Quarterly report, first quarter 2019

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

Prepared for:

The Boeing Company
Seattle, Washington

Revised June 19, 2019

Quarterly report, first quarter 2019

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

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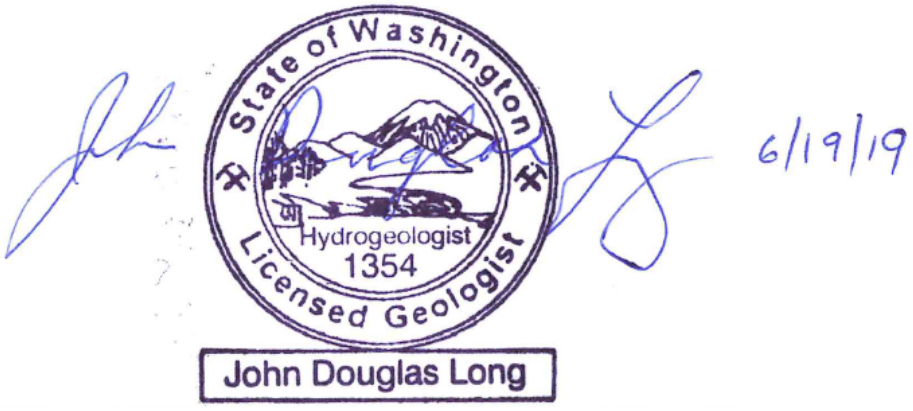

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1.0 Introduction

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 first quarter 2019. 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 Addendum to the Compliance Monitoring Plan (Wood, 2019) which contains changes to the revised Compliance Monitoring Plan (Amec Foster Wheeler, 2016a) that superseded the original plan presented in Appendix D of the EDR (AMEC, 2014).

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

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

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

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

protection of groundwater for drinking water beneficial uses by comparing concentrations to the Model Toxics Control Act (MTCA) or United States Environmental Protection Agency (USEPA) Maximum Contaminant Level (MCL) as well as to site specific cleanup levels (CULs) which are based on protection of surface water beneficial uses.

This quarterly report:

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

This report presents this information for the first quarter of 2019—the period from January through March 2019.

1.1 Quarterly progress reporting

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

1.1.1 Work completed in the first quarter 2019

The following work was completed during the first quarter of 2019, the period from January through March 2019:

- On behalf of Boeing, Wood submitted the fourth quarter 2018 report to Ecology on February 19, 2019.
- Groundwater monitoring for the first quarter of 2019 was completed during March 2019.
- A sixth 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 March 2019. Groundwater samples were collected from these injection wells and from monitoring wells GW244S and GW031S in February 2019.
- Sugar substrate injections were performed in March 2019 at Building 4-78/79 injection wells B78-12, B78-14, B78-15 and B78-16 for continued biostimulation of chlorinated solvents.
- An addendum to the Compliance Monitoring Plan was submitted in April 2019, requesting permission to remove AOC-034 and AOC-035 from the compliance monitoring program. Ecology approved the addendum on April 30, 2019; thus, AOC-034 and AOC-035 are not included in this report.

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 second quarter of 2019:

- Reporting will be completed in accordance with the Order, CAP, EDR, Addendum to the Compliance Monitoring Plan (Wood, 2019), and any changes approved by Ecology.
- Groundwater sampling and analysis for the second quarter of 2019 will be completed.
- Soil investigation work will be conducted at Building 4-78/79.

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

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

3.0 Corrective action activities completed during quarter

This section describes the corrective action activities conducted at the Facility during the first quarter of 2019. Operation of the SVE system at SWMU-172/174 continued during the first quarter, as discussed in Sections 3.2.1.2 and 3.3.1.2. Quarterly compliance monitoring was conducted in accordance with the Addendum to the Compliance Monitoring Plan (Wood, 2019).

3.1 SWMU-168

This section describes corrective action activities conducted at this SWMU. Figure 1 shows the location of the groundwater monitoring wells at SWMU-168, as well as the groundwater elevations measured during this monitoring event. The cleanup remedy for SWMU-168 is MNA; therefore, cleanup activities consist of monitoring only.

3.1.1 Cleanup action activities

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

3.1.2 Compliance monitoring plan deviations

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

3.1.3 Water levels

Groundwater elevations measured during the first quarter 2019 groundwater monitoring event at SWMU 168 are summarized in Table 1 and shown on Figure 1. Groundwater elevation contours are not shown due to the limited number of shallow groundwater monitoring wells.

3.1.4 Groundwater monitoring results

Results for primary geochemical indicators are presented in Table 2; results for the SWMU-168 COCs are presented in Table 3. Groundwater in this area is monitored following the schedule presented in Tables A-1 and A-2 in Appendix A, which includes semiannual monitoring at the CPOC for both the area COCs and the primary geochemical indicators listed in Table A-2.

3.1.4.1 Natural attenuation/geochemical indicators

The geochemical indicator results are presented in Table 2. Data from the CPOC wells indicate that conditions are conducive to natural attenuation of vinyl chloride (VC) in this SWMU. The results for dissolved oxygen (DO) and oxidation reduction potential (ORP) measurements indicate reducing conditions. The pH values measured in all wells were near neutral.

3.1.4.2 COC results for source area

Groundwater samples were not collected from the source area well for SWMU-168, following the sampling schedule presented in Tables A-1 and A-2.

3.1.4.3 COC results for conditional point of compliance area

Monitoring results for the CPOC area monitoring wells are shown in Table 3. VC was detected below the CUL in the groundwater collected from all CPOC wells at concentrations ranging from 0.0211 micrograms per liter (µg/L) in the groundwater from CPOC well GW229S to 0.0566 µg/L in the groundwater from CPOC well GW231S. VC concentrations are below the applicable MCLs/MTCA criteria for potable water supply and the CULs established in the CAP.

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 SVE, bioremediation, and MA. Figure 2 shows the layout of the groundwater monitoring and 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 first quarter.

3.2.1.2 Soil vapor extraction and bioremediation operations

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

3.2.3 Water levels

Groundwater elevations for the SWMU-172 and SWMU-174 area measured during the first quarter 2019 are summarized in Table 4 and shown on Figure 2. The contoured data for March 2019 show that groundwater is generally flowing 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 at 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 5; results for the SWMU-172 and SWMU-174 area COCs are presented in Table 6

3.2.4.1 Monitored attenuation/geochemical indicators

The geochemical indicator results are presented in Table 5. Total organic carbon (TOC) concentrations ranged from 0.56 milligrams per liter (mg/L) to 9.09 mg/L for all SWMU-172 and SWMU-174 monitoring 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 DO and ORP indicate reducing conditions were present.

3.2.4.2 COC results for source and downgradient plume areas

Table 6 lists first quarter 2019 analytical results for the SWMU-172 and SWMU-174 COCs. Figure 3 shows historical trend plots for tetrachloroethene (PCE), trichloroethene (TCE), VC, and *cis*-1,2-dichloroethene (*cis*-1,2-DCE) in source area wells GW152S and GW153S. Historical trend plots for PCE, TCE, VC, and *cis*-1,2-DCE in downgradient plume area wells GW172S and GW173S are shown in Figure 4. 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 6, *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 Figure 3, the concentrations of COCs in groundwater from source area wells generally decreased during the first quarter of 2019. As shown in Figure 4, COC concentrations also decreased in the groundwater from downgradient plume area wells GW172S and GW173S during the first quarter, except for VC in the groundwater from well GW172S. The concentrations of COCs in the groundwater from the source area and downgradient plume area are within the range of concentrations observed over the last two years.

Arsenic was detected above the CUL in all source area and downgradient plume area wells. As shown in Figure 5, the arsenic concentrations in the groundwater from both source area and downgradient wells decreased during the first quarter sampling event, except for in downgradient plume well GW173S, which increased very slightly. Copper was detected above the CUL in the groundwater from source area well GW152S and downgradient plume wells GW173S and GW226S. Copper was below the CUL in the groundwater from all other source and downgradient plume wells. Lead was detected above the CUL in the groundwater from source area well GW152S, but was not detected at concentrations above the CUL in the groundwater from the remaining source area well or any of the downgradient plume area wells.

While concentrations of select COCs in groundwater from source area and downgradient plume area wells exceed the CULs, COC concentrations are below the applicable MCLs/MTCA criteria for potable water supply, except for VC in source area well GW153S.

3.2.4.3 COC results for conditional point of compliance area

Results from the CPOC area wells are presented in Table 6 and trend charts for *cis*-1,2-DCE, TCE, and VC for all CPOC area wells are presented in Figure 6. As shown in Table 6, *cis*-1,2-DCE was detected at concentrations above the CUL, ranging from 0.0443 to 0.250 µg/L, in the groundwater collected from all CPOC area wells; TCE was detected above the CUL in the groundwater from CPOC well GW235I; and VC was detected above the CUL in the groundwater from CPOC well GW232S. PCE was not detected in the groundwater collected from the CPOC wells and is not shown on Figure 6. As shown on Figure 6, concentrations of *cis*-1,2-DCE have exceeded the CUL in the CPOC wells since compliance monitoring began, but are generally stable and are of low concern due to the low toxicity of *cis*-1,2-DCE and associated lack of surface water quality standard for this constituent. The concentrations of TCE and VC in the CPOC wells also generally appear to be stable.

Arsenic was detected above the CUL in the groundwater samples from CPOC area wells GW232S, GW234S, and GW236S. Lead was detected above the CUL in the groundwater sample from CPOC well GW236S; copper was not detected above the CUL in the groundwater from the CPOC wells (Table 6). Figure 7 shows arsenic, copper, and lead trends since the beginning of compliance monitoring in groundwater samples from the CPOC wells. As shown in Figure 7, though arsenic, copper and lead concentrations appear to vary over time, there are no increasing trends in the groundwater collected from CPOC wells.

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

3.3 Building 4-78/79 SWMU/AOC group

This section describes corrective action activities conducted at the Building 4-78/79 SWMU/AOC Group during the first quarter of 2019. The cleanup remedy for this SMWU/AOC group is bioremediation, SVE, MNA, and MA. Figure 8 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 this cleanup action area during the first quarter. Substrate injections were performed on March 14, 2019, in injection wells B78-12, B78-14, B78-15, and B78-16.

3.3.1.2 Soil vapor extraction and bioremediation operations

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

A fifth round of nitrate/sulfate injections was performed in December 2018 and groundwater samples were collected in February 2019. An additional round (the sixth round) of nitrate/sulfate injections was performed in March 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 9. As shown in Figure 9, benzene concentrations in groundwater collected from injection wells in February 2019 ranged from below the reporting limit of 0.20 µg/L to 16.50 µg/L. The benzene concentration in source area well GW031S in March 2019 was 55.9 µg/L. Trend charts for TCE and VC in the injection wells are presented in Figure 10.

The reagent concentrations for the December 2018 and March 2019 treatment injection events to provide additional nitrate and sulfate to the affected area due to the rapid reaction time observed during previous injection events were 800 mg/L for nitrate and 400 mg/L for sulfate. Injections were performed at B78-11, B78-13, B78-17, B78-18, B78-19, B78-20, and B78-21. 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 first quarter.

3.3.3 Water levels

Groundwater elevations measured during the first quarter 2019 groundwater monitoring event at the Building 4-78/79 SWMU/AOC group are summarized in Table 7 and shown on Figure 8. The approximate direction of groundwater flow from the source area is generally to the west, with a hydraulic gradient of 0.001.

3.3.4 Groundwater monitoring results

Results for primary geochemical indicators are presented in Table 8; results for the COCs for Building 4-78/79 SWMU/AOC Group are presented in Table 9. Groundwater at this area is monitored following the schedule presented in Tables A-1 and A-2 in Appendix A.

3.3.4.1 Natural attenuation/geochemical indicators

The geochemical indicator results are presented in Table 8. 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 near 6 standard units during the first quarter monitoring period. Results for the other primary geochemical indicators were fairly consistent throughout this area.

3.3.4.2 COC results for source and downgradient plume areas

Table 9 lists first quarter 2019 analytical results for the Building 4-78/79 SWMU/AOC Group COCs. The CULs established in the CAP are also presented on Table 9. Figures 11 and 12 are trend charts showing historical trends for COCs for in source and downgradient plume area 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 9, benzene was detected in groundwater samples from three source area wells at concentrations above the CUL. Benzene was below detection in the remaining source area wells. *Cis*-1,2-DCE and VC were detected at concentrations above their respective CULs in the groundwater from source area wells GW033S and GW244S. TCE was below detection in the groundwater from all source area wells. TPH-G was detected in the groundwater from source area well GW031S, at a concentration of 4,200 µg/L (the field duplicate concentration was 4,220 µg/L). TPH-G was also detected in the groundwater from source area well GW033S at a concentration below the CUL. No COCs were detected in the groundwater collected from the downgradient plume area wells.

Figure 11 shows trends for selected COCs for source area wells GW031S and GW033S and Figure 12 shows trends for selected COCs for source area well GW034S and downgradient plume area well GW209S. COC concentrations in the groundwater collected from GW031S are generally consistent with historical results and trends. The concentration of benzene in the groundwater collected from source area well GW033S is generally consistent with historical results. The concentrations of *cis*-1,2-DCE, TCE, and VC in both source area wells have decreased since mid-2018. COC concentrations in groundwater samples collected from source area well GW034S (Figure 12) are stable. Nitrate and sulfate injections described in Appendix D are continuing to be performed to address elevated benzene present between GW210S and GW031S.

Figure 12 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 all COCs are stable in the groundwater collected from GW209S, with concentrations either not detected or detected at concentrations just above the reporting limit of 0.2 µg/L.

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

3.3.4.3 COC results for conditional point of compliance area

Groundwater monitoring results from the first quarter for the CPOC area are summarized in Table 9. Trends for CPOC wells GW143S, GW237S and GW240D are shown in Figures 13 through 15. Benzene was only detected in the groundwater sample collected from CPOC well GW237S. As shown in Figure 13, benzene has been sporadically detected in the groundwater from CPOC well GW237S but has not been detected in the groundwater samples from any other CPOC wells at concentrations above the CUL. VC was detected in the groundwater from CPOC wells GW237S and GW240D at concentrations above the

CUL. As shown in Figure 13, the concentrations of VC in the groundwater from these CPOC wells is within the range of concentrations detected since monitoring began. *Cis*-1,2-DCE and TCE were not detected in the groundwater collected from CPOC wells and concentrations above their respective CULs. As shown in Figures 13 and 14, the groundwater collected from CPOC well GW143S has sporadically had concentrations of both *cis*-1,2-DCE and TCE above the CUL. The only other COC detected in the groundwater samples from the CPOC area during the first quarter was TPH-G at a concentration of 1,680 µg/L in the sample from CPOC well GW237S. As shown in Figure 15, TPH-G concentrations in the groundwater from CPOC GW237S appear to fluctuate seasonally.

While benzene and VC exceed the CUL in the groundwater from select CPOC wells, as detailed above, the concentrations of benzene and VC are below the applicable MCLs/MTCA criteria for potable water supply, with the exception of GW237S which exceeds the benzene MCL of 5 ug/L.

3.4 Former fuel farm AOC group

The final remedy for the Former Fuel Farm is MNA. The Former Fuel Farm AOC group is monitored semiannually in May and November; therefore, no monitoring was conducted for this area during the first quarter of 2019.

3.5 AOC-001 and AOC-002

This section describes corrective action activities conducted at these AOCs during first quarter of 2019. The cleanup remedy for this corrective action area is bioremediation and MA. Bioremediation commenced for this area in late 2004, following source area excavation. Figure 16 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 first quarter.

3.5.2 Compliance monitoring plan deviations

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

3.5.3 Water levels

Table 10 presents the groundwater elevations measured during the first quarter 2019 monitoring event at AOC-001 and AOC-002. Figure 16 shows the groundwater elevations from this event. The average elevation of Lake Washington was not available from the U.S. Army Corps of Engineers Northwestern Division website. First quarter 2019 data indicate that groundwater in the vicinity of these AOCs was flowing west-northwest, toward Lake Washington, with an approximate horizontal hydraulic gradient of 0.001.

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.

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

The analytical results for the AOC-001 and -002 COCs are summarized in Table 12. Concentrations of 1,1-dichloroethene and benzene were below CULs in all AOC-001/002 source area and downgradient plume wells in the first quarter. *Cis*-1,2-DCE and VC were detected at concentrations above the CUL in the groundwater collected from all source and downgradient wells. TCE was detected at concentrations above the CUL in the groundwater collected from downgradient plume wells GW190S and GW192S. Trend plots for TCE, VC, and *cis*-1,2-DCE in source area well GW193S, and *cis*-1,2-DCE and VC in downgradient plume well GW190S are shown in Figure 17. The concentrations of the COCs in the groundwater from source area well are generally decreasing, while the concentrations of the COCs in the groundwater from downgradient plume wells remains stable (Figures 17 and 18).

While select COCs exceed the CULs in the groundwater from the source and downgradient plume wells, COC concentrations are below the applicable MCLs/MTCA criteria for potable water supply in the groundwater from the source area well and exceed these criteria in the groundwater from downgradient plume wells GW190S, GW192S and GW246S.

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 samples collected from CPOC wells were either below detection or below the CUL. Concentrations of *cis*-1,2-DCE ranged from 0.0277 µg/L to 0.194 µg/L, above the CUL of 0.02 µg/L, in the groundwater samples from all CPOC area wells except for GW194S. VC was detected above the CUL of 0.05 µg/L in groundwater samples from CPOC wells GW185S, GW195S, and GW197S. As shown in Figure 19, concentrations of *cis*-1,2-DCE and VC in the CPOC area monitoring wells have been generally stable since compliance monitoring began, aside from the increase in concentrations of *cis*-1,2-DCE and VC observed in the groundwater samples collected from GW185S in the second and third quarters of 2016. COPC area wells GW194S and GW245S are not shown on Figure 19 because COCs are generally not detected in the groundwater samples from these wells. Similarly, the remaining COCs are generally below the CUL in the CPOC area monitoring wells and are not included on Figure 19.

COC concentrations in the groundwater from CPOC wells are below the applicable MCLs/MTCA criteria for potable water supply.

3.6 AOC-003

This section describes corrective action activities conducted at AOC-003 for the first quarter of 2019. The cleanup remedy for this AOC is bioremediation and MA. Figure 20 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 first quarter.

3.6.2 Compliance monitoring plan deviations

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

3.6.3 Water levels

Table 13 presents the groundwater elevations measured during the first quarter 2019 monitoring event at AOC-003. Figure 20 shows the groundwater elevations from this event. Groundwater elevation contours are not shown due to the limited number of shallow groundwater monitoring wells. The first quarter 2019 groundwater elevation data were anomalous with higher measured water levels in the downgradient CPOC wells, which is the opposite of what is usually observed at this AOC. Historic groundwater levels suggest that groundwater generally flows north-northwest toward Lake Washington.

3.6.4 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 primary geochemical indicators are presented in Table 14; results for the AOC-003 COCs are presented in Table 15.

3.6.4.1 Monitored attenuation/geochemical indicators

The geochemical indicator results are presented in Table 14. Results in Table 14 indicate that geochemical conditions are generally consistent throughout this AOC. 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

Table 15 lists first quarter 2019 analytical results for the AOC-003 COCs. Trend plots have not been prepared for the AOC-003 source area well, since groundwater analyses for source area well GW249S have been generally below reporting limits. During the first quarter sampling event, VC was detected above the CUL in the groundwater samples from the source area well, GW249S, and the downgradient plume area well, GW188S. Concentrations of all other COCs were below the CUL.

COC concentrations in the groundwater from source and downgradient plume area wells are below the applicable MTCA/MCL criteria for potable water, except for the concentrations of VC in both source and downgradient plume wells.

3.6.4.3 COC results for conditional point of compliance area

Groundwater collected from the two CPOC monitoring 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 samples collected from both CPOC wells, as shown in Table 15.

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

3.7 AOC-004

This section describes corrective action activities conducted at AOC-004. The cleanup remedy for this AOC is bioremediation and MA. Figure 21 shows the layout of the groundwater monitoring and bioremediation injection wells for this AOC.

3.7.1 Cleanup action activities

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

3.7.2 Compliance monitoring plan deviations

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

3.7.3 Water levels

Table 16 presents the groundwater elevations measured during the first quarter 2019 monitoring event at AOC-004. Figure 21 shows the groundwater elevations. Because there are only two groundwater elevation monitoring locations for AOC-004, groundwater contours are not shown on Figure 21.

3.7.4 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 primary geochemical indicators are presented in Table 17; results for COCs are presented in Table 18.

3.7.4.1 Monitored attenuation/geochemical indicators

The geochemical indicator results are presented in Table 17. The primary geochemical indicators were generally uniform across the AOC. Geochemical indicators will continue to be monitored to assess attenuation of AOC 004 COCs.

3.7.4.2 COC results for the source area

Table 18 lists first quarter 2019 analytical results for lead, the sole AOC-004 COC. Lead was detected at a concentration of 0.00154 mg/L, above the CUL of 0.001 mg/L , in the groundwater sample from the source area well. Trend plots have not been created for the AOC-004 source area well, since COCs have not been detected consistently at concentrations above the CUL since monitoring began in 2015. The lead concentration is also below the applicable MCLs/MTCA criteria for potable water supply in the source area well.

3.7.4.3 COC results for the conditional point of compliance area

As shown in Table 18, lead was detected below the CUL at a concentration of 0.000815 mg/L in the groundwater from CPOC well GW174S. Lead concentrations are also below the applicable MCLs/MTCA criteria for potable water supply.

3.8 AOC-060

This section describes corrective action activities conducted at AOC-060 during the first quarter of 2019. The cleanup remedy for this AOC is bioremediation and MA. Figure 22 shows the locations of the groundwater monitoring and bioremediation injection wells at AOC-060, as well as the groundwater elevations measured during the first quarter sampling event.

3.8.1 Cleanup action activities

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

3.8.2 Compliance monitoring plan deviations

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

3.8.3 Water levels

Table 19 presents the groundwater elevations measured during the first quarter 2019 groundwater monitoring event at AOC-060. Figure 22 shows the groundwater elevations measured during this event. The groundwater flow direction is west toward the Cedar River, and the hydraulic gradient was 0.001.

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 primary geochemical indicators are presented in Table 20; results for COCs are presented in Table 21.

3.8.4.1 Monitored attenuation/geochemical indicators

The geochemical indicator results are presented in Table 20. The primary geochemical indicators show general uniform conditions in source and downgradient plume areas, except for the higher TOC concentrations detected in the groundwater from downgradient plume area wells GW012S and GW147S, reflecting the recent substrate injections. These data indicate that conditions are generally conducive to biodegradation of the COCs for this AOC.

3.8.4.2 COC results for source and downgradient plume areas

Table 21 presents first quarter 2019 analytical results for the AOC-060 groundwater COCs. Figures 23 and 24 present trend plots for the COCs in selected source area and downgradient plume area wells. Trend charts are not shown for groundwater monitoring wells for which COCs are not commonly detected.

As shown in Table 21 and Figures 23 and 24, concentrations of all COCs exceeded the CUL in the groundwater collected from source area well GW009S as well as all of the downgradient plume area wells, except for VC, which was detected at concentrations below the CUL in the groundwater from downgradient plume wells GW014S and GW147S. The concentrations of COCs in the groundwater from source area well GW009S and downgradient plume wells GW012S and GW014S are generally stable (Figures 23 and 24), while the concentrations of COCs in the groundwater from downgradient plume well GW147S appear to vary seasonally (Figure 24).

While select COCs exceed the CULs in source and downgradient plume area wells, as described above, with the exception of VC in the groundwater from GW012S, concentrations of COCs in the groundwater in the source area and downgradient plume area are below the applicable MCL/MTCA criteria for potable water supply.

3.8.4.3 COC results for the conditional point of compliance area

As shown in Table 21, *cis*-1,2-DCE was detected at a concentration above the CUL in the groundwater collected from CPOC wells GW253I and GW254S, and at concentrations below the CUL in the groundwater CPOC wells GW149S and GW150S. TCE was detected in the groundwater from CPOC well GW253I at a concentration above the CUL; TCE concentrations in the remaining CPOC wells were below the CUL. VC was detected in the groundwater from all of the CPOC wells except GW252S, but the concentrations were below the CUL. Figures 25 and 26 present trends for the COCs in the CPOC wells. As shown in Figures 25 and 26, the COC concentrations in the groundwater from the CPOC wells are generally stable, with *cis*-1,2-DCE and TCE the most consistently detected at concentrations above the CUL. VC has not been detected in the groundwater from the CPOC at concentrations above the CUL since February 2016.

While *cis*-1,2-DCE and TCE concentrations exceed the CUL in the groundwater from select CPOC wells, as detailed above, COC concentrations are below the applicable MCLs/MTCA criteria for potable water supply in all CPOC wells.

3.9 AOC-090

This section describes corrective action activities conducted at AOC-090 during the first quarter of 2019. The cleanup remedy for this AOC is bioremediation and MA. Figure 27 shows the locations of the groundwater monitoring wells and the bioremediation injection system at AOC-090, as well as the groundwater elevations measured during the first quarter.

3.9.1 Cleanup action activities

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

3.9.2 Compliance monitoring plan deviations

The laboratory inadvertently performed a silica gel cleanup during the TPH as diesel (TPH-D) analysis for the samples collected during the first quarter. During the second quarter, samples analyzed for TPH-D will be analyzed with and without the silica gel cleanup procedure to compare results for this area of degraded hydrocarbons.

3.9.3 Water levels

Table 22 presents the groundwater elevations measured during the first quarter 2019 groundwater monitoring event at AOC-090. Figure 27 shows the groundwater elevations measured during this event. Based on these measurements, groundwater flow directions in the vicinity of AOC-090 could not be accurately determined. The cause of variations in water levels is not known.

3.9.4 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 primary geochemical indicators are presented in Table 23; results for COCs are presented in Table 24.

3.9.4.1 Monitored attenuation/geochemical indicators

The geochemical indicator results are presented in Table 23. The pH was near neutral in all CPOC wells except for GW189S, which was slightly below neutral at 5.15 SU. The other geochemical indicators show that conditions are generally uniform in AOC-090 groundwater and in general, primary geochemical indicators show that conditions support biological degradation of chlorinated VOCs.

3.9.4.2 COC Results for source and downgradient plume areas

Table 24 presents first quarter 2019 analytical results for the AOC-090 groundwater COCs. As shown in Table 24, only TCE, VC, TPH-G, and TPH-D were detected at concentrations above their respective CULs in the groundwater sample collected from GW189S. VC was also detected in the groundwater collected from downgradient plume area well GW176S at a concentration of 0.294 µg/L, above the CUL. No other COCs were detected at concentrations above the CUL in the groundwater samples collected from downgradient plume area wells.

Figure 28 presents trends for selected COCs in source area well GW189S. As shown in Figure 28; concentrations of *cis*-1,2-DCE, TCE, and VC decreased during the first quarter sampling event. COC

concentrations in the groundwater sample from this source area well have been declining over the past several years and concentrations during the first quarter are within the ranges observed historically.

While select COCs exceed the CULs in groundwater from source and downgradient area wells, concentrations of COCs are below the applicable MCLs/MTCA criteria for potable water supply, with the exception of VC.

3.9.4.3 COC Results for conditional point of compliance area

VC was detected at concentrations above the CUL in the shallow zone CPOC wells GW178S and GW208S, and the intermediate zone CPOC well GW179I. No other COCs in were detected above the CULs in groundwater from either the shallow or intermediate zone CPOC wells. This is the tenth consecutive sampling event that neither 1,1,2-trichloroethane, acetone, benzene, carbon tetrachloride, chloroform, *cis*-1,2-DCE, methylene chloride, toluene, trans-1,2-dichloroethene, nor any of the TPH fractions were detected above CULs in any of the CPOC area wells.

As described above, VC concentrations exceed the CUL in the groundwater from select CPOC wells. Select concentrations also exceed the applicable MCLs/MTCA criteria for potable water supply. The concentrations of remaining COCs in the groundwater from CPOC wells are below applicable MCLs/MTCA criteria for potable water supply.

3.10 Building 4-70 area

This section describes corrective action activities conducted at this area during first quarter 2019. The cleanup remedy for the Building 4-70 Area is bioremediation and MA. Figure 29 shows the locations of the groundwater monitoring and bioremediation injection wells for this area.

3.10.1 Cleanup action activities

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

3.10.2 Compliance monitoring plan deviations

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

3.10.3 Water levels

Table 25 presents the groundwater elevations measured during the first quarter 2019 monitoring event at Building 4-70. Figure 29 shows the groundwater elevations in the two monitoring wells for this area. These groundwater elevation data (only two wells) do not support development of elevation contours. However, the flow direction is expected to be similar to the flow observed at the Building 4 78/79 Area, which is generally to the west, toward the Cedar River Waterway.

3.10.4 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 26; results for the Building 70 Area COCs are presented in Table 27.

3.10.4.1 Monitored attenuation/geochemical indicators

The geochemical indicator results are presented in Table 26. The primary geochemical indicators show that reducing conditions were present and that conditions were conducive to biological degradation of

the chlorinated VOCs. Geochemical indicators will continue to be monitored following the schedule presented in Table A-2 in Appendix A.

3.10.4.2 COC Results for conditional point of compliance area

Both of the groundwater monitoring wells for the Building 4-70 Area are located along the CPOC (Figure 29). Groundwater monitoring results for the CPOC area wells are shown in Table 27. VC was detected in the groundwater from monitoring well GW260S at a concentration of 0.21 µg/L, just above the CUL of 0.2 µg/L. No other COCs were detected in the groundwater at concentrations above the CUL. Concentrations of all COCs were also below the applicable MCLs/MTCA criteria for potable water supply in all wells.

3.11 Lot 20/former building 10-71 parcel

The Lot 20/Former Building 10-71 Parcel is monitored semiannually in May and November; therefore, no monitoring was conducted for this area during the first quarter of 2019.

3.12 Apron A area

The Apron A Area is monitored semiannually in May and November; therefore, no monitoring was conducted for this area during the first quarter of 2019.

4.0 References

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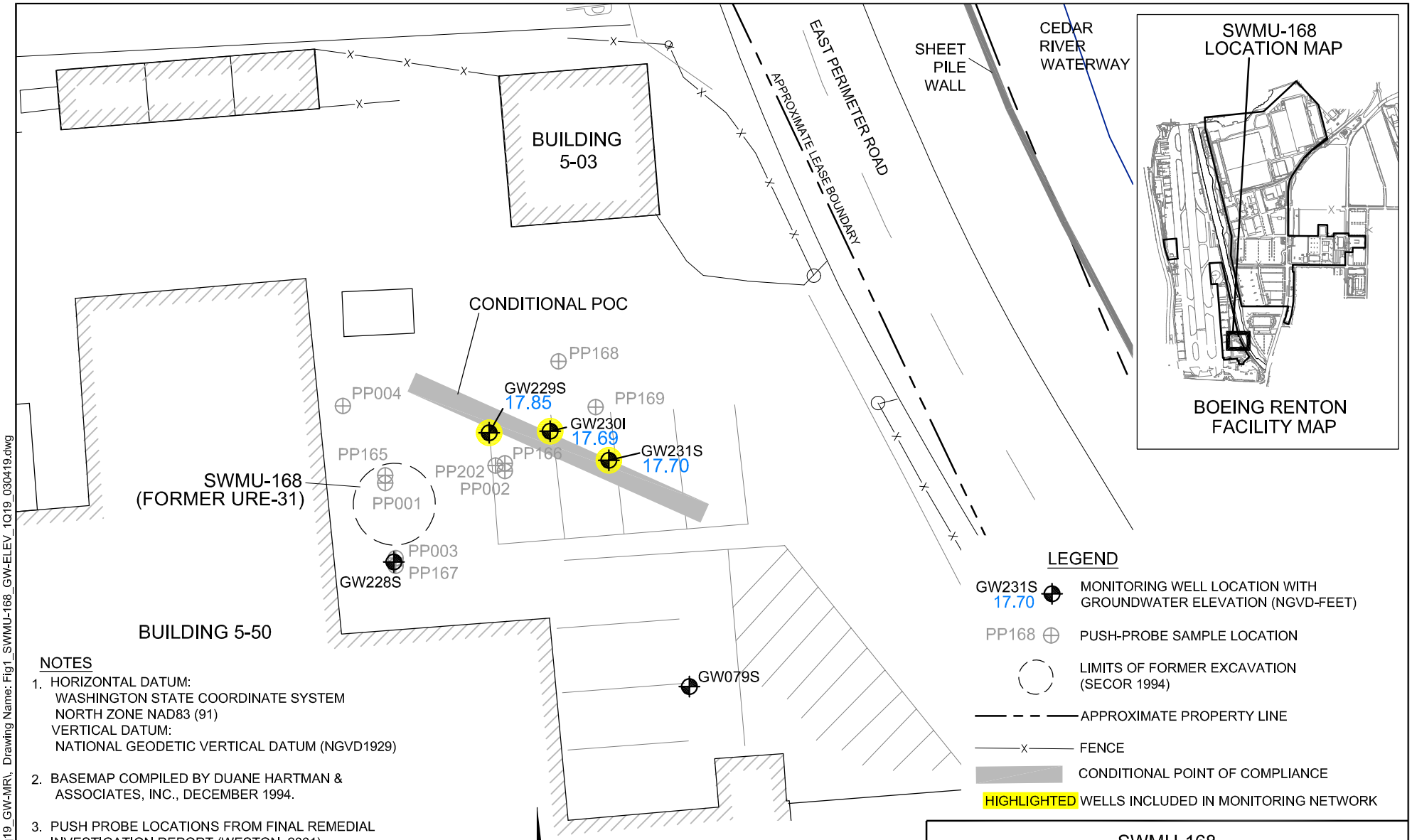
Wood, 2019, Addendum to the Compliance Monitoring Plan, Boeing Renton Facility, Renton, Washington: Prepared for the Boeing Company, April.

Figures



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.

0 10 20
APPROXIMATE SCALE IN FEET

SWMU-168 MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS MARCH 4, 2019 Boeing Renton Facility Renton, Washington

By: APS	Date: 04/09/19	Project No. 8888
Wood Environment & Infrastructure Solutions, Inc.	Figure	1

Plot Date: 04/09/19 - 10:14am, Plotted by: Mike.stenberg
Drawing Path: S:\8888_2006\098_1q19_GW-MR\, Drawing Name: Fig1_SWMU-168_GW-ELEV_1Q19_030419.dwg

SHEET PILE WALL

CEDAR RIVER WATERWAY

EAST PERIMETER ROAD

BUILDING 5-50

BUILDING 5-08

BUILDING 5-09

AOC-049 (FORMER URE-30)

SWMU-174 (FORMER URE-73)

SWMU-172 (FORMER URE-66)

CONDITIONAL POC

APPROXIMATE LEASE BOUNDARY

GW079S

GW136S

GW080S

GW081S 17.76

GW083S

GW082S

GW084S

GW153S 18.30

GW226S 18.19

GW152S 18.23

GW171S

GW173S 17.48

GW233I 17.14*

GW232S 16.71

GW172S 17.26

GW234S 17.18

GW235I 17.48*

GW236S 17.33

B172-01

B172-02

B172-03

B172-04

B172-05

B172-06

B172-07

B172-08

B172-09

B172-10

B172-11

B172-12

B172-13

B172-14

SVE-01

SVE-02

SVE-03

PP005

PP006

PP008

PP061

PP062

PP063

PP077

PP086

PP087

PP088

PP089

PP110

PP170

PP171

PP172

PP173

PP174

PP175

PP176

PP177

18.00

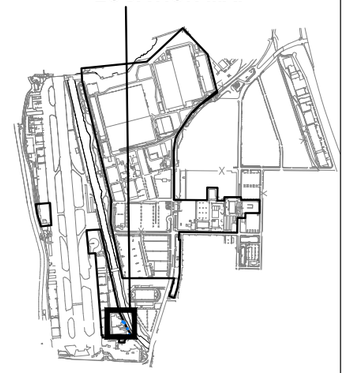
17.50

17.00

0 20 40

APPROXIMATE SCALE IN FEET

SWMU-172 AND SWMU-174 LOCATION MAP



BOEING RENTON FACILITY MAP

LEGEND

GW172S 17.26 — 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

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

GENERAL DIRECTION OF GROUNDWATER FLOW

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.

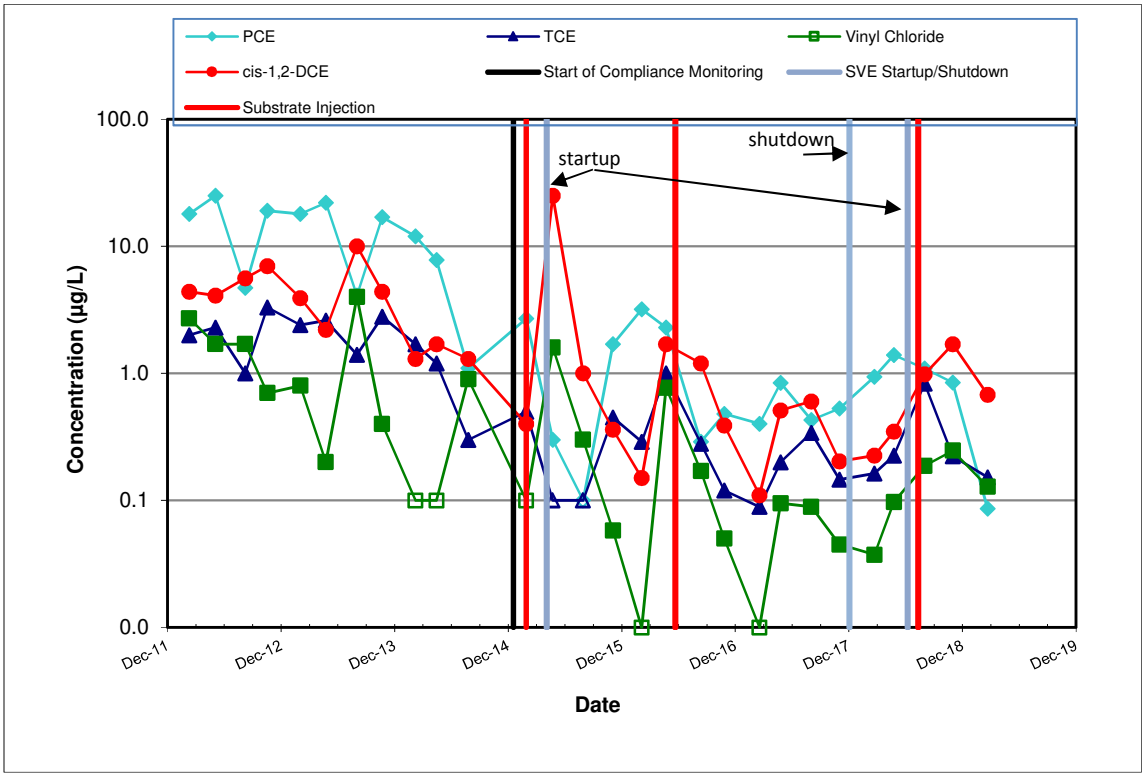
SWMU-172 AND SWMU-174 MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS MARCH 4, 2019 Boeing Renton Facility Renton, Washington

By: APS	Date: 05/09/19	Project No. 8888
Wood Environment & Infrastructure Solutions, Inc.		Figure 2

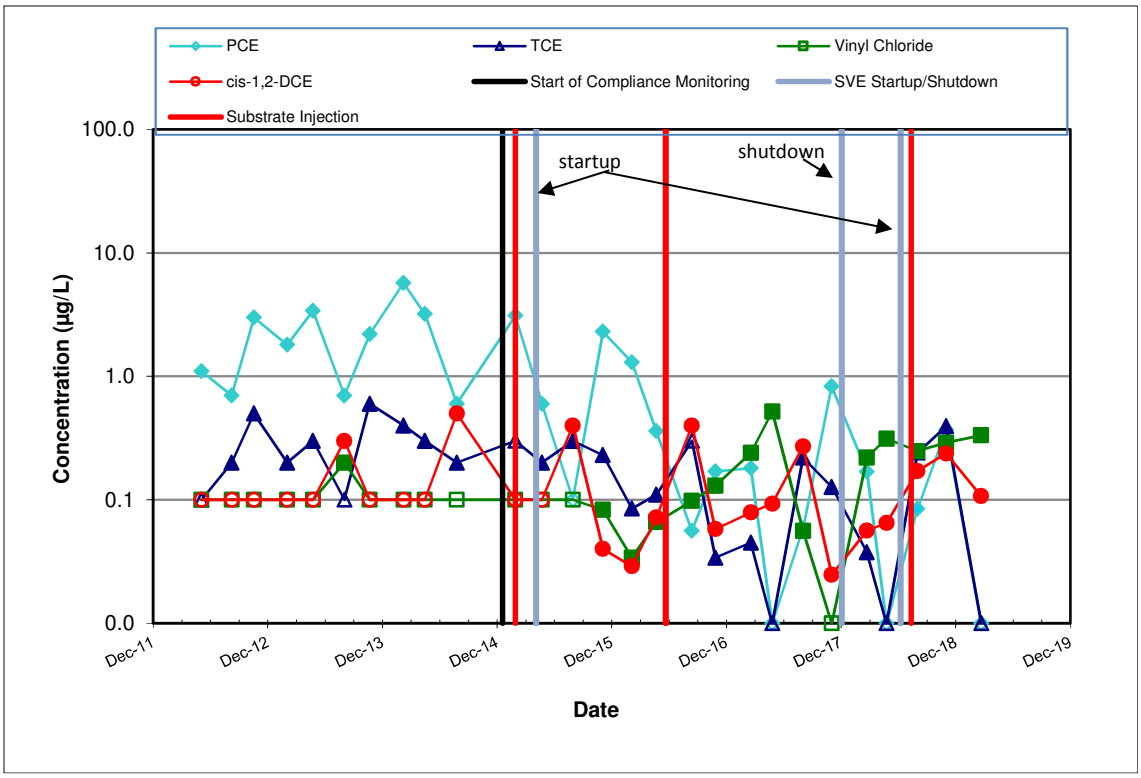
BOEING

wood.

Plot Date: 05/09/19 - 12:04pm, Plotted by: adam stenberg
Drawing Path: S:\8888_2006\098_1q19_GW-MR\, Drawing Name: Fig2_SWMU-172-174_GW-ELEV_1Q19_030419.dwg



SOURCE AREA WELL GW152S

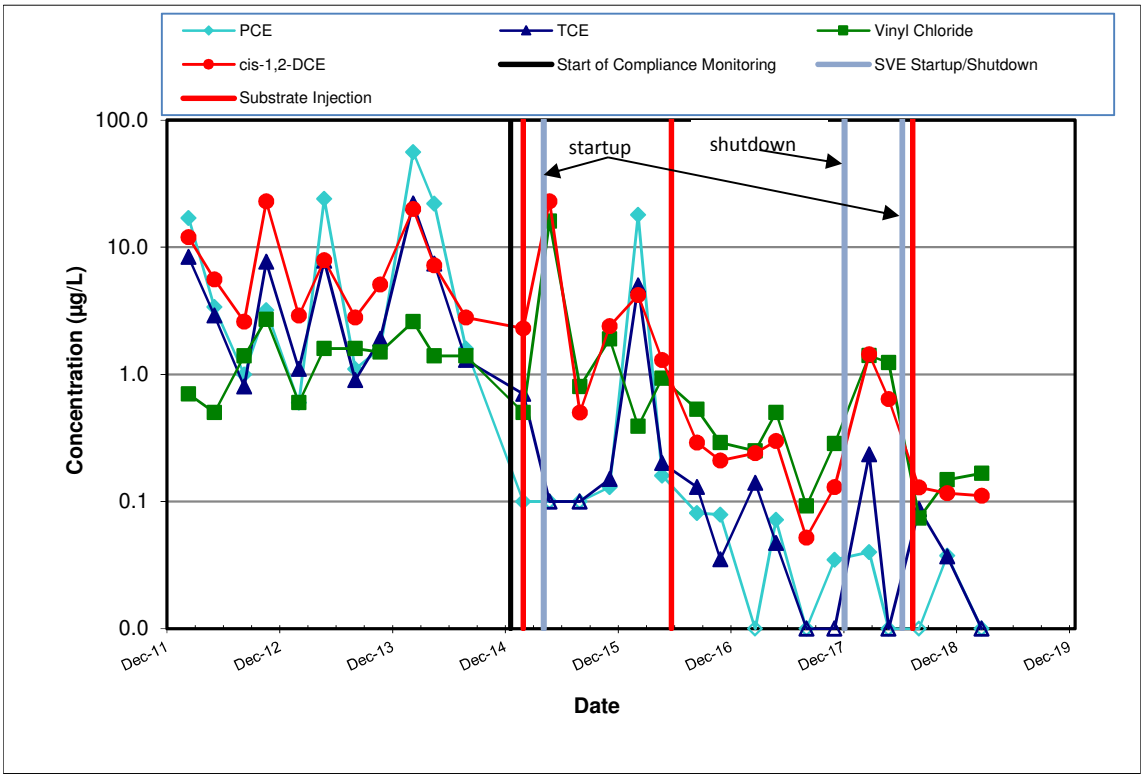


SOURCE AREA WELL GW153S

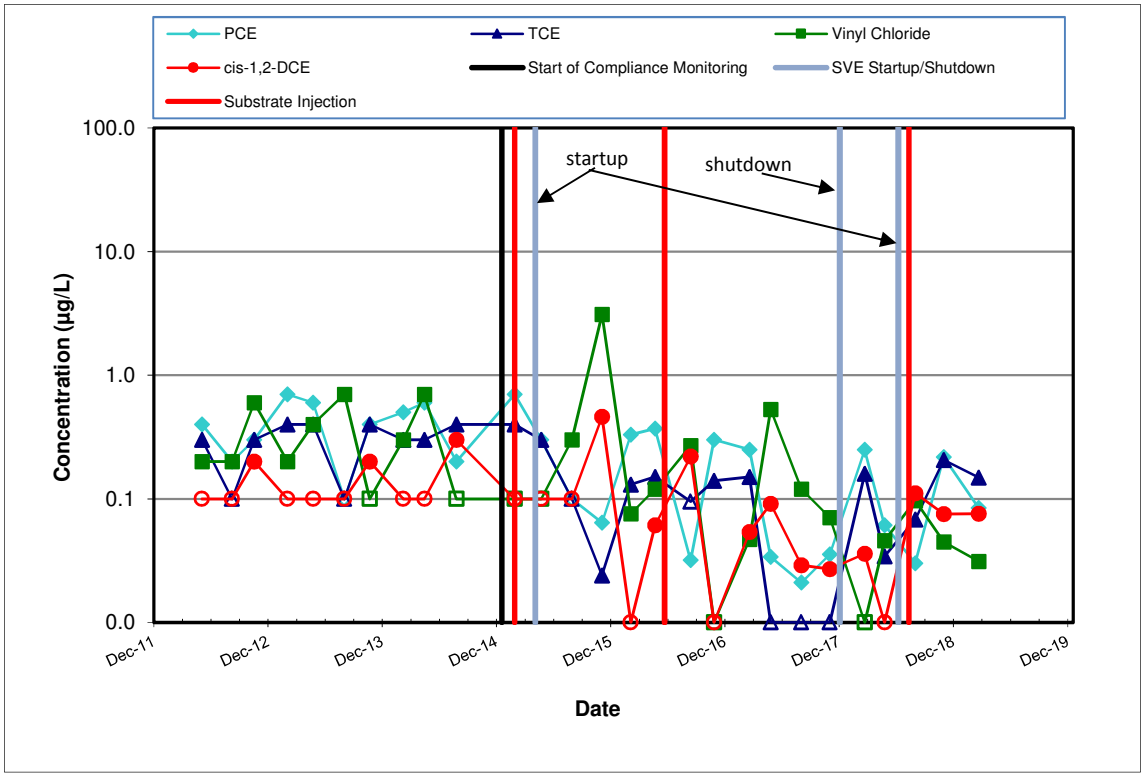
Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

wood.	SWMU-172 AND SWMU-174 TREND PLOTS FOR SOURCE AREA WELLS GW152S AND GW153S Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 3

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



DOWNGRADIENT PLUME AREA WELL GW172S



DOWNGRADIENT PLUME AREA WELL GW173S

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

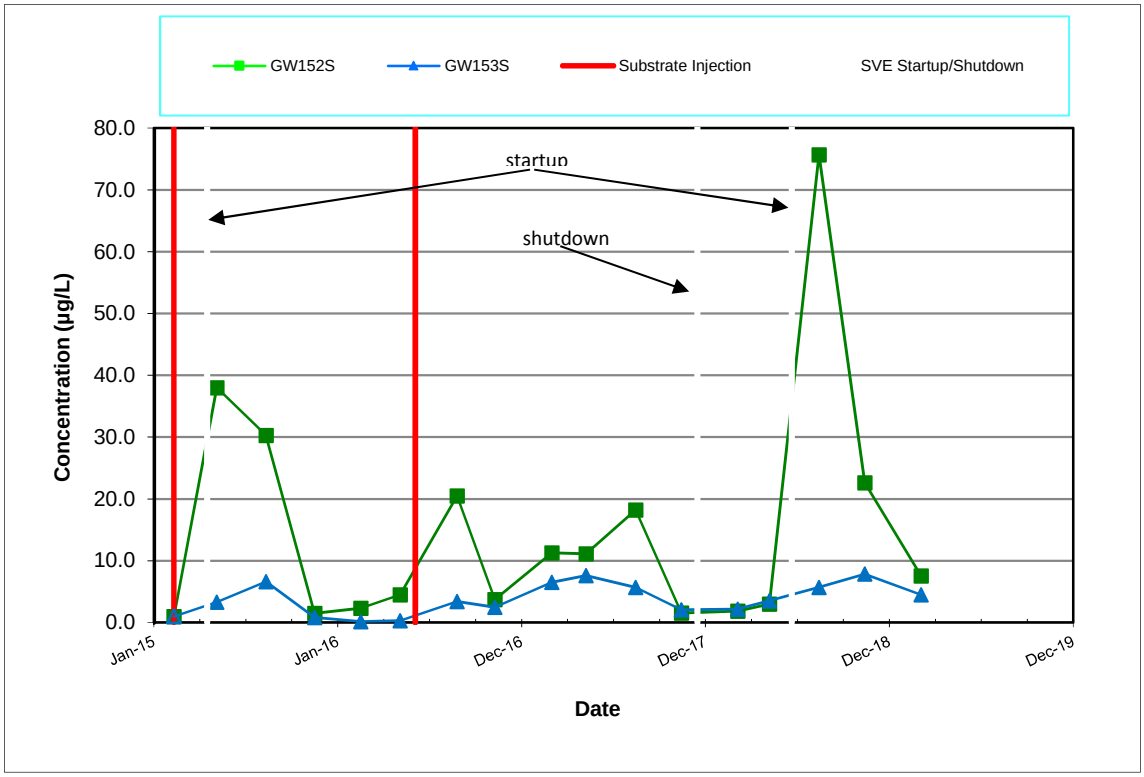
P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figures 3 to 7_ SWMU_172-174 Trend Plots.xlsx

wood.

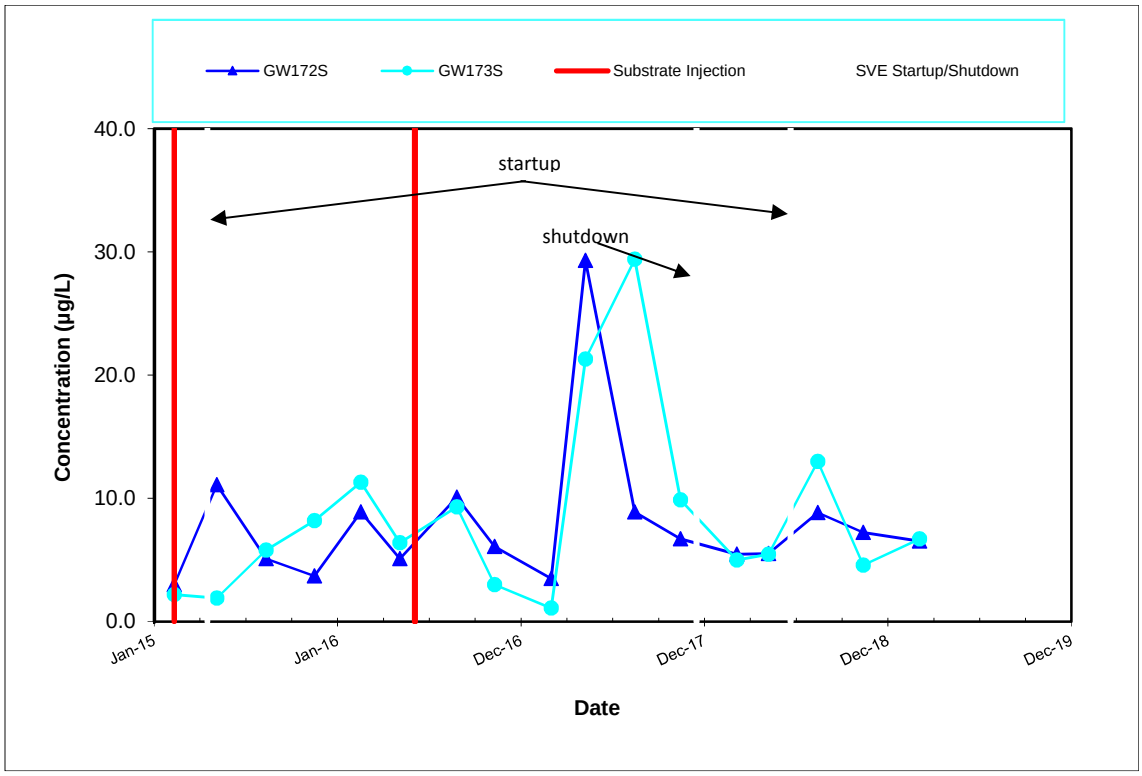
SWMU-172 AND SWMU-174 TREND PLOTS FOR DOWNGRADIENT PLUME AREA WELLS GW172S AND GW173S
Boeing Renton Facility
Renton, Washington

Project No. 8888

Figure 4



TOTAL ARSENIC IN SOURCE AREA WELLS

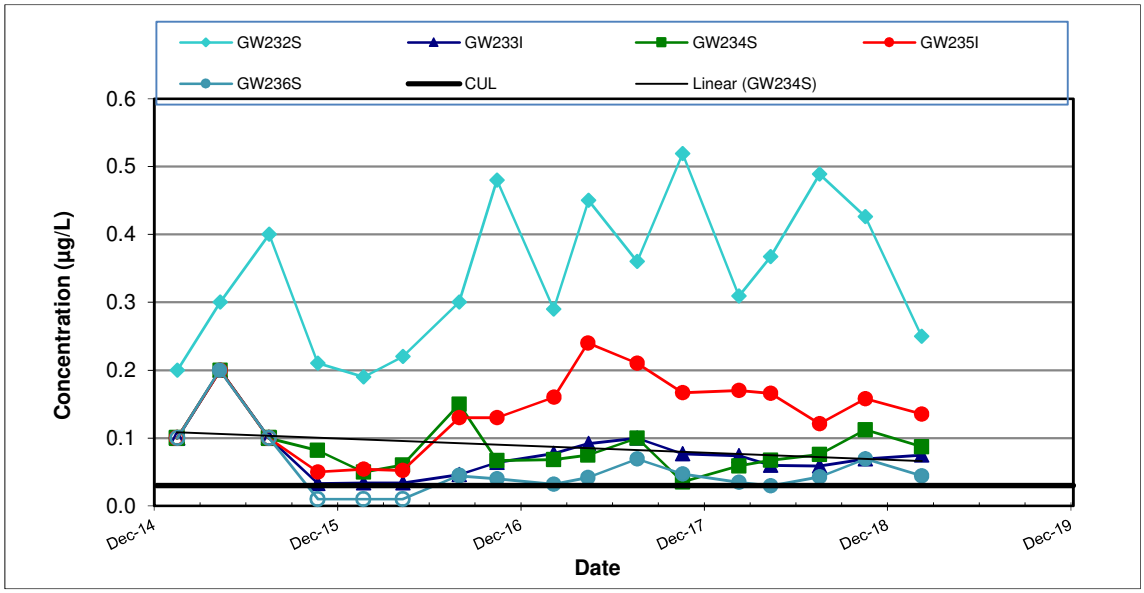


TOTAL ARSENIC IN DOWNGRADIENT PLUME AREA WELLS

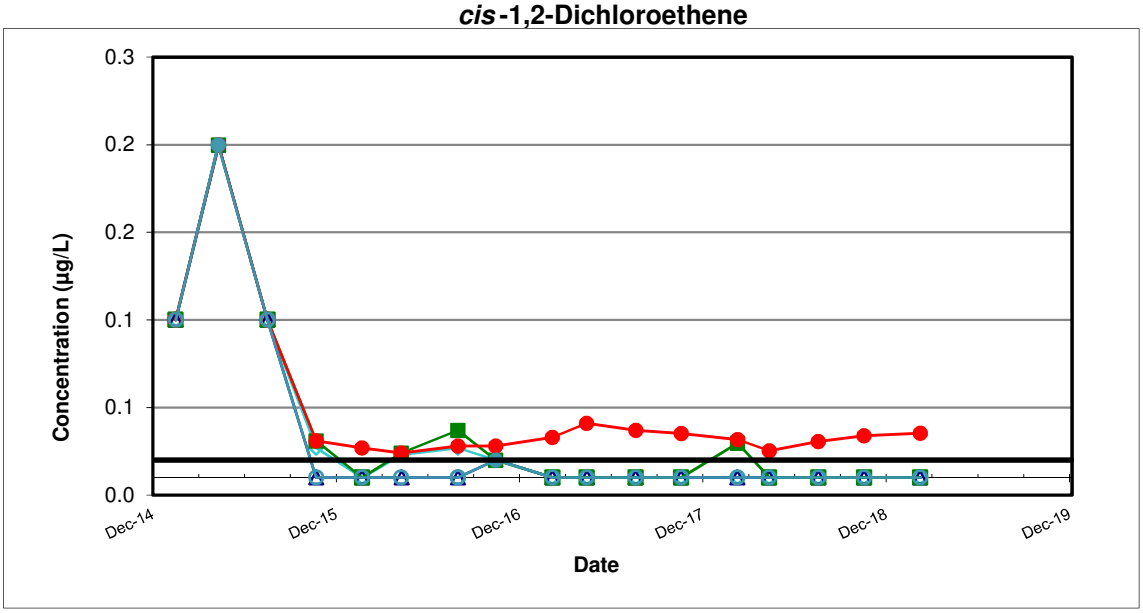
Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

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

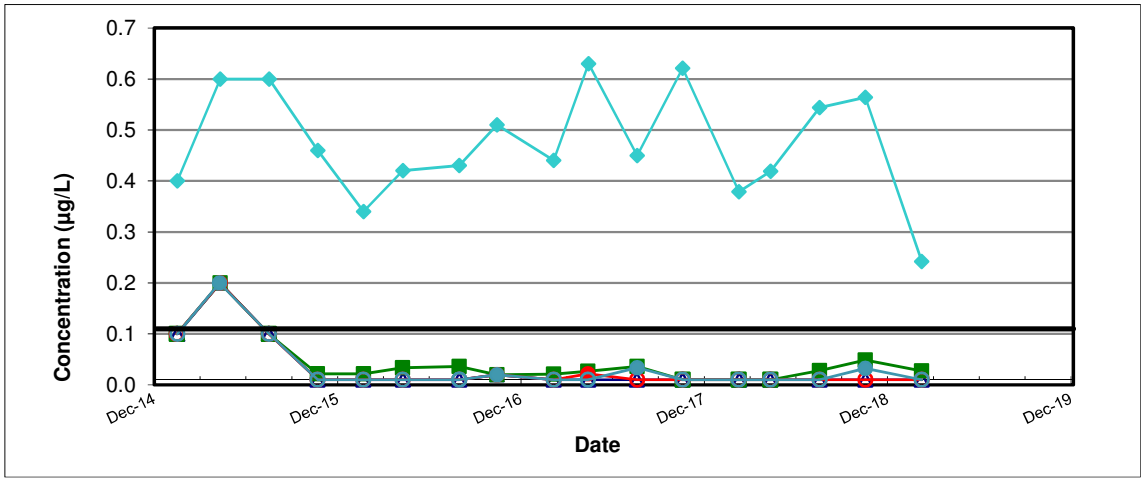
wood.	SWMU-172 AND SWMU-174 TREND PLOTS FOR ARSENIC IN SELECT SOURCE AREA AND DOWNGRADIENT PLUME AREA WELLS Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 5



***cis*-1,2-Dichloroethene**



Trichloroethene



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

Vinyl Chloride

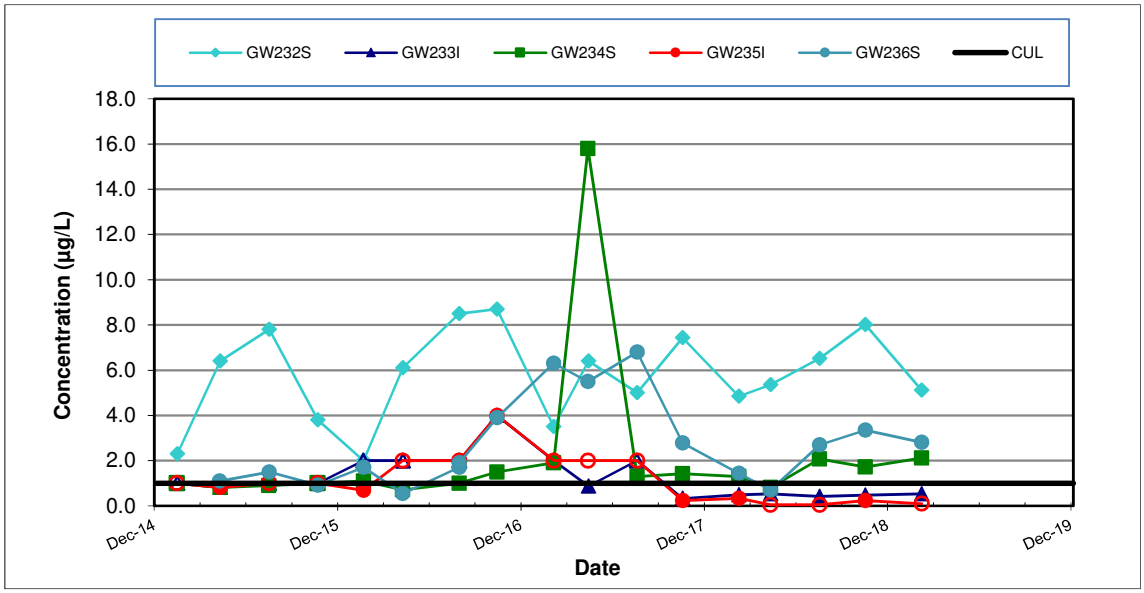
wood.

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

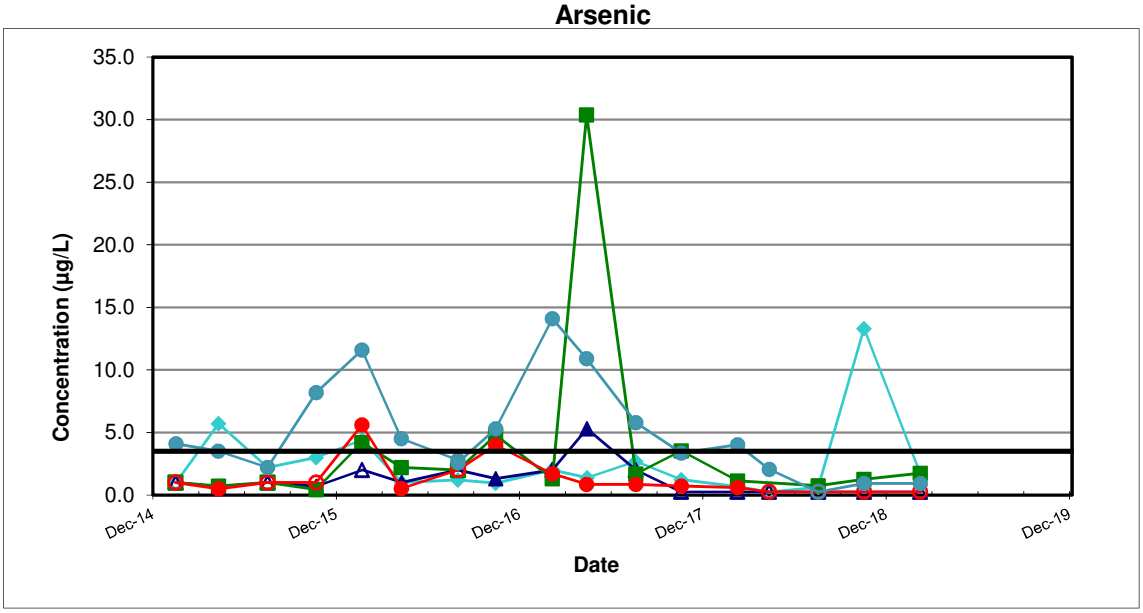
Project No. 8888

Figure 6

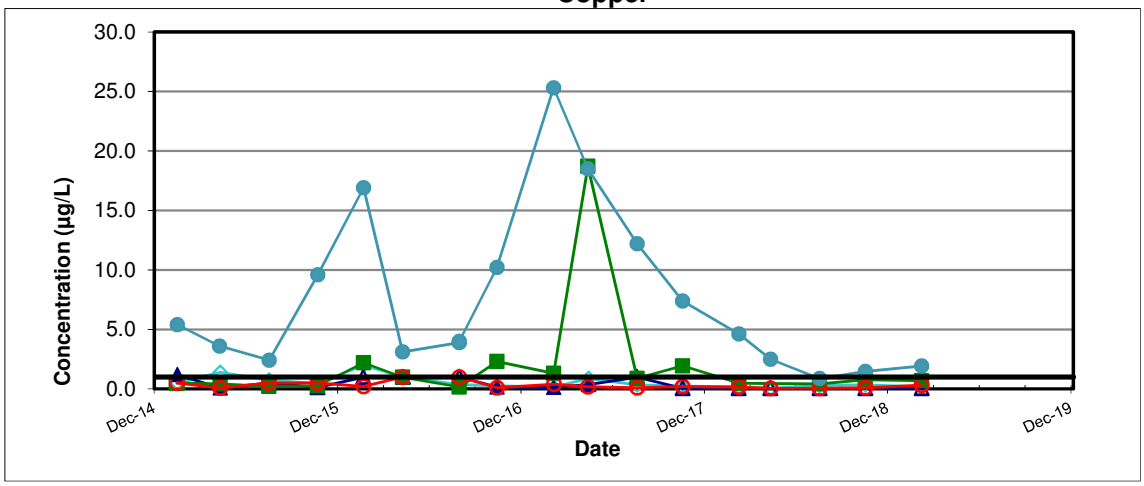
P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figures 3 to 7_ SWMU_172-174 Trend Plots.xlsx



Arsenic



Copper



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

Lead

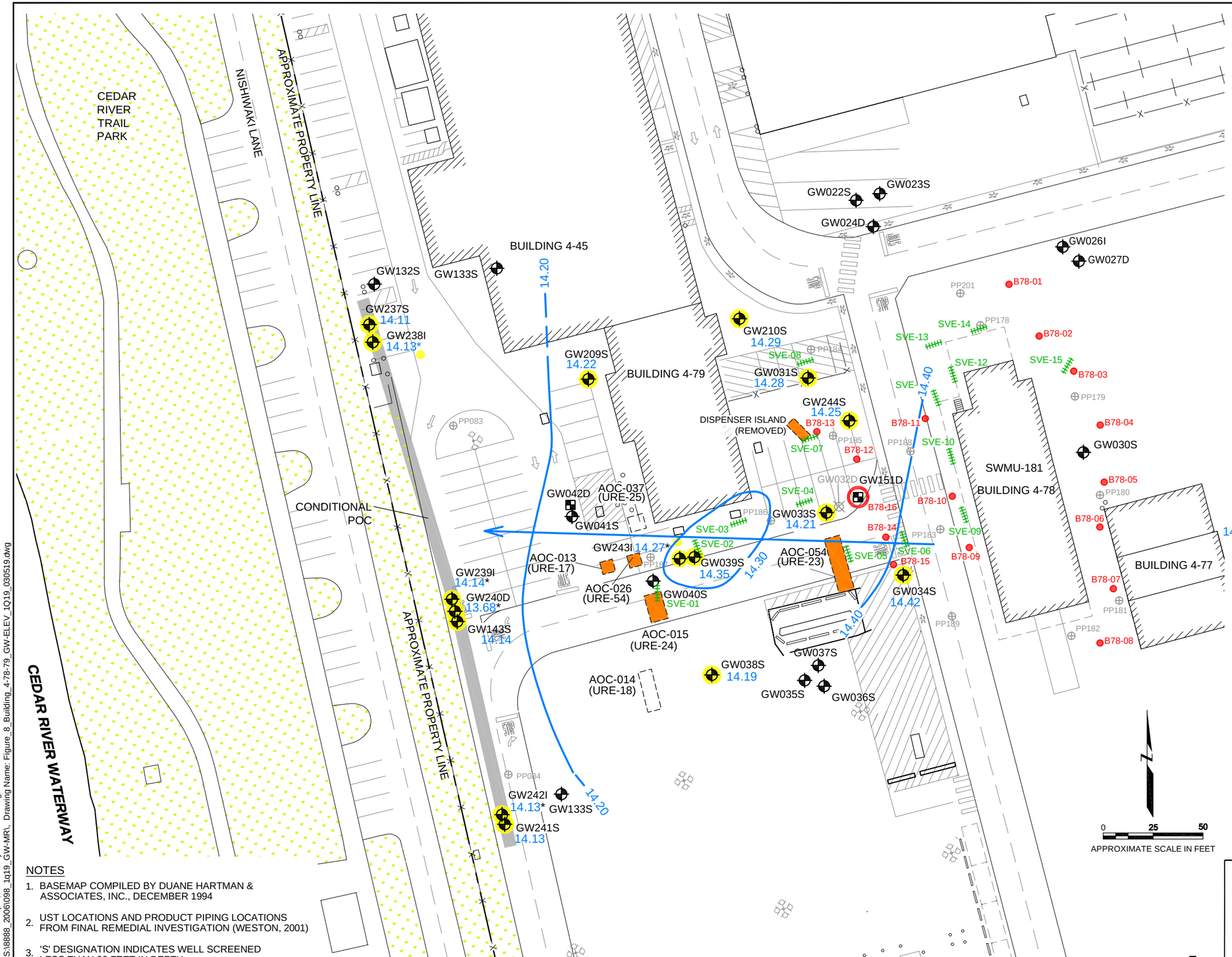
P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figures 3 to 7_ SWMU_172-174 Trend Plots.xlsx

wood.

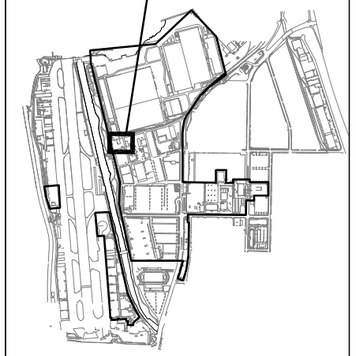
SWMU-172 AND SWMU-174 TREND PLOTS FOR ARSENIC, COPPER AND LEAD IN CPOC AREA WELLS
Boeing Renton Facility
Renton, Washington

Project No. 8888

Figure 7



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

14.10 — 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

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.

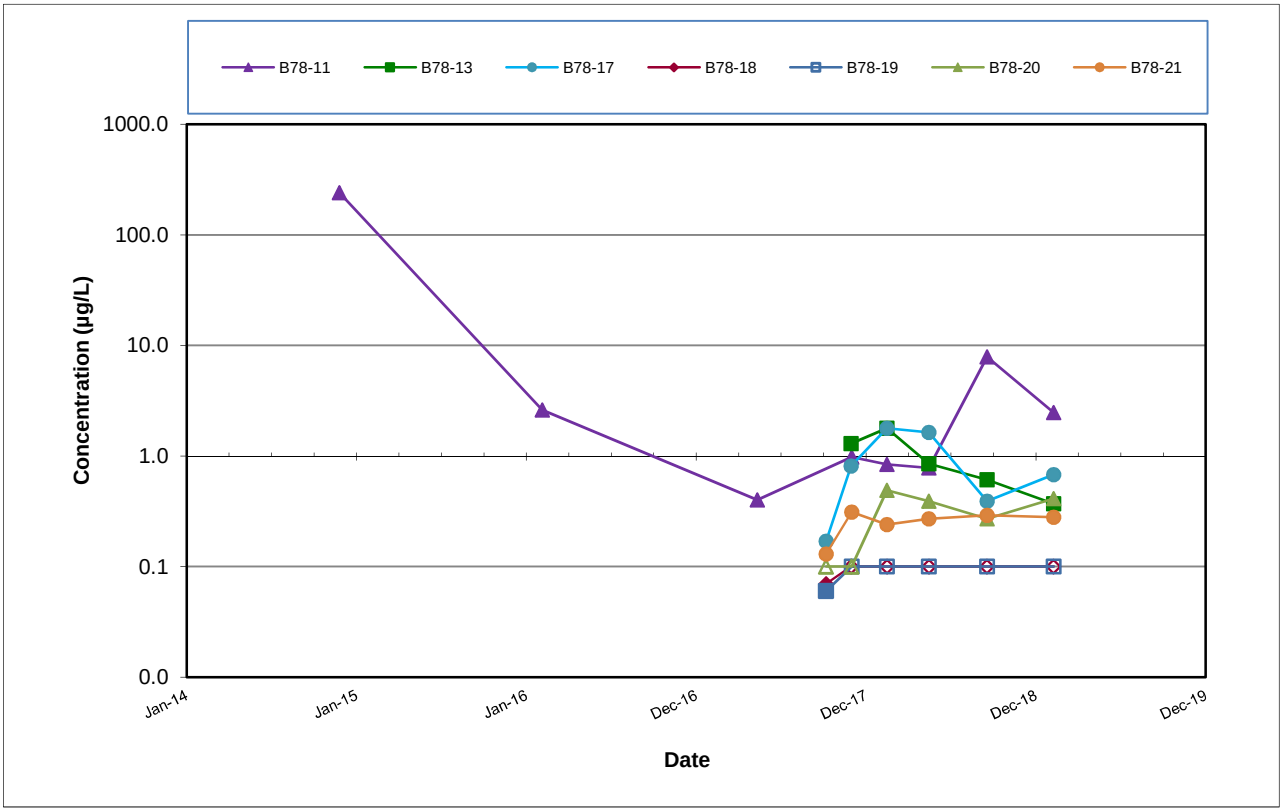
BOEING

wood.

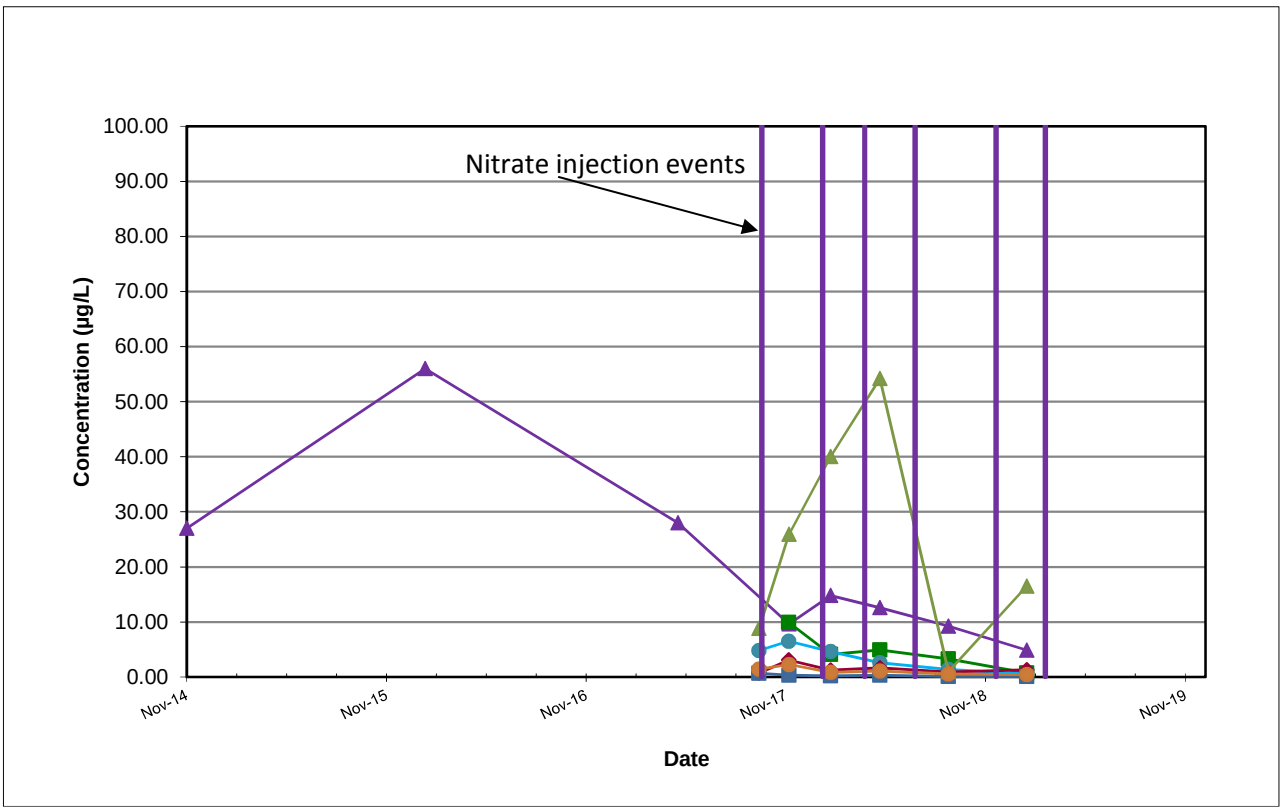
BUILDING 4-78/79 SWMU/AOC GROUP MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS MARCH 4 AND 5, 2019 Boeing Renton Facility Renton, Washington

By: APS	Date: 05/09/19	Project No. 8888
Wood Environment & Infrastructure Solutions, Inc.		Figure 8

Plot Date: 05/09/19 - 12:06pm Plotted by: adam.stenberg
Drawing Path: S:\8888_2006\098_1q19_GW-MR_Drawing Name: Figure_8_Building_4-78-79_GW-ELEV_1Q19_030519.dwg



cis-1,2-Dichloroethene

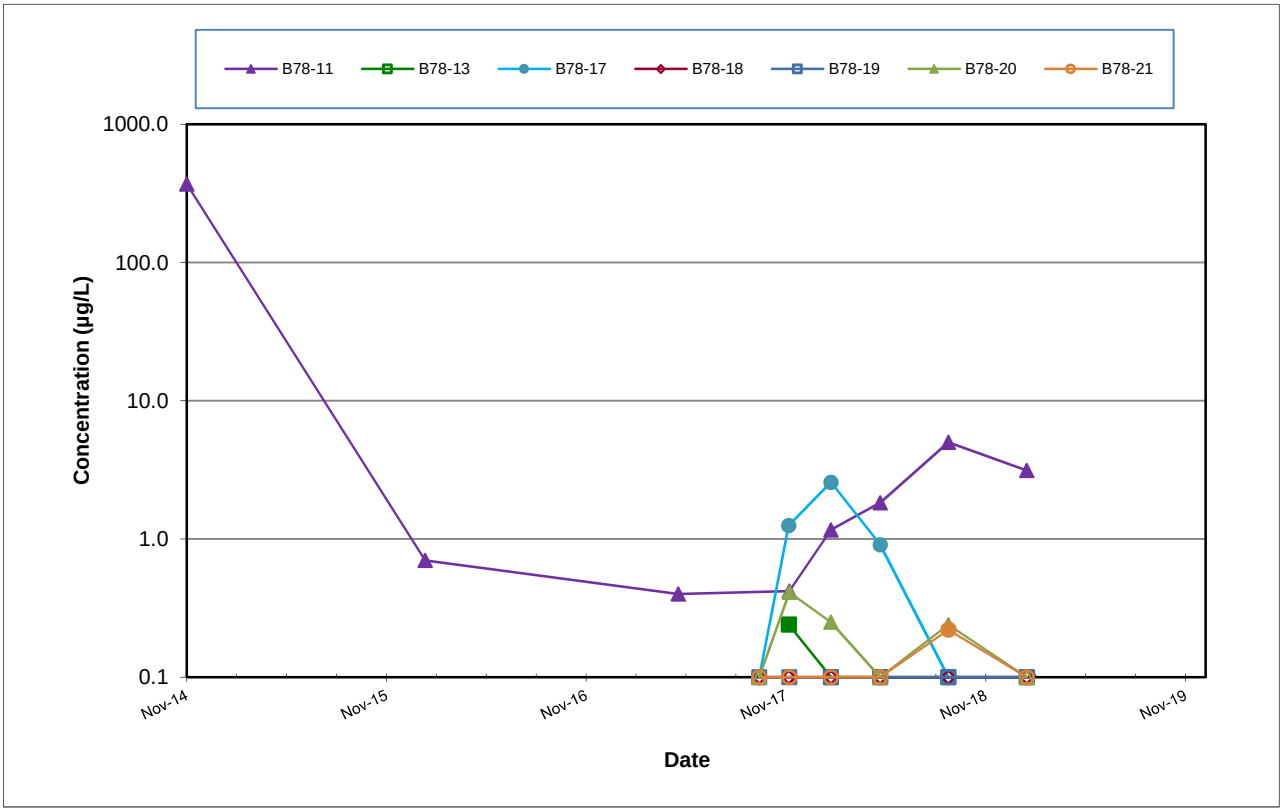


Benzene

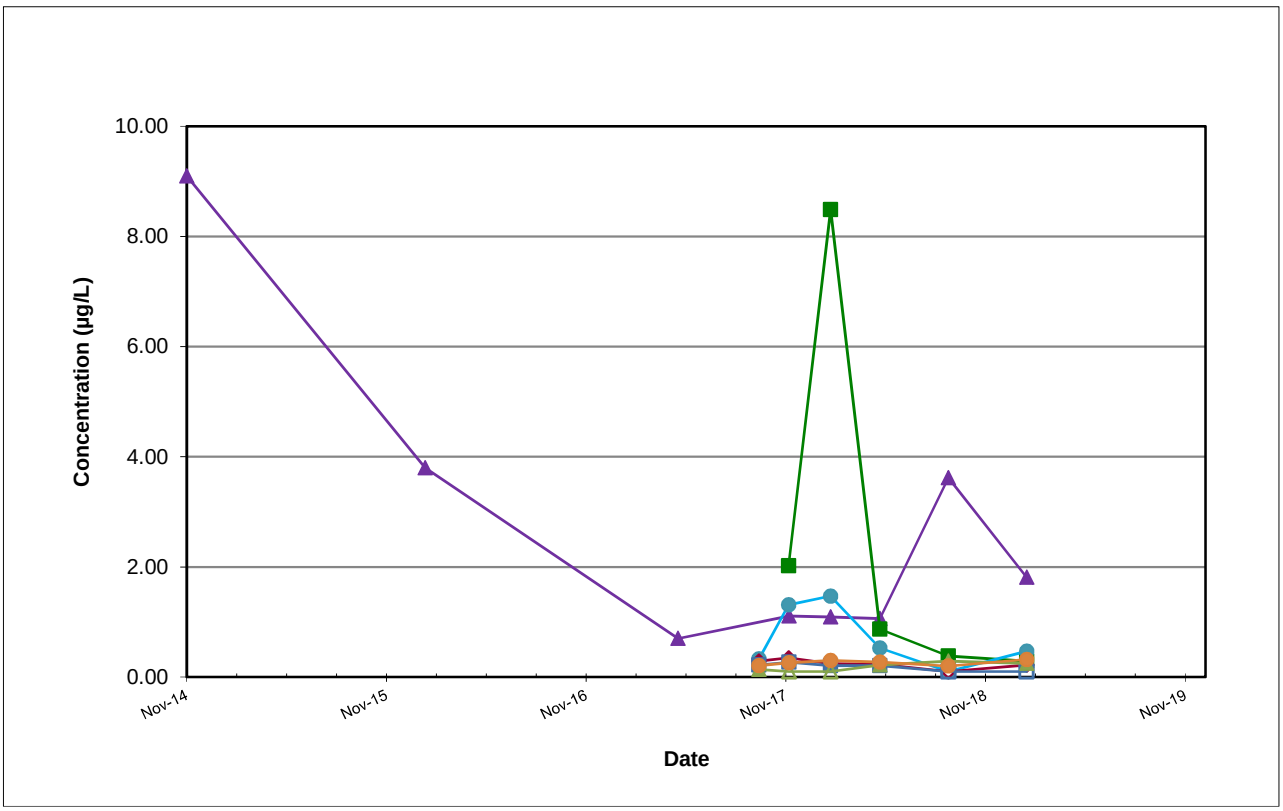
Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

wood.	BUILDING 4-78/79 SWMU/AOC GROUP TREND PLOTS FOR CIS-1,2-DICHLOROETHENE AND BENZENE IN INJECTION WELLS Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 9

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



Trichloroethene



Vinyl Chloride

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

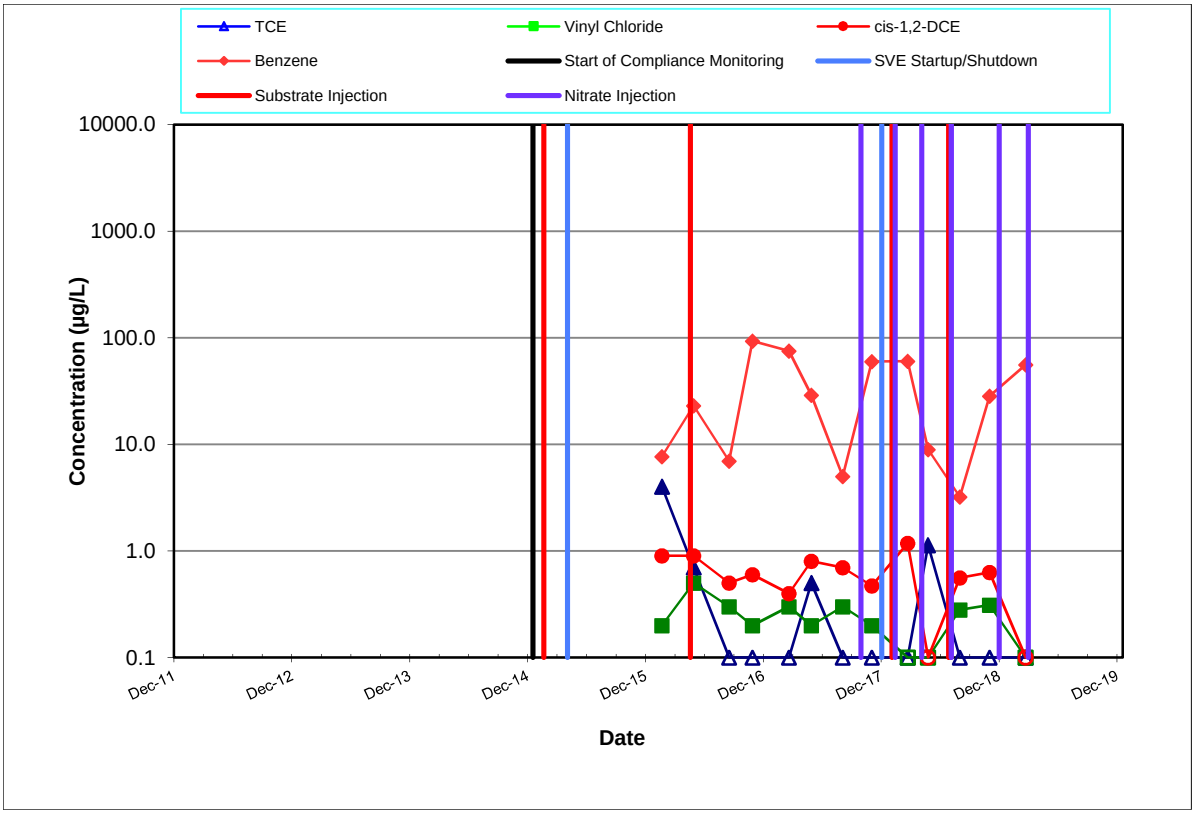
wood.

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

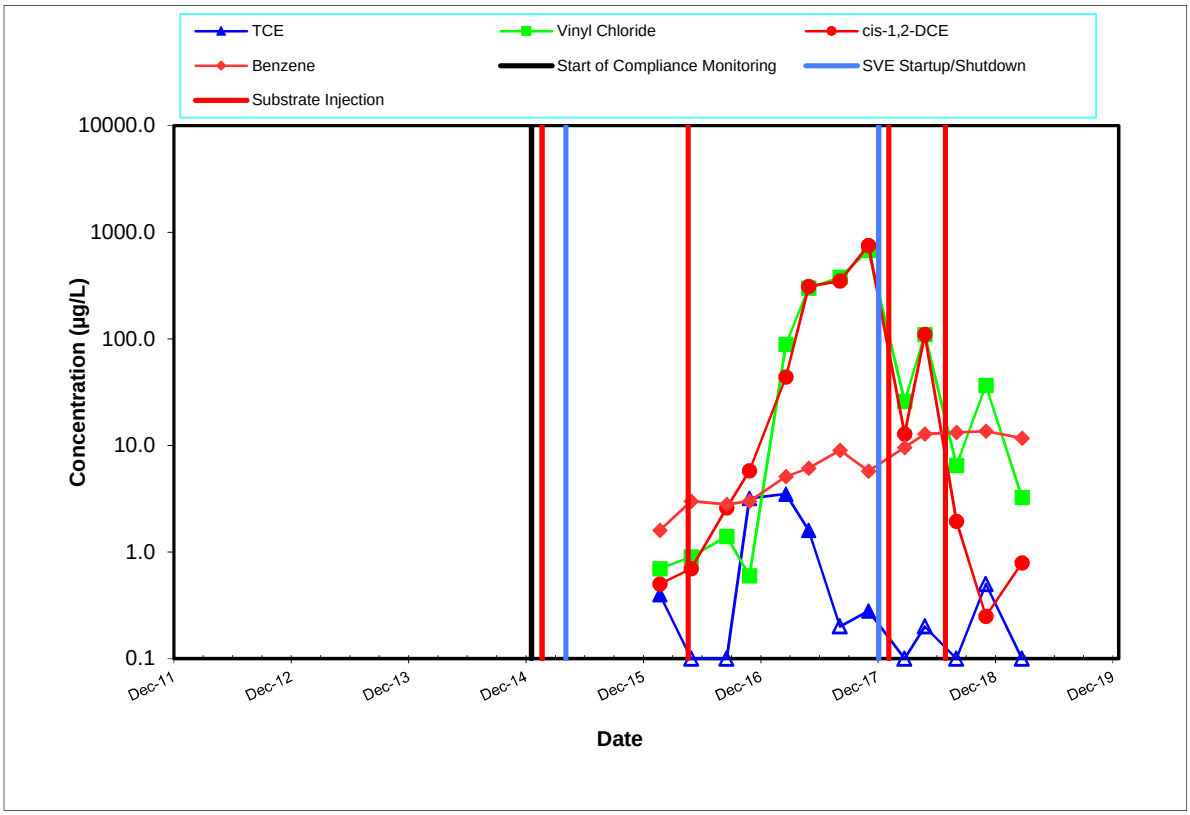
Project No. 8888

Figure 10

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



SOURCE AREA WELL GW031S

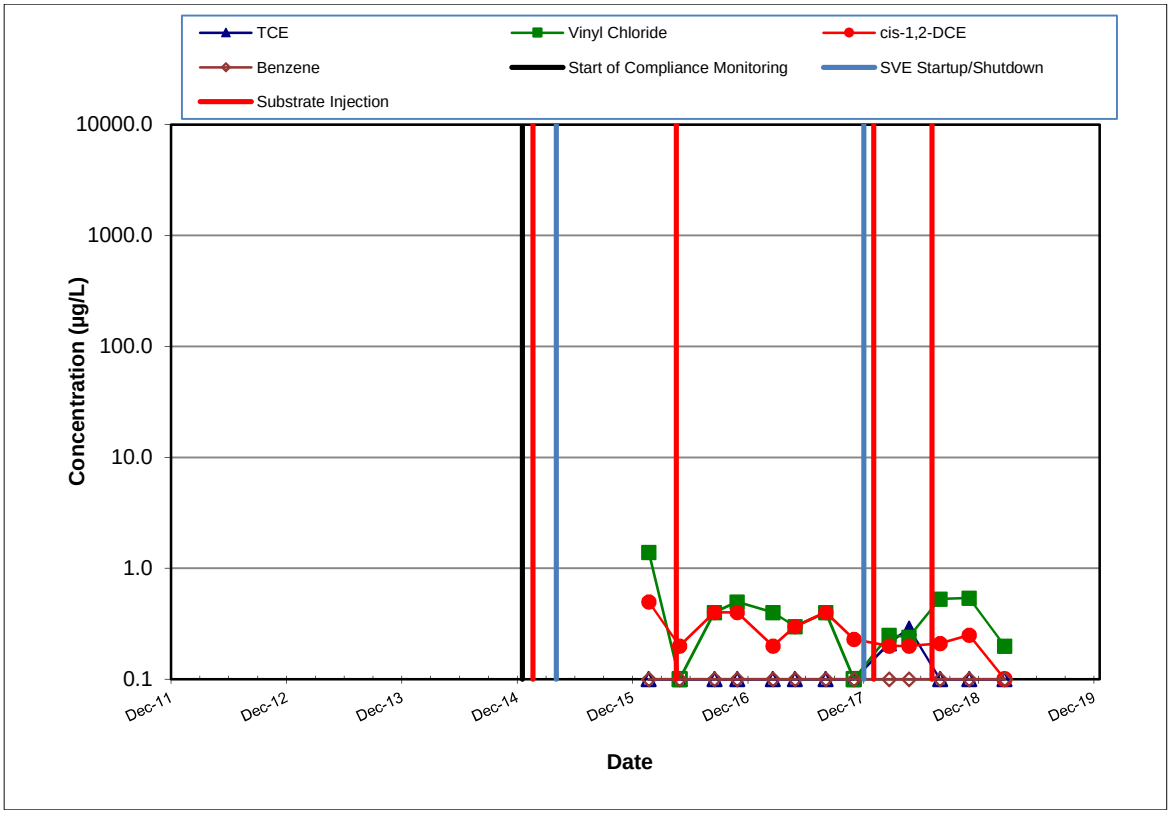


SOURCE AREA WELL GW033S

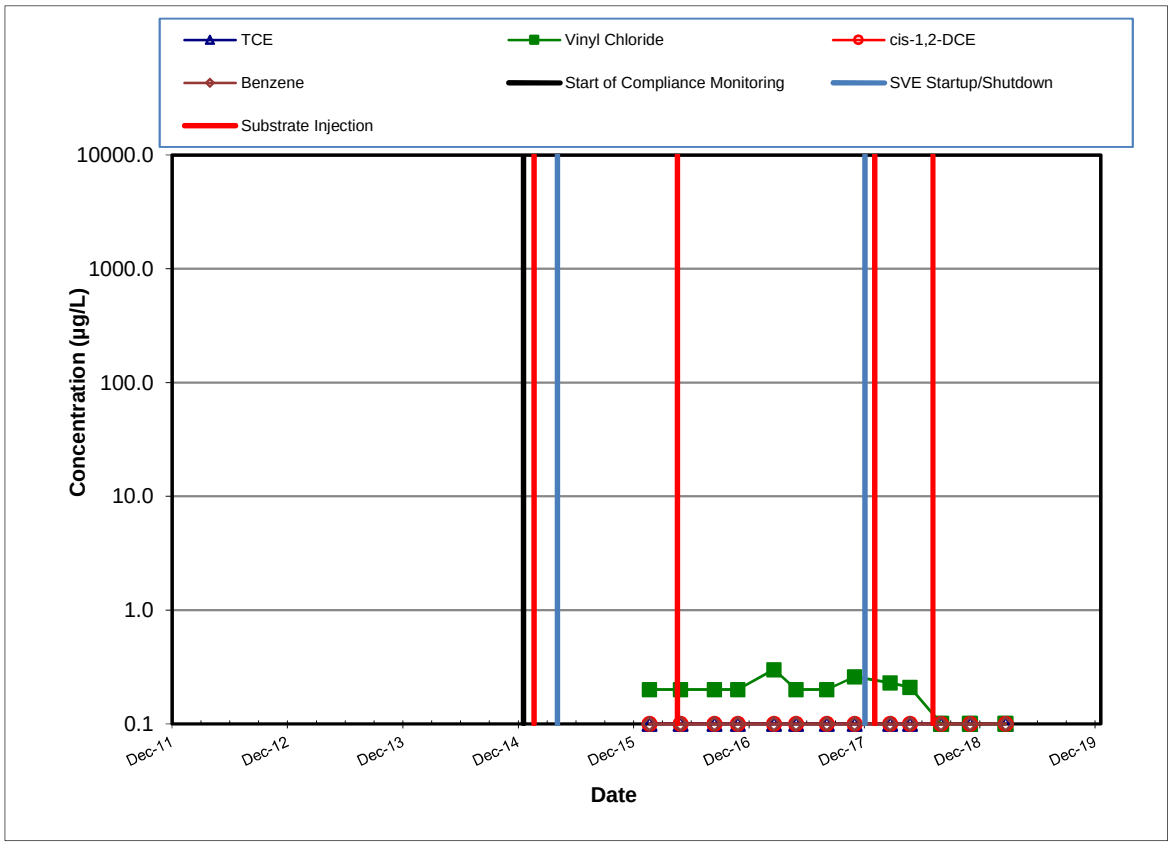
Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

wood.	BUILDING 4-78/79 SWMU/AOC GROUP TREND PLOTS FOR SOURCE AREA WELLS GW031S AND GW033S Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 11

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



SOURCE AREA WELL GW034S

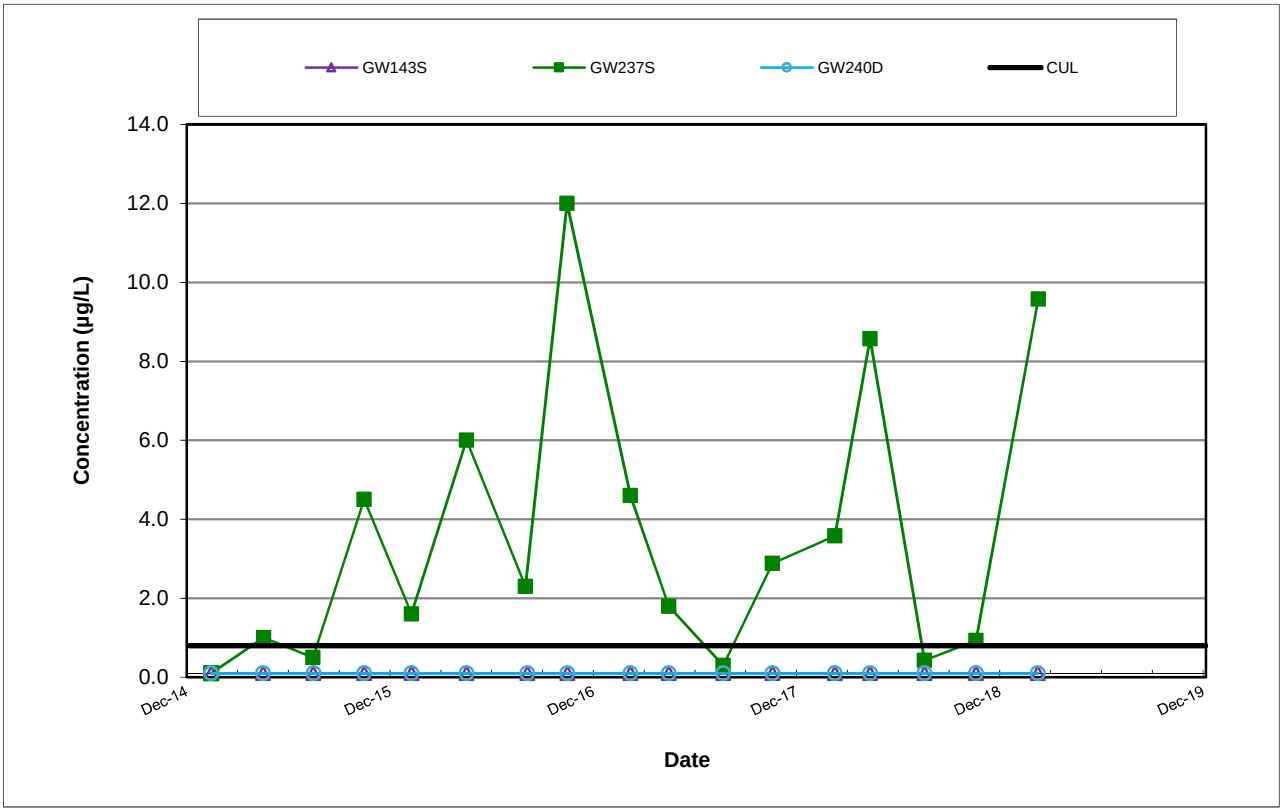


DOWNGRADIENT PLUME AREA WELL GW209S

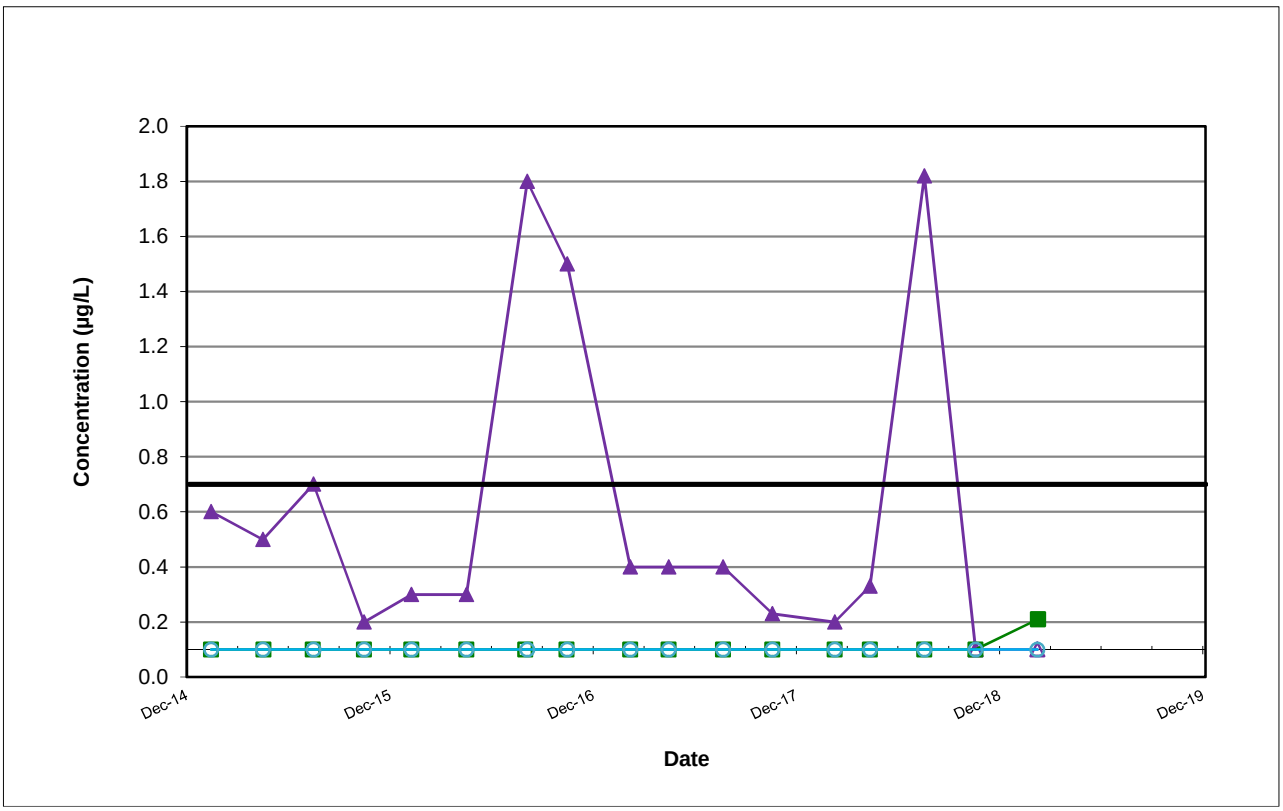
Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

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 12

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



Benzene



cis-1,2-Dichloroethene

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

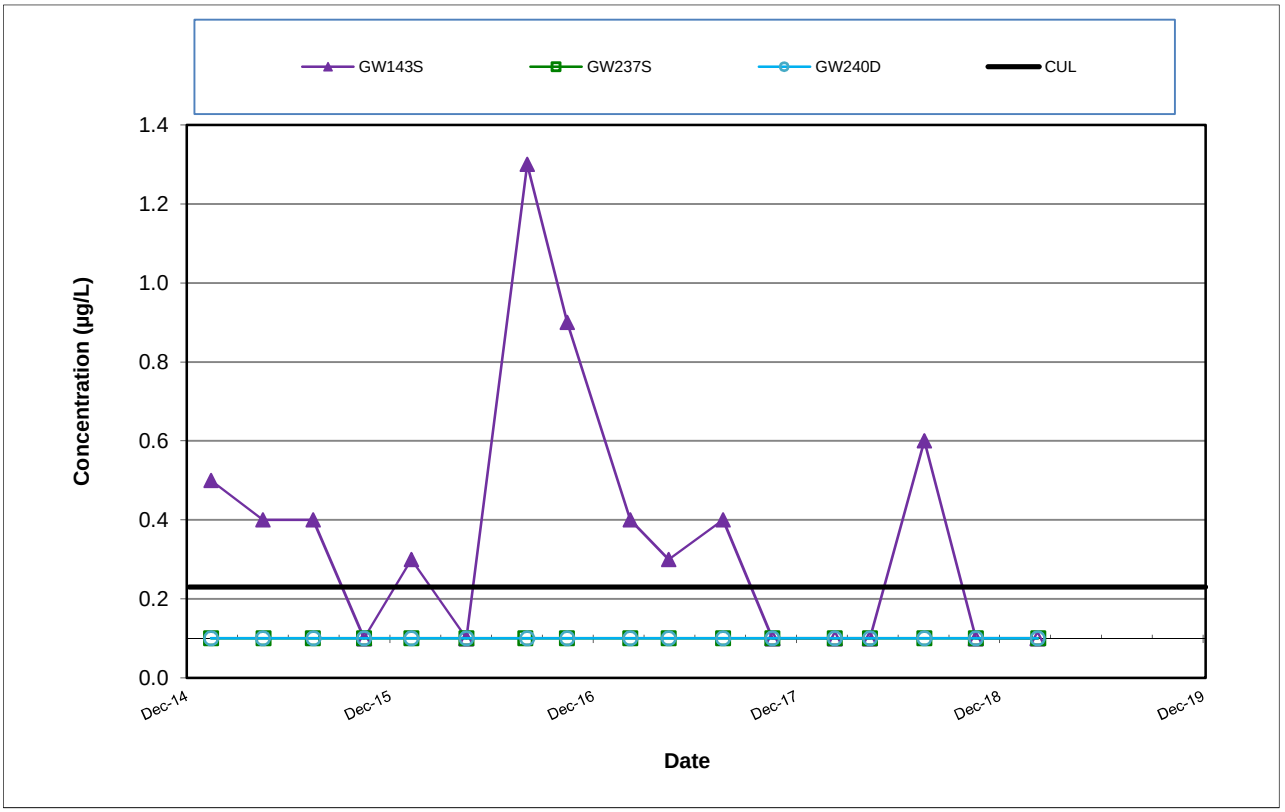
wood.

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

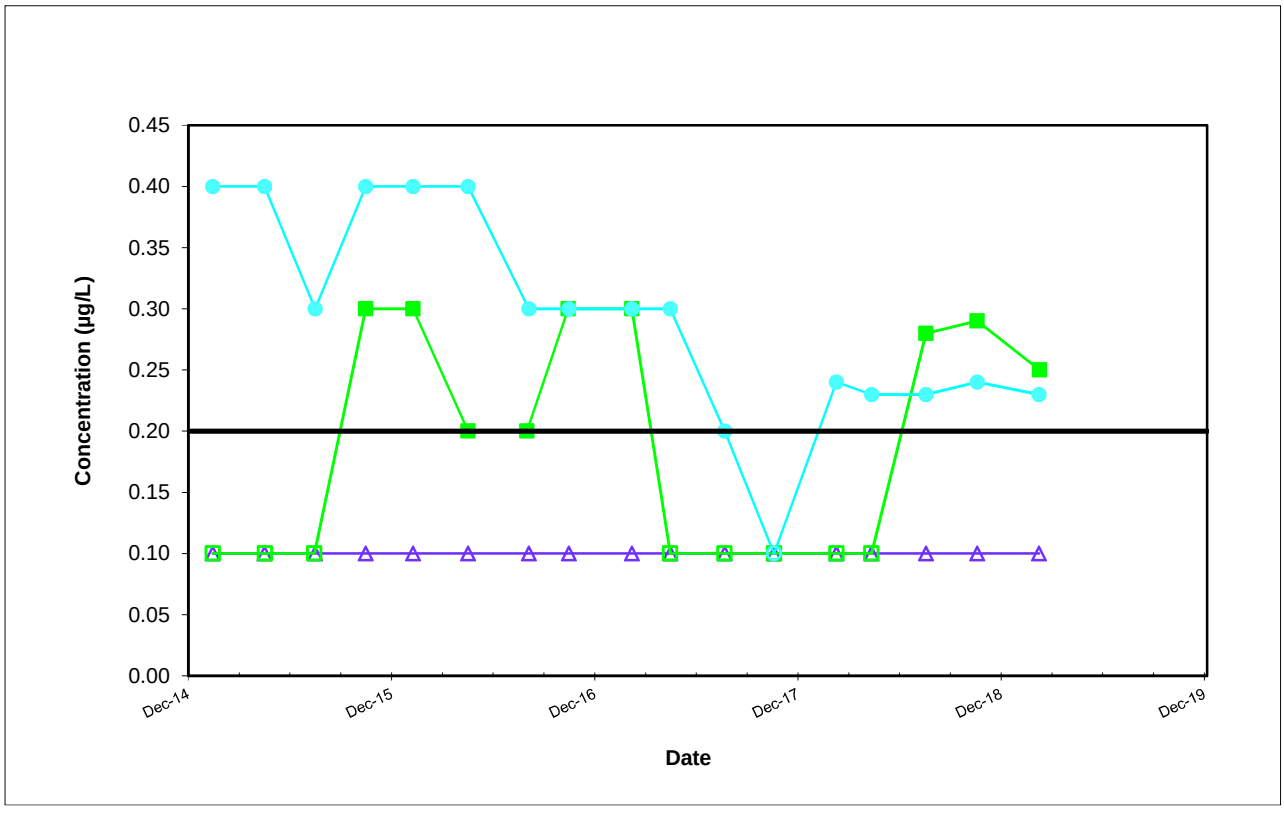
Project No. 8888

Figure 13

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



Trichloroethene

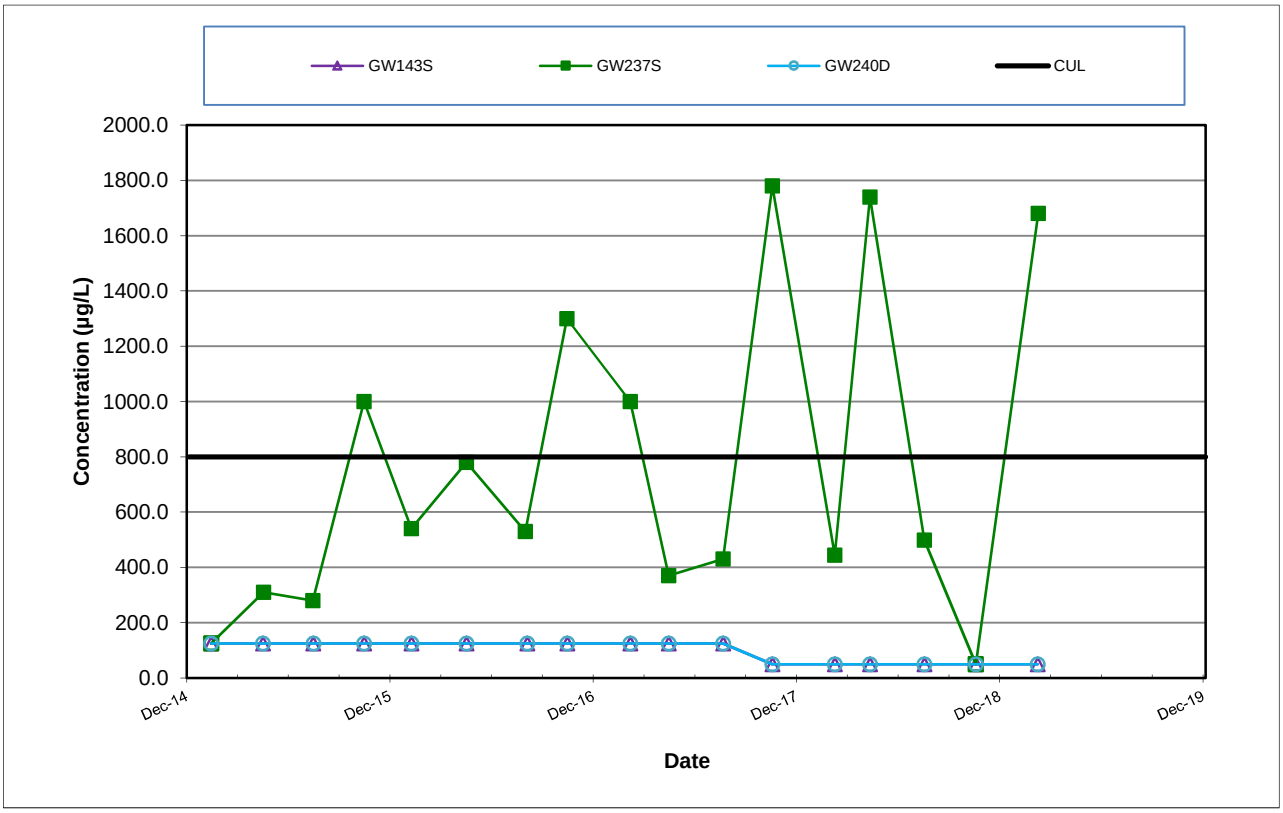


Vinyl Chloride

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

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

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

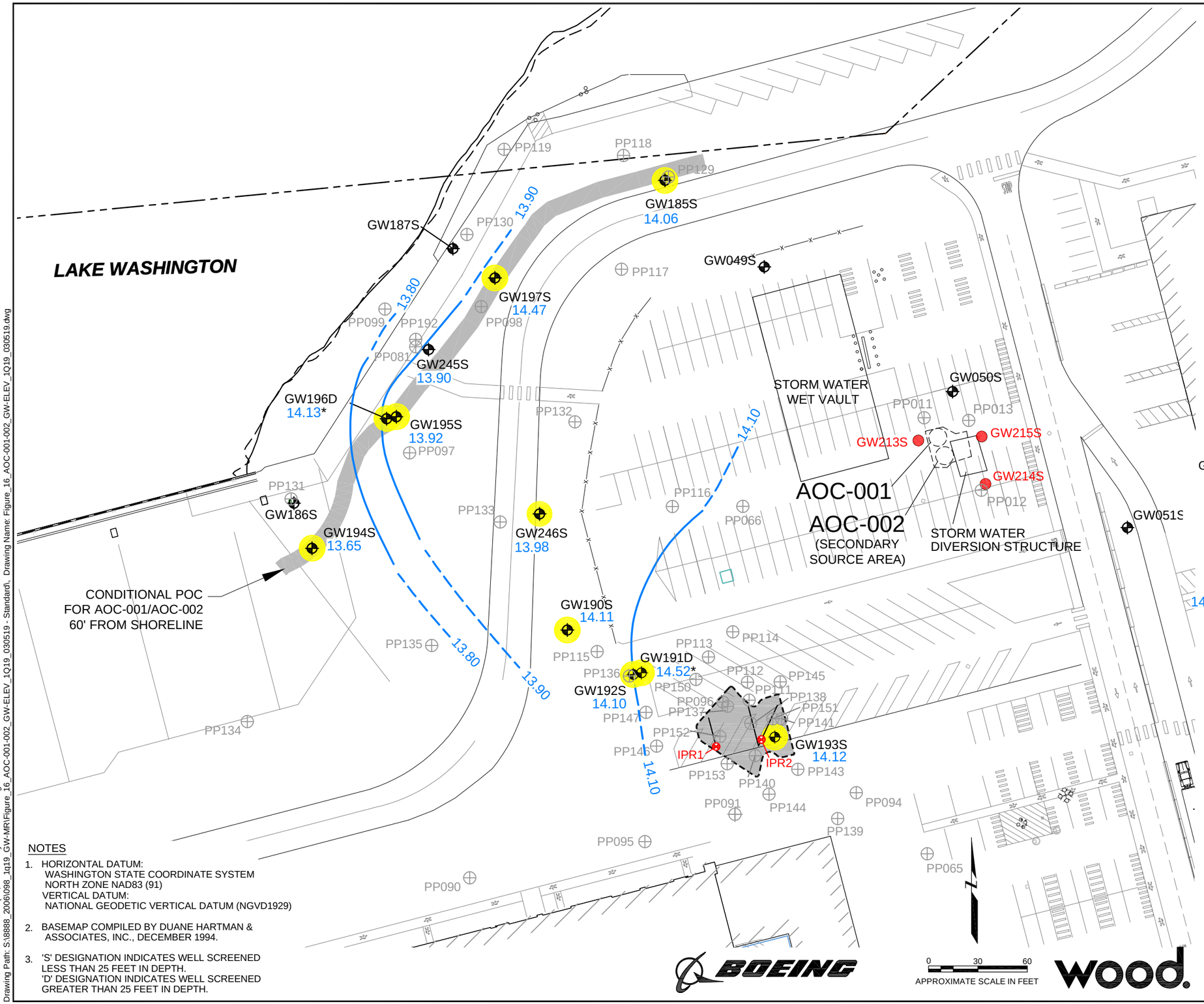


TPH as Gasoline

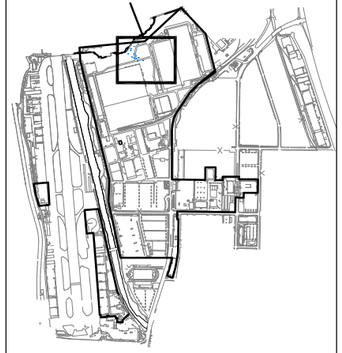
Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

wood.	BUILDING 4-78/79 SWMU/AOC GROUP TREND PLOTS FOR TPH AS GASOLINE IN CPOC AREA WELLS Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 15

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



AOC-001 AND AOC-002
LOCATION MAP



BOEING RENTON
FACILITY MAP

LEGEND

GW195S 13.92	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.
14.10	GROUNDWATER ELEVATION CONTOUR (IN FEET) (DASHED WHERE INFERRED)
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.

BOEING

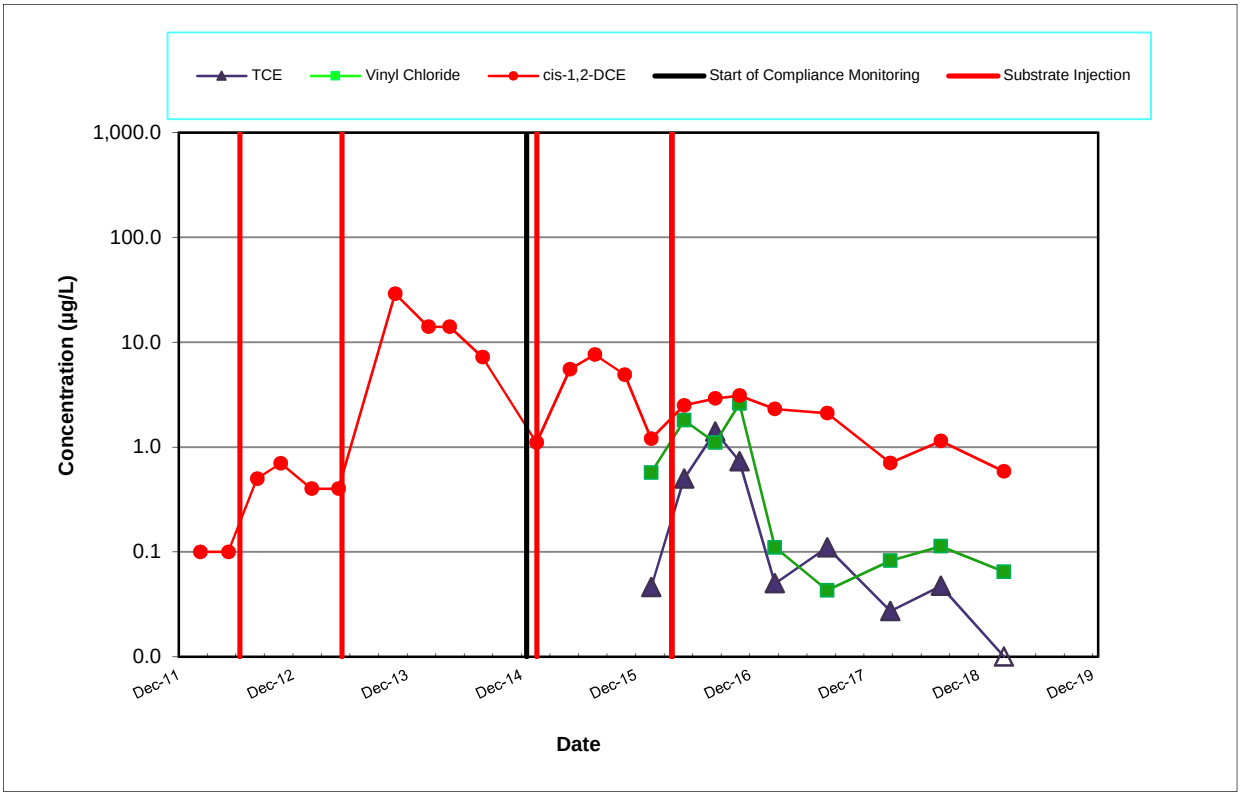
0 30 60
APPROXIMATE SCALE IN FEET

wood.

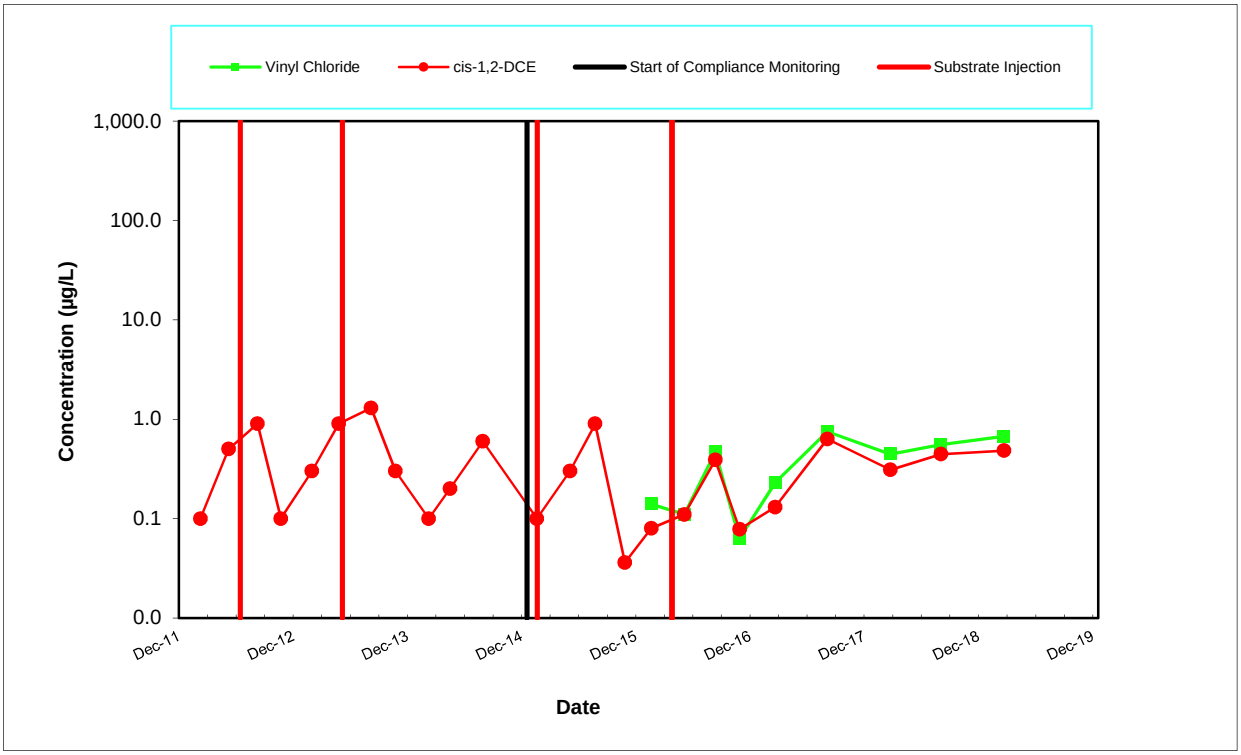
AOC-001 AND AOC-002 MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS MARCH 5, 2019 Boeing Renton Facility Renton, Washington

By: APS	Date: 05/09/19	Project No. 8888
Wood Environment & Infrastructure Solutions, Inc.		Figure 16

Plot Date: 05/09/19 - 12:13pm Plotted by: adam.stenberg
Drawing Path: S:\8888_2006\098_4q19_GW-MR\Figure_16_AOC-001-002_GW-ELEV_1Q19_030519 - Standard\ Drawing Name: Figure_16_AOC-001-002_GW-ELEV_1Q19_030519.dwg



SOURCE AREA WELL GW193S

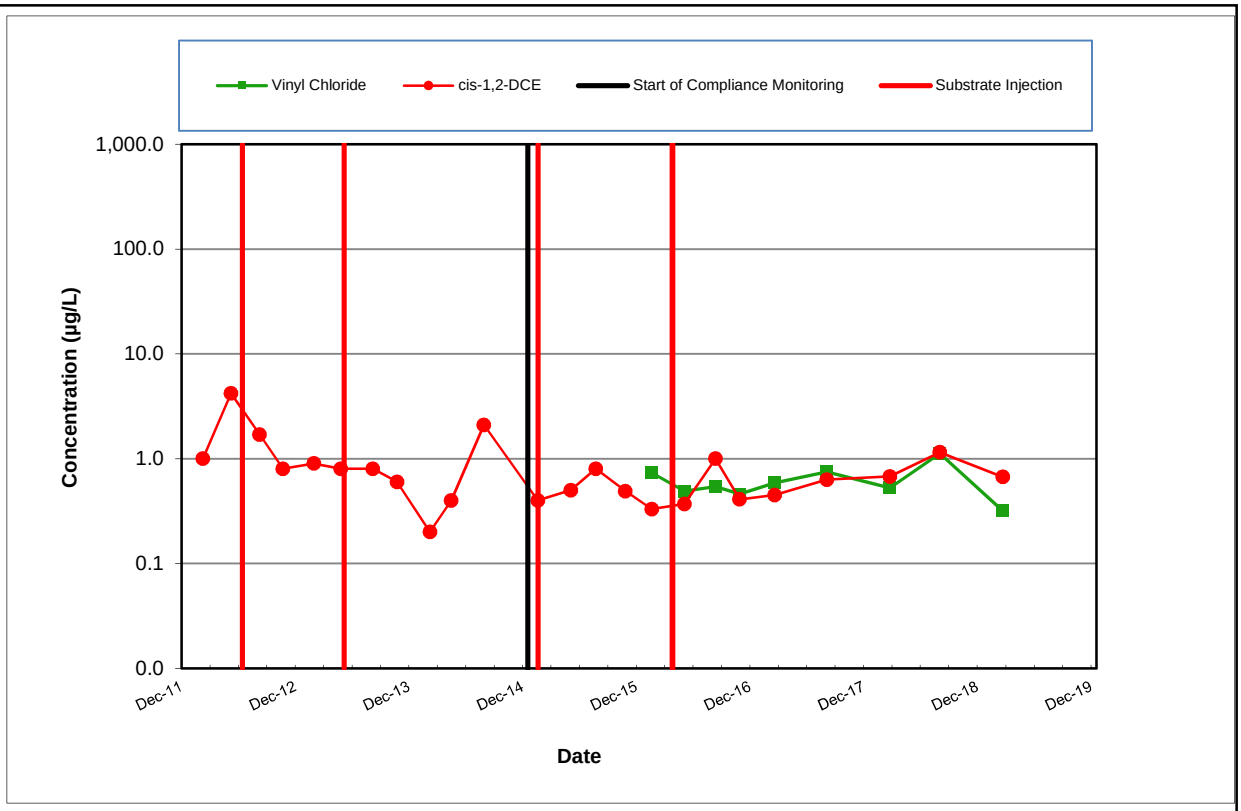


DOWNGRADIENT PLUME AREA WELL GW190S

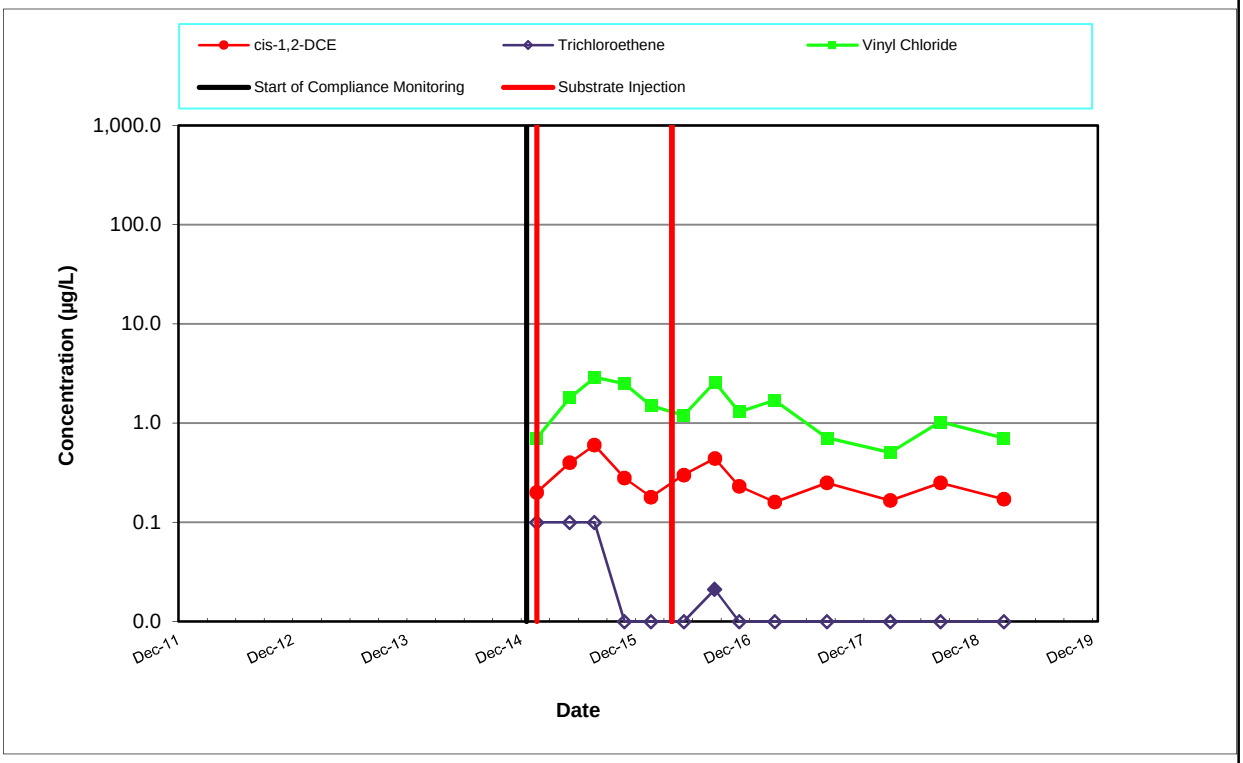
Note: non-detected values shown at one-half the reporting limit and are graphed with an open symbol.

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

wood.	AOC-001 AND 002 TREND PLOTS FOR SOURCE AREA WELL GW193S AND DOWNGRADIENT PLUME AREA WELL GW190S Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 17



DOWNGRADIENT PLUME AREA WELL GW192S

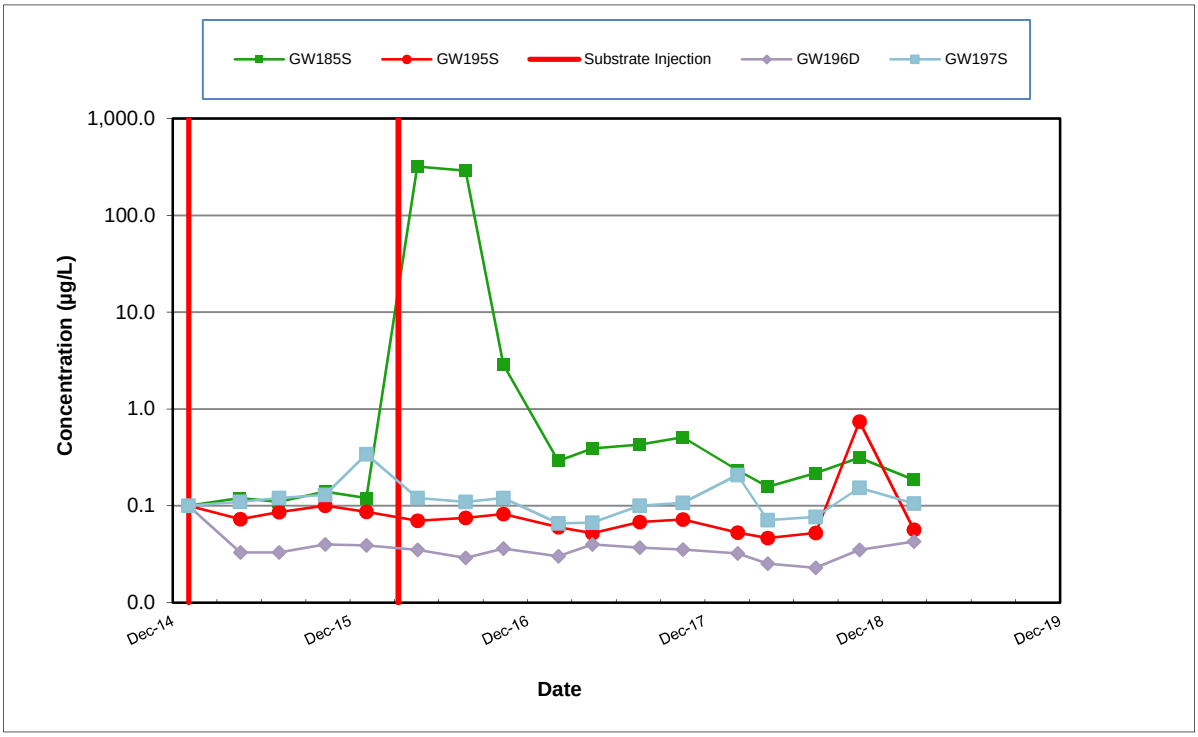


DOWNGRADIENT PLUME AREA WELL GW246S

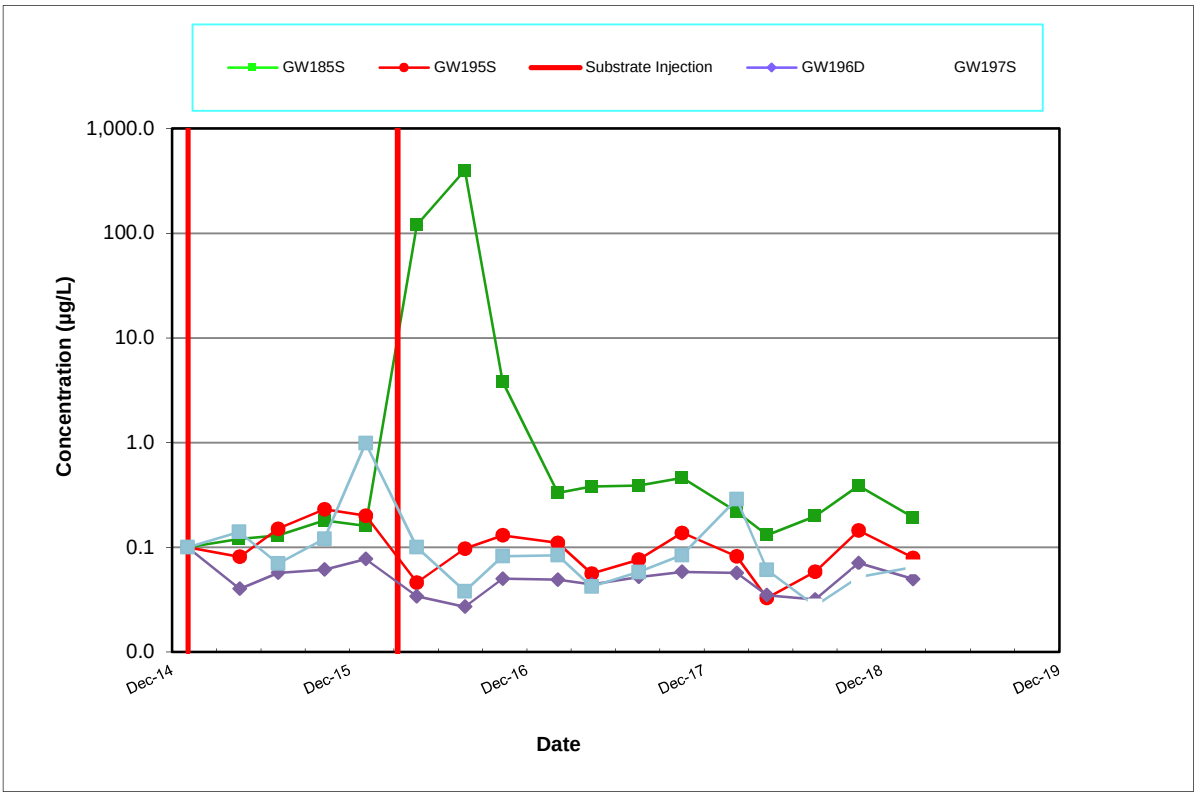
Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

wood.	AOC-001 AND 002 TREND PLOTS FOR DOWNGRADIENT PLUME AREA WELLS GW192S AND GW246S Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 18

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



cis-1,2-Dichloroethene

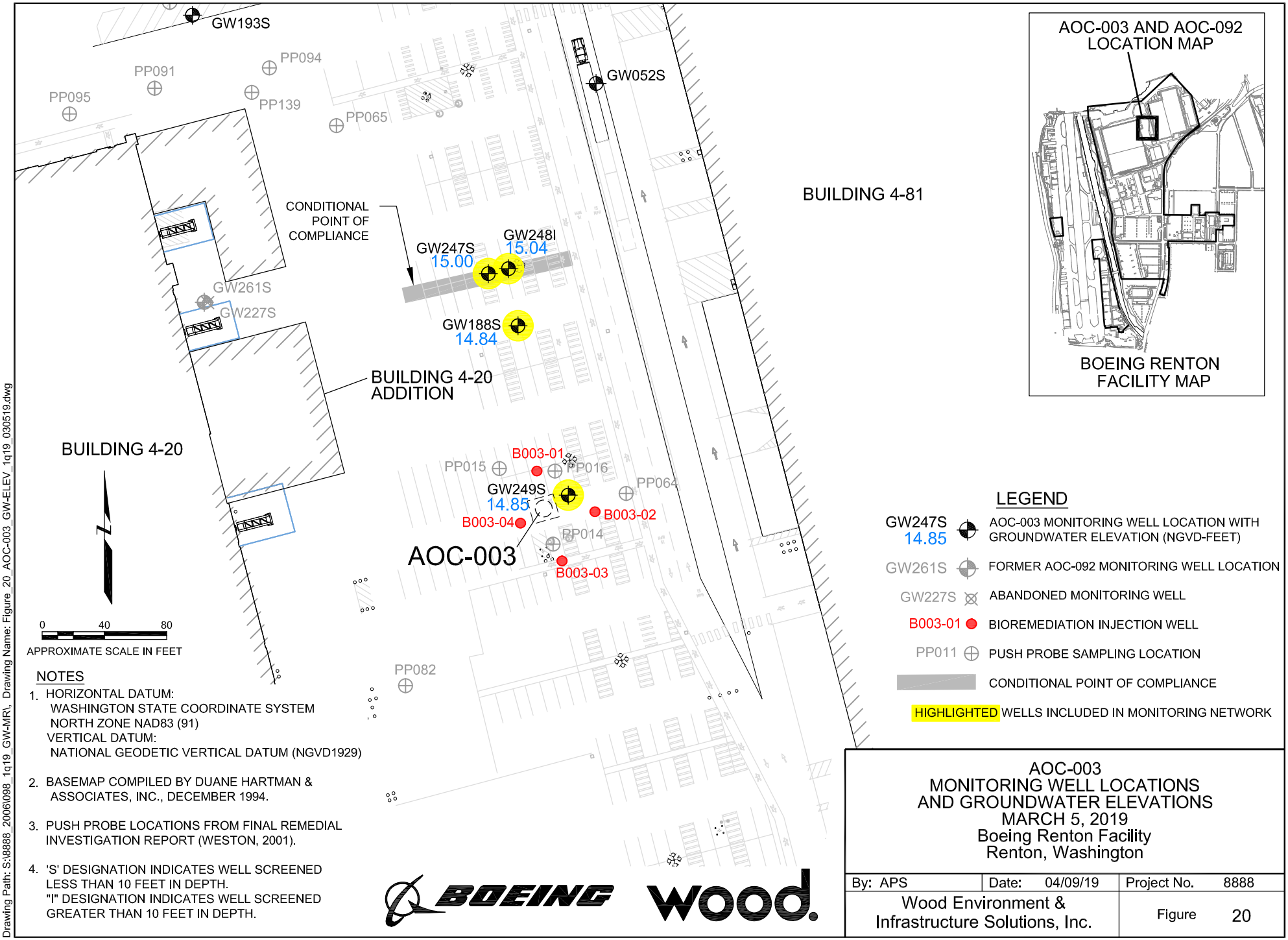


Vinyl Chloride

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

wood.	AOC-001 AND 002 TREND PLOTS FOR CIS-1,2-DICHLOROETHENE AND VINYL CHLORIDE IN CPOC AREA WELLS Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 19

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



AOC-003 AND AOC-092 LOCATION MAP

BOEING RENTON FACILITY MAP

LEGEND

- GW247S 14.85 — 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

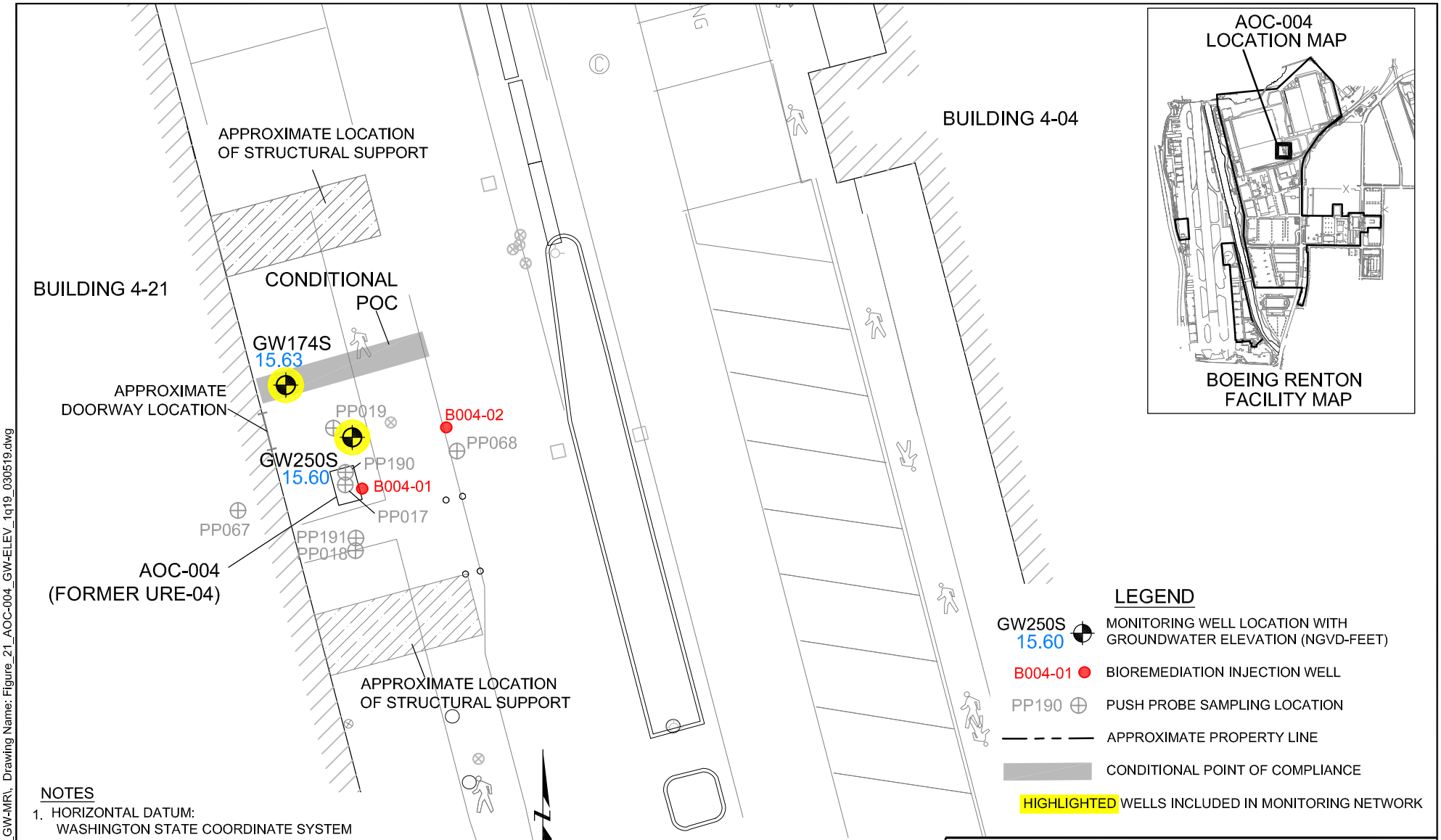
NOTES

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 MARCH 5, 2019 Boeing Renton Facility Renton, Washington

By: APS	Date: 04/09/19	Project No. 8888
Wood Environment & Infrastructure Solutions, Inc.		Figure 20

Plot Date: 04/09/19 - 9:04am, Plotted by: Mike.stenberg
Drawing Path: S:\8888_2006\098_1q19_GW-MR\, Drawing Name: Figure_20_AOC-003_GW-ELEV_1q19_030519.dwg



LEGEND

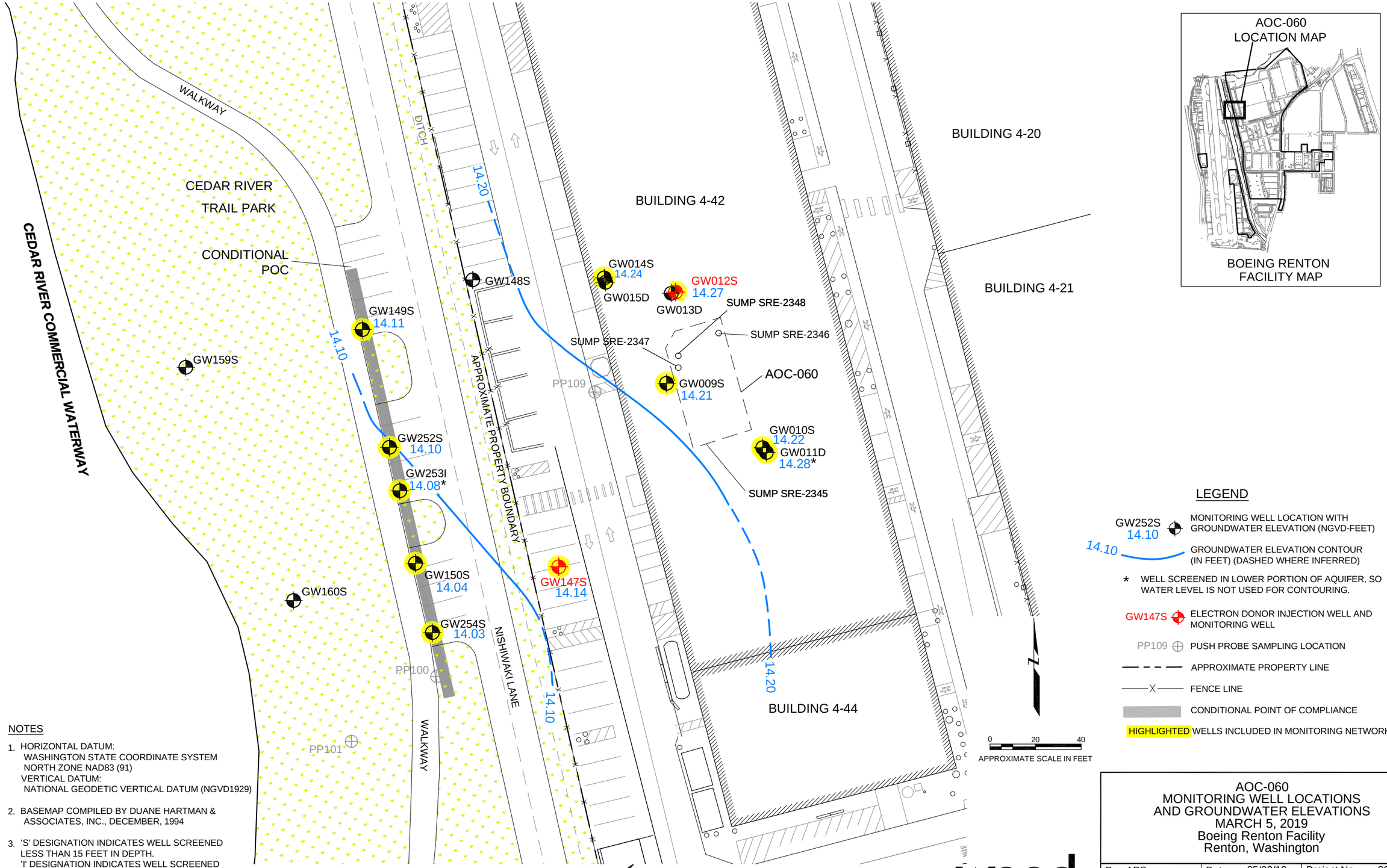
- GW250S 15.60 — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION (NGVD-FEET)
- B004-01 — BIOREMEDIATION INJECTION WELL
- PP190 — PUSH PROBE SAMPLING LOCATION
- APPROXIMATE PROPERTY LINE
- CONDITIONAL POINT OF COMPLIANCE
- HIGHLIGHTED WELLS INCLUDED IN MONITORING NETWORK

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.

AOC-004
MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS
MARCH 5, 2019
Boeing Renton Facility
Renton, Washington

By: APS	Date: 04/09/19	Project No. 8888
Wood Environment & Infrastructure Solutions, Inc.		Figure 21



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 15 FEET IN DEPTH.
   'I' DESIGNATION INDICATES WELL SCREENED BETWEEN 15 AND 29 FEET.
   'D' DESIGNATION INDICATES WELL SCREENED GREATER THAN 29 FEET IN DEPTH.

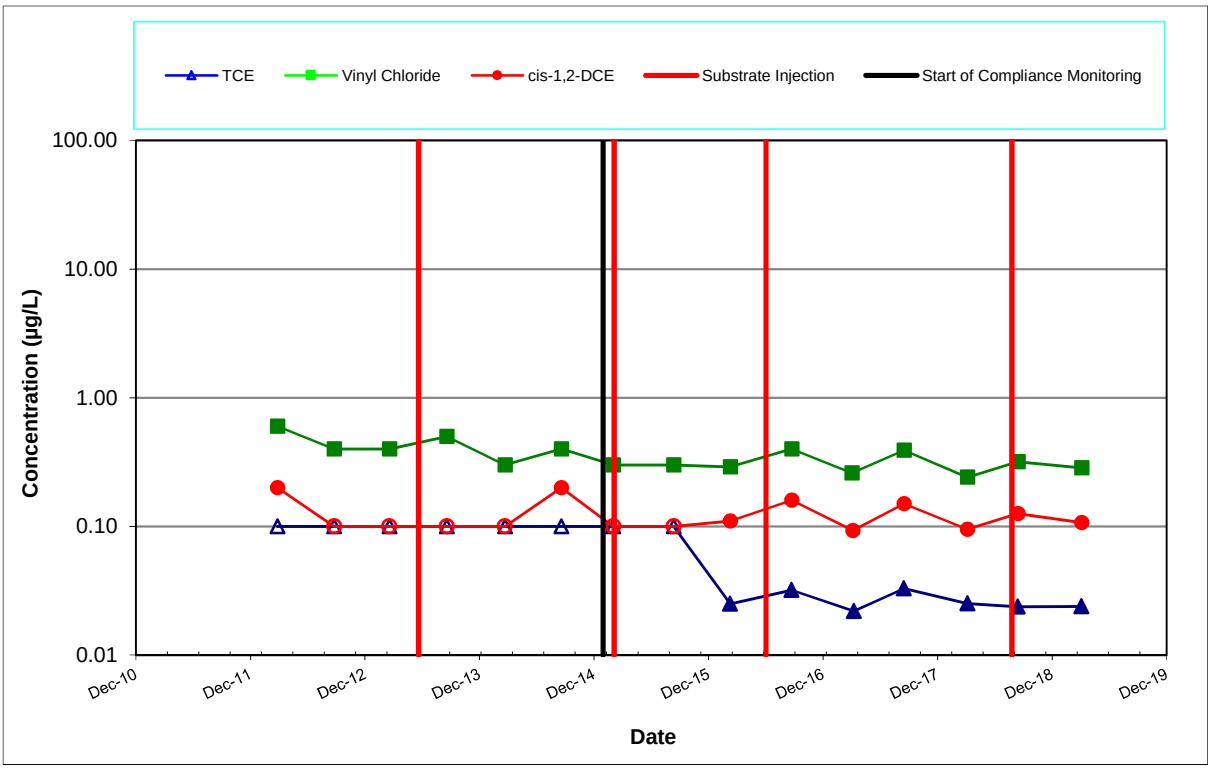
BOEING

wood.

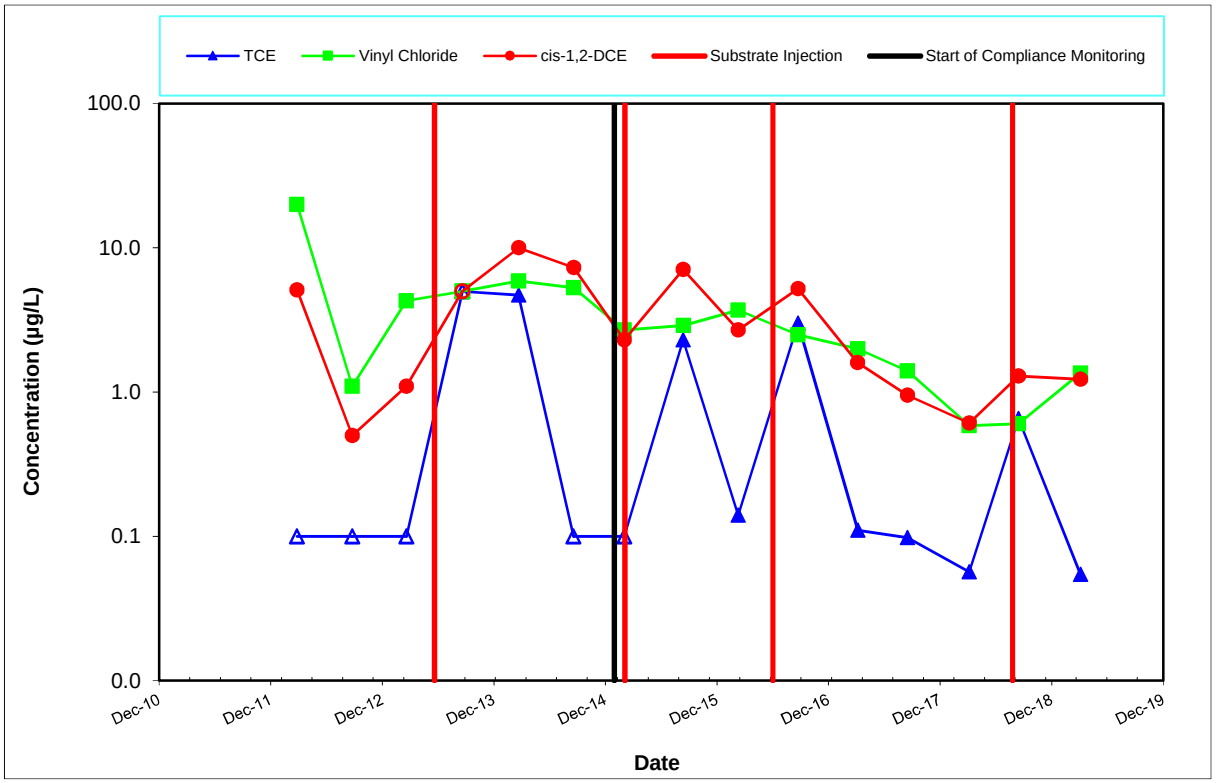
AOC-060
MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS
MARCH 5, 2019
Boeing Renton Facility
Renton, Washington

By: APS	Date: 05/02/19	Project No. 8888
Wood Environment & Infrastructure Solutions, Inc.	Figure	22

Plot Date: 05/02/19 - 12:47pm Plotted by: adam.stenberg
Drawing Path: S:\8888_2006\098_1q19_GW-MR_Drawing Name: Figure_22_AOC-060_GW-ELEV_1Q19_030519.dwg



SOURCE AREA WELL GW009S

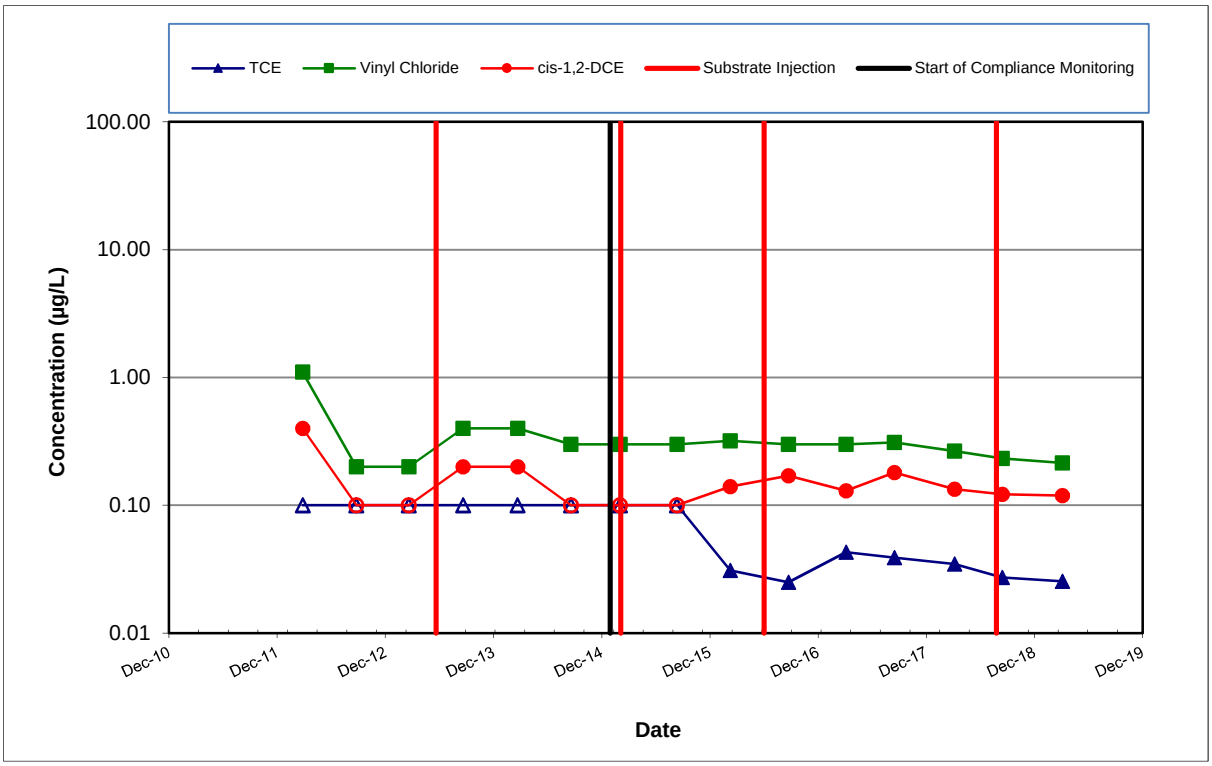


DOWNGRADIENT PLUME AREA WELL GW012S

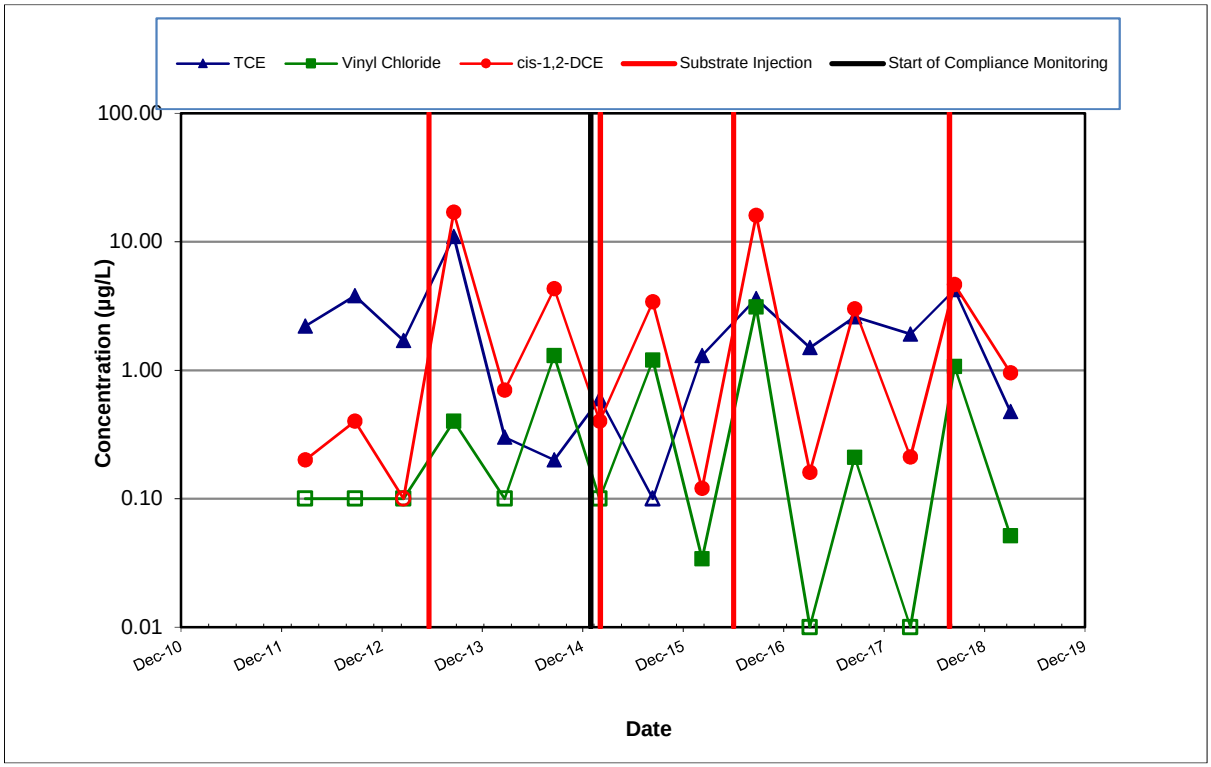
Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol. August 2013 reporting limits elevated.

wood.	AOC-060 TREND PLOTS FOR SOURCE AREA WELL GW009S AND DOWNGRADIENT PLUME AREA WELL GW012S Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 23

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figures 23 to 26 AOC 60.xlsx



DOWNGRADIENT PLUME AREA WELL GW014S

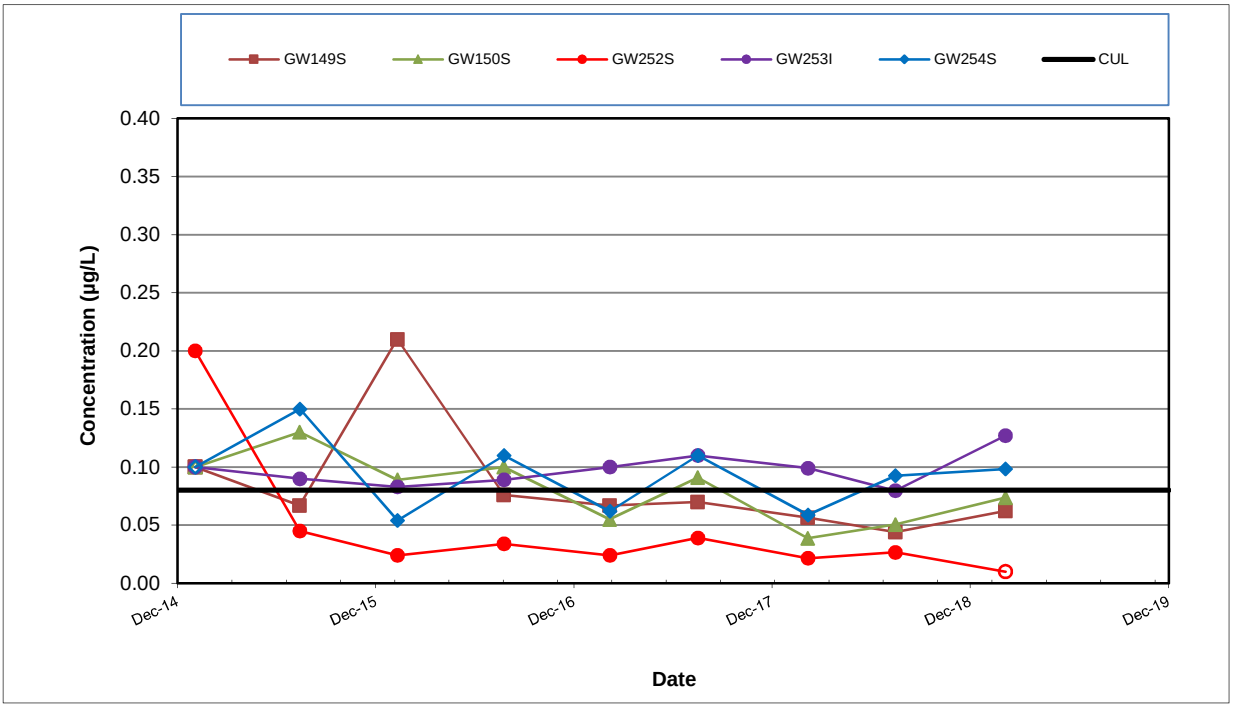


DOWNGRADIENT PLUME AREA WELL GW147S

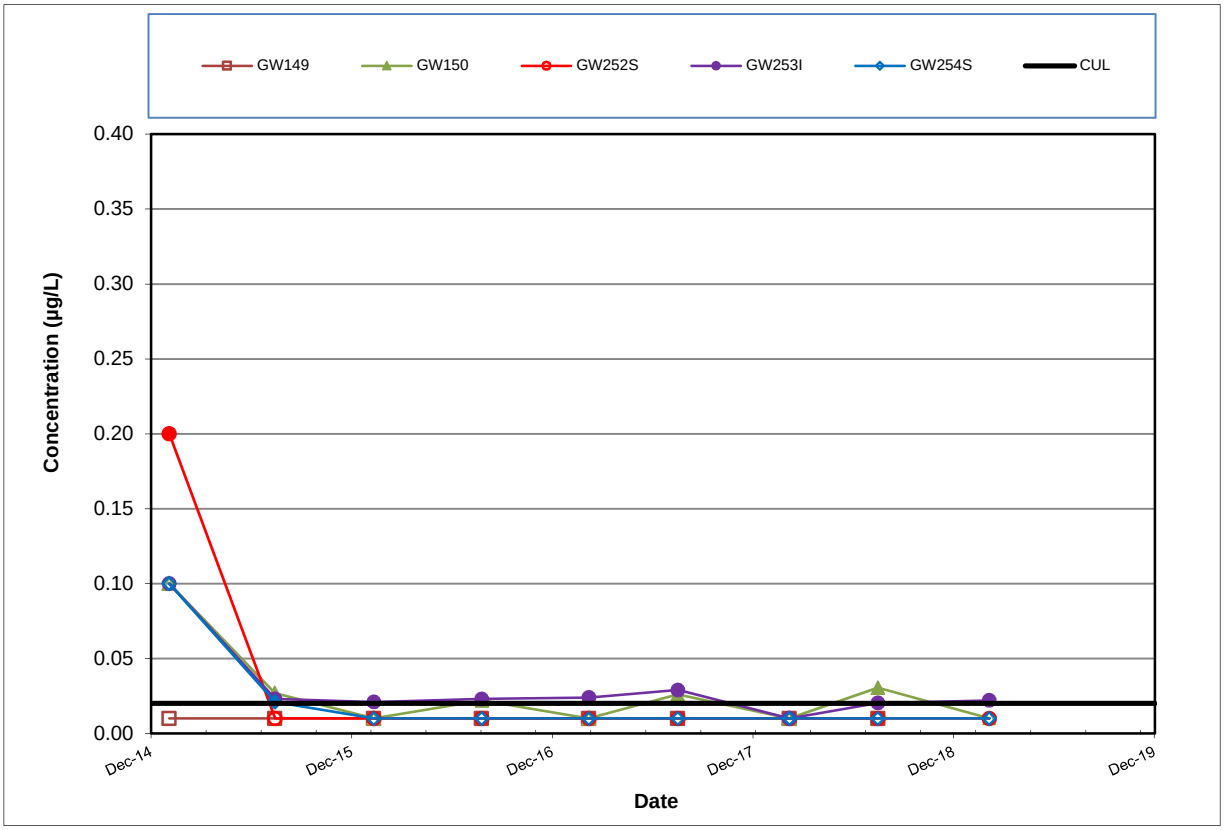
Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

wood.	AOC-060 TREND PLOTS FOR DOWNGRADIENT PLUME AREA WELLS GW014S AND GW147S Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 24

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figures 23 to 26 AOC 60.xlsx



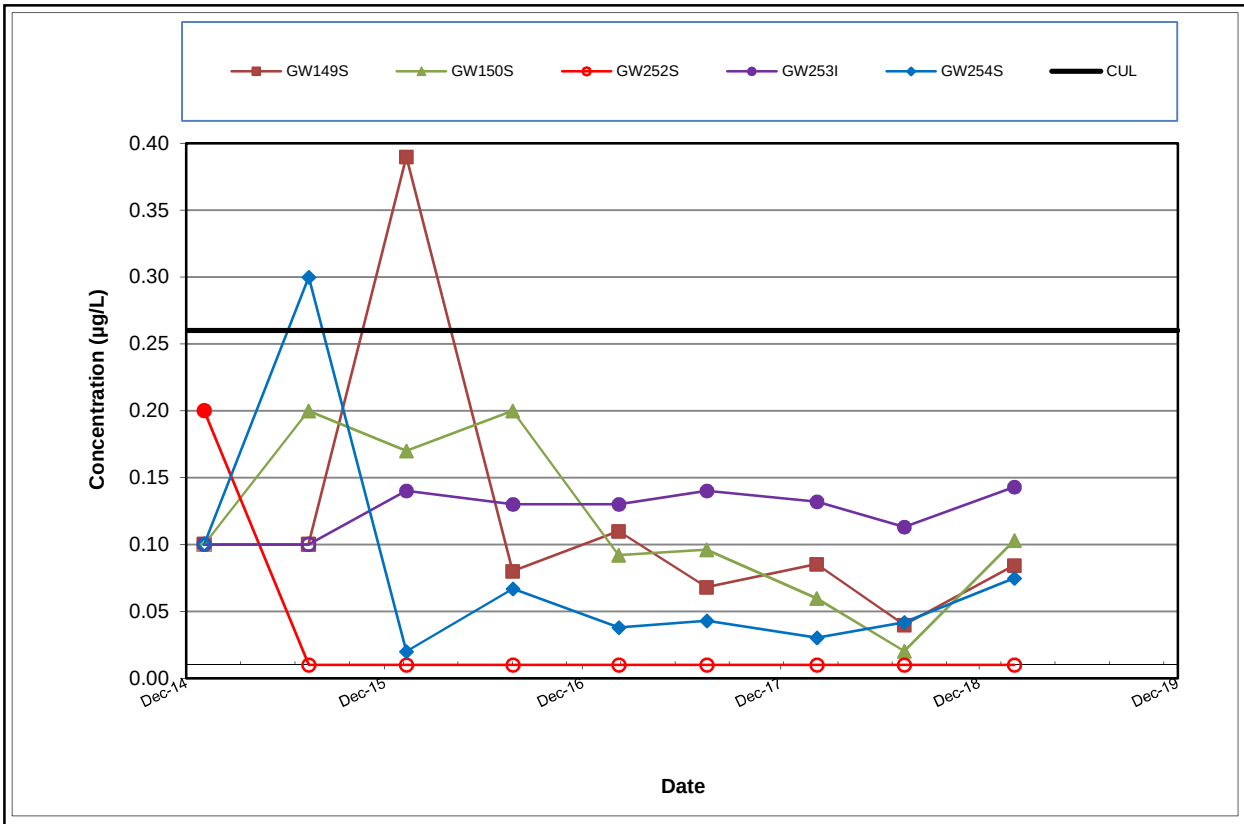
cis-1,2-Dichloroethene



Trichloroethene

wood.	AOC-060 TREND PLOTS FOR CIS-1,2-DICHLOROETHENE AND TRICHLOROETHENE IN CPOC AREA WELLS Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 25

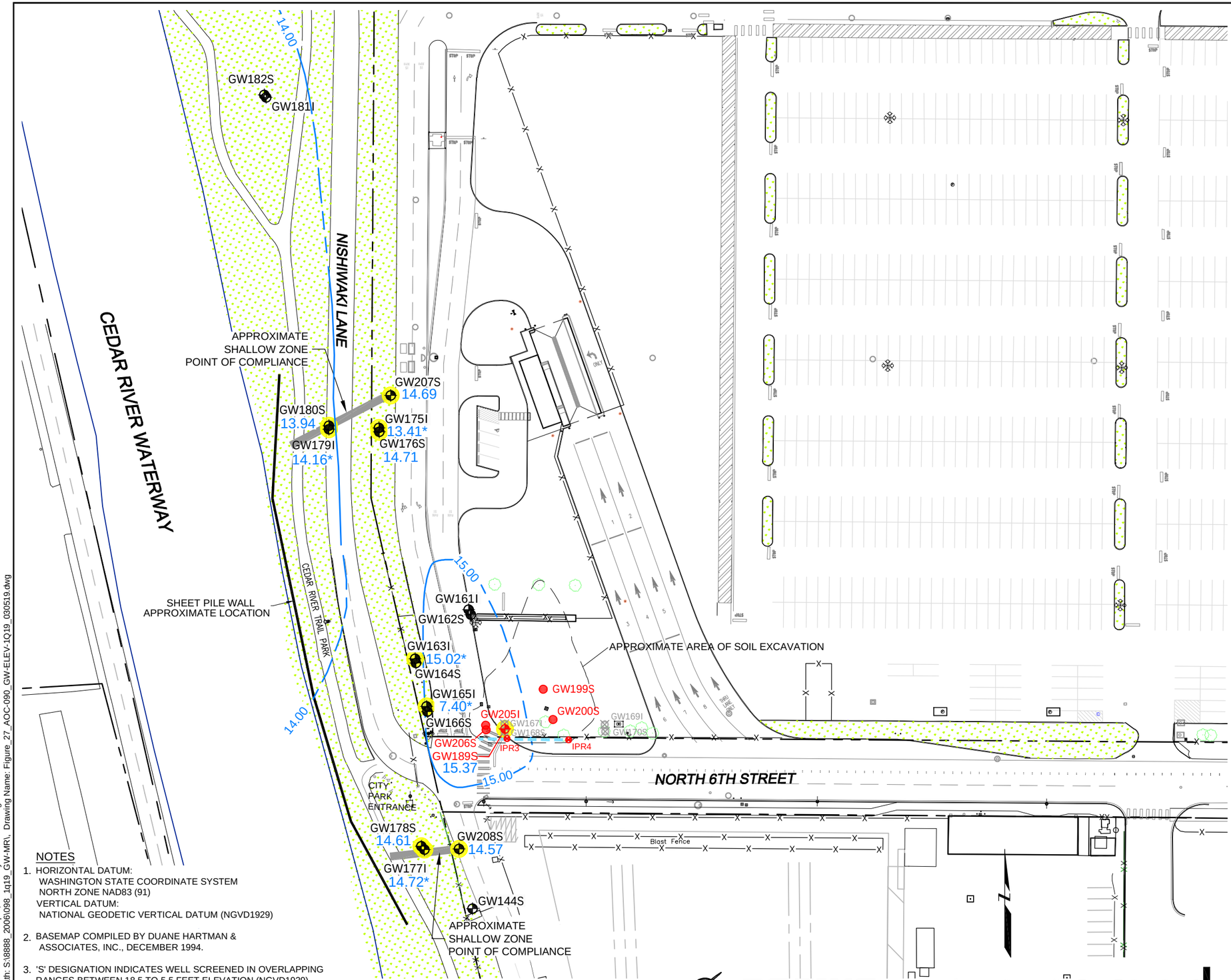
P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figures 23 to 26 AOC 60.xlsx



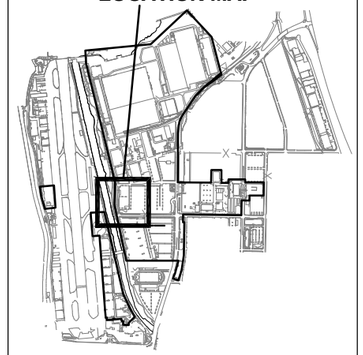
Vinyl Chloride

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figures 23 to 26 AOC 60.xlsx

wood.	AOC-060 TREND PLOTS FOR VINYL CHLORIDE IN CPOC AREA WELLS Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 26



AOC-090 LOCATION MAP



BOEING RENTON FACILITY MAP

LEGEND

- GW178S — MONITORING WELL LOCATION WITH
- GW201S — EXISTING BIOREMEDIATION SUBSTRATE INJECTION WELL
- GW189S 15.37 — EXISTING BIOREMEDIATION SUBSTRATE INJECTION WELL AND MONITORING WELL GROUNDWATER ELEVATION (NGVD-FEET)
- IPR4 — EXISTING INJECTION PIPE RISER
- GW170S — ABANDONED MONITORING WELL
- APPROXIMATE PROPERTY LINE
- FENCE
- APPROXIMATE LOCATION OF 4-INCH DIAMETER PERFORATED PIPE
- 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 IN OVERLAPPING RANGES BETWEEN 18.5 TO 5.5 FEET ELEVATION (NGVD1929).
   'I' DESIGNATION INDICATES WELL SCREENED IN OVERLAPPING RANGES BETWEEN 1.0 TO -13.7 FEET IN ELEVATION (NGVD1929).

BOEING

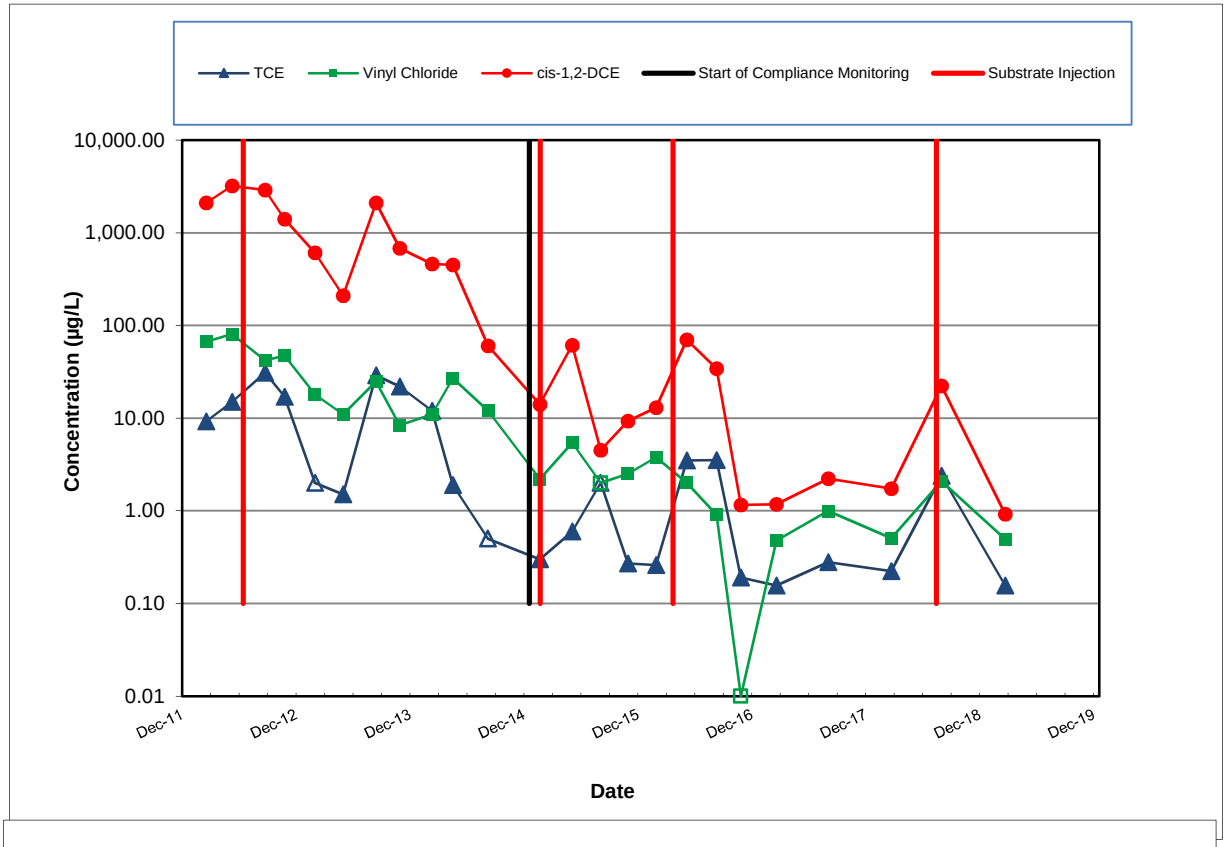
0 40 80
APPROXIMATE SCALE IN FEET

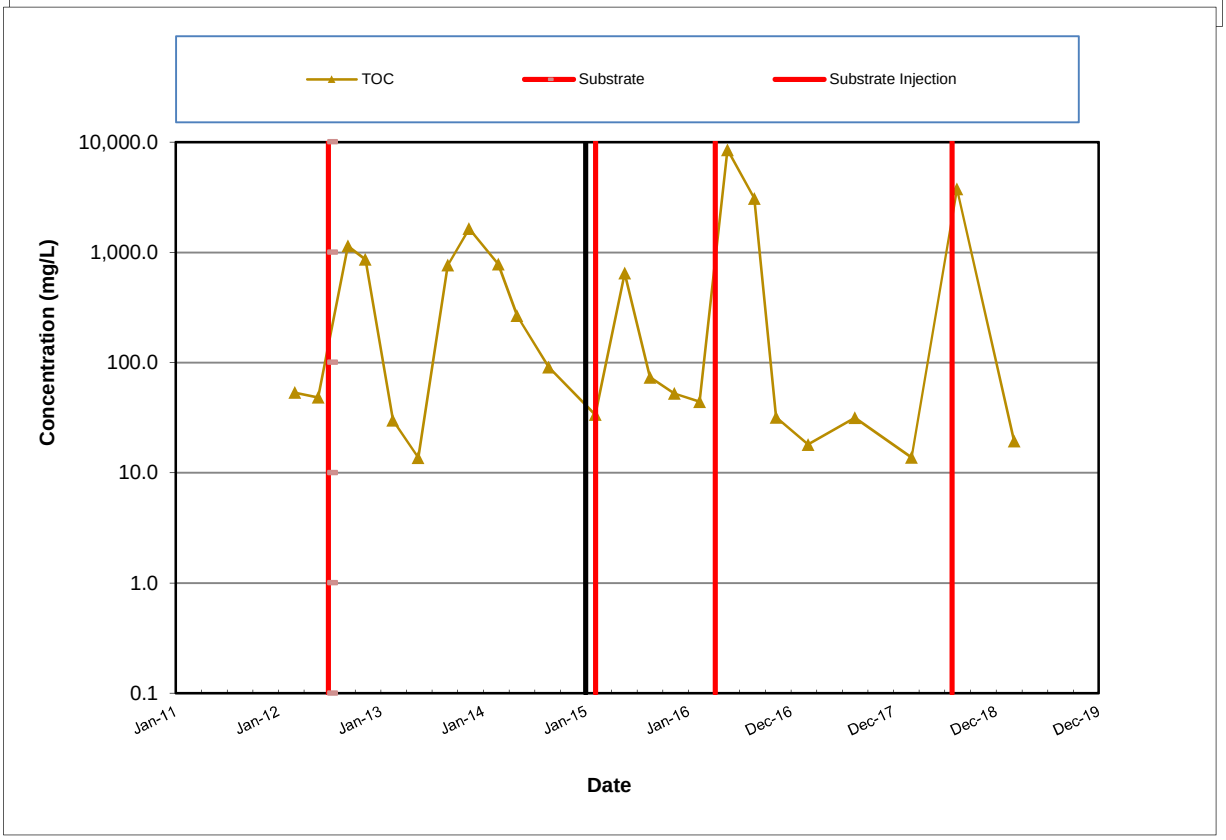
wood.

AOC-090 MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATION MARCH 4 AND 5, 2019 Boeing Renton Facility Renton, Washington

By: APS	Date: 05/09/19	Project No. 8888
Wood Environment & Infrastructure Solutions, Inc.		Figure 27

Plot Date: 05/09/19 - 12:18pm, Plotted by: adam.stenberg
Drawing Path: S:\8888_2006\098_1q19_GW-MR\, Drawing Name: Figure_27_AOC-090_GW-ELEV-1Q19_030519.dwg

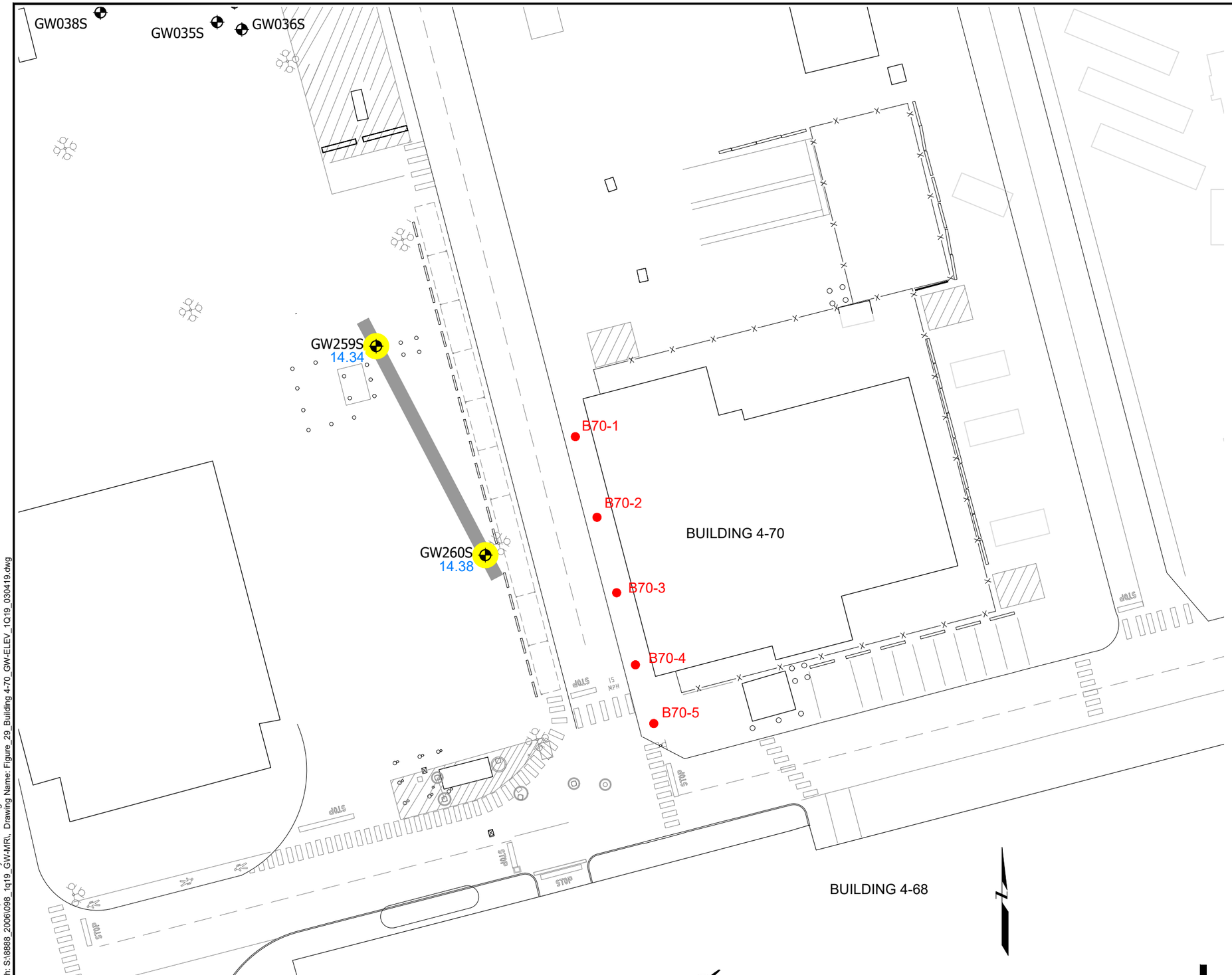


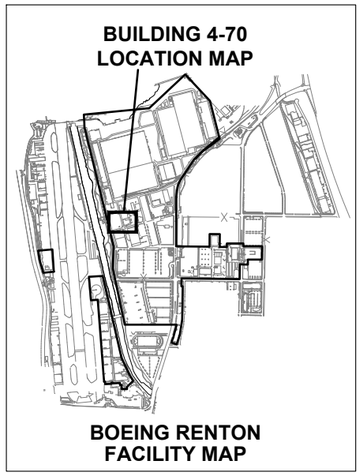


Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

wood.	AOC-090 TREND PLOTS FOR SOURCE AREA WELL GW189S Boeing Renton Facility Renton, Washington	Project No. 8888 Figure 28

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figure 28 AOC-90 Trend Plots.xls





LEGEND

- GW259S / 14.34 — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION (NGVD-FEET)
- B70-2 — ELECTRON DONOR INJECTION WELL
- APPROXIMATE PROPERTY 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. 'S' DESIGNATION INDICATES WELL SCREENED IN OVERLAPPING RANGES BETWEEN 18.5 TO 5.5 FEET ELEVATION (NGVD1929).
   'I' DESIGNATION INDICATES WELL SCREENED IN OVERLAPPING RANGES BETWEEN 1.0 TO -13.7 FEET IN ELEVATION (NGVD1929).

0 20 40
APPROXIMATE SCALE IN FEET

BOEING

wood.

BUILDING 4-70
MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS
MARCH 4, 2019
Boeing Renton Facility
Renton, Washington

By: APS	Date: 04/10/19	Project No. 8888
Wood Environment & Infrastructure Solutions, Inc.	Figure	29

Plot Date: 04/10/19 - 10:20am Plotted by: Mike.stenberg
Drawing Path: S:\8888_2006\098_1q19_GW-MR\, Drawing Name: Figure_29_Building 4-70_GW-ELEV_1Q19_030419.dwg

Tables

TABLE 1: SWMU-168 GROUNDWATER ELEVATION DATA
March 4, 2019
Boeing Renton Facility, Renton, Washington

Well ID[1]	Screen Interval Depth (feet bgs)	TOC Elevation (feet)[2]	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet)[2]
GW229S	5 to 10	25.42	7.57	17.85
GW230I	4 to 14	24.86	7.17	17.69
GW231S	5 to 10	24.65	6.95	17.70

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
SWMU = solid waste management unit
TOC = top of casing

TABLE 2: SWMU-168 CONCENTRATIONS OF PRIMARY GEOCHEMICAL INDICATORS [1]

March 4, 2019

Boeing Renton Facility, Renton, Washington

	Well ID [2]		
	CPOC Area		
	GW229S	GW230I	GW231S
Temperature (degrees C)	-1.92	9.12	6.49
Specific Conductivity (µS/cm)	347	271	275
Dissolved Oxygen (mg/L)	1.43	1.12	3.50
pH (standard units)	6.26	6.44	6.54
Oxidation/Reduction Potential (mV)	5.9	-6.2	-12.6

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
mg/L = milligrams per liter
mV = millivolts
SWMU = solid waste management unit

TABLE 3: SWMU-168 CONCENTRATIONS OF CONSTITUENTS OF CONCERN[1]
March 4, 2019
Boeing Renton Facility, Renton, Washington

		Cleanup Level [3]	Well ID [2]		
			CPOC Area		
			GW229S	GW230I	GW231S
Volatile Organic Compounds (µg/L)					
Vinyl Chloride		0.11	0.0211	0.0566	0.0327

Notes
1. **Bolded** values exceed the cleanup levels.
2. S = shallow well; I = intermediate well.
3 Cleanup levels obtained from Table 2 of the Cleanup Action Plan.

Abbreviations
µg/L = micrograms per liter
CPOC = conditional point of compliance
SWMU = solid waste management unit

TABLE 4: SWMU-172 AND SWMU-174 GROUP GROUNDWATER ELEVATION DATA
March 4, 2019
Boeing Renton Facility, Renton, Washington

Well ID[1]	Screen Interval Depth (feet bgs)[2]	TOC Elevation (feet)[3]	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet)[3]
GW081S	5 to 20[2]	25.91	8.15	17.76
GW152S	5 to 20[2]	26.98	8.75	18.23
GW153S	5 to 20[2]	27.47	9.17	18.30
GW172S	8 to 18[2]	26.44	9.18	17.26
GW173S	8 to 18[2]	26.51	9.03	17.48
GW226S	5 to 20[2]	26.86	8.67	18.19
GW232S	4 to 14	24.45	7.74	16.71
GW233I	15 to 25	24.35	7.21	17.14
GW234S	3 to 13	24.95	7.77	17.18
GW235I	15 to 25	24.90	7.42	17.48
GW236S	5 to 15	24.36	7.03	17.33

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

Abbreviations
bgs = below ground surface
SWMU = solid waste management unit
TOC = top of casing

TABLE 5: SWMU-172 AND SWMU-174 GROUP CONCENTRATIONS OF PRIMARY GEOCHEMICAL INDICATORS [1]
March 4, 2019
Boeing Renton Facility, Renton, Washington

	Well ID [2]											
	Source Area			Downgradient Plume Area				CPOC Area				
	GW152S	GW152S (field dup.)	GW153S	GW081S	GW172S	GW173S	GW226S	GW232S	GW233I	GW234S	GW235I	GW236S
Temperature (degrees C)	9.9	9.9	10.7	11.3	8.9	9.4	11.1	6.9	8.6	9.2	7.8	8.8
Specific Conductivity (µS/cm)	161.8	161.8	208.3	186.7	291.1	272.7	209.5	278.9	179.2	229.0	130.7	328.6
Dissolved Oxygen (mg/L)	0.34	0.34	0.73	0.59	1.99	0.37	0.54	2.94	1.04	1.51	1.78	1.99
pH (standard units)	6.25	6.25	6.49	6.56	6.47	6.65	6.58	6.00	6.56	6.31	6.39	6.61
Oxidation/Reduction Potential (mV)	46.7	46.7	30.9	64.3	-24.5	-7.1	17.5	-35.9	103.4	-12.7	-12.8	-44.4
Total Organic Carbon (mg/L)	2.81	4.55	7.03	4.12	3.87	4.54	9.09	6.12	4.20	1.40	0.56	2.17

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
SWMU = solid waste management unit

TABLE 6: SWMU-172 AND SWMU-174 GROUP CONCENTRATIONS OF CONSTITUENTS OF CONCERN [1,2]
March 4, 2019
Boeing Renton Facility, Renton, Washington

	Cleanup Level [4]	Well ID [3]											
		Source Area			Downgradient Plume Area				CPOC Area				
		GW152S	GW152S (field dup.)	GW153S	GW081S	GW172S	GW173S	GW226S	GW232S	GW233I	GW234S	GW235I	GW236S
Volatile Organic Compounds (µg/L)													
cis -1,2-Dichloroethene	0.03	**0.678**	**0.655**	**0.107**	**0.0355**	**0.111**	**0.0756**	**0.0387**	**0.250**	**0.075**	**0.0869**	**0.135**	**0.0443**
Tetrachloroethene	0.02	**0.086**	**0.0874**	0.020 U	0.020 U	0.020 U	**0.0842**	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Trichloroethene	0.02	**0.152**	**0.162**	0.020 U	0.020 U	0.020 U	**0.149**	0.020 U	0.020 U	0.020 U	0.020 U	**0.0353**	0.020 U
Vinyl Chloride	0.11	**0.128**	**0.142**	**0.333**	0.020 U	**0.167**	0.0312	0.0432	**0.242**	0.020 U	0.0273	0.020 U	0.020 U
Total Metals (µg/L)													
Arsenic	1.0	**7.54**	**7.11**	**4.49**	**2.33**	**6.52**	**6.72**	**5.07**	**5.12**	0.529	**2.11**	0.200 U	**2.81**
Copper	3.5	**5.12**	**4.44**	2.00	0.536	2.07	**4.38**	**4.55**	1.70	0.500 U	1.75	0.500 U	0.919
Lead	1.0	**3.33**	**3.33**	0.352	0.100 U	0.774	0.712	0.413	0.167	0.102	0.701	0.322	**1.94**

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

Abbreviations
µg/L = micrograms per liter
CPOC = conditional point of compliance
field dup. = field duplicate
SWMU = solid waste management unit

TABLE 7: BUILDING 4-78/79 SWMU/AOC GROUP GROUNDWATER ELEVATION DATA
March 4 and 5, 2019
Boeing Renton Facility, Renton, Washington

Well ID[1]	Screen Interval Depth (feet bgs)	TOC Elevation (feet)[2]	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet)[2]
GW031S	5 to 25	19.44	5.16	14.28
GW033S	5 to 25	19.49	5.28	14.21
GW034S[3]	5 to 25	19.65	5.39	14.42
GW038S	5 to 25	19.68	5.49	14.19
GW039S	3.5 to 13.5	19.30	4.95	14.35
GW143S	10 to 15	19.81	5.67	14.14
GW209S	3.5 to 13.3	19.37	5.15	14.22
GW210S	3.5 to 13.3	19.19	4.90	14.29
GW237S	5 to 15	18.85	4.74	14.11
GW238I	5 to 20	18.94	4.81	14.13
GW239I	15 to 20	19.69	5.55	14.14
GW240D	22 to 27	19.81	6.13	13.68
GW241S	4 to 14	20.28	6.15	14.13
GW242I	15 to 20	20.44	6.31	14.13
GW243I	5 to 20	19.49	5.22	14.27
GW244S	5 to 15	19.53	5.28	14.25

Notes
1. S = shallow well; I = intermediate well; D = deep well.
2. Elevations in feet relative to National Geodetic Vertical Datum of 1929.
3. GW034S was measured on March 24, 2017, becaue it was inaccessible during the March 2 and 3 sampling event.

Abbreviations
AOC = area of concern
bgs = below ground surface
SWMU = solid waste management unit
TOC = top of casing

TALBE 8: BUILDING 4-78/79 SWMU/AOC GROUP CONCENTRATIONS
OF PRIMARY GEOCHEMICAL INDICATORS [1]
March 4 and 5, 2019
Boeing Renton Facility, Renton, Washington

	Well ID [2]						
	Source Area						
	GW031S	GW031S (field dup.)	GW033S	GW034S	GW039S	GW243I	GW244S
Temperature (degrees C)	12.2	12.2	13.1	9.1	13.7	14.1	11.6
Specific Conductivity (µS/cm)	410.5	410.5	301.1	264.9	230.8	382.5	350.0
Dissolved Oxygen (mg/L)	0.41	0.41	0.28	0.54	0.34	0.43	0.31
pH (standard units)	6.48	6.48	6.29	6.26	6.18	6.43	6.32
Oxidation/Reduction Potential (mV)	-57.3	-57.3	-20.2	-12.5	30.5	-11.1	-19.1
Total Organic Carbon (mg/L)	14.44	13.34	17.90	8.95	2.66	10.41	14.69

	Well ID [2]		
	Downgradient Plume Area		
	GW038S	GW209S	GW210S
Temperature (degrees C)	12.8	8.2	7.3
Specific Conductivity (µS/cm)	260.8	288.6	267.5
Dissolved Oxygen (mg/L)	0.48	0.73	0.49
pH (standard units)	6.60	6.38	6.99
Oxidation/Reduction Potential (mV)	-32.8	-22.5	-27.9
Total Organic Carbon (mg/L)	8.69	9.34	14.47

	Well ID [2]						
	CPOC Area						
	GW143S	GW237S	GW238I	GW239I	GW240D	GW241S	GW242I
Temperature (degrees C)	13.7	8.3	8.0	11.3	10.0	11.10	9.53
Specific Conductivity (µS/cm)	287.6	171.0	356.1	272.3	332.5	301	395
Dissolved Oxygen (mg/L)	0.17	2.77	1.05	0.21	0.26	0.36	0.50
pH (standard units)	6.47	6.34	6.37	6.44	6.53	6.19	6.49
Oxidation/Reduction Potential (mV)	-32.7	19.3	-31.6	6.1	-35.5	-16.8	-15.8
Total Organic Carbon (mg/L)	9.27	9.15	9.1	9.8	5.07	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
AOC = area of concern
CPOC = conditional point of compliance
degrees C = degrees Celsius
field dup. = field duplicate
mg/L = milligrams per liter
mV = millivolts
SWMU = solid waste management unit

TABLE 9: BUILDING 4-78/79 SWMU/AOC GROUP CONCENTRATIONS OF CONSTITUENTS OF CONCERN [1,2]
March 4 and 5, 2019
Boeing Renton Facility, Renton, Washington

	Cleanup Level [4]	Well ID [3]						
		Source Area						
		GW031S	GW031S (field dup.)	GW033S	GW034S	GW039S	GW243I	GW244S
Volatile Organic Compounds (µg/L)								
Benzene	0.80	**55.9**	**58.6**	**11.7**	0.20 U	0.20 U	0.20 U	**1.73**
cis -1,2-Dichloroethene	0.70	0.20 U	0.20 U	**0.79**	0.20 U	0.20 U	0.20 U	**0.82**
Trichloroethene	0.23	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.22
Vinyl Chloride	0.20	0.20 U	0.20 U	**3.26**	0.20	0.20 U	0.20 U	**0.86**
Total Petroleum Hydrocarbons (µg/L)								
NWTPH-Gx (C7-C12)	800	**4,200**	**4,220**	395	100 U	100 U	100 U	100 U

	Cleanup Level [4]	Well ID [3]		
		Downgradient Plume Area		
		GW038S	GW209S	GW210S
Volatile Organic Compounds (µg/L)				
Benzene	0.80	0.20 U	0.20 U	0.20 U
cis -1,2-Dichloroethene	0.70	0.20 U	0.20 U	0.20 U
Trichloroethene	0.23	0.20 U	0.20 U	0.20 U
Vinyl Chloride	0.20	0.20 U	0.20 U	0.20 U
Total Petroleum Hydrocarbons (µg/L)				
NWTPH-Gx (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	**9.58**	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
cis -1,2-Dichloroethene	0.70	0.20 U	0.21	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	**0.25**	0.20 U	0.20 U	**0.23**	0.20 U	0.20 U
Total Petroleum Hydrocarbons (µg/L)								
NWTPH-Gx (C7-C12)	800	100 U	**1,680**	100 U	100 U	100 U	100 U	100 U

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

Abbreviations
µg/L = micrograms per liter
AOC = area of concern
CPOC = conditional point of compliance
field dup. = field duplicate
NWTPH-Gx = total petroleum hydrocarbons in gasoline range

TABLE 10: AOC-001 AND AOC-002 GROUNDWATER ELEVATION DATA
March 5, 2019
Boeing Renton Facility, Renton, Washington

Well ID[1]	Screen Interval Depth (feet bgs)	TOC Elevation (feet)[2]	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet)[2]
GW185S	4.5 to 14.5	16.27	2.21	14.06
GW190S	3.0 to 13.0	17.30	3.19	14.11
GW191D	26.5 to 36.0	17.53	3.01	14.52
GW192S	5.0 to 9.5	17.54	3.44	14.10
GW193S	3.0 to 12.8	18.67	4.55	14.12
GW194S	7.3 to 12.0	16.79	3.14	13.65
GW195S	7.3 to 12.0	16.34	2.42	13.92
GW196D	26.8 to 36.8	16.46	2.33	14.13
GW197S	7.8 to 12.5	16.52	2.05	14.47
GW245S	3.0 to 13.0	16.08	2.18	13.90
GW246S	4.0 to 14.0	16.53	2.55	13.98

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

Abbreviations
AOC = area of concern
bgs = below ground surface
TOC = top of casing

TABLE 11: AOC-001 AND AOC-002 CONCENTRATIONS OF PRIMARY GEOCHEMICAL INDICATORS [1]

March 5, 2019

Boeing Renton Facility, Renton, Washington

	Well ID [2]											
	Source Area	Downgradient Plume Area				CPOC Area [3]						
	GW193S	GW190S	GW191D[4]	GW192S	GW246S	GW185S	GW185S (field dup.)	GW194S	GW195S	GW196D[5]	GW197S	GW245S
Temperature (degrees C)	9.4	12.0	12.7	11.3	11.8	12.0	12.0	11.5	12.2	10.5	13.4	12.4
Specific Conductivity (µS/cm)	911	270.5	298.1	290.5	171.0	584	584	495.5	444.3	326.1	781	439.4
Dissolved Oxygen (mg/L)	0.55	0.25	0.20	0.26	0.26	0.61	0.61	0.32	0.50	0.50	0.49	0.41
pH (standard units)	6.39	6.37	6.57	6.09	6.47	6.40	6.40	6.26	6.25	6.13	7.03	6.64
Oxidation/Reduction Potential (mV)	2.1	10.6	-27.8	1.9	-10.7	-34.8	-34.8	11.0	-44.6	-5.7	-108.7	-73.7
Total Organic Carbon (mg/L)	25.10	6.69	5.88	6.53	4.31	12.04	12.01	13.05	12.87	7.63	11.70	8.79

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. Wells GW185S through GW197S and GW246S are associated with the AOC-001 and AOC-002 cleanup action area.
4. GW191D is installed in a cluster with GW192S, and GW191D is screened below a silt layer at 26.5 to 36 feet in depth.
5. GW196D is installed in a cluster with GW195S, and GW196D is screened below a silt layer at 26.8 to 36.8 feet in depth.

Abbreviations

µS/cm = microsiemens per centimeter
AOC = area of concern
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]

March 5, 2019

Boeing Renton Facility, Renton, Washington

	Cleanup Level [4]	Well ID [3]											
		Source Area	Downgradient Plume Area				CPOC Area						
		GW193S	GW190S	GW191D [5]	GW192S	GW246S	GW185S	GW185S (field dup.)	GW194S	GW195S	GW196D [6]	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	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Benzene	0.8	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.26	0.20 U
cis -1,2-Dichloroethene	0.02	**0.586**	**0.484**	**0.0558**	**0.670**	**0.171**	**0.185**	**0.194**	0.020 U	**0.0568**	**0.0427**	**0.106**	**0.0277**
Trichloroethene	0.02	0.020 U	**0.0207**	0.020 U	**0.0383**	0.020 U	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	**0.0647**	**0.672**	**0.154**	**0.317**	**0.707**	**0.192**	**0.210**	0.020 U	**0.0790**	0.0496	**0.0647**	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. GW191D is installed in a cluster with GW192S, and GW191D is screened below a silt layer at 26.5 to 36 feet in depth.
6. GW196D is installed in a cluster with GW195S, and GW196D is screened below a silt layer at 26.8 to 36.8 feet in depth.

Abbreviations

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

TABLE 13: AOC-003 GROUNDWATER ELEVATION DATA
March 5, 2019
Boeing Renton Facility, Renton, Washington

Well ID[1]	Screen Interval Depth (feet bgs)	TOC Elevation (feet)[2]	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet)[2]
GW188S	3.5 to 13.5	18.78	3.94	14.84
GW247S	4 to 14	18.91	3.91	15.00
GW248I	10 to 20	18.78	3.74	15.04
GW249S	4 to 14	18.85	3.71	14.85

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

Abbreviations
AOC = area of concern
bgs = below ground surface
TOC = top of casing

TABLE 14: AOC-003 CONCENTRATIONS OF PRIMARY GEOCHEMICAL INDICATORS [1]

March 5, 2019

Boeing Renton Facility, Renton, Washington

	Well ID [2]			
	Source Area	Downgradient Plume Area	CPOC Area	
	GW249S	GW188S	GW247S	GW248I
Temperature (degrees C)	12.6	12.8	9.8	10.4
Specific Conductivity (µS/cm)	343.4	407.6	344.2	418.4
Dissolved Oxygen (mg/L)	0.41	0.44	0.52	0.19
pH (standard units)	6.47	6.34	6.41	6.40
Oxidation/Reduction Potential (mV)	-8.1	-9.9	43.2	-23.1
Total Organic Carbon (mg/L)	17.03	9.38	9.86	13.25

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
AOC = area of concern
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]

March 5, 2019

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	0.0790	0.0493	0.0728	0.020 U
Tetrachloroethene	0.02	0.0105	0.0107	0.020 U	0.020 U
Trichloroethene	0.16	0.0157	0.0125	0.0180	0.020 U
Vinyl Chloride	0.24	**0.424**	**0.537**	**0.392**	**0.707**

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
AOC = area of concern
CPOC = conditional point of compliance

TABLE 16: AOC-004 GROUNDWATER ELEVATION DATA
March 5, 2019
Boeing Renton Facility, Renton, Washington

Well ID[1]	Screen Interval Depth (feet bgs)	TOC Elevation (feet)[2]	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet)[2]
GW174S	4 to 14	19.56	3.93	15.63
GW250S	4 to 14	19.31	3.71	15.60

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

Abbreviations
AOC = area of concern
bgs = below ground surface
TOC = top of casing

TABLE 17: AOC-004 CONCENTRATIONS OF PRIMARY GEOCHEMICAL INDICATORS [1]

March 5, 2019

Boeing Renton Facility, Renton, Washington

	Well ID [2]	
	Source Area	CPOC Area
	GW250S	GW174S
Temperature (degrees C)	8.99	10.83
Specific Conductivity (µS/cm)	154	188
Dissolved Oxygen (mg/L)	0.49	0.20
pH (standard units)	6.97	6.86
Oxidation/Reduction Potential (mV)	-371.1	-391.4

Notes

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

Abbreviations

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

TABLE 18: AOC-004 CONCENTRATIONS OF CONSTITUENTS OF CONCERN[1]
March 5, 2019
Boeing Renton Facility, Renton, Washington

	Cleanup Level [3]	Well ID [2]	
		Source Area	CPOC Area
		GW250S	GW174S
Metals (mg/L)			
Lead	0.001	**0.00154**	0.000815

Notes
1. **Bolded** values exceed the cleanup levels.
2. S = shallow well.
3. Cleanup levels obtained from Table 2 of the Cleanup Action Plan.

Abbreviations
AOC = area of concern
CPOC = conditional point of compliance
mg/L = milligrams per liter

TABLE 19: AOC-060 GROUNDWATER ELEVATION DATA
March 5, 2019
Boeing Renton Facility, Renton, Washington

Well ID[1]	Screen Interval Depth (feet bgs)	TOC Elevation (feet)[2]	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet)[2]
GW009S	4.5 to 14.5	19.36	5.15	14.21
GW010S	4.5 to 14.5	19.47	5.25	14.22
GW011D	29 to 39	19.49	5.21	14.28
GW012S	4.5 to 14.5	19.11	4.84	14.27
GW014S	4.5 to 14.5	19.24	5.00	14.24
GW147S	5 to 15	18.73	4.59	14.14
GW149S	5 to 15	19.19	5.08	14.11
GW150S	5 to 15	19.10	5.06	14.04
GW252S	4 to 14	19.01	4.91	14.10
GW253I	10 to 20	19.02	4.94	14.08
GW254S	4 to 14	19.16	5.13	14.03

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

Abbreviations
AOC = area of concern
bgs = below ground surface
TOC = top of casing

TABLE 20: AOC-060 CONCENTRATIONS OF PRIMARY GEOCHEMICAL INDICATORS [1]
March 5, 2019
Boeing Renton Facility, Renton, Washington

	Well ID [2]									
	Source Area	Downgradient Plume Area				CPOC Area				
	GW009S	GW012S	GW014S	GW014S (field dup.)	GW147S	GW149S	GW150S	GW252S	GW253I	GW254S
Temperature (degrees C)	19.90	19.92	18.50	18.50	11.72	12.79	7.40	8.84	9.37	8.44
Specific Conductivity (µS/cm)	421	2102	418	418	648	315	421	668	385	546
Dissolved Oxygen (mg/L)	0.33	0.21	0.20	0.20	0.22	0.37	0.48	0.24	0.33	0.59
pH (standard units)	6.45	6.02	6.44	6.44	4.52	6.60	6.80	6.78	6.67	6.77
Oxidation/Reduction Potential (mV)	-404.5	-406.2	-410.1	-410.1	-315.9	-369.5	-430.0	-415.8	-440.7	-409.3
Total Organic Carbon (mg/L)	5.90	29.17	3.34	4.62	22.26	5.16	4.32	4.64	4.10	6.11

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
AOC = area of concern
CPOC = conditional point of compliance
degrees C = degrees Celsius
field dup. = field duplicate
mg/L = milligrams per liter
mV = millivolts

TABLE 21: AOC-060 CONCENTRATIONS OF CONSTITUENTS OF CONCERN [1,2]

March 5, 2019

Boeing Renton Facility, Renton, Washington

	Cleanup Levels [4]	Well ID [3]									
		Source Area	Downgradient Plume Area				CPOC Area				
		GW009S	GW012S	GW014S	GW014S (field dup.)	GW147S	GW149S	GW150S	GW252S	GW253I	GW254S
Volatile Organic Compounds (µg/L)											
cis -1,2-Dichloroethene	0.08	**0.107**	**1.230**	**0.119**	**0.115**	**0.955**	0.0623	0.0737	0.020 U	**0.127**	**0.0983**
Trichloroethene	0.02	**0.0239**	**0.0546**	**0.0254**	**0.0264**	**0.475**	0.020 U	0.020 U	0.020 U	**0.0221**	0.020 U
Vinyl Chloride	0.26	**0.285**	**1.350**	0.214	0.203	0.0514	0.0843	0.103	0.020 UJ	0.143	0.0749

Notes

1. Data qualifiers are as follows:
   U = The analyte was not detected at the reporting limit indicated.
   U = The analyte was not detected at the estimated 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
AOC = area of concern
CPOC = conditional point of compliance

TABLE 22: AOC-090 GROUNDWATER ELEVATION DATA
March 4 and 5, 2019
Boeing Renton Facility, Renton, Washington

Well ID[1]	Screen Interval Depth (feet bgs)	TOC Elevation (feet)[2]	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet)[2]
GW163I	25 to 35	21.27	6.25	15.02
GW165I	25 to 35	21.14	13.74	7.40
GW175I	21.2 to 26.1	20.57	7.16	13.41
GW176S	10 to 14.3	20.15	5.44	14.71
GW177I	21.7 to 26	22.51	7.79	14.72
GW178S	11.2 to 15.5	22.73	8.12	14.61
GW179I	21.5 to 26	20.47	6.31	14.16
GW180S	10.5 to 15	20.56	6.62	13.94
GW189S	4 to 14	22.01	6.64	15.37
GW207S	7.3 to 12	21.12	6.43	14.69
GW208S	6.3 to 11	22.45	7.88	14.57

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

Abbreviations
AOC = area of concern
bgs = below ground surface
TOC = top of casing

TABLE 23: AOC-090 CONCENTRATIONS OF PRIMARY GEOCHEMICAL INDICATORS [1]
March 4 and 5, 2019
Boeing Renton Facility, Renton, Washington

	Well ID [2]											
	Source Area	Downgradient Plume Area		Shallow Zone CPOC Area					Intermediate Zone CPOC Area			
	GW189S [3]	GW175I	GW176S	GW178S	GW180S	GW180s (field dup.)	GW207S	GW208S	GW163I	GW165I	GW177I	GW179I
Temperature (degrees C)	6.05	12.60	11.90	12.62	10.27	10.27	12.30	10.41	12.30	13.40	10.71	10.13
Specific Conductivity (µS/cm)	649	446.6	549	514	303	303	310.2	632	316.4	332.6	644	418
Dissolved Oxygen (mg/L)	0.67	0.30	0.39	0.35	0.53	0.53	0.26	0.37	0.54	0.81	0.67	0.36
pH (standard units)	5.15	6.33	6.32	6.64	6.41	6.41	6.69	6.78	6.30	6.34	6.44	6.50
Oxidation/Reduction Potential (mV)	-536.8	-12.1	-50.4	-39.3	2.2	2.2	-60.9	-67.9	-22.4	-43.3	-21.9	0.1
Total Organic Carbon (mg/L)	19.29	NA	NA	NA	NA	NA	NA	NA	NA	NA	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.
3. GW189S is the replacement well for GW168S.

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

TABLE 24: AOC-090 CONCENTRATIONS OF CONSTITUENTS OF CONCERN [1,2]
March 4 and 5, 2019
Boeing Renton Facility, Renton, Washington

	Cleanup Levels [4]	Well ID [3]											
		Source Area	Downgradient Plume Area		Shallow Zone CPOC Area					Intermediate Zone CPOC Area			
		GW189S [5]	GW175I	GW176S	GW178S	GW180S	GW180S (field dup.)	GW207S	GW208S	GW163I	GW165I	GW177I	GW179I
Volatile Organic Compounds (µg/L)													
1,1,2,2-Tetrachloroethane	0.17	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
1,1,2-Trichloroethane	0.2	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
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	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Acetone	300	5.00 U	5.00 U	5.00 U	5.54	5.00 U	6.44	5.00 U	5.00 U	6.90	5.00 U	5.00 U	7.16
Benzene	0.8	0.20	0.20 U	0.20 U	0.20 U	0.23	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Carbon Tetrachloride	0.23	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Chloroform	2	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
cis-1,2-Dichloroethene	2.4	0.92	0.20 U	0.25	0.20 U	0.20 U	0.20 U	0.20 U	0.21	0.20 U	0.20 U	0.20 U	0.20 U
Methylene Chloride	2	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Tetrachloroethene	0.05	0.0280	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Toluene	75	4.96	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
trans-1,2-Dichloroethene	53.9	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Trichloroethene	0.08	**0.156**	0.020 U	0.020 U	0.0213	0.020 U	0.0212	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Vinyl Chloride	0.13	**0.496**	0.020 U	**0.294**	**0.392**	0.020 U	0.020 U	0.0692	**0.437**	0.020 U	0.020 U	0.0573	**0.133**
Total Petroleum Hydrocarbons (µg/L)													
NWTPH-Gx (C7-C12)	800	**1,070**	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
DRO (C12-C24)	500	362	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ
HRO (C24-C40)	500	**522**	200 UJ	200 UJ	200 UJ	200 UJ	200 UJ	200 UJ	200 UJ	200 UJ	200 UJ	200 UJ	200 UJ

Notes
1. Data qualifiers are as follows:
   U = The analyte was not detected at the reporting limit indicated.
   UJ = The analyte was not detected at the estimated reporting limit indicated.
2. **Bolded** values exceed the cleanup levels.
3. S = shallow well; I = well in intermediate zone.
4. Cleanup levels obtained from Table 2 of the Cleanup Action Plan.
5. GW189S is the replacement well for GW168S.

Abbreviations
µg/L = micrograms per liter
AOC = area of concern
CPOC = conditional point of compliance
DRO = diesel range organics
HRO = heavy range organics in the motor oil range
NWTPH-Gx = total petroleum hydrocarbons in gasoline range

TABLE 25: BUILDING 4-70 GROUNDWATER ELEVATION DATA
March 4, 2019
Boeing Renton Facility, Renton, Washington

Well ID[1]	Screen Interval Depth (feet bgs)	TOC Elevation (feet)[2]	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet)[2]
GW259S	5 to 15	19.72	5.38	14.34
GW260S	5 to 15	19.83	5.45	14.38

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

Abbreviations
bgs = below ground surface
TOC = top of casing

TABLE 26: BUILDING 4-70 CONCENTRATIONS OF PRIMARY GEOCHEMICAL INDICATORS [1]

March 4, 2019

Boeing Renton Facility, Renton, Washington

	Well ID [2]	
	CPOC Area	
	GW259S	GW260S
Temperature (degrees C)	15.8	12.1
Specific Conductivity (µS/cm)	351.6	276.6
Dissolved Oxygen (mg/L)	0.83	0.39
pH (standard units)	6.66	6.33
Oxidation/Reduction Potential (mV)	55.5	-48.5
Total Organic Carbon (mg/L)	3.05	9.66

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
AOC = area of concern
CPOC = conditional point of compliance
degrees C = degrees Celsius
mg/L = milligrams per liter
mV = millivolts

TABLE 27: BUILDING 4-70 CONCENTRATIONS OF CONSTITUENTS OF CONCERN [1, 2]
March 4, 2019
Boeing Renton Facility, Renton, Washington

	Cleanup Level [4]	Well ID [3]	
		CPOC Area	
		GW259S	GW260S
Volatile Organic Compounds (µg/L)			
cis-1,2-Dichloroethene	16	0.42	0.20 U
Trichloroethene	0.54	0.39	0.20 U
Vinyl Chloride	0.2	0.20 U	**0.21**

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
4. Cleanup levels obtained from Washington State Department of Ecology email to Boeing on December 30, 2015.

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

Appendix A

TABLE A-1: GROUNDWATER COMPLIANCE MONITORING SCHEDULE

Boeing Renton Facility, Renton, Washington

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

Notes:

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

Abbreviations:

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

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

Boeing Renton Facility, Renton, Washington

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

Notes:

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

Abbreviations:

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

Appendix B

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 907

Sample Number: RGW229S- 190304 | Weather: CLEAR COLD

Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount

DTW Before Purging (ft) 7.57 Time: 838 Flow through cell vol. GW Meter No.(s 2

Begin Purge: Date/Time: 3/ 4 /2019 @ 840 End Purge: Date/Time: 3/ 4 /2019 @ 859 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		
843	-2.70	373	2.34	6.23	2.4				
846	-2.80	364	2.05	6.21	6.0				DTW BELOW TOP OF PUMP
849	-2.65	361	1.78	6.24	5.1				
852	-2.41	352	1.59	6.25	4.2				
855	-2.44	354	1.48	6.27	1.3				
858	-1.92	347	1.43	6.26	5.9				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type 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 WHITE NONS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	-1.94	349	1.40	6.27	1.9				
2	-1.99	349	1.38	6.28	0.8				
3	-1.95	350	1.41	6.28	0.9				
4	-1.96	349	1.35	6.29	0.9				
Average:	-1.96	349	1.39	6.28	1.1	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)	
3	(8260C SIM VC) (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 SM5310C) (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: DSB Date: 3/4/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 837
Sample Number: RGW230I- 190304 | Weather: CLEAR COLD
Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 7.17 Time: 808 Flow through cell vol. GW Meter No.(s 2
Begin Purge: Date/Time: 3/ 4 /2019 @ 810 End Purge: Date/Time: 3/ 4 /2019 @ 831 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**	
813	9.70	510	1.98	6.64	-13.1		7.19		
816	8.84	347	1.85	6.55	-7.2		7.2		
819	8.86	302	1.77	6.50	-8.9		7.2		
822	9.10	283	1.60	6.46	-6.6				
825	9.32	279	1.48	6.45	-4.2				
828	9.12	271	1.12	6.44	-6.2				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type 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 NONS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	9.09	272	1.13	6.44	-6.0				
2	9.08	271	1.08	6.44	-6.1				
3	9.09	271	1.09	6.44	-6.1				
4	9.10	270	1.08	6.44	-6.0				
Average:	9.09	271	1.10	6.44	-6.1	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)	
3	(8260C SIM VC) (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 SM5310C) (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: DSB Date: 3/4/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 807
Sample Number: RGW231S- 190304 | Weather: CLEAR COLD
Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 6.95 Time: 737 Flow through cell vol. GW Meter No.(s 2
Begin Purge: Date/Time: 3/ 4 /2019 @ 741 End Purge: Date/Time: 3/ 4 /2019 @ 759 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		
744	8.58	374	5.29	6.61	-23.6		6.98		DTW BELOW TOP OF PUMP
747	7.98	334	4.26	6.55	-17.0		6.98		
750	7.16	305	3.95	6.54	-14.1		6.98		
753	6.51	290	3.70	6.54	-12.9				
756	6.53	281	3.56	6.53	-9.8				
759	6.49	275	3.50	6.54	-12.6				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type 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 GREY NONS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	6.49	275	3.45	6.54	-12.9				
2	6.48	273	3.46	6.54	-13.1				
3	6.47	274	3.41	6.54	-13.3				
4	6.48	272	3.39	6.54	-12.8				
Average:	6.48	274	3.43	6.54	-13.0	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)	
3	(8260C SIM VC) (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 SM5310C) (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: DSB Date: 3/4/2019

Groundwater Low-Flow Sample Collection Form

LANDAU ASSOCIATES

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 851
Sample Number: RGW081S- 190304 | 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) 8.15 | Time: 823 | Flow through cell vol. | GW Meter No.(s HERON 3
Begin Purge: Date/Time: 3/ 4 /2019 @ 827 | End Purge: Date/Time: 3/ 4 /2019 @ 848 | 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		
830	10.6	167.3	2.62	6.39	107.3	LOW	8.27	<0.25	TURN CPM DOWN
833	11.0	179.9	1.34	6.45	103.5		8.27	<0.25	
836	11.1	183.3	0.90	6.51	97.6			0.25	
839	11.2	186.4	0.67	6.55	85.8		8.27		
842	11.3	186.5	0.61	6.55	78.5				
845	11.3	187.3	0.61	6.56	70.9			0.5	
847	11.3	186.7	0.59	6.56	64.3				

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	186.4	0.59	6.57	63.7				
2	11.2	186.8	0.58	6.57	63.1				
3	11.2	185.6	0.58	6.57	62.4				
4	11.2	185.9	0.58	6.57	61.9				
Average:	11.2	186.2	0.58	6.57	62.8	#DIV/0!	8.35		

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: JHA | Date: 3/4/2019

Groundwater Low-Flow Sample Collection Form

LANDAU ASSOCIATES

Project Name:	Boeing Renton	Project Number:	0025217.099.099
Event:	Quarterly March 2019	Date/Time:	3/ 4 /2019@ 1056
Sample Number:	RGW152S- 190304	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) 8.75 Time: 1029 Flow through cell vol. GW Meter No.(s HERON 3

Begin Purge: Date/Time: 3/ 4 /2019 @ 1031 End Purge: Date/Time: 3/ 4 /2019 @ 1052 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		
1034	9.8	210.1	0.96	6.24	70.6	LOW	8.78	<0.25	
1037	9.6	186.0	0.59	6.24	61.0			<0.25	
1040	9.7	173.5	0.45	6.23	56.0		8.78	0.25	
1043	9.9	169.0	0.40	6.23	52.3				
1046	10.1	166.0	0.37	6.23	49.8				
1049	9.8	163.3	0.35	6.24	48.0				
1051	9.9	161.8	0.34	6.25	46.7				

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.): 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	9.9	161.7	0.34	6.25	46.5				
2	9.9	161.7	0.34	6.25	46.4				
3	9.9	161.5	0.34	6.25	46.2				
4	9.9	161.6	0.33	6.25	46.1				
Average:	9.9	161.6	0.34	6.25	46.3	#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: JHA Date: 3/4/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 1026
Sample Number: RGW153S- 190304 | 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) 9.17 Time: 958 Flow through cell vol. GW Meter No.(s HERON 3

Begin Purge: Date/Time: 3/ 4 /2019 @ 1001 End Purge: Date/Time: 3/ 4 /2019 @ 1022 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		
1004	10.6	269.2	2.97	6.50	71.3	LOW	9.23	<0.25	
1007	10.6	224.6	1.25	6.49	52.5		9.23	0.25	
1010	10.6	222.0	1.09	6.50	49.1				
1013	10.7	217.1	0.92	6.49	42.6				
1016	10.7	214.3	0.84	6.49	37.8				
1019	10.7	211.7	0.78	6.48	34.4			0.5	
1021	10.7	208.3	0.73	6.49	30.9				

SAMPLE COLLECTION DATA

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

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

Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other

Sample Description (color, turbidity, odor, sheen, etc.): CLOUDY, 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	10.7	207.9	0.73	6.48	30.4				
2	10.7	208.2	0.72	6.48	30.1				
3	10.7	207.3	0.73	6.47	30.0				
4	10.7	207.7	0.73	6.48	29.7				
Average:	10.7	207.8	0.73	6.48	30.1	#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: JHA Date: 3/4/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 1030
Sample Number: RGW172S- 190304 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe:
DTW Before Purging (ft) 9.18 Time: 950 Flow through cell vol. GW Meter No.(s HERON1
Begin Purge: Date/Time: 3/ 4 /2019 @ 1000 End Purge: Date/Time: 3/ 4 /2019 @ 1020 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**		
1003	9.2	252.2	2.95	6.51	35.6	LOW	9.49		
1006	9.6	265.9	2.73	6.42	23.6		9.45		
1009	9.2	304.2	2.21	6.44	-20.0		9.35		
1012	8.9	300.6	2.10	6.46	-24.3		9.30		
1015	8.9	294.0	2.02	6.47	-24.5				
1018	8.9	291.1	1.99	6.47	-24.5				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BALDDER
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 SLIGHTLY 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	8.9	288.0	1.99	6.47	-24.7				
2	8.8	289.4	1.97	6.47	-24.8				
3	8.9	288.6	1.93	6.47	-24.8				
4	8.9	286.2	1.95	6.47	-25.4				
Average:	8.9	288.1	1.96	6.47	-24.9	#DIV/0!			

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

Duplicate Sample No(s):
Comments:
Signature: SRB Date: 3.4.19

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 916
Sample Number: RGW173S- 190304 | 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) 9.03 | Time: 849 | Flow through cell vol. | GW Meter No.(s HERON 3
Begin Purge: Date/Time: 3/ 4 /2019 @ 854 | End Purge: Date/Time: 3/ 4 /2019 @ 915 | 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		
857	9.1	301.7	0.79	6.59	49.0	LOW	9.08	<0.25	
900	9.3	284.8	0.53	6.66	30.2		9.08	<0.25	
903	9.2	283.3	0.49	6.67	22.7				
906	9.2	277.7	0.59	6.67	7.2		9.08		
909	9.3	275.2	0.52	6.66	-0.1				
912	9.5	275.0	0.51	6.65	-2.4				
914	9.4	272.7	0.37	6.65	-7.1				

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.): 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	9.4	270.8	0.37	6.65	-7.5				
2	9.3	271.1	0.38	6.65	-7.8				
3	9.3	270.2	0.37	6.65	-8.1				
4	9.3	270.5	0.37	6.65	-8.4				
Average:	9.3	270.7	0.37	6.65	-8.0	#DIV/0!	9.28		

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): MSMSD Location
Comments:

Signature: JHA | Date: 3/4/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 951
Sample Number: RGW226S- 190304 | 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) 8.67 Time: 925 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 3/ 4 /2019 @ 929 End Purge: Date/Time: 3/ 4 /2019 @ 950 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		
932	11.7	233.7	1.82	6.49	74.3	LOW	8.67	<0.25	
935	11.3	241.0	1.40	6.52	62.9				
938	10.6	220.5	0.83	6.58	45.2		8.67	0.25	
941	10.7	215.4	0.65	6.58	35.0				
944	11.0	214.5	0.62	6.57	30.3				
947	11.0	213.2	0.57	6.57	22.5			0.5	
959	11.1	209.5	0.54	6.58	17.5				

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, 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	11.0	210.1	0.54	6.59	17.2				
2	11.0	209.6	0.53	6.59	16.9				
3	11.0	209.5	0.53	6.58	16.7				
4	11.0	209.6	0.53	6.58	16.4				
Average:	11.0	209.7	0.53	6.59	16.8	#DIV/0!			

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

Duplicate Sample No(s):
Comments:
Signature: JHA Date: 3/4/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 800
Sample Number: RGW232S- 190304 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe:
DTW Before Purging (ft) 7.74 Time: 729 Flow through cell vol. GW Meter No.(s HERON1
Begin Purge: Date/Time: 3/ 4 /2019 @ 730 End Purge: Date/Time: 3/ 4 /2019 @ 753 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**		
733	6.8	367.8	4.63	5.83	29.5	LOW	8.05		
736	4.9	335.2	4.02	5.84	-12.9		8.13		
739	4.6	304.8	3.71	5.83	-15.5		8.17		
742	5.3	292.4	3.37	5.82	-17.5		8.22		
745	6.3	293.6	3.14	5.83	-20.6		8.25		
748	7.0	289.6	2.99	5.92	-30.4				
751	6.9	278.9	2.94	6.00	-35.9				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BALDDER
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	6.9	278.3	2.94	6.02	-37.0				
2	6.9	276.6	2.90	6.03	-37.6				
3	6.9	277.4	2.88	6.03	-38.1				
4	6.9	275.2	2.90	6.04	-39.0				
Average:	6.9	276.9	2.91	6.03	-37.9	#DIV/0!			

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

Duplicate Sample No(s):
Comments: LOWEST LEVEL OF PURGE -- STILL DRAWDOWN

Signature: SRB Date: 3.4.19

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 801
Sample Number: RGW233I- 190304 | 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) 7.21 Time: 733 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 3/ 4 /2019 @ 737 End Purge: Date/Time: 3/ 4 /2019 @ 758 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		
740	4.5	163.1	3.21	6.42	141.0	LOW	7.23	<0.25	
743	6.3	161.9	1.96	6.26	143.4				
746	7.2	167.8	1.58	6.32	139.7		7.23	0.25	
749	8.0	170.5	1.46	6.44	131.4				
752	8.6	175.7	1.42	6.51	120.9				
755	8.4	177.8	1.17	6.49	109.8			0.5	
757	8.6	179.2	1.04	6.56	103.4				

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	8.6	178.9	1.01	6.56	102.4				
2	8.6	179.1	0.99	6.56	101.8				
3	8.6	178.1	1.00	6.56	101.0				
4	8.5	176.8	1.03	6.56	100.4				
Average:	8.6	178.2	1.01	6.56	101.4	#DIV/0!			

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

Duplicate Sample No(s):
Comments:
Signature: JHA Date: 3/4/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 1000
Sample Number: RGW234S- 190304 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) | Damaged (NO) | Describe:
DTW Before Purging (ft) 7.77 | Time: 920 | Flow through cell vol. | GW Meter No.(s HERON1
Begin Purge: Date/Time: 3/ 4 /2019 @ 930 | End Purge: Date/Time: 3/ 4 /2019 @ 953 | 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:	**+/- 3%**	**+/- 3%**	**+/- 10%**	**Stablization of Parameters for three consecutive readings within the following limits +/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
933	7.7	149.1	6.66	6.42	45.0	MED	7.77		
936	10.2	250.8	1.55	6.49	-19.3		7.77		
939	10.0	244.5	1.51	6.47	-20.6		7.77		
942	9.4	236.3	1.59	6.40	-17.5				
945	9.2	231.2	1.56	6.32	-13.0				
948	9.1	229.3	1.53	6.30	-12.2				
951	9.2	229.0	1.51	6.31	-12.7				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BALDDER
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 SLIGHTLY 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	9.1	228.7	1.52	6.31	-12.9				
2	9.2	228.8	1.50	6.31	-13.2				
3	9.2	228.9	1.50	6.32	-13.4				
4	9.1	228.5	1.50	6.32	-13.7				
Average:	9.2	228.7	1.51	6.32	-13.3	#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:
Signature: SRB | Date: 3.4.19

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 930
Sample Number: RGW235I- 190304 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe:
DTW Before Purging (ft) 7.42 Time: 850 Flow through cell vol. GW Meter No.(s HERON1
Begin Purge: Date/Time: 3/ 4 /2019 @ 900 End Purge: Date/Time: 3/ 4 /2019 @ 920 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**		
903	7.0	134.0	3.02	6.98	16.2	LOW-MED	7.42		
906	7.3	136.7	2.06	6.41	9.9		7.42		
909	8.1	133.7	1.81	6.36	-10.1		7.42		
912	8.0	131.0	1.75	6.39	-11.8				
915	7.8	130.7	1.78	6.39	-12.8				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BALDDER
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	7.8	130.5	1.77	6.39	-12.9				
2	7.8	130.5	1.75	6.39	-12.8				
3	7.8	130.1	1.75	6.39	-13.1				
4	7.7	130.0	1.74	6.39	-13.1				
Average:	7.8	130.3	1.75	6.39	-13.0	#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: SRB Date: 3.4.19

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 900
Sample Number: RGW236S- 190304 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe:
DTW Before Purging (ft) 7.03 Time: 828 Flow through cell vol. GW Meter No.(s HERON1
Begin Purge: Date/Time: 3/ 4 /2019 @ 830 End Purge: Date/Time: 3/ 4 /2019 @ 855 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**		
833	5.7	263.0	7.00	6.78	83.4	LOW	7.10		
836	6.7	265.8	6.51	6.52	84.2		7.10		
839	8.3	309.0	4.72	6.38	24.3		7.10		
842	8.6	323.8	2.26	6.59	-28.0				
845	8.6	325.8	2.17	6.60	-33.0				
849	8.8	327.8	2.03	6.60	-40.6				
852	8.8	328.6	1.99	6.61	-44.4				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BALDDER
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	8.8	328.6	1.99	6.61	-45.0				
2	8.9	328.7	2.03	6.60	-45.7				
3	8.9	328.8	2.03	6.60	-46.0				
4	8.9	328.6	2.04	6.60	-46.6				
Average:	8.9	328.7	2.02	6.60	-45.8	#DIV/0!			

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

Duplicate Sample No(s):
Comments:

Signature: SRB Date: 3.4.19

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 841

Sample Number: RGW031S- 190305 | 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) 5.16 | Time: 806 | Flow through cell vol. | GW Meter No.(s HERON 3

Begin Purge: Date/Time: 3/ 5 /2019 @ 818 | End Purge: Date/Time: 3/ 5 /2019 @ 839 | 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**		
821	12.3	407.9	0.59	6.48	-35.5	MED	5.18	<0.25	
824	12.3	409.1	0.66	6.48	-41.3				
827	12.3	409.8	0.50	6.58	-48.1		5.18	0.25	
830	12.3	410.6	0.45	6.48	-50.7				
833	12.2	410.1	0.43	6.48	-53.3				
836	12.2	410.2	0.40	6.48	-54.9				
838	12.2	410.5	0.41	6.48	-57.3				

SAMPLE COLLECTION DATA

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

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

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

(By Numerical Order) ☐ Other

Sample Description (color, turbidity, odor, sheen, etc.): CLEAR WITH MINOR SUSPENDED SOLIDS, COLORLESS, 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	12.2	410.6	0.40	6.48	-57.5				
2	12.3	411.2	0.40	6.48	-58.1				
3	12.3	411.4	0.41	6.48	-58.6				
4	12.4	411.6	0.40	6.48	-59.1				
Average:	12.3	411.2	0.40	6.48	-58.3	#DIV/0!			

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

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

Comments:

Signature: JHA | Date: 3/5/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 951
Sample Number: RGW033S- 190305 | 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) 5.28 Time: 925 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 3/ 5 /2019 @ 928 End Purge: Date/Time: 3/ 5 /2019 @ 947 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**	
931	12.7	326.6	0.36	6.25	35.4	LOW	5.28	<0.25	
934	12.8	306.2	0.29	6.27	10.2				
937	13.0	302.9	0.27	6.28	-7.1		5.28		
940	13.0	302.4	0.27	6.27	-11.7				
943	13.0	300.0	0.28	6.28	-17.9				
946	13.1	301.1	0.28	6.29	-20.2				

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, SLIGHTEST ROTTEN/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	13.1	301.2	0.27	6.29	-20.6				
2	13.1	301.2	0.27	6.29	-20.9				
3	13.1	301.2	0.27	6.29	-21.1				
4	13.1	301.2	0.27	6.29	-21.4				
Average:	13.1	301.2	0.27	6.29	-21.0	#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: JHA Date: 3/5/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 05 /2019@ 1045
Sample Number: RGW034S- 190305 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 5.39 Time: 1012 Flow through cell vol. GW Meter No.(s HERON1
Begin Purge: Date/Time: 3/ 05 /2019 1015 End Purge: Date/Time: 3/ 05 /2019 @ 1033 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**		
1018	9.7	271.4	1.06	6.57	20.0	LOW	5.39		
1021	9.3	268.0	0.61	6.17	15.1		5.39		
1024	9.3	266.6	0.59	6.20	5.4		5.39		
1027	9.1	265.5	0.58	6.25	-7.7				
1030	9.1	264.9	0.54	6.26	-12.5				

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	9.1	264.6	0.55	6.25	-12.6				
2	9.1	264.7	0.54	6.24	-13.0				
3	9.0	264.7	0.55	6.26	-14.6				
4	9.1	264.7	0.54	6.26	-15.6				
Average:	9.1	264.7	0.55	6.25	-14.0	#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: SRB Date: 3.5.19

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Quarterly March 2019 | Date/Time: 3/ 05 /2019@ 1020

Sample Number: RGW038S- 190305 | Weather: CLEAR

Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) | Damaged (NO) | Describe: flush mount

DTW Before Purging (ft) 5.49 | Time: 946 | Flow through cell vol. | GW Meter No.(s HERON1

Begin Purge: Date/Time: 3/ 05 /2019 950 | End Purge: Date/Time: 3/ 05 /2019 @ 1002 | Gallons Purged: 0.25

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals:	**Stablization of Parameters for three consecutive readings within the following limits**							**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		
953	12.3	254.0	0.50	6.61	-16.8	LOW	5.49		
956	12.5	255.5	0.49	6.61	-23.5		5.49		
959	12.8	260.8	0.48	6.60	-32.8		5.49		

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	12.8	261.8	0.48	6.60	-34.3				
2	12.9	262.1	0.49	6.60	-35.1				
3	12.9	263.0	0.49	6.60	-36.0				
4	12.8	263.0	0.49	6.60	-36.9				
Average:	12.9	262.5	0.49	6.60	-35.6	#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: SRB | Date: 3.5.19

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 1021
Sample Number: RGW039S- 190305 | 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) 4.95 Time: 956 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 3/ 5 /2019 @ 959 End Purge: Date/Time: 3/ 5 /2019 @ 1020 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		
1002	13.1	214.3	0.82	6.19	34.1	LOW	4.99	<0.25	
1005	13.5	221.0	0.66	6.18	32.6			<0.25	
1008	13.5	224.7	0.54	6.18	31.7			0.25	
1011	13.5	226.9	0.46	6.17	31.3		4.99		
1014	13.6	228.6	0.39	6.17	31.0				
1017	13.7	230.1	0.36	6.17	30.7				
1019	13.7	230.8	0.34	6.18	30.5				

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	12.7	230.8	0.33	6.18	30.4				
2	12.7	230.8	0.33	6.17	30.3				
3	12.7	231.0	0.33	6.18	30.3				
4	12.7	231.1	0.33	6.18	30.3				
Average:	12.7	230.9	0.33	6.18	30.3	#DIV/0!			

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

Duplicate Sample No(s):
Comments:
Signature: JHA Date: 3/5/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 1441
Sample Number: RGW143S- 190304 | 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) 5.67 Time: 1357 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 3/ 4 /2019 @ 1418 End Purge: Date/Time: 3/ 4 /2019 @ 1439 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		
1421	13.2	281.1	0.19	6.45	35.8	LOW	5.67	<0.25	
1424	13.4	284.0	0.15	6.46	14.7				
1427	13.5	285.4	0.14	6.47	-5.1		5.67	0.25	
1430	13.6	286.1	0.16	6.47	-18.3				
1433	13.6	286.8	0.16	6.47	-26.7				
1436	13.7	287.2	0.16	6.47	-30.9				
1438	13.7	287.6	0.17	6.47	-32.7				

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	13.7	287.6	0.16	6.47	-33.2				
2	13.7	287.2	0.17	6.47	-33.9				
3	13.7	287.3	0.17	6.47	-34.2				
4	13.7	287.1	0.17	6.47	-34.7				
Average:	13.7	287.3	0.17	6.47	-34.0	#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: JHA Date: 3/4/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Quarterly March 2019 | Date/Time: 3/ 05 /2019@ 945

Sample Number: RGW209S- 190305 | Weather: CLEAR

Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) | Damaged (NO) | Describe: flush mount

DTW Before Purging (ft) 5.15 | Time: 845 | Flow through cell vol. | GW Meter No.(s HERON1

Begin Purge: Date/Time: 3/ 05 /2019 915 | End Purge: Date/Time: 3/ 05 /2019 @ 938 | 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:	**+/- 3%**	**+/- 3%**	**+/- 10%**	**Stablization of Parameters for three consecutive readings within the following limits +/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
918	9.9	290.4	1.06	6.27	43.1	LOW	5.15		
921	10.7	303.6	0.62	6.60	-1.4		5.15		
924	9.4	299.4	0.69	6.60	-18.4		5.15		
927	8.8	294.3	0.71	6.55	-21.6				
930	8.4	291.2	0.75	6.46	-21.7				
933	8.3	289.7	0.72	6.41	-21.7				
936	8.2	288.6	0.73	6.38	-22.5				

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	8.2	288.5	0.72	6.38	-22.8				
2	8.2	288.3	0.72	6.37	-23.0				
3	8.2	288.1	0.73	6.37	-23.3				
4	8.2	288.1	0.73	6.37	-23.6				
Average:	8.2	288.3	0.73	6.37	-23.2	#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: SRB | Date: 3.5.19

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 811
Sample Number: RGW210S- 190305 | 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) 4.9 Time: 747 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 3/ 5 /2019 @ 749 End Purge: Date/Time: 3/ 5 /2019 @ 810 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		
752	6.9	267.1	0.91	61.20	60.5	MED/HIGH	4.95	<0.25	
755	7.0	267.3	0.81	6.95	49.6			<0.25	
758	7.1	268.6	0.69	6.98	33.0		4.95	0.25	
801	7.2	269.1	0.62	7.00	12.1				
804	7.2	266.4	0.53	6.99	-11.3				
807	7.2	266.3	0.51	6.99	-17.0			0.5	
809	7.3	267.5	0.49	6.99	-27.9				

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.): TURBID WITH SAND, BROWNISH COLOR, 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	7.3	266.7	0.47	6.99	-29.2				
2	7.3	267.7	0.49	6.99	-30.8				
3	7.3	266.6	0.47	6.99	-32.2				
4	7.3	266.2	0.47	6.99	-34.0				
Average:	7.3	266.8	0.48	6.99	-31.6	#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: JHA Date: 3/5/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 05 /2019@ 815
Sample Number: RGW237S- 190305 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) | Damaged (NO) | Describe: flush mount
DTW Before Purging (ft) 4.74 | Time: 744 | Flow through cell vol. | GW Meter No.(s HERON1
Begin Purge: Date/Time: 3/ 05 /2019 745 | End Purge: Date/Time: 3/ 05 /2019 @ 809 | 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:	**+/- 3%**	**+/- 3%**	**+/- 10%**	**Stablization of Parameters for three consecutive readings within the following limits +/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
748	8.2	162.3	7.12	6.01	150.0	LOW	4.74		
751	7.8	167.3	3.86	6.16	84.0		4.74		
754	7.9	166.1	3.70	6.18	77.9		4.74		
757	7.8	163.3	3.30	6.27	49.4				
800	8.1	165.4	3.09	6.26	38.7				
803	8.3	168.4	2.90	6.30	26.9				
806	8.3	171.0	2.77	6.34	19.3				

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 GRAY 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	8.3	171.7	2.74	6.34	17.8				
2	8.4	172.3	2.70	6.34	16.7				
3	8.4	172.7	2.70	6.34	15.9				
4	8.4	172.9	2.66	6.34	15.0				
Average:	8.4	172.4	2.70	6.34	16.4	#DIV/0!			

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

Duplicate Sample No(s):
Comments:

Signature: SRB | Date: 3.5.19

Groundwater Low-Flow Sample Collection Form

Project Name:	Boeing Renton	Project Number:	0025217.099.099
Event:	Quarterly March 2019	Date/Time:	3/ 05 /2019@ 900
Sample Number:	RGW238I- 190305	Weather:	CLEAR
Landau Representative:	SRB		

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount

DTW Before Purging (ft) 4.81 Time: 800 Flow through cell vol. GW Meter No.(s HERON1

Begin Purge: Date/Time: 3/ 05 /2019 830 End Purge: Date/Time: 3/ 05 /2019 @ 842 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**		
833	8.0	364.7	1.12	6.39	-20.9	LOW	4.81		
836	7.9	360.9	1.10	6.40	-26.0		4.81		
839	8.0	356.1	1.05	6.37	-31.6		4.81		

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 CLEAR NO/NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	8.0	355.2	1.05	6.37	-32.0				
2	8.1	355.2	1.04	6.37	-32.3				
3	8.1	354.6	1.06	6.36	-32.3				
4	8.2	354.7	1.04	6.36	-32.9				
Average:	8.1	354.9	1.05	6.37	-32.4	#DIV/0!			

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

Duplicate Sample No(s): MSMSD Location

Comments:

Signature: SRB Date: 3.5.19

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 1341
Sample Number: RGW239I- 190304 | 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) 5.55 | Time: 1313 | Flow through cell vol. | GW Meter No.(s HERON 3
Begin Purge: Date/Time: 3/ 4 /2019 @ 1318 | End Purge: Date/Time: 3/ 4 /2019 @ 1339 | 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		
1321	11.3	275.8	0.49	6.39	62.1	LOW	5.56	<0.25	
1324	11.0	273.3	0.32	6.42	45.6		5.56		
1327	11.2	272.8	0.35	6.43	35.1			0.25	
1330	11.2	272.7	0.25	6.44	27.0				
1333	11.2	272.4	0.24	6.45	19.2				
1336	11.2	272.4	0.23	6.45	10.5				
1338	11.3	272.3	0.21	6.44	6.1				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORLESS, 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	272.2	0.22	6.44	5.4				
2	11.2	272.2	0.22	6.45	4.8				
3	11.2	272.2	0.22	6.45	4.2				
4	11.2	272.2	0.21	6.45	3.5				
Average:	11.2	272.2	0.22	6.45	4.5	#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):
Comments:

Signature: JHA | Date: 3/4/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 1406
Sample Number: RGW240D- 190304 | 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) 6.13 Time: 1326 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 3/ 4 /2019 @ 1342 End Purge: Date/Time: 3/ 4 /2019 @ 1403 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		
1345	13.5	365.4	0.17	6.52	7.6	MED	6.57	<0.25	TURN DOWN CPM
1348	12.9	361.1	0.16	6.53	-9.4		6.26		
1351	12.2	355.6	0.18	6.53	-16.6		6.19		
1354	11.8	351.3	0.18	6.53	-20.4			0.25	
1357	11.0	345.0	0.20	6.53	-25.0				
1400	10.7	340.3	0.22	6.53	-29.7				
1402	10.0	332.5	0.26	6.53	-35.5				

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	9.9	332.0	0.26	6.52	-35.9				
2	9.9	331.7	0.26	6.53	-36.3				
3	9.9	331.3	0.26	6.53	-36.3				
4	9.9	331.1	0.26	6.53	-37.2				
Average:	9.9	331.5	0.26	6.53	-36.4	#DIV/0!			

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

Duplicate Sample No(s):
Comments:
Signature: JHA Date: 3/4/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 1515
Sample Number: RGW-241S 190304 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe:
DTW Before Purging (ft) 6.15 Time: 1442 Flow through cell vol. GW Meter No.(s HERON1
Begin Purge: Date/Time: 3/ /2019 @ 1445 End Purge: Date/Time: 3/ /2019 @ 1500 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals:	**Stablization of Parameters for three consecutive readings within the following limits**							**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		
1448	11.1	300.3	0.38	6.16	3.7	LOW	6.17		
1451	11.1	300.6	0.36	6.16	-10.4		6.17		
1454	11.1	301.2	0.36	6.19	-16.8		6.17		

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	11.1	301.4	0.38	6.20	-19.6				
2	11.2	301.5	0.38	6.21	-21.0				
3	11.2	301.4	0.39	6.21	-22.0				
4	11.2	301.6	0.38	6.21	-22.7				
Average:	11.2	301.5	0.38	6.21	-21.3	#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)
	(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: 3.6.19

Groundwater Low-Flow Sample Collection Form

LANDAU ASSOCIATES

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 1457

Sample Number: RGW-242I- 190304 | Weather: CLEAR

Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft): 6.31 Time: 1425 Flow through cell vol. GW Meter No.(s: 2

Begin Purge: Date/Time: 3/ 4 /2019 @ 1428 End Purge: Date/Time: 3/ 4 /2019 @ 1444 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		
1431	12.35	375	0.81	6.45	-20.4		6.35		
1434	11.51	386	0.49	6.45	-16.2		6.35		
1437	10.34	393	0.51	6.48	-15.7		6.35		
1440	9.53	395	0.50	6.49	-15.8				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type 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 NONS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	9.44	395	0.46	6.50	-16.0				
2	9.43	395	0.48	6.50	-15.7				
3	9.42	395	0.47	6.50	-15.5				
4	9.39	395	0.47	6.50	-15.5				
Average:	9.42	395	0.47	6.50	-15.7	#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) (Hardness) (Silica)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):

Comments:

Signature: DSB Date: 3/4/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 1046
Sample Number: RGW-243I- 190305 | 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) 5.22 Time: 1015 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 3/ 5 /2019 @ 1024 End Purge: Date/Time: 3/ 5 /2019 @ 1045 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		
1027	12.5	356.1	0.29	6.38	56.2	LOW	5.22	<0.25	
1030	12.9	360.8	0.38	6.41	39.2			<0.25	
1033	13.4	367.3	0.44	6.42	17.9		5.22	0.25	
1036	13.6	370.7	0.46	6.44	10.9				
1039	13.7	373.9	0.44	6.44	5.2				
1042	14.0	379.0	0.44	6.43	-5.0			0.5	
1044	14.1	382.5	0.43	6.43	-11.1				

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	383.0	0.57	6.43	-11.5				
2	14.2	383.3	0.56	6.43	-12.0				
3	14.2	383.4	0.54	6.43	-12.3				
4	14.2	383.7	0.55	6.43	-12.7				
Average:	14.2	383.4	0.56	6.43	-12.1	#DIV/0!			

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

Duplicate Sample No(s):
Comments:

Signature: JHA Date: 3/5/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 921
Sample Number: RGW-244S-190305 | 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) 5.28 Time: 851 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 3/ 5 /2019 @ 857 End Purge: Date/Time: 3/ 5 /2019 @ 918 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		
900	11.1	343.0	0.37	6.31	22.7	LOW	5.31	<0.25	
903	11.1	344.8	0.34	6.31	14.4				
906	11.4	346.2	0.33	6.31	4.3		5.31	0.25	
909	11.5	348.2	0.34	6.32	-1.9				
912	11.7	350.0	0.30	6.31	-8.2				
915	11.6	350.1	0.32	6.31	-17.3				
917	11.6	350.0	0.31	6.32	-19.1				

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	11.7	350.2	0.32	6.31	-19.5				
2	11.7	350.5	0.38	6.32	-19.9				
3	11.8	350.3	0.41	6.32	-20.5				
4	11.8	350.3	0.43	6.32	-21.0				
Average:	11.8	350.3	0.39	6.32	-20.2	#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: JHA Date: 3/5/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 05 /2019@ 1200
Sample Number: RGW185S- 190305 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) | Damaged (NO) | Describe: flush mount
DTW Before Purging (ft) 2.21 | Time: 1125 | Flow through cell vol. | GW Meter No.(s HERON1
Begin Purge: Date/Time: 3/ 05 /2019 1130 | End Purge: Date/Time: 3/ 05 /2019 @ 1145 | 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**		
1133	12.0	563	0.61	6.12	77.0	LOW	2.21		
1136	12.1	583	0.59	6.35	-12.2		2.21		
1139	12.1	583	0.59	6.36	-14.8		2.21		
1142	12.0	584	0.61	6.40	-34.8				

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	12.1	585	0.61	6.40	-36.0				
2	12.0	585	0.62	6.41	-37.1				
3	12.0	585	0.62	6.41	-38.0				
4	12.0	585	0.61	6.41	-38.8				
Average:	12.0	585	0.62	6.41	-37.5	#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 ☐
	(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 (DUP3)
Comments:

Signature: SRB | Date: 3.5.19

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 1256
Sample Number: RGW190S- 190305 | 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) 3.19 Time: 1231 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 3/ 5 /2019 @ 1234 End Purge: Date/Time: 3/ 5 /2019 @ 1255 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		
1237	11.7	305.1	0.56	6.41	27.7	LOW		<0.25	
1240	11.8	292.6	0.45	6.40	22.3				
1243	11.8	286.9	0.38	6.40	21.1		3.19		
1246	11.9	273.5	0.31	6.39	17.0				
1249	12.0	272.8	0.30	6.38	13.7				
1252	12.0	270.9	0.27	6.37	12.7				
1254	12.0	270.5	0.25	6.37	10.6				

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.): 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	12.0	270.5	0.25	6.37	10.4				
2	12.0	270.4	0.25	6.37	10.3				
3	12.0	270.8	0.25	6.36	9.9				
4	12.0	270.6	0.30	6.37	9.7				
Average:	12.0	270.6	0.26	6.37	10.1	#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: JHA Date: 3/5/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 1336
Sample Number: RGW191D- 190305 | 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) 3.01 Time: 1306 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 3/ 5 /2019 @ 1309 End Purge: Date/Time: 3/ 5 /2019 @ 1330 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		
1312	12.8	302.9	0.25	6.55	38.2	LOW	3.04	<0.25	
1315	12.7	303.2	0.22	6.56	23.0				
1318	12.7	300.0	0.21	6.56	3.4		3.04		
1321	12.7	299.9	0.21	6.56	-11.3				
1324	12.7	299.4	0.22	6.56	-15.6				
1327	12.7	298.9	0.21	6.57	-20.0				
1329	12.7	298.1	0.20	6.57	-27.8				

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	12.7	298.2	0.19	6.57	-28.5				
2	12.7	298.2	0.20	6.57	-29.1				
3	12.7	298.2	0.19	6.58	-29.6				
4	12.8	298.3	0.20	6.57	-30.2				
Average:	12.7	298.2	0.20	6.57	-29.4	#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 ☐
	(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: 3/5/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 1406
Sample Number: RGW192S- 190305 | 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) 3.44 Time: 1323 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 3/ 5 /2019 @ 1342 End Purge: Date/Time: 3/ 5 /2019 @ 1352 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
	Purge Goals: Stablization of Parameters for three consecutive readings within the following limits							>/= 1 flow through cell	
	+/- 3%	+/- 3%	+/- 10%	+/- 0.1 units	+/- 10 mV	+/- 10%	< 0.3 ft		
1345	11.2	296.2	0.24	6.11	4.7	LOW	3.44	<0.25	
1348	11.2	292.6	0.24	6.10	3.1				
1351	11.3	290.5	0.26	6.09	1.9				

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	11.3	290.8	0.26	6.10	1.0				
2	11.3	290.5	0.26	6.10	0.3				
3	11.3	290.4	0.26	6.10	0.3				
4	11.3	289.9	0.26	6.09	0.0				
Average:	11.3	290.4	0.26	6.10	0.4	#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 ☐
	(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: 3/5/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 05 /2019@ 1440
Sample Number: RGW193S- 190305 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 4.55 Time: 1406 Flow through cell vol. GW Meter No.(s HERON1
Begin Purge: Date/Time: 3/ 05 /2019 1410 End Purge: Date/Time: 3/ 05 /2019 @ 1430 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:	**+/- 3%**	**+/- 3%**	**+/- 10%**	**Stablization of Parameters for three consecutive readings within the following limits +/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1413	9.8	918	0.44	6.33	29.9	LOW	4.65		
1416	9.7	917	0.46	6.34	24.3		4.55		
1419	9.3	908	0.51	6.36	9.8		4.55		
1422	9.6	913	0.52	6.37	4.6				
1425	9.4	911	0.55	6.39	2.1				

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	9.4	909	0.55	6.39	1.0				
2	9.4	908	0.55	6.39	0.5				
3	9.3	908	0.56	6.39	0.0				
4	9.3	907	0.55	6.39	-0.5				
Average:	9.4	908	0.55	6.39	0.3	#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: SRB Date: 3.5.19

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 1151
Sample Number: RGW194S- 190305 | 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) 3.14 | Time: 1125 | Flow through cell vol. | GW Meter No.(s HERON 3
Begin Purge: Date/Time: 3/ 5 /2019 @ 1129 | End Purge: Date/Time: 3/ 5 /2019 @ 1048 | 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		
1132	11.8	513.0	0.49	6.23	59.3	LOW	2.77	<0.25	
1135	11.3	505.0	0.44	6.24	45.9			<0.25	
1138	11.3	498.0	0.39	6.26	31.9		2.77		
1141	11.4	496.2	0.34	6.26	18.0				
1144	11.4	495.8	0.34	6.26	15.3				
1147	11.5	495.5	0.32	6.26	11.0				

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, 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	11.5	495.3	0.32	6.26	10.9				
2	11.5	495.0	0.31	6.26	10.7				
3	11.5	495.2	0.31	6.26	10.6				
4	11.5	495.0	0.31	6.26	10.2				
Average:	11.5	495.1	0.31	6.26	10.6	#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: WATER LEVEL SEEMED TO BR RISING WHEN TAKING INITIAL MEASUREMENT.

Signature: JHA | Date: 3/5/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 05 /2019@ 1330
Sample Number: RGW195S- 190305 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) | Damaged (NO) | Describe: flush mount
DTW Before Purging (ft) 2.42 | Time: 1240 | Flow through cell vol. | GW Meter No.(s HERON1
Begin Purge: Date/Time: 3/ 05 /2019 1300 | End Purge: Date/Time: 3/ 05 /2019 @ 1325 | 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:	**+/- 3%**	**+/- 3%**	**+/- 10%**	**Stablization of Parameters for three consecutive readings within the following limits +/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1303	12.4	503.0	0.51	6.18	15.5	LOW	2.42		
1306	12.2	495.0	0.43	6.17	-6.5		2.42		
1309	12.2	478.2	0.45	6.20	-22.5		2.42		
1312	12.1	463.3	0.48	6.22	-31.7				
1315	12.0	449.2	0.49	6.22	-37.2				
1318	12.1	446.2	0.50	6.23	-40.9				
1321	12.2	444.3	0.50	6.25	-44.6				

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	12.1	442.7	0.51	6.26	-45.7				
2	12.2	442.6	0.51	6.26	-46.0				
3	12.2	442.8	0.51	6.26	-46.4				
4	12.1	440.9	0.51	6.27	-47.3				
Average:	12.2	442.3	0.51	6.26	-46.4	#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 ☐
	(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: 3.5.19

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 05 /2019@ 1400
Sample Number: RGW196D-190305 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 2.33 Time: 1315 Flow through cell vol. GW Meter No.(s HERON1
Begin Purge: Date/Time: 3/ 05 /2019 1330 End Purge: Date/Time: 3/ 05 /2019 @ 1342 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	11.3	334.0	0.51	6.21	-0.3	LOW	2.35		
1336	10.6	328.4	0.52	6.13	-2.2		2.36		
1339	10.5	326.1	0.50	6.13	-5.7		2.36		

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	10.4	325.8	0.50	6.13	-6.3				
2	10.4	325.7	0.50	6.13	-6.8				
3	10.4	325.5	0.49	6.13	-7.4				
4	10.4	325.3	0.49	6.13	-7.8				
Average:	10.4	325.6	0.50	6.13	-7.1	#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: SRB Date: 3.5.19

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 05 /2019@ 1230
Sample Number: RGW197S- 190305 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) | Damaged (NO) | Describe: flush mount
DTW Before Purging (ft) 2.05 | Time: 1157 | Flow through cell vol. | GW Meter No.(s HERON1
Begin Purge: Date/Time: 3/ 05 /2019 1200 | End Purge: Date/Time: 3/ 05 /2019 @ 1217 | 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:	**+/- 3%**	**+/- 3%**	**+/- 10%**	**Stablization of Parameters for three consecutive readings within the following limits +/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1203	13.3	821	0.50	6.96	-35.3	LOW	2.05		
1206	13.3	813	0.49	7.07	-69.9		2.05		
1209	13.4	798	0.49	7.08	-91.7		2.05		
1212	13.3	781	0.49	7.05	-105.6				
1215	13.4	781	0.49	7.03	-108.7				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated

Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): SLIGHTLY GRAY 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	13.4	782	0.49	7.03	-109.9				
2	13.5	783	0.49	7.03	-110.7				
3	13.5	784	0.49	7.02	-111.4				
4	13.4	785	0.48	7.02	-112.5				
Average:	13.5	784	0.49	7.03	-111.1	#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: SRB | Date: 3.5.19

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 05 /2019@ 1300
Sample Number: RGW245S- 190305 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 2.18 Time: 1215 Flow through cell vol. GW Meter No.(s HERON1
Begin Purge: Date/Time: 3/ 05 /2019 1230 End Purge: Date/Time: 3/ 05 /2019 @ 1247 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**		
1233	11.2	438.6	0.54	6.44	-22.2	LOW	2.20		
1236	12.3	437.3	0.43	6.48	-45.3		2.20		
1239	12.9	441.3	0.44	6.62	-65.5		2.20		
1242	12.6	441.2	0.43	6.64	-71.1				
1245	12.4	439.4	0.41	6.64	-73.7				

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	12.5	439.8	0.42	6.63	-73.7				
2	12.5	440.3	0.41	6.63	-74.3				
3	12.5	440.4	0.41	6.63	-74.3				
4	12.5	440.6	0.41	6.61	-73.7				
Average:	12.5	440.3	0.41	6.63	-74.0	#DIV/0!			

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

Duplicate Sample No(s):
Comments:

Signature: SRB Date: 3.5.19

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 1221
Sample Number: RGW246S- 190305 | 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) 2.55 | Time: 1155 | Flow through cell vol. | GW Meter No.(s HERON 3
Begin Purge: Date/Time: 3/ 5 /2019 @ 1159 | End Purge: Date/Time: 3/ 5 /2019 @ 1218 | 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**		
1202	11.3	167.5	0.30	6.47	21.7	LOW		<0.25	
1205	11.3	168.9	0.36	6.47	11.1		2.55		
1208	11.6	169.8	0.33	6.47	4.8				
1211	11.7	170.6	0.28	6.47	-2.1		2.55		
1214	11.7	170.8	0.26	6.47	-6.2				
1217	11.8	171.0	0.26	6.47	-10.7				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ■ Dedicated

Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ■ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): 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	11.8	171.1	0.25	6.47	-12.5				
2	11.8	171.1	0.25	6.47	-13.4				
3	11.8	171.0	0.25	6.47	-13.8				
4	11.8	171.0	0.24	6.47	-14.4				
Average:	11.8	171.1	0.25	6.47	-13.5	#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 ☐
	(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: 3/5/2019

Groundwater Low-Flow Sample Collection Form

Project Name:	Boeing Renton	Project Number:	0025217.099.099
Event:	Quarterly March 2019	Date/Time:	3/ 05 /2019@ 1600
Sample Number:	RGW188S- 190305	Weather:	CLEAR
Landau Representative:	SRB		

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount

DTW Before Purging (ft) 3.94 Time: 1515 Flow through cell vol. GW Meter No.(s HERON1

Begin Purge: Date/Time: 3/ 05 /2019 1530 End Purge: Date/Time: 3/ 05 /2019 @ 1542 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**		
1533	13.0	408.6	0.42	6.33	-2.4	LOW	3.94		
1536	13.0	408.8	0.42	6.34	-6.2		3.94		
1539	12.8	407.6	0.44	6.34	-9.9		3.94		

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	12.9	407.7	0.43	6.33	-10.3				
2	12.9	407.8	0.44	6.33	-10.5				
3	12.8	407.5	0.43	6.33	-10.9				
4	12.9	407.6	0.43	6.33	-11.2				
Average:	12.9	407.7	0.43	6.33	-10.7	#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): MSMSD Location

Comments:

Signature: SRB Date: 3.5.19

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 1526
Sample Number: RGW247S- 190305 | 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) 3.91 Time: 1455 Flow through cell vol. GW Meter No.(s HERON 3

Begin Purge: Date/Time: 3/ 5 /2019 @ 1501 End Purge: Date/Time: 3/ 5 /2019 @ 1517 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		
1504	10.8	342.9	0.50	6.37	71.1	LOW	4.3	<0.25	TURN CPM DOWN
1507	10.8	347.4	0.51	6.40	62.1		4.16		
1510	10.4	347.9	0.55	6.41	53.6				
1513	10.2	346.9	0.54	6.41	48.7				
1516	9.8	344.2	0.52	6.41	43.2				

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	9.8	344.0	0.52	6.41	42.0				
2	9.8	343.8	0.53	6.41	41.2				
3	9.8	343.5	0.52	6.41	40.4				
4	9.8	343.3	0.52	6.41	40.0				
Average:	9.8	343.7	0.52	6.41	40.9	#DIV/0!	4.25		

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: 3/5/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/5/19 @ 1546
Sample Number: RGW248I- 190305 | 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) 3.74 Time: 1522 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 3/ 5 /2019 @ 1524 End Purge: Date/Time: 3/ 5 /2019 @ 1545 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		
1527	11.3	436.6	0.24	6.41	38.8	LOW	4.12	<0.25	TURN CPM DOWN
1530	11.4	438.1	0.22	6.40	8.5				
1533	11.6	439.5	0.22	6.42	-2.4				
1536	11.2	430.2	0.21	6.41	-13.0		3.86		
1539	11.0	425.6	0.20	6.40	-17.5				
1542	10.6	421.1	0.20	6.40	-21.4				
1544	10.4	418.4	0.19	6.40	-23.1				

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	10.4	418.3	0.19	6.40	-23.5				
2	10.3	418.1	0.19	6.40	-23.7				
3	10.3	417.9	0.19	6.40	-23.9				
4	10.3	417.8	0.19	6.40	-24.5				
Average:	10.3	418.0	0.19	6.40	-23.9	#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: JHA Date: 3/5/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 05 /2019@ 1530
Sample Number: RGW249S- 190305 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 3.71 Time: 1457 Flow through cell vol. GW Meter No.(s HERON1
Begin Purge: Date/Time: 3/ 05 /2019 1500 End Purge: Date/Time: 3/ 05 /2019 @ 1517 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**		
1503	11.1	415.2	0.52	6.72	36.0	LOW	3.76		
1506	12.1	369.4	0.38	6.62	9.2		3.73		
1509	12.5	348.1	0.39	6.53	-0.1		3.73		
1512	12.5	343.8	0.40	6.50	-4.3				
1515	12.6	343.4	0.41	6.47	-8.1				

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 GRAY SLIGHLTY 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	12.6	343.7	0.41	6.47	-8.8				
2	12.6	343.9	0.41	6.47	-9.1				
3	12.6	344.1	0.42	6.47	-9.6				
4	12.6	344.3	0.41	6.47	-10.0				
Average:	12.6	344.0	0.41	6.47	-9.4	#DIV/0!			

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

Duplicate Sample No(s):
Comments:

Signature: SRB Date: 3.5.19

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 1607
Sample Number: RGW174S- 190305 | Weather: CLEAR
Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe:
DTW Before Purging (ft) 3.93 Time: 1540 Flow through cell vol. GW Meter No.(s 2
Begin Purge: Date/Time: 3/ 5 /2019 @ 1541 End Purge: Date/Time: 3/ 5 /2019 @ 1555 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		
1544	11.51	187	0.27	6.81	-383.3		4.02		ORP LOW
1547	12.15	186	0.18	6.83	-392.9		4.01		
1550	11.41	187	0.19	6.84	-399.7		3.98		
1553	10.83	188	0.20	6.86	-391.4				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type 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 NONS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	10.74	188	0.21	6.87	-392.7				
2	10.66	188	0.21	6.87	-392.5				
3	10.59	188	0.20	6.87	-392.9				
4	10.52	189	0.21	6.88	-393.5				
Average:	10.63	188	0.21	6.87	-392.9	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)	
	(8260) (8010) (8021) (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)	
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: ORP VERY LOW, WILL CHECK AT END OF DAY AT OFFICE
Signature: DSB Date: 3/5/2019

Groundwater Low-Flow Sample Collection Form

LANDAU ASSOCIATES

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 1547

Sample Number: RGW250S- 190305 | Weather: CLEAR

Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 3.71 Time: 1520 Flow through cell vol. GW Meter No.(s 2

Begin Purge: Date/Time: 3/ 5 /2019 @ 1523 End Purge: Date/Time: 3/ 5 /2019 @ 1543 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		
1526	11.59	151	1.92	6.90	-354.5		3.91		ORP LOW
1529	11.16	152	1.48	6.89	-357.8		3.88		
1532	10.13	154	1.25	6.92	-363.9		3.82		
1535	9.47	155	1.03	6.94	-367.7				
1538	9.09	155	0.73	6.96	-371.0				
1541	8.99	154	0.49	6.97	-371.1				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type 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 SLIGHT YELLOW NONS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	8.99	155	0.46	6.97	-371.3				
2	8.99	154	0.43	6.97	-371.8				
3	9.00	155	0.40	6.98	-373.2				
4	9.00	154	0.38	6.98	-373.6				
Average:	9.00	155	0.42	6.98	-372.5	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
	(8260) (8010) (8021) (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)		
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: ORP VERY LOW, WILL CHECK AT END OF DAY AT OFFICE

Signature: DSB Date: 3/5/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 1337
Sample Number: RGW009S- 190305 | Weather: CLEAR
Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 5.15 Time: 1313 Flow through cell vol. GW Meter No.(s 2
Begin Purge: Date/Time: 3/ 5 /2019 @ 1314 End Purge: Date/Time: 3/ 5 /2019 @ 1330 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		
1317	19.45	432	0.43	6.36	-392.6		5.13		ORP LOW
1320	19.64	424	0.39	6.41	-403.3		5.14		
1323	19.72	422	0.36	6.44	-410.2		5.14		
1326	19.66	421	0.34	6.45	-403.8				
1329	19.90	421	0.33	6.45	-404.5				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type 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 NONS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	19.93	421	0.32	6.45	-405.7				
2	19.93	421	0.32	6.46	-405.3				
3	19.94	421	0.32	6.46	-405.1				
4	19.95	421	0.32	6.46	-405.7				
Average:	19.94	421	0.32	6.46	-405.5	#DIV/0!			

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

Duplicate Sample No(s):
Comments: ORP VERY LOW, WILL CHECK AT END OF DAY AT OFFICE
Signature: DSB Date: 3/5/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@

Sample Number: RGW010S- 190305 | Weather: CLEAR

Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount

DTW Before Purging (ft) 5.25 Time: 1446 Flow through cell vol. GW Meter No.(s 2

Begin Purge: Date/Time: 3/ 5 /2019 @ End Purge: Date/Time: 3/ 5 /2019 @ Gallons Purged:

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

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

WATER LEVEL ONLY

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ☐ Pump/Pump Type 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.):

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

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

Duplicate Sample No(s):

Comments:

Signature: DSB Date: 3/5/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@
Sample Number: RGW011D- 190305 | Weather: CLEAR
Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 5.21 Time: 1444 Flow through cell vol. GW Meter No.(s 2
Begin Purge: Date/Time: 3/ 5 /2019 @ End Purge: Date/Time: 3/ 5 /2019 @ Gallons Purged:
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ☐ Other SITE TREATMENT SYSTEM

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

WATER LEVEL ONLY

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ☐ Pump/Pump Type 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.):

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

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

Duplicate Sample No(s):
Comments:

Signature: DSB Date: 3/5/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 1407
Sample Number: RGW012S- 190305 | Weather: CLEAR
Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 4.84 Time: 1344 Flow through cell vol. GW Meter No.(s 2
Begin Purge: Date/Time: 3/ 5 /2019 @ 1347 End Purge: Date/Time: 3/ 5 /2019 @ 1406 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**		
1350	20.15	2201	0.26	5.45	-391.7		4.91		ORP LOW
1353	20.06	2166	0.26	5.70	-395.3		4.92		
1356	20.00	2148	0.24	5.76	-395.3		4.92		
1359	19.96	2137	0.23	5.84	-398.3				
1402	19.94	2124	0.22	5.91	-404.0				
1405	19.92	2102	0.21	6.02	-406.2				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type BLADDER
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other ☒ Dedicated
Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ☒ Dedicated
(By Numerical Order) ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.): SLIGHTLY CLOUDY COLORLESS NONS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	19.92	2100	0.20	6.03	-405.7				
2	19.92	2099	0.20	6.04	-405.4				
3	19.92	2097	0.20	6.05	-405.3				
4	19.92	2095	0.20	6.05	-405.3				
Average:	19.92	2098	0.20	6.04	-405.4	#DIV/0!			

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

Duplicate Sample No(s):
Comments: ORP VERY LOW, WILL CHECK AT END OF DAY AT OFFICE
Signature: DSB Date: 3/5/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 1437
Sample Number: RGW014S- 190305 | Weather: CLEAR
Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 5 Time: 1415 Flow through cell vol. GW Meter No.(s 2
Begin Purge: Date/Time: 3/ 5 /2019 @ 1416 End Purge: Date/Time: 3/ 5 /2019 @ 1429 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		
1419	18.60	452	0.25	6.40	-414.7		5.07		ORP LOW
1422	18.48	426	0.21	6.43	-410.6		5.07		
1425	18.48	421	0.20	6.44	-410.2		5.07		
1428	18.50	418	0.20	6.44	-410.1				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type 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 NONS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	18.50	418	0.19	6.44	-410.6				
2	18.52	417	0.19	6.44	-410.5				
3	18.52	417	0.19	6.44	-410.6				
4	18.53	417	0.18	6.44	-410.8				
Average:	18.52	417	0.19	6.44	-410.6	#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): Duplicate location (DUP4)
Comments: ORP VERY LOW, WILL CHECK AT END OF DAY AT OFFICE
Signature: DSB Date: 3/5/2019

Groundwater Low-Flow Sample Collection Form

LANDAU ASSOCIATES

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 1257
Sample Number: RGW147S- 190305 | Weather: CLEAR
Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 4.59 Time: 1231 Flow through cell vol. GW Meter No.(s 2
Begin Purge: Date/Time: 3/ 5 /2019 @ 1232 End Purge: Date/Time: 3/ 5 /2019 @ 1253 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**		
1235	12.28	1673	0.60	4.47	-315.6		4.6		ORP LOW
1238	12.29	1384	0.36	4.47	-304.8		4.59		
1241	12.16	1072	0.28	4.48	-313.5		4.59		
1244	11.98	937	0.25	4.48	-314.9				
1247	11.90	828	0.24	4.49	-315.4				
1250	11.72	648	0.22	4.52	-315.9				

SAMPLE COLLECTION DATA

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

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	11.73	633	0.22	4.52	-316.0				
2	11.69	614	0.21	4.52	-316.2				
3	11.70	599	0.22	4.52	-316.3				
4	11.70	591	0.22	4.53	-316.2				
Average:	11.71	609	0.22	4.52	-316.2	#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: ORP VERY LOW, WILL CHECK AT END OF DAY AT OFFICE
Signature: DSB Date: 3/5/2019

Groundwater Low-Flow Sample Collection Form

LANDAU ASSOCIATES

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 1147
Sample Number: RGW149S- 190305 | Weather: CLEAR
Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 5.08 Time: 1126 Flow through cell vol. GW Meter No.(s 2
Begin Purge: Date/Time: 3/ 5 /2019 @ 1128 End Purge: Date/Time: 3/ 5 /2019 @ 1146 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**		
1131	12.66	303	0.22	6.58	-373.9		5.08		ORP LOW
1134	12.70	307	0.38	6.58	-366.2		5.08		
1137	12.68	312	0.45	6.59	-374.8		5.08		
1140	12.72	315	0.38	6.60	-371.5				
1143	12.75	315	0.38	6.60	-371.0				
1146	12.79	315	0.37	6.60	-369.5				

SAMPLE COLLECTION DATA

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

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	12.81	315	0.37	6.60	-369.9				
2	12.81	315	0.37	6.60	-369.6				
3	12.83	315	0.36	6.60	-369.7				
4	12.83	315	0.36	6.60	-369.4				
Average:	12.82	315	0.37	6.60	-369.7	#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: ORP VERY LOW, WILL CHECK AT END OF DAY AT OFFICE
Signature: DSB Date: 3/5/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 1017
Sample Number: RGW150S- 190305 | Weather: CLEAR
Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 5.06 Time: 954 Flow through cell vol. GW Meter No.(s 2
Begin Purge: Date/Time: 3/ 5 /2019 @ 956 End Purge: Date/Time: 3/ 5 /2019 @ 1018 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**	
959	11.83	441	0.32	6.81	-379.1		5.05		ORP LOW
1002	11.53	445	0.24	6.81	-379.2		5.04		
1005	10.91	444	0.27	6.82	-406.8		5.04		
1008	9.66	439	0.34	6.82	-414.1				
1011	7.61	425	0.46	6.81	-427.3				
1014	7.40	421	0.48	6.80	-430.0				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type 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 NONS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	7.31	417	0.48	6.80	-431.7				
2	7.30	416	0.48	6.80	-432.4				
3	7.28	416	0.48	6.80	-433.0				
4	7.26	415	0.47	6.80	-433.5				
Average:	7.29	416	0.48	6.80	-432.7	#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: ORP VERY LOW, WILL CHECK AT END OF DAY AT OFFICE
Signature: DSB Date: 3/5/2019

Groundwater Low-Flow Sample Collection Form

LANDAU ASSOCIATES

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 1127
Sample Number: RGW252S- 190305 | Weather: CLEAR
Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 4.91 Time: 1059 Flow through cell vol. GW Meter No.(s 2
Begin Purge: Date/Time: 3/ 5 /2019 @ 1100 End Purge: Date/Time: 3/ 5 /2019 @ 1111 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		
1103	11.29	667	0.25	6.76	-414.1		4.93		ORP LOW
1106	10.32	668	0.24	6.77	-412.1		4.93		
1109	8.84	668	0.24	6.78	-415.8		4.93		

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type 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 WHITE NONS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	8.74	665	0.25	6.78	-415.9				
2	8.74	664	0.26	6.78	-416.1				
3	8.74	663	0.26	6.78	-416.5				
4	8.63	663	0.26	6.78	-416.7				
Average:	8.71	664	0.26	6.78	-416.3	#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): MSMSD Location
Comments: ORP VERY LOW, WILL CHECK AT END OF DAY AT OFFICE
Signature: DSB Date: 3/5/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 1057
Sample Number: RGW253I- 190305 | Weather: CLEAR
Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 4.94 Time: 1027 Flow through cell vol. GW Meter No.(s 2
Begin Purge: Date/Time: 3/ 5 /2019 @ 1031 End Purge: Date/Time: 3/ 5 /2019 @ 1051 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		
1034	2.68	493	0.57	6.64	-482.4		4.96		ORP LOW
1037	7.14	427	0.32	6.65	-476.2		4.94		
1040	10.42	395	0.27	6.65	-480.7		4.94		
1043	9.51	392	0.34	6.66	-456.0				
1046	9.29	386	0.37	6.66	-447.4				
1049	9.37	385	0.33	6.67	-440.7				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type 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 NONS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	9.37	385	0.30	6.67	-440.7				
2	9.37	385	0.29	6.67	-440.4				
3	9.38	385	0.30	6.67	-440.1				
4	9.37	385	0.28	6.67	-440.0				
Average:	9.37	385	0.29	6.67	-440.3	#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: ORP VERY LOW, WILL CHECK AT END OF DAY AT OFFICE
Signature: DSB Date: 3/5/2019

Groundwater Low-Flow Sample Collection Form

LANDAU ASSOCIATES

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 957
Sample Number: RGW254S- 190305 | Weather: CLEAR
Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 5.13 Time: 927 Flow through cell vol. GW Meter No.(s 2
Begin Purge: Date/Time: 3/ 5 /2019 @ 930 End Purge: Date/Time: 3/ 5 /2019 @ 944 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**		
933	10.19	596	0.95	6.63	-372.2		5.13		ORP LOW
936	9.87	580	0.56	6.72	-388.9		5.13		
939	9.37	575	0.55	6.74	-396.7		5.13		
942	8.44	546	0.59	6.77	-409.3				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type 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 NONS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	8.46	540	0.58	6.77	-408.1				
2	8.52	535	0.58	6.78	-409.4				
3	8.58	533	0.56	6.78	-410.0				
4	8.63	532	0.54	6.78	-410.4				
Average:	8.55	535	0.57	6.78	-409.5	#DIV/0!			

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

Duplicate Sample No(s):
Comments: ORP VERY LOW, WILL CHECK AT END OF DAY AT OFFICE
Signature: DSB Date: 3/5/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 1230
Sample Number: RGW163I- 190304 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe:
DTW Before Purging (ft) 6.25 Time: 1159 Flow through cell vol. GW Meter No.(s HERON1
Begin Purge: Date/Time: 3/ 4 /2019 @ 1200 End Purge: Date/Time: 3/ 4 /2019 @ 1215 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:	**+/- 3%**	**+/- 3%**	**+/- 10%**	**Stablization of Parameters for three consecutive readings within the following limits +/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1203	11.0	272.3	2.26	6.27	31.1	LOW	6.34		
1206	12.1	309.6	0.58	6.21	-8.4		6.34		
1209	12.1	311.1	0.56	6.22	-10.4		6.34		
1212	12.3	316.4	0.54	6.30	-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.): COLORLESS SLIGHTLY TURBID 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	12.3	316.7	0.53	6.30	-23.3				
2	12.3	316.9	0.52	6.31	-23.9				
3	12.2	317.5	0.53	6.32	-25.0				
4	12.2	317.7	0.52	6.32	-25.6				
Average:	12.3	317.2	0.53	6.31	-24.5	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)	
7	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐ OR ☐
2	(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: CAP WAS OFF WHEN MONUMENT OPENED

Signature: SRB Date: 3.4.19

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 1200
Sample Number: RGW165I- 190304 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe:
DTW Before Purging (ft) 13.74 Time: 1129 Flow through cell vol. GW Meter No.(s HERON1
Begin Purge: Date/Time: 3/ 4 /2019 @ 1130 End Purge: Date/Time: 3/ 4 /2019 @ 1145 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**	
1133	12.7	323.3	0.87	6.23	50.2	LOW	13.03		
1136	13.8	334.0	0.82	6.35	-39.7		13.05		
1139	13.8	334.0	0.82	6.35	-40.9		13.05		
1142	13.4	332.6	0.81	6.34	-43.3				

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 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	331.9	0.82	6.34	-43.4				
2	13.3	331.3	0.83	6.34	-43.7				
3	13.2	330.5	0.85	6.34	-44.0				
4	13.1	330.1	0.86	6.33	-44.1				
Average:	13.2	331.0	0.84	6.34	-43.8	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
7	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
2	(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: 3.4.19

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 1231
Sample Number: RGW175I- 190304 | 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) 7.16 Time: 1203 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 3/ 4 /2019 @ 1208 End Purge: Date/Time: 3/ 4 /2019 @ 1221 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**	
1211	12.8	448.5	0.27	6.33	15.1	LOW	6.83	<0.25	
1214	12.9	448.7	0.28	6.34	-1.9		6.97	<0.25	AT LOWEST SETTING
1217	12.7	447.0	0.28	6.32	-7.9				
1220	12.6	446.6	0.30	6.33	-12.1				

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.): 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	12.7	446.8	0.29	6.34	-12.1				
2	12.7	447.1	0.28	6.34	-12.3				
3	12.7	445.6	0.29	6.34	-12.4				
4	12.7	446.0	0.30	6.34	-12.6				
Average:	12.7	446.4	0.29	6.34	-12.4	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
7	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX) WA ☐ OR ☐
2	(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): WELL UNDER PRESSURE.
Comments: WATER LEVEL MEASURED RIGHT AFTER OPENING. PRESSURE DIFFERENCE CAUSED DIFFERENT WATER LEVEL?

Signature: JHA Date: 3/4/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 1256
Sample Number: RGW176S- 190304 | 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) 5.44 Time: 1227 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 3/ 4 /2019 @ 1232 End Purge: Date/Time: 3/ 4 /2019 @ 1253 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**	
1235	12.1	555	0.31	6.31	20.8	LOW	5.61	<0.25	TURN TO LOWEST CPM
1238	11.8	552	0.38	6.31	-17.6		5.53		
1241	11.8	552	0.33	6.32	-31.9				
1244	11.8	549	0.54	6.32	-43.9			0.25	
1247	11.8	549	0.38	6.32	-49.6		5.58		
1250	11.8	549	0.38	6.32	-50.0				
1252	11.9	549	0.39	6.32	-50.4				

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 TINT, 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	11.8	549	0.39	6.32	-50.6				
2	11.8	549	0.40	6.32	-51.0				
3	11.8	549	0.41	6.32	-51.2				
4	11.8	549	0.40	6.32	-51.5				
Average:	11.8	549	0.40	6.32	-51.1	#DIV/0!	5.82		

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
7	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX) WA ☐ OR ☐
2	(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: 3/4/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 1217
Sample Number: RGW177I- 190304 | Weather: CLEAR
Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 7.79 Time: 1145 Flow through cell vol. GW Meter No.(s 2
Begin Purge: Date/Time: 3/ 4 /2019 @ 1153 End Purge: Date/Time: 3/ 4 /2019 @ 1208 Gallons Purged: 0.25
Purge water disposed to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ■ Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1156	11.09	660	0.84	6.46	-32.9		7.57		
1159	11.66	644	0.72	6.43	-27.4		7.55		
1202	11.30	645	0.71	6.43	-23.5		7.53		
1205	11.15	644	0.64	6.42	-20.0				
1208	10.71	644	0.67	6.44	-21.9				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type 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 NONS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	10.55	645	0.68	6.44	-21.6				
2	10.49	645	0.66	6.43	-21.1				
3	10.43	645	0.69	6.43	-21.0				
4	10.37	645	0.70	6.43	-21.0				
Average:	10.46	645	0.68	6.43	-21.2	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
7	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
2	(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: DSB Date: 3/4/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 1247
Sample Number: RGW178S- 190304 | Weather: CLEAR
Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 8.12 Time: 1220 Flow through cell vol. GW Meter No.(s 2
Begin Purge: Date/Time: 3/ 4 /2019 @ 1221 End Purge: Date/Time: 3/ 4 /2019 @ 1239 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**	
1224	12.69	486	0.55	6.42	-23.2		8.16		
1227	12.42	495	0.34	6.55	-38.5		8.12		
1230	12.20	512	0.35	6.65	-47.2		8.12		
1233	12.49	513	0.35	6.59	-42.7				
1236	12.62	514	0.35	6.64	-39.3				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type 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 NONS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	12.64	513	0.33	6.66	-40.4				
2	12.64	513	0.34	6.67	-40.3				
3	12.66	513	0.33	6.67	-40.2				
4	12.68	513	0.33	6.68	-40.3				
Average:	12.66	513	0.33	6.67	-40.3	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)	
7	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐ OR ☐
2	(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: DSB Date: 3/4/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 1117
Sample Number: RGW179I- 190304 | Weather: CLEAR
Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 6.31 Time: 1042 Flow through cell vol. GW Meter No.(s 2
Begin Purge: Date/Time: 3/ 4 /2019 @ 1047 End Purge: Date/Time: 3/ 4 /2019 @ 1104 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		
1050	10.85	490	0.53	6.47	0.7		6.14		
1053	10.31	455	0.42	6.48	4.0		6.13		
1056	10.17	439	0.40	6.49	3.1		6.14		
1059	10.09	429	0.36	6.49	2.4				
1102	10.13	418	0.36	6.50	0.1				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type 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 NONS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	10.15	417	0.34	6.52	-5.1				
2	10.16	417	0.33	6.53	-5.9				
3	10.16	417	0.33	6.53	-6.1				
4	10.15	417	0.33	6.53	-6.0				
Average:	10.16	417	0.33	6.53	-5.8	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)	
7	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐ OR ☐
2	(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: DSB Date: 3/4/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 1037
Sample Number: RGW180S- 190304 | Weather: CLEAR
Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 6.62 Time: 1004 Flow through cell vol. GW Meter No.(s 2
Begin Purge: Date/Time: 3/ 4 /2019 @ 1008 End Purge: Date/Time: 3/ 4 /2019 @ 1025 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**		
1011	11.13	309	1.02	6.45	-1.7		6.16		
1014	10.50	305	0.79	6.47	-3.1		6.13		
1017	10.26	304	0.66	6.46	0.0		6.12		
1020	10.26	304	0.60	6.45	1.0				
1023	10.27	303	0.53	6.41	2.2				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type 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 NONS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	10.27	303	0.52	6.41	-0.3				
2	10.28	303	0.54	6.42	-1.7				
3	10.32	303	0.52	6.42	-1.6				
4	10.34	303	0.51	6.42	-1.4				
Average:	10.30	303	0.52	6.42	-1.3	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)	
7	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐ OR ☐
2	(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): Duplicate Location (DUP5)
Comments:

Signature: DSB Date: 3/4/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 5 /2019@ 817
Sample Number: RGW189S- 190305 | Weather: CLEAR
Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe:
DTW Before Purging (ft) 6.64 Time: 742 Flow through cell vol. GW Meter No.(s 2
Begin Purge: Date/Time: 3/ 5 /2019 @ 750 End Purge: Date/Time: 3/ 5 /2019 @ 811 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		
753	8.74	1191	1.32	4.76	-544.1		6.87		0RP LOW
756	8.19	977	0.97	4.83	-537.5		6.84		
759	7.08	856	0.84	4.91	-534.7		6.81		
802	6.81	818	0.81	4.95	-532.9				
805	6.25	705	0.72	5.08	-561.3				
808	6.05	649	0.67	5.15	-536.8				

SAMPLE COLLECTION DATA

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

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	6.00	641	0.66	5.15	-536.1				
2	6.01	634	0.65	5.16	-534.0				
3	6.02	629	0.64	5.18	-532.5				
4	6.01	626	0.65	5.20	-531.3				
Average:	6.01	633	0.65	5.17	-533.5	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)	
7	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐ OR ☐
2	(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): MSMSD Location
Comments: ORP VERY LOW, WILL CHECK AT END OF DAY AT OFFICE Changed the soak sock
Signature: DSB Date: 3/5/2019

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 1156
Sample Number: RGW207S- 190304 | 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) 6.43 Time: 1128 Flow through cell vol. GW Meter No.(s HERON 3
Begin Purge: Date/Time: 3/ 4 /2019 @ 1133 End Purge: Date/Time: 3/ 4 /2019 @ 1154 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		
1136	11.9	340.3	0.31	6.71	13.4	LOW	6.43	<0.25	
1139	11.9	328.5	0.28	6.71	-25.1			<0.25	
1142	11.9	325.1	0.26	6.70	-31.5		6.43	0.25	
1145	12.1	318.5	0.30	6.70	-43.6				
1148	12.3	313.4	0.28	6.69	-54.3				
1151	12.4	310.5	0.26	6.69	-60.1				
1153	12.3	310.2	0.26	6.69	-60.9				

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	12.3	309.6	0.26	6.69	-61.4				
2	12.3	309.7	0.26	6.69	-61.6				
3	12.3	309.6	0.26	6.69	-61.8				
4	12.3	309.4	0.26	6.69	-62.3				
Average:	12.3	309.6	0.26	6.69	-61.8	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
7	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX) WA ☐ OR ☐
2	(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: 3/4/2019

Groundwater Low-Flow Sample Collection Form

LANDAU ASSOCIATES

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 1327

Sample Number: RGW208S- 190304 | Weather: CLEAR

Landau Representative: DSB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount

DTW Before Purging (ft) 7.88 Time: 1303 Flow through cell vol. GW Meter No.(s 2

Begin Purge: Date/Time: 3/ 4 /2019 @ 1304 End Purge: Date/Time: 3/ 4 /2019 @ 1323 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		
1307	11.32	607	0.79	6.26	-6.1		7.91		
1310	10.73	619	0.56	6.86	-39.5		7.91		
1313	10.73	628	0.48	6.49	-30.7		7.91		
1316	10.84	631	0.46	6.70	-17.6				
1319	10.75	633	0.43	4.61	45.3				
1322	10.41	632	0.37	6.78	-67.9				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type 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 NONS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	10.40	632	0.38	6.80	-69.9				
2	10.39	632	0.37	6.83	-72.1				
3	10.39	632	0.36	6.85	-73.2				
4	10.39	632	0.36	6.86	-73.5				
Average:	10.39	632	0.37	6.84	-72.2	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)	
7	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐ OR ☐
2	(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: DSB Date: 3/4/2019

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 1400
Sample Number: RGW259S- 190304 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 5.38 Time: 1320 Flow through cell vol. GW Meter No.(s HERON1
Begin Purge: Date/Time: 3/ 4 /2019 @ 1330 End Purge: Date/Time: 3/ 4 /2019 @ 1355 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:	**+/- 3%**	**+/- 3%**	**+/- 10%**	**Stablization of Parameters for three consecutive readings within the following limits +/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1333	13.5	265.0	1.98	6.45	88.3	LOW	5.64		
1336	13.9	329.5	0.84	6.60	68.6		5.70		
1339	13.9	332.5	0.86	6.61	67.5		5.70		
1342	14.1	335.9	0.72	6.61	65.5		5.70		
1345	14.8	342.6	0.66	6.65	59.5				
1348	15.3	346.8	0.70	6.65	57.6				
1351	15.8	351.6	0.83	6.66	55.5				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BALDDER
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.): BROWN AND TURBID WITH FLOATING 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	15.9	352.6	0.91	6.66	55.2				
2	16.0	353.9	0.88	6.67	54.6				
3	16.2	354.5	0.88	6.67	54.4				
4	16.2	354.9	0.86	6.67	54.2				
Average:	16.1	354.0	0.88	6.67	54.6	#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: 3.4.19

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099
Event: Quarterly March 2019 | Date/Time: 3/ 4 /2019@ 1430
Sample Number: RGW260S- 190304 | Weather: CLEAR
Landau Representative: SRB

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe: flush mount
DTW Before Purging (ft) 5.45 Time: 1345 Flow through cell vol. GW Meter No.(s HERON1
Begin Purge: Date/Time: 3/ 4 /2019 @ 1400 End Purge: Date/Time: 3/ 4 /2019 @ 1425 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	11.6	254.8	0.33	6.12	17.0	LOW	5.47		
1406	11.9	261.0	0.28	6.13	-3.0		5.47		
1409	12.1	269.1	0.27	6.19	-16.4		5.47		
1412	12.0	271.7	0.30	6.26	-26.8				
1415	12.5	277.1	0.34	6.31	-39.0				
1418	12.4	278.1	0.34	6.36	-45.7				
1421	12.1	276.6	0.39	6.33	-48.5				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type DED BALDDER
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	276.3	0.37	6.33	-48.4				
2	11.9	276.0	0.36	6.32	-48.1				
3	11.8	276.0	0.38	6.32	-48.3				
4	11.9	275.7	0.38	6.31	-47.9				
Average:	11.9	276.0	0.37	6.32	-48.2	#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: SRB Date: 3.4.19

Appendix C

Memo

To:	John Long, Project Manager	Project:	0088880100.2019
From:	Crystal Thimsen	c:	Project File
Tel:	(206) 342-1760		
Fax:	(206) 342-1761		
Date:	April 11, 2019		

Subject: Summary Data Quality Review
March 2019 Boeing Renton Groundwater Sampling
SWMU-168
ARI Work Order Number: 19C0069

This memo presents the summary data quality review of three primary groundwater samples and one trip blank sample collected on March 4, 2019. The samples were submitted to Analytical Resources, Inc. (ARI), located in Tukwila, Washington, a laboratory accredited by the Washington State Department of Ecology. The samples were analyzed for volatile organic compounds (VOCs) (vinyl chloride) by U.S. Environmental Protection Agency (EPA) Method 8260C with selected ion monitoring.

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

Sample ID	Laboratory Sample ID	Requested Analyses
RGW231S-190304	19C0069-01	vinyl chloride
RGW230I-190304	19C0069-02	vinyl chloride
RGW229S-190304	19C0069-03	vinyl chloride
Trip Blank	19C0069-04	vinyl chloride

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, 2014).

ARI received the samples on March 5, 2019. The temperature of the cooler was recorded upon receipt and was below the maximum acceptable temperature of 6 degrees Celsius (ºC).

Organic analyses

Samples were analyzed for vinyl chloride. 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 analysis of MS/MSD samples. The project frequency requirement was achieved with MS/MSD analysis conducted 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 ARI work order number 19C0069 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
RGW231S-190304	none
RGW230I-190304	none
RGW229S-190304	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	cc:	Project File
Tel:	(206) 342-1760		
Fax:	(206) 342-1761		
Date:	April 10, 2019		

Subject: Summary Data Quality Review
March 2019 Boeing Renton Groundwater Sampling
SWMU-172/174
ARI Work Order Number: 19C0064

This memo presents the summary data quality review of 11 primary groundwater samples, one groundwater field duplicate, and one trip blank sample collected on March 4, 2019. The samples were submitted to Analytical Resources, Inc. (ARI) located in Tukwila, Washington, a laboratory accredited by the Washington State Department of 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;
- Total organic carbon (TOC) by Standard Method (SM) 5310 B-00; 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
RGWDup1-190304	19C0064-01	all
RGW232S-190304	19C0064-02	all
RGW233I-190304	19C0064-03	all
RGW081S-190304	19C0064-04	all
RGW236S-190304	19C0064-05	all
RGW173S-190304	19C0064-06	all
RGW235I-190304	19C0064-07	all
RGW226S-190304	19C0064-08	all
RGW234S-190304	19C0064-09	all
RGW153S-190304	19C0064-10	all
RGW172S-190304	19C0064-11	all

Sample ID	Laboratory Sample ID	Requested Analyses
RGW152S-190304	19C0064-12	all
Trip Blank	19C0064-13	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 March 5, 2019. The temperatures of the coolers were recorded upon receipt and were below the maximum acceptable temperature of 6 degrees Celsius (ºC).

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. 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 (µg/L)	Duplicate Result (µg/L)	Reporting Limit (µg/L)	RPD (%)
RGW152-190304/ RGWDup1-190304	vinyl chloride	0.128	0.142	0.020	10
	cis-1,2-dichloroethene	0.678	0.655	0.020	3
	trichloroethene	0.152	0.162	0.020	6
	tetrachloroethene	0.0860	0.0874	0.020	NC

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

7. Reporting Limits and Laboratory Flags – Acceptable

Inorganic analyses

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

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

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

Sample ID/ Field Duplicate ID	Analyte	Primary Result	Duplicate Result	Reporting Limit	Units	RPD (%)
RGW152-190304/ RGWDup1-190304	TOC	2.81	2.89	0.5	mg/L	3
	total arsenic	7.54	7.11	0.2	µg/L	6
	total copper	5.12	4.44	0.5	µg/L	14
	total lead	3.33	3.33	0.1	µg/L	0

Notes
µg/L = micrograms per liter
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 ARI work order number 19C0064 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
RGWDup1-190304	none
RGW232S-190304	none
RGW233I-190304	none
RGW081S-190304	none
RGW236S-190304	none
RGW173S-190304	none
RGW235I-190304	none
RGW226S-190304	none
RGW234S-190304	none
RGW153S-190304	none
RGW172S-190304	none
RGW152S-190304	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 Contract Laboratory Program 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: April 11, 2019

Project: 0088880100.2019
c: Project File

Subject: Summary Data Quality Review
March 2019 Boeing Renton Groundwater Sampling
Building 4-78/79 SWMU/AOC Group
ARI Work Order Numbers: 19C0077 and 19C0111

This memo presents the summary data quality review of 16 primary groundwater samples, one field duplicate groundwater sample, and two trip blank samples collected on March 4 and 5, 2019. The samples were submitted to Analytical Resources, Inc. (ARI), located in Tukwila, Washington, a laboratory accredited by the Washington State Department of Ecology (Ecology). The samples were analyzed for the following:

- Volatile organic compounds (VOCs) (limited suite: benzene, vinyl chloride, cis-1,2-dichloroethene, and trichloroethene) by U.S. Environmental Protection Agency (EPA) Method 8260C;
- Total petroleum hydrocarbons as gasoline (TPH-G) by Ecology Method NWTPH Gx; 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
RGW239I-190304	19C0077-01	all
RGW240D-190304	19C0077-02	all
RGW143S-190304	19C0077-03	all
RGW-242I-190304	19C0077-04	VOCs and TPH-G
RGW-241S-190304	19C0077-05	VOCs and TPH-G
Trip Blank	19C0077-06	VOCs and TPH-G
RGWDUP2-190305	19C0111-01	all
RGW210S-190305	19C0111-02	all
RGW237S-190305	19C0111-03	all
RGW031S-190305	19C0111-04	all
RGW238I-190305	19C0111-05	all
RGW244S-190305	19C0111-06	all
RGW209S-190305	19C0111-07	all

Sample ID	Laboratory Sample ID	Requested Analyses
RGW033S-190305	19C0111-08	all
RGW038S-190305	19C0111-09	all
RGW039S-190305	19C0111-10	all
RGW034S-190305	19C0111-11	all
RGW243I-190305	19C0111-12	all
Trip Blank	19C0111-13	VOCs and TPH-G

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

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

ARI received the samples on March 5 and 6, 2019. The temperatures of the coolers were recorded upon receipt and were below the maximum acceptable temperature of 6 degrees Celsius (ºC).

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: The recoveries for one of three surrogates, 1,2-dichloroethane-d4, was 163 percent for sample RGWDUP2-190305 and 173 percent for sample RGW031S-190305, above the control limits of 80 to 129 percent. The laboratory did not reanalyze the samples. The high surrogate recovery equates to a potential high bias in the sample; and all analytes were below detection; therefore, samples results are not affected and 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.

Sample ID/ Field Duplicate ID	Analyte	Primary Result (µg/L)	Duplicate Result (µg/L)	Reporting Limit (µg/L)	RPD (%)
RGW031S-190305/ RGWDUP2-190305	benzene	55.9	58.6	0.20	5
	TPH-G	4,200	4,220	100	<1

Abbreviations
µg/L = micrograms per liter
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 – Acceptable
4. MS – 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-190305/ RGWDUP2-190305	TOC	14.44	13.34	0.50	8

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 ARI work order numbers 19C0077 and 19C0111 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
RGW239I-190304	none
RGW240D-190304	none
RGW143S-190304	none
RGW-242I-190304	none
RGW-241S-190304	none
Trip Blank	none
RGWDUP2-190305	none
RGW210S-190305	none
RGW237S-190305	none
RGW031S-190305	none
RGW238I-190305	none
RGW244S-190305	none
RGW209S-190305	none
RGW033S-190305	none
RGW038S-190305	none
RGW039S-190305	none
RGW034S-190305	none
RGW243I-190305	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:	April 17, 2019		

Subject: Summary Data Quality Review
March 2019 Boeing Renton Groundwater Sampling
AOC-001 and -002 and AOC-003
ARI Work Order Number: 19C0109

This memo presents the summary data quality review of 15 primary groundwater samples, one field duplicate, and one trip blank sample collected on March 5, 2019. The samples were submitted to Analytical Resources, Inc. (ARI), located in Tukwila, Washington, a laboratory accredited by the Washington State Department of Ecology.

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

- Volatile organic compounds (VOCs) (benzene only reported) 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); and
- 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 5310 B-00.

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

Sample ID	Laboratory Sample ID	Requested Analyses
RGWDUP3-190305	19C0109-01	all AOC-001 and -002 analyses
RGW194S-190305	19C0109-02	all AOC-001 and -002 analyses
RGW185S-190305	19C0109-03	all AOC-001 and -002 analyses
RGW246S-190305	19C0109-04	all AOC-001 and -002 analyses
RGW197S-190305	19C0109-05	all AOC-001 and -002 analyses
RGW245S-190305	19C0109-06	all AOC-001 and -002 analyses
RGW190S-190305	19C0109-07	all AOC-001 and -002 analyses

Sample ID	Laboratory Sample ID	Requested Analyses
RGW195S-190305	19C0109-08	all AOC-001 and -002 analyses
RGW191D-190305	19C0109-09	all AOC-001 and -002 analyses
RGW196D-190305	19C0109-10	all AOC-001 and -002 analyses
RGW192S-190305	19C0109-11	all AOC-001 and -002 analyses
RGW193S-190305	19C0109-12	all AOC-001 and -002 analyses
RGW247S-190305	19C0109-13	all AOC-003 analyses
RGW249S-190305	19C0109-14	all AOC-003 analyses
RGW248S-190305	19C0109-15	all AOC-003 analyses
RGW188S-190305	19C0109-16	all AOC-003 analyses
Trip Blank	19C0109-17	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 March 5, 2019. The temperatures of the coolers were recorded upon receipt and were below the maximum acceptable temperature of 6 degrees Celsius (ºC). The field team did not put the date on the chain of custody. The laboratory logged the samples according to the date in the sample IDs.

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 (%)
RGW185S-190305/ RGWDUP3-190305	vinyl chloride	192	210	20.0	9
	cis-1,2-dichloroethene	185	194	20.0	5

Abbreviations
ng/L = nanograms per liter
RPD = relative percent difference

7. Reporting Limits and Laboratory Flags – Acceptable

Inorganic analyses

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

1. Preservation and Holding Times – Acceptable
2. Blanks – Acceptable
3. LCS – Acceptable
4. MS – Acceptable
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-190305/ RGWDUP3-190305	TOC	12.04	12.01	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 ARI work order number 19C0109 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
RGWDUP3-190305	none
RGW194S-190305	none
RGW185S-190305	none
RGW246S-190305	none
RGW197S-190305	none
RGW245S-190305	none
RGW190S-190305	none
RGW195S-190305	none
RGW191D-190305	none
RGW196D-190305	none
RGW192S-190305	none
RGW193S-190305	none
RGW247S-190305	none
RGW249S-190305	none
RGW248S-190305	none
RGW188S-190305	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:	April 16, 2019		

Subject: Summary Data Quality Review
March 2019 Boeing Renton Groundwater Sampling
AOC-004
ARI Work Order Number: 19C0091

This memo presents the summary data quality review of two primary groundwater samples collected on March 5, 2019. The samples were submitted to Analytical Resources, Inc. (ARI), located in Tukwila, Washington, a laboratory accredited by the Washington State Department of Ecology. The samples were analyzed for total lead by U.S. Environmental Protection Agency (EPA) Method 6020A.

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

Sample ID	Laboratory Sample ID	Requested Analyses
RGW250S-190305	19C0091-01	total lead
RGW174S-190305	19C0091-02	total lead

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, 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, 2014).

ARI received the samples on March 6, 2019. The temperature of the cooler was recorded upon receipt and was below the maximum acceptable temperature of 6 degrees Celsius (°C).

Inorganic analyses

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

1. Preservation and Holding Times – Acceptable
2. Blanks – Acceptable
3. LCS – Acceptable

4. MS/MSD – Acceptable

   Additional sample volume was not submitted for MS/MSD analyses with samples collected from this site. MS/MSD results were reported with samples not associated with project samples; therefore, sample results are evaluated based on LCS/LCSD results. Project-specific MS/MSD requirements were met with samples collected at other sites included in this sampling event. The laboratory reported MS/MSD results; but project samples are not evaluated using this data since the spiked sample was not a project sample.

5. 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.

6. Reporting Limits and Laboratory Flags – Acceptable

Overall assessment of data

The table below summarizes the data assessment. The completeness of work order number 19C0091 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
RGW250S-190305	none
RGW174S-190305	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 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:	April 17, 2019		

Subject: Summary Data Quality Review
March 2019 Boeing Renton Groundwater Sampling
AOC-060
ARI Work Order Number: 19C0108

This memo presents the summary data quality review of nine primary groundwater samples, one field duplicate, and one trip blank sample collected on March 5, 2019. The samples were submitted to Analytical Resources, Inc. (ARI), located in Tukwila, Washington, a laboratory accredited by the Washington State Department of Ecology. The samples were selectively analyzed for the following:

- Volatile organic compounds (VOCs) (cis-1,2-dichloroethene, trichloroethene, and vinyl chloride) by U.S. Environmental Protection Agency (EPA) Method 8260C with selected ion monitoring (SIM); 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
RGW254S-190305	19C0108-01	all
RGW150S-190305	19C0108-02	all
RGW253I-190305	19C0108-03	all
RGW252S-190305	19C0108-04	all
RGW149S-190305	19C0108-05	all
RGW147S-190305	19C0108-06	all
RGW009S-190305	19C0108-07	all
RGWDUP4-190305	19C0108-08	all
RGW012S-190305	19C0108-09	all
RGW014S-190305	19C0108-10	all
Trip Blank	19C0108-11	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.

Hold 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).

Samples were received by ARI on March 6, 2019. The temperatures of the coolers were recorded upon receipt and were below the maximum acceptable temperature of 6º 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 except as noted:
5. MS/MSD – Acceptable except as noted:

   VOCs by EPA 8260C SIM: the recoveries for vinyl chloride in the MS/MSD performed with sample RGW252S-090305 were 73.7 and 75.1 percent, lower than the control limits of 76 to 120 percent. The low recoveries equate to a potential low bias in the sample, and vinyl chloride was not detected in sample RGW252S-090305. Therefore, the vinyl chloride result is qualified as estimated and flagged with a "UJ."

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 (%)
RGW014S-190305/ RGWDUP4-190305	vinyl chloride	214	203	20.0	5
	cis-1,2-dichloroethene	119	115	20.0	3
	trichloroethene	25.4	26.4	20.0	NC

Abbreviations

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

7. Reporting Limits and Laboratory Flags – Acceptable

Inorganic analyses

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

1. Preservation and Holding Times – Acceptable
2. Blanks – Acceptable
3. LCS – Acceptable
4. MS – Acceptable
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 RPDs were within the control limits

Sample ID/ Field Duplicate ID	Analyte	Primary Result (mg/L)	Duplicate Result (mg/L)	Reporting Limit (mg/L)	RPD (%)
RGW014S-190305/ RGWDUP4-190305	TOC	3.34	3.31	0.50	1

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

7. Reporting Limits – Acceptable

Overall assessment of data

A summary of the data assessment is presented in the table below. The completeness of work order number 19C0108 is 100 percent. Evaluation of the usefulness of these data is based on the EPA guidance document 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
RGW254S-190305	none			
RGW150S-190305	none			
RGW253I-190305	none			
RGW252S-190305	vinyl chloride	0.20 UJ	ng/L	MS/MSD recovery
RGW149S-190305	none			

Sample ID	Qualified Analyte	Qualified Result	Units	Qualifier Reason
RGW147S-190305	none			
RGW009S-190305	none			
RGWDUP4-190305	none			
RGW012S-190305	none			
RGW014S-190305	none			
Trip Blank	none			

Abbreviations:
UJ = the value is estimated at the reporting limit indicated
MS/MSD = matrix spike/matrix spike duplicate
ng/L = nanograms per liter

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:	April 12, 2019		

Subject: Summary Data Quality Review
March 2019 Boeing Renton Groundwater Sampling
AOC-090
ARI Work Order Number: 19C0081 and 19C0103

This memo summarizes the data quality review of 11 primary groundwater samples, one duplicate sample, and two trip blank samples collected on March 4 and 5, 2019. The samples were submitted to Analytical Resources, Inc. (ARI), located in Tukwila, Washington, a laboratory accredited by the Washington State Department of Ecology (Ecology). The samples were selectively analyzed for the following:

- Volatile organic compounds (VOCs) (acetone, methylene chloride, trans-1,2-dichlorethene, cis-1,2-dichloroethene, chloroform, carbon tetrachloride, benzene, toluene, 1,1,2-trichloroethane) by U.S. Environmental Protection Agency (EPA) Method 8260C;
- VOCs (vinyl chloride, 1,1-dichloroethene, trichloroethene, tetrachloroethene, 1,1,2,2-tetrachloroethane) by EPA Method 8260C with selected ion monitoring (SIM);
- Total petroleum hydrocarbons in the gasoline range (TPH-G) by Ecology Method NWTPH Gx;
- Total petroleum hydrocarbons in the diesel and motor oil ranges (TPH-D and TPH O) by Ecology Method NWTPH-Dx (with silica gel cleanup); and
- Total organic carbon (TOC) by Standard Method (SM) 5310C.

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

Sample ID	Laboratory Sample ID	Requested Analyses
RGWDUP5-190304	19C0081-01	VOCs and TPH
RGW180S-190304	19C0081-02	VOCs and TPH
RGW179I-190304	19C0081-03	VOCs and TPH
RGW207S-190304	19C0081-04	VOCs and TPH
RGW165I-190304	19C0081-05	VOCs and TPH
RGW177I-190304	19C0081-06	VOCs and TPH
RGW163I-190304	19C0081-07	VOCs and TPH
RGW175I-190304	19C0081-08	VOCs and TPH
RGW178S-190304	19C0081-09	VOCs and TPH

Sample ID	Laboratory Sample ID	Requested Analyses
RGW176S-190304	19C0081-10	VOCs and TPH
RGW208S-190304	19C0081-11	VOCs and TPH
Trip Blank	19C0081-12	VOCs and TPH-G
RGW189S-190305	19C0103-01	All
Trip Blank	19C0103-02	VOCs and TPH-G

Data were reviewed in accordance with the appropriate method procedures and criteria documented in the Quality Assurance Project Plan Addendum (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), laboratory 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 March 5 and 6, 2019. The temperatures of the coolers were recorded upon receipt and were less than the maximum acceptable temperature of 6 degrees Celsius (ºC).

Organic analyses

Samples were analyzed for VOCs and TPH. 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: The recovery for one of four surrogates, 1,2-dichloroethane-d4, was 132 percent in the MSD analyzed with sample RGW189S-190305; above the control limits of 80 to 129 percent. Sample results are not affected by surrogate recoveries in quality control samples. Therefore, sample results are not qualified.

4. LCS/LCSD – Acceptable except as noted:

   VOCs by EPA 8260C: The recovery for chloroform in the LCSD associated with samples analyzed on March 18, 2019, in word order 19C0081 was below the control limits. The associated LCS recovery was acceptable, as was the LCS/LCSD relative percent difference. Sample results are not qualified based on the acceptable LCS recovery.

5. MS/MSD – Acceptable except as noted:

   VOCs by EPA 8260C: The recovery for 1,1,2-trichloroethane was above the control limits in the MS/MSD performed with sample RGW189S-190305. The high recovery equates to a potential

high bias in the sample; and the 1,1,2-trichloroethane result was below detection in sample RGW189S-190305. Therefore, the result for 1,1,2-trichloroethane in sample RGW189S-190305 was not affected and not qualified.

VOCs by EPA 8260C SIM: The recovery for 1,1,2,2-tetrachloroethane was above the control limits in the MS/MSD performed with sample RGW189S-190305. The high recovery equates to a potential high bias in the sample; and the 1,1,2,2-tetrachloroethane result in sample RGW189S-190305 was below detection. Therefore, the result for 1,1,2,2-tetrachloroethane in sample RGW189S-190305 was not affected and 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 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 (µg/L)	Duplicate Result (µg/L)	Reporting Limit (µg/L)	RPD (%)
RGW180S-190304/ RGWDup5-190304	Acetone	5.00 U	6.44	5.00	NC
	Benzene	0.23	0.20 U	0.20	NC
	Trichloroethene	0.020 U	0.0212	0.0200	NC

Abbreviations
µg/L = micrograms per liter
NC = not calculated
RPD = relative percent difference
U = The analyte was not detected at the reporting limit indicated

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

A field duplicate was not collected for TOC analysis 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 – Acceptable

Overall assessment of data

The completeness of ARI work order numbers 19C0081 and 19C0103 is 100 percent. Evaluation of 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, as qualified, meet the project's data quality objectives.

A summary of the data quality review is presented in the table below.

Sample ID	Qualified Analyte
RGWDUP5-190304	none
RGW180S-190304	none
RGW179I-190304	none
RGW207S-190304	none
RGW165I-190304	none
RGW177I-190304	none
RGW163I-190304	none
RGW175I-190304	none
RGW178S-190304	none
RGW176S-190304	none
RGW208S-190304	none
Trip Blank	none
RGW189S-190305	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:	April 11, 2019		

Subject: Summary Data Quality Review
August 2018 Boeing Renton Groundwater Sampling
Bldg. 4-70
ARI Work Order Number: 19C0073

This memo summarizes the data quality review of two primary groundwater samples and one trip blank sample collected on March 4, 2019. The samples were submitted to Analytical Resources, Inc. (ARI), located in Tukwila, Washington, a laboratory accredited by the Washington State Department of Ecology. The samples were analyzed for the following:

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

Sample ID	Laboratory Sample ID	Requested Analyses
RGW259S-190304	19C0073-01	all
RGW260S-190304	19C0073-02	all
Trip Blank	19C0073-03	VOCs

Data were reviewed in accordance with the appropriate method procedures and criteria documented in the Quality Assurance Project Plan Addendum (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), laboratory 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 March 5, 2019. The temperature of the cooler was recorded upon receipt and was less than the maximum acceptable temperature of 6 degrees Celsius (ºC).

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 – Acceptable except as noted:
5. MS/MSD – Extra volume was not submitted with samples to perform MS/MSD analyses. MS/MSD analyses performed with project samples submitted separately met project frequency requirements.
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 completeness of ARI work order number 19C0073 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, as qualified, meet the project's data quality objectives.

A summary of the data quality review is presented in the table below.

Sample ID	Qualified Result
RGW259S-190304	none
RGW260S-190304	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.

Appendix D

APPENDIX D

Summary of Remedial Actions at the Boeing Renton Facility January – March 2019

Boeing Renton Site
Renton, Washington

Prepared for:
The Boeing Company
EHS Remediation

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

June 12, 2019

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Acronyms

AOC	Area of Concern
^{o}Bx	degrees brix
bgs	below ground surface
Building 4-78/79	Building 4-78/4-79 SWMU/AOC Group
CALIBRE	CALIBRE Systems, Inc.
cfm	cubic feet per minute
DAP	Diammonium Phosphate
DCA	Dichloroethane
DCE	Dichloroethene
EDR	Engineering Design Report
ERD	Enhanced Reductive Dechlorination
ft	feet
lbs	pounds
mg/L	milligrams per liter
MgSO4	Magnesium Sulfate
NA	not analyzed
NaNO3	Sodium Nitrate
ND	non-detect
PCE	Tetrachloroethene
PID	Photoionization detector
ppbv	parts per billion by volume
SVE	Soil Vapor Extraction
SWMU	Solid Waste Management Unit
TCA	Trichloroethane
TCE	Trichloroethene
Tech Memo	Technical Memorandum
Total Chlorinated	Sum of PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, 1,1,1-TCA, and 1,1-DCA
TPH-G	Total Petroleum Hydrocarbons-Gasoline
ug/L	micorgrams per liter
VC	Vinyl Chloride
VOCs	Volatile Organic Compounds
VPC	Vapor Phase Carbon

1.0 Introduction

CALIBRE Systems, Inc. (CALIBRE) prepared this Technical Memorandum (Tech Memo) for the Boeing Company to summarize remedial actions implemented at the Boeing Renton Facility in the first quarter of 2019 (between January 1 and March 31, 2019). The ongoing remedial actions include:

1. Operation of one soil vapor extraction (SVE) system located at Solid Waste Management Unit (SWMU) designated as SWMU-172/174;
2. Biological treatment to promote Enhanced Reductive Dechlorination (ERD) of volatile organic compounds (VOCs) in groundwater underway at several AOCs located throughout the Renton Facility, and;
3. Anaerobic biodegradation of benzene by nitrate/sulfate injections at the 4-78/79 Building.

CALIBRE completed the work described in this Tech Memo to support remedial activities described in the Engineering Design Report (EDR), (AMEC, 2014) as supplemented by a document describing the remedial approach for *in situ* treatment for benzene in groundwater (CALIBRE 2017).

1.1 Facility Location and Background

The Boeing Renton Facility is used for assembly of 737 airplanes and is located at the southern end of Lake Washington in Renton, Washington. The location of the Renton Facility and the locations of SWMU-172/174 and Building 4-78/79 within the Facility are shown on Figure 1-1. The locations of the other AOCs and SWMUs where groundwater treatment is ongoing are also included in Figure 1-1.

1.2 Objectives and Organization

The objective for this Tech Memo is to summarize work completed in accordance with the EDR in the first quarter of 2019. This includes operation and monitoring activities for the SVE system located at SWMU-172/174 and a summary of the ongoing biological treatment and monitoring of groundwater at the following areas:

SWMU-172/174
Building 4-78/4-79 SWMU/AOC Group (Building 4-78/79)
AOC-001/002
AOC-003
Lot 20/Former Building 10-71
AOC-060
AOC-090
Building 4-70, and
Apron A

This Tech Memo is organized as follows:
Section 1 – Introduction and Background
Section 2 – SVE System Operation and Monitoring

Section 3 – Groundwater Treatment
Section 4 – Conclusions and Recommendations
Section 5 – References
Attachment A – Field Data Sheets
Attachment B – Laboratory Report

2.0 SVE Systems Operation and Monitoring

SVE systems were installed in the Building 4-78/79 and SWMU-172/174 areas and began operation in April 2015. During the last quarter of 2017 photoionization detector (PID) results from both systems had shown low-level VOC concentrations removed at asymptotically low levels. Rebound stabilization tests were conducted in early 2018 followed by collection of soil confirmation samples from both areas in June 2018. Ecology approved the recommended shutdown of the Building 4-78/79 SVE system on November 1, 2018 after review and evaluation of the soil confirmation results for that area (CALIBRE 2018a). Operational modifications have continued at the SWMU-172/174 SVE system to optimize VOC removal for that area. The following sections summarize the operating conditions, operational changes, and performance monitoring/evaluation for the SWMU-172/174 SVE system performed in January – March 2019.

2.1 SWMU-172/174 SVE System

The SWMU-172/174 SVE system consists of three vapor extraction wells and a SVE equipment trailer as shown in Figure 2-1. The SVE system is equipped with two vapor-phase GAC vessels, each filled with 1,800 pounds of virgin carbon. The GAC vapor treatment system is configured to run in a lead-lag configuration with vapor from the outlet of the lead vessel passing through the lag vessel. The system also includes two smaller vessels each containing 200 pounds of zeolite impregnated with permanganate.

Routine maintenance including oil changes, drive-belt tensioning and inspection, inspection of the air filter, and inspection of the moisture separator was completed per the Operations Manual (CALIBRE, 2014). System monitoring includes regular monitoring of total organic vapor concentrations with a calibrated photo-ionization detector (PID).

2.1.1 TO-15 Laboratory Analysis of Vapor Samples

Two vapor samples were collected from the SWMU-172/174 SVE system for TO-15 analysis on February 13, 2019. The results showed tetrachloroethene (PCE) represented approximately 90% of the total VOCs for the SWMU-172/174 SVE system influent and SVE-2 samples. Table 2-1 summarizes the TO-15 detections for the SWMU-172/174 SVE system for 14 TO-15 sampling events[1] that have been implemented since system startup. During this time, SVE-2 has continued to extract vapor while system operation modifications have been completed at SVE-1 and SVE-3 to alter the flushing patterns in the area of SVE-2, as described below. The laboratory report is included in Attachment B.

[1] Multiple changes to SVE system operations have been implemented over the period where data are shown. Changes to extraction flow rates by SVE wells are used to maximize the VOC mass removal and the corresponding SVE influent concentration is highly dependent on the flow rate from selected wells.

2.1.2 Summary of Operations and Operational Changes

The soil confirmation samples collected in the second quarter of 2018 identified a location between SVE-2 and SVE-3 which still showed elevated PCE levels in soil. During the third quarter of 2018, the SVE system was adjusted to alter the flushing pattern through this area by using SVE-3 as an inlet vent well with continued extraction through SVE-2 and SVE-1. Vapor concentrations, measured with a PID, showed some increase for approximately two weeks during that reporting period. Subsequent measurements during the fourth quarter 2018 reporting period showed vapor concentrations reducing to previous low level detections. Therefore, on December 5, 2018 the SVE system was adjusted to alter the flushing pattern around SVE-2 and SVE-3 by using SVE-1 as an inlet vent well with continued extraction from SVE-2 and re-opening SVE-3 to extraction.

On February 7, 2019 (first quarter 2019) PID readings showed reduced VOC levels at SVE-3 while SVE-2 remained at 0 ppbv. Systems operation modifications were completed that day to adjust SVE-3 as an inlet vent well with extraction at SVE-1 and SVE-2. Upon opening SVE-1, audible sounds indicated water was present in the line near the gate valve of that well. To remove the water, SVE-2 and SVE-3 were closed to focus entire system flow/removal rate on the SVE-1 line. The system was allowed to operate in this manner overnight and re-checked the following day. No sounds of water movement were observed during that site inspection and SVE-3 was then opened as an inlet vent well with extraction at SVE-1 and SVE-2. Two samples were collected during the following site visit due to increased detections at the SVE wells and system influent. Table 2-2 shows the PID readings for the wells in the SWMU 172/174 SVE system. On March 14, 2019 a detection of 42 ppbv was measured with the PID from the effluent of the lag carbon vessel. This detection is near the field instrument detection limit able to be measured by the PID. In addition, measurements preceding and following this date showed 0 ppbv. Table 2-3 shows an operational summary for the system.

2.1.3 Mass Removal Estimate

Between April 17, 2015 and March 21, 2019 the SWMU-172/174 SVE system has recovered an estimated 15.6 pounds of VOCs (primarily PCE), as shown in Table 2-3. Approximately 1 pound of VOCs was removed during the current reporting period (first quarter 2019) based on PID measurements collected. Evaluation of the TO-15 results indicate a much lower mass removal rate therefore expanded TO-15 sampling will be completed in the following quarter. The cumulative VOC mass removal for the SWMU-172/174 SVE system is shown in Figure 2-2.

2.2 Recommended Next Steps for the SVE Systems

In December 2018, Boeing submitted to Ecology a Tech Memo describing the planned approach for further evaluation of soils 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 on February 7, 2019 showed increases in VOC mass removal from SVE-1, SVE-2 and the system influent for a number of weeks following the adjustment. TO-15 samples collected from SVE-2 and the system influent continue to show PCE as the primary chemical detected, comprising approximately 90% of the total VOCs detected. Subsequent monitoring during the later half of March 2019 show vapor concentrations reducing at SVE-1 and SVE-2. If concentrations reduce to asymptotic levels the system will be modified to alternate flows between wells as has been done in the past (i.e. SVE-1 was extracting and will be changed to an inlet vent and vice versa for SVE-3). Summa can samples for TO-15 analysis will be planned for the 2nd Quarter 2019 to monitor changes in vapor concentrations if observed.

Additional modifications to the operation of this system should be considered to continue increased mass removal in the area between SVE-2 and SVE-3. These modifications may include opening SVE-1 and SVE-3 as an inlet vent or SVE-1 and SVE-2 as an inlet vent, to focus vapor removal in that area. It may also be beneficial to operate the SVE system in a pulsed mode in order to allow vapor concentrations to rebound followed by running the system for a period of time.

3.0 Ongoing Groundwater Treatment

Groundwater treatment is being implemented at several AOCs/SWMUs at the Renton Facility. The primary remedy being implemented is enhanced reductive dechlorination (ERD) of chlorinated solvents in targeted areas. The ERD treatment involves substrate injection using sucrose as a carbon source to stimulate biological degradation of the chlorinated solvents between December 2014 and March 2019.

Beginning in late 2017, anaerobic biodegradation of benzene using nitrate and sulfate injections was implemented for a small area at the 4-78/79 Building. Performance monitoring was completed at the injection and monitoring wells at this area in February 2019 and those results are summarized in Table 3-1. A sixth round of nitrate/sulfate injections were performed in March 2019 and collection of performance monitoring samples are planned for the second quarter of 2019 from the injection and monitoring wells at this area. Selected wells at the 4-78/79 Building Area were also amended with sucrose substrate in March 2019, see Table 3-2 and Table 3-3.

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 3-4 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 following the system modification on 2/7/2019 and were sustained into mid-March 2019. It is recommended that SVE operations be continued for this area, with samples collected for TO-15 analysis in the second 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. Substrate for ERD treatment at the Building 4-78/79 area was injected in the first quarter of 2019 after the quarterly sampling was completed. In addition, a sixth round of nitrate/sulfate injections for benzene treatment at the Building 4-78/79 area was completed in March 2019 and collection of performance monitoring data is planned for the second quarter of 2019. Additional substrate and/or nitrate/sulfate injections will be recommended following the review of the 2nd quarter 2019 monitoring results.

5.0 References

AMEC 2014. Draft Engineering Design Report Boeing Renton Cleanup Action Plan Implementation. Prepared by AMEC Environment & Infrastructure, Inc. for The Boeing Company. July 2014.

CALIBRE 2014. Operations and Maintenance Plan for the Renton Cleanup Action Soil Vapor Extraction Systems. Prepared by CALIBRE Systems, Inc. for The Boeing Company, EHS Remediation. July 2014.

CALIBRE 2017. Bioremediation of Benzene in Groundwater; Building 4-78/79 Area, Boeing Renton Facility Rev. 1. Prepared by CALIBRE Systems, Inc. for The Boeing Company, EHS Remediation. September 2017.

CALIBRE 2018a. Recommendation to shut down SVE system at Building 4-78/4-79 SWMU/AOC Group; Boeing Renton Site. Prepared by CALIBRE Systems, Inc. for The Boeing Company, EHS Remediation. October 2018.

CALIBRE 2018b. Plan for Evaluation of Soils around Probe PP13 at Building 4-78/4-79 SWMU/AOC Group; Boeing Renton Site. Prepared by CALIBRE Systems, Inc. for The Boeing Company, EHS Remediation. November 2018.

Ecology 2015. Washington State Water Quality Standards: Human Health Criteria and Implementation Tools. Prepared by the Washington Department of Ecology. Publication no. 14-10-058. January 2015.

USACE 2002. Engineering and Design - Soil Vapor Extraction and Bioventing. Prepared by US Army Corps of Engineers. EM 1110-1-4001. June 2002.

TABLES

Table 2-1 TO-15 Analytical Results - SWMU-172/174 SVE System Project History

SVE System Inlet

Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1,1-TCA	1,1-DCA	Acetone	Toluene	m,p-Xylene	Chloroform	o-Xylene	Pentane	Hexane	Total Chlorinated	Total VOCs
4/17/2015	1,500	130	120	ND	ND	13	ND	ND	ND	ND	ND	ND	ND	ND	1,763	1,763
10/13/2015	400	31	13	ND	ND	3.3	ND	ND	ND	ND	ND	ND	ND	ND	447	447
3/8/2016	82	5.4	3.1	ND	ND	ND	ND	ND	1.1	2.2	ND	ND	ND	ND	91	94
6/30/2016	230	18	10	ND	ND	1.8	ND	11	ND	ND	2.4	ND	ND	ND	260	273
9/12/2016	230	16	8.3	ND	ND	1.9	ND	ND	ND	ND	1.2	ND	ND	ND	256	257
12/14/2016	100	6.2	3.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	110	110
5/30/2017 - 30 min	520	220	17	ND	ND	13	2.7	ND	ND	ND	ND	ND	ND	ND	773	773
5/30/2017 - 100 min	530	200	17	ND	ND	14	ND	ND	ND	ND	ND	ND	ND	ND	761	761
5/30/2017 - 225 min	510	130	16	ND	ND	12	ND	ND	ND	ND	ND	ND	ND	ND	668	668
8/16/2017	180	16	7.8	ND	ND	1.7	ND	ND	ND	ND	ND	ND	ND	ND	206	206
12/8/2017 - Rebound Start	99	7.6	3.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	110	110
5/22/2018	430	43	13	ND	ND	12	ND	ND	ND	ND	ND	ND	ND	ND	498	498
6/7/2018	160	13	5.4	ND	ND	1.8	ND	ND	ND	ND	ND	ND	ND	ND	180	180
6/20/2018	170	14	5.7	ND	ND	1.8	ND	ND	ND	ND	ND	ND	ND	ND	192	192
8/30/2018	110	8.6	3.7	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	122	122
2/13/2019	**32**	**2.2**	**1.6**	**NA**	**ND**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**36**	**36**

SVE-2

Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1,1-TCA	1,1-DCA	Acetone	Toluene	m,p-Xylene	Chloroform	o-Xylene	Pentane	Hexane	Total Chlorinated	Total VOCs
8/30/2018	180	14	6.1	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	200	200
2/13/2019	**48**	**3.3**	**2.8**	**NA**	**ND**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**54**	**54**

SVE-3

Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1,1-TCA	1,1-DCA	Acetone	Toluene	m,p-Xylene	Chloroform	o-Xylene	Pentane	Hexane	Total Chlorinated	Total VOCs
5/30/2017 - 30 min	540	51	18	ND	ND	14	2.6	ND	2.2	ND	ND	ND	ND	ND	626	628
5/30/2017 - 100 min	200	16	6.5	ND	ND	5.5	ND	ND	ND	ND	ND	ND	ND	ND	228	228
8/16/2017	350	30	15	ND	ND	3.5	ND	ND	ND	ND	1.3	ND	ND	ND	399	400
12/8/2017 - Rebound Start	170	13	5.8	ND	ND	1.7	ND	ND	ND	ND	ND	ND	ND	ND	191	191
1/19/2018 - 35-Day 60 Minute Sample	310	30	13	ND	ND	6.9	1.3	ND	ND	ND	1.1	ND	ND	ND	361	362
1/19/2018 - 35-Day 180 Minute Sample	310	28	12	ND	ND	7.9	1.1	ND	ND	ND	1.1	ND	ND	ND	359	360
3/6/2018 - 80-Day 60 Min Sample	440	41	15	ND	ND	14	2.2	ND	ND	ND	ND	ND	ND	ND	512	512
3/6/2018 - 80-Day 180 Min Sample	410	33	13	ND	ND	13	1.6	ND	ND	ND	ND	ND	ND	ND	471	471
5/22/2018	790	66	22	ND	ND	22	ND	ND	ND	ND	ND	ND	ND	ND	900	900
6/7/2018	280	23	9.6	ND	ND	3	ND	ND	ND	ND	ND	ND	ND	ND	316	316
6/20/2018	310	24	11	ND	ND	3.4	ND	ND	ND	ND	ND	ND	ND	ND	348	348

Table 2-1 TO-15 Analytical Results - SWMU-172/174 SVE System Project History

VPC Outlet

Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1,1-TCA	1,1-DCA	Acetone	Toluene	m,p-Xylene	Chloroform	o-Xylene	Pentane	Hexane	Total Chlorinated	Total VOCs
4/17/2015	5.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.1	5.1
10/13/2015	ND	ND	ND	ND	ND	ND	ND	11	ND	ND	ND	ND	ND	ND	ND	11
3/8/2016	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
6/30/2016	ND	ND	ND	ND	ND	ND	ND	ND	15	1.6	ND	1.2	6.2	1.2	ND	25.2
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.

Shaded cells are results from 1st Quarter 2019.

Table 2-2 PID Monitoring - SWMU-172/174 SVE System

Date	Days in Operation Since Startup [1]	SVE-01 (ppbv)	SVE-02 (ppbv)	SVE-03 (ppbv)	VPC Inlet (ppbv)	VPC Mid (ppbv)	VPC Outlet (ppbv)[2]	Notes
1/15/2019	1,206	Vent	0	2,451	242		0	
1/25/2019	1,216	Vent	74	1,388	469		0	
2/7/2019	1,229	Vent	0	455	214		0	Opened SVE-3 as vent and started extracting at SVE-1. Hear water in SVE-1 line near gate valve. Closed SVE-2 temporarily to focus vacuum at SVE-1 to extract water. Will keep these settings overnight and check system tomorrow.
2/8/2019	1,230	0	0	Vent	6		0	On site to check water in SVE-1 line. Piping sounds clear, opened SVE-2 to operate.
2/13/2019	1,235	792	1,272	Vent	762		0	Collected TO-15 samples from system influent and SVE-2.
2/22/2019	1,244	0	1,251	Vent	431		0	
3/6/2019	1,256	143	1,242	Vent	1,082		0	
3/14/2019	1,264	319	722	Vent	353		42	
3/21/2019	1,271	114	329	Vent	287		0	

Notes:

ppbv = parts per billion by volume

VPC = vapor phase carbon

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

[2] Concentrations measured are near the field instrument detection limit able to be measured by the PID.

Operational change was made on 2/7/19. Due to reduced influent concentrations observed SVE-03 was opened as a vent well to promote focused flow towards SVE-01 and SVE-02.

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

Table 2-3 VOC Mass Removal Estimate - SWMU 172/174 SVE System

Date	PID Reading (ppbv)	Corrected Value (PCE) (ppbv)[1]	System Flow (cfm)	Cumulative Runtime Hours	VOCs removed in Operating Period Between Monitoring Events (lbs)[2]	Cumulative VOC Mass Removed Since Start of SVE Operations in April, 2015 (lbs)
1/15/2019	242	139	90	22,835	0.173	14.78
1/25/2019	469	269	90	23,061	0.133	14.91
2/7/2019	214	123	98	23,366	0.089	15.00
2/8/2019	6	3	70	23,366	0.000	15.00
2/13/2019	762	438	70	23,477	0.083	15.08
2/22/2019	431	248	70	23,695	0.092	15.17
3/6/2019	1,082	623	70	23,973	0.295	15.47
3/14/2019	353	203	70	24,164	0.066	15.53
3/21/2019	287	165	70	24,327	0.046	15.58

Notes:

PID = photoionization detector

ppbv = parts per billion by volume

cfm = cubic feet per minute

lbs = pounds

[1] A correction factor of 0.57 has been applied to the PID vapor measurement for VOCs based on the mixture of analytes detected in the TO-15 analysis at the influent sample point from 2/13/19. This number is much higher than the TO-15 results.

[2] These are based soley on the PID measurements collected this quarter; the TO-15 analysis indicates much lower mass.

TO-15 analysis results showed Tetrachloroethene made up 89% of the total VOCs removed at the influent on 2/13/19.

Table 3-1 - Baseline and Performance Monitoring Groundwater Data; 4-78/79 Benzene Treatment Area

Sample ID	Date	Sample Depth (ft bgs)	TCE (ug/L)		cis-1,2-DCE (ug/L)		VC (ug/L)		Benzene (ug/L)		Nitrate (mg-N/L)		Nitrite (mg-N/L)		Sulfate (mg/L)	
B78-11-8-113017	11/30/2017	8	0.42		0.98		1.11		9.66		<0.100	U	<0.100	U	1.94	
B78-11-021418	2/14/2018	8	1.16		0.84		1.09		14.8		<0.100	U	<0.100	U	9.22	D
B78-11-051518	5/15/2018	8	1.86		0.78		1.06		12.6		<0.100	U	<0.100	U	34.1	D
B78-11-180917	9/17/2018	8	5.01		7.90		3.62		9.20		<0.100	U	<0.100	U	23.4	D
B78-11-020719	2/7/2019	8	3.13		2.47		1.81		4.88		<0.100	U	<0.100	U	25.0	D
B78-13-15-112917	11/29/2017	15	0.24		1.29		2.02		9.92		0.135		<0.100	U	0.652	
B78-13-021418	2/14/2018	15	<0.2	U	1.78		8.49		4.11		<0.100	U	<0.100	U	1.31	
B78-13-051518	5/15/2018	15	<0.2	U	0.85		0.87		4.94		0.182		<0.100	U	4.32	D
B78-13-180917	9/17/2018	15	<0.2	U	0.61		0.38		3.29		<0.100	U	<0.100	U	0.812	
B78-13-020719	2/7/2019	15	<0.2	U	0.37		0.29		0.74		<0.100	U	<0.100	U	0.189	
B78-17-9-100617	10/6/2017	9	<0.2	U	0.17	J	0.33		4.84		-		-		-	
B78-17-15-112917	11/29/2017	15	1.25		0.81		1.31		6.52		<0.100	U	<0.100	U	17.1	D
B78-17-021418	2/14/2018	15	2.57		1.78		1.47		4.61		<0.100	U	<0.100	U	7.35	D
B78-17-051518	5/15/2018	15	0.91		1.63		0.53		2.60		<0.100	U	<0.100	U	8.66	D
B78-17-180917	9/17/2018	15	<0.2	U	0.39		<0.2	U	1.37		<0.100	U	<0.100	U	9.63	D
B78-17-020719	2/7/2019	15	<0.2	U	0.68		0.47		0.56		0.101		<0.100	U	2.32	
B78-18-8-100617	10/6/2017	8	<0.2	U	0.07	J	0.29		0.72		-		-		-	
B78-18-15-112917	11/29/2017	15	<0.2	U	<0.2	U	0.35	M	3.10		<0.100	U	<0.100	U	0.343	
DUP-01-112917	11/29/2017	15	<0.2	U	<0.2	U	0.36		2.96		<0.100	U	<0.100	U	1.68	
B78-18-021418	2/14/2018	15	<0.2	U	<0.2	U	0.24		1.28		<0.100	U	<0.100	U	1.47	
B78-18-051518	5/15/2018	15	<0.2	U	<0.2	U	0.23		1.68		<0.100	U	<0.100	U	27.6	D
B78-18-180917	9/17/2018	15	<0.2	U	<0.2	U	<0.2	U	0.89		<0.100	U	<0.100	U	7.28	D
B78-18-020719	2/7/2019	15	<0.2	U	<0.2	U	0.22		1.32		<0.100	U	<0.100	U	2.41	D
B78-19-9-100617	10/6/2017	9	<0.2	U	0.06	J	0.22		0.69		-		-		-	
B78-19-15-112917	11/29/2017	15	<0.2	U	<0.2	U	0.27	M	0.36		<0.100	U	<0.100	U	0.255	
B78-19-021418	2/14/2018	15	<0.2	U	<0.2	U	0.21		0.23		<0.100	U	<0.100	U	1.22	
B78-19-051518	5/15/2018	15	<0.2	U	<0.2	U	0.21		0.34		<0.100	U	<0.100	U	22.4	D
B78-19-180917	9/17/2018	15	<0.2	U	<0.2	U	<0.2	U	<0.2	U	<0.100	U	<0.100	U	1.91	
B78-19-020719	2/7/2019	15	<0.2	U	<0.2	U	<0.2	U	<0.2	U	<0.100	U	<0.100	U	2.16	
B78-20-8-100617	10/6/2017	8	<0.2	U	<0.2	U	0.14	J	8.81		-		-		-	
B78-20-15-113017	11/30/2017	15	0.41		<0.2	U	<0.2	U	25.9		2.93	D	<0.100	U	53.9	D
B78-20-021418	2/14/2018	15	0.25		0.49	M	<0.2	U	40.0		<0.100	U	<0.100	U	21.1	D
B78-20-051518	5/15/2018	15	<0.2	U	0.39		0.22		54.2		<0.100	U	<0.100	U	15.5	D
B78-20-180917	9/17/2018	15	0.24		0.27		0.29		0.98		<0.100	U	<0.100	U	2.39	
B78-20-020719	2/7/2019	15	<0.2	U	0.41	M	0.25		16.5		<0.100	U	<0.100	U	1.89	
B78-21-8-100617	10/6/2017	8	<0.2	U	0.13	J	0.21		1.42		-		-		-	
Dup01-100617	10/6/2017	15	<0.2	U	0.15	J	0.20	J	2.01		-		-		-	
B78-21-15-112917	11/29/2017	15	<0.2	U	0.31	M	0.26		2.27		0.101		<0.100	U	4.43	D
B78-21-021418	2/14/2018	15	<0.2	U	0.24		0.30		0.86		<0.100	U	<0.100	U	1.60	
B78-21-051518	5/15/2018	15	<0.2	U	0.27		0.27		1.08		<0.100	U	<0.100	U	4.59	D
B78-21-180917	9/17/2018	15	0.22		0.29		<0.2	U	0.59		<0.100	U	<0.100	U	3.62	D
B78-21-020719	2/7/2019	15	<0.2	U	0.28		0.32		0.43		0.170		0.161		3.78	D

Table 3-1 - Baseline and Performance Monitoring Groundwater Data; 4-78/79 Benzene Treatment Area

Sample ID	Date	Sample Depth (ft bgs)	TCE (ug/L)		cis-1,2-DCE (ug/L)		VC (ug/L)		Benzene (ug/L)		Nitrate (mg-N/L)		Nitrite (mg-N/L)		Sulfate (mg/L)	
GW-244S-13-112917	11/29/2017	13	3.48		8.06		5.68		7.97		<0.100	U	<0.100	U	0.753	
GW-244S-021418	2/14/2018	13	1.01		1.25		1.22		5.34		<0.100	U	<0.100	U	1.25	
GW-244S	3/6/2018	13	1.26		2.00		1.56		6.86		-		-		-	
GW-244S-051518	5/15/2018	13	<0.2	U	0.30		0.41		3.89		<0.100	U	<0.100	U	<0.100	U
GW-244S-180917	9/17/2018	13	<0.2	U	0.25		0.38		3.74		<0.100	U	<0.100	U	0.113	
GW-244S	*11/13/2018*	*13*	*<0.2*	*U*	*0.26*		*0.55*		*2.95*		-		-		-	
GW-244S-020719	2/7/2019	13	<0.2	U	0.26		0.47		1.14		0.101		<0.100	U	0.337	
GW-244S	*3/4/2019*	*13*	*0.22*		*0.82*		*0.86*		*1.73*		-		-		-	
GW-031S-23-113017	11/30/2017	23	<0.2	U	<0.2	U	<0.2	U	17.6		<0.100	U	<0.100	U	2.54	D
GW-031S-021418	2/14/2018	23	<0.2	U	0.45	M	0.49		21.9		<0.100	U	<0.100	U	3.67	D
DUP-01-021418	2/14/2018	23	<0.2	U	0.46		0.42		21.4		-		-		-	
GW-031S	3/6/2018	23	<0.2	U	1.18		<0.2	U	60.3		-		-		-	
GW-031S-051518	5/15/2018	23	0.36		0.40		0.21		2.68		<0.100	U	<0.100	U	2.95	D
Dup-01-051518	5/15/2018	23	0.32		0.34		0.20		2.64		<0.100	U	<0.100	U	2.87	D
GW-031S-180917	9/17/2018	23	<0.2	U	<0.2	U	0.28		<0.2	U	<0.100	U	<0.100	U	0.499	
Dup-01-180917	9/17/2018	23	<0.2	U	0.21		0.30		<0.2	U	<0.100	U	<0.100	U	0.441	
GW-031S	*11/13/2018*	*23*	*<0.2*	*U*	*0.63*		*0.31*		*28.3*		-		-		-	
Dup-01	*11/13/2018*	*23*	*<0.2*	*U*	*0.58*		*0.30*		*23.8*		-		-		-	
GW-031S-020719	2/7/2019	23	<0.2	U	0.51	M	<0.2	U	21.6		<0.100	U	<0.100	U	0.170	
Dup-01-020719	2/7/2019	23	<0.2	U	0.57	M	0.24		22.7		<0.100	U	<0.100	U	0.202	
GW-031S	*3/4/2019*	*23*	*<0.2*	*U*	*<0.2*	*U*	*<0.2*	*U*	*55.9*		-		-		-	
Dup-01	*3/4/2019*	*23*	*<0.2*	*U*	*<0.2*	*U*	*<0.2*	*U*	*58.6*		-		-		-	

Notes:

U = non-detect

D = dilution

M = Estimated value for a GC/MS analyte detected and confirmed by an analyst but with low spectral match parameters.

Table 3-2 - March 2019 Injection Volumes at ERD Wells

Area	Injection Well	Volume of Solution (gallons)	Brix (^{o}Bx)	Pounds Substrate in the Solution (lbs)
Building 4-78/79	B78-12	500	9.0	375
	B78-14	500	9.0	375
	B78-15	500	9.0	375
	B78-16	497	9.0	373
	Total (gal)	1,997	Total (lbs)	1,499

Notes:

^{o}Bx (degrees brix) is a measure of the sugar content in an aqueous solution. One degree Brix is 1 gram of sucrose in 100 grams of solution and represents the strength of the solution as percantage by mass.

Table 3-3 - March 2019 Injection Volumes at Benzene Treatment Wells

Area	Injection Well	Volume Total (gal)	NaNO3 (lbs)	MgSO4 (lbs)	DAP (lbs)	Concentration NO3 Injected (mg/L)	Concentration SO4 Injected (mg/L)
Building 4-78/79	B78-11	504	4.74	2.08	5.38	825	397
	B78-13	508	4.62	2.08	5.41	797	393
	B78-17	508	4.62	2.08	5.41	797	393
	B78-18	508	4.62	2.08	5.41	797	393
	B78-19	511	4.62	2.08	5.34	793	391
	B78-20	503	4.62	2.08	5.34	805	397
	B78-21	507	4.62	2.08	5.34	799	394

Notes:

NaNO3 - Sodium Nitrate

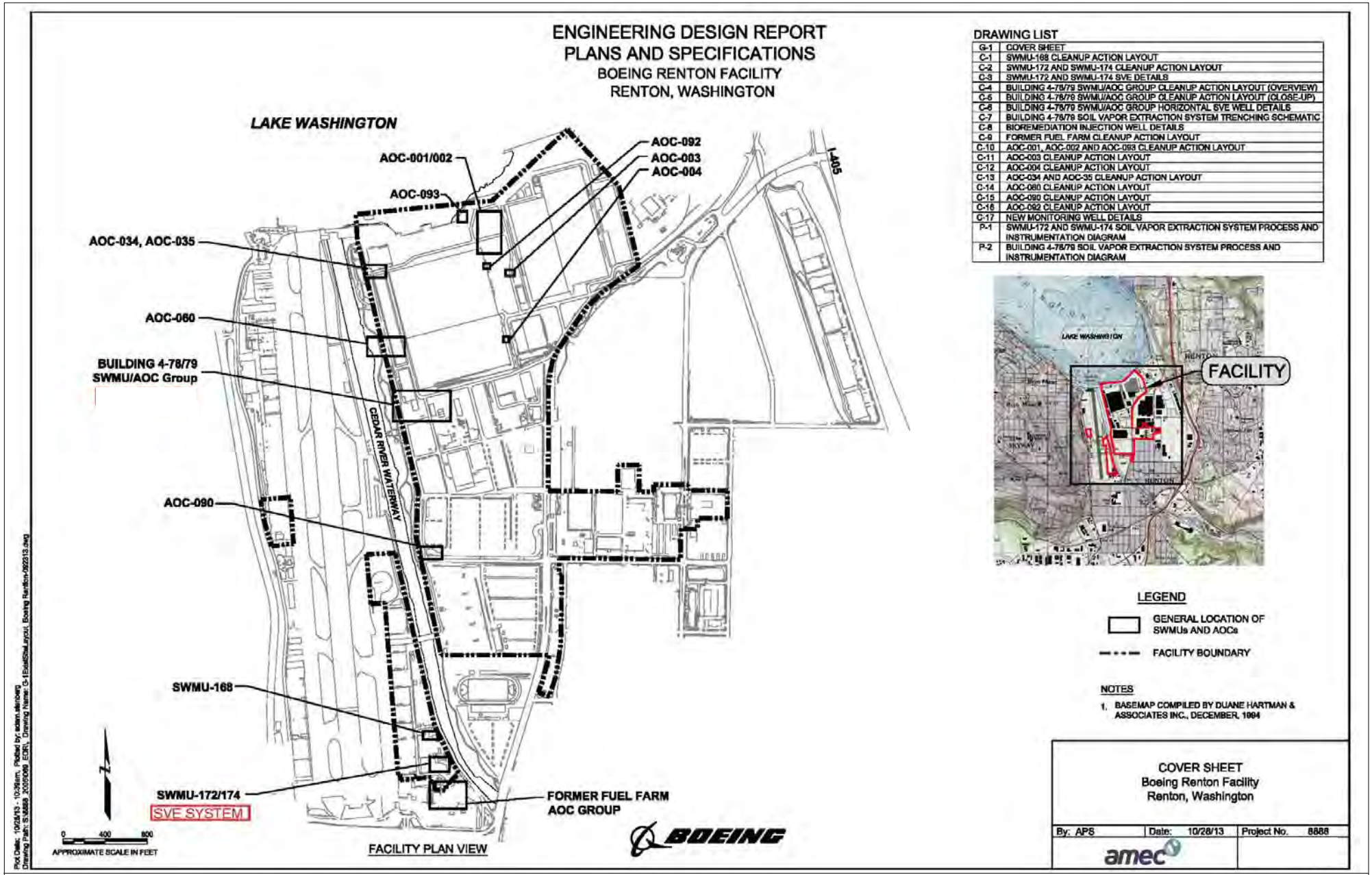
MgSO4 - Magnesium Sulfate

DAP - Diammonium Phosphate

Table 3-4 Groundwater Monitoring Results Summary March 2019 and Recommended ERD Treatment

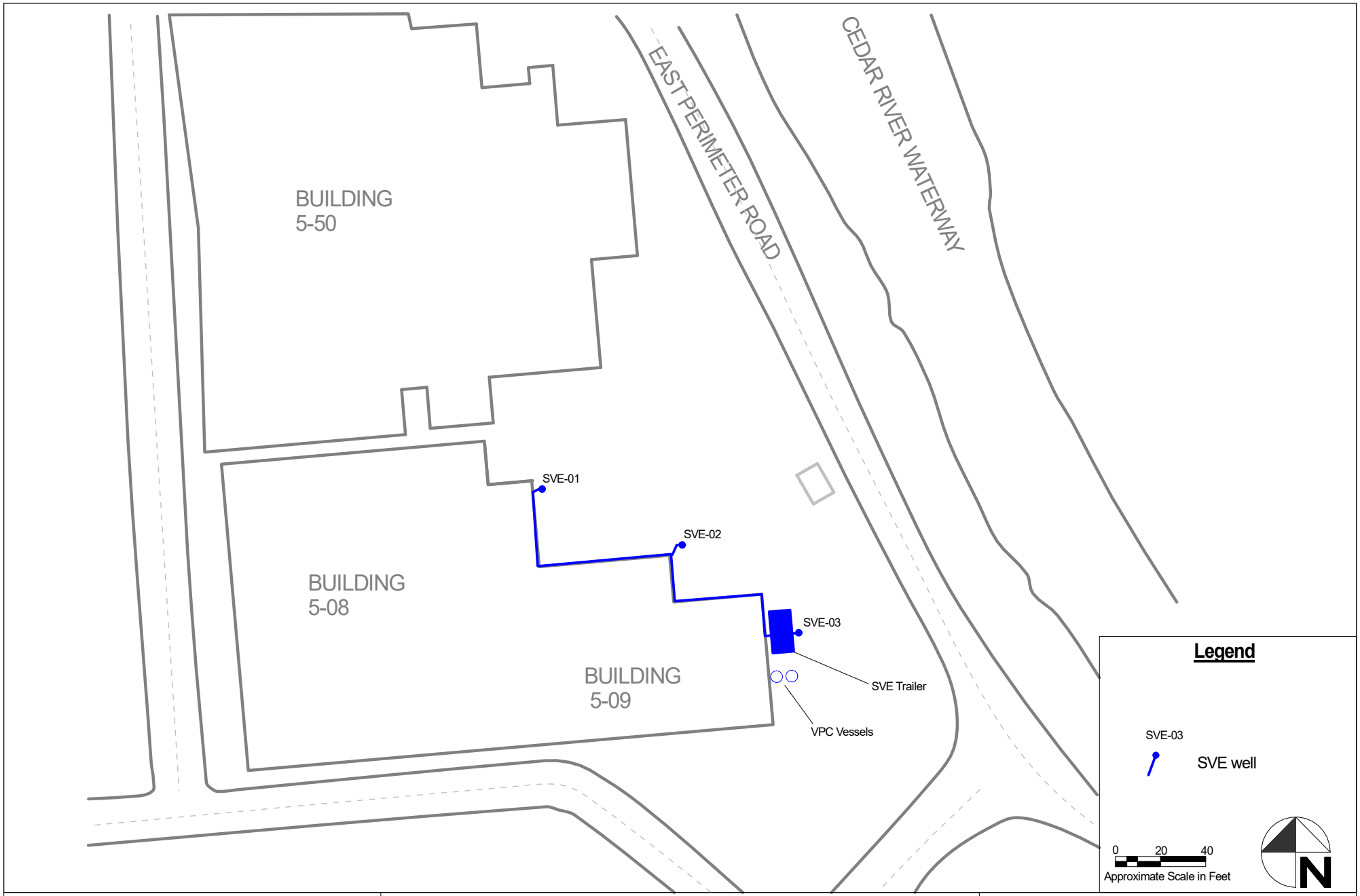
GW Treatment Area	Source and down gradient MWs	CPOC wells	Treatment IWs	ERD Treatment Recommendation
SWMU-172/174	PCE and TCE less than 0.20 ug/L; cisDCE less than 0.70 ug/L; VC less than 0.20 ug/L.	All detections are at 0.25 ug/L or less.	*Prior data Mar 2018, North and South IWS showed total CVOCs range from 0.03 ug/L to 6.90 ug/L. TOC near background.*	**Detections are very low and less than 1 ug/L throughout the site. Will consider additional injections if beneficial.**
Building 4-78/4-79 SWMU/AOC Group	TCE, cisDCE and VC are ND or less than 0.86 ug/L at all but GW033S. One central well (GW033S) continues to show significant reductions in total CVOCs from 1,430 ug/L in Nov 2017. Recent data show 46 ug/L in Nov 2018 and now 4.1 ug/L in Mar 2019. Substrate was applied to this area after Mar 2019 sampling. Benzene increased at source well GW031S (28 ug/L in Nov 2018 to 59 ug/L in Mar 2019). Nitrate/sulfate injected following Mar 2019 sampling.	All CPOC wells with CVOCs either ND or slightly above CULs. Max VC concentration at 0.25 ug/L (CUL is 0.20 ug/L). Northern well GW237S showed increase in Benzene at 9.58 ug/L, up from 0.93 ug/L in Nov 2018.	*Prior data May 2017, 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 March 2019 following sampling. Nitrate/Sulfate injected in area of GW031S completed in March 2019 following sampling. Performance samples collected in May 2019. Review performance monitoring results and make recommendation.**
AOC-001/002	Source MW: TCE is ND; cisDCE less than 0.60 ug/L and VC less than 0.07 ug/L. Down gradient wells less than 0.71 ug/L	All detections below 0.21 ug/L.	*Prior data Mar 2018, detections at or below 0.30 ug/L.*	**Consider injection at infiltration galleries at source (IPRA and IPRB) when area is accessible.**
AOC-003	All detections are less than 0.54 ug/L.	All detections are less than 0.71 ug/L.	*Prior data May 2017 one of four IWs sampled – VC detection less than 0.30 ug/L*	**Substrate injection to be considered in conjunction with AOC-001/002.**
Lot 20 / former 10-71	*Prior data Nov 2018, two of three wells are ND; other well shows TCE at 0.28 ug/L and cisDCE at 0.25 ug/L.*	-	-	**No action at this time.**
AOC-60	MW's with detections less than 0.30 ug/L; treatment MWs with total CVOCs less than 2.6 ug/L.	Detections less than 0.15 ug/L.	-	**Detections are very low throughout the site. Will consider additional injections if beneficial.**
AOC – 90	Treatment MW at source with total CVOCs at 1.6 ug/L total CVOCs down from 27 ug/L in Aug 2018; down gradient wells less than 0.30 ug/L.	Detections less than 0.44 ug/L.	-	**Detections are very low throughout the site. Will consider additional injections if beneficial.**
Apron A	*Prior data; two of three wells ND; other well shows VC at 0.55 ug/L.*	-	-	**No action at this time.**
Building 4-70	-	Detections less than 0.42 ug/L.	-	**No action at this time.**

FIGURES



CALIBRE Systems, Inc.

Figure 1-1 Site Location/ AOC Outlines



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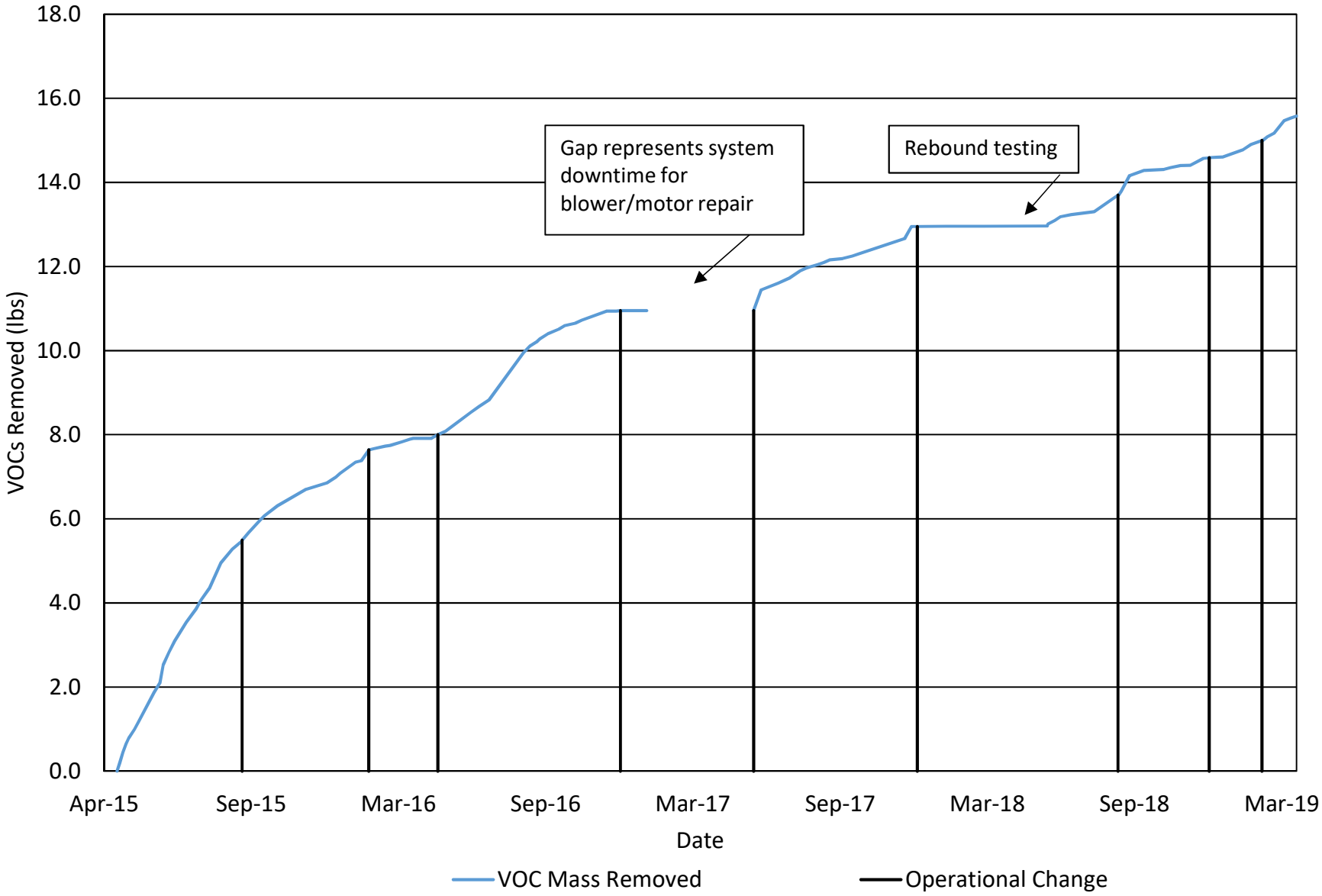
Spring 2017 SVE Quarterly Summary Report

Figure 2-1 SWMU-172/174 Area
SVE System Layout

Figure 2-2 Cumulative VOC Mass Removed - SWMU-172/174 SVE System



*SWMU 172/174 SVE system did not run Winter 2017 due to equipment failure.

Attachment A: Field Log Forms

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

Inspection Date: 1/15/19 Date of last inspection: 12/21/18

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: 1100		Motor Hours: 8,001.8
Blower	**Current Value**	**Other Notes**
Vacuum gauge	39 "H20	
Pressure gauge	20 "H20	
System flow rate	90 scfm	
Blower Temperature	95°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: 1/15/19 1100		PID check after monitoring:					
Sampling Point	**Time**	**PID Reading (1)**	**PID Reading (2)**	**Vacuum**	**Flow Rate (gauge)**	**Differential Pressure**	**Flow Rate Calculated[1]**
SVE-01		Vent					
SVE-02		0 ppb	8 ppb				
SVE-03		2,451 ppb	2,033 ppb				
VPC Inlet		242 ppb	189 ppb				
VPC Midpoint							
VPC Outlet		0 ppb	0 ppb				
Other vapor point _____							

1. Flow rate calculated from the equation $Flow\ Rate\ (cfm) = 12.24 \times \sqrt{differential\ pressure}$.

Questions? Call Justin Neste @ (360) 981-5606
At the Completion of a monitoring event scan monitoring forms and email to Justin Neste: Justin.Neste@calibresys.com

Signature Justin Neste (Printed Name) (Signature) 1/15/19 (Date)

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

Inspection Date: 1/25/19 Date of last inspection: 1/15/19

Periodic systems check:

1) Check flowrate, vacuum, pressure, moisture separator, water storage drums

2) Check each SVE well, VPC inlet, and VPC outlet with PID.

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 0920		Motor Hours: 8,227.6
Blower	**Current Value**	**Other Notes**
Vacuum gauge	40" H_2O	
Pressure gauge	20 "H_2O	
System flow rate	90 scfm	
Blower Temperature	97°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPB RAE 3000	Details: 0 ppb / 10.01 ppm
Calibration time/ date: 0920 1/25/19	PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01		Vent					
SVE-02		56 ppb	74 ppb				
SVE-03		1,316 ppb	1,388 ppb				
VPC Inlet		451 ppb	469 ppb				
VPC Midpoint							
VPC Outlet		0 ppb	0 ppb				
Other vapor point _____							

1. Flow rate calculated from the equation $Flow\ Rate\ (cfm) = 12.24 \times \sqrt{differential\ pressure}$.

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Signature Justin Neste (Printed Name) _____ (Signature) 1/25/19 (Date)

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

Inspection Date: 2/7/19 Date of last inspection: 1/25/19

Periodic systems check:
1) Check flowrate, vacuum, pressure, moisture separator, water storage drums
2) Check each SVE well, VPC inlet, and VPC outlet with PID.

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 1545		Motor Hours: 8,532.6
Blower	**Current Value**	**Other Notes**
Vacuum gauge	42" H20	Due to reduced concentrations, opened SVE3 as vent + started extracting from SVE-1, Can hear water in SVE-1 line near gate valve. Closed SVE-2 to focus vac @ SVE-1 Will allow system to run like this overnight to try to remove water in line. Vac = 60" H20 Flow = 42 scfm Pres = 5" H20 Temp = 104°F
Pressure gauge	20" H20	
System flow rate	98 SCFM	
Blower Temperature	93°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: 1550 2/7/19	PID check after monitoring:

Sampling Point	**Time**	**PID Reading (1)**	**PID Reading (2)**	**Vacuum**	**Flow Rate (gauge)**	**Differential Pressure**	**Flow Rate Calculated[1]**
SVE-01		Vent					
SVE-02		0 ppb	0 ppb				
SVE-03		303 ppb	420 ppb / 455 ppb				
VPC Inlet		176 ppb	214 ppb				
VPC Midpoint							
VPC Outlet		0 ppb	0 ppb				
Other vapor point _____							

1. Flow rate calculated from the equation $Flow\ Rate\ (cfm) = 12.24 \times \sqrt{differential\ pressure}$.

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Signature Justin Neste (Printed Name) _____ (Signature) 2/7/19 (Date)

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

Inspection Date: 2/8/19 Date of last inspection: 2/7/19

Periodic systems check:

1) Check flowrate, vacuum, pressure, moisture separator, water storage drums

2) Check each SVE well, VPC inlet, and VPC outlet with PID.

Operational Parameters - Monitoring interval is variable.		
Inspection Time:		Motor Hours:
Blower	**Current Value**	**Other Notes**
Vacuum gauge	50" H2O	On site to check water in SVE 1 line. Sounds clear
Pressure gauge	10" H2O	opened SVE-2 to system flow & SVE-3 to inlet vent.
System flow rate	70 SCFM	
Blower Temperature	104°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model:	Details:
Calibration time/ date:	PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01		0 ppb	0 ppb				
SVE-02		0 ppb	0 ppb				
SVE-03		vent					
VPC Inlet		0 ppb	6 ppb				
VPC Midpoint							
VPC Outlet							
Other vapor point _____							

1. Flow rate calculated from the equation $Flow\ Rate\ (cfm) = 12.24 \times \sqrt{differential\ pressure}$.

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At the Completion of a monitoring event scan monitoring forms and email to Justin Neste: Justin.Neste@calibresys.com

Signature _____ Printed Name _____ Signature _____ Date

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

Inspection Date: 2/13/19 Date of last inspection: 2/8/19

Periodic systems check:

1) Check flowrate, vacuum, pressure, moisture separator, water storage drums

2) Check each SVE well, VPC inlet, and VPC outlet with PID.

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 0815		Motor Hours: 8,668.3
Blower	**Current Value**	**Other Notes**
Vacuum gauge	51" H_2O	5-09-SVE-IN-021319 @ 0925 TO-15
Pressure gauge	10" H_2O	5-09-SVE-2-021319 @ 0940 TO-15
System flow rate	70 SCFM	
Blower Temperature	97°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: 2/13 0830			PID check after monitoring:				
Sampling Point	**Time**	**PID Reading (1)**	**PID Reading (2)**	**Vacuum**	**Flow Rate (gauge)**	**Differential Pressure**	**Flow Rate Calculated[1]**
SVE-01	0855	774 ppb	792 ppb				
SVE-02	0910	1,272 ppb	1,230 ppb				
SVE-03		Vault					
VPC Inlet	0845	762 ppb	745 ppb				
VPC Midpoint							
VPC Outlet	0840	0 ppb	0 ppb				
Other vapor point _____							

1. Flow rate calculated from the equation $Flow\ Rate\ (cfm) = 12.24 \times \sqrt{differential\ pressure}$.

Questions? Call Justin Neste @ (360) 981-5606

At the Completion of a monitoring event scan monitoring forms and email to Justin Neste: Justin.Neste@calibresys.com

Signature Justin Neste (Printed Name) _____ (Signature) 2/13/19 (Date)

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

Inspection Date: 3/6/19 Date of last inspection: 2/22/19

Periodic systems check:

1) Check flowrate, vacuum, pressure, moisture separator, water storage drums

2) Check each SVE well, VPC inlet, and VPC outlet with PID.

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 0900		Motor Hours: 9163.5
Blower	**Current Value**	**Other Notes**
Vacuum gauge	45" H2O	
Pressure gauge	10" H2O	
System flow rate	70 SCFM	
Blower Temperature	99°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 / 9,998 ppb				
Calibration time/ date: 0830 3/6/19			PID check after monitoring:				
Sampling Point	**Time**	**PID Reading (1)**	**PID Reading (2)**	**Vacuum**	**Flow Rate (gauge)**	**Differential Pressure**	**Flow Rate Calculated[1]**
SVE-01	0920	143 ppb	134 ppb				
SVE-02	0930	1,210 ppb	1,242 ppb				
SVE-03	Vault						
VPC Inlet	0910	956 ppb	1,082 ppb				
VPC Midpoint							
VPC Outlet	0905	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) 3/6/19 (Date)

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

Inspection Date: 3/14/19 Date of last inspection: 3/6/19

Periodic systems check:
1) Check flowrate, vacuum, pressure, moisture separator, water storage drums
2) Check each SVE well, VPC inlet, and VPC outlet with PID.

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 1210		Motor Hours: 9354.8
Blower	**Current Value**	**Other Notes**
Vacuum gauge	45" H_2O	
Pressure gauge	10" H_2O	
System flow rate	70 Scfm	
Blower Temperature	113°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPB RAE 3000			Details: 0 ppb / 10.03 ppm				
Calibration time/ date: 1210 3/14/19			PID check after monitoring:				
Sampling Point	**Time**	**PID Reading (1)**	**PID Reading (2)**	**Vacuum**	**Flow Rate (gauge)**	**Differential Pressure**	**Flow Rate Calculated[1]**
SVE-01	1235	319 ppb	152 ppb				
SVE-02	1230	722 ppb	642 ppb				
SVE-03		Vent					
VPC Inlet	1225	353 ppb	326 ppb				
VPC Midpoint							
VPC Outlet	1220	42 ppb	25 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) 3/14/19 (Date)

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

Inspection Date: 3/21/19 Date of last inspection: 3/14/19

Periodic systems check:
1) Check flowrate, vacuum, pressure, moisture separator, water storage drums
2) Check each SVE well, VPC inlet, and VPC outlet with PID.

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 0830		Motor Hours: 9,517.4
Blower	**Current Value**	**Other Notes**
Vacuum gauge	44" H_2O	
Pressure gauge	10" H_2O	
System flow rate	70 SCFM	
Blower Temperature	110°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: Calgas can empty
Calibration time/ date: N/A (3/14/19)	PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01	0925	107 ppb	114 ppb				
SVE-02	0934	329 ppb	324 ppb				
SVE-03		Vent					
VPC Inlet	0915	287 ppb	277 ppb				
VPC Midpoint							
VPC Outlet	0910	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) 3/21/19 (Date)

Attachment B: TO-15 Laboratory Data Package

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3/8/2019
Mr. Justin Neste
CALIBRE, Environmental Technology Solutions
20926 Pugh Rd NE

Poulsbo WA 98370

Project Name: Renton
Project #:
Workorder #: 1902481

Dear Mr. Justin Neste

The following report includes the data for the above referenced project for sample(s) received on 2/25/2019 at Air Toxics Ltd.

The data and associated QC analyzed by TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics Inc. for your air analysis needs. Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Kelly Buettner at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Kelly Buettner

Project Manager

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WORK ORDER #: 1902481

Work Order Summary

CLIENT:	Mr. Justin Neste CALIBRE, Environmental Technology Solutions 20926 Pugh Rd NE Poulsbo, WA 98370	**BILL TO:**	Accounts Payable Eurofins Lancaster Laboratories Environmental, LLC 2425 New Holland Pike Lancaster, PA 17605-2425
PHONE:	360-981-5606	**P.O. #**	
FAX:		**PROJECT #**	Renton
DATE RECEIVED:	02/25/2019	**CONTACT:**	Kelly Buettner
DATE COMPLETED:	03/08/2019		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	5-09-SVE-IN-021319	TO-15	5.5 "Hg	15 psi
02A	5-09-SVE-2-021319	TO-15	5.5 "Hg	15 psi
03A	Lab Blank	TO-15	NA	NA
04A	CCV	TO-15	NA	NA
05A	LCS	TO-15	NA	NA
05AA	LCSD	TO-15	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 03/08/19

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704434-15-9, UT NELAP CA0093332015-6, VA NELAP - 8113, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2015, Expiration date: 10/17/2016.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
EPA Method TO-15
CALIBRE, Environmental Technology Solutions
Workorder# 1902481

Two 1 Liter Summa Canister samples were received on February 25, 2019. The laboratory performed analysis via EPA Method TO-15 using GC/MS in the full scan mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

There were no analytical discrepancies.

Definition of Data Qualifying Flags

Ten qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

M - Reported value may be biased due to apparent matrix interferences.

CN - See Case Narrative.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

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Summary of Detected Compounds
EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: 5-09-SVE-IN-021319

Lab ID#: 1902481-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
cis-1,2-Dichloroethene	1.2	1.6	4.9	6.5
Trichloroethene	1.2	2.2	6.6	12
Tetrachloroethene	1.2	32	8.4	220

Client Sample ID: 5-09-SVE-2-021319

Lab ID#: 1902481-02A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
cis-1,2-Dichloroethene	1.2	2.8	4.9	11
Trichloroethene	1.2	3.3	6.6	18
Tetrachloroethene	1.2	48	8.4	330

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Client Sample ID: 5-09-SVE-IN-021319

Lab ID#: 1902481-01A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a022809**	**Date of Collection: 2/13/19 9:26:00 AM**	
Dil. Factor:	**2.47**	**Date of Analysis: 2/28/19 07:05 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloromethane	12	Not Detected	26	Not Detected
Vinyl Chloride	1.2	Not Detected	3.2	Not Detected
1,1-Dichloroethene	1.2	Not Detected	4.9	Not Detected
Methylene Chloride	12	Not Detected	43	Not Detected
cis-1,2-Dichloroethene	1.2	1.6	4.9	6.5
Benzene	1.2	Not Detected	3.9	Not Detected
Trichloroethene	1.2	2.2	6.6	12
Tetrachloroethene	1.2	32	8.4	220

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	101	70-130
1,2-Dichloroethane-d4	80	70-130
4-Bromofluorobenzene	95	70-130

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Client Sample ID: 5-09-SVE-2-021319

Lab ID#: 1902481-02A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a022810**	**Date of Collection: 2/13/19 9:41:00 AM**	
Dil. Factor:	**2.47**	**Date of Analysis: 2/28/19 07:31 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloromethane	12	Not Detected	26	Not Detected
Vinyl Chloride	1.2	Not Detected	3.2	Not Detected
1,1-Dichloroethene	1.2	Not Detected	4.9	Not Detected
Methylene Chloride	12	Not Detected	43	Not Detected
cis-1,2-Dichloroethene	1.2	2.8	4.9	11
Benzene	1.2	Not Detected	3.9	Not Detected
Trichloroethene	1.2	3.3	6.6	18
Tetrachloroethene	1.2	48	8.4	330

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	101	70-130
1,2-Dichloroethane-d4	83	70-130
4-Bromofluorobenzene	96	70-130

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Client Sample ID: Lab Blank

Lab ID#: 1902481-03A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a022805**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 2/28/19 12:48 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Chloromethane	5.0	Not Detected	10	Not Detected
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
1,1-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Methylene Chloride	5.0	Not Detected	17	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Benzene	0.50	Not Detected	1.6	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	101	70-130
1,2-Dichloroethane-d4	83	70-130
4-Bromofluorobenzene	96	70-130

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Client Sample ID: CCV

Lab ID#: 1902481-04A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a022802**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 2/28/19 10:54 AM**	

Compound	%Recovery
Chloromethane	89
Vinyl Chloride	88
1,1-Dichloroethene	91
Methylene Chloride	91
cis-1,2-Dichloroethene	96
Benzene	100
Trichloroethene	103
Tetrachloroethene	100

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	99	70-130
1,2-Dichloroethane-d4	82	70-130
4-Bromofluorobenzene	97	70-130

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Client Sample ID: LCS

Lab ID#: 1902481-05A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a022803**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 2/28/19 11:19 AM**	

Compound	%Recovery	Method Limits
Chloromethane	86	70-130
Vinyl Chloride	89	70-130
1,1-Dichloroethene	92	70-130
Methylene Chloride	89	70-130
cis-1,2-Dichloroethene	105	70-130
Benzene	103	70-130
Trichloroethene	105	70-130
Tetrachloroethene	99	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	102	70-130
1,2-Dichloroethane-d4	82	70-130
4-Bromofluorobenzene	96	70-130

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Client Sample ID: LCSD

Lab ID#: 1902481-05AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a022804**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 2/28/19 11:44 AM**	

Compound	%Recovery	Method Limits
Chloromethane	86	70-130
Vinyl Chloride	90	70-130
1,1-Dichloroethene	91	70-130
Methylene Chloride	91	70-130
cis-1,2-Dichloroethene	107	70-130
Benzene	101	70-130
Trichloroethene	104	70-130
Tetrachloroethene	100	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	100	70-130
1,2-Dichloroethane-d4	82	70-130
4-Bromofluorobenzene	96	70-130