Quarterly report, fourth quarter 2018

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

Prepared for:

The Boeing Company
Seattle, Washington

February 19, 2019

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Prepared by:

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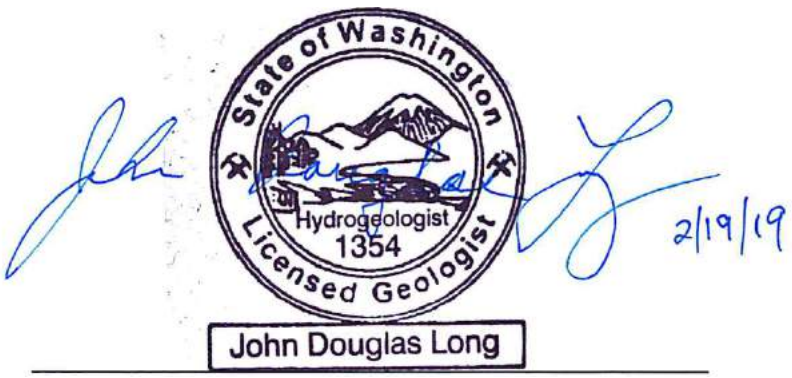

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1.0 Introduction

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 fourth quarter 2018. This work is required under the Resource Conservation and Recovery Act (RCRA) Corrective Action Program being performed at the Boeing Renton Facility in Renton, Washington. 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 Second Addendum to the Compliance Monitoring Plan (Amec Foster Wheeler, 2017) which contains changes to the revised Compliance Monitoring Plan (Amec Foster Wheeler, 2016a) that supersede 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-034 and AOC-035: (MNA);
- 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 of 2016, as reported in the Apron A Investigation Results report (Amec Foster Wheeler, 2016b).

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 of cleanup levels (CULs) at the conditional points of compliance (CPOCs).

This report presents this information for the fourth quarter of 2018, the period from October through December 2018.

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 fourth quarter 2018

The following work was completed during the fourth quarter of 2018, the period from October through December 2018:

- Groundwater monitoring for the fourth quarter of 2018 was completed during November 2018.
- On behalf of Boeing, Wood submitted the Third Quarter 2018 Report to Ecology on October 15, 2018.
- A fifith round of nitrate/sulfate injections was completed in Building 4-78/79 injection wells B78-11, B78-13, and B78-17 through B78-21 in December 2018.

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 first quarter of 2019:

- Reporting will be completed in accordance with the Order, CAP, EDR, and any changes approved by Ecology.
- Groundwater sampling and analysis for the first quarter of 2019 will be completed.
- Nitrate and sulfate injections may be performed for the Building 4-78/79 Area depending on performance monitoring results. Performance monitoring to support the benzene plume study is currently scheduled to be conducted during the first quarter of 2019.
- During the first or second quarter, soil samples will be collected from the Building 4-78/79 area as detailed in the work plan submitted to Ecology on December 10, 2018.

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 soil and groundwater sampling methodology, which is described in more detail 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 Second Addendum to the Compliance Monitoring Plan (Amec Foster Wheeler, 2017) for all Facility corrective action areas. Table A-1 also includes Building 4-70, Lot 20/Former Building 10-71, and Apron A, which were not included in the CAP. 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. Table A-2 also includes Building 4-70 and Apron A, which were not specified 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 fourth quarter of 2018. Operation of the SVE systems at the SWMU-172/174 and Building 4-78/79 areas continued during the fourth quarter, as discussed in Sections 3.2.1.2 and 3.3.1.2. Quarterly compliance monitoring was also conducted in accordance with the Second Addendum to the Compliance Monitoring Plan (Amec Foster Wheeler, 2017).

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 fourth quarter of 2018.

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 fourth quarter.

3.2.1.2 Soil vapor extraction and bioremediation operations

The SVE system at SWMU-172 and SWMU-174 operated normally during the fourth 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 fourth quarter.

3.2.3 Water levels

Groundwater elevations for the SWMU-172 and SWMU-174 area measured during the fourth quarter 2018 are summarized in Table 1 and shown on Figure 1. The contoured data for November 2018 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. All organic chemicals detected (PCE, TCE, cis 1,2-DCE and VC) are present at levels below the applicable MCLs/MTCA criteria for potable water supply in all wells.

3.2.4.1 Monitored attenuation/geochemical indicators

The geochemical indicator results are presented in Table 2. Total organic carbon (TOC) concentrations ranged from 0.64 milligrams per liter (mg/L) to 55.74 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 (VOCs); the dissolved oxygen (DO) and oxidation/reduction potential (ORP) results indicate reducing conditions were present.

3.2.4.2 COC results for source and downgradient plume areas

Table 3 lists fourth quarter 2018 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 CULs in the groundwater collected 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 fourth quarter.

Arsenic was detected above the CUL in 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 fourth quarter sampling event. Copper was detected above the CUL in the groundwater from source area wells, but concentrations were below the CUL in groundwater from the downgradient plume area wells. Lead was detected above the CUL in the groundwater from source area well GW152S and from downgradient plume well GW172S, but was not detected at concentrations above the CUL in the groundwater from the remaining downgradient plume area wells. Metals concentrations decreased during the fourth quarter after increasing during the third quarter. The observed variations for concentrations of inorganics may be influenced by the naturally occurring reducing conditions or other factors such as turbidity in the sample. 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 0.0690 to 0.426 micrograms per liter (µg/L) in the groundwater collected from all CPOC area wells; TCE was detected above the CUL in the groundwater from monitoring well GW235I; and VC was detected above the CUL in the groundwater from monitoring well GW232S. PCE was not detected in the groundwater collected 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. TCE concentrations exceed the CUL in the groundwater from CPOC well GW235I, and VC concentrations exceed the CUL in the groundwater from CPOC well GW232S. The concentrations of both TCE and VC generally appear to be stable. Cleanup levels 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.

Arsenic was detected above the CUL in the groundwater from CPOC area wells GW232S, GW234S, and GW236S. Copper was detected above the CUL in the groundwater from CPOC well GW232S. Lead was not detected above the CUL in the groundwater from CPOC wells (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 collected from CPOC area 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 fourth quarter of 2018. 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 fourth quarter.

3.3.1.2 Soil vapor extraction and bioremediation operations

The SVE system at Building 4-78/79 SWMU/AOC Group was shut down during the first quarter, during which rebound testing was implemented. Soil samples were collected during the second quarter to assess the attainment of soil CULs, and results were reported in the second quarter monitoring report (Wood, 2018). On October 18, 2018, Boeing submitted a formal request for approval of the shutdown of the SVE system at Building 4-78/79 SWMU/AOC Group, which Ecology approved on November 1, 2018. Ecology also requested a work plan for excavating the soils near PP13 and GW013S. The work plan was submitted to Ecology on December 10, 2018. Further details are included in the SVE operations and monitoring report prepared by Calibre and included as Appendix D.

A fifth round of nitrate/sulfate injections was performed in December 2018. Groundwater samples will be collected during the first quarter 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 collected from injection wells ranged from below the reporting limit of 0.20 µg/L to 9.20 µg/L. As shown in Table 6, the benzene concentration in the source area well GW031S in November 2018 was 28.3 ug/L. Trend charts for TCE and VC in the injection wells are presented in Figure 9.

The four benzene treatment injection events completed prior to December 2018 were implemented utilizing low target concentrations of nitrate and sulfate applied to each of the injection wells with concentrations of 100, 200, and 400 mg/L in October 2017, January 2018, and April 2018, respectively. The reagent concentration for the July and December 2018 treatment injection event was 800 mg/L for nitrate and 400 mg/L for sulfate to provide additional nitrate and sulfate to the affected area due to the rapid reaction time observed during previous injection events. More detail is provided in Appendix D.

3.3.2 Compliance monitoring plan deviations

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

3.3.3 Water levels

Table 4 presents the groundwater elevations measured during the fourth quarter 2018 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 November 2018 is generally to the west, with a hydraulic gradient of 0.002.

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. All COCs detected in the down gradient plume and CPOC wells (VC and benzene) are present at levels below the applicable MCLs/MTCA criteria for potable water supply. In the source area, selected wells remain above the MCLs/MTCA standard for potable water supply (specifically for VC, benzene and TPH-GRO) and active treatment is ongoing.

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 DO and ORP, indicating that reducing conditions are present over the area and are generally favorable for reductive dechlorination of chlorinated VOCs. The pH in all monitoring wells was above 6.0 standard units during the fourth quarter monitoring period. Results for the other primary geochemical indicators were fairly consistent throughout this area. TOC concentrations in source area wells ranged from 3.50 to 23.21 mg/L.

3.3.4.2 COC results for source and downgradient plume areas

Table 6 lists fourth quarter 2018 analytical results for the Building 4-78/79 SWMU/AOC Group COCs. The CULs established in the CAP 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 their respective CULs, except for groundwater from source area well GW039S and GW243I, for which 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 2,010 µg/L (the field duplicate concentration was 2,000 µg/L). TPH-G was also detected in the groundwater from source area wells GW033S and GW243I at concentrations below the CUL.

The only COC detected in the groundwater collected from the downgradient plume area wells was VC, which was detected at a concentration of 0.20 µg/L in the groundwater collected from downgradient plume area well GW038S. The detection of VC in the groundwater from GW038S is consistent with historical concentrations of VC in the groundwater from this well.

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 collected from GW031S and GW033S are generally consistent with historical results and trends, though the concentration cis-1,2-DCE decreased significantly during the fourth 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 collected from source area well GW034S (Figure 11) are stable. Nitrate and sulfate injections described in Appendix D are continuing, in order to address remaining benzene present between GW210S and GW244S.

Figure 11 shows a trend chart for downgradient plume area well GW209S, which was installed in 2008 and is located west of Building 4-79. Monitoring results for benzene and VC for GW209S decreased in 2015 and have remained low through the fourth quarter 2018 monitoring event, with concentrations of all COCs below reporting limits.

3.3.4.3 COC results for conditional point of compliance area

Groundwater monitoring results from the fourth 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 0.93 µg/L, above the CUL, in the groundwater from CPOC area well GW237S; all other benzene results for the CPOC area were below detection. As shown in Figure 12, benzene has been sporadically detected in the groundwater from CPOC area well GW237S and has not been detected in the groundwater from any other CPOC wells at concentrations above the CUL. The benzene concentrations in the groundwater from CPOC well GW237S have remained lower than the concentrations observed during the second quarter. The only other COCs detected in the groundwater from the CPOC area during the fourth quarter was VC at concentrations ranging from 0.21 µg/L to 0.29 µg/L in the groundwater from CPOC wells GW237S, GW238I, and 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 fourth quarter.

3.4.2 Compliance monitoring plan deviations

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

3.4.3 Water levels

Groundwater elevations for the Former Fuel Farm AOC Group measured during the fourth quarter 2018 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 GW256S was below 6.0 standard units; low pH may interfere with biological degradation of site COCs. However, COCs are below cleanup levels 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 fourth quarter 2018 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 and Jet A ranges exceeded the CUL in the groundwater collected from CPOC area wells GW221S and GW224S, and was detected at concentrations below the CUL in CPOC well GW211S. TPH in the diesel range was also detected at concentrations below the CUL in CPOC well GW212S. Figure 16 shows that the fourth quarter results for these wells are consistent with the historical monitoring results since late 2013.

3.5 AOC-001 and AOC-002

This section describes corrective action activities conducted at these AOCs during the fourth quarter of 2018. 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 fourth quarter.

3.5.2 Compliance monitoring plan deviations

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

3.5.3 Water levels

Table 10 presents the groundwater elevations measured during the fourth quarter 2018 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. All 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; however, concentrations are still greater than current project cleanup levels.

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 DO 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 quaters; therefore, no monitoring for source area or downgradient plume area wells was conducted in the fourth 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 collected 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 all CPOC area wells except GW194S and GW245S.

As shown in Figure 18, aside from the increase in concentrations of cis-1,2-DCE and VC observed in the in the groundwater collected from GW185S in the third and fourth quarters of 2015; concentrations of cis-1,2-DCE and VC in the CPOC area monitoring wells have been generally stable since compliance monitoring began. COPC 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, cleanup levels 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 fourth quarter of 2018. 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 fourth quarter.

3.6.2 Compliance monitoring plan deviations

Groundwater samples were collected from the source and downgradient area wells during the fourth 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 fourth quarter 2018 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. The sole COC detected, VC, is present at levels below the applicable MCL/MTCA criteria for potable water supply in all wells.

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. The data indicate that conditions are generally conducive to biodegradation of the COCs for this AOC.

3.6.4.2 COC results for source and downgradient plume areas

Groundwater collected from the source area and downgradient plume area wells did not have detections of PCE, TCE or cis-1,2-DCE above their respective CULs. VC was detected above the CUL in the groundwater collected from both source area well GW249S and downgradient plume are well GW188S.

3.6.4.3 COC results for conditional point of compliance area

Groundwater collected from the two CPOC area wells did not have detections of PCE, TCE or cis-1,2-DCE above their respective CULs. VC was detected at concentrations above the CUL in the groundwater collected from CPOC wells GW247S and GW248I, at concentrations of 0.679 and 0.987 µg/L, respectively.

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 fourth quarter of 2018.

3.8 AOC-034 and AOC-035

This section describes corrective action activities conducted at AOC-034 and AOC-035 during the fourth quarter of 2018. The cleanup remedy for these AOCs is MNA. Figure 20 shows the locations of the groundwater monitoring wells at AOC-034 and AOC-035, as well as the groundwater elevations measured during this sampling event.

3.8.1 Cleanup action activities

No construction or operations work was conducted for this AOC during the fourth quarter.

3.8.2 Compliance monitoring plan deviations

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

3.8.3 Water levels

Table 16 presents the groundwater elevations measured during the fourth quarter 2018 monitoring event at AOC-034 and AOC-035. Figure 20 shows the groundwater elevation contours based on the groundwater elevations. Based on these contours, groundwater in the vicinity of AOC-034 and AOC-035 flows to the west-northwest, toward the Cedar River Waterway/Lake Washington, with a horizontal hydraulic gradient of approximately 0.003.

3.8.4 Groundwater monitoring results

Groundwater at this area is monitored following the schedule presented in Tables A-1 and A-2 in Appendix A. Results for geochemical indicators are presented in Table 17; results for COCs are presented in Table 18. All COCs (cis-1,2-DCE and VC) are non detect and therefore below the applicable MCLs/MTCA criteria for potable water supply in all wells.

3.8.4.1 Monitored natural attenuation/geochemical indicators

The geochemical indicator results are presented in Table 17. In general, the results indicate uniform conditions are present across this corrective action area and that conditions are conducive to natural attenuation of chlorinated VOCs, as indicated by the pH, ORP, and DO measurements.

3.8.4.2 COC results for source and cross-gradient plume areas

Table 18 presents the fourth quarter 2018 analytical results for the AOC-034 and AOC-035 groundwater COCs. Trend charts have not been developed for this area, because the COCs are not commonly detected in the AOC-034 and AOC-035 groundwater monitoring wells. As shown in Table 18, neither cis-1,2-DCE nor VC were detected in the groundwater collected from source area well GW217S or cross-gradient plume area well GW216S.

3.8.4.3 COC results for conditional point of compliance area

Table 18 shows that COC concentrations in groundwater from the CPOC area wells were below reporting limits and CULs for the fourth quarter of 2018. This is the eighth consecutive semiannual monitoring event with COC concentrations below CULs in the CPOC area well samples. With 4 years (8 sampling events) of semi-annual data demonstrating that COCs are below CULs, groundwater monitoring at this AOC is no longer necessary and a request to discontinue sampling at this location will be requested by Boeing to Ecology.

3.9 AOC-060

AOC-060 is monitored semiannually during the first and third quarters; therefore, no monitoring was conducted for this area during the fourth quarter of 2018.

3.10 AOC-090

AOC-090 is monitored semiannually during the first and third quarters; therefore, no monitoring was conducted for this area during the fourth quarter of 2018.

3.11 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 fourth quarter of 2018.

3.12 Lot 20/former building 10-71 parcel

This section describes corrective action activities conducted for this area during the fourth quarter 2018. Figure 21 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 fourth 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.

3.12.1 Cleanup action activities

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

3.12.2 Water levels

The groundwater elevations measured during the fourth quarter at the Lot 20/Former Building 10-71 Parcel are presented in Table 19 and on Figure 21. Groundwater contours are not shown on Figure 21 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 fourth quarter water level measurements, the apparent groundwater flow appears to be generally to the northwest.

3.12.3 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 20; results for COCs for the Lot 20/Former Building 10-71 Parcel monitoring wells are presented in Table 21. Groundwater in this area is monitored following the schedule presented in Tables A-1 in Appendix A. All COCs detected (TCE and cis-1,2-DCE) are present at levels below the applicable MCLs/MTCA criteria for potable water supply in all wells.

3.12.3.1 Monitored attenuation/geochemical indicators

The geochemical indicator results are presented in Table 20. The pH in groundwater from the Lot 20/Former Building 10-71 Parcel monitoring wells was near neutral and the remaining parameters appear uniform in the groundwater collected from these monitoring wells.

3.12.3.2 COC results

Fourth quarter analytical results for the Lot 20/Former Building 10-71 Parcel COCs are presented in Table 21. The concentrations of all of the COCs—cis-1,2-DCE, toluene, TCE, and VC—in the groundwater collected from Lot 20/Former Building 10-71 Parcel monitoring wells were below detection, except for detections of cis-1,2-DCE and TCE at concentrations of 0.25 and 0.28 µg/L, respectively, in the groundwater collected from 10-71-MW2.

3.13 Apron A area

This section describes corrective action activities conducted at the Apron A area during the fourth quarter 2018. The cleanup remedy proposed for the Apron A area is bioremediation and MA. Figure 22 shows the locations of the groundwater monitoring wells in the Apron A area.

3.13.1 Cleanup action activities

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

3.13.2 Water levels

The depth to groundwater measured during the fourth quarter at Apron A are presented in Table 22 and on Figure 22. Groundwater elevations are not available because the top of casing elevations were never surveyed.

3.13.3 Groundwater monitoring results

Results for primary geochemical indicators for groundwater from groundwater monitoring wells GW262S and GW264S are presented in Table 23; results for COCs from these wells are presented in Table 24. Groundwater in this area is monitored following the schedule presented in Tables A-1 and A-2 in Appendix A. The sole COC detected, VC, is present at a level below the applicable MCL/MTCA criteria for potable water supply in all wells.

3.13.3.1 Monitored attenuation/geochemical indicators

Geochemical parameters are presented in Table 23. TOC concentrations in the monitoring wells were slightly elevated during the fourth quarter 2018 monitoring event. The other primary geochemical

indicators show that reducing conditions were present and that conditions were conducive to biological degradation of the chlorinated VOCs.

3.13.3.2 COC results

Table 24 lists fourth quarter analytical results for the Apron A COCs: cis-1,2-DCE and VC. Cis-1,2-DCE was not detected in the groundwater collected from either GW262S or GW264S. VC was detected in the groundwater collected from monitoring well GW264S at a concentration of 0.55 µg/L. VC was not detected in the groundwater collected 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.

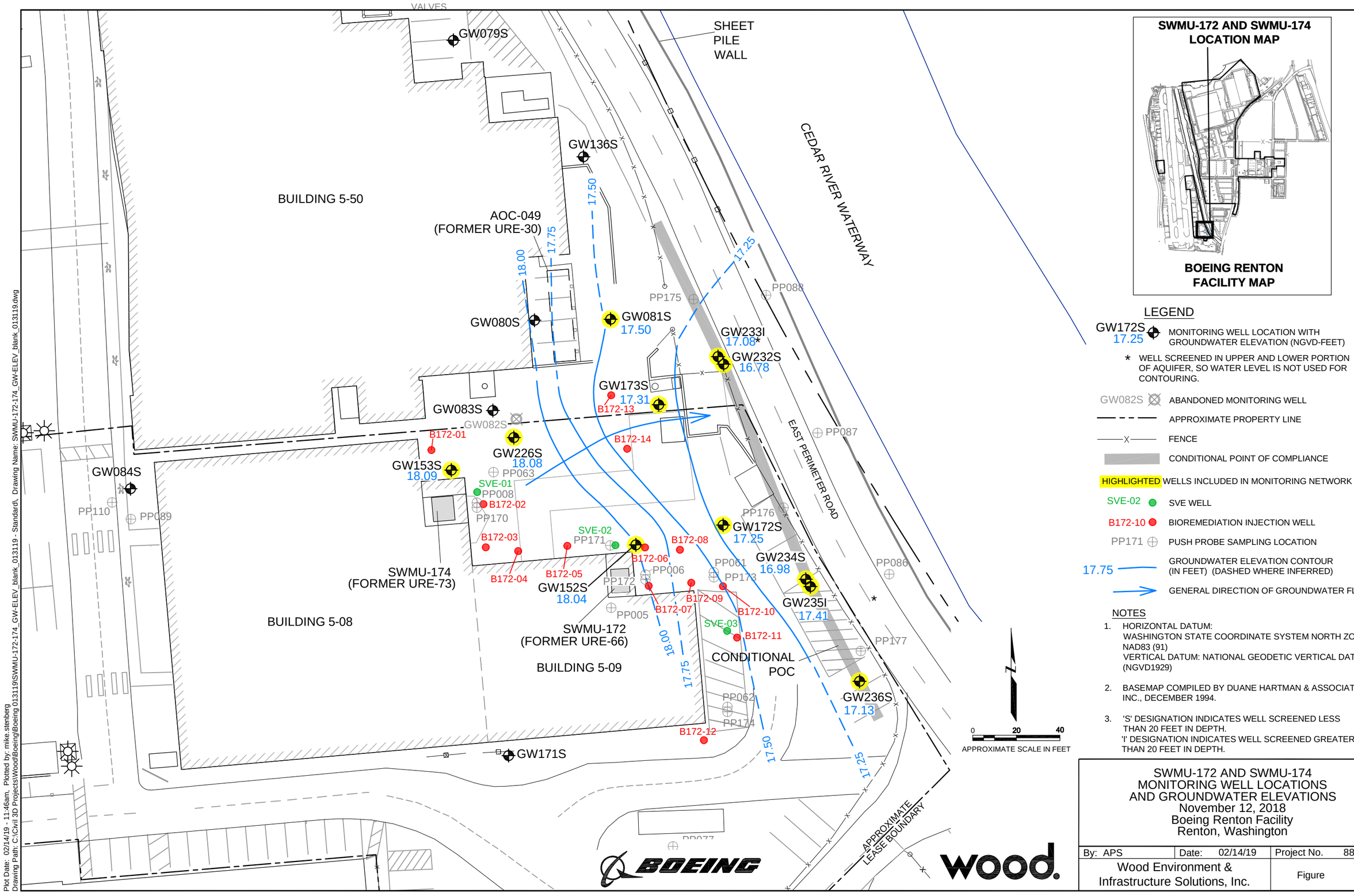
Amec Foster Wheeler, 2016b, Apron A Investigation Results, Renton Municipal Airport – Boeing Apron A Renton, Washington, June.

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

Amec Foster Wheeler, 2017, Second Addendum to the Compliance Monitoring Plan, Boeing Renton Facility, Renton Washington: Prepared for the Boeing Company, December.

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

Figures



SWMU-172 AND SWMU-174 LOCATION MAP

BOEING RENTON FACILITY MAP

LEGEND

- GW172S 17.25 — 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.
- 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
- 17.75 — GROUNDWATER ELEVATION CONTOUR (IN FEET) (DASHED WHERE INFERRED)
- GENERAL DIRECTION OF GROUNDWATER FLOW

0 20 40
APPROXIMATE SCALE IN FEET

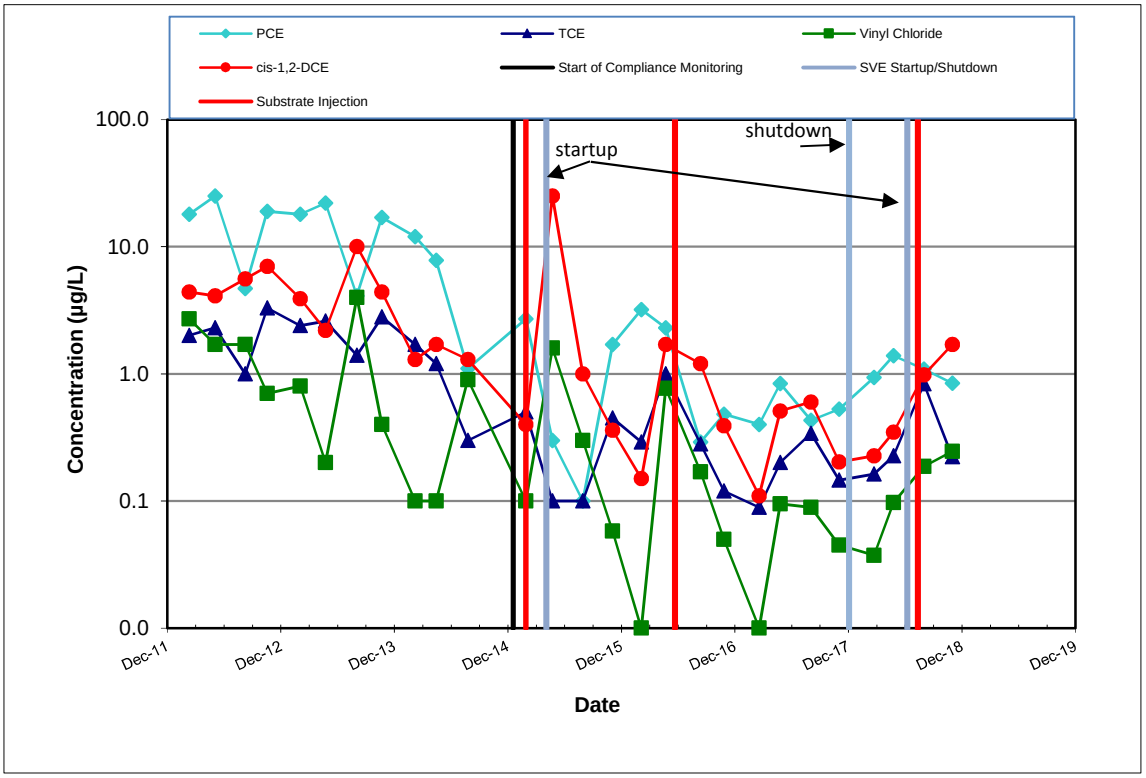
NOTES

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 20 FEET IN DEPTH.
   'I' DESIGNATION INDICATES WELL SCREENED GREATER THAN 20 FEET IN DEPTH.

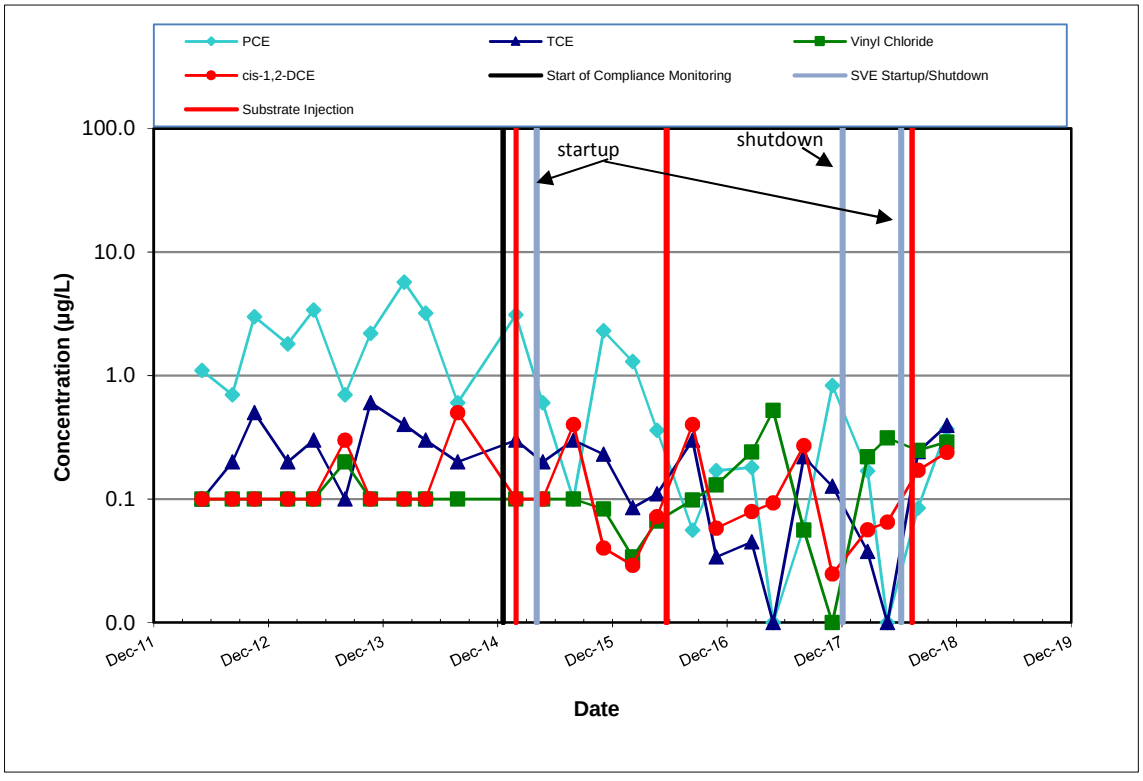
SWMU-172 AND SWMU-174 MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS November 12, 2018 Boeing Renton Facility Renton, Washington

By: APS	Date: 02/14/19	Project No. 8888
Wood Environment & Infrastructure Solutions, Inc.	Figure	1

Plot Date: 02/14/19 - 11:46am, Plotted by: mike.stenberg
Drawing Path: C:\Civil 3D Projects\Wood\Boeing\Boeing 013119\SWMU-172-174_GW-ELEV_blank_013119 - Standard\, Drawing Name: SWMU-172-174_GW-ELEV_blank_013119.dwg



SOURCE AREA WELL GW152S



SOURCE AREA WELL GW153S

Note: non-detected values shown at one-half the reporting limit

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

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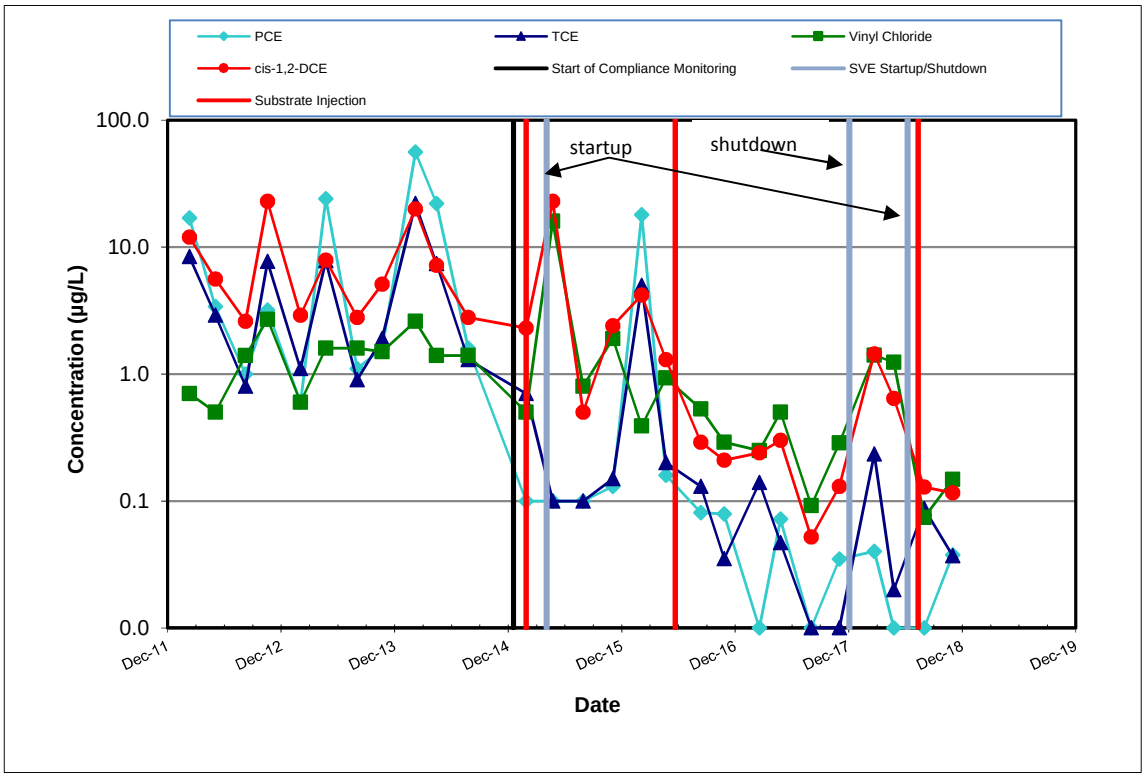
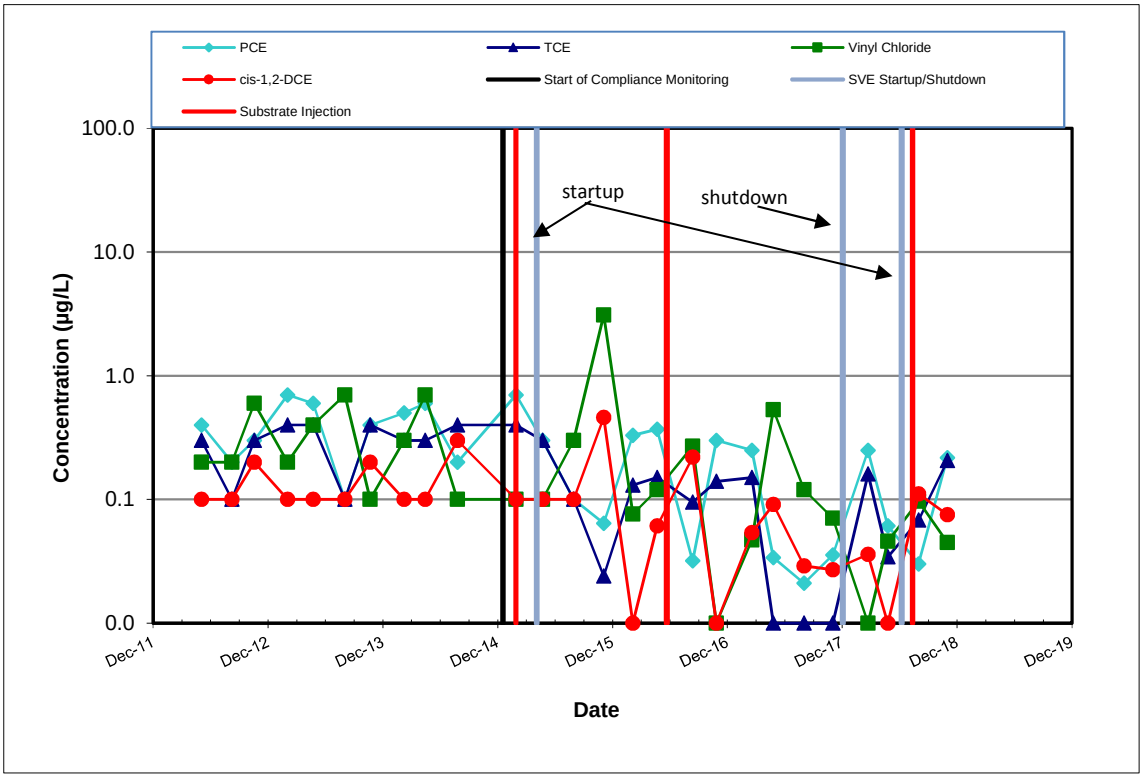


DOWNGRADIENT PLUME AREA WELL GW172S



DOWNGRADIENT PLUME AREA WELL GW173S

Note: non-detected values shown at one-half the reporting limit

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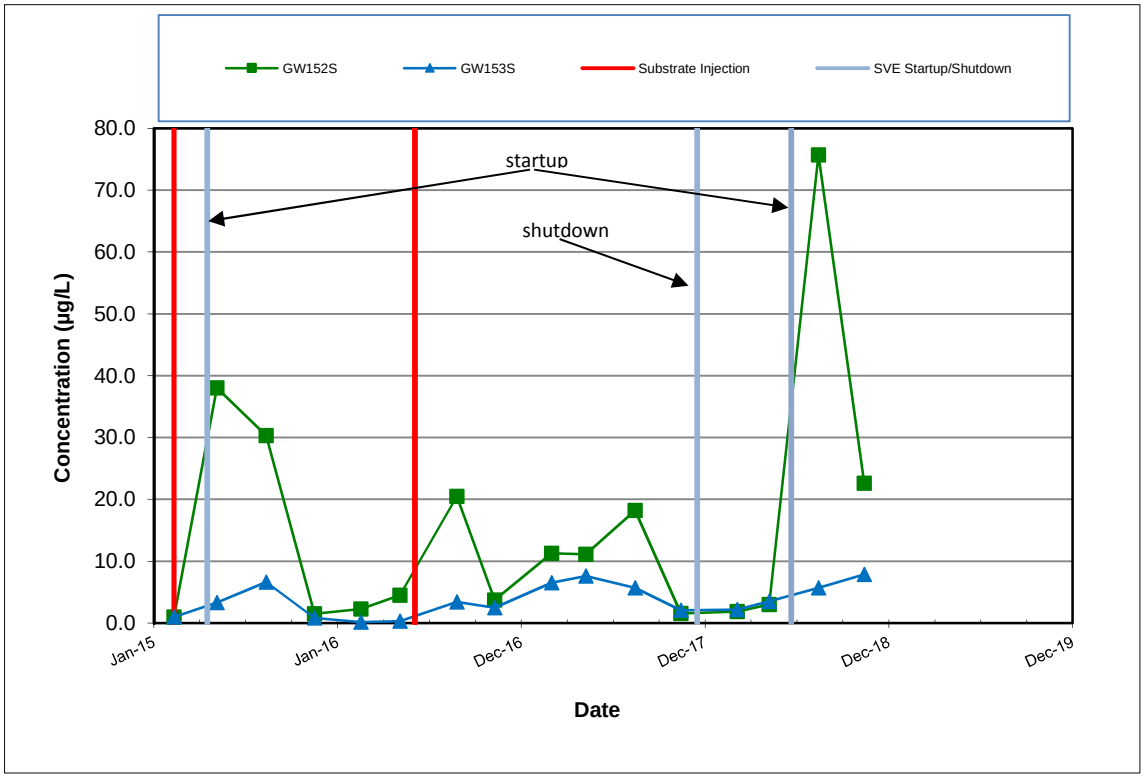
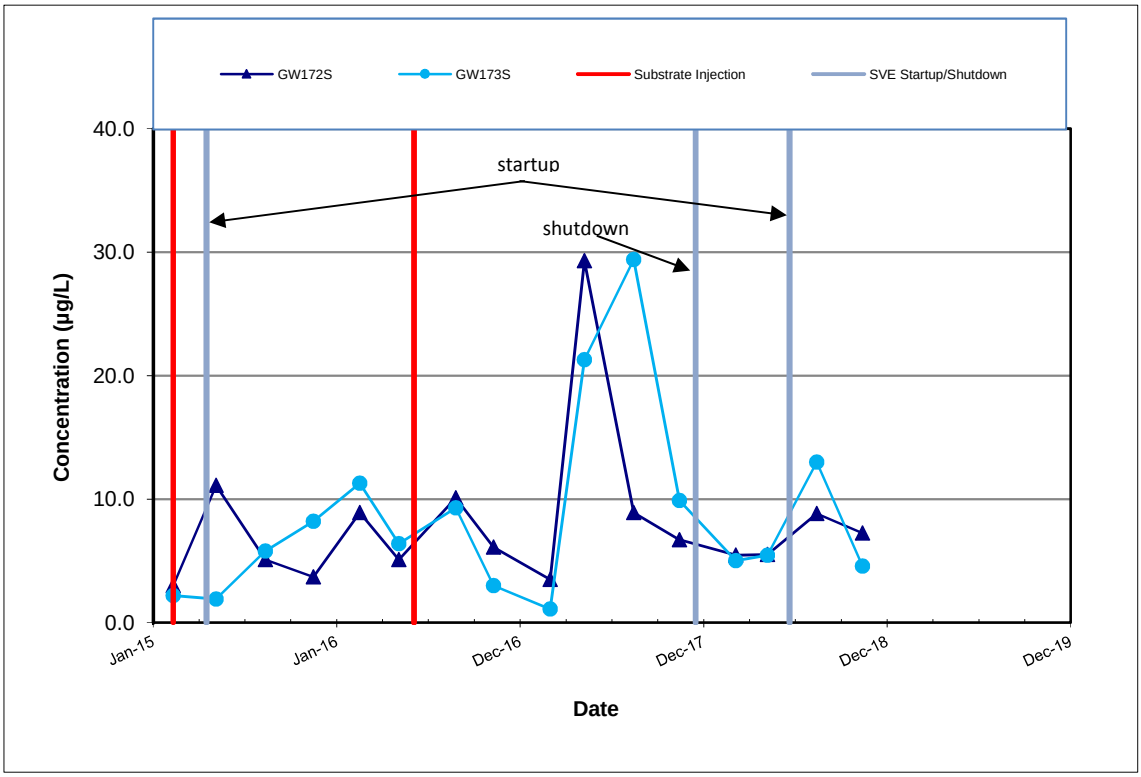
wood.	SWMU-172 AND SWMU-174 TREND PLOTS FOR DOWNGRADIENT PLUME AREA WELLS GW172S AND GW173S Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 3



TOTAL ARSENIC IN SOURCE AREA WELLS



TOTAL ARSENIC IN DOWNGRADIENT PLUME AREA WELLS

Note: non-detected values shown at one-half the reporting limit

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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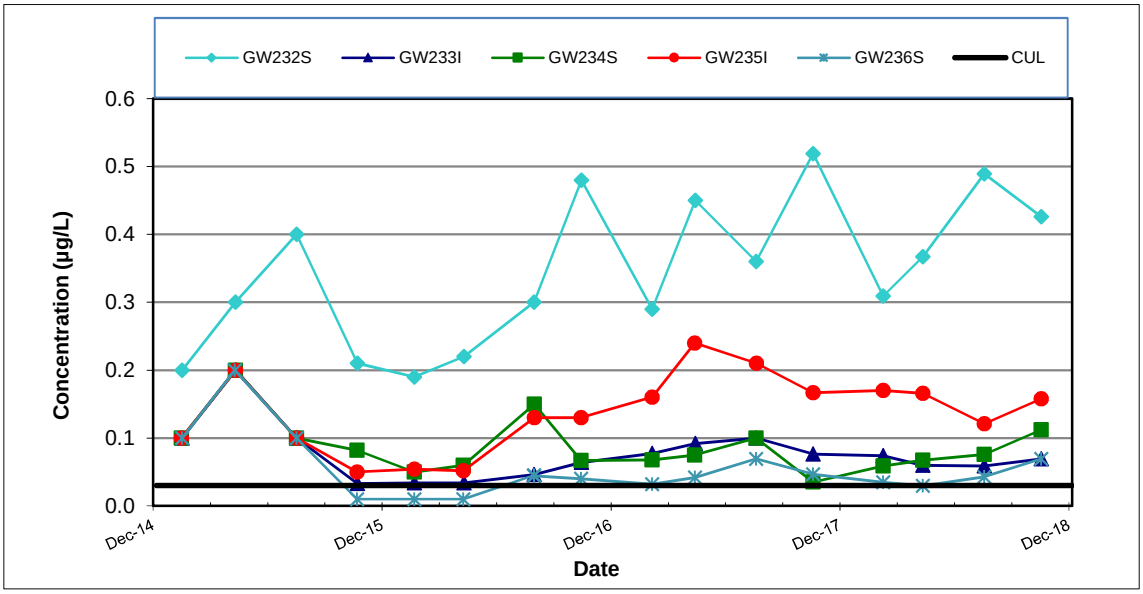
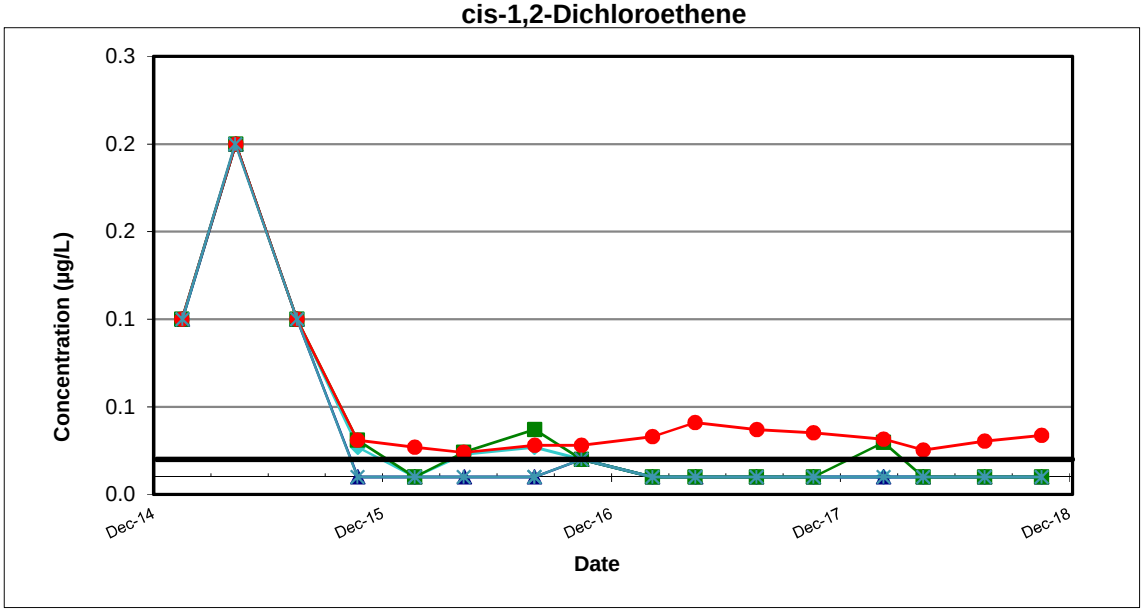
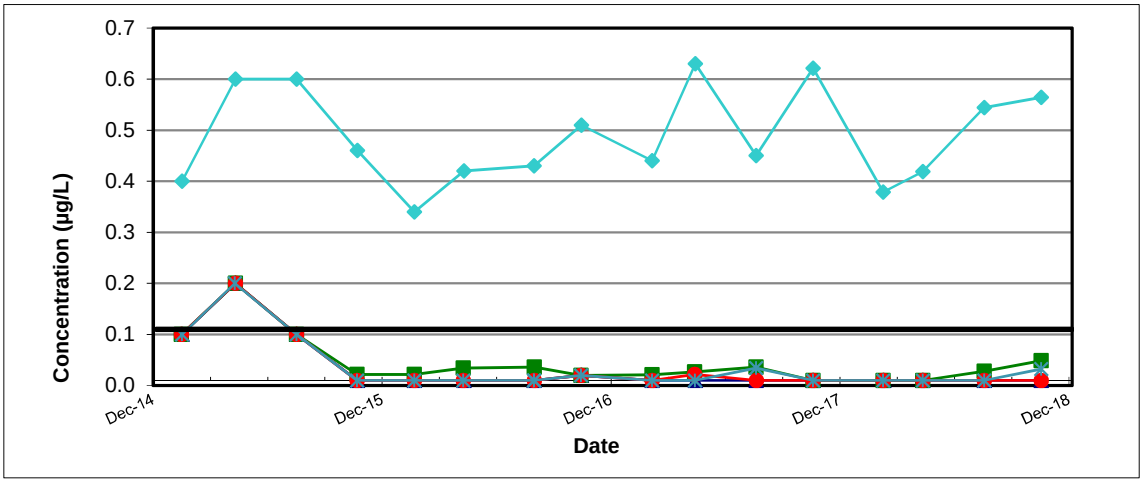


cis-1,2-Dichloroethene



Trichloroethene



Vinyl Chloride

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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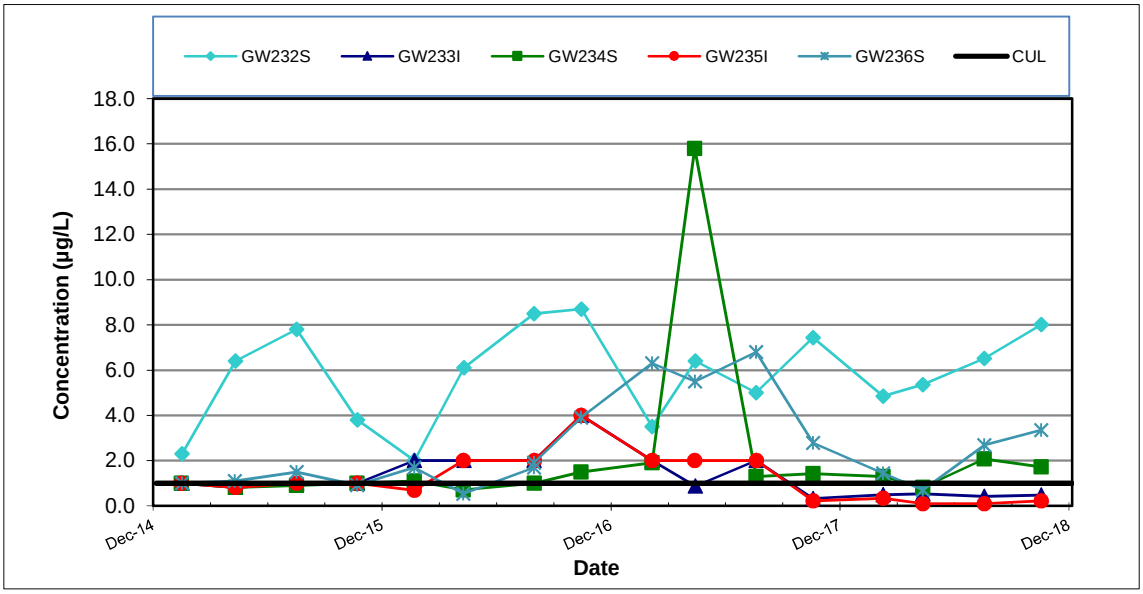
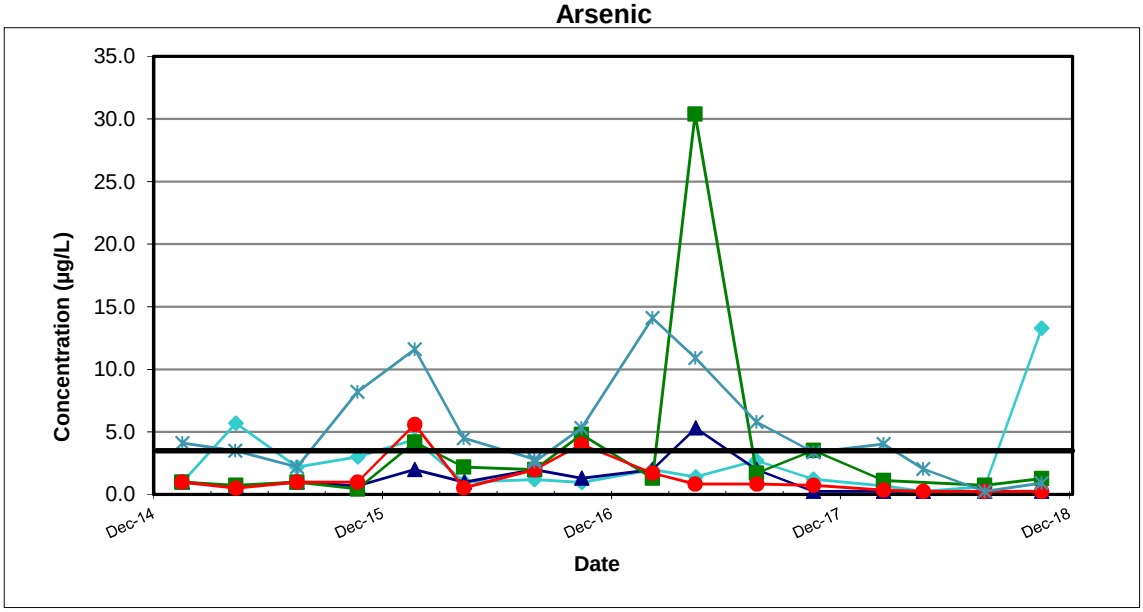
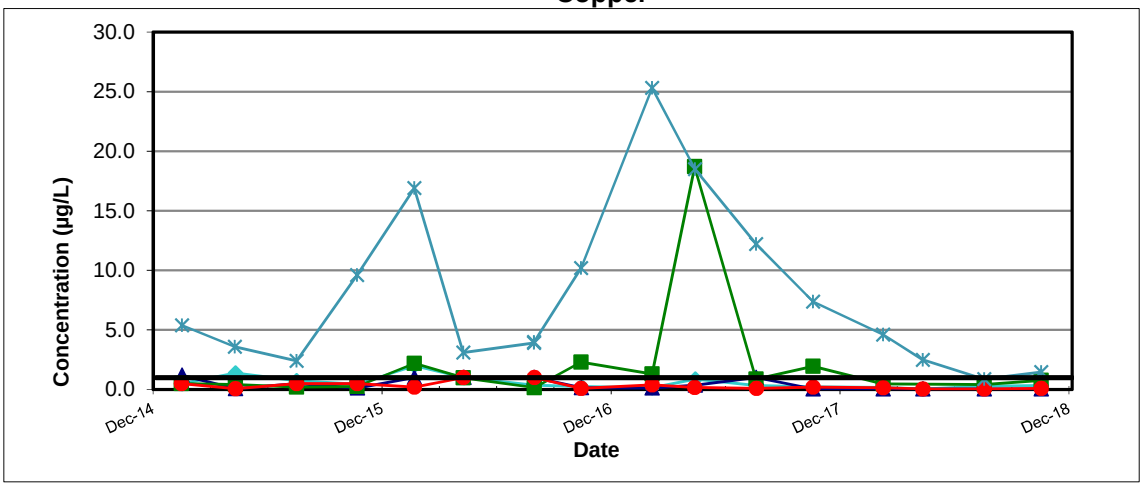


Arsenic



Copper



Lead

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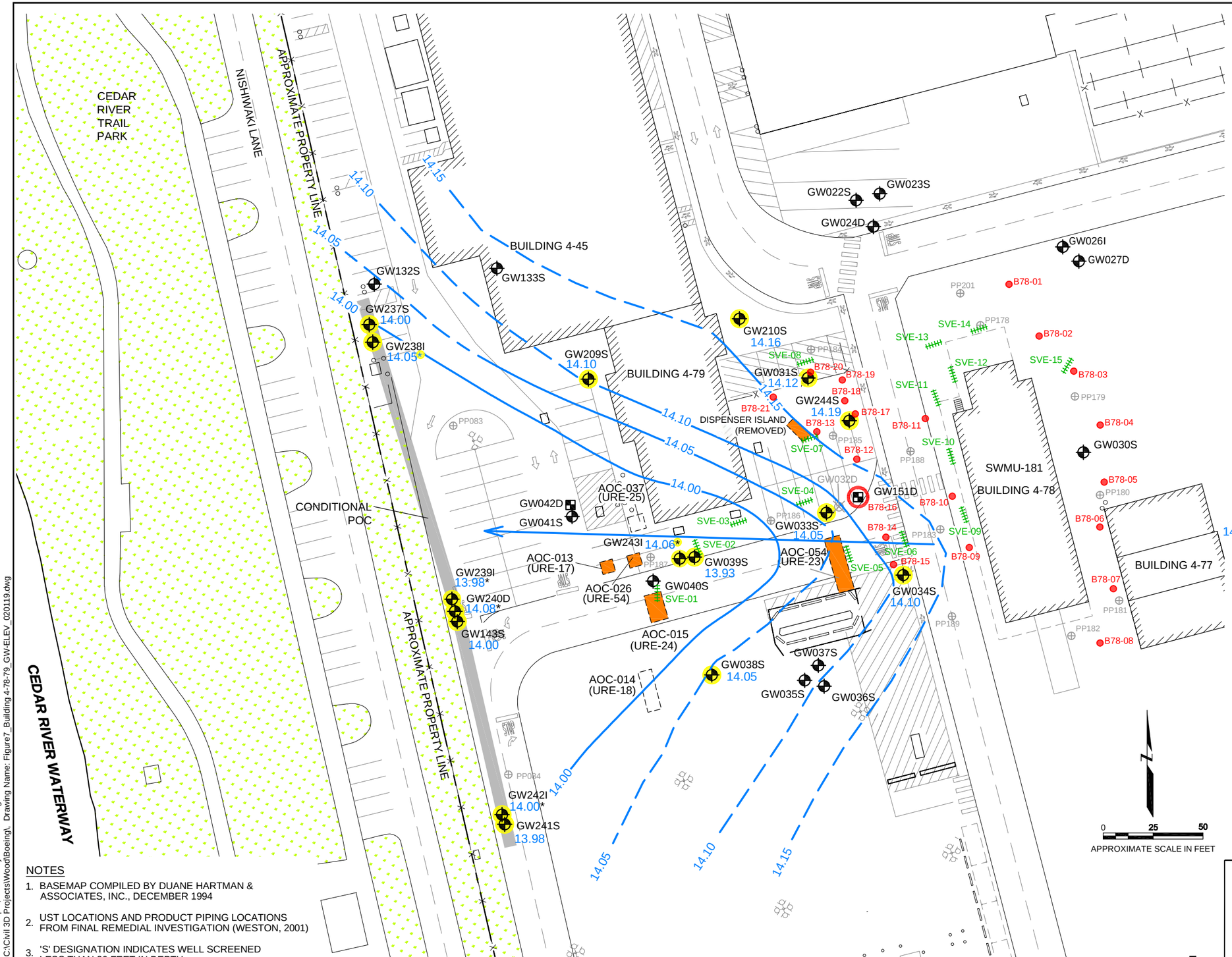
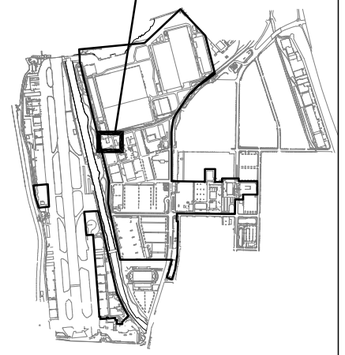
wood.	SWMU-172 AND SWMU-174 TREND PLOTS FOR ARSENIC, COPPER AND LEAD IN CPOC AREA WELLS Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 6



4-78/79 SWMU/AOC GROUP LOCATION MAP



BOEING RENTON FACILITY MAP

LEGEND

GW033S 14.05 — 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.

GW042D — EXTRACTION WELL

14.00 — 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

FENCE

APPROXIMATE FUEL AND NON-CHLORINATED VOC SOURCE AREAS

REMOVED UST (WESTON, 2001)

CONDITIONAL POINT OF COMPLIANCE

HIGHLIGHTED WELLS INCLUDED IN MONITORING NETWORK

0 25 50

APPROXIMATE SCALE IN FEET

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.

BOEING

wood.

BUILDING 4-78/79 SWMU/AOC GROUP MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS NOVEMBER 13, 2018 Boeing Renton Facility Renton, Washington

By: APS	Date: 03/22/19	Project No. 8888
Wood Environment & Infrastructure Solutions, Inc.		Figure 7

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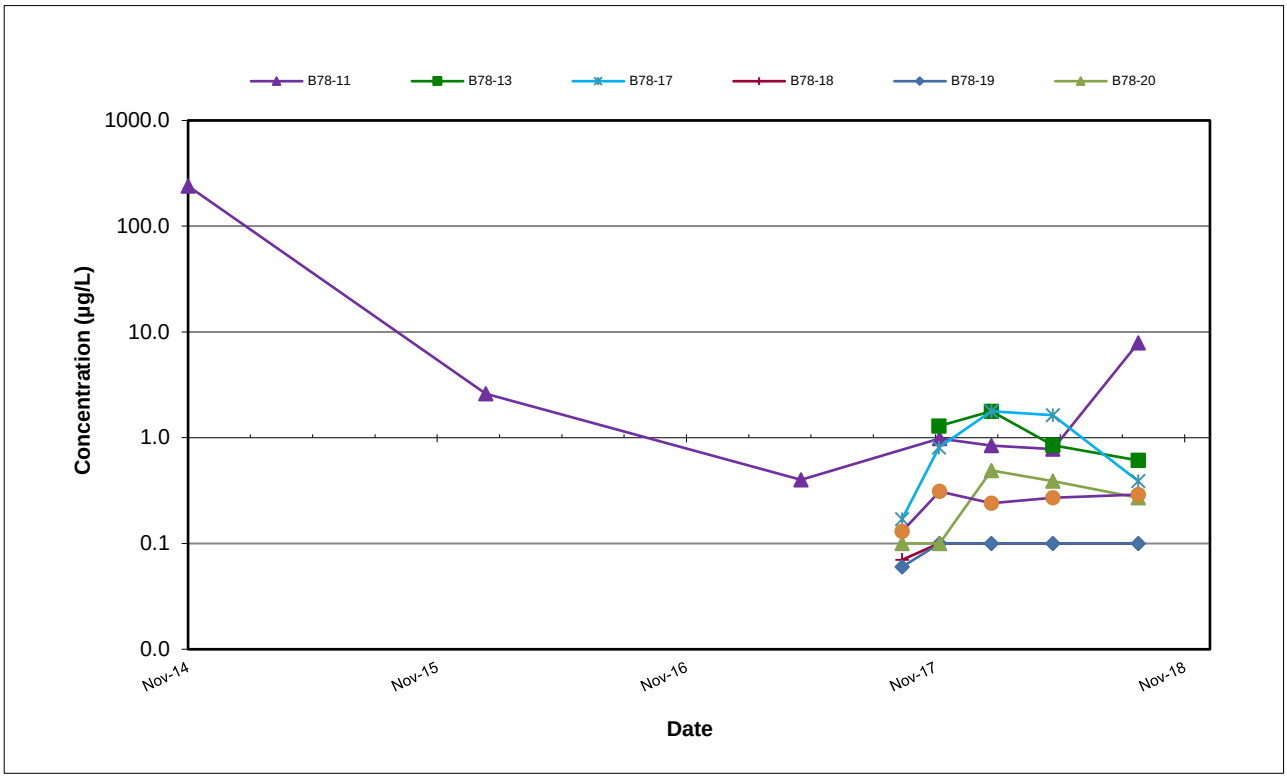
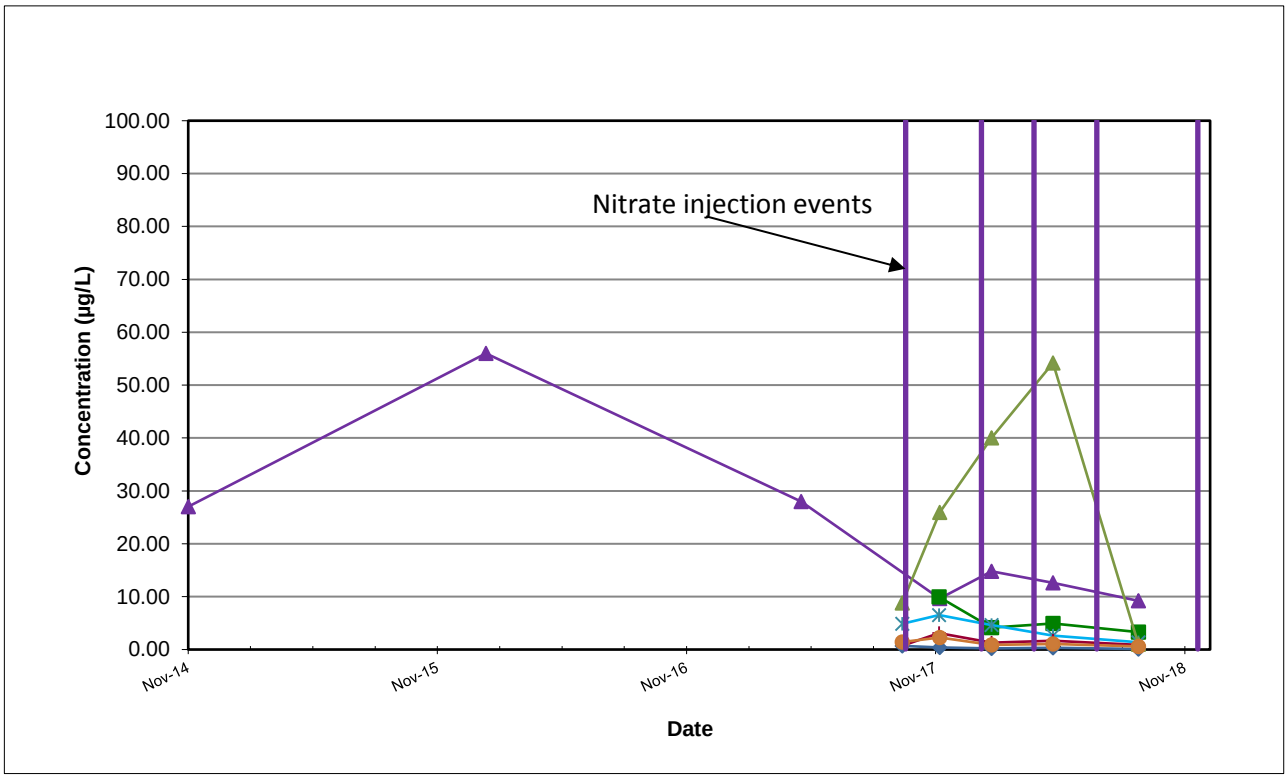


cis-1,2-Dichloroethene



Benzene

Note: non-detected values shown at one-half the reporting limit

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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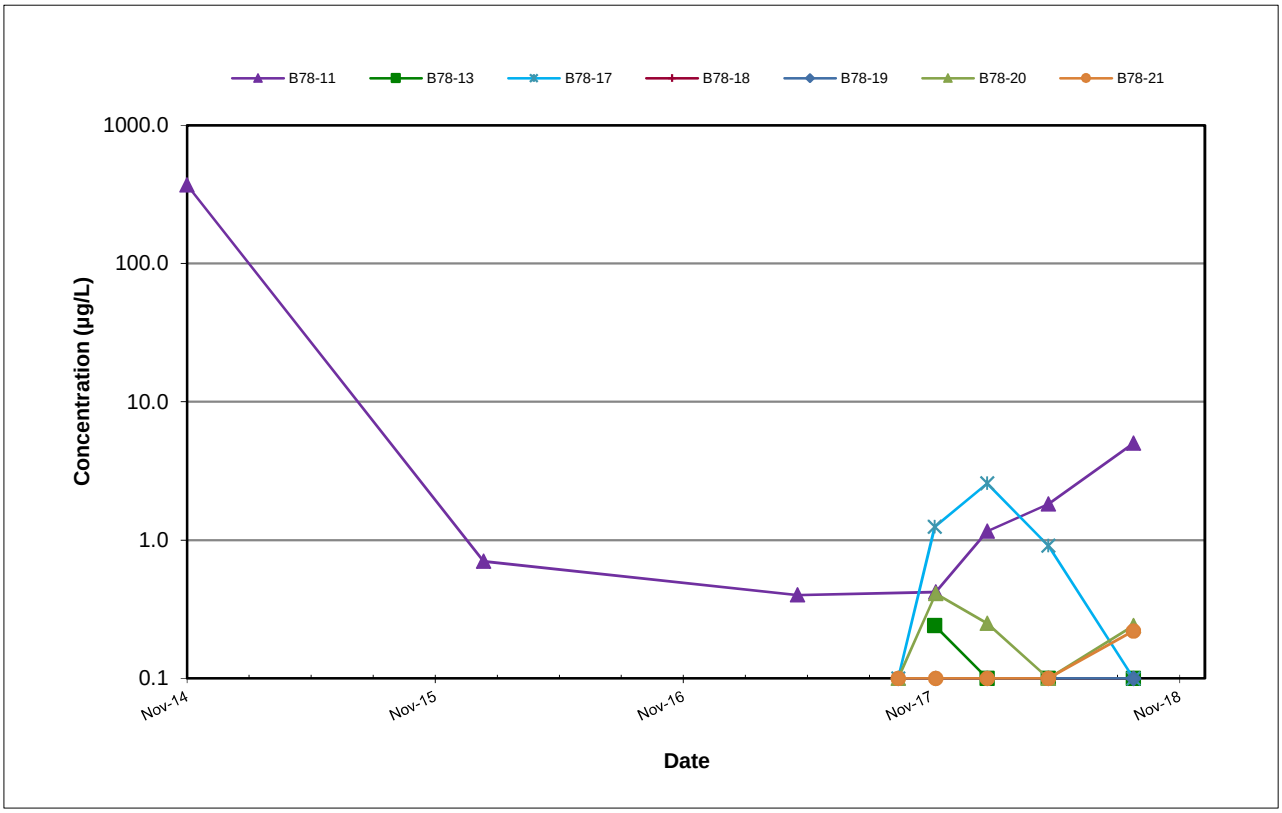
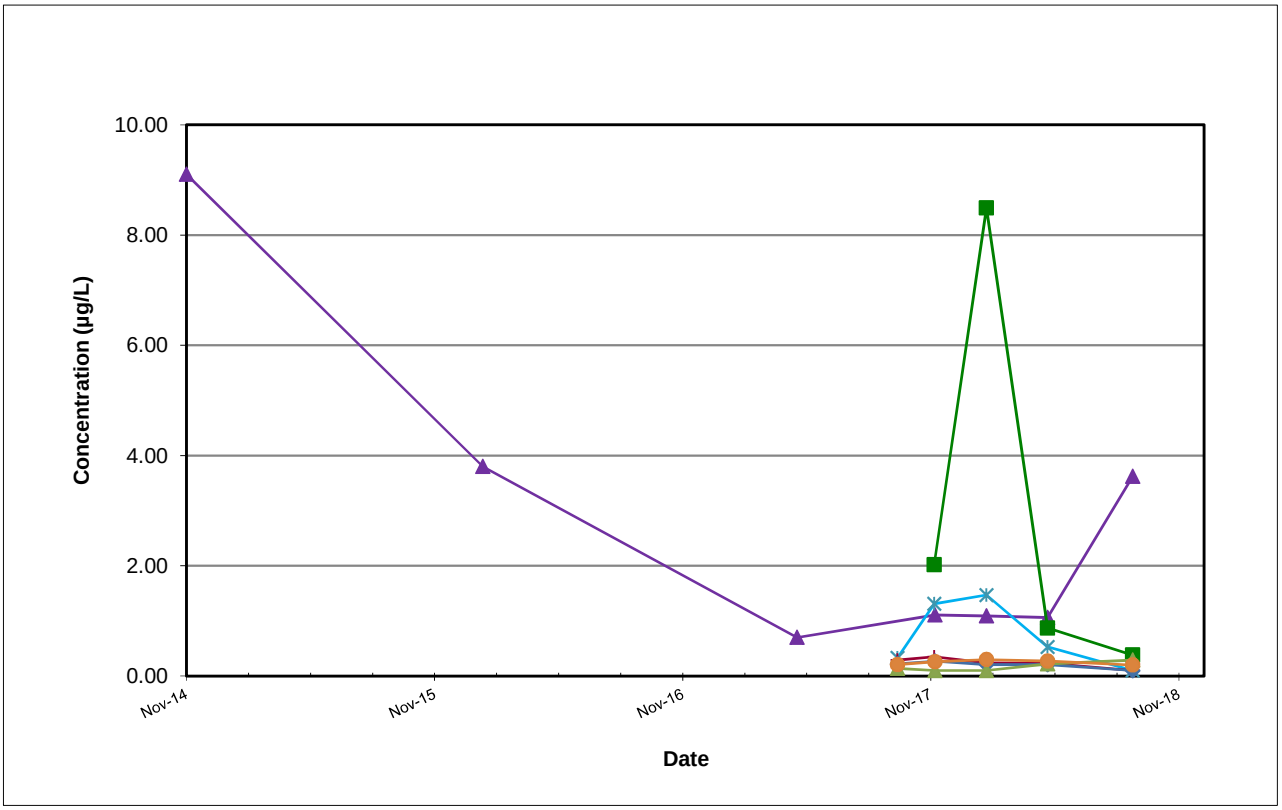


Trichloroethene



Vinyl Chloride

Note: non-detected values shown at one-half the reporting limit

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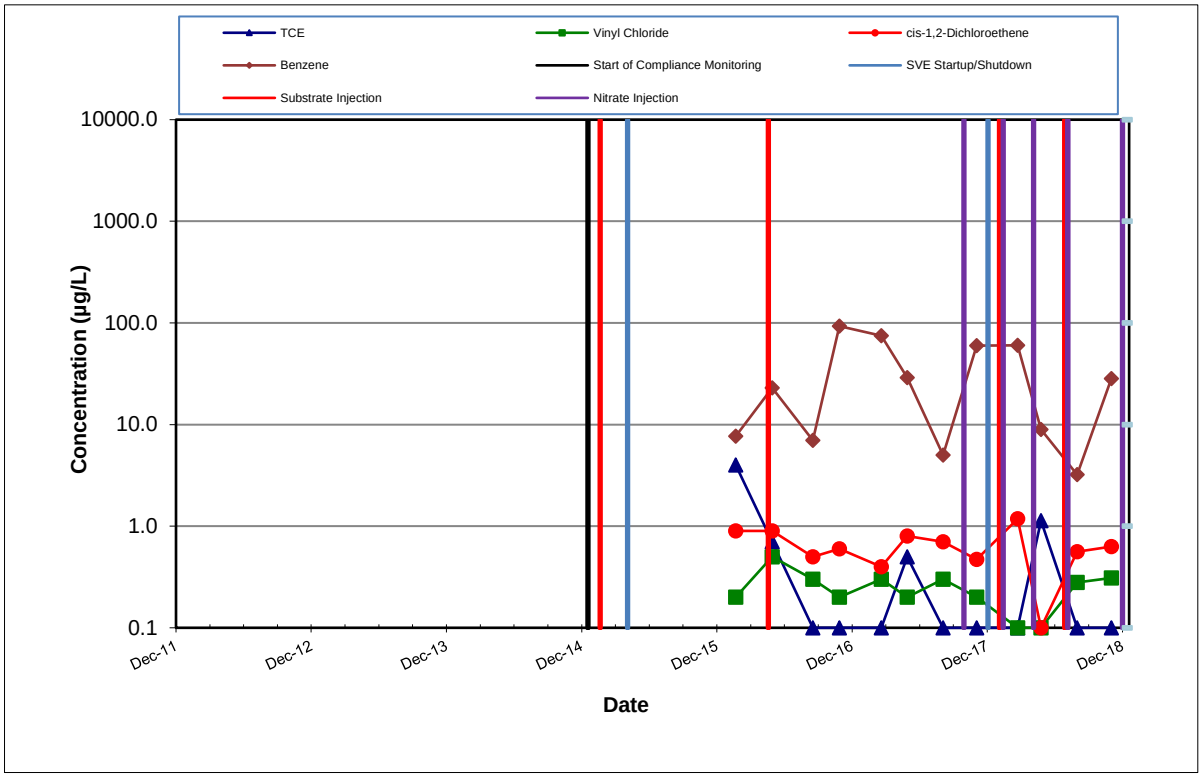
wood.

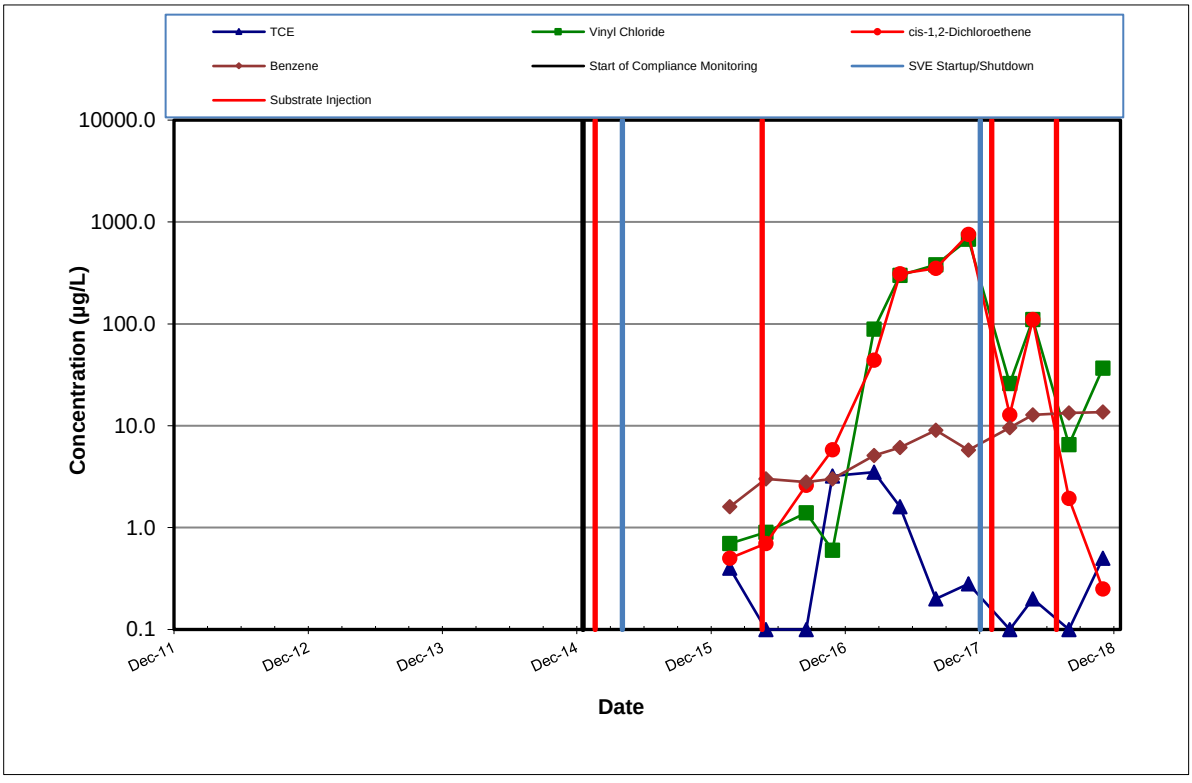
BUILDING 4-78/79 SWMU/AOC GROUP TREND PLOTS FOR
TRICHLOROETHENE AND VINYL CHLORIDE IN INJECTION WELLS
Boeing Renton Facility
Renton, Washington

Project No. 8888

Figure 9



SOURCE AREA WELL GW031S



SOURCE AREA WELL GW033S

Note: non-detected values shown at one-half the reporting limit

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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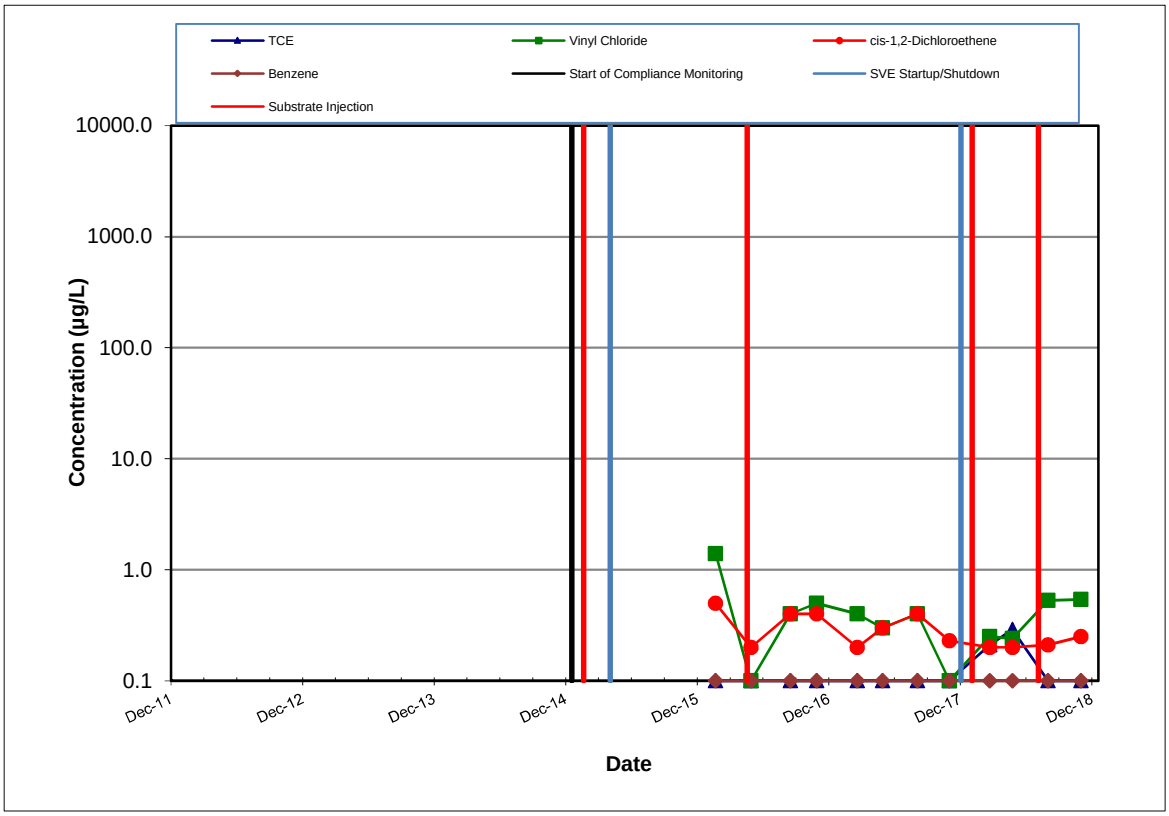
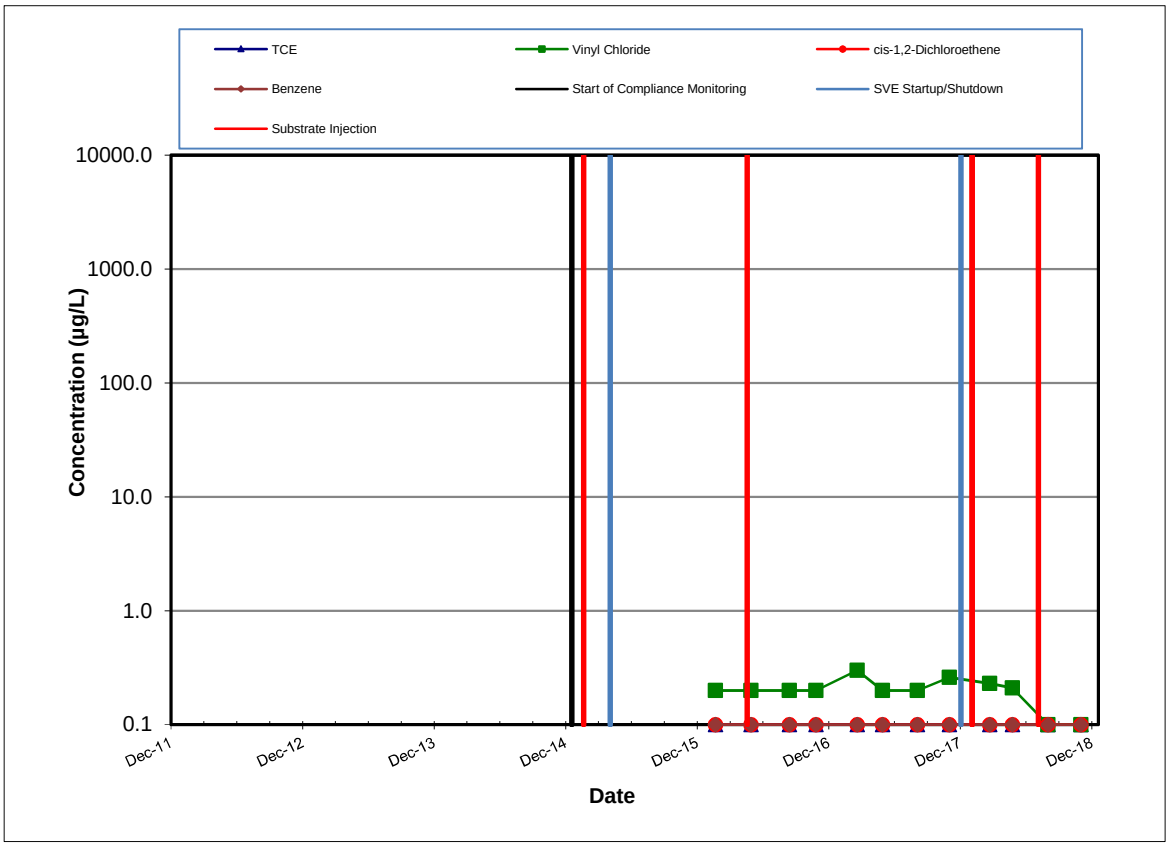


SOURCE AREA WELL GW034S



DOWNGRADIENT PLUME AREA WELL GW209S

Note: non-detected values shown at one-half the reporting limit

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

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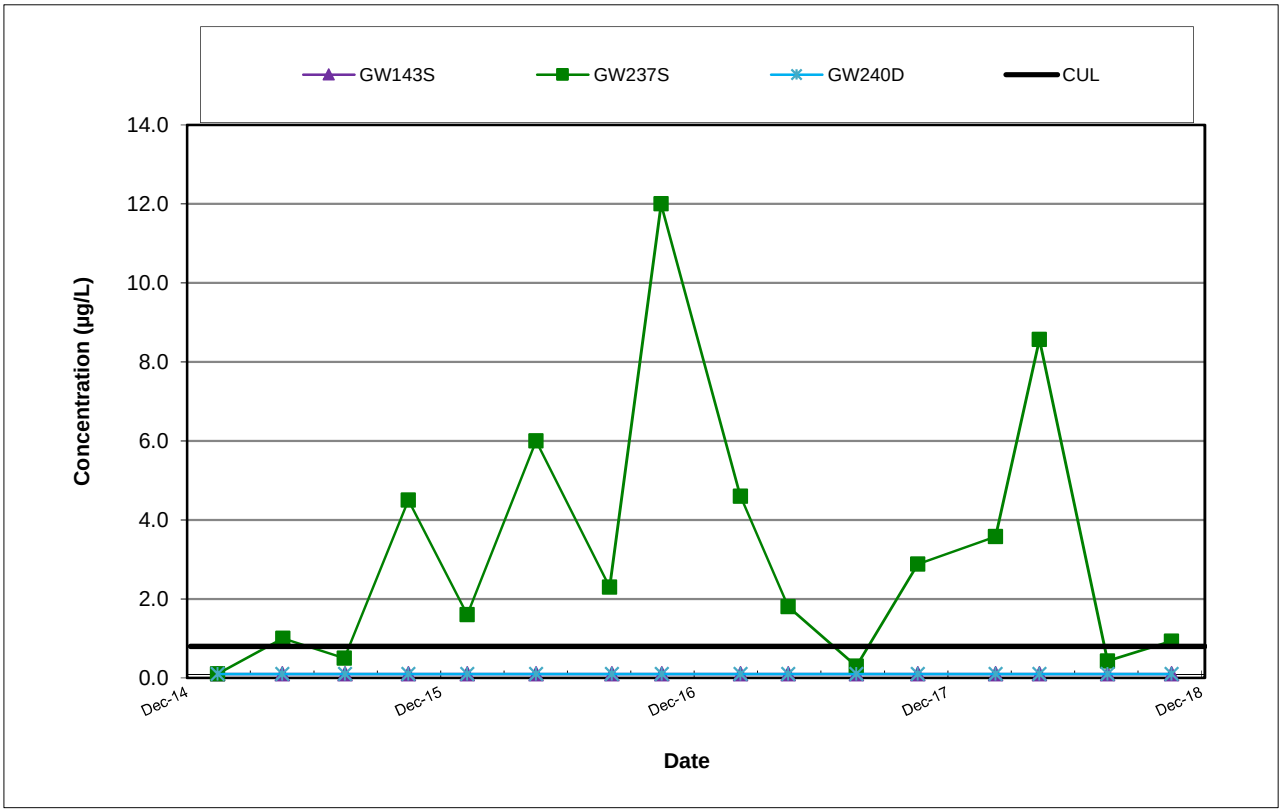
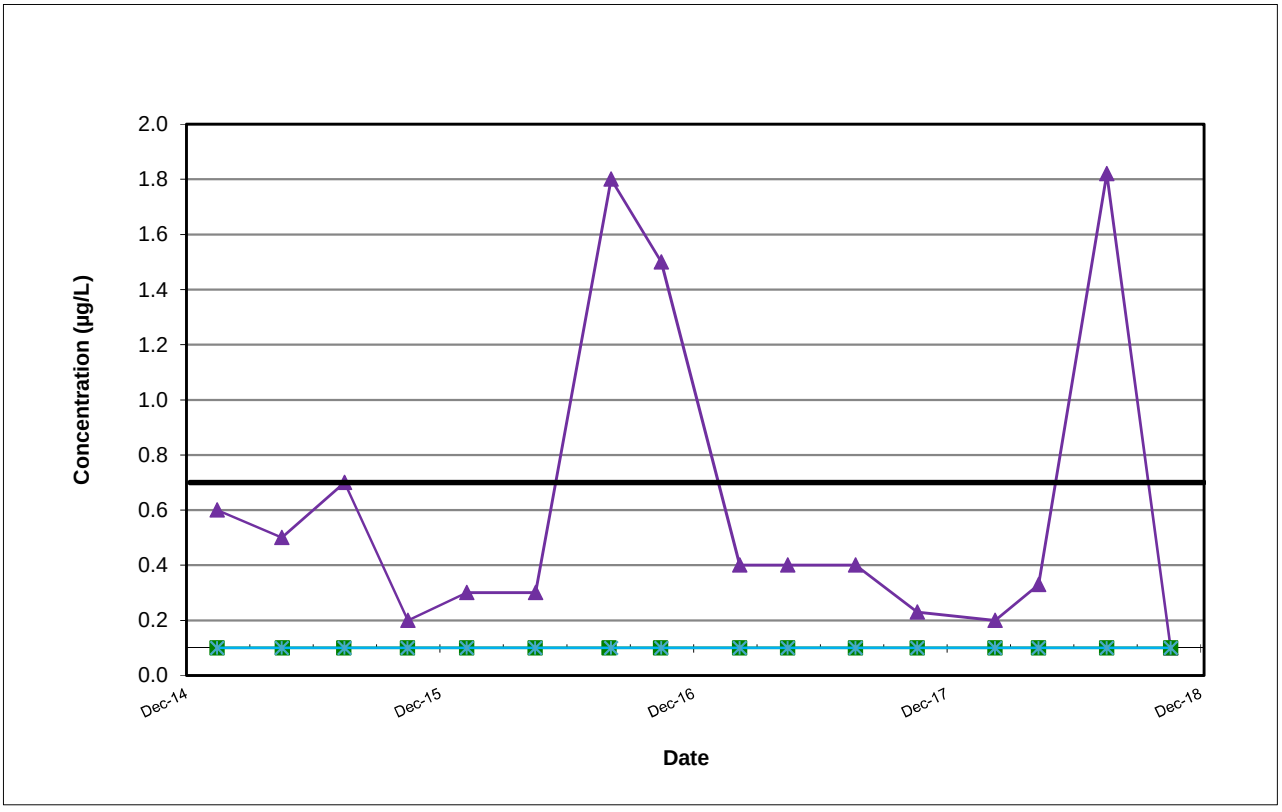


Benzene



cis-1,2-Dichloroethene

Note: non-detected values shown at one-half the reporting limit

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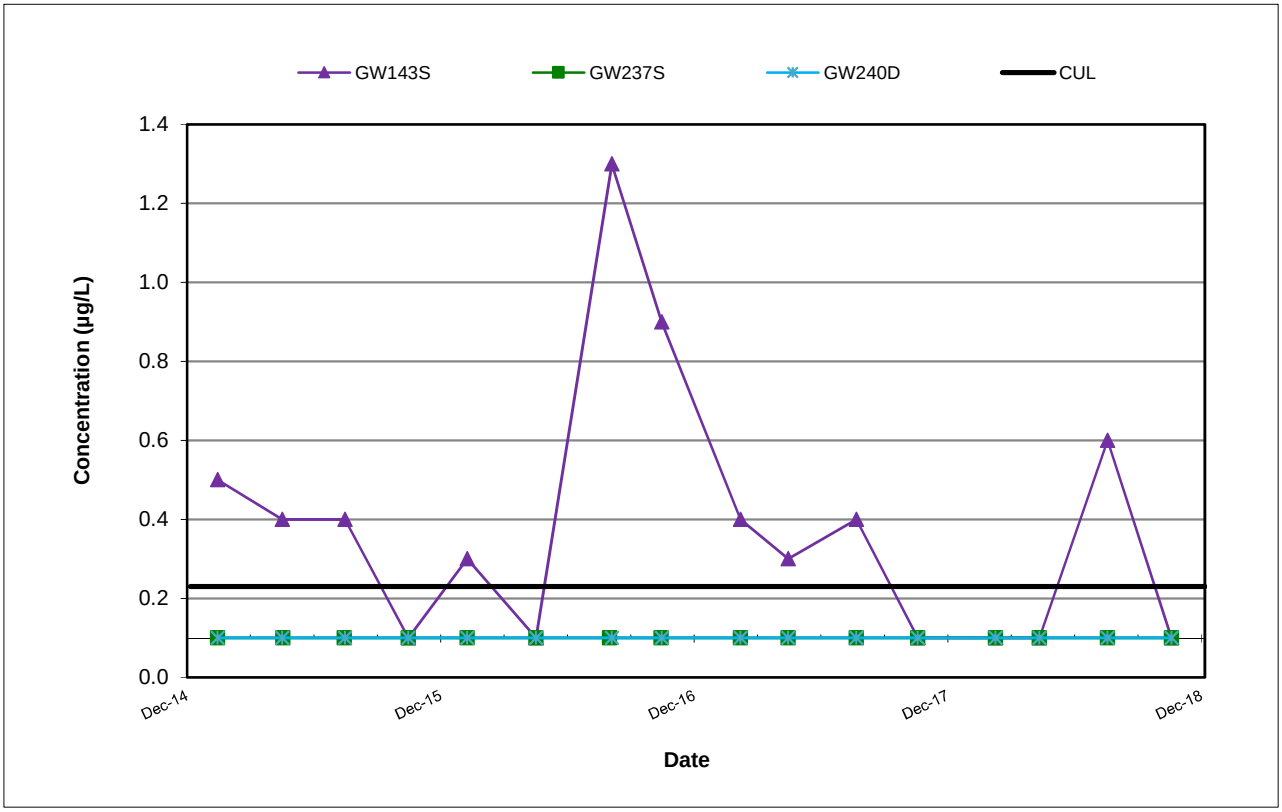
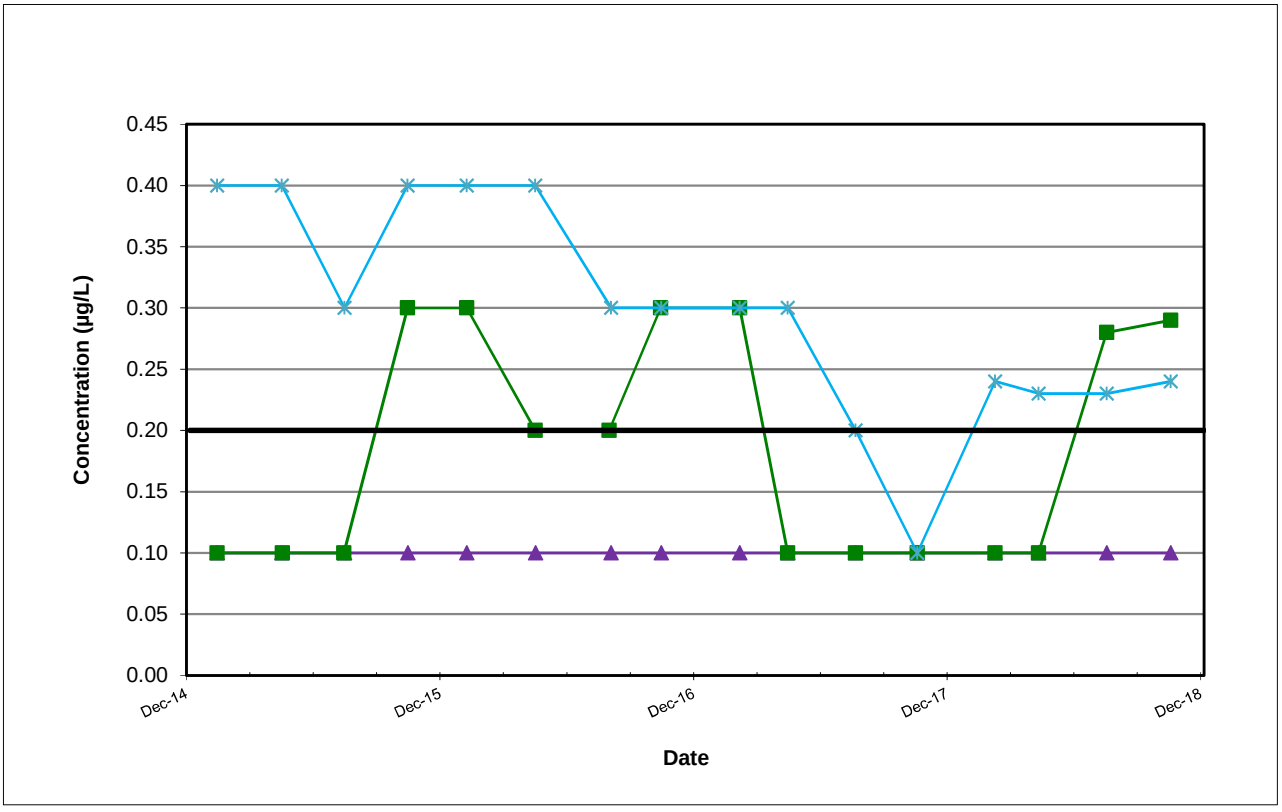
wood.	BUILDING 4-78/79 SWMU/AOC GROUP TREND PLOTS FOR BENZENE AND CIS-1,2-DICHLOROETHENE IN CPOC AREA WELLS Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 12



Trichloroethene



Vinyl Chloride

Note: non-detected values shown at one-half the reporting limit

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

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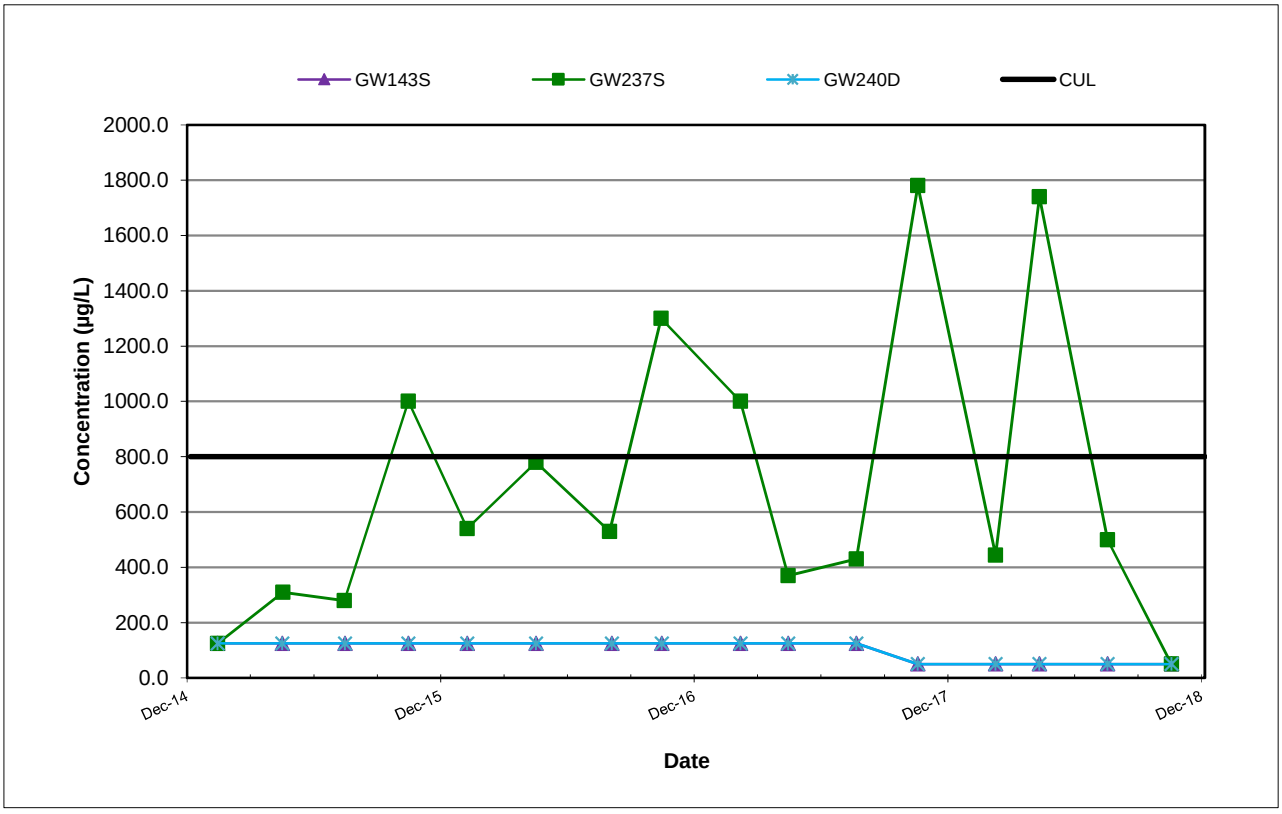
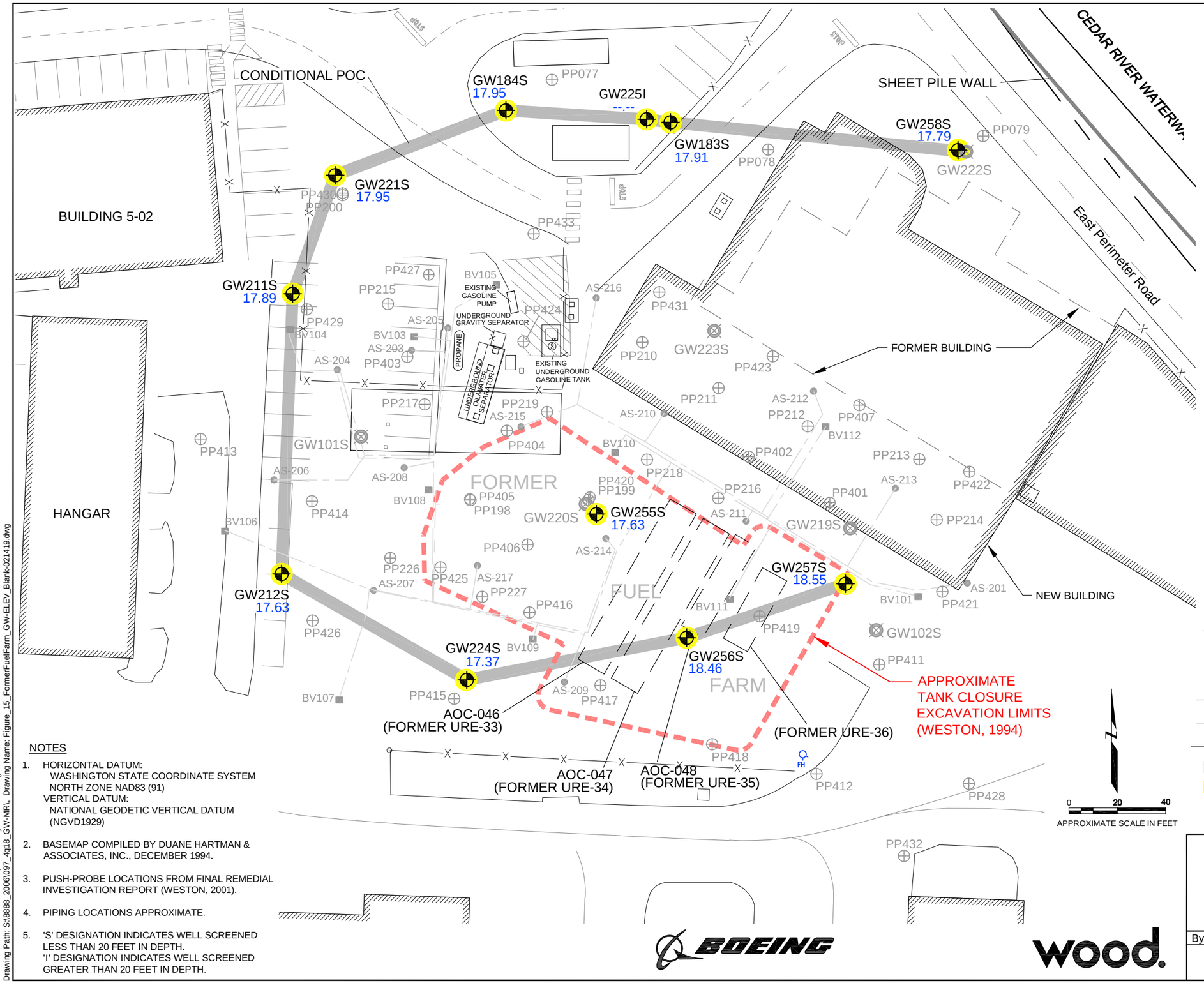


TPH as Gasoline

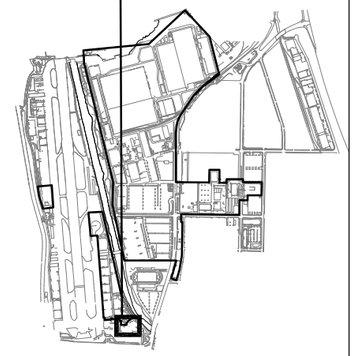
Note: non-detected values shown at one-half the reporting limit

E:\renton\Figure 8 to Figure 14 Bldg 4-78-79 Trend Plots.xls

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



FORMER FUEL FARM AOC GROUP
LOCATION MAP



BOEING RENTON
FACILITY MAP

LEGEND

- GW184S 17.95 — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION (NGVD-FEET)
- GROUNDWATER ELEVATION CONTOUR (CONTOUR INTERVAL: 0.25 FOOT) (DASHED WHERE INFERRED)
- GENERAL DIRECTION OF GROUNDWATER FLOW
- 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

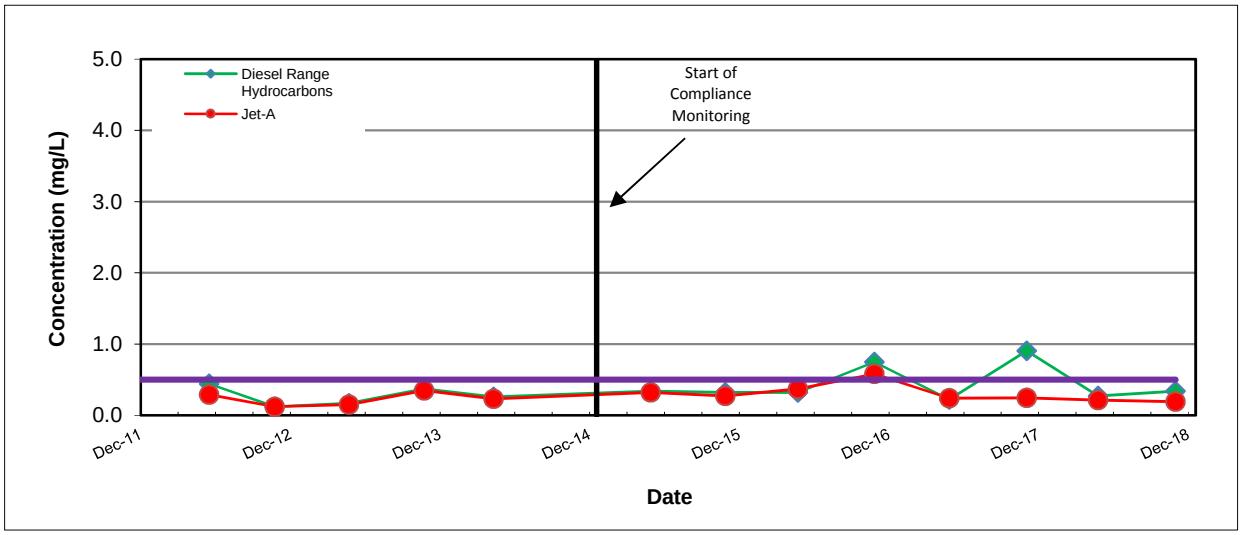
NOTES

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.

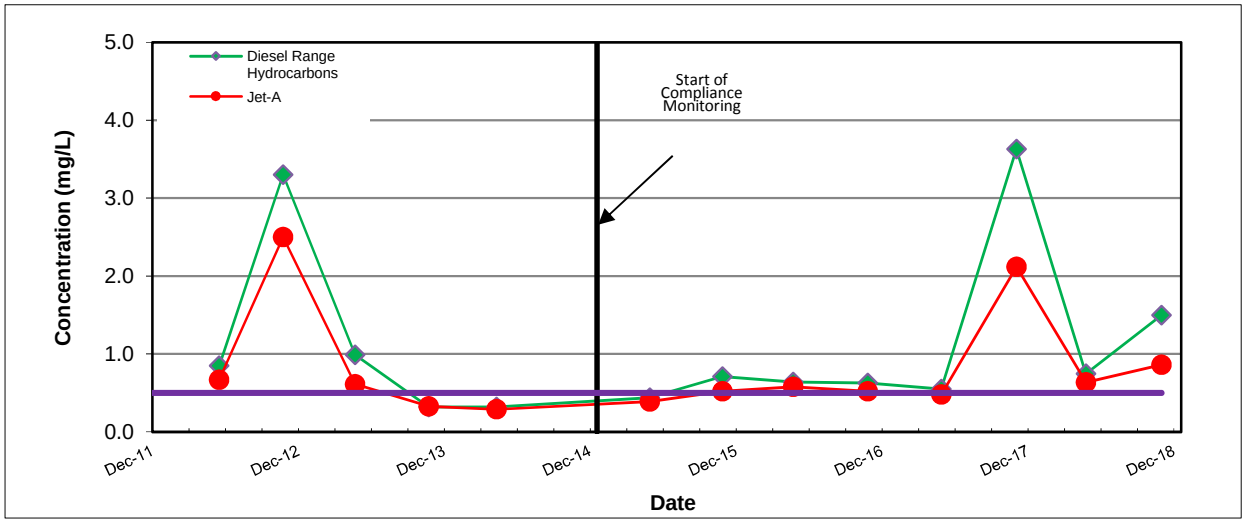
FORMER FUEL FARM AOC GROUP MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS NOVEMBER 12, 2018 Boeing Renton Facility Renton, Washington

By: APS	Date: 02/14/19	Project No. 8888
Wood Environment & Infrastructure Solutions, Inc.		Figure 15

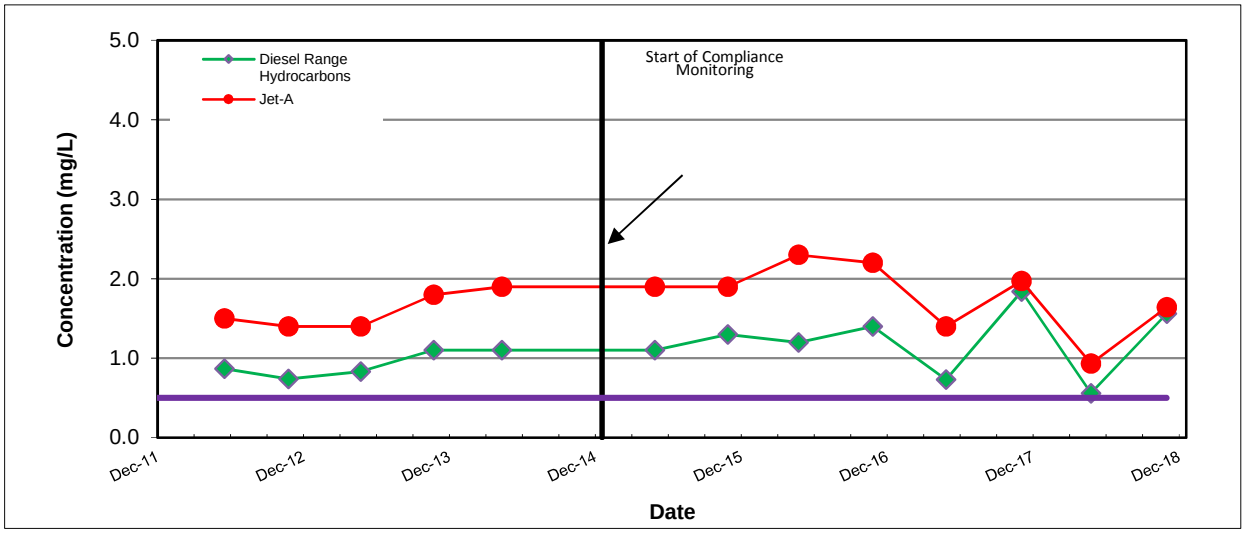
Plot Date: 02/14/19 - 11:39am Plotted by: mike.stenberg
Drawing Path: S:\8888_2006\097_4q18_GW-MR\ Drawing Name: Figure_15_FormerFuelFarm_GW-ELEV_Blank-021419.dwg



CPOC WELL GW211S



CPOC WELL GW221S

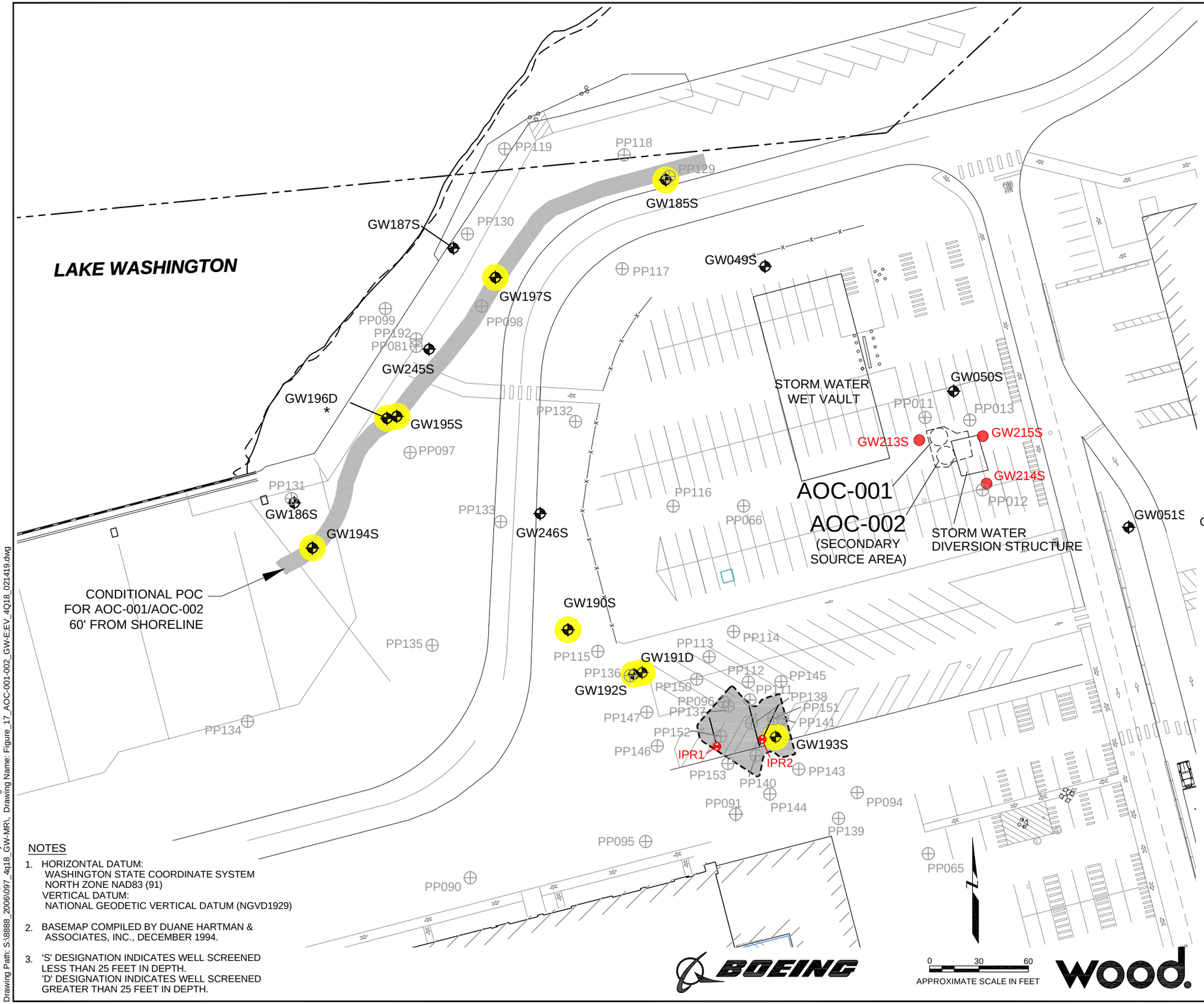


CPOC WELL GW224S

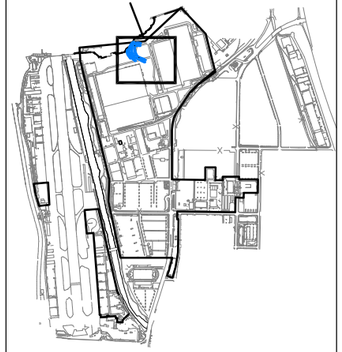
Note: non-detected values shown at one-half the reporting limit

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

C:\Users\kellie.mcbee\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Outlook\FGRRSZY8\Figure 16 FFF Trend Plots.xls



AOC-001 AND AOC-002
LOCATION MAP



BOEING RENTON
FACILITY MAP

LEGEND

GW195S 13.90	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.
**	WATER LEVEL IS ANOMALOUS, 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

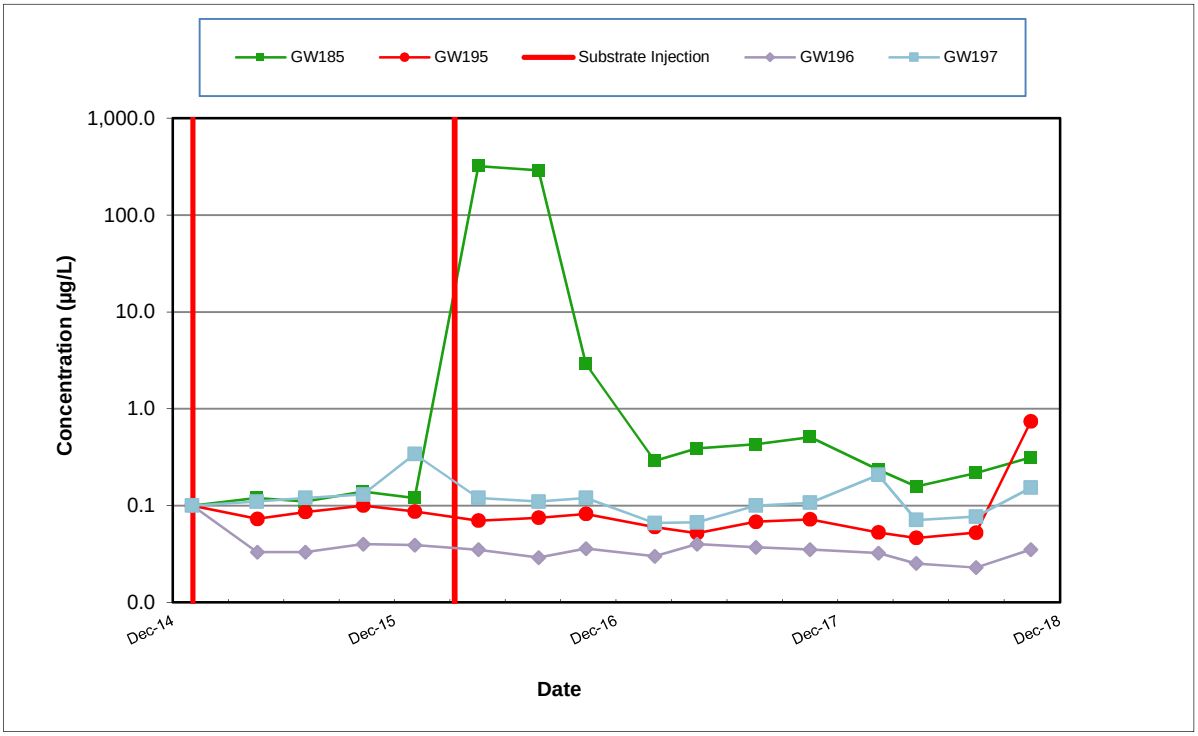
NOTES

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.

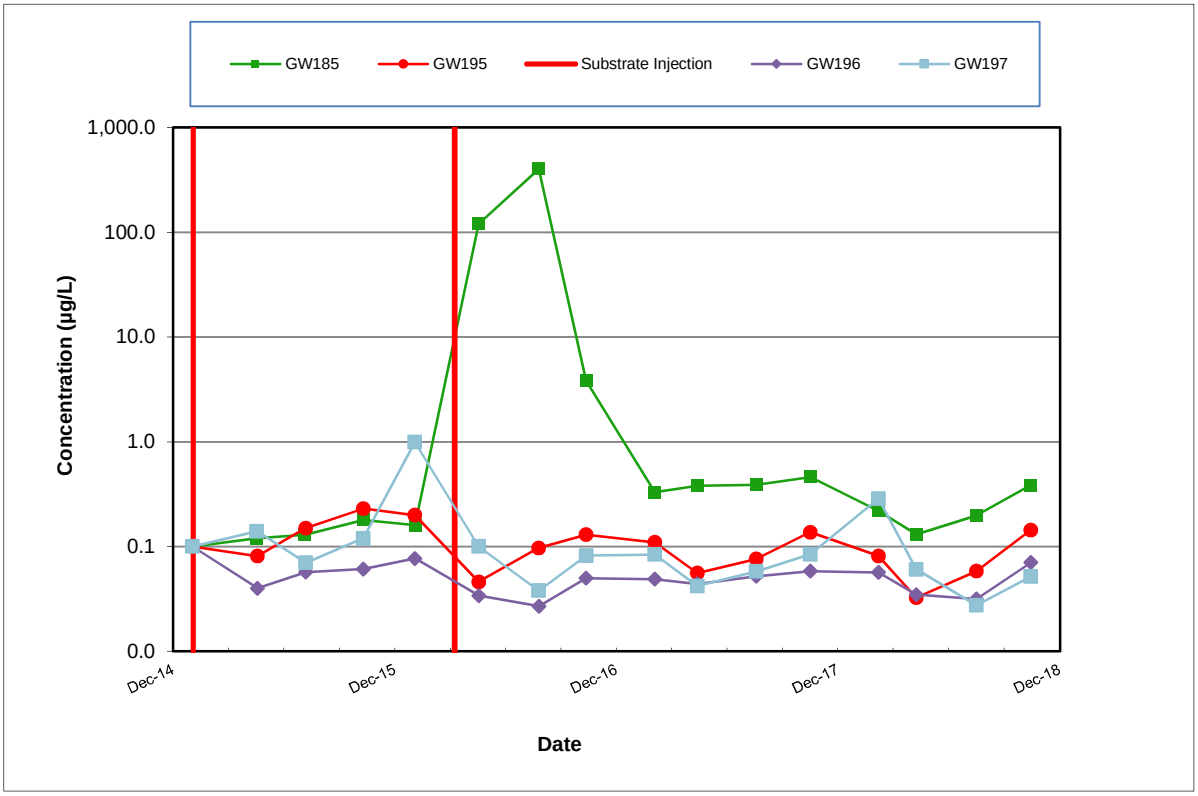
AOC-001 AND AOC-002 MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS NOVEMBER 13, 2018 Boeing Renton Facility Renton, Washington

By: APS	Date: 02/14/19	Project No. 8888
Wood Environment & Infrastructure Solutions, Inc.		Figure 17

Plot Date: 02/14/19 - 11:31am, Plotted by: mike.stenberg
Drawing Path: S:\8888_2006\097_4q18_GW-MR\, Drawing Name: Figure_17_AOC-001-002_GW-E;EV_4Q18_021419.dwg



cis-1,2-Dichloroethene

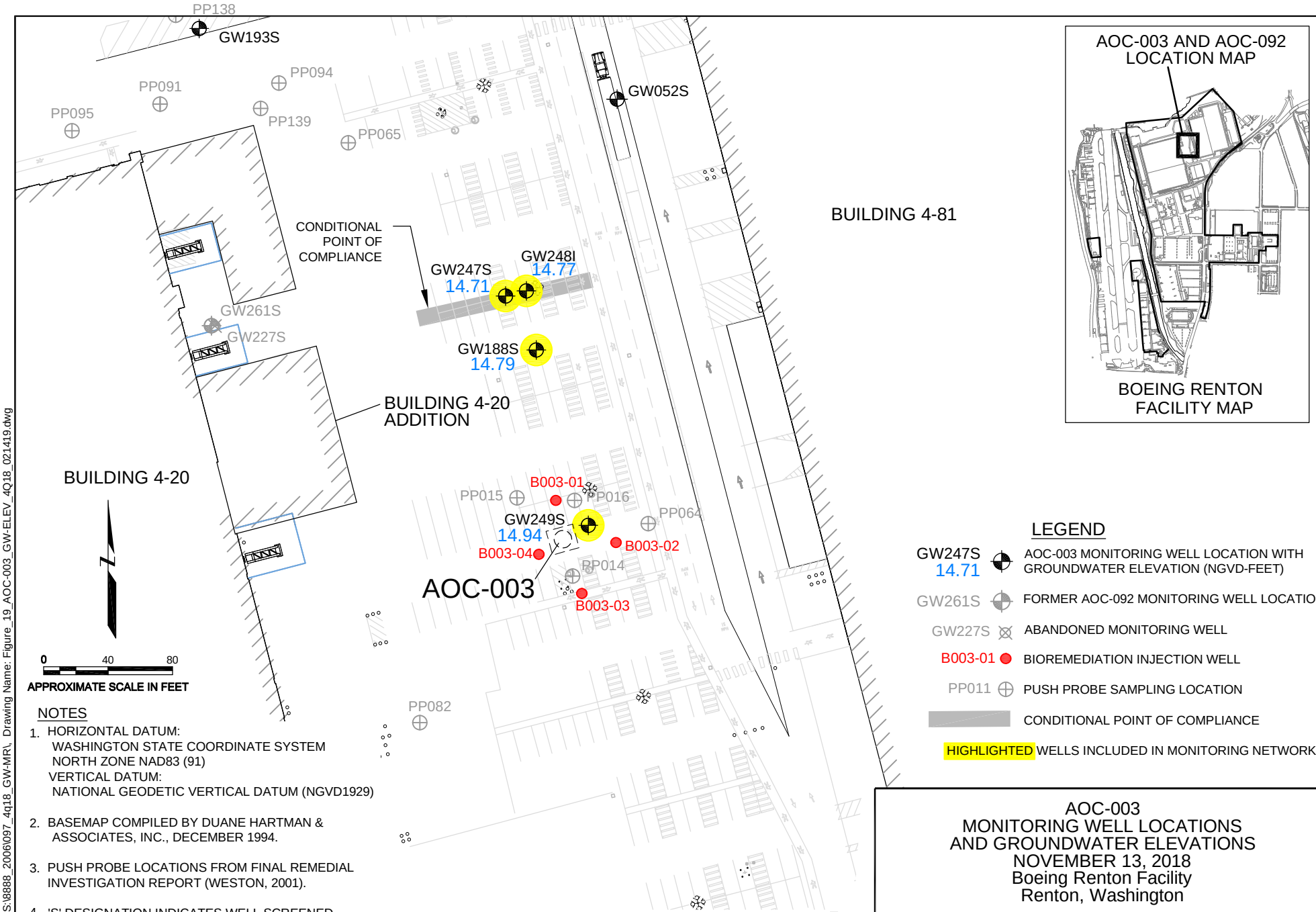


Vinyl Chloride

Note: non-detected values shown at one-half the reporting limit

C:\Users\kellie.mcbee\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Outlook\FGRRSZY8\Figure 18 AOC 1-2 Trend Plots.xls

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



AOC-003 AND AOC-092
LOCATION MAP

BOEING RENTON
FACILITY MAP

LEGEND

GW247S 14.71	AOC-003 MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION (NGVD-FEET)
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.

AOC-003
MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS NOVEMBER 13, 2018
Boeing Renton Facility
Renton, Washington

By: APS	Date: 02/14/19	Project No. 8888
Wood Environment & Infrastructure Solutions, Inc.		Figure 19

Plot Date: 02/14/19 - 11:55am, Plotted by: mike.stenberg
Drawing Path: S:\8888_2006\097_4q18_GW-MR\, Drawing Name: Figure_19_AOC-003_GW-ELEV_4Q18_021419.dwg

LAKE WASHINGTON

LAKE WASHINGTON

GW001S
13.84**

GW004S
13.76**

GW005S
NM

CEDAR RIVER
TRAIL PARK

14.00

14.05

BUILDING
4-41

14.10

CONDITIONAL
POC

GW216S
14.17

GW006S

PILINGS

CEDAR RIVER COMMERCIAL WATERWAY

GW218S
14.11

AOC-035
(FORMER URE-08)

AOC-034
(FORMER URE-07)

(FORMER URE-07)

PARK DRIVE

GW217S
14.18

DOOR 5
DOOR 6
DOOR 7
DOOR 8
DOOR 8A

GW007S

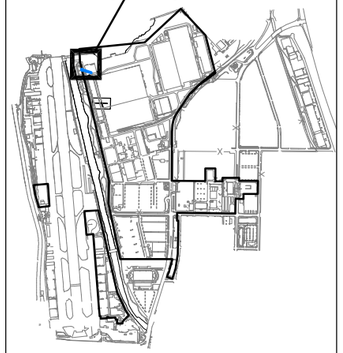
PP160
PP161
PP162
PP032
PP035
PP164
PP034
PP163
PP033

14.00
14.05
14.10

GW251S
13.93

0 25 50
APPROXIMATE SCALE IN FEET

AOC-034 and AOC-035
LOCATION MAP



BOEING RENTON
FACILITY MAP

LEGEND

GW218S 14.11	MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION (NGVD-FEET)
NM	NOT MEASURED
14.00	GROUNDWATER ELEVATION CONTOUR (CONTOUR INTERVAL: 0.10 FOOT) (DASHED WHERE INFERRED)
**	WATER LEVELS IN THESE ARE ANOMALOUS AND NOT USED IN CONTOURING
	GENERAL DIRECTION OF GROUNDWATER FLOW
	LIMITS OF PREVIOUS EXCAVATION
	FORMER UST LOCATION
	APPROXIMATE PROPERTY LINE
x	FENCE
	CONDITIONAL POINT OF COMPLIANCE
HIGHLIGHTED	WELLS INCLUDED IN MONITORING NETWORK
PP162	12/14/2006 PUSH-PROBE SOIL AND GROUNDWATER SAMPLE LOCATION
PP032	HISTORICAL PUSH-PROBE SAMPLE LOCATION

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 24 FEET IN DEPTH.

AOC-034 AND AOC-035
MONITORING WELL LOCATIONS
AND GROUNDWATER ELEVATIONS
NOVEMBER 13, 2018
Boeing Renton Facility
Renton, Washington

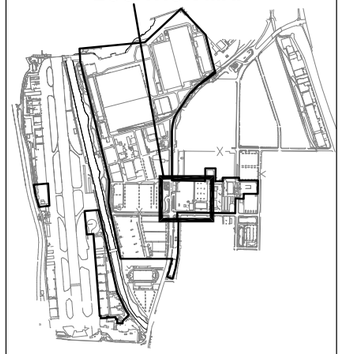
By: APS	Date: 02/14/19	Project No. 8888
Wood Environment & Infrastructure Solutions, Inc.	Figure	20

BOEING

wood.

Plot Date: 02/14/19 - 12:09pm Plotted by: mike.stenberg
Drawing Path: S:\8888_2006\097_4q18_GW-MR\ Drawing Name: Figure_20_AOC-034-035_GW-ELEV_4Q18_021319.dwg

FORMER BUILDING 10-71 LOCATION MAP



BOEING RENTON FACILITY MAP

FORMER BUILDING 10-71 (DEMOLISHED)

MULTI-LEVEL PARKING GARAGE

10-71-MW4
20.07

10-71-MW3
NM

10-71-MW2
20.85

10-71-MW1
21.26

BUILDING 10-20

FORMER BUILDING 10-72

LOGAN AVE N

N 6TH ST

PAVED PARKING

LEGEND

10-71-MW4 20.07	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.

0 40 80
APPROXIMATE SCALE IN FEET

BOEING

wood.

LOT 20 / FORMER BUILDING 10-71 PARCEL MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS NOVEMBER 12, 2018 Boeing Renton Facility Renton, Washington

By: APS	Date: 02/14/19	Project No. 8888
Wood Environment & Infrastructure Solutions, Inc.		Figure 21

Plot Date: 02/14/19 - 12:26pm, Plotted by: mike.stenberg
Drawing Path: S:\8888_2006\097_4q18_GW-MR\, Drawing Name: Figure_21_FormerBldg10-71_GW-ELEV_4Q18_021419.dwg

Plot Date: 02/14/19 - 12:38pm, Plotted by: mike.stenberg
Drawing Path: S:\8888_2006\097_4q18_GW-MR\, Drawing Name: Figure_22_APRON_A_GW-ELEV_4Q18_021419.dwg

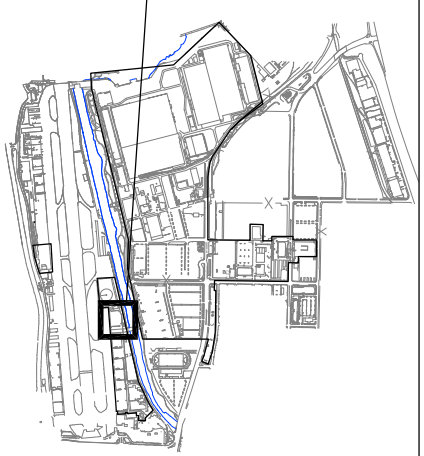
CEDAR RIVER WATERWAY

EAST PERIMETER ROAD

B-4
B-3
B-6
SHED
SHED
SHED
SHED
SHED
CB
B-10
B-12
B-2
B-9
B-8
B-17
B-7
CB
B-1
B-16
BUILDING
B-13
B-15
B-14
GW265S
GW263S
5.65' DTW
GW264S
6.49' DTW
GW262S
5.22' DTW

APPROXIMATE AREA
OF TRENCH INJECTION

APRON A
LOCATION MAP



BOEING RENTON
FACILITY MAP

N

0 20 40
APPROXIMATE SCALE IN FEET

LEGEND

GW264S
6.49' 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

APRON A
MONITORING WELL LOCATIONS AND DEPTH TO GROUNDWATER
NOVEMBER 13, 2018
Boeing Renton Facility
Renton, Washington

By: APS	Date: 02/14/19	Project No. 16096
Wood Environment & Infrastructure Solutions, Inc.		Figure 22

Tables

TABLE 1: SWMU-172 and SWMU-174 GROUP GROUNDWATER ELEVATION DATA
NOVEMBER 12, 2018
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	8.41	17.50
GW152S	5 to 20[3]	26.98	8.94	18.04
GW153S	5 to 20[3]	27.47	9.38	18.09
GW172S	8 to 18[3]	26.44	9.19	17.25
GW173S	8 to 18[3]	26.51	9.20	17.31
GW226S	5 to 20[3]	26.86	8.78	18.08
GW232S	4 to 14	24.45	7.67	16.78
GW233I	15 to 25	24.35	7.27	17.08
GW234S	3 to 13	24.95	7.97	16.98
GW235I	15 to 25	24.90	7.49	17.41
GW236S	5 to 15	24.36	7.23	17.13

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]
NOVEMBER 12, 2018
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)	257.2	257.2	474.8	187.7	443.2	368.8	226.1	457.6	189.4	215.1	138.0	385.4
Dissolved Oxygen (mg/L)	0.51	0.51	0.81	0.41	0.65	0.54	0.57	2.27	1.78	0.29	0.31	0.48
Oxidation/Reduction Potential (mV)	-6.2	-6.2	16.4	-25.8	-5.0	-42.6	-42.3	-49.5	4.3	-24.2	-37.1	-66.4
pH (standard units)	5.60	5.60	5.68	6.41	5.85	6.40	6.36	5.99	6.37	6.32	6.53	6.54
Temperature (degrees C)	10.80	10.80	12.10	12.40	10.80	11.90	11.20	7.30	12.70	15.20	13.00	13.30
Total Organic Carbon (mg/L)	10.91	14.18	55.74	4.3	39.64	7.12	6.94	13.16	3.76	1.42	0.64	1.77

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]
NOVEMBER 12, 2018
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	**1.7**	**1.83**	**0.238**	**0.0327**	**0.116**	**0.0753**	0.020 U	**0.426**	**0.0692**	**0.112**	**0.158**	**0.0690**
Tetrachloroethene	0.02	**0.846**	**0.756**	**0.370**	0.020 U	**0.0376**	**0.218**	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Trichloroethene	0.02	**0.223**	**0.211**	**0.394**	0.020 U	**0.0370**	**0.206**	0.020 U	0.020 U	0.020 U	0.020 U	**0.0338**	0.020 U
Vinyl Chloride	0.11	**0.246**	**0.260**	**0.289**	0.020 U	**0.148**	0.0448 J	0.0655	**0.564**	0.020 U	0.0488	0.020 U	0.0323
Total Metals (µg/L)													
Arsenic	1.0	**22.6**	**22.5**	**7.84**	**2.20**	**7.24**	**4.59**	**3.44**	**8.01**	0.481	**1.72**	0.230	**3.35**
Copper	3.5	**4.76**	**4.44**	**16.2**	0.561	1.77	3.85	2.28	**13.3**	0.500 U	1.27	0.500 U	0.924
Lead	1.0	**2.48 J**	1.24 J	0.381	0.100 U	**1.13**	0.706	0.422	0.338	0.100 U	0.781	0.104	1.48

Notes
1. Data qualifiers are as follows:
U = The analyte was not detected at the reporting limit indicated.
J = The value is an estimate.
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
NOVEMBER 13, 2018
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	5.32	14.12
GW033S	5 to 25	19.49	5.44	14.05
GW034S	5 to 25	19.65	5.55	14.10
GW038S	5 to 25	19.68	5.63	14.05
GW039S	3.5 to 13.5	19.30	5.37	13.93
GW143S	10 to 15	19.81	5.81	14.00
GW209S	3.5 to 13.3	19.37	5.27	14.10
GW210S	3.5 to 13.3	19.19	5.03	14.16
GW237S	5 to 15	18.85	4.85	14.00
GW238I	5 to 20	18.94	4.89	14.05
GW239I	15 to 20	19.69	5.71	13.98
GW240D	22 to 27	19.81	5.73	14.08
GW241S	4 to 14	20.28	6.30	13.98
GW242I	15 to 20	20.44	6.44	14.00
GW243I	5 to 20	19.49	5.43	14.06
GW244S	5 to 15	19.53	5.34	14.19

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]
NOVEMBER 13, 2018
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)	342.9	342.9	357.1	331.8	95.5	399.2	434.8	306.9	419.0	202.7
Dissolved Oxygen (mg/L)	0.62	0.62	0.39	0.27	1.57	0.59	0.45	0.26	0.16	1.01
Oxidation/Reduction Potential (mV)	-75.7	-75.7	-46.7	-72.2	82.1	-68.5	-54.3	-60.7	-73.4	22.4
pH (standard units)	6.25	6.25	6.18	6.34	6.09	6.11	6.17	6.32	6.33	6.05
Temperature (degrees C)	13.50	13.50	16.30	16.20	17.60	15.10	13.5	17.30	14.01	10.40
Total Organic Carbon (mg/L)	20.46	20.27	23.21	8.11	3.50	9.77	14.83	9.77	10.32	7.22

	Well ID[2]						
	CPOC Area						
	GW143S	GW237S	GW238I	GW239I	GW240D	GW241S	GW242I
Specific Conductivity (µS/cm)	299.5	298	492	282.8	331	303.4	277.6
Dissolved Oxygen (mg/L)	0.41	0.26	0.14	1.73	0.40	0.32	0.50
Oxidation/Reduction Potential (mV)	-70.7	-49.3	-75.9	-58.8	-63.5	-78.1	-54.2
pH (standard units)	6.34	6.40	6.24	6.12	6.18	6.32	6.24
Temperature (degrees C)	15.00	16.57	13.40	12.10	9.40	14.10	11.90
Total Organic Carbon (mg/L)	9.26	6.50	9.56	10.15	5.13	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]
NOVEMBER 13, 2018
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	**28.3 J**	**23.8 J**	**13.6**	0.20 U	0.20 U	0.20 U	**2.95**
cis-1,2-Dichloroethene	0.70	0.63 J	0.58 J	**9.35**	0.25	0.20 U	0.20 U	0.26
Trichloroethene	0.23	0.20 U	0.20 U	1.00 U	0.20 U	0.20 U	0.20 U	0.20 U
Vinyl Chloride	0.20	**0.31 J**	**0.30 J**	**36.7**	**0.54**	0.20 U	0.20 U	**0.55**
Total Petroleum Hydrocarbons (µg/L)								
GRO (C7-C12)	800	**2010**	**2000**	239	100 U	100 U	106	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	0.20 U	0.20 U
Total Petroleum Hydrocarbons (µg/L)				
GRO (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	**0.93**	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	**0.29**	**0.21**	0.20 U	**0.24**	0.20 U	0.20 U
Total Petroleum Hydrocarbons (µg/L)								
GRO (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.
   J = The value is an estimate.
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
GRO = gasoline range organics

TABLE 7: FORMER FUEL FARM GROUNDWATER ELEVATION DATA
NOVEMBER 12, 2018
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	8.67	17.91
GW184S	5.6 to 15	27.14	9.19	17.95
GW211S	4.8 to 14.7	27.77	9.88	17.89
GW212S	4.9 to 14.8	28.06	10.43	17.63
GW221S	5 to 15	27.93	9.98	17.95
GW224S	5 to 15	27.98	10.61	17.37
GW255S	6 to 16	27.49	9.86	17.63
GW256S	7 to 16	27.22	8.76	18.46
GW257S	8 to 16	27.87	9.32	18.55
GW258S	9 to 16	25.51	7.72	17.79

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]
NOVEMBER 12, 2018
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)	195.1	142.2	134.1	261.8	218.6	219.5	249.9	249.9	195.1	171.4	168.1	294.3
Dissolved Oxygen (mg/L)	0.15	0.35	1.13	0.14	0.42	0.39	0.4	0.4	0.15	0.41	0.37	0.45
Oxidation/Reduction Potential (mV)	-1.2	13.4	88.8	-74.7	130.3	12.7	-1.7	-1.7	-1.2	78.9	89.7	-5.0
pH (standard units)	6.27	6.39	6.14	6.31	5.54	6.06	6.03	6.03	6.27	5.85	6.00	6.16
Temperature (degrees C)	17.30	13.30	13.30	16.20	15.20	13.50	16.80	16.80	17.30	15.70	16.70	11.90

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]
NOVEMBER 12, 2018
Boeing Renton Facility, Renton, Washington

	Cleanup Level[4]	Well ID[3]										
		Source Area	CPOC Area									
		GW255S	GW183S	GW184S	GW211S	GW212S	GW221S	GW224S	GW224S (field dup.)	GW256S	GW257S	GW258S
Total Petroleum Hydrocarbons (mg/L)												
DRO (C12-C24)	0.5	0.100 U	0.100 U	0.100 U	0.341	0.109	**1.50**	**1.56**	**1.56**	0.100 U	0.100 U	0.100 U
Jet A	0.5	0.100 U	0.100 U	0.100 U	0.191	0.100 U	**0.863**	**1.64**	**1.72**	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. S = shallow well; I = intermediate well.
4. Cleanup levels obtained from Table 2 of the Cleanup Action Plan.

Abbreviations
CPOC = conditional point of compliance
DRO = diesel range organics
field dup. = field duplicate
mg/L = milligrams per liter

TABLE 10: AOC-001 AND AOC-002 GROUNDWATER ELEVATION DATA
NOVEMBER 13, 2018
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	2.39	13.88
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	3.24	13.55
GW195S	7.3 to 12.0	16.34	2.58	13.76
GW196D	26.8 to 36.8	16.46	2.57	13.89
GW197S	7.8 to 12.5	16.52	2.25	14.27
GW245S	3.0 to 13.0	16.08	2.38	13.70

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]
NOVEMBER 13, 2018
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)	647	647	663	602.0	385.5	892	398.7
Dissolved Oxygen (mg/L)	0.40	0.40	0.34	0.77	0.27	0.12	0.12
Oxidation/Reduction Potential (mV)	-73.1	-73.1	-53.9	-108.4	-55.3	-173.8	-86.8
pH (standard units)	6.32	6.32	6.13	6.29	6.33	7.08	6.76
Temperature (degrees C)	13.9	13.9	14.9	16.7	14.8	16.2	15.2
Total Organic Carbon (mg/L)	12.39	12.39	16.26	16.18	7.59	12	7.00

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]

NOVEMBER 13, 2018

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	0.32	0.27	0.20 U	0.20 U	0.20 U	0.020 U	0.20 U
cis-1,2-Dichloroethene	0.02	**0.315**	**0.343**	0.020 U	**0.742**	**0.0351**	**0.153**	**0.0222**
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	**0.385**	**0.346**	0.020 U	**0.144**	**0.0706**	**0.0518**	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
NOVEMBER 13, 2018
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	3.99	14.79
GW247S	4 to 14	18.91	4.20	14.71
GW248I	10 to 20	18.78	4.01	14.77
GW249S	4 to 14	18.85	3.91	14.94

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
TOC = top of casing

TABLE 14: AOC-003 CONCENTRATIONS
OF PRIMARY GEOCHEMICAL INDICATORS [1]
NOVEMBER 13, 2018
Boeing Renton Facility, Renton, Washington

	Well ID[2]			
	Source Area	Downgradient Plume Area	CPOC Area	
	GW249S	GW188S	GW247S	GW248I
Specific Conductivity (µS/cm)	601	571	511	591
Dissolved Oxygen (mg/L)	0.11	0.11	0.15	0.2
Oxidation/Reduction Potential (mV)	-92.1	-88.7	-75.2	-87.3
pH (standard units)	6.41	6.31	6.36	6.33
Temperature (degrees C)	15.67	15.7	13.91	13.21
Total Organic Carbon (mg/L)	20.77	11.14	9.88	12.92

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; 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

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

NOVEMBER 13, 2018

Boeing Renton Facility, Renton, Washington

	Cleanup Level[4]	Well ID[3]			
		Source Area	Downgradient Plume Area	CPOC Area	
		GW249S	GW188S	GW247S	GW248I
Volatile Organic Compounds (µg/L)					
cis-1,2-Dichloroethene	0.78	0.0829	0.0636	0.102	0.020 U
Tetrachloroethene	0.02	0.020 U	0.020 U	0.020 U	0.020 U
Trichloroethene	0.16	0.020 U	0.020 U	0.0208	0.020 U
Vinyl Chloride	0.24	**0.629**	**0.813**	**0.679**	**0.987**

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: AOC-034 AND AOC-035 GROUNDWATER ELEVATION DATA
NOVEMBER 13, 2018
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]
GW001S	2 to 12	18.28	4.44	13.84
GW004S	2 to 12	16.66	2.90	13.76
GW005S[3]	2 to 12	18.20	4.25	NM
GW216S	4.4 to 14.2	18.90	4.73	14.17
GW217S	3.5 to 13.4	19.20	5.02	14.18
GW218S	3.6 to 13.5	18.01	3.90	14.11
GW251S	4 to 14	17.98	4.05	13.93

Notes
1. S = shallow well
2. Elevations in feet relative to National Geodetic Vertical Datum of 1929.
3. Access to this well was blocked due to construction.

Abbreviations
bgs = below ground surface
TOC = top of casing

TABLE 17: AOC-034 AND AOC-035 CONCENTRATIONS
OF PRIMARY GEOCHEMICAL INDICATORS [1]
NOVEMBER 13, 2018
Boeing Renton Facility, Renton, Washington

	Well ID[2]			
	Source Area	Downgradient Plume Area	CPOC Area	
	GW217S	GW216S	GW218S	GW251S
Specific Conductivity (µS/cm)	111.1	252.9	184	126.1
Dissolved Oxygen (mg/L)	0.32	0.14	0.16	2.07
Oxidation/Reduction Potential (mV)	0.3	-107.9	-44.0	27.7
pH (standard units)	6.27	6.57	6.77	6.52
Temperature (degrees C)	16.40	16.40	13.80	12.60

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

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

TABLE 18: AOC-034 AND AOC-035
CONCENTRATIONS OF CONSTITUENTS OF CONCERN [1]
NOVEMBER 13, 2018
Boeing Renton Facility, Renton, Washington

	Cleanup Level[3]	Well ID[2]			
		Source Area	Cross-Gradient Plume Area	CPOC Area	
		GW217S	GW216S	GW218S	GW251S
Volatile Organic Compounds (µg/L)					
cis-1,2-Dichloroethene	0.65	0.2 U	0.2 U	0.2 UJ	0.2 U
Vinyl Chloride	0.29	0.2 U	0.2 U	0.2 UJ	0.2 U

Notes
1. Data qualifiers are as follows:
U = The analyte was not detected at the reporting limit indicated.
2. S = shallow well
3. Cleanup levels obtained from Table 2 of the Cleanup Action Plan.

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

TABLE 19: LOT 20/FORMER BUILDING 10-71 PARCEL
GROUNDWATER ELEVATION DATA
NOVEMBER 12, 2018
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]
10-71-MW-1	7 to 17	30.07	8.81	21.26
10-71-MW-2	7 to 17	29.88	9.03	20.85
10-71-MW-4	6 to 16	28.97	8.90	20.07

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

Abbreviations
bgs = below ground surface
TOC = top of casing

TABLE 20: LOT 20/FORMER BUILDING 10-71 PARCEL CONCENTRATIONS
OF PRIMARY GEOCHEMICAL INDICATORS [1]
NOVEMBER 12, 2018
Boeing Renton Facility, Renton, Washington

	Well ID		
	10-71-MW1	10-71-MW2	10-71-MW4
Specific Conductivity (µS/cm)	204.1	189	276
Dissolved Oxygen (mg/L)	1.09	0.28	0.72
Oxidation/Reduction Potential (mV)	37.0	-16.5	-10.1
pH (standard units)	5.73	6.02	6.20
Temperature (degrees C)	13.20	15.90	15.70

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 21: LOT 20/FORMER BUILDING 10-71 PARCEL
CONCENTRATIONS OF CONSTITUENTS OF CONCERN [1, 2]
NOVEMBER 12, 2018
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	0.25	0.20 U
Toluene	0.20 U	0.20 U	0.20 U
Trichloroethene	0.20 U	0.28	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 22: APRON A GROUNDWATER ELEVATION DATA
NOVEMBER 13, 2018
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	5.22	NA
GW263S	8 to 18	NA	5.65	NA
GW264S	8 to 18	NA	6.49	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 23: APRON A CONCENTRATIONS OF
PRIMARY GEOCHEMICAL INDICATORS [1]
NOVEMBER 13, 2018
Boeing Renton Facility, Renton, Washington

	Well ID[2]		
	Source Area Wells		
	GW262S	GW262S (field dup.)	GW264S
Specific Conductivity (µS/cm)	548	548	881
Dissolved Oxygen (mg/L)	0.97	0.97	0.26
Oxidation/Reduction Potential (mV)	-61.7	-61.7	-102.4
pH (standard units)	6.00	6.00	6.25
Temperature (degrees C)	5.78	5.78	10.70
Total Organic Carbon (mg/L)	33.32	32.53	34.37

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 24: APRON A CONCENTRATIONS
OF CONSTITUENTS OF CONCERN[1]
NOVEMBER 13, 2018
Boeing Renton Facility, Renton, Washington

	Well ID[2]		
	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	0.55

Notes
1. Data qualifiers are as follows:
U = The analyte was not detected at the reporting limit indicated.
2. 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-034/AOC-035		X (2,4)	GW216S	GW217S	NA	GW218S and GW251S	GW001S, GW004S, and GW005S	VC, *cis* -1,2-DCE	SW8260C[6]
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-034/AOC-035	GW216S	GW217S	NA	GW218S and GW251S	Dissolved oxygen, pH, ORP, temperature, specific conductance		X (2,4)
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

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/13 /2018@ 1238
Sample Number: RGW185S- 181113 | Weather: CLOUDY 40S
Landau Representative: SRB/JHA/CEB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 2.39 Time: 1202 Flow through cell vol. GW Meter No.(s 1
Begin Purge: Date/Time: 11/13/2018 @ 1204 End Purge: Date/Time: 11/13 /2018 @ 1217 Gallons Purged: 0.5
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		
1207	15.9	675.0	0.30	6.43	-48.3	LOW	2.41		
1210	15.3	671.0	0.31	6.43	-63.9		2.41		
1213	14.4	661.0	0.35	6.41	-70.6		2.41		
1216	13.9	647.0	0.40	6.32	-73.1				

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	13.9	646.0	0.40	6.31	-73.1				
2	13.9	646.0	0.40	6.31	-73.2				
3	13.9	645.0	0.39	6.31	-73.3				
4	13.9	645.0	0.40	6.30	-73.4				
Average:	13.9	645.5	0.40	6.31	-73.3	#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 ☐
	(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: CEB Date: 11/13/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ /2018@ 1200
Sample Number: RGWDUP4 181113 | Weather: CLOUDY 40S
Landau Representative: SRB/JHA/CEB

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 1
Begin Purge: Date/Time: 11/ 13 /2018 @ End Purge: Date/Time: 11/13 /2018 @ 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**		
		DUPLICATE TO RGW185S							

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.): 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	13.8	644.0	0.40	6.30	-73.8				
2	13.8	644.0	0.39	6.30	-73.9				
3	13.8	644.0	0.39	6.30	-74.2				
4	13.8	643.0	0.39	6.30	-74.4				
Average:	13.8	643.8	0.39	6.30	-74.1	#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 to RGW185S
Comments:

Signature: CEB Date: 11/13/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Nov-18 | Date/Time: 11/ 13 /2018@ 1313

Sample Number: RGW194S- 181113 | Weather: CLOUDY 40S

Landau Representative: SRB/JHA/CEB

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 3.24 Time: 1250 Flow through cell vol. GW Meter No.(s 1

Begin Purge: Date/Time: 11/13/2018 @ 1251 End Purge: Date/Time: 11/13 /2018 @ 1307 Gallons Purged: 0.5

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		
1254	16.6	755.0	0.25	6.25	-25.4	LOW	2.92		
1257	15.7	709.0	0.30	6.23	-45.3		2.92		
1300	15.2	683.0	0.33	6.19	-51.2		2.41		
1303	15.0	670.0	0.34	6.16	-52.6				
1306	14.9	663.0	0.34	6.13	-53.9				

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 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	14.8	663.0	0.35	6.13	-54.2				
2	14.9	662.0	0.35	6.12	-54.4				
3	14.8	663.0	0.35	6.12	-54.7				
4	14.8	663.0	0.35	6.12	-55.1				
Average:	14.8	662.8	0.35	6.12	-54.6	#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 ☐
	(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: CEB Date: 11/13/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 1346
Sample Number: RGW195S- 181113 | Weather: 40'S, CLOUDY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 2.58 Time: 1320 Flow through cell vol. GW Meter No.(s SLOPE 4
Begin Purge: Date/Time: 11/ 13 /2018 @ 1324 End Purge: Date/Time: 11/ 13 /2018 @ 1345 Gallons Purged: 0.75
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		
1327	16.1	702	0.19	6.26	-82.9	LOW	2.58	<0.25	
1330	16.3	683	0.25	6.28	-97.2				
1333	16.6	635	0.37	6.29	-102.8		2.58	0.25	
1336	16.5	617	0.51	6.29	-105.5				
1339	16.6	608	0.65	6.29	-107.2		2.58		
1342	16.7	606	0.69	6.28	-107.6				
1344	16.7	602	0.77	6.29	-108.4				

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, 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	16.7	602	0.77	6.28	-108.6				
2	16.7	601	0.78	6.29	-108.8				
3	16.7	600	0.79	6.28	-108.9				
4	16.7	599	0.79	6.28	-109.0				
Average:	16.7	601	0.78	6.28	-108.8	#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:
Signature: JHA Date: 11/13/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/13 /2018@ 1353
Sample Number: RGW196D- 181113 | Weather: SUNNY/ W/ CLOUDS 40S
Landau Representative: SRB/JHA/CEB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 2.57 Time: 1321 Flow through cell vol. GW Meter No.(s 1
Begin Purge: Date/Time: 11/13/2018 @ 1328 End Purge: Date/Time: 11/13 /2018 @ 1349 Gallons Purged: 0.5
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		
1331	14.7	385.3	0.33	6.29	-0.7	LOW	2.58		
1334	14.8	386.2	0.30	6.30	-14.0		2.58		
1337	14.9	387.3	0.30	6.31	-25.7		2.41		
1340	14.9	388.1	0.28	6.32	-36.2				
1343	14.8	386.7	0.27	6.33	-49.0				
1346	14.8	386.1	0.27	6.33	-52.5				
1348	14.8	385.5	0.27	6.33	-55.3				

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	14.9	385.3	0.26	6.33	-56.1				
2	14.9	385.2	0.26	6.33	-56.8				
3	14.9	385.1	0.26	6.33	-57.4				
4	14.9	385.3	0.26	6.33	-58.0				
Average:	14.9	385.2	0.26	6.33	-57.1	#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: CEB Date: 11/13/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 1236
Sample Number: RGW197S- 181113 | Weather: 40'S, CLOUDY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 2.25 Time: 1212 Flow through cell vol. GW Meter No.(s SLOPE 4
Begin Purge: Date/Time: 11/ 13 /2018 @ 1214 End Purge: Date/Time: 11/ 13 /2018 @ 1235 Gallons Purged: 1.25
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		
1217	16.0	889	0.14	6.79	-89.6	LOW	2.25	<0.25	
1220	16.2	893	0.11	7.00	-148.5		2.25	0.25	
1223	16.2	893	0.12	7.02	-154.0				
1226	16.2	890	0.14	7.05	-163.5			0.5	
1229	16.2	889	0.14	7.05	-166.2		2.25		
1232	16.2	889	0.12	7.06	-170.8				
1234	16.2	892	0.12	7.08	-173.8				

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/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	16.2	891	0.12	7.08	-174.1				
2	16.2	892	0.12	7.08	-174.2				
3	16.2	892	0.12	7.08	-174.3				
4	16.2	892	0.13	7.08	-174.4				
Average:	16.2	892	0.12	7.08	-174.3	#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 ☐
	(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: JHA Date: 11/13/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 1311
Sample Number: RGW245S- 181113 | Weather: 40'S, CLOUDY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 2.38 Time: 1244 Flow through cell vol. GW Meter No.(s SLOPE 4
Begin Purge: Date/Time: 11/ 13 /2018 @ 1248 End Purge: Date/Time: 11/ 13 /2018 @ 1309 Gallons Purged: 0.75
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		
1251	13.3	383.5	0.43	6.77	-50.8	LOW	2.38	<0.25	
1254	14.5	345.8	0.22	6.68	-46.2				
1257	14.9	357.8	0.17	6.74	-55.4			0.25	
1300	15.1	368.6	0.14	6.77	-69.4		2.38		
1303	15.1	375.6	0.13	6.77	-75.1				
1306	15.2	390.3	0.12	6.76	-81.6			0.5	
1308	15.2	398.7	0.12	6.76	-86.8				

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.): CLOUDY, 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	15.2	399.2	0.13	6.76	-87.5				
2	15.2	399.8	0.13	6.76	-88.1				
3	15.2	400.1	0.12	6.76	-88.3				
4	15.2	400.4	0.14	6.76	-88.8				
Average:	15.2	399.9	0.13	6.76	-88.2	#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: JHA Date: 11/13/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 1400
Sample Number: RGW188S- 181113 | Weather: 40s PC
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 3.99 Time: 1310 Flow through cell vol. GW Meter No.(s heron3
Begin Purge: Date/Time: 11/13/2018 @ 1330 End Purge: Date/Time: 11/ 13 /2018 @ 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								>/= 1 flow through cell	
	+/- 3%	+/- 3%	+/- 10%	+/- 0.1 units	+/- 10 mV	+/- 10%	< 0.3 ft		
1333	16.02	570	0.23	6.21	-48.0	LOW	4.01		
1336	16.03	571	0.18	6.23	-61.4		4.02		
1339	15.71	572	0.16	6.25	-72.7		4.03		
1342	15.56	572	0.14	6.27	-79.6		4.03		
1345	15.50	571	0.13	6.30	-83.4				
1348	15.54	571	0.12	6.30	-85.1				
1351	15.65	571	0.11	6.31	-88.7				

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	15.63	571	0.11	6.31	-88.9				
2	15.63	571	0.11	6.31	-89.1				
3	15.65	571	0.11	6.31	-89.5				
4	15.65	571	0.11	6.32	-89.7				
Average:	15.64	571	0.11	6.31	-89.3	#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: MSMSD Location
Signature: SRB Date: 11/13/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 1320
Sample Number: RGW247S- 181113 | Weather: 40s PC
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 4.2 Time: 1240 Flow through cell vol. GW Meter No.(s heron3
Begin Purge: Date/Time: 11/13/2018 @ 1250 End Purge: Date/Time: 11/ 13 /2018 @ 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								>/= 1 flow through cell	
	+/- 3%	+/- 3%	+/- 10%	+/- 0.1 units	+/- 10 mV	+/- 10%	< 0.3 ft		
1253	14.02	534	0.31	6.28	-37.5	LOW	4.41		
1256	14.18	531	0.26	6.30	-47.0		4.4		
1259	14.10	527	0.19	6.34	-61.9		4.35		
1302	13.98	519	0.19	6.41	-67.8				
1305	14.02	514	0.16	6.36	-72.3				
1308	13.96	513	0.16	6.36	-73.9				
1311	13.91	511	0.15	6.36	-75.2				

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/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	13.91	511	0.15	6.36	-75.6				
2	13.90	510	0.14	6.36	-75.6				
3	13.84	510	0.15	6.36	-75.9				
4	13.86	510	0.15	6.36	-76.3				
Average:	13.88	510	0.15	6.36	-75.9	#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):
Comments:
Signature: SRB Date: 11/13/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 1250
Sample Number: RGW248I- 181113 | Weather: 40s PC
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 4.01 Time: 1218 Flow through cell vol. GW Meter No.(s heron3
Begin Purge: Date/Time: 11/13/2018 @ 1220 End Purge: Date/Time: 11/ 13 /2018 @ 1242 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		
1223	13.40	633	0.99	6.25	-50.0	LOW	4.05		
1226	13.67	642	0.54	6.31	-76.0		3.95		
1229	13.51	644	0.36	6.33	-83.6		3.95		
1232	12.97	629	0.29	6.35	-88.9				
1235	12.98	601	0.24	6.34	-88.3				
1238	13.12	594	0.22	6.33	-87.1				
1241	13.21	591	0.20	6.33	-87.3				

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 GRAY AND TURBID

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	13.25	591	0.20	6.33	-87.5				
2	13.26	591	0.19	6.34	-87.7				
3	13.26	591	0.19	6.33	-87.8				
4	13.28	590	0.19	6.34	-88.0				
Average:	13.26	591	0.19	6.34	-87.8	#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: 11/13/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@
Sample Number: RGW249S- 181113 | Weather: 40s PC
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 3.91 Time: 1345 Flow through cell vol. GW Meter No.(s heron3
Begin Purge: Date/Time: 11/13/2018 @ 1400 End Purge: Date/Time: 11/ 13 /2018 @ 1420 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		
1403	15.75	651	0.32	6.32	-62.3	LOW	3.87		
1406	15.91	622	0.17	6.36	-79.6		3.87		
1409	15.91	614	0.13	6.39	-85.5		3.87		
1412	15.90	609	0.12	6.40	-88.1				
1415	15.81	608	0.11	6.41	-89.7				
1418	15.67	601	0.11	6.41	-92.1				

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.): SLIGHTLY YELLOW AND TURBID WITH RED 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	15.67	599	0.11	6.41	-92.3				
2	15.64	598	0.11	6.42	-92.5				
3	15.63	597	0.11	6.41	-92.8				
4	15.63	596	0.10	6.42	-93.2				
Average:	15.64	598	0.11	6.42	-92.7	#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: 11/13/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 1446
Sample Number: RGW216S- 1811 | Weather: 40'S, CLOUDY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 4.73 Time: 1419 Flow through cell vol. GW Meter No.(s SLOPE 4
Begin Purge: Date/Time: 11/ 13 /2018 @ 1424 End Purge: Date/Time: 11/ 13 /2018 @ 1445 Gallons Purged: 0.75
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		
1427	15.8	299.2	0.31	6.49	-50.6	LOW	4.73	<0.25	
1430	16.1	282.5	0.20	6.59	-74.7				
1433	16.4	262.1	0.17	6.60	-93.7		4.73	0.25	
1436	16.4	256.7	0.16	6.59	-99.9				
1439	16.5	255.4	0.14	6.58	-103.8				
1442	16.5	253.4	0.14	6.58	-107.1			0.5	
1444	16.4	252.9	0.14	6.57	-107.9				

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/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	16.4	252.8	0.14	6.57	-108.1				
2	16.4	252.7	0.13	6.57	-108.1				
3	16.4	252.7	0.14	6.57	-108.3				
4	16.4	252.6	0.14	6.57	-108.3				
Average:	16.4	252.7	0.14	6.57	-108.2	#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: JHA Date: 11/13/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 1443
Sample Number: RGW217S- 181113 | Weather: CLEAR 40S
Landau Representative: SRB/JHA/CEB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 5.02 Time: 1420 Flow through cell vol. GW Meter No.(s 1
Begin Purge: Date/Time: 11/13/2018 @ 1421 End Purge: Date/Time: 11/13/2018 @ 1440 Gallons Purged: 0.5
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		
1424	17.1	128.4	0.52	6.54	13.9	LOW	5.02		
1427	16.5	112.4	0.43	6.37	6.7		5.02		
1430	16.5	110.8	0.37	6.30	4.0		5.02		
1433	16.4	110.4	0.34	6.28	0.4				
1436	16.4	110.8	0.33	6.27	0.3				
1439	16.4	111.1	0.32	6.27	0.3				

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	16.4	111.4	0.31	6.26	-6.1				
2	16.4	112.0	0.31	6.25	-6.6				
3	16.5	112.3	0.31	6.26	-6.9				
4	16.5	112.4	0.32	6.26	-7.8				
Average:	16.5	112.0	0.31	6.26	-6.9	#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)		
	(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: CEB Date: 11/13/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 1520
Sample Number: RGW218S- 181113 | Weather: 40s PC
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 3.9 Time: 1445 Flow through cell vol. GW Meter No.(s heron3
Begin Purge: Date/Time: 11/13/2018 @ 1450 End Purge: Date/Time: 11/ 13 /2018 @ 1515 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		
1453	13.35	246	1.21	6.96	27.0	LOW	3.95		
1456	13.66	228	0.39	6.52	8.1		3.98		
1459	13.78	205	0.22	6.54	-9.8		3.98		
1502	13.83	201	0.20	6.61	-21.7		3.98		
1505	13.85	193	0.17	6.68	-33.8				
1508	13.84	187	0.16	6.73	-40.4				
1511	13.80	184	0.16	6.77	-44.0				

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	13.78	183	0.16	6.78	-45.2				
2	13.78	182	0.16	6.79	-46.3				
3	13.76	178	0.15	6.79	-47.3				
4	13.75	177	0.16	6.80	-48.0				
Average:	13.77	180	0.16	6.79	-46.7	#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)	
	(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: 11/13/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 1518
Sample Number: RGW251S- 181113 | Weather: CLEAR 40S
Landau Representative: SRB/JHA/CEB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 4.05 Time: 1452 Flow through cell vol. GW Meter No.(s 1
Begin Purge: Date/Time: 11/13/2018 @ 1453 End Purge: Date/Time: 11/ 13 /2018 @ 1510 Gallons Purged: 0.5
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		
1456	13.9	147.0	2.09	6.33	37.1	LOW	4.04		
1459	13.2	146.2	2.10	6.46	27.9		4.04		
1502	12.7	129.0	2.08	6.53	26.1		4.04		
1505	12.6	127.3	2.09	6.52	27.0				
1508	12.6	126.1	2.07	6.52	27.7				

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 SLIGHT YELLOWISH TINT WITH BROWN 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	12.6	125.8	2.05	6.53	27.5				
2	12.6	125.6	2.04	6.53	27.5				
3	12.6	125.2	2.04	6.53	27.5				
4	12.6	124.7	2.06	6.53	27.7				
Average:	12.6	125.3	2.05	6.53	27.6	#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)
	(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: CEB Date: 11/13/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 805
Sample Number: RGW262S- 181113 | Weather: 40s PC
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 5.22 Time: 730 Flow through cell vol. GW Meter No.(s heron3
Begin Purge: Date/Time: 11/13/2018 @ 735 End Purge: Date/Time: 11/ 13 /2018 @ 758 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**	
738	10.43	547	2.23	6.06	-74.9	LOW	5.87		
741	9.75	549	1.57	5.99	-69.7		5.95		
744	7.87	547	1.27	5.98	-64.6		5.98		
747	7.32	547	1.21	5.98	-62.8		6.02		
750	6.65	547	1.06	5.98	-60.4		6.06		
753	6.21	546	0.92	5.99	-60.7		6.09		
756	5.78	548	0.97	6.00	-61.7		6.11		

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 SLIGHTLY YELLOW 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	5.77	547	0.85	6.00	-61.3				
2	5.29	550	0.89	6.01	-62.3				
3	5.31	548	0.69	6.01	-60.7				
4	4.95	549	0.75	6.02	-61.1				
Average:	5.33	549	0.80	6.01	-61.4	#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): Duplicate Location (DUP5)
Comments: SIGNIGICANT DRAWDOWN
Signature: SRB Date: 11/13/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@
Sample Number: RGW263S- 181113 | Weather: 40s PC
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 5.65 Time: 915 Flow through cell vol. GW Meter No.(s heron3
Begin Purge: Date/Time: 11/ 13 /2018 @ End Purge: Date/Time: 11/ 13 /2018 @ 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**		

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)
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: 11/13/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 920
Sample Number: RGW264S- 181113 | Weather: 40s PC
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 6.49 Time: 847 Flow through cell vol. GW Meter No.(s heron3
Begin Purge: Date/Time: 11/13/2018 @ 850 End Purge: Date/Time: 11/ 13 /2018 @ 912 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		
853	13.45	860	0.71	6.25	-81.7	LOW	6.6		
856	13.21	867	0.56	6.26	-95.5		6.55		
859	11.66	886	0.50	6.27	-97.1		6.65		
902	12.44	867	0.34	6.25	-102.9		6.65		
905	12.20	871	0.33	6.25	-101.1		6.65		
908	10.92	880	0.26	6.25	-102.9				
911	10.70	881	0.26	6.25	-102.4				

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 SLIGHTLY YELLOW 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	10.33	877	0.24	6.25	-102.8				
2	10.34	860	0.20	6.25	-103.6				
3	10.88	856	0.17	6.24	-103.9				
4	11.69	847	0.17	6.21	-103.9				
Average:	10.81	860	0.20	6.24	-103.6	#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:
Signature: SRB Date: 11/13/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 848
Sample Number: RGW031S- 181113 | Weather: CLEAR 30S
Landau Representative: SRB/JHA/CEB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 5.32 Time: 823 Flow through cell vol. GW Meter No.(s 1
Begin Purge: Date/Time: 11/13/2018 @ 824 End Purge: Date/Time: 11/13 /2018 @ 840 Gallons Purged: 0.5
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		
827	14.4	330.0	0.66	6.26	-38.6	LOW	5.32		
830	13.5	341.4	0.72	6.27	-65.0		5.33		
833	13.3	341.5	0.67	6.27	-69.8		5.34		
836	13.4	342.4	0.63	6.25	-75.0				
839	13.5	342.9	0.62	6.25	-75.7				

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, SLIGHT YELLOW COLOR, ORANGE 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	13.5	344.1	0.65	6.25	-76.8				
2	13.4	343.8	0.66	6.25	-77.6				
3	13.4	343.7	0.65	6.25	-78.4				
4	13.4	344.0	0.65	6.25	-79.3				
Average:	13.4	343.9	0.65	6.25	-78.0	#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 ☐
	(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: CEB Date: 11/13/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Nov-18 | Date/Time: 11/ 13 /2018@ 700

Sample Number: RGWDUP2 181113 | Weather:

Landau Representative: SRB/JHA/CEB

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 1

Begin Purge: Date/Time: 11/ 13 /2018 @ | End Purge: Date/Time: 11/13 /2018 @ | 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**		

DUPLICATE TO RGW031S

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.): CLEAR, SLIGHT YELLOW COLOR, ORANGE 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	13.5	344.0	0.65	6.25	-77.2				
2	13.4	343.8	0.66	6.25	-78.1				
3	13.4	343.9	0.65	6.26	-78.9				
4	13.4	344.1	0.64	6.26	-79.7				
Average:	13.4	344.0	0.65	6.26	-78.5	#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: CEB | Date: 11/13/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Nov-18 | Date/Time: 11/ 13 /2018@ 1018

Sample Number: RGW033S- 181113 | Weather: CLEAR 30S

Landau Representative: SRB/JHA/CEB

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 5.44 Time: 954 Flow through cell vol. GW Meter No.(s 1

Begin Purge: Date/Time: 11/13/2018 @ 955 End Purge: Date/Time: 11/13 /2018 @ 1011 Gallons Purged: 0.5

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		
958	16.9	406.8	0.41	6.25	-27.2	LOW	5.44		
1001	16.5	384.2	0.42	6.24	-37.3		5.45		
1004	16.3	359.7	0.40	6.21	-45.7		5.45		
1007	16.3	357.1	0.39	6.18	-46.7				
1010									

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	16.4	356.6	0.39	6.17	-47.5				
2	16.4	356.8	0.38	6.17	-47.7				
3	16.4	356.5	0.38	6.17	-47.8				
4	16.4	356.4	0.39	6.17	-48.0				
Average:	16.4	356.6	0.39	6.17	-47.8	#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 ☐
	(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: CEB Date: 11/13/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 1053
Sample Number: RGW034S- 181113 | Weather: CLEAR 30S
Landau Representative: SRB/JHA/CEB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 5.55 Time: 1028 Flow through cell vol. GW Meter No.(s 1
Begin Purge: Date/Time: 11/13/2018 @ 1029 End Purge: Date/Time: 11/13 /2018 @ 1045 Gallons Purged: 0.5
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		
1032	16.4	327.8	0.32	6.35	-38.7	LOW	5.56		
1035	16.2	329.1	0.30	6.36	-50.1		5.56		
1038	16.1	331.7	0.27	6.34	-67.9		5.56		
1041	16.1	331.5	0.27	6.34	-68.8				
1044	16.2	331.8	0.27	6.34	-72.2				

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 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	16.2	332.2	0.27	6.34	-73.0				
2	16.2	331.9	0.27	6.34	-73.4				
3	16.2	332.0	0.27	6.34	-73.9				
4	16.2	332.4	0.27	6.33	-74.3				
Average:	16.2	332.1	0.27	6.34	-73.7	#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: CEB Date: 11/13/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Nov-18 | Date/Time: 11/ 13 /2018@ 1143

Sample Number: RGW038S- 181113 | Weather: CLOUDY 30S

Landau Representative: SRB/JHA/CEB

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 5.63 Time: 1106 Flow through cell vol. GW Meter No.(s 1

Begin Purge: Date/Time: 11/13/2018 @ 1108 End Purge: Date/Time: 11/13 /2018 @ 1122 Gallons Purged: 0.5

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%			
1111	17.7	330.0	0.32	6.39	-31.9	LOW	5.63		
1114	17.3	309.0	0.27	6.35	-56.6		5.64		
1117	17.3	308.0	0.28	6.34	-58.5		5.65		
1120	17.3	306.9	0.26	6.32	-60.7				

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	306.0	0.26	6.31	-62.8				
2	17.3	306.3	0.26	6.31	-62.2				
3	17.4	306.0	0.26	6.31	-63.2				
4	17.4	305.9	0.26	6.30	-63.6				
Average:	17.4	306.1	0.26	6.31	-63.0	#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 ☐
	(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: CEB Date: 11/13/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 1036
Sample Number: RGW039S- 181113 | Weather: 40'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 5.37 Time: 1009 Flow through cell vol. GW Meter No.(s SLOPE 4
Begin Purge: Date/Time: 11/ 13 /2018 @ 1013 End Purge: Date/Time: 11/ 1 /2018 @ 1034 Gallons Purged: 0.75
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		
1016	16.9	122.7	1.75	6.10	50.1	LOW	5.37	<0.25	
1019	17.3	109.9	1.65	6.10	56.5				
1022	17.3	102.2	1.65	6.12	61.8		5.37	0.25	
1025	17.5	99.2	1.65	6.12	68.0				
1028	17.6	97.2	1.63	6.10	72.3				
1031	17.6	95.9	1.60	6.10	78.1				
1033	17.6	95.5	1.57	6.09	82.1				

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	17.7	95.4	1.61	6.09	82.0				
2	17.7	95.4	1.58	6.09	82.3				
3	17.7	95.4	1.64	6.10	82.0				
4	17.7	95.4	1.60	6.10	82.4				
Average:	17.7	95.4	1.61	6.10	82.2	#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)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:
Signature: JHA Date: 11/13/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 906
Sample Number: RGW143S- 181113 | Weather: 40'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 5.81 Time: 841 Flow through cell vol. GW Meter No.(s SLOPE 4
Begin Purge: Date/Time: 11/ 13 /2018 @ 844 End Purge: Date/Time: 11/ 1 /2018 @ 905 Gallons Purged: 0.75
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	
847	14.9	274.3	0.27	6.33	-28.2	LOW	5.81	<0.25	
850	15.0	291.6	0.29	6.34	-51.0				
853	15.0	295.1	0.30	6.35	-57.5		5.81	0.25	
856	15.0	297.3	0.35	6.35	-63.8				
859	15.1	298.3	0.36	6.34	-66.4				
902	15.1	299.2	0.38	6.34	-68.7			0.5	
904	15.0	299.5	0.41	6.34	-70.7				

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	15.0	299.6	0.41	6.34	-71.0				
2	15.1	299.7	0.41	6.34	-71.2				
3	15.1	299.8	0.41	6.34	-71.4				
4	15.1	299.8	0.42	6.34	-71.4				
Average:	15.1	299.7	0.41	6.34	-71.3	#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)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:
Signature: JHA Date: 11/13/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 1145
Sample Number: RGW209S- 181113 | Weather: 40s PC
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 5.27 Time: 1112 Flow through cell vol. GW Meter No.(s heron3
Begin Purge: Date/Time: 11/13/2018 @ 1115 End Purge: Date/Time: 11/ 13 /2018 @ 1130 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**	
1118	14.33	456	0.33	6.36	-76.8	LOW	5.27		
1121	13.97	422	0.17	6.35	-73.3		5.27		
1124	13.99	421	0.18	6.34	-73.0		5.27		
1127	14.01	419	0.16	6.33	-73.4				

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 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	14.02	418	0.15	6.33	-73.3				
2	14.03	418	0.15	6.33	-74.0				
3	14.04	418	0.15	6.33	-74.2				
4	14.08	417	0.14	6.33	-74.1				
Average:	14.04	418	0.15	6.33	-73.9	#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) (Silic		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:
Signature: SRB Date: 11/13/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 813
Sample Number: RGW210S- 181113 | Weather: CLEAR 30S
Landau Representative: CEB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 5.03 Time: 745 Flow through cell vol. GW Meter No.(s 1
Begin Purge: Date/Time: 11/13/2018 @ 748 End Purge: Date/Time: 11/13 /2018 @ 814 Gallons Purged: 0.5
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**	
751	13.2	251.4	2.96	6.53	2.9	LOW	5.11		
754	11.1	218.3	2.39	6.46	5.6		5.11		
757	10.3	194.3	1.27	6.05	33.8		5.13		
800	10.3	194.8	1.20	6.04	34.2				
803	10.2	199.4	1.01	6.01	29.2				
806	10.4	201.4	1.00	6.03	25.6				
808	10.4	202.7	1.01	6.05	22.4				

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, SLIGHT YELLOW COLOR, SOME ORANGE 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	10.5	203.1	0.99	6.06	21.7				
2	10.5	203.6	0.96	6.06	21.0				
3	10.5	204.5	0.94	6.07	20.1				
4	10.5	205.0	0.95	6.07	19.4				
Average:	10.5	204.1	0.96	6.07	20.6	#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: CEB Date: 11/13/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 1030
Sample Number: RGW237S- 181113 | Weather: 40s PC
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 4.85 Time: 957 Flow through cell vol. GW Meter No.(s heron3
Begin Purge: Date/Time: 11/13/2018 @ 1000 End Purge: Date/Time: 11/ 13 /2018 @ 1022 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**	
1003	12.95	332	3.09	6.49	-12.1	LOW	4.85		
1006	13.06	320	2.91	6.46	-14.1		4.85		
1009	16.12	269	0.68	6.43	-32.6		4.85		
1012	16.40	271	0.52	6.43	-37.6				
1015	16.52	277	0.37	6.41	-40.9				
1018	16.72	292	0.31	6.39	-45.4				
1021	16.57	298	0.26	6.40	-49.3				

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 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	16.57	297	0.26	6.39	-50.0				
2	16.57	297	0.25	6.39	-50.3				
3	16.57	298	0.24	6.39	-50.6				
4	16.60	298	0.24	6.38	-50.9				
Average:	16.58	298	0.25	6.39	-50.5	#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) (Silic
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
	others

Duplicate Sample No(s):
Comments:
Signature: SRB Date: 11/13/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 1100
Sample Number: RGW238I- 181113 | Weather: 40s PC
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 4.89 Time: 1020 Flow through cell vol. GW Meter No.(s heron3
Begin Purge: Date/Time: 11/13/2018 @ 1030 End Purge: Date/Time: 11/ 13 /2018 @ 1053 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		
1033	12.40	430	0.78	6.02	-5.0	LOW	4.92		
1036	12.40	441	0.44	5.96	-9.3		4.94		
1039	12.53	455	0.38	6.02	-40.5		4.94		
1042	12.47	504	0.22	6.14	-63.3		4.94		
1045	12.71	501	0.18	6.17	-67.0				
1048	13.04	498	0.16	6.20	-71.7				
1051	13.40	492	0.14	6.24	-75.9				

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/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	13.55	490	0.14	6.25	-76.6				
2	13.50	490	0.15	6.25	-77.1				
3	13.55	490	0.15	6.26	-77.8				
4	13.60	489	0.15	6.27	-78.4				
Average:	13.55	490	0.15	6.26	-77.5	#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) (Silic	
	VOC (Boeing short list)	
	Methane Ethane Ethene Acetylene	
	others	

Duplicate Sample No(s):
Comments:
Signature: SRB Date: 11/13/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 806
Sample Number: RGW239I- 181113 | Weather: 40'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 5.71 Time: 740 Flow through cell vol. GW Meter No.(s SLOPE 4
Begin Purge: Date/Time: 11/ 13 /2018 @ 744 End Purge: Date/Time: 11/ 1 /2018 @ 805 Gallons Purged: 0.75
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		
747	11.0	272.2	2.90	6.86	40.5	LOW	5.71	<0.25	
750	11.2	277.4	2.73	5.93	-10.5				
753	11.6	280.5	2.42	6.03	-40.5		5.71	0.25	
756	11.7	280.9	2.25	6.06	-48.1				
759	11.8	281.3	1.98	6.08	-51.4				
802	11.9	281.7	2.01	6.10	-55.8				
804	12.1	282.8	1.73	6.12	-58.8				

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/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	12.2	283.2	1.69	6.12	-59.1				
2	12.2	283.6	1.69	6.12	-59.4				
3	12.2	283.5	1.75	6.12	-60.0				
4	12.3	284.0	1.78	6.12	-60.5				
Average:	12.2	283.6	1.73	6.12	-59.8	#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 ☐
	(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)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments: MSMSD Location

Signature: JHA Date: 11/13/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 841
Sample Number: RGW240D- 181113 | Weather: 40'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 5.73 Time: 813 Flow through cell vol. GW Meter No.(s SLOPE 4
Begin Purge: Date/Time: 11/ 13 /2018 @ 817 End Purge: Date/Time: 11/ 1 /2018 @ 833 Gallons Purged: 0.5
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		
820	10.5	341.5	0.55	6.33	-40.6	MED	6.11		TURN TO LOWES
823	9.4	338.5	0.46	6.34	-52.0		6.08		AT LOWEST
826	8.9	331.1	0.42	6.20	-55.3		6.08	<0.25	
829	9.2	330.2	0.39	6.17	-60.1				
832	9.4	331.0	0.40	6.18	-63.5				

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.): CLOUDY, LIGHT WHITE/GRAY COLOR, 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	9.4	331.0	0.39	6.18	-63.6				
2	9.4	331.2	0.39	6.18	-63.7				
3	9.4	331.2	0.40	6.19	-64.1				
4	9.4	331.4	0.39	6.19	-64.3				
Average:	9.4	331.2	0.39	6.19	-63.9	#DIV/0!	6.26		

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)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments: DRAWDOWN WAS INEVITABLE
Signature: JHA Date: 11/13/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 1001
Sample Number: RGW241S- 181113 | Weather: 40'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 6.3 Time: 933 Flow through cell vol. GW Meter No.(s SLOPE 4
Begin Purge: Date/Time: 11/ 13 /2018 @ 938 End Purge: Date/Time: 11/ 1 /2018 @ 957 Gallons Purged: 0.5
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		
941	12.4	287.7	0.34	6.27	-59.1	LOW	6.3	<0.25	
944	12.2	286.7	0.32	6.25	-61.3				
947	13.9	298.0	0.29	6.26	-69.2		6.3	0.25	
950	14.1	301.1	0.30	6.29	-72.8				
953	14.4	303.2	0.32	6.31	-76.0				
956	14.1	303.4	0.32	6.32	-78.1				

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	14.1	303.1	0.33	6.32	-78.3				
2	14.1	302.9	0.33	6.32	-78.1				
3	14.1	303.0	0.34	6.32	-78.5				
4	14.1	302.9	0.34	6.32	-78.5				
Average:	14.1	303.0	0.34	6.32	-78.4	#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)		
	(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)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:
Signature: JHA Date: 11/13/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 936
Sample Number: RGW242I- 181113 | Weather: 40'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 6.44 Time: 858 Flow through cell vol. GW Meter No.(s SLOPE 4
Begin Purge: Date/Time: 11/ 13 /2018 @ 914 End Purge: Date/Time: 11/ 1 /2018 @ 930 Gallons Purged: 0.5
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		
917	11.7	275.3	0.59	6.21	-20.4	LOW	6.44	<0.25	
920	11.4	275.4	0.52	6.22	-32.1				
923	11.6	275.7	0.46	6.22	-41.8		6.44	0.25	
926	11.7	275.6	0.46	6.22	-48.4				
929	11.9	277.6	0.50	6.24	-54.2				

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.): CLOUDY, 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	11.9	277.6	0.50	6.25	-55.2				
2	11.9	277.6	0.49	6.25	-55.5				
3	11.9	277.6	0.49	6.25	-55.8				
4	11.9	277.6	0.48	6.25	-56.2				
Average:	11.9	277.6	0.49	6.25	-55.7	#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)		
	(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)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:
Signature: JHA Date: 11/13/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 1116
Sample Number: RGW243I- 181113 | Weather: 40'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 5.43 Time: 1048 Flow through cell vol. GW Meter No.(s SLOPE 4
Begin Purge: Date/Time: 11/ 13 /2018 @ 1053 End Purge: Date/Time: 11/ 1 /2018 @ 1113 Gallons Purged: 0.75
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		
1056	16.0	374.6	0.26	6.08	-24.0	LOW	5.43	<0.25	
1059	15.7	393.5	0.27	6.11	-47.9				
1101	15.4	398.2	0.32	6.12	-58.0			0.25	
1104	15.3	398.7	0.34	6.12	-60.1		5.43		
1107	15.3	399.4	0.44	6.11	-63.6				
1110	15.2	399.1	0.48	6.11	-65.8				
1112	15.1	399.2	0.59	6.11	-68.5				

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/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	15.1	399.1	0.59	6.11	-68.6				
2	15.1	399.1	0.61	6.11	-68.8				
3	15.1	398.9	0.62	6.11	-69.0				
4	15.1	398.8	0.62	6.11	-69.1				
Average:	15.1	399.0	0.61	6.11	-68.9	#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) (NWTPD) (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)	
	VOC (Boeing short list)	
	Methane Ethane Ethene Acetylene	
	others	

Duplicate Sample No(s):
Comments:
Signature: JHA Date: 11/13/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 13 /2018@ 938
Sample Number: RGW244S- 181113 | Weather: CLEAR 30S
Landau Representative: CEB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 5.34 Time: 913 Flow through cell vol. GW Meter No.(s 1
Begin Purge: Date/Time: 11/13/2018 @ 915 End Purge: Date/Time: 11/ 13 /2018 @ 932 Gallons Purged: 0.5
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**		
918	14.4	446.8	0.42	6.22	-21.2		5.45		
921	13.5	435.1	0.43	6.22	-39.0		5.45		
924	13.6	436.7	0.44	6.18	-49.9		5.45		
927	13.5	435.2	0.43	6.18	-52.7				
930	13.5	434.8	0.45	6.17	-54.3				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ☒ Pump/Pump Type DED BLADDR
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 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	13.4	434.5	0.46	6.16	-54.7				
2	13.4	434.5	0.45	6.16	-55.0				
3	13.4	434.4	0.44	6.16	-55.3				
4	13.4	434.3	0.44	6.16	-55.6				
Average:	13.4	434.4	0.45	6.16	-55.2	#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: CEB Date: 11/13/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 12 /2018@ 1633
Sample Number: 10-71-MW1 181112 | Weather: CLEAR 40S
Landau Representative: SRB/JHA/CEB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 8.81 Time: 1606 Flow through cell vol. GW Meter No.(s 1
Begin Purge: Date/Time: 11/12/2018 @ 1608 End Purge: Date/Time: 11/12 /2018 @ 1621 Gallons Purged: 0.5
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		
1611	13.9	215.7	0.93	5.70	41.5	LOW	8.82		
1614	13.8	209.9	1.03	5.67	47.3		8.82		
1617	13.6	207.8	1.10	5.71	42.1		8.82		
1620	13.2	204.1	1.09	5.73	37.0				

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	13.1	202.3	1.07	5.73	34.8				
2	13.1	201.3	1.06	5.74	34.2				
3	13.0	200.8	1.05	5.76	33.5				
4	12.9	200.3	1.05	5.75	32.2				
Average:	13.0	201.2	1.06	5.75	33.7	#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: CEB Date: 11/12/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Nov-18 | Date/Time: 11/ 12 /2018@ 1556

Sample Number: 10-71-MW2 181112 | Weather: 40'S, SUNNY

Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft): 9.03 | Time: 1530 | Flow through cell vol. | GW Meter No.(s HERON 3

Begin Purge: Date/Time: 11/ 12 /2018 @ 1534 | End Purge: Date/Time: 11/ 12 /2018 @ | 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		
1537	16.4	179.8	0.94	5.86	88.1	LOW	9.06	<0.25	
1540	16.4	187.5	0.46	5.99	36.3				
1543	16.2	188.4	0.36	6.02	8.0		9.06	0.25	
1546	16.0	188.7	0.38	6.01	-4.4				
1549	16.0	189.0	0.32	6.01	-11.0		9.06		
1552	15.9	189.0	0.28	6.02	-14.7			0.5	
1554	15.9	189.0	0.28	6.02	-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/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	15.9	189.0	0.28	6.02	-16.6				
2	15.9	189.0	0.29	6.02	-16.3				
3	15.9	189.0	0.28	6.02	-16.9				
4	15.9	189.0	0.28	6.02	-17.2				
Average:	15.9	189.0	0.28	6.02	-16.8	#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)
	(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: JHA | Date: 11/12/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 12 /2018@ 1558
Sample Number: 10-71-MW4 181112 | Weather: SUNNY 40S
Landau Representative: SRB/JHA/CEB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 8.90 Time: 1530 Flow through cell vol. GW Meter No.(s 1
Begin Purge: Date/Time: 11/12/2018 @ 1536 End Purge: Date/Time: 11/ 12 /2018 @ 1549 Gallons Purged: 0.5
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		
1539	16.6	259.9	0.79	6.22	29.0	LOW	8.89		
1542	16.3	277.9	0.70	6.22	-2.0		8.89		
1545	15.8	277.1	0.67	6.20	-9.3		8.90		
1548	15.7	276.0	0.72	6.20	-10.1				

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	15.7	275.4	0.76	6.20	-9.9				
2	15.7	275.2	0.78	6.20	-9.8				
3	15.7	274.9	0.81	6.20	-9.6				
4	15.7	274.6	0.83	6.19	-9.3				
Average:	15.7	275.0	0.80	6.20	-9.7	#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)		
	(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: CEB Date: 11/12/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 12 /2018@ 1211
Sample Number: RGW183S- 181112 | Weather: 40'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 8.67 Time: 1142 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 11/ 12 /2018 @ 1148 End Purge: Date/Time: 11/ 12 /2018 @ 1209 Gallons Purged: 0.5
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	13.0	137.5	0.71	6.29	71.6	LOW	8.67	<0.25	
1154	13.0	139.7	0.56	6.30	56.5				
1157	13.1	141.1	0.45	6.34	37.5		8.67		
1200	13.2	141.7	0.41	6.37	24.7				
1203	13.2	141.8	0.41	6.38	20.3				
1206	13.3	142.0	0.35	6.38	16.2				
1208	13.3	142.2	0.35	6.39	13.4				

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, 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	13.3	142.3	0.35	6.40	12.7				
2	13.3	142.3	0.35	6.39	12.3				
3	13.3	142.8	0.35	6.39	11.8				
4	13.3	142.4	0.35	6.39	11.5				
Average:	13.3	142.5	0.35	6.39	12.1	#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: JHA Date: 11/12/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 12 /2018@ 1236
Sample Number: RGW184S- 181112 | Weather: 40'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 9.19 Time: 1213 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 11/ 12 /2018 @ 1214 End Purge: Date/Time: 11/ 12 /2018 @ 1235 Gallons Purged: 0.5
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**	
1217	14.3	150.0	3.31	6.19	86.5	LOW	9.19	<0.25	
1220	13.7	142.1	2.29	6.19	89.0				
1223	13.5	138.1	1.73	6.18	89.5		9.19	0.25	
1226	13.3	136.1	1.45	6.16	90.7				
1229	13.2	135.0	1.30	6.14	90.9				
1232	13.2	134.5	1.22	6.13	90.2			0.5	
1234	13.3	134.1	1.13	6.14	88.8				

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.): CLOUDY, LIGHT BROWN COLOR, 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	13.3	134.1	1.15	6.14	88.5				
2	13.3	134.1	1.15	6.14	88.3				
3	13.3	134.1	1.13	6.14	88.1				
4	13.3	134.1	1.11	6.14	88.0				
Average:	13.3	134.1	1.14	6.14	88.2	#DIV/0!	9.19		

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: JHA Date: 11/12/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 12 /2018@ 1346
Sample Number: RGW211S- 181112 | Weather: 40'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 9.88 Time: 1321 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 11/ 12 /2018 @ 1324 End Purge: Date/Time: 11/ 12 /2018 @ 1337 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**	
1327	16.1	279.3	0.15	6.34	-58.6	HIGH	9.88	<0.25	
1330	16.2	269.3	0.14	6.36	-75.8		9.88	<0.25	
1333	16.2	266.5	0.12	6.34	-75.8				
1336	16.2	261.8	0.14	6.31	-74.7				

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.): TURBID, BROWN, SLIGHT PETROLEUM ODOR/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	16.2	260.9	0.14	6.30	-74.5				
2	16.2	260.0	0.14	6.30	-74.7				
3	16.2	259.9	0.15	6.30	-74.6				
4	16.2	259.6	0.02	6.30	-74.6				
Average:	16.2	260.1	0.11	6.30	-74.6	#DIV/0!	9.88		

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: JHA Date: 11/12/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/12 /2018@ 1348
Sample Number: RGW212S- 181112 | Weather: CLEAR 40S
Landau Representative: SRB/JHA/CEB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 10.43 Time: 1325 Flow through cell vol. GW Meter No.(s 1
Begin Purge: Date/Time: 11/12 /201 1325 End Purge: Date/Time: 11/ 12 /2018 @ 1345 Gallons Purged: 0.5
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**	
1328	15.3	231.8	0.42	5.63	117.6	LOW	10.54		
1331	15.3	229.6	0.44	5.61	119.1		10.54		
1334	15.2	224.2	0.47	5.58	122.8		10.55		
1337	15.2	220.7	0.42	5.55	127.0				
1340	15.2	219.4	0.40	5.54	128.7				
1343	15.2	218.6	0.42	5.54	130.3				

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	15.2	218.5	0.41	5.54	130.4				
2	15.2	218.2	0.40	5.53	130.6				
3	15.2	218.4	0.39	5.53	130.9				
4	15.2	218.3	0.39	5.53	131.2				
Average:	15.2	218.4	0.40	5.53	130.8	#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: CEB Date: 11/12/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/12 /2018@ 1308
Sample Number: RGW221S- 181112 | Weather: CLEAR 40S
Landau Representative: SRB/JHA/CEB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 9.98 Time: 1240 Flow through cell vol. GW Meter No.(s 1
Begin Purge: Date/Time: 11/ 12 /201 1246 End Purge: Date/Time: 11/12 /2018 @ 1300 Gallons Purged: 0.5
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**	
1249	14.8	227.0	0.32	6.27	25.5	LOW	9.98		
1252	13.6	221.2	0.43	6.16	12.3		9.98		
1255	13.6	221.0	0.43	6.15	12.2		9.98		
1258	13.5	219.5	0.39	6.06	12.7				

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	13.5	219.0	0.39	6.05	12.6				
2	13.5	219.1	0.39	6.04	12.5				
3	13.5	219.1	0.39	6.04	12.4				
4	13.5	218.9	0.39	6.04	12.3				
Average:	13.5	219.0	0.39	6.04	12.5	#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: CEB Date: 1/12/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Nov-18 | Date/Time: 11/ 12 /2018@ 1423

Sample Number: RGW224S- 181112 | Weather: CLEAR 40S

Landau Representative: SRB/JHA/CEB

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 10.61 Time: 1400 Flow through cell vol. GW Meter No.(s 1

Begin Purge: Date/Time: 11/ 12 /201 1401 End Purge: Date/Time: 11/12 /2018 @ 1415 Gallons Purged: 0.5

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		
1404	16.9	212.4	0.38	5.99	26.2	LOW	10.65		
1407	16.8	244.1	0.40	6.04	3.2		10.65		
1410	16.8	246.1	0.41	6.03	1.6		10.66		
1413	16.8	249.9	0.40	6.03	-1.7				

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	16.8	250.5	0.40	6.02	-3.5				
2	16.9	250.6	0.38	6.02	-3.8				
3	16.8	250.7	0.39	6.02	-4.1				
4	16.8	250.7	0.39	6.02	-4.4				
Average:	16.8	250.6	0.39	6.02	-4.0	#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 Location (DUP3)

Comments:

Signature: CEB Date: 11/12/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 12 /2018@ 1411
Sample Number: RGW255S- 181112 | Weather: 40'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 9.86 Time: 1346 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 11/ 12 /2018 @ 1349 End Purge: Date/Time: 11/ 12 /2018 @ 1408 Gallons Purged: 0.75
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**	
1352	17.1	198.6	0.22	5.98	20.6	LOW	9.92	<0.25	
1355	17.2	199.4	0.21	6.09	12.9				
1358	17.4	197.2	0.17	6.25	1.6		9.94	0.25	
1401	17.3	196.3	0.15	6.27	0.2				
1404	17.3	195.3	0.14	6.27	-1.0		9.94		
1407	17.3	195.1	0.15	6.27	-1.2			0.5	

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/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	195.0	0.15	6.27	-1.0				
2	17.3	195.2	0.14	6.27	-1.1				
3	17.3	195.2	0.15	6.27	-0.9				
4	17.3	195.0	0.15	6.27	-1.2				
Average:	17.3	195.1	0.15	6.27	-1.1	#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: JHA Date: 11/12/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 12 /2018@ 1100
Sample Number: DUP3- 181112 | Weather: CLOUDY 40S
Landau Representative: SRB/JHA/CEB

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)
Begin Purge: Date/Time: 11/ /2018 @ End Purge: Date/Time: 11/ /2018 @ Gallons Purged: 0.5
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
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	16.8	250.8	0.39	6.02	-3.6				
2	16.8	250.6	0.38	6.02	-4.0				
3	16.8	250.7	0.39	6.02	-4.3				
4	16.8	250.7	0.39	6.02	-4.4				
Average:	16.8	250.7	0.39	6.02	-4.1	#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): Duplicate to RGW224S
Comments:

Signature: CEB Date: 11/12/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/12 /2018@ 1508
Sample Number: RGW256S- 181112 | Weather: SUNNY 40S
Landau Representative: SRB/JHA/CEB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 8.76 Time: 1447 Flow through cell vol. GW Meter No.(s 1
Begin Purge: Date/Time: 11/ 12 /201 1447 End Purge: Date/Time: 11/ 12 /2018 @ 1501 Gallons Purged: 0.5
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**	
1450	16.5	167.2	0.36	5.85	81.8	LOW	8.78		
1453	16.1	171.9	0.39	5.87	77.0		8.76		
1456	15.8	171.8	0.41	5.87	77.2		8.76		
1459	15.7	171.4	0.41	5.85	78.9				

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 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	15.5	170.8	0.42	5.85	80.2				
2	15.5	170.7	0.42	5.85	80.3				
3	15.5	170.5	0.41	5.86	80.4				
4	15.5	170.5	0.41	5.85	80.7				
Average:	15.5	170.6	0.42	5.85	80.4	#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: CEB Date: 11/12/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Nov-18 | Date/Time: 11/ 12 /2018@ 1441

Sample Number: RGW257S- 181112 | Weather: 40'S, SUNNY

Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 9.32 | Time: 1415 | Flow through cell vol. | GW Meter No.(s HERON 3

Begin Purge: Date/Time: 11/ 12 /2018 @ 1418 | End Purge: Date/Time: 11/ 12 /2018 @ 1434 | Gallons Purged: 0.5

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**	
1421	16.9	165.6	1.34	5.90	100.9	LOW	9.32	<0.25	
1424	16.7	166.1	0.65	5.97	95.5				
1427	16.7	167.9	0.39	5.98	93.0		9.32	0.25	
1430	16.7	168.0	0.36	6.00	90.6				
1433	16.7	168.1	0.37	6.00	89.7				

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	16.7	168.2	0.37	6.00	89.7				
2	16.7	168.1	0.37	6.00	89.4				
3	16.7	168.1	0.36	6.00	89.5				
4	16.7	168.0	0.36	6.00	89.2				
Average:	16.7	168.1	0.37	6.00	89.5	#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: JHA | Date: 11/12/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 12 /2018@ 1213
Sample Number: RGW258S- 181112 | Weather: CLOUDY 40S
Landau Representative: SRB/JHA/CEB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 7.72 Time: 1148 Flow through cell vol. GW Meter No.(s 1
Begin Purge: Date/Time: 11/12 /201 1149 End Purge: Date/Time: 11/12 /2018 @ 1206 Gallons Purged: 0.5
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	
1152	13.4	306.1	0.42	6.42	0.8	LOW	7.72		
1155	13.0	304.6	0.45	6.41	-1.1		7.72		
1158	12.2	297.3	0.51	6.18	-0.9		7.73		
1201	12.0	296.5	0.50	6.14	-0.6				
1204	11.9	294.3	0.45	6.16	-5.0				

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	11.9	294.0	0.43	6.17	-6.3				
2	12.0	293.7	0.44	6.17	-6.9				
3	12.0	293.6	0.44	6.18	-7.3				
4	12.0	293.5	0.43	6.18	-7.9				
Average:	12.0	293.7	0.44	6.18	-7.1	#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: MSMSD Location

Signature: CEB Date: 11/12/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 12 /2018@ 856
Sample Number: RGW081S- 181112 | Weather: 40'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 8.41 Time: 827 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 11/ 12 /2018 @ 834 End Purge: Date/Time: 11/ 12 /2018 @ 853 Gallons Purged: 0.5
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	
837	12.5	181.8	1.20	6.29	83.7	LOW	8.41	<0.25	
840	12.7	188.4	0.54	6.42	24.4				
843	12.5	188.9	0.46	6.46	0.2		8.41	0.25	
846	12.1	186.7	0.42	6.44	-18.8				
849	12.2	187.3	0.41	6.42	-22.4				
852	12.4	187.7	0.41	6.41	-25.8				

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/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	12.4	187.9	0.41	6.41	-26.2				
2	12.4	188.0	0.42	6.41	-26.5				
3	12.4	187.9	0.41	6.41	-26.9				
4	12.4	187.8	0.42	6.41	-27.3				
Average:	12.4	187.9	0.42	6.41	-26.7	#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)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:
Signature: JHA Date: 11/12/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 12 /2018@ 956
Sample Number: RGW172S- 181112 | Weather: 30'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 9.19 Time: 932 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 11/ 12 /2018 @ 934 End Purge: Date/Time: 11/ 12 /2018 @ 955 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	
937	14.9	736.0	0.59	5.27	71.6	LOW	9.51	<0.25	TURN CPM DON
940	14.0	635.0	0.49	5.57	33.8		9.34	<0.25	LOWEST SETTIN(
943	13.7	611.0	0.51	5.70	26.4			<0.25	
946	13.0	563.0	0.54	5.65	17.3		9.29		
949	11.5	489.1	0.61	5.81	1.5		9.25		
952	11.0	457.3	0.63	5.83	-3.5				
954	10.8	443.2	0.65	5.85	-5.0				

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 WITH SOME SUSPENDED SOLIDS, COLORLESS, ROTTEN MILK ODOR/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	10.8	441.1	0.65	5.85	-4.8				
2	10.8	439.9	0.65	5.86	-4.6				
3	10.8	434.8	0.66	5.86	-4.8				
4	10.8	432.0	0.66	5.86	-4.9				
Average:	10.8	437.0	0.66	5.86	-4.8	#DIV/0!	9.46		

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)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:
Signature: JHA Date: 11/12/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 12 /2018@ 926
Sample Number: RGW226S- 181112 | Weather: 30'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) | Damaged (NO) | Describe: Flush Mount
DTW Before Purging (ft) 8.78 | Time: 900 | Flow through cell vol. | GW Meter No.(s HERON 3
Begin Purge: Date/Time: 11/ 12 /2018 @ 904 | End Purge: Date/Time: 11/ 12 /2018 @ 925 | Gallons Purged: 0.75
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**	
907	13.8	215.5	1.69	6.30	73.5	LOW	8.81	<0.25	
910	12.9	255.4	1.10	6.29	40.0				
913	12.0	251.5	0.83	6.40	-8.8		8.81	0.25	
916	11.7	237.6	0.68	6.39	-36.0				
919	11.6	233.3	0.62	6.38	-39.5				
922	11.5	231.8	0.59	6.37	-40.4			0.5	
924	11.2	226.1	0.57	6.36	-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, 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	11.2	225.8	0.56	6.36	-42.3				
2	11.2	225.5	0.57	6.36	-42.3				
3	11.2	225.3	0.57	6.36	-42.3				
4	11.2	224.9	0.57	6.36	-42.1				
Average:	11.2	225.4	0.57	6.36	-42.3	#DIV/0!	8.89		

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)	
	VOC (Boeing short list)	
	Methane Ethane Ethene Acetylene	
	others	

Duplicate Sample No(s):
Comments:

Signature: JHA | Date: 11/12/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 12 /2018@ 756
Sample Number: RGW233I- 181112 | Weather: 30'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 7.27 Time: 730 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 11/ 12 /2018 @ 734 End Purge: Date/Time: 11/ 12 /2018 @ 755 Gallons Purged: 0.75
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**	
737	10.6	185.5	3.52	6.13	95.7	LOW	7.29	<0.25	
740	11.4	182.6	2.60	6.07	82.0				
743	12.6	189.4	1.89	6.24	42.9		7.29	0.25	
746	12.7	190.7	1.91	6.32	24.3				
749	12.7	190.7	1.96	6.36	16.5				
752	12.6	189.4	2.13	6.37	8.3			0.5	
754	12.7	189.4	1.78	6.37	4.3				

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	12.7	189.6	1.71	6.36	3.6				
2	12.8	190.2	1.71	6.36	3.1				
3	12.9	190.4	1.67	6.36	2.7				
4	12.9	190.1	1.69	6.36	2.3				
Average:	12.8	190.1	1.70	6.36	2.9	#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)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:
Signature: JHA Date: 11/12/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 12 /2018@ 1106
Sample Number: RGW234S- 181112 | Weather: 30'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 7.97 Time: 1042 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 11/ 12 /2018 @ 1045 End Purge: Date/Time: 11/ 12 /2018 @ 1101 Gallons Purged: 0.5
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		
1048	15.1	232.1	0.33	6.37	-10.9	MED	7.97	<0.25	
1051	15.2	222.3	0.36	6.36	-21.3				
1054	15.2	219.1	0.30	6.35	-21.6		7.97	0.25	
1057	15.1	215.3	0.28	6.33	-23.3				
1100	15.2	215.1	0.29	6.32	-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.): CLOUDY, 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	15.3	214.9	0.29	6.33	-24.7				
2	15.3	214.9	0.29	6.33	-24.6				
3	15.3	214.9	0.29	6.33	-24.7				
4	15.3	214.9	0.29	6.33	-24.9				
Average:	15.3	214.9	0.29	6.33	-24.7	#DIV/0!	7.97		

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)
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
	others

Duplicate Sample No(s):
Comments:
Signature: JHA Date: 11/12/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 12 /2018@ 1036
Sample Number: RGW235I- 181112 | Weather: 30'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 7.49 Time: 1010 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 11/ 12 /2018 @ 1014 End Purge: Date/Time: 11/ 12 /2018 @ 1035 Gallons Purged: 0.5
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**	
1017	11.2	134.0	1.30	6.18	17.4	LOW	7.52	<0.25	
1020	12.4	145.8	0.49	6.14	1.6				
1023	12.5	144.0	0.40	6.31	-13.3		7.52		
1026	12.7	141.9	0.36	6.42	-23.1			0.25	
1029	12.6	140.3	0.33	6.48	-29.9				
1032	13.0	139.1	0.32	6.52	-34.6				
1034	13.0	138.0	0.31	6.53	-37.1				

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	13.0	137.8	0.30	6.54	-37.4				
2	13.0	137.7	0.30	6.54	-37.7				
3	13.0	137.6	0.30	6.54	-37.8				
4	13.0	137.6	0.30	6.54	-38.0				
Average:	13.0	137.7	0.30	6.54	-37.7	#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)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:
Signature: JHA Date: 11/12/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Nov-18 | Date/Time: 11/12 /2018@ 1013

Sample Number: RGW152S- 181112 | Weather: CLEAR 40S

Landau Representative: SRB/JHA/CEB

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 8.94 Time: 952 Flow through cell vol. GW Meter No.(s 1

Begin Purge: Date/Time: 11/12 /201 952 End Purge: Date/Time: 11/12 /2018 @ 1014 Gallons Purged: 0.5

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**	
955	16.7	312.8	0.26	5.90	15.9	LOW	8.94		
958	15.0	300.9	0.27	5.92	-2.4				
1001	13.2	279.2	0.40	5.91	-10.7				
1004	12.2	268.2	0.48	5.90	-12.1				
1007	11.1	254.2	0.54	5.59	1.2				
1010	10.9	257.1	0.53	5.58	-4.8				
1012	10.8	257.2	0.51	5.60	-6.2				

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 SMELLS LIKE OLD BUTTER 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	10.9	257.2	0.52	5.60	-6.9				
2	10.9	257.1	0.52	5.62	-8.8				
3	10.9	256.4	0.52	5.65	-11.5				
4	10.8	255.7	0.52	5.67	-13.8				
Average:	10.9	256.6	0.52	5.64	-10.3	#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: CEB Date: 11/12/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Nov-18 | Date/Time: 11/12 /2018@ 700

Sample Number: RGWDUP1 181112 | Weather: CLEAR 30S

Landau Representative: SRB/JHA/CEB

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 1

Begin Purge: Date/Time: 11/ /2018 @ End Purge: Date/Time: 11/ /2018 @ 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**		

DUPLICATE TO RGW152S

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.): CLEAR COLORLESS, SMELLS LIKE OLD BUTTER 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	10.9	257.2	0.52	5.61	-8.0				
2	10.9	256.7	0.52	5.64	-10.8				
3	10.9	256.1	0.52	5.66	-12.7				
4	10.8	255.4	0.51	5.68	-14.5				
Average:	10.9	256.4	0.52	5.65	-11.5	#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: CEB Date: 11/12/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Nov-18 | Date/Time: 11/12 /2018@ 948

Sample Number: RGW153S- 181112 | Weather: CLEAR 30S

Landau Representative: SRB/JHA/CEB

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 9.38 Time: 912 Flow through cell vol. GW Meter No.(s 1

Begin Purge: Date/Time: 11/12 /201 913 End Purge: Date/Time: 11/12 /2018 @ 935 Gallons Purged: 0.5

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**	
916	14.6	1315.0	0.85	5.03	76.6	LOW	9.38		
919	13.1	967.0	0.92	5.16	66.1		9.38		
922	12.3	677.0	0.88	5.38	48.3		9.40		
925	12.2	632.0	0.85	5.43	43.7				
928	12.1	540.0	0.87	5.55	29.2				
931	12.1	503.0	0.81	5.63	18.9				
933	12.1	474.8	0.81	5.68	16.4				

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 SLIGHT ODOR 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	12.1	465.6	0.85	5.70	14.9				
2	12.1	459.9	0.84	5.72	12.2				
3	12.1	455.5	0.83	5.73	11.3				
4	12.1	450.0	0.83	5.74	10.3				
Average:	12.1	457.8	0.84	5.72	12.2	#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: CEB Date: 11/12/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 12 /2018@ 956
Sample Number: RGW172S- 181112 | Weather: 30'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 9.19 Time: 932 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 11/ 12 /2018 @ 934 End Purge: Date/Time: 11/ 12 /2018 @ 955 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	
937	14.9	736.0	0.59	5.27	71.6	LOW	9.51	<0.25	TURN CPM DON
940	14.0	635.0	0.49	5.57	33.8		9.34	<0.25	LOWEST SETTIN(
943	13.7	611.0	0.51	5.70	26.4			<0.25	
946	13.0	563.0	0.54	5.65	17.3		9.29		
949	11.5	489.1	0.61	5.81	1.5		9.25		
952	11.0	457.3	0.63	5.83	-3.5				
954	10.8	443.2	0.65	5.85	-5.0				

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 WITH SOME SUSPENDED SOLIDS, COLORLESS, ROTTEN MILK ODOR/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	10.8	441.1	0.65	5.85	-4.8				
2	10.8	439.9	0.65	5.86	-4.6				
3	10.8	434.8	0.66	5.86	-4.8				
4	10.8	432.0	0.66	5.86	-4.9				
Average:	10.8	437.0	0.66	5.86	-4.8	#DIV/0!	9.46		

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)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:
Signature: JHA Date: 11/12/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/12 /2018@ 853
Sample Number: RGW173S- 181112 | Weather: CLEAR 30S
Landau Representative: SRB/JHA/CEB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 9.20 Time: 823 Flow through cell vol. GW Meter No.(s 1
Begin Purge: Date/Time: 11/ 12 /201 830 End Purge: Date/Time: 11/ 12 /2018 @ 905 Gallons Purged: 0.5
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**	
833	13.1	747.0	0.57	6.73	-99.0	LOW	9.22		
836	11.9	560.0	0.61	6.63	-77.6		9.22		
839	11.8	519.0	0.57	6.57	-70.4		9.22		
842	11.5	396.3	0.53	6.36	-44.8				
845	11.5	394.2	0.54	6.36	-44.1				
848	11.9	368.8	0.54	6.40	-42.6				

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 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	11.9	367.6	0.54	6.40	-42.5				
2	11.9	366.2	0.56	6.42	-42.4				
3	11.9	365.6	0.55	6.42	-42.2				
4	11.9	365.6	0.55	6.43	-42.1				
Average:	11.9	366.3	0.55	6.42	-42.3	#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: CEB Date: 11/12/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 12 /2018@ 926
Sample Number: RGW226S- 181112 | Weather: 30'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) | Damaged (NO) | Describe: Flush Mount
DTW Before Purging (ft) 8.78 | Time: 900 | Flow through cell vol. | GW Meter No.(s HERON 3
Begin Purge: Date/Time: 11/ 12 /2018 @ 904 | End Purge: Date/Time: 11/ 12 /2018 @ 925 | Gallons Purged: 0.75
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**	
907	13.8	215.5	1.69	6.30	73.5	LOW	8.81	<0.25	
910	12.9	255.4	1.10	6.29	40.0				
913	12.0	251.5	0.83	6.40	-8.8		8.81	0.25	
916	11.7	237.6	0.68	6.39	-36.0				
919	11.6	233.3	0.62	6.38	-39.5				
922	11.5	231.8	0.59	6.37	-40.4			0.5	
924	11.2	226.1	0.57	6.36	-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, 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	11.2	225.8	0.56	6.36	-42.3				
2	11.2	225.5	0.57	6.36	-42.3				
3	11.2	225.3	0.57	6.36	-42.3				
4	11.2	224.9	0.57	6.36	-42.1				
Average:	11.2	225.4	0.57	6.36	-42.3	#DIV/0!	8.89		

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)	
	VOC (Boeing short list)	
	Methane Ethane Ethene Acetylene	
	others	

Duplicate Sample No(s):
Comments:

Signature: JHA | Date: 11/12/2018

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/12 /2018@ 758
Sample Number: RGW232S- 181112 | Weather: clear 30s
Landau Representative: SRB/JHA/CEB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 7.67 Time: 730 Flow through cell vol. GW Meter No.(s 1
Begin Purge: Date/Time: 11/12 /201 736 End Purge: Date/Time: 11/12 /2018 @ 757 Gallons Purged: 0.5
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**	
739	15.5	581.0	1.97	6.42	-92.7	LOW	8.42		
742	14.2	544.0	1.83	6.37	-91.9		8.44		
745	13.4	539.0	1.86	6.33	-89.9		8.47		
748	10.8	512.0	2.12	6.22	-78.0				
751	8.3	479.9	2.49	6.05	-59.0				
754	7.6	461.5	2.41	5.99	-50.9				
756	7.3	457.6	2.27	5.99	-49.5				

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 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	7.3	454.7	2.20	5.98	-48.2				
2	7.1	452.3	2.17	5.97	-47.0				
3	6.9	450.8	2.05	5.96	-45.8				
4	6.9	447.9	1.97	5.96	-44.5				
Average:	7.1	451.4	2.10	5.97	-46.4	#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: pumped at lowest cpm
Signature: CEB Date: 11/12/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 12 /2018@ 756
Sample Number: RGW233I- 181112 | Weather: 30'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 7.27 Time: 730 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 11/ 12 /2018 @ 734 End Purge: Date/Time: 11/ 12 /2018 @ 755 Gallons Purged: 0.75
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**	
737	10.6	185.5	3.52	6.13	95.7	LOW	7.29	<0.25	
740	11.4	182.6	2.60	6.07	82.0				
743	12.6	189.4	1.89	6.24	42.9		7.29	0.25	
746	12.7	190.7	1.91	6.32	24.3				
749	12.7	190.7	1.96	6.36	16.5				
752	12.6	189.4	2.13	6.37	8.3			0.5	
754	12.7	189.4	1.78	6.37	4.3				

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	12.7	189.6	1.71	6.36	3.6				
2	12.8	190.2	1.71	6.36	3.1				
3	12.9	190.4	1.67	6.36	2.7				
4	12.9	190.1	1.69	6.36	2.3				
Average:	12.8	190.1	1.70	6.36	2.9	#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)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:
Signature: JHA Date: 11/12/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 12 /2018@ 1106
Sample Number: RGW234S- 181112 | Weather: 30'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 7.97 Time: 1042 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 11/ 12 /2018 @ 1045 End Purge: Date/Time: 11/ 12 /2018 @ 1101 Gallons Purged: 0.5
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		
1048	15.1	232.1	0.33	6.37	-10.9	MED	7.97	<0.25	
1051	15.2	222.3	0.36	6.36	-21.3				
1054	15.2	219.1	0.30	6.35	-21.6		7.97	0.25	
1057	15.1	215.3	0.28	6.33	-23.3				
1100	15.2	215.1	0.29	6.32	-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.): CLOUDY, 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	15.3	214.9	0.29	6.33	-24.7				
2	15.3	214.9	0.29	6.33	-24.6				
3	15.3	214.9	0.29	6.33	-24.7				
4	15.3	214.9	0.29	6.33	-24.9				
Average:	15.3	214.9	0.29	6.33	-24.7	#DIV/0!	7.97		

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)
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
	others

Duplicate Sample No(s):
Comments:
Signature: JHA Date: 11/12/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/ 12 /2018@ 1036
Sample Number: RGW235I- 181112 | Weather: 30'S, SUNNY
Landau Representative: JHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 7.49 Time: 1010 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 11/ 12 /2018 @ 1014 End Purge: Date/Time: 11/ 12 /2018 @ 1035 Gallons Purged: 0.5
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**	
1017	11.2	134.0	1.30	6.18	17.4	LOW	7.52	<0.25	
1020	12.4	145.8	0.49	6.14	1.6				
1023	12.5	144.0	0.40	6.31	-13.3		7.52		
1026	12.7	141.9	0.36	6.42	-23.1			0.25	
1029	12.6	140.3	0.33	6.48	-29.9				
1032	13.0	139.1	0.32	6.52	-34.6				
1034	13.0	138.0	0.31	6.53	-37.1				

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	13.0	137.8	0.30	6.54	-37.4				
2	13.0	137.7	0.30	6.54	-37.7				
3	13.0	137.6	0.30	6.54	-37.8				
4	13.0	137.6	0.30	6.54	-38.0				
Average:	13.0	137.7	0.30	6.54	-37.7	#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)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:
Signature: JHA Date: 11/12/2018

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Nov-18 | Date/Time: 11/12 /2018@ 1113
Sample Number: RGW236S- 181112 | Weather: CLEAR 30S
Landau Representative: SRB/JHA/CEB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: Flush Mount
DTW Before Purging (ft) 7.23 Time: 1048 Flow through cell vol. GW Meter No.(s 1
Begin Purge: Date/Time: 11/12 /201 1048 End Purge: Date/Time: 11/12 /2018 @ 1105 Gallons Purged: 0.5
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**	
1051	13.9	336.1	1.70	6.47	-2.2	LOW	7.25		
1054	13.3	370.1	1.19	6.53	-32.3		7.25		
1057	13.1	383.1	0.51	6.54	-58.0		7.25		
1100	13.1	383.8	0.48	6.53	-61.0				
1103	13.3	385.4	0.48	6.54	-66.4				

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, SMELLS LIKE OLD BUTTER, 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	13.2	385.2	0.48	6.54	-66.6				
2	13.3	385.5	0.49	6.54	-67.0				
3	13.3	385.1	0.48	6.54	-67.2				
4	13.2	384.8	0.48	6.54	-67.2				
Average:	13.3	385.2	0.48	6.54	-67.0	#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: CEB Date: 11/12/2018

Appendix C

Memo

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

Date: January 17, 2019

Project: 0088880100.2019
c: Project File

Subject: Summary Data Quality Review
November 2018 Boeing Renton Groundwater Sampling
SWMU-172/174
ARI Group Number: 18K0181

This memo presents the summary data quality review of 11 primary groundwater samples, one groundwater field duplicate, and one trip blank sample collected on November 12, 2018. 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
RGWDUP1-181112	18K0181-01	all
RGW233I-181112	18K0181-02	all
RGW232S-181112	18K0181-03	all
RGW173S-181112	18K0181-04	all
RGW081S-181112	18K0181-05	all
RGW226S-181112	18K0181-06	all
RGW153S-181112	18K0181-07	all
RGW172S-181112	18K0181-08	all
RGW152S-181112	18K0181-09	all
RGW235I-181112	18K0181-10	all
RGW236S-181112	18K0181-11	all

Sample ID	Laboratory Sample ID	Requested Analyses
RGW234S-181112	18K0181-12	all
Trip Blank	18K0181-13	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 November 13, 2018. 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-181112/ RGWDUP1-191112	vinyl chloride	246	260	20	6
	cis-1,2-dichloroethene	1,700	1,830	20	7
	trichloroethene	223	211	20	6
	tetrachloroethene	846	756	20	11

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

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

   The vinyl chloride result for sample RGW173S-181112 was flagged with an "M" by the laboratory to indicate the analyte was detected and confirmed by the analyst but with a low spectral match. The result is qualified as estimated and flagged with a "J."

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 lead. The total lead results for samples RGW152S-181112 and RGWDUP1-181112 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-181112/ RGWDUP1-181112	TOC	10,910	14,180	500	26
	total arsenic	22.6	22.5	0.200	<1
	total copper	4.76	4.44	0.500	7
	total lead	2.48	1.24	0.100	67

Abbreviations
µg/L = micrograms 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 18K0181 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
RGWDUP1-181112	total lead	1.24 J	µg/L	field duplicate RPD
RGW233I-181112	none			
RGW232S-181112	none			
RGW173S-181112	vinyl chloride	44.8 J	ng/L	flagged "M" by lab
RGW081S-181112	none			
RGW226S-181112	none			
RGW153S-181112	none			
RGW172S-181112	none			
RGW152S-181112	total lead	2.48 J	µg/L	field duplicate RPD
RGW235I-181112	none			
RGW236S-181112	none			
RGW234S-181112	none			
Trip Blank	none			

Abbreviations
µg/L = micrograms per liter
J = the analyte is qualified as estimated
M = the analyte was detected and confirmed by the analyst but with a low spectral match

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: January 21, 2019

Project: 0088880100.2019
c: Project File

Subject: Summary Data Quality Review
November 2018 Boeing Renton Groundwater Sampling
Building 4-78/79 SWMU/AOC Group
ARI Work Order Number: 18K0190

This memo presents the summary data quality review of 16 primary groundwater samples, one field duplicate groundwater sample, and one trip blank sample collected on November 13, 2018. 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
RGWDUP2-181113	18K0190-01	all
RGW239I-181113	18K0190-02	all
RGW210S-181113	18K0190-03	all
RGW240D-181113	18K0190-04	all
RGW031S-181113	18K0190-05	all
RGW143S-181113	18K0190-06	all
RGW242I-181113	18K0190-07	all
RGW244S-181113	18K0190-08	all
RGW241S-181113	18K0190-09	all
RGW033S-181113	18K0190-10	all
RGW237S-181113	18K0190-11	all
RGW039S-181113	18K0190-12	all
RGW238I-181113	18K0190-13	all

Sample ID	Laboratory Sample ID	Requested Analyses
RGW243I-181113	17K0213-14	all
RGW034S-181113	18K0190-15	all
RGW209S-181113	18K0190-16	all
RGW038S-181113	18K0190-17	all
Trip Blank	18K0190-18	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, 2014a and b).

ARI received the samples on November 13, 2018. The temperature of the cooler was recorded upon receipt and was below the maximum acceptable temperature of 6 degrees Celsius, except for one cooler that was received at 7.1 degrees Celsius. Because samples were submitted within four hours of the final sample collection time, they were not subject to elevated temperatures for an extended amount of time; therefore, 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 except as noted:

   VOCs by EPA 8260C: One of three surrogates, 1,2-dichloroethene-d4, was recovered at 134 percent in sample RGWDUP2-181113 and at 131 percent in sample RGW031S-181113. Both recoveries are above the control limits of 80 to 129 percent. The high recoveries equate to a potential high bias in the samples. Therefore, results for detected compounds are qualified as estimated and flagged with a "J" and non-detected compounds are not qualified.
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-181113/ RGWDUP2-181113	vinyl chloride	0.31	0.30	0.20	NC
	cis-1,2-dichloroethene	0.63	0.58	0.20	NC
	benzene	28.3	23.8	0.20	17
	TPH-G	2010	2000	100	<1

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

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-181113/ RGWDUP2-181113	TOC	20.46	20.27	0.50	1

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 18K0190 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
RGWDUP2-181113	vinyl chloride cis-1,2-dichloroethene benzene	0.30 J 0.58 J 23.8 J	µg/L	surrogate recoveries
RGW239I-181113	none			
RGW210S-181113	none			
RGW240D-181113	none			
RGW031S-181113	vinyl chloride cis-1,2-dichloroethene benzene	0.31 J 0.63 J 28.3 J	µg/L	surrogate recoveries
RGW143S-181113	none			
RGW242I-181113	none			
RGW244S-181113	none			
RGW241S-181113	none			
RGW033S-181113	none			
RGW237S-181113	none			
RGW039S-181113	none			
RGW238I-181113	none			
RGW243I-181113	none			
RGW034S-181113	none			
RGW209S-181113	none			
RGW038S-181113	none			
Trip Blank	none			

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.

Memo

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

Date: January 21, 2019

Project: 0088880100.2019
c: Project File

Subject: Summary Data Quality Review
November 2018 Boeing Renton Groundwater Sampling
Former Fuel Farm AOC Group
ARI Work Order Number: 18K0186

This memo presents the summary data quality review of 10 primary groundwater samples and one field duplicate collected on November 12, 2018. 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.

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

Sample ID	Laboratory Sample ID	Requested Analyses
RGWDUP3-181112	18K0186-01	all
RGW183S-181112	18K0186-02	all
RGW258S-181112	18K0186-03	all
RGW184S-181112	18K0186-04	all
RGW221S-181112	18K0186-05	all
RGW211S-181112	18K0186-06	all
RGW212S-181112	18K0186-07	all
RGW255S-181112	18K0186-08	all
RGW224S-181112	18K0186-09	all
RGW257S-181112	18K0186-10	all
RGW256S-181112	18K0186-11	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.

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 November 13, 2018. 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 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	DRO C12-C24	1.56	1.56	0.100	0
	TPH JetA C10-C18	1.64	1.72	0.100	5

Abbreviations
mg/L = milligrams per liter
DRO = diesel range organics
RPD = relative percent difference
TPH = total petroleum hydrocarbons

7. Reporting Limits and Laboratory Flags – Acceptable

Overall assessment of data

The table below summarizes the data review. The completeness of ARI work order number 18K0186 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
RGWDUP3-181112	none
RGW183S-181112	none
RGW258S-181112	none
RGW184S-181112	none
RGW221S-181112	none
RGW211S-181112	none
RGW212S-181112	none
RGW255S-181112	none
RGW224S-181112	none
RGW257S-181112	none
RGW256S-181112	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:	January 21, 2019		

Subject: Summary Data Quality Review
November 2018 Boeing Renton Groundwater Sampling
AOC-001 and -002 and AOC-003
ARI Work Order Number: 18K0191

This memo presents the summary data quality review of 10 primary groundwater samples, one field duplicate, and one trip blank sample collected on November 13, 2018. 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
RGWDUP4-181113	18K0191-01	all AOC-001 and -002 analyses
RGW197S-181113	18K0191-02	all AOC-001 and -002 analyses
RGW185S-181113	18K0191-03	all AOC-001 and -002 analyses
RGW248I-181113	18K0191-04	all AOC-003 analyses
RGW245S-181113	18K0191-05	all AOC-001 and -002 analyses
RGW247S-181113	18K0191-06	all AOC-003 analyses
RGW194S-181113	18K0191-07	all AOC-001 and -002 analyses

Sample ID	Laboratory Sample ID	Requested Analyses
RGW195S-181113	18K0191-08	all AOC-001 and -002 analyses
RGW196D-181113	18K0191-09	all AOC-001 and -002 analyses
RGW188S-181113	18K0191-10	all AOC-003 analyses
RGW249S-181113	18K0191-11	all AOC-003 analyses
Trip Blank	18K0191-12	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 November 13, 2018. The temperature of the cooler was recorded upon receipt and was 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

   VOCs by EPA 8260C SIM: The recoveries for 1,1-dichloroethene in the MS/MSD performed with sample RGW188S-181113 were 128 and 138 percent, greater than the control limits of 80 to 120 percent. The high recoveries equate to a possible high bias in the samples and 1,1-dichloroethene was not detected in the project samples. Therefore, sample results are not affected and are not qualified.

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-181113/ RGWDUP4-181113	benzene	0.32	0.27	0.20	NC
	cis-1,2-dichloroethene	0.315	0.343	0.020	9
	vinyl chloride	0.385	0.346	0.020	11

Abbreviations
µg/L = micrograms per liter
NC = not calculated
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-181113/ RGWDUP4-181113	TOC	12.39	12.39	0.50	0

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 18K0191 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
RGWDUP4-181113	none
RGW197S-181113	none
RGW185S-181113	none
RGW248I-181113	none
RGW245S-181113	none
RGW247S-181113	none
RGW194S-181113	none
RGW195S-181113	none
RGW196D-181113	none
RGW188S-181113	none
RGW249S-181113	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:	January 21, 2019		

Subject: Summary Data Quality Review
November 2018 Boeing Renton Groundwater Sampling
AOC-034 and -035
ARI Work Order Number: 18K0189

This memo presents the summary data quality review of four primary groundwater samples and one trip blank collected on November 13, 2018. 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 and vinyl chloride) 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
RGW217S-181113	18K0189-01	all
RGW216S-181113	18K0189-02	all
RGW218S-181113	18K0189-03	all
RGW251S-181113	18K0189-04	all
Trip Blank	18K0189-05	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.

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 guidance documents (EPA, 2014).

ARI received the samples on November 13, 2018. The temperature of the cooler was recorded upon receipt and was 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 except as noted:

   One of four surrogates, 4-bromofluorobenzene, was recovered at 78.7 percent, below the control limits of 80 to 120 percent, in sample RGW218S-181113. The sample was reanalyzed with similar surrogate recoveries. The results are reported from the initial analysis, and qualified as estimated due to the potential low bias. Because the results are all below detection, a "UJ" flag is applied to the results.

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 review. The completeness of work order number 18K0189 is 100 percent. Evaluation of the usefulness of these data is based on EPA guidance documents referenced 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
RGW217S-181113	none			
RGW216S-181113	none			
RGW218S-181113	vinyl chloride cis-1,2-dichloroethene	0.20 UJ 0.20 UJ	µg/L	surrogate recoveries
RGW251S-181113	none			
Trip Blank	none			

Abbreviations
µg/L = micrograms per liter
UJ = The analyte was not detected at the estimated reporting limit indicated.

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.

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Memo

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

Subject: Summary Data Quality Review
November 2018 Boeing Renton Groundwater Sampling
Building 10-71 Parcel
ARI Work Order Number: 18K0183

This memo presents the summary data quality review of three primary groundwater samples and one trip blank sample collected on November 12, 2018. 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-MW2-181112	18K0183-01	VOCs
10-71-MW4-181112	18K0183-02	VOCs
10-71-MW1-181112	18K0183-03	VOCs
Trip Blank	18K0183-04	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 November 13, 2018. The temperature of the cooler was recorded upon receipt and was 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

   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 18K0183 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-MW2-181112	none
10-71-MW4-181112	none
10-71-MW1-181112	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:	February 1, 2019		

Subject: Summary Data Quality Review
November 2018 Boeing Renton Groundwater Sampling
Apron A
ARI Work Order Number: 18K0192

This memo presents the summary data quality review of two primary groundwater samples, one groundwater field duplicate, and one trip blank sample collected on November 13, 2018. 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
RGWDUP5-181113	18K0192-01	all
RGW262S-181113	18K0192-02	all
RGW264S-181113	18K0192-03	all
Trip Blank	18K0192-04	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 November 13, 2018. The temperature of the coolers were recorded upon receipt and was below the maximum acceptable temperature of 6 degrees Celsius. The laboratory noted that the sample time for RGW264S-181113 was different than the time on the chain-of-custody. The laboratory logged the samples with the time on the chain-of-custody and proceeded with analysis.

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, RGWDUP5-181113, was submitted with sample RGW262S-181113. 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	33.32	32.53	0.50	2

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 18K0192 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
RGWDUP5-181113	none
RGW262S-181113	none
RGW264S-181113	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 October - December 2018

Boeing Renton Site
Renton, Washington

Prepared for:
The Boeing Company
EHS Remediation

Prepared by:
CALIBRE Systems, Inc.
Project No. K0357000

February 14, 2019

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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 fourth quarter of 2018 (between October 1 and December 31, 2018). The ongoing remedial actions include:

1. Operation of two soil vapor extraction (SVE) systems located at Solid Waste Management Unit (SWMU) and Area of Concern (AOC) locations designated as SWMU-172/174 and Building 4-78/4-79 SWMU/AOC Group;
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 (SWMU-172/174 and Building 4-78/79 are the locations where the two SVE systems have operated). 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 fourth quarter of 2018. This includes operation and monitoring activities for the SVE systems located at Building 4-78/79 and SWMU-172/174 and a summary of the ongoing biological treatment 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. 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 SVE systems performed in October – December 2018.

2.1 Building 4-78/4-79 SWMU/AOC Group SVE System

The Building 4-78/79 SVE system consists of 15 vapor extraction wells and a SVE equipment trailer as shown in Figure 2-1. The SVE system is equipped with two vapor-phase granular-activated carbon (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 vapors 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 to remove and oxidize specific compounds, such as vinyl chloride, that are not efficiently adsorbed by GAC.

Through November 1, 2018, 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. This SVE system was shutdown at the beginning of November following Ecology's approval. System monitoring included regular monitoring of total organic vapor concentrations with a calibrated photo-ionization detector (PID).

2.1.1 TO-15 Laboratory Analysis of Vapor Samples

No samples for TO-15 analysis were collected during this operating period. Table 2-1 shows historical samples for TO-15 analysis at the Building 4-78/79 SVE system.

2.1.2 Summary of Operations and Operational Changes

Monitoring completed in October 2018 show the influent concentrations were maintained at the asymptotic levels observed prior to and during the rebound testing periods.

Table 2-2 shows the PID readings for selected wells in the Building 4-78/79 SVE system. Table 2-3 shows the operational parameters (flow rate and PID readings) and a summary of the mass removal for the SVE system over this quarter.

2.1.3 Mass Removal Estimate

Between April 17, 2015 and October 31, 2018 the Building 4-78/79 SVE system has recovered an estimated 19.6 pounds of VOCs (a mixture of TCE, other CVOCs and fuel related compounds), as shown in Table 2-3. Approximately 0.4 pounds of VOCs were removed during the October 2018 operating period (fourth quarter 2018). The cumulative VOC mass removal for the Building 4-78/79 SVE system is shown in Figure 2-2.

2.2 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 2-3. 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).

2.2.1 TO-15 Laboratory Analysis of Vapor Samples

No samples for TO-15 analysis were collected during this operating period. Table 2-4 summarizes the TO-15 detections for the SWMU-172/174 SVE system for 13 TO-15 sampling events[1] that have been implemented since system startup.

2.2.2 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

[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.

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 again 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. The system was periodically monitored over a 3-hour period the day of the system modification to identify any increase in vapor concentration from the operating wells or the system inlet. No significant increases in vapor concentrations were observed following these changes during this operating period. Table 2-5 shows the PID readings for the wells in the SWMU 172/174 SVE system. Table 2-6 shows an operational summary for the system.

2.2.3 Mass Removal Estimate

Between April 17, 2015 and December 27, 2018 the SWMU-172/174 SVE system has recovered an estimated 14.6 pounds of VOCs (primarily tetrachloroethene, PCE), as shown in Table 2-6. Approximately 0.3 pounds of VOCs were removed during the current reporting period (fourth quarter 2018). The cumulative VOC mass removal for the SWMU-172/174 SVE system is shown in Figure 2-4.

2.3 Recommended Next Steps for the SVE Systems

During this reporting period (October 2018), Boeing submitted to Ecology a separate Tech Memo recommending the shutdown of the SVE system at the Building 4-78/79 area and received concurrence from Ecology in November 2018 at which point the system was shutdown (CALIBRE 2018a). In December 2018, Boeing submitted to Ecology a Tech Memo describing the planned approach for further evaluation of soils at the Building 4-78/79 area (CALIBRE 2018b). Soil confirmation samples previously collected at this area revealed that cleanup standards for COCs were met at all but one of the 24 samples at the 4-78/79 area. 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. Utility clearance, coring and probe sampling related to the additional soil evaluation are planned for 2019.

Modifying the SVE system flow at the SWMU-172/174 area showed marginal increases in VOC mass removal from SVE-2 and the system influent on the day the system was adjusted in December 2018 however subsequent monitoring during this quarter did not show significant change in vapor concentrations. Continued monitoring in January 2019 show increases in vapor concentrations and summa can samples for TO-15 analysis are planned for the first quarter of 2019. It's possible the observed increase in vapor concentrations is associated with alternating flows between wells (i.e. SVE-1 was extracting and is now an inlet vent and vice versa for SVE-3) or may be related to seasonal changes in water table elevation (December 2018 had above average precipitation while January 2019 showed significantly below average precipitation). 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 July 2018.

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. A fifth round of nitrate/sulfate injections was performed in December 2018 and collection of groundwater samples are planned for the first quarter of 2019 from the injection and monitoring wells at this area.

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 3-1 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 soil sampling is planned in 2019.

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-2 and the system influent for a brief period however no significant/sustained increases were observed until January 2019. It is recommended that SVE operations be continued for this area, with samples collected for TO-15 analysis in the first 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. No substrate for ERD treatment was injected in the fourth quarter of 2018. A fifth round of nitrate/sulfate injections for benzene treatment at the Building 4-78/79 area was completed in December 2018 and collection of performance monitoring data is planned for the first quarter of 2019. Additional substrate injections are recommended for Building 4-78/79, AOC-003, and AOC-001/002 (after access is available in this area).

5.0 References

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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 - 4-78/79 SVE System

SVE System Inlet

Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1,1-TCA	1,1-DCA	1,1-DCE	Acetone	Benzene	Freon 113	Hexane	Pentane	Toluene	TPHg	MEK	Carbon Disulfide	m,p-Xylene	o-Xylene	Ethyl Benzene	Chloroform	1,2,4-Trimethylbenzene	Cumene	Styrene	Total Chlorinated	Total VOCs
4/17/2015[1]	2.9	280	5.2	ND	ND	8.0	ND	ND	ND	ND	98	ND	ND	1.2	ND	21	ND	ND	ND	ND	ND	ND	ND	ND	296	416
5/18/2015	11	800	27	ND	ND	21.0	ND	ND	ND	ND	120	ND	ND	ND	ND	61	ND	ND	ND	ND	ND	ND	ND	ND	859	1,040
10/13/2015	2.7	160	11	ND	ND	2.7	ND	ND	12	ND	48	9.4	ND	ND	1,400	ND	ND	ND	ND	ND	ND	ND	ND	ND	176	1,646
3/18/2016	ND	49	2.5	ND	ND	ND	ND	ND	19	ND	16	6.6	13	2.3	69	ND	ND	ND	ND	ND	ND	ND	ND	ND	52	177
6/30/2016	1.2	100	6.0	ND	2.3	2.2	ND	ND	32	ND	49	ND	ND	ND	ND	ND	7.2	ND	ND	ND	ND	ND	ND	ND	112	200
9/12/2016	1.6	110	20	ND	5.9	2.2	ND	ND	ND	ND	54	26	100	ND	600	ND	ND	ND	ND	ND	ND	ND	ND	ND	140	920
12/14/2016	ND	17	6.3	ND	2.4	ND	ND	ND	ND	ND	18	4.5	33	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	25.7	81.2
4/5/2017	ND	43	3.0	ND	ND	1.7	ND	ND	ND	ND	11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	47.7	58.7
8/16/2017	1.3	91	8.0	ND	ND	3.1	ND	ND	ND	ND	6.4	ND	ND	7	ND	ND	ND	0.96	ND	ND	ND	ND	ND	ND	103	118
12/8/2017 - Rebound Start	ND	42	2.5	ND	ND	1.3	ND	ND	ND	ND	1.7	1.7	5.2	1.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	45.8	56.3
1/19/2018 - 35-Day 60 Minute Sample	ND	68	2.6	ND	2.0	5.8	ND	ND	ND	ND	13	13	26	1.0	280	7.1	ND	ND	ND	ND	ND	ND	ND	ND	78.4	419
3/6/2018 - 80-Day 60 Min Sample	ND	67	3.2	ND	8.9	7.6	ND	ND	ND	ND	40	44	48	1.0	510	ND	ND	ND	ND	ND	ND	ND	ND	ND	86.7	730
5/22/2018	2.6	260	10	ND	4.6	19	ND	ND	22	ND	50	49	110	2.8	2,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	296	2,530
6/7/2018	ND	69	3.7	ND	ND	2.1	ND	ND	ND	ND	2.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	74.8	77.6
6/20/2018	1.3	87	3.7	ND	ND	2.6	ND	ND	ND	ND	3.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	94.6	98.0

SVE-01

Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1,1-TCA	1,1-DCA	1,1-DCE	Acetone	Benzene	Freon 113	Hexane	Pentane	Toluene	TPHg	MEK	Carbon Disulfide	m,p-Xylene	o-Xylene	Ethyl Benzene	Chloroform	1,2,4-Trimethylbenzene	Cumene	Styrene	Total Chlorinated	Total VOCs
10/13/2015	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11	ND	ND	2,100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2,111
6/30/2016	ND	1.2	ND	ND	ND	ND	ND	ND	11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.2	12.2
9/12/2016	ND	ND	ND	ND	ND	ND	ND	ND	14	ND	ND	62	160	1.3	1,800	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2,037
12/8/2017 - Rebound Start	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11	27	2.0	250	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	290
5/22/2018	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	26	83	ND	630	ND	16	ND	ND	ND	ND	ND	1.7	ND	ND	757
6/7/2018	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11
6/20/2018	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0

SVE-05

Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1,1-TCA	1,1-DCA	1,1-DCE	Acetone	Benzene	Freon 113	Hexane	Pentane	Toluene	TPHg	MEK	Carbon Disulfide	m,p-Xylene	o-Xylene	Ethyl Benzene	Chloroform	1,2,4-Trimethylbenzene	Cumene	Styrene	Total Chlorinated	Total VOCs
8/16/2017	2.5	39	ND	ND	ND	ND	ND	ND	ND	ND	17	ND	ND	160	320	ND	ND	4.5	1.4	1.4	ND	ND	ND	ND	41.5	546

SVE-6

Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1,1-TCA	1,1-DCA	1,1-DCE	Acetone	Benzene	Freon 113	Hexane	Pentane	Toluene	TPHg	MEK	Carbon Disulfide	m,p-Xylene	o-Xylene	Ethyl Benzene	Chloroform	1,2,4-Trimethylbenzene	Cumene	Styrene	Total Chlorinated	Total VOCs
9/12/2016	ND	98	ND	ND	190	ND	ND	ND	ND	ND	6,900	55	360	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	288	7,603
8/16/2017	16	100	4.5	ND	ND	5.4	1.5	ND	ND	ND	75	ND	ND	ND	440	ND	ND	ND	ND	ND	5.0	ND	ND	ND	127	647
12/8/2017 - Rebound Start	5.4	37	ND	ND	ND	2.7	ND	ND	ND	ND	7.2	ND	ND	6.4	ND	ND	ND	ND	ND	ND	1.2	ND	ND	ND	45	60
1/19/2018 - 35-Day 60 Minute Sample	6.4	52	1.0	ND	ND	4.6	ND	ND	ND	ND	24	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.3	ND	ND	ND	64	89
3/6/2018 - 80-Day 60 Min Sample	9.8	67	ND	ND	ND	10	ND	ND	ND	ND	2,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	87	2,087
5/22/2018	36	220	ND	ND	29	28	ND	ND	ND	ND	1,900	350	690	ND	26,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	313	29,253
6/7/2018	20	120	3.3	ND	ND	5.9	1.4	ND	ND	ND	65	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	151	218
6/20/2018	24	120	2.7	ND	ND	4.2	1.5	ND	ND	1.5	57	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.4	ND	ND	ND	152	214

SVE-8

Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1,1-TCA	1,1-DCA	1,1-DCE	Acetone	Benzene	Freon 113	Hexane	Pentane	Toluene	TPHg	MEK	Carbon Disulfide	m,p-Xylene	o-Xylene	Ethyl Benzene	Chloroform	1,2,4-Trimethylbenzene	Cumene	Styrene	Total Chlorinated	Total VOCs
9/12/2016	ND	4.9	ND	ND	ND	ND	ND	ND	17	2.3	3.9	290	ND	6.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.9	324
4/5/2017	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.1

Table 2-1 TO-15 Analytical Results - 4-78/79 SVE System

SVE-10

Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1,1-TCA	1,1-DCA	1,1-DCE	Acetone	Benzene	Freon 113	Hexane	Pentane	Toluene	TPHg	MEK	Carbon Disulfide	m,p-Xylene	o-Xylene	Ethyl Benzene	Chloroform	1,2,4-Trimethylbenzene	Cumene	Styrene	Total Chlorinated	Total VOCs
3/18/2016	ND	250	13	ND	ND	6.9	ND	ND	ND	ND	16	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	270	286
6/30/2016	1.5	250	17	ND	7.1	6.2	ND	ND	ND	ND	120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	282	402
9/12/2016	2.6	320	97	2.1	18	7.9	2.3	1.6	ND	ND	130	ND	ND	2.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	452	584
12/16/2016	ND	91	95	1.4	28	3.3	1.6	1.4	ND	ND	95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	222	317
4/5/2017	1.4	240	19	ND	ND	10	ND	ND	ND	ND	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	270	290
8/16/2017	2.6	300	42	ND	ND	14	1.4	ND	ND	ND	34	ND	ND	9.5	260	ND	ND	2.9	1.6	ND	ND	1.5	ND	ND	360	670
12/8/2017 - Rebound Start	ND	180	11	ND	ND	6.3	ND	ND	ND	ND	8.9	ND	ND	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	197	207
1/19/2018 - 35-Day 60 Minute Sample	1.7	330	13	ND	ND	28	1.2	ND	ND	ND	39	ND	ND	1.4	ND	17	ND	ND	ND	ND	ND	ND	ND	ND	374	431
1/19/2018 - 35-Day 180 Minute Sample	1.8	350	15	ND	ND	24	1.3	ND	ND	ND	31	ND	ND	ND	ND	37	ND	ND	ND	ND	ND	ND	ND	ND	392	460
3/6/2018 - 80-Day 60 Min Sample	1.7	330	12	ND	ND	41	1.7	ND	ND	ND	59	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	386	445
3/6/2018 - 80-Day 180 Min Sample	1.6	300	12	ND	ND	32	ND	ND	ND	ND	41	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	346	387
5/22/2018	5.4	720	23	ND	ND	70	ND	ND	ND	ND	77	ND	17	38	480	ND	ND	19	7.6	6.9	ND	ND	ND	11	818	1,475
6/7/2018	1.6	230	14	ND	ND	8.5	ND	ND	ND	ND	11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	254	265
6/20/2018	1.9	300	15	ND	ND	11	ND	ND	11	ND	11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	328	350

SVE-12

Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1,1-TCA	1,1-DCA	1,1-DCE	Acetone	Benzene	Freon 113	Hexane	Pentane	Toluene	TPHg	MEK	Carbon Disulfide	m,p-Xylene	o-Xylene	Ethyl Benzene	Chloroform	1,2,4-Trimethylbenzene	Cumene	Styrene	Total Chlorinated	Total VOCs
8/16/2017	2.8	320	16	ND	ND	7	ND	ND	ND	ND	4.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	346	350

Notes:
(1) The TO-15 sample results from this day were considered anomalously low based on multiple PID measurements at the time and subsequent TO-15 samples from system operation
All results are in parts per billion by volume (ppbv).
ND = non-detect
DCA = Dichloroethane
DCE = Dichloroethene
MEK = methyl ethyl ketone or 2-butanone
PCE = Tetrachloroethene
TCA = Trichloroethane
TCE = Trichloroethene
Total Chlorinated = the sum of PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, 1,1,1-TCA, 1,1-DCA, and 1,1-DCE.

Table 2-2 PID Monitoring - 4-78/79 SVE System

Date	Days in Operation Since Startup [1]	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	VPC Inlet	VPC Mid	VPC Outlet [2]	Notes
10/11/2018	1,117																311		0	
10/19/2018	1,125																422		0	Background PID at 340 ppb.
10/31/2018	1,137																418		0	System down; PLC screen is off with no warning or cause listed for system turning off. Possible power outage. Restart system.
11/1/2018	1,138																			System turned off following approval from Ecology.

Notes:

[1] Days in operation since system startup on April 17, 2015.

[2] Concentrations measured are at the low end of the range of concentrations able to be measured by the PID. Data presented should be compared with analytical results presented in Table 2-1 which show no detections of COCs.

All PID results posted are reported in parts per billion by volume (ppbv).

PID values listed are field measurements calibrated to isobutylene that have not been corrected to the ionization potentials of the target compounds

Blank cells - Not all wells were measured with the PID during each sampling event.

Table 2-3 VOC Mass Removal Estimate - 4-78/4-79 SVE System

Date	PID Reading (ppbv)	Corrected Value (VOC) (ppbv) [1]	System Flow (cfm)	Cumulative Runtime Hours	VOCs removed in Operating Period Between Monitoring Events (lbs)	Cumulative VOC Mass Removed Since Start of SVE Operations in April, 2015 (lbs)
10/11/2018	311	181	105	21,190	0.24	19.51
10/19/2018	422	246	98	21,381	0.10	19.61
10/31/2018	418	244	105	21,432	0.03	19.64

Notes:

PID = photoionization detector

ppbv = parts per billion by volume

cfm = cubic feet per minute

lbs = pounds

A correction factor of 0.58 has been applied to the PID vapor measurement for VOCs based on the mixture of analytes detected in the influent TO-15 analysis on 6/20/18.

TO-15 analysis results showed Trichloroethene made up of 89% of the total VOCs removed in the 6/20/18 results.

Table 2-4 TO-15 Analytical Results - SWMU-172/174 SVE System

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

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

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

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	25.2
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.

Table 2-5 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
10/11/2018	1,110			Vent	40	0	0	
10/19/2018	1,118			Vent	282		0	
10/31/2018	1,130		222	Vent	182		38	
11/12/2018	1,142		91	Vent	12		0	Changed blower oil
11/28/2018	1,158	128	419	Vent	462		37	
12/5/2018	1,165	0	142	Vent	75		0	After initial readings, modified system to vent from SVE-1 and pull soil vapor from SVE-2 and SVE-3.
12/5/2018	1,165	Vent	153	174	174		0	Readings ~1 hrs after system flow modification.
12/5/2018	1,165	Vent	316	187	252		0	Readings ~3 hrs after system flow modification.
12/14/2018	1,174	Vent	0	132	41		0	
12/21/2018	1,181	Vent	0	93	23		0	

Notes:

[1] Days in operation since system startup on April 17, 2015.

Operational change was made on 12/5/18. 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 2-6 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)	Cumulative VOC Mass Removed Since Start of SVE Operations in April, 2015 (lbs)
10/11/2018	40	23	77	20,713	0.023	14.31
10/19/2018	282	162	70	20,869	0.043	14.35
10/31/2018	182	104	77	21,136	0.052	14.40
11/12/2018	12	7	77	21,401	0.003	14.41
11/28/2018	462	265	77	21,743	0.169	14.58
12/5/2018	75	43	77	21,892	0.012	14.59
12/5/2018	174	100	90	21,893	0.000	14.59
12/5/2018	252	144	90	21,896	0.001	14.59
12/14/2018	41	23	90	22,104	0.011	14.60
12/21/2018	23	13	90	22,466	0.010	14.61

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 8/30/18.

TO-15 analysis results showed Tetrachloroethene made up 90% of the total VOCs removed at the influent on 8/30/18.

Table 3-1 Groundwater Monitoring Results Summary November 2018 and Recommended ERD Treatment

GW Treatment Area	Source and downgradient	CPOC wells	Treatment IWs	ERD Treatment
SWMU-172/174	PCE and TCE less than 1.0 ug/L; cisDCE less than 2.0 ug/L; VC less than 0.30 ug/L.	All detections are at 0.56 ug/L or less.	*Prior data, North and South IWS showed total CVOCs range from 0.03 ug/L to 6.90 ug/L. TOC near background.*	**Substrate injection completed in July 2018. Continue monitoring.**
Building 4-78/4-79 SWMU/AOC Group	TCE is ND; cisDCE and VC are ND or less than 0.55 ug/L at all but one well. One central well (GW033S) continues to show significant reductions in total CVOCs from 1,430 ug/L in Nov 2017. Recent data show 150 ug/L in May 2018, 8.5 ug/L in Aug 2018, and 46 ug/L in Nov 2018 after substrate injections in January and July 2018. Benzene increased at source well GW031S (from 3 ug/L in Aug 2018 to 28 ug/L in Nov 2018). Nitrate/sulfate injected in December 2018.	All CPOC wells with CVOCs either ND or slightly above CULs. Max VC concentration at 0.29 ug/L (CUL is 0.20 ug/L).	*Prior data, 4 of 5 wells with low detections where sum of CVOCs are less than 3 ug/L*	**Substrate injection in selected IWs/areas around GW033S completed in July 2018. Recommend additional substrate in this area as CVOCs increased at GW033S.**
AOC-001/002	*Prior data, MW near source at 1.2 ug/L; downgradient all detections are less than 2.5 ug/L.*	All detections remain below 0.75 ug/L.	*Prior data, detections at or below 0.30 ug/L.*	**Inject infiltration galleries at source (IPRA and IPRB) when area is accessible.**
AOC-003	All detections are less than 1.0 ug/L.	All detections are less than 1.0 ug/L.	*Prior data, in 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	Two of three wells are ND; other well shows TCE at 0.28 ug/L and cisDCE at 0.25 ug/L.	-	-	**No action**
AOC-60	*Prior data, detections less than 5 ug/L; elevated TOC at treated wells.*	*Prior data, all detections less than 0.10 ug/L*	-	**Substrate injection completed in July 2018. Continue monitoring.**
AOC – 90	*Prior data, MW near source at 27 ug/L CVOCs; downgradient wells less than 0.30 ug/L; elevated TOC at treated well.*	*Prior data, all detections are less than 0.40 ug/L.*	-	**Substrate injection at GW-189S completed in July 2018. Continue monitoring**
Apron A	Two of three wells ND; other well shows VC at 0.55 ug/L.	-	-	**No action**
Building 4-70	-	*Prior data, CVOCs at 0.70 ug/L and 0.22 ug/L.*	-	**No action**

FIGURES

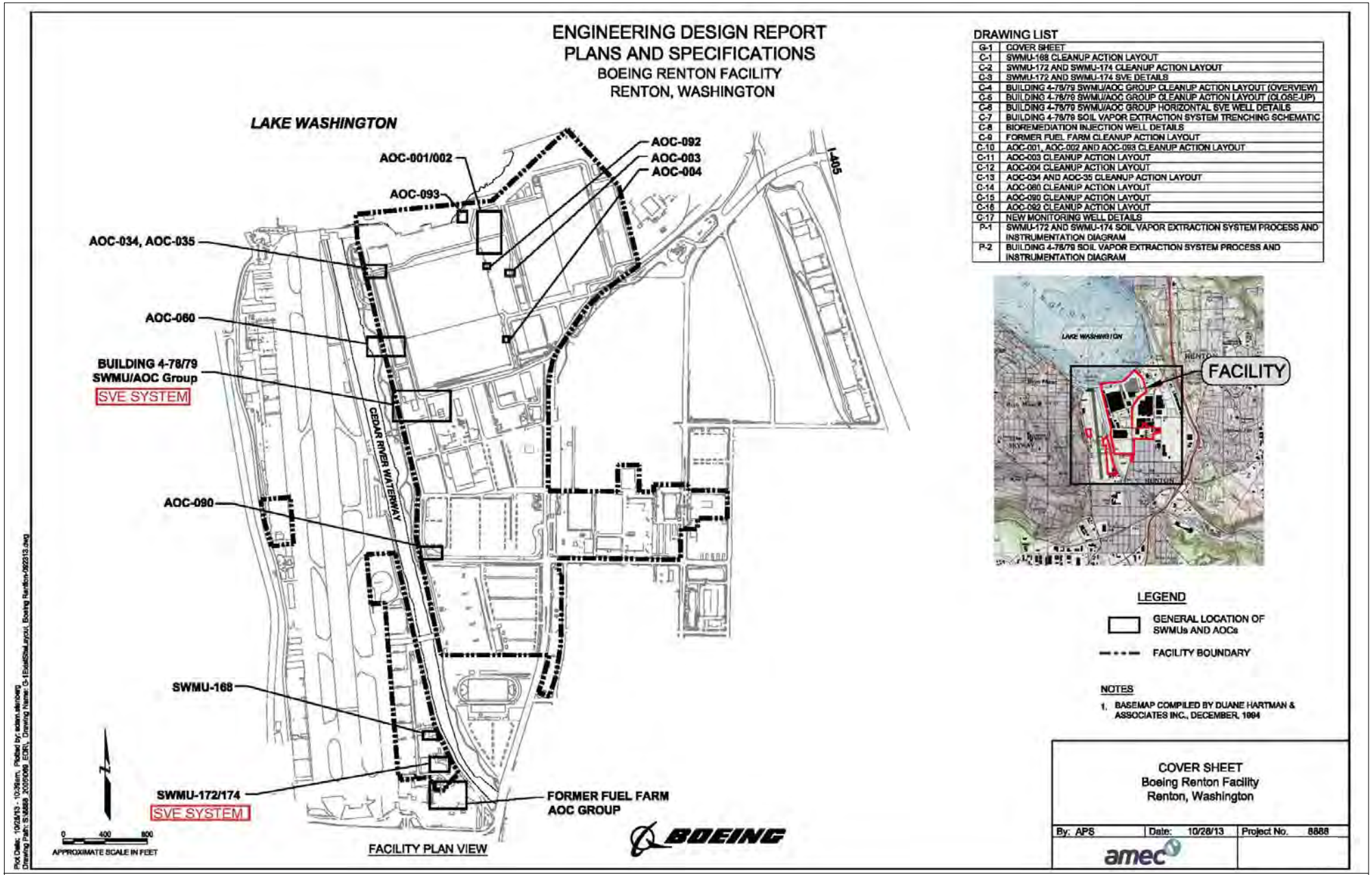

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Figure 1-1 Site Location/ AOC Outlines

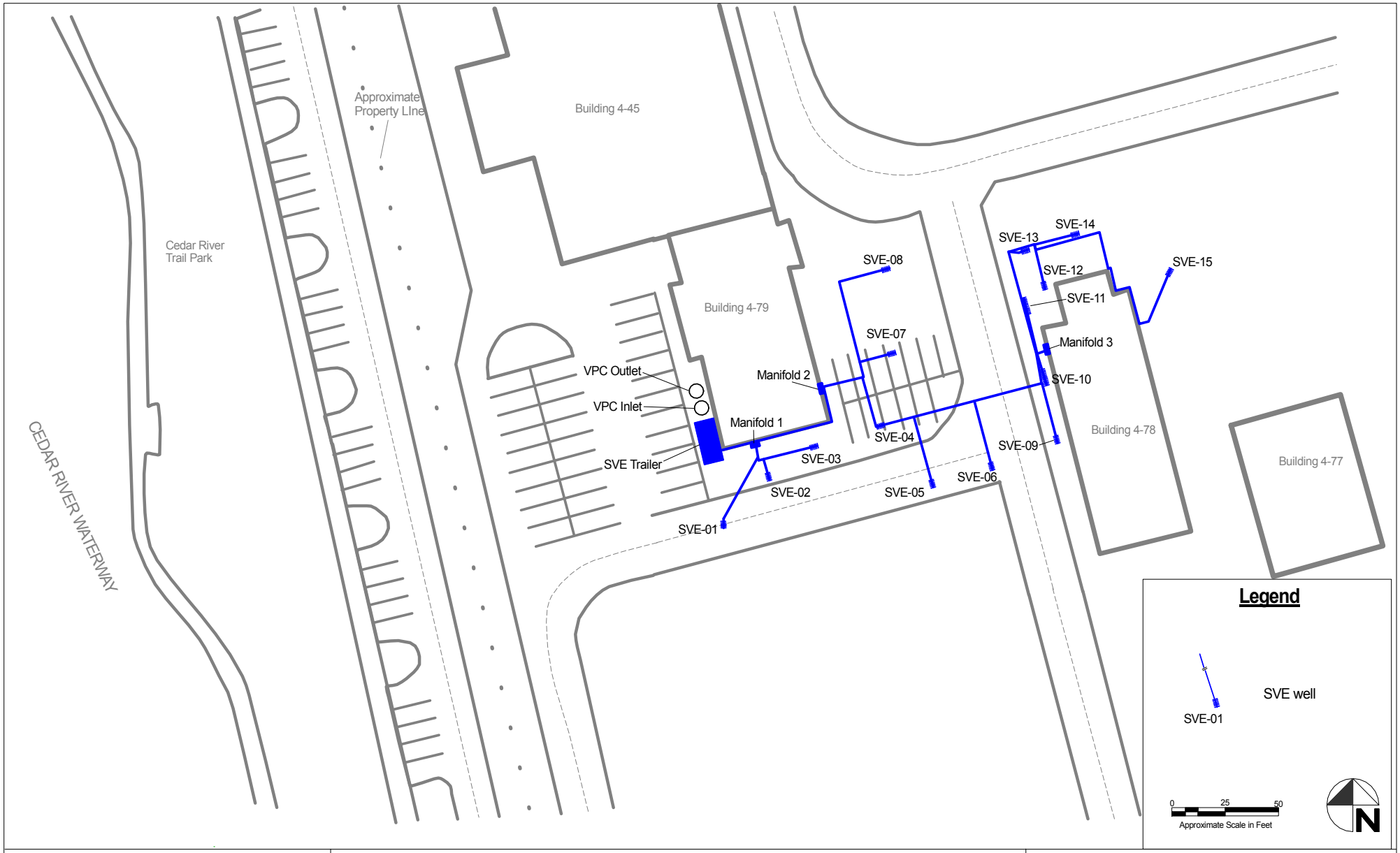

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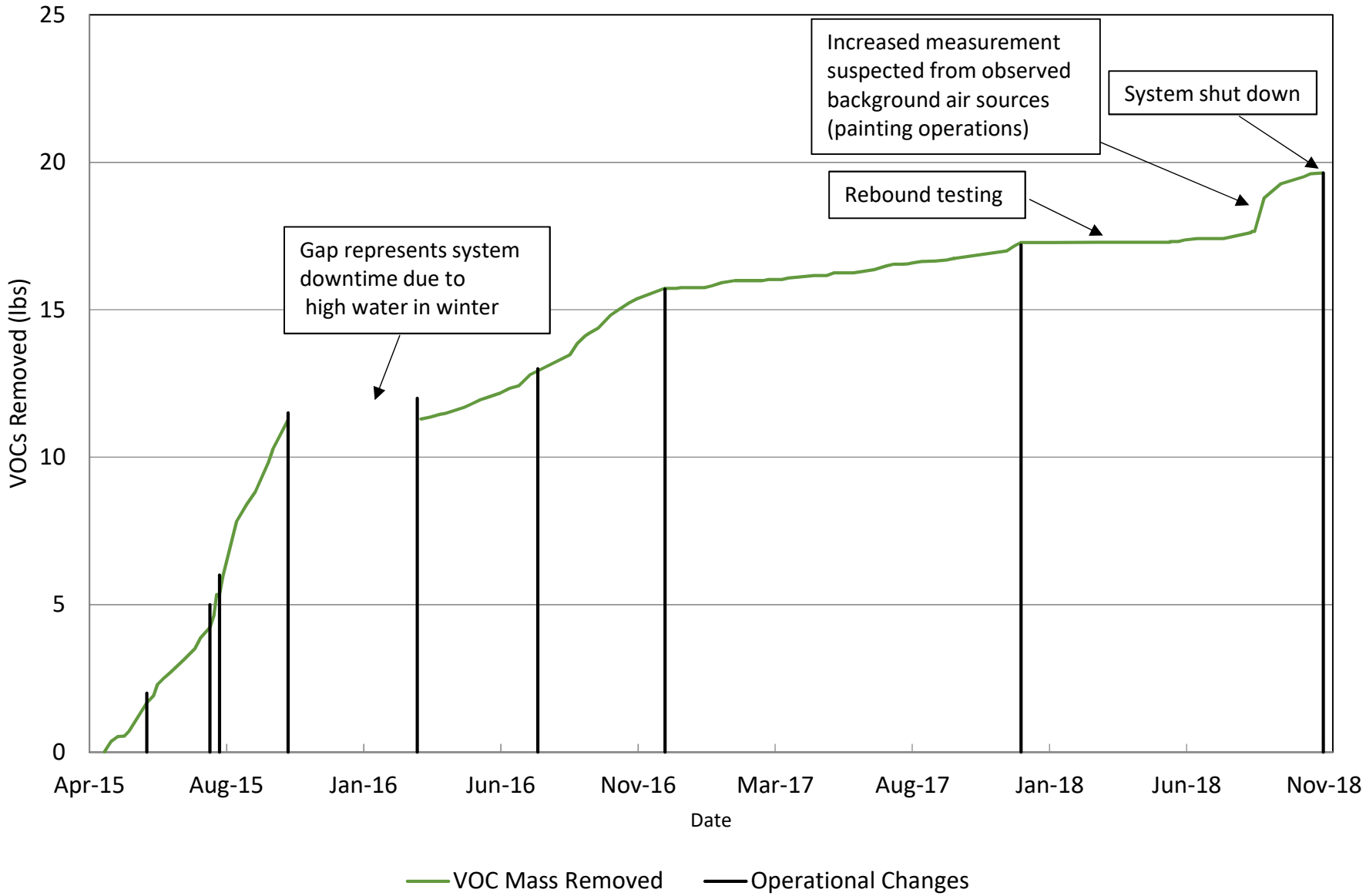
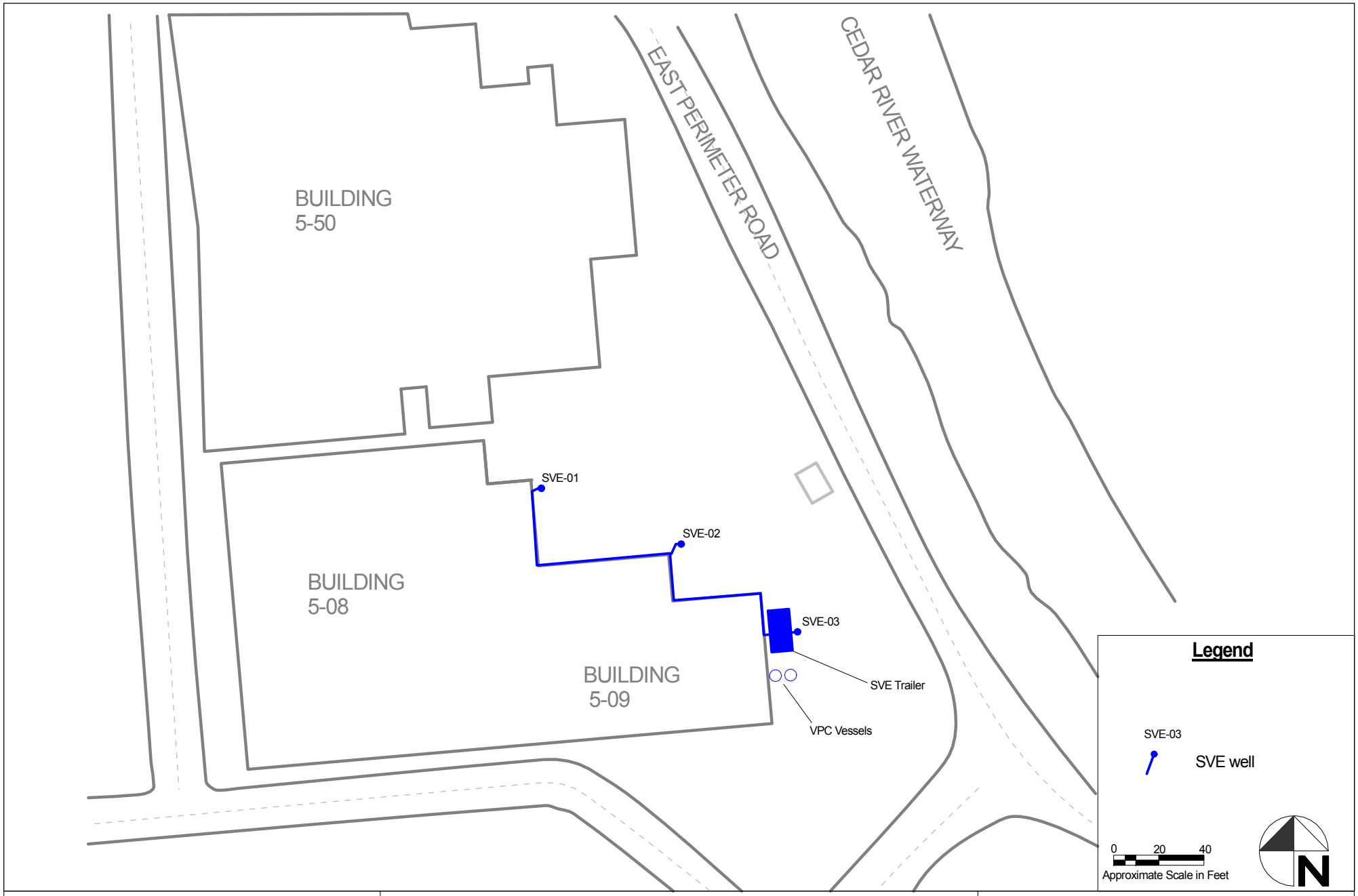
Figure 2-1 Building 4-78/79

SVE System Layout

Figure 2-2 Cumulative VOC Mass Removed - 4-78/79 SVE System





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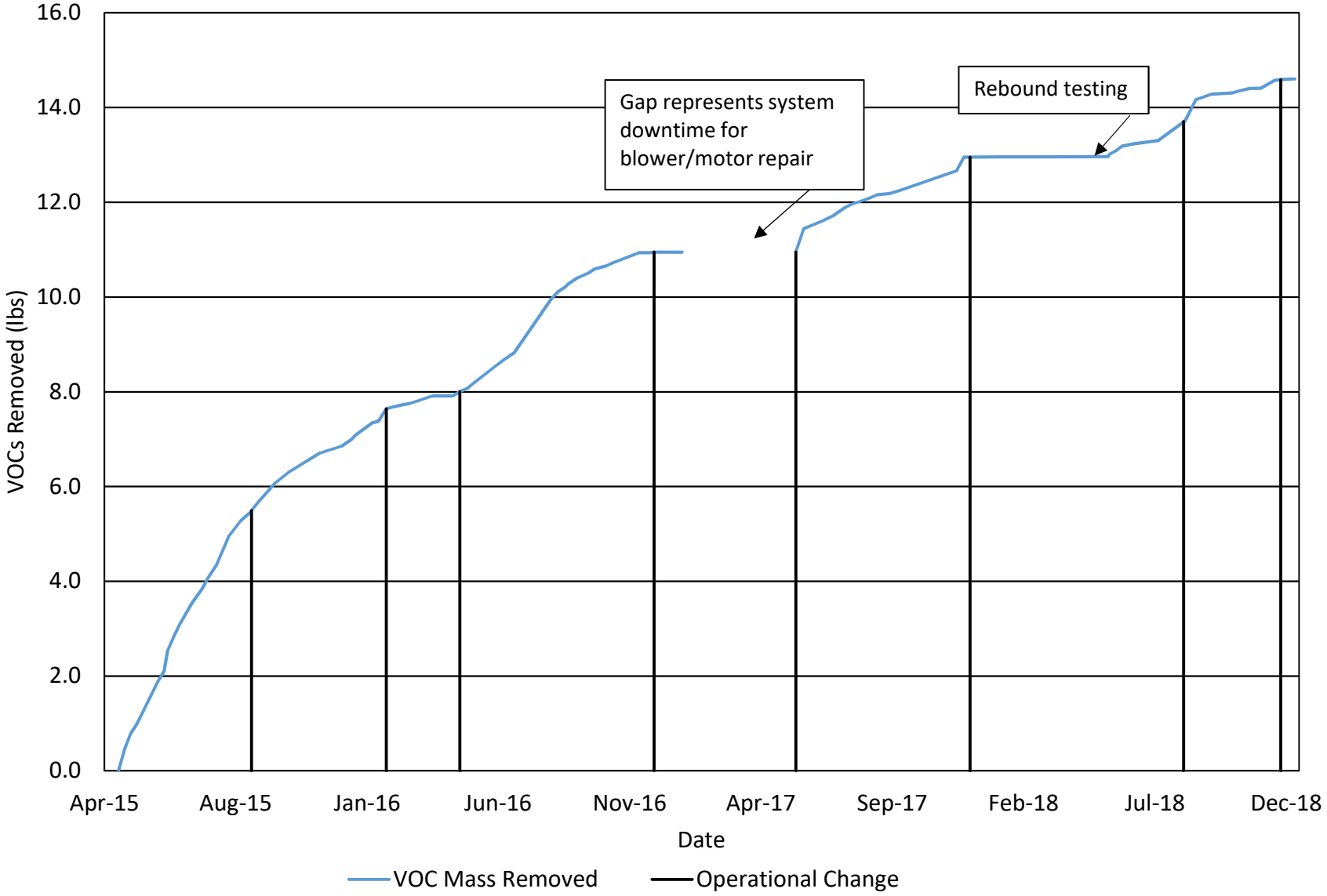
Spring 2017 SVE Quarterly Summary Report

Figure 2-3 SWMU-172/174 Area
SVE System Layout

Figure 2-4 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 – 4-78/79
Field Operations Log Form

Inspection Date: 10/11/18 Date of last inspection: 9/17/18

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: 5296.3
Blower	**Current Value**	**Other Notes**
Vacuum gauge	35" H2O	
Pressure gauge	13" H2O	
System flow rate	105 SCFM	
Blower Temperature	126°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: 10/11/18 0740				PID check after monitoring:				
Sampling Point	**Time**	**PID Reading (1)**	**PID Reading (2)**	**Vacuum**	**Flow Rate (gauge)**	**Differential Pressure**	**Flow Rate Calculated[1]**	**Well Off**
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								
Other:_____								

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]	Well Off
VPC Inlet	0840	311 ppb	303 ppb					
VPC Midpoint								
VPC Outlet	0845	0 PPb	0 ppb					

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 e-mail to Justin Neste @ Justin.Neste@calibresys.com

Signature _____ Printed Name _____ Signature _____ Date

Renton Cleanup Action SVE System – 4-78/79
Field Operations Log Form

Inspection Date: 10/19/18 Date of last inspection: 10/11/18

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: 0755 Motor Hours: 54869

Blower	Current Value	Other Notes
Vacuum gauge	31 "H20	Background PID = 340 ppb
Pressure gauge	14 "H20	
System flow rate	985 CFM	
Blower Temperature	127°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 / 9996 ppb

Calibration time/ date: 10/19/18 0745 PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]	Well Off
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								
Other:_____								

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]	Well Off
VPC Inlet	0755	422 ppb						
VPC Midpoint								
VPC Outlet	0757	0 ppb						

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

10/19/18
Date

Renton Cleanup Action SVE System – 4-78/79
Field Operations Log Form

Inspection Date: 10/31/18 Date of last inspection: 10/19/18

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: 0730		Motor Hours: 5538.5
Blower	**Current Value**	**Other Notes**
Vacuum gauge	33" H_2O	System Down. PLC screen is off w/ no warning or cause listed for systems turning off. Possibly a power outage. Restarted system
Pressure gauge	15" H_2O	
System flow rate	105SCFM	
Blower Temperature	102°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: 0ppb / 10.00 ppm				
Calibration time/ date: 10/31/18 0730				PID check after monitoring:				
Sampling Point	**Time**	**PID Reading (1)**	**PID Reading (2)**	**Vacuum**	**Flow Rate (gauge)**	**Differential Pressure**	**Flow Rate Calculated[1]**	**Well Off**
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								
Other:_____								

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]	Well Off
VPC Inlet	0749	375 ppb	418 ppb					
VPC Midpoint								
VPC Outlet	0745	0 ppb	0 ppb					

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 e-mail to Justin Neste @ Justin.Neste@calibresys.com

Signature

Justin Neste
Printed Name

Signature

10/3/18
Date

Renton Cleanup Action SVE System – SWMU 172/174
Field Operations Log Form

Inspection Date: 10/11/18 Date of last inspection: 9/17/18

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: 0745		Motor Hours: 5881.2
Blower	**Current Value**	**Other Notes**
Vacuum gauge	49 "H2O	
Pressure gauge	14 "H2O	
System flow rate	77 scfm	
Blower Temperature	108 °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: 10/11/18 0740	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							
SVE-02							
SVE-03	VENT						
VPC Inlet	0750	40 ppb	36 ppb				
VPC Midpoint	0752	0 ppb	0 ppb				
VPC Outlet	0755	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) 10/11/18 (Date)

Renton Cleanup Action SVE System – SWMU 172/174
Field Operations Log Form

Inspection Date: 10/19/18 Date of last inspection: 10/11/18

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: 0715		Motor Hours: 6036.6
Blower	**Current Value**	**Other Notes**
Vacuum gauge	55 "H_2O	
Pressure gauge	10 "H_2O	
System flow rate	70 SCFM	
Blower Temperature	117°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 / 9,996 PPB
Calibration time/ date: 10/19/18 0715	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							
SVE-02							
SVE-03							
VPC Inlet	0722	282 ppb	265 ppb				
VPC Midpoint							
VPC Outlet	0730	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) 10/19/18 (Date)

Renton Cleanup Action SVE System – SWMU 172/174
Field Operations Log Form

Inspection Date: 10/31/18 Date of last inspection: 10/19/18

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: 0815		Motor Hours: 6303.4
Blower	**Current Value**	**Other Notes**
Vacuum gauge	51 "H20	
Pressure gauge	11 "H20	
System flow rate	77 scfm	
Blower Temperature	115°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 / 10.00 ppm
Calibration time/ date: 10/31/18 0730	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							
SVE-02	0825	~~222~~ 182 ppb	179 ppb				
SVE-03	Dent						
VPC Inlet	0820	182 ppb	179 ppb				
VPC Midpoint							
VPC Outlet	0817	38 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] (Signature) 10/31/18 (Date)

Renton Cleanup Action SVE System – SWMU 172/174
Field Operations Log Form

Inspection Date: 11/12/18 Date of last inspection: 10/31/18

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: 0900		Motor Hours: 6568.7
Blower	**Current Value**	**Other Notes**
Vacuum gauge	53 "H2O	Changed blower oil
Pressure gauge	11 "H2O	
System flow rate	77 scfm	
Blower Temperature	106°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPBRAE3000	Details: 0 ppb / 9,996 ppb
Calibration time/ date: 11/12/18 0900	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							
SVE-02	0921	91 ppb	66 ppb				
SVE-03	Vent						
VPC Inlet	0918	12 ppb	0 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) 11/12/18 (Date)

Renton Cleanup Action SVE System – SWMU 172/174
Field Operations Log Form

Inspection Date: 11/28/18 Date of last inspection: 11/12/18

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: 0900		Motor Hours: 6910.6
Blower	**Current Value**	**Other Notes**
Vacuum gauge	56 "H20	
Pressure gauge	12 "H20	
System flow rate	77 SCFM	
Blower Temperature	117°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: 11/28/18 0900	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	0945	126 ppb	128 ppb				
SVE-02	0940	419 ppb	382 ppb				
SVE-03	Vent						
VPC Inlet	0935	462 ppb	455 ppb				
VPC Midpoint							
VPC Outlet	0930	33 ppb	37 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) 11/28/18 (Date)

Renton Cleanup Action SVE System – SWMU 172/174
Field Operations Log Form

Inspection Date: 12/5/18 Date of last inspection: 11/28/18

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: 0855		Motor Hours: 7059.9
Blower	**Current Value**	**Other Notes**
Vacuum gauge	55" H_2O	closed SVE1 valve & opened as vent opened SVE3 valve & closed vent Vac = 35" H_2O Pres = 18" H_2O Flow = 90 scfm Temp = 91°F 1005 IN = 174 ppb 1010 SVE3 = ~~174~~ 175 ppb/174 1015 SVE2 = 153 ppb/149 1130 IN = 244/252 ppb 1137 SVE2 = 316 ppb 1140 SVE3 = 187 ppb
Pressure gauge	12" H_2O	
System flow rate	77 scfm	
Blower Temperature	100°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: 12/5/18 0855		PID check after monitoring:	

Sampling Point	Time	PID Reading (1)	PID Reading (2) 0920	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01	0915	0 ppb	0 ppb	close/vent			
SVE-02	0912	135 ppb	142 ppb	10" H_2O	730 scfm	10" H_2O	39 scfm
SVE-03	Vent			open 7" H_2O	>730 scfm	17" H_2O	50 scfm
VPC Inlet	0907	~~74~~ 74 ppb	~~75~~ 75 ppb				
VPC Midpoint		~~74~~ ppb	~~75~~				
VPC Outlet	0903	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) 12/5/18 (Date)

Renton Cleanup Action SVE System – SWMU 172/174
Field Operations Log Form

Inspection Date: 12/14/18 Date of last inspection: 12/5/18

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: 1030		Motor Hours: 7,270.4
Blower	**Current Value**	**Other Notes**
Vacuum gauge	35 "H2O	
Pressure gauge	18 "H2O	
System flow rate	90 SCFM	
Blower Temperature	100 °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: 1030 12/14	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		128 ppb	132 ppb				
VPC Inlet		41 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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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) 12/14/18 (Date)

Renton Cleanup Action SVE System – SWMU 172/174
Field Operations Log Form

Inspection Date: 12/21/18 Date of last inspection: 12/14/18

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: 1240		Motor Hours: 7,432.7
Blower	**Current Value**	**Other Notes**
Vacuum gauge	37" H2O	
Pressure gauge	20" H2O	
System flow rate	90 SCFM	
Blower Temperature	98 °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		Vent					
SVE-02		0 ppb	0 ppb				
SVE-03		89 ppb	93 ppb				
VPC Inlet		18 ppb	23 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