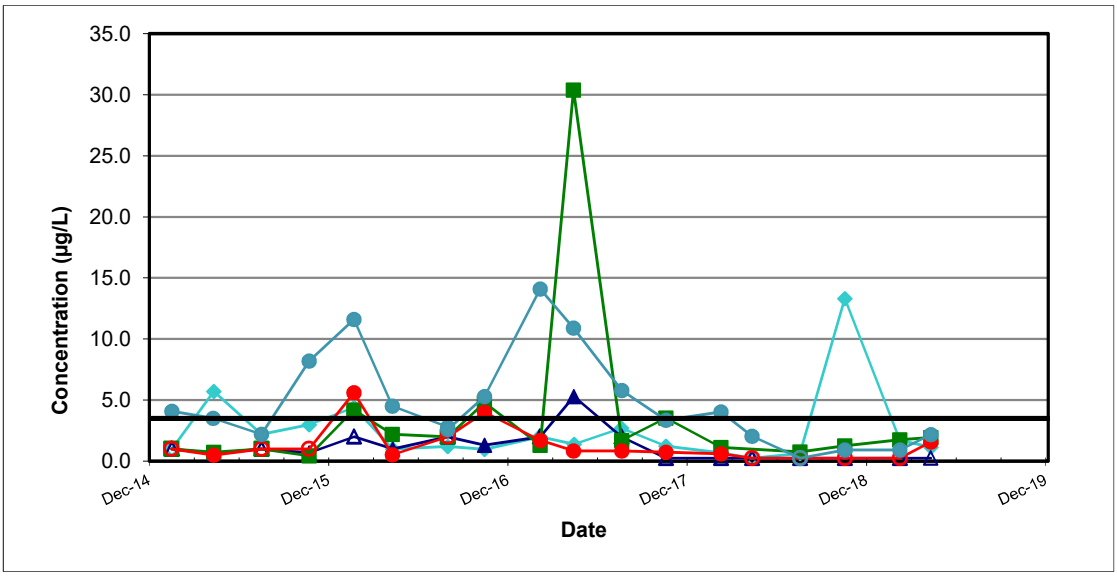
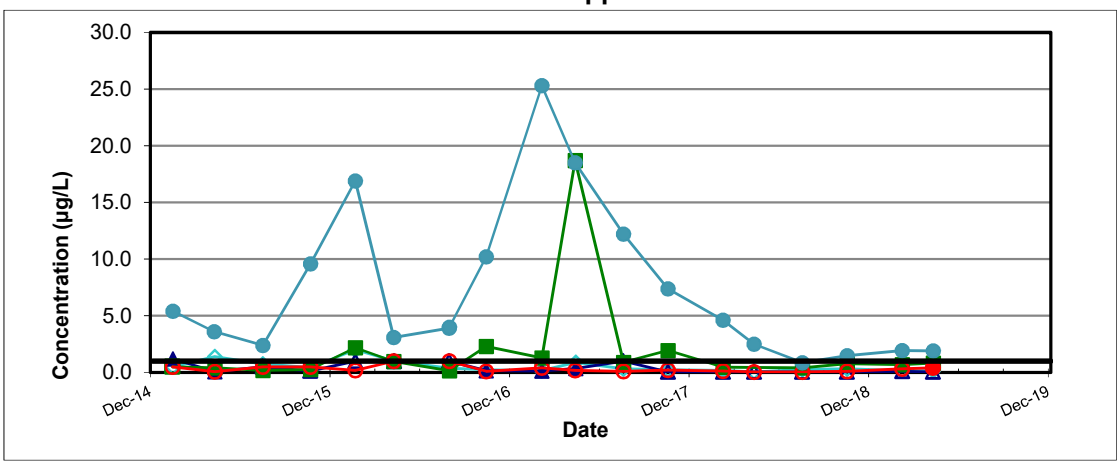


Arsenic



Copper



Lead

Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

wood.	SWMU-172 AND SWMU-174 TREND PLOTS FOR ARSENIC, COPPER AND LEAD IN CPOC AREA WELLS Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 6

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CEDAR RIVER TRAIL PARK

NISHIWAKI LANE

APPROXIMATE PROPERTY LINE

CONDITIONAL POC

CEDAR RIVER WATERWAY

APPROXIMATE PROPERTY LINE

BUILDING 4-45

BUILDING 4-79

BUILDING 4-78

BUILDING 4-77

SWMU-181

15.30

15.40

15.50

GW133S

GW132S

GW237S 15.28

GW238I 15.28*

GW209S 15.29

GW042D

GW041S

AOC-037 (URE-25)

GW243I 15.29**

GW239I 15.27*

GW240D 14.74*

GW143S 15.29

AOC-013 (URE-17)

AOC-026 (URE-54)

GW040S

SVE-01

GW039S 15.41**

AOC-015 (URE-24)

AOC-014 (URE-18)

GW242I 15.26*

GW241S 15.23

GW022S

GW023S

GW024D

GW026I

GW027D

GW210S 15.58

GW031S 15.35

GW244S 15.34

DISPENSER ISLAND (REMOVED)

GW032D

GW151D

GW033S 15.24

AOC-054 (URE-23)

GW034S 15.53

GW038S 15.24

GW037S

GW035S

GW036S

GW030S

PP083 PP084 PP085 PP086 PP087 PP088 PP089 PP090 PP091 PP092 PP093 PP094 PP095 PP096 PP097 PP098 PP099 PP100 PP101 PP102 PP103 PP104 PP105 PP106 PP107 PP108 PP109 PP110 PP111 PP112 PP113 PP114 PP115 PP116 PP117 PP118 PP119 PP120 PP121 PP122 PP123 PP124 PP125 PP126 PP127 PP128 PP129 PP130 PP131 PP132 PP133 PP134 PP135 PP136 PP137 PP138 PP139 PP140 PP141 PP142 PP143 PP144 PP145 PP146 PP147 PP148 PP149 PP150 PP151 PP152 PP153 PP154 PP155 PP156 PP157 PP158 PP159 PP160 PP161 PP162 PP163 PP164 PP165 PP166 PP167 PP168 PP169 PP170 PP171 PP172 PP173 PP174 PP175 PP176 PP177 PP178 PP179 PP180 PP181 PP182 PP183 PP184 PP185 PP186 PP187 PP188 PP189 PP190 PP191 PP192 PP193 PP194 PP195 PP196 PP197 PP198 PP199 PP200 PP201

PP-01 PP-02 PP-03 PP-04 PP-05 PP-06 PP-07 PP-08 PP-09 PP-10 PP-11 PP-12 PP-13 PP-14 PP-15 PP-16 PP-17 PP-18

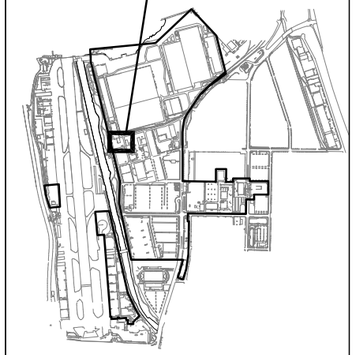
SVE-01 SVE-02 SVE-03 SVE-04 SVE-05 SVE-06 SVE-07 SVE-08 SVE-09 SVE-10 SVE-11 SVE-12 SVE-13 SVE-14 SVE-15

B78-01 B78-02 B78-03 B78-04 B78-05 B78-06 B78-07 B78-08 B78-09 B78-10 B78-11 B78-12 B78-13 B78-14 B78-15 B78-16

0 25 50

APPROXIMATE SCALE IN FEET

4-78/79 SWMU/AOC GROUP LOCATION MAP



BOEING RENTON FACILITY MAP

LEGEND

GW033S 15.24 — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION (NGVD-FEET)

* WELL SCREENED IN UPPER AND LOWER PORTION OF AQUIFER, SO WATER LEVEL IS NOT USED FOR CONTOURING.

** WATER LEVEL IS ANOMALOUS, NOT USED FOR CONTOURING.

GW042D — EXTRACTION WELL

15.30 — GROUNDWATER ELEVATION CONTOUR (IN FEET) (DASHED WHERE INFERRED)

GENERAL DIRECTION OF GROUNDWATER FLOW

GW032D — ABANDONED MONITORING WELL

SVE-15 — HORIZONTAL SVE WELL

B78-12 — BIOREMEDIATION INJECTION WELL

EXTRACTION WELL CONVERTED TO INJECTION WELL

PP083 — PUSH-PROBE SAMPLE LOCATION

PP-18 — PUSH-PROBE SAMPLE LOCATION COMPLETED IN JUNE 2018

FENCE

APPROXIMATE FUEL AND NON-CHLORINATED VOC SOURCE AREAS

REMOVED UST (WESTON, 2001)

CONDITIONAL POINT OF COMPLIANCE

HIGHLIGHTED WELLS INCLUDED IN MONITORING NETWORK

NOTES

1. BASEMAP COMPILED BY DUANE HARTMAN & ASSOCIATES, INC., DECEMBER 1994
2. UST LOCATIONS AND PRODUCT PIPING LOCATIONS FROM FINAL REMEDIAL INVESTIGATION (WESTON, 2001)
3. 'S' DESIGNATION INDICATES WELL SCREENED LESS THAN 20 FEET IN DEPTH.
   'I' DESIGNATION INDICATES WELL SCREENED BETWEEN 20 AND 25 FEET IN DEPTH.
   'D' DESIGNATION INDICATES WELL SCREENED GREATER THAN 25 FEET IN DEPTH.

BUILDING 4-78/79 SWMU/AOC GROUP MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS MAY 7 AND 8, 2019 Boeing Renton Facility Renton, Washington

By: MDS	Date: 07/31/19	Project No. 8888
wood.		Figure 7

BOEING

Plot Date: 07/31/19 - 4:05pm, Plotted by: adam.stenberg
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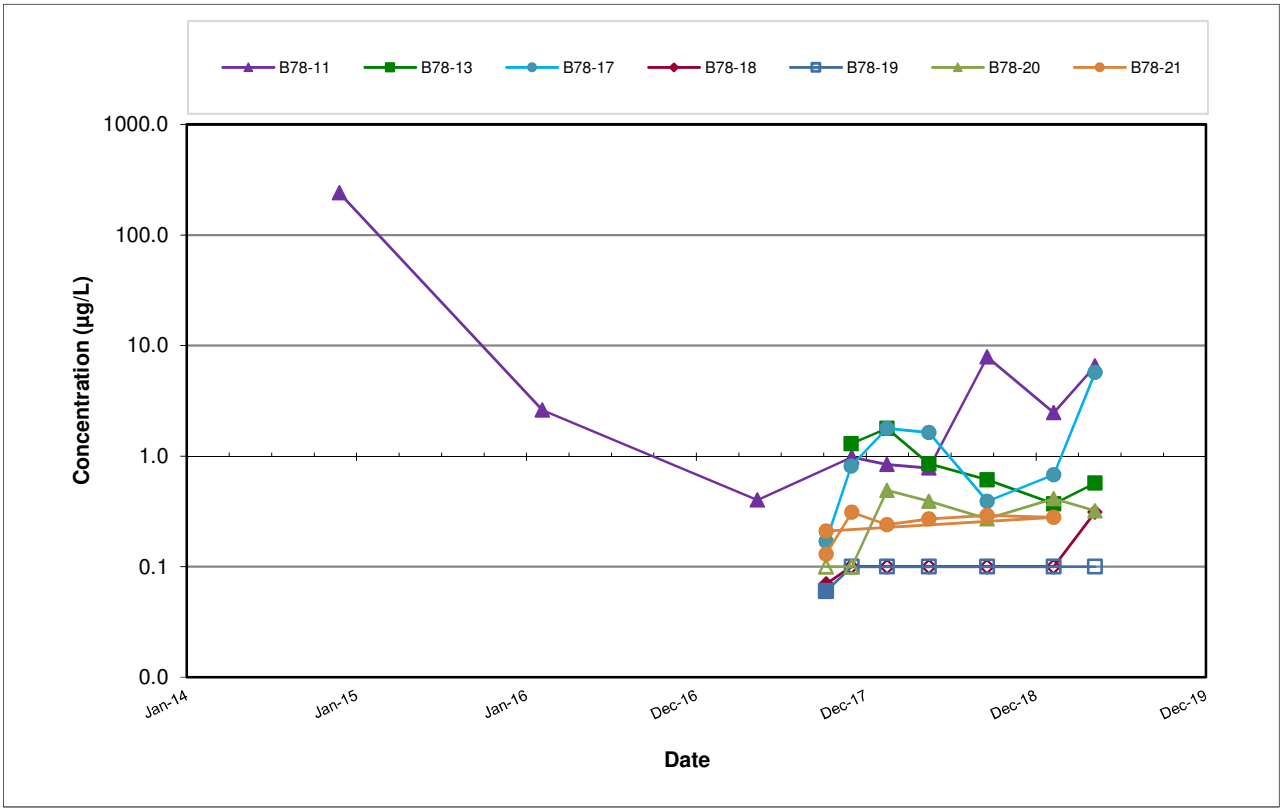
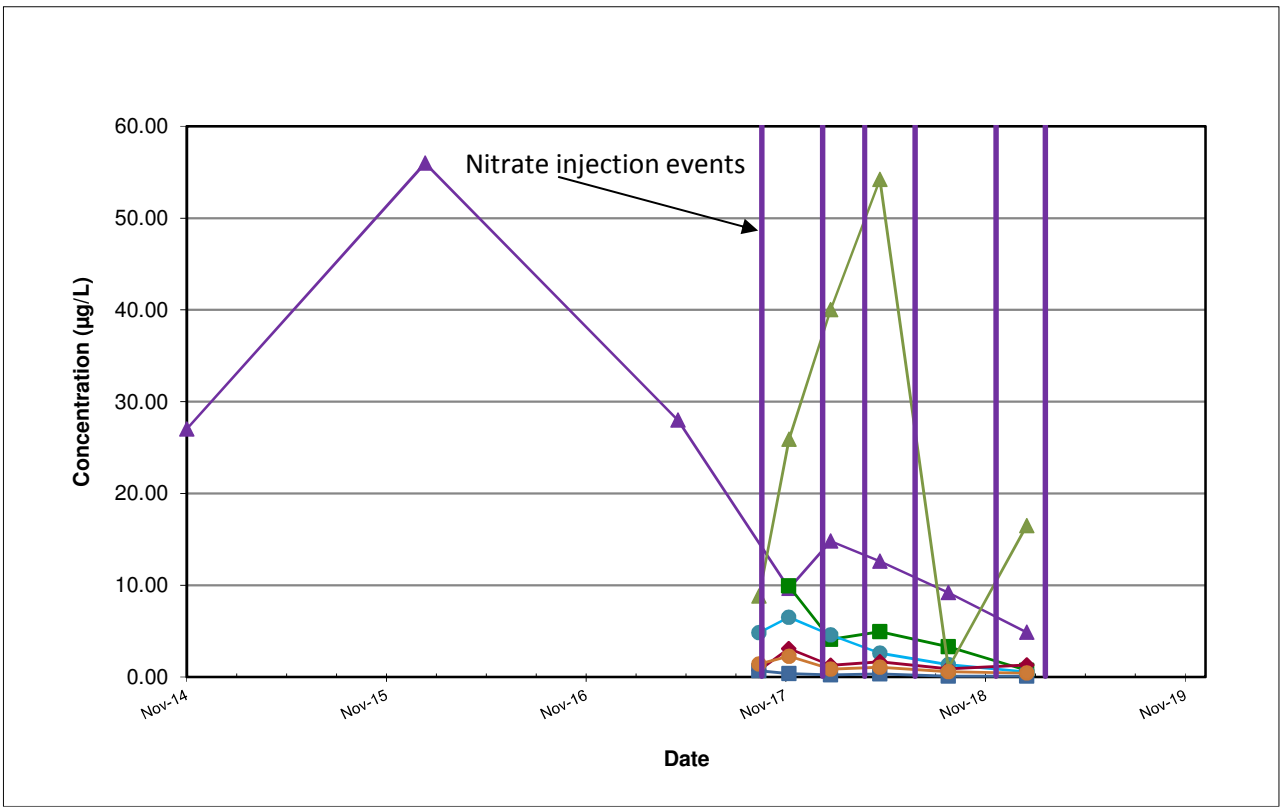


cis-1,2-Dichloroethene



Benzene

Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

wood.

BUILDING 4-78/79 SWMU/AOC GROUP TREND PLOTS FOR
CIS-1,2-DICHLOROETHENE AND BENZENE IN INJECTION WELLS
Boeing Renton Facility
Renton, Washington

Project No. 8888

Figure 8

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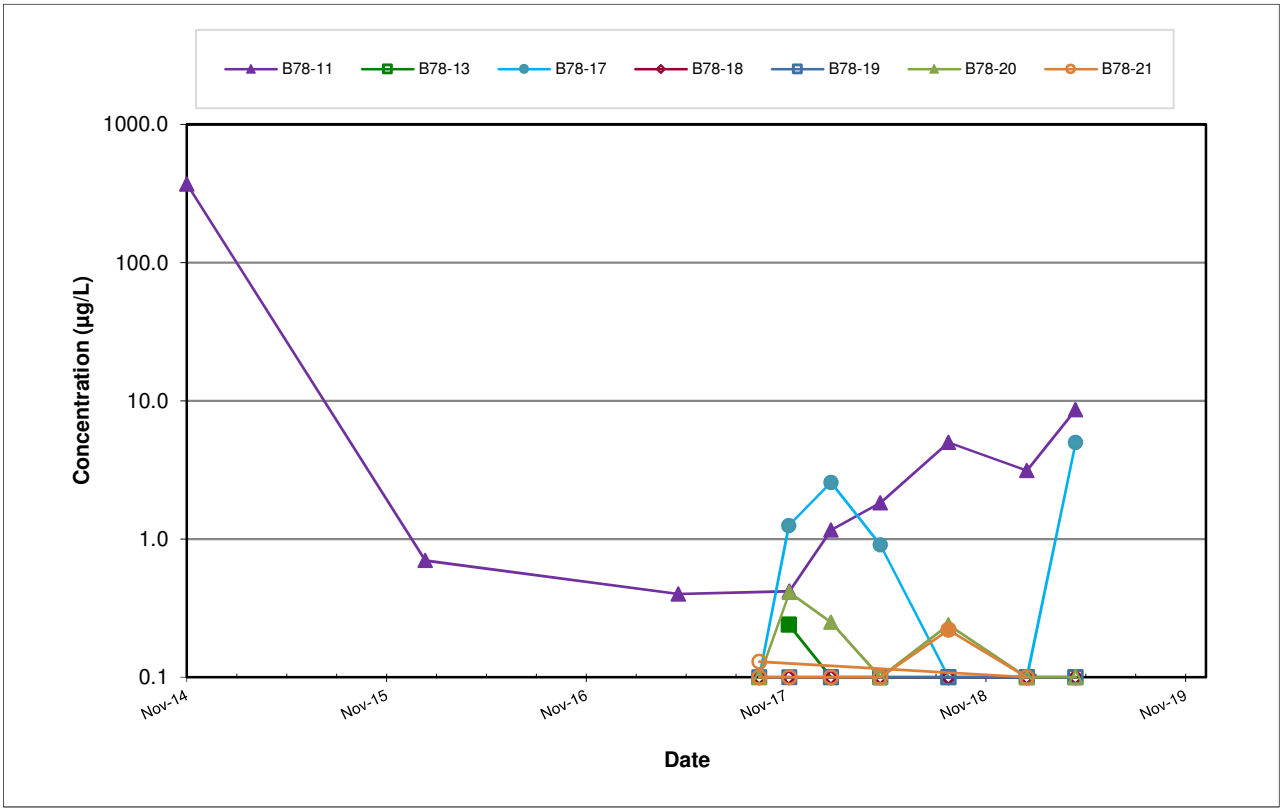
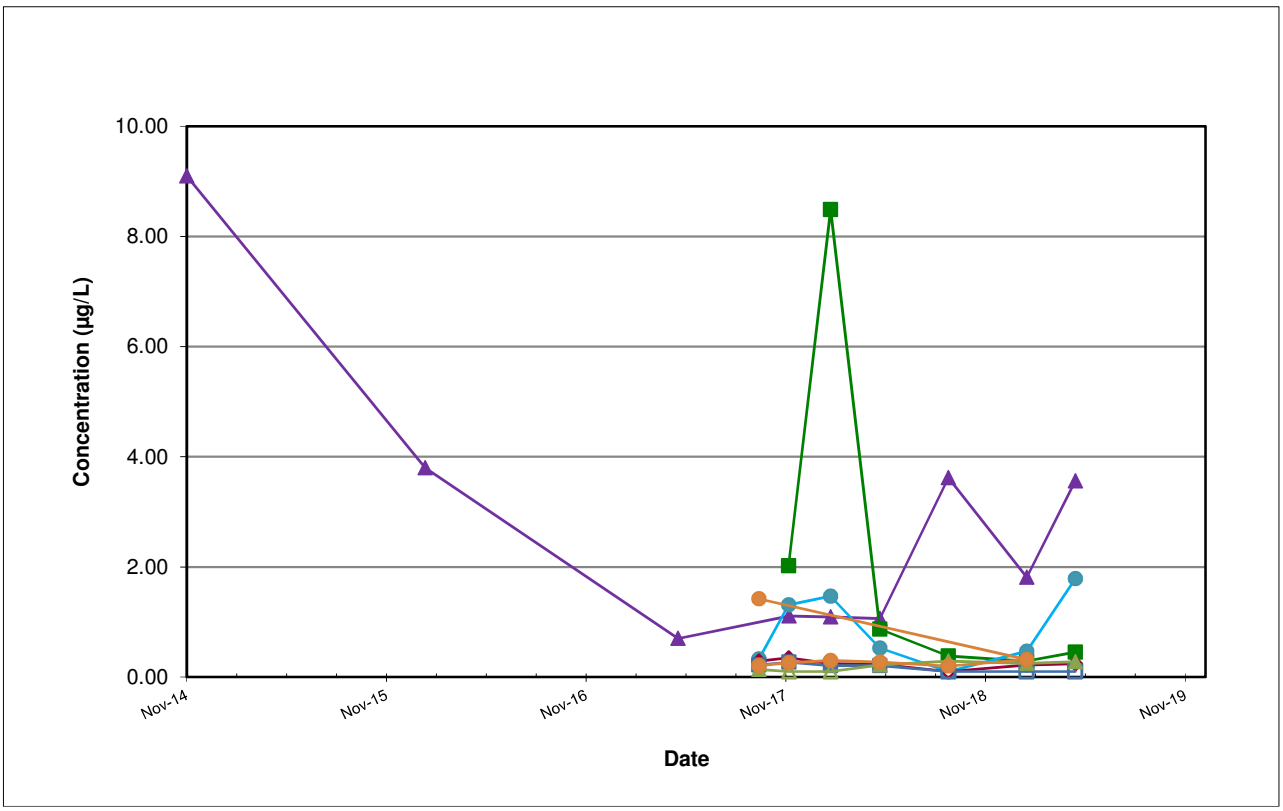


Trichloroethene



Vinyl Chloride

Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

wood.

BUILDING 4-78/79 SWMU/AOC GROUP TREND PLOTS FOR
TRICHLOROETHENE AND VINYL CHLORIDE IN INJECTION WELLS
Boeing Renton Facility
Renton, Washington

Project No. 8888

Figure 9

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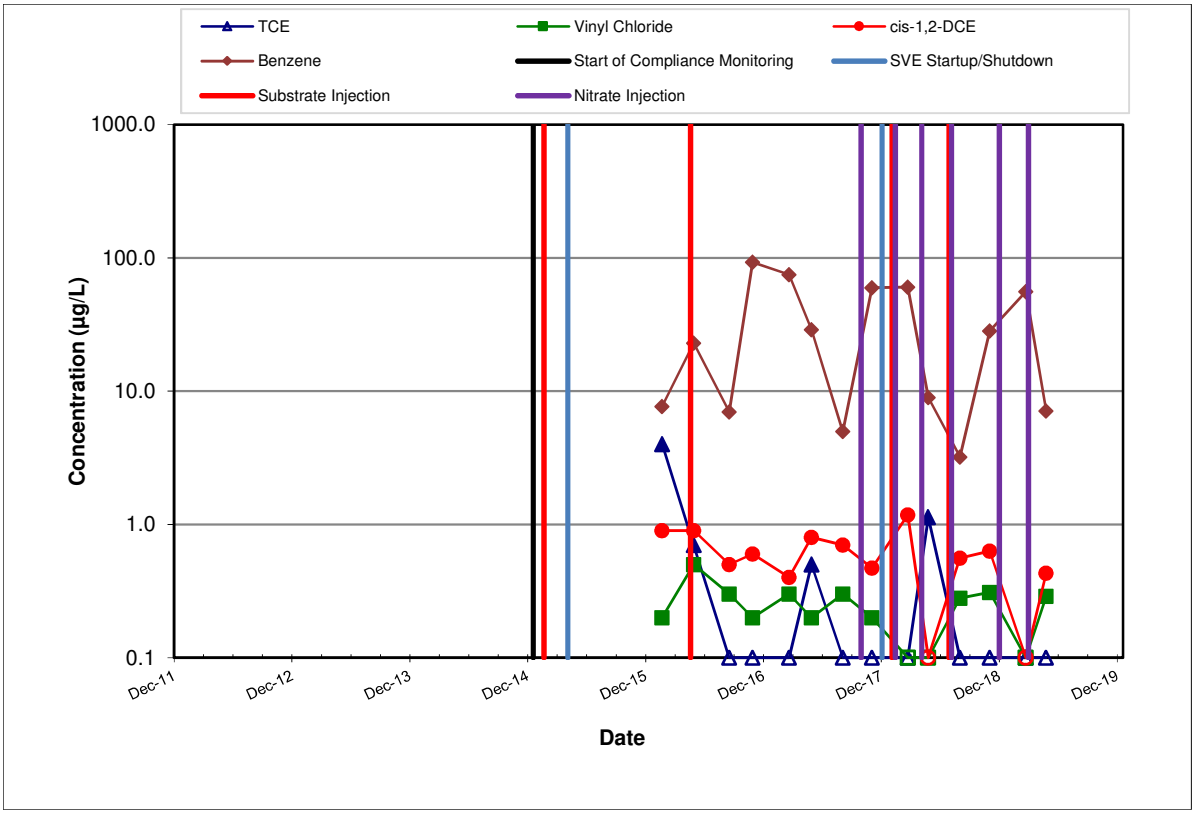
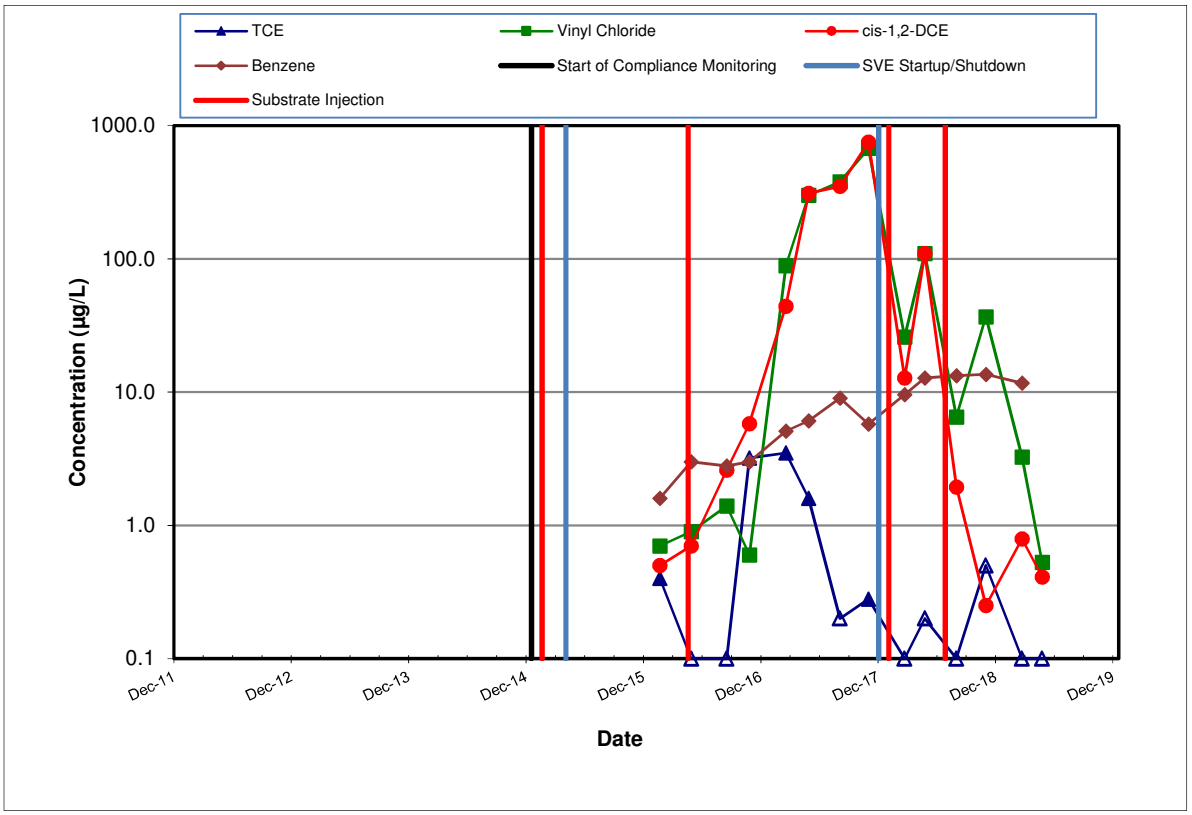


SOURCE AREA WELL GW031S



SOURCE AREA WELL GW033S

Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

wood.	BUILDING 4-78/79 SWMU/AOC GROUP TREND PLOTS FOR SOURCE AREA WELLS GW031S AND GW033S Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 10

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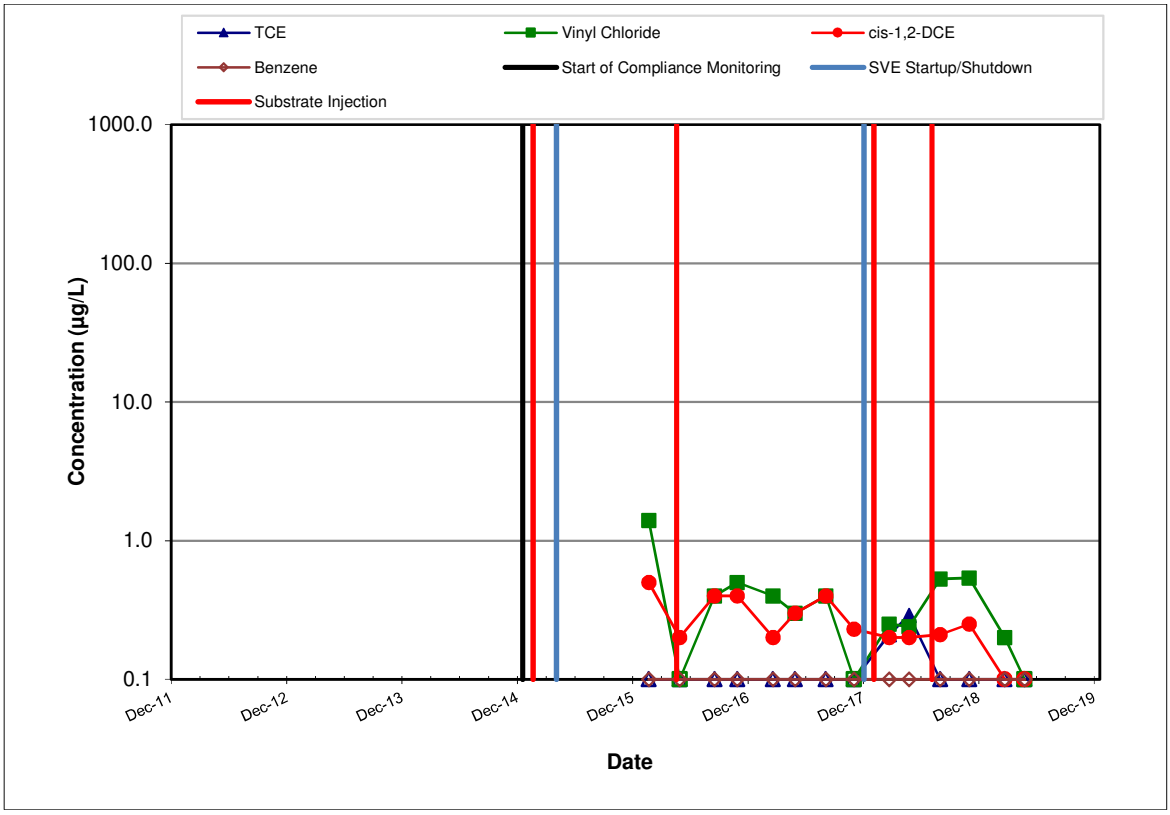
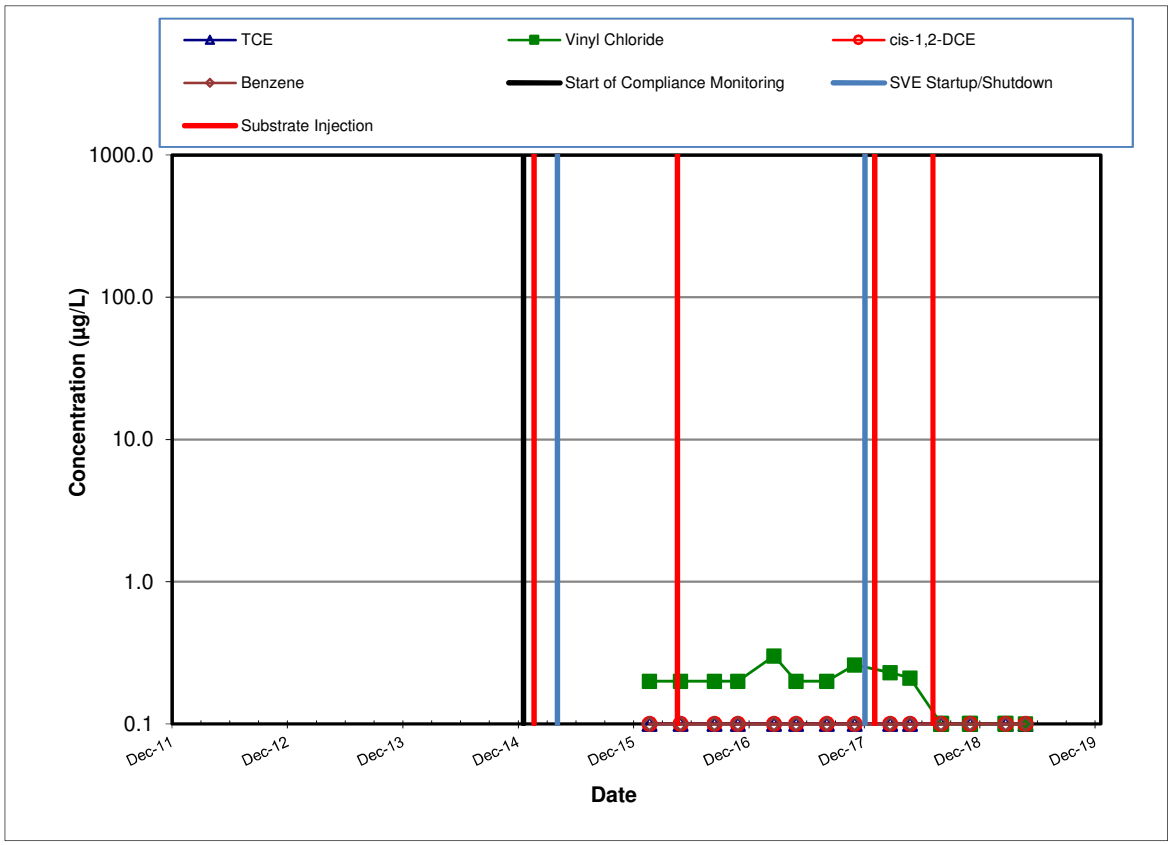


SOURCE AREA WELL GW034S



DOWNGRADIENT PLUME AREA WELL GW209S

Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

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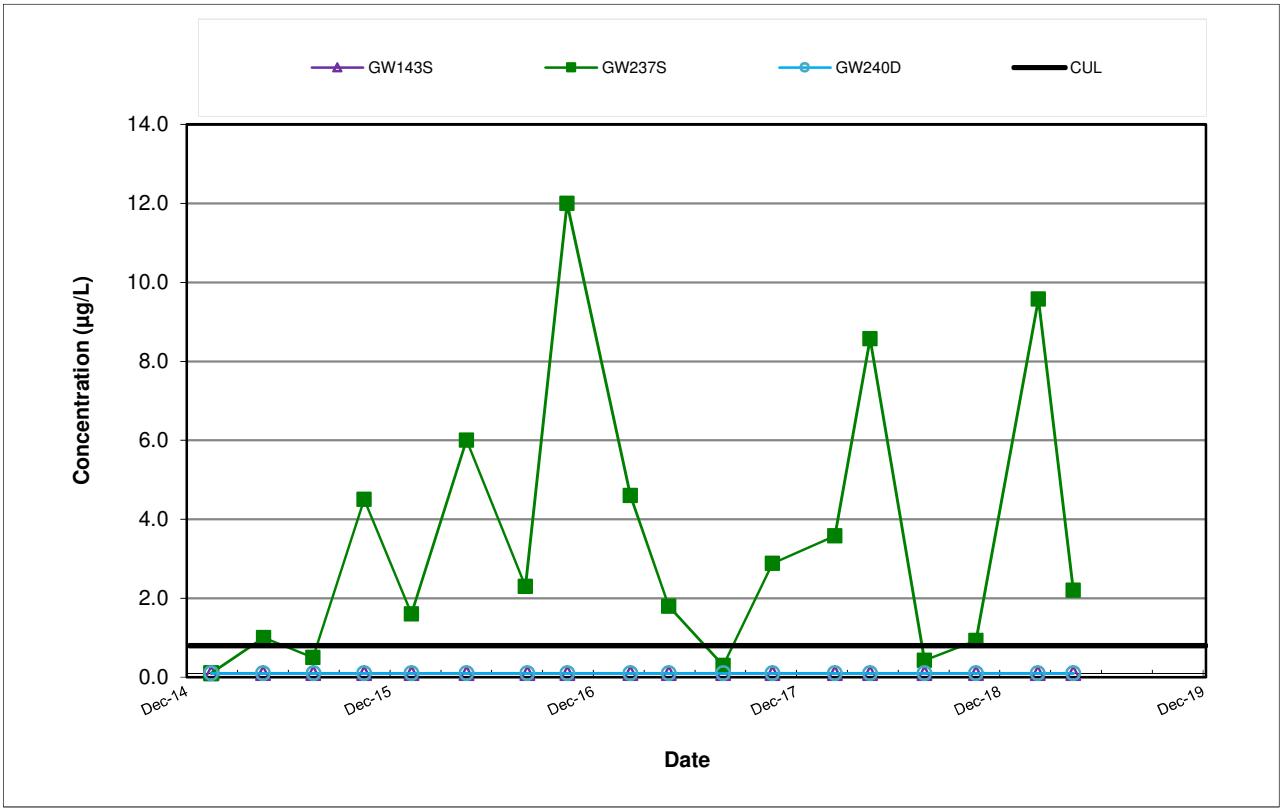
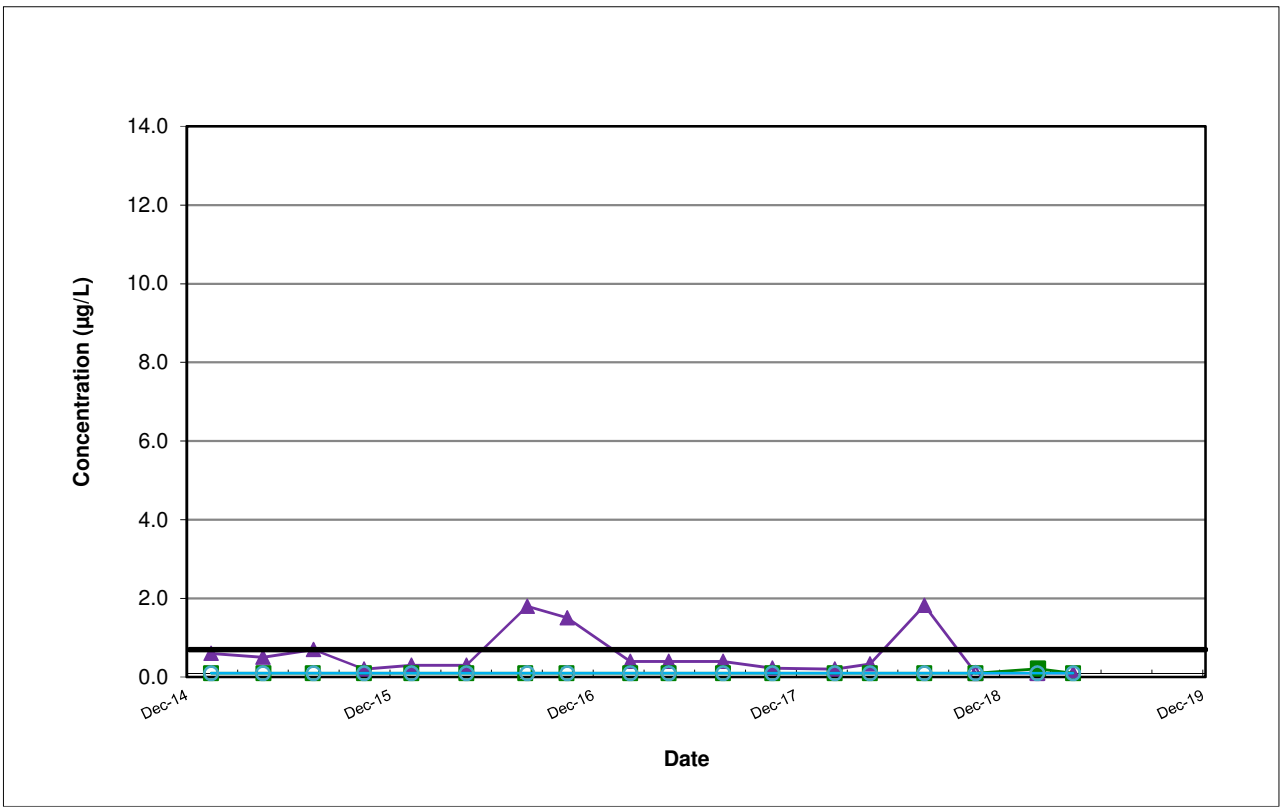
wood.	BLDG 4-78/79 SWMU/AOC GROUP TREND PLOTS FOR SOURCE AREA WELL GW034S AND DOWNGRADIENT PLUME AREA WELL GW209S Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 11



Benzene

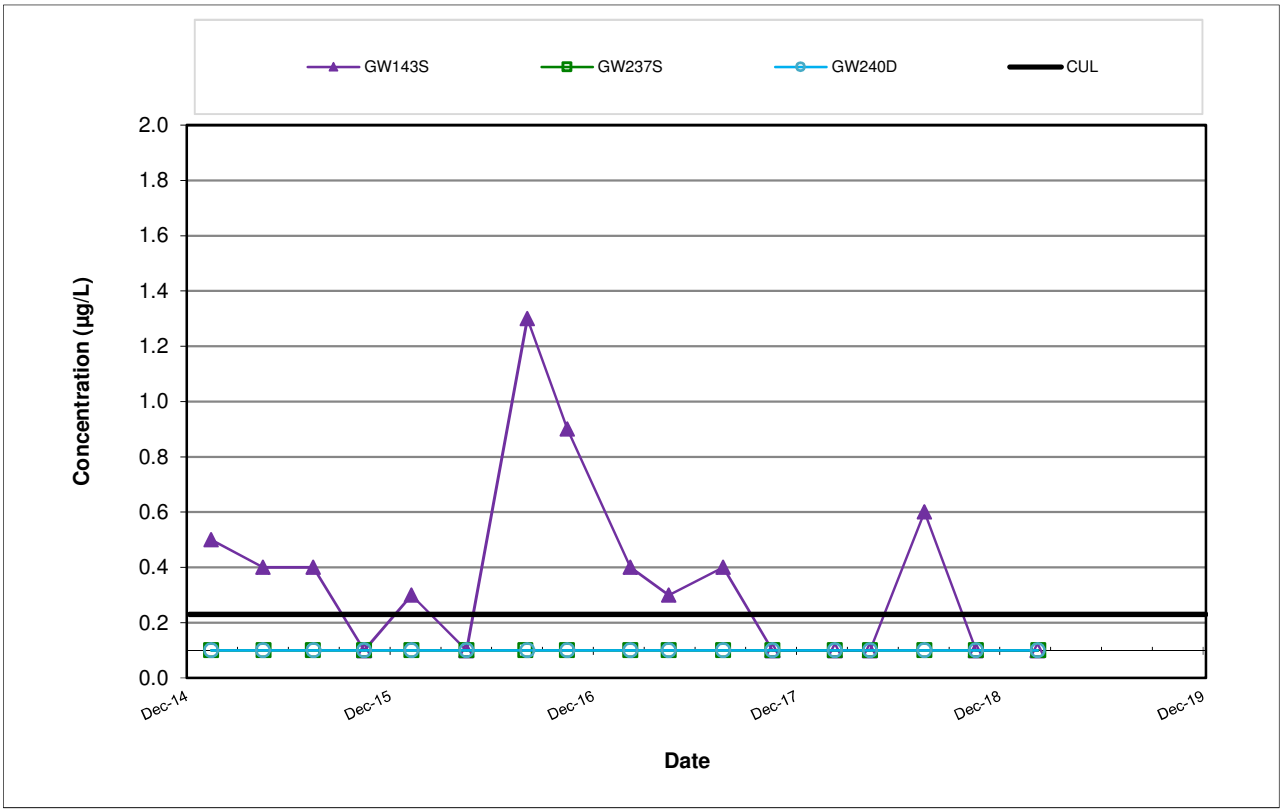


cis-1,2-Dichloroethene

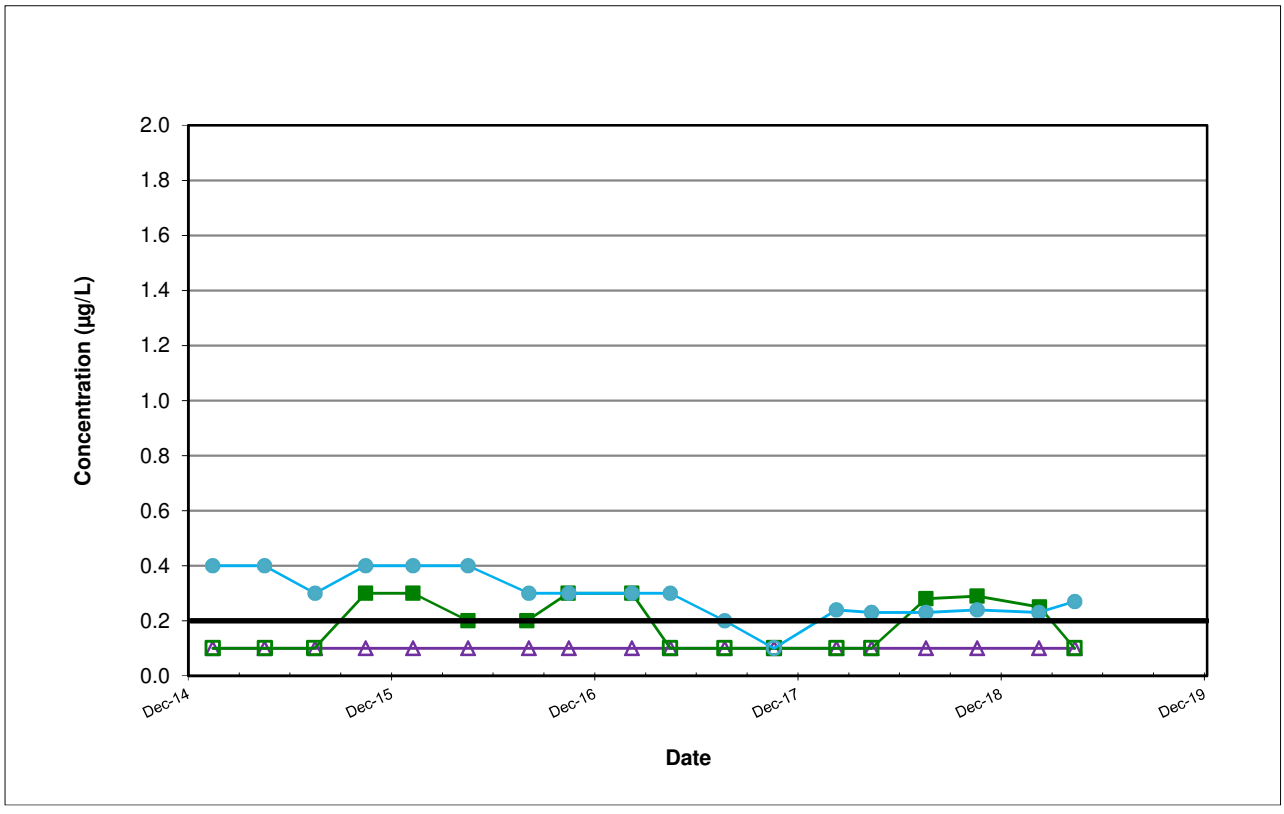
Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

wood.	BUILDING 4-78/79 SWMU/AOC GROUP TREND PLOTS FOR BENZENE AND CIS-1,2-DICHLOROETHENE IN CPOC AREA WELLS Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 12

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figures 9 to 15_ Bldg 4-78-79 Trend Plots.xlsx



Trichloroethene

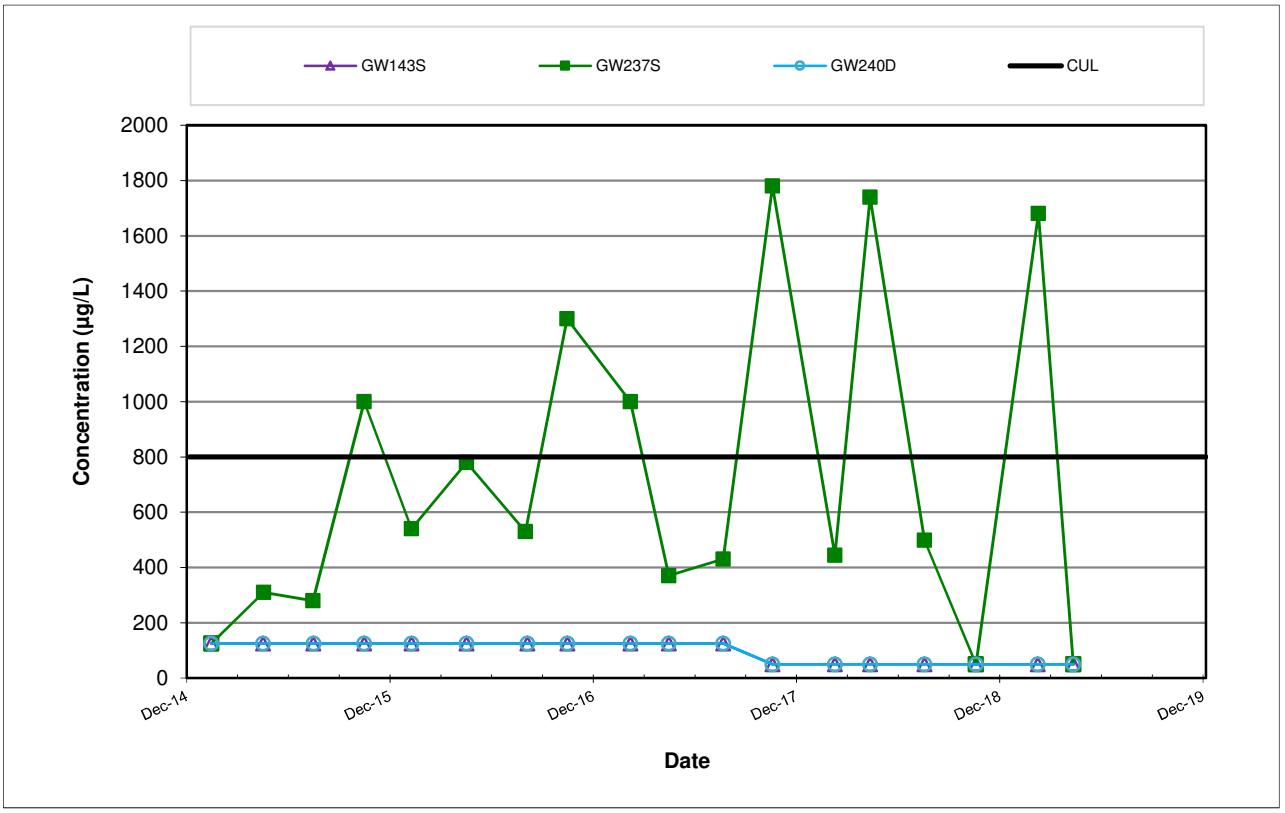


Vinyl Chloride

Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

wood.	BUILDING 4-78/79 SWMU/AOC GROUP TREND PLOTS FOR TRICHLOROETHENE AND VINYL CHLORIDE IN CPOC AREA WELLS Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 13

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figures 9 to 15_ Bldg 4-78-79 Trend Plots.xlsx

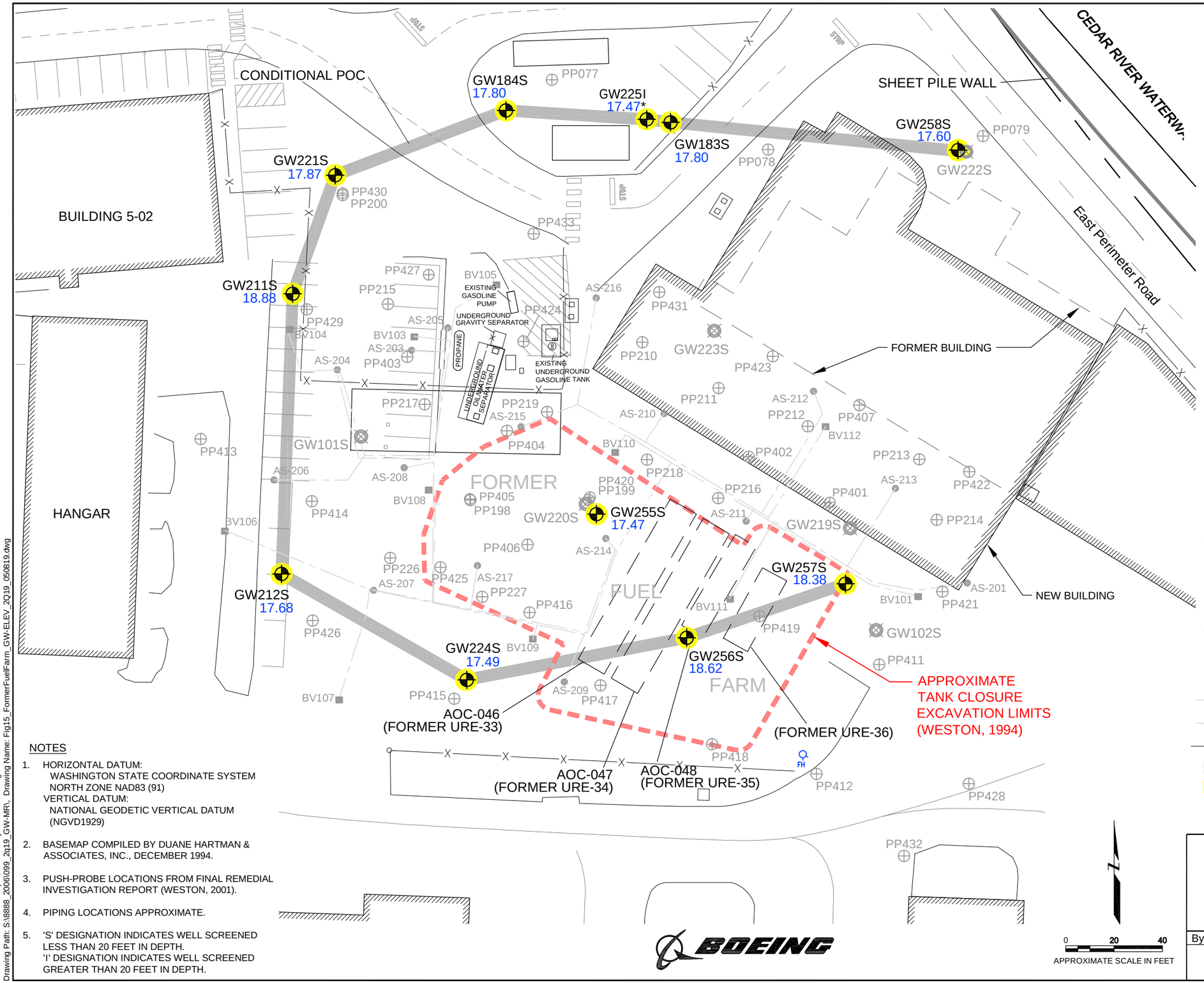


TPH as Gasoline

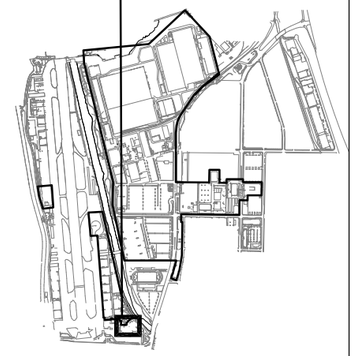
Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

wood.	BUILDING 4-78/79 SWMU/AOC GROUP TREND PLOTS FOR TPH AS GASOLINE IN CPOC AREA WELLS Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 14

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figures 9 to 15_ Bldg 4-78-79 Trend Plots.xlsx



FORMER FUEL FARM AOC GROUP
LOCATION MAP



BOEING RENTON
FACILITY MAP

LEGEND

- GW184S 17.80 — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION (NGVD-FEET)
- * WELL SCREENED IN LOWER PORTION OF AQUIFER, SO WATER LEVEL IS NOT USED FOR CONTOURING.
- PP042 — PUSH PROBE LOCATION
- GW222S — ABANDONED GROUNDWATER MONITORING WELL
- AS-204 — FORMER UNDERGROUND AIR SPARGING WELL
- BV112 — FORMER UNDERGROUND BIOVENTING WELL
- FORMER UNDERGROUND BIOVENTING LINE
- FORMER UNDERGROUND AIR SPARGING LINE
- FENCE
- CONDITIONAL POINT OF COMPLIANCE
- HIGHLIGHTED WELLS INCLUDED IN MONITORING NETWORK

NOTES

1. HORIZONTAL DATUM:
   WASHINGTON STATE COORDINATE SYSTEM
   NORTH ZONE NAD83 (91)
   VERTICAL DATUM:
   NATIONAL GEODETIC VERTICAL DATUM
   (NGVD1929)
2. BASEMAP COMPILED BY DUANE HARTMAN & ASSOCIATES, INC., DECEMBER 1994.
3. PUSH-PROBE LOCATIONS FROM FINAL REMEDIAL INVESTIGATION REPORT (WESTON, 2001).
4. PIPING LOCATIONS APPROXIMATE.
5. 'S' DESIGNATION INDICATES WELL SCREENED LESS THAN 20 FEET IN DEPTH.
   'I' DESIGNATION INDICATES WELL SCREENED GREATER THAN 20 FEET IN DEPTH.

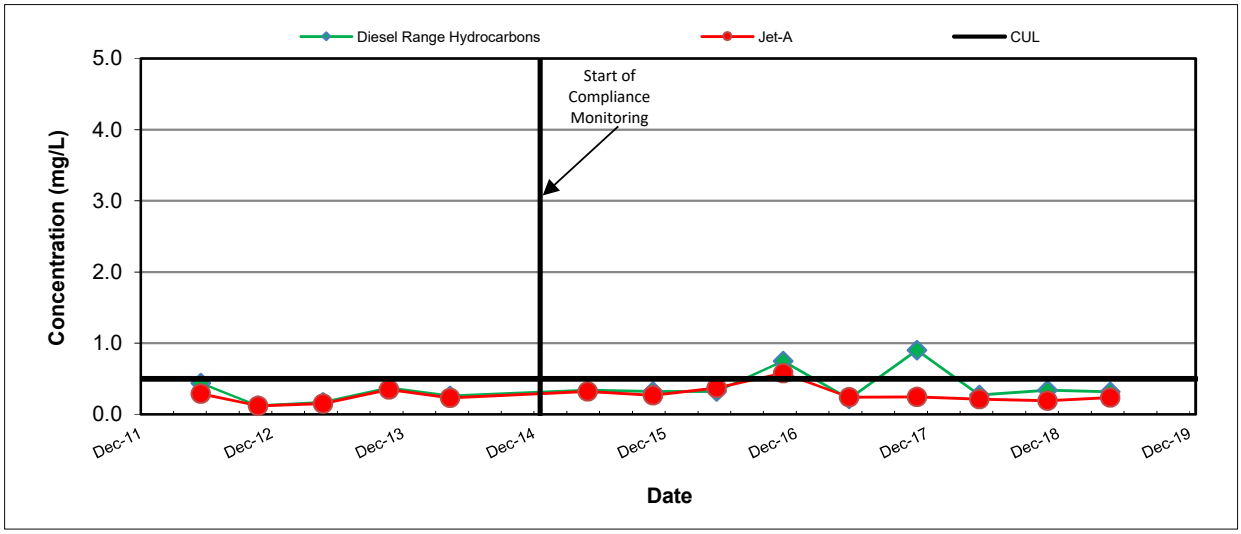
BOEING

0 20 40
APPROXIMATE SCALE IN FEET

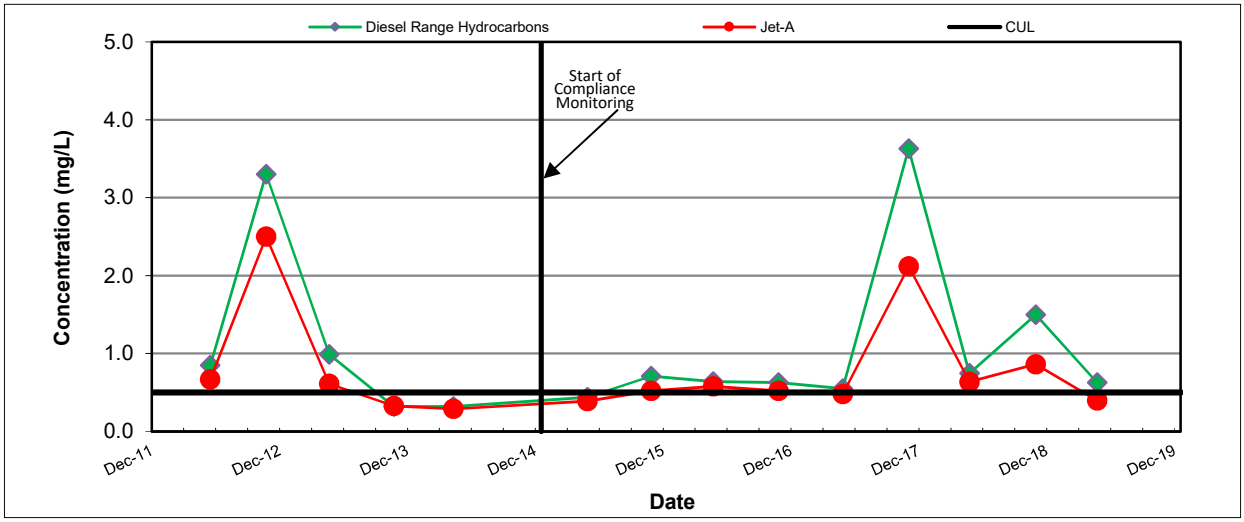
FORMER FUEL FARM AOC GROUP MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS MAY 6 AND 7, 2019 Boeing Renton Facility Renton, Washington

By: MDS	Date: 07/31/19	Project No. 8888
wood.		Figure 15

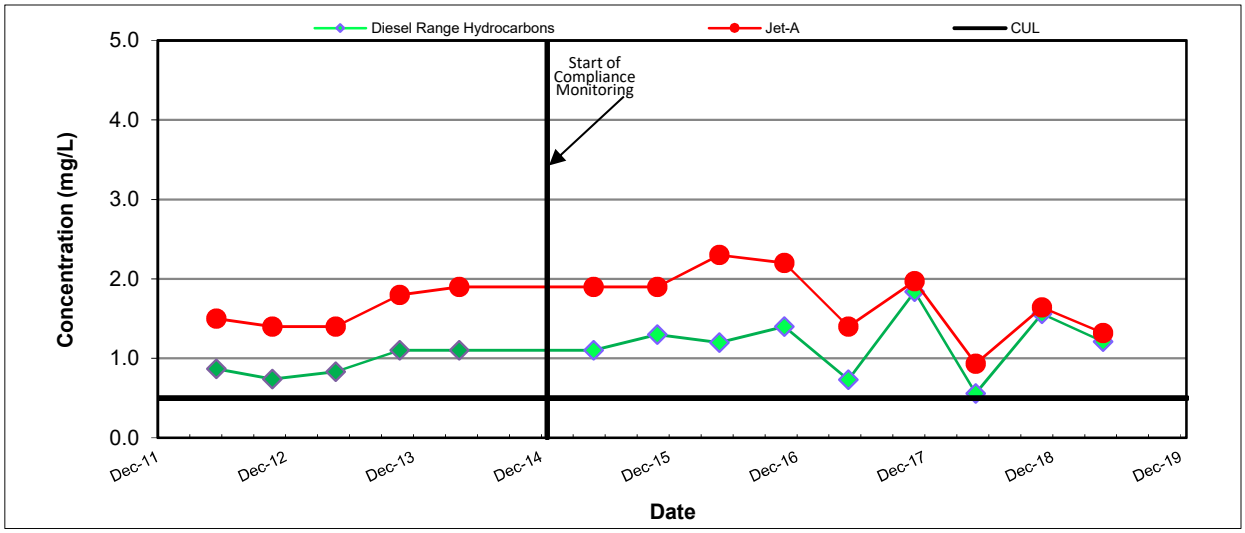
Plot Date: 07/31/19 - 4:08pm Plotted by: adam.stenberg
Drawing Path: S:\8888_2006\099_2q19_GW-MR_Drawing Name: Fig15_FormerFuelFarm_GW-ELEV_2Q19_050819.dwg



CPOC WELL GW211S



CPOC WELL GW221S



CPOC WELL GW224S

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\FFF CPOC trends.xls

wood.

FORMER FUEL FARM AOC GROUP TREND PLOTS
FOR CPOC AREA WELLS GW211S, GW221S, AND GW224S
Boeing Renton Facility
Renton, Washington

Project No. 8888

Figure 16

LAKE WASHINGTON

GW187S

PP130

PP119

PP118

PP129

GW185S
15.36

GW197S
15.82

PP099

PP192

PP098

PP081

GW245S
15.28

GW196D
15.33*

GW195S
15.27

PP097

PP131

GW186S

GW194S
15.06

CONDITIONAL POC
FOR AOC-001/AOC-002
60' FROM SHORELINE

PP135

PP134

PP117

GW049S

PP132

STORM WATER
WET VAULT

GW050S

PP011

PP013

GW213S

GW215S

GW214S

PP012

AOC-001

AOC-002
(SECONDARY
SOURCE AREA)

STORM WATER
DIVERSION STRUCTURE

PP116

PP066

PP133

GW246S

GW051S

GW190S
NM

PP115

PP113

PP114

GW191D
NM

PP136

PP112

PP145

PP150

PP111

PP138

GW192S
NM

PP096

PP151

PP137

PP147

PP141

PP152

GW193S
NM

PP146

IPR1

IPR2

PP143

PP153

PP140

PP091

PP144

PP094

PP139

PP095

PP065

PP090

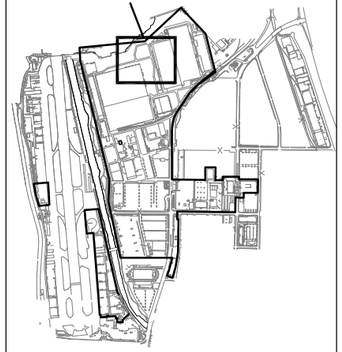
BOEING

0 30 60
APPROXIMATE SCALE IN FEET

NOTES

1. HORIZONTAL DATUM:
   WASHINGTON STATE COORDINATE SYSTEM
   NORTH ZONE NAD83 (91)
   VERTICAL DATUM:
   NATIONAL GEODETIC VERTICAL DATUM (NGVD1929)
2. BASEMAP COMPILED BY DUANE HARTMAN & ASSOCIATES, INC., DECEMBER 1994.
3. 'S' DESIGNATION INDICATES WELL SCREENED LESS THAN 25 FEET IN DEPTH.
   'D' DESIGNATION INDICATES WELL SCREENED GREATER THAN 25 FEET IN DEPTH.

AOC-001 AND AOC-002
LOCATION MAP



BOEING RENTON
FACILITY MAP

LEGEND

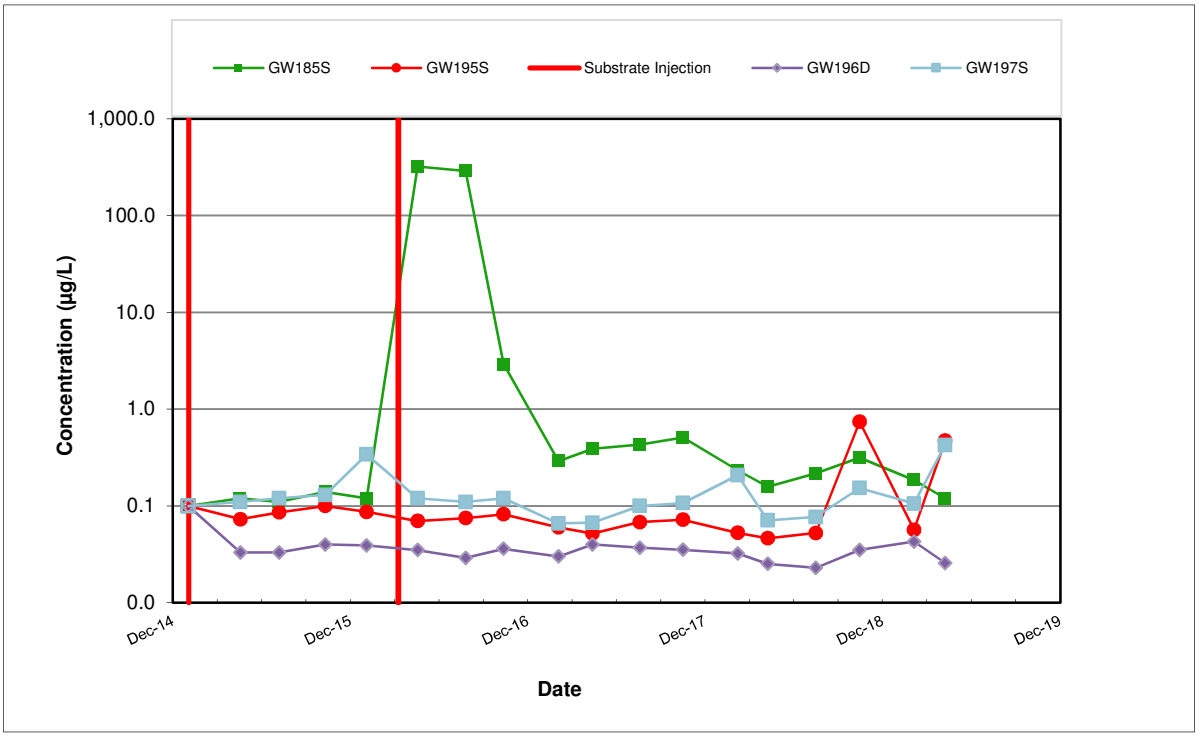
- GW195S 15.27 — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION (NGVD-FEET)
- NM — NOT MEASURED
- * — WELL SCREENED IN LOWER PORTION OF AQUIFER, SO WATER LEVEL IS NOT USED FOR CONTOURING.
- GW227S — ABANDONED MONITORING WELL
- GW215S — EXISTING ELECTRON DONOR INJECTION WELL
- IPR1 — EXISTING INJECTION PIPE RISER
- PP011 — PUSH PROBE SAMPLING LOCATION
- APPROXIMATE PROPERTY LINE
- FENCE LINE
- APPROXIMATE LIMIT OF NOVEMBER 2005 SOURCE AREA EXCAVATION
- AOC-001, AOC-002 CONDITIONAL POINT OF COMPLIANCE

HIGHLIGHTED WELLS INCLUDED IN MONITORING NETWORK

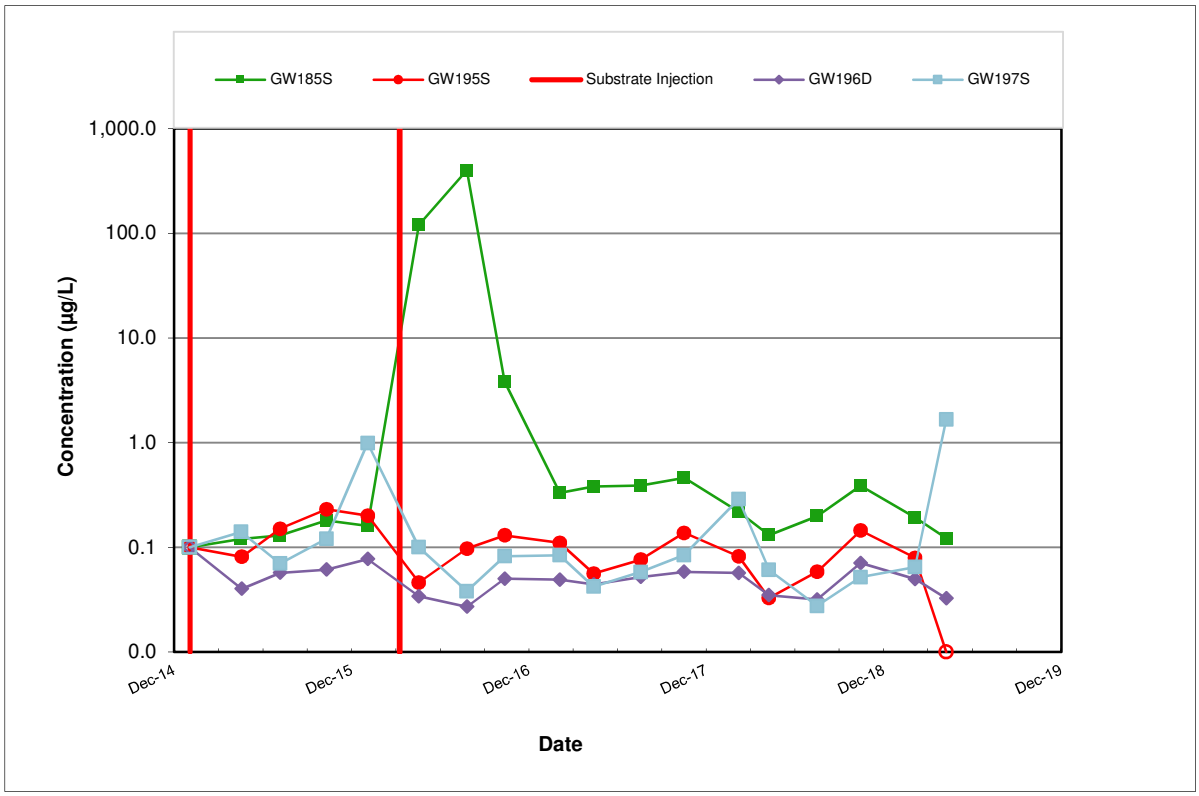
AOC-001 AND AOC-002
MONITORING WELL LOCATIONS
AND GROUNDWATER ELEVATIONS
MAY 8, 2019
Boeing Renton Facility
Renton, Washington

By: APS	Date: 07/31/19	Project No. 8888
wood.		Figure 17

Plot Date: 07/31/19 - 4:18pm Plotted by: adam.stenberg
Drawing Path: S:\8888_2006\099_2q19_GW-MR\; Drawing Name: Fig17_AOC-001-002_GW-ELEV_2Q19_050719.dwg



cis-1,2-Dichloroethene

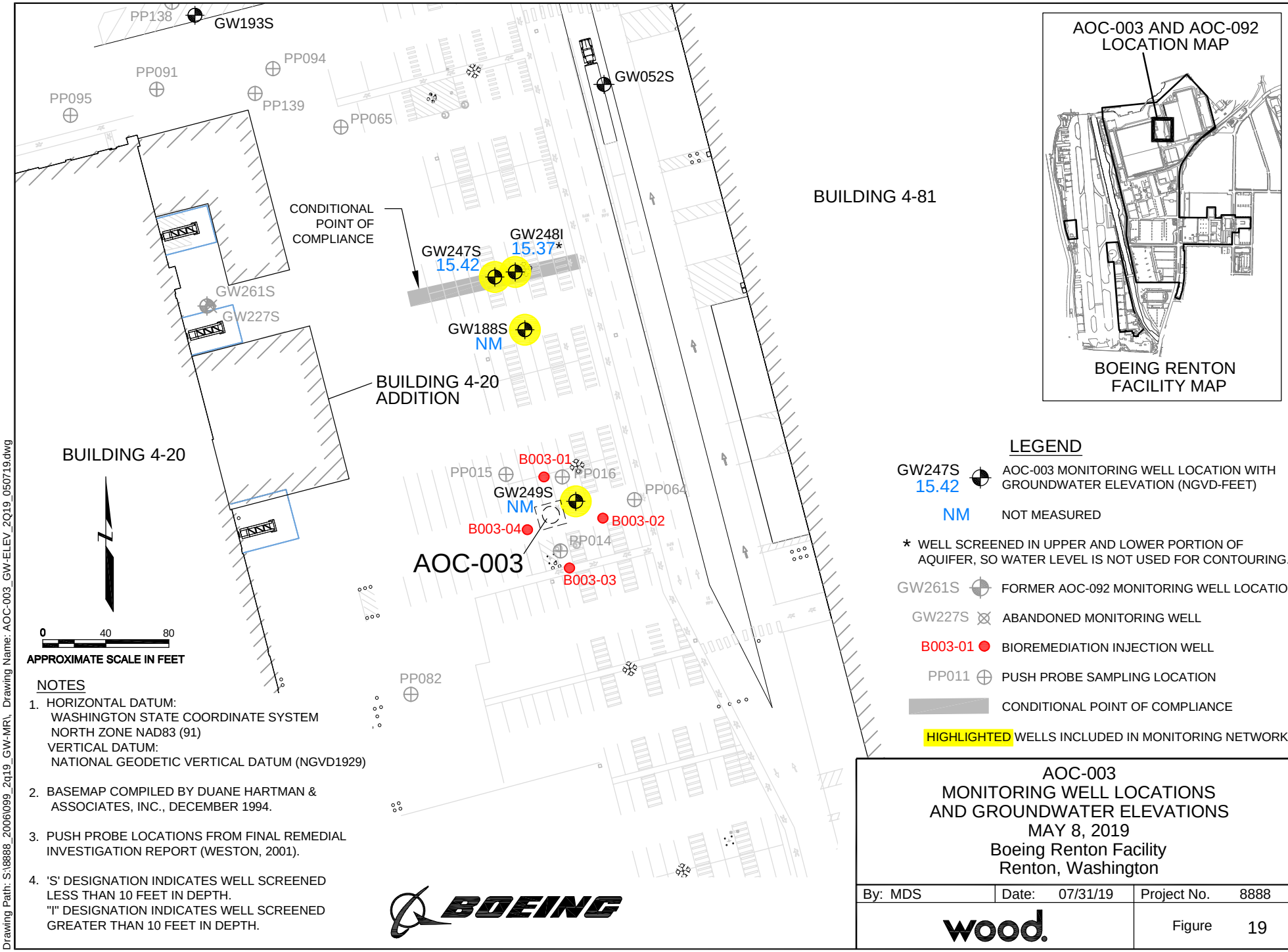


Vinyl Chloride

Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

wood.	AOC-001 AND 002 TREND PLOTS FOR CIS-1,2-DICHLOROETHENE AND VINYL CHLORIDE IN CPOC AREA WELLS Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 18

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figures 17 to 19_AOC 1-2 Trend Plots.xls.xlsx



AOC-003 AND AOC-092
LOCATION MAP

BOEING RENTON
FACILITY MAP

LEGEND

GW247S 15.42	AOC-003 MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION (NGVD-FEET)
NM	NOT MEASURED
*	WELL SCREENED IN UPPER AND LOWER PORTION OF AQUIFER, SO WATER LEVEL IS NOT USED FOR CONTOURING.
GW261S	FORMER AOC-092 MONITORING WELL LOCATION
GW227S	ABANDONED MONITORING WELL
B003-01	BIOREMEDIATION INJECTION WELL
PP011	PUSH PROBE SAMPLING LOCATION
	CONDITIONAL POINT OF COMPLIANCE
HIGHLIGHTED	WELLS INCLUDED IN MONITORING NETWORK

NOTES

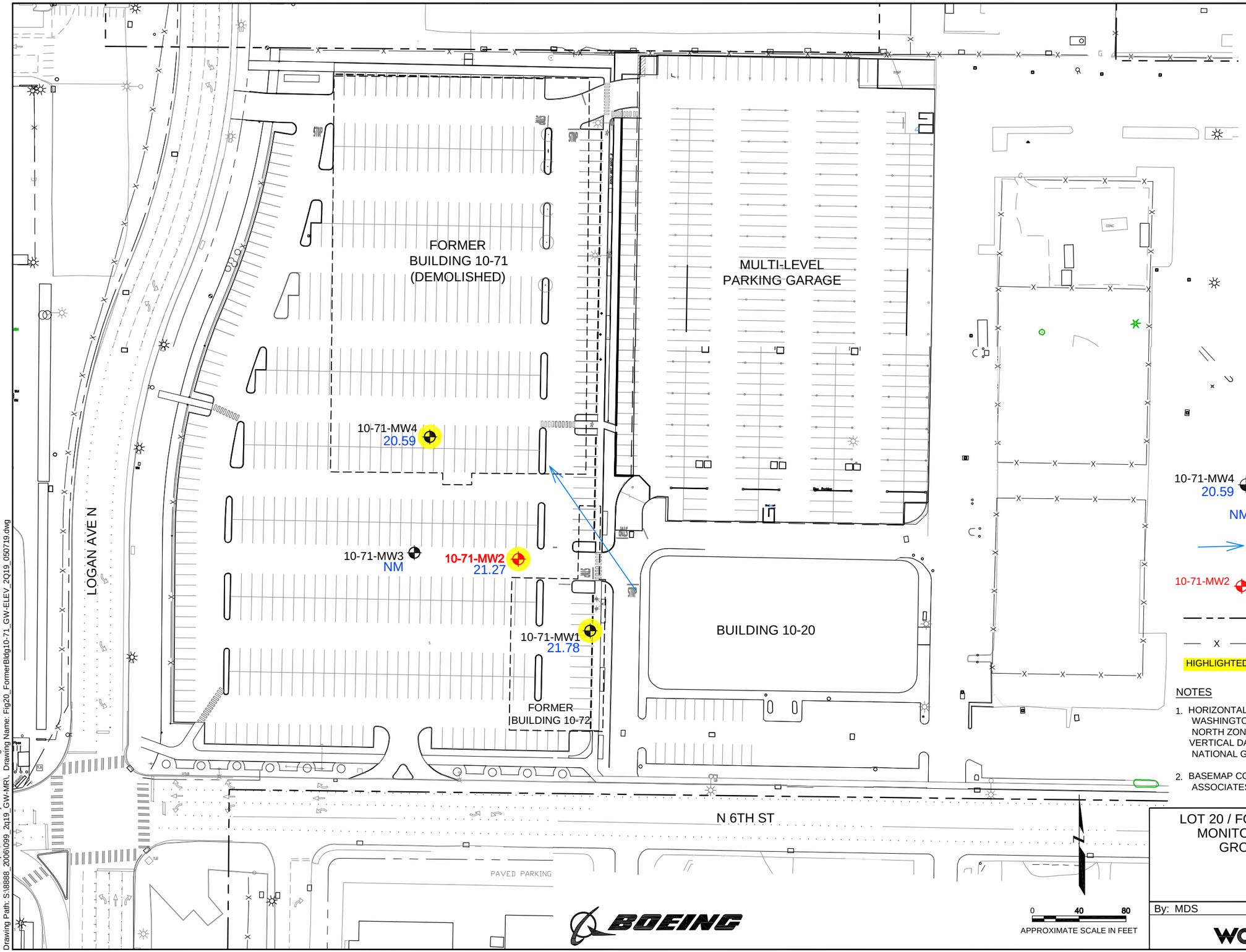
1. HORIZONTAL DATUM:
   WASHINGTON STATE COORDINATE SYSTEM
   NORTH ZONE NAD83 (91)
   VERTICAL DATUM:
   NATIONAL GEODETIC VERTICAL DATUM (NGVD1929)
2. BASEMAP COMPILED BY DUANE HARTMAN & ASSOCIATES, INC., DECEMBER 1994.
3. PUSH PROBE LOCATIONS FROM FINAL REMEDIAL INVESTIGATION REPORT (WESTON, 2001).
4. 'S' DESIGNATION INDICATES WELL SCREENED LESS THAN 10 FEET IN DEPTH.
   "I" DESIGNATION INDICATES WELL SCREENED GREATER THAN 10 FEET IN DEPTH.

BOEING

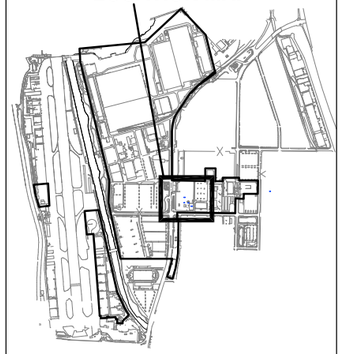
AOC-003
MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS
MAY 8, 2019
Boeing Renton Facility
Renton, Washington

By: MDS	Date: 07/31/19	Project No. 8888
wood.		Figure 19

Plot Date: 07/31/19 - 4:28pm, Plotted by: adam.stenberg
Drawing Path: S:\8888_2006\099_2q19_GW-MR\, Drawing Name: AOC-003_GW-ELEV_2Q19_050719.dwg



FORMER BUILDING 10-71 LOCATION MAP



BOEING RENTON FACILITY MAP

LEGEND

10-71-MW4 20.59	MONITORING WELL LOCATION GROUNDWATER ELEVATION (NGVD-FT)
NM	NOT MEASURED
	GENERAL DIRECTION OF GROUNDWATER FLOW
10-71-MW2	ELECTRON DONOR INJECTION WELL AND MONITORING WELL LOCATION
	APPROXIMATE PROPERTY LINE
— x —	FENCE
HIGHLIGHTED	WELLS INCLUDED IN MONITORING NETWORK

NOTES

1. HORIZONTAL DATUM:
   WASHINGTON STATE COORDINATE SYSTEM
   NORTH ZONE NAD83 (91)
   VERTICAL DATUM:
   NATIONAL GEODETIC VERTICAL DATUM (NGVD1929)
2. BASEMAP COMPILED BY DUANE HARTMAN & ASSOCIATES, INC., DECEMBER 1994.

LOT 20 / FORMER BUILDING 10-71 PARCEL MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS MAY 8, 2019

Boeing Renton Facility
Renton, Washington

By: MDS	Date: 07/31/19	Project No. 8888
wood.		Figure 20

Plot Date: 07/31/19 - 4:21pm, Plotted by: adam.stenberg
Drawing Path: S:\8888_2006\099_2q19_GW-MR\, Drawing Name: Fig20_FormerBldg10-71_GW-ELEV_2Q19_050719.dwg

Plot Date: 07/19/19 - 11:34am, Plotted by: adam.stenberg
Drawing Path: S:\8888_2006\099_2q19_GW-MR\, Drawing Name: Fig21_APRON A_GW-ELEV_2Q19_050719.dwg

CEDAR RIVER WATERWAY

EAST PERIMETER ROAD

B-4
B-3
B-6
B-10
B-12
B-2
B-9
B-8
B-7
B-1
B-16
B-17
B-13
B-14
B-15

SHED
SHED
SHED
SHED
SHED

CB
CB

BUILDING

GW262S
4.90' DTW

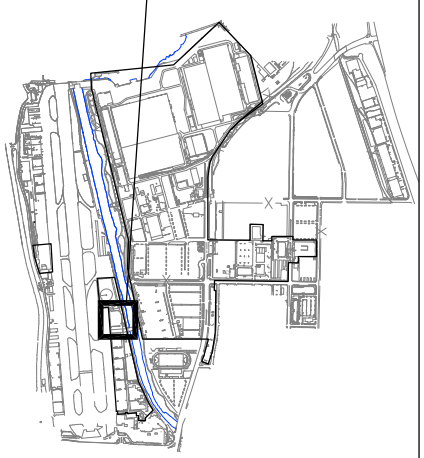
GW264S
6.08' DTW

GW265S

GW263S
6.36' DTW

APPROXIMATE AREA
OF TRENCH INJECTION

APRON A
LOCATION MAP



BOEING RENTON
FACILITY MAP

LEGEND

GW264S
6.08' DTW — MONITORING WELL LOCATION WITH DEPTH TO WATER (BGS IN FEET)

B-1 — SOIL SAMPLE LOCATION

APPROXIMATE PROPERTY LINE

FENCE

HIGHLIGHTED WELLS INCLUDED IN MONITORING NETWORK

N

0 20 40
APPROXIMATE SCALE IN FEET

APRON A
MONITORING WELL LOCATIONS AND DEPTH TO GROUNDWATER
MAY 7, 2019
Boeing Renton Facility
Renton, Washington

By: MDS	Date: 07/19/19	Project No. 16096
wood.		Figure 21

Tables

TABLE 1: SWMU-172 and SWMU-174 GROUP GROUNDWATER ELEVATION DATA
May 6, 2019
Boeing Renton Facility, Renton, Washington

Well ID[1]	Screen Interval Depth (feet bgs)	TOC Elevation (feet)[2]	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet)[2]
GW081S	5 to 20[3]	25.91	8.68	17.23
GW152S	5 to 20[3]	26.98	9.06	17.92
GW153S	5 to 20[3]	27.47	9.45	18.02
GW172S	8 to 18[3]	26.44	9.38	17.06
GW173S	8 to 18[3]	26.51	9.44	17.07
GW226S	5 to 20[3]	26.86	8.84	18.02
GW232S	4 to 14	24.45	7.92	16.53
GW233I	15 to 25	24.35	7.56	16.79
GW234S	3 to 13	24.95	8.09	16.86
GW235I	15 to 25	24.90	7.66	17.24
GW236S	5 to 15	24.36	7.12	17.24

Notes
1. S = shallow well; I = intermediate well.
2. Elevations in feet relative to National Geodetic Vertical Datum of 1929.
3. Screen intervals are approximate and based on database listings of the screen interval depths for these wells.

Abbreviations
bgs = below ground surface
TOC = top of casing

TABLE 2: SWMU-172 AND SWMU-174 GROUP CONCENTRATIONS OF PRIMARY GEOCHEMICAL INDICATORS [1]
MAY 6, 2019
Boeing Renton Facility, Renton, Washington

	Well ID[2]											
	Source Area			Downgradient Plume Area				CPOC Area				
	GW152S	GW152S (field dup.)	GW153S	GW081S	GW172S	GW173S	GW226S	GW232S	GW233I	GW234S	GW235I	GW236S
Specific Conductivity (µS/cm)	193.3	191.3	225.8	222.3	279.1	349.4	250.7	459.3	223.7	239.8	131.8	357.5
Dissolved Oxygen (mg/L)	0.55	0.57	0.54	0.67	0.47	0.44	0.52	3.87	3.79	0.59	0.77	1.86
Oxidation/Reduction Potential (mV)	18.2	18.9	-11.8	-6.1	-40.6	-27.6	-28.4	-31.3	9.7	-10.7	5.3	-22.3
pH (standard units)	5.93	5.92	6.21	6.27	6.30	6.26	6.31	6.10	6.14	6.16	6.18	6.26
Temperature (degrees C)	18.10	18.20	17.30	17.50	18.10	15.30	19.40	16.30	16.90	15.80	16.00	15.60
Total Organic Carbon (mg/L)	2.65	2.58	7.10	4.47	3.67	5.11	5.79	6.09	4.16	1.31	0.90	1.87

Notes
1. Primary geochemical indicators are measured in the field, with the exception of total organic carbon, which is measured in the laboratory.
2. S = shallow well; I = intermediate well.

Abbreviations
µS/cm = microsiemens per centimeter
CPOC = conditional point of compliance
degrees C = degrees Celsius
field dup. = field duplicate
mg/L = milligrams per liter
mV = millivolts

TABLE 3: SWMU-172 AND SWMU-174 GROUP CONCENTRATIONS OF CONSTITUENTS OF CONCERN[1, 2]
MAY 6, 2019
Boeing Renton Facility, Renton, Washington

	Cleanup Level[4]	Well ID[3]											
		Source Area			Downgradient Plume Area				CPOC Area				
		GW152S	GW152S (field dup.)	GW153S	GW081S	GW172S	GW173S	GW226S	GW232S	GW233I	GW234S	GW235I	GW236S
Volatile Organic Compounds (µg/L)													
cis-1,2-Dichloroethene	0.03	**0.655**	**0.700**	**0.108**	**0.025**	**0.0581**	**0.037**	0.0223	**0.319**	**0.054**	**0.0630**	**0.109**	**0.0281**
Tetrachloroethene	0.02	**0.0594**	**0.0677**	0.020 U	0.020 U	0.020 U	**0.0416**	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Trichloroethene	0.02	**0.157**	**0.196**	**0.0212**	0.020 U	0.020 U	**0.0742**	0.020 U	**0.0331**	**0.0225**	0.020 U	**0.0342**	**0.0206**
Vinyl Chloride	0.11	**0.173**	**0.201**	**0.242**	0.020 U	0.0808	0.0486	0.0459	**0.348**	0.020 U	0.0235	0.020 U	0.020 U
Total Metals (µg/L)													
Arsenic	1.0	**4.49**	**4.72**	**5.97**	**2.49**	**7.71**	**7.38**	**2.97**	**3.96**	0.428	**2.22**	0.403	**2.10**
Copper	3.5	2.35	2.86	1.25	0.546	2.13	1.11	0.500 U	1.15	0.500 U	1.93	1.58	2.17
Lead	1.0	**1.26**	**1.65**	0.198	0.100 U	0.991	0.251	0.100 U	0.167	0.100 U	0.843	0.405	**1.90**

Notes
1. Data qualifiers are as follows:
U = The analyte was not detected at the reporting limit indicated.
2. **Bolded** values exceed the cleanup levels.
3. S = shallow well; I = intermediate well.
4. Cleanup levels obtained from Table 2 of the Cleanup Action Plan.

Abbreviations
µg/L = micrograms per liter
CPOC = conditional point of compliance
field dup. = field duplicate

TABLE 4: BUILDING 4-78/79 SWMU/AOC GROUP
GROUNDWATER ELEVATION DATA
MAY 7 AND 8, 2019
Boeing Renton Facility, Renton, Washington

Well ID[1]	Screen Interval Depth (feet bgs)	TOC Elevation (feet)[2]	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet)[2]
GW031S	5 to 25	19.44	4.09	15.35
GW033S	5 to 25	19.49	4.25	15.24
GW034S	5 to 25	19.65	4.12	15.53
GW038S	5 to 25	19.68	4.44	15.24
GW039S	3.5 to 13.5	19.30	3.89	15.41
GW143S	10 to 15	19.81	4.52	15.29
GW209S	3.5 to 13.3	19.37	4.08	15.29
GW210S	3.5 to 13.3	19.19	3.61	15.58
GW237S	5 to 15	18.85	3.57	15.28
GW238I	5 to 20	18.94	3.66	15.28
GW239I	15 to 20	19.69	4.42	15.27
GW240D	22 to 27	19.81	5.07	14.74
GW241S	4 to 14	20.28	5.05	15.23
GW242I	15 to 20	20.44	5.18	15.26
GW243I	5 to 20	19.49	4.20	15.29
GW244S	5 to 15	19.53	4.19	15.34

Notes
1. S = shallow well; I = intermediate well; D = deep well.
2. Elevations in feet relative to National Geodetic Vertical Datum of 1929.

Abbreviations
bgs = below ground surface
TOC = top of casing

TABLE 5: BUILDING 4-78/79 SWMU/AOC GROUP CONCENTRATIONS OF PRIMARY GEOCHEMICAL INDICATORS [1]
MAY 7 AND 8, 2019
Boeing Renton Facility, Renton, Washington

	Well ID[2]									
	Source Area							Downgradient Plume Area		
	GW031S	GW031S (field dup.)	GW033S	GW034S	GW039S	GW243I	GW244S	GW038S	GW209S	GW210S
Specific Conductivity (µS/cm)	478.0	487.2	359.8	321.3	209.7	378.9	515.0	316.7	407.9	306.6
Dissolved Oxygen (mg/L)	0.25	0.26	0.26	0.58	0.81	0.35	0.37	0.20	0.20	0.17
Oxidation/Reduction Potential (mV)	-33.1	-37.6	-16.1	-57.3	53.4	-16.5	-25.7	-24.2	-37.3	6.7
pH (standard units)	6.20	6.21	6.17	6.23	6.04	6.22	6.12	6.40	6.40	6.07
Temperature (degrees C)	22.10	23.00	16.60	22.60	17.20	16.60	23.7	16.20	20.50	17.40
Total Organic Carbon (mg/L)	9.53	9.09	28.09	7.66	4.80	9.96	15.32	9.17	9.36	6.37

	Well ID[2]						
	CPOC Area						
	GW143S	GW237S	GW238I	GW239I	GW240D	GW241S	GW242I
Specific Conductivity (µS/cm)	308.9	313	419	328.4	389	331.0	329.4
Dissolved Oxygen (mg/L)	0.21	0.24	0.26	0.23	0.21	0.47	0.35
Oxidation/Reduction Potential (mV)	-21.2	-26.9	-25.1	-35.6	-49.1	-28.5	-24.4
pH (standard units)	6.39	6.55	6.25	6.38	6.46	6.30	6.33
Temperature (degrees C)	16.90	16.00	16.30	17.80	17.90	18.10	18.80
Total Organic Carbon (mg/L)	10.40	10.72	14.55	10.07	5.39	NA	NA

Notes
1. Primary geochemical indicators are measured in the field, with the exception of total organic carbon, which is measured in the laboratory.
2. S = shallow well; I = intermediate well; D = deep well.

Abbreviations
µS/cm = microsiemens per centimeter
CPOC = conditional point of compliance
degrees C = degrees Celsius
field dup. = field duplicate
mg/L = milligrams per liter
mV = millivolts
NA = not analyzed

TABLE 6: BUILDING 4-78/79 SWMU/AOC GROUP
CONCENTRATIONS OF CONSTITUENTS OF CONCERN [1, 2]
MAY 7 AND 8, 2019
Boeing Renton Facility, Renton, Washington

	Cleanup Level[4]	Well ID[3]						
		Source Area						
		GW031S	GW031S (field dup.)	GW033S	GW034S	GW039S	GW243I	GW244S
Volatile Organic Compounds (µg/L)								
Benzene	0.80	**7.13**	**6.69**	**12.5**	0.20 U	0.21	0.20 U	**1.47**
cis-1,2-Dichloroethene	0.70	0.43	0.38	**0.41**	0.20 U	0.20 U	0.20 U	**2.03**
Trichloroethene	0.23	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Vinyl Chloride	0.20	**0.29**	**0.27**	**0.53**	0.20 U	0.20 U	0.20 U	**1.45**
Total Petroleum Hydrocarbons (µg/L)								
TPH-G (C7-C12)	800	**1020**	**848**	297	100 U	100 U	100 U	100 U

	Cleanup Level[4]	Well ID[3]		
		Downgradient Plume Area		
		GW038S	GW209S	GW210S
Volatile Organic Compounds (µg/L)				
Benzene	0.80	0.20 U	0.20 U	0.20 U
cis -1,2-Dichloroethene	0.70	0.20 U	0.20 U	0.20 U
Trichloroethene	0.23	0.20 U	0.20 U	0.20 U
Vinyl Chloride	0.20	0.20 U	0.20 U	0.20 U
Total Petroleum Hydrocarbons (µg/L)				
TPH-G (C7-C12)	800	100 U	100 U	100 U

	Cleanup Level[4]	Well ID[3]						
		CPOC Area						
		GW143S	GW237S	GW238I	GW239I	GW240D	GW241S	GW242I
Volatile Organic Compounds (µg/L)								
Benzene	0.80	0.20 U	**2.20**	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
cis -1,2-Dichloroethene	0.70	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Trichloroethene	0.23	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Vinyl Chloride	0.20	0.20 U	0.20 U	0.20 U	0.20 U	**0.27**	0.20 U	0.20 U
Total Petroleum Hydrocarbons (µg/L)								
TPH-G (C7-C12)	800	100 U	100 U	100 U	100 U	100 U	100 U	100 U

Notes
1. Data qualifiers are as follows:
U = The analyte was not detected at the reporting limit indicated.
2. **Bolded** values exceed the cleanup levels.
3. S = shallow well; I = intermediate well; D = deep well.
4. Cleanup levels obtained from Table 2 of the Cleanup Action Plan.

Abbreviations
µg/L = micrograms per liter
CPOC = conditional point of compliance
field dup. = field duplicate
TPH-G = total petroleum hydrocarbons as gasoline

TABLE 7: FORMER FUEL FARM GROUNDWATER ELEVATION DATA
May 6 AND 7, 2019
Boeing Renton Facility, Renton, Washington

Well ID[1]	Screen Interval Depth (feet bgs)	TOC Elevation (feet)[2]	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet)[2]
GW183S	5.5 to 15	26.58	8.78	17.80
GW184S	5.6 to 15	27.14	9.34	17.80
GW211S	4.8 to 14.7	27.77	8.89	18.88
GW212S	4.9 to 14.8	28.06	10.38	17.68
GW221S	5 to 15	27.93	10.06	17.87
GW224S	5 to 15	27.98	10.49	17.49
GW255S	6 to 16	27.49	10.02	17.47
GW256S	7 to 16	27.22	8.60	18.62
GW257S	8 to 16	27.87	9.49	18.38
GW258S	9 to 16	25.51	7.91	17.60

Notes
1. S = shallow well, I = intermediate well
2. Elevations in feet relative to National Geodetic Vertical Datum of 1929.

Abbreviations
bgs = below ground surface
TOC = top of casing

TABLE 8: FORMER FUEL FARM CONCENTRATIONS OF PRIMARY GEOCHEMICAL INDICATORS [1]
MAY 6 AND 7, 2019
Boeing Renton Facility, Renton, Washington

	Well ID[2]											
	Source Area	CPOC Area										
	GW255S	GW183S	GW184S	GW211S	GW212S	GW221S	GW224S	GW224S (field dup.)	GW255S	GW256S	GW257S	GW258S
Specific Conductivity (µS/cm)	217.8	149.2	146.2	196.7	255.7	243.2	200.0	200.3	217.8	149.5	142.0	366.4
Dissolved Oxygen (mg/L)	0.35	0.32	1.17	0.47	0.78	0.5	0.4	0.41	0.35	0.47	0.56	0.37
Oxidation/Reduction Potential (mV)	23.3	24.1	11.7	6.4	52.9	17.7	16.9	15.0	23.3	32.2	77.7	-2.7
pH (standard units)	6.23	6.18	6.18	6.03	5.66	6.02	6.06	6.05	6.23	6.17	5.73	6.11
Temperature (degrees C)	18.30	18.20	18.90	14.20	17.90	20.60	19.60	19.70	18.30	18.20	14.60	17.30

Notes
1. Primary geochemical indicators are measured in the field.
2. S = shallow well; I = intermediate well.

Abbreviations
µS/cm = microsiemens per centimeter
CPOC = conditional point of compliance
degrees C = degrees Celsius
field dup. = field duplicate
mg/L = milligrams per liter
mV = millivolts

TABLE 9: FORMER FUEL FARM CONCENTRATIONS OF CONSTITUENTS OF CONCERN [1, 2, 3]
MAY 6 AND 7, 2019
Boeing Renton Facility, Renton, Washington

	Cleanup Level[5]	Well ID[4]													
		Source Area	CPOC Area												
		GW255S	GW183S	GW184S	GW211S		GW212S	GW221S		GW224S		GW224S (field dup.)		GW256S	GW257S	GW258S
Total Petroleum Hydrocarbons (mg/L)																
TPH-D (C12-C24)	0.5	0.100 U	0.100 U	0.100 U	0.316	*0.124*	0.100 U	0.419	***0.630***	**1.21**	*0.256*	**1.13**	*0.191*	0.100 U	0.100 U	0.100 U
Jet A	0.5	0.100 U	0.100 U	0.100 U	0.236	*0.117*	0.100 U	0.278	*0.397*	**1.32**	*0.388*	**1.10**	*0.281*	0.100 U	0.100 U	0.100 U

Notes
1. Data qualifiers are as follows:
   U = The analyte was not detected at the reporting limit indicated.
2. **Bolded** values exceed the cleanup levels.
3. Italicized values are results after silica gel cleanup to remove biogenic interference.
4. S = shallow well; I = intermediate well.
5. Cleanup levels obtained from Table 2 of the Cleanup Action Plan.

Abbreviations
CPOC = conditional point of compliance
field dup. = field duplicate
mg/L = milligrams per liter
TPH-D = total petroleum hydrocarbons as diesel

TABLE 10: AOC-001 AND AOC-002 GROUNDWATER ELEVATION DATA
MAY 8, 2019
Boeing Renton Facility, Renton, Washington

Well ID[1]	Screen Interval Depth (feet bgs)	TOC Elevation (feet)[2]	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet)[2]
GW185S	4.5 to 14.5	16.27	0.91	15.36
GW190S	3.0 to 13.0	17.30	NM	NM
GW191D	26.5 to 36.0	17.53	NM	NM
GW192S	5.0 to 9.5	17.54	NM	NM
GW193S	3.0 to 12.8	18.67	NM	NM
GW194S	7.3 to 12.0	16.79	1.73	15.06
GW195S	7.3 to 12.0	16.34	1.07	15.27
GW196D	26.8 to 36.8	16.46	1.13	15.33
GW197S	7.8 to 12.5	16.52	0.70	15.82
GW245S	3.0 to 13.0	16.08	0.80	15.28

Notes
1. S = shallow well; D = deep well.
2. Elevations in feet relative to National Geodetic Vertical Datum of 1929.

Abbreviations
bgs = below ground surface
NM = not measured
TOC = top of casing

TABLE 11: AOC-001 AND AOC-002 CONCENTRATIONS OF PRIMARY GEOCHEMICAL INDICATORS[1]
MAY 8, 2019
Boeing Renton Facility, Renton, Washington

	Well ID[2]						
	CPOC Area						
	GW185S	GW185S (field dup.)	GW194S	GW195S	GW196D[3]	GW197S	GW245S[4]
Specific Conductivity (µS/cm)	795	805	853	684.0	406.2	923	711.0
Dissolved Oxygen (mg/L)	0.60	0.62	0.30	0.21	0.15	0.47	0.44
Oxidation/Reduction Potential (mV)	-57.9	-61.8	-42.3	-46.1	-22.9	-95.4	-72.4
pH (standard units)	6.40	6.40	6.24	6.33	6.33	6.81	6.72
Temperature (degrees C)	19.4	19.5	20.7	16.7	18.2	18.3	17.8
Total Organic Carbon (mg/L)	19.39	18.48	18.01	16.98	8.44	12.73	9.92

Notes
1. Primary geochemical indicators are measured in the field, with the exception of total organic carbon, which is measured in the laboratory.
2. S = shallow well; D = deep well.
3. GW196D is installed in a cluster with GW195S, and is screened below a silt layer at 26.8 to 36.8 feet in depth.
4. GW245S is both the source area and CPOC well for AOC-093.

Abbreviations
µS/cm = microsiemens per centimeter
CPOC = conditional point of compliance
degrees C = degrees Celsius
field dup. = field duplicate
mg/L = milligrams per liter
mV = millivolts

TABLE 12: AOC-001 AND AOC-002 CONCENTRATIONS OF CONSTITUENTS OF CONCERN [1, 2]

MAY 8, 2019

Boeing Renton Facility, Renton, Washington

	Cleanup Level[4]	CPOC Area[3]						
		GW185S	GW185S (field dup.)	GW194S	GW195S	GW196D[5]	GW197S	GW245S
Volatile Organic Compounds (µg/L)								
1,1-Dichloroethene	0.057	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Benzene	0.8	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.28	0.20 U
cis-1,2-Dichloroethene	0.02	**0.120**	**0.118**	0.020 U	**0.473**	**0.0257**	**0.427**	**0.0261**
Trichloroethene	0.02	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Vinyl Chloride	0.05	**0.122**	**0.121**	0.020 U	0.020 U	0.0324	**1.66**	0.020 U

Notes

1. Data qualifiers are as follows:
   U = The analyte was not detected at the reporting limit indicated.
2. **Bolded** values exceed the cleanup levels.
3. S = shallow well; D = deep well.
4. Cleanup levels obtained from Table 2 of the Cleanup Action Plan.
5. GW196D is installed in a cluster with GW195S, and is screened below a silt layer at 26.8 to 36.8 feet in depth.

Abbreviations

µg/L = micrograms per liter
CPOC = conditional point of compliance
field dup. = duplicate field

TABLE 13: AOC-003 GROUNDWATER ELEVATION DATA
MAY 8, 2019
Boeing Renton Facility, Renton, Washington

Well ID[1]	Screen Interval Depth (feet bgs)	TOC Elevation (feet)[2]	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet)[2]
GW188S[3]	3.5 to 13.5	18.78	NM	NM
GW247S	4 to 14	18.91	3.49	15.42
GW248I	10 to 20	18.78	3.41	15.37
GW249S	4 to 14	18.85	NM	NM

Notes
1. S = shallow well; I = intermediate well.
2. Elevations in feet relative to National Geodetic Vertical Datum of 1929.
3. Depth to water measurement not collected at GW188S during the second quarter 2017.

Abbreviations
bgs = below ground surface
NM = not measured
TOC = top of casing

TABLE 14: AOC-003 CONCENTRATIONS
OF PRIMARY GEOCHEMICAL INDICATORS [1]
MAY 8, 2019
Boeing Renton Facility, Renton, Washington

	Well ID[2]			
	Source Area	Downgradient Plume Area	CPOC Area	
	GW249S	GW188S	GW247S	GW248I
Specific Conductivity (µS/cm)	NM	NM	448	544
Dissolved Oxygen (mg/L)			0.38	0.45
Oxidation/Reduction Potential (mV)			-31.3	-70.9
pH (standard units)			6.39	6.34
Temperature (degrees C)			19.60	22.00
Total Organic Carbon (mg/L)			9.82	12.68

Notes
1. Primary geochemical indicators are measured in the field, with the exception of total organic carbon, which is measured in the laboratory.
2. S = shallow well; I = intermediate well.

Abbreviations
µS/cm = microsiemens per centimeter
CPOC = conditional point of compliance
degrees C = degrees Celsius
mg/L = milligrams per liter
mV = millivolts
NM = not measured

TABLE 15: AOC-003 CONCENTRATIONS OF CONSTITUENTS OF CONCERN [1, 2]

MAY 8, 2019

Boeing Renton Facility, Renton, Washington

	Cleanup Level[4]	Well ID[3]	
		CPOC Area	
		GW247S	GW248I
Volatile Organic Compounds (µg/L)			
cis-1,2-Dichloroethene	0.78	0.058	0.020 U
Tetrachloroethene	0.02	0.020 U	0.020 U
Trichloroethene	0.16	0.020 U	0.020 U
Vinyl Chloride	0.24	**0.497**	**0.551**

Notes

1. Data qualifiers are as follows:
   U = The analyte was not detected at the reporting limit indicated.
2. **Bolded** values exceed the cleanup levels.
3. S = shallow well; I = intermediate well.
4. Cleanup levels obtained from Table 2 of the Cleanup Action Plan.

Abbreviations

µg/L = micrograms per liter
CPOC = conditional point of compliance

TABLE 16: LOT 20/FORMER BUILDING 10-71 PARCEL
GROUNDWATER ELEVATION DATA[1]
MAY 8, 2019
Boeing Renton Facility, Renton, Washington

Well ID	Screen Interval Depth (feet bgs)	TOC Elevation (feet)[2]	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet)[2]
10-71-MW-1	7 to 17	30.07	8.29	21.78
10-71-MW-2	7 to 17	29.88	8.61	21.27
10-71-MW-4	6 to 16	28.97	8.38	20.59

Notes
1. Water levels not measured in monitoring well 10-71-MW-3 so it is not included in this table.
2. Elevations in feet relative to National Geodetic Vertical Datum of 1929.

Abbreviations
bgs = below ground surface
TOC = top of casing

TABLE 17: LOT 20/FORMER BUILDING 10-71 PARCEL CONCENTRATIONS OF PRIMARY GEOCHEMICAL INDICATORS [1]

MAY 8, 2019

Boeing Renton Facility, Renton, Washington

	Well ID		
	10-71-MW1	10-71-MW2	10-71-MW4
Specific Conductivity (µS/cm)	187.4	199	321
Dissolved Oxygen (mg/L)	0.91	1.75	1.14
Oxidation/Reduction Potential (mV)	48.7	84.0	35.1
pH (standard units)	5.85	5.63	6.17
Temperature (degrees C)	14.10	13.90	15.30

Notes

1. Primary geochemical indicators are measured in the field.

Abbreviations

µS/cm = microsiemens per centimeter
degrees C = degrees Celsius
mg/L = milligrams per liter
mV = millivolts

TABLE 18: LOT 20/FORMER BUILDING 10-71 PARCEL
CONCENTRATIONS OF CONSTITUENTS OF CONCERN [1, 2]
MAY 8, 2019
Boeing Renton Facility, Renton, Washington

	Well ID		
	10-71-MW1	**10-71-MW2**	**10-71-MW4**
Volatile Organic Compounds (µg/L)			
cis- 1,2-Dichloroethene	0.20 U	0.20 U	0.20 U
Toluene	0.20 U	0.20 U	0.20 U
Trichloroethene	0.20 U	0.20 U	0.20 U
Vinyl Chloride	0.20 U	0.20 U	0.20 U

Notes
1. Data qualifiers are as follows:
   U = The analyte was not detected at the reporting limit indicated.
2. No cleanup standards have been established for the Building 10-71 Parcel.

Abbreviations
µg/L = micrograms per liter

TABLE 19: APRON A GROUNDWATER ELEVATION DATA
MAY 7, 2019
Boeing Renton Facility, Renton, Washington

Well ID	Screen Interval Depth (feet bgs)	TOC Elevation (feet)[1]	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet)[1]
GW262S	8 to 18	NA	4.90	NA
GW263S	8 to 18	NA	6.36	NA
GW264S	8 to 18	NA	6.08	NA

Notes
1. Elevations in feet relative to National Geodetic Vertical Datum of 1929.

Abbreviations
bgs = below ground surface
NA = not available
TOC = top of casing

TABLE 20: APRON A CONCENTRATIONS OF
PRIMARY GEOCHEMICAL INDICATORS [1]
MAY 7, 2019
Boeing Renton Facility, Renton, Washington

	Well ID[2]		
	Source Area Wells		
	GW262S	GW262S (field dup.)	GW264S
Specific Conductivity (µS/cm)	459	456	739
Dissolved Oxygen (mg/L)	1.28	1.21	0.86
Oxidation/Reduction Potential (mV)	-44.2	-46.9	-40.2
pH (standard units)	5.90	5.91	6.14
Temperature (degrees C)	14.10	13.70	15.60
Total Organic Carbon (mg/L)	33.94	33.29	37.28

Notes

1. Primary geochemical indicators are measured in the field, with the exception of total organic carbon, which is measured in the laboratory.
2. S = shallow well.

Abbreviations

µS/cm = microsiemens per centimeter
degrees C = degrees Celsius
field dup. = field duplicate
mg/L = milligrams per liter
mV = millivolts

TABLE 21: APRON A CONCENTRATIONS
OF CONSTITUENTS OF CONCERN[1, 2]
MAY 7, 2019
Boeing Renton Facility, Renton, Washington

	Well ID[3]		
	GW262S	GW262S (field dup.)	GW264S
Volatile Organic Compounds (µg/L)			
cis- 1,2-Dichloroethene	0.20 U	0.20 U	0.20 U
Vinyl Chloride	0.20 U	0.20 U	1.39

Notes
1. Data qualifiers are as follows:
   U = The analyte was not detected at the reporting limit indicated.
2. No cleanup standards have been established for the Apron A Parcel.
3. S = shallow well.

Abbreviations
µg/L = micrograms per liter

Appendix A

TABLE A-1: GROUNDWATER COMPLIANCE MONITORING SCHEDULE

Boeing Renton Facility, Renton, Washington

Cleanup Action Area	Monitoring Frequency[1]		Groundwater Monitoring Wells[2]				Additional Water Level Monitoring Wells[3]	Constituents of Concern[4]	Analyses[5]
	Quarterly	Semiannual	Cross-Gradient Wells	Source Area Wells	Downgradient Plume Wells	CPOC Wells			
SWMU-168		X (1,3)	NA	GW228S[7]	NA	GW229S, GW230I, and GW231S		VC	SW8260C SIM
SWMU-172/SWMU-174	X		NA	GW152S and GW153S	GW081S, GW172S, GW173S, and GW226S	GW232S, GW233I, GW234S, GW235I, and GW236S		*cis* -1,2-DCE, PCE, TCE, VC	SW8260C SIM[6]
								Arsenic, copper, and lead	EPA 6020A
Building 4-78/79 SWMU/AOC Group	X		NA	GW031S, GW033S, GW034S, GW039S, GW243I, and GW244S	GW038S, GW209S, and GW210S	GW143S, GW237S, GW238I, GW239I, GW240D, GW241S, and GW242I		VC, TCE, *cis* -1,2-DCE, benzene	SW8260C[6]
								TPH-gasoline	NWTPH-Gx
Former Fuel Farm SWMU/AOC Group		X (2,4)	NA	GW255S, GW256S, and GW257S	NA	GW183S, GW184S, GW211S, GW212S, GW221S, GW224S, and GW258S		TPH-jet fuel, TPH-diesel	NWTPH-Dx
AOC-001/AOC-002	X (CPOC wells)	X (1,3) (all other wells)	NA	GW193S	GW190S, GW191D, GW192S, and GW246S	GW185S, GW194S, GW195S, GW196D, GW197S, and GW245S		Benzene	SW8260C[6]
								TCE, *cis* -1,2-DCE, 1,1-dichloroethene, VC	SW8260C SIM[6]
AOC-003	X (CPOC wells)	X (1,3) (all other wells)	NA	GW249S	GW188S	GW247S and GW248I		PCE, TCE	SW8260C SIM[6]
								cis -1,2-DCE, VC	
AOC-004		X (1,3)	NA	GW250S	NA	GW174S		Lead	EPA 6020A
AOC-060		X (1,3)	GW012S and GW014S	GW009S	GW147S	GW149S, GW150S, GW252S, GW253I, and GW254S	GW010S and GW011D	VC	SW8260C SIM[6]
								TCE, *cis* -1,2-DCE	
AOC-090		X (1,3)	NA	GW189S	GW175I and GW176S	GW163I, GW165I, GW177I, GW178S, GW179I, GW180S, GW207S, and GW208S		1,1,2-Trichloroethane, acetone, benzene, toluene, carbon tetrachloride, chloroform, *cis* -1,2-DCE, *trans* -1,2-DCE, methylene chloride	SW8260C[6]
								1,1-Dichloroethene, 1,1,2,2-tetrachloroethane, VC, PCE, TCE	SW8260C SIM[6]
								TPH-gasoline	NWPTH-Gx
								TPH-diesel, TPH-motor oil	NWTPH-Dx
Building 4-70 Area		X (1,3)	NA	NA	NA	GW259S and GW260S		TCE, *cis* -1,2-DCE, VC	SW8260C[6]
Lot 20/Former Building 10-71		X (2,4)	NA	10-71-MW1, 10-71-MW2, and 10-71-MW4	NA	NA		Toluene, cis-1,2-DCE, TCE, VC	SW8260C[6]
Apron A		X (2,4)	NA	GW262S and GW264S	NA	NA		*cis* -1,2-DCE and VC	SW8260C[6]

Notes:

1. The EDR presents the groundwater monitoring frequency for each SWMU/AOC. For sites with semiannual monitoring frequency, specific quarters when monitoring will be conducted is indicated by 1 for quarter 1, 2 for quarter 2, etc.
2. Groundwater monitoring wells are also monitored for groundwater levels.
3. Additional wells are monitored for groundwater levels only.
4. In addition to COCs, primary geochemical indicators will be monitored during each regular monitoring event. Geochemical indicators are listed in Table A-2.
5. Details of analytical methods are specified in the Quality Assurance Project Plan, which is Appendix E to the Cleanup Action Plan (AMEC, 2012).
6. SIM methods will be used if the cleanup level is lower than the reporting limit achieved by the conventional 8021, 8260 or 8270 method. If cleanup levels become higher or if the conventional 8021, 8260 or 8270 methods are updated and able to achieve reporting limits below the cleanup levels, then the conventional method rather than the SIM method will be used.
7. GW228S will not be monitored on a semiannual basis - only the CPOC wells will be monitored on a semiannual basis for SWMU-168.

Abbreviations:

AOC = area of concern
cis -1,2-DCE = *cis* -1,2 dichloroethene
COCs = constituents of concern
CPOC = conditional point of compliance
Cr = chromium
EDR = Engineering Design Report
EPA = Environmental Protection Agency
NA = not applicable
PCE = tetrachloroethene
SIM = selected ion monitoring
SWMU = solid waste management unit
TCE = trichloroethene
TPH = total petroleum hydrocarbons
trans -1,2-DCE = *trans* -1,2 dichloroethene
VC = vinyl chloride
VOCs = volatile organic compounds

TABLE A-2: MONITORED NATURAL ATTENUATION/MONITORED ATTENUATION SCHEDULE

Boeing Renton Facility, Renton, Washington

Cleanup Action Area	Groundwater Monitoring Wells				Primary Geochemical Parameters[2]		
					Indicators	Monitoring Frequency[3]	
	Cross-Gradient Wells	Source Area Wells	Downgradient Plume Wells	CPOC Wells		Quarterly	Semiannual
SWMU-168	NA	GW228S[4]	NA	GW229S, GW230I, and GW231S	Dissolved oxygen, pH, ORP, temperature, specific conductance		X (1,3)
SWMU-172/SWMU-174	NA	GW152S and GW153S	GW081S, GW172S, GW173S, and GW226S	GW232S, GW233I, GW234S, GW235I, and GW236S	Dissolved oxygen, pH, ORP, temperature, specific conductance, TOC	X	
Building 4-78/79 SWMU/AOC Group	NA	GW031S, GW033S, GW034S, GW039S, GW243I, and GW244S	GW038S, GW209S, and GW210S	GW143S, GW237S, GW238I, GW239I, GW240D, GW241S, and GW242I	Dissolved oxygen, pH, ORP, temperature, specific conductance in all wells, TOC in all wells except GW241S and GW242I	X	
Former Fuel Farm SWMU/AOC Group	NA	GW255S, GW256S, and GW257S	NA	GW183S, GW184S, GW211S, GW212S, GW221S, GW224S, and GW258S	Dissolved oxygen, pH, ORP, temperature, specific conductance		X (2,4)
AOC-001/AOC-002	NA	GW193S	GW190S, GW191D, GW192S, and GW246S	GW185S, GW194S, GW195S, GW196D, GW197S, and GW245S	Dissolved oxygen, pH, ORP, temperature, specific conductance, TOC	X (CPOC wells)	X (1,3) (all other wells)
AOC-003	NA	GW249S	GW188S	GW247S and GW248I	Dissolved oxygen, pH, ORP, temperature, specific conductance, TOC	X (CPOC wells)	X (1,3) (all other wells)
AOC-004	NA	GW250S	NA	GW174S	Dissolved oxygen, pH, ORP, temperature, specific conductance		X (1,3)
AOC-060	GW012S and GW014S	GW009S	GW147S	GW149S, GW150S, GW252S, GW253I, and GW254S	Dissolved oxygen, pH, ORP, temperature, specific conductance, TOC		X (1,3)
AOC-090	NA	GW189S	GW175I and GW176S	GW163I, GW165I, GW177I, GW178S, GW179I, GW180S, GW207S, and GW208S	Dissolved oxygen, pH, ORP, temperature, specific conductance, TOC [5]		X (1,3)
Building 4-70 Area	NA	NA	NA	GW259S and GW260S	Dissolved oxygen, pH, ORP, temperature, specific conductance, TOC		X (1,3)
Lot 20/Former Building 10-71	NA	10-71-MW1, 10-71-MW2, and 10-71-MW4	NA	NA	Dissolved oxygen, pH, ORP, temperature, specific conductance		X (2,4)
Apron A	NA	GW262S and GW264S	NA	NA	Dissolved oxygen, pH, ORP, temperature, specific conductance, TOC		X (2,4)

Notes:

1. In addition to COCs listed in Table A-1, primary geochemical indicators will be monitored during each regular monitoring event.
2. All primary geochemical indicators except TOC are monitored in the field during sampling. TOC is analyzed in the laboratory following methods specified in the Quality Assurance Project Plan, which is Appendix E to the Cleanup Action Plan (AMEC, 2012).
   The primary geochemical indicators differ slightly depending on whether the site is a fuel-related site or a solvent-related site.
   At a fuel related site, TOC is not necessary; at a solvent-related site, TOC is a measure of how much electron donor remains present.
3. The EDR presents the groundwater monitoring frequency for each SWMU/AOC. For sites with semiannual monitoring frequency, specific quarters when monitoring will be conducted is indicated by 1 for quarter 1, 2 for quarter 2, etc.
4. Primary geochemical parameters will not be collected at GW228S - only at CPOC wells that are sampled semiannually.
5. TOC will only be analyzed in the groundwater from the source area well (GW189S).

Abbreviations:

AOC = area of concern
COCs = constituents of concern
CPOC = conditional point of compliance
EDR = Engineering Design Report
NA = not applicable
ORP = oxidation reduction potential
SWMU = solid waste management unit
TOC = total organic carbon

Appendix B

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 6 /2019@ 800
Sample Number: RGWDUP1 190506 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) | Damaged (NO) | Describe: Flush Mount
DTW Before Purging (ft) | Time: | Flow through cell vol. | GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 06 /2019 @ | End Purge: Date/Time: 05/ 06 /2019 @ | Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits								**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		

DUPLICATE TO RGW152S

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ☐ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ☐ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ☐ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): SLIGHTY GRAY AND CLOUDY NO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	18.2	192.3	0.56	5.93	18.6				
2	18.2	191.5	0.57	5.93	18.4				
3	18.2	190.7	0.58	5.92	18.9				
4	18.3	190.5	0.58	5.91	19.5				
Average:	18.2	191.3	0.57	5.92	18.9	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
3	(8260-SIM) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC5310C) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
1	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s): Duplicate to RGW152S
Comments:

Signature: SRB | Date: 5/6/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 6 /2019@ 940
Sample Number: RGW081S- 190506 | Weather: SUNNY WARM
Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 8.68 Time: 912 Flow through cell vol. GW Meter No.(s 1-HERON
Begin Purge: Date/Time: 05/ 6 /2019 @ 915 End Purge: Date/Time: 05/ 6 /2019 @ 935 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
918	16.9	192.4	1.77	6.22	44.1		8.67		
921	16.9	205.8	0.88	6.17	32.6		8.67		
924	16.8	211.3	0.57	6.22	17.8		8.67		
927	17.1	216.2	0.58	6.25	6.0				
930	17.2	219.2	0.59	6.26	-1.2				
933	17.5	222.3	0.67	6.27	-6.1				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORLESS, SMALL YELLOWISH SOLIDS, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	17.5	223.0	0.67	6.27	-6.3				
2	17.6	223.3	0.68	6.27	-6.5				
3	17.6	222.6	0.68	6.27	-7.0				
4	17.7	223.4	0.67	6.27	-7.4				
Average:	17.6	223.1	0.68	6.27	-6.8	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
3	(8260-SIM) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC5310C) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
1	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:

Signature: BXM Date: 5/6/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 6 /2019@ 1149
Sample Number: RGW152S- 190506 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 9.06 Time: 1110 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 06 /201 1119 End Purge: Date/Time: 05/ 06 /2019 @ 1136 Gallons Purged: 0.25
Purge water disposed to: ☐ 1119 ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1122	14.6	220.4	0.70	5.96	32.2	LOW	9.06		
1125	17.8	223.5	0.50	5.96	13.1		9.06		
1128	18.0	196.6	0.52	5.96	15.1		9.06		
1131	18.1	195.0	0.54	5.95	16.1				
1134	18.1	193.3	0.55	5.93	18.2				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): SLIGHTLY GRAY AND CLOUDY NO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	18.2	192.5	0.55	5.93	17.9				
2	18.2	191.7	0.57	5.92	18.5				
3	18.2	191.2	0.57	5.92	19.2				
4	18.3	190.7	0.58	5.93	18.7				
Average:	18.2	191.5	0.57	5.93	18.6	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
3	(8260-SIM) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX) WA ☐ OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease) WA ☐ OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)
1	(COD) (TOC5310C) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)
1	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
	others

Duplicate Sample No(s): Duplicate Location (DUP1)
Comments:

Signature: SRB Date: 5/6/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 6 /2019@ 1225
Sample Number: RGW153S- 190506 | Weather: SUNNY, WARM
Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 9.45 Time: 1200 Flow through cell vol. GW Meter No.(s 1-HERON
Begin Purge: Date/Time: 05/ 6 /2019 @ 1201 End Purge: Date/Time: 05/ 6 /2019 @ 1221 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1204	16.9	235.9	2.38	6.17	35.1		9.53		TURNED THROTTLE DOWN
1207	17.3	243.2	1.46	6.17	24.2		9.49		
1210	17.4	233.8	0.94	6.19	9.6		9.49		
1213	17.4	233.8	0.66	6.21	-1.7				
1216	17.4	228.8	0.54	6.21	-8.0				
1219	17.3	225.8	0.54	6.21	-11.8				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORLESS, NO SHEEN, SOME BLACK AND WHITE SOLIDS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	17.5	224.8	0.58	6.21	-12.4				
2	17.5	224.9	0.56	6.21	-12.7				
3	17.5	225.0	0.55	6.21	-13.0				
4	17.6	224.6	0.57	6.21	-13.3				
Average:	17.5	224.8	0.57	6.21	-12.9	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
3	(8260-SIM) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC5310C) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
1	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:
Signature: BXM Date: 5/6/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 6 /2019@ 1114
Sample Number: RGW172S- 190506 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 9.38 Time: 1040 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 06 /201 1044 End Purge: Date/Time: 05/ 06 /2019 @ 1107 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1047	15.5	269.9	0.56	5.98	34.1	LOW	9.74		
1050	16.2	278.5	0.49	5.93	15.7		9.41		
1053	18.9	300.9	0.47	6.33	-27.8		9.5		
1056	18.5	296.4	0.46	6.37	-35.6		9.5		
1059	18.4	289.5	0.42	6.36	-40.0				
1102	18.3	284.2	0.46	6.34	-40.8				
1105	18.1	279.1	0.47	6.30	-40.6				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): SLIGHTLY YELLOW AND TURBID NO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	18.1	278.9	0.46	6.30	-40.5				
2	18.2	278.3	0.46	6.28	-39.4				
3	18.1	278.0	0.46	6.28	-39.7				
4	18.1	277.9	0.46	6.28	-39.7				
Average:	18.1	278.3	0.46	6.29	-39.8	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
3	(8260-SIM) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX) WA ☐ OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease) WA ☐ OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)
1	(COD) (TOC5310C) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)
1	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
	others

Duplicate Sample No(s):
Comments:
Signature: SRB Date: 5/6/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 6 /2019@ 1030
Sample Number: RGW173S- 190506 | Weather: SUNNY, WARM
Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 9.44 Time: 1003 Flow through cell vol. GW Meter No.(s 1-HERON
Begin Purge: Date/Time: 05/ 6 /2019 @ 1007 End Purge: Date/Time: 05/6 /2019 @ 1027 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1010	15.6	320.4	1.28	6.15	28.7		9.46		
1013	16.0	357.6	0.44	6.23	6.8		9.46		
1016	15.7	360.9	0.32	6.29	-14.7		9.46		
1019	15.6	357.1	0.33	6.29	-21.6				
1022	15.4	353.1	0.36	6.28	-24.9				
1025	15.3	349.4	0.44	6.26	-27.6				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): COLORLESS, SLIGHTLY CLOUDY, SOME WHITE SOLIDS, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	15.2	347.2	0.46	6.26	-27.7				
2	15.2	347.4	0.45	6.25	-27.9				
3	15.2	347.5	0.44	6.25	-28.0				
4	15.3	346.8	0.43	6.26	-28.4				
Average:	15.2	347.2	0.45	6.26	-28.0	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
3	(8260-SIM) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC5310C) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
1	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments: MSMSD Location

Signature: BXM Date: 5/6/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 6 /2019@ 1135
Sample Number: RGW226S- 190506 | Weather: SUNNY, WARM
Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 8.84 Time: 1102 Flow through cell vol. GW Meter No.(s 1-HERON
Begin Purge: Date/Time: 05/ 6 /2019 @ 1113 End Purge: Date/Time: 05/ 6 /2019 @ 1132 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1116	19.1	268.5	1.46	6.25	31.5		8.87		
1119	19.3	282.8	0.94	6.29	8.7		8.88		
1122	19.3	275.5	0.68	6.31	-9.4		8.89		
1125	19.5	265.5	0.59	6.32	-20.0		8.89		
1128	19.5	261.1	0.49	6.32	-25.5				
1131	19.4	250.7	0.52	6.31	-28.4				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORLESS, ORANGE SOLIDS, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	19.4	249.5	0.56	6.31	-28.6				
2	19.3	249.7	0.53	6.31	-28.8				
3	19.4	249.7	0.52	6.31	-28.9				
4	19.4	247.2	0.56	6.31	-29.1				
Average:	19.4	249.0	0.54	6.31	-28.9	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
3	(8260-SIM) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC5310C) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
1	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:

Signature: BXM Date: 5/6/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 6 /2019@ 839
Sample Number: RGW232S- 190506 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 7.92 Time: 808 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 06 /201 809 End Purge: Date/Time: 05/ 06 /2019 @ 833 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
812	13.9	403.5	5.80	5.65	30.7	LOW	8.31		
815	14.7	438.9	5.00	5.61	10.7		8.5		
818	15.2	450.0	4.30	5.80	-9.7		8.61		
821	15.3	451.8	4.21	5.81	-12.4		8.65		
824	15.6	453.0	4.11	5.94	-21.0				
827	16.0	456.2	4.04	6.05	-26.2		8.61		
830	16.3	459.3	3.87	6.10	-31.3				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR COLORLESS NO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	16.3	458.3	3.80	6.09	-31.5				
2	16.4	456.2	3.80	6.11	-32.2				
3	16.4	457.4	3.76	6.09	-32.1				
4	16.5	456.1	3.75	6.11	-33.1				
Average:	16.4	457.0	3.78	6.10	-32.2	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
3	(8260-SIM) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC5310C) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
1	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:
Signature: SRB Date: 5/6/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/6 /2019@ 845
Sample Number: RGW233I- 190506 | Weather: SUNNY, WARM
Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 7.56 Time: 913 Flow through cell vol. GW Meter No.(s 1-HERON
Begin Purge: Date/Time: 05/6 /2019 @ 820 End Purge: Date/Time: 05/ 6 /2019 @ 839 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
823	15.5	214.3	4.68	6.60	21.0		7.56		
826	16.0	222.0	4.55	6.37	12.6		7.56		
829	16.4	224.8	4.15	6.26	7.6		7.56		
832	16.6	222.9	3.96	6.20	8.4				
835	16.9	223.7	3.79	6.14	9.7				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORLESS, SOME BLACK SOLIDS, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	17.1	224.7	3.65	6.14	9.2				
2	17.1	225.0	3.63	6.14	8.9				
3	17.1	224.7	3.65	6.14	9.0				
4	17.2	224.8	3.62	6.13	8.9				
Average:	17.1	224.8	3.64	6.14	9.0	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
3	(8260-SIM) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC5310C) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
1	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:

Signature: BXM Date: 5/6/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 6 /2019@ 1041
Sample Number: RGW234S- 190506 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 8.09 Time: 955 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 06 /201 1011 End Purge: Date/Time: 05/ 06 /2019 @ 1030 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1014	13.8	219.8	2.25	5.63	70.6	LOW	8.14		
1017	15.7	253.0	0.64	6.14	-6.0		8.14		
1020	15.7	250.8	0.64	6.15	-7.2		8.14		
1023	15.6	245.8	0.61	6.16	-9.8				
1026	15.7	241.4	0.60	6.16	-0.4				
1029	15.8	239.8	0.59	6.16	-10.7				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): SLIGHTLY CLOUDY AND TURBID NO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	15.8	240.0	0.59	6.15	-10.4				
2	15.8	239.5	0.58	6.15	-10.7				
3	15.8	239.5	0.58	6.15	-10.3				
4	15.8	239.8	0.58	6.14	-10.0				
Average:	15.8	239.7	0.58	6.15	-10.4	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
3	(8260-SIM) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX) WA ☐ OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease) WA ☐ OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)
1	(COD) (TOC5310C) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)
1	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
	others

Duplicate Sample No(s):
Comments:

Signature: SRB Date: 5/6/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 6 /2019@ 1011
Sample Number: RGW235I- 190506 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 7.66 Time: 940 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 06 /201 941 End Purge: Date/Time: 05/ 06 /2019 @ 1002 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
943	13.9	131.8	1.09	6.71	5.2	MED	7.71		
946	15.1	137.1	1.10	5.59	58.8		7.71		
949	15.6	147.0	0.99	5.81	42.7		7.71		
952	15.7	147.4	0.98	5.83	41.6				
955	15.9	144.6	0.80	6.09	17.6				
958	16.0	144.7	0.79	6.11	16.3				
1001	16.0	142.8	0.77	6.18	5.3				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR COLORLESS NO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	16.0	142.8	0.76	6.20	4.0				
2	16.1	142.9	0.75	6.20	3.4				
3	16.1	142.4	0.75	6.20	2.6				
4	16.1	142.4	0.74	6.21	1.1				
Average:	16.1	142.6	0.75	6.20	2.8	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
3	(8260-SIM) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX) WA ☐ OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease) WA ☐ OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)
1	(COD) (TOC5310C) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)
1	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
	others

Duplicate Sample No(s):
Comments:
Signature: SRB Date: 5/6/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 6 /2019@ 931
Sample Number: RGW236S- 190506 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 7.12 Time: 910 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 06 /201 911 End Purge: Date/Time: 05/ 06 /2019 @ 925 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
914	14.0	338.7	3.44	5.73	46.4	HIGH	7.45		
917	16.7	364.5	2.04	6.19	-9.4		7.35		
920	16.6	365.1	1.97	6.21	-13.1		7.35		
923	15.6	357.5	1.86	6.26	-22.3				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): SLIGHTLY YELLOW AND TURBID NO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	15.4	355.7	1.84	6.25	-21.7				
2	15.5	355.9	1.81	6.22	-20.9				
3	15.4	355.0	1.81	6.22	-20.9				
4	15.4	355.1	1.81	6.20	-20.1				
Average:	15.4	355.4	1.82	6.22	-20.9	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
3	(8260-SIM) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX) WA ☐ OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease) WA ☐ OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)
1	(COD) (TOC5310C) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)
1	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
1	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
	others

Duplicate Sample No(s):
Comments:
Signature: SRB Date: 5/6/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 7 /2019@ 1446
Sample Number: RGW-244S-190507 | Weather: CLEAR
Landau Representative: RJC

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 4.19 Time: 1410 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 07 /2019 1413 End Purge: Date/Time: 05/ 07 /2019 @ 1435 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1416	17.1	436.8	0.43	5.73	43.6		4.19		
1419	18.0	447.9	0.36	5.74	38.0		4.19		
1422	20.1	464.0	0.35	5.90	14.7		4.19		
1425	21.4	479.4	0.34	5.97	2.7				
1428	22.2	494.8	0.36	6.05	-10.7				
1431	22.9	506.0	0.36	6.09	-18.5				
1434	23.7	515.0	0.37	6.12	-25.7				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR COLORLESS NO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	23.9	516.0	0.37	6.12	-26.9				
2	23.9	516.0	0.38	6.12	-27.0				
3	23.9	517.0	0.39	6.13	-28.0				
4	24.2	520.0	0.37	6.13	-28.7				
Average:	24.0	517.3	0.38	6.13	-27.7	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:

Signature: RJC Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 7 /2019@ 800
Sample Number: RGWDUP2 190507 | Weather: CLEAR 70S
Landau Representative: RJC

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) Time: Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 7 /2019 @ End Purge: Date/Time: 05/ 7 /2019 @ Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ☐ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits								**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		

DUPLICATE TO RGW031S

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ☐ Pump/Pump Type DED BLAD
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ☐ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ☐ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR COLORLESS NO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	22.7	482.3	0.25	6.20	-35.6				
2	22.9	486.1	0.26	6.21	-37.1				
3	23.1	489.0	0.27	6.21	-38.7				
4	23.3	491.2	0.27	6.21	-39.0				
Average:	23.0	487.2	0.26	6.21	-37.6	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s): Duplicate to RGW031S
Comments:

Signature: RJC Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 7 /2019@ 1412
Sample Number: RGW031S- 190507 | Weather: CLEAR 70S
Landau Representative: RJC

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 4.09 Time: 13355 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 7 /2019 1342 End Purge: Date/Time: 05/ 7 /2019 @ 1401 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1342	16.0	423.3	0.23	5.85	30.0				
1345	17.1	426.5	0.22	5.83	26.4		4.12		SLOWED PUMP
1348	17.7	436.8	0.21	5.87	16.0		4.09		
1351	19.1	450.8	0.20	6.04	-5.2				
1354	20.3	461.0	0.22	6.15	-20.4				
1357	21.3	468.5	0.23	6.18	-26.4				
1400	22.1	478.0	0.25	6.20	-33.1				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLAD
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR COLORLESS NO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	22.4	480.3	0.25	6.21	-34.6				
2	22.6	483.6	0.26	6.21	-36.6				
3	23.3	487.9	0.27	6.21	-38.1				
4	23.5	490.6	0.27	6.21	-39.0				
Average:	23.0	485.6	0.26	6.21	-37.1	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s): Duplicate Location (DUP2)
Comments:

Signature: RJC Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 8 /2019@ 1030
Sample Number: RGW033S- 190508 | Weather: SUNNY, WARM
Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 4.25 Time: 1003 Flow through cell vol. GW Meter No.(s 1-HERON
Begin Purge: Date/Time: 05/ 8 /2019 @ 1009 End Purge: Date/Time: 05/ 8 /2019 @ 1028 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1012	16.6	350.4	0.34	6.19	29.8		4.25		
1015	16.7	351.1	0.34	6.18	16.0		4.25		
1018	16.7	352.4	0.28	6.19	1.8		4.25		
1021	16.5	356.8	0.26	6.19	-9.7				
1024	16.6	358.1	0.24	6.18	-12.4				
1027	16.6	359.8	0.26	6.17	-16.1				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORLESS, WHITE FLOATING SOLIDS, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	16.6	360.5	0.25	6.17	-16.4				
2	16.6	360.6	0.26	6.17	-16.7				
3	16.6	360.7	0.25	6.17	-17.2				
4	16.6	361.7	0.25	6.17	-17.4				
Average:	16.6	360.9	0.25	6.17	-16.9	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:

Signature: BXM Date: 5/8/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: May-19 | Date/Time: 05/ 7 /2019@ 1511

Sample Number: RGW034S- 190507 | Weather: CLEAR

Landau Representative: RJC

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount

DTW Before Purging (ft) 4.12 Time: 1435 Flow through cell vol. GW Meter No.(s HERON3

Begin Purge: Date/Time: 05/ 07 /201 1438 End Purge: Date/Time: 05/ 07 /2019 @ 1500 Gallons Purged: 0.25

Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1441	16.3	310.8	0.38	6.02	18.0		4.2		
1444	17.1	309.6	0.32	5.84	17.7		4.2		
1447	18.9	309.7	0.02	6.00	-5.0		4.2		
1450	20.4	315.6	0.02	6.09	-24.8				
1453	21.2	319.9	0.02	6.14	-35.7				
1456	21.8	324.3	0.02	6.21	-48.3				
1459	22.6	321.3	0.58	6.23	-57.3				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER

Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated

Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated

(By Numerical Order) ☐ Other

Sample Description (color, turbidity, odor, sheen, etc.): CLEAR COLORLESS NO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	22.7	327.4	0.44	6.24	-58.1				
2	22.7	327.5	0.39	6.24	-58.3				
3	22.8	327.8	0.37	6.24	-59.2				
4	22.8	328.0	0.36	6.24	-59.3				
Average:	22.8	327.7	0.39	6.24	-58.7	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):

Comments: VERY LOW DO DURING PURGE. FLOW CELL WAS SHAKEN AND DO STARTED TO RISE

Signature: RJC Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 8 /2019@ 1115
Sample Number: RGW038S- 190508 | Weather: PARTLY CLOUDY, WARM
Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 4.44 Time: 1048 Flow through cell vol. GW Meter No.(s 1-HERON
Begin Purge: Date/Time: 05/ 8 /2019 @ 1053 End Purge: Date/Time: 05/ 8 /2019 @ 1112 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1056	16.3	301.0	0.30	6.29	18.6		4.43		
1059	16.3	308.9	0.21	6.33	4.2		4.43		
1102	16.3	311.7	0.21	6.36	-4.2		4.43		
1105	16.4	314.5	0.19	6.37	-10.3				
1108	16.4	315.8	0.19	6.39	-18.5				
1111	16.2	316.7	0.20	6.40	-24.2				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORLESS, NO SHEEN, SOME BLACK SOLIDS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	16.3	316.7	0.20	6.40	-24.8				
2	16.3	316.7	0.20	6.40	-25.4				
3	16.3	316.9	0.20	6.41	-26.0				
4	16.3	317.0	0.19	6.40	-26.5				
Average:	16.3	316.8	0.20	6.40	-25.7	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:

Signature: BXM Date: 5/8/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton
Project Number: 0025217.099.099
Event: May-19
Date/Time: 05/8 /2019@ 905
Sample Number: RGW039S- 190508
Weather: SUNNY, COOL
Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 3.89 Time: 826 Flow through cell vol. GW Meter No.(s 1 - HERON
Begin Purge: Date/Time: 05/ 8 /2019 @ 842 End Purge: Date/Time: 05/ 8 /2019 @ 901 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
845	16.3	214.1	1.34	6.18	55.2		3.88		
848	16.6	217.9	1.10	6.07	54.9		3.88		
851	16.9	217.7	1.15	6.06	54.9		3.88		
854	17.8	216.4	1.09	6.05	54.5				
857	17.2	210.1	0.97	6.04	53.9				
900	17.2	209.7	0.81	6.04	53.4				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORLESS, ORANGE SOLIDS, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	17.1	208.7	0.81	6.04	53.1				
2	17.0	198.7	0.80	6.04	53.0				
3	17.1	208.8	0.76	6.04	52.9				
4	17.0	207.5	0.78	6.04	52.5				
Average:	17.1	205.9	0.79	6.04	52.9	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:

Signature: BXM Date: 5/8/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 7 /2019@ 1405
Sample Number: RGW143S- 190507 | Weather: SUNNY, WARM
Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 4.52 Time: 1338 Flow through cell vol. GW Meter No.(s 1-HERON
Begin Purge: Date/Time: 05/ 7 /2019 @ 1343 End Purge: Date/Time: 05/ 7 /2019 @ 1402 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1346	17.2	298.9	0.68	6.28	29.0				
1349	17.0	302.6	0.30	6.33	14.8		4.5		
1352	16.9	305.7	0.28	6.36	12.3		4.52		
1355	17.0	306.6	0.23	6.37	-6.5		4.52		
1358	16.9	308.1	0.23	6.38	-13.7				
1401	16.9	308.9	0.21	6.39	-21.2				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORLESS, ORANGE FLAKES, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	16.9	308.7	0.21	6.39	-21.8				
2	17.1	309.5	0.23	6.39	-22.4				
3	16.9	309.1	0.21	6.39	-23.1				
4	16.9	309.1	0.20	6.39	-23.6				
Average:	17.0	309.1	0.21	6.39	-22.7	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:

Signature: BXM Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 7 /2019@ 1500
Sample Number: RGW209S- 190507 | Weather: SUNNY, WARM
Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 4.08 Time: 1434 Flow through cell vol. GW Meter No.(s 1-HERON
Begin Purge: Date/Time: 05/ 7 /2019 @ 1436 End Purge: Date/Time: 05/ 7 /2019 @ 1455 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1439	19.7	393.6	0.27	6.30	17.8		4.06		
1442	20.1	397.3	0.30	6.33	2.0		4.08		
1445	20.2	400.5	0.23	6.38	-17.3		4.08		
1448	20.4	404.0	0.19	6.40	-27.9				
1451	20.5	405.7	0.19	6.40	-31.8				
1454	20.5	407.9	0.20	6.40	-37.3				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORLESS, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	20.5	407.9	0.18	6.40	-38.0				
2	20.5	408.6	0.19	6.40	-38.2				
3	20.5	408.6	0.20	6.40	-38.6				
4	20.5	408.4	0.19	6.40	-38.9				
Average:	20.5	408.4	0.19	6.40	-38.4	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:

Signature: BXM Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 7 /2019@ 1335
Sample Number: RGW210S- 190507 | Weather: CLEAR 70S
Landau Representative: RJC

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 3.61 Time: 1312 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 7 /2019 1312 End Purge: Date/Time: 05/ 7 /2019 @ 1332 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1312	21.0	317.0	0.19	6.27	39.5				
1315	19.3	290.2	0.22	6.27	35.7		3.9		SLOWED DISCHARGE
1318	17.3	289.7	0.19	5.93	42.8		3.9		
1321	18.4	305.0	0.17	6.14	19.4				
1325	18.3	309.7	0.17	6.19	5.9				
1328	17.0	306.0	0.18	6.23	-2.1				
1331	17.4	306.6	0.17	6.07	6.7				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLAD
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): TURBID YELLOW CLEAR NO ODOR NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	17.6	320.5	0.16	6.00	9.7				
2	19.8	323.7	0.16	6.12	0.8				
3	19.7	324.7	0.16	6.16	-3.9				
4	19.5	322.0	0.16	6.23	-3.7				
Average:	19.2	322.7	0.16	6.13	0.7	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:
Signature: RJC Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 7 /2019@ 1310
Sample Number: RGW237S- 190507 | Weather: SUNNY, WARM
Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 3.57 Time: 1246 Flow through cell vol. GW Meter No.(s 1-HERON
Begin Purge: Date/Time: 05/ 7/2019 @ 1249 End Purge: Date/Time: 05/ 7 /2019 @ 1308 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1252	16.2	277.9	1.11	6.34	21.1		3.57		
1255	16.0	303.9	0.50	6.48	5.2		3.57		
1258	16.0	304.7	0.48	6.50	-0.8		3.57		
1301	16.0	308.8	0.33	6.54	-14.0				
1304	15.9	311.0	0.28	6.55	-19.9				
1307	16.0	312.7	0.24	6.55	-26.9				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLOUDY, YELLOW WITH YELLOW/ORANGE SOLIDS, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	16.0	312.5	0.24	6.55	-27.7				
2	16.0	312.4	0.24	6.55	-28.1				
3	16.0	312.6	0.24	6.55	-28.5				
4	16.0	312.4	0.23	6.55	-28.9				
Average:	16.0	312.5	0.24	6.55	-28.3	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:

Signature: BXM Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 7 /2019@ 1225
Sample Number: RGW238I- 190507 | Weather: SUNNY, WARM
Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 3.66 Time: 1159 Flow through cell vol. GW Meter No.(s 1-HERON
Begin Purge: Date/Time: 05/ 7 /2019 @ 1204 End Purge: Date/Time: 05/ 7 /2019 @ 1223 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1207	16.7	367.1	0.54	6.08	30.8		3.66		
1210	17.0	434.4	0.36	6.16	20.2		3.66		
1213	16.5	427.5	0.40	6.23	7.8		3.66		
1216	16.3	418.4	0.30	6.26	-5.9				
1219	16.3	416.9	0.30	6.23	-13.6				
1222	16.3	419.1	0.26	6.25	-25.1				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, YELLOW TINY, BLACK AND YELLOW SOLIDS, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	16.3	422.2	0.24	6.26	-27.4				
2	16.3	422.3	0.24	6.27	-29.8				
3	16.4	425.3	0.23	6.27	-31.1				
4	16.4	427.5	0.24	6.28	-32.7				
Average:	16.4	424.3	0.24	6.27	-30.3	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:

Signature: BXM Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton
Project Number: 0025217.099.099
Event: May-19
Date/Time: 05/ 7 /2019@ 1110
Sample Number: RGW239I- 190507
Weather: SUNNY, WARM
Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 4.42 Time: 1044 Flow through cell vol. GW Meter No.(s 1-HERON
Begin Purge: Date/Time: 05/ 7 /2019 @ 1045 End Purge: Date/Time: 05/ 7 /2019 @ 1105 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1048	17.8	297.6	0.26	6.29	11.4		4.43		
1051	17.8	310.2	0.23	6.31	5.2		4.42		
1054	17.8	322.0	0.21	6.35	-11.4		4.44		
1057	17.9	327.2	0.21	6.37	-26.2		4.42		
1100	17.9	328.4	0.21	6.38	-33.0				
1103	17.8	328.4	0.23	6.38	-35.6				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORLESS, NO SHEEN, SMALL DARK SOLIDS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	17.9	328.3	0.23	6.38	-36.3				
2	17.8	328.5	0.22	6.38	-37.1				
3	17.8	328.4	0.21	6.39	-37.7				
4	17.9	328.5	0.24	6.39	-38.2				
Average:	17.9	328.4	0.23	6.39	-37.3	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments: MSMSD Location

Signature: BXM Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 7 /2019@ 1035
Sample Number: RGW240D- 190507 | Weather: SUNNY, WARM
Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 5.07 Time: 1005 Flow through cell vol. GW Meter No.(s 1-HERON
Begin Purge: Date/Time: 05/ 7 /2019 @ 1009 End Purge: Date/Time: 05/ 7 /2019 @ 1032 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1012	17.9	393.1	0.36	6.38	11.6		5.07		
1015	17.8	395.6	0.24	6.43	-16.0		5.13		
1018	17.8	391.1	0.22	6.43	-26.5		5.13		
1021	17.8	389.2	0.24	6.44	-35.7				
1024	17.8	388.5	0.22	6.45	-45.8				
1027	17.9	389.1	0.21	6.46	-49.1				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORLESS, NO SHEEN, SMALL BLACK SOLIDS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	18.0	389.5	0.21	6.46	-49.9				
2	18.0	389.5	0.21	6.46	-50.3				
3	18.0	389.5	0.21	6.46	-50.8				
4	18.0	390.0	0.22	6.46	-51.3				
Average:	18.0	389.6	0.21	6.46	-50.6	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:

Signature: BXM Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 7 /2019@ 845
Sample Number: RGW-241S-190507 | Weather: SUNNNY, WARM
Landau Representative: BX0

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 5./5 Time: 819 Flow through cell vol. GW Meter No.(s 1-SLOPE
Begin Purge: Date/Time: 05/ 7 /2019 @ 824 End Purge: Date/Time: 05/ 7/2019 @ 843 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
827	16.8	338.6	0.63	6.27	55.2		5.04		
830	17.3	341.6	0.56	6.15	37.0		5.04		
833	17.8	340.1	0.68	6.20	5.1				
836	18.0	337.0	0.58	6.24	-9.3				
839	18.0	335.7	0.51	6.28	-21.2				
842	18.1	331.0	0.47	6.30	-28.5				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORLESS, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	18.0	331.8	0.47	6.31	-29.1				
2	18.0	332.2	0.46	6.31	-29.7				
3	18.1	332.4	0.46	6.31	-30.5				
4	18.0	331.1	0.46	6.31	-31.0				
Average:	18.0	331.9	0.46	6.31	-30.1	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:

Signature: BXM Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 7 /2019@ 930
Sample Number: RGW-242I- 190507 | Weather: SUNNY, WARM
Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 5.18 Time: 903 Flow through cell vol. GW Meter No.(s 1-HERON
Begin Purge: Date/Time: 05/ 7 /2019 @ 907 End Purge: Date/Time: 05/ 7 /2019 @ 926 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
910	16.4	304.7	0.40	6.19	24.2		5.19		
913	16.4	309.5	0.35	6.23	15.8		5.19		
916	17.0	314.2	0.36	6.27	2.9		5.18		
919	17.9	320.9	0.34	6.30	-7.9				
922	18.4	325.7	0.36	6.31	-16.2				
925	18.7	328.8	0.35	6.32	-22.8				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORLESS, NO SHEEN, SOME ORANGE SOLIDS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	18.7	329.0	0.35	6.32	-23.5				
2	18.7	329.2	0.35	6.33	-24.0				
3	18.8	329.6	0.34	6.33	-24.7				
4	18.8	329.8	0.34	6.33	-25.4				
Average:	18.8	329.4	0.35	6.33	-24.4	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:

Signature: BXM Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 8 /2019@ 945
Sample Number: RGW-243I- 190508 | Weather: OVERCAST, COOL
Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 4.2 Time: 917 Flow through cell vol. GW Meter No.(s 1-HERON
Begin Purge: Date/Time: 05/ 8 /2019 @ 922 End Purge: Date/Time: 05/ 8/2019 @ 942 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
925	16.6	356.4	0.35	6.21	51.2		4.2		
928	16.5	367.4	0.44	6.21	33.0		4.2		
931	16.5	375.4	0.40	6.19	14.8				
934	16.5	377.0	0.39	6.19	-0.4				
937	16.6	378.4	0.35	6.21	-12.9				
940	16.6	378.9	0.35	6.22	-16.5				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORLESS, NO SHEEN, SOME DARK SMALL SOLIDS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	16.6	379.3	0.35	6.22	-17.2				
2	16.7	379.4	0.35	6.22	-18.1				
3	16.7	379.4	0.34	6.23	-18.7				
4	16.7	379.9	0.35	6.23	-19.3				
Average:	16.7	379.5	0.35	6.23	-18.3	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:

Signature: BXM Date: 5/8/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: May-19 | Date/Time: 05/ 7 /2019@ 900

Sample Number: DUP3- 190507 | Weather: CLEAR

Landau Representative: RJC

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) | Damaged (NO) | Describe: Flush Mount

DTW Before Purging (ft) | Time: | Flow through cell vol. | GW Meter No.(s HERON3

Begin Purge: Date/Time: 05/ 07 /2019 @ | End Purge: Date/Time: 05/ 07 /2019 @ | Gallons Purged: 0.25

Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits								**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		

DUPLICATE TO RGW224S

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ☐ Pump/Pump Type DED BLADDER

Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ☐ Dedicated

Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ☐ Dedicated

(By Numerical Order) ☐ Other

Sample Description (color, turbidity, odor, sheen, etc.): CLEAR COLORLESS NO ODOR NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	19.6	200.2	0.40	6.05	15.5				
2	19.7	200.2	0.40	6.05	15.0				
3	19.7	200.3	0.41	6.04	14.8				
4	19.8	200.4	0.41	6.04	14.6				
Average:	19.7	200.3	0.41	6.05	15.0	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
2	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s): Duplicate to RGW224S

Comments:

Signature: RJC | Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: May-19 | Date/Time: 05/ 6 /2019@ 1409

Sample Number: RGW183S- 190506 | Weather: CELAR

Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount

DTW Before Purging (ft) 8.78 Time: 1338 Flow through cell vol. GW Meter No.(s HERON3

Begin Purge: Date/Time: 05/ 06 /201 1339 End Purge: Date/Time: 05/ 06 /2019 @ 1352 Gallons Purged: 0.25

Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1342	14.7	151.7	1.09	6.04	66.2	LOW	8.78		
1345	18.0	150.4	0.34	6.20	26.2		8.78		
1348	18.1	150.4	0.34	6.19	26.0		8.78		
1351	18.2	149.2	0.32	6.18	24.1				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER

Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated

Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated

(By Numerical Order) ☐ Other

Sample Description (color, turbidity, odor, sheen, etc.): CLEAR COLORLESS NO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	18.2	149.2	0.32	6.19	23.6				
2	18.2	149.3	0.32	6.20	22.9				
3	18.2	149.1	0.31	6.19	23.4				
4	18.1	149.0	0.32	6.20	22.4				
Average:	18.2	149.2	0.32	6.20	23.1	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)	
	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐ OR ☐
2	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐ OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)	
	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)	
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)	
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)	
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica	
	VOC (Boeing short list)	
	Methane Ethane Ethene Acetylene	
	others	

Duplicate Sample No(s):

Comments:

Signature: SRB Date: 5/6/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 6 /2019@1420
Sample Number: RGW184S- 190506 | Weather: SUNNY, WARM
Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 9.34 Time: 1352 Flow through cell vol. GW Meter No.(s 1-HERON
Begin Purge: Date/Time: 05/ 6 /2019 @ 1356 End Purge: Date/Time: 05/6 /2019 @ 1416 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1359	19.1	158.0	2.57	6.14	33.4		9.35		
1402	19.3	153.3	1.91	6.14	25.8		9.34		
1405	19.1	150.3	1.36	6.16	17.3		9.34		
1408	19.0	148.6	1.22	6.17	14.2				
1411	18.8	146.3	1.17	6.18	12.3				
1414	18.9	146.2	1.17	6.18	11.7				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORLESS, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	19.0	146.3	1.10	6.19	11.8				
2	19.0	146.4	1.06	6.19	11.7				
3	19.0	146.3	1.16	6.19	11.5				
4	19.0	146.3	1.11	6.19	11.6				
Average:	19.0	146.3	1.11	6.19	11.7	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
2	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:
Signature: BXM Date: 5/6/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 7 /2019@ 940
Sample Number: RGW211S- 190507 | Weather: CLEAR
Landau Representative: RJC

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 8.89 Time: 906 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 07 /201 906 End Purge: Date/Time: 05/ 07 /2019 @ 927 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
910	13.9	201.7	0.45	5.94	31.9				
913	13.8	196.2	0.46	5.88	28.3		9.1		
916	13.9	185.7	0.46	5.89	22.8		8.95		
919	14.1	196.7	0.46	5.99	13.6				
922	14.1	197.3	0.47	6.04	8.2				
925	14.2	196.7	0.47	6.03	6.4				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): TURBID DARK BROWN COLOR NO ODOR NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	14.2	196.7	0.45	6.02	6.4				
2	14.2	196.7	0.46	6.03	5.9				
3	14.2	196.7	0.45	6.02	5.9				
4	14.2	196.6	0.45	6.03	5.5				
Average:	14.2	196.7	0.45	6.03	5.9	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX) WA ☐ OR ☐
2	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease) WA ☐ OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)
	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
	others

Duplicate Sample No(s):
Comments:

Signature: RJC Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: May-19 | Date/Time: 05/ 7 /2019@ 1011

Sample Number: RGW212S- 190507 | Weather: CLEAR

Landau Representative: RJC

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount

DTW Before Purging (ft) 10.38 Time: Flow through cell vol. GW Meter No.(s HERON3

Begin Purge: Date/Time: 05/ 07 /201 941 End Purge: Date/Time: 05/ 07 /2019 @ 1002 Gallons Purged: 0.25

Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
942	14.0	224.5	0.50	5.34	68.1				
945	14.3	231.4	0.50	5.40	65.0		10.71		
948	15.9	238.3	0.51	5.53	56.7		10.58		
951	17.1	248.0	0.58	5.67	50.8				
954	17.5	251.6	0.64	5.66	51.6				
957	17.7	253.7	0.70	5.67	52.0				
1000	17.9	255.7	0.78	5.66	52.9				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER

Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated

Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated

(By Numerical Order) ☐ Other

Sample Description (color, turbidity, odor, sheen, etc.): CLEAR COLORLESS NO ODOR NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	17.9	256.0	0.81	5.66	53.3				
2	18.0	256.4	0.84	5.66	53.3				
3	18.0	256.7	0.85	5.66	53.6				
4	18.0	257.3	0.86	5.66	53.6				
Average:	18.0	256.6	0.84	5.66	53.5	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX) WA ☐ OR ☐
2	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease) WA ☐ OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)
	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
	others

Duplicate Sample No(s):

Comments:

Signature: RJC Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 6 /2019@ 1325
Sample Number: RGW221S- 190506 | Weather: SUNNY, WARM
Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 10.06 Time: 1258 Flow through cell vol. GW Meter No.(s 1-HERON
Begin Purge: Date/Time: 05/ 6 /2019 @ 1301 End Purge: Date/Time: 05/ 6 /2019 @ 1321 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1304	19.3	217.9	1.88	5.94	49.2		10.07		
1307	20.5	248.4	1.55	6.00	45.4		10.06		
1310	21.8	268.2	1.17	6.03	31.6		10.06		
1313	21.5	260.1	0.93	6.04	26.8				
1316	20.7	247.2	0.60	6.03	20.7				
1319	20.6	243.2	0.50	6.02	17.7				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORELESS, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	20.6	242.2	0.50	6.02	16.9				
2	20.5	242.2	0.48	6.62	16.7				
3	20.5	242.0	0.46	6.02	16.6				
4	20.5	240.9	0.48	6.02	16.1				
Average:	20.5	241.8	0.48	6.17	16.6	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
2	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:
Signature: BXM Date: 5/6/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 7 /2019@ 1221
Sample Number: RGW224S- 190507 | Weather: CLEAR
Landau Representative: RJC

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 10.49 Time: 1145 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 07 /2019 @ 1151 End Purge: Date/Time: 05/ 07 /2019 @ 1208 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1151	14.5	182.5	0.48	5.68	65.1				
1154	16.7	189.2	0.40	5.67	59.2		10.6		SLOWED PUMP
1157	18.1	193.9	0.42	5.91	36.6		10.53		
1200	19.3	198.5	0.40	6.05	21.5		10.5		
1203	19.4	199.1	0.40	6.05	20.5				
1206	19.6	200.0	0.40	6.06	16.9				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR COLORLESS NO ODOR NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	19.6	200.1	0.40	6.05	16.1				
2	19.7	200.1	0.40	6.04	15.7				
3	19.7	200.2	0.41	6.04	15.0				
4	19.7	200.3	0.41	6.04	15.0				
Average:	19.7	200.2	0.41	6.04	15.5	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
2	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s): Duplicate Location (DUP3)
Comments:

Signature: RJC Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 7 /2019@ 1152
Sample Number: RGW255S- 190507 | Weather: CLEAR
Landau Representative: RJC

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 10.02 Time: 1122 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 07 /201 1122 End Purge: Date/Time: 05/ 07 /2019 @ 1142 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1122	13.7	187.2	0.43	5.82	72.1				
1125	14.8	192.7	0.37	5.79	71.6		10.15		REDUCED DISCHARGE RATE
1128	15.3	194.5	0.35	5.96	54.4		10.1		
1131	17.1	204.6	0.34	6.13	36.8				
1134	17.4	207.0	0.33	6.14	35.2				
1137	18.1	215.0	0.35	6.21	25.0				
1140	18.3	217.8	0.35	6.23	23.3				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR COLORLESS NO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	18.3	218.4	0.34	6.23	22.9				
2	18.4	220.6	0.34	6.22	22.6				
3	18.5	220.1	0.34	6.23	22.2				
4	18.5	219.9	0.34	6.23	21.7				
Average:	18.4	219.8	0.34	6.23	22.4	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)	
	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐ OR ☐
2	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐ OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)	
	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)	
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)	
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)	
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica	
	VOC (Boeing short list)	
	Methane Ethane Ethene Acetylene	
	others	

Duplicate Sample No(s):
Comments:
Signature: RJC Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 7 /2019@ 1052
Sample Number: RGW256S- 190507 | Weather: CLEAR
Landau Representative: RJC

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 8.6 Time: 1022 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 07 /201 1022 End Purge: Date/Time: 05/ 07 /2019 @ 1042 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1022	14.1	138.6	0.56	5.57	85.4				
1025	14.1	136.1	0.54	5.65	79.2		8.89		
1028	14.7	137.2	0.50	5.76	69.4		8.98		REDUCED
1031	16.3	142.3	0.49	6.02	47.4		8.95		DISCHARGE
1034	17.2	145.7	0.49	6.09	40.0				
1037	17.9	148.2	0.48	6.15	35.3				
1040	18.2	149.5	0.47	6.17	32.2				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR COLORLESS NO ODOR NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	18.3	149.9	0.47	6.18	31.3				
2	18.4	150.4	0.47	6.19	31.0				
3	18.4	150.5	0.47	6.19	30.9				
4	18.5	150.9	0.47	6.20	30.8				
Average:	18.4	150.4	0.47	6.19	31.0	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)	
	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐ OR ☐
2	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐ OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)	
	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)	
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)	
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)	
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica	
	VOC (Boeing short list)	
	Methane Ethane Ethene Acetylene	
	others	

Duplicate Sample No(s):
Comments:
Signature: RJC Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 7 /2019@ 1125
Sample Number: RGW257S- 190507 | Weather: CLEAR
Landau Representative: RJC

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 9.49 Time: 1055 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 07 /201 1054 End Purge: Date/Time: 05/ 07 /2019 @ 1056 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1055	13.6	142.2	0.70	5.69	85.8				
1058	14.3	142.2	0.62	5.63	87.7		9.49		
1101	14.6	142.7	0.60	5.68	83.4		9.49		
1104	14.6	142.0	0.56	5.73	77.7				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR COLORLESS NO ODOR NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	14.6	141.7	0.57	5.74	77.4				
2	14.6	141.6	0.57	5.76	75.9				
3	14.6	141.7	0.57	5.75	75.6				
4	14.6	141.4	0.56	5.79	75.8				
Average:	14.6	141.6	0.57	5.76	76.2				

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX) WA ☐ OR ☐
2	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease) WA ☐ OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)
	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
	others

Duplicate Sample No(s):
Comments:
Signature: RJC Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 6 /2019@ 1329
Sample Number: RGW258S- 190506 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 7.91 Time: 1258 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 06 /201 1259 End Purge: Date/Time: 05/ 06 /2019 @ 1312 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1302	15.2	297.7	0.77	5.60	7.4	LOW	7.91		
1305	17.4	370.3	0.40	6.10	3.7		7.91		
1308	17.4	369.8	0.39	6.10	2.3		7.91		
1311	17.3	366.4	0.37	6.11	-2.7				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR COLORLESS NO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	17.3	365.3	0.37	6.11	-3.6				
2	17.4	364.6	0.37	6.11	-3.8				
3	17.4	364.4	0.36	6.10	-3.6				
4	17.4	363.0	0.37	6.10	-3.9				
Average:	17.4	364.3	0.37	6.11	-3.7	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX) WA ☐ OR ☐
2	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease) WA ☐ OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)
	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
	others

Duplicate Sample No(s):
Comments: MSMSD Location

Signature: SRB Date: 5/6/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 8 /2019@ 1125
Sample Number: RGW197S- 190508 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 0.7 Time: 1045 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 8 /2019 1055 End Purge: Date/Time: 05/ 8 /2019 @ 1118 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1058	16.1	858	0.54	6.23	7.9	LOW	0.7		
1101	16.4	881	0.50	6.31	-6.0		0.7		
1104	17.2	891	0.48	6.39	-19.5		0.7		
1107	7.8	911	0.48	6.62	-52.9				
1110	18.1	924	0.47	6.72	-73.3				
1113	18.2	924	0.47	6.77	-84.5				
1116	18.3	923	0.47	6.81	-95.4				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLAD
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): SLIGHTLY GRAY WITH MINOR PARTICULATES NO SLIGHT PETROLEUM LIKE SHEEN VISI

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	18.3	923	0.47	6.82	-96.8				
2	18.3	923	0.47	6.83	-98.1				
3	18.3	922	0.47	6.83	-99.9				
4	18.3	922	0.47	6.84	-101.2				
Average:	18.3	923	0.47	6.83	-99.0	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:
Signature: SRB Date: 5.8.19

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 8 /2019@ 1000
Sample Number: RGWDUP4 190508 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) Time: Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 8 /2019 @ End Purge: Date/Time: 05/ 8 /2019 @ Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits								**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		

DUPLICATE TO RGW185S

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ☐ Pump/Pump Type DED BLAD
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ☐ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ☐ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): SLIGHTLY YELLOW CLEAR NO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	19.4	799	0.61	6.40	-59.8				
2	19.5	804	0.61	6.40	-61.2				
3	19.5	805	0.62	6.40	-62.5				
4	19.5	810	0.63	6.39	-63.6				
Average:	19.5	805	0.62	6.40	-61.8	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s): Duplicate to RGW185S
Comments:

Signature: SRB Date: 5.8.19

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 8 /2019@ 1050
Sample Number: RGW185S- 190508 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 0.91 Time: 1016 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 8 /2019 1020 End Purge: Date/Time: 05/ 8 /2019 @ 1340 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1023	15.5	654	0.57	6.05	60.2	MED	0.91		
1026	18.0	725	0.52	6.31	-1.1		0.91		
1029	17.9	729	0.52	6.33	-5.2		0.91		
1032	19.1	782	0.56	6.40	-45.3				
1035	19.3	784	0.56	6.40	-46.8				
1038	19.4	795	0.60	6.40	-57.9				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLAD
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): SLIGHTLY YELLOW CLEAR NO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	19.4	798	0.60	6.40	-58.7				
2	19.4	799	0.62	6.40	-60.6				
3	19.5	805	0.61	6.40	-61.8				
4	19.5	810	0.62	6.40	-63.2				
Average:	19.5	803	0.61	6.40	-61.1	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s): Duplicate Location (DUP4)
Comments:

Signature: SRB Date: 5.8.19

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton
Project Number: 0025217.099.099
Event: May-19
Date/Time: 05/ 8 /2019@ 1350
Sample Number: RGW194S- 190508
Weather: SUNNY, WARM
Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 1.73 Time: 1324 Flow through cell vol. GW Meter No.(s 1-HERON
Begin Purge: Date/Time: 05/ 8 /2019 @ 1326 End Purge: Date/Time: 05/ 8 /2019 @ 1346 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1329	15.7	679	0.14	6.14	28.3		1.59		
1332	16.4	751	0.14	6.18	14.2		1.54		
1335	17.3	776	0.15	6.21	-6.6		1.5		
1338	18.7	815	0.17	6.22	-16.9		1.5		
1341	19.9	841	0.24	6.24	-35.5		1.5		
1344	20.7	853	0.30	6.24	-42.3				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORLESS, WITH ORANGE SOLID FLAKES, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	20.7	854	0.31	6.24	-43.2				
2	20.7	855	0.31	6.24	-43.7				
3	20.8	856	0.31	6.24	-44.4				
4	20.8	857	0.32	6.24	-45.2				
Average:	20.8	856	0.31	6.24	-44.1	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:

Signature: BXM Date: 5/8/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 8 /2019@ 1220
Sample Number: RGW195S- 190508 | Weather: SUNNY, WARM
Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 1.07 Time: 1153 Flow through cell vol. GW Meter No.(s 1-HERON
Begin Purge: Date/Time: 05/ 8 /2019 @ 1157 End Purge: Date/Time: 05/ 8 /2019 @ 1217 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1200	17.0	625	0.33	6.12	41.0		1.08		
1203	16.8	700	0.22	6.19	29.1		1.08		
1206	16.9	725	0.19	6.27	-8.9		1.09		
1209	16.8	709	0.21	6.30	-25.0		1.08		
1212	16.9	710	0.20	6.31	-32.4				
1215	16.7	684	0.21	6.33	-46.1				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORLESS, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	16.7	677	0.22	6.33	-46.9				
2	16.7	677	0.22	6.33	-47.6				
3	16.7	678	0.22	6.33	-48.1				
4	16.7	671	0.22	6.34	-48.8				
Average:	16.7	676	0.22	6.33	-47.9	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:

Signature: BXM Date: 5/8/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 8 /2019@ 1305
Sample Number: RGW196D- 190508 | Weather: SUNNY, WARM
Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 1.13 Time: 1231 Flow through cell vol. GW Meter No.(s 1- HERON
Begin Purge: Date/Time: 05/ 8/2019 @ 1243 End Purge: Date/Time: 05/ 8 /2019 @ 1302 Gallons Purged: < 1
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1246	17.1	393.6	0.16	6.21	18.7		1.14		
1249	17.0	396.7	0.13	6.22	12.4		1.14		
1252	16.9	398.4	0.14	6.27	0.9		1.15		
1255	17.0	399.2	0.13	6.30	-7.7				
1258	17.4	402.2	0.14	6.32	-17.8				
1301	18.2	406.2	0.15	6.33	-22.9				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORLESS, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	18.2	407.4	0.18	6.33	-23.0				
2	18.2	408.3	0.18	6.34	-24.6				
3	19.0	409.8	0.17	6.34	-25.7				
4	18.0	411.5	0.17	6.34	-26.6				
Average:	18.4	409.3	0.18	6.34	-25.0	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:

Signature: BXM Date: 5/8/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 8 /2019@ 1155
Sample Number: RGW245S- 190508 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 0.8 Time: 1115 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 8 /2019 1125 End Purge: Date/Time: 05/ 8 /2019 @ 1143 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1128	15.7	614	0.66	6.77	-29.9	LOW	0.8		
1131	15.6	643	0.50	6.39	-22.0		0.8		
1134	17.4	693	0.45	6.65	-60.0		0.8		
1137	17.7	711	0.45	6.71	-71.3				
1140	17.8	711	0.44	6.72	-72.4				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLAD
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): SLIGHTLY GRAY WITH PARTICULATES NO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	17.8	715	0.45	6.72	-74.0				
2	17.9	715	0.45	6.73	-75.3				
3	17.9	716	0.45	6.73	-76.2				
4	18.0	719	0.44	6.73	-77.7				
Average:	17.9	716	0.45	6.73	-75.8	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
5	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments: SHEEN IN PURGE BUCKET
Signature: SRB Date: 5.8.19

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 8 /2019@ 1255
Sample Number: RGW247S- 190508 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 3.49 Time: 1222 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 8 /2019 1225 End Purge: Date/Time: 05/ 8 /2019 @ 1246 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1228	18.3	455.3	0.78	6.97	17.8	LOW	3.67		
1231	18.7	430.2	0.39	6.18	27.4		3.61		
1234	18.7	432.0	0.38	6.23	21.2		3.61		
1237	19.5	444.0	0.37	6.35	-4.5				
1240	19.5	446.7	0.38	6.39	-19.5				
1243	19.6	448.3	0.38	6.39	-31.3				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLAD
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): SLIGHTLY YELLOW WITH MINOR PARTICULATES NO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	19.6	448.4	0.38	6.39	-32.8				
2	19.7	448.8	0.38	6.39	-34.0				
3	19.6	448.9	0.38	6.39	-34.8				
4	19.7	448.9	0.38	6.39	-35.8				
Average:	19.7	448.8	0.38	6.39	-34.4	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
3	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:

Signature: SRB Date: 5.8.19

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 8 /2019@ 1320
Sample Number: RGW248I- 190508 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 3.41 Time: 1240 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 8 /2019 1250 End Purge: Date/Time: 05/ 8 /2019 @ 1306 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1253	18.7	503	0.48	6.31	-45.7	LOW	3.29		
1256	20.2	515	0.45	6.28	-59.0		3.29		
1259	21.8	535	0.43	6.34	-67.0		3.29		
1302	21.9	540	0.43	6.34	-68.8				
1305	22.0	544	0.45	6.34	-70.9				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLAD
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): SLIGHTLY GRAY AND TURBID NNO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	22.0	543	0.45	6.34	-71.3				
2	22.0	544	0.45	6.34	-71.4				
3	22.0	545	0.45	6.34	-71.6				
4	22.0	545	0.45	6.34	-71.8				
Average:	22.0	544	0.45	6.34	-71.5	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
3	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:

Signature: SRB Date: 5.8.19

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 8 /2019@ 925
Sample Number: 10-71-MW1190508 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 8.29 Time: 845 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 8 /2019 855 End Purge: Date/Time: 05/ 8 /2019 @ 918 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
858	14.1	142.2	2.27	5.72	76.8	LOW	8.31		
901	13.9	167.8	1.52	5.63	76.6		8.31		
904	13.9	182.8	1.18	5.71	69.2		8.31		
907	13.9	185.9	1.05	5.78	60.3				
910	14.0	186.5	1.03	5.79	59.6				
913	14.0	187.1	0.95	5.83	51.8				
916	14.1	187.4	0.91	5.85	48.7				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLAD
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR COLORLESS NO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	14.1	187.3	0.90	5.85	48.0				
2	14.2	187.4	0.89	5.85	47.0				
3	14.2	187.6	0.88	5.85	47.2				
4	14.2	187.8	0.86	5.86	45.7				
Average:	14.2	187.5	0.88	5.85	47.0	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
3	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:

Signature: SRB Date: 5.8.19

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: May-19 | Date/Time: 05/ 8 /2019@ 855

Sample Number: 10-71-MW2190508 | Weather: CLEAR

Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount

DTW Before Purging (ft) 8.61 Time: 824 Flow through cell vol. GW Meter No.(s HERON3

Begin Purge: Date/Time: 05/ 8 /2019 825 End Purge: Date/Time: 05/ 8 /2019 @ 848 Gallons Purged: 0.25

Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
828	14.0	150.2	7.40	5.30	114.9	LOW	8.61		
831	14.0	180.0	4.66	5.32	113.5		8.61		
834	14.0	185.3	4.20	5.37	110.0		8.61		
837	13.9	191.2	3.58	5.44	105.3				
840	13.9	195.2	2.85	5.51	99.7				
843	14.0	198.1	2.21	5.59	91.5				
846	13.9	198.8	1.75	5.63	84.0				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLAD

Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated

Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated

(By Numerical Order) ☐ Other

Sample Description (color, turbidity, odor, sheen, etc.): SLIGHTLY YELLOW, CLEAR NONS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	13.9	198.9	1.71	5.63	83.0				
2	13.9	198.8	1.67	5.64	82.0				
3	13.9	198.9	1.62	5.64	81.3				
4	13.9	199.0	1.60	5.65	80.4				
Average:	13.9	198.9	1.65	5.64	81.7	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
3	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):

Comments:

Signature: SRB Date: 5.8.19

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: May-19 | Date/Time: 05/ 8 /2019@ 955

Sample Number: 10-71-MW4 190508 | Weather: CLEAR

Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount

DTW Before Purging (ft) 8.38 Time: 910 Flow through cell vol. GW Meter No.(s HERON3

Begin Purge: Date/Time: 05/ 8 /2019 925 End Purge: Date/Time: 05/ 8 /2019 @ 949 Gallons Purged: 0.25

Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
928	15.1	198.8	2.51	6.13	44.6	LOW	8.38		
931	14.9	216.3	2.28	6.11	41.7		8.38		
934	15.1	307.4	1.82	5.98	50.4		8.38		
937	15.2	334.8	1.50	6.09	45.1				
940	15.3	331.0	1.39	6.14	40.7				
943	15.3	325.6	1.21	6.15	38.2				
946	15.3	320.9	1.14	6.17	35.1				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLAD

Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated

Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated

(By Numerical Order) ☐ Other

Sample Description (color, turbidity, odor, sheen, etc.): SLIGHTLY YELLOW CLEAR NO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	15.3	318.8	1.12	6.17	35.0				
2	15.3	317.9	1.10	6.17	34.3				
3	15.3	317.3	1.09	6.18	33.7				
4	15.3	315.8	1.08	6.16	34.2				
Average:	15.3	317.5	1.10	6.17	34.3	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
3	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):

Comments:

Signature: SRB Date: 5.8.19

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 7 /2019@ 800
Sample Number: RGW262S- 190507 | Weather: CLEAR
Landau Representative: RJC

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) Time: Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 07 /2019 @ End Purge: Date/Time: 05/ 07 /2019 @ Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits								**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		

Duplicate to RGW262S

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ☐ Pump/Pump Type PERI
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ☐ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ☐ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR YELLOW TINT NO ODOR NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	13.8	457.0	1.27	5.95	-47.4				
2	13.6	456.8	1.23	5.90	-45.8				
3	13.7	454.7	1.20	5.90	-47.2				
4	13.7	454.2	1.15	5.88	-47.2				
Average:	13.7	455.7	1.21	5.91	-46.9	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
3	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX) WA ☐ OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease) WA ☐ OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
	others

Duplicate Sample No(s): Duplicate to RGW262S
Comments:

Signature: RJC Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 7 /2019@ 815
Sample Number: RGW262S- 190507 | Weather: CLEAR
Landau Representative: RJC

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 4.9 Time: 743 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 07 /201 745 End Purge: Date/Time: 05/ 07 /2019 @ 804 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
747	13.7	452.5	1.40	5.56	38.2		6		SLOWED PUMP
750	13.8	456.6	1.24	5.63	12.7				
753	14.0	458.0	1.16	5.69	-6.6				
756	14.0	461.4	1.27	5.82	-25.2		6.4		
759	14.3	461.1	1.31	5.88	-36.6		6.71		
802	14.1	459.2	1.28	5.90	-44.2				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type PERI
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): SLIGHT YELLOW TINT, CLEAR, EFFERVESCENT SAMPLE, NO ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	14.5	459.8	1.25	5.91	-45.6				
2	13.8	458.0	1.25	5.92	-46.0				
3	13.9	456.6	1.20	5.90	-45.7				
4	13.7	454.4	1.19	5.88	-46.5				
Average:	14.0	457.2	1.22	5.90	-46.0	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
3	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX) WA ☐ OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease) WA ☐ OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
	others

Duplicate Sample No(s): Duplicate Location (DUP5)
Comments:

Signature: RJC Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: May-19 | Date/Time: 05/ 7 /2019@

Sample Number: RGW263S- 190507 | Weather: CLEAR

Landau Representative: RJC

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) | Damaged (NO) | Describe: Flush Mount

DTW Before Purging (ft) 6.36 | Time: 800 | Flow through cell vol. | GW Meter No.(s HERON3

Begin Purge: Date/Time: 05/ 07 /2019 @ | End Purge: Date/Time: 05/ 07 /2019 @ | Gallons Purged:

Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
	Purge Goals: Stablization of Parameters for three consecutive readings within the following limits							>/= 1 flow through cell	
	+/- 3%	+/- 3%	+/- 10%	+/- 0.1 units	+/- 10 mV	+/- 10%	< 0.3 ft		

WATER LEVEL ONLY

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ☐ Pump/Pump Type

Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ☐ Dedicated

Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ☐ Dedicated

(By Numerical Order) ☐ Other

Sample Description (color, turbidity, odor, sheen, etc.):

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1									
2									
3									
4									
Average:	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):

Comments:

Signature: RJC | Date: 5/7/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: May-19 | Date/Time: 05/ 7 /2019@ 855
Sample Number: RGW264S- 190507 | Weather: CLEAR
Landau Representative: RJC

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 6.08 Time: 808 Flow through cell vol. GW Meter No.(s HERON3
Begin Purge: Date/Time: 05/ 07 /201 825 End Purge: Date/Time: 05/ 07 /2019 @ 839 Gallons Purged: 0.7
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
830	15.0	720	0.76	6.03	-8.1				
833	15.8	733	0.78	6.09	-23.2				
836	15.2	734	0.81	6.14	-34.2		6.08		
839	15.6	739	0.86	6.12	-40.2				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type PERI PUMP
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, SLIGHT YELLOW TINT, NO ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	15.6	740	0.87	6.14	-42.7				
2	15.6	741	0.89	6.14	-44.3				
3	15.6	741	0.9	6.15	-45.7				
4	15.5	740	0.89	6.15	-45.6				
Average:	15.6	741	0.9	6.1	-44.6	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
3	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
	(8270D) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease)	WA ☐	OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)		
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)		
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)		
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)		
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments: LARGE DRAWDOWN
Signature: SRB Date: 5/7/2019

Appendix C

Memo

To: John Long, Project Manager
From: Crystal Thimsen
Tel: (206) 342-1760
Fax: (206) 342-1761

Date: June 17, 2019

Project: 0088880100.2019
c: Project File

Subject: Summary Data Quality Review
May 2019 Boeing Renton Groundwater Sampling
SWMU-172/174
ARI Group Number: 19E0098

This memo presents the summary data quality review of 11 primary groundwater samples, one groundwater field duplicate, and one trip blank sample collected on May 6, 2019. The samples were submitted to Analytical Resources, Inc. (ARI), located in Tukwila, Washington, a laboratory accredited by the Washington State Department of Ecology (Ecology). The samples were analyzed for the following:

- Volatile organic compounds (VOCs) (cis-1,2-dichloroethene, tetrachloroethene, trichloroethene, and vinyl chloride) by U.S. Environmental Protection Agency (EPA) Method 8260C with selected ion monitoring (SIM);
- Total organic carbon (TOC) by Standard Method (SM) 5310B; and
- Total metals (arsenic, copper, and lead) by EPA Method 6020A.

The samples and the analyses conducted on the samples are listed below.

Sample ID	Laboratory Sample ID	Requested Analyses
RGWDUP1-190506	19E0098-01	all
RGW232S-190506	19E0098-02	all
RGW233I-190506	19E0098-03	all
RGW236S-190506	19E0098-04	all
RGW081S-190506	19E0098-05	all
RGW235I-190506	19E0098-06	all
RGW173S-190506	19E0098-07	all
RGW234S-190506	19E0098-08	all
RGW172S-190506	19E0098-09	all
RGW226S-190506	19E0098-10	all
RGW152S-190506	19E0098-11	all

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Sample ID	Laboratory Sample ID	Requested Analyses
RGW153S-190506	19E0098-12	all
Trip Blank	19E0098-13	VOCs

Data were reviewed in accordance with the appropriate method procedures and criteria documented in the Quality Assurance Project Plan (QAPP) (Amec Foster Wheeler, 2016). The control limits provided in the QAPP are advisory limits; therefore, the most current control limits provided by the laboratory were used to evaluate the quality control data. In cases where the laboratory did not track limits for an analyte, the limits in the QAPP were used.

Holding times, method/trip blanks, surrogate recoveries, laboratory control samples (LCS) and laboratory control sample duplicates (LCSD), matrix spike/matrix spike duplicates (MS/MSD), field duplicates, and reporting limits were reviewed where available to assess compliance with applicable methods. If qualification was required, data were qualified based on the definitions and use of qualifying flags outlined in the EPA guidance documents (EPA, 2014a and b).

ARI received the samples on May 7, 2019. The temperatures of the coolers were recorded upon receipt and were below the maximum acceptable temperature of 6 degrees Celsius.

Organic analyses

Samples were analyzed for VOCs. Laboratory data were evaluated for the following parameters:

1. Preservation and Holding Times – Acceptable
2. Blanks – Acceptable
3. Surrogates – Acceptable
4. LCS/LCSD – Acceptable
5. MS/MSD – Acceptable
6. Field Duplicates – Acceptable

   One field duplicate was submitted for each analysis during this sampling event, meeting the project frequency requirement of five percent, or one for every 20 samples. Primary and duplicate results are summarized in the table below. The project-specific control limit for field duplicate relative percent differences (RPDs) is 30 percent for concentrations greater than five times the reporting limit. The RPD is not calculated for results that are less than five times the reporting limit, as indicated on the table below by "NC." In these cases, the absolute value of the difference between the primary and duplicate result should not exceed the value of the reporting limit. The field duplicate RPDs were within the control limits.

Sample ID/ Field Duplicate ID	Analyte	Primary Result (ng/L)	Duplicate Result (ng/L)	Reporting Limit (ng/L)	RPD (%)
RGW152S-190506/ RGWDUP1-190506	vinyl chloride	173	201	20	15
	cis-1,2-dichloroethene	655	700	20	7
	trichloroethene	157	196	20	22
	tetrachloroethene	59.4	67.7	20	13

Abbreviations
ng/L = nanograms per liter
NC = not calculated
RPD = relative percent difference

7. Reporting Limits and Laboratory Flags – Acceptable

Inorganic analyses

Samples were analyzed for total metals and TOC. Laboratory data were evaluated for the following parameters:

1. Preservation and Holding Times – Acceptable
2. Blanks – Acceptable
3. LCS– Acceptable
4. MS/MSD – Acceptable
5. Laboratory Duplicates – Acceptable
6. Field Duplicates – Acceptable

   One field duplicate was submitted for each analysis during this sampling event, meeting the project frequency requirement of five percent, or one for every 20 samples. Primary and duplicate results are summarized in the table below. The project-specific control limit for field duplicate RPDs is 30 percent for concentrations greater than five times the reporting limit. The RPD is not calculated for results that are less than five times the reporting limit, as indicated on the table below by "NC." In these cases, the absolute value of the difference between the primary and duplicate result should not exceed the value of the reporting limit. The field duplicate RPDs were within the control limits, except for total copper. The total lead results for samples RGW152S-190506 and RGWDUP1-190506 are qualified as estimated and flagged with a "J."

Sample ID/ Field Duplicate ID	Analyte	Primary Result (µg/L)	Duplicate Result (µg /L)	Reporting Limit (µg /L)	RPD (%)
RGW152S-190506/ RGWDUP1-190506	TOC	2.65 mg/L	2.58 mg/L	0.50 mg/L	3
	total arsenic	4.49 µg/L	4.72 µg/L	0.200 µg/L	5
	total copper	2.35 µg/L	2.86 µg/L	0.500 µg/L	NC
	total lead	1.26 µg/L	1.65 µg/L	0.100 µg/L	27

Abbreviations:
µg/L = micrograms per liter
mg/L = milligrams per liter
NC = not calculated
RPD = relative percent difference
TOC = total organic carbon

7. Reporting Limits and Laboratory Flags – Acceptable

Overall assessment of data

The table below summarizes the data assessment. The completeness of work order number 19E0098 is 100 percent. The usefulness of these data was evaluated based on EPA guidance documents listed in the introduction to this report. Few problems were identified, and analytical performance was generally within specified limits. The data meet the project's data quality objectives.

Sample ID	Qualified Analyte	Qualified Result	Units	Qualifier Reason
RGWDUP1-190506	total copper	2.86 J	µg/L	field duplicate RPD
RGW232S-190506	none			
RGW233I-190506	none			
RGW236S-190506	none			
RGW081S-190506	none			
RGW235I-190506	none			
RGW173S-190506	none			
RGW234S-190506	none			
RGW172S-190506	none			
RGW226S-190506	none			
RGW152S-190506	total copper	2.35 J	µg/L	field duplicate RPD
RGW153S-190506	none			
Trip Blank	none			

Abbreviations
µg/L = micrograms per liter
J = the analyte is qualified as estimated
RPD = relative percent difference

References

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler), 2016, Quality Assurance Project Plan, Boeing Renton Facility, Renton, Washington: Prepared for the Boeing Company, February.

U.S. Environmental Protection Agency (EPA), 2014a, U.S. EPA National Functional Guidelines for Superfund Organic Methods Data Review: EPA 540-R-014-002, August.

EPA, 2014b, U.S. EPA National Functional Guidelines for Inorganic Superfund Data Review: EPA 540-R-013-001, August.

Memo

To: John Long, Project Manager
From: Crystal Thimsen
Tel: (206) 342-1760
Fax: (206) 342-1761

Date: June 26, 2019

Project: 0088880100.2019
c: Project File

Subject: Summary Data Quality Review
May 2019 Boeing Renton Groundwater Sampling
Building 4-78/79 SWMU/AOC Group
ARI Work Order Number: 19E0134 and 19E0145

This memo presents the summary data quality review of 16 primary groundwater samples, one field duplicate groundwater sample, and two trip blank samples collected on May 7 and 8, 2019. The samples were submitted to Analytical Resources, Inc. (ARI), located in Tukwila, Washington, a laboratory accredited by the Washington State Department of Ecology (Ecology). The samples were analyzed for the following:

- Volatile organic compounds (VOCs) (limited suite: benzene, vinyl chloride, cis-1,2-dichloroethene, and trichloroethene) by U.S. Environmental Protection Agency (EPA) Method 8260C;
- Total petroleum hydrocarbons as gasoline (TPH-G) by Ecology Method NWTPH-G; and
- Total organic carbon (TOC) by Standard Method (SM) 5310B-00.

The samples and the analyses conducted on the samples are listed below.

Sample ID	Laboratory Sample ID	Requested Analyses
RGWDUP2-190507	19E0134-01	all
RGW241S-190507	19E0134-02	VOCs and TPH-G
RGW242I-190507	19E0134-03	VOCs and TPH-G
RGW240D-190507	19E0134-04	all
RGW239I-190507	19E0134-05	all
RGW238I-190507	19E0134-06	all
RGW210S-190507	19E0134-07	all
RGW031S-190507	19E0134-08	all
RGW143S-190507	19E0134-09	all
RGW237S-190507	19E0134-10	all
RGW244S-190507	19E0134-11	all
RGW209S-190507	19E0134-12	all
RGW034S-190507	19E0134-13	all

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Sample ID	Laboratory Sample ID	Requested Analyses
Trip Blank	19E0134-14	VOCs and TPH-G
RGW039S-190508	19E0145-01	all
RGW243I-190508	19E0145-02	all
RGW033S-190508	19E0145-03	all
RGW038S-190508	19E0145-04	all
Trip Blank	19E0145-05	VOCs and TPH-G

Data were reviewed in accordance with the appropriate method procedures and criteria documented in the Quality Assurance Project Plan (QAPP) (Amec Foster Wheeler, 2016). The control limits provided in the QAPP are advisory limits; therefore, the most current control limits provided by the laboratory were used to evaluate the quality control data. In cases where the laboratory did not track limits for an analyte, the limits in the QAPP were used.

Holding times, method/trip blanks, surrogate recoveries, laboratory control samples (LCS) and laboratory control sample duplicates (LCSD), matrix spike/matrix spike duplicates (MS/MSD), field duplicates, and reporting limits were reviewed where available to assess compliance with applicable methods. If qualification was required, data were qualified based on the definitions and use of qualifying flags outlined in EPA guidelines (EPA, 2014a and b).

ARI received the samples on May 8 and 9, 2019. The temperatures of the coolers were recorded upon receipt and were below the maximum acceptable temperature of 6 degrees Celsius. For work order 19E0134, bubbles were observed in one of five vials submitted for samples RGWDUP2-190507, RGW241S-190507, RGW242I-190507, RGW237S-190507, five of five vials submitted for sample RGW240D-190507, eight of 15 vials submitted for sample RGW239I-190507, three of five vials submitted for sample RGW143S-190507, and four of five vials submitted for sample RGW209S-190507.

For work order 19E0145, bubbles were observed in two of five vials submitted for samples RGW243I-190508 and RGW038S-190508.

The laboratory proceeded with analysis using unaffected vials, where possible. The sample results are not affected and are not qualified.

Organic analyses

Samples were analyzed for VOCs and TPH-G. Laboratory data were evaluated for the following parameters:

1. Preservation and Holding Times – Acceptable
2. Blanks – Acceptable
3. Surrogates – Acceptable
4. LCS/LCSD – Acceptable
5. MS/MSD – Acceptable
6. Field Duplicates – Acceptable

One field duplicate was submitted for each analysis during this sampling event, meeting the project frequency requirement of five percent, or one for every 20 samples. Primary and duplicate results are summarized in the table below. The relative percent differences (RPDs) for the field duplicate are within the project-specific control limit of 30 percent for concentrations greater than five times the reporting limit. The RPD is not calculated for results that are less than five times the reporting limit, as indicated on the table below by "NC." In these cases, the absolute value of the difference between the primary and duplicate result should not exceed the value of the reporting limit. As shown in the table below, the field duplicate results are acceptable.

Sample ID/ Field Duplicate ID	Analyte	Primary Result (µg/L)	Duplicate Result (µg/L)	Reporting Limit (µg/L)	RPD (%)
RGW031S-190507/ RGWDUP2-190507	vinyl chloride	0.29	0.27	0.20	NC
	cis-1,2-dichloroethene	0.43	0.38	0.20	NC
	benzene	7.13	6.69	0.20	6
	TPH-G	1,020	848	100	18

Abbreviations
µg/L = micrograms per liter
NC = not calculated
RPD = relative percent difference
TPH-G = total petroleum hydrocarbons as gasoline

7. Reporting Limits and Laboratory Flags – Acceptable except as noted:

   VOCs by EPA 8260C: the cis-1,2-dichloroethene results for samples RGWDUP2-190507 and RGW031S-190507 were flagged by the laboratory with an "M" to indicate an estimated value for a detected and confirmed analyte, with low spectral match parameters. The cis-1,2-dichloroethene results for samples RGWDUP2-190507 and RGW031S-190507 are qualified as estimated and flagged with a "J."

Inorganic analyses

Samples were analyzed for TOC. Laboratory data were evaluated for the following parameters:

1. Preservation and Holding Times – Acceptable
2. Blanks – Acceptable
3. LCS/LCSD – Acceptable
4. MS/MSD – Acceptable
5. Laboratory Duplicates – Acceptable
6. Field Duplicates – Acceptable

   One field duplicate was submitted for each analysis during this sampling event, meeting the project frequency requirement of five percent, or one for every 20 samples. Primary and duplicate results are summarized in the table below. The RPDs are acceptable.

Sample ID/ Field Duplicate ID	Analyte	Primary Result (mg/L)	Duplicate Result (mg /L)	Reporting Limit (mg /L)	RPD (%)
RGW031S-190507/ RGWDUP2-190507	TOC	9.53	9.09	0.50	5

Abbreviations
mg/L = milligrams per liter
RPD = relative percent difference
TOC = total organic carbon

7. Reporting Limits and Laboratory Flags – Acceptable

Overall assessment of data

The table below summarizes the data assessment. The completeness of work order numbers 19E0134 and 19E0145 is 100 percent. Evaluation of the usefulness of these data is based on EPA guidance documents identified in the introduction to this report. Few problems were identified, and analytical performance was generally within specified limits. The data meet the project's data quality objectives.

Sample ID	Qualified Analyte	Qualified Result	Units	Qualifier Reason
RGWDUP2-190507	cis-1,2-dichloroethene	0.38 J	µg/L	flagged "M" by laboratory
RGW241S-190507	none			
RGW242I-190507	none			
RGW240D-190507	none			
RGW239I-190507	none			
RGW238I-190507	none			
RGW210S-190507	none			
RGW031S-190507	cis-1,2-dichloroethene	0.43 J	µg/L	flagged "M" by laboratory
RGW143S-190507	none			
RGW237S-190507	none			
RGW244S-190507	none			
RGW209S-190507	none			
RGW034S-190507	none			
Trip Blank	none			
RGW039S-190508	none			
RGW243I-190508	none			
RGW033S-190508	none			
RGW038S-190508	none			

Sample ID	Qualified Analyte	Qualified Result	Units	Qualifier Reason
Trip Blank				

Abbreviations
µg/L = micrograms per liter
J = The value is an estimate

References

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler), 2016, Quality Assurance Project Plan, Boeing Renton Facility, Renton, Washington: Prepared for the Boeing Company, February.

U.S. Environmental Protection Agency (EPA), 2014a, U.S. EPA National Functional Guidelines for Superfund Organic Methods Data Review: EPA 540-R-014-002, August.

EPA, 2014b, U.S. EPA National Functional Guidelines for Inorganic Superfund Data Review: EPA 540-R-013-001, August.

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Memo

To: John Long, Project Manager
From: Crystal Thimsen
Tel: (206) 342-1760
Fax: (206) 342-1761

Date: June 26, 2019

Project: 0088880100.2019
c: Project File

Subject: Summary Data Quality Review
May 2019 Boeing Renton Groundwater Sampling
Former Fuel Farm AOC Group
ARI Work Order Number: 19E0099 and 19E0128

This memo presents the summary data quality review of 10 primary groundwater samples and one field duplicate collected on May 6 and 7, 2019. The samples were submitted to Analytical Resources Inc. (ARI), a Washington State Department of Ecology (Ecology)-accredited laboratory located in Tukwila, Washington. The samples were analyzed for total petroleum hydrocarbons as diesel (TPH-D), plus motor oil (TPH-O) and Jet A (TPH Jet A) ranges by Ecology Method NWTPH-Dx, both with and without silica-gel acid cleanup procedure to determine if concentrations are affected by natural organic material.

The samples and the analyses conducted on the samples are listed below.

Sample ID	Laboratory Sample ID	Requested Analyses
RGW221S-190506	19E0199-01 and 05	all
RGW258S-190506	19E0199-02 and 06	all
RGW184S-190506	19E0199-03 and 07	all
RGW183S-190506	19E0199-04 and 08	all
RGWDUP3-190507	19E0128-01 and 02	all
RGW211S-190507	19E0128-03 and 04	all
RGW212S-190507	19E0128-05 and 06	all
RGW256S-190507	19E0128-07 and 08	all
RGW257S-190507	19E0128-09 and 10	all
RGW255S-190507	19E0128-11 and 12	all
RGW224S-190507	19E0128-13 and 14	all

Data were reviewed in accordance with the appropriate method procedures and criteria documented in the Quality Assurance Project Plan (QAPP) (Amec Foster Wheeler, 2016). The control limits provided in the QAPP are advisory limits; therefore, the most current control limits provided by the laboratory were used to evaluate the quality control data. In cases where the laboratory did not track limits for an analyte, the limits in the QAPP were used.

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Holding times, method/trip blanks, surrogate recoveries, laboratory control samples (LCS) and laboratory control sample duplicates (LCSD), matrix spike/matrix spike duplicates (MS/MSD), field duplicates, and reporting limits were reviewed where available to assess compliance with applicable methods. If qualification was required, data were qualified based on the definitions and use of qualifying flags outlined in EPA guidelines (EPA, 2014).

ARI received the samples on May 7 and 8, 2019. The temperatures of the coolers were recorded upon receipt and were received at 9.6 degrees Celcius, which is above the maximum acceptable temperature of 6 degrees Celsius.

Organic analyses

Samples were analyzed for TPH-D plus TPH-O and TPH Jet A ranges. Laboratory data were evaluated for the following parameters:

1. Preservation and Holding Times – Acceptable
2. Blanks – Acceptable
3. Surrogates – Acceptable
4. LCS – Acceptable
5. MS/MSD – Acceptable
6. Field Duplicates – Acceptable

   One field duplicate was submitted for each analysis during this sampling event, meeting the project frequency requirement of 5 percent, or one for every 20 samples. Primary and duplicate results are summarized in the table below. The field duplicate relative percent difference (RPD) is within the project-specific control limit of 30 percent for concentrations greater than five times the reporting limit.

Sample ID/ Field Duplicate ID	Analyte	Primary Result (mg/L)	Duplicate Result (mg/L)	Reporting Limit (mg/L)	RPD (%)
RGW224S-181112/ RGWDUP3-181112	TPH-D C12-C24	1.21	1.13	0.100	7
	TPH Jet A C10-C18	1.32	1.10	0.100	18

Abbreviations
mg/L = milligrams per liter
RPD = relative percent difference
TPH = total petroleum hydrocarbons
TPH-D = total petroleum hydrocarbons as diesel

7. Reporting Limits and Laboratory Flags – Acceptable

Overall assessment of data

The table below summarizes the data review. The completeness of ARI work order numbers 19E0099 and 19E0128 is 100 percent. Evaluation of the usefulness of these data is based on EPA guidance documents listed in the introduction to this report. Few problems were identified, and analytical performance was generally within specified limits. The data meet the project's data quality objectives.

Sample ID	Qualified Analyte
RGW221S-190506	none
RGW258S-190506	none
RGW184S-190506	none
RGW183S-190506	none
RGWDUP3-190507	none
RGW211S-190507	none
RGW212S-190507	none
RGW256S-190507	none
RGW257S-190507	none
RGW255S-190507	none
RGW224S-190507	none

References

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler), 2016, Quality Assurance Project Plan, Boeing Renton Facility, Renton, Washington: Prepared for the Boeing Company, February.

U.S. Environmental Protection Agency (EPA), 2014, U.S. EPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review: EPA 540-R-014-002, August.

Memo

To:	John Long, Project Manager	Project:	0088880100.2019
From:	Crystal Thimsen	c:	Project File
Tel:	(206) 342-1760		
Fax:	(206) 342-1761		
Date:	June 28, 2019		

Subject: Summary Data Quality Review
May 2019 Boeing Renton Groundwater Sampling
AOC-001 and -002 and AOC-003
ARI Work Order Number: 19E0146

This memo presents the summary data quality review of eight primary groundwater samples, one field duplicate, and one trip blank sample collected on May 8, 2019. The samples were submitted to Analytical Resources, Inc. (ARI), located in Tukwila, Washington, a laboratory accredited by the Washington State Department of Ecology (Ecology).

The samples from AOC-001 and -002 were analyzed for the following:

- Volatile organic compounds (VOCs) (benzene only) by U.S. Environmental Protection Agency (EPA) Method 8260C;
- VOCs (vinyl chloride, 1,1-dichloroethene, trichloroethene, and cis-1,2-dichloroethene) by EPA Method 8260C with selected ion monitoring (SIM);
- Total organic carbon (TOC) by Standard Method (SM) 5310C.

Samples from AOC-003 were analyzed for the following:

- VOCs (cis-1,2-dichloroethene, tetrachloroethene, trichloroethene, and vinyl chloride) by EPA Method 8260C SIM; and
- TOC by SM 5310C.

The samples and the analyses conducted on the samples are listed below.

Sample ID	Laboratory Sample ID	Requested Analyses
RGWDUP4-190508	19E0146-01	all AOC-001 and -002 analyses
RGW185S-190508	19E0146-02	all AOC-001 and -002 analyses
RGW197S-190508	19E0146-03	all AOC-001 and -002 analyses
RGW245S-190508	19E0146-04	all AOC-001 and -002 analyses
RGW195S-190508	19E0146-05	all AOC-001 and -002 analyses
RGW247S-190508	19E0146-06	all AOC-003 analyses
RGW196D-190508	19E0146-07	all AOC-001 and -002 analyses

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Sample ID	Laboratory Sample ID	Requested Analyses
RGW248I-190508	19E0146-08	all AOC-003 analyses
RGW194S-190508	19E0146-09	all AOC-001 and -002 analyses
Trip Blank	19E0146-10	VOCs

Data were reviewed in accordance with the appropriate method procedures and criteria documented in the Quality Assurance Project Plan (QAPP) (Amec Foster Wheeler, 2016). The control limits provided in the QAPP are advisory limits; therefore, the most current control limits provided by the laboratory were used to evaluate the quality control data. In cases where the laboratory did not track limits for an analyte, the limits in the QAPP were used.

Holding times, method/trip blanks, surrogate recoveries, laboratory control samples (LCS) and laboratory control sample duplicates (LCSD), matrix spike/matrix spike duplicates (MS/MSD), field duplicates, and reporting limits were reviewed where available to assess compliance with applicable methods. If qualification was required, data were qualified based on the definitions and use of qualifying flags outlined in the EPA guidance documents (EPA, 2014a and b).

ARI received the samples on May 9, 2019. The temperature of the cooler was recorded upon receipt and was below the maximum acceptable temperature of 6 degrees Celsius. The laboratory noted that bubbles were observed in one of five vials submitted for samples RGW185S-190508 and the trip blank, two of five vials submitted for sample RGW194S-190508, and four of five vials submitted for sample RGW196D-190508. The laboratory proceeded with analysis using unaffected vials, where possible. The sample results are not affected and are not qualified.

Organic analyses

Samples were analyzed for VOCs. Laboratory data were evaluated for the following parameters:

1. Preservation and Holding Times – Acceptable
2. Blanks – Acceptable
3. Surrogates – Acceptable
4. LCS/LCSD – Acceptable
5. MS/MSD – Acceptable
6. Field Duplicates – Acceptable

   One field duplicate was submitted for each analysis during this sampling event, meeting the project frequency requirement of five percent, or one for every 20 samples. Primary and duplicate results are summarized in the table below. The relative percent differences (RPDs) for the field duplicate are within the project-specific control limit of 30 percent for concentrations greater than five times the reporting limit. The RPD is not calculated for results that are less than five times the reporting limit, as indicated on the table below by "NC." In these cases, the absolute value of the difference between the primary and duplicate result should not exceed the value of the reporting limit.

Sample ID/ Field Duplicate ID	Analyte	Primary Result (µg/L)	Duplicate Result (µg/L)	Reporting Limit (µg/L)	RPD (%)
RGW185S-190508/ RGWDUP4-190508	cis-1,2-dichloroethene	0.120	0.118	0.020	2
	vinyl chloride	0.122	0.121	0.020	1

Abbreviations
µg/L = micrograms per liter
RPD = relative percent difference

7. Reporting Limits and Laboratory Flags – Acceptable

Inorganic analyses

Samples were analyzed for TOC. Laboratory data were evaluated for the following parameters:

1. Preservation and Holding Times – Acceptable
2. Blanks – Acceptable
3. LCS – Acceptable
4. MS/MSD – Acceptable

   Extra volume was not submitted for project specific MS/MSD analyses. Sample precision is evaluated based on LCS and LCSD recoveries. The MS/MSD project frequency requirement of one MS/MSD for every 20 samples was achieved with extra volume submitted at other sites included in this sampling event.

5. Laboratory Duplicates – Acceptable
6. Field Duplicates – Acceptable

   One field duplicate was submitted for TOC analysis during this sampling event, meeting the project frequency requirement of five percent, or one for every 20 samples. Primary and duplicate results are summarized in the table below. The project-specific control limit for field duplicate RPDs is 30 percent for concentrations greater than five times the reporting limit. The field duplicate RPD was within the control limits.

Sample ID/ Field Duplicate ID	Analyte	Primary Result (mg/L)	Duplicate Result (mg /L)	Reporting Limit (mg /L)	RPD (%)
RGW185S-190508/ RGWDUP4-190508	TOC	19.39	18.48	0.50	5

Abbreviations
mg/L = milligrams per liter
RPD = relative percent difference
TOC = total organic carbon

7. Reporting Limits and Laboratory Flags – Acceptable

Overall assessment of data

The table below summarizes the data assessment. The completeness of work order number 19E0146 is 100 percent. The usefulness of these data was evaluated based on EPA guidance documents listed in the introduction to this report. Few problems were identified, and analytical performance was generally within specified limits.

Sample ID	Qualified Analyte
RGWDUP4-190508	none
RGW185S-190508	none
RGW197S-190508	none
RGW245S-190508	none
RGW195S-190508	none
RGW247S-190508	none
RGW196D-190508	none
RGW248I-190508	none
RGW194S-190508	none
Trip Blank	none

References

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler), 2016, Quality Assurance Project Plan, Boeing Renton Facility, Renton, Washington: Prepared for the Boeing Company, February.

U.S. Environmental Protection Agency (EPA), 2014a, U.S. EPA National Functional Guidelines for Superfund Organic Methods Data Review: EPA 540-R-014-002, August.

EPA, 2014b, U.S. EPA National Functional Guidelines for Inorganic Superfund Data Review: EPA 540-R-013-001, August.

Memo

To:	John Long, Project Manager	Project:	0088880100.2019
From:	Crystal Thimsen	c:	Project File
Tel:	(206) 342-1760		
Fax:	(206) 342-1761		
Date:	June 27, 2019		

Subject: Summary Data Quality Review
November 2018 Boeing Renton Groundwater Sampling
Building 10-71 Parcel
ARI Work Order Number: 19E0143

This memo presents the summary data quality review of three primary groundwater samples and one trip blank sample collected on May 8, 2019. The samples were submitted to Analytical Resources, Inc. (ARI), located in Tukwila, Washington, a laboratory accredited by the Washington State Department of Ecology (Ecology). The samples were analyzed for the following:

- Volatile organic compounds (VOCs) (vinyl chloride, cis-1,2-dichloroethene, trichloroethene, and toluene) by U.S. Environmental Protection Agency (EPA) Method 8260C.

The samples and the analyses conducted on the samples are listed below.

Sample ID	Laboratory Sample ID	Requested Analyses
10-71-MW2-190508	19E0143-01	VOCs
10-71-MW1-190508	19E0143-02	VOCs
10-71-MW4-190508	19E0143-03	VOCs
Trip Blank	19E0143-04	VOCs

Data were reviewed in accordance with the appropriate method procedures and criteria documented in the Quality Assurance Project Plan (QAPP) (Amec Foster Wheeler, 2016). The control limits provided in the QAPP are advisory limits; therefore, the most current control limits provided by the laboratory were used to evaluate the quality control data. In cases where the laboratory did not track limits for an analyte, the limits in the QAPP were used.

Holding times, method/trip blanks, surrogate recoveries, laboratory control samples (LCS) and laboratory control sample duplicates (LCSD), matrix spike/matrix spike duplicates (MS/MSD), field duplicates, and reporting limits were reviewed where available to assess compliance with applicable methods. If qualification was required, data were qualified based on the definitions and use of qualifying flags outlined in EPA guidelines (EPA, 2014).

ARI received the samples on May 9, 2019. The temperature of the cooler was recorded upon receipt and was below the maximum acceptable temperature of 6 degrees Celsius .

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Organic analyses

Samples were analyzed for VOCs. Laboratory data were evaluated for the following parameters:

1. Preservation and Holding Times – Acceptable
2. Blanks – Acceptable
3. Surrogates – Acceptable
4. LCS/LCSD – Acceptable
5. MS/MSD – Acceptable

   Extra volume was not submitted for project specific MS/MSD analyses. Sample precision is evaluated based on LCS and LCSD recoveries. The MS/MSD project frequency requirement of one MS/MSD for every 20 samples was achieved with extra volume submitted at other sites included in this sampling event.
6. Field Duplicates – Acceptable

   Field duplicates were not collected at this site during this sampling event. The project frequency requirement of one field duplicate for every 20 samples was achieved with field duplicate samples collected at other sites included in this sampling event.
7. Reporting Limits and Laboratory Flags – Acceptable

Overall assessment of data

The table below summarizes the data assessment. The completeness of work order number 19E0143 is 100 percent. Evaluation of the usefulness of these data is based on EPA guidance documents listed in the introduction to this report. Few problems were identified, and analytical performance was generally within specified limits. The data are not qualified and meet the project's data quality objectives.

Sample ID	Qualified Analyte
10-71-MW2-190508	none
10-71-MW1-190508	none
10-71-MW4-190508	none
Trip Blank	none

References

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler), 2016, Quality Assurance Project Plan, Boeing Renton Facility, Renton, Washington: Prepared for the Boeing Company, February.

U.S. Environmental Protection Agency (EPA), 2014, U.S. EPA National Functional Guidelines for Superfund Organic Methods Data Review: EPA 540-R-014-002, August.

Memo

To:	John Long, Project Manager	Project:	0088880100.2019
From:	Crystal Thimsen	c:	Project File
Tel:	(206) 342-1760		
Fax:	(206) 342-1761		
Date:	June 17, 2019		

Subject: Summary Data Quality Review
May 2019 Boeing Renton Groundwater Sampling
Apron A
ARI Work Order Number: 19E0129

This memo presents the summary data quality review of two primary groundwater samples, one groundwater field duplicate, and one trip blank sample collected on May 7, 2019. The samples were submitted to Analytical Resources, Inc., (ARI), located in Tukwila, Washington, a laboratory accredited by the Washington State Department of Ecology (Ecology). The samples were analyzed for the following:

- Volatile organic compounds (VOCs) (vinyl chloride and cis-1,2-dichloroethene) by U.S. Environmental Protection Agency (EPA) Method 8260C; and
- Total organic carbon (TOC) by Standard Method (SM) 5310B.

The samples and the analyses conducted on the samples are listed below.

Sample ID	Laboratory Sample ID	Requested Analyses
RGWDUP5-190507	19E0129-01	all
RGW262S-190507	19E0129-02	all
RGW264S-190507	19E0129-03	all
Trip Blank	19E0129-04	VOCs

Data were reviewed in accordance with the appropriate method procedures and criteria documented in the Quality Assurance Project Plan (QAPP) (Amec Foster Wheeler, 2016). The control limits provided in the QAPP are advisory limits; therefore, the most current control limits provided by the laboratory were used to evaluate the quality control data. In cases where the laboratory did not track limits for an analyte, the limits in the QAPP were used.

Holding times, method/trip blanks, surrogate recoveries, laboratory control samples (LCS) and laboratory control sample duplicates (LCSD), matrix spike/matrix spike duplicates (MS/MSD), field duplicates, and reporting limits were reviewed where available to assess compliance with applicable methods. If qualification was required, data were qualified based on the definitions and use of qualifying flags outlined in the EPA guidance documents (EPA, 2014a and b).

ARI received the samples on May 8, 2019. The temperature of the coolers were recorded upon receipt and was below the maximum acceptable temperature of 6 degrees Celsius. The laboratory logged the samples with the time on the chain-of-custody and proceeded with analysis.

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Organic analyses

Samples were analyzed for VOCs. Laboratory data were evaluated for the following parameters:

1. Preservation and Holding Times – Acceptable
2. Blanks – Acceptable
3. Surrogates – Acceptable
4. LCS/LCSD – Acceptable
5. MS/MSD – Acceptable

   Extra volume was not submitted for project specific MS/MSD analyses. Sample precision is evaluated based on LCS and LCSD recoveries. The MS/MSD project frequency requirement of one MS/MSD for every 20 samples was achieved with extra volume submitted at other sites included in this sampling event.
6. Field Duplicates – Acceptable

   One field duplicate, RGWDUP5-190507, was submitted with sample RGW262S-190507. Primary and duplicate samples were analyzed for each analysis during this sampling event, meeting the project frequency requirement of 5 percent, or one for every 20 samples. Primary and duplicate results were below detection; therefore, the field duplicate relative percent difference (RPD) is not calculated for samples in this work order.
7. Reporting Limits and Laboratory Flags – Acceptable

Inorganic analyses

Samples were analyzed for TOC. Laboratory data were evaluated for the following parameters:

1. Preservation and Holding Times – Acceptable
2. Blanks – Acceptable
3. LCS – Acceptable
4. MS/MSD – Acceptable

   Extra volume was not submitted for project specific MS/MSD analyses. Sample precision is evaluated based on LCS and LCSD recoveries. The MS/MSD project frequency requirement of one MS/MSD for every 20 samples was achieved with extra volume submitted at other sites included in this sampling event.
5. Laboratory Duplicates – Acceptable
6. Field Duplicates – Acceptable

   One field duplicate was submitted for each analysis during this sampling event, meeting the project frequency of five percent, or one for every 20 samples. Primary and duplicate results are summarized in the table below. The RPDs are acceptable.

Sample ID/ Field Duplicate ID	Analyte	Primary Result (mg/L)	Duplicate Result (mg/L)	Reporting Limit (mg/L)	RPD (%)
RGW262S-181113/ RGWDUP5-181113	TOC	33.94	33.29	10.00	NC

Abbreviations
mg/L = milligrams per liter
NC = not calculated
RPD = relative percent difference
TOC = total organic carbon

7. Reporting Limits and Laboratory Flags – Acceptable

Overall assessment of data

The table below summarizes the data assessment. The completeness of work order number 19E0129 is 100 percent. The usefulness of these data was evaluated based on EPA guidance documents listed in the introduction to this report. Few problems were identified, and analytical performance was generally within specified limits. The data meet the project's data quality objectives.

Sample ID	Qualified Analyte
RGWDUP5-190507	none
RGW262S-190507	none
RGW264S-190507	none
Trip Blank	none

References

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler), 2016, Quality Assurance Project Plan, Boeing Renton Facility, Renton, Washington: Prepared for the Boeing Company, February.

U.S. Environmental Protection Agency (EPA), 2014a, U.S. EPA National Functional Guidelines for Superfund Organic Methods Data Review: EPA 540-R-014-002, August.

EPA, 2014b, U.S. EPA National Functional Guidelines for Inorganic Superfund Data Review: EPA 540-R-013-001, August.

Appendix D

APPENDIX D

Summary of Remedial Actions at the Boeing Renton Facility April – June 2019

Boeing Renton Site
Renton, Washington

Prepared for:
The Boeing Company
EHS Remediation

Prepared by:
CALIBRE Systems, Inc.
Project No. K0357000

August 13, 2019

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Acronyms

AOC	Area of Concern
^{o}Bx	degrees brix
bgs	below ground surface
Building 4-78/79	Building 4-78/4-79 SWMU/AOC Group
CALIBRE	CALIBRE Systems, Inc.
cfm	cubic feet per minute
DAP	Diammonium Phosphate
DCA	Dichloroethane
DCE	Dichloroethene
EDR	Engineering Design Report
ERD	Enhanced Reductive Dechlorination
ft	feet
lbs	pounds
mg/L	milligrams per liter
MgSO4	Magnesium Sulfate
NA	not analyzed
NaNO3	Sodium Nitrate
ND	non-detect
PCE	Tetrachloroethene
PID	Photoionization detector
ppbv	parts per billion by volume
SVE	Soil Vapor Extraction
SWMU	Solid Waste Management Unit
TCA	Trichloroethane
TCE	Trichloroethene
Tech Memo	Technical Memorandum
Total Chlorinated	Sum of PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, 1,1,1-TCA, and 1,1-DCA
TPH-G	Total Petroleum Hydrocarbons-Gasoline
ug/L	micorgrams per liter
VC	Vinyl Chloride
VOCs	Volatile Organic Compounds
VPC	Vapor Phase Carbon

1.0 Introduction

CALIBRE Systems, Inc. (CALIBRE) prepared this Technical Memorandum (Tech Memo) for the Boeing Company to summarize remedial actions implemented at the Boeing Renton Facility in the second quarter of 2019 (between April 1 and June 30, 2019). The ongoing remedial actions include:

1. Operation of one soil vapor extraction (SVE) system located at Solid Waste Management Unit (SWMU) designated as SWMU-172/174;
2. Biological treatment to promote Enhanced Reductive Dechlorination (ERD) of volatile organic compounds (VOCs) in groundwater underway at several AOCs located throughout the Renton Facility, and;
3. Anaerobic biodegradation of benzene by nitrate/sulfate injections at the 4-78/79 Building.

CALIBRE completed the work described in this Tech Memo to support remedial activities described in the Engineering Design Report (EDR), (AMEC, 2014) as supplemented by a document describing the remedial approach for *in situ* treatment for benzene in groundwater (CALIBRE 2017).

1.1 Facility Location and Background

The Boeing Renton Facility is used for assembly of 737 airplanes and is located at the southern end of Lake Washington in Renton, Washington. The location of the Renton Facility and the locations of SWMU-172/174 and Building 4-78/79 within the Facility are shown on Figure 1-1. The locations of the other AOCs and SWMUs where groundwater treatment is ongoing are also included in Figure 1-1.

1.2 Objectives and Organization

The objective for this Tech Memo is to summarize work completed in accordance with the EDR in the second quarter of 2019. This includes operation and monitoring activities for the SVE system located at SWMU-172/174 and a summary of the ongoing biological treatment and monitoring of groundwater at the following areas:

SWMU-172/174
Building 4-78/4-79 SWMU/AOC Group (Building 4-78/79)
AOC-001/002
AOC-003
Lot 20/Former Building 10-71
AOC-060
AOC-090
Building 4-70, and
Apron A

This Tech Memo is organized as follows:
Section 1 – Introduction and Background
Section 2 – SVE System Operation and Monitoring

Section 3 – Groundwater Treatment
Section 4 – Conclusions and Recommendations
Section 5 – References
Attachment A – Field Data Sheets
Attachment B – Laboratory Report

2.0 SVE Systems Operation and Monitoring

SVE systems were installed in the Building 4-78/79 and SWMU-172/174 areas and began operation in April 2015. During the last quarter of 2017 photoionization detector (PID) results from both systems had shown low-level VOC concentrations removed at asymptotically low levels. Rebound stabilization tests were conducted in early 2018 followed by collection of soil confirmation samples from both areas in June 2018. Ecology approved the recommended shutdown of the Building 4-78/79 SVE system on November 1, 2018 after review and evaluation of the soil confirmation results for that area (CALIBRE 2018a). Operational modifications have continued at the SWMU-172/174 SVE system to optimize VOC removal for that area. The following sections summarize the operating conditions, operational changes, and performance monitoring/evaluation for the SWMU-172/174 SVE system performed in April – June 2019.

2.1 SWMU-172/174 SVE System

The SWMU-172/174 SVE system consists of three vapor extraction wells and a SVE equipment trailer as shown in Figure 2-1. The SVE system is equipped with two vapor-phase GAC vessels, each filled with 1,800 pounds of virgin carbon. The GAC vapor treatment system is configured to run in a lead-lag configuration with vapor from the outlet of the lead vessel passing through the lag vessel. The system also includes two smaller vessels each containing 200 pounds of zeolite impregnated with permanganate.

Routine maintenance including oil changes, drive-belt tensioning and inspection, inspection of the air filter, and inspection of the moisture separator was completed per the Operations Manual (CALIBRE, 2014). System monitoring includes regular monitoring of total organic vapor concentrations with a calibrated photo-ionization detector (PID).

2.1.1 TO-15 Laboratory Analysis of Vapor Samples

Two vapor samples were collected from the SWMU-172/174 SVE system for TO-15 analysis on June 20, 2019. The results showed tetrachloroethene (PCE) represented approximately 90% of the total VOCs for the SWMU-172/174 SVE system influent, SVE-1 and SVE-2 samples. Table 2-1 summarizes the TO-15 detections for the SWMU-172/174 SVE system for 15 TO-15 sampling events[1] that have been implemented since system startup. During this time, SVE-2 has continued to extract vapor while system operation modifications have been completed at SVE-1 and SVE-3 to alter the flushing patterns in the area of SVE-2, as described below. The laboratory report is included in Attachment B.

[1] Multiple changes to SVE system operations have been implemented over the period where data are shown. Changes to extraction flow rates by SVE wells are used to maximize the VOC mass removal and the corresponding SVE influent concentration is highly dependent on the flow rate from selected wells.

2.1.2 Summary of Operations and Operational Changes

The soil confirmation samples collected in the second quarter of 2018 identified a location between SVE-2 and SVE-3 which still showed elevated PCE levels in soil. During the third quarter of 2018, the SVE system was adjusted to alter the flushing pattern through this area by using SVE-3 as an inlet vent well with continued extraction through SVE-2 and SVE-1. Vapor concentrations, measured with a PID, showed some increase for approximately two weeks during that reporting period. Subsequent measurements during the fourth quarter 2018 reporting period showed vapor concentrations reducing to previous low level detections. Therefore, on December 5, 2018 the SVE system was adjusted to alter the flushing pattern around SVE-2 and SVE-3 by using SVE-1 as an inlet vent well with continued extraction from SVE-2 and re-opening SVE-3 to extraction.

On June 20, 2019 (second quarter 2019) PID readings showed reduced VOC levels at SVE-2 while SVE-1 remained near 0 ppbv. Systems operation modifications were completed that day (following the collection of samples for TO-15 analysis) to adjust SVE-1 as an inlet vent well with extraction at SVE-2 and SVE-3. PID monitoring showed the system influent increasing for two hours after the system adjustment was made. The following site visit showed those detections reduced back to lower levels. Table 2-2 shows the PID readings for the wells in the SWMU 172/174 SVE system. Table 2-3 shows an operational summary for the system.

2.1.3 Mass Removal Estimate

Between April 17, 2015 and June 27, 2019 the SWMU-172/174 SVE system has recovered an estimated 17.3 pounds of VOCs (primarily PCE), as shown in Table 2-3. Approximately 1.7 pounds of VOCs were removed during the current reporting period (second quarter 2019) based on PID measurements collected. Due to the differences observed in PID readings and 1st quarter 2019 TO-15 results, the recent samples for TO-15 analysis in 2nd quarter 2019 were completed with an expanded VOC list to help identify any possible analytes causing an interference with the PID. These results do not show any unusual detections. It is likely the PID is picking up other vapors from the 5-09 paint shop; the area around the 5-09 building can at times have a noticeable paint odor. The cumulative VOC mass removal for the SWMU-172/174 SVE system is shown in Figure 2-2.

2.2 Recommended Next Steps for the SVE Systems

In December 2018, Boeing submitted to Ecology a Tech Memo describing the planned approach for further evaluation of soils around probe point PP13 at the Building 4-78/79 area (CALIBRE 2018b). The single sample (PP13) which exceed cleanup standards for TPH-G was collected from a low permeable silty/clay layer. The objective of the soil evaluation is to identify the location and depth of utilities in the immediate area, determine the feasibility of excavating soil by delineating the extent of soil contamination around PP13 and to determine the extent of soil that can be removed.

Additional probe points were sampled in June 2019 and those results showed concentrations of TPH-G exceeding the cleanup level of 30 mg/L to a depth 11.5 ft bgs in certain areas, with the highest detections between 5 to 9 ft bgs. Boeing is currently monitoring the water table elevation in this area to determine if soil excavation will be feasible. A separate Tech Memo summarizing the sampling results along with figures and a plan for soil excavation will be provided to Ecology. It is expected that additional nitrate/sulfate injections will be completed following the soil excavation work.

TO-15 samples collected from SVE-1, SVE-2 and the system influent continue to show PCE as the primary chemical detected, comprising approximately 90% of the total VOCs detected. Modifying the SVE system flow at the SWMU-172/174 area on June 20, 2019 showed increases in VOC mass removal from the system influent for a number of hours following the adjustment. Subsequent monitoring during the following weeks of June 2019 and into July 2019 show vapor concentrations reducing at SVE-2 and SVE-3. If concentrations reduce to asymptotic levels the system will be modified to alternate flows between wells as has been done in the past (i.e. SVE-3 is extracting and will be changed to an inlet vent and vice versa for SVE-1). Summa can samples for TO-15 analysis will be planned for the 3rd Quarter 2019 to monitor changes in vapor concentrations if observed.

Additional modifications to the operation of this system should be considered to continue increased mass removal in the area between SVE-2 and SVE-3. These modifications may include opening SVE-1 and SVE-3 as an inlet vent or SVE-1 and SVE-2 as an inlet vent, to focus vapor removal in that area. It may also be beneficial to operate the SVE system in a pulsed mode in order to allow vapor concentrations to rebound followed by running the system for a period of time.

3.0 Ongoing Groundwater Treatment

Groundwater treatment is being implemented at several AOCs/SWMUs at the Renton Facility. The primary remedy being implemented is enhanced reductive dechlorination (ERD) of chlorinated solvents in targeted areas. The ERD treatment involves substrate injection using sucrose as a carbon source to stimulate biological degradation of the chlorinated solvents between December 2014 and March 2019.

Beginning in late 2017, anaerobic biodegradation of benzene using nitrate and sulfate injections was implemented for a small area at the 4-78/79 Building. Performance monitoring was completed at the injection and monitoring wells at this area in May 2019 and those results are summarized in Table 3-1. The results show that 5 of the 7 injection wells and the two monitoring wells are below baseline benzene concentrations. The two injection wells above baseline concentrations, B78-18 and B78-20, show benzene at 1.66 ug/L and 16.3 ug/L, respectively. Soil excavations are being considered for this area in September 2019 (third quarter 2019) and additional nitrate/sulfate injections would be completed following any excavation activities. Performance monitoring samples will be collected following the injection event.

Site wide groundwater sampling was conducted as part of the quarterly monitoring program during this reporting period and the results are discussed in the main text of the quarterly report. Table 3-2 presents a summary of those groundwater monitoring results, by area, related to groundwater treatment/ERD implementation, with recommendations for additional substrate injections at selected areas.

4.0 Conclusions and Recommendations

The soil confirmation samples in the second quarter of 2018 revealed that cleanup standards for CVOCs were met at all but one of the 24 samples at the 4-78/79 area. The single sample which exceed cleanup standards for TPH-G was collected from a low permeable silty/clay layer. TO-15 samples from the nearest extraction well to this location showed TPH-G was non-detect in both samples, indicating it is unlikely that continued SVE operation would have any impact on this low permeable layer. Subsequently, Ecology approved the shutdown of the Building 4-78/79 SVE system in November 2018. A separate work plan was provided to Ecology for review and approval outlining the proposed locations and depths of additional soil sampling (by Geoprobe) around PP13 for evaluation of soil excavation. Ecology has since approved the work plan and the additional probe points were sampled in June 2019. A separate Tech Memo summarizing the sampling results along with figures and a plan for soil excavation will be provided to Ecology.

SVE operations were modified at the SWMU-172/174 area to increase flushing between extraction wells SVE-2 and SVE-3, based on the elevated PCE detections observed during the soil confirmation sampling event in the second quarter of 2018. Increased vapor concentrations were observed at SVE-3 and the system influent following the system modification on 6/20/2019. It is recommended that SVE operations be continued for this area, with samples collected for TO-15 analysis in the third quarter of 2019 and additional modifications to include opening of SVE-1 and SVE-2 as inlet vents or SVE-1 and SVE-3 as inlet vents to allow focused vapor removal at SVE-2 and SVE-3. In addition, it may be beneficial to operate the SVE system in a pulsed mode to monitor for any VOC rebound in soil vapor.

Groundwater monitoring will continue according to the EDR, with supplemental VOC and TOC sampling at selected wells. Performance monitoring data related to benzene treatment at the Building 4-78/79 area show a majority of the wells at benzene concentrations below baseline results, many of these are at 90% reduction from baseline. Additional nitrate/sulfate injections are recommended following the soil excavation being considered for this area. Substrate injections for ERD treatment will be recommended following the review of the 3rd quarter 2019 monitoring results.

5.0 References

AMEC 2014. Draft Engineering Design Report Boeing Renton Cleanup Action Plan Implementation. Prepared by AMEC Environment & Infrastructure, Inc. for The Boeing Company. July 2014.

CALIBRE 2014. Operations and Maintenance Plan for the Renton Cleanup Action Soil Vapor Extraction Systems. Prepared by CALIBRE Systems, Inc. for The Boeing Company, EHS Remediation. July 2014.

CALIBRE 2017. Bioremediation of Benzene in Groundwater; Building 4-78/79 Area, Boeing Renton Facility Rev. 1. Prepared by CALIBRE Systems, Inc. for The Boeing Company, EHS Remediation. September 2017.

CALIBRE 2018a. Recommendation to shut down SVE system at Building 4-78/4-79 SWMU/AOC Group; Boeing Renton Site. Prepared by CALIBRE Systems, Inc. for The Boeing Company, EHS Remediation. October 2018.

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Ecology 2015. Washington State Water Quality Standards: Human Health Criteria and Implementation Tools. Prepared by the Washington Department of Ecology. Publication no. 14-10-058. January 2015.

USACE 2002. Engineering and Design - Soil Vapor Extraction and Bioventing. Prepared by US Army Corps of Engineers. EM 1110-1-4001. June 2002.

TABLES

Table 2-1 TO-15 Analytical Results - SWMU-172/174 SVE System Project History

SVE System Inlet

Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1,1-TCA	1,1-DCA	Acetone	Toluene	m,p-Xylene	Chloroform	o-Xylene	Pentane	Hexane	Total Chlorinated	Total VOCs
4/17/2015	1,500	130	120	ND	ND	13	ND	ND	ND	ND	ND	ND	ND	ND	1,763	1,763
10/13/2015	400	31	13	ND	ND	3.3	ND	ND	ND	ND	ND	ND	ND	ND	447	447
3/8/2016	82	5.4	3.1	ND	ND	ND	ND	ND	1.1	2.2	ND	ND	ND	ND	91	94
6/30/2016	230	18	10	ND	ND	1.8	ND	11	ND	ND	2.4	ND	ND	ND	260	273
9/12/2016	230	16	8.3	ND	ND	1.9	ND	ND	ND	ND	1.2	ND	ND	ND	256	257
12/14/2016	100	6.2	3.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	110	110
5/30/2017 - 30 min	520	220	17	ND	ND	13	2.7	ND	ND	ND	ND	ND	ND	ND	773	773
5/30/2017 - 100 min	530	200	17	ND	ND	14	ND	ND	ND	ND	ND	ND	ND	ND	761	761
5/30/2017 - 225 min	510	130	16	ND	ND	12	ND	ND	ND	ND	ND	ND	ND	ND	668	668
8/16/2017	180	16	7.8	ND	ND	1.7	ND	ND	ND	ND	ND	ND	ND	ND	206	206
12/8/2017 - Rebound Start	99	7.6	3.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	110	110
5/22/2018	430	43	13	ND	ND	12	ND	ND	ND	ND	ND	ND	ND	ND	498	498
6/7/2018	160	13	5.4	ND	ND	1.8	ND	ND	ND	ND	ND	ND	ND	ND	180	180
6/20/2018	170	14	5.7	ND	ND	1.8	ND	ND	ND	ND	ND	ND	ND	ND	192	192
8/30/2018	110	8.6	3.7	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	122	122
2/13/2019	32	2.2	1.6	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	36	36
6/20/2019	74	6.2	3.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	84	84

SVE-1

Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1,1-TCA	1,1-DCA	Acetone	Toluene	m,p-Xylene	Chloroform	o-Xylene	Pentane	Hexane	Total Chlorinated	Total VOCs
6/20/2019	10	1.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11	11

SVE-2

Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1,1-TCA	1,1-DCA	Acetone	Toluene	m,p-Xylene	Chloroform	o-Xylene	Pentane	Hexane	Total Chlorinated	Total VOCs
8/30/2018	180	14	6.1	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	200	200
2/13/2019	48	3.3	2.8	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	54	54
6/20/2019	100	9.6	5.1	ND	ND	1.4	ND	ND	1.4	ND	ND	ND	ND	ND	116	118

SVE-3

Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1,1-TCA	1,1-DCA	Acetone	Toluene	m,p-Xylene	Chloroform	o-Xylene	Pentane	Hexane	Total Chlorinated	Total VOCs
5/30/2017 - 30 min	540	51	18	ND	ND	14	2.6	ND	2.2	ND	ND	ND	ND	ND	626	628
5/30/2017 - 100 min	200	16	6.5	ND	ND	5.5	ND	ND	ND	ND	ND	ND	ND	ND	228	228
8/16/2017	350	30	15	ND	ND	3.5	ND	ND	ND	ND	1.3	ND	ND	ND	399	400
12/8/2017 - Rebound Start	170	13	5.8	ND	ND	1.7	ND	ND	ND	ND	ND	ND	ND	ND	191	191
1/19/2018 - 35-Day 60 Minute Sample	310	30	13	ND	ND	6.9	1.3	ND	ND	ND	1.1	ND	ND	ND	361	362
1/19/2018 - 35-Day 180 Minute Sample	310	28	12	ND	ND	7.9	1.1	ND	ND	ND	1.1	ND	ND	ND	359	360
3/6/2018 - 80-Day 60 Min Sample	440	41	15	ND	ND	14	2.2	ND	ND	ND	ND	ND	ND	ND	512	512
3/6/2018 - 80-Day 180 Min Sample	410	33	13	ND	ND	13	1.6	ND	ND	ND	ND	ND	ND	ND	471	471
5/22/2018	790	66	22	ND	ND	22	ND	ND	ND	ND	ND	ND	ND	ND	900	900
6/7/2018	280	23	9.6	ND	ND	3	ND	ND	ND	ND	ND	ND	ND	ND	316	316
6/20/2018	310	24	11	ND	ND	3.4	ND	ND	ND	ND	ND	ND	ND	ND	348	348

Table 2-1 TO-15 Analytical Results - SWMU-172/174 SVE System Project History

VPC Outlet

Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1,1-TCA	1,1-DCA	Acetone	Toluene	m,p-Xylene	Chloroform	o-Xylene	Pentane	Hexane	Total Chlorinated	Total VOCs
4/17/2015	5.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.1	5.1
10/13/2015	ND	ND	ND	ND	ND	ND	ND	11	ND	ND	ND	ND	ND	ND	ND	11
3/8/2016	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
6/30/2016	ND	ND	ND	ND	ND	ND	ND	ND	15	1.6	ND	1.2	6.2	1.2	ND	25
9/12/2016	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
12/14/2016	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
8/16/2017	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

All results are in parts per billion by volume (ppbv).

ND = non-detect

NA = not analyzed

DCE = Dichloroethene

PCE = tetrachloroethene

TCE = trichloroethene

Total Chlorinated = the sum of PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, 1,1,1-TCA, and 1,1-DCA.

Shaded cells are results from 2nd Quarter 2019.

Table 2-2 PID Monitoring - SWMU-172/174 SVE System

Date	Days in Operation Since Startup [1]	SVE-01	SVE-02	SVE-03	VPC Inlet	VPC Mid	VPC Outlet	Notes
4/8/2019	1,289	0	1,518	Vent	1,092		0	
4/18/2019	1,299	0	68	Vent	41		0	
4/23/2019	1,304	0	772	Vent	809		0	
5/3/2019	1,314	0	1,760	Vent	0		0	System down on arrival.
5/7/2019	1,318	0	4,764	Vent	2,279		0	
5/24/2019	1,335	0	0	Vent	0		0	
5/29/2019	1,340	0	2,082	Vent	1,461		0	
6/3/2019	1,345	75	314	Vent	175		0	
6/20/2019	1,362	10	2,032	Vent	1,861		0	Samples for TO-15 from SVE-1, SVE-2, and Influent. Adjusted system after sampling to open SVE-1 as vent well and SVE-3 for system extraction.
6/20/2019	1,362	Vent	1,665	2,766	4,356		0	System PID Readings 1 hour after adjustments.
6/27/2019	1,369	Vent	68	330	331		0	
7/2/2019	1,374	Vent	0	440	844		0	Changed blower oil
7/19/2019	1,391	Vent	56	350	148		0	
7/24/2019	1,396	Vent	0	570	385		0	

Notes:

[1] Days in operation since system startup on April 17, 2015.

Operational change was made on 6/20/19. Due to reduced concentrations observed at SVE-1 and the influent, SVE-01 was opened as a vent well to promote focused flow towards SVE-02 and SVE-03.

Blank cells - Not all wells were measured with the PID during each sampling event.

Table 2-3 VOC Mass Removal Estimate - SWMU 172/174 SVE System

Date	PID Reading (ppbv)	Corrected Value (PCE) (ppbv)[1]	System Flow (cfm)	Cumulative Runtime Hours	VOCs removed in Operating Period Between Monitoring Events (lbs)[2]	Cumulative VOC Mass Removed Since Start of SVE Operations in April, 2015 (lbs)
4/8/2019	1,092	628	70	24,755	0.458	16.04
4/18/2019	41	24	70	24,992	0.010	16.05
4/23/2019	809	466	70	25,111	0.094	16.14
5/3/2019	0	0	70	25,275	0.000	16.14
5/7/2019	1,765	1,016	70	25,372	0.169	16.31
5/24/2019	0	0	70	25,772	0.000	16.31
5/29/2019	1,461	841	70	25,885	0.161	16.47
6/3/2019	175	101	70	26,006	0.021	16.49
6/20/2019	1,861	1,071	70	26,407	0.731	17.22
6/27/2019	331	190	100	26,572	0.077	17.30
7/2/2019	844	486	98	26,690	0.136	17.43
7/19/2019	148	85	100	27,093	0.083	17.52
7/24/2019	385	222	98	27,205	0.059	17.58

Notes:

PID = photoionization detector

ppbv = parts per billion by volume

cfm = cubic feet per minute

lbs = pounds

[1] A correction factor of 0.57 has been applied to the PID vapor measurement for VOCs based on the mixture of analytes detected in the TO-15 analysis at the influent sample point from 6/20/19. This number is much higher than the TO-15 results.

[2] These are based soley on the PID measurements collected this quarter; the TO-15 analysis indicates much lower mass.

TO-15 analysis results showed Tetrachloroethene made up 88% of the total VOCs removed at the influent on 6/20/19.

Table 3-1 - Baseline and Performance Monitoring Groundwater Data; 4-78/79 Benzene Treatment Area

Sample ID	Date	Sample Depth (ft bgs)	TCE (ug/L)		cis-1,2-DCE (ug/L)		VC (ug/L)		Benzene (ug/L)		Nitrate (mg-N/L)		Nitrite (mg-N/L)		Sulfate (mg/L)	
B78-11-8-113017	11/30/2017	8	0.42		0.98		1.11		9.66		<0.100	U	<0.100	U	1.94	
B78-11-021418	2/14/2018	8	1.16		0.84		1.09		14.8		<0.100	U	<0.100	U	9.22	D
B78-11-051518	5/15/2018	8	1.86		0.78		1.06		12.6		<0.100	U	<0.100	U	34.1	D
B78-11-180917	9/17/2018	8	5.01		7.90		3.62		9.20		<0.100	U	<0.100	U	23.4	D
B78-11-020719	2/7/2019	8	3.13		2.47		1.81		4.88		<0.100	U	<0.100	U	25.0	D
B78-11-050719	5/7/2019	8	8.60		6.55		3.56		2.15		<0.100	U	<0.100	U	47.0	D
B78-13-15-112917	11/29/2017	15	0.24		1.29		2.02		9.92		0.135		<0.100	U	0.652	
B78-13-021418	2/14/2018	15	<0.2	U	1.78		8.49		4.11		<0.100	U	<0.100	U	1.31	
B78-13-051518	5/15/2018	15	<0.2	U	0.85		0.87		4.94		0.182		<0.100	U	4.32	D
B78-13-180917	9/17/2018	15	<0.2	U	0.61		0.38		3.29		<0.100	U	<0.100	U	0.812	
B78-13-020719	2/7/2019	15	<0.2	U	0.37		0.29		0.74		<0.100	U	<0.100	U	0.189	
B78-13-050719	5/7/2019	15	<0.2	U	0.57		0.45		1.16		<0.100	U	<0.100	U	<0.100	U
B78-17-9-100617	10/6/2017	9	<0.2	U	0.17	J	0.33		4.84		-		-		-	
B78-17-15-112917	11/29/2017	15	1.25		0.81		1.31		6.52		<0.100	U	<0.100	U	17.1	D
B78-17-021418	2/14/2018	15	2.57		1.78		1.47		4.61		<0.100	U	<0.100	U	7.35	D
B78-17-051518	5/15/2018	15	0.91		1.63		0.53		2.60		<0.100	U	<0.100	U	8.66	D
B78-17-180917	9/17/2018	15	<0.2	U	0.39		<0.2	U	1.37		<0.100	U	<0.100	U	9.63	D
B78-17-020719	2/7/2019	15	<0.2	U	0.68		0.47		0.56		0.101		<0.100	U	2.32	
B78-17-050719	5/7/2019	15	5.00		5.72		1.79		1.07		0.101		<0.100	U	4.92	D
B78-18-8-100617	10/6/2017	8	<0.2	U	0.07	J	0.29		0.72		-		-		-	
B78-18-15-112917	11/29/2017	15	<0.2	U	<0.2	U	0.35	M	3.10		<0.100	U	<0.100	U	0.343	
DUP-01-112917	11/29/2017	15	<0.2	U	<0.2	U	0.36		2.96		<0.100	U	<0.100	U	1.68	
B78-18-021418	2/14/2018	15	<0.2	U	<0.2	U	0.24		1.28		<0.100	U	<0.100	U	1.47	
B78-18-051518	5/15/2018	15	<0.2	U	<0.2	U	0.23		1.68		<0.100	U	<0.100	U	27.6	D
B78-18-180917	9/17/2018	15	<0.2	U	<0.2	U	<0.2	U	0.89		<0.100	U	<0.100	U	7.28	D
B78-18-020719	2/7/2019	15	<0.2	U	<0.2	U	0.22		1.32		<0.100	U	<0.100	U	2.41	D
B78-18-050719	5/7/2019	15	<0.2	U	0.31		0.24		1.66		<0.100	U	<0.100	U	2.44	D
B78-19-9-100617	10/6/2017	9	<0.2	U	0.06	J	0.22		0.69		-		-		-	
B78-19-15-112917	11/29/2017	15	<0.2	U	<0.2	U	0.27	M	0.36		<0.100	U	<0.100	U	0.255	
B78-19-021418	2/14/2018	15	<0.2	U	<0.2	U	0.21		0.23		<0.100	U	<0.100	U	1.22	
B78-19-051518	5/15/2018	15	<0.2	U	<0.2	U	0.21		0.34		<0.100	U	<0.100	U	22.4	D
B78-19-180917	9/17/2018	15	<0.2	U	<0.2	U	<0.2	U	<0.2	U	<0.100	U	<0.100	U	1.91	
B78-19-020719	2/7/2019	15	<0.2	U	<0.2	U	<0.2	U	<0.2	U	<0.100	U	<0.100	U	2.16	
B78-19-050719	5/7/2019	15	<0.2	U	<0.2	U	<0.2	U	0.50		<0.100	U	<0.100	U	14.2	D
B78-20-8-100617	10/6/2017	8	<0.2	U	<0.2	U	0.14	J	8.81		-		-		-	
B78-20-15-113017	11/30/2017	15	0.41		<0.2	U	<0.2	U	25.9		2.93	D	<0.100	U	53.9	D
B78-20-021418	2/14/2018	15	0.25		0.49	M	<0.2	U	40.0		<0.100	U	<0.100	U	21.1	D
B78-20-051518	5/15/2018	15	<0.2	U	0.39		0.22		54.2		<0.100	U	<0.100	U	15.5	D
B78-20-180917	9/17/2018	15	0.24		0.27		0.29		0.98		<0.100	U	<0.100	U	2.39	
B78-20-020719	2/7/2019	15	<0.2	U	0.41	M	0.25		16.5		<0.100	U	<0.100	U	1.89	
B78-20-050719	5/7/2019	15	<0.2	U	0.32		0.28		16.3		<0.100	U	<0.100	U	4.93	D

Table 3-1 - Baseline and Performance Monitoring Groundwater Data; 4-78/79 Benzene Treatment Area

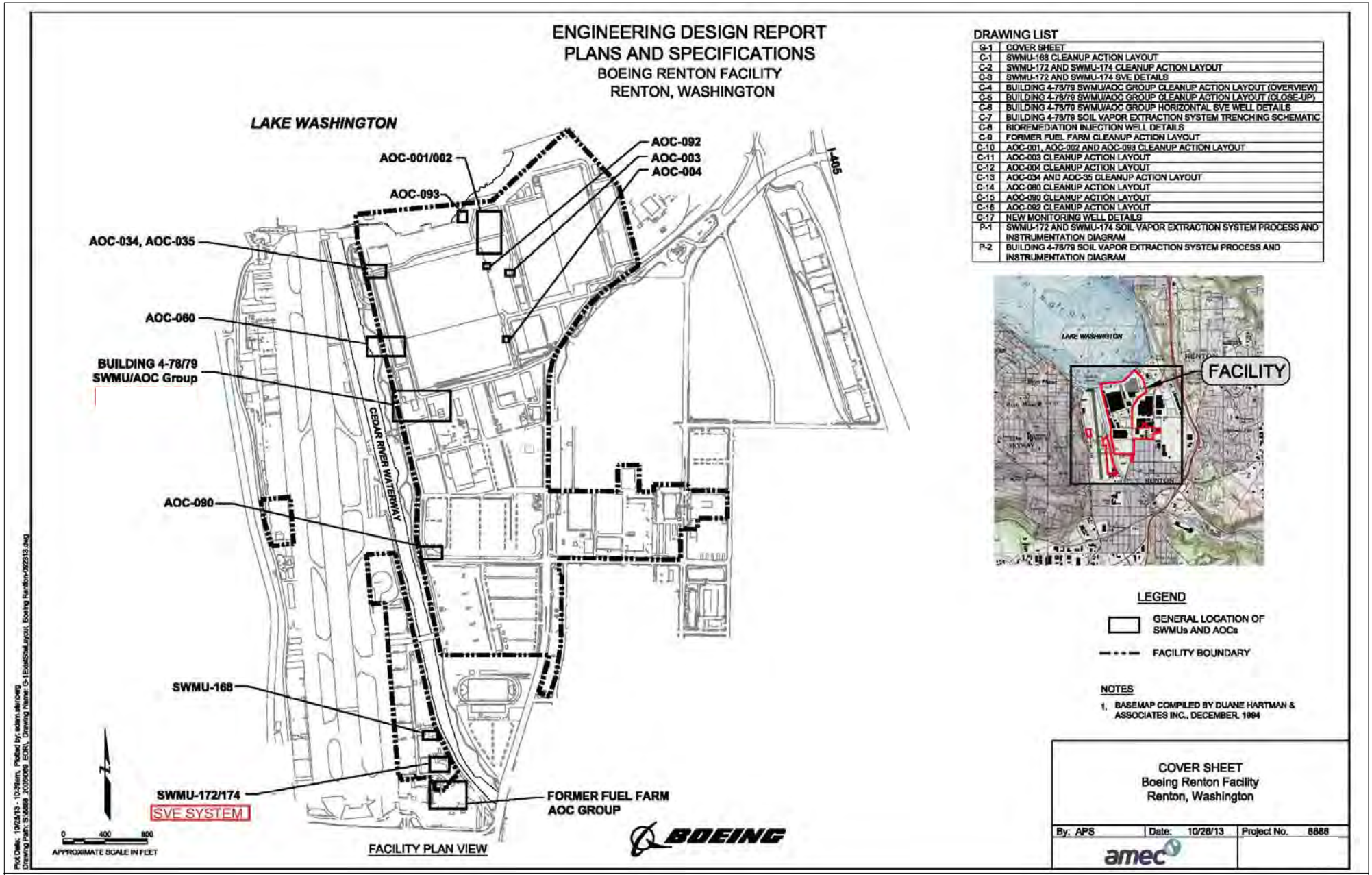
Sample ID	Date	Sample Depth (ft bgs)	TCE (ug/L)		cis-1,2-DCE (ug/L)		VC (ug/L)		Benzene (ug/L)		Nitrate (mg-N/L)		Nitrite (mg-N/L)		Sulfate (mg/L)	
B78-21-8-100617	10/6/2017	8	<0.2	U	0.13	J	0.21		1.42		-		-		-	
Dup01-100617	10/6/2017	15	<0.2	U	0.15	J	0.20	J	2.01		-		-		-	
B78-21-15-112917	11/29/2017	15	<0.2	U	0.31	M	0.26		2.27		0.101		<0.100	U	4.43	D
B78-21-021418	2/14/2018	15	<0.2	U	0.24		0.30		0.86		<0.100	U	<0.100	U	1.60	
B78-21-051518	5/15/2018	15	<0.2	U	0.27		0.27		1.08		<0.100	U	<0.100	U	4.59	D
B78-21-180917	9/17/2018	15	0.22		0.29		<0.2	U	0.59		<0.100	U	<0.100	U	3.62	D
B78-21-020719	2/7/2019	15	<0.2	U	0.28		0.32		0.43		0.170		0.161		3.78	D
B78-21-050719	5/7/2019	15	<0.2	U	0.42		<0.2	U	0.80		<0.100	U	<0.100	U	5.73	D
GW-244S-13-112917	11/29/2017	13	3.48		8.06		5.68		7.97		<0.100	U	<0.100	U	0.753	
GW-244S-021418	2/14/2018	13	1.01		1.25		1.22		5.34		<0.100	U	<0.100	U	1.25	
GW-244S	3/6/2018	13	1.26		2.00		1.56		6.86		-		-		-	
GW-244S-051518	5/15/2018	13	<0.2	U	0.30		0.41		3.89		<0.100	U	<0.100	U	<0.100	U
GW-244S-180917	9/17/2018	13	<0.2	U	0.25		0.38		3.74		<0.100	U	<0.100	U	0.113	
GW-244S	*11/13/2018*	*13*	*<0.2*	*U*	*0.26*		*0.55*		*2.95*		-		-		-	
GW-244S-020719	2/7/2019	13	<0.2	U	0.26		0.47		1.14		0.101		<0.100	U	0.337	
GW-244S	*3/4/2019*	*13*	*0.22*		*0.82*		*0.86*		*1.73*		-		-		-	
GW-244S-050719	5/7/2019	13	<0.2	U	1.22		1.18		1.13		<0.100	U	<0.100	U	1.45	
GW-244S	*5/7/2019*	*13*	*<0.2*	*U*	*2.03*		*1.45*		*1.47*		-		-		-	
GW-031S-23-113017	11/30/2017	23	<0.2	U	<0.2	U	<0.2	U	17.6		<0.100	U	<0.100	U	2.54	D
GW-031S-021418	2/14/2018	23	<0.2	U	0.45	M	0.49		21.9		<0.100	U	<0.100	U	3.67	D
DUP-01-021418	2/14/2018	23	<0.2	U	0.46		0.42		21.4		-		-		-	
GW-031S	3/6/2018	23	<0.2	U	1.18		<0.2	U	60.3		-		-		-	
GW-031S-051518	5/15/2018	23	0.36		0.40		0.21		2.68		<0.100	U	<0.100	U	2.95	D
Dup-01-051518	5/15/2018	23	0.32		0.34		0.20		2.64		<0.100	U	<0.100	U	2.87	D
GW-031S-180917	9/17/2018	23	<0.2	U	<0.2	U	0.28		<0.2	U	<0.100	U	<0.100	U	0.499	
Dup-01-180917	9/17/2018	23	<0.2	U	0.21		0.30		<0.2	U	<0.100	U	<0.100	U	0.441	
GW-031S	*11/13/2018*	*23*	*<0.2*	*U*	*0.63*		*0.31*		*28.3*		-		-		-	
Dup-01	*11/13/2018*	*23*	*<0.2*	*U*	*0.58*		*0.30*		*23.8*		-		-		-	
GW-031S-020719	2/7/2019	23	<0.2	U	0.51	M	<0.2	U	21.6		<0.100	U	<0.100	U	0.170	
Dup-01-020719	2/7/2019	23	<0.2	U	0.57	M	0.24		22.7		<0.100	U	<0.100	U	0.202	
GW-031S	*3/4/2019*	*23*	*<0.2*	*U*	*<0.2*	*U*	*<0.2*	*U*	*55.9*		-		-		-	
Dup-01	*3/4/2019*	*23*	*<0.2*	*U*	*<0.2*	*U*	*<0.2*	*U*	*58.6*		-		-		-	
GW-031S-050719	5/7/2019	23	<0.2	U	0.22		0.30		1.90		<0.100	U	<0.100	U	1.86	
Dup-01-050719	5/7/2019	23	<0.2	U	0.27		<0.2	U	2.16		<0.100	U	<0.100	U	0.689	
GW-031S	*5/7/2019*	*23*	*<0.2*	*U*	*0.43*		*0.29*		*7.13*		-		-		-	
Dup-01	*5/7/2019*	*23*	*<0.2*	*U*	*0.38*		*0.27*		*6.69*		-		-		-	

Notes:
U = non-detect
D = dilution
M = Estimated value for a GC/MS analyte detected and confirmed by an analyst but with low spectral match parameters.
Samples in italics collected as part of the Renton quarterly groundwater monitoring program.

Table 3-2 Groundwater Monitoring Results Summary May 2019 and Recommended ERD Treatment

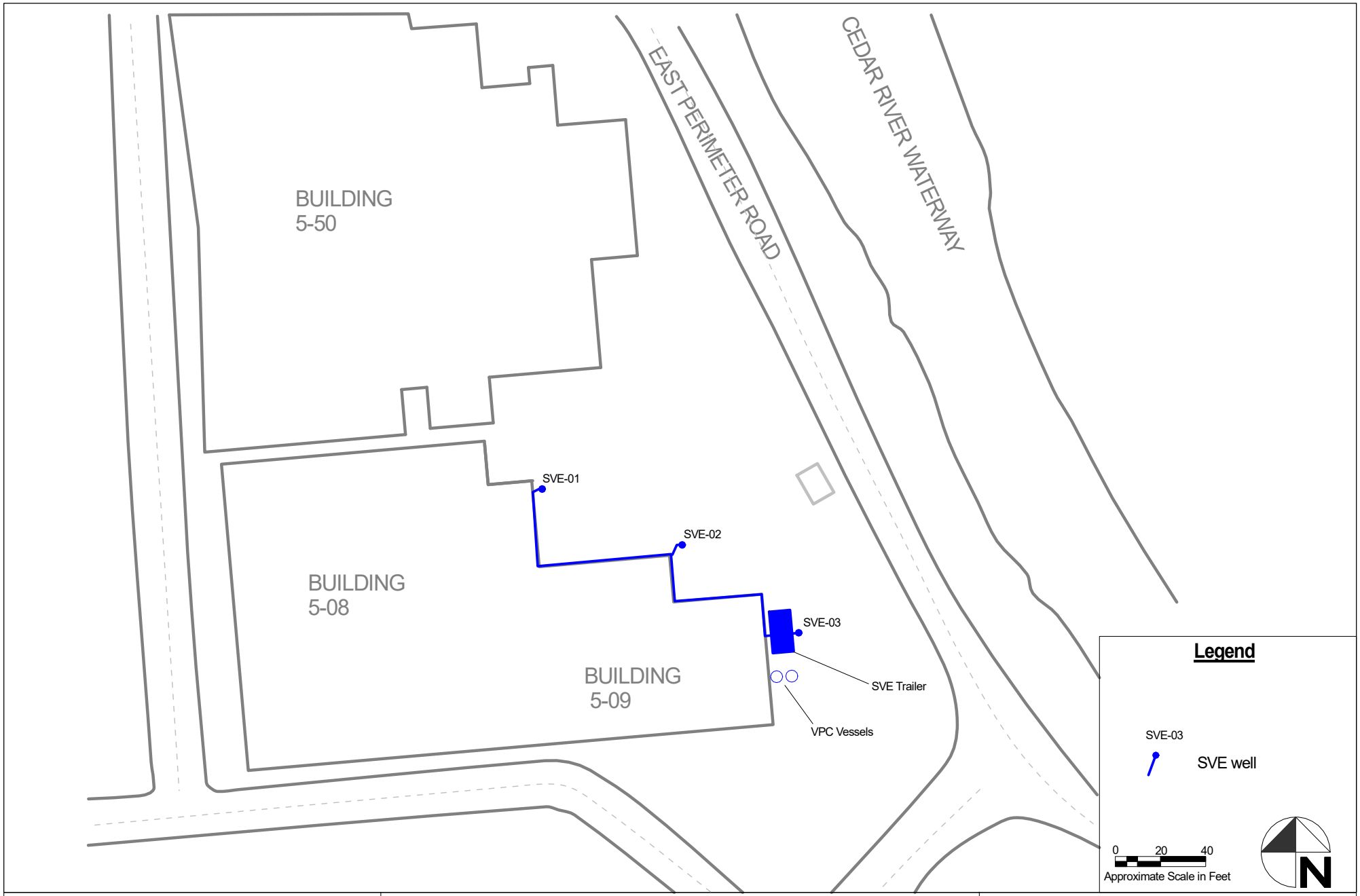
GW Treatment Area	Source and down gradient MWs	CPOC wells	Treatment IWs	ERD Treatment Recommendation
SWMU-172/174	PCE less than 0.1 ug/L and TCE less than 0.20 ug/L; cisDCE less than 0.70 ug/L; VC less than 0.25 ug/L.	All detections are at 0.35 ug/L or less.	*Prior data Mar 2018, North and South IWS showed total CVOCs range from 0.03 ug/L to 6.90 ug/L. TOC near background.*	**Detections are very low and less than 1 ug/L throughout the site. Will consider additional injections if beneficial.**
Building 4-78/4-79 SWMU/AOC Group	TCE, cisDCE and VC are ND or less than 0.55 ug/L at all but GW244S (cDCE at 2 ug/L and VC at 1.5 ug/L). One central well (GW033S) continues to show significant reductions in total CVOCs from 1,430 ug/L in Nov 2017. Recent data show 46 ug/L in Nov 2018, 4.1 ug/L in Mar 2019, and 0.94 ug/L in May 2019. Substrate was applied to this area after Mar 2019 sampling. Benzene decreased at source well GW031S (59 ug/L in Mar 2019 to 7.1 ug/L in May 2019). Nitrate/sulfate injected following Mar 2019 sampling.	All CPOC wells are ND for CVOCs except GW240D with VC at 0.27 ug/L (CUL is 0.20 ug/L). Northern well GW237S showed decrease in Benzene from 9.58 ug/L to 2.20 ug/L in May 2019.	*Prior data May 2017, 4 of 5 wells with low detections where sum of CVOCs are less than 3 ug/L*	**Detections are very low throughout the site. Will consider additional injections if beneficial. Nitrate/sulfate injections to be completed following planned soil excavations in benzene treatment area.**
AOC-001/002	*Prior data Mar 2019: Source MW: TCE is ND; cisDCE less than 0.60 ug/L and VC less than 0.07 ug/L. Down gradient wells less than 0.71 ug/L*	All detections below 0.50 ug/L with the exception of GW197S which showed an increase in VC from 0.0647 ug/L in Mar to 1.66 ug/L in May 2019.	*Prior data Mar 2018, detections at or below 0.30 ug/L.*	**Consider injection at infiltration galleries at source (IPRA and IPRB) when area is accessible.**
AOC-003	*Prior data Mar 2019: All detections are less than 0.54 ug/L.*	All detections are less than 0.55 ug/L.	*Prior data May 2017 one of four IWs sampled – VC detection less than 0.30 ug/L*	**Substrate injection to be considered in conjunction with AOC-001/002.**
Lot 20 / former 10-71	All wells are ND.	-	-	**No action at this time.**
AOC-60	*Prior data Mar 2019: MW's with detections less than 0.30 ug/L; treatment MWs with total CVOCs less than 2.6 ug/L.*	*Prior data Mar 2019: Detections less than 0.15 ug/L.*	-	**Detections are very low throughout the site. Will consider additional injections if beneficial.**
AOC – 90	*Prior data Mar 2019: Treatment MW at source with total CVOCs at 1.6 ug/L total CVOCs down from 27 ug/L in Aug 2018; down gradient wells less than 0.30 ug/L.*	*Prior data Mar 2019: Detections less than 0.44 ug/L.*	-	**Detections are very low throughout the site. Will consider additional injections if beneficial.**
Apron A	Two of three wells ND; other well shows VC at 1.39 ug/L.	-	-	**Detections are very low throughout the site. Will consider additional injections if beneficial.**
Building 4-70	-	*Prior data Mar 2019: Detections less than 0.42 ug/L.*	-	**No action at this time.**

FIGURES



CALIBRE Systems, Inc.

Figure 1-1 Site Location/ AOC Outlines



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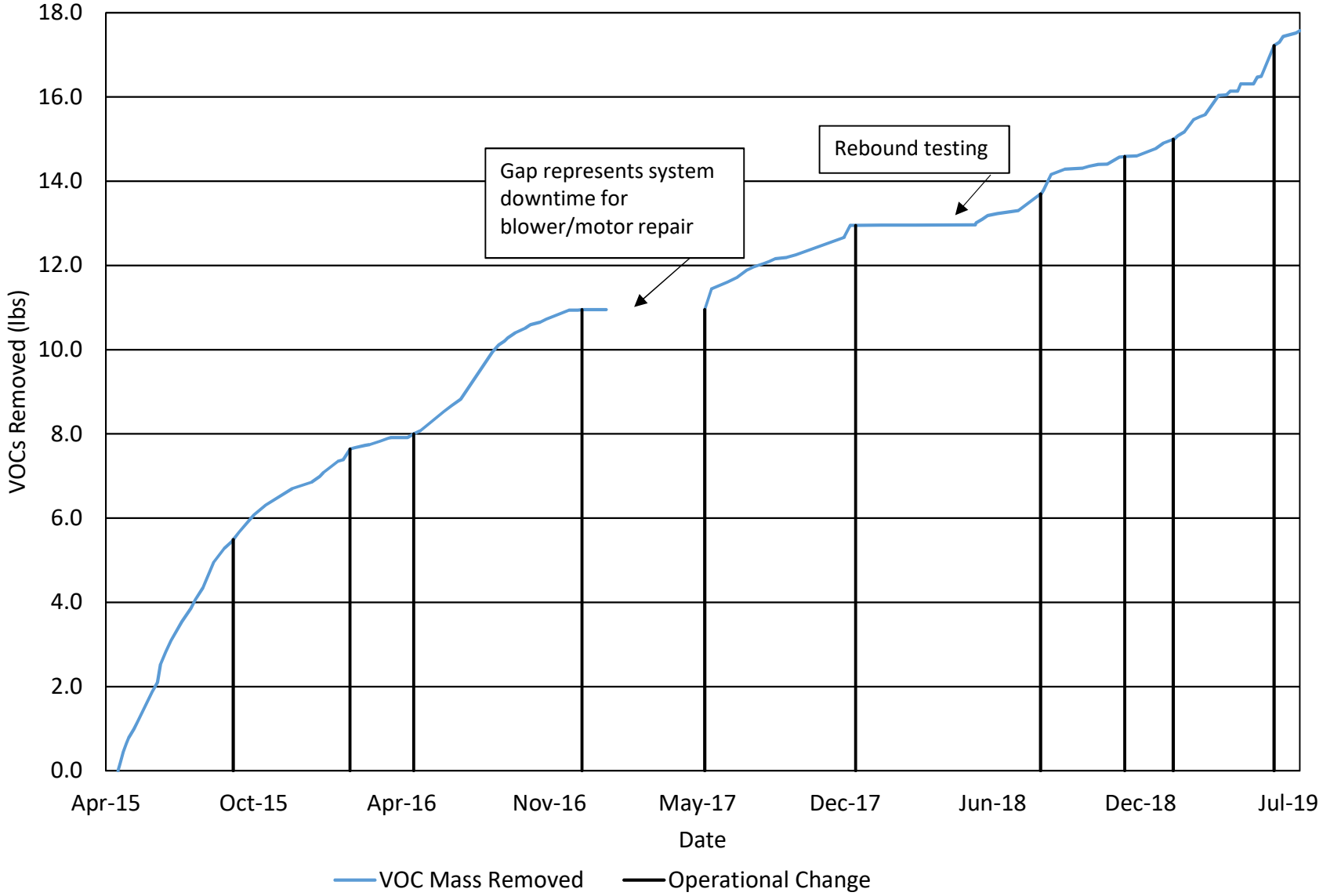
Boeing Renton
Spring 2017 SVE Quarterly Summary Report

Figure 2-1 SWMU-172/174 Area
SVE System Layout

Figure 2-2 Cumulative VOC Mass Removed - SWMU-172/174 SVE System



*SWMU 172/174 SVE system did not run Winter 2017 due to equipment failure.

Attachment A: Field Log Forms

Renton Cleanup Action SVE System – SWMU 172/174
Field Operations Log Form

Inspection Date: 4/8/19 Date of last inspection: 3/21/19

Periodic systems check:
1) Check flowrate, vacuum, pressure, moisture separator, water storage drums
2) Check each SVE well, VPC inlet, and VPC outlet with PID.

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 0935		Motor Hours: 9945.7
Blower	**Current Value**	**Other Notes**
Vacuum gauge	45" H20	Picked up new bottle of 10 ppm Isobutylene calgas from National Safety
Pressure gauge	10" H20	
System flow rate	70 SCFM	
Blower Temperature	114°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPBRAE 3000			Details: 0 ppb / 10.06 ppm				
Calibration time/ date: 0935 4/8/19			PID check after monitoring:				
Sampling Point	**Time**	**PID Reading (1)**	**PID Reading (2)**	**Vacuum**	**Flow Rate (gauge)**	**Differential Pressure**	**Flow Rate Calculated[1]**
SVE-01	1019	0 ppb	0 ppb		24	4.4	25.7
SVE-02	1010	1,518 ppb	1,457 ppb		>30	>5	
SVE-03	Vault						
VPC Inlet	0957	1,092 ppb	1,089 ppb				
VPC Midpoint							
VPC Outlet	0950	0 ppb	0 ppb				
Other vapor point _____							

1. Flow rate calculated from the equation $Flow\ Rate\ (cfm) = 12.24 \times \sqrt{differential\ pressure}$.

Questions? Call Justin Neste @ (360) 981-5606
At the Completion of a monitoring event scan monitoring forms and email to Justin Neste: Justin.Neste@calibresys.com

Signature _____ Printed Name _____ Signature _____ Date

Renton Cleanup Action SVE System – SWMU 172/174
Field Operations Log Form

Inspection Date: 4/18/19 Date of last inspection: 4/8/19

Periodic systems check:

1) Check flowrate, vacuum, pressure, moisture separator, water storage drums

2) Check each SVE well, VPC inlet, and VPC outlet with PID.

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 10:30		Motor Hours: 10,183.3
Blower	**Current Value**	**Other Notes**
Vacuum gauge	45" H_2O	
Pressure gauge	10" H_2O	
System flow rate	70 SCFM	
Blower Temperature	119 °F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model:	Details:
Calibration time/ date:	PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01		0 ppb	0 ppb				
SVE-02		66 ppb	62 ppb				
SVE-03		Vent					
VPC Inlet		26 ppb	41 ppb				
VPC Midpoint							
VPC Outlet		0 ppb	0 ppb				
Other vapor point _____							

1. Flow rate calculated from the equation $Flow\ Rate\ (cfm) = 12.24 \times \sqrt{differential\ pressure}$.

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Signature _____ Printed Name _____ Signature _____ Date

Renton Cleanup Action SVE System – SWMU 172/174
Field Operations Log Form

Inspection Date: 4/23/19 Date of last inspection: 4/18/19

Periodic systems check:

1) Check flowrate, vacuum, pressure, moisture separator, water storage drums

2) Check each SVE well, VPC inlet, and VPC outlet with PID.

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 1100		Motor Hours: 10,302.0
Blower	**Current Value**	**Other Notes**
Vacuum gauge	45" H_2O	
Pressure gauge	8" H_2O	
System flow rate	70 SCFM	
Blower Temperature	123°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPB RAE 3000			Details: 0 ppb / 10.01 ppm				
Calibration time/ date: 4/23/19 1100			PID check after monitoring:				
Sampling Point	**Time**	**PID Reading (1)**	**PID Reading (2)**	**Vacuum**	**Flow Rate (gauge)**	**Differential Pressure**	**Flow Rate Calculated[1]**
SVE-01		0 ppb	0 ppb				
SVE-02		772 ppb	741 ppb				
SVE-03		Vent					
VPC Inlet		809 ppb	786 ppb				
VPC Midpoint							
VPC Outlet		0 ppb	0 ppb				
Other vapor point _____							

1. Flow rate calculated from the equation $Flow\ Rate\ (cfm) = 12.24 \times \sqrt{differential\ pressure}$.

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At the Completion of a monitoring event scan monitoring forms and email to Justin Neste: Justin.Neste@calibresys.com

Signature Justin Neste (Printed Name) _____ (Signature) 4/23/19 (Date)

Renton Cleanup Action SVE System – SWMU 172/174
Field Operations Log Form

Inspection Date: 5/3/19 Date of last inspection: 4/23/19

Periodic systems check:
1) Check flowrate, vacuum, pressure, moisture separator, water storage drums
2) Check each SVE well, VPC inlet, and VPC outlet with PID.

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 1130		Motor Hours: 10465.5
Blower	**Current Value**	**Other Notes**
Vacuum gauge	48" H20	System down @ arrival
Pressure gauge	10" H20	
System flow rate	70 scfm	
Blower Temperature	94°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model:	Details:
Calibration time/ date:	PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01		0 ppb	0 ppb @ 25 min				
SVE-02		1,760 ppb	705 ppb @ 10 min	1,731 ppb @ 20 min			
SVE-03		Vent					
VPC Inlet		0 ppb	0 ppb @ 10 min	0 ppb @ 25 min			
VPC Midpoint							
VPC Outlet		0 ppb	0 ppb				
Other vapor point _____							

1. Flow rate calculated from the equation $Flow\ Rate\ (cfm) = 12.24 \times \sqrt{differential\ pressure}$.

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Signature _____ Printed Name _____ Signature _____ Date

Renton Cleanup Action SVE System – SWMU 172/174
Field Operations Log Form

Inspection Date: 5/7/19 Date of last inspection: 5/3/19

Periodic systems check:
1) Check flowrate, vacuum, pressure, moisture separator, water storage drums
2) Check each SVE well, VPC inlet, and VPC outlet with PID.

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 1420		Motor Hours: 10563.2
Blower	**Current Value**	**Other Notes**
Vacuum gauge	45 "H20	
Pressure gauge	10" H20	
System flow rate	70 SCFM	
Blower Temperature	125°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPB RAE 3000	Details: 0 ppb / 9,991 ppb
Calibration time/ date: 5/7/19 1420	PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01		0 ppb					
SVE-02		4,769 ppb	3,400 ppb				
SVE-03		Vent					
VPC Inlet		1,765 ppb	2,279 ppb				
VPC Midpoint							
VPC Outlet		0 ppb	0 ppb				
Other vapor point _____							

1. Flow rate calculated from the equation $Flow\ Rate\ (cfm) = 12.24 \times \sqrt{differential\ pressure}$.

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Signature Justin Neste Printed Name _____ Signature 5/7/19 Date

Renton Cleanup Action SVE System – SWMU 172/174
Field Operations Log Form

Inspection Date: 5/24/19 Date of last inspection: 5/7/19

Periodic systems check:
1) Check flowrate, vacuum, pressure, moisture separator, water storage drums
2) Check each SVE well, VPC inlet, and VPC outlet with PID.

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 1200		Motor Hours: 10963.2
Blower	**Current Value**	**Other Notes**
Vacuum gauge	45" H_2O	
Pressure gauge	10" H_2O	
System flow rate	70 scfm	
Blower Temperature	119°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model:	Details:
Calibration time/ date:	PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01		0 ppb	0 ppb				
SVE-02		0 ppb	0 ppb				
SVE-03		Vent					
VPC Inlet		0 ppb	0 ppb				
VPC Midpoint							
VPC Outlet		0 ppb	0 ppb				
Other vapor point _____							

1. Flow rate calculated from the equation $Flow\ Rate\ (cfm) = 12.24 \times \sqrt{differential\ pressure}$.

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At the Completion of a monitoring event scan monitoring forms and email to Justin Neste: Justin.Neste@calibresys.com

Signature _____ Printed Name _____ Signature _____ Date

Renton Cleanup Action SVE System – SWMU 172/174
Field Operations Log Form

Inspection Date: 5/29/19 Date of last inspection: 5/24/19

Periodic systems check:

1) Check flowrate, vacuum, pressure, moisture separator, water storage drums

2) Check each SVE well, VPC inlet, and VPC outlet with PID.

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 0630		Motor Hours: 11075.7
Blower	**Current Value**	**Other Notes**
Vacuum gauge	46" H20	
Pressure gauge	10" H20	
System flow rate	70 SCFM	
Blower Temperature	116°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPB RAE 3000			Details: 0 ppb / 9,991 ppb				
Calibration time/ date: 5/29/19 0630			PID check after monitoring:				
Sampling Point	**Time**	**PID Reading (1)**	**PID Reading (2)**	**Vacuum**	**Flow Rate (gauge)**	**Differential Pressure**	**Flow Rate Calculated[1]**
SVE-01	0705	0 ppb	0 ppb				
SVE-02	0715	2,082 ppb	1,970 ppb				
SVE-03	Vent						
VPC Inlet	0655	1,349 ppb	1,461 ppb				
VPC Midpoint							
VPC Outlet	0646	0 ppb	0 ppb				
Other vapor point _____							

1. Flow rate calculated from the equation $Flow\ Rate\ (cfm) = 12.24 \times \sqrt{differential\ pressure}$.

Questions? Call Justin Neste @ (360) 981-5606

At the Completion of a monitoring event scan monitoring forms and email to Justin Neste: Justin.Neste@calibresys.com

Signature Justin Neste (Printed Name) _____ (Signature) 5/29/19 (Date)

Renton Cleanup Action SVE System – SWMU 172/174
Field Operations Log Form

Inspection Date: 6/3/19 Date of last inspection: 5/29/19

Periodic systems check:

1) Check flowrate, vacuum, pressure, moisture separator, water storage drums

2) Check each SVE well, VPC inlet, and VPC outlet with PID.

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 0920		Motor Hours: 11,196.4
Blower	**Current Value**	**Other Notes**
Vacuum gauge	45" H_2O	
Pressure gauge	10" H_2O	
System flow rate	70SCFM	
Blower Temperature	125°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPB RAE 3000	Details: 0 PPB / 9999 PPB
Calibration time/ date: 6/3/19 0920	PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01		58 PPB	75 PPB				
SVE-02		285 PPB	224 PPB, 314 PPB				
SVE-03		Vent					
VPC Inlet		440 PPB	175 PPB				
VPC Midpoint							
VPC Outlet		0 PPB	0 PPB				
Other vapor point _____							

1. Flow rate calculated from the equation $Flow\ Rate\ (cfm) = 12.24 \times \sqrt{differential\ pressure}$.

Questions? Call Justin Neste @ (360) 981-5606

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Signature _____ Printed Name _____ Signature _____ Date

Renton Cleanup Action SVE System – SWMU 172/174
Field Operations Log Form

Inspection Date: 6/20/19 Date of last inspection: 6/3/19

Periodic systems check:
1) Check flowrate, vacuum, pressure, moisture separator, water storage drums
2) Check each SVE well, VPC inlet, and VPC outlet with PID.

Operational Parameters - Monitoring interval is variable.

Inspection Time: 0800 Motor Hours: 1,597.4

Blower	Current Value
Vacuum gauge	46" H2O
Pressure gauge	10" H2O
System flow rate	70 scfm
Blower Temperature	122°F
Temp.at lag VPC discharge	

Other Notes

Sampled SVE-1, 2 & Influent
After samples, adjusted system to open SVE-1 to vent & SVE-3 to extract.
Vac = 40" H2O
Pres = 20" H2O
Flow = 98 scfm
Temp = 117°F

	Flow	Diff Pres
SVE-3	>30 scfm	>5" H2O
SVE-2	>30 scfm	>5" H2O

SEE PID READINGS AFTER CHANGE BELOW.

Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration

PID Model: PPB RAE 3000 Details: 0 ppb / 10.01 ppm

Calibration time/ date: 6/20/19 0800 PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01		6 ppb	10 ppb				
SVE-02		1,989 ppb	2,032 ppb				
SVE-03		Vent					
VPC Inlet		1,861 ppb	1,807 ppb				
VPC Midpoint							
VPC Outlet	0840	0 ppb	0 ppb				
Other vapor point _____							

1. Flow rate calculated from the equation $Flow\ Rate\ (cfm) = 12.24 \times \sqrt{differential\ pressure}$.

Questions? Call Justin Neste @ (360) 981-5606
At the Completion of a monitoring event scan monitoring forms and email to Justin Neste: Justin.Neste@calibresys.com

Signature Justin Neste Printed Name Signature 6/20/19 Date

	SVE-IN	SVE out	SVE 2	SVE 3
~10 min	~~3,062~~ / 3,849 ppb		1,573 / 1,581 ppb	2,039 / 2,140 ppb
~1 Hr	4,344 / 4,356 ppb	@ 10 ppb	1,665 / 1,420 ppb	2,766 / 2,645 ppb
~2Hr	4,450 ppb			3,158 ppb

Renton Cleanup Action SVE System – SWMU 172/174
Field Operations Log Form

Inspection Date: 6/27/19 Date of last inspection: 6/20/19

Periodic systems check:
1) Check flowrate, vacuum, pressure, moisture separator, water storage drums
2) Check each SVE well, VPC inlet, and VPC outlet with PID.

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 0915		Motor Hours: 11,763.2
Blower	**Current Value**	**Other Notes**
Vacuum gauge	30" H20	
Pressure gauge	20" H20	
System flow rate	100 scfm	
Blower Temperature	113°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPB RAE 3000			Details: 0 ppb / 9.98 ppm				
Calibration time/ date: 6/27/19 0915			PID check after monitoring:				
Sampling Point	**Time**	**PID Reading (1)**	**PID Reading (2)**	**Vacuum**	**Flow Rate (gauge)**	**Differential Pressure**	**Flow Rate Calculated[1]**
SVE-01		Vent					
SVE-02		68 ppb	53 ppb 58 ppb				
SVE-03		285 ppb	125 ppb 330 ppb				
VPC Inlet		329 ppb	331 ppb				
VPC Midpoint							
VPC Outlet		0 ppb	0 ppb				
Other vapor point _____							

1. Flow rate calculated from the equation $Flow\ Rate\ (cfm) = 12.24 \times \sqrt{differential\ pressure}$.

Questions? Call Justin Neste @ (360) 981-5606
At the Completion of a monitoring event scan monitoring forms and email to Justin Neste: Justin.Neste@calibresys.com

Signature _____ Printed Name _____ Signature _____ Date

Renton Cleanup Action SVE System – SWMU 172/174
Field Operations Log Form

Inspection Date: 7/2/19 Date of last inspection: 6/27/19

Periodic systems check:
1) Check flowrate, vacuum, pressure, moisture separator, water storage drums
2) Check each SVE well, VPC inlet, and VPC outlet with PID.

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 0830		Motor Hours: 11,880.6
Blower	**Current Value**	**Other Notes**
Vacuum gauge	38" H20	Changed oil in blower.
Pressure gauge	22" H20	
System flow rate	98 SCFM	
Blower Temperature	113°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPB RAE 3000	Details: 0 ppb / 10.00 ppm
Calibration time/ date:	PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01		VENT					
SVE-02	0924	0 ppb	0 ppb				
SVE-03	0932	440 ppb	420 ppb				
VPC Inlet	0920	840 ppb	844 ppb				
VPC Midpoint							
VPC Outlet	0916	0 ppb	0 ppb				
Other vapor point _____							

1. Flow rate calculated from the equation $Flow\ Rate\ (cfm) = 12.24 \times \sqrt{differential\ pressure}$.

Questions? Call Justin Neste @ (360) 981-5606
At the Completion of a monitoring event scan monitoring forms and email to Justin Neste: Justin.Neste@calibresys.com

Signature Justin Neste (Printed Name) _____ (Signature) 7/2/19 (Date)

Renton Cleanup Action SVE System – SWMU 172/174
Field Operations Log Form

Inspection Date: 7/19/19 Date of last inspection: 7/2/19

Periodic systems check:

1) Check flowrate, vacuum, pressure, moisture separator, water storage drums

2) Check each SVE well, VPC inlet, and VPC outlet with PID.

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 1421		Motor Hours: 12,283.8
Blower	**Current Value**	**Other Notes**
Vacuum gauge	39" H_2O	
Pressure gauge	22" H_2O	
System flow rate	100 SCFM	
Blower Temperature	119°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPB RAE 3000	Details: 0 ppb / 9,999 ppb
Calibration time/ date: 7/19/19 1421	PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01		Vent					
SVE-02		45 ppb	56 ppb				
SVE-03		350 ppb	236 ppb				
VPC Inlet		146 ppb	148 ppb				
VPC Midpoint							
VPC Outlet		0 ppb	0 ppb				
Other vapor point _____							

1. Flow rate calculated from the equation $Flow\ Rate\ (cfm) = 12.24 \times \sqrt{differential\ pressure}$.

Questions? Call Justin Neste @ (360) 981-5606

At the Completion of a monitoring event scan monitoring forms and email to Justin Neste: Justin.Neste@calibresys.com

Signature _____ Printed Name _____ Signature _____ Date

Renton Cleanup Action SVE System – SWMU 172/174
Field Operations Log Form

Inspection Date: 7/24/19 Date of last inspection: 7/19/19

Periodic systems check:
1) Check flowrate, vacuum, pressure, moisture separator, water storage drums
2) Check each SVE well, VPC inlet, and VPC outlet with PID.

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 0830		Motor Hours: 12,395.7
Blower	**Current Value**	**Other Notes**
Vacuum gauge	40" H2O	Paint room door open near SVE-1 PID Reads 13.9 ppm reading in @ door.
Pressure gauge	22" H2O	
System flow rate	98 SCFM	
Blower Temperature	113°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPBRAE 3000		Details: 0 ppb / 10.03 ppm	
Calibration time/ date: 7/24/19 0830		PID check after monitoring:	

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01		Vent					
SVE-02		0 ppb	0 ppb				
SVE-03		522 ppb	570 ppb				
VPC Inlet		375 ppb	385 ppb				
VPC Midpoint							
VPC Outlet		0 ppb	0 ppb				
Other vapor point _____							

1. Flow rate calculated from the equation $Flow\ Rate\ (cfm) = 12.24 \times \sqrt{differential\ pressure}$.

Questions? Call Justin Neste @ (360) 981-5606
At the Completion of a monitoring event scan monitoring forms and email to Justin Neste: Justin.Neste@calibresys.com

Signature Justin Neste (Printed Name) _____ (Signature) 7/24/19 (Date)

Attachment B: TO-15 Laboratory Data Package

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7/8/2019
Mr. Justin Neste
CALIBRE, Environmental Technology Solutions
20926 Pugh Rd NE

Poulsbo WA 98370

Project Name: Boeing Renton
Project #:
Workorder #: 1906480

Dear Mr. Justin Neste

The following report includes the data for the above referenced project for sample(s) received on 6/24/2019 at Air Toxics Ltd.

The data and associated QC analyzed by TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics Inc. for your air analysis needs. Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Kelly Buettner at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Kelly Buettner

Project Manager

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WORK ORDER #: 1906480

Work Order Summary

CLIENT:	Mr. Justin Neste CALIBRE, Environmental Technology Solutions 20926 Pugh Rd NE Poulsbo, WA 98370	**BILL TO:**	Accounts Payable Eurofins Lancaster Laboratories Environmental, LLC 2425 New Holland Pike Lancaster, PA 17605-2425
PHONE:	360-981-5606	**P.O. #**	
FAX:		**PROJECT #**	Boeing Renton
DATE RECEIVED:	06/24/2019	**CONTACT:**	Kelly Buettner
DATE COMPLETED:	07/08/2019		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	SVE-1-062019	TO-15	4.7 "Hg	15.1 psi
02A	SVE-2-062019	TO-15	4.7 "Hg	15.9 psi
03A	SVE-IN-062019	TO-15	5.3 "Hg	15.5 psi
04A	Lab Blank	TO-15	NA	NA
05A	CCV	TO-15	NA	NA
06A	LCS	TO-15	NA	NA
06AA	LCSD	TO-15	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 07/08/19

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704434-15-9, UT NELAP CA0093332015-6, VA NELAP - 8113, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2015, Expiration date: 10/17/2016.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

This report shall not be reproduced, except in full, without the written approval of Eurofins Air Toxics, Inc.

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
EPA Method TO-15
CALIBRE, Environmental Technology Solutions
Workorder# 1906480

Three 1 Liter Summa Canister samples were received on June 24, 2019. The laboratory performed analysis via EPA Method TO-15 using GC/MS in the full scan mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

The reported CCV for each daily batch may be derived from more than one analytical file due to the client's request for non-standard compounds. Non-standard compounds may have different acceptance criteria than the standard TO-14A/TO-15 compound list as per contract or verbal agreement.

A single point calibration for TPH referenced to Gasoline was performed for each daily analytical batch. Recovery is reported as 100% in the associated results for each CCV.

Definition of Data Qualifying Flags

Ten qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).
J - Estimated value.
E - Exceeds instrument calibration range.
S - Saturated peak.
Q - Exceeds quality control limits.
U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.
UJ- Non-detected compound associated with low bias in the CCV
N - The identification is based on presumptive evidence.
M - Reported value may be biased due to apparent matrix interferences.
CN - See Case Narrative.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

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Summary of Detected Compounds
EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: SVE-1-062019

Lab ID#: 1906480-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	1.2	1.4	6.4	7.4
Tetrachloroethene	1.2	10	8.1	72

Client Sample ID: SVE-2-062019

Lab ID#: 1906480-02A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
cis-1,2-Dichloroethene	1.2	5.1	4.9	20
1,1,1-Trichloroethane	1.2	1.4	6.7	7.4
Trichloroethene	1.2	9.6	6.6	52
Toluene	1.2	1.4	4.6	5.4
Tetrachloroethene	1.2	100	8.4	720

Client Sample ID: SVE-IN-062019

Lab ID#: 1906480-03A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
cis-1,2-Dichloroethene	1.2	3.5	5.0	14
Trichloroethene	1.2	6.2	6.7	33
Tetrachloroethene	1.2	74	8.5	500

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Client Sample ID: SVE-1-062019

Lab ID#: 1906480-01A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17070509**	**Date of Collection:**	**6/20/19 9:56:00 AM**
Dil. Factor:	**2.40**	**Date of Analysis:**	**7/5/19 03:38 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloromethane	12	Not Detected	25	Not Detected
Vinyl Chloride	1.2	Not Detected	3.1	Not Detected
Freon 113	1.2	Not Detected	9.2	Not Detected
1,1-Dichloroethene	1.2	Not Detected	4.8	Not Detected
Acetone	12	Not Detected	28	Not Detected
Carbon Disulfide	4.8	Not Detected	15	Not Detected
Methylene Chloride	12	Not Detected	42	Not Detected
trans-1,2-Dichloroethene	1.2	Not Detected	4.8	Not Detected
Hexane	1.2	Not Detected	4.2	Not Detected
1,1-Dichloroethane	1.2	Not Detected	4.8	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.8	Not Detected	14	Not Detected
cis-1,2-Dichloroethene	1.2	Not Detected	4.8	Not Detected
Chloroform	1.2	Not Detected	5.8	Not Detected
1,1,1-Trichloroethane	1.2	Not Detected	6.5	Not Detected
Benzene	1.2	Not Detected	3.8	Not Detected
Trichloroethene	1.2	1.4	6.4	7.4
Toluene	1.2	Not Detected	4.5	Not Detected
1,1,2-Trichloroethane	1.2	Not Detected	6.5	Not Detected
Tetrachloroethene	1.2	10	8.1	72
Chlorobenzene	1.2	Not Detected	5.5	Not Detected
Ethyl Benzene	1.2	Not Detected	5.2	Not Detected
m,p-Xylene	1.2	Not Detected	5.2	Not Detected
o-Xylene	1.2	Not Detected	5.2	Not Detected
Styrene	1.2	Not Detected	5.1	Not Detected
Cumene	1.2	Not Detected	5.9	Not Detected
Propylbenzene	1.2	Not Detected	5.9	Not Detected
1,3,5-Trimethylbenzene	1.2	Not Detected	5.9	Not Detected
1,2,4-Trimethylbenzene	1.2	Not Detected	5.9	Not Detected
TPH ref. to Gasoline (MW=100)	120	Not Detected	490	Not Detected
Acetonitrile	12	Not Detected	20	Not Detected
Vinyl Acetate	4.8	Not Detected	17	Not Detected
Octane	4.8	Not Detected	22	Not Detected
Pentane	4.8	Not Detected	14	Not Detected
Butylbenzene	4.8	Not Detected	26	Not Detected
Decane	4.8	Not Detected	28	Not Detected
Dodecane	12	Not Detected	84	Not Detected
sec-Butylbenzene	4.8	Not Detected	26	Not Detected
p-Cymene	4.8	Not Detected	26	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits

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Client Sample ID: SVE-1-062019

Lab ID#: 1906480-01A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17070509**	**Date of Collection:**	**6/20/19 9:56:00 AM**
Dil. Factor:	**2.40**	**Date of Analysis:**	**7/5/19 03:38 PM**

Surrogates	%Recovery	Method Limits
Toluene-d8	104	70-130
1,2-Dichloroethane-d4	96	70-130
4-Bromofluorobenzene	96	70-130

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Client Sample ID: SVE-2-062019

Lab ID#: 1906480-02A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17070510**	**Date of Collection:**	**6/20/19 10:06:00 AM**
Dil. Factor:	**2.47**	**Date of Analysis:**	**7/5/19 04:06 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloromethane	12	Not Detected	26	Not Detected
Vinyl Chloride	1.2	Not Detected	3.2	Not Detected
Freon 113	1.2	Not Detected	9.5	Not Detected
1,1-Dichloroethene	1.2	Not Detected	4.9	Not Detected
Acetone	12	Not Detected	29	Not Detected
Carbon Disulfide	4.9	Not Detected	15	Not Detected
Methylene Chloride	12	Not Detected	43	Not Detected
trans-1,2-Dichloroethene	1.2	Not Detected	4.9	Not Detected
Hexane	1.2	Not Detected	4.4	Not Detected
1,1-Dichloroethane	1.2	Not Detected	5.0	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.9	Not Detected	14	Not Detected
cis-1,2-Dichloroethene	1.2	5.1	4.9	20
Chloroform	1.2	Not Detected	6.0	Not Detected
1,1,1-Trichloroethane	1.2	1.4	6.7	7.4
Benzene	1.2	Not Detected	3.9	Not Detected
Trichloroethene	1.2	9.6	6.6	52
Toluene	1.2	1.4	4.6	5.4
1,1,2-Trichloroethane	1.2	Not Detected	6.7	Not Detected
Tetrachloroethene	1.2	100	8.4	720
Chlorobenzene	1.2	Not Detected	5.7	Not Detected
Ethyl Benzene	1.2	Not Detected	5.4	Not Detected
m,p-Xylene	1.2	Not Detected	5.4	Not Detected
o-Xylene	1.2	Not Detected	5.4	Not Detected
Styrene	1.2	Not Detected	5.3	Not Detected
Cumene	1.2	Not Detected	6.1	Not Detected
Propylbenzene	1.2	Not Detected	6.1	Not Detected
1,3,5-Trimethylbenzene	1.2	Not Detected	6.1	Not Detected
1,2,4-Trimethylbenzene	1.2	Not Detected	6.1	Not Detected
TPH ref. to Gasoline (MW=100)	120	Not Detected	500	Not Detected
Acetonitrile	12	Not Detected	21	Not Detected
Vinyl Acetate	4.9	Not Detected	17	Not Detected
Octane	4.9	Not Detected	23	Not Detected
Pentane	4.9	Not Detected	14	Not Detected
Butylbenzene	4.9	Not Detected	27	Not Detected
Decane	4.9	Not Detected	29	Not Detected
Dodecane	12	Not Detected	86	Not Detected
sec-Butylbenzene	4.9	Not Detected	27	Not Detected
p-Cymene	4.9	Not Detected	27	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits

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Client Sample ID: SVE-2-062019

Lab ID#: 1906480-02A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17070510**	**Date of Collection:**	**6/20/19 10:06:00 AM**
Dil. Factor:	**2.47**	**Date of Analysis:**	**7/5/19 04:06 PM**

Surrogates	%Recovery	Method Limits
Toluene-d8	104	70-130
1,2-Dichloroethane-d4	95	70-130
4-Bromofluorobenzene	96	70-130

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Client Sample ID: SVE-IN-062019

Lab ID#: 1906480-03A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17070511**	**Date of Collection:**	**6/20/19 10:16:00 AM**
Dil. Factor:	**2.50**	**Date of Analysis:**	**7/5/19 04:34 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloromethane	12	Not Detected	26	Not Detected
Vinyl Chloride	1.2	Not Detected	3.2	Not Detected
Freon 113	1.2	Not Detected	9.6	Not Detected
1,1-Dichloroethene	1.2	Not Detected	5.0	Not Detected
Acetone	12	Not Detected	30	Not Detected
Carbon Disulfide	5.0	Not Detected	16	Not Detected
Methylene Chloride	12	Not Detected	43	Not Detected
trans-1,2-Dichloroethene	1.2	Not Detected	5.0	Not Detected
Hexane	1.2	Not Detected	4.4	Not Detected
1,1-Dichloroethane	1.2	Not Detected	5.0	Not Detected
2-Butanone (Methyl Ethyl Ketone)	5.0	Not Detected	15	Not Detected
cis-1,2-Dichloroethene	1.2	3.5	5.0	14
Chloroform	1.2	Not Detected	6.1	Not Detected
1,1,1-Trichloroethane	1.2	Not Detected	6.8	Not Detected
Benzene	1.2	Not Detected	4.0	Not Detected
Trichloroethene	1.2	6.2	6.7	33
Toluene	1.2	Not Detected	4.7	Not Detected
1,1,2-Trichloroethane	1.2	Not Detected	6.8	Not Detected
Tetrachloroethene	1.2	74	8.5	500
Chlorobenzene	1.2	Not Detected	5.8	Not Detected
Ethyl Benzene	1.2	Not Detected	5.4	Not Detected
m,p-Xylene	1.2	Not Detected	5.4	Not Detected
o-Xylene	1.2	Not Detected	5.4	Not Detected
Styrene	1.2	Not Detected	5.3	Not Detected
Cumene	1.2	Not Detected	6.1	Not Detected
Propylbenzene	1.2	Not Detected	6.1	Not Detected
1,3,5-Trimethylbenzene	1.2	Not Detected	6.1	Not Detected
1,2,4-Trimethylbenzene	1.2	Not Detected	6.1	Not Detected
TPH ref. to Gasoline (MW=100)	120	Not Detected	510	Not Detected
Acetonitrile	12	Not Detected	21	Not Detected
Vinyl Acetate	5.0	Not Detected	18	Not Detected
Octane	5.0	Not Detected	23	Not Detected
Pentane	5.0	Not Detected	15	Not Detected
Butylbenzene	5.0	Not Detected	27	Not Detected
Decane	5.0	Not Detected	29	Not Detected
Dodecane	12	Not Detected	87	Not Detected
sec-Butylbenzene	5.0	Not Detected	27	Not Detected
p-Cymene	5.0	Not Detected	27	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits

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Client Sample ID: SVE-IN-062019

Lab ID#: 1906480-03A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17070511**	**Date of Collection:**	**6/20/19 10:16:00 AM**
Dil. Factor:	**2.50**	**Date of Analysis:**	**7/5/19 04:34 PM**

Surrogates	%Recovery	Method Limits
Toluene-d8	104	70-130
1,2-Dichloroethane-d4	95	70-130
4-Bromofluorobenzene	97	70-130

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Client Sample ID: Lab Blank

Lab ID#: 1906480-04A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17070508d**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 7/5/19 02:34 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloromethane	5.0	Not Detected	10	Not Detected
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
Freon 113	0.50	Not Detected	3.8	Not Detected
1,1-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Acetone	5.0	Not Detected	12	Not Detected
Carbon Disulfide	2.0	Not Detected	6.2	Not Detected
Methylene Chloride	5.0	Not Detected	17	Not Detected
trans-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Hexane	0.50	Not Detected	1.8	Not Detected
1,1-Dichloroethane	0.50	Not Detected	2.0	Not Detected
2-Butanone (Methyl Ethyl Ketone)	2.0	Not Detected	5.9	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Chloroform	0.50	Not Detected	2.4	Not Detected
1,1,1-Trichloroethane	0.50	Not Detected	2.7	Not Detected
Benzene	0.50	Not Detected	1.6	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
1,1,2-Trichloroethane	0.50	Not Detected	2.7	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
Chlorobenzene	0.50	Not Detected	2.3	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
Styrene	0.50	Not Detected	2.1	Not Detected
Cumene	0.50	Not Detected	2.4	Not Detected
Propylbenzene	0.50	Not Detected	2.4	Not Detected
1,3,5-Trimethylbenzene	0.50	Not Detected	2.4	Not Detected
1,2,4-Trimethylbenzene	0.50	Not Detected	2.4	Not Detected
TPH ref. to Gasoline (MW=100)	50	Not Detected	200	Not Detected
Acetonitrile	5.0	Not Detected	8.4	Not Detected
Vinyl Acetate	2.0	Not Detected	7.0	Not Detected
Octane	2.0	Not Detected	9.3	Not Detected
Pentane	2.0	Not Detected	5.9	Not Detected
Butylbenzene	2.0	Not Detected	11	Not Detected
Decane	2.0	Not Detected	12	Not Detected
Dodecane	5.0	Not Detected	35	Not Detected
sec-Butylbenzene	2.0	Not Detected	11	Not Detected
p-Cymene	2.0	Not Detected	11	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits

eurofins | Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 1906480-04A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17070508d**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 7/5/19 02:34 PM**	

Surrogates	%Recovery	Method Limits
Toluene-d8	102	70-130
1,2-Dichloroethane-d4	97	70-130
4-Bromofluorobenzene	96	70-130

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Client Sample ID: CCV

Lab ID#: 1906480-05A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17070502**	**Date of Collection: NA**
Dil. Factor:	**1.00**	**Date of Analysis: 7/5/19 10:37 AM**

Compound	%Recovery
Chloromethane	84
Vinyl Chloride	101
Freon 113	84
1,1-Dichloroethene	93
Acetone	100
Carbon Disulfide	96
Methylene Chloride	91
trans-1,2-Dichloroethene	105
Hexane	110
1,1-Dichloroethane	107
2-Butanone (Methyl Ethyl Ketone)	112
cis-1,2-Dichloroethene	111
Chloroform	108
1,1,1-Trichloroethane	98
Benzene	113
Trichloroethene	106
Toluene	109
1,1,2-Trichloroethane	102
Tetrachloroethene	96
Chlorobenzene	99
Ethyl Benzene	98
m,p-Xylene	102
o-Xylene	101
Styrene	105
Cumene	104
Propylbenzene	103
1,3,5-Trimethylbenzene	101
1,2,4-Trimethylbenzene	103
TPH ref. to Gasoline (MW=100)	100
Acetonitrile	86
Vinyl Acetate	107
Octane	121
Pentane	86
Butylbenzene	98
Decane	118
Dodecane	115
sec-Butylbenzene	98
p-Cymene	102

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits

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Client Sample ID: CCV

Lab ID#: 1906480-05A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17070502**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 7/5/19 10:37 AM**	

Surrogates	%Recovery	Method Limits
Toluene-d8	105	70-130
1,2-Dichloroethane-d4	98	70-130
4-Bromofluorobenzene	98	70-130

eurofins | Air Toxics

Client Sample ID: LCS

Lab ID#: 1906480-06A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17070504**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 7/5/19 11:33 AM**	

Compound	%Recovery	Method Limits
Chloromethane	95	70-130
Vinyl Chloride	102	70-130
Freon 113	84	70-130
1,1-Dichloroethene	94	70-130
Acetone	92	70-130
Carbon Disulfide	84	70-130
Methylene Chloride	89	70-130
trans-1,2-Dichloroethene	88	70-130
Hexane	109	70-130
1,1-Dichloroethane	107	70-130
2-Butanone (Methyl Ethyl Ketone)	112	70-130
cis-1,2-Dichloroethene	123	70-130
Chloroform	107	70-130
1,1,1-Trichloroethane	100	70-130
Benzene	116	70-130
Trichloroethene	108	70-130
Toluene	112	70-130
1,1,2-Trichloroethane	101	70-130
Tetrachloroethene	95	70-130
Chlorobenzene	99	70-130
Ethyl Benzene	98	70-130
m,p-Xylene	102	70-130
o-Xylene	105	70-130
Styrene	111	70-130
Cumene	106	70-130
Propylbenzene	108	70-130
1,3,5-Trimethylbenzene	103	70-130
1,2,4-Trimethylbenzene	108	70-130
TPH ref. to Gasoline (MW=100)	Not Spiked	
Acetonitrile	Not Spiked	
Vinyl Acetate	104	70-130
Octane	Not Spiked	
Pentane	Not Spiked	
Butylbenzene	Not Spiked	
Decane	Not Spiked	
Dodecane	Not Spiked	
sec-Butylbenzene	Not Spiked	
p-Cymene	Not Spiked	

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits

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Client Sample ID: LCS

Lab ID#: 1906480-06A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17070504**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 7/5/19 11:33 AM**	

Surrogates	%Recovery	Method Limits
Toluene-d8	107	70-130
1,2-Dichloroethane-d4	98	70-130
4-Bromofluorobenzene	99	70-130

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Client Sample ID: LCSD

Lab ID#: 1906480-06AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17070505**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 7/5/19 11:59 AM**	

Compound	%Recovery	Method Limits
Chloromethane	96	70-130
Vinyl Chloride	103	70-130
Freon 113	86	70-130
1,1-Dichloroethene	95	70-130
Acetone	96	70-130
Carbon Disulfide	86	70-130
Methylene Chloride	89	70-130
trans-1,2-Dichloroethene	93	70-130
Hexane	112	70-130
1,1-Dichloroethane	107	70-130
2-Butanone (Methyl Ethyl Ketone)	116	70-130
cis-1,2-Dichloroethene	128	70-130
Chloroform	108	70-130
1,1,1-Trichloroethane	101	70-130
Benzene	113	70-130
Trichloroethene	108	70-130
Toluene	111	70-130
1,1,2-Trichloroethane	102	70-130
Tetrachloroethene	100	70-130
Chlorobenzene	101	70-130
Ethyl Benzene	102	70-130
m,p-Xylene	106	70-130
o-Xylene	109	70-130
Styrene	114	70-130
Cumene	109	70-130
Propylbenzene	111	70-130
1,3,5-Trimethylbenzene	105	70-130
1,2,4-Trimethylbenzene	109	70-130
TPH ref. to Gasoline (MW=100)	Not Spiked	
Acetonitrile	Not Spiked	
Vinyl Acetate	110	70-130
Octane	Not Spiked	
Pentane	Not Spiked	
Butylbenzene	Not Spiked	
Decane	Not Spiked	
Dodecane	Not Spiked	
sec-Butylbenzene	Not Spiked	
p-Cymene	Not Spiked	

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits

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Client Sample ID: LCSD

Lab ID#: 1906480-06AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17070505**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 7/5/19 11:59 AM**	

Surrogates	%Recovery	Method Limits
Toluene-d8	106	70-130
1,2-Dichloroethane-d4	98	70-130
4-Bromofluorobenzene	100	70-130

Analytical Resources, Incorporated
Analytical Chemists and Consultants

21 May 2019

Carl Bach
The Boeing Company
P.O. Box 3707 MC 9U4-26
Seattle, WA 98124

RE: Boeing Renton Regional GW Building 4-78/79

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
19E0092	N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in it entirety.

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006

PJLA Testing
Accreditation # 66169

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Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 19E0092	Turn-around Requested: Standard	Page: 1 of 2	
ARI Client Company: Boeing	Phone: 206 898 0438	Date: 05/02/19	Ice Present? Yes
Client Contact: Carl Bach Tom McKeon		No. of Coolers: 1	Cooler Temps: 5.7°C
Client Project Name: Renton			
Client Project #: Renton	Samplers: Justin Neste Rune Lassen		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)
www.arilabs.com

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: VOC 8260	Sulfate, Nitrate, Nitrite							Notes/Comments
050719-B78-19	5/1/19	941	Water	4	X	X							VOC: TCE cis 1,2-DCE VC, Benzene
B78-20-050719		942			X	X							
B78-11-050719		1036			X	X							
GW-031S-050719		1044			X	X							
B78-18-050719		1129			X	X							
GW-244S-050719		1134			X	X							
B78-17-050719		1210			X	X							
B78-13-050719		1210			X	X							
DUP01-050719		0800			X	X							
TRIP Blank		—		1	X	X							

Comments/Special Instructions	Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
cc Justin Neste	Printed Name: Rune Lassen	Printed Name: Jacob Walk	Printed Name:	Printed Name:
	Company: Calibre	Company: ARI	Company:	Company:
	Date & Time: 05/07/19 1613	Date & Time: 05/07/19 1613	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 19E0092	Turn-around Requested: Standard	Page: 2 of 2	
ARI Client Company: Boeing	Phone: 206 898 0438	Date: 05/02/19	Ice Present? Yes
Client Contact: Carl Beach TOM McKeon		No. of Coolers: 1	Cooler Temps: 5.7°C
Client Project Name: Renton			
Client Project #: Renton	Samplers: Justin Neste Rune Lassen		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)
www.arilabs.com

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: VOC 8260	Sulfate	Nitrate Nitrite						Notes/Comments
B178-21-050719	05/07/19	1253	Water	4	x	x							VOC: TCE cis 1,2-DCE VC Benzene

Comments/Special Instructions	Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
CC JustinNest	Printed Name: Rune Lassen	Printed Name: Jacob Smalter	Printed Name:	Printed Name:
	Company: calibre	Company: ARI	Company:	Company:
	Date & Time: 05/07/19 1613	Date & Time: 05/07/19 1613	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

The Boeing Company	Project: Boeing Renton Regional GW Building 4-78/79	
P.O. Box 3707 MC 9U4-26	Project Number: Boeing Renton Regional GW Building 4-78/79	**Reported:**
Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
050719-B78-19	19E0092-01	Water	07-May-2019 09:41	07-May-2019 16:13
B78-20-050719	19E0092-02	Water	07-May-2019 09:42	07-May-2019 16:13
B78-11-050719	19E0092-03	Water	07-May-2019 10:36	07-May-2019 16:13
GW-031S-050719	19E0092-04	Water	07-May-2019 10:44	07-May-2019 16:13
B78-18-050719	19E0092-05	Water	07-May-2019 11:29	07-May-2019 16:13
GW-244S-050719	19E0092-06	Water	07-May-2019 11:34	07-May-2019 16:13
B78-17-050719	19E0092-07	Water	07-May-2019 12:10	07-May-2019 16:13
B78-13-050719	19E0092-08	Water	07-May-2019 12:10	07-May-2019 16:13
DUP01-050719	19E0092-09	Water	07-May-2019 08:00	07-May-2019 16:13
Trip Blank	19E0092-10	Water	07-May-2019 08:00	07-May-2019 16:13
B78-21-050719	19E0092-11	Water	07-May-2019 12:53	07-May-2019 16:13

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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The Boeing Company	Project: Boeing Renton Regional GW Building 4-78/79	
P.O. Box 3707 MC 9U4-26	Project Number: Boeing Renton Regional GW Building 4-78/79	**Reported:**
Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

Work Order Case Narrative

Volatiles - EPA Method SW8260C

The sample(s) were run within the recommended holding times.

Initial and continuing calibrations were within method requirements.

Internal standard areas were within limits.

The surrogate percent recoveries were within control limits.

The method blank(s) were clean at the reporting limits.

The LCS/LCSD percent recoveries and RPD were within control limits.

Wet Chemistry

The sample(s) were prepared and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The method blank(s) were clean at the reporting limits.

The LCS percent recoveries were within control limits.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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WORK ORDER

19E0092

Client: The Boeing Company
Project: Boeing Renton Regional GW Building 4-78/79

Project Manager: Kelly Bottem
Project Number: Boeing Renton Regional GW Building 4-78/79

Report To:
The Boeing Company
Carl Bach
P.O. Box 3707 MC 9U4-26
Seattle, WA 98124
Phone: (206) 898-0438
Fax: -

Invoice To:
The Boeing Company
Jennifer Parsons
PO Box 3703 MS 2R-96
Seattle, WA 98124
Phone :-
Fax: -

Date Due: 22-May-2019 18:00 (10 day TAT)

Received By: Jacob Walter
Date Received: 07-May-2019 16:13

Logged In By: Jacob Walter
Date Logged In: 07-May-2019 16:54

Samples Received at: **5.7°C**

Intact, properly signed and dated custody seals attached to outside of cooler(s)	No	Custody papers included with the cooler	Yes
Custody papers properly filled out (in, signed, analyses requested, etc)	Yes	Was a temperature blank included in the cooler	No
Was sufficient ice used (if appropriate)	Yes	All bottles sealed in individual plastic bags	No
All bottles arrived in good condition (unbroken)	Yes	All bottle labels complete and legible	Yes
Number of containers listed on COC match number received	Yes	Bottle labels and tags agree with COC	Yes
Correct bottles used for the requested analyses	Yes	All VOC vials free of air bubbles	Yes
Analyses/bottles require preservation (attach preservation sheet excluding VOC)	No	Sufficient amount of sample sent in each bottle	Yes
Sample split at ARI	No		

Analysis	Due	TAT	Expires	Comments

WORK ORDER

19E0092

Client: The Boeing Company
Project Manager: Kelly Bottem
Project: Boeing Renton Regional GW Building 4-78/79
Project Number: Boeing Renton Regional GW Building 4-78/79

Analysis	Due	TAT	Expires	Comments
19E0092-01 050719-B78-19 [Water] Sampled 07-May-2019 09:41 (GMT-08:00) Pacific Time (US & Canada)				
A = Small OJ, 500 mL	*B = VOA Vial, Clear, 40 mL, HCL*	*C = VOA Vial, Clear, 40 mL, HCL*	*D = VOA Vial, Clear, 40 mL, HCL*	
Nitrate-N, IC, EPA 300.0	22-May-2019 15:00	10	09-May-2019 09:41	
Nitrite-N, IC, EPA 300.0	22-May-2019 15:00	10	09-May-2019 09:41	
Sulfate, IC, EPA 300.0	22-May-2019 15:00	10	04-Jun-2019 09:41	
8260C VOA	22-May-2019 15:00	10	21-May-2019 09:41	
19E0092-02 B78-20-050719 [Water] Sampled 07-May-2019 09:42 (GMT-08:00) Pacific Time (US & Canada)				
A = Small OJ, 500 mL	*B = VOA Vial, Clear, 40 mL, HCL*	*C = VOA Vial, Clear, 40 mL, HCL*	*D = VOA Vial, Clear, 40 mL, HCL*	
Nitrate-N, IC, EPA 300.0	22-May-2019 15:00	10	09-May-2019 09:42	
8260C VOA	22-May-2019 15:00	10	21-May-2019 09:42	
Sulfate, IC, EPA 300.0	22-May-2019 15:00	10	04-Jun-2019 09:42	
Nitrite-N, IC, EPA 300.0	22-May-2019 15:00	10	09-May-2019 09:42	
19E0092-03 B78-11-050719 [Water] Sampled 07-May-2019 10:36 (GMT-08:00) Pacific Time (US & Canada)				
A = Small OJ, 500 mL	*B = VOA Vial, Clear, 40 mL, HCL*	*C = VOA Vial, Clear, 40 mL, HCL*	*D = VOA Vial, Clear, 40 mL, HCL*	
Nitrate-N, IC, EPA 300.0	22-May-2019 15:00	10	09-May-2019 10:36	
Nitrite-N, IC, EPA 300.0	22-May-2019 15:00	10	09-May-2019 10:36	
8260C VOA	22-May-2019 15:00	10	21-May-2019 10:36	
Sulfate, IC, EPA 300.0	22-May-2019 15:00	10	04-Jun-2019 10:36	
19E0092-04 GW-031S-050719 [Water] Sampled 07-May-2019 10:44 (GMT-08:00) Pacific Time (US & Canada)				
A = Small OJ, 500 mL	*B = VOA Vial, Clear, 40 mL, HCL*	*C = VOA Vial, Clear, 40 mL, HCL*	*D = VOA Vial, Clear, 40 mL, HCL*	
8260C VOA	22-May-2019 15:00	10	21-May-2019 10:44	
Nitrate-N, IC, EPA 300.0	22-May-2019 15:00	10	09-May-2019 10:44	
Nitrite-N, IC, EPA 300.0	22-May-2019 15:00	10	09-May-2019 10:44	
Sulfate, IC, EPA 300.0	22-May-2019 15:00	10	04-Jun-2019 10:44	
19E0092-05 B78-18-050719 [Water] Sampled 07-May-2019 11:29 (GMT-08:00) Pacific Time (US & Canada)				
A = Small OJ, 500 mL	*B = VOA Vial, Clear, 40 mL, HCL*	*C = VOA Vial, Clear, 40 mL, HCL*	*D = VOA Vial, Clear, 40 mL, HCL*	
Sulfate, IC, EPA 300.0	22-May-2019 15:00	10	04-Jun-2019 11:29	
8260C VOA	22-May-2019 15:00	10	21-May-2019 11:29	
Nitrate-N, IC, EPA 300.0	22-May-2019 15:00	10	09-May-2019 11:29	
Nitrite-N, IC, EPA 300.0	22-May-2019 15:00	10	09-May-2019 11:29	

WORK ORDER

19E0092

Client: The Boeing Company
Project Manager: Kelly Bottem
Project: Boeing Renton Regional GW Building 4-78/79
Project Number: Boeing Renton Regional GW Building 4-78/79

Analysis	Due	TAT	Expires	Comments
19E0092-06 GW-244S-050719 [Water] Sampled 07-May-2019 11:34 (GMT-08:00) Pacific Time (US & Canada)				
A = Small OJ, 500 mL	*B = VOA Vial, Clear, 40 mL, HCL*	*C = VOA Vial, Clear, 40 mL, HCL*	*D = VOA Vial, Clear, 40 mL, HCL*	
8260C VOA	22-May-2019 15:00	10	21-May-2019 11:34	
Nitrite-N, IC, EPA 300.0	22-May-2019 15:00	10	09-May-2019 11:34	
Sulfate, IC, EPA 300.0	22-May-2019 15:00	10	04-Jun-2019 11:34	
Nitrate-N, IC, EPA 300.0	22-May-2019 15:00	10	09-May-2019 11:34	
19E0092-07 B78-17-050719 [Water] Sampled 07-May-2019 12:10 (GMT-08:00) Pacific Time (US & Canada)				
A = Small OJ, 500 mL	*B = VOA Vial, Clear, 40 mL, HCL*	*C = VOA Vial, Clear, 40 mL, HCL*	*D = VOA Vial, Clear, 40 mL, HCL*	
8260C VOA	22-May-2019 15:00	10	21-May-2019 12:10	
Nitrate-N, IC, EPA 300.0	22-May-2019 15:00	10	09-May-2019 12:10	
Nitrite-N, IC, EPA 300.0	22-May-2019 15:00	10	09-May-2019 12:10	
Sulfate, IC, EPA 300.0	22-May-2019 15:00	10	04-Jun-2019 12:10	
19E0092-08 B78-13-050719 [Water] Sampled 07-May-2019 12:10 (GMT-08:00) Pacific Time (US & Canada)				
A = Small OJ, 500 mL	*B = VOA Vial, Clear, 40 mL, HCL*	*C = VOA Vial, Clear, 40 mL, HCL*	*D = VOA Vial, Clear, 40 mL, HCL*	
Nitrate-N, IC, EPA 300.0	22-May-2019 15:00	10	09-May-2019 12:10	
Nitrite-N, IC, EPA 300.0	22-May-2019 15:00	10	09-May-2019 12:10	
8260C VOA	22-May-2019 15:00	10	21-May-2019 12:10	
Sulfate, IC, EPA 300.0	22-May-2019 15:00	10	04-Jun-2019 12:10	
19E0092-09 DUP01-050719 [Water] Sampled 07-May-2019 08:00 (GMT-08:00) Pacific Time (US & Canada)				
A = Small OJ, 500 mL	*B = VOA Vial, Clear, 40 mL, HCL*	*C = VOA Vial, Clear, 40 mL, HCL*	*D = VOA Vial, Clear, 40 mL, HCL*	
8260C VOA	22-May-2019 15:00	10	21-May-2019 08:00	
Nitrate-N, IC, EPA 300.0	22-May-2019 15:00	10	09-May-2019 08:00	
Nitrite-N, IC, EPA 300.0	22-May-2019 15:00	10	09-May-2019 08:00	
Sulfate, IC, EPA 300.0	22-May-2019 15:00	10	04-Jun-2019 08:00	
19E0092-10 Trip Blank [Water] Sampled 07-May-2019 08:00 (GMT-08:00) Pacific Time (US & Canada)				
A = VOA Vial, Clear, 40 mL, HCL	*B = VOA Vial, Clear, 40 mL, HCL*			
8260C VOA	22-May-2019 15:00	10	21-May-2019 08:00	

WORK ORDER

19E0092

Client: The Boeing Company
Project Manager: Kelly Bottem
Project: Boeing Renton Regional GW Building 4-78/79
Project Number: Boeing Renton Regional GW Building 4-78/79

Analysis	Due	TAT	Expires	Comments
19E0092-11 B78-21-050719 [Water] Sampled 07-May-2019 12:53 (GMT-08:00) Pacific Time (US & Canada)				
A = Small OJ, 500 mL	*B = VOA Vial, Clear, 40 mL, HCL*	*C = VOA Vial, Clear, 40 mL, HCL*	*D = VOA Vial, Clear, 40 mL, HCL*	
Sulfate, IC, EPA 300.0	22-May-2019 15:00	10	04-Jun-2019 12:53	
8260C VOA	22-May-2019 15:00	10	21-May-2019 12:53	
Nitrate-N, IC, EPA 300.0	22-May-2019 15:00	10	09-May-2019 12:53	
Nitrite-N, IC, EPA 300.0	22-May-2019 15:00	10	09-May-2019 12:53	

Reviewed By

Date

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Barley

Project Name: Renton

COC No(s): _____ NA

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Assigned ARI Job No: 19E0092

Tracking No: _____ NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of the cooler?	YES	NO
Were custody papers included with the cooler?	YES	NO
Were custody papers properly filled out (ink, signed, etc.)	YES	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time 1613 5.7°C

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: D00 5206

Cooler Accepted by: JSm Date: 05/07/19 Time: 1613

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	NO
What kind of packing material was used?	Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: _____		
Was sufficient ice used (if appropriate)?	NA	YES	NO
How were bottles sealed in plastic bags?	Individually	Grouped	Not
Did all bottles arrive in good condition (unbroken)?		YES	NO
Were all bottle labels complete and legible?		YES	NO
Did the number of containers listed on COC match with the number of containers received?		YES	NO
Did all bottle labels and tags agree with custody papers?		YES	NO
Were all bottles used correct for the requested analyses?		YES	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)	NA	YES	NO
Were all VOC vials free of air bubbles?	NA	YES	NO
Was sufficient amount of sample sent in each bottle?		YES	NO
Date VOC Trip Blank was made at ARI	NA	5/6/19	

Were the sample(s) split by ARI? NA YES Date/Time: _____ Equipment: _____ Split by: _____

Samples Logged by: JSm Date: 05/07/19 Time: 1657 Labels checked by: JSm

*** Notify Project Manager of discrepancies or concerns ***

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

The Boeing Company	Project: Boeing Renton Regional GW Building 4-78/79	
P.O. Box 3707 MC 9U4-26	Project Number: Boeing Renton Regional GW Building 4-78/79	**Reported:**
Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

050719-B78-19

19E0092-01 (Water)

Volatile Organic Compounds

Method: EPA 8260C — Sampled: 05/07/2019 09:41

Instrument: NT3 Analyst: PKC — Analyzed: 05/08/2019 17:34

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap) — Extract ID: 19E0092-01 D

Preparation Batch: BHE0191 — Sample Size: 10 mL

Prepared: 08-May-2019 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Vinyl Chloride	75-01-4	1	0.20	ND	ug/L	U
cis-1,2-Dichloroethene	156-59-2	1	0.20	ND	ug/L	U
Benzene	71-43-2	1	0.20	**0.50**	ug/L	
Trichloroethene	79-01-6	1	0.20	ND	ug/L	U
Surrogate: 1,2-Dichloroethane-d4			*80-129 %*	*105*	*%*	
Surrogate: Toluene-d8			*80-120 %*	*99.8*	*%*	
Surrogate: 4-Bromofluorobenzene			*80-120 %*	*89.9*	*%*	

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The Boeing Company	Project: Boeing Renton Regional GW Building 4-78/79	
P.O. Box 3707 MC 9U4-26	Project Number: Boeing Renton Regional GW Building 4-78/79	**Reported:**
Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

050719-B78-19

19E0092-01 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 05/07/2019 09:41

Instrument: DX500 Analyst: KOTT — Analyzed: 05/07/2019 22:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 19E0092-01 A

Preparation Batch: BHE0189 — Sample Size: 5 mL

Prepared: 07-May-2019 — Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrite-N	14797-65-0	1	0.100	0.100	ND	mg/L	U

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The Boeing Company	Project: Boeing Renton Regional GW Building 4-78/79	
P.O. Box 3707 MC 9U4-26	Project Number: Boeing Renton Regional GW Building 4-78/79	**Reported:**
Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

050719-B78-19

19E0092-01RE4 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 05/07/2019 09:41

Instrument: DX2100 Analyst: KOTT — Analyzed: 05/20/2019 13:24

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 19E0092-01RE4 A

Preparation Batch: BHE0189 — Sample Size: 5 mL

Prepared: 07-May-2019 — Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	10	1.00	1.00	**14.2**	mg/L	D

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The Boeing Company	Project: Boeing Renton Regional GW Building 4-78/79	
P.O. Box 3707 MC 9U4-26	Project Number: Boeing Renton Regional GW Building 4-78/79	**Reported:**
Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

B78-20-050719

19E0092-02 (Water)

Volatile Organic Compounds

Method: EPA 8260C — Sampled: 05/07/2019 09:42

Instrument: NT3 Analyst: PKC — Analyzed: 05/08/2019 18:00

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap) — Extract ID: 19E0092-02 D

Preparation Batch: BHE0191 — Sample Size: 10 mL

Prepared: 08-May-2019 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Vinyl Chloride	75-01-4	1	0.20	**0.28**	ug/L	
cis-1,2-Dichloroethene	156-59-2	1	0.20	**0.32**	ug/L	
Benzene	71-43-2	1	0.20	**16.3**	ug/L	
Trichloroethene	79-01-6	1	0.20	ND	ug/L	U
Surrogate: 1,2-Dichloroethane-d4			*80-129 %*	*111*	*%*	
Surrogate: Toluene-d8			*80-120 %*	*102*	*%*	
Surrogate: 4-Bromofluorobenzene			*80-120 %*	*98.6*	*%*	

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The Boeing Company	Project: Boeing Renton Regional GW Building 4-78/79	
P.O. Box 3707 MC 9U4-26	Project Number: Boeing Renton Regional GW Building 4-78/79	**Reported:**
Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

B78-20-050719

19E0092-02 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 05/07/2019 09:42

Instrument: DX500 Analyst: KOTT — Analyzed: 05/07/2019 23:48

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 19E0092-02 A

Preparation Batch: BHE0189 — Sample Size: 5 mL

Prepared: 07-May-2019 — Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrite-N	14797-65-0	1	0.100	0.100	ND	mg/L	U

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The Boeing Company	Project: Boeing Renton Regional GW Building 4-78/79	
P.O. Box 3707 MC 9U4-26	Project Number: Boeing Renton Regional GW Building 4-78/79	**Reported:**
Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

B78-20-050719

19E0092-02RE2 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 05/07/2019 09:42

Instrument: DX2100 Analyst: KOTT — Analyzed: 05/17/2019 20:39

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 19E0092-02RE2 A

Preparation Batch: BHE0189 — Sample Size: 5 mL

Prepared: 07-May-2019 — Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	5	0.500	0.500	**4.93**	mg/L	D

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The Boeing Company	Project: Boeing Renton Regional GW Building 4-78/79	
P.O. Box 3707 MC 9U4-26	Project Number: Boeing Renton Regional GW Building 4-78/79	**Reported:**
Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

B78-11-050719

19E0092-03 (Water)

Volatile Organic Compounds

Method: EPA 8260C — Sampled: 05/07/2019 10:36

Instrument: NT3 Analyst: PKC — Analyzed: 05/08/2019 18:26

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap) — Extract ID: 19E0092-03 D

Preparation Batch: BHE0191 — Sample Size: 10 mL

Prepared: 08-May-2019 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Vinyl Chloride	75-01-4	1	0.20	**3.56**	ug/L	
cis-1,2-Dichloroethene	156-59-2	1	0.20	**6.55**	ug/L	
Benzene	71-43-2	1	0.20	**2.15**	ug/L	
Trichloroethene	79-01-6	1	0.20	**8.60**	ug/L	
Surrogate: 1,2-Dichloroethane-d4			*80-129 %*	*105*	*%*	
Surrogate: Toluene-d8			*80-120 %*	*99.4*	*%*	
Surrogate: 4-Bromofluorobenzene			*80-120 %*	*94.0*	*%*	

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The Boeing Company	Project: Boeing Renton Regional GW Building 4-78/79	
P.O. Box 3707 MC 9U4-26	Project Number: Boeing Renton Regional GW Building 4-78/79	**Reported:**
Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

B78-11-050719

19E0092-03 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 05/07/2019 10:36

Instrument: DX500 Analyst: KOTT — Analyzed: 05/08/2019 00:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 19E0092-03 A

Preparation Batch: BHE0189 — Sample Size: 5 mL

Prepared: 07-May-2019 — Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrite-N	14797-65-0	1	0.100	0.100	ND	mg/L	U

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The Boeing Company	Project: Boeing Renton Regional GW Building 4-78/79	
P.O. Box 3707 MC 9U4-26	Project Number: Boeing Renton Regional GW Building 4-78/79	**Reported:**
Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

B78-11-050719

19E0092-03RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 05/07/2019 10:36

Instrument: DX500 Analyst: KOTT — Analyzed: 05/09/2019 14:52

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 19E0092-03RE1 A

Preparation Batch: BHE0189 — Sample Size: 5 mL

Prepared: 07-May-2019 — Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	50	5.00	5.00	**47.0**	mg/L	D

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The Boeing Company	Project: Boeing Renton Regional GW Building 4-78/79	
P.O. Box 3707 MC 9U4-26	Project Number: Boeing Renton Regional GW Building 4-78/79	**Reported:**
Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

GW-031S-050719

19E0092-04 (Water)

Volatile Organic Compounds

Method: EPA 8260C — Sampled: 05/07/2019 10:44
Instrument: NT3 Analyst: PKC — Analyzed: 05/08/2019 18:52

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap) — Extract ID: 19E0092-04 D
Preparation Batch: BHE0191 — Sample Size: 10 mL
Prepared: 08-May-2019 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Vinyl Chloride	75-01-4	1	0.20	**0.30**	ug/L	
cis-1,2-Dichloroethene	156-59-2	1	0.20	**0.22**	ug/L	
Benzene	71-43-2	1	0.20	**1.90**	ug/L	
Trichloroethene	79-01-6	1	0.20	ND	ug/L	U
Surrogate: 1,2-Dichloroethane-d4			*80-129 %*	*118*	*%*	
Surrogate: Toluene-d8			*80-120 %*	*103*	*%*	
Surrogate: 4-Bromofluorobenzene			*80-120 %*	*96.9*	*%*	

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The Boeing Company	Project: Boeing Renton Regional GW Building 4-78/79	
P.O. Box 3707 MC 9U4-26	Project Number: Boeing Renton Regional GW Building 4-78/79	**Reported:**
Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

GW-031S-050719

19E0092-04 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 05/07/2019 10:44

Instrument: DX500 Analyst: KOTT — Analyzed: 05/08/2019 00:55

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 19E0092-04 A

Preparation Batch: BHE0189 — Sample Size: 5 mL

Prepared: 07-May-2019 — Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrite-N	14797-65-0	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	**1.86**	mg/L	

The Boeing Company	Project: Boeing Renton Regional GW Building 4-78/79	
P.O. Box 3707 MC 9U4-26	Project Number: Boeing Renton Regional GW Building 4-78/79	**Reported:**
Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

B78-18-050719

19E0092-05 (Water)

Volatile Organic Compounds

Method: EPA 8260C — Sampled: 05/07/2019 11:29

Instrument: NT3 Analyst: PKC — Analyzed: 05/08/2019 19:18

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap) — Extract ID: 19E0092-05 D

Preparation Batch: BHE0191 — Sample Size: 10 mL

Prepared: 08-May-2019 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Vinyl Chloride	75-01-4	1	0.20	**0.24**	ug/L	
cis-1,2-Dichloroethene	156-59-2	1	0.20	**0.31**	ug/L	
Benzene	71-43-2	1	0.20	**1.66**	ug/L	
Trichloroethene	79-01-6	1	0.20	ND	ug/L	U
Surrogate: 1,2-Dichloroethane-d4			*80-129 %*	*107*	*%*	
Surrogate: Toluene-d8			*80-120 %*	*99.4*	*%*	
Surrogate: 4-Bromofluorobenzene			*80-120 %*	*95.4*	*%*	

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The Boeing Company	Project: Boeing Renton Regional GW Building 4-78/79	
P.O. Box 3707 MC 9U4-26	Project Number: Boeing Renton Regional GW Building 4-78/79	**Reported:**
Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

B78-18-050719

19E0092-05 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 05/07/2019 11:29

Instrument: DX500 Analyst: KOTT — Analyzed: 05/08/2019 01:12

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 19E0092-05 A

Preparation Batch: BHE0189 — Sample Size: 5 mL

Prepared: 07-May-2019 — Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrite-N	14797-65-0	1	0.100	0.100	ND	mg/L	U

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The Boeing Company	Project: Boeing Renton Regional GW Building 4-78/79	
P.O. Box 3707 MC 9U4-26	Project Number: Boeing Renton Regional GW Building 4-78/79	**Reported:**
Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

B78-18-050719

19E0092-05RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 05/07/2019 11:29

Instrument: DX500 Analyst: KOTT — Analyzed: 05/09/2019 15:09

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 19E0092-05RE1 A

Preparation Batch: BHE0189 — Sample Size: 5 mL

Prepared: 07-May-2019 — Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	2	0.200	0.200	**2.44**	mg/L	D

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The Boeing Company	Project: Boeing Renton Regional GW Building 4-78/79	
P.O. Box 3707 MC 9U4-26	Project Number: Boeing Renton Regional GW Building 4-78/79	**Reported:**
Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

GW-244S-050719

19E0092-06 (Water)

Volatile Organic Compounds

Method: EPA 8260C — Sampled: 05/07/2019 11:34

Instrument: NT3 Analyst: PKC — Analyzed: 05/08/2019 19:44

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap) — Extract ID: 19E0092-06 D

Preparation Batch: BHE0191 — Sample Size: 10 mL

Prepared: 08-May-2019 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Vinyl Chloride	75-01-4	1	0.20	**1.18**	ug/L	
cis-1,2-Dichloroethene	156-59-2	1	0.20	**1.22**	ug/L	
Benzene	71-43-2	1	0.20	**1.13**	ug/L	
Trichloroethene	79-01-6	1	0.20	ND	ug/L	U
Surrogate: 1,2-Dichloroethane-d4			*80-129 %*	*102*	*%*	
Surrogate: Toluene-d8			*80-120 %*	*96.1*	*%*	
Surrogate: 4-Bromofluorobenzene			*80-120 %*	*97.5*	*%*	

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The Boeing Company	Project: Boeing Renton Regional GW Building 4-78/79	
P.O. Box 3707 MC 9U4-26	Project Number: Boeing Renton Regional GW Building 4-78/79	**Reported:**
Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

GW-244S-050719

19E0092-06 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 05/07/2019 11:34

Instrument: DX500 Analyst: KOTT — Analyzed: 05/08/2019 01:28

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 19E0092-06 A

Preparation Batch: BHE0189 — Sample Size: 5 mL

Prepared: 07-May-2019 — Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrite-N	14797-65-0	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	**1.45**	mg/L	

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P.O. Box 3707 MC 9U4-26	Project Number: Boeing Renton Regional GW Building 4-78/79	**Reported:**
Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

B78-17-050719

19E0092-07 (Water)

Volatile Organic Compounds

Method: EPA 8260C — Sampled: 05/07/2019 12:10

Instrument: NT3 Analyst: PKC — Analyzed: 05/08/2019 20:10

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap) — Extract ID: 19E0092-07 D

Preparation Batch: BHE0191 — Sample Size: 10 mL

Prepared: 08-May-2019 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Vinyl Chloride	75-01-4	1	0.20	**1.79**	ug/L	
cis-1,2-Dichloroethene	156-59-2	1	0.20	**5.72**	ug/L	
Benzene	71-43-2	1	0.20	**1.07**	ug/L	
Trichloroethene	79-01-6	1	0.20	**5.00**	ug/L	
Surrogate: 1,2-Dichloroethane-d4			*80-129 %*	*102*	*%*	
Surrogate: Toluene-d8			*80-120 %*	*100*	*%*	
Surrogate: 4-Bromofluorobenzene			*80-120 %*	*95.5*	*%*	

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P.O. Box 3707 MC 9U4-26	Project Number: Boeing Renton Regional GW Building 4-78/79	**Reported:**
Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

B78-17-050719

19E0092-07 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 05/07/2019 12:10

Instrument: DX500 Analyst: KOTT — Analyzed: 05/08/2019 01:45

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 19E0092-07 A

Preparation Batch: BHE0189 — Sample Size: 5 mL

Prepared: 07-May-2019 — Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrite-N	14797-65-0	1	0.100	0.100	ND	mg/L	U

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Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

B78-17-050719

19E0092-07RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 05/07/2019 12:10

Instrument: DX500 Analyst: KOTT — Analyzed: 05/09/2019 15:26

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 19E0092-07RE1 A

Preparation Batch: BHE0189 — Sample Size: 5 mL

Prepared: 07-May-2019 — Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	5	0.500	0.500	**4.92**	mg/L	D

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Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

B78-13-050719

19E0092-08 (Water)

Volatile Organic Compounds

Method: EPA 8260C — Sampled: 05/07/2019 12:10

Instrument: NT3 Analyst: PKC — Analyzed: 05/08/2019 20:35

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap) — Extract ID: 19E0092-08 B

Preparation Batch: BHE0191 — Sample Size: 10 mL

Prepared: 08-May-2019 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Vinyl Chloride	75-01-4	1	0.20	**0.45**	ug/L	
cis-1,2-Dichloroethene	156-59-2	1	0.20	**0.57**	ug/L	
Benzene	71-43-2	1	0.20	**1.16**	ug/L	
Trichloroethene	79-01-6	1	0.20	ND	ug/L	U
Surrogate: 1,2-Dichloroethane-d4			*80-129 %*	*106*	*%*	
Surrogate: Toluene-d8			*80-120 %*	*103*	*%*	
Surrogate: 4-Bromofluorobenzene			*80-120 %*	*93.9*	*%*	

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B78-13-050719

19E0092-08 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 05/07/2019 12:10

Instrument: DX500 Analyst: KOTT — Analyzed: 05/08/2019 02:02

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 19E0092-08 A

Preparation Batch: BHE0189 — Sample Size: 5 mL

Prepared: 07-May-2019 — Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrite-N	14797-65-0	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	ND	mg/L	U

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Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

DUP01-050719

19E0092-09 (Water)

Volatile Organic Compounds

Method: EPA 8260C — Sampled: 05/07/2019 08:00
Instrument: NT3 Analyst: PKC — Analyzed: 05/08/2019 21:01

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap) — Extract ID: 19E0092-09 C
Preparation Batch: BHE0191 — Sample Size: 10 mL
Prepared: 08-May-2019 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Vinyl Chloride	75-01-4	1	0.20	ND	ug/L	U
cis-1,2-Dichloroethene	156-59-2	1	0.20	**0.27**	ug/L	
Benzene	71-43-2	1	0.20	**2.16**	ug/L	
Trichloroethene	79-01-6	1	0.20	ND	ug/L	U
Surrogate: 1,2-Dichloroethane-d4			*80-129 %*	*118*	*%*	
Surrogate: Toluene-d8			*80-120 %*	*100*	*%*	
Surrogate: 4-Bromofluorobenzene			*80-120 %*	*96.4*	*%*	

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Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

DUP01-050719

19E0092-09 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 05/07/2019 08:00
Instrument: DX500 Analyst: KOTT — Analyzed: 05/08/2019 02:19

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 19E0092-09 A
Preparation Batch: BHE0189 — Sample Size: 5 mL
Prepared: 07-May-2019 — Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrite-N	14797-65-0	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	**0.689**	mg/L	

The Boeing Company	Project: Boeing Renton Regional GW Building 4-78/79	
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Trip Blank

19E0092-10 (Water)

Volatile Organic Compounds

Method: EPA 8260C — Sampled: 05/07/2019 08:00
Instrument: NT3 Analyst: PKC — Analyzed: 05/09/2019 13:37

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap) — Extract ID: 19E0092-10 A
Preparation Batch: BHE0194 — Sample Size: 10 mL
Prepared: 09-May-2019 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Vinyl Chloride	75-01-4	1	0.20	ND	ug/L	U
cis-1,2-Dichloroethene	156-59-2	1	0.20	ND	ug/L	U
Benzene	71-43-2	1	0.20	ND	ug/L	U
Trichloroethene	79-01-6	1	0.20	ND	ug/L	U
Surrogate: 1,2-Dichloroethane-d4			*80-129 %*	*113*	*%*	
Surrogate: Toluene-d8			*80-120 %*	*101*	*%*	
Surrogate: 4-Bromofluorobenzene			*80-120 %*	*90.6*	*%*	

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Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

B78-21-050719

19E0092-11 (Water)

Volatile Organic Compounds

Method: EPA 8260C — Sampled: 05/07/2019 12:53

Instrument: NT3 Analyst: PKC — Analyzed: 05/09/2019 16:45

Sample Preparation: Preparation Method: EPA 5030 (Purge and Trap) — Extract ID: 19E0092-11 B

Preparation Batch: BHE0194 — Sample Size: 10 mL

Prepared: 09-May-2019 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Vinyl Chloride	75-01-4	1	0.20	ND	ug/L	U
cis-1,2-Dichloroethene	156-59-2	1	0.20	**0.42**	ug/L	
Benzene	71-43-2	1	0.20	**0.80**	ug/L	
Trichloroethene	79-01-6	1	0.20	ND	ug/L	U
Surrogate: 1,2-Dichloroethane-d4			*80-129 %*	*107*	*%*	
Surrogate: Toluene-d8			*80-120 %*	*100*	*%*	
Surrogate: 4-Bromofluorobenzene			*80-120 %*	*98.0*	*%*	

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Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

B78-21-050719

19E0092-11 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 05/07/2019 12:53

Instrument: DX500 Analyst: KOTT — Analyzed: 05/08/2019 02:35

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 19E0092-11 A

Preparation Batch: BHE0189 — Sample Size: 5 mL

Prepared: 07-May-2019 — Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrite-N	14797-65-0	1	0.100	0.100	ND	mg/L	U

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B78-21-050719

19E0092-11RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 05/07/2019 12:53

Instrument: DX2100 Analyst: KOTT — Analyzed: 05/17/2019 15:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 19E0092-11RE1 A

Preparation Batch: BHE0189 — Sample Size: 5 mL

Prepared: 07-May-2019 — Final Volume: 5 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	5	0.500	0.500	**5.73**	mg/L	D

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Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

Volatile Organic Compounds - Quality Control

Batch BHE0191 - EPA 5030 (Purge and Trap)

Instrument: NT3 Analyst: PKC

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BHE0191-BLK1)				Prepared: 08-May-2019 Analyzed: 08-May-2019 13:07						
Vinyl Chloride	ND	0.20	ug/L							U
cis-1,2-Dichloroethene	ND	0.20	ug/L							U
Benzene	ND	0.20	ug/L							U
Trichloroethene	ND	0.20	ug/L							U
Surrogate: 1,2-Dichloroethane-d4	5.22		ug/L	*5.00*		*104*	*80-129*			
Surrogate: Toluene-d8	5.00		ug/L	*5.00*		*100*	*80-120*			
Surrogate: 4-Bromofluorobenzene	4.79		ug/L	*5.00*		*95.7*	*80-120*			
LCS (BHE0191-BS1)				Prepared: 08-May-2019 Analyzed: 08-May-2019 10:57						
Vinyl Chloride	9.84	0.20	ug/L	10.0		98.4	66-133			
cis-1,2-Dichloroethene	9.87	0.20	ug/L	10.0		98.7	80-121			
Benzene	10.4	0.20	ug/L	10.0		104	80-120			
Trichloroethene	10.3	0.20	ug/L	10.0		103	80-120			
Surrogate: 1,2-Dichloroethane-d4	4.98		ug/L	*5.00*		*99.5*	*80-129*			
Surrogate: Toluene-d8	5.13		ug/L	*5.00*		*103*	*80-120*			
Surrogate: 4-Bromofluorobenzene	4.86		ug/L	*5.00*		*97.2*	*80-120*			
LCS Dup (BHE0191-BSD1)				Prepared: 08-May-2019 Analyzed: 08-May-2019 11:23						
Vinyl Chloride	11.1	0.20	ug/L	10.0		111	66-133	12.20	30	
cis-1,2-Dichloroethene	11.2	0.20	ug/L	10.0		112	80-121	12.80	30	
Benzene	11.6	0.20	ug/L	10.0		116	80-120	11.30	30	
Trichloroethene	11.1	0.20	ug/L	10.0		111	80-120	7.95	30	
Surrogate: 1,2-Dichloroethane-d4	5.01		ug/L	*5.00*		*100*	*80-129*			
Surrogate: Toluene-d8	5.10		ug/L	*5.00*		*102*	*80-120*			
Surrogate: 4-Bromofluorobenzene	4.92		ug/L	*5.00*		*98.4*	*80-120*			

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Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

Volatile Organic Compounds - Quality Control

Batch BHE0194 - EPA 5030 (Purge and Trap)

Instrument: NT3 Analyst: PKC

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BHE0194-BLK1)				Prepared: 09-May-2019 Analyzed: 09-May-2019 12:44						
Vinyl Chloride	ND	0.20	ug/L							U
cis-1,2-Dichloroethene	ND	0.20	ug/L							U
Benzene	ND	0.20	ug/L							U
Trichloroethene	ND	0.20	ug/L							U
Surrogate: 1,2-Dichloroethane-d4	5.14		ug/L	*5.00*		*103*	*80-129*			
Surrogate: Toluene-d8	5.01		ug/L	*5.00*		*100*	*80-120*			
Surrogate: 4-Bromofluorobenzene	4.52		ug/L	*5.00*		*90.5*	*80-120*			
LCS (BHE0194-BS1)				Prepared: 09-May-2019 Analyzed: 09-May-2019 10:07						
Vinyl Chloride	9.80	0.20	ug/L	10.0		98.0	66-133			
cis-1,2-Dichloroethene	9.74	0.20	ug/L	10.0		97.4	80-121			
Benzene	10.2	0.20	ug/L	10.0		102	80-120			
Trichloroethene	10.1	0.20	ug/L	10.0		101	80-120			
Surrogate: 1,2-Dichloroethane-d4	5.07		ug/L	*5.00*		*101*	*80-129*			
Surrogate: Toluene-d8	5.03		ug/L	*5.00*		*101*	*80-120*			
Surrogate: 4-Bromofluorobenzene	4.94		ug/L	*5.00*		*98.7*	*80-120*			
LCS Dup (BHE0194-BSD1)				Prepared: 09-May-2019 Analyzed: 09-May-2019 11:26						
Vinyl Chloride	9.10	0.20	ug/L	10.0		91.0	66-133	7.45	30	
cis-1,2-Dichloroethene	9.84	0.20	ug/L	10.0		98.4	80-121	0.99	30	
Benzene	10.4	0.20	ug/L	10.0		104	80-120	1.51	30	
Trichloroethene	10.3	0.20	ug/L	10.0		103	80-120	2.58	30	
Surrogate: 1,2-Dichloroethane-d4	5.27		ug/L	*5.00*		*105*	*80-129*			
Surrogate: Toluene-d8	4.97		ug/L	*5.00*		*99.3*	*80-120*			
Surrogate: 4-Bromofluorobenzene	4.90		ug/L	*5.00*		*98.1*	*80-120*			

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P.O. Box 3707 MC 9U4-26	Project Number: Boeing Renton Regional GW Building 4-78/79	**Reported:**
Seattle WA, 98124	Project Manager: Carl Bach	21-May-2019 13:59

Wet Chemistry - Quality Control

Batch BHE0189 - No Prep Wet Chem

Instrument: DX2100 Analyst: KOTT

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Duplicate (BHE0189-DUP3)	**Source: 19E0092-01RE4**			Prepared: 07-May-2019 Analyzed: 20-May-2019 13:43							
Sulfate	14.5	1.00	1.00	mg/L		14.2			1.67	20	D
Matrix Spike (BHE0189-MS2)	**Source: 19E0092-01RE4**			Prepared: 07-May-2019 Analyzed: 17-May-2019 16:59							
Sulfate	34.6	2.00	2.00	mg/L	20.0	14.2	102	75-125			*, D

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Instrument: DX500 Analyst: KOTT

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BHE0189-BLK1)				Prepared: 07-May-2019 Analyzed: 08-May-2019 03:09							
Nitrate-N	ND	0.100	0.100	mg/L							U
Nitrite-N	ND	0.100	0.100	mg/L							U
Sulfate	ND	0.100	0.100	mg/L							U
LCS (BHE0189-BS1)				Prepared: 07-May-2019 Analyzed: 08-May-2019 03:59							
Nitrate-N	1.42	0.100	0.100	mg/L	1.50		94.9	90-110			
Nitrite-N	1.56	0.100	0.100	mg/L	1.50		104	90-110			
Sulfate	1.60	0.100	0.100	mg/L	1.50		107	90-110			
Duplicate (BHE0189-DUP1)	**Source: 19E0092-01**			Prepared: 07-May-2019 Analyzed: 07-May-2019 23:14							
Nitrate-N	ND	0.100	0.100	mg/L		ND					U
Nitrite-N	ND	0.100	0.100	mg/L		ND					U
Matrix Spike (BHE0189-MS1)	**Source: 19E0092-01**			Prepared: 07-May-2019 Analyzed: 07-May-2019 23:31							
Nitrate-N	2.06	0.100	0.100	mg/L	2.00	ND	103	90-110			
Nitrite-N	2.19	0.100	0.100	mg/L	2.00	ND	109	90-110			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Certified Analyses included in this Report

Analyte	Certifications
EPA 300.0 in Water	
Nitrate-N	DoD-ELAP,WADOE,WA-DW,NELAP
Nitrite-N	DoD-ELAP,WADOE,WA-DW,NELAP
Sulfate	DoD-ELAP,WADOE,WA-DW,NELAP
EPA 8260C in Water	
Chloromethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Vinyl Chloride	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Bromomethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Chloroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Trichlorofluoromethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Acrolein	DoD-ELAP,NELAP,CALAP,WADOE
1,1,2-Trichloro-1,2,2-Trifluoroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Acetone	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,1-Dichloroethene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Bromoethane	DoD-ELAP,NELAP,CALAP,WADOE
Iodomethane	DoD-ELAP,NELAP,CALAP,WADOE
Methylene Chloride	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Acrylonitrile	DoD-ELAP,NELAP,CALAP,WADOE
Carbon Disulfide	DoD-ELAP,NELAP,CALAP,WADOE
trans-1,2-Dichloroethene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Vinyl Acetate	DoD-ELAP,NELAP,CALAP,WADOE
1,1-Dichloroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
2-Butanone	DoD-ELAP,NELAP,CALAP,WADOE
2,2-Dichloropropane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
cis-1,2-Dichloroethene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Chloroform	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Bromochloromethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,1,1-Trichloroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,1-Dichloropropene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Carbon tetrachloride	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,2-Dichloroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Benzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Trichloroethene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,2-Dichloropropane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Bromodichloromethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Dibromomethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE

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2-Chloroethyl vinyl ether	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
4-Methyl-2-Pentanone	DoD-ELAP,NELAP,CALAP,WADOE
cis-1,3-Dichloropropene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Toluene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
trans-1,3-Dichloropropene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
2-Hexanone	DoD-ELAP,NELAP,CALAP,WADOE
1,1,2-Trichloroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,3-Dichloropropane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Tetrachloroethene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Dibromochloromethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,2-Dibromoethane	DoD-ELAP,NELAP,CALAP,WADOE
Chlorobenzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Ethylbenzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,1,1,2-Tetrachloroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
m,p-Xylene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
o-Xylene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Styrene	DoD-ELAP,NELAP,CALAP,WADOE
Bromoform	DoD-ELAP,NELAP,CALAP,WADOE
1,1,2,2-Tetrachloroethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,2,3-Trichloropropane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
trans-1,4-Dichloro 2-Butene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
n-Propylbenzene	DoD-ELAP,NELAP,CALAP,WADOE
Bromobenzene	DoD-ELAP,NELAP,CALAP,WADOE
Isopropyl Benzene	DoD-ELAP,NELAP,CALAP,WADOE
2-Chlorotoluene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
4-Chlorotoluene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
t-Butylbenzene	DoD-ELAP,NELAP,CALAP,WADOE
1,3,5-Trimethylbenzene	DoD-ELAP,NELAP,CALAP,WADOE
1,2,4-Trimethylbenzene	DoD-ELAP,NELAP,CALAP,WADOE
s-Butylbenzene	DoD-ELAP,NELAP,CALAP,WADOE
4-Isopropyl Toluene	DoD-ELAP,NELAP,CALAP,WADOE
1,3-Dichlorobenzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,4-Dichlorobenzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
n-Butylbenzene	DoD-ELAP,NELAP,CALAP,WADOE
1,2-Dichlorobenzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,2-Dibromo-3-chloropropane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,2,4-Trichlorobenzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Hexachloro-1,3-Butadiene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Naphthalene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
1,2,3-Trichlorobenzene	DoD-ELAP,ADEC,NELAP,CALAP,WADOE

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Dichlorodifluoromethane	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
Methyl tert-butyl Ether	DoD-ELAP,ADEC,NELAP,CALAP,WADOE
n-Hexane	WADOE
2-Pentanone	WADOE

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	17-015	01/31/2021
CALAP	California Department of Public Health CAELAP	2748	06/30/2019
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	01/01/2021
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006-012	05/12/2020
WADOE	WA Dept of Ecology	C558	06/30/2019
WA-DW	Ecology - Drinking Water	C558	06/30/2019

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Notes and Definitions

*	Flagged value is not within established control limits.
D	The reported value is from a dilution
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL)
U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
Y1	Raised reporting limit due to interference
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.