Groundwater Monitoring Report

RCRA Corrective Action Program
Boeing Renton Facility
Wood Project # PS20203450.2021

Prepared for:

The Boeing Company
Seattle, Washington

November 29, 2021

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Prepared by:

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November 29, 2021

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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As approved by the Washington State Department of Ecology in a letter dated July 31, 2020, progress reporting is conducted on a semiannual basis in conjunction with monitoring, operations, and maintenance activities conducted pursuant to the Order and as outlined in the Engineering Design Report (AMEC, 2014).

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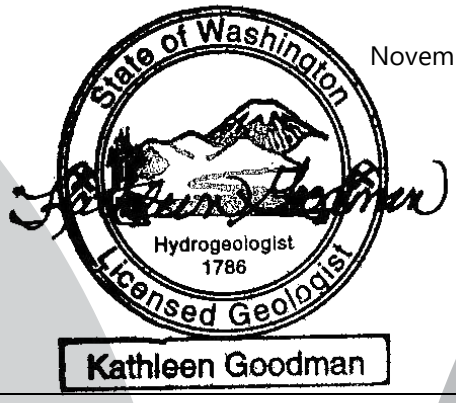

November 29, 2021

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List of Acronyms

µg/L	micrograms per liter
AOC	area of concern
Boeing	The Boeing Company
CAP	Cleanup Action Plan
cis-1,2-DCE	cis 1,2 dichloroethene
CMP	Compliance Monitoring Plan
COC	constituent of concern
CPOC	conditional points of compliance
CUL	cleanup level
CVOC	chlorinated volatile organic compound
DO	dissolved oxygen
Ecology	Washington State Department of Ecology
EDR	Engineering Design Report
MA	monitored attenuation
mg/L	milligrams per liter
MNA	monitored natural attenuation
Order	Agreed Order No. 8191
ORP	oxidation/reduction potential
PCE	tetrachloroethene
RCRA	Resource Conservation and Recovery Act
SVE	soil vapor extraction
SWMU	solid waste management unit
TCE	trichloroethene
the Facility	The Boeing Company Renton Facility
TOC	total organic carbon
TPH	total petroleum hydrocarbons
TPH-D	total petroleum hydrocarbons – diesel
TPH-O	total petroleum hydrocarbons – oil
VC	vinyl chloride
VOC	volatile organic compound
Wood	Wood Environment & Infrastructure Solutions, Inc.

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 during the dry season of 2021 at The Boeing Company (Boeing) Renton Facility (the Facility) (Figure 1). This work is required under the Resource Conservation and Recovery Act (RCRA) Corrective Action Program being performed at the Facility. Corrective action activities are performed for those solid waste management units (SWMUs), areas of concern (AOCs), and other areas where cleanup actions are ongoing. Monitoring, cleanup activities, and reporting are being conducted as part of the final remedy implementation described in the Engineering Design Report (EDR) (AMEC, 2014).

As approved by the Washington State Department of Ecology (Ecology) in a letter dated July 31, 2020, progress reporting is conducted on a semiannual basis in conjunction with monitoring, operations, and maintenance activities conducted pursuant to the Order and as outlined in the EDR.

The following documents summarize ongoing compliance activities conducted at the Facility:

- The original monitoring plan presented in Appendix D of the EDR (AMEC, 2014) was superseded by the Compliance Monitoring Plan (CMP) (Amec Foster Wheeler, 2016a), which was subsequently revised in the Addendum to the CMP (CMP Addendum #1) (Amec Foster Wheeler, 2017).
- The groundwater monitoring program was further revised in the second Addendum to the CMP (CMP Addendum #2) (Wood, 2019), which removed selected areas or wells from the sampling program. These changes were approved by Ecology.
- Boeing submitted a third Addendum to the CMP (CMP Addendum #3) (CALIBRE, 2020) to Ecology on June 30, 2020. This addendum recommended further modifications to the groundwater monitoring program at the Facility and was approved by Ecology in July 2020.

Groundwater monitoring and cleanup actions 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 and MA; SVE has been discontinued, and Ecology approved the SVE system decommissioning in 2018);
- Former Fuel Farm AOC Group: (MNA);
- AOC-003: (bioremediation and MA);
- AOC-004: (bioremediation and MA);
- AOC-060: (bioremediation and MA);
- AOC-090: (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).

Although Apron A was not included in the CAP or EDR, this report includes monitoring results for Apron A. Semiannual monitoring began in Apron A starting in the fourth quarter 2016 (Amec Foster Wheeler, 2016b).

The goals for cleanup of groundwater at the Facility, as described in the CAP, include protection of groundwater for drinking water beneficial use at all areas of the site, and demonstration of protection of surface water beneficial uses at the conditional points of compliance (CPOCs) for each SWMU and AOC. Cleanup goals and comparison with specific criteria are discussed in this report for each SWMU and AOC. Concentrations for protection of groundwater for beneficial use for each constituent of concern (COC) are based on site-specific cleanup levels (CULs) specified in the CAP. Ecology has made multiple clarifications and changes to the CULs in the Model Toxics Control Act regulations since the draft CAP (AMEC, 2012) was prepared that are relevant to the Facility CULs. Boeing recently submitted proposed updates to the CULs (CALIBRE 2021a) to Ecology, that are currently under review. The measured COC concentrations in groundwater presented in this report are compared with the CULs specified in the CAP.

This semiannual report:

- Describes work completed during the reporting period;
- 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 semiannual sampling event, 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 reporting period;
- Describes and discusses trends in monitoring data;
- Assesses remediation at each area; and
- Assesses attainment of CULs at the CPOCs.

This report presents information based on monitoring activities conducted during the dry season 2021 for the period from May through October 2021. In accordance with the requirements of FAthe Order, corrective action activities were conducted at the Facility as described in this report.

1.1 Work completed in the dry season 2021

The following work was completed during the dry season 2021 (the period from May through October 2021):

- CALIBRE submitted the Remedial Progress Review and Evaluation of Groundwater Cleanup Levels at the Boeing Renton Plan to Ecology on May 4, 2021 (CALIBRE, 2021a).
- On behalf of Boeing, Wood submitted the wet season 2021 Groundwater Monitoring Report to Ecology on May 26, 2021.
- Landau Associates completed the 2021 site-wide dry season sampling between August 10 and 17, 2021.
- Excavation of soil with total petroleum hydrocarbons (TPH) exceeding CULs in the unsaturated and smear zones occurred on the east side of Building 4-79 on September 9-10, 2021. More information is provided in Section 3.3.1.2.
- CALIBRE submitted the Excavation Report for Soil Remediation at Building 4-78/79 on October 21, 2021 (CALIBRE, 2021b).

- The SVE system in SWMU-172 and SWMU-174 operated throughout the dry season.
- No active bioremediation was performed at the Facility during this reporting period.

1.2 Deviations from required tasks

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

1.3 Deviations from CAP

No deviations from the CAP occurred during this activity period. Modifications proposed in CMP Addendum #3 (CALIBRE, 2020) and approved by Ecology have been incorporated into this sampling event and are summarized for each sampling area.

1.4 Schedule of monitoring

Ecology approved the modifications to the monitoring plan in CMP Addendum #3 (CALIBRE, 2020) on July 31, 2020, including a change from both quarterly and semiannual sampling to a sitewide semiannual program with sampling events to occur once each during the wet and dry seasons (in February and August, respectively). The revised monitoring plan is detailed in Appendix A, Table A-1. This revised sampling schedule began in August 2020.

In 2022, the wet season report will be delivered to Ecology on or before May 30 and the dry season report will be delivered to Ecology on or before November 30.

1.5 Work projected for the next reporting period

The following work is projected for the upcoming 2021–2022 wet season event:

- Well decommissioning and reinstallation in Apron R is planned to take place. Monitoring wells in the area of construction at Apron R were decommissioned in November 2019 and more are planned to be abandoned in late 2021/early 2022. Wells that are a part of the CMP Addendum #3 sampling program will be reinstalled prior to the next CMP sampling event.
- Monitoring wells GW031S and GW244S were decommissioned as a part of the Building 4-78/79 excavation work and are planned to be replaced in early 2022, prior to the next CMP sampling event.
- Submittal to Ecology of a technical memorandum recommending closure/decommissioning of wells which are no longer required for investigative, bioremediation, or compliance monitoring purposes (November 10, 2021). Pending Ecology approval, well decommissioning activities are planned for the first quarter of 2022.
- Reporting will be completed in accordance with the Order, CAP, EDR, and changes approved by Ecology, including those modifications proposed in CMP Addendum #3 (CALIBRE, 2020).

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 CMP (Amec Foster Wheeler, 2016a) and CMP Addendum #3 (CALIBRE, 2020). Table A-1 summarizes the current groundwater monitoring program and COCs specified in the CAP and revised in CMP Addendum #1 (Amec Foster Wheeler, 2017), CMP Addendum #2 (Wood, 2019) and CMP Addendum #3 (CALIBRE, 2020) 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 specify monitoring requirements for Apron A, which was not included in the CAP. Any changes or exceptions to the sampling or analytical methods cited

in Appendix A during the event is 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 event, 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 a secure online storage application, OneDrive. The data validation memoranda are included in Appendix C.

3.0 Corrective action activities completed during the reporting period

This section describes the corrective action activities conducted at the Facility during the dry season of 2021. Operation of the SVE system at SWMU-172/174 continued during the dry season, as discussed in Section 3.2.1.2. Compliance monitoring was conducted in accordance with the CMP (Amec Foster Wheeler, 2016a) and CMP Addendum #3 (CALIBRE, 2020).

3.1 SWMU-168

This section describes corrective action activities conducted at this SWMU. Figure 2 shows the locations of the groundwater monitoring wells at SWMU-168, as well as the groundwater elevation 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 dry season.

3.1.2 Compliance monitoring plan deviations

No deviations from the CMP occurred for this area during the dry season. The wells monitored in this group changed with the acceptance of CMP Addendum #3 (CALIBRE, 2020) by Ecology. CPOC area wells GW229S and GW231S have been removed from the monitoring plan in this area. COCs remained the same.

3.1.3 Water levels

The groundwater elevation measured during the dry season 2021 groundwater monitoring event at SWMU 168 is summarized in Table 1 and shown on Figure 2. Groundwater elevation contours are not shown since only one well, GW230I, is currently monitored in this group. The general direction of groundwater flow depicted is based on historical information.

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; and COC results for sampling events in recent years are presented in Appendix D.

3.1.4.1 Natural attenuation/geochemical indicators

The geochemical indicator results are presented in Table 2. Data from the CPOC area well indicate that conditions are conducive to natural attenuation of vinyl chloride (VC) in this SWMU. The pH value measured was slightly acidic at 6.32. The CPOC well showed reducing conditions with low dissolved oxygen (DO) and a negative oxidation/reduction potential (ORP) reading. Reducing conditions are present in well GW230I, indicating conditions favorable for dechlorination of volatile organic compounds (VOCs).

3.1.4.2 COC results for source area

Groundwater samples were not collected from the source area well, GW228S, for SWMU-168 per CMP Addendum #3 (CALIBRE, 2020).

3.1.4.3 COC results for conditional point of compliance area

The monitoring result for the CPOC area well is shown in Table 3. The concentration of VC in the groundwater from CPOC area well GW230I was above the CUL for VC at 0.359 micrograms per liter (µg/L) although the results were flagged as estimated. Historical trends for VC in GW230I are shown in Appendix D and depicted on Figure 3.

3.2 SWMU-172 and SWMU-174

This section describes corrective action activities conducted at these two SWMUs. The cleanup remedy for SWMU-172 and SWMU-174 is a combination of bioremediation, SVE, and MA. Figure 4 shows the layout of the groundwater monitoring wells and the remediation system for these SWMUs.

3.2.1 Cleanup action activities

3.2.1.1 Installation/construction activities

No installation/construction activities were conducted for these SWMUs during the dry season of 2021.

3.2.1.2 Soil vapor extraction and bioremediation operations

The SVE system operated throughout the dry season of 2021. Details of system operations are included in the SVE operations and monitoring summary prepared by CALIBRE and included as Appendix E.

3.2.2 Compliance monitoring plan deviations

No deviations from the CMP occurred for this area during the dry season event. The wells monitored in this group changed with the acceptance of CMP Addendum #3 (CALIBRE, 2020) by Ecology. Downgradient plume area well GW081S and CPOC area well GW233I were removed from the monitoring plan under CMP Addendum #3 (CALIBRE, 2020). The COCs remained the same for SWMU-172 and SWMU-174 under CMP Addendum #3.

3.2.3 Water levels

Groundwater elevations for the SWMU-172 and SWMU-174 area measured during the dry season event 2021 are summarized in Table 4 and shown on Figure 4. The groundwater elevation data show a flow direction generally to the northeast, toward the Cedar River Waterway; however, the sheet pile wall to the east of this area prevents a direct groundwater connection to the river as depicted by the contours.

3.2.4 Groundwater monitoring results

Groundwater at this area is monitored following the analysis protocol 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. Specific conductivity was lower in the source area than in the downgradient plume area or the CPOC area, and pH was slightly acidic across SWMI-172 and SWMU-174. DO and ORP results indicate reducing conditions in the area and other natural attenuation

parameter results were generally uniform across this area. Total organic carbon (TOC) concentrations ranged from 0.51 milligrams per liter (mg/L) to 10.47 mg/L for all SWMU-172 and SWMU-174 monitoring wells.

3.2.4.2 COC results for source and downgradient plume areas

Table 6 lists dry season 2021 analytical results for the SWMU-172 and SWMU-174 COCs. Figures 5 and 6 show 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, and in downgradient plume area wells GW172S and GW173S. Groundwater flows generally 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.

Source area groundwater CUL exceedances (Table 6) consisted of:

- GW152S: cis-1,2-DCE, PCE, TCE, and VC (and the associated duplicate sample),
- GW153S: cis-1,2-DCE, and VC

In the downgradient plume area groundwater CUL exceedances (Table 6) were:

- GW172S: cis-1,2-DCE and VC
- GW173S: cis-1,2-DCE and VC
- GW226S: cis-1,2-DCE and PCE.

As shown in Figures 5 through 7, the concentrations of COCs in groundwater from source area wells and downgradient plume area wells have generally remained stable or decreased over time.

Arsenic was detected above the CUL in the groundwater from all source area and downgradient plume area wells; both copper and lead were detected above the CULs in the groundwater from source area well GW152S, and downgradient plume area well GW173S; lead was detected above the CUL in the groundwater from downgradient plume area well GW172S. As shown in Figure 8, the arsenic concentrations in groundwater have generally remained stable over the past two years. The arsenic concentration in downgradient plume area well GW172S for this sampling event was the lowest ever detected in that well. The observed range of arsenic in groundwater is within the naturally occurring background arsenic range reported by Ecology[1] for Washington State (Ecology 2021).

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 9. As shown in Table 6, cis-1,2-DCE was detected above the CUL in the groundwater from all CPOC area wells; TCE was also detected above the CUL in the groundwater from GW235I; and VC was detected above the CUL in the groundwater from GW232S. PCE was not detected in the groundwater from the CPOC area wells. Figure 9 shows the COCs remained within stable ranges for each well.

Arsenic was detected above the CUL in the groundwater from all CPOC area wells except for GW235I; lead was detected above the CUL in the groundwater from CPOC area wells GW234S and GW236S (Table 6).

[1] The 2021 Ecology background study is based on testing from over 2,500 supply wells used for potable supply in Puget Sound Basin. All samples are from water supply aquifers with no known anthropogenic impacts. For the Puget Sound Basin, 50% of samples are non-detect but the natural background range includes more than 1,400 samples between 0.8-76 µg/L arsenic, with an average of 5.4 µg/L. This naturally occurring range is consistent with prior studies by USGS (2000) and Ecology (1989) in Washington State.

Figure 10 shows arsenic, copper, and lead concentration trends since the beginning of compliance monitoring in groundwater from the CPOC area wells. As shown in Figure 10, arsenic remained within a stable range; copper and lead concentrations appear to be decreasing since the last sampling event.

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 dry season 2021. The cleanup remedy for this SMWU/AOC group is bioremediation and MA as well as excavation of TPH-contaminated soils; SVE has been discontinued and the system was decommissioned. Figure 11 shows the location of the September 2021 soil excavation, groundwater monitoring wells, extraction wells, abandoned wells, horizontal SVE wells, and bioremediation injection wells for this area. Recently decommissioned wells in the area are depicted on the figure with a gray symbol.

3.3.1 Cleanup action activities

3.3.1.1 Installation/construction activities

A work plan for removal of TPH-contaminated soil (CALIBRE, 2021c) was submitted to Ecology in January 2021 and approved by Ecology in February 2021. In preparation for the excavation activities, six bioremediation injection wells and two monitoring wells in the Building 4-78/79 SWMU/AOC were decommissioned in late August 2021. Monitoring wells GW031S and GW244S were decommissioned by over drilling and chip in place methods, respectively. The two monitoring wells are scheduled to be replaced in early 2022 to allow for sampling during the next CMP monitoring event.

The excavation work to remove the TPH-contaminated soil at Building 4-78/79 took place on September 9 and 10, 2021. The work went generally according to the work plan (CALIBRE, 2021c). The results from this work are detailed in the excavation report (CALIBRE, 2021b). A total of 302.7 tons of soil were removed and transported for disposal from the site. A high-pressure water line and other utilities are present in the vicinity of the work area, so the TPH could not be completely remediated. This was known prior to the start of work and was explained in the work plan. Two new horizontal injection lines were installed during the backfill process and a substrate injection is planned for November 2021. TPH will continue to be monitored in groundwater at this area.

3.3.1.2 Soil vapor extraction and bioremediation activities

SVE operations were discontinued in late 2018. Certain injection wells are still sampled to monitor the status of contaminants. Trend charts for *cis*-1,2-DCE and benzene in nitrate/sulfate injection wells are presented in Figure 12, and charts for TCE and VC in the injection wells are presented in Figure 13.

3.3.2 Compliance monitoring plan deviations

No deviations from the CMP occurred for this area during the dry season event. The wells monitored in this group changed with Ecology's acceptance of CMP Addendum #3 (CALIBRE, 2020). Source area wells GW039S and GW243I; downgradient plume area wells GW038S, GW209S, and GW210S; and CPOC area wells GW238I, GW239I, GW241S, and GW242I were removed from the monitoring plan for this SWMU/AOC group. COCs remained the same for this group.

3.3.3 Water levels

Table 7 presents the groundwater elevations measured during the dry season groundwater monitoring event at the Building 4-78/79 SWMU/AOC group. As shown in Figure 11, the observed direction of

groundwater flow from the source area during August 2021 is generally to the west. The measured groundwater elevations during this event did not allow for contouring of groundwater flow patterns.

3.3.4 Groundwater monitoring results

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

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, ranging from 0.43 to 1.31 mg/L, and high specific conductivity. The pH was between 6.0 and 6.5 standard units in all wells. The source area wells showed reducing conditions with low DO and mostly negative ORP readings. Results for the other primary geochemical indicators were generally consistent in all wells. TOC concentrations in source area wells ranged from 4.63 to 15.21 mg/L.

3.3.4.2 COC results for source area

Table 9 lists analytical results for COCs during the dry season event at the Building 4-78/79 SWMU/AOC Group. The CULs established in the CAP for the CPOC are also presented on Table 9. Figures 14 and 15 are trend charts showing historical trends for COCs for the source area wells.

Benzene was detected above the CUL in source area wells GW031S (and the duplicate sample), and GW033S. TPH-G was detected above the CUL in GW031S (and the duplicate sample). VC was detected above the CUL in source area wells GW033S, GW034S, and GW244S. Two detections of cis-1,2-DCE were present in groundwater from the source area, but neither exceeded the CUL of 0.70 µg/L.

Figure 14 shows trends for VOCs in source area wells GW031S and GW033S. COCs shown for GW031S appear to be generally stable with greater annual fluctuations in benzene, which should be more consistent now that the remedial excavation was conducted in this area. The concentration of benzene in GW031S was the lowest detected since 2014. Trends in GW033S appear to show greater fluctuation, with cis-1,2-DCE and VC results decreasing significantly over the past year.

Figure 15 shows trends for VOCs in source area wells GW034S and GW244S. Concentrations of COCs in GW034S appear generally stable, with all COCs except for VC below laboratory detection limits for the past nine monitoring events. COC concentrations in GW244S have generally trended down since monitoring began.

3.3.4.3 COC results for conditional point of compliance area

Groundwater monitoring results in the CPOC area for the dry season 2021 are summarized in Table 9. Trends for CPOC area wells GW143S, GW237S, and GW240D are shown in Figures 16 through 18. None of the COCs were detected in groundwater from the CPOC area wells at concentrations above the CULs.

Benzene has been sporadically detected above the CUL in groundwater from the CPOC area well GW237S but has not been detected above the CUL in the groundwater from any of the other CPOC wells and was not detected in GW237S during this event.

Cis-1,2-DCE has been detected sporadically in groundwater above CULs from CPOC area well GW143S (though below the CUL in this sampling event) but has not been detected above the CUL in the groundwater from any of the other CPOC area wells (Figure 16). Figure 17 shows that TCE has not been detected in the CPOC area for two consecutive events; VC has not been detected in the CPOC area for four consecutive

events, except for in groundwater from GW237S. Figure 18 shows that TPH-G was only detected in GW237S since monitoring began and has been steadily decreasing.

3.4 Former Fuel Farm AOC group

This section describes corrective action activities conducted at the Former Fuel Farm AOC group during the dry season 2021. The final remedy for the Former Fuel Farm is MNA.

3.4.1 Cleanup action activities

No installation/construction activities were conducted for this cleanup action area during the dry season 2021.

3.4.2 Compliance monitoring plan deviations

No deviations from the CMP occurred for this area during the dry season. The wells monitored in this group changed with Ecology's acceptance of CMP Addendum #3 (CALIBRE, 2020). Source area well GW255S and CPOC area wells GW183S, GW184S, GW212S, GW256S, GW257S, and GW258S were removed from the monitoring program for this group. COCs remained the same for this group.

3.4.3 Water levels

Groundwater elevations for the Former Fuel Farm AOC Group measured during the dry season event are summarized in Table 10 and shown on Figure 19. Groundwater elevation contours are not shown since only three wells are monitored in this group and data are too limited to produce accurate contours. Groundwater flow direction is shown based on historical information from this AOC and is to the northeast.

3.4.4 Groundwater monitoring results

Results for primary geochemical indicators are presented in Table 11; results for COCs for the Former Fuel Farm AOC Group are presented in Table 12.

3.4.4.1 Monitored natural attenuation indicators

The geochemical indicator results are presented in Table 11. Results in Table 11 indicate that geochemical conditions are generally consistent throughout the Former Fuel Farm AOC Group. Specific conductivity was moderate for groundwater. pH in CPOC area wells ranged from 6.08 to 6.54 standard units. DO was generally low across wells in this area, and ORP was negative. The geochemical indicators indicate natural attenuation of the COCs for the Former Fuel Farm AOC Group is occurring.

3.4.4.2 COC results for source area

The single source area well for this group was removed from the monitoring plan with Ecology's acceptance of CMP Addendum #3 (CALIBRE, 2020).

3.4.4.3 COC results for conditional point of compliance area

CPOC area monitoring results are presented in Table 12. Figure 20 shows trend data for CPOC area wells GW211S, GW221S, and GW224S. Figure 20 shows that the dry season event results for these wells are consistent with the historical monitoring results since late 2013. Samples were analyzed for TPH as diesel (TPH-D), motor oil (TPH-O), and Jet A. TPH-D and Jet-A were detected above the CUL in GW221S and GW224S. TPH-O was not detected in any of the CPOC area wells. GW211S has had both TPH-D and Jet-A below the CUL for the past eight monitoring events. COC concentrations in GW221S have recovered to the lower end of the observed ranges for this well after a spike was observed approximately one year ago.

Concentrations in GW224S appear to be decreasing steadily, with annual fluctuations in both TPH-D and Jet-A.

3.5 AOC-001 and AOC-002

Apron R near AOC-001 and AOC-002 is under reconstruction. Therefore, no monitoring was conducted for this area during the dry season 2021. Monitoring wells in these areas were removed on November 25, 2019, and more are scheduled to be removed in late 2021/early 2022. Monitoring wells are planned to be reinstalled after construction is complete, currently anticipated for late 2022 with well installation tentatively planned for 2023. Groundwater monitoring activities are anticipated to resume in 2023.

3.6 AOC-003

This section describes corrective action activities conducted at AOC-003 for the dry season event. The cleanup remedy for this AOC is bioremediation and MA. Figure 21 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 dry season event.

3.6.2 Compliance monitoring plan deviations

No deviations from the CMP occurred for this area during the dry season. The COCs monitored in this group changed with Ecology's acceptance of CMP Addendum #3 (CALIBRE, 2020). PCE, TCE, and cis-1,2-DCE were removed as COCs. Wells in the monitoring program remained the same for this AOC.

3.6.3 Water levels

Table 13 presents the groundwater elevations measured during the dry season event at AOC-003. Figure 21 shows the groundwater elevations from this event. The layout of remaining groundwater elevations in this area does not allow for contouring of groundwater patterns. The groundwater flow direction to the northwest is estimated based on historical information of the area and is consistent with the available groundwater elevations measured during this event.

3.6.4 Groundwater monitoring results

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

3.6.4.1 Monitored attenuation/geochemical indicators

The geochemical indicator results are presented in Table 14. Results in Table 14 indicate that geochemical conditions are generally consistent throughout this AOC. High specific conductivity and low DO were observed during this monitoring event, and pH readings were near neutral for all wells in this area. Based on the geochemical indicators, reducing conditions are occurring in this area.

3.6.4.2 COC results for source and downgradient plume areas

Wells in this group were analyzed for VC. Both the source area and downgradient plume area well samples were above the CUL. Figure 22 shows the historical trends of VC in source area well GW249S and downgradient plume area well GW188S.

3.6.4.3 COC results for conditional point of compliance area

VC was detected at concentrations above the CULs in the groundwater from both CPOC area wells (GW247S and GW248I). Figure 23 shows the historical trends of VC in GW247S and GW248I.

3.7 AOC-004

This section describes corrective action activities conducted at AOC-004 for the dry season event. The cleanup remedy for this AOC is bioremediation and MA. Figure 24 shows the location of groundwater monitoring and bioremediation wells at AOC-004, as well as the groundwater elevations measured during this monitoring event.

3.7.1 Cleanup action activities

No installation/construction activities were conducted for this cleanup action area during the dry season event.

3.7.2 Compliance monitoring plan deviations

No deviations from the CMP occurred for this area during the dry season. The wells monitored in this group changed with Ecology's acceptance of CMP Addendum #3 (CALIBRE, 2020). CPOC area well GW174S was removed from the monitoring program for AOC-004. The COC remained the same, only lead is monitored in this area.

3.7.3 Water levels

Table 16 presents the groundwater elevation measured during the dry season event at AOC-004. Figure 24 shows the groundwater elevation from this event. Groundwater contouring and flow direction cannot be determined from the single groundwater elevation measurement, but a general direction of groundwater flow based on historical information is shown on Figure 24.

3.7.4 Groundwater monitoring results

Results for geochemical indicators are presented in Table 17; results for the AOC-004 COCs are presented in Table 18.

3.7.4.1 Monitored attenuation/geochemical indicators

The geochemical indicator results are presented in Table 17. The pH reading was near neutral at 6.96 standard units. Moderate specific conductivity, low DO, and a negative ORP reading were observed during this monitoring event.

3.7.4.2 COC results for source area

The source area well in this group was analyzed for lead and the result was below the CUL of 0.001 mg/L. Figure 25 shows the historical trend for lead in GW250S.

3.8 AOC-060

This section describes corrective action activities conducted at AOC-060 for the dry season event. The cleanup remedy for this AOC is bioremediation and MA. Figure 26 shows the location of groundwater monitoring and bioremediation wells at AOC-060, as well as the groundwater elevations measured during this monitoring event.

3.8.1 Cleanup action activities

No installation/construction activities were conducted for this cleanup action area during the dry season event.

3.8.2 Compliance monitoring plan deviations

No deviations from the CMP occurred for this area during the dry season. The wells monitored in this group changed with Ecology's acceptance of CMP Addendum #3 (CALIBRE, 2020). GW149S, GW252S, and GW254S were removed from the monitoring program. COCs in the monitoring group remained the same.

3.8.3 Water levels

Table 19 presents the groundwater elevations measured during the dry season event at AOC-060. Figure 26 shows the groundwater elevations from this event. Groundwater flow direction is generally to the west, toward the Cedar River Waterway. The groundwater elevation data collected during this monitoring event did not allow for contouring of groundwater patterns, but the direction of groundwater flow is shown on Figure 26.

3.8.4 Groundwater monitoring results

Results for geochemical indicators are presented in Table 20; results for the AOC-060 COCs are presented in Table 21.

3.8.4.1 Monitored attenuation/geochemical indicators

The geochemical indicator results are presented in Table 20. Results during this monitoring event showed high specific conductivity and low to moderate DO. The pH was near neutral in this AOC, with only one well below 6.0 standard units, and all other wells between 6.0 and 7.0 standard units. TOC results ranged from 4.02 to 11.88 mg/L.

3.8.4.2 COC results for source and downgradient plume areas

Wells in this group were analyzed for cis-1,2-DCE, TCE, and VC (Table 21). Groundwater from all source area and downgradient plume area wells exceeded the CULs for cis-1,2-DCE and TCE. All downgradient plume area wells exceeded the CUL for VC. Figure 27 shows historical trends for COCs in GW009S, which have been stable since monitoring began. Figures 27 and 28 show historical trends for COCs in downgradient plume area wells. COC results in GW014S have been generally stable since monitoring began, but GW012S and GW147S exhibit more fluctuation in COC concentrations, possibly due to seasonal groundwater flow variations.

3.8.4.3 COC results for conditional point of compliance area

Groundwater from both CPOC area wells exceeded the CUL for cis-1,2-DCE. A detection of TCE in GW253I was just over the laboratory reporting limit at 0.0202 µg/L, and also exceeded the CUL. Detections of VC were present in groundwater from both CPOC area wells but did not exceed the CUL. Figure 29 shows historical trends of COCs in CPOC area wells GW150S and GW253I.

3.9 AOC-090

This section describes corrective action activities conducted at AOC-090 for the dry season event. The cleanup remedy for this AOC is bioremediation and MA. Figure 30 shows the location of groundwater monitoring and bioremediation wells at AOC-090, as well as the groundwater elevations measured during this monitoring event.

3.9.1 Cleanup action activities

No installation/construction activities were conducted for this cleanup action area during the dry season event.

3.9.2 Compliance monitoring plan deviations

No deviations from the CMP occurred for this area during the dry season. The wells and COCs monitored in this group changed with Ecology's acceptance of CMP Addendum #3 (CALIBRE, 2020). Wells GW163I, GW165I, GW175I, GW177I, GW179I, and GW180S were removed from the monitoring program. Analytes were reduced to chlorinated VOCs (CVOCs) and TPH in GW189S, and VC in the remaining wells.

3.9.3 Water levels

Table 22 presents the groundwater elevations measured during the dry season event at AOC-090. Figure 30 shows the groundwater elevations from this event. Groundwater flow direction is to the west, toward the Cedar River Waterway.

3.9.4 Groundwater monitoring results

Results for geochemical indicators are presented in Table 23; results for the AOC-090 COCs are presented in Table 24.

3.9.4.1 Monitored attenuation/geochemical indicators

The geochemical indicator results are presented in Table 23. Results in Table 23 indicate that geochemical conditions are consistent throughout this AOC. The pH was near neutral in this AOC, with only one well below 6.0 standard units, and all other wells between 6.0 and 6.5 standard units. Specific conductivity and DO measurements were moderate across the wells in this area. TOC was measured at 9.58 mg/L in GW189S.

3.9.4.2 COC results for source and downgradient plume areas

Groundwater from source area well GW189S exceeded the CUL for cis-1,2-DCE, TCE, VC, and TPH-O; all other CVOC and TPH results were below CULs or not detected. Historical trends for GW189S show CVOCs are trending downward since the start of monitoring (Figure 31). Downgradient plume area well GW176S exceeded the CUL for VC.

3.9.4.3 COC results for conditional point of compliance area

Groundwater collected from all CPOC area wells exceeded the CUL for VC.

3.10 Building 4-70 area

The Building 4-70 Area was removed from the monitoring program with Ecology's approval of CMP Addendum #3 (CALIBRE, 2020).

3.11 Lot 20/Former Building 10-71 Parcel

The Lot 20/Former Building 10-71 Parcel was removed from the monitoring program with the acceptance of CMP Addendum #3.

3.12 Apron A area

This section describes corrective action activities conducted at the Apron A area during the dry season event. The cleanup remedy proposed for the Apron A area is bioremediation and MA. Figure 32 shows the locations of the groundwater monitoring wells in the Apron A area.

3.12.1 Cleanup action activities

No construction or operations work was conducted in the Apron A area during the dry season event.

3.12.2 Compliance monitoring plan deviations

No deviations from the CMP occurred for this area during the dry season. The wells monitored in this group changed with Ecology's acceptance of CMP Addendum #3 (CALIBRE, 2020). Well GW262S was removed from the monitoring program for this area. COCs monitored for this group remained the same.

3.12.3 Water levels

The depth to groundwater measurements during the dry season at Apron A are presented in Table 25 and on Figure 32. Groundwater elevations are not available because the top of casing elevations were never surveyed. Groundwater flow direction is estimated based on historical information of the area and flows east toward the Cedar River Waterway.

3.12.4 Groundwater monitoring results

Results for primary geochemical indicators for groundwater from groundwater monitoring well GW264S are presented in Table 26; results for COCs from this well are presented in Table 27.

3.12.4.1 Monitored attenuation/geochemical indicators

Geochemical parameters are presented in Table 26. Observations included high specific conductivity, moderate DO, near neutral pH of 6.21 standard units, and a negative ORP reading.

3.12.4.2 COC results

Analytes from Apron A samples do not have established CULs to compare to because they were added to the monitoring program after the CMP (Amec Foster Wheeler, 2016a) was in place. Additional monitoring of the soil and groundwater in Apron A was completed in 2016 and included installation of the monitoring wells in this area (Amec Foster Wheeler, 2016b). Apron A COCs (cis-1,2-DCE and VC) for GW264S are presented in Table 27. Cis-1,2-DCE was not detected in the groundwater from GW264S. VC was detected in the groundwater from monitoring well GW264S at a concentration of 1.37 µg/L. This exceeds the CUL for VC of 0.11 µg/L in SWMU-168, the closest monitoring area to Apron A on the west side of the Cedar River Waterway.

4.0 References

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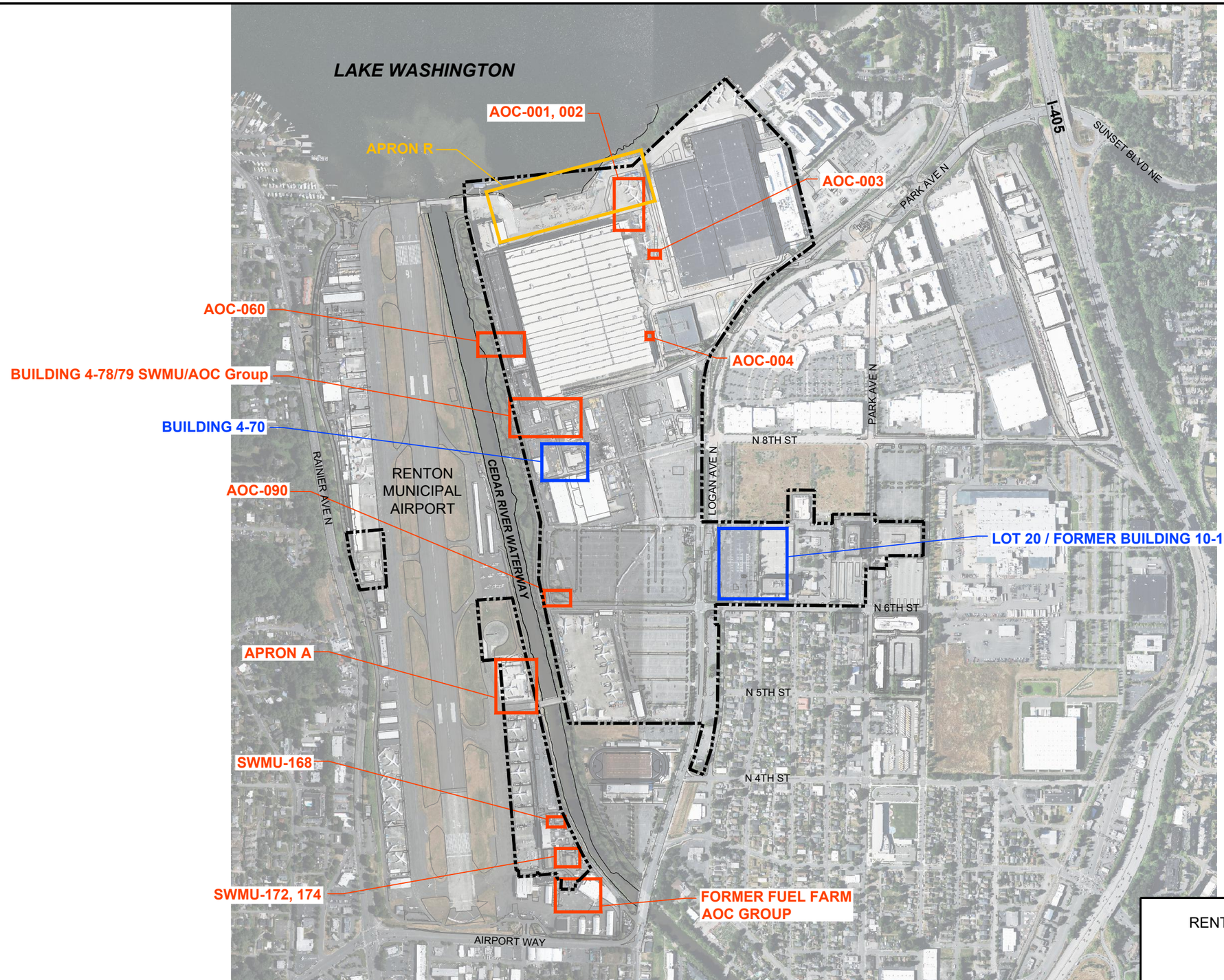
Figures



LEGEND

- GENERAL LOCATION OF SWMUs AND AOCs
- AOCs CLOSED WITH ECOLOGY APPROVAL
- APPROXIMATE APRON R CONSTRUCTION ZONE
- FACILITY BOUNDARY

NOTES

1. BASEMAP COMPILED BY DUANE HARTMAN & ASSOCIATES INC., DECEMBER, 1994

0 400 800

APPROXIMATE SCALE IN FEET

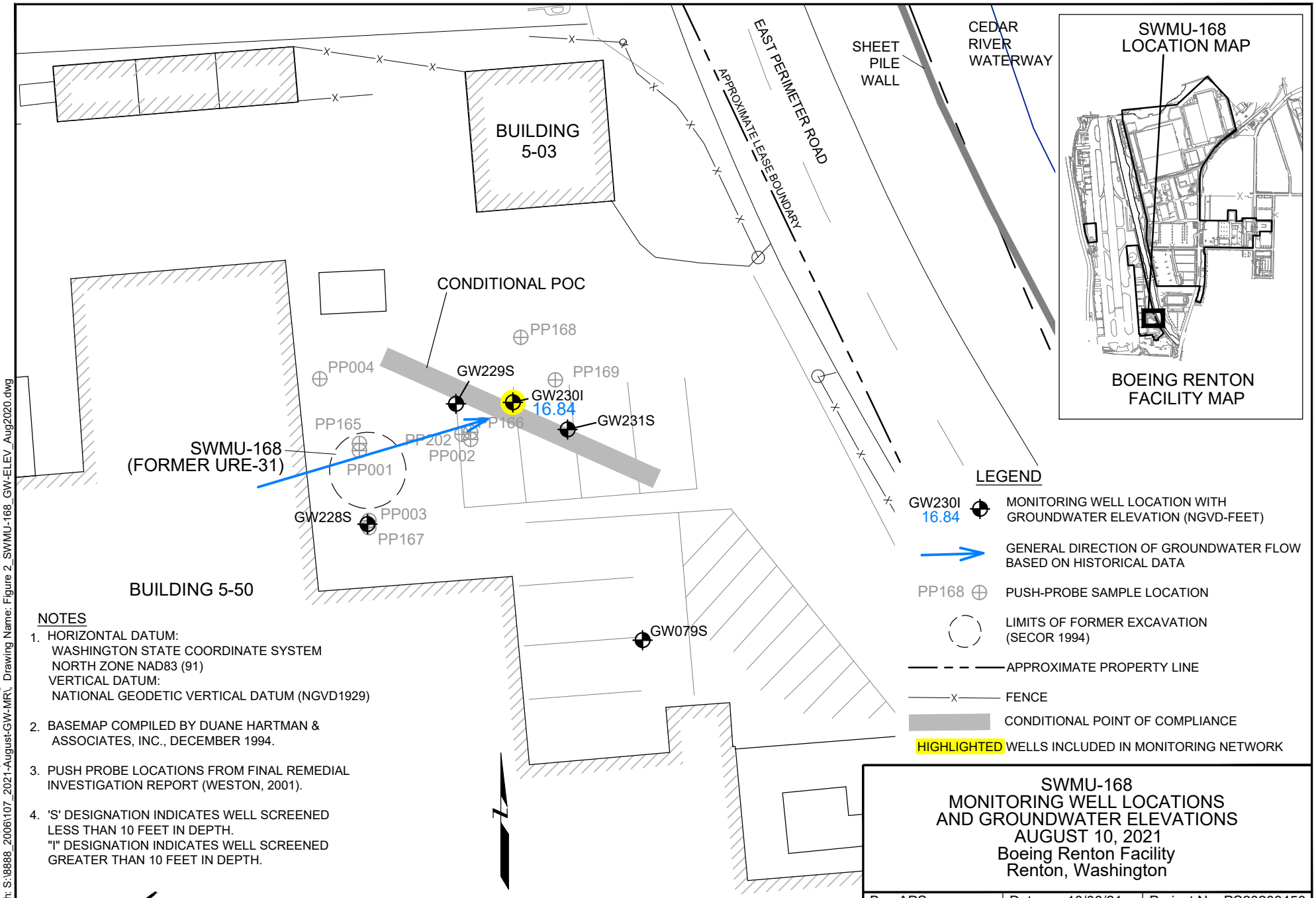
BOEING

RENTON SWMU AND AOC LOCATIONS

Boeing Renton Facility
Renton, Washington

By: APS	Date: 11/12/21	Project No. PS20203450
wood.		Figure 1

Plot Date: 11/12/21 - 1:51pm Plotted by: adam.stenberg
Drawing Path: S:\8888_2006\ Drawing Name: BoeingRentonSiteMap_2021.dwg



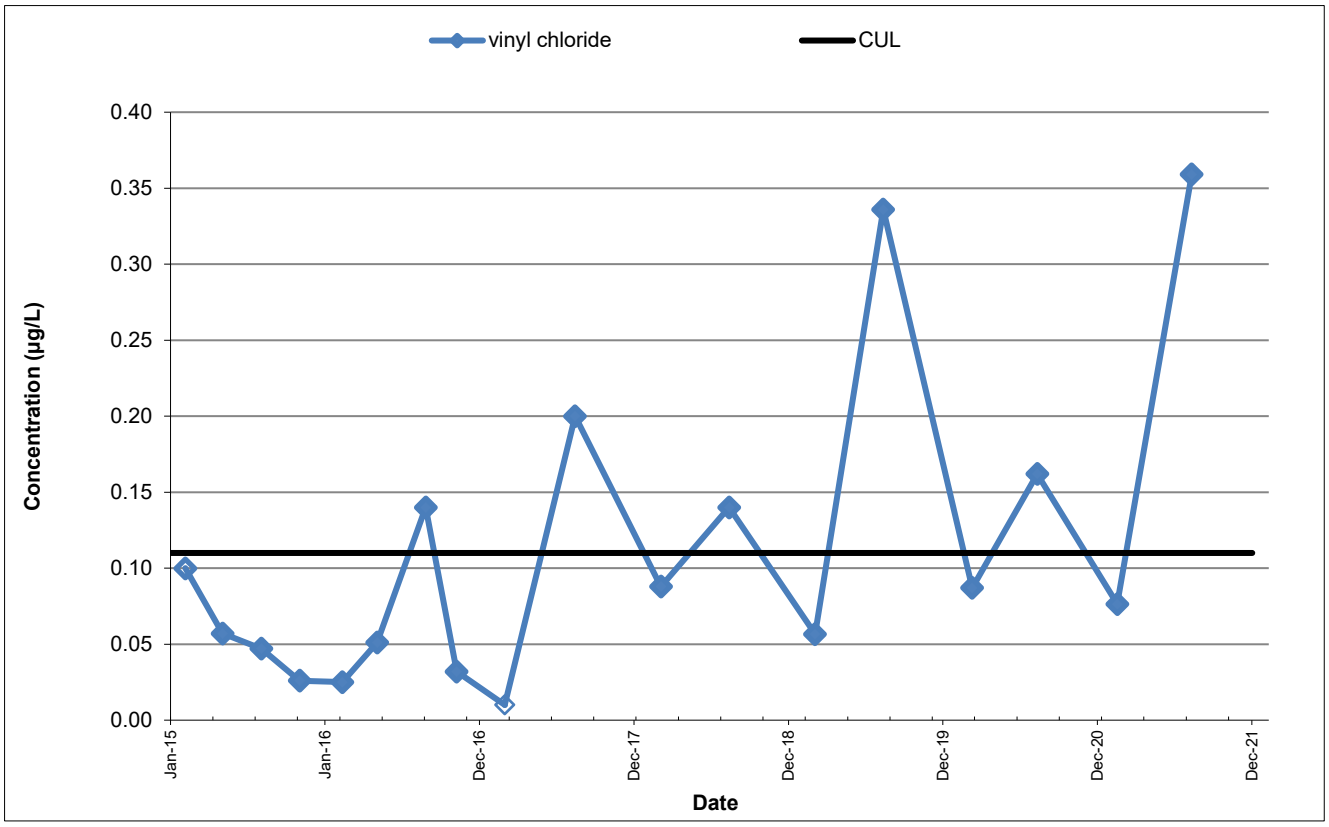
NOTES

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

BOEING

SWMU-168
MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS
AUGUST 10, 2021
Boeing Renton Facility
Renton, Washington

By: APS	Date: 10/06/21	Project No. PS20203450
wood.		Figure 2



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

CPOC AREA WELL GW230I

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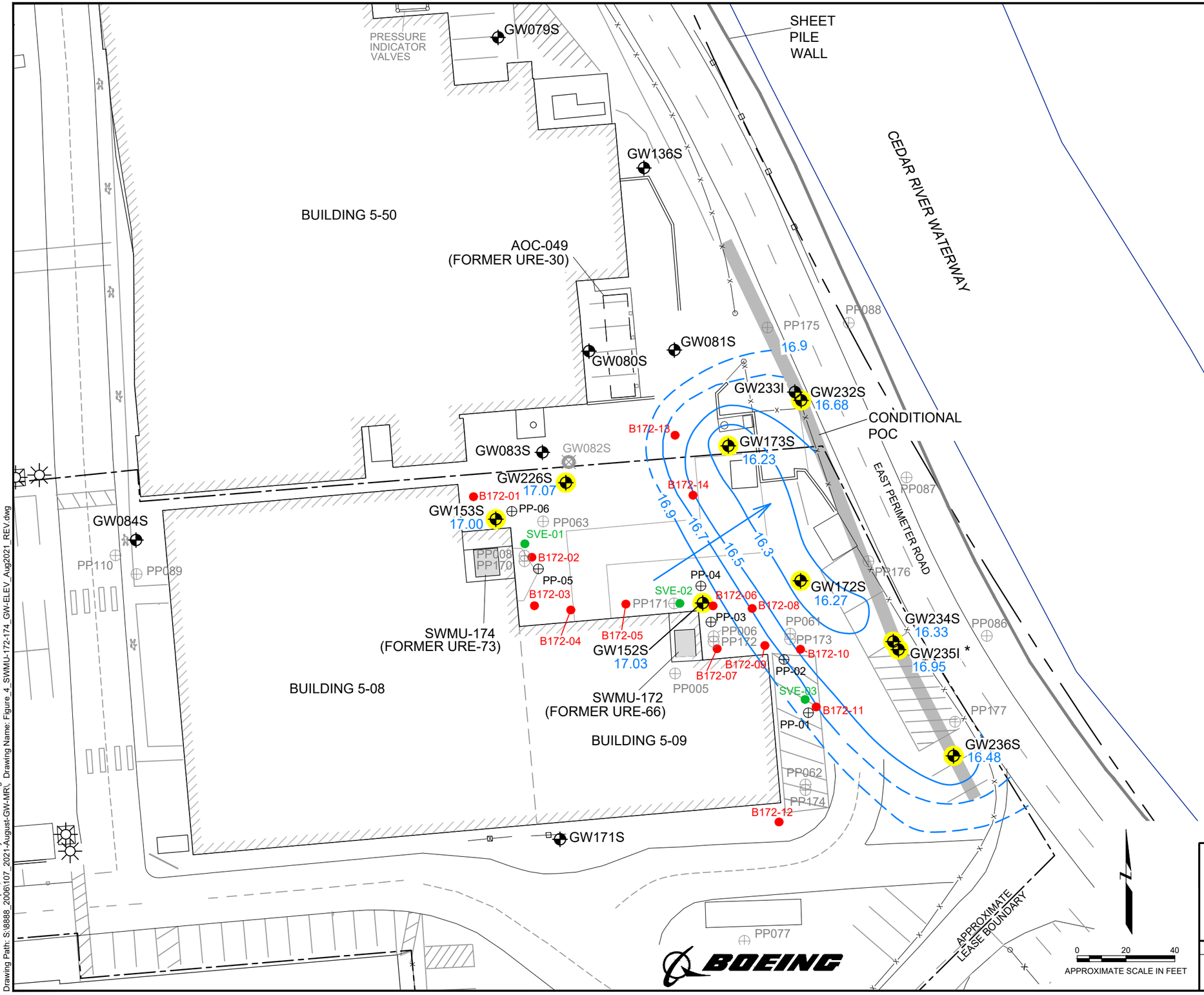
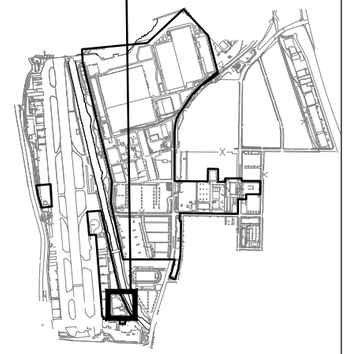
wood.	SWMU-168 HISTORICAL VC TREND PLOT FOR CPOC WELL GW230I Boeing Renton Facility Renton, Washington	Project No. PS20203450 Figure **3**



SWMU-172 AND SWMU-174 LOCATION MAP



BOEING RENTON FACILITY MAP

LEGEND

- GW172S 16.27 — 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.
- 16.3 — GROUNDWATER ELEVATION CONTOUR (IN FEET) (DASHED WHERE INFERRED)
- GENERAL DIRECTION OF GROUNDWATER FLOW
- GW082S — ABANDONED MONITORING WELL
- APPROXIMATE PROPERTY LINE
- FENCE
- CONDITIONAL POINT OF COMPLIANCE
- HIGHLIGHTED WELLS INCLUDED IN MONITORING NETWORK
- SVE-02 — SVE WELL
- B172-10 — BIOREMEDIATION INJECTION WELL
- PP171 — PUSH PROBE SAMPLING LOCATION
- PP-01 — PUSH PROBE SAMPLE LOCATION COMPLETED IN JUNE 2018

NOTES

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

SWMU-172 AND SWMU-174 MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS AUGUST 10, 2021 Boeing Renton Facility Renton, Washington

By: APS	Date: 11/10/21	Project No. PS20203450
wood.		Figure 4

Plot Date: 11/10/21 - 1:28pm Plotted by: adam stenberg
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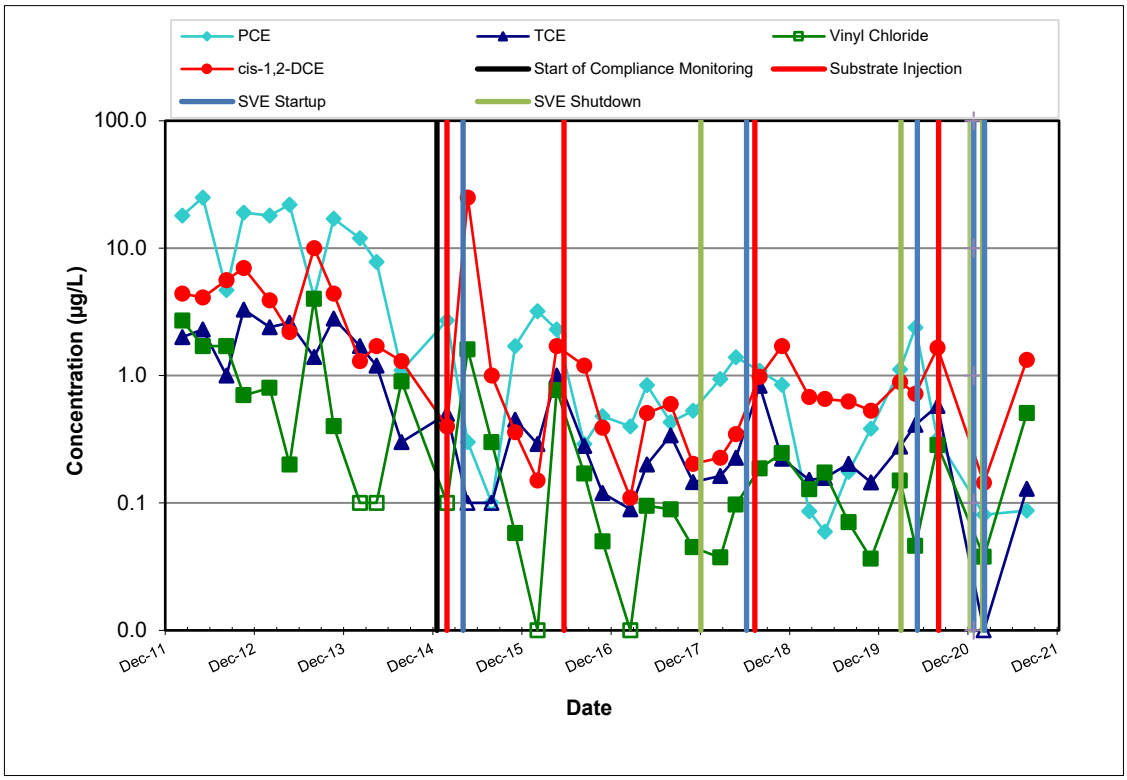
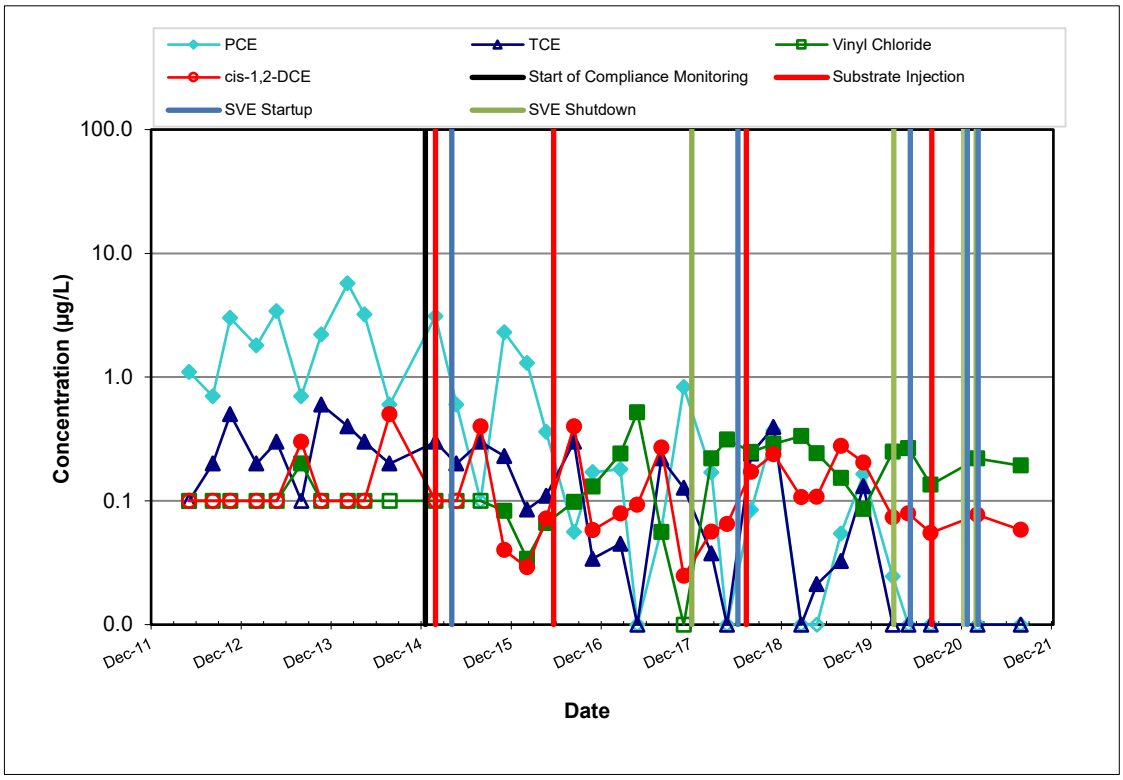


SOURCE AREA WELL GW152S



SOURCE AREA WELL GW153S

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

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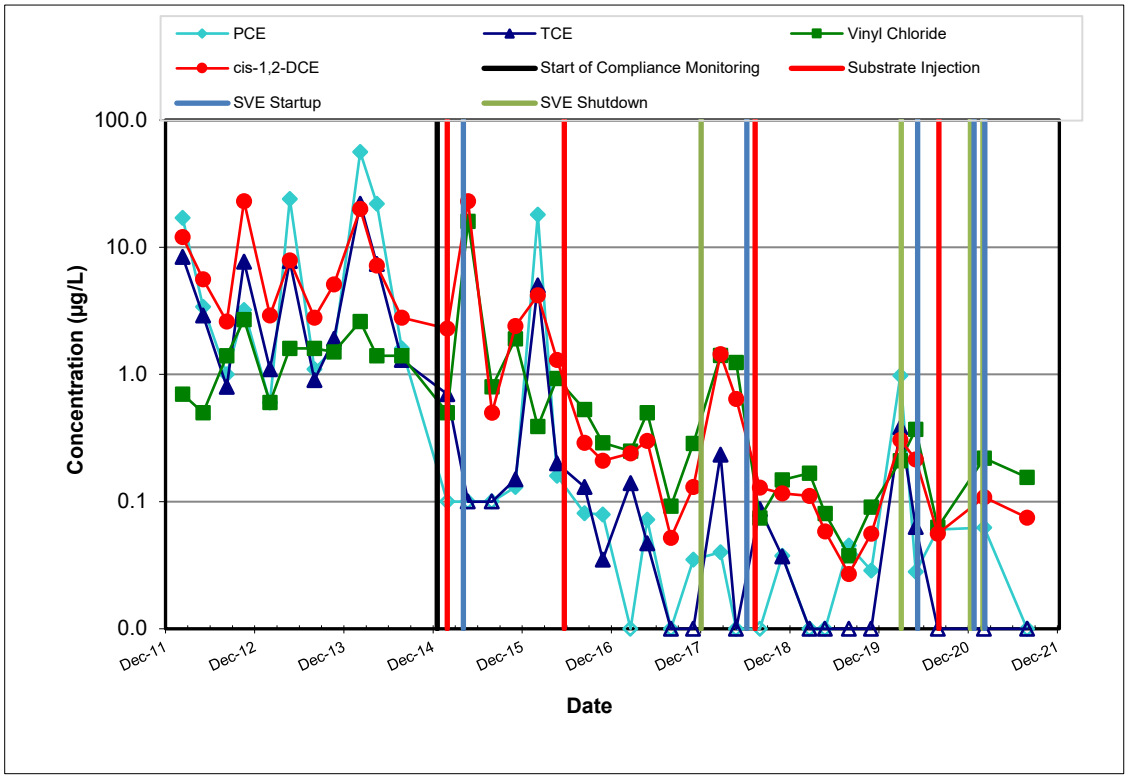
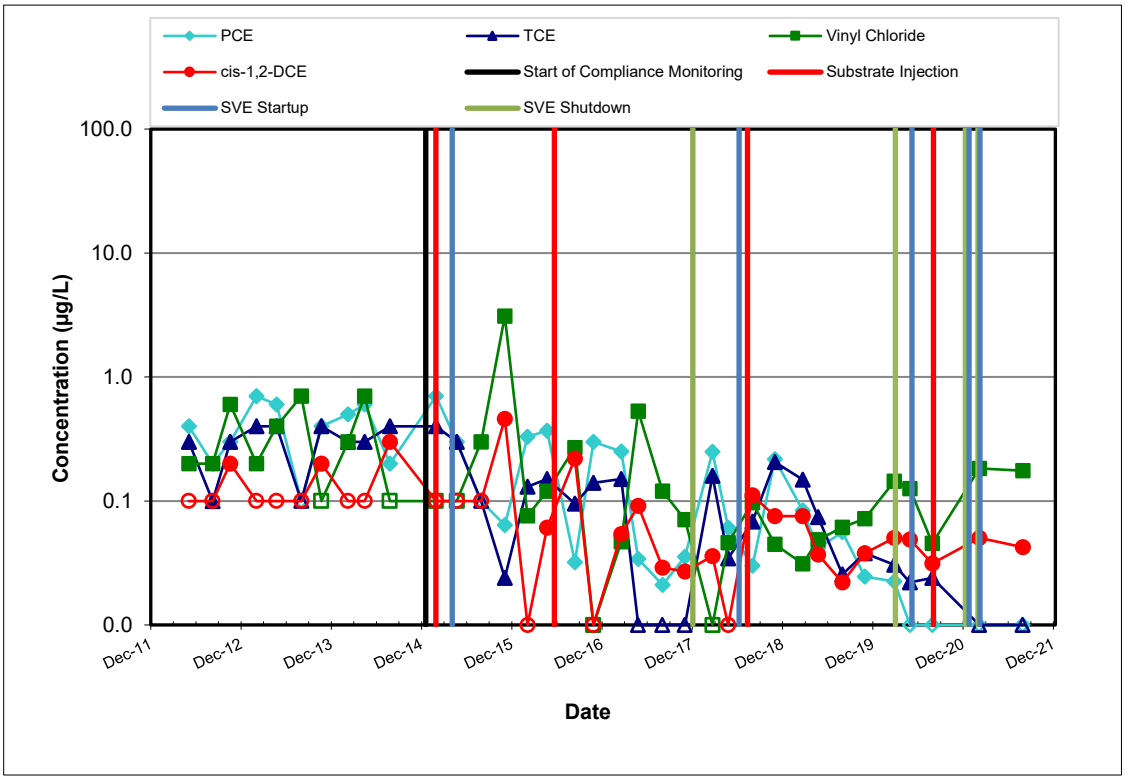
wood.	SWMU-172 AND SWMU-174 TREND PLOTS FOR SOURCE AREA WELLS GW152S AND GW153S Boeing Renton Facility Renton, Washington	Project No. PS20203450 Figure 5



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.

wood.	SWMU-172 AND SWMU-174 TREND PLOTS FOR DOWNGRADIENT PLUME AREA WELLS GW172S AND GW173S Boeing Renton Facility Renton, Washington	Project No. PS20203450 Figure 6

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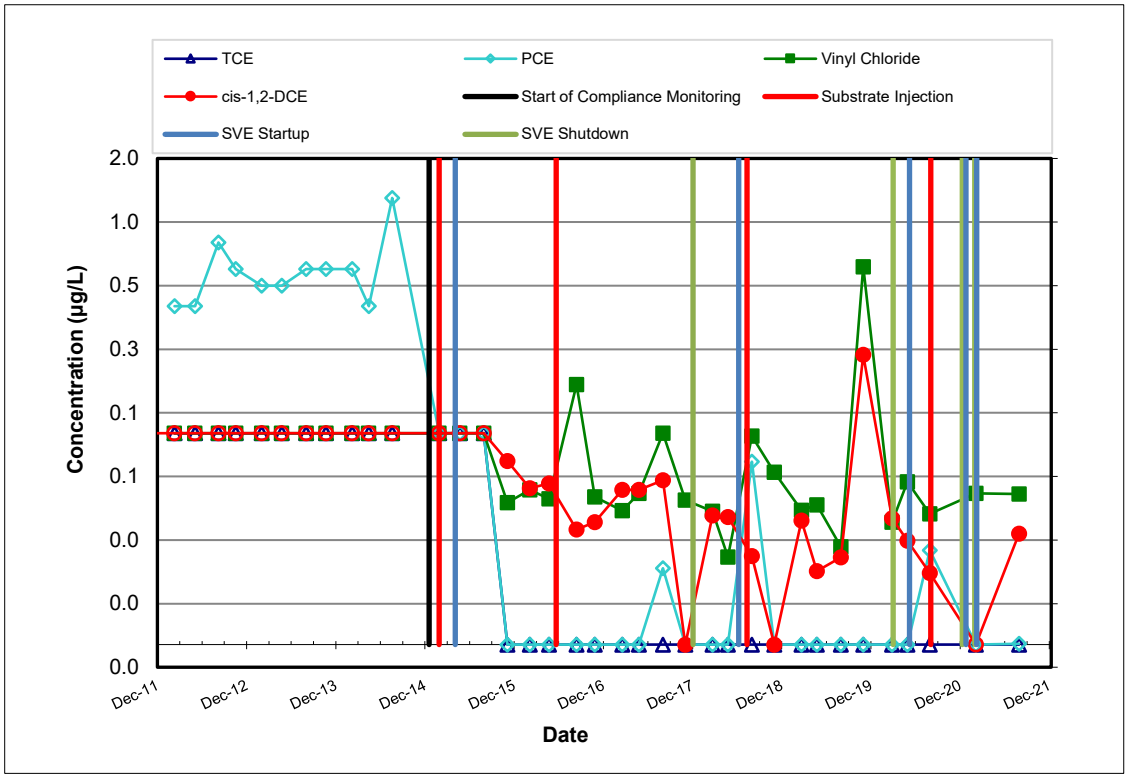
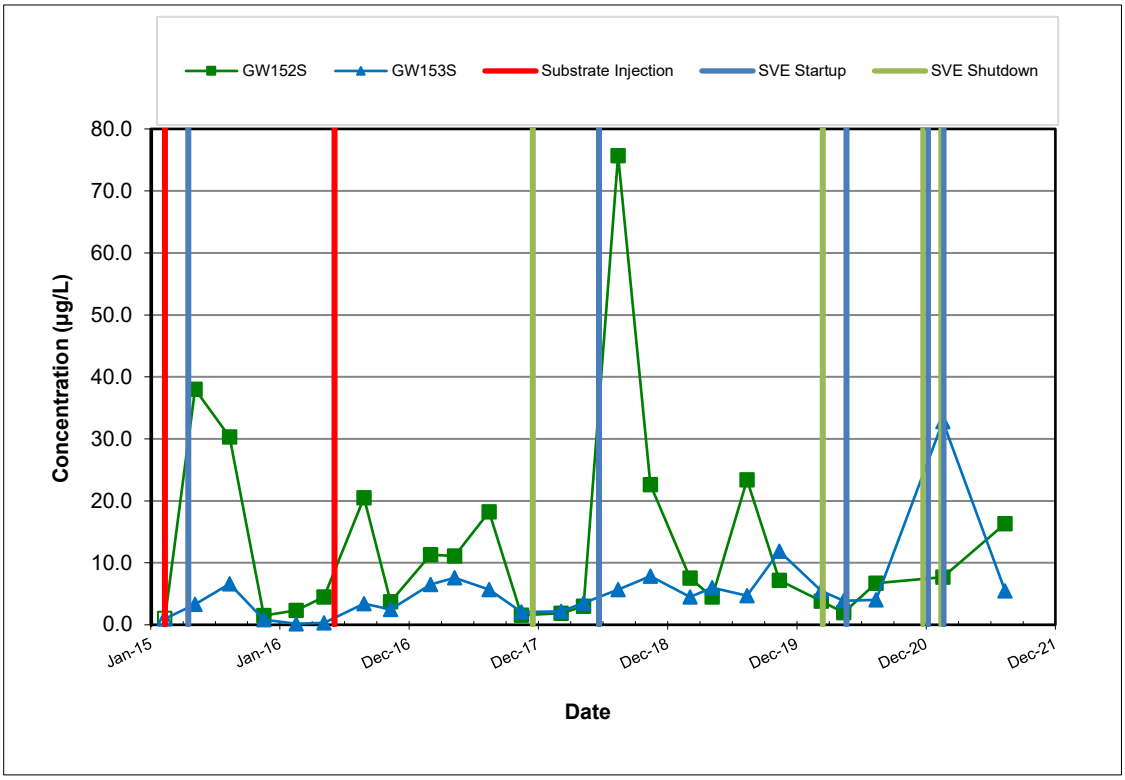


Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

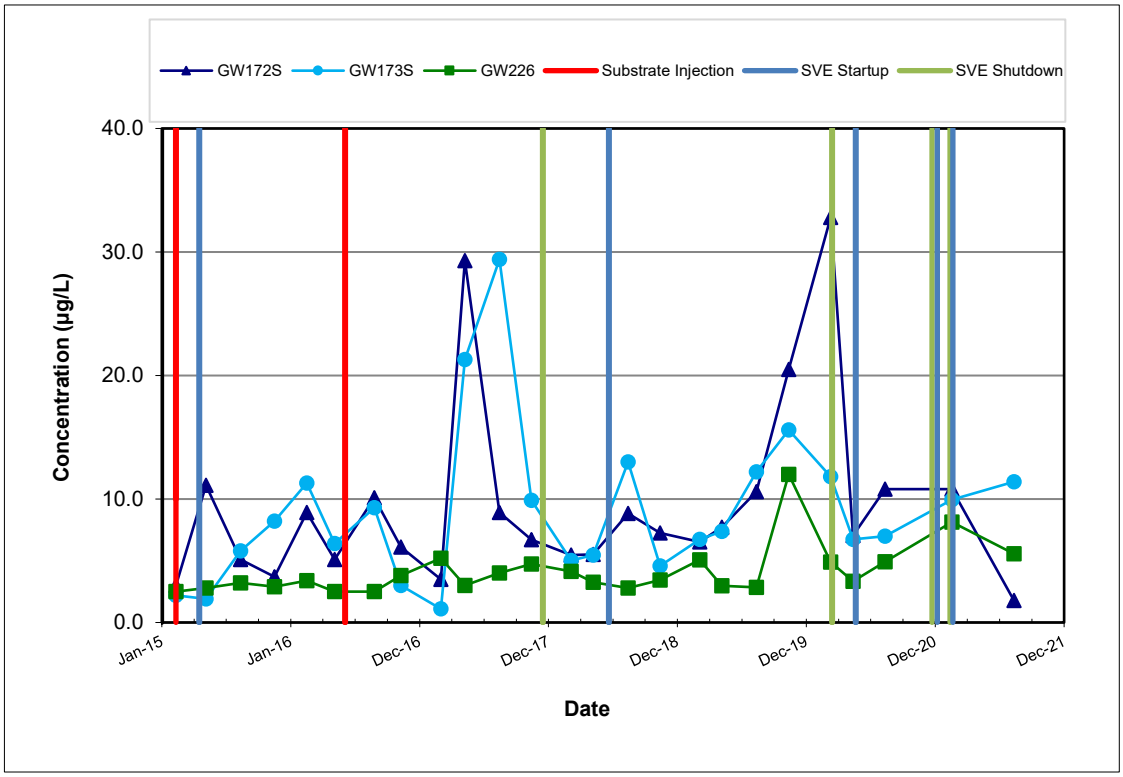
DOWNGRADIENT PLUME AREA WELL GW226S

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figure 5 to 10_ SWMU_172-174.xlsx

wood.	SWMU-172 AND SWMU-174 TREND PLOTS FOR DOWNGRADIENT PLUME AREA WELL GW226S Boeing Renton Facility Renton, Washington	Project No. PS20203450 Figure 7



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.

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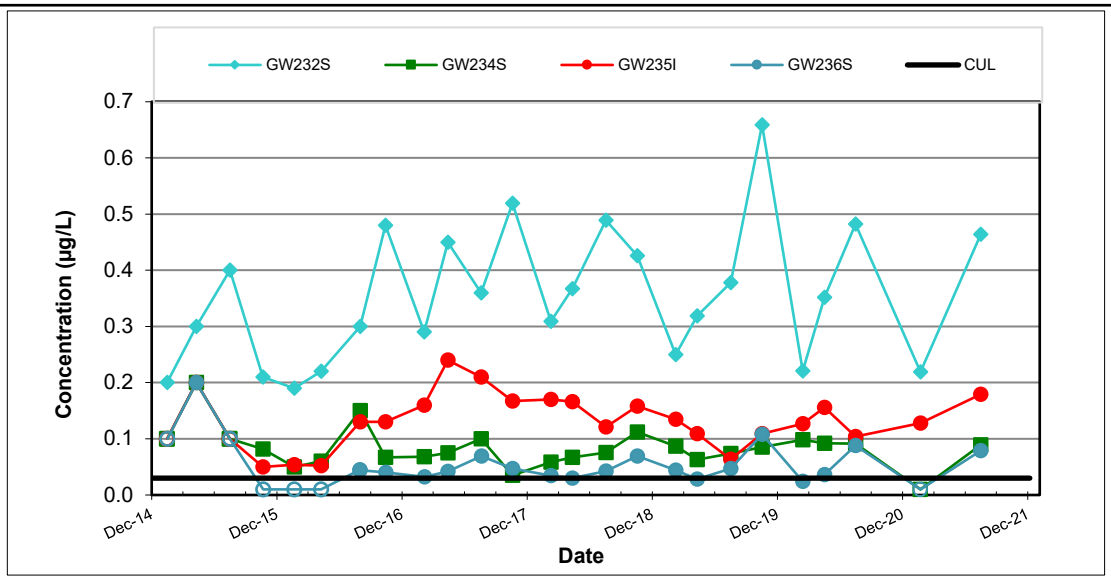
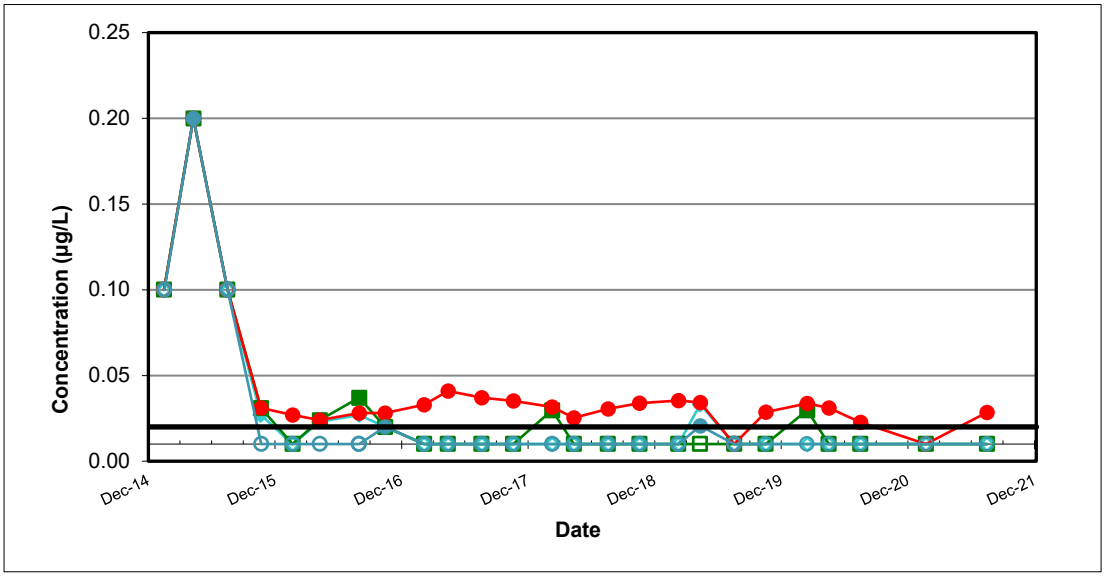
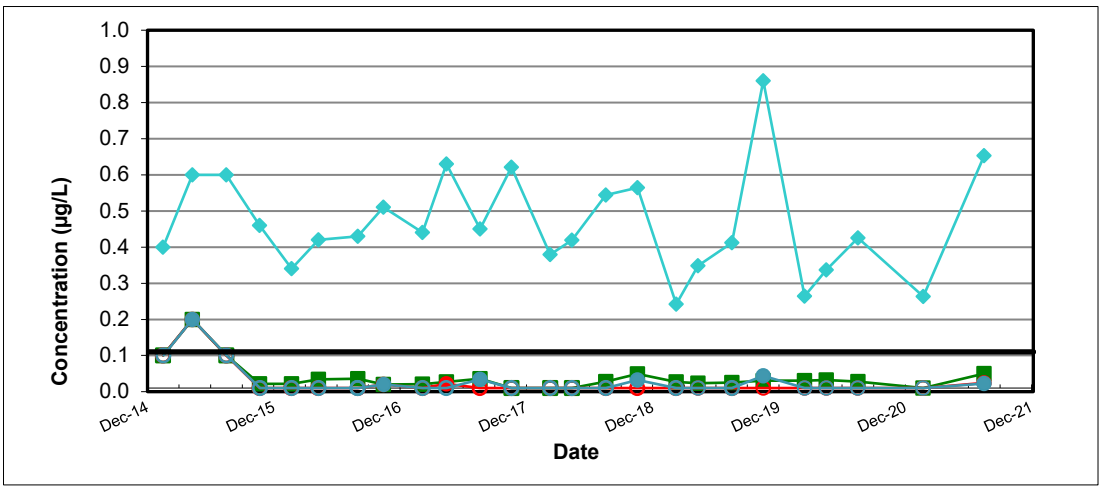
wood.	SWMU-172 AND SWMU-174 TREND PLOTS FOR ARSENIC IN SELECT SOURCE AREA AND DOWNGRADIENT PLUME AREA WELLS Boeing Renton Facility Renton, Washington	Project No. PS20203450 Figure 8



cis-1,2-Dichloroethene



Trichloroethene



Vinyl Chloride

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

wood.	SWMU-172 AND SWMU-174 TREND PLOTS FOR CIS-1,2-DICHLROETHENE, TRICHLOROETHENE, AND VINYL CHLORIDE IN CPOC AREA WELLS Boeing Renton Facility Renton, Washington	Project No. PS20203450 Figure 9

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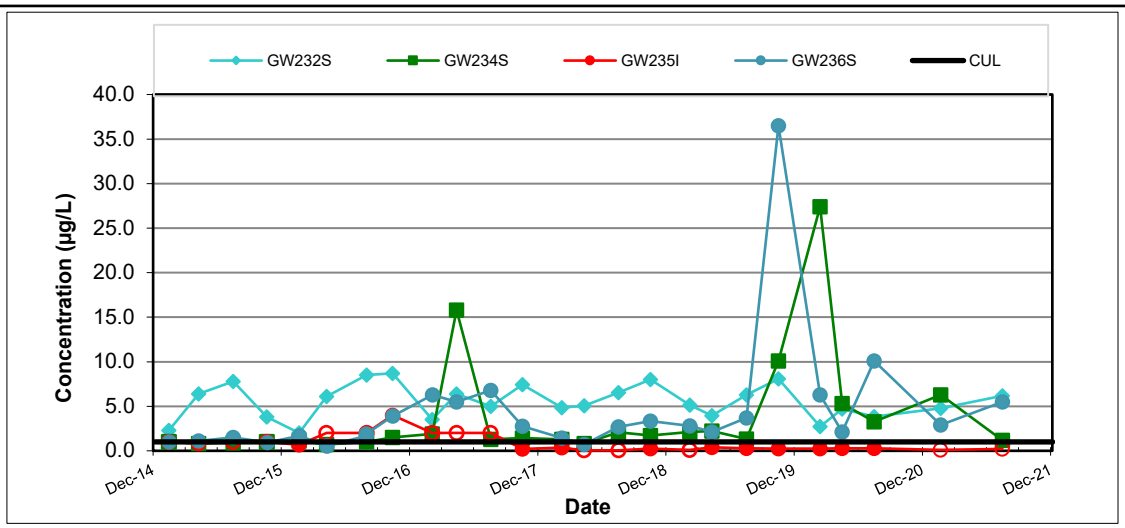
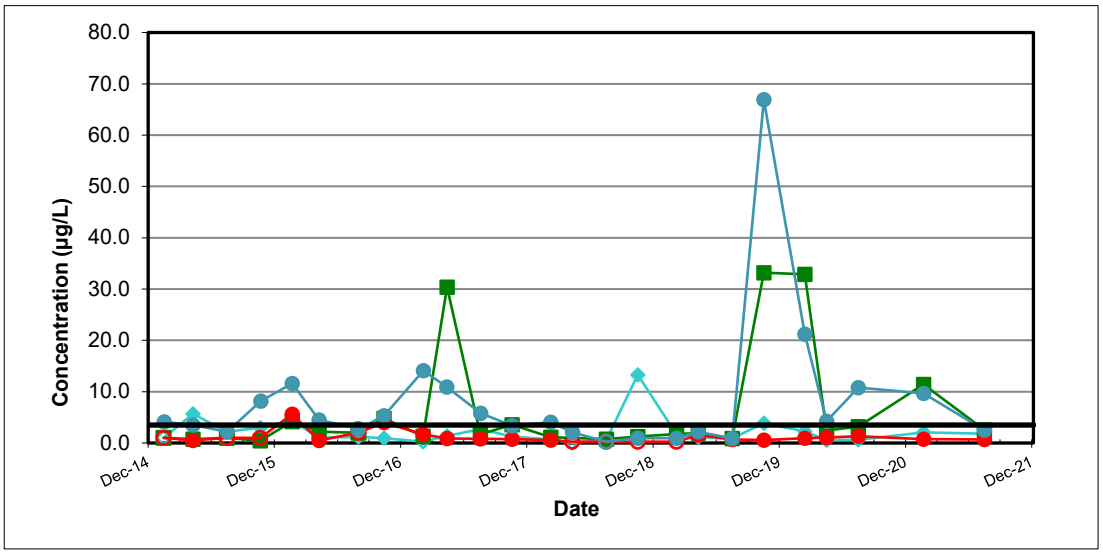
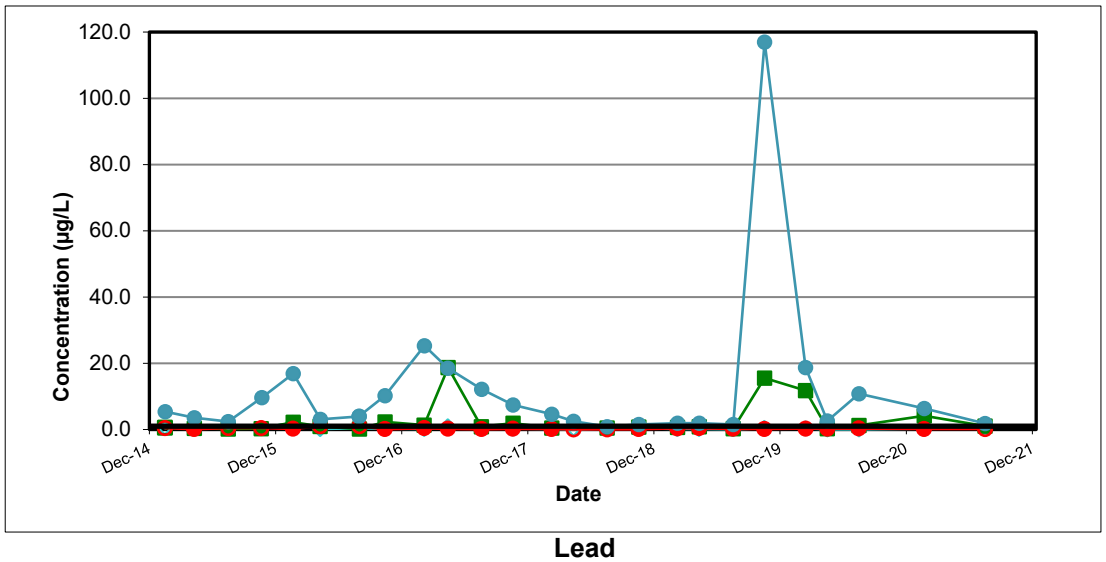


Arsenic



Copper



Lead

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

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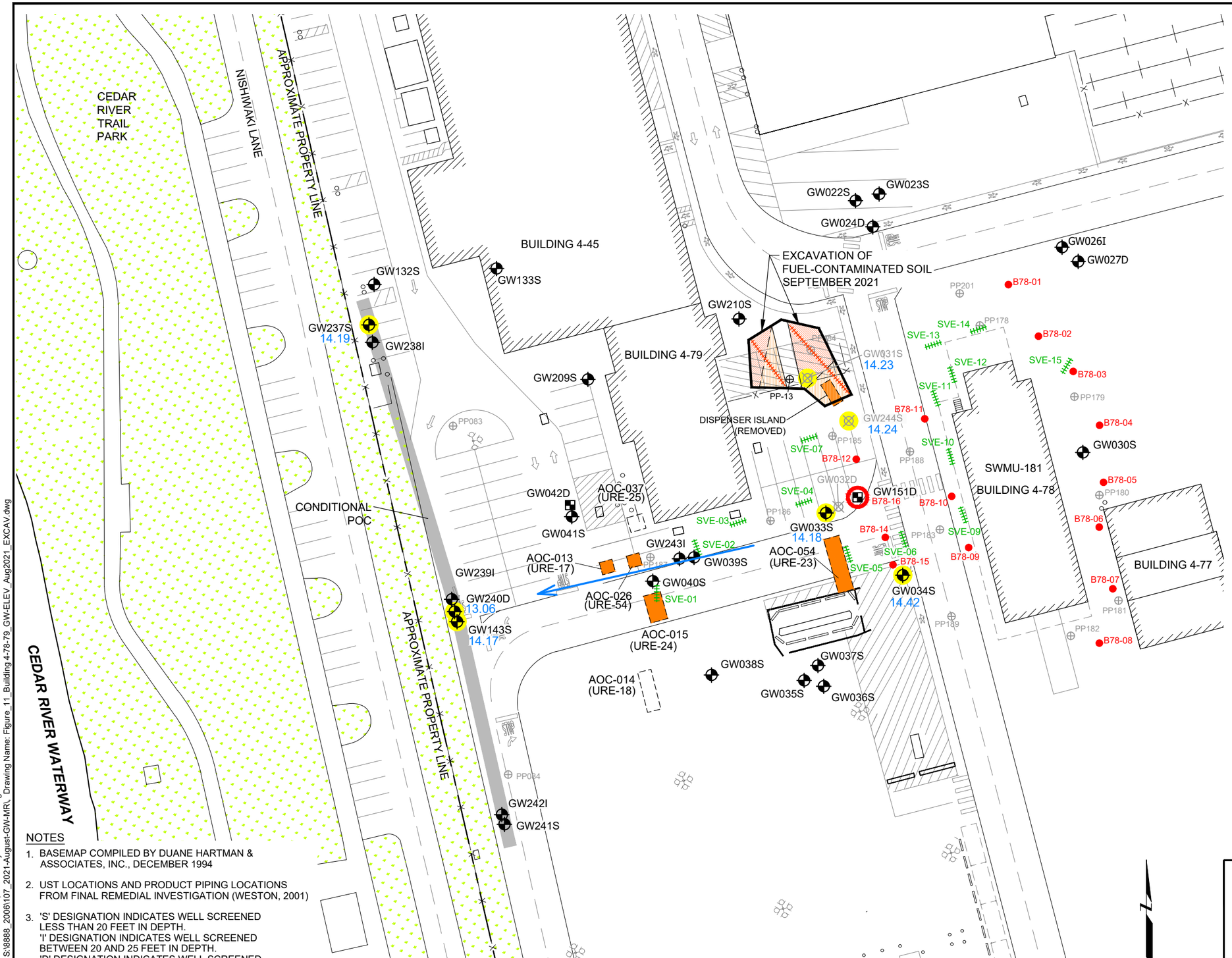
wood.

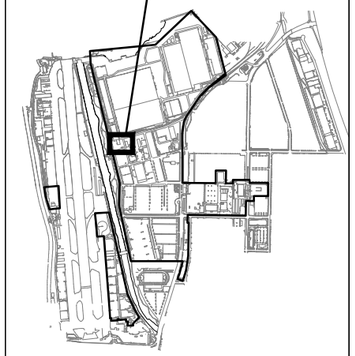
SWMU-172 AND SWMU-174 TREND PLOTS FOR ARSENIC, COPPER AND LEAD IN CPOC AREA WELLS
Boeing Renton Facility
Renton, Washington

Project No. PS20203450

Figure 10



4-78/79 SWMU/AOC GROUP LOCATION MAP



BOEING RENTON FACILITY MAP

LEGEND

- GW033S 14.18 — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION (NGVD-FEET)
- GENERAL GROUNDWATER FLOW DIRECTION
- GW042D — EXTRACTION WELL
- GW032D — ABANDONED MONITORING WELL
- SVE-15 — HORIZONTAL SVE WELL
- HORIZONTAL BIOREMEDIATION INJECTION 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

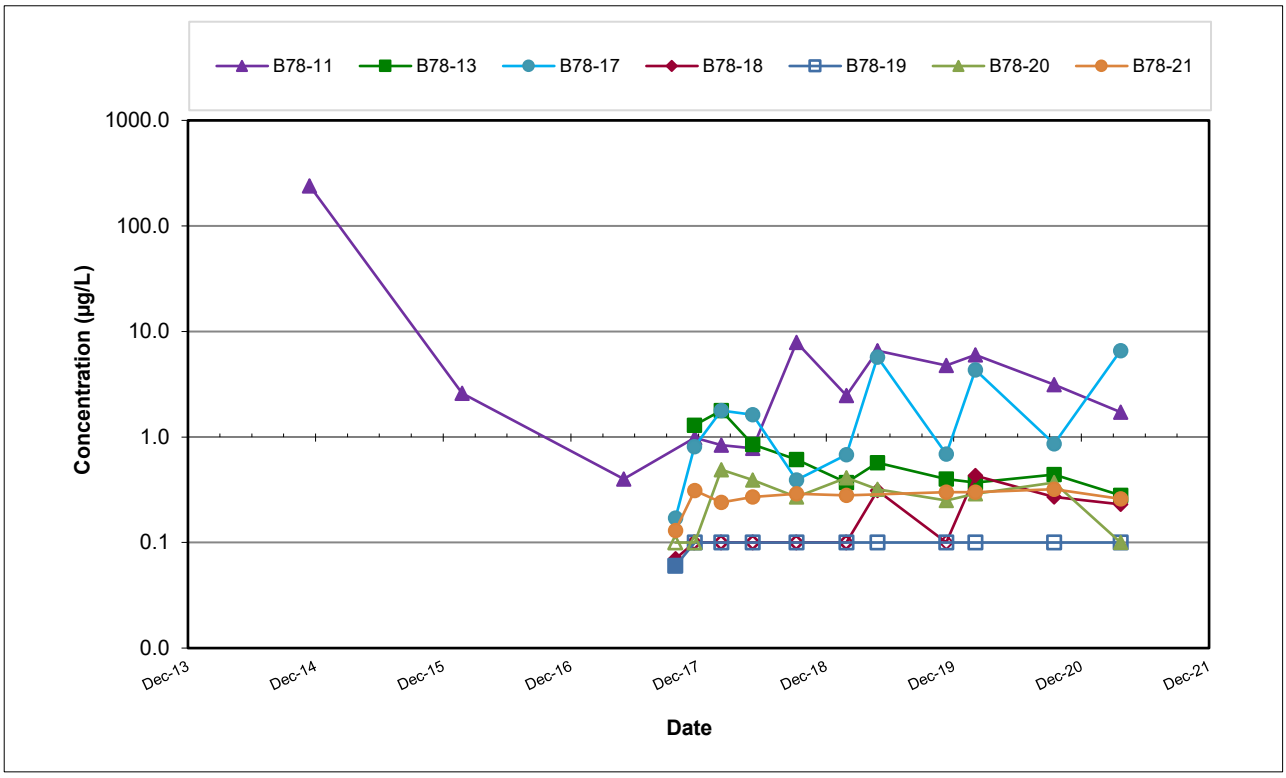
1. BASEMAP COMPILED BY DUANE HARTMAN & ASSOCIATES, INC., DECEMBER 1994
2. UST LOCATIONS AND PRODUCT PIPING LOCATIONS FROM FINAL REMEDIAL INVESTIGATION (WESTON, 2001)
3. 'S' DESIGNATION INDICATES WELL SCREENED LESS THAN 20 FEET IN DEPTH.
   'I' DESIGNATION INDICATES WELL SCREENED BETWEEN 20 AND 25 FEET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

BUILDING 4-78/79 SWMU/AOC GROUP MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS AUGUST 11, 2021 Boeing Renton Facility Renton, Washington

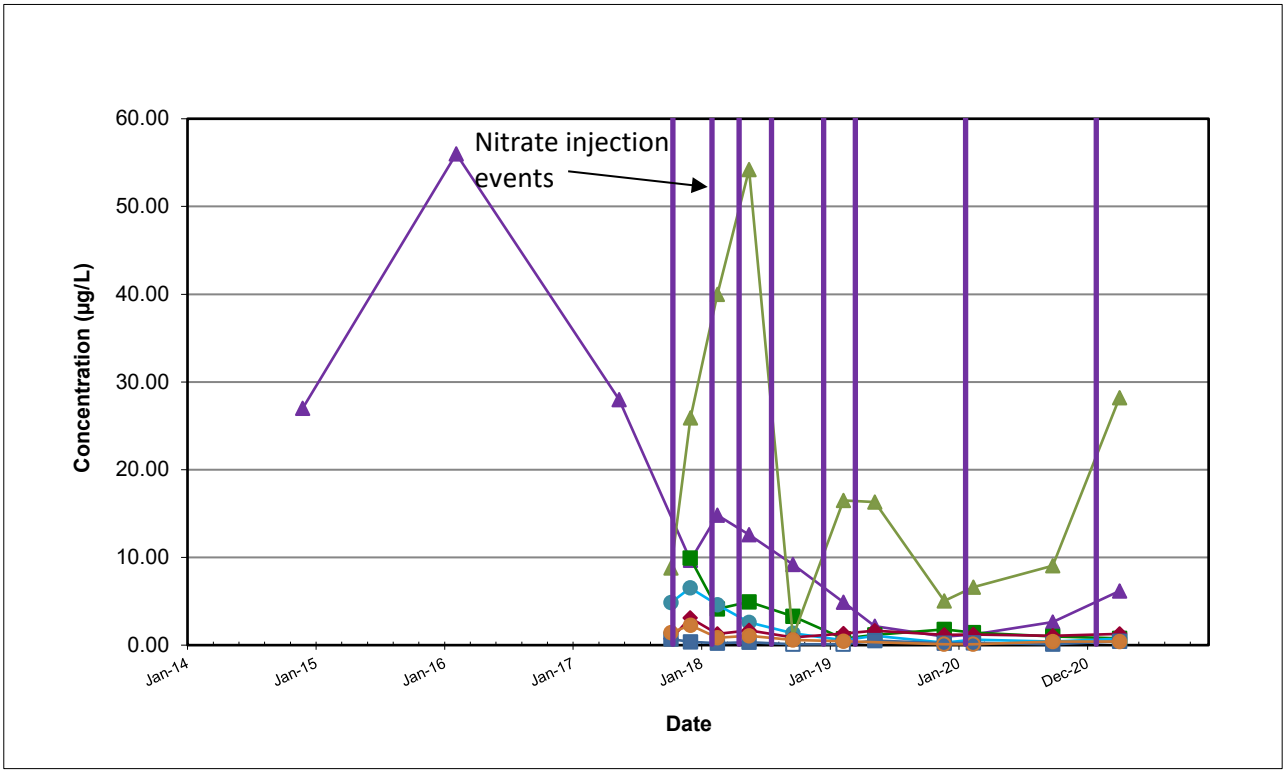
By: APS	Date: 11/24/21	Project No. PS20203450
wood.		Figure 11

BOEING

Plot Date: 11/24/21 - 11:58am, Plotted by: adam.stenberg
Drawing Path: S:\8888_2006\107_2021-August-GW-MR\, Drawing Name: Figure_11_Building 4-78-79_GW-ELEV_Aug2021_EXCAV.dwg



cis-1,2-Dichloroethene

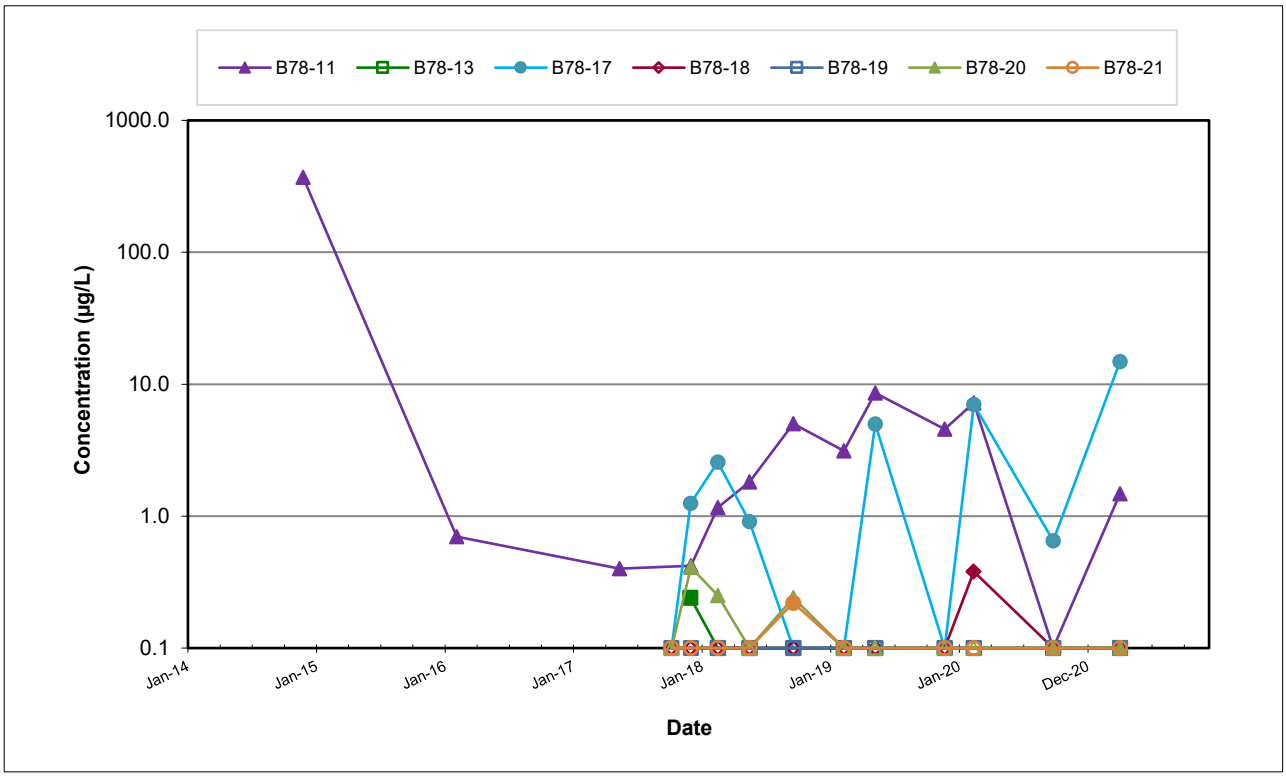


Benzene

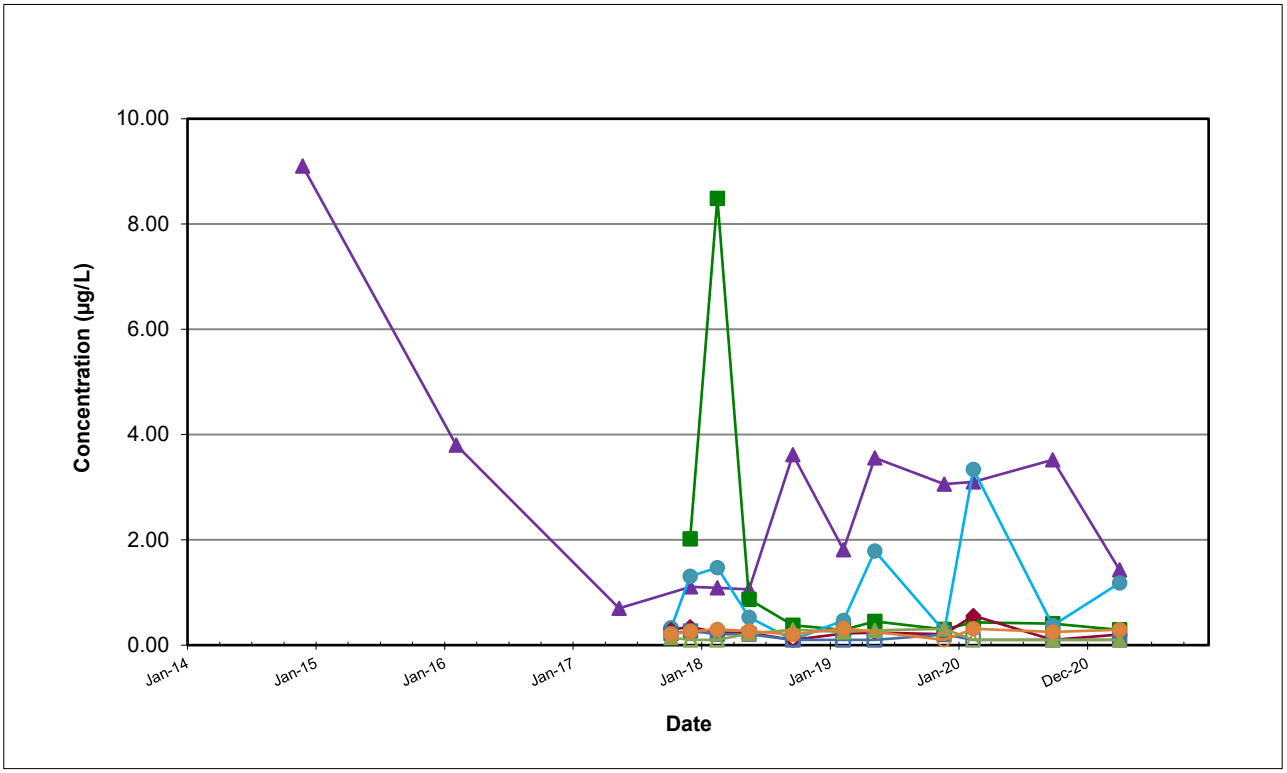
Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

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. PS20203450 Figure 12

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figure 12 to 18_ Bldg 4-78-79.xlsx



Trichloroethene

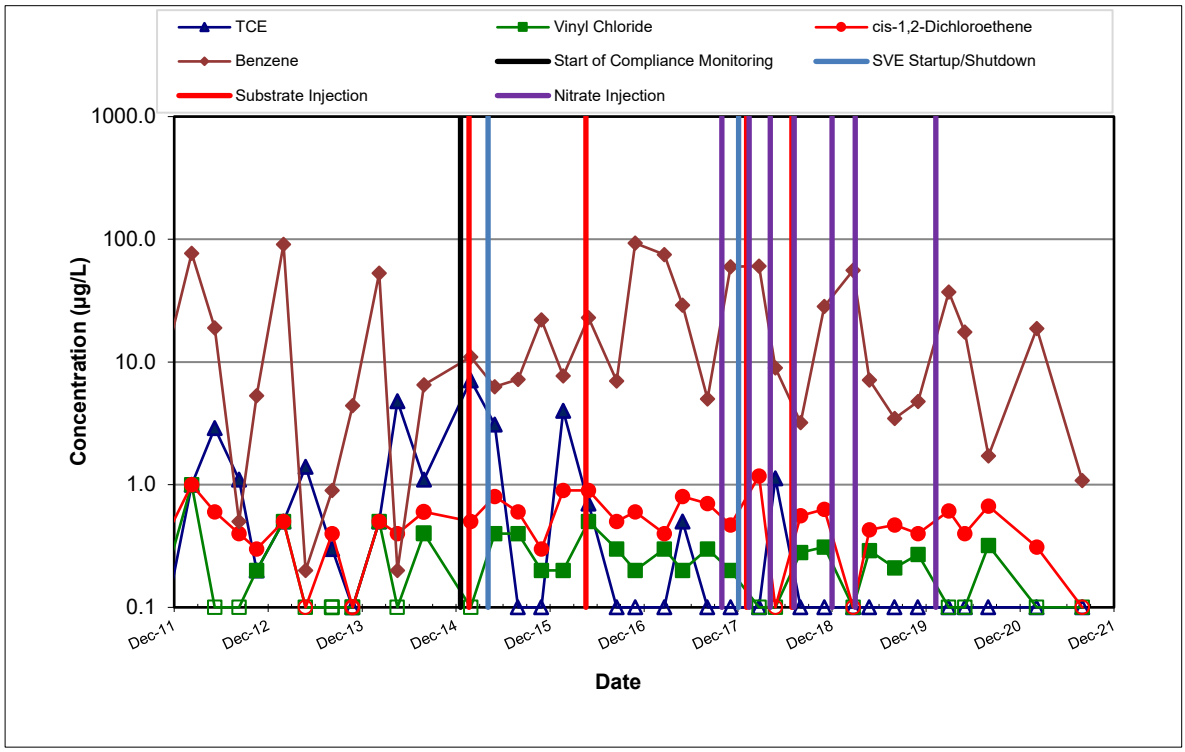


Vinyl Chloride

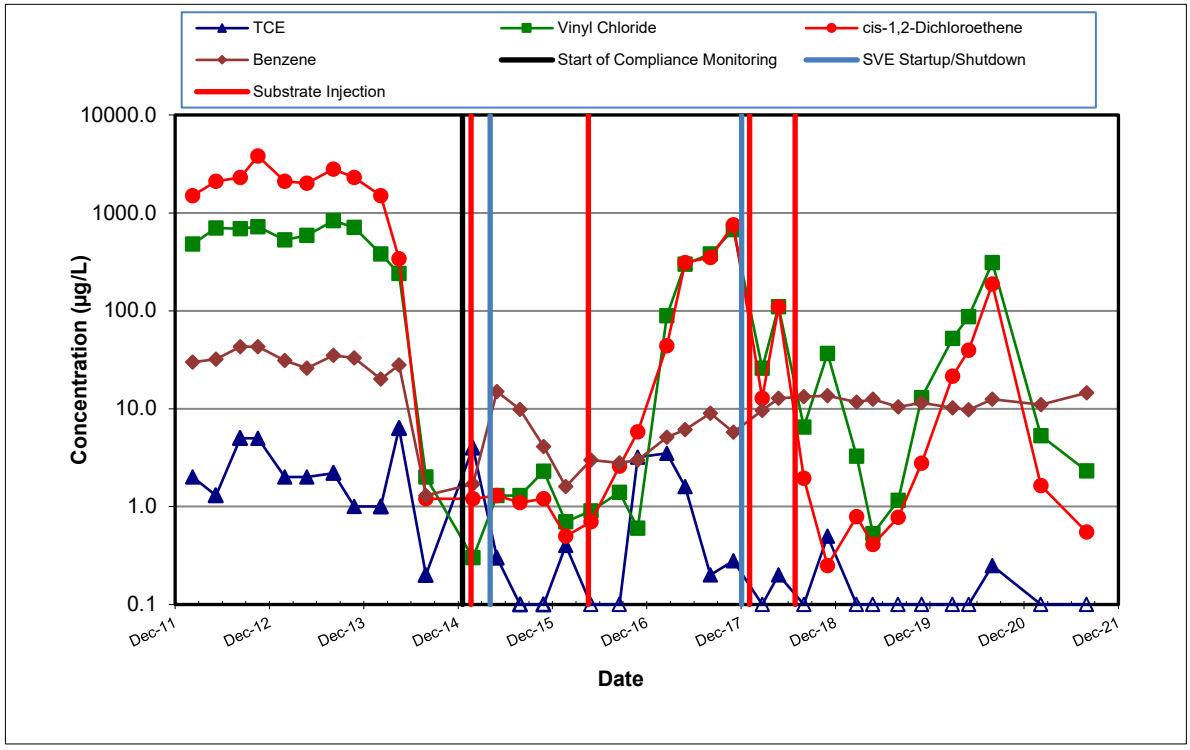
Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

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. PS20203450 Figure 13

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figure 12 to 18_ Bldg 4-78-79.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.

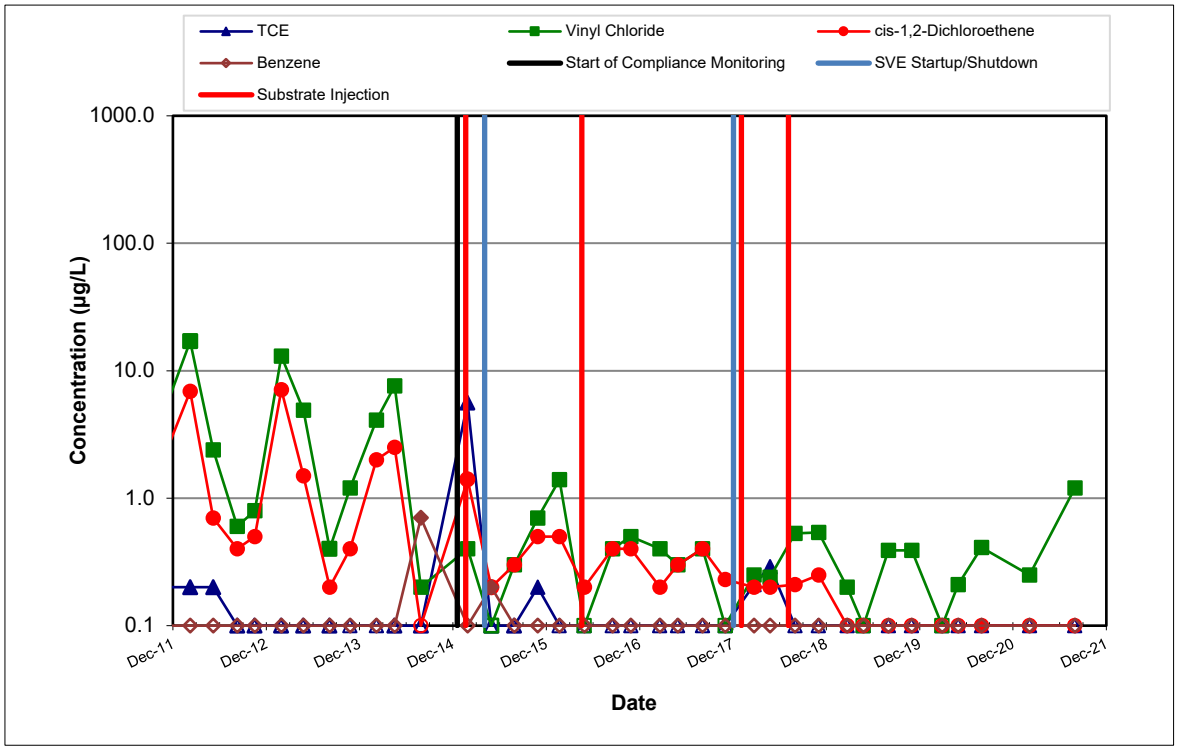
P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figure 12 to 18_ Bldg 4-78-79.xlsx

wood.

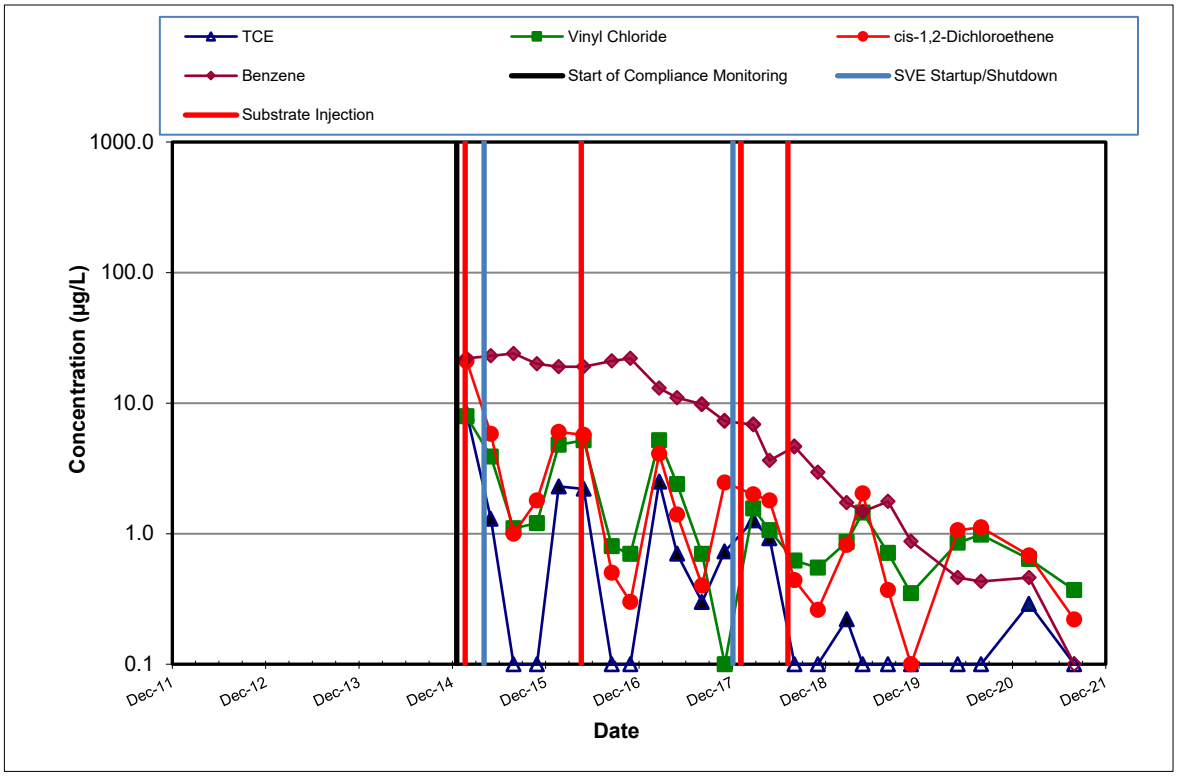
BUILDING 4-78/79 SWMU/AOC GROUP TREND PLOTS
FOR SOURCE AREA WELLS GW031S AND GW033S
Boeing Renton Facility
Renton, Washington

Project No.
PS20203450

Figure
14



SOURCE AREA WELL GW034S

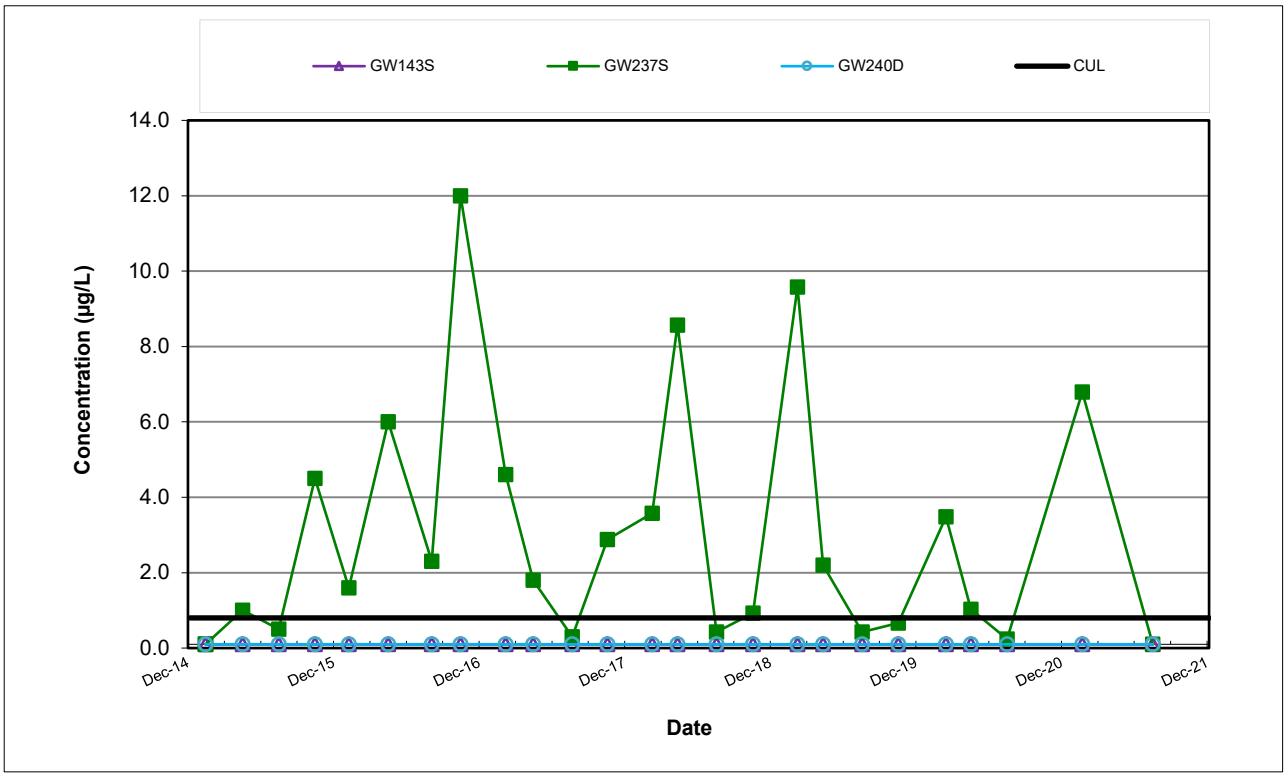


SOURCE AREA WELL GW244S

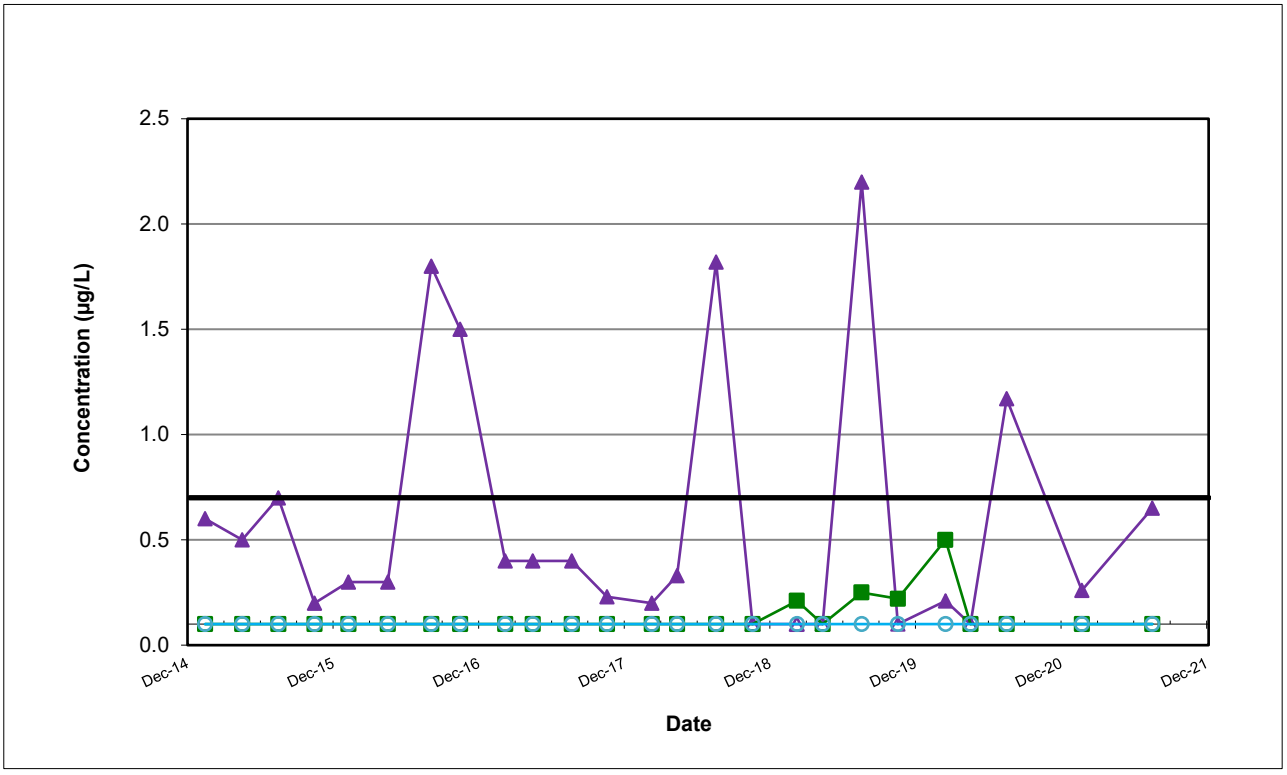
Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

wood.	BLDG 4-78/79 SWMU/AOC GROUP TREND PLOTS FOR SOURCE AREA WELLS GW034S AND GW244S Boeing Renton Facility	Project No. PS20203450 Figure 15

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figure 12 to 18_ Bldg 4-78-79.xlsx



Benzene

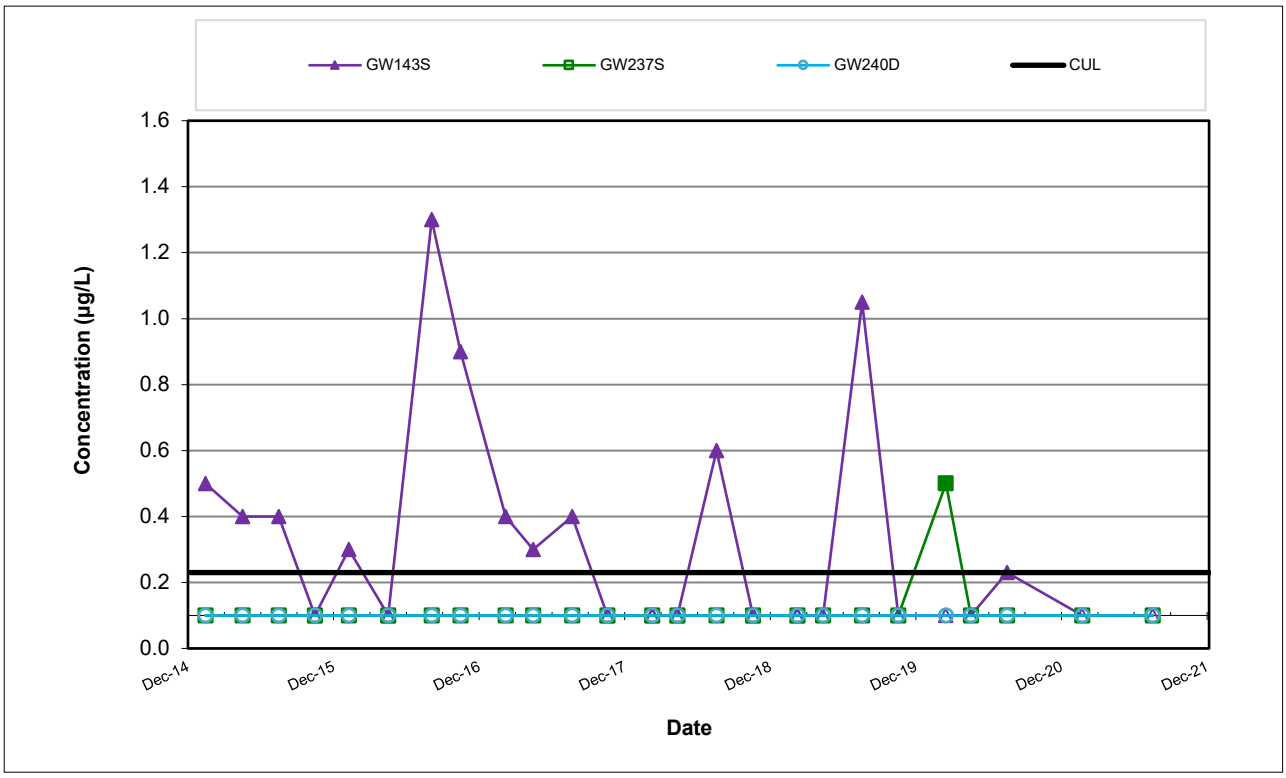


cis-1,2-Dichloroethene

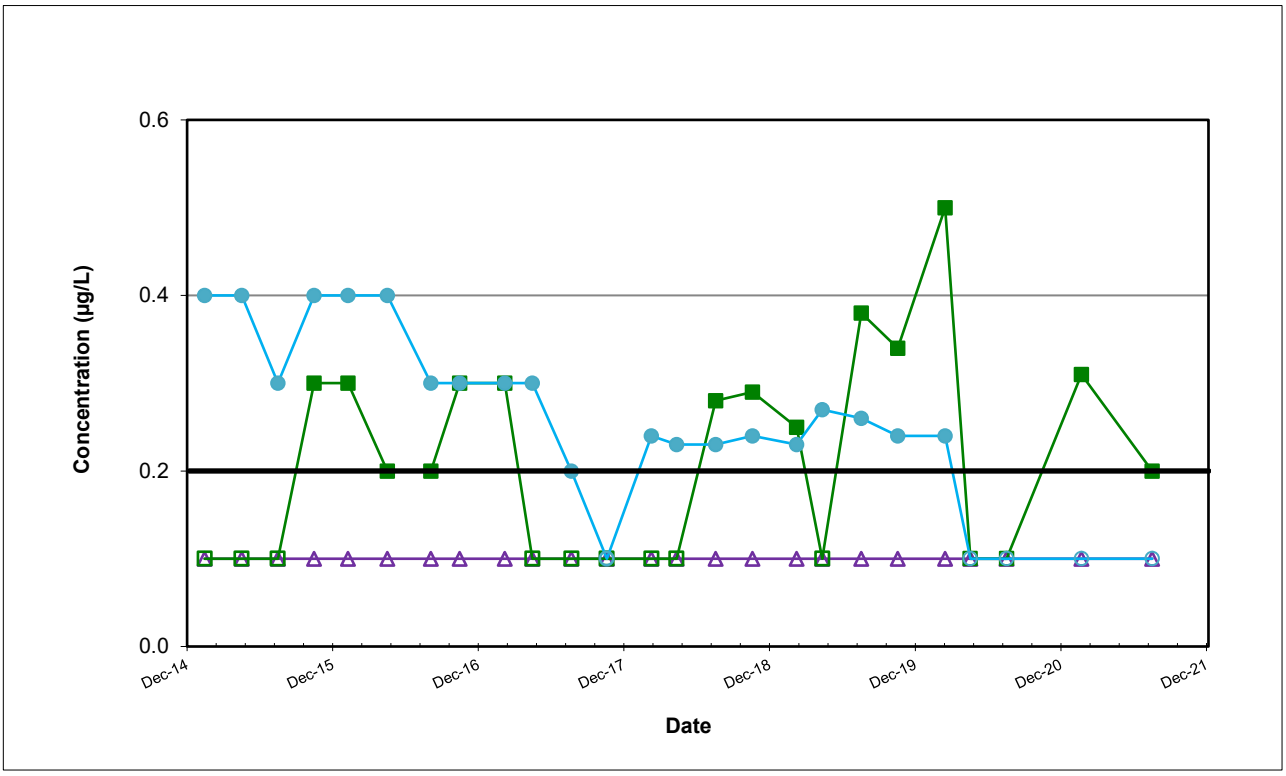
Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

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. PS20203450 Figure 16

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figure 12 to 18_ Bldg 4-78-79.xlsx



Trichloroethene

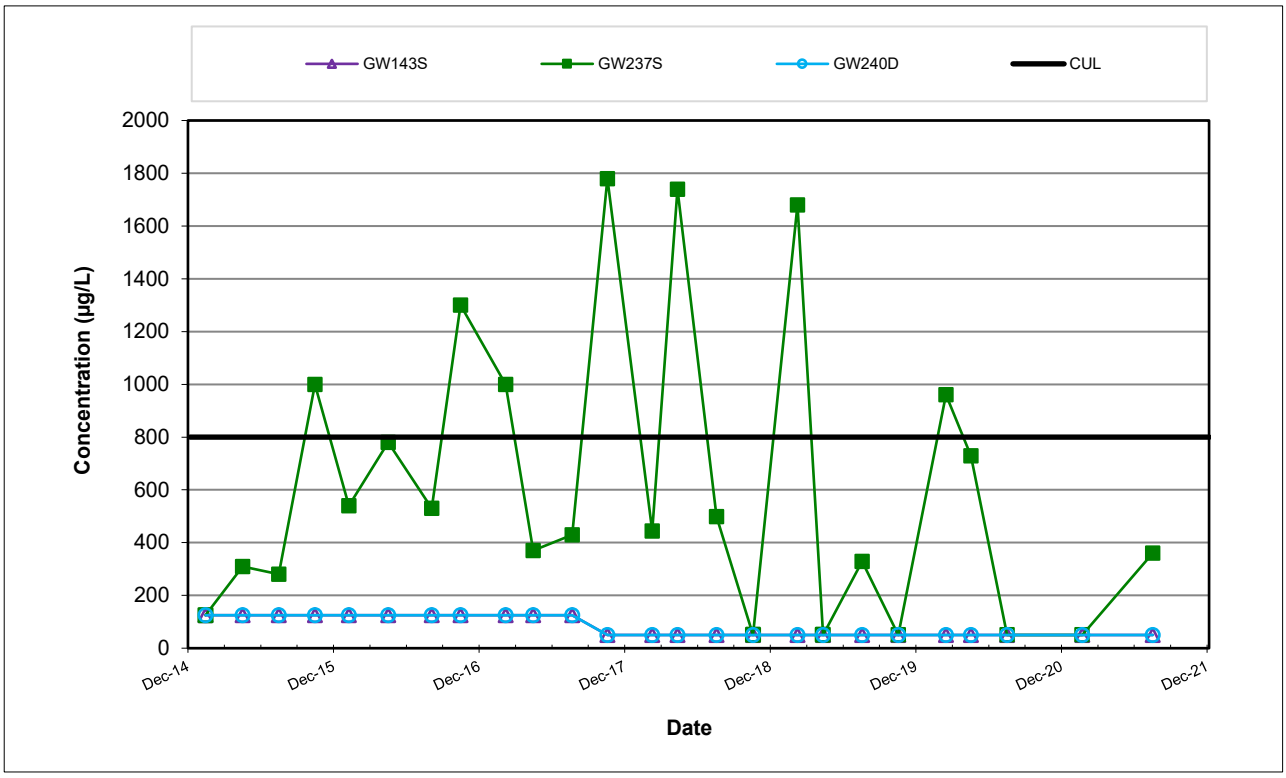


Vinyl Chloride

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. PS20203450 Figure 17

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figure 12 to 18_ Bldg 4-78-79.xlsx

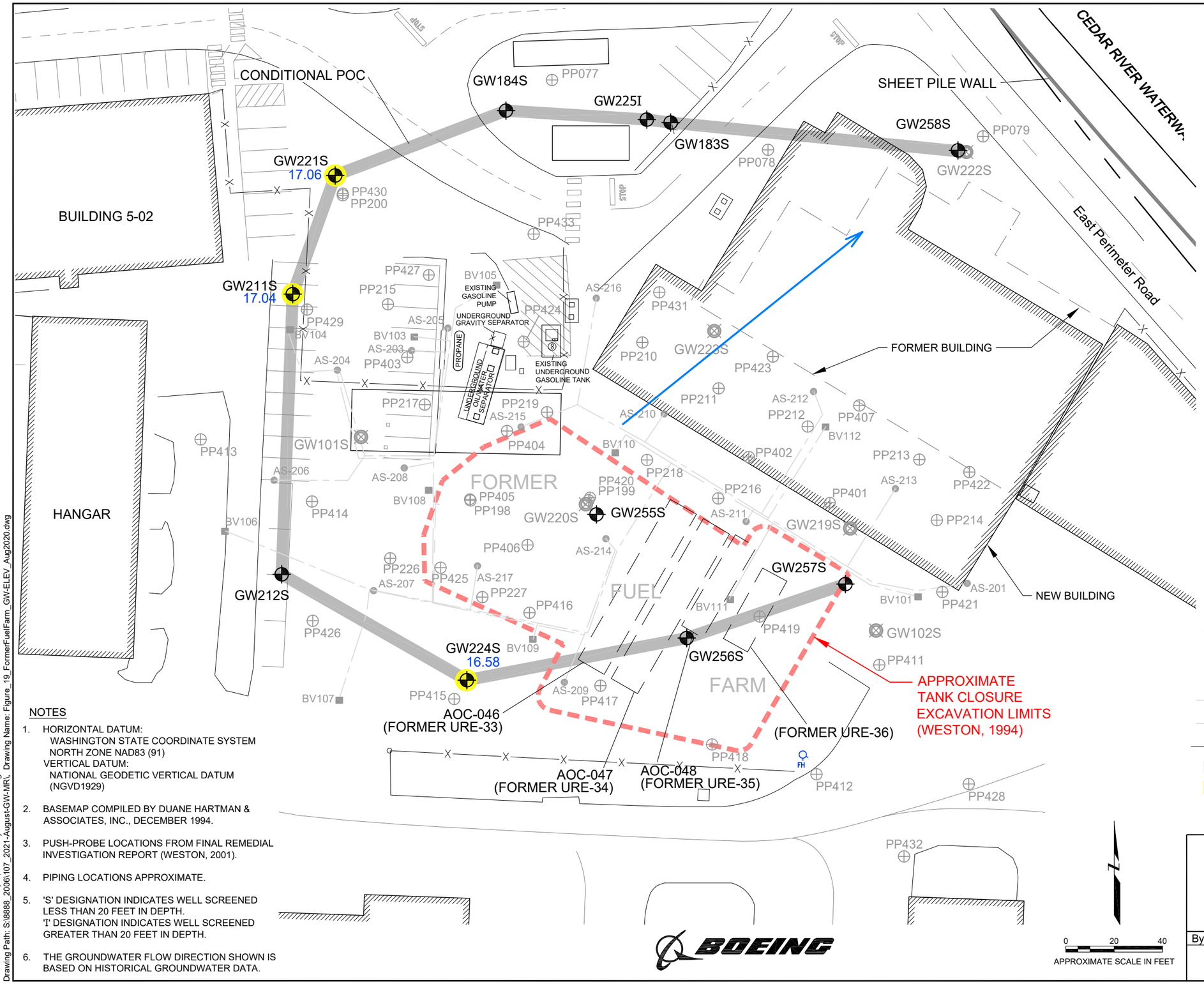


TPH as Gasoline

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. PS20203450 Figure 18

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figure 12 to 18_ Bldg 4-78-79.xlsx



NOTES

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

LEGEND

- GW224S 16.58 — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION (NGVD-FEET)
- GENERAL DIRECTION OF GROUNDWATER FLOW BASED ON HISTORICAL DATA
- PP042 — PUSH PROBE LOCATION
- GW222S — ABANDONED GROUNDWATER MONITORING WELL
- AS-204 — FORMER UNDERGROUND AIR SPARGING WELL
- BV112 — FORMER UNDERGROUND BIOVENTING WELL
- FORMER UNDERGROUND BIOVENTING LINE
- FORMER UNDERGROUND AIR SPARGING LINE
- FENCE
- CONDITIONAL POINT OF COMPLIANCE
- HIGHLIGHTED WELLS INCLUDED IN MONITORING NETWORK

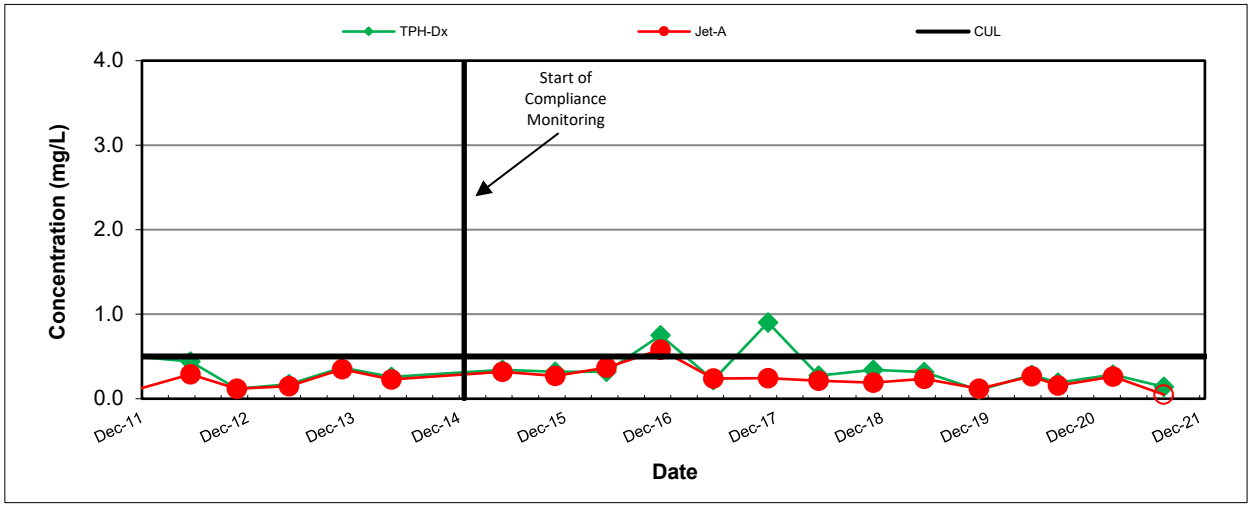
0 20 40
APPROXIMATE SCALE IN FEET

FORMER FUEL FARM AOC GROUP MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS AUGUST 10, 2021

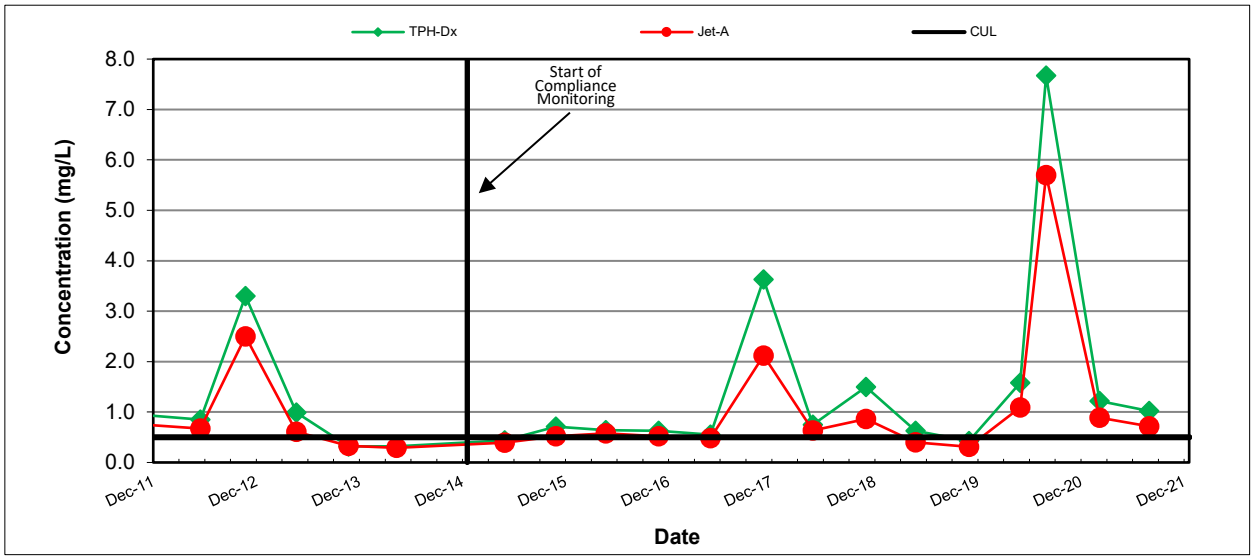
Boeing Renton Facility
Renton, Washington

By: APS	Date: 11/08/21	Project No. PS20203450
wood.		Figure 19

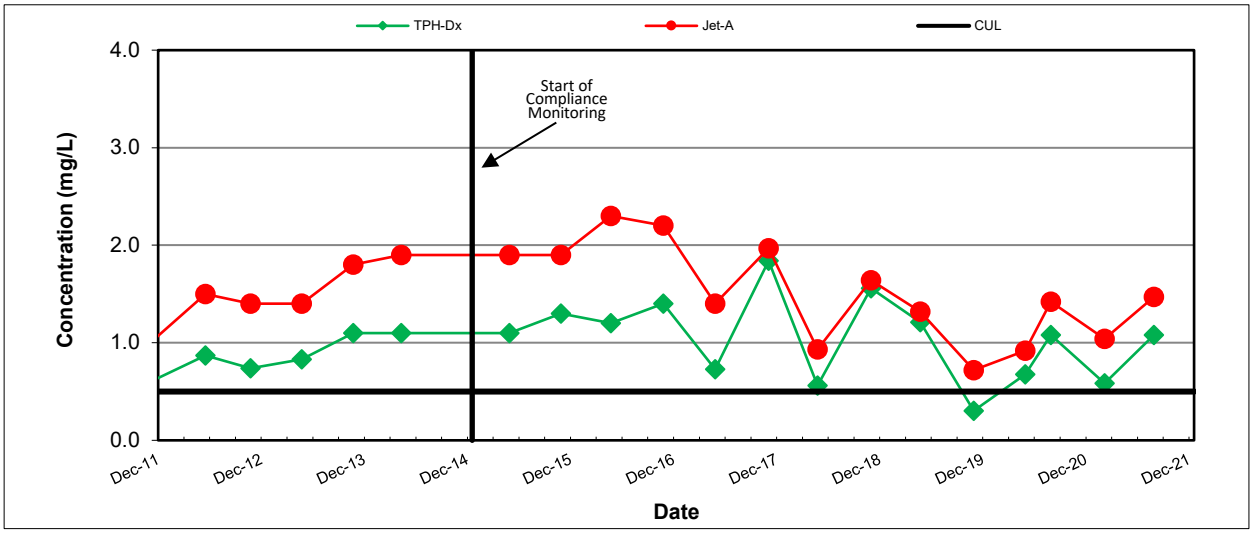
Plot Date: 11/08/21 - 2:00pm, Plotted by: adam.sternberg
Drawing Path: S:\8888_2006\107_2021-August-GW-MR\, Drawing Name: Figure_19_FormerFuelFarm_GW-ELEV_Aug2020.dwg



CPOC WELL GW211S



CPOC WELL GW221S

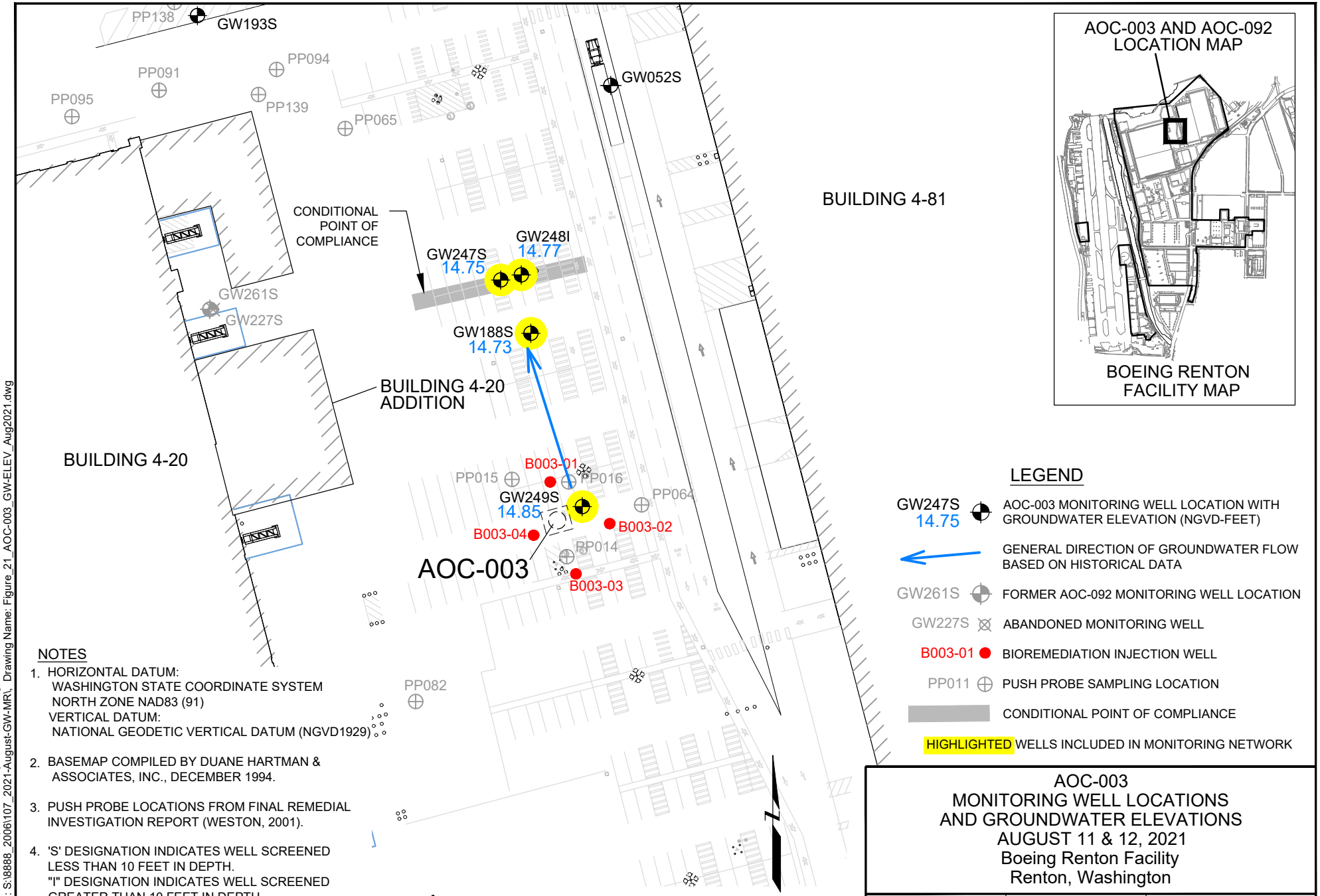


CPOC WELL GW224S

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

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figure 20_FFF CPOC trend plot.xls

wood.	FORMER FUEL FARM AOC GROUP TREND PLOTS FOR CPOC AREA WELLS GW211S, GW221S, AND GW224S Boeing Renton Facility Renton, Washington	Project No. PS20203450 Figure 20



NOTES

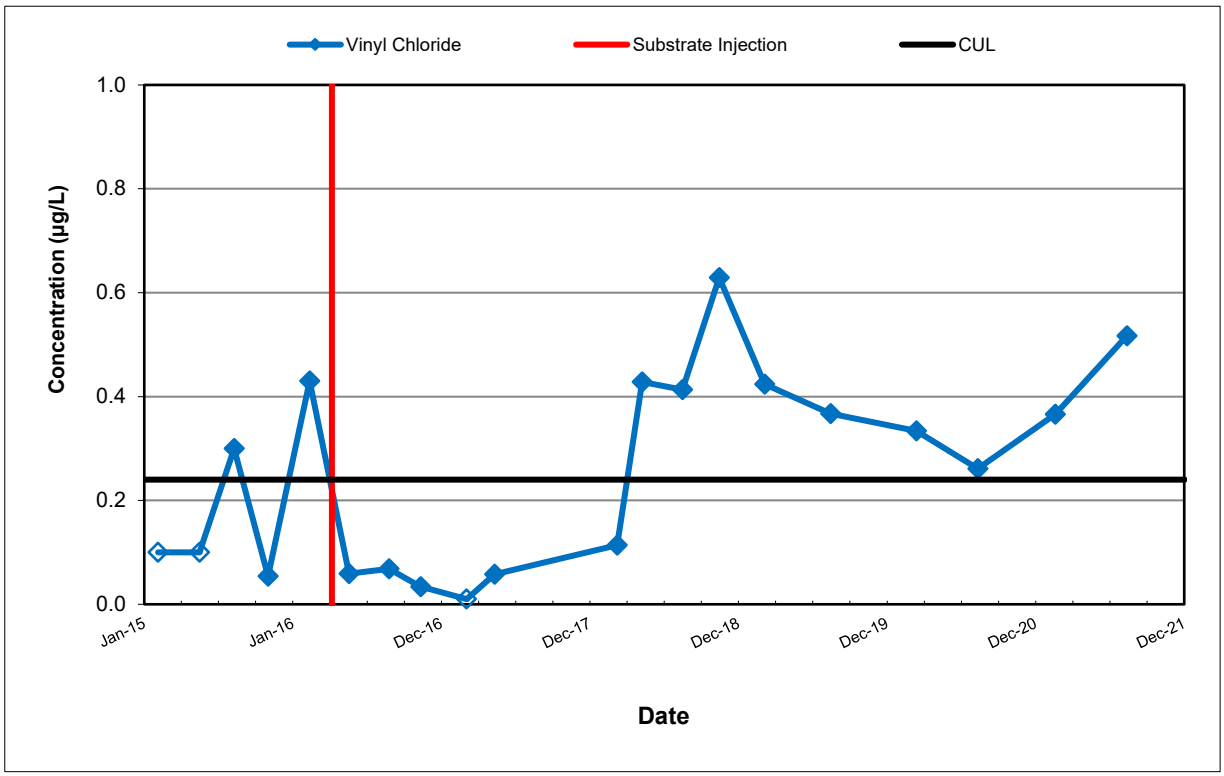
1. HORIZONTAL DATUM:
   WASHINGTON STATE COORDINATE SYSTEM
   NORTH ZONE NAD83 (91)
   VERTICAL DATUM:
   NATIONAL GEODETIC VERTICAL DATUM (NGVD1929)
2. BASEMAP COMPILED BY DUANE HARTMAN & ASSOCIATES, INC., DECEMBER 1994.
3. PUSH PROBE LOCATIONS FROM FINAL REMEDIAL INVESTIGATION REPORT (WESTON, 2001).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

BOEING

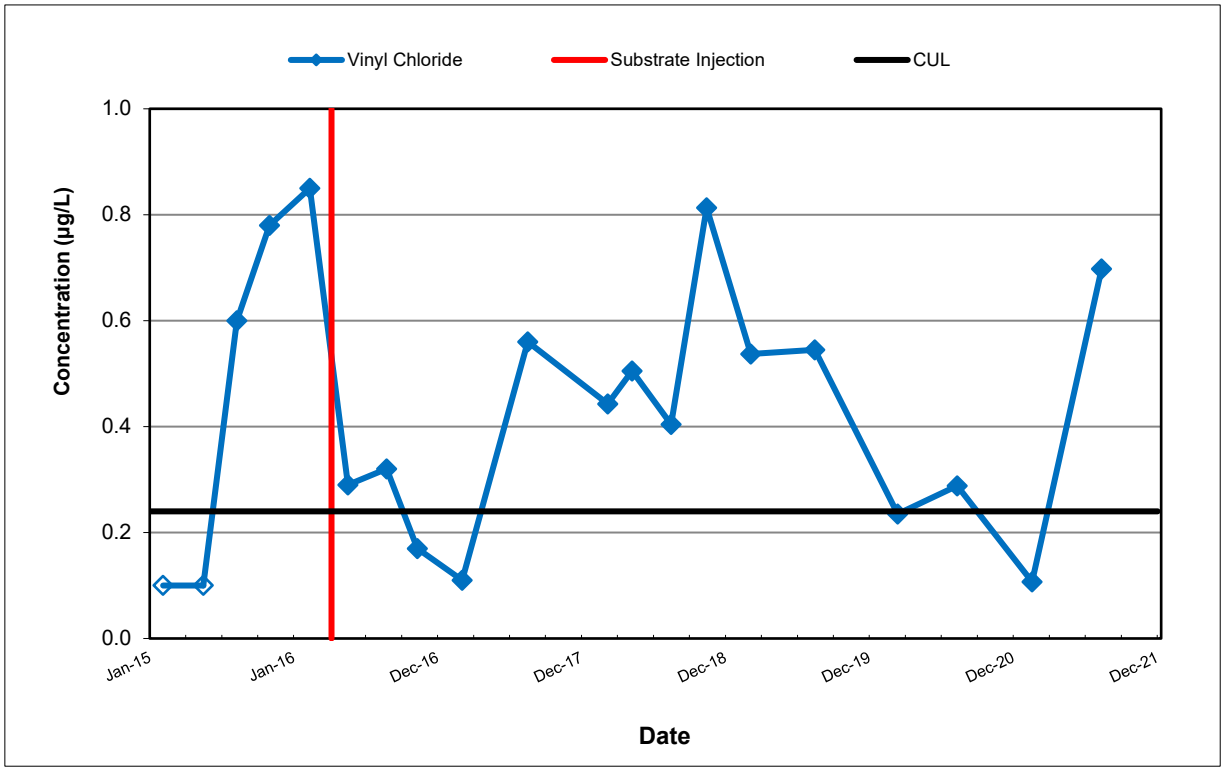
AOC-003
MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS
AUGUST 11 & 12, 2021
Boeing Renton Facility
Renton, Washington

By: MDS	Date: 11/10/21	Project No. PS20203450
wood.		Figure 21

Plot Date: 11/10/21 - 1:30pm, Plotted by: adam.stenberg
Drawing Path: S:\8888_2006\107_2021-August-GW-MR\, Drawing Name: Figure_21_AOC-003_GW-ELEV_Aug2021.dwg



SOURCE AREA WELL GW249S

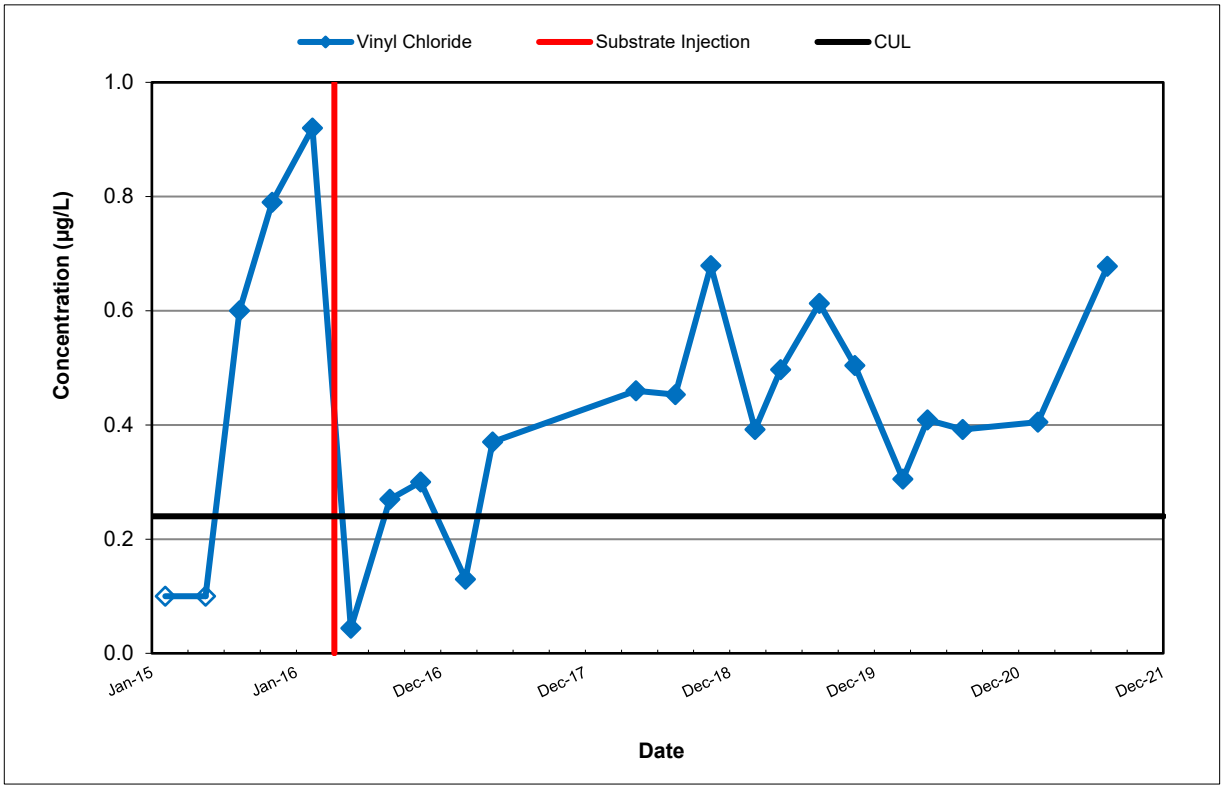


DOWNGRADIENT PLUME AREA WELL GW188S

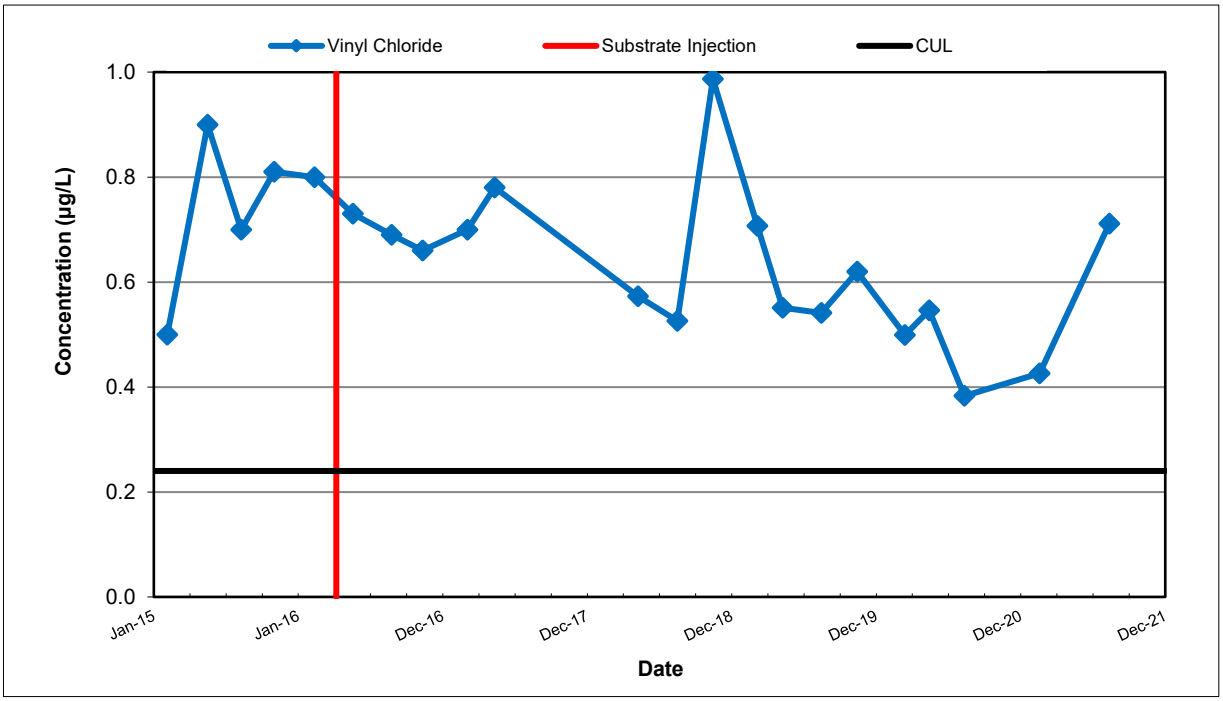
Note: non-detected values shown at one-half the reporting limit and with an open symbol

wood.	AOC-003 HISTORICAL TREND PLOTS FOR SOURCE AREA WELL GW249S AND DOWNGRADIENT PLUME AREA WELL GW188S Boeing Renton Facility Renton, Washington	Project No. PS20203450 Figure 22

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figure 22 to 25_AOC 003-4.xls



CPOC WELL GW247S

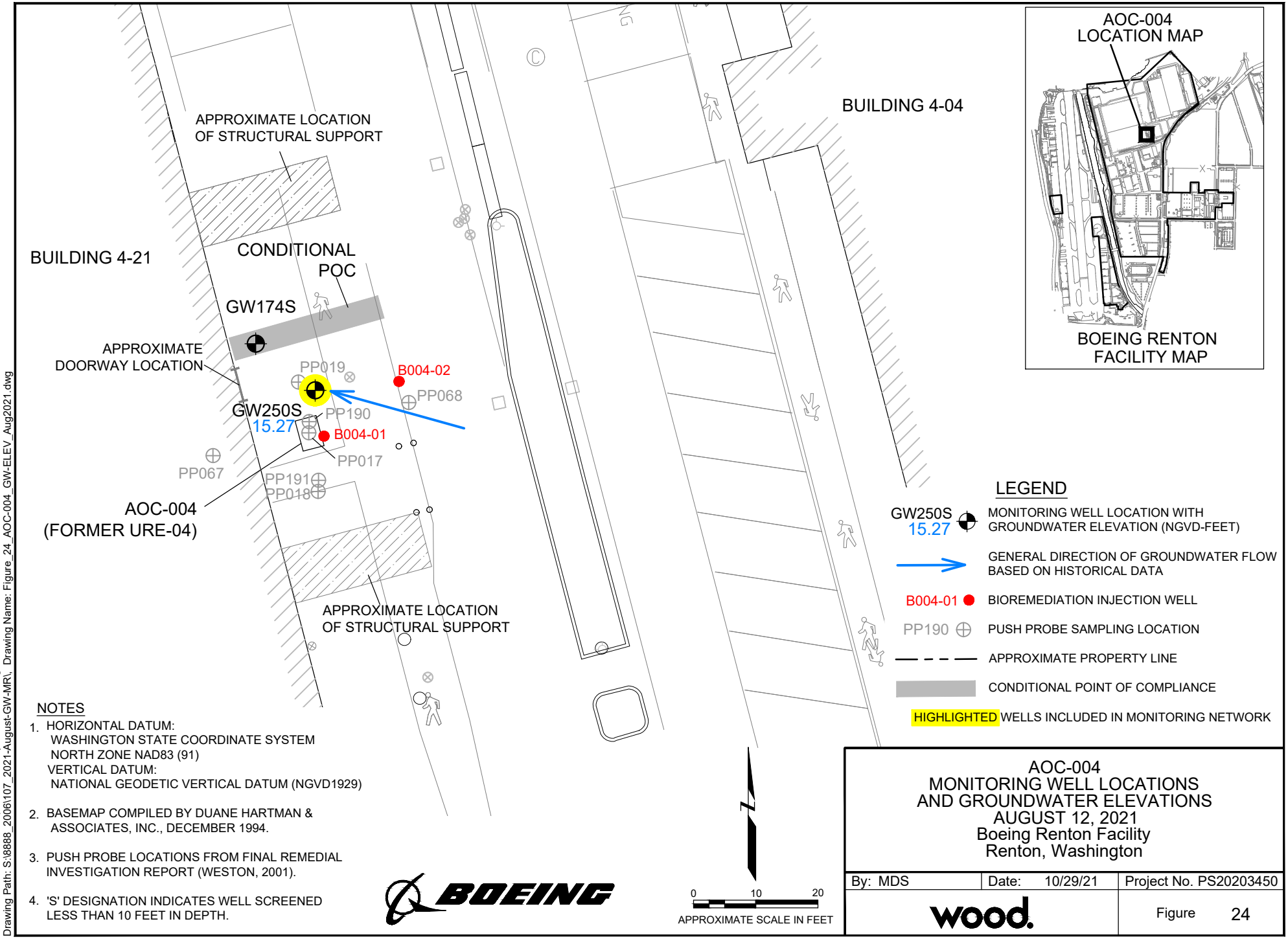


CPOC WELL GW248I

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

wood.	AOC-003 HISTORICAL TREND PLOTS FOR CPOC WELLS GW247S AND GW248I Boeing Renton Facility	Project No. PS20203450 Figure 23

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figure 22 to 25_AOC 003-4.xls



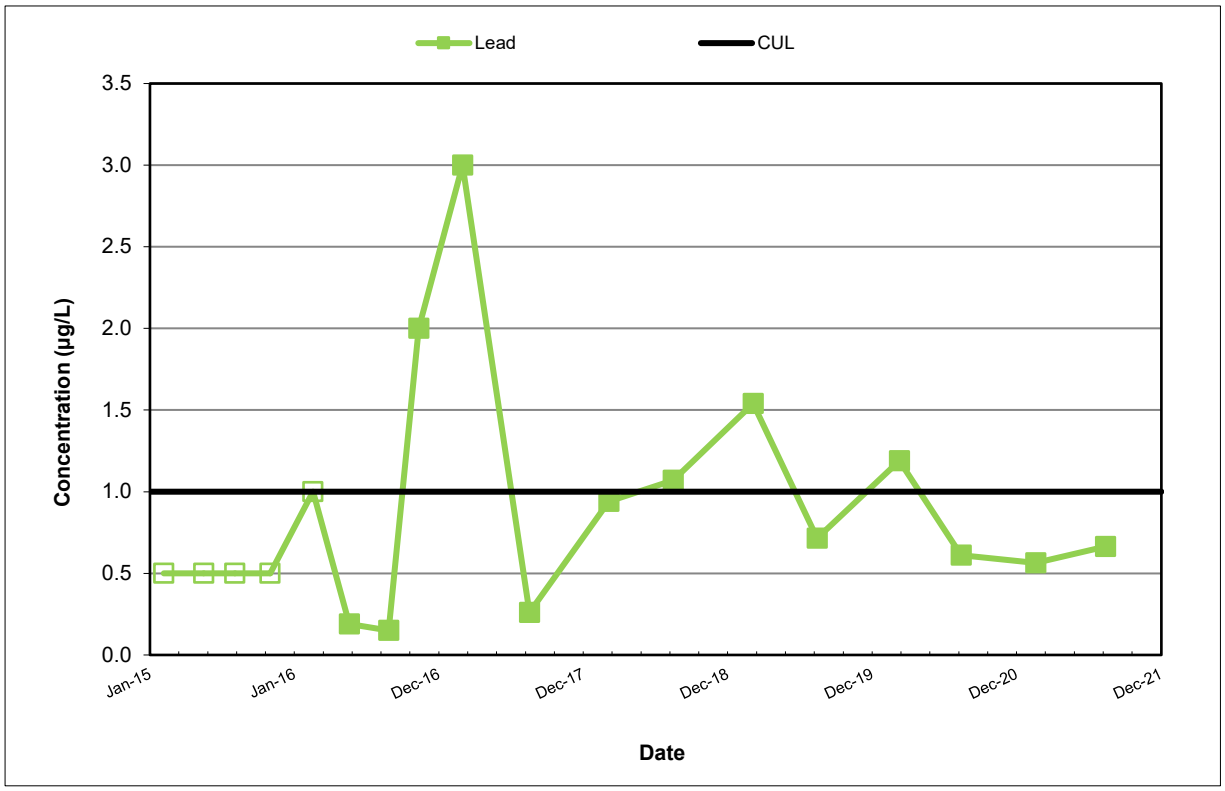
NOTES

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.

BOEING

AOC-004
MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS
AUGUST 12, 2021
Boeing Renton Facility
Renton, Washington

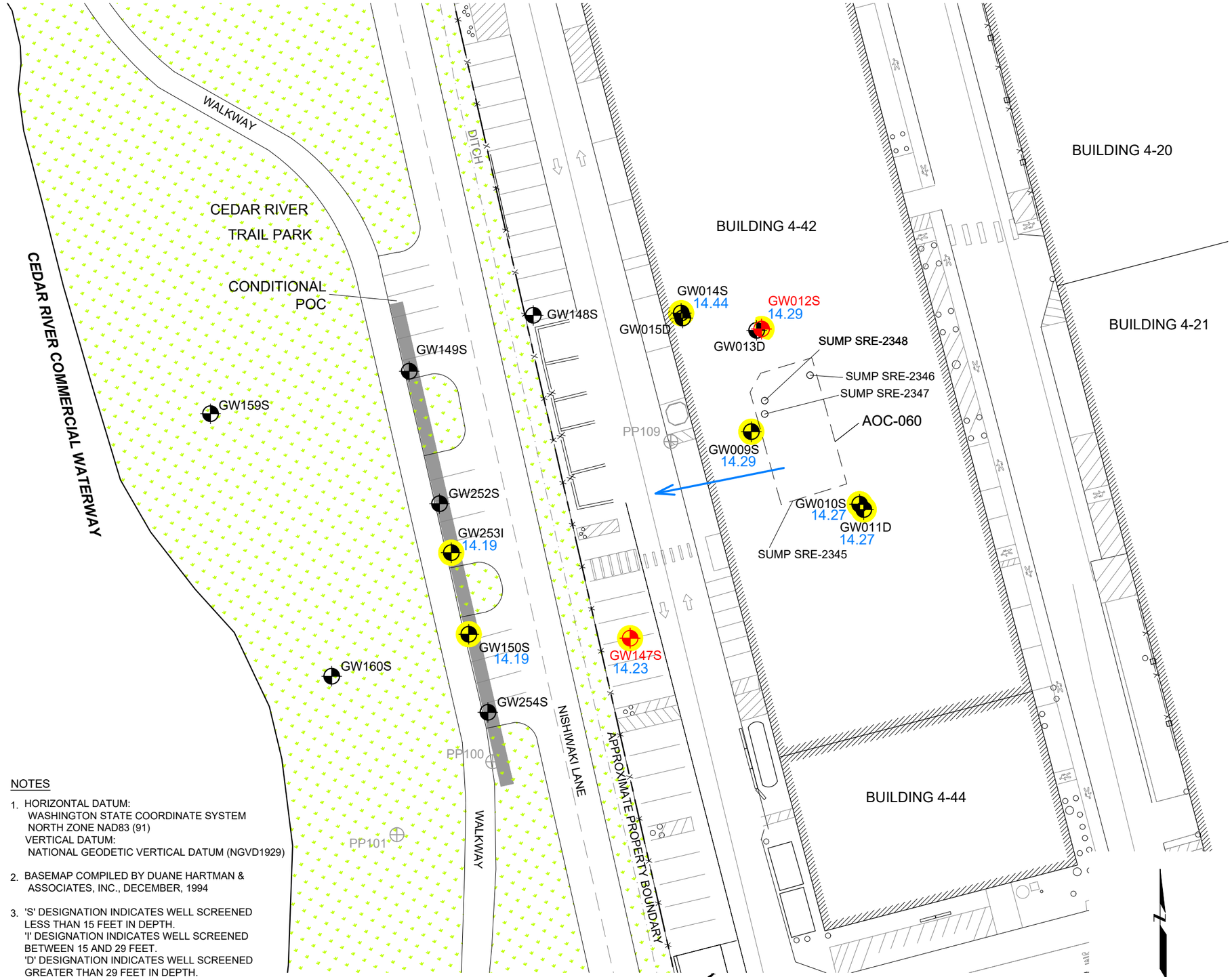
By: MDS	Date: 10/29/21	Project No. PS20203450
wood.		Figure 24

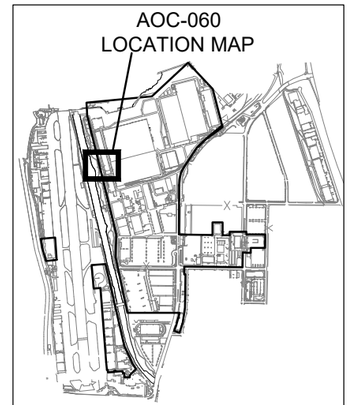


SOURCE AREA WELL GW250S

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figure 22 to 25_AOC 003-4.xls

wood.	AOC-004 HISTORICAL TREND PLOT FOR SOURCE AREA WELL GW250S Boeing Renton Facility	Project No. PS20203450 Figure 25





LEGEND

- GW150S 14.19 — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION (NGVD-FEET)
- GW147S — ELECTRON DONOR INJECTION WELL AND MONITORING WELL
- GENERAL DIRECTION OF GROUNDWATER FLOW
- PP109 — PUSH PROBE SAMPLING LOCATION
- APPROXIMATE PROPERTY LINE
- FENCE 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. '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.
4. THE GROUNDWATER FLOW DIRECTION SHOWN IS BASED ON HISTORICAL GROUNDWATER DATA.

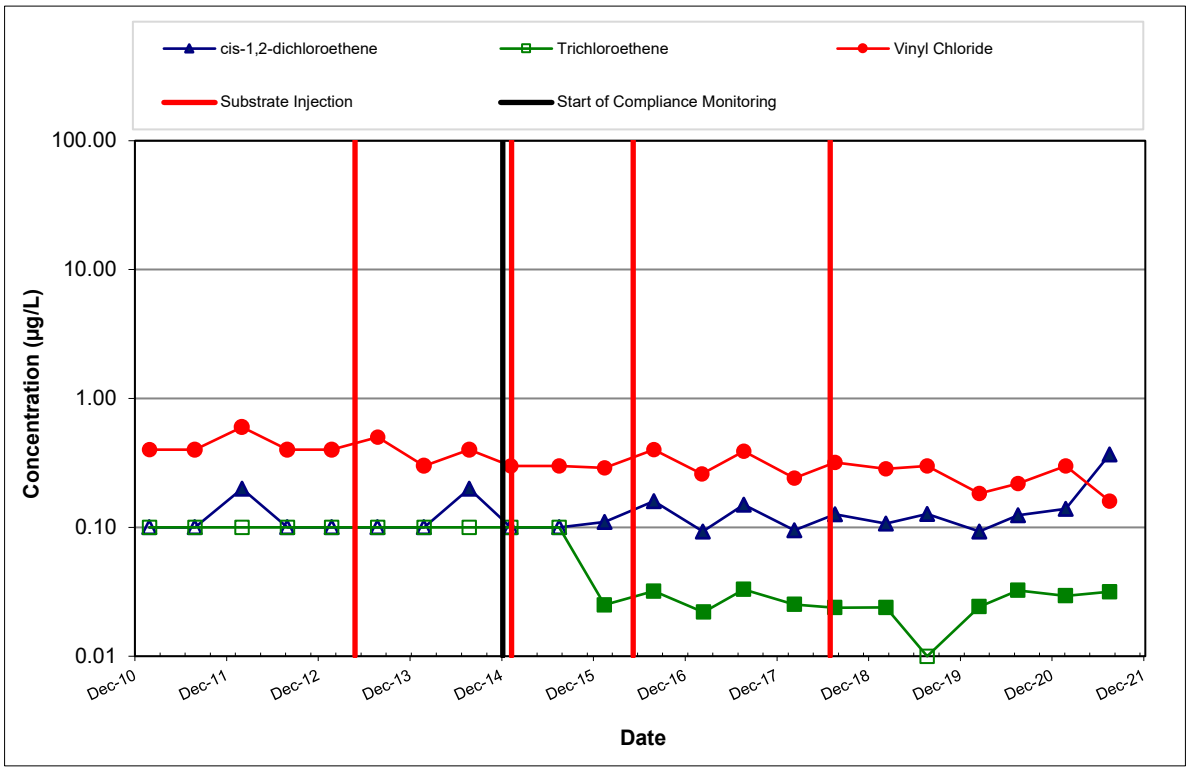
BOEING

0 20 40
APPROXIMATE SCALE IN FEET

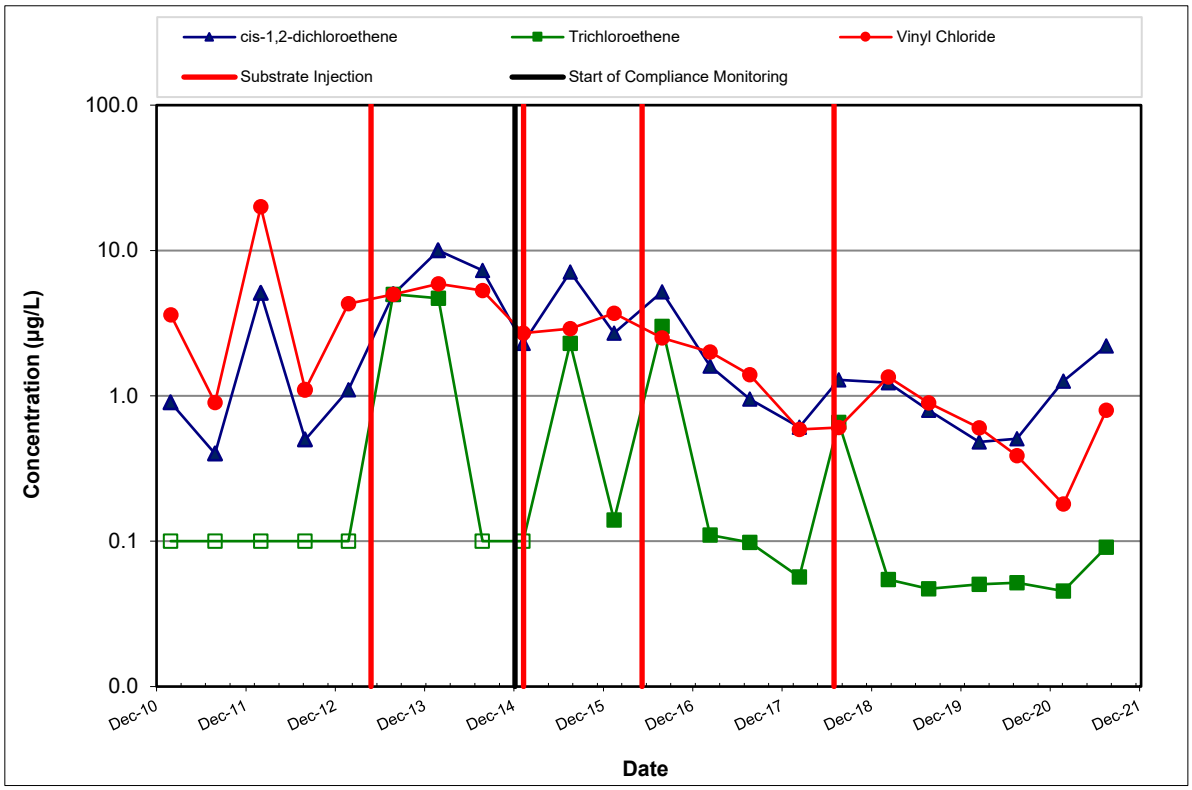
AOC-060
MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS
AUGUST 11, 2021
Boeing Renton Facility
Renton, Washington

By: APS	Date: 10/06/21	Project No. PS20203450
wood.		Figure 26

Plot Date: 10/06/21 - 1:36pm, Plotted by: adam.stenberg
Drawing Path: S:\8888_2006\107_2021-August-GW-MR\, Drawing Name: Figure_26_AOC-060_GW-ELEV_Aug2021.dwg



SOURCE AREA WELL GW009S

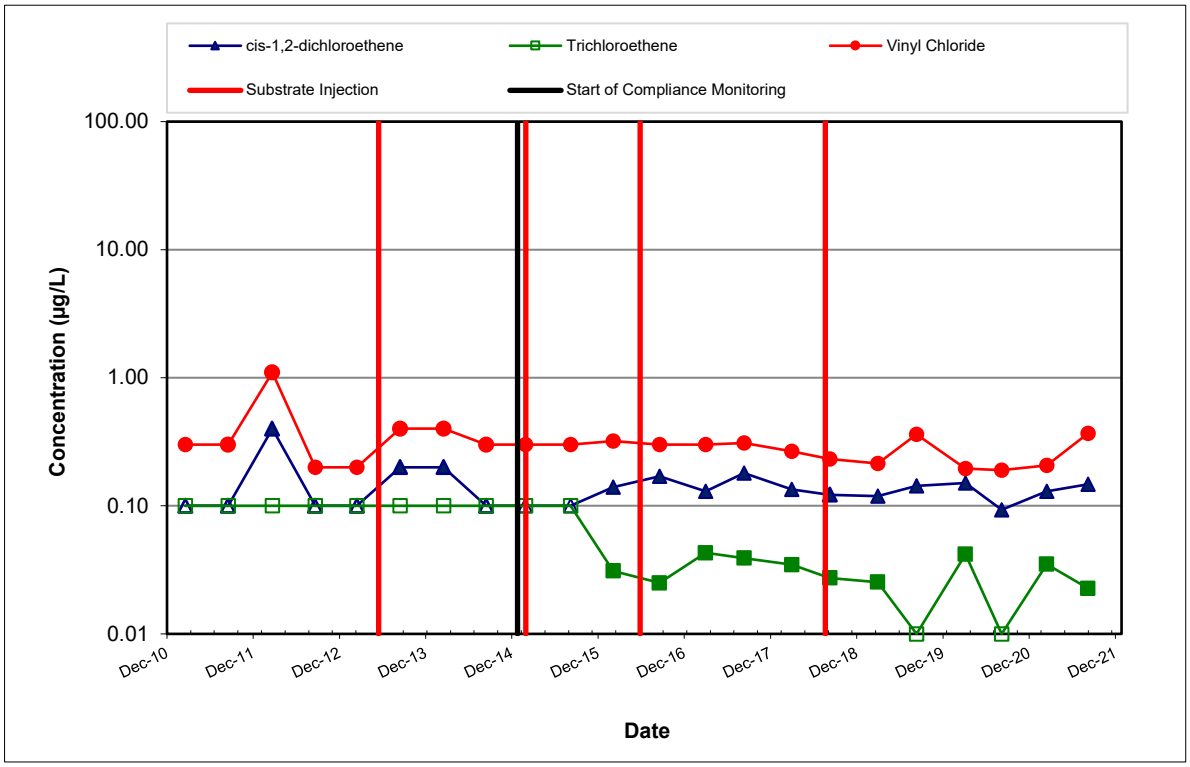


DOWNGRADIENT PLUME AREA WELL GW012S

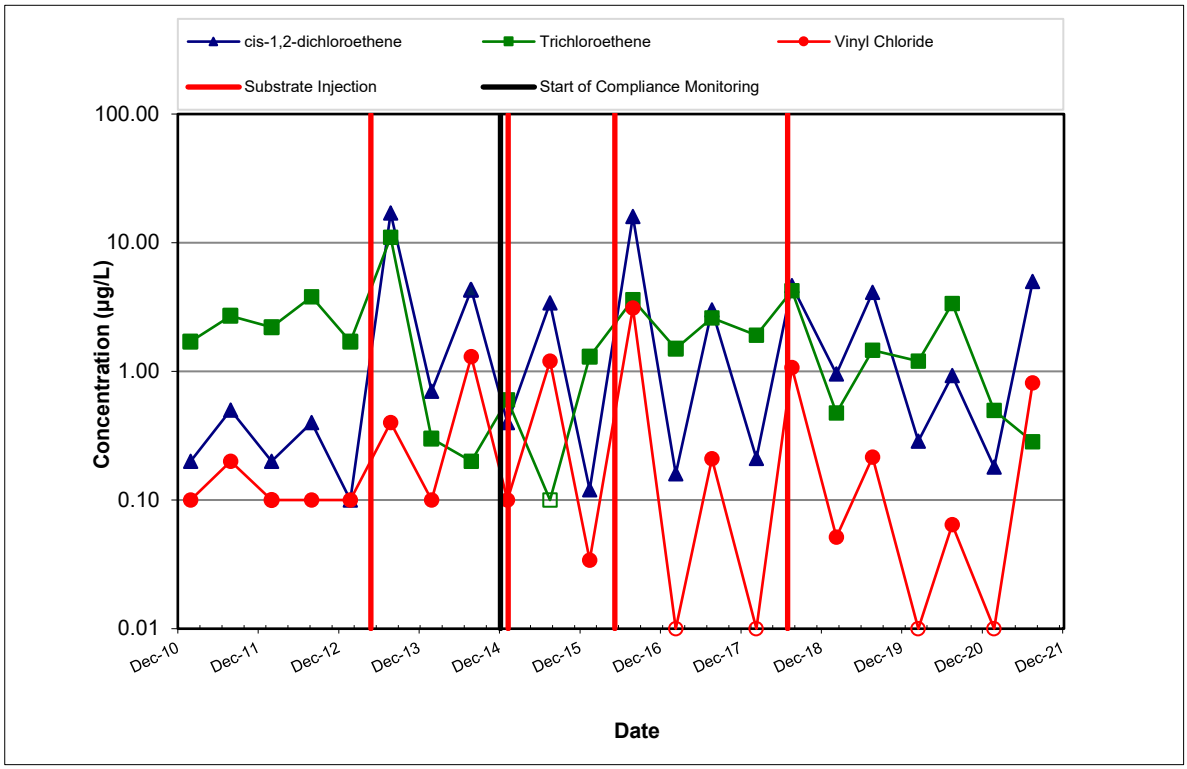
Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol. August 2013 reporting limits elevated.

wood.	AOC-060 TREND PLOTS FOR SOURCE AREA WELL GW009S AND DOWNGRADIENT PLUME AREA WELL GW012S Boeing Renton Facility Renton, Washington	Project No. PS20203450 Figure 27

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figure 27 to 29 AOC 60.xlsx



DOWNGRADIENT PLUME AREA WELL GW014S

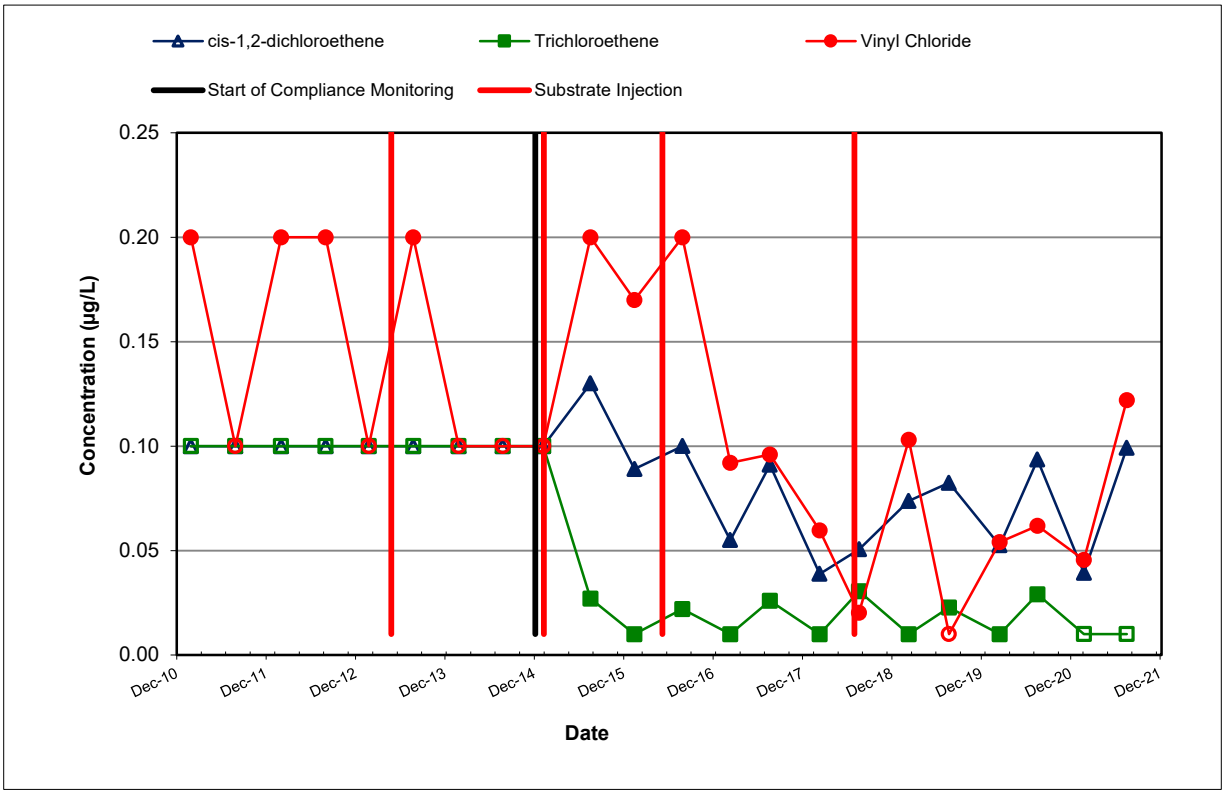


DOWNGRADIENT PLUME AREA WELL GW147S

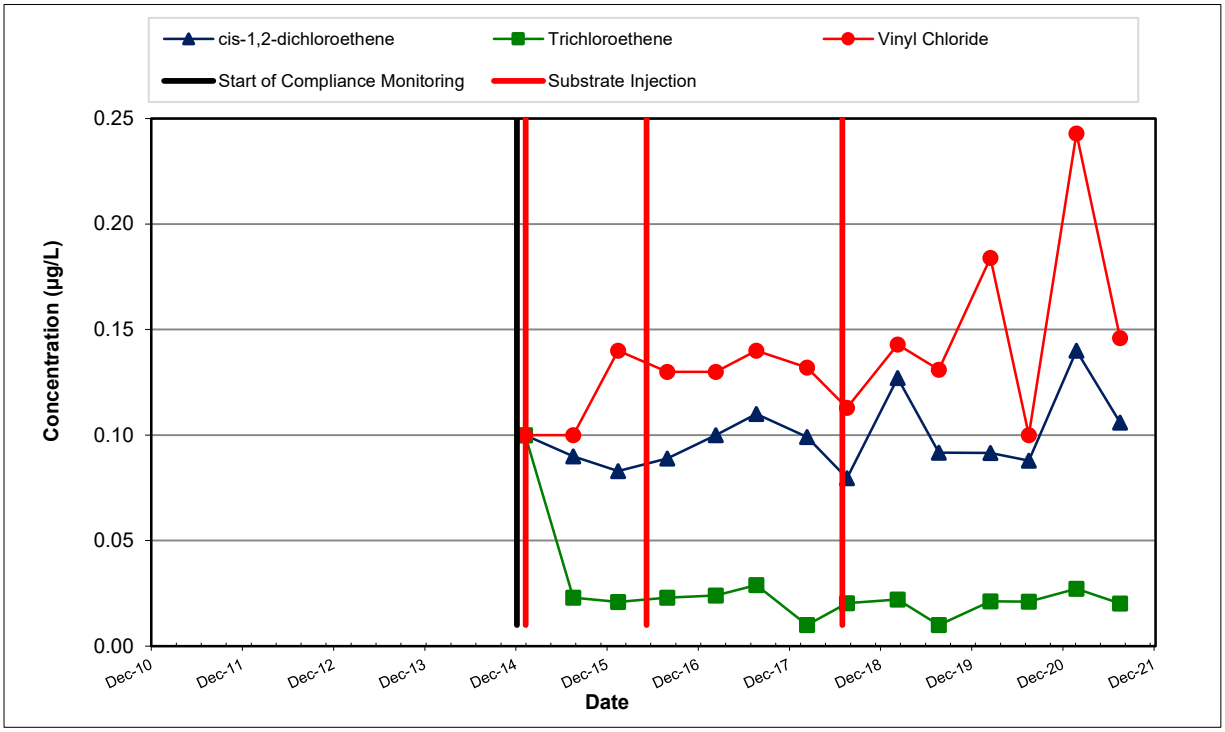
Note: non-detected values shown at one-half the reporting limit and graphed with an open symbol.

wood.	AOC-060 TREND PLOTS FOR DOWNGRADIENT PLUME AREA WELLS GW014S AND GW147S Boeing Renton Facility Renton, Washington	Project No. PS20203450 Figure 28

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figure 27 to 29 AOC 60.xlsx



CPOC AREA WELL GW150S

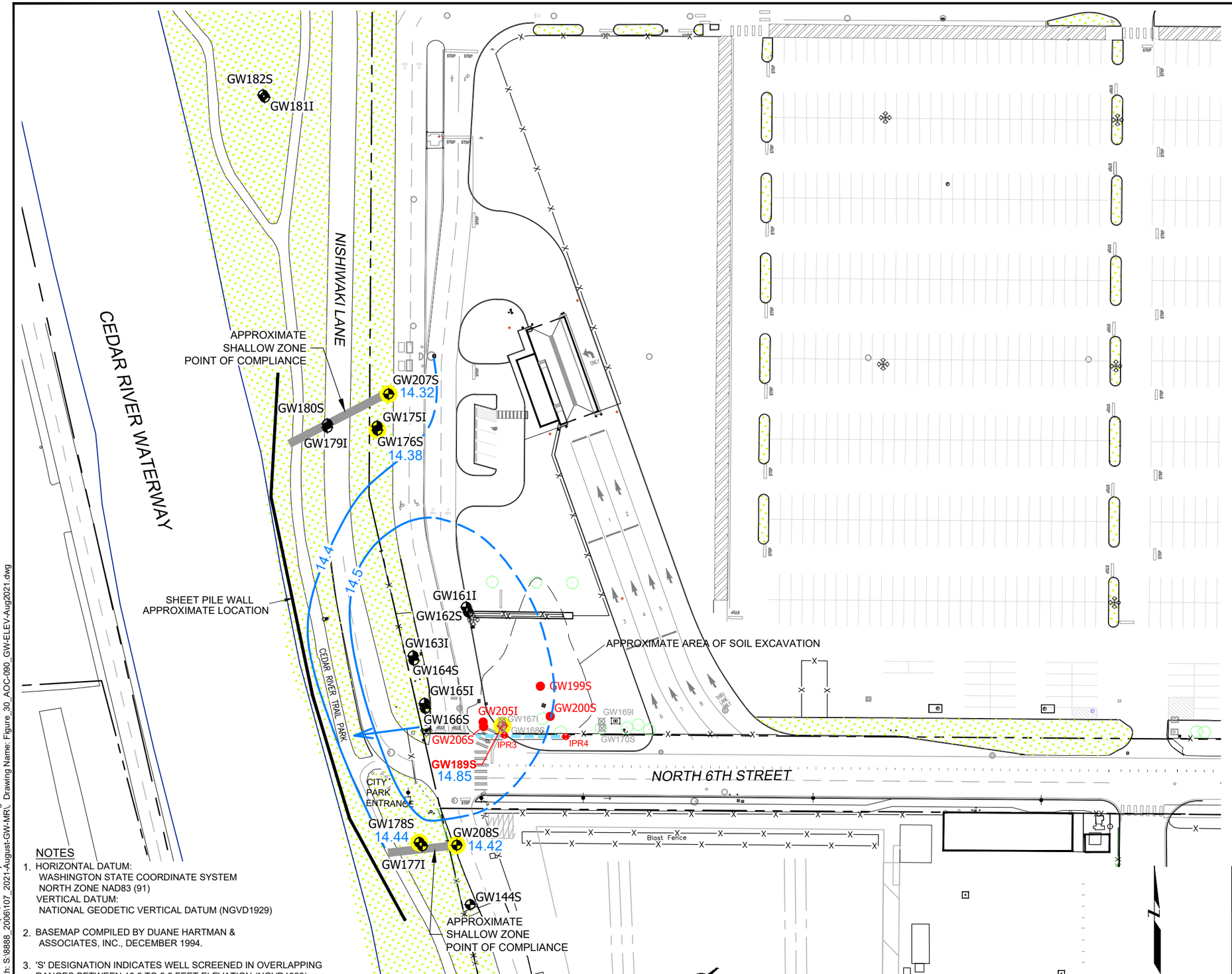


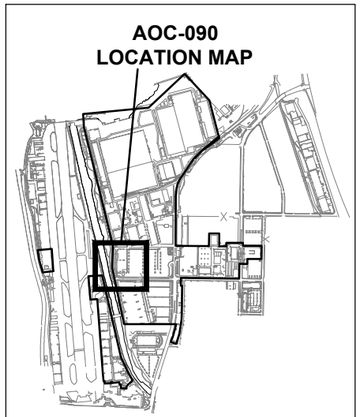
CPOC AREA WELL GW253I

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\Figure 27 to 29 AOC 60.xlsx

wood.	AOC-060 TREND PLOTS FOR CPOC AREA WELLS GW150S AND GW253I Boeing Renton Facility Renton, Washington	Project No. PS20203450 Figure 29





LEGEND

- GW178S 14.44 — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION (NGVD-FEET)
- 14.5 — GROUNDWATER ELEVATION CONTOUR (IN FEET) (DASHED WHERE INFERRED)
- GENERAL DIRECTION OF GROUNDWATER FLOW
- GW201S — EXISTING BIOREMEDIATION SUBSTRATE INJECTION WELL
- GW189S 14.85 — 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

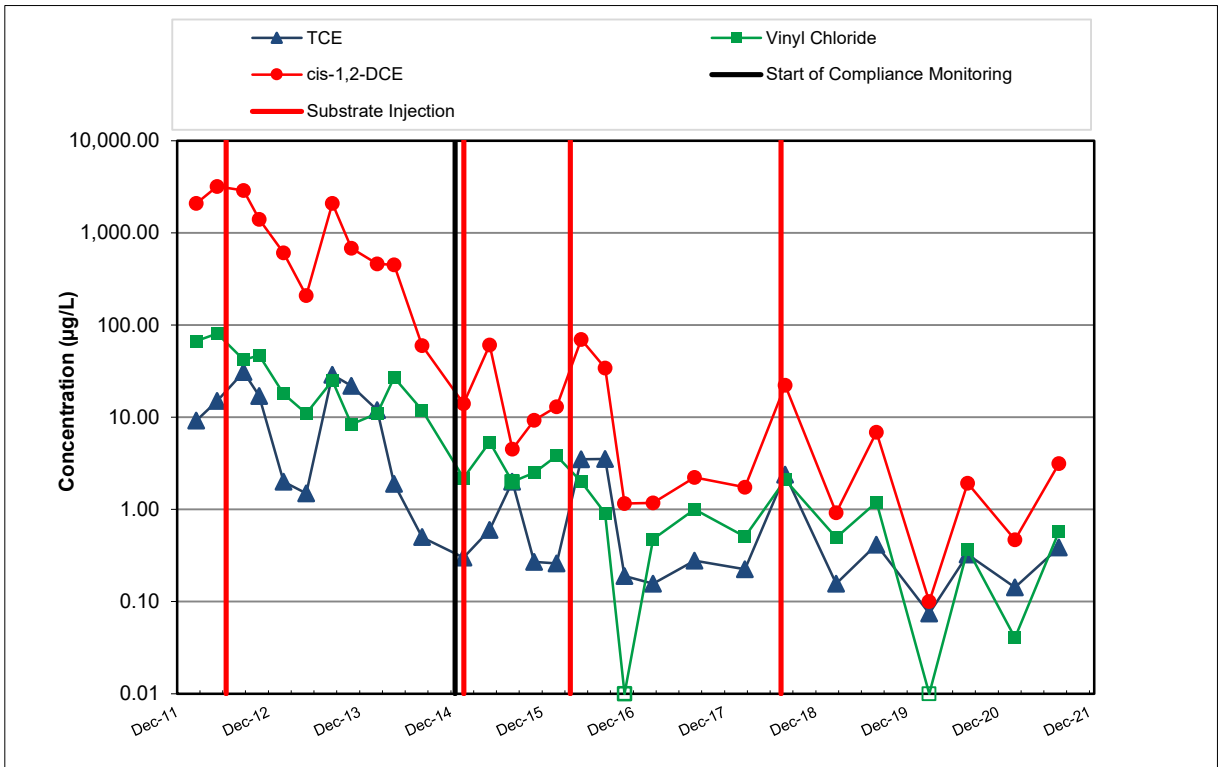
1. HORIZONTAL DATUM:
   WASHINGTON STATE COORDINATE SYSTEM
   NORTH ZONE NAD83 (91)
   VERTICAL DATUM:
   NATIONAL GEODETIC VERTICAL DATUM (NGVD1929)
2. BASEMAP COMPILED BY DUANE HARTMAN & ASSOCIATES, INC., DECEMBER 1994.
3. 'S' DESIGNATION INDICATES WELL SCREENED IN OVERLAPPING RANGES BETWEEN 18.5 TO 5.5 FEET ELEVATION (NGVD1929).
   'I' DESIGNATION INDICATES WELL SCREENED IN OVERLAPPING RANGES BETWEEN 1.0 TO -13.7 FEET IN ELEVATION (NGVD1929).

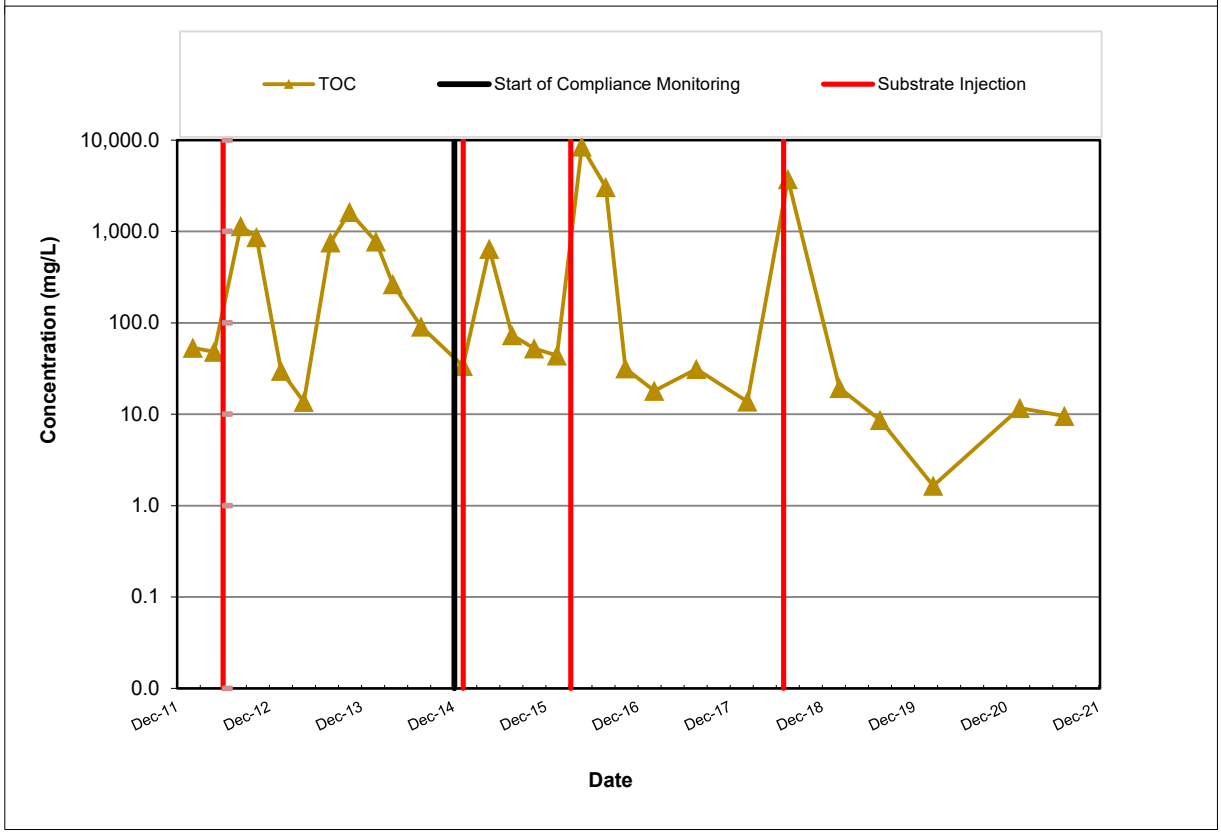
AOC-090
MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS
AUGUST 12 & 17, 2021
Boeing Renton Facility
Renton, Washington

By: MDS	Date: 10/06/21	Project No. PS20203450
wood.		Figure 30

BOEING

Plot Date: 10/06/21 - 2:33pm, Plotted by: adam.stenberg
Drawing Path: S:\8888_2006\107_2021-August-GW-MR\, Drawing Name: Figure_30_AOC-090_GW-ELEV-Aug2021.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. PS20203450 Figure 31

P:\8888 - Boeing Renton\02 Data Management\Grapher and Excel Figure Files\excel\Figure 31 AOC-90 Trend Plots.xls

Plot Date: 10/06/21 - 1:39pm, Plotted by: adam.stenberg
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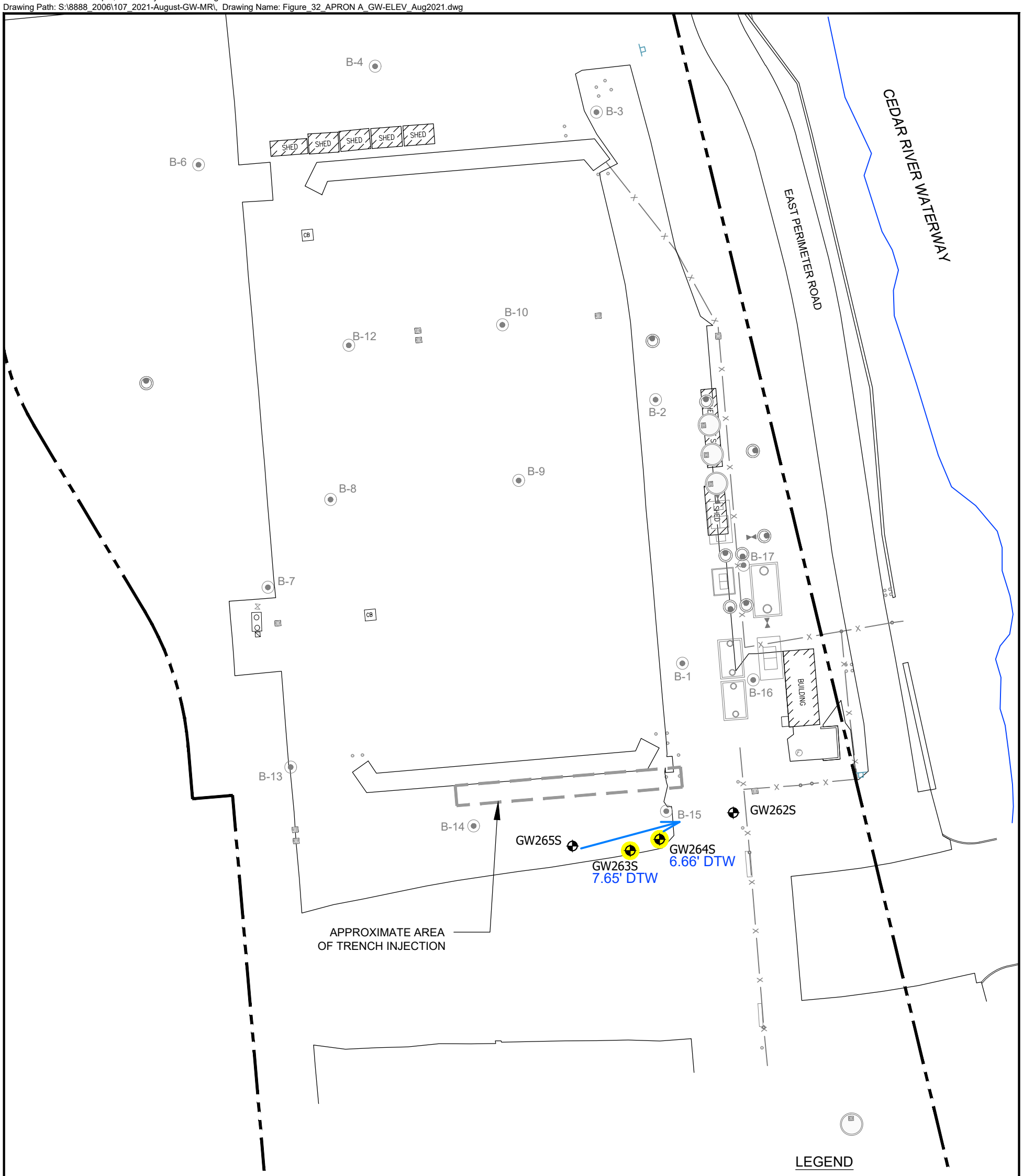
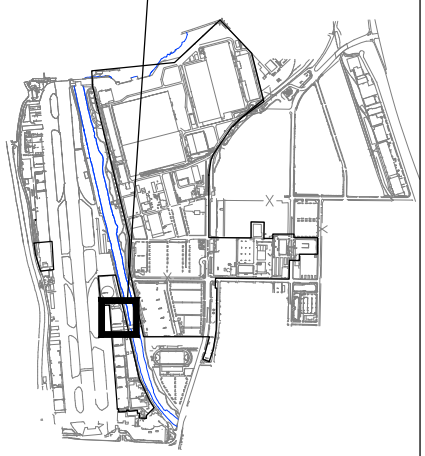


APRON A
LOCATION MAP



BOEING RENTON
FACILITY MAP

LEGEND

- GW264S 6.66' DTW — MONITORING WELL LOCATION WITH DEPTH TO WATER (BGS IN FEET)
- PRESUMED GENERAL DIRECTION OF GROUNDWATER FLOW
- B-1 — SOIL SAMPLE LOCATION
- APPROXIMATE PROPERTY LINE
- FENCE

HIGHLIGHTED WELLS INCLUDED IN MONITORING NETWORK

NOTE:
1. 'S' DESIGNATION INDICATES WELL SCREENED LESS THAN 10 FEET IN DEPTH.

N

0 20 40
APPROXIMATE SCALE IN FEET

BOEING

APRON A AREA
MONITORING WELL LOCATIONS AND DEPTH TO GROUNDWATER
AUGUST 10, 2021
Boeing Renton Facility
Renton, Washington

By: APS	Date: 10/06/21	Project No. PS20203450
wood.		Figure 32

Tables

TABLE 1: SWMU-168 GROUNDWATER ELEVATION DATA
AUGUST 10, 2021
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]
GW230I	4 to 14	24.86	8.02	16.84

Notes:
1. 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 PRIMARY GEOCHEMICAL INDICATORS [1]
AUGUST 10, 2021
Boeing Renton Facility, Renton, Washington

Parameter	Well ID [2] CPOC Area GW230I
Temperature (degrees C)	25.4
Specific Conductivity (µS/cm)	427.3
Dissolved Oxygen (mg/L)	0.35
pH (standard units)	6.32
Oxidation/Reduction Potential (mV)	-39.1

Notes:
1. Primary geochemical indicators are measured in the field.
2. 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, 2]
AUGUST 10, 2021
Boeing Renton Facility, Renton, Washington

Analyte		Cleanup Level [3]	Well ID [4] CPOC Area GW230I
Volatile Organic Compounds (µg/L)			
Vinyl Chloride		0.11	**0.359 J**

Notes:
1. Data qualifiers are as follows:
   J = the value is estimated.
2. **Bolded** values exceed the cleanup levels.
3. Cleanup levels obtained from Table 2 of the Cleanup Action Plan.
4. I = intermediate well.

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
AUGUST 10, 2021
Boeing Renton Facility, Renton, Washington

Well ID[1]	Screen Interval Depth (feet bgs)	TOC Elevation (feet)[3]	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet)[3]
GW152S	5 to 20[2]	26.98	9.95	17.03
GW153S	5 to 20[2]	27.47	10.47	17.00
GW172S	8 to 18[2]	26.44	10.17	16.27
GW173S	8 to 18[2]	26.51	10.28	16.23
GW226S	5 to 20[2]	26.86	9.79	17.07
GW232S	4 to 14	24.45	7.77	16.68
GW234S	3 to 13	24.95	8.62	16.33
GW235I	15 to 25	24.90	7.95	16.95
GW236S	5 to 15	24.36	7.88	16.48

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 PRIMARY GEOCHEMICAL INDICATORS [1]
AUGUST 10, 2021
Boeing Renton Facility, Renton, Washington

Parameter	Well ID[2]									
	Source Area			Downgradient Plume Area			CPOC Area			
	GW152S	GW152S (field dup.)	GW153S	GW172S	GW173S	GW226S	GW232S	GW234S	GW235I	GW236S
Temperature (degrees C)	23.1	23.1	22.7	27.5	26.8	27.3	24.0	24.1	22.1	28.9
Specific Conductivity (µS/cm)	212.1	212.1	278.6	364.8	413.4	432.5	603.0	252.4	190.0	507.0
Dissolved Oxygen (mg/L)	0.48	0.48	0.74	0.29	0.63	0.39	1.28	0.63	0.24	0.53
pH (standard units)	5.80	5.80	6.39	6.80	6.51	6.58	6.29	6.23	6.42	6.63
Oxidation/Reduction Potential (mV)	16.2	16.2	-57.3	-58.5	-74.3	-107.1	-56.6	-32.9	-37.6	-71.1
Total Organic Carbon (mg/L)	5.88	5.30	7.99	3.36	5.05	8.92	10.47	2.52	0.51	2.01

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]
AUGUST 10, 2021
Boeing Renton Facility, Renton, Washington

Analyte	Cleanup Level [4]	Well ID [3]									
		Source Area			Downgradient Plume Area			CPOC Area			
		GW152S	GW152S (field dup.)	GW153S	GW172S	GW173S	GW226S	GW232S	GW234S	GW235I	GW236S
Volatile Organic Compounds (µg/L)											
cis -1,2-Dichloroethene	0.03	**1.330**	**1.370**	**0.0582 J**	**0.0746**	**0.0424 J**	**0.0335 J**	**0.464 J**	**0.0892**	**0.179**	**0.0791**
Tetrachloroethene	0.02	**0.0872**	**0.0802**	0.020 UJ	0.020 U	0.020 UJ	**0.0202 J**	0.020 UJ	0.020 U	0.020 U	0.020 U
Trichloroethene	0.02	**0.129**	**0.119**	0.020 UJ	0.020 U	0.020 UJ	0.020 UJ	0.020 UJ	0.020 U	**0.0285**	0.020 U
Vinyl Chloride	0.11	**0.506**	**0.525**	**0.193 J**	**0.155**	**0.176 J**	0.0516 J	**0.653 J**	0.0497	0.024	0.0223
Total Metals (µg/L)											
Arsenic	1.0	**16.3**	**18.3**	**5.47**	**7.18**	**11.4**	**5.57**	**6.19**	**1.18**	0.200 U	**5.49**
Copper	3.5	**9.08 J**	**12.4 J**	2.37	2.86	**5.96**	1.48	1.79	2.58	0.689	2.47
Lead	1.0	**5.38 J**	**7.82 J**	0.448	**1.33**	**1.65**	0.124	0.262	**1.01**	0.179	**1.79**

Notes:
1. Data qualifiers are as follows:
   U = The analyte was not detected at the reporting limit indicated.
   J = the value is estimated.
   UJ = 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
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
AUGUST 11, 2021
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	5.21	14.23
GW033S	5 to 25	19.49	5.31	14.18
GW034S	5 to 25	19.65	5.42	14.42
GW143S	10 to 15	19.81	5.64	14.17
GW237S	5 to 15	18.85	4.66	14.19
GW240D	22 to 27	19.81	6.75	13.06
GW244S	5 to 15	19.53	5.29	14.24

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
SWMU = solid waste management unit
TOC = top of casing

TABLE 8: BUILDING 4-78/79 SWMU/AOC GROUP PRIMARY GEOCHEMICAL INDICATORS [1]
AUGUST 11, 2021
Boeing Renton Facility, Renton, Washington

Parameter	Well ID[2]							
	Source Area					CPOC Area		
	GW031S	GW031S (field dup.)	GW033S	GW034S	GW244S	GW143S	GW237S	GW240D
Temperature (degrees C)	22.3	22.3	23.6	26.9	26.9	22.8	25.6	26.0
Specific Conductivity (µS/cm)	518.0	518.0	518.0	329.0	599.0	421.9	385.5	389.4
Dissolved Oxygen (mg/L)	0.50	0.50	0.72	0.43	0.77	1.31	0.48	0.70
pH (standard units)	6.29	6.29	6.14	6.34	6.12	6.31	6.34	6.46
Oxidation/Reduction Potential (mV)	-61.6	-61.6	-53.8	-72.1	-61.1	-30.8	-55.6	-74.6
Total Organic Carbon (mg/L)	15.15	15.21	13.54	7.66	13.38	8.47	5.72	4.63

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.

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
SWMU = solid waste management unit

TABLE 9: BUILDING 4-78/79 SWMU/AOC GROUP CONCENTRATIONS OF CONSTITUENTS OF CONCERN [1, 2]
AUGUST 11, 2021
Boeing Renton Facility, Renton, Washington

Analyte	Cleanup Level [4]	Well ID [3]							
		Source Area					CPOC Area		
		GW031S	GW031S (field dup.)	GW033S	GW034S	GW244S	GW143S	GW237S	GW240D
Volatile Organic Compounds (µg/L)									
Benzene	0.80	**1.08**	**0.84**	**14.5**	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
cis -1,2-Dichloroethene	0.70	0.20 U	0.20 U	0.55	0.20 U	0.22	0.65	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	0.20 U
Vinyl Chloride	0.20	0.20 U	0.20	**2.31**	**1.20**	**0.37**	0.20 U	0.20	0.20 U
Total Petroleum Hydrocarbons (µg/L)									
TPH-G (C7-C12)	800	**1,540**	**1,620**	360	100 U	100 U	100 U	360	100 U

Notes:
1. Data qualifiers are as follows:
   U = The analyte was not detected at the reporting limit indicated.
   J = the value is estimated.
   UJ = The analyte was not detected at the estimated 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.

Abbreviations:
µg/L = micrograms per liter
AOC = area of concern
CPOC = conditional point of compliance
field dup. = field duplicate
SWMU = solid waste management unit
TPH-G = total petroleum hydrocarbons in gasoline range

TABLE 10: FORMER FUEL FARM GROUNDWATER ELEVATION DATA
AUGUST 10, 2021
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]
GW211S	4.8 to 14.7	27.77	10.73	17.04
GW221S	5 to 15	27.93	10.87	17.06
GW224S	5 to 15	27.98	11.40	16.58

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 11: FORMER FUEL FARM PRIMARY GEOCHEMICAL INDICATORS [1]
AUGUST 10, 2021
Boeing Renton Facility, Renton, Washington

Parameter	Well ID[2]			
	CPOC Area			
	GW211S	GW221S	GW224S	GW224S (field dup.)
Temperature (degrees C)	21.0	27.5	23.6	23.6
Specific Conductivity (µS/cm)	276.8	264.3	175.0	175.0
Dissolved Oxygen (mg/L)	0.24	0.47	0.28	0.28
pH (standard units)	6.54	6.43	6.08	6.08
Oxidation/Reduction Potential (mV)	-67.9	-23.1	-16.0	-16.0

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

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

TABLE 12: FORMER FUEL FARM CONCENTRATIONS OF CONSTITUENTS OF CONCERN [1, 2]
AUGUST 10, 2021
Boeing Renton Facility, Renton, Washington

Analyte	Cleanup Level [4]	Well ID[3]			
		CPOC Area			
		GW211S	GW221S	GW224S	GW224S (field dup.)
Total Petroleum Hydrocarbons (mg/L)					
TPH-D (C12-C24)	0.5	0.140	**1.02**	**1.08**	**1.01**
TPH-O (C24-C38)	NC	0.200 U	0.200 U	0.200 U	0.200 U
Jet A (C10-C18)	0.5	0.100 U	**0.718**	**1.47**	**1.35**

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 Table 2 of the Cleanup Action Plan.

Abbreviations
CPOC = conditional point of compliance
field dup. = field duplicate
mg/L = milligrams per liter
NC = No cleanup level established
TPH-D = total petroleum hydrocarbons as diesel
TPH-O = total petroleum hydrocarbons as motor oil

TABLE 13: AOC-003 GROUNDWATER ELEVATION DATA
AUGUST 11 & 12, 2021
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	4.05	14.73
GW247S	4 to 14	18.91	4.16	14.75
GW248I	10 to 20	18.78	4.01	14.77
GW249S	4 to 14	18.85	3.95	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 PRIMARY GEOCHEMICAL INDICATORS [1]
AUGUST 11 & 12, 2021
Boeing Renton Facility, Renton, Washington

Parameter	Well ID[2]			
	Source Area	Downgradient Plume Area	CPOC Area	
	RGW249S	RGW188S	GW247S	GW248I
Temperature (degrees C)	28.5	25.7	30.6	29.9
Specific Conductivity (µS/cm)	504	532	576.0	636
Dissolved Oxygen (mg/L)	0.21	0.27	0.39	0.16
pH (standard units)	6.53	6.53	6.30	6.59
Oxidation/Reduction Potential (mV)	-19.8	-21.4	-62.7	-38.2
Total Organic Carbon (mg/L)	16.33	9.86	11.24	12.18

Notes
1. Primary geochemical indicators are measured in the field.
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]
AUGUST 11 & 12, 2021
Boeing Renton Facility, Renton, Washington

Analyte	Cleanup Level [3]	Well ID [2]			
		Source Area	Downgradient Plume Area	CPOC Area	
		GW249S	GW188S	GW247S	GW248I
Volatile Organic Compounds (µg/L)					
Vinyl Chloride	0.24	**0.517**	**0.698**	**0.678**	**0.711**

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
AOC = area of concern
CPOC = conditional point of compliance

TABLE 16: AOC-004 GROUNDWATER ELEVATION DATA
AUGUST 12, 2021
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]
GW250S	4 to 14	19.31	4.04	15.27

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 PRIMARY GEOCHEMICAL INDICATORS [1]
AUGUST 12, 2021
Boeing Renton Facility, Renton, Washington

Parameter	Well ID [2] Source Area GW250S
Temperature (degrees C)	25.8
Specific Conductivity (µS/cm)	144.3
Dissolved Oxygen (mg/L)	0.37
pH (standard units)	6.96
Oxidation/Reduction Potential (mV)	-38.2

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

Abbreviations:
µS/cm = microsiemens per centimeter
AOC = area of concern
degrees C = degrees Celsius
mg/L = milligrams per liter
mV = millivolts

TABLE 18: AOC-004 CONCENTRATIONS OF CONSTITUENTS OF CONCERN
AUGUST 12, 2021
Boeing Renton Facility, Renton, Washington

Analyte	Cleanup Level [2]	Well ID [1] / Source Area / GW250S
Metals (mg/L)		
Lead	0.001	0.000663

Notes:
1. S = shallow well.
2. Cleanup levels obtained from Table 2 of the Cleanup Action Plan.

Abbreviations:
AOC = area of concern
mg/L = milligrams per liter

TABLE 19: AOC-060 GROUNDWATER ELEVATION DATA
AUGUST 11, 2021
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	5.07	14.29
GW010S	4.5 to 14.5	19.47	5.20	14.27
GW011D	29 to 39	19.49	5.22	14.27
GW012S	4.5 to 14.5	19.11	4.82	14.29
GW014S	4.5 to 14.5	19.24	4.80	14.44
GW147S	5 to 15	18.73	4.50	14.23
GW150S	5 to 15	19.10	4.91	14.19
GW253I	10 to 20	19.02	4.83	14.19

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 PRIMARY GEOCHEMICAL INDICATORS [1]
AUGUST 11, 2021
Boeing Renton Facility, Renton, Washington

Parameter	Well ID [2]						
	Source Area	Downgradient Plume Area				CPOC Area	
	GW009S	GW012S	GW014S	GW014S (field dup.)	GW147S	GW150S	GW253I
Temperature (degrees C)	21.4	23.4	23.0	23.0	23.0	21.4	21.1
Specific Conductivity (µS/cm)	396.7	711	599	599	160.6	417.6	407.7
Dissolved Oxygen (mg/L)	0.26	0.26	0.33	0.33	0.35	0.44	0.48
pH (standard units)	6.35	6.03	6.29	6.29	5.86	6.51	6.52
Oxidation/Reduction Potential (mV)	-28.5	-62.6	-26.8	-26.8	-17.7	-45.5	-57.7
Total Organic Carbon (mg/L)	7.48	11.88	4.09	4.02	4.35	5.16	4.81

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]
AUGUST 11, 2021
Boeing Renton Facility, Renton, Washington

Analyte	Cleanup Levels [4]	Well ID [3]						
		Source Area	Downgradient Plume Area				CPOC Area	
		GW009S	GW012S	GW014S	GW014S (field dup.)	GW147S	GW150S	GW253I
Volatile Organic Compounds (µg/L)								
cis -1,2-Dichloroethene	0.08	**0.368**	**2.210**	**0.147**	**0.156**	**5.000**	**0.0991**	**0.106**
Trichloroethene	0.02	**0.0316**	**0.0908**	**0.0227**	**0.0234**	**0.283**	0.020 U	**0.0202**
Vinyl Chloride	0.26	0.160	**0.795**	**0.367**	**0.358**	**0.813**	0.122	0.146

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
field dup. = field duplicate

TABLE 22: AOC-090 GROUNDWATER ELEVATION DATA
AUGUST 12 & 17, 2021

Well ID[1]	Screen Interval Depth (feet bgs)	TOC Elevation (feet)[2]	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet)[2]
GW176S	10 to 14.3	20.15	5.77	14.38
GW178S	11.2 to 15.5	22.73	8.29	14.44
GW189S	4 to 14	22.01	7.16	14.85
GW207S	7.3 to 12	21.12	6.80	14.32
GW208S	6.3 to 11	22.45	8.03	14.42

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 23: AOC-090 PRIMARY GEOCHEMICAL INDICATORS [1]
AUGUST 12 & 17, 2021
Boeing Renton Facility, Renton, Washington

Parameter	Well ID [2]				
	Source Area	Downgradient Plume Area	Shallow Zone CPOC Area		
	GW189S [3]	GW176S	GW178S	GW207S	GW208S
Temperature (degrees C)	19.8	16.8	19.2	21.9	22.6
Specific Conductivity (µS/cm)	324.9	569.0	417.5	454.8	562.0
Dissolved Oxygen (mg/L)	0.47	1.22	0.55	0.24	1.59
pH (standard units)	6.22	5.91	6.34	6.47	6.35
Oxidation/Reduction Potential (mV)	-22.9	-24.5	-8.7	-12.6	-24.0
Total Organic Carbon (mg/L)	9.58	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 measured in the laboratory.
2. S = shallow 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
mg/L = milligrams per liter
mV = millivolts
NA = Not analyzed

TABLE 24: AOC-090 CONCENTRATIONS OF CONSTITUENTS OF CONCERN [1, 2]
AUGUST 12 & 17, 2021
Boeing Renton Facility, Renton, Washington

Analyte	Cleanup Levels [4]	Well ID [3]				
		Source Area	Downgradient Plume Area	Shallow Zone CPOC Area		
		GW189S [5]	GW176S	GW178S	GW207S	GW208S
Chlorinated Volatile Organic Compounds (µg/L)						
1,1,2,2-Tetrachloroethane	0.17	0.020 U	NA	NA	NA	NA
1,1,2-Trichloroethane	0.2	0.20 U	NA	NA	NA	NA
1,1-Dichloroethene	0.057	0.020 U	NA	NA	NA	NA
Acetone	300	5.00 U	NA	NA	NA	NA
Benzene	0.8	0.20 U	NA	NA	NA	NA
Carbon Tetrachloride	0.23	0.20 U	NA	NA	NA	NA
Chloroform	2	0.20 U	NA	NA	NA	NA
cis-1,2-Dichloroethene	2.4	**3.15**	NA	NA	NA	NA
Methylene Chloride	2	1.00 U	NA	NA	NA	NA
Tetrachloroethene	0.05	0.020 U	NA	NA	NA	NA
Toluene	75	2.42	NA	NA	NA	NA
trans-1,2-Dichloroethene	53.9	0.20 U	NA	NA	NA	NA
Trichloroethene	0.08	**0.386**	NA	NA	NA	NA
Vinyl Chloride	0.13	**0.575**	**0.431**	**0.182**	**0.232**	**0.313**
Total Petroleum Hydrocarbons (µg/L)						
TPH-G (C7-C12)	800	504	NA	NA	NA	NA
TPH-D (C12-C24)	500	390	NA	NA	NA	NA
TPH-O (C24-C40)	500	**689**	NA	NA	NA	NA

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 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
NA = not analyzed
TPH-D = total petroleum hydrocarbons in diesel range
TPH-G = total petroleum hydrocarbons in the gasoline range
TPH-O = total petroleum hydrocarbons in the motor oil range

TABLE 25: APRON A GROUNDWATER ELEVATION DATA
AUGUST 10, 2021
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]
GW263S	8 to 18	NA	7.65	NA
GW264S	8 to 18	NA	6.66	NA

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

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

TABLE 26: APRON A PRIMARY GEOCHEMICAL INDICATORS [1]
AUGUST 10, 2021
Boeing Renton Facility, Renton, Washington

Parameter	Well ID[2] Source Area GW264S
Temperature (degrees C)	19.2
Specific Conductivity (µS/cm)	699.0
Dissolved Oxygen (mg/L)	0.47
pH (standard units)	6.21
Oxidation/Reduction Potential (mV)	-39.7
Total Organic Carbon (mg/L)	25.26

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

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

TABLE 27: APRON A CONCENTRATIONS
OF CONSTITUENTS OF CONCERN[1]
AUGUST 10, 2021
Boeing Renton Facility, Renton, Washington

Analyte	Cleanup Levels	Well ID[2] GW264S
Volatile Organic Compounds (µg/L)		
cis- 1,2-Dichloroethene	NE	0.20 U
Vinyl Chloride	NE	1.37

Notes
1. Data qualifiers are as follows:
   U = The analyte was not detected at the reporting limit indicated.
2. S = shallow well.

Abbreviations
µg/L = micrograms per liter
NE = not established

Appendix A

Summary of Groundwater Sampling Methodology

TABLE A-1: GROUNDWATER COMPLIANCE MONITORING PLAN

Boeing Renton Facility, Renton, Washington

Cleanup Action Area	Monitoring Wells[1, 2]				Constituents of Concern[4]	Analyses[5]
	Source Area Wells	Downgradient Plume Wells	CPOC Wells	Level Monitoring Wells[3]		
SWMU-168	NA	NA	GW230I	NA	VC	SW8260D SIM
SWMU-172/SWMU-174	GW152S and GW153S	GW172S, GW173S, and GW226S	GW232S, GW234S, GW235I, and GW236S	NA	*cis* -1,2-DCE, PCE, TCE, VC	SW8260D SIM[8]
					Arsenic, copper, and lead	EPA 6020A
Building 4-78/79 SWMU/AOC Group	GW031S, GW033S, GW034S, and GW244S	NA	GW143S, GW237S, and GW240D	NA	VC, TCE, *cis* -1,2-DCE, benzene	SW8260D
					TPH-gasoline	NWTPH-Gx
Former Fuel Farm SWMU/AOC Group	NA	NA	GW211S, GW221S, and GW224S	NA	TPH-jet fuel, TPH-diesel	NWTPH-Dx
AOC-001/AOC-002[6, 7]	All wells closed with the start of Apron R construction.				Benzene	SW8260D
					TCE, *cis* -1,2-DCE, 1,1-dichloroethene, VC	SW8260D SIM[8]
AOC-003	GW249S	GW188S	GW247S and GW248I	NA	VC	SW8260D
AOC-004	GW250S	NA	NA	NA	Lead	EPA 6020A
AOC-060	GW009S	GW012S, GW014S, and GW147S	GW150S and GW253I	GW010S and GW011D	VC, TCE, cis-1,2-DCE	SW8260D SIM[8]
AOC-090[9]	GW189S	GW176S	GW178S, GW207S, and GW208S	NA	1,1,2-Trichloroethane, acetone, benzene, toluene, carbon tetrachloride, chloroform, *cis* -1,2-DCE, *trans* -1,2-DCE, methylene chloride	SW8260D
					1,1-Dichloroethene, 1,1,2,2-tetrachloroethane, VC, PCE, TCE	SW8260D SIM[8]
					TPH-gasoline	NWPTH-Gx
					TPH-diesel, TPH-motor oil	NWTPH-Dx
Apron A	GW264S	NA	NA	GW263S	*cis* -1,2-DCE and VC	SW8260D

Notes:

1. The EDR presents the groundwater monitoring frequency for each SWMU/AOC. All sites are monitored on a semi-annual basis with sampling events occurring in February and August.
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. Monitoring wells were abandoned on 11/25/2019 prior to Apron R construction and will be replaced upon completion of construction.
7. Groundwater monitoring and sampling will be suspended until completion of construction.
8. 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.
9. GW189S will be sampled for CVOCs and TPH, all other wells will only be sampled for VC.

Abbreviations:

AOC = area of concern
cis -1,2-DCE = *cis* -1,2 dichloroethene
COCs = constituents of concern
CPOC = conditional point of compliance
CVOCs = chlorinated volatile organic compounds
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

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

Boeing Renton Facility, Renton, Washington

Cleanup Action Area	Groundwater Monitoring Wells				Primary Geochemical Parameters[1, 2]
	Cross-Gradient Wells	Source Area Wells	Downgradient Plume Wells	CPOC Wells	Indicators
SWMU-168	NA	NA	NA	GW230I	Dissolved oxygen, pH, ORP, temperature, specific conductance
SWMU-172/SWMU-174	NA	GW152S and GW153S	GW172S, GW173S, and GW226S	GW232S, GW234S, GW235I, and GW236S	Dissolved oxygen, pH, ORP, temperature, specific conductance, TOC
Building 4-78/79 SWMU/AOC Group	NA	GW031S, GW033S, GW034S, and GW244S	NA	GW143S, GW237S, and GW240D	Dissolved oxygen, pH, ORP, temperature, specific conductance, TOC
Former Fuel Farm SWMU/AOC Group	NA	NA	NA	GW211S, GW221S, and GW224S	Dissolved oxygen, pH, ORP, temperature, specific conductance
AOC-001/AOC-002[3, 4]	NA	All wells closed with the start of Apron R construction.			
AOC-003	NA	GW249S	GW188S	GW247S and GW248I	Dissolved oxygen, pH, ORP, temperature, specific conductance, TOC
AOC-004	NA	GW250S	NA	NA	Dissolved oxygen, pH, ORP, temperature, specific conductance
AOC-060	GW012S and GW014S	GW009S	GW147S	GW150S and GW253I	Dissolved oxygen, pH, ORP, temperature, specific conductance, TOC
AOC-090	NA	GW189S	GW176S	GW178S, GW207S, and GW208S	Dissolved oxygen, pH, ORP, temperature, specific conductance, TOC[5]
Apron A	NA	GW264S	NA	NA	Dissolved oxygen, pH, ORP, temperature, specific conductance, TOC

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.
   All MNA parameters are measured semiannually in all wells on a wet season/dry season basis.
3. Monitoring wells were abandoned on 11/25/2019 prior to Apron R construction and will be replaced upon completion of construction.
4. Groundwater monitoring and sampling will be suspended until completion of construction.
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
MNA = monitored natural attenuation
NA = not applicable
ORP = oxidation reduction potential
SWMU = solid waste management unit
TOC = total organic carbon

Appendix B

Field Forms

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 10 /2021@ 1300

Sample Number: RGWDUP1 210810 | Weather: SUNNY 70'S

Landau Representative: AHA

WATER LEVEL/WELL/PURGE DATA

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

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

Begin Purge: Date/Time: 8/ /2021 @ End Purge: Date/Time: 8/ /2021 @ Gallons Purged:

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

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

DUPLICATE TO RGW152S

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ☐ Pump/Pump Type

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

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

(By Numerical Order) ☐ Other

Sample Description (color, turbidity, odor, sheen, etc.): NO COLOR, MED-HIGH TURB,NO ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	23.1	215.0	0.47	5.81	14.7				
2	23.1	215.2	0.47	5.80	14.6				
3	23.1	215.6	0.49	5.80	14.4				
4	23.1	216.1	0.48	5.80	14.1				
Average:	23.1	215.5	0.48	5.80	14.5	#DIV/0!			

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

Duplicate Sample No(s): Duplicate to RGW152S

Comments:

Signature: AHA Date: 8/10/2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 11 /2021@ 1330

Sample Number: RGWDUP2 210811 | Weather: SUNNY 70'S

Landau Representative: AHA

WATER LEVEL/WELL/PURGE DATA

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

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

Begin Purge: Date/Time: 8/ 11 /2021 @ End Purge: Date/Time: 8/ 11 /2021 @ Gallons Purged: 0.25

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

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

DUPLICATE TO RGW031S

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ☐ Pump/Pump Type 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.): NO COLOR, LOW TURB, NO ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	22.0	517	0.49	6.26	-62.6				
2	22.0	517	0.49	6.25	-62.6				
3	22.0	517	0.49	6.25	-62.7				
4	22.1	518	0.49	6.25	-63.0				
Average:	22.0	517	0.49	6.25	-62.7	#DIV/0!			

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

Duplicate Sample No(s): Duplicate to RGW031S

Comments:

Signature: AHA Date: 8/11/2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 10 /2021@ 1230

Sample Number: RGWDUP3 2108 | Weather: SUNNY, 80s

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 11.4 Time: 1136 Flow through cell vol. GW Meter No.(s SLOPE 8

Begin Purge: Date/Time: 8/ 10 /2021 1137 End Purge: Date/Time: 8/ 10 /2021 @ 1157 Gallons Purged: 1

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

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

DUPLICATE TO RGW224S

SAMPLE COLLECTION DATA

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

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

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

(By Numerical Order) ☐ Other

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

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	23.6	176.2	0.31	6.08	-15.9				
2	23.6	177.0	0.31	6.08	-16.1				
3	23.6	177.7	0.27	6.08	-16.2				
4	23.7	178.6	0.28	6.08	-16.4				
Average:	23.6	177.4	0.29	6.08	-16.2				

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

Duplicate Sample No(s): Duplicate to RGW224S

Comments:

Signature: BXM Date: 8.10.2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 11 /2021@ 1030

Sample Number: RGWDUP4 210811 | Weather: INSIDE

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 4.80 Time: 1040 Flow through cell vol. GW Meter No.(s SLOPE 8

Begin Purge: Date/Time: 8/ 11 /2021 1041 End Purge: Date/Time: 8/ 11 /2021 @ 1103 Gallons Purged: 1

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

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

DUPLICATE TO RGW014S

SAMPLE COLLECTION DATA

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

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

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

(By Numerical Order) ☐ Other

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

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	23.1	600	0.33	6.29	-27.9				
2	23.1	600	0.31	6.29	-28.1				
3	23.1	601	0.31	6.29	-28.5				
4	23.1	601	0.33	6.29	-28.8				
Average:	23.1	601	0.32	6.29	-28.3				

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

Duplicate Sample No(s): Duplicate to RGW014S

Comments:

Signature: BXM Date: 8.11.2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 11 /2021@ 1240

Sample Number: RGW009S- 210811 | Weather: INSIDE

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 5.07 Time: 1217 Flow through cell vol. GW Meter No.(s SLOPE 8

Begin Purge: Date/Time: 8/ 11 /2021 1218 End Purge: Date/Time: 8/ 11 /2021 @ 1239 Gallons Purged: 1

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits								**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		
1220	21.1	384.4	0.24	6.26	-5.9		5.07		
1223	21.3	385.6	0.25	6.3	-12.9		5.07		
1226	21.3	388.8	0.24	6.32	-16.9		5.07		
1229	21.4	391.2	0.27	6.34	-22.5				
1232	21.4	395.8	0.27	6.35	-27				
1235	21.4	396.7	0.26	6.35	-28.5				

SAMPLE COLLECTION DATA

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

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

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

(By Numerical Order) ☐ Other

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

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	21.4	397	0.26	6.35	-29.1				
2	21.4	396.7	0.27	6.35	-29.5				
3	21.4	396.8	0.26	6.35	-29.8				
4	21.4	396.8	0.26	6.35	-29.9				
Average:	21.4	396.8	0.26	6.35	-29.6				

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: BXM Date: 8.11.2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ /2021@

Sample Number: RGW010S- 210811 | Weather: INSIDE

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 5.20 Time: 1204 Flow through cell vol. GW Meter No.(s SLOPE 8

Begin Purge: Date/Time: 8/ /2021 @ NA End Purge: Date/Time: 8/ /2021 @ NA Gallons Purged: NA

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

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

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ☐ Pump/Pump Type

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

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

(By Numerical Order) ☐ Other

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

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

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

Duplicate Sample No(s):

Comments:

Signature: BXM Date: 8.11.2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ /2021@

Sample Number: RGW011D-210811 | Weather: INSIDE

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 5.22 Time: 1205 Flow through cell vol. GW Meter No.(s SLOPE 8

Begin Purge: Date/Time: 8/ /2021 @ NA End Purge: Date/Time: 8/ /2021 @ NA Gallons Purged: NA

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

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

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ☐ Pump/Pump Type

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

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

(By Numerical Order) ☐ Other

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

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

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

Duplicate Sample No(s):

Comments:

Signature: BXM Date: 8.11.2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 11 /2021@ 1150

Sample Number: RGW012S- 210811 | Weather: INSIDE

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 4.82 Time: 1115 Flow through cell vol. GW Meter No.(s SLOPE 8

Begin Purge: Date/Time: 8/ 11 /2021 1123 End Purge: Date/Time: 8/ 11 /2021 @ 1145 Gallons Purged: 1

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits								**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		
1126	22.9	909	0.23	6.16	-61.8		4.84		
1129	23.3	823	0.27	6.13	-65.4		4.84		
1132	23.3	793	0.29	6.11	-65.3		4.84		
1135	23.4	759	0.3	6.08	-64.6				
1138	23.4	741	0.27	6.06	-62.9				
1141	23.4	716	0.26	6.04	-62.1				
1144	23.4	711	0.26	6.03	-62.6				

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 ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	23.4	710	0.26	6.04	-62.7				
2	23.4	710	0.26	6.04	-62.7				
3	23.4	709	0.25	6.04	-62.6				
4	23.4	709	0.26	6.04	-62.7				
Average:	23.4	710	0.26	6.04	-62.7				

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: SMALL PIECES OF PLASTIC ON TIP OF WATER LEVEL METER

Signature: BXM Date: 8.11.2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 11 /2021@ 1105

Sample Number: RGW014S- 210811 | Weather: INSIDE

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft): 4.8 Time: 1040 Flow through cell vol. GW Meter No.(s SLOPE 8

Begin Purge: Date/Time: 8/11 /2021 1041 End Purge: Date/Time: 8/ 11 /2021 @ 1103 Gallons Purged: 1

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
	Purge Goals: Stablization of Parameters for three consecutive readings within the following limits							**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		
1044	22.5	592	0.36	6.23	-12.8		4.86		
1047	22.8	595	0.33	6.27	-20.5		4.94		
1050	22.9	597	0.32	6.28	-24.1		4.96		
1053	23.0	599	0.33	6.29	-26.8		4.98		

SAMPLE COLLECTION DATA

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

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

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

(By Numerical Order) ☐ Other

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

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	23.0	600	0.31	6.29	-27.6				
2	23.1	600	0.32	6.29	-28.0				
3	23.1	601	0.33	6.29	-28.3				
4	23.1	601	0.30	6.29	-28.7				
Average:	23.1	601	0.32	6.29	-28.2				

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:

Signature: BXM Date: 8.11.2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 11 /2021@ 1300

Sample Number: RGW031S- 210811 | Weather: SUNNY 70'S

Landau Representative: AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 5.21 Time: 1233 Flow through cell vol. GW Meter No.(s SLOPE 2

Begin Purge: Date/Time: 8/ 11 /2021 1234 End Purge: Date/Time: 8/ 11 /2021 @ 1257 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**		
1237	21.5	492	0.37	6.25	-18.4		5.21		
1240	22.2	510	0.35	6.29	-36.0		5.21		
1243	22.4	516	0.36	6.22	-45.6		5.21		
1246	22.3	517	0.39	6.30	-51.3		5.21		
1249	22.2	517	0.42	6.29	-55.6		5.21		
1252	22.3	518	0.46	6.29	-59.9				
1254	22.3	518	0.50	6.29	-61.6				

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.): NO COLOR, LOW TURB, NO ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	21.9	518	0.48	6.27	-61.9				
2	22.0	518	0.49	6.27	-61.9				
3	22.0	518	0.48	6.26	-61.9				
4	22.0	518	0.48	6.26	-62.2				
Average:	22.0	518	0.48	6.27	-62.0	#DIV/0!			

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

Duplicate Sample No(s): Duplicate Location (DUP2) 1330

Comments:

Signature: AHA Date: 8/11/2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 11 /2021@ 1220

Sample Number: RGW033S- 210811 | Weather: SUNNY 70'S

Landau Representative: AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 5.31 Time: 1150 Flow through cell vol. GW Meter No.(s SLOPE 2

Begin Purge: Date/Time: 8/ 11 /2021 1155 End Purge: Date/Time: 8/ 11 /2021 @ 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: 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**		
1158	22.2	541	0.41	6.14	-37.2		5.34		
1201	23.2	537	0.46	6.16	-43.2		5.31		
1204	23.4	535	0.46	6.16	-46.3		5.31		
1207	23.6	529	0.54	6.16	-51.5		5.31		
1210	23.6	524	0.61	6.16	-52.4		5.31		
1213	23.6	519	0.67	6.13	-53.7				
1215	23.6	518	0.72	6.14	-53.8				

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.): NO COLOR, LOW TURB , NO ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	23.7	517	0.75	6.11	-53.3				
2	23.6	517	0.72	6.10	-53.3				
3	23.7	517	0.70	6.10	-53.3				
4	23.7	517	0.70	6.09	-53.2				
Average:	23.7	517	0.72	6.10	-53.3	#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: AHA Date: 8/11/2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 11 /2021@ 1110

Sample Number: RGW034S- 210811 | Weather: SUNNY 70'S

Landau Representative: AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 5.42 Time: 1040 Flow through cell vol. GW Meter No.(s SLOPE 2

Begin Purge: Date/Time: 8/ 11 /2021 1043 End Purge: Date/Time: 8/ 11 /2021 @ 1106 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**	
1046	23.6	327.3	0.29	6.36	-42.2		5.42		
1049	25.1	329.0	0.26	6.33	-54.7		5.41		
1052	25.9	329.5	0.27	6.35	-61.4		5.41		
1055	26.4	330.4	0.31	6.34	-64.8		5.41		
1058	26.7	330.6	0.29	6.34	-69.1				
1101	26.8	329.7	0.34	6.34	-71.1				
1103	26.9	329.0	0.43	6.34	-72.1				

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.): NO COLOR, LOW TURB, NO ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	26.9	329.0	0.43	6.34	-72.3				
2	26.9	328.9	0.40	6.34	-72.6				
3	26.9	328.8	0.39	6.34	-72.8				
4	26.9	328.7	0.40	6.34	-72.9				
Average:	26.9	328.9	0.41	6.34	-72.7	#DIV/0!			

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

Duplicate Sample No(s):

Comments:

Signature: AHA Date: 8/11/2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 11 /2021@ 850

Sample Number: RGW143S- 210811 | Weather: SUNNY 70'S

Landau Representative: AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 5.64 Time: 819 Flow through cell vol. GW Meter No.(s SLOPE 2

Begin Purge: Date/Time: 8/ 11 /2021 824 End Purge: Date/Time: 8/ 11 /2021 @ 847 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**		
827	20.8	390.4	2.01	6.34	-18.1		5.65		
830	21.6	397.6	1.65	6.26	-28.5		5.65		
833	21.9	407.9	1.51	6.29	-29.1		5.65		
836	22.2	412.5	1.28	6.29	-28.2		5.65		
839	22.4	416.9	1.32	6.31	-28.4				
842	22.7	419.6	1.32	6.31	-29.0				
845	22.8	421.9	1.31	6.31	-30.8				

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.): NO COLOR, LOW TURB, NO ODOR, NO SHEEN, SOME RED PARTICULES

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	22.8	422.0	1.33	6.31	-30.9				
2	22.8	422.0	1.31	6.31	-31.0				
3	22.8	422.3	1.29	6.31	-31.3				
4	22.8	422.6	1.30	6.31	-31.6				
Average:	22.8	422.2	1.31	6.31	-31.2	#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: AHA Date: 8/11/2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 11 /2021@ 1010

Sample Number: RGW147S- 210811 | Weather: SUNNY, 70S

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 4.5 Time: 944 Flow through cell vol. GW Meter No.(s SLOPE 8

Begin Purge: Date/Time: 8/ 11 /2021 945 End Purge: Date/Time: 8/ 11 /2021 @ 1007 Gallons Purged: 1

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits								**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		
948	20.8	217.0	0.36	5.82	3.8		4.49		
951	21.8	198.4	0.42	5.89	-7.9		4.49		
954	22.3	183.3	0.42	5.91	-12.4		4.49		
957	22.7	172.3	0.38	5.89	-14.4				
1000	22.8	167.0	0.37	5.88	-15.8				
1003	22.9	162.1	0.37	5.87	-16.9				
1006	23.0	160.6	0.35	5.86	-17.7				

SAMPLE COLLECTION DATA

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

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

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

(By Numerical Order) ☐ Other

Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORLESS, NO ODOR, NO SHEEN, VERY SLIGHTLY EFFERVESCENT, SOME LIGHT

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	23.0	160.2	0.37	5.86	-17.8				
2	23.0	160.5	0.36	5.86	-17.9				
3	23.0	160.7	0.35	5.86	-17.9				
4	23.0	159.8	0.37	5.86	-18.0				
Average:	23.0	160.3	0.36	5.86	-17.9				

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: PIECES OF VERY FINE PLASTIC ON TIP OF WATER LEVEL METER

Signature: BXM Date: 8.11.2010

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 11 /2021@ 920

Sample Number: RGW150S- 210811 | Weather: SUNNY, 70S

Landau Representative: BXM/AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 4.91 Time: 853 Flow through cell vol. GW Meter No.(s SLOPE 8

Begin Purge: Date/Time: 8/ 11 /2021 854 End Purge: Date/Time: 8/ 11 /2021 @ 916 Gallons Purged: 1

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
857	19.4	329.7	0.4	6.26	-14.5		4.91		
900	20.6	385	0.43	6.44	-33		4.91		
903	21.1	400.6	0.47	6.47	-38.6		4.91		
906	21.3	411.2	0.45	6.49	-43.8				
909	21.3	415.8	0.45	6.5	-45.3				
912	21.4	417.6	0.44	6.51	-45.5				

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 ODOR, NO SHEEN, SLIGHTLY EFFERVESCENT, SOME LIGHT SOLID

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	21.5	418.3	0.43	6.51	-45.4				
2	21.5	418.7	0.42	6.51	-45.4				
3	21.5	418.6	0.44	6.51	-45.3				
4	21.5	418.9	0.43	6.52	-45.1				
Average:	21.5	418.6	0.4	6.5	-45.3				

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: Date:

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 10 /2021@ 1255

Sample Number: RGW152S- 210810 | Weather: SUNNY 70'S

Landau Representative: AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 9.95 Time: 1224 Flow through cell vol. GW Meter No.(s SLOPE 2

Begin Purge: Date/Time: 8/ 10 /2021 1228 End Purge: Date/Time: 8/ 10 /2021 @ 1250 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**		
1231	22.3	228.8	1.07	5.89	15.9		10.57		
1234	22.7	224.4	0.75	5.90	11.1		10.57		
1237	22.8	211.5	0.54	5.83	15.1		10.95		
1240	22.9	206.9	0.51	5.81	17.1		10.97		
1243	23.0	207.3	0.48	5.80	17.5		11.19		
1246	23.1	209.3	0.49	5.80	17.1		11.19		
1248	23.1	212.1	0.48	5.80	16.2				

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.): NO COLOR, MED-HIGH TURB,NO ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	23.1	212.8	0.49	5.80	15.7				
2	23.1	213.5	0.47	5.80	15.3				
3	23.1	213.7	0.51	5.80	15.2				
4	23.1	214.4	0.49	5.80	14.9				
Average:	23.1	213.6	0.49	5.80	15.3	#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 1300

Comments: WELL WENT DRY AFTER FILLING 6 VOCS 2 AMBERS 1 POLY

Signature: AHA Date: 8/10/2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 10 /2021@ 1035

Sample Number: RGW153S- 210810 | Weather: SUNNY 60'S

Landau Representative: AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 10.47 Time: 1003 Flow through cell vol. GW Meter No.(s SLOPE 2

Begin Purge: Date/Time: 8/ 10 /2021 1008 End Purge: Date/Time: 8/ 10 /2021 @ 1030 Gallons Purged: 0.25

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits								**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		
1011	21.3	256.5	1.45	6.42	-34.9		10.53		
1014	21.7	267.9	1.18	6.41	-45.9		10.48		
1017	22.0	271.1	0.96	6.38	-50.1		10.48		
1020	22.1	273.4	0.99	6.37	-50.6		10.48		
1023	22.4	274.8	0.82	6.36	-53.8		10.51		
1026	22.6	277.2	0.76	6.38	-56.2		10.51		
1028	22.7	278.6	0.74	6.39	-57.3		10.51		

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.): LIGHT YELLOW TINT, LOW-MED TURB, NO ODOR, NO SHEEN WHITE PARTICULATES

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	22.7	279.0	0.73	6.39	-57.4				
2	22.7	279.1	0.73	6.39	-57.3				
3	22.7	279.3	0.71	6.39	-57.2				
4	22.7	279.7	0.70	6.39	-57.2				
Average:	22.7	279.3	0.72	6.39	-57.3	#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: AHA Date: 8/10/2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 10 /2021@ 1409

Sample Number: RGW172S- 210810 | Weather: SUNNY, 80S

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 10.17 Time: 1342 Flow through cell vol. GW Meter No.(s SLOPE 8

Begin Purge: Date/Time: 8/ 10 /2021 1345 End Purge: Date/Time: 8/ 10 /2021 @ 1408 Gallons Purged: 1

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits								**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		
1348	21.9	357.0	0.45	6.78	-29.5		10.45		
1351	24.9	367.3	0.35	6.85	-48.3		10.43		
1354	25.8	370.8	0.32	6.88	-54.6		10.38		
1357	26.9	370.5	0.27	6.87	-57.3		10.38		
1400	27.4	367.3	0.29	6.82	-58.4		10.38		
1403	27.5	364.8	0.29	6.80	-58.5				

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 ODOR, NO SHEEN, SLIGHTLY EFFERVESCENT

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	27.1	361.4	0.35	6.75	-57.2				
2	27.1	360.0	0.32	6.74	-57.2				
3	27.2	360.0	0.32	6.73	-56.7				
4	27.1	359.4	0.32	6.72	-56.7				
Average:	27.1	360.2	0.33	6.74	-57.0				

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

Duplicate Sample No(s):

Comments:

Signature: BXM Date: 8.10.2010

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 10 /2021@ 1155

Sample Number: RGW173S- 210810 | Weather: SUNNY 60'S

Landau Representative: AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 10.28 Time: 1128 Flow through cell vol. GW Meter No.(s SLOPE 2

Begin Purge: Date/Time: 8/ 10 /2021 1132 End Purge: Date/Time: 8/ 10 /2021 @ 1153 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**		
1135	23.6	328.8	1.16	6.36	-27.2		10.38		
1138	24.6	372.2	1.01	6.39	-46.1		10.38		
1141	25.1	388.5	0.96	6.42	-54.7		10.35		
1144	25.7	399.8	0.79	6.46	-60.9		10.35		
1147	26.2	408.6	0.73	6.48	-67.9		10.35		
1150	26.6	411.6	0.67	6.49	-71.3		10.35		
1152	26.8	413.4	0.63	6.51	-74.3				

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.): SLIGHT YELLOW TINT, MED-HIGH TURB, NO ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	26.8	413.8	0.61	6.50	-74.7				
2	26.8	415.1	0.63	6.50	-75.3				
3	26.8	415.2	0.62	6.50	-75.6				
4	26.8	415.3	0.61	6.50	-75.9				
Average:	26.8	414.9	0.62	6.50	-75.4	#DIV/0!			

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
9	(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)
3	(COD) (TOC5310C) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)
3	(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: AHA Date: 8/10/2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 17 /2021@ 915

Sample Number: RGW176S- 210817 | Weather: OVERCAST, 60S

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 5.77 Time: 846 Flow through cell vol. GW Meter No.(s SLOPE 2

Begin Purge: Date/Time: 8/ 17 /2021 851 End Purge: Date/Time: 8/ 17 /2021 @ 913 Gallons Purged: 1

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits								**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		
905	17.3	590	1.70	5.87	-15.0		5.85		
908	17.1	586	1.79	5.89	-13.9		5.88		
911	17.0	584	1.61	5.90	-15.9		5.88		
914	16.9	579	1.39	5.91	-19.4		5.89		
917	16.8	576	1.30	5.91	-21.6				
920	16.8	573	1.24	5.92	-23.1				
923	16.8	569	1.22	5.91	-24.5				

SAMPLE COLLECTION DATA

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

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

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

(By Numerical Order) ☐ Other

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

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	16.8	571	1.20	5.91	-24.5				
2	16.8	571	1.18	5.91	-24.5				
3	16.8	569	1.17	5.92	-25.0				
4	16.8	569	1.18	5.92	-25.0				
Average:	16.8	570	1.18	5.92	-24.8				

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

Duplicate Sample No(s):

Comments:

Signature: BXM Date: 8.18.2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 12 /2021@ 842

Sample Number: RGW178S- 210812 | Weather: SUNNY, 80S

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 8.29 Time: 815 Flow through cell vol. GW Meter No.(s SLOPE #8

Begin Purge: Date/Time: 8/ 12 /2021 817 End Purge: Date/Time: 8/ 12 /2021 @ 840 Gallons Purged: 1

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
820	17.8	371.6	0.59	6.21	7.1		8.30		
823	18.5	384.9	0.51	6.24	2.5		8.30		
826	19.0	399.9	0.46	6.31	-2.5		8.31		
829	19.2	411.0	0.48	6.34	-4.9				
832	19.2	416.2	0.5	6.34	-6.3				
835	19.2	417.1	0.54	6.34	-7.2				
838	19.2	417.5	0.55	6.34	-8.7				

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.): NO COLOR, NO ODOR, NO SHEEN, CLEAR

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	19.2	417.4	0.55	6.34	-8.7				
2	19.2	417.6	0.55	6.34	-8.9				
3	19.2	417.4	0.55	6.34	-9.0				
4	19.2	417.4	0.55	6.34	-9.2				
Average:	19.2	417.5	0.55	6.34	-9.0				

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

Duplicate Sample No(s):

Comments:

Signature: BXM Date: 8.12.2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 12 /2021@ 1324

Sample Number: RGW188S- 210812 | Weather: SUNNY, 80S

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 4.05 Time: 1254 Flow through cell vol. GW Meter No.(s SLOPE #8

Begin Purge: Date/Time: 8/ 12 /2021 1256 End Purge: Date/Time: 8/ 12 /2021 @ 1320 Gallons Purged: 1

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits								**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		
1259	20.8	414	0.15	6.33	-4.1		4.05		
1302	22.3	449	0.25	6.38	-10.8		4.05		
1305	23.8	479	0.21	6.47	-15.4		4.04		
1308	24.7	500	0.21	6.48	-18.2				
1311	25.2	511	0.24	6.5	-18.7				
1314	25.6	521	0.25	6.52	-20.0				
1317	25.7	532	0.27	6.53	-21.4				

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.): NO COLOR, NO ODOR, NO SHEEN, SMALL BROWN PARTICLES

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	25.7	532	0.27	6.53	-21.7				
2	25.7	534	0.27	6.53	-21.9				
3	25.8	535	0.27	6.53	-22.1				
4	25.8	535	0.29	6.53	-22.3				
Average:	25.8	534	0.28	6.53	-22.0				

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: BXM Date: 8.12.2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 12 /2021@ 920

Sample Number: RGW189S- 210812 | Weather: SUNNY, 70S

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 7.16 Time: 852 Flow through cell vol. GW Meter No.(s SLOPE 8

Begin Purge: Date/Time: 8/ 12 /2021 857 End Purge: Date/Time: 8/ 12 /2021 @ 919 Gallons Purged: 1

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
900	18.2	357.4	0.36	5.9	5.2		7.41		
903	18.7	345.7	0.36	6.06	-7.0		7.39		
906	19.1	334.0	0.36	6.14	-12.9		7.39		
909	19.4	328.9	0.43	6.18	-17.4				
912	19.6	326.9	0.41	6.20	-19.6				
915	19.8	325.8	0.45	6.21	-21.6				
918	19.8	324.9	0.47	6.22	-22.9				

SAMPLE COLLECTION DATA

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

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

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

(By Numerical Order) ☐ Other

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

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	19.8	324.6	0.48	6.22	-23.2				
2	19.8	324.6	0.47	6.22	-23.3				
3	19.8	324.4	0.48	6.22	-23.7				
4	19.8	324.5	0.48	6.22	-24.0				
Average:	19.8	324.5	0.48	6.22	-23.6				

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)		
21	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX)	WA ☐	OR ☐
6	(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)		
3	(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: REPLACED SOAK SOCK

Signature: BXM Date: 8.12.2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 12 /2021@ 1102

Sample Number: RGW207S- 210812 | Weather: SUNNY, 80S

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 6.8 Time: 1034 Flow through cell vol. GW Meter No.(s SLOPE #8

Begin Purge: Date/Time: 8/ 12 /2021 1036 End Purge: Date/Time: 8/ 12 /2021 @ 1059 Gallons Purged: 1

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits								**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		
1039	20	381.1	0.31	6.39	2.9		6.74		
1042	20.9	412.1	0.29	6.46	-4.0		6.73		
1045	21.5	431.7	0.27	6.52	-8.4		6.7		
1048	21.7	442.8	0.23	6.51	-9.8		6.73		
1051	21.8	449.6	0.22	6.48	-10.9				
1054	21.9	453.2	0.24	6.47	-11.9				
1057	21.9	454.8	0.24	6.47	-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.): NO COLOR, NO ODOR, NO SHEEN, CLEAR

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	21.9	454.7	0.23	6.46	-12.6				
2	21.9	454.7	0.23	6.46	-12.8				
3	21.9	455.3	0.24	6.46	-12.9				
4	21.9	455.2	0.24	6.46	-13.1				
Average:	21.9	455.0	0.24	6.46	-12.9				

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

Duplicate Sample No(s):

Comments:

Signature: BXM Date: 8.12.2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 12 /2021@ 805

Sample Number: RGW208S- 210812 | Weather: SUNNY, 70S

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 8.03 Time: 732 Flow through cell vol. GW Meter No.(s SLOPE 8

Begin Purge: Date/Time: 8/ 12 /2021 739 End Purge: Date/Time: 8/ 12 /2021 @ 801 Gallons Purged: 1

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
742	19.5	574	0.86	6.35	-2.0		8.05		
745	20.7	546	1.17	6.35	-10.5		8.05		
748	21.2	549	1.32	6.36	-16.4		8.04		
751	21.7	553	1.33	6.36	-18.1		8.04		
754	22.0	557	1.55	6.35	-20.0				
757	22.4	560	1.57	6.35	-22.5				
800	22.6	562	1.59	6.35	-24.0				

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.): COLORLESS, NO ODOR, NO SHEEN, CLEAR

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	22.7	562	1.55	6.35	-24.3				
2	22.7	562	1.54	6.35	-24.5				
3	22.7	563	1.53	6.35	-24.8				
4	22.8	563	1.53	6.35	-25.0				
Average:	22.7	563	1.54	6.35	-24.7				

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

Duplicate Sample No(s):

Comments:

Signature: BXM Date: 8.12.2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 10 /2021@ 1115

Sample Number: RGW211S- 210810 | Weather: SUNNY, 70S

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 10.73 Time: 1034 Flow through cell vol. GW Meter No.(s SLOPE 8

Begin Purge: Date/Time: 8/ 10 /2021 1049 End Purge: Date/Time: 8/ 10 /2021 @ 1112 Gallons Purged: 1

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
	Purge Goals: Stablization of Parameters for three consecutive readings within the following limits							**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		
1052	20.5	302.2	0.40	6.46	-55.2		10.83		
1055	20.7	290.1	0.35	6.54	-65.9		10.80		
1058	21.0	286.5	0.33	6.58	-69.1		10.79		
1101	21.0	283.5	0.31	6.60	-68.7		10.82		
1104	21.0	280.4	0.27	6.56	-67.1				
1107	20.9	277.9	0.25	6.55	-66.6				
1110	21.0	276.8	0.24	6.54	-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.): BROWN, TURBID, NO ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	21.0	276.6	0.24	6.55	-68.4				
2	21.0	276.8	0.24	6.55	-68.3				
3	21.1	276.3	0.25	6.55	-68.4				
4	21.1	276.4	0.23	6.55	-68.6				
Average:	21.1	276.5	0.24	6.55	-68.4				

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

Duplicate Sample No(s):

Comments:

Signature: BXM Date: 8.10.2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 10 /2021@ 1250

Sample Number: RGW221S- 2108 | Weather: SUNNY, 80s

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 10.87 Time: 1223 Flow through cell vol. GW Meter No.(s SLOPE 8

Begin Purge: Date/Time: 8/ 10 /2021 1226 End Purge: Date/Time: 8/ 10 /2021 @ 1249 Gallons Purged: 1

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1229	21.7	244.4	0.78	6.34	-4.4		10.89		
1232	24.2	254.8	0.71	6.44	-19.1		10.87		
1235	24.7	257.9	0.79	6.45	-21.7		10.87		
1238	26.1	261.9	0.64	6.46	-23.2		10.87		
1241	26.4	263.0	0.56	6.48	-23.6				
1244	27.1	264.0	0.48	6.45	-23.6				
1247	27.5	264.3	0.47	6.43	-23.1				

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, NO COLOR, NO ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	27.5	264.1	0.47	6.42	-23.0				
2	27.5	264.2	0.44	6.42	-22.9				
3	27.5	264.3	0.49	6.42	-22.8				
4	27.6	264.0	0.48	6.41	-22.8				
Average:	27.5	264.2	0.47	6.42	-22.9				

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

Duplicate Sample No(s):

Comments:

Signature: BXM Date: 8.10.2010

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 10 /2021@ 1200

Sample Number: RGW224S- 210810 | Weather: SUNNY, 70S

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 11.4 Time: 1136 Flow through cell vol. GW Meter No.(s SLOPE 8

Begin Purge: Date/Time: 8/ 10 /2021 1137 End Purge: Date/Time: 8/ 10 /2021 @ 1157 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**		
1140	23.0	155.3	0.49	5.93	-2.0		11.50		
1143	23.5	174.4	0.33	6.06	-13.6		11.47		
1146	23.4	174.3	0.36	6.06	-14.2		11.47		
1149	23.5	174.2	0.30	6.06	-14.9		11.48		
1152	23.6	174.4	0.30	6.07	-15.4		11.46		
1155	23.6	175.0	0.28	6.08	-16.0				

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, NO ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	23.6	175.9	0.29	6.08	-15.8				
2	23.6	176.6	0.28	6.08	-15.9				
3	23.6	177.4	0.27	6.08	-16.2				
4	23.7	178.2	0.26	6.08	-16.3				
Average:	23.6	177.0	0.28	6.08	-16.1				

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

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

Comments:

Signature: BXM Date: 8.10.2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 10 /2021@ 1115

Sample Number: RGW226S- 210810 | Weather: SUNNY 60'S

Landau Representative: AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 9.79 Time: 1043 Flow through cell vol. GW Meter No.(s SLOPE 2

Begin Purge: Date/Time: 8/ 10 /2021 1050 End Purge: Date/Time: 8/ 10 /2021 @ 1112 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**		
1053	25.0	375.5	0.94	6.41	-52.3		9.79		
1056	25.6	401.4	0.52	6.43	-66.9		9.79		
1059	26.1	419.9	0.39	6.50	-84.7		9.79		
1102	26.4	427.7	0.37	6.54	-93.5		9.79		
1105	26.8	431.6	0.35	6.56	-98.5		9.79		
1108	27.2	432.5	0.39	6.57	-103.9		9.79		
1110	27.3	432.5	0.39	6.58	-107.1				

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.): LIGHT YELLOW, LOW TURB, NO ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	27.4	432.3	0.38	6.58	-107.2				
2	27.4	432.4	0.37	6.58	-107.4				
3	27.4	432.3	0.36	6.58	-107.7				
4	27.4	432.3	0.38	6.58	-108.1				
Average:	27.4	432.3	0.37	6.58	-107.6	#DIV/0!			

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

Duplicate Sample No(s):

Comments:

Signature: AHA Date: 8/10/2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 10 /2021@ 1555

Sample Number: RGW230I- 210810 | Weather: SUNNY, 80s

Landau Representative: BXM/AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 8.02 Time: 1528 Flow through cell vol. GW Meter No.(s SLOPE 8

Begin Purge: Date/Time: 8/ 10 /2021 1530 End Purge: Date/Time: 8/ 10 /2021 @ 1553 Gallons Purged: 1

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits								**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		
1533	22.7	307	0.41	6.08	-3.3		8.03		
1536	24.6	372	0.45	6.22	-18		8.00		
1539	25.4	403.3	0.37	6.31	-29.9		8.00		
1542	25.4	424.7	0.36	6.33	-36.3				
1545	25.3	427.1	0.36	6.33	-38.1				
1548	25.4	427.3	0.35	6.32	-39.1				

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, NO ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	25.3	427.1	0.36	6.32	-39.1				
2	25.3	426.9	0.35	6.32	-39.3				
3	25.3	426.7	0.36	6.33	-39.2				
4	25.2	426.5	0.36	6.32	-39.2				
Average:	25.3	426.8	0.36	6.32	-39.2				

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: BXM Date: 8.10.2010

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 10 /2021@ 935

Sample Number: RGW232S- 210810 | Weather: SUNNY 60'S

Landau Representative: AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 7.77 Time: 908 Flow through cell vol. GW Meter No.(s SLOPE 2

Begin Purge: Date/Time: 8/ 10 /2021 910 End Purge: Date/Time: 8/ 10 /2021 @ 932 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**	
913	21.9	530	2.23	6.22	-41.3		8.08		
916	23.0	562	1.68	6.24	-41.2		8.15		
919	23.2	569	1.56	6.25	-41.3		8.15		
922	23.5	547	1.50	6.26	-43.1		8.15		
925	23.6	588	1.47	6.28	-46.8		8.15		
928	23.8	597	1.41	6.29	-51.4				
930	24.0	603	1.28	6.29	-56.6				

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.): NO COLOR, LOW TURB, NO ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	24.0	604	1.28	6.30	-57.0				
2	24.1	604	1.28	6.29	-57.6				
3	24.1	604	1.26	6.30	-57.8				
4	24.1	604	1.25	6.29	-57.9				
Average:	24.1	604	1.27	6.30	-57.6	#DIV/0!			

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

Duplicate Sample No(s):

Comments:

Signature: AHA Date: 8/10/2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 10 /2021@ 1430

Sample Number: RGW234S- 210810 | Weather: SUNNY 80'S

Landau Representative: AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 8.62 Time: 1403 Flow through cell vol. GW Meter No.(s SLOPE 2

Begin Purge: Date/Time: 8/ 10 /2021 1406 End Purge: Date/Time: 8/ 10 /2021 @ 1428 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**		
1409	21.8	272.9	0.85	6.15	-17.5		8.62		
1412	22.5	270.5	0.63	6.16	-20.7		8.62		
1415	23.4	263.6	0.56	6.16	-24.1		8.62		
1418	23.8	260.5	0.56	6.20	-29.1		8.62		
1421	24.0	255.9	0.53	6.22	-31.4		8.62		
1424	24.1	253.1	0.56	6.23	-32.4		8.62		
1426	24.1	252.4	0.63	6.23	-32.9				

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.): NOCOLOR, LOW-MED TURB, NO ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	24.1	252.3	0.60	6.23	-32.7				
2	24.1	252.3	0.59	6.23	-32.6				
3	24.1	252.1	0.61	6.23	-32.7				
4	24.2	251.9	0.59	6.22	-32.8				
Average:	24.1	252.2	0.60	6.23	-32.7	#DIV/0!			

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

Duplicate Sample No(s):

Comments:

Signature: AHA Date: 8/10/2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 10 /2021@ 1505

Sample Number: RGW235I- 210810 | Weather: SUNNY 80'S

Landau Representative: AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 7.95 Time: 1420 Flow through cell vol. GW Meter No.(s SLOPE 2

Begin Purge: Date/Time: 8/ 10 /2021 1440 End Purge: Date/Time: 8/ 10 /2021 @ 1502 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**		
1443	20.3	186.7	0.44	6.35	-8.1		7.95		
1446	21.3	189.5	0.31	6.26	-16.4		7.95		
1449	22.1	192.1	0.27	6.33	-27.1		7.98		
1452	22.2	191.6	0.24	6.38	-32.9		7.98		
1455	22.1	190.8	0.25	6.42	-37.3		7.98		
1458	22.1	190.0	0.24	6.42	-37.6				

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.): NO COLOR, LOW TURB, NO ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	22.0	190.1	0.25	6.42	-38.2				
2	22.0	189.9	0.25	6.42	-38.1				
3	22.1	189.9	0.25	6.42	-37.9				
4	22.1	189.9	0.25	6.42	-38.1				
Average:	22.1	190.0	0.25	6.42	-38.1	#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: AHA Date: 8/10/2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 10 /2021@ 1503

Sample Number: RGW236S- 210810 | Weather: SUNNY, 80S

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 7.88 Time: 1430 Flow through cell vol. GW Meter No.(s SLOPE 8

Begin Purge: Date/Time: 8/ 10 /2021 1438 End Purge: Date/Time: 8/ 10 /2021 @ 1501 Gallons Purged: 1

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
	Purge Goals: Stablization of Parameters for three consecutive readings within the following limits							**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		
1441	21.6	425.5	0.99	6.69	-30.1		8.23		
1444	22.3	450.5	0.59	6.72	-45.2		8.16		
1447	23.5	461.5	0.52	6.77	-55.2		7.94		
1450	25.2	476.5	0.56	6.75	-60.8		7.88		
1453	26.7	490.3	0.52	6.7	-64.8		7.83		
1456	28.2	499.4	0.51	6.65	-68.0		7.82		
1459	28.9	507	0.53	6.63	-71.1				

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, NO COLOR BUT SOME BROWN SOLIDS FLOATING, NO ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	28.9	507	0.50	6.62	-71.3				
2	29.0	508	0.52	6.63	-70.9				
3	29.1	508	0.52	6.62	-71.4				
4	29.0	508	0.49	6.63	-71.8				
Average:	29.0	508	0.51	6.63	-71.4				

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

Duplicate Sample No(s):

Comments:

Signature: BXM Date: 8.10.2010

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 11 /2021@ 1015

Sample Number: RGW237S- 210811 | Weather: SUNNY 70'S

Landau Representative: AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 4.66 Time: 947 Flow through cell vol. GW Meter No.(s SLOPE 2

Begin Purge: Date/Time: 8/ 11 /2021 950 End Purge: Date/Time: 8/ 11 /2021 @ 1012 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	22.9	294.6	0.54	6.16	-8.5		4.66		
956	23.1	302.4	0.46	6.20	-14.2		4.66		
959	23.6	315.6	0.50	6.24	-30.8		4.69		
1002	23.8	331.8	0.45	6.28	-38.7		4.66		
1005	24.2	363.6	0.46	6.30	-45.0		4.66		
1008	25.3	384.2	0.49	6.34	-54.3				
1010	25.6	385.5	0.48	6.34	-55.6				

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.): NO COLOR, LOW TURB, NO ODOR, NO SHEEN, BROWN PARTICULATES

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	25.8	386.2	0.49	6.34	-56.2				
2	25.8	386.8	0.48	6.34	-56.6				
3	25.8	387.4	0.50	6.34	-56.9				
4	25.8	387.8	0.73	6.35	-57.2				
Average:	25.8	387.1	0.55	6.34	-56.7	#DIV/0!			

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

Duplicate Sample No(s):

Comments:

Signature: AHA Date: 8/11/2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 11 /2021@ 925

Sample Number: RGW240D- 210811 | Weather: SUNNY 70'S

Landau Representative: AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 6.75 Time: 858 Flow through cell vol. GW Meter No.(s SLOPE 2

Begin Purge: Date/Time: 8/ 11 /2021 902 End Purge: Date/Time: 8/ 11 /2021 @ 923 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**	
905	23.0	368.4	0.37	6.50	-52.8		6.31		
908	23.6	369.9	0.47	6.46	-59.6		6.09		
911	24.0	372.7	0.55	6.42	-62.5		5.95		
914	24.7	378.9	0.62	6.45	-67.2		5.82		
917	25.1	384.1	0.69	6.46	-71.1		5.77		
920	25.3	387.9	0.66	6.46	-73.6		5.72		
922	26.0	389.4	0.70	6.46	-74.6		5.72		

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, HIGH TURB, NO ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	26.0	389.7	0.69	6.46	-74.8				
2	26.1	390.3	0.72	6.46	-75.2				
3	26.2	390.5	0.68	6.46	-75.5				
4	26.2	390.6	0.67	6.46	-75.9				
Average:	26.1	390.3	0.69	6.46	-75.4	#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: AHA Date: 8/11/2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 11 /2021@ 1145

Sample Number: RGW-244S 210811 | Weather: SUNNY 70'S

Landau Representative: AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 5.29 Time: 1116 Flow through cell vol. GW Meter No.(s SLOPE 2

Begin Purge: Date/Time: 8/ 11 /2021 1118 End Purge: Date/Time: 8/ 11 /2021 @ 1140 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**		
1121	22.1	554.0	0.48	6.12	-30.4		5.29		
1124	24.1	574.0	0.50	6.10	-44.5		5.29		
1127	24.7	580.0	0.57	6.11	-48.6		5.29		
1130	25.5	586.0	0.62	6.12	-54.0		5.29		
1133	26.0	591.0	0.70	6.12	-57.3				
1136	26.5	595.0	0.75	6.12	-59.7				
1138	26.9	599.0	0.77	6.12	-61.1				

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.): NO COLOR, LOW TURB, NO ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	26.9	600.0	0.76	6.13	-61.3				
2	27.0	600.0	0.78	6.13	-61.5				
3	27.0	600.0	0.79	6.13	-61.6				
4	27.1	601.0	0.81	6.13	-61.6				
Average:	27.0	600.3	0.79	6.13	61.6	#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: AHA Date: 8/11/2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 11 /2021@ 1357

Sample Number: RGW247S- 210811 | Weather: SUNNY 80'S

Landau Representative: AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 4.16 Time: 1329 Flow through cell vol. GW Meter No.(s SLOPE 2

Begin Purge: Date/Time: 8/ 11 /2021 1333 End Purge: Date/Time: 8/ 11 /2021 @ 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: 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**		
1336	24.4	476.4	0.41	6.15	-1.3		4.22		
1339	26.2	522.0	0.42	6.16	-23.3		4.19		
1342	27.9	543.0	0.37	6.2	-35.9		4.18		
1345	28.6	554.0	0.36	6.21	-43.4		4.19		
1348	29.8	564.0	0.39	6.24	-52.3		4.19		
1351	30.1	570.0	0.39	6.26	-58.0				
1353	30.6	576.0	0.39	6.3	-62.7				

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.): NO COLOR, LOW TURB, NO ODOR, NO SHEEN, SOME PARTICULATES

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	30.9	576.0	0.41	6.28	-63.1				
2	30.8	577.0	0.41	6.28	-63.5				
3	30.8	577.0	0.41	6.28	-63.9				
4	30.8	577.0	0.41	6.28	-64.1				
Average:	30.8	576.8	0.41	6.28	-63.7	#DIV/0!			

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

Duplicate Sample No(s):

Comments:

Signature: AHA Date: 8/11/2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 11 /2021@ 1345

Sample Number: RGW248I- 210811 | Weather: sunny, 80s

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 4.01 Time: 1319 Flow through cell vol. GW Meter No.(s SLOPE 8

Begin Purge: Date/Time: 8/11 /2021 1320 End Purge: Date/Time: 8/ 11 /2021 @ 1342 Gallons Purged: 1

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
	Purge Goals: Stablization of Parameters for three consecutive readings within the following limits							**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		
1323	20.7	515	0.13	6.67	-4.9		3.95		
1326	23.3	553	0.13	6.78	-16.9		3.95		
1329	26.7	585	0.14	6.71	-23.7		3.95		
1332	27.0	597	0.14	6.69	-26.6				
1335	27.8	611	0.13	6.63	-30.4				
1338	28.8	623	0.15	6.58	-34.8				
1341	29.9	636	0.16	6.59	-38.2				

SAMPLE COLLECTION DATA

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

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

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

(By Numerical Order) ☐ Other

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

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	30.1	637	0.16	6.60	-38.6				
2	30.1	637	0.16	6.60	-38.8				
3	30.1	638	0.15	6.59	-38.8				
4	30.4	639	0.16	6.59	-38.9				
Average:	30.2	638	0.16	6.60	-38.8				

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: BXM Date: 8.11.2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 12 /2021@ 1400

Sample Number: RGW249S- 210812 | Weather: SUNNY, HIGH 80S

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 3.95 Time: 1333 Flow through cell vol. GW Meter No.(s SLOPE #8

Begin Purge: Date/Time: 8/ 12 /2021 1334 End Purge: Date/Time: 8/ 12 /2021 @ 1357 Gallons Purged: 1

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
	Purge Goals: Stablization of Parameters for three consecutive readings within the following limits							**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		
1337	23.1	460	0.2	6.47	-1.7		3.94		
1340	25.5	498	0.16	6.5	-11.1		3.95		
1343	27.0	510	0.15	6.52	-15.0		3.94		
1346	27.6	510	0.16	6.52	-16.7				
1349	28.1	508	0.18	6.52	-18.1				
1352	28.4	504	0.22	6.53	-19.6				
1355	28.5	504	0.21	6.53	-19.8				

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, SLIGHT YELLOW COLOR, NO ODOR, NO SHEEN, SMALL PARTICULATES

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	28.5	504	0.21	6.53	-19.8				
2	28.6	503	0.25	6.53	-20.0				
3	28.6	503	0.24	6.54	-20.1				
4	28.6	503	0.23	6.53	-20.0				
Average:	28.6	503	0.23	6.53	-20.0				

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: BXM Date: 8.12.2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 12 /2021@ 1235

Sample Number: RGW250S- 210812 | Weather: SUNNY, 80S

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 4.04 Time: 1208 Flow through cell vol. GW Meter No.(s SLOPE #8

Begin Purge: Date/Time: 8/ 12 /2021 1209 End Purge: Date/Time: 8/ 12 /2021 @ 1232 Gallons Purged: 1

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
	Purge Goals: Stablization of Parameters for three consecutive readings within the following limits							**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		
1212	20.3	132.4	0.36	6.82	-7.8		4.35		
1215	22.1	134.9	0.46	6.85	-17.2		4.33		
1218	23.5	139.3	0.50	6.96	-35.9		4.26		
1221	24.9	142.3	0.45	6.99	-38.3		4.22		
1224	25.5	143.5	0.48	6.97	-38.8		4.19		
1227	25.8	144.3	0.37	6.96	-38.2		4.18		

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 ODOR, NO SHEEN

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	25.8	144.5	0.34	6.95	-38.1				
2	25.9	144.8	0.39	6.95	-38.4				
3	25.9	144.8	0.35	6.95	-38.3				
4	25.9	144.7	0.32	6.95	-38.0				
Average:	25.9	144.7	0.35	6.95	-38.2				

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:

Signature: BXM Date: 8.12.2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 11 /2021@ 840

Sample Number: RGW253I- 210811 | Weather: SUNNY, 70S

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 4.83 Time: 813 Flow through cell vol. GW Meter No.(s SLOPE 8

Begin Purge: Date/Time: 8/ 11 /2021 815 End Purge: Date/Time: 8/ 11 /2021 @ 837 Gallons Purged: 1

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits								**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		
818	19.3	376.4	0.71	6.31	-20.2		4.82		
821	20.4	388.2	0.75	6.47	-38.9		4.82		
824	20.5	391.0	0.71	6.49	-41.6		4.82		
827	20.6	397.2	0.64	6.5	-46.3				
830	20.9	404.6	0.55	6.51	-53.2				
833	21.1	406.3	0.54	6.51	-55.5				
836	21.1	407.7	0.48	6.52	-57.7				

SAMPLE COLLECTION DATA

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

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

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

(By Numerical Order) ☐ Other

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

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	21.1	408.1	0.47	6.52	-58.3				
2	21.2	407.7	0.51	6.52	-58.5				
3	21.2	407.9	0.49	6.52	-58.7				
4	21.2	408.3	0.48	6.52	-58.9				
Average:	21.2	408.0	0.49	6.52	-58.6				

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: BXM Date: 8.11.2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 10 /2021@

Sample Number: RGW263S- 210810 | Weather: sunny, 70s

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 7.65 Time: 923 Flow through cell vol. GW Meter No.(s SLOPE 8

Begin Purge: Date/Time: 8/ 10 /2021 NA End Purge: Date/Time: 8/ 10 /2021 @ NA Gallons Purged: NA

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

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

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ☐ Pump/Pump Type

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

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

(By Numerical Order) ☐ Other

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

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

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

Duplicate Sample No(s):

Comments:

Signature: BXM Date: 8.10.2021

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.099.099

Event: Aug-21 | Date/Time: 8/ 10 /2021@ 1000

Sample Number: RGW264S- 210810 | Weather: SUNNY, 70S

Landau Representative: BXM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 6.66 Time: 929 Flow through cell vol. GW Meter No.(s SLOPE 8

Begin Purge: Date/Time: 8/ 10 /2021 933 End Purge: Date/Time: 8/ 10 /2021 @ 955 Gallons Purged: 1

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits								**>/= 1 flow through cell**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		
936	21.2	745	0.78	6.08	-58.6		6.60		
939	20.9	740	0.64	6.13	-55.5		6.69		
942	21.3	730	2.75	6.31	-46.3		7.90		Air in line, well going dry
945	20.4	714	1.33	6.20	-37.0		8.10		
948	19.7	707	0.57	6.17	-37.2		8.28		
951	19.3	702	0.46	6.21	-39.6		8.52		
954	19.2	699	0.47	6.21	-39.7		8.70		

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ■ Pump/Pump Type peri pump

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

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

(By Numerical Order) ☐ Other

Sample Description (color, turbidity, odor, sheen, etc.): CLEAR, COLORLESS TO SLIGHTLY YELLOW, NO ODOR, NO SHEEN, EFFERVESCENT SOME BLACK SOLIDS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	19.2	697	0.46	6.21	-39.7				
2	19.2	698	0.49	6.21	-39.7				
3	19.2	698	0.48	6.21	-40.1				
4	19.3	698	0.49	6.21	-40.0				
Average:	19.2	698	0.48	6.21	-39.9				

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: BXM Date: 9.10.2021

Appendix C

Data Validation Memos

Memo

To:	Kathleen Goodman, Project Manager	Project:	PS20203450.2021
From:	Chelsea Foster	c:	Project File
Tel:	(206) 342-1760		
Fax:	(206) 342-1761		
Date:	August 24, 2021		

Subject: Summary Data Quality Review
August 2021 Boeing Renton Groundwater Sampling
SWMU-168
ARI Work Order Number: 21H0114

This memo presents the summary data quality review of one primary groundwater sample and one trip blank sample collected on August 10, 2021. 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 (vinyl chloride) by U.S. Environmental Protection Agency (EPA) Method 8260D with selected ion monitoring.

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

Sample ID	Laboratory Sample ID	Requested Analyses
Tripblank-210810	21H0114-01	Vinyl chloride
RGW230I-210810	21H0114-02	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 August 10, 2021. 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 except as noted:

   One surrogate, 1,2-dichloroethane-d4, was above control limits for continuing calibrations in both samples as well as the analysis blank, LCS, and LCSD. This indicates a slight positive bias for the VOC in this analysis. The result should be flagged with a "J" for reporting.

4. LCS/LCSD – Acceptable as noted:

   One surrogate, 1,2-dichloroethane-d4, was above continuing calibration range for the LCS and LCSD, indicating a slight positive bias in the analysis. The affected results are already flagged for use due to the surrogate.

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 21H0114 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	Reason for Qualification	Qualified Result
Tripblank-210810	Vinyl chloride	Surrogate Calibration	20.0 UJ ng/L
RGW230I-210810	Vinyl chloride	Surrogate Calibration	359 J ng/L

Abbreviations
ng/L = nanograms per liter
J = The value is an estimate
UJ = The analyte was not detected at the estimated reporting limit indicated

References

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

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

Memo

To:	Kathleen Goodman, Project Manager	Project:	PS20203450.2021
From:	Chelsea Foster	c:	Project File
Tel:	(206) 342-1760		
Fax:	(206) 342-1761		
Date:	August 25, 2021		

Subject: Summary Data Quality Review
August 2021 Boeing Renton Groundwater Sampling
SWMU-172/174
ARI Group Number: 21H0121

This memo presents the summary data quality review of nine primary groundwater samples, one groundwater field duplicate, and one trip blank sample collected on August 10, 2021. 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 8260D with selected ion monitoring;
- Total organic carbon (TOC) by Standard Method 5310B; and
- Total metals (arsenic, copper, and lead) by EPA Method 6020A.

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

Sample ID	Laboratory Sample ID	Requested Analyses
RGW232S-210810	21H0121-01	all
RGW153S-210810	21H0121-02	all
RGW226S-210810	21H0121-03	all
RGW173S-210810	21H0121-04	all
RGW152S-210810	21H0121-05	all
RGWDUP1-210810	21H0121-06	all
RGW172S-210810	21H0121-07	all
RGW234S-210810	21H0121-08	all
RGW236S-210810	21H0121-09	all
RGW235I-210810	21H0121-10	all
TripBlank-210810	21H0121-11	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.

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 August 10, 2021. The temperatures of the coolers were recorded upon receipt and were below the maximum acceptable temperature of 6 degrees Celsius.

Organic analyses

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

1. Preservation and Holding Times – Acceptable as noted:

   One of the vials from the sample RGW236S-210810 had a bubble upon receipt, but since there were two vials for this sample, the analysis could be performed on the other vial and the results are not flagged for use.

2. Blanks – Acceptable as noted:

   The surrogate analyte 1,2-dichloroethane-d4 was above continuing calibration range in the blank sample. The affected results are flagged as noted below.

3. Surrogates – Acceptable except as noted:

   Surrogate 1,2-dichloroethane-d4 was out of range for continuing calibration and/or percent recovery in multiple samples, as well as the analysis blank, LCS, LCSD, MS, and MSD. This indicates a slight positive bias for the VOCs in this analysis. The results should be flagged with a "J" for reporting. For samples RGWDUP1-210810, RGW152S-210810, RGW172S-210810, RGW234S-210810, RGW236S-210810, and RGW235I-210810, the sample was rerun with all surrogates in range and the second set of results can be used without a qualifier.

4. LCS/LCSD – Acceptable as noted:

   The surrogate analyte 1,2-dichloroethane-d4 was above continuing calibration range in the LCS and LCSD, indicating a slight positive bias in the analysis. The affected results are already flagged for use due to the surrogate in the primary sample analysis.

5. MS/MSD – Acceptable as noted:

   Continuing calibration range and percent recoveries for the surrogate analyte 1,2-dichloroethane-d4 were above range in the MS and MSD, indicating a slight positive bias in the analysis. Percent recovery was also below range for trichloroethylene and tetrachloroethylene in the MS/MSD, which was likely due to matrix effect. The affected results are already flagged for use due to the surrogate results in the primary sample analysis.

6. Field Duplicates – Acceptable as noted:

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

Sample ID/ Field Duplicate ID	Analyte	Primary Result (ng/L)	Duplicate Result (ng/L)	Reporting Limit (ng/L)	RPD (%)
RGW152S-210810/ RGWDUP1-210810	vinyl chloride	506	525	20	4
	cis-1,2-dichloroethene	1,330	1370	20	3
	trichloroethene	129	119	20	8
	tetrachloroethene	87.2	80.2	20	NC

Abbreviations
NC = not calculated
ng/L = nanograms 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 RPD for TOC and total arsenic were within control limits. RPDs for total copper, and total lead were above control limits; primary and duplicate results for total copper and total lead will be flagged with a "J."

Sample ID/ Field Duplicate ID	Analyte	Primary Result	Duplicate Result	Reporting Limit	RPD (%)
RGW152S-210810/ RGWDUP1-210810	TOC	5.88 mg/L	5.30 mg/L	0.50 mg/L	10
	total arsenic	16.3 µg/L	18.3 µg/L	0.400 µg/L	12
	total copper	9.08 µg/L	12.4 µg/L	1.00 µg/L	31
	total lead	5.38 µg/L	7.82 µg/L	0.200 µg/L	37

Abbreviations:
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 as noted:

   The samples RGW232S-210810, RGW153S-210810, RGW173S-210810, RGW152S-210810, RGWDUP1-210810, RGW172S-210810, and RGW234S-210810 are flagged "D," indicating the result was from a diluted analysis for lead, arsenic, and copper. The samples were diluted at a factor of 2 due to higher levels of carbon present in the sample, and the results are not flagged for use.

Overall assessment of data

The table below summarizes the data assessment. The completeness of work order number 21H0121 is 100 percent. The usefulness of these data was evaluated based on EPA guidance documents listed in the introduction to this report. Few problems were identified, and analytical performance was generally within specified limits. The data meet the project's data quality objectives.

Sample ID	Qualified Analyte	Reason for Qualifier	Qualified Result[1]
RGW232S-210810	Vinyl chloride cis-1,2-Dichloroethene Trichloroethene Tetrachloroethene	Surrogate Calibration	653 J ng/L 464 J ng/L 20.0 UJ ng/L 20.0 UJ ng/L
RGW153S-210810	Vinyl chloride cis-1,2-Dichloroethene Trichloroethene Tetrachloroethene	Surrogate Calibration	193 J ng/L 58.2 J ng/L 20.0 UJ ng/L 20.0 UJ ng/L
RGW226S-210810	Vinyl chloride cis-1,2-Dichloroethene Trichloroethene Tetrachloroethene	Surrogate Calibration	51.6 J ng/L 33.5 J ng/L 20.0 UJ ng/L 20.2 J ng/L
RGW173S-210810	Vinyl chloride cis-1,2-Dichloroethene Trichloroethene Tetrachloroethene	Surrogate Calibration	176 J ng/L 42.4 J ng/L 20.0 UJ ng/L 20.0 UJ ng/L
RGW152S-210810	total copper total lead	Duplicate RPD	9.08 J µg/L 5.38 J µg/L
RGWDUP1-210810	total copper total lead	Duplicate RPD	12.4 J µg/L 7.82 J µg/L
RGW172S-210810	none	NA	NA
RGW234S-210810	none	NA	NA
RGW236S-210810	none	NA	NA
RGW235I-210810	none	NA	NA
TripBlank-210810	Vinyl chloride cis-1,2-Dichloroethene Trichloroethene Tetrachloroethene	Surrogate Calibration	20.0 UJ ng/L 20.0 UJ ng/L 20.0 UJ ng/L 20. 0 UJ ng/L

Notes
1. Data qualifiers are as follows:
J = The value is an estimate.
UJ = The analyte was not detected at the estimated reporting limit indicated.

Abbreviations
µg/L = micrograms per liter
ng/L = nanograms per liter
NA = not applicable
RPD = relative percent difference

References

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

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

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

Memo

To:	Kathleen Goodman, Project Manager	Project:	PS20203450.2021
From:	Chelsea Foster	c:	Project File
Tel:	(206) 342-1760		
Fax:	(206) 342-1761		
Date:	September 6, 2021		

Subject: Summary Data Quality Review
August 2021 Boeing Renton Groundwater Sampling
Building 4-78/79 SWMU/AOC Group
ARI Work Order Number: 21H0137

This memo presents the summary data quality review of seven primary groundwater samples, one field duplicate groundwater sample, and one trip blank sample collected on August 11, 2021. 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 8260D;
- Total petroleum hydrocarbons as gasoline (TPH-G) by Ecology Method NWTPH-G; and
- Total organic carbon (TOC) by Standard Method 5310B-00.

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

Sample ID	Laboratory Sample ID	Requested Analyses
RGW143S-210811	21H0137-01	all
RGW240D-210811	21H0137-02	all
RGW237S-210811	21H0137-03	all
RGW034S-210811	21H0137-04	all
RGW244S-210811	21H0137-05	all
RGW033S-210811	21H0137-06	all
RGW031S-210811	21H0137-07	all
RGWDUP2-210811	21H0137-08	all
Tripblanks-210811	21H0137-09	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 for work order on August 11, 2021. The temperature of the cooler was recorded upon receipt and was below the maximum acceptable temperature of 6 degrees Celsius.

Organic analyses

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

1. Preservation and Holding Times – Acceptable as noted:

   One of the vials from the sample RGW240D-210811 had a bubble upon receipt, but since there were additional vials for this sample, the analysis could be performed on the other vial and the results are not flagged for use.

2. Blanks – Acceptable
3. Surrogates – Acceptable
4. LCS/LCSD – Acceptable
5. MS/MSD – Acceptable

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

6. Field Duplicates – Acceptable

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

Sample ID/ Field Duplicate ID	Analyte	Primary Result (µg/L)	Duplicate Result (µg/L)	Reporting Limit (µg/L)	RPD (%)
RGW031S-210811/ RGWDUP2-210811	vinyl chloride	0.20 U	0.20	0.20	NC
	cis-1,2-dichloroethene	0.20 U	0.20 U	0.20	NC
	benzene	1.08	0.84	0.20	25
	trichloroethene	0.20 U	0.20 U	0.20	NC
	TPH-G	1,540	1,620	100	5

Abbreviations
µg/L = micrograms per liter
NC = not calculated
RPD = relative percent difference
U = analyte was not detected above the reporting limit indicated
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/MSD – Acceptable

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

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

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

Sample ID/ Field Duplicate ID	Analyte	Primary Result (mg/L)	Duplicate Result (mg /L)	Reporting Limit (mg /L)	RPD (%)
RGW031S-210811/ RGWDUP2-210811	TOC	15.15	15.21	0.50	0

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

7. Reporting Limits and Laboratory Flags – Acceptable.

Overall assessment of data

The table below summarizes the data assessment. The completeness of work order numbers 21H0137 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
RGW143S-210811	none
RGW240D-210811	none
RGW237S-210811	none
RGW034S-210811	none
RGW244S-210811	none
RGW033S-210811	none
RGW031S-210811	none
RGWDUP2-210811	none
Tripblanks-210811	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:	Kathleen Goodman, Project Manager	Project:	PS20203450.2021
From:	Chelsea Foster	c:	Project File
Tel:	(206) 342-1760		
Fax:	(206) 342-1761		
Date:	September 2, 2021		

Subject: Summary Data Quality Review
August 2021 Boeing Renton Groundwater Sampling
Former Fuel Farm AOC Group
ARI Work Order Number: 21H0113

This memo presents the summary data quality review of three primary groundwater samples and one field duplicate collected on August 10, 2021. The samples were submitted to Analytical Resources Inc. (ARI), a Washington State Department of Ecology (Ecology)-accredited laboratory located in Tukwila, Washington. The samples were analyzed for total petroleum hydrocarbons as diesel (TPH-D), plus motor oil (TPH-O) and Jet A (TPH-Jet A) ranges by Ecology Method NWTPH-Dx.

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

Sample ID	Laboratory Sample ID	Requested Analyses
RGW211S-210810	21H0113-01	all
RGW224S-210810	21H0113-02	all
RGW221S-210810	21H0113-03	all
RGWDUP3-210810	21H0113-04	all

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

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

ARI received the samples on August 10, 2021. The temperatures of the coolers were recorded upon receipt and were below the maximum acceptable temperature of 6 degrees Celsius.

Organic analyses

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

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

   One field duplicate was submitted for each analysis during this sampling event, meeting the project frequency requirement of 5 percent, or one for every 20 samples. Primary and duplicate results are summarized in the table below. The 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 control limits.

Sample ID/ Field Duplicate ID	Analyte	Primary Result (mg/L)	Duplicate Result (mg/L)	Reporting Limit (mg/L)	RPD (%)
RGW224S-210810/ RGWDUP3-210810	TPH-D (C12–C24)	1.08	1.01	0.100	7
	TPH-O (C24–C38)	ND	ND	0.200	NC
	TPH-Jet A (C10–C18)	1.47	1.35	0.100	9

Abbreviations
mg/L = milligrams per liter
NC = not calculated
ND = not detected
RPD = relative percent difference
TPH-D = total petroleum hydrocarbons as diesel
TPH-Jet A = total petroleum hydrocarbons in the Jet A range
TPH-O = total petroleum hydrocarbons as motor oil

7. Reporting Limits and Laboratory Flags – Acceptable

Overall assessment of data

The table below summarizes the data review. The completeness of ARI work order number 21H0113 is 100 percent. Evaluation of the usefulness of these data is based on EPA guidance documents listed in the

introduction to this report. Few problems were identified, and analytical performance was generally within specified limits. The data meet the project's data quality objectives.

Sample ID	Qualified Analyte
RGW211S-210810	none
RGW224S-210810	none
RGW221S-210810	none
RGWDUP3-210810	none

References

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

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

Memo

To:	Kathleen Goodman, Project Manager	Project:	PS20203450.2021
From:	Chelsea Foster	c:	Project File
Tel:	(206) 342-1760		
Fax:	(206) 342-1761		
Date:	September 2, 2021		

Subject: Summary Data Quality Review
August 2021 Boeing Renton Groundwater Sampling
AOC-003
ARI Work Order Number: 21H0136 and 21H0153

This memo presents the summary data quality review of four primary groundwater samples and two trip blank samples collected on August 11 and 12, 2021. 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

- Vinyl chloride (a volatile organic compound) by U.S. Environmental Protection Agency (EPA) Method 8260D with selected ion monitoring; and
- Total organic carbon (TOC) by Standard Method 5310B.

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

Sample ID	Laboratory Sample ID	Requested Analyses
Tripblank-210811	21H0136-01	vinyl chloride
RGW248I-210811	21H0136-02	all
RGW247S-210811	21H0136-03	all
Tripblank-210812	21H0153-01	vinyl chloride
RGW188S-210812	21H0153-02	all
RGW249S-210812	21H0153-03	all

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

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

ARI received the samples for work order 21H0136 on August 11, 2021, and the samples for work order 21H1053 on August 12, 2021. The temperatures of the coolers were recorded upon receipt and were below the maximum acceptable temperature of 6 degrees Celsius.

Organic analyses

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

1. Preservation and Holding Times – Acceptable as noted:

   Two of the vials from the sample RGW248I-210811 and one vial from the sample RGW247S-210811 (both on work order 21H0136) had a bubble upon receipt, but since there were additional vials for these samples, the analysis could be performed on the other vial and the results are not flagged for use.

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 work order numbers 21H0136 and 21H0153 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
Tripblanks-210811	none
RGW248I-210811	none
RGW247S-210811	none
Tripblank-210812	none
RGW188S-210812	none
RGW249S-210812	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:	Kathleen Goodman, Project Manager	Project:	PS20203450.2021
From:	Chelsea Foster	c:	Project File
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Date:	September 14, 2021		

Subject: Summary Data Quality Review
August 2021 Boeing Renton Groundwater Sampling
AOC-004
ARI Work Order Number: 21H0180

This memo presents the summary data quality review of one primary groundwater sample collected on August 12, 2021. The sample was submitted to Analytical Resources, Inc. (ARI), located in Tukwila, Washington, a laboratory accredited by the Washington State Department of Ecology. The sample was analyzed for total lead by U.S. Environmental Protection Agency (EPA) Method 6020A.

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

Sample ID	Laboratory Sample ID	Requested Analyses
RGW250S-210812	21H0180-01	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 August 12, 2021. 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 for MS/MSD analyses was not submitted 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 21H0180 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-210216	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:	Kathleen Goodman, Project Manager	Project:	PS20203450.2021
From:	Chelsea Foster	c:	Project File
Tel:	(206) 342-1760		
Fax:	(206) 342-1761		
Date:	August 25, 2021		

Subject: Summary Data Quality Review
August 2021 Boeing Renton Groundwater Sampling
AOC-060
ARI Work Order Numbers: 21H0135

This memo presents the summary data quality review of six primary groundwater samples, one field duplicate, and one trip blank sample collected on August 11, 2021. 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 8260D with selected ion monitoring; and
- Total organic carbon (TOC) by Standard Method 5310B-00.

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

Sample ID	Laboratory Sample ID	Requested Analyses
Tripblank-210811	21H0135-01	VOCs
RGW253I-210811	21H0135-02	all
RGW150S-210811	21H0135-03	all
RGW147S-210811	21H0135-04	all
RGWDUP4-210811	21H0135-05	all
RGW014S-210811	21H0135-06	all
RGW012S-210811	21H0135-07	all
RGW009S-210811	21H0135-08	all

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

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 August 11, 2021. The temperatures of the cooler were recorded upon receipt and was 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

   Additional sample volume for MS/MSD analyses was not submitted 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.

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-210811/ RGWDUP4-210811	vinyl chloride	367	358	20.0	2
	cis-1,2-dichloroethene	147	156	20.0	6
	trichloroethene	22.7	23.4	20.0	NC

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

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

   The spectral pattern for samples RGW253I-210811, RGW150S-210811, RGW147S-210811, RGWDUP4-210811, and RGW014S-210811 had low match to the spectral pattern for vinyl chloride, but were confirmed by an analyst for results. These results are not flagged for use.

Inorganic analyses

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

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

   Additional sample volume for MS/MSD analyses was not submitted 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. 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 (%)
RGW014S-210811/ RGWDUP4-210811	TOC	4.09	4.02	0.50	2

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

7. Reporting Limits – Acceptable as noted:

Overall assessment of data

A summary of the data assessment is presented in the table below. The completeness of work order number 21H0135 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
Tripblank-210811	none
RGW253I-210811	none
RGW150S-210811	none
RGW147S-210811	none
RGWDUP4-210811	none
RGW014S-210811	none
RGW012S-210811	none
RGW009S-210811	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:	Kathleen Goodman, Project Manager	Project:	PS20203450.2021
From:	Chelsea Foster	c:	Project File
Tel:	(206) 342-1760		
Fax:	(206) 342-1761		
Date:	September 14, 2021		

Subject: Summary Data Quality Review
August 2021 Boeing Renton Groundwater Sampling
AOC-090
ARI Work Order Number: 21H0183 and 21H0211

This memo summarizes the data quality review of five primary groundwater samples and two trip blank samples collected on August 12 and 17, 2021. 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, and 1,1,2-trichloroethane) by U.S. Environmental Protection Agency (EPA) Method 8260D;
- VOCs (vinyl chloride, 1,1-dichloroethene, trichloroethene, tetrachloroethene, and 1,1,2,2-tetrachloroethane) by EPA Method 8260D 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) 5310B.

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

Sample ID	Laboratory Sample ID	Requested Analyses
TripBlanks-210812	21H0183-01	VOCs and TPH
RGW208S-210812	21H0183-02	Vinyl chloride w/ SIM
RGW178S-210812	21H0183-03	Vinyl chloride w/ SIM
RGW189S-210812	21H0183-04	All
RGW207S-210812	21H0183-05	Vinyl chloride w/SIM
TripBlank-210817	21H0211-01	Vinyl chloride w/ SIM
RGW176S-210817	21H0211-02	Vinyl chloride w/ SIM

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 August 12 and 17, 2021. The temperatures of the coolers were recorded upon receipt and were below the maximum acceptable temperature of 6 degrees Celsius.

Organic analyses

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

1. Preservation and Holding Times – Acceptable as noted:

   One of the trip blank vials sampled on August 12, 2021, had a bubble in it upon check-in at the laboratory; however, the analyses could still be executed fully using other vials for the same sample.

2. Blanks – Acceptable
3. Surrogates – Acceptable
4. LCS/LCSD – Acceptable except as noted:
5. MS/MSD – Acceptable except as noted:

   The percent recovery in the MS/MSD sample was out of control limits for 1,1,2,2-tetrachloroethane in the VOC analysis, and TOC in the wet chemistry analysis. The LCS/LCSD samples were within control limits for the same analytes, therefore the variation is likely due to matrix effect. The data is not qualified for use.

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

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. Surrogates – Acceptable
4. LCS/LCSD – Acceptable

5. MS/MSD – Acceptable
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 numbers 21H0183 and 21H0211 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
TripBlanks-210812	none
RGW208S-210812	none
RGW178S-210812	none
RGW189S-210812	none
RGW207S-210812	none
TripBlank-210817	none
RGW176S-210817	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.

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

Memo

To:	Kathleen Goodman, Project Manager	Project:	PS20203450.2021
From:	Chelsea Foster	c:	Project File
Tel:	(206) 342-1760		
Fax:	(206) 342-1761		
Date:	August 24, 2021		

Subject: Summary Data Quality Review
August 2021 Boeing Renton Groundwater Sampling
Apron A
ARI Work Order Number: 21H0115

This memo presents the summary data quality review of one primary groundwater sample and one trip blank sample collected on August 10, 2021. 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 and cis-1,2-dichloroethene) by U.S. Environmental Protection Agency (EPA) Method 8260D; and
- Total organic carbon (TOC) by Standard Method 5310B.

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

Sample ID	Laboratory Sample ID	Requested Analyses
RGW264S-210810	21H0115-01	All
Trip Blank-210810	21H0115-02	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 August 10, 2021. The temperature of the coolers were recorded upon receipt and were below the maximum acceptable temperature of 6 degrees Celsius. The laboratory logged the samples with the time on the chain-of-custody and proceeded with analysis.

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 as noted:

   Surrogate 1,2-dichloroethane-d4 in the VOC analysis was above calibration range, indicating a slight positive bias. The samples were rerun, and all surrogates were within calibration range. The second set of results should be used for reporting purposes.
4. LCS/LCSD – Acceptable
5. MS/MSD – Acceptable

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

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

Inorganic analyses

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

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

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

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

Overall assessment of data

The table below summarizes the data assessment. The completeness of work order number 21H0115 is 100 percent. The usefulness of these data was evaluated based on EPA guidance documents listed in the introduction to this report. Few problems were identified, and analytical performance was generally within specified limits. The data meet the project's data quality objectives.

Sample ID	Qualified Analyte
RGW264S-210810	none
Trip Blank-210810	none

References

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

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

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

Appendix D

Historical Groundwater Data Tables

TABLE D-1: SWMU-168 HISTORICAL CONCENTRATIONS OF CONSTITUENTS OF CONCERN[1, 2]

Boeing Renton Facility, Renton, Washington

Analyte	Current Cleanup Level[4]	Well ID[3]							
		CPOC Area							
		GW229S							
		11/7/2016	3/1/2017	8/14/2017	3/5/2018	8/13/2018	3/4/2019	8/12/2019	3/9/2020
Volatile Organic Compounds (µg/L)									
Vinyl Chloride	0.11	0.020 U	0.020 U	0.021	0.0273	0.020 U	0.0211	0.020 U	0.020 U

Analyte	Current Cleanup Level[4]	Well ID[3]							
		CPOC Area							
		GW230I							
		3/5/2018	8/13/2018	3/4/2019	8/12/2019	3/9/2020	8/10/2020	2/15/2021	8/10/2021
Volatile Organic Compounds (µg/L)									
Vinyl Chloride	0.11	0.0873	**0.14**	0.0566	**0.336**	0.087	**0.162**	0.076	0.359 J

Analyte	Current Cleanup Level[4]	Well ID[3]							
		CPOC Area							
		GW231S							
		11/7/2016	3/1/2017	8/14/2017	3/5/2018	8/13/2018	3/4/2019	8/12/2019	3/9/2020
Volatile Organic Compounds (µg/L)									
Vinyl Chloride	0.11	0.020 U	0.020 U	0.020 U	0.0393	0.0326	0.0327	0.026	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; I = intermediate well.
4. Current cleanup levels obtained from Table 2 of the Cleanup Action Plan and are based on each individual SWMU or AOC.

Abbreviations:

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

TABLE D-2: SWMU-172 AND SWMU-174 GROUP HISTORICAL CONCENTRATIONS OF CONSTITUENTS OF CONCERN[1, 2]

Boeing Renton Facility, Renton, Washington

Analyte	Current Cleanup Level[4]	Well ID[3]															
		Source Area															
		GW152S								GW153S							
		5/6/2019	8/12/2019	11/11/2019	3/9/2020	5/11/2020	8/10/2020	2/15/2021	8/10/2021	5/6/2019	8/12/2019	11/11/2019	3/9/2020	5/11/2020	8/10/2020	2/15/2021	8/10/2021
Volatile Organic Compounds (µg/L)																	
cis-1,2-Dichloroethene	0.03	**0.655**	**0.627**	**0.530**	**0.892**	**0.719**	**1.66**	**0.144**	**1.330**	**0.108**	**0.278**	**0.204**	**0.0736**	**0.0789**	**0.0551**	**0.077**	**0.0582 J**
Tetrachloroethene	0.02	**0.0594**	**0.176**	**0.384**	**1.12**	**2.38**	**0.319**	**0.081**	**0.0872**	0.020 U	**0.0544**	**0.164**	**0.024**	0.020 U	0.020 U	0.020 U	0.020 UJ
Trichloroethene	0.02	**0.157**	**0.203**	**0.145**	**0.278**	**0.412**	**0.579**	0.020 U	**0.129**	**0.0212**	**0.0326**	**0.131**	0.02 U	0.020 U	0.020 U	0.020 U	0.020 UJ
Vinyl Chloride	0.11	**0.173**	0.0705	0.0366	**0.15**	0.0463	**0.284**	0.0378	**0.506**	**0.242**	**0.153**	0.0859	**0.249**	**0.266**	**0.135**	**0.220**	**0.193 J**
Total Metals (µg/L)																	
Arsenic	1.0	**4.49**	**23.4**	**7.48**	**3.84**	**1.95**	**6.72**	**7.67**	**16.3**	**5.97**	**4.72**	**11.9**	**5.48**	**3.85**	**4.05**	**32.8**	**32.8**
Copper	3.5	2.35	**21.8**	**16.6**	**8.03**	**2.76**	**7.45 J**	**17.2 J**	**9.08 J**	1.25	1.58	**10.2**	3.09	1.73	1.68	**33.9**	**33.9**
Lead	1.0	**1.26**	**14.8**	**12.1**	**6.13**	**1.09**	**3.89**	**12.5 J**	**5.38 J**	0.198	0.351	**2.76**	0.712	0.372	0.326	**5.80**	**5.80**

Analyte	Current Cleanup Level[4]	Well ID[3]															
		Downgradient Plume Area															
		GW172S								GW173S							
		5/6/2019	8/12/2019	11/11/2019	3/9/2020	5/11/2020	8/10/2020	2/15/2021	8/10/2021	5/6/2019	8/12/2019	11/11/2019	3/9/2020	5/11/2020	8/10/2020	2/15/2021	8/10/2021
Volatile Organic Compounds (µg/L)																	
cis-1,2-Dichloroethene	0.03	**0.0581**	0.027	**0.0561**	**0.305**	**0.214**	**0.0561**	**0.108**	**0.0746**	**0.037**	0.022	**0.0378**	**0.0504**	**0.0488**	**0.0313**	**0.0505**	**0.0424 J**
Tetrachloroethene	0.02	0.020 U	**0.0451**	**0.0287**	**0.976**	**0.0625**	**0.0603**	**0.0624**	0.020 U	**0.0416**	**0.0561**	**0.0246**	**0.0224**	0.020 U	0.020 U	0.020 U	0.020 UJ
Trichloroethene	0.02	0.020 U	0.020 U	0.020 U	**0.384**	**0.028**	0.020 U	0.020 U	0.020 U	**0.0742**	**0.0256**	**0.0379**	**0.0305**	**0.0215**	**0.0239**	0.020 U	0.020 UJ
Vinyl Chloride	0.11	0.0808	0.0376	0.0905	**0.209**	**0.369**	0.0628	**0.219**	**0.155**	0.0486	0.0613	0.072	0.144	0.126	0.0455	**0.183**	**0.176 J**
Total Metals (µg/L)																	
Arsenic	1.0	**7.71**	**10.6**	**20.5**	**32.8**	**7.03**	**10.8**	**10.8**	**7.18**	**7.38**	**12.2**	**15.6**	**11.8**	**6.72**	**7.00**	**9.94**	**11.4**
Copper	3.5	2.13	**3.86**	**9.25**	**27.6**	**2.2**	**6.12**	**3.89**	**2.86**	1.11	1.39	**4.68**	1.51	0.875	3.19	3.11	**5.96**
Lead	1.0	0.991	**1.02**	**7.44**	**15.1**	**1.07**	**2.58**	**1.98**	**1.33**	0.251	0.290	**1.36**	0.442	0.215	0.470	0.850	**1.65**

Analyte	Current Cleanup Level[4]	Well ID[3]															
		Downgradient Plume Area								CPOC Area							
		GW226S								GW232S							
		5/6/2019	8/12/2019	11/11/2019	3/9/2020	5/11/2020	8/10/2020	2/15/2021	8/10/2021	5/6/2019	8/12/2019	11/11/2019	3/9/2020	5/11/2020	8/10/2020	2/15/2021	8/10/2021
Volatile Organic Compounds (µg/L)																	
cis-1,2-Dichloroethene	0.03	0.0223	0.0259	0.0235	**0.0396**	**0.0305**	0.0218	0.020 U	**0.0335 J**	**0.319**	**0.378**	**0.659**	**0.221**	**0.352**	**0.482**	**0.219**	**0.464 J**
Tetrachloroethene	0.02	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	**0.0279**	0.020 U	**0.0202 J**	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 UJ
Trichloroethene	0.02	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 UJ	**0.0331**	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 UJ
Vinyl Chloride	0.11	0.0459	0.029	0.0615	0.038	0.0594	0.0415	0.0519	0.0516 J	**0.348**	**0.412**	**0.860**	**0.264**	**0.337**	**0.425**	**0.263**	**0.653 J**
Total Metals (µg/L)																	
Arsenic	1.0	**2.97**	**2.85**	**12.0**	**4.88**	**3.33**	**4.93**	**8.12**	**5.57**	**3.96**	**6.29**	**8.09**	**2.73**	**4.71**	**3.83**	**4.78**	**6.19**
Copper	3.5	0.500 U	0.626	**15.6**	**5.00**	0.704	1.48	**3.92**	1.48	1.15	0.878	**3.85**	2.22	0.539	0.627	2.09	1.79
Lead	1.0	0.100 U	0.100 U	**2.43**	0.500	0.190	0.136	0.513	0.124	0.167	0.102	0.378	0.354	0.100 U	0.100 U	0.318	0.262

TABLE D-2: SWMU-172 AND SWMU-174 GROUP HISTORICAL CONCENTRATIONS OF CONSTITUENTS OF CONCERN[1, 2]
Boeing Renton Facility, Renton, Washington

Analyte	Current Cleanup Level[4]	Well ID[3]															
		CPOC Area															
		GW234S								GW235I							
		5/6/2019	8/12/2019	11/11/2019	3/9/2020	5/11/2020	8/10/2020	2/15/2021	8/10/2021	5/6/2019	8/12/2019	11/11/2019	3/9/2020	5/11/2020	8/10/2020	2/15/2021	8/10/2021
Volatile Organic Compounds (µg/L)																	
cis-1,2-Dichloroethene	0.03	**0.0630**	**0.0738**	**0.0850**	**0.0984**	**0.092**	**0.0914**	0.020 U	**0.0892**	**0.109**	**0.0638**	**0.109**	**0.127**	**0.156**	**0.104**	**0.128**	**0.179**
Tetrachloroethene	0.02	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	0.020 U	0.020 U	**0.0292**	0.020 U
Trichloroethene	0.02	0.020 U	0.020 U	0.020 U	**0.0297**	0.020 U	0.020 U	0.020 U	0.020 U	**0.0342**	0.020 U	**0.0287**	**0.0336**	**0.031**	**0.0227**	0.020 U	**0.0285**
Vinyl Chloride	0.11	0.0235	0.0252	0.0309	0.0302	0.032	0.0279	0.020 U	0.0497	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	**0.24**
Total Metals (µg/L)																	
Arsenic	1.0	**2.22**	**1.31**	**10.1**	**27.4**	**5.31**	**3.26**	**6.29**	**1.18**	0.403	0.292	0.237	0.251	0.289	0.288	0.200 U	0.200 U
Copper	3.5	1.93	0.869	**33.2**	**32.9**	2.43	3.21	**11.4**	2.58	1.58	0.714	0.573	0.935	1.08	1.30	0.727	0.689
Lead	1.0	0.843	0.280	**15.5**	**11.8**	0.671	**1.25**	**4.13**	**1.01**	0.405	0.182	0.127	0.235	0.223	0.304	0.174	0.179

Analyte	Current Cleanup Level[4]	Well ID[3]							
		CPOC Area							
		GW236S							
		5/6/2019	8/12/2019	11/11/2019	3/9/2020	5/11/2020	8/10/2020	2/15/2021	8/10/2021
Volatile Organic Compounds (µg/L)									
cis-1,2-Dichloroethene	0.03	0.0281	**0.0468**	**0.108**	0.0241	**0.036**	**0.0881**	0.020 U	**0.0791**
Tetrachloroethene	0.02	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Trichloroethene	0.02	**0.0206**	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Vinyl Chloride	0.11	0.020 U	0.020 U	0.0437	0.020 U	0.020 U	0.020 U	0.020 U	0.0223
Total Metals (µg/L)									
Arsenic	1.0	**2.10**	**3.70**	**36.5**	**6.29**	**2.10**	**10.1**	**2.89**	**5.49**
Copper	3.5	2.17	0.893	**66.9**	**21.2**	**4.24**	**10.8**	**9.70**	2.47
Lead	1.0	**1.90**	**1.53**	**117**	**18.7**	**2.61**	**10.8**	**6.31**	**1.79**

Notes
1. Data qualifiers are as follows:
   U = The analyte was not detected at the reporting limit indicated.
   J = The value is an estimate.
2. **Bolded** values exceed the cleanup levels.
3. S = shallow well; I = intermediate well.
4. Current cleanup levels obtained from Table 2 of the Cleanup Action Plan and are based on each individual SWMU or AOC.

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

TABLE D-3: BUILDING 4-78/79 SWMU/AOC GROUP HISTORICAL CONCENTRATIONS OF CONSTITUENTS OF CONCERN [1, 2]

Boeing Renton Facility, Renton, Washington

Analyte	Current Cleanup Level[4]	Well ID[3]															
		Source Area															
		GW031S								GW033S							
		5/7/2019	8/13/2019	11/12/2019	3/11/2020	5/11/2020	8/11/2020	2/15/2021	8/11/2021	5/7/2019	8/13/2019	11/12/2019	3/11/2020	5/11/2020	8/11/2020	2/16/2021	8/11/2021
Volatile Organic Compounds (µg/L)																	
Benzene	0.80	**7.13**	**3.47**	**4.77**	**37.1**	**17.6**	**1.72 J**	**18.8 J**	**1.08**	**12.5**	**10.4**	**11.5**	**10.2**	**9.75**	**12.5**	**11.0**	**14.5**
cis-1,2-Dichloroethene	0.70	0.43	0.47	0.40	0.61	0.40 J	0.67 J	0.31 J	0.20 U	0.41	**0.78**	**2.78**	**21.4**	**39.5**	**188**	**1.64**	0.55
Trichloroethene	0.23	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	**0.25**	0.20 U	0.20 U
Vinyl Chloride	0.20	**0.29**	**0.21**	**0.25**	0.20 U	0.20 U	**0.32 J**	0.20 UJ	0.20 U	**0.53**	**1.16**	**13.0**	**52.2**	**87.3**	**310**	**5.31**	**2.31**
Total Petroleum Hydrocarbons (µg/L)																	
TPH-G (C7-C12)	800	**1020**	**1390**	**1540**	**2,980**	**1,880**	**1,160**	**2,340**	**1,540**	297	277	347	296	301	255	323	360

Analyte	Current Cleanup Level[4]	Well ID[3]															
		Source Area															
		GW034S								GW244S							
		5/7/2019	8/13/2019	11/12/2019	3/11/2020	5/11/2020	8/11/2020	2/15/2021	8/11/2021	5/7/2019	8/13/2019	11/12/2019	3/11/2020	5/11/2020	8/11/2020	2/15/2021	8/11/2021
Volatile Organic Compounds (µg/L)																	
Benzene	0.80	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	**1.47**	**1.77**	**0.87**	0.52	0.46	0.43	0.46	0.20 U
cis-1,2-Dichloroethene	0.70	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	**2.03**	0.37	0.20 U	0.68	**1.06**	**1.12**	0.68	0.22
Trichloroethene	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	0.23	0.20 U	0.20 U	**0.29**	0.20 U
Vinyl Chloride	0.20	0.20 U	**0.39**	**0.39**	0.20 U	**0.21**	**0.41**	**0.25**	**1.20**	**1.45**	**0.71**	**0.35**	**0.7**	**0.85**	**0.98**	**0.64**	**0.37**
Total Petroleum Hydrocarbons (µg/L)																	
TPH-G (C7-C12)	800	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U

Analyte	Current Cleanup Level[4]	Well ID[3]															
		CPOC Area															
		GW143S								GW237S							
		5/7/2019	8/13/2019	11/12/2019	3/10/2020	5/11/2020	8/11/2020	2/15/2021	8/11/2021	5/7/2019	8/13/2019	11/12/2019	3/10/2020	5/11/2020	8/11/2020	2/16/2021	8/11/2021
Volatile Organic Compounds (µg/L)																	
Benzene	0.80	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	**2.20**	0.43	0.66	**3.48**	**1.03**	0.24	**6.79 J**	0.20 U
cis-1,2-Dichloroethene	0.70	0.20 U	**2.20**	0.20 U	0.21	0.20 U	**1.17**	0.26	0.65	0.20 U	0.25	0.22	**1.00 U**	0.20 U	0.20 U	0.20 UJ	0.20 U
Trichloroethene	0.23	0.20 U	**1.05**	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	**1.00 U**	0.20 U	0.20 U	0.20 UJ	0.20 U
Vinyl Chloride	0.20	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	**0.38**	**0.34**	**1.00 U**	0.20 U	0.20 U	**0.31 J**	0.20
Total Petroleum Hydrocarbons (µg/L)																	
TPH-G (C7-C12)	800	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	329	100 U	**961**	729	100 U	100 UJ	360

TABLE D-3: BUILDING 4-78/79 SWMU/AOC GROUP HISTORICAL CONCENTRATIONS OF CONSTITUENTS OF CONCERN [1, 2]

Boeing Renton Facility, Renton, Washington

Analyte	Current Cleanup Level[4]	Well ID[3]							
		CPOC Area							
		GW240D							
		5/7/2019	8/13/2019	11/12/2019	3/10/2020	5/11/2020	8/11/2020	2/15/2021	8/11/2021
Volatile Organic Compounds (µg/L)									
Benzene	0.80	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	0.70	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	0.23	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Vinyl Chloride	0.20	**0.27**	**0.26**	**0.24**	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Total Petroleum Hydrocarbons (µg/L)									
TPH-G (C7-C12)	800	100 U	100 U	100 U	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.
   UJ = The result is estimated and was not detected at the reporting limit indicated.
   J = The value is an estimate.
2. **Bolded** values exceed the cleanup levels.
3. S = shallow well; D = deep well.
4. Current cleanup levels obtained from Table 2 of the Cleanup Action Plan and are based on each individual SWMU or AOC.

Abbreviations

µg/L = micrograms per liter
AOC = area of concern
CPOC = conditional point of compliance
SWMU = solid waste management unit
TPH-G = total petroleum hydrocarbons as gasoline

TABLE D-4: FORMER FUEL FARM HISTORICAL CONCENTRATIONS OF CONSTITUENTS OF CONCERN[1]

Boeing Renton Facility, Renton, Washington

Analyte	Current Cleanup Level[3]	Well ID[2]															
		CPOC Area															
		GW211S								GW221S							
		5/7/2018	11/12/2018	5/7/2019	11/11/2019	5/11/2020	8/10/2020	2/15/2021	8/10/2021	5/7/2018	11/12/2018	5/7/2019	11/11/2019	5/11/2020	8/10/2020	2/15/2021	8/10/2021
Total Petroleum Hydrocarbons (mg/L)																	
TPH-D (C12-C24)	0.5	0.272	0.341	0.124	0.120	0.282	0.192	0.284	0.140	**0.746**	**1.50**	**0.630**	**1.65**	**1.58**	**7.67**	**1.22**	**1.02**
Jet A	0.5	0.214	0.191	0.117	0.117	0.267	0.155	0.262	0.100 U	**0.635**	**0.863**	**0.397**	**1.09**	**1.09**	**5.70**	**0.89**	**0.718**

Analyte	Current Cleanup Level[3]	Well ID[2]							
		CPOC Area							
		GW224S							
		5/7/2018	11/12/2018	5/7/2019	11/11/2019	5/11/2020	8/10/2020	2/15/2021	8/10/2021
Total Petroleum Hydrocarbons (mg/L)									
TPH-D (C12-C24)	0.5	**0.560**	**1.56**	**0.256**	**1.46**	**0.675**	**1.08**	**0.584**	**1.08**
Jet A	0.5	**0.933**	**1.64**	**0.388**	**1.80**	**0.918 J**	**1.42**	**1.04**	**1.47**

Notes

1. **Bolded** values exceed the cleanup levels.
2. S = shallow well.
3. Current cleanup levels obtained from Table 2 of the Cleanup Action Plan and are based on each individual SWMU or AOC.

Abbreviations

AOC = area of concern
CPOC = conditional point of compliance
mg/L = milligrams per liter
SWMU = solid waste management unit
TPH-D = total petroleum hydrocarbons as diesel

TABLE D-5: AOC-003 HISTORICAL CONCENTRATIONS OF CONSTITUENTS OF CONCERN[1, 2]

Boeing Renton Facility, Renton, Washington

Analyte	Current Cleanup Level[4]	Well ID [3]															
		Source Area								Downgradient Plume Area							
		GW249S								GW188S							
		8/15/2018	11/13/2018	3/5/2019	8/14/2019	3/12/2020	8/10/2020	2/16/2021	8/12/2021	8/15/2018	11/13/2018	3/5/2019	8/14/2019	3/12/2020	8/10/2020	2/16/2021	8/12/2021
Volatile Organic Compounds (µg/L)																	
cis-1,2-Dichloroethene	0.78	0.0524	0.0829	0.079	0.0526	0.0604	NA	NA	NA	0.0386	0.0636	0.0493	0.0361	0.0362	NA	NA	NA
Tetrachloroethene	0.02	0.020 U	0.020 U	0.0105	0.020 U	0.020 U	NA	NA	NA	0.020 U	0.020 U	0.0107	0.020 U	0.0244	NA	NA	NA
Trichloroethene	0.16	0.020 U	0.020 U	0.0157	0.020 U	0.020 U	NA	NA	NA	0.020 U	0.020 U	0.0125	0.020 U	0.020 U	NA	NA	NA
Vinyl Chloride	0.24	**0.413**	**0.629**	**0.424**	**0.367**	**0.334**	**0.261**	**0.366**	**0.517**	**0.404**	**0.813**	**0.537**	**0.545**	**0.235**	**0.288**	**0.107**	**0.698**

Analyte	Current Cleanup Level[4]	Well ID [3]															
		CPOC Area															
		GW247S								GW248I							
		5/8/2019	8/14/2019	11/12/2019	3/12/2020	5/13/2020	8/10/2020	2/16/2021	8/11/2021	5/8/2019	8/14/2019	11/12/2019	3/12/2020	5/13/2020	8/10/2020	2/16/2021	8/11/2021
Volatile Organic Compounds (µg/L)																	
cis-1,2-Dichloroethene	0.78	0.0584	0.065	0.0635	0.039	0.584	NA	NA	NA	0.020 U	0.020 U	0.020 U	0.02 U	0.020 U	NA	NA	NA
Tetrachloroethene	0.02	0.020 U	0.020 U	0.020 U	0.02 U	0.020 U	NA	NA	NA	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	NA	NA	NA
Trichloroethene	0.16	0.020 U	0.020 U	0.148	0.02 U	0.020 U	NA	NA	NA	0.020 U	0.020 U	0.0514	0.020 U	0.020 U	NA	NA	NA
Vinyl Chloride	0.24	**0.497**	**0.613**	**0.504**	**0.305**	**0.409**	**0.392**	**0.405**	**0.678**	**0.551**	**0.541**	**0.62**	**0.499**	**0.546**	**0.383**	**0.426**	**0.711**

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. Current cleanup levels obtained from Table 2 of the Cleanup Action Plan and are based on each individual SWMU or AOC.

Abbreviations

µg/L = micrograms per liter
AOC = area of concern
CPOC = conditional point of compliance
NA = not analyzed
SWMU = solid waste management unit

TABLE D-6: AOC-004 HISTORICAL CONCENTRATIONS OF CONSTITUENTS OF CONCERN[1]

Boeing Renton Facility, Renton, Washington

Analyte	Current Cleanup Level[3]	Well ID[2]									
		Source Area									
		GW250S									
		3/1/2017	8/17/2017	3/6/2018	8/15/2018	3/5/2019	8/14/2019	3/9/2020	8/12/2020	2/16/2021	8/12/2021
Metals (mg/L)											
Lead	0.001	**0.0030**	0.00026	0.000941	**0.00107**	**0.00154**	0.000714	**0.00119**	**0.000611**	**0.000564**	**0.000663**

Notes

1. **Bolded** values exceed the cleanup levels.
2. S = shallow well.
3. Current cleanup levels obtained from Table 2 of the Cleanup Action Plan and are based on each individual SWMU or AOC.

Abbreviations

mg/L = milligrams per liter
AOC = area of concern
CPOC = conditional point of compliance
SWMU = solid waste management unit

TABLE D-7: AOC-060 HISTORICAL CONCENTRATIONS OF CONSTITUENTS OF CONCERN[1, 2]

Boeing Renton Facility, Renton, Washington

Analyte	Current Cleanup Levels[4]	Well ID[3]															
		Source Area								Downgradient Plume Area							
		GW009S								GW012S							
		3/6/2018	8/14/2018	3/5/2019	8/14/2019	3/10/2020	8/11/2020	2/17/2021	8/11/2021	3/6/2018	8/14/2018	3/5/2019	8/14/2019	3/10/2020	8/11/2020	2/17/2021	8/11/2021
Volatile Organic Compounds (µg/L)																	
cis -1,2-Dichloroethene	0.08	**0.0948**	**0.126**	**0.107**	**0.127**	**0.093**	**0.124**	**0.139**	**0.368**	**0.609**	**1.29**	**1.23**	**0.798**	**0.482**	**0.508**	**1.260**	**2.210**
Trichloroethene	0.02	**0.0252**	**0.0238**	**0.0239**	0.020 U	**0.0242**	**0.0324**	**0.0294**	**0.0316**	**0.0568**	**0.656**	**0.0546**	**0.0471**	**0.0505**	**0.0518**	**0.0454**	**0.0908**
Vinyl Chloride	0.26	0.241 J	**0.318**	**0.285**	**0.300**	0.183	0.219	**0.300**	0.160	**0.586**	**0.605**	**1.35**	**0.893**	**0.603**	**0.387**	0.180	**0.795**

Analyte	Current Cleanup Levels[4]	Well ID[3]															
		Downgradient Plume Area															
		GW014S								GW147S							
		3/6/2018	8/14/2018	3/5/2019	8/14/2019	3/10/2020	8/11/2020	2/17/2021	8/11/2021	3/6/2018	8/14/2018	3/5/2019	8/14/2019	3/10/2020	8/11/2020	2/17/2021	8/11/2021
Volatile Organic Compounds (µg/L)																	
cis -1,2-Dichloroethene	0.08	**0.134**	**0.122**	**0.119**	**0.143**	**0.151**	**0.0932**	**0.130**	**0.147**	**0.211**	**4.63**	**0.955**	**4.11**	**0.287**	**0.931**	**0.180**	**0.180**
Trichloroethene	0.02	**0.0347**	**0.0273**	**0.0254**	0.020 U	**0.0419**	0.020 U	**0.035**	**0.0227**	**1.91**	**4.23**	**0.475**	**1.46**	**1.20**	**3.37**	**0.498**	**0.498**
Vinyl Chloride	0.26	**0.266**	0.232 J	0.214	**0.365**	0.195	0.190	0.207	**0.367**	0.020 U	**1.07 J**	0.0514	0.215	0.020 U	0.0643	0.020 U	0.020 U

Analyte	Current Cleanup Levels[4]	Well ID[3]															
		CPOC Area															
		GW150S								GW253I							
		3/6/2018	8/14/2018	3/5/2019	8/14/2019	3/10/2020	8/11/2020	2/17/2021	8/11/2021	3/6/2018	8/14/2018	3/5/2019	8/14/2019	3/10/2020	8/11/2020	2/17/2021	8/11/2021
Volatile Organic Compounds (µg/L)																	
cis -1,2-Dichloroethene	0.08	0.0388	0.0506	0.0737	**0.0824**	0.0525	**0.0935**	0.0393	**0.0991**	**0.0991**	0.0796	**0.127**	**0.0917**	**0.0915**	**0.0879**	**0.140**	**0.106**
Trichloroethene	0.02	0.020 U	**0.0305**	0.020 U	**0.0228**	0.02 U	**0.0291**	0.020 U	0.020 U	0.020 U	**0.0204**	**0.0221**	0.020 U	**0.0212**	**0.0211**	**0.0272**	**0.0202**
Vinyl Chloride	0.26	0.0596	0.0203	0.103	0.020 U	0.0541	0.0619	0.0455	0.122	0.132	0.113	0.143	0.131	0.184	0.100	0.243	0.146

Notes:

1. Data qualifiers are as follows:
   U = The analyte was not detected at the reporting limit indicated.
   J = The value is an estimate.
2. **Bolded** values exceed the cleanup levels.
3. S = shallow well; I = intermediate well.
4. Current cleanup levels obtained from Table 2 of the Cleanup Action Plan and are based on each individual SWMU or AOC.

Abbreviations:

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

TABLE D-8: AOC-090 HISTORICAL CONCENTRATIONS OF CONSTITUENTS OF CONCERN[1, 2]
Boeing Renton Facility, Renton, Washington

Analyte	Current Cleanup Levels[4]	Well ID[3]															
		Source Area								Downgradient Plume Area							
		GW189S[5]								GW176S							
		3/5/2018	8/13/2018	3/5/2019	8/12/2019	3/11/2020	8/12/2020	2/17/2021	8/12/2021	3/5/2018	8/13/2018	3/5/2019	8/12/2019	3/11/2020	8/12/2020	2/17/2021	8/17/2021
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	0.020 U	NM	NM	NM
1,1,2-Trichloroethane	0.2	0.20 U	**2.00 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	NM	NM	NM
1,1-Dichloroethene	0.057	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.0529	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	NM	NM	NM
Acetone	300	5.00 U	70	5.00 U	5.0 U	5.0 U	5.00 U	10.6 J	5.00 U	5.00 U	5.00 U	5.00 U	5.0 U	5.0 U	NM	NM	NM
Benzene	0.8	0.55	**2.42**	0.20	0.49	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	NM	NM	NM
Carbon Tetrachloride	0.23	0.20 U	**2.00 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	NM	NM	NM
Chloroform	2	0.20 U	**2.23**	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	NM	NM	NM
cis-1,2-Dichloroethene	2.4	1.74	**22.3**	0.92	**6.87**	0.20 U	1.93	0.47	**3.15**	0.26	0.27	0.25	0.27	0.25	NM	NM	NM
Methylene Chloride	2	1.00 U	**10.9 UJ**	1.00 U	1.0 U	1.0 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.0 U	1.0 U	NM	NM	NM
Tetrachloroethene	0.05	0.020 U	**0.20 U**	0.028	0.020 U	0.0263	0.020 U	0.0283	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	NM	NM	NM
Toluene	75	6.34	21.7	4.96	3.11	0.20 U	1.05	5.21	2.42	0.42	0.20 U	0.20 U	0.20 U	0.20 U	NM	NM	NM
trans-1,2-Dichloroethene	53.9	0.48	2.00 U	0.20 U	0.39	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	NM	NM	NM
Trichloroethene	0.08	**0.224**	**2.38**	**0.156**	**0.414**	0.0745	**0.324**	**0.143**	**0.386**	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	NM	NM	NM
Vinyl Chloride	0.13	**0.508 J**	**2.09 J**	**0.50**	**1.20**	0.020 U	**0.369**	0.0405	**0.575**	**0.208**	**0.230**	**0.294**	**0.301**	**0.207**	**0.232**	**0.138**	**0.431**
Total Petroleum Hydrocarbons (µg/L)																	
TPH-G (C7-C12)	800	**1,860**	**9,440**	**1,070**	**943**	189	699	507	504	100 U	100 U	100 U	100 U	100 U	NM	NM	NM
TPH-D (C12-C24)	500	200	**4,120**	362	432	100 U	150	**2160**	390	100 U	100 U	100 UJ	100 U	100 U	NM	NM	NM
TPH-O (C24-C40)	500	298	**2,000 U**	**522**	**853**	200 U	379	**3990**	**689**	200 U	200 U	200 UJ	200 U	200 U	NM	NM	NM

Analyte	Current Cleanup Levels[4]	Well ID[3]																							
		Shallow Zone CPOC Area																							
		GW178S								GW207S								GW208S							
		3/5/2018	8/13/2018	3/5/2019	8/12/2019	3/11/2020	8/12/2020	2/17/2021	8/12/2021	3/5/2018	8/13/2018	3/5/2019	8/12/2019	3/11/2020	8/12/2020	2/17/2021	8/12/2021	3/5/2018	8/13/2018	3/5/2019	8/12/2019	3/11/2020	8/12/2020	2/17/2021	8/12/2021
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	NM	NM	NM	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	NM	NM	NM	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	NM	NM	NM
1,1-Dichloroethene	0.057	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	NM	NM	NM	0.020 U	0.023	0.020 U	0.020 U	0.020 U	NM	NM	NM	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	NM	NM	NM
Acetone	300	5.00 U	5.00 U	5.54	5.0 U	5.0 U	NM	NM	NM	5.00 U	5.00 U	5.00 U	5.0 U	5.0 U	NM	NM	NM	5.00 U	5.00 U	5.00 U	5.0 U	5.0 U	NM	NM	NM
Benzene	0.8	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	NM	NM	NM	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	NM	NM	NM	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	NM	NM	NM
Carbon Tetrachloride	0.23	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	NM	NM	NM	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	NM	NM	NM	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	NM	NM	NM
Chloroform	2	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	NM	NM	NM	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	NM	NM	NM	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	NM	NM	NM
cis-1,2-Dichloroethene	2.4	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	NM	NM	NM	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	NM	NM	NM	0.20	0.20 U	0.21	0.20 U	0.20 U	NM	NM	NM
Methylene Chloride	2	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NM	NM	NM	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	NM	NM	NM	1.00 U	1.00 U	1.00 U	1.0 U	1.0 U	NM	NM	NM
Tetrachloroethene	0.05	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	NM	NM	NM	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	NM	NM	NM	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	NM	NM	NM
Toluene	75	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	NM	NM	NM	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	NM	NM	NM	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	NM	NM	NM
trans-1,2-Dichloroethene	53.9	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	NM	NM	NM	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	NM	NM	NM	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	NM	NM	NM
Trichloroethene	0.08	0.0214	0.0213	0.0213	0.020 U	0.021	NM	NM	NM	0.020 U	0.0388	0.020 U	0.0305	0.020 U	NM	NM	NM	0.020 U	0.0234	0.020 U	0.0293	0.020 U	NM	NM	NM
Vinyl Chloride	0.13	**0.409**	**0.378**	**0.392**	**0.3840**	**0.1840**	**0.141**	**0.224**	**0.182**	0.0300	**0.311 J**	0.0692	0.020 U	0.020 U	**0.377**	0.066	**0.232**	**0.388**	0.097	**0.437**	**0.245**	**0.419**	**0.343**	**0.349**	**0.313**
Total Petroleum Hydrocarbons (µg/L)																									
TPH-G (C7-C12)	800	100 U	100 U	100 U	100 U	100 U	NM	NM	NM	100 U	100 U	100 U	100 U	100 U	NM	NM	NM	100 U	100 U	100 U	100 U	100 U	NM	NM	NM
TPH-D (C12-C24)	500	100 U	100 U	100 UJ	100 U	100 U	NM	NM	NM	100 U	100 U	100 UJ	100 U	100 U	NM	NM	NM	100 U	100 U	100 UJ	100 U	100 U	NM	NM	NM
TPH-O (C24-C40)	500	200 U	200 U	200 UJ	200 U	200 U	NM	NM	NM	200 U	200 U	200 UJ	200 U	200 U	NM	NM	NM	200 U	200 U	200 UJ	200 U	200 U	NM	NM	NM

Notes:
1. Data qualifiers are as follows:
   U = The analyte was not detected at the reporting limit indicated.
   J = The value is an estimate.
   UJ = The analyte was not detected at the estimated reporting limit indicated.
2. **Bolded** values exceed the cleanup levels.
3. S = shallow well.
4. Current cleanup levels obtained from Table 2 of the Cleanup Action Plan and are based on each individual SWMU or AOC.
5. GW189S is the replacement well for GW168S.

Abbreviations:
µg/L = micrograms per liter
AOC = area of concern
CPOC = conditional point of compliance
NM = Analyte not measured
SWMU = solid waste management unit
TPH-D = total petroleum hydrocarbons as diesel
TPH-G = total petroleum hydrocarbons as gasoline
TPH-O = total petroleum hydrocarbons as oil

TABLE D-9: APRON A HISTORICAL CONCENTRATIONS OF CONSTITUENTS OF CONCERN[1]

Boeing Renton Facility, Renton, Washington

Analyte	Well ID[2]							
	GW264S							
	5/7/2018	11/13/2018	5/7/2019	11/11/2019	5/12/2020	8/10/2020	2/15/2021	8/10/2021
Volatile Organic Compounds (µg/L)								
cis-1,2-Dichloroethene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.52	0.20 U	0.20 U
Vinyl Chloride	1.63	0.55	1.39	0.38	1.48	0.20 U	1.49	1.37

Notes:

1. Data qualifiers are as follows:

   U = The analyte was not detected at the reporting limit indicated.

2. S = shallow well

Abbreviations:

µg/L = micrograms per liter

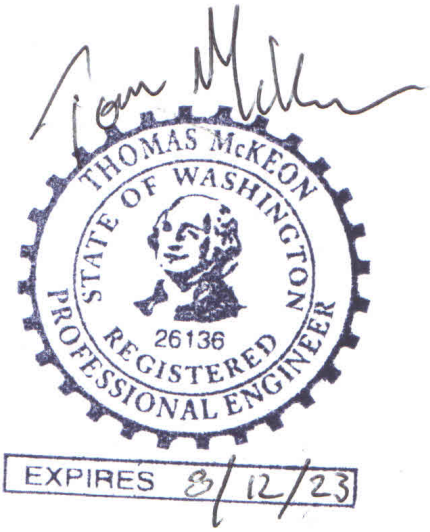
Appendix E

Summary of Remedial Actions

APPENDIX E

Summary of Remedial Actions at the Boeing Renton Facility
May 2021 – October 2021

Boeing Renton Site
Renton, Washington



Prepared for:
The Boeing Company
EHS Remediation

Prepared by:
CALIBRE Systems, Inc.
Project No. T0014538

November 24, 2021

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Acronyms

AOC	Area of Concern
Building 4-78/79	Building 4-78/4-79 SWMU/AOC Group
CALIBRE	CALIBRE Systems, Inc.
CMP	Compliance Monitoring Plan
EDR	Engineering Design Report
ERD	Enhanced Reductive Dechlorination
GAC	granular activated carbon
mg/L	milligrams per liter
PCE	Tetrachloroethene
PID	Photoionization detector
SVE	Soil Vapor Extraction
SWMU	Solid Waste Management Unit
TCE	Trichloroethene
Tech Memo	Technical Memorandum
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 between May 1, 2021 and October 31, 2021. The ongoing remedial actions include:

1. Operation of a 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 areas of concern (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 Tech Memo describing the remedial approach for *in situ* biodegradation treatment of benzene in groundwater near the 4-78/79 Building (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 location of SWMU-172/174 within the Facility is shown on Figure 1-1. The locations of the other AOCs and SWMUs where groundwater treatment is ongoing are also presented 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 during the reporting period stated above. 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
AOC-060
AOC-090
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

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 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 May to October 2021.

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 granular activated carbon (GAC) vessels, each filled with 1,800 pounds of 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 historically included two smaller vessels each containing 200 pounds of zeolite impregnated with permanganate for vinyl chloride treatment. Permanganate for vapor treatment was originally included in the design to treat potential vinyl chloride that, if present, would not be effectively captured in the GAC. Monitoring data has demonstrated that vinyl chloride is not present in the inlet air stream and permanganate treatment is not required or providing any benefit. The lag permanganate drum became plugged during the fourth quarter 2019 and was taken offline. The lead permanganate drum is still operating within the treatment system and may be discontinued in the future.

The SWMU-172/174 SVE system operated without issue during this monitoring period. 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 PID.

2.1.1 TO-15 Laboratory Analysis of Vapor Samples

No samples for TO-15 analysis were collected during this operating period. Table 2-1 summarizes the TO-15 detections for the SWMU-172/174 SVE system for 18 TO-15 sampling events[1] that have been implemented since system startup.

[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 detectable PCE levels in soil. During all subsequent reporting periods, 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 or using SVE-1 as an inlet vent well with continued extraction through SVE-2 and SVE-3. Vapor concentrations, measured with a PID, are monitored following these adjustments and additional modifications to alter the flushing pattern are made when vapor concentrations decline to previous low-level detections.

During this reporting period, the system operated with SVE-1 as an air inlet well with extraction at SVE-2 and SVE-3. PID vapor concentrations remained low and relatively unchanged at the operating wells and system influent during this operating period. Prior operational changes included swapping between wells and the data demonstrate that these concentrations remain at asymptotic levels and an evaluation of SVE system shutdown is planned. Table 2-2 shows the PID readings for the wells in the SWMU-172/174 SVE system and Table 2-3 shows an operational summary for the system. The operational logs are included in Attachment A.

2.1.3 Mass Removal Estimate

Between April 17, 2015 and October 29, 2021 the SWMU-172/174 SVE system has recovered an estimated 23.8 pounds of VOCs (primarily PCE), as shown in Table 2-3. Approximately 1.7 pounds of VOCs were removed during the current reporting period (May to October 2021) based on the PID measurements collected while the system was operating. The PID results from July 16, August 17, September 24, and October 8, 2021 were unusually high at that time and, if used, would overestimate VOC mass removal. Therefore, the prior week's PID measurements were used to estimate mass removal. While no noticeable paint odors were observed during these site visits, it is likely the PID was picking up other vapors from the paint shop in the 5-09 building; the area around the 5-09 building can, at times, have a noticeable paint odor. If paint odors are apparent in the area in the future then field screening at the system will be delayed. The cumulative VOC mass removal for the SWMU-172/174 SVE system is shown in Figure 2-2. The change in SVE system influent concentrations since the time of system startup is presented in Figure 2-3.

2.2 Recommended Next Steps for the SVE Systems

Vapor concentrations measured with PID during this reporting period show SVE-2, SVE-3, and the system influent have remained at reduced levels similar to prior asymptotic low-level concentrations (see Figure 2-3). Summa can samples for TO-15 analysis will be planned for the next reporting period to monitor changes in vapor concentrations, if observed.

SVE system shutdown and rebound testing is recommended following procedures outlined in the Engineering Design Report (AMEC 2014). The evaluation will also consider operating the SVE system in a pulsed mode in order to determine if there is any benefit to cyclical operation.

3.0 Ongoing Groundwater Treatment

Groundwater treatment is being implemented at several AOCs/SWMUs at the Renton Facility. The primary remedy being implemented is ERD of chlorinated solvents in targeted areas. The ERD treatment involves substrate injection using sucrose/fructose as a carbon source to stimulate biological degradation of the chlorinated solvents and nitrate/sulfate to anaerobically degrade benzene.. Continued treatment is evaluated on a semi-annual basis following review of groundwater sampling results. Site-wide groundwater sampling was conducted as part of the biannual monitoring program during this reporting period and the results are discussed in the main text of the summary report. Table 3-1 presents a summary of those groundwater monitoring results, by area, related to groundwater treatment/ERD implementation.

Beginning in late 2017, anaerobic biodegradation of benzene using nitrate and sulfate injections was implemented for a small area at the Building 4-78/79 area. Boeing has continued additional nitrate/sulfate injections in the area; the most recent injection was completed in January 2021 (ninth event). Boeing planned a removal action of fuel-contaminated soil at the Building 4-78/79 area in a work plan "Soil Excavation at Building 4-78/79 Area, Boeing Renton" submitted to the Washington Department of Ecology in January 2021 and approved on February 2, 2021 (CALIBRE 2021a). The removal action was completed in September 2021, in accordance with that work plan and summarized in a Tech Memo submitted to Ecology in October 2021 (CALIBRE 2021b). The soil excavation work required the decommissioning of wells previously used for benzene treatment in this area and two new horizontal injection wells were installed within the excavation footprint following completion of the removal action. Additional nitrate/sulfate injections are planned for this area in November 2021, utilizing similar target concentrations of nitrate and sulfate (1,600 mg/L and 800 mg/L, respectively) to what was injected during recent prior injection events.

4.0 Conclusions and Recommendations

Asymptotic low levels of vapor concentrations were observed at the SWMU 172/174 operating SVE wells and system influent during the May to October 2021 operating period (see Figure 2-3). Rebound testing is recommended in order to evaluate whether SVE operations should be discontinued. SVE system shutdown will be considered if the system continues to show asymptotic low level vapor concentrations following rebound testing. Boeing will coordinate with Ecology and seek agency concurrence prior to discontinuing SVE system operations.

A limited source-area excavation at the Building 4-78/79 benzene treatment area was completed in September 2021 and included the installation of two new horizontal injection wells for continued TPH/benzene treatment in groundwater (CALIBRE, 2021b). Additional nitrate/sulfate injections are planned based on the monitoring results from site-wide sampling completed during this reporting period.

Continued ERD treatment for VOCs in groundwater is planned in 2022 for the following areas: SWMU-172/174, Building 4-78/4-79 SWMU/AOC Group, AOC-003, AOC-060, AOC-090, and Apron A.

Upon completion of the Apron R construction work estimated for late 2022, the well monitoring network will be replaced and Boeing will evaluate if continued ERD treatment is needed for VOCs in groundwater in AOC 001/002.

Groundwater monitoring will continue in accordance with the EDR and approved updates to the Compliance Monitoring Plan (CMP), with supplemental VOC and TOC sampling at selected wells.

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.

CALIBRE 2019. Plan for Evaluation of Soils around Probe PP13 at Building 4-78/79 SWMU/AOC Group; Boeing Renton Site, Prepared by CALIBRE Systems, Inc. for The Boeing Company, EHS Remediation. April 29.

CALIBRE 2021a. Soil Excavation at Building 4-78/79 Area, Boeing Renton. Prepared by CALIBRE Systems, Inc. for The Boeing Company, EHS Remediation. January 2021.

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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	2-Butanone (Methyl Ethyl Ketone)	Benzene	Ethyl Benzene	Propylbenzene	Cumene	1,3,5-Trimethylbenzene	1,2,4-Trimethylbenzene	TPH ref. to Gasoline (MW=100)	Total Chlorinated	Total VOCs
4/17/2015	1,500	130	120	ND	ND	13	ND	ND	ND	ND	ND	ND	ND	ND	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	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	ND	ND	ND	ND	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	ND	ND	ND	ND	ND	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	ND	ND	ND	ND	ND	ND	ND	ND	256	257
12/14/2016	100	6.2	3.8	ND	ND	ND	ND	ND	ND	ND	ND	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	ND	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	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	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	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	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	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	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	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	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	NA	NA	NA	NA	NA	NA	NA	NA	36	36
6/20/2019	74	6.2	3.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	84	84
5/19/20 - Rebound Start	150	17	5.7	ND	ND	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	177	177
5/21/20 - Rebound 48 Hrs	120	230	5	ND	ND	2.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	358	358
9/23/2020	110	11	3.7	ND	ND	1.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	127	127
1/5/2021 (5-09-Influent A)	83	9.8	3.4	ND	ND	1.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	98	98
1/5/2021 (5-09-Influent B)	1.6	1.5	2.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.2	5.2
1/7/2021 ((5-09-Influent C)	75	6.0	2.3	ND	ND	1.8	ND	92	73	23	ND	8.7	ND	22	14	47	12	4.9	2.4	4.5	18	2200	85	2,607

SVE-1

Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1,1-TCA	1,1-DCA	Acetone	Toluene	m,p-Xylene	Chloroform	o-Xylene	Pentane	Hexane	2-Butanone (Methyl Ethyl Ketone)	Benzene	Ethyl Benzene	Propylbenzene	Cumene	1,3,5-Trimethylbenzene	1,2,4-Trimethylbenzene	TPH ref. to Gasoline (MW=100)	Total Chlorinated	Total VOCs
6/20/2019	10	1.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11	11

SVE-2

Date	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1,1-TCA	1,1-DCA	Acetone	Toluene	m,p-Xylene	Chloroform	o-Xylene	Pentane	Hexane	2-Butanone (Methyl Ethyl Ketone)	Benzene	Ethyl Benzene	Propylbenzene	Cumene	1,3,5-Trimethylbenzene	1,2,4-Trimethylbenzene	TPH ref. to Gasoline (MW=100)	Total Chlorinated	Total VOCs
8/30/2018	180	14	6.1	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	200	200
2/13/2019	48	3.3	2.8	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	54	54
6/20/2019	100	9.6	5.1	ND	ND	1.4	ND	ND	1.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	116	118
5/19/20 - Rebound Start	28	3.8	1.4	ND	ND	1.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	35	35
5/21/20 - Rebound 48 Hrs	20	3.4	2.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	26	26
9/23/2020	42	6.7	5.6	ND	ND	ND	ND	ND	ND	ND	1.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	54	56

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

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	2-Butanone (Methyl Ethyl Ketone)	Benzene	Ethyl Benzene	Propylbenzene	Cumene	1,3,5-Trimethylbenzene	1,2,4-Trimethylbenzene	TPH ref. to Gasoline (MW=100)	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	ND	ND	ND	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	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	ND	ND	ND	ND	ND	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	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	ND	ND	ND	ND	ND	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	ND	ND	ND	ND	ND	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	ND	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	ND	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	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	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	ND	ND	ND	ND	ND	ND	ND	ND	348	348
5/19/20 - Rebound Start	350	49	14	ND	ND	10	2.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	425	425
5/21/20 - Rebound 48 Hrs	290	240	9.8	ND	ND	5.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	546	546
9/23/2020	410	37	11	ND	ND	6.0	ND	ND	3.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	464	468

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	2-Butanone (Methyl Ethyl Ketone)	Benzene	Ethyl Benzene	Propylbenzene	Cumene	1,3,5-Trimethylbenzene	1,2,4-Trimethylbenzene	TPH ref. to Gasoline (MW=100)	Total Chlorinated	Total VOCs
4/17/2015	5.1	ND	ND	ND	ND	ND	ND	ND	ND	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	ND	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	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	ND	ND	ND	ND	ND	ND	ND	ND	25
9/12/2016	ND	ND	ND	ND	ND	ND	ND	ND	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	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	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

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

ND = non-detect

NA = not analyzed

DCE = Dichloroethene

PCE = tetrachloroethene

TCE = trichloroethene

Total Chlorinated = the sum of PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, 1,1,1-TCA, and 1,1-DCA.

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

Date	Days in Operation Since Startup [1]	SVE-01	SVE-02	SVE-03	VPC Inlet	VPC Mid	VPC Outlet	Notes
5/4/2021	1,979	Vent	23	142	136		0	Replaced hr meter
5/10/2021	1,985	Vent	67	255	176		0	
5/20/2021	1,995	Vent	55	200	206	14	0	Topped off oil
5/27/2021	2,002	Vent	50	385	274			
6/3/2021	2,009	Vent	56	232	272	0	0	
6/18/2021	2,024	Vent	130	282	320	19	0	
7/1/2021	2,037	Vent	191	271	342			
7/9/2021	2,045	Vent	5	88	445			
7/16/2021	2,052	Vent	229	263	1,327			
8/2/2021	2,069	Vent	11	293	278		0	Changed oil
8/17/2021	2,084	Vent	2	58	4,320			
8/23/2021	2,090	Vent	63	273	257		0	Topped off oil
9/10/2021	2,108	Vent	0	0	0		0	System down on arrival. Added oil and restart. Screen ~ 1 hr after restart.
9/24/2021	2,122	Vent	0	3,226	2,030			
10/8/2021	2,136	Vent	0	10,790	9,293			
10/15/2021	2,143	Vent	63	63	193		0	7 gallons of condensate
10/29/2021	2,157	Vent	27	304	236		0	2 gallons condensate

Notes:

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

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)
5/4/2021	136	79	105	38,781	0.092	22.18
5/10/2021	176	102	105	38,924	0.037	22.22
5/20/2021	206	120	105	39,163	0.073	22.29
5/27/2021	274	159	108	39,339	0.073	22.37
6/3/2021	272	158	105	39,499	0.064	22.43
6/18/2021	320	186	105	39,858	0.170	22.60
7/1/2021	342	198	105	40,175	0.160	22.76
7/9/2021	445	258	105	40,367	0.127	22.89
7/16/2021[3]	445	258	105	40,535	0.111	23.00
8/2/2021	278	161	108	40,942	0.172	23.17
8/17/2021[3]	278	161	105	41,301	0.148	23.32
8/23/2021	257	149	105	41,443	0.054	23.37
9/10/2021	0	0	105	41,778	0.000	23.37
9/24/2021[3]	257	149	105	42,113	0.128	23.50
10/8/2021[3]	257	149	105	42,452	0.129	23.63
10/15/2021	193	112	105	42,615	0.047	23.68
10/29/2021	236	137	105	42,953	0.118	23.79

Notes:

PID = photoionization detector

ppbv = parts per billion by volume

cfm = cubic feet per minute

lbs = pounds

[1] A correction factor of 0.58 has been applied to the PID vapor measurement for VOCs based on the mixture of analytes detected in the TO-15 analysis at the influent sample point from 1/5/21. This number is much higher than the TO-15 results.

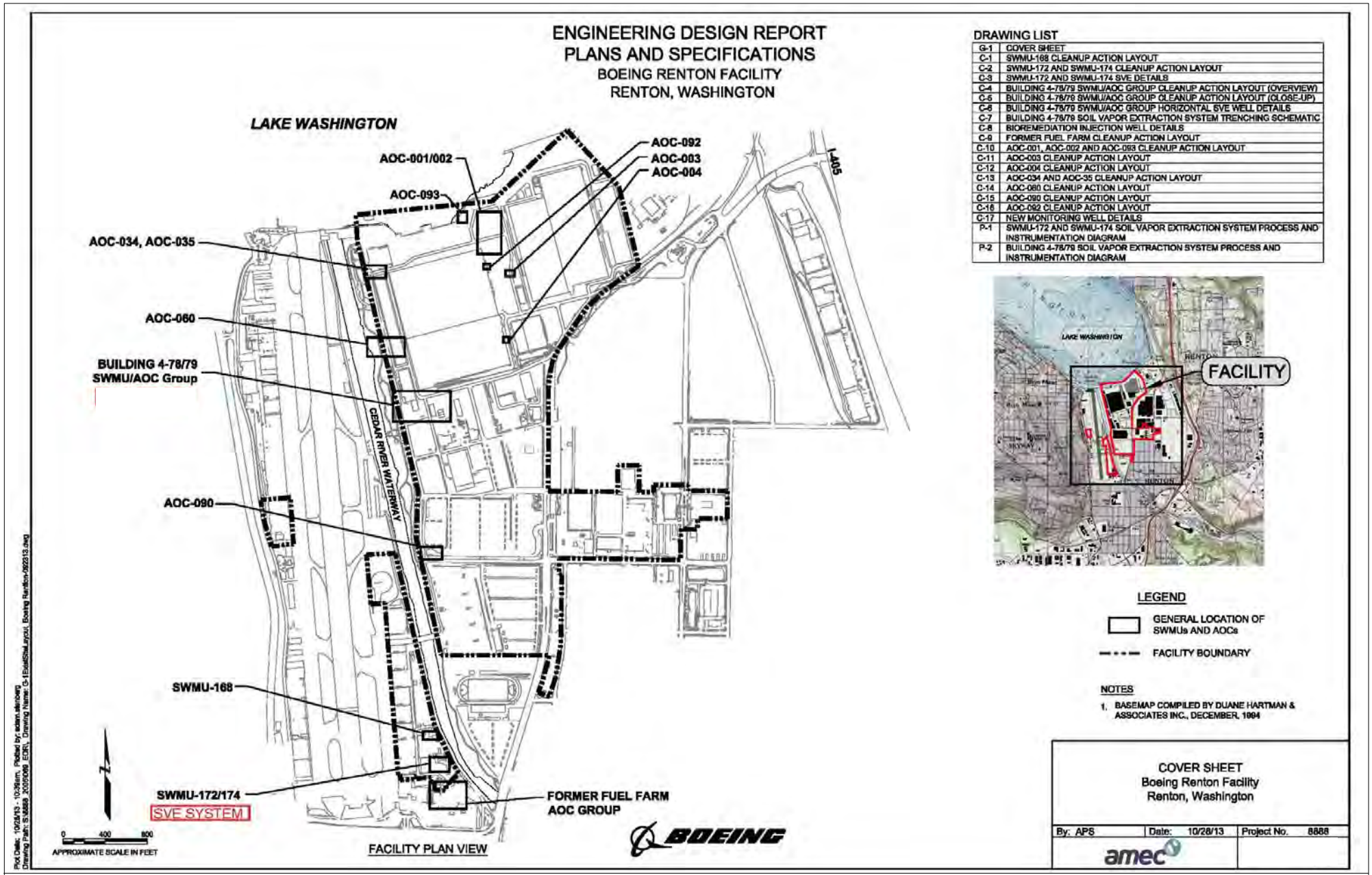
[2] These are based soley on the PID measurements collected this period; the prior TO-15 analyses indicates much lower mass.
TO-15 analysis results showed Tetrachloroethene made up 88% of the total VOCs removed at the influent on 1/5/21.

[3] The PID readings from this week are significantly higher than the laboratory results and if used, would overestimate the mass removal.
Prior week PID readings have been used instead to estimate mass removal.

Table 3-1 Groundwater Monitoring Results Summary August 2021 and Recommended ERD Treatment

GW Treatment Area	Source and down gradient MWs	CPOC wells	Treatment IWs	ERD Treatment Recommendation
SWMU-172/174	PCE at or less than 0.09 ug/L; TCE is less than 0.13 ug/L; cisDCE less than 1.4 ug/L and VC less than 0.60 ug/L.	All detections are at or below 0.65 ug/L	*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.*	**Recommend additional injections to continue driving CVOCs down.**
Building 4-78/4-79 SWMU/AOC Group	TCE is nondetect, cisDCE is under 0.55 ug/L in all samples; VC is higher in GW033S (at 2.31 ug/L). Benzene reduced in source well GW031S (1.08 ug/L) and around the same in GW033S (14.5 ug/L). TPH-G remain above criteria at GW031S. Soil excavation completed Sept 2021 after monitoring.	All samples are ND or below cleanup levels.	*Prior data May 2017, 4 of 5 wells with low detections where sum of CVOCs are less than 3 ug/L*	**Recommend substrate injection in selected IWs/areas around GW033S for ERD, Nitrate/sulfate injections in two new injection galleries near former GW031S.**
AOC-001/002	*Prior data Mar 2020: Source MW: TCE is 0.03 ug/L, cisDCE is 0.49 ug/L and VC is 0.27 ug/L.*	*Prior data Aug 2019: All detections below 0.30 ug/L.*	*Prior data Mar 2018, detections at or below 0.30 ug/L.*	**Site still not accessible due to construction**
AOC-003	VC less than 0.8 ug/L.	VC less than 0.8 ug/L.	*Prior data May 2017 one of four IWs sampled – VC detection less than 0.30 ug/L*	**Recommend additional injections to continue driving CVOCs down.**
Lot 20 / former 10-71	*Prior data May 2020 - All wells are ND.*	-	-	**No action at this time.**
AOC-60	Treatment MWs with total CVOCs less than 6.1 ug/L, other MWs with total CVOCs less than 0.56 ug/L, primarily cis-1,2DCE and VC.	MW's with total CVOCs less than 0.30 ug/L, primarily as cis-1,2DCE and VC.	-	**Recommend additional injections to continue driving CVOCs down.**
AOC – 90	Source with total CVOCs 4.11 ug/L, primarily cis-1,2DCE; down gradient well with VC at 0.43 ug/L.	VC detections less than 0.32 ug/L.	-	**Recommend additional injections to continue driving CVOCs down.**
Apron A	cis-1,2DCE is nondetect and VC reduced to 1.37 ug/L	-	-	**Recommend additional injections to continue driving CVOCs down.**
SWMU-168	-	VC estimated at 0.36	-	**Consider additional injections if beneficial after review of future sample results.**
Building 4-70	-	*Prior data March 2020, total CVOCs less than 0.63 ug/L.*	-	**No action at this time.**

FIGURES



CALIBRE Systems, Inc.

Figure 1-1 Site Location/ AOC Outlines

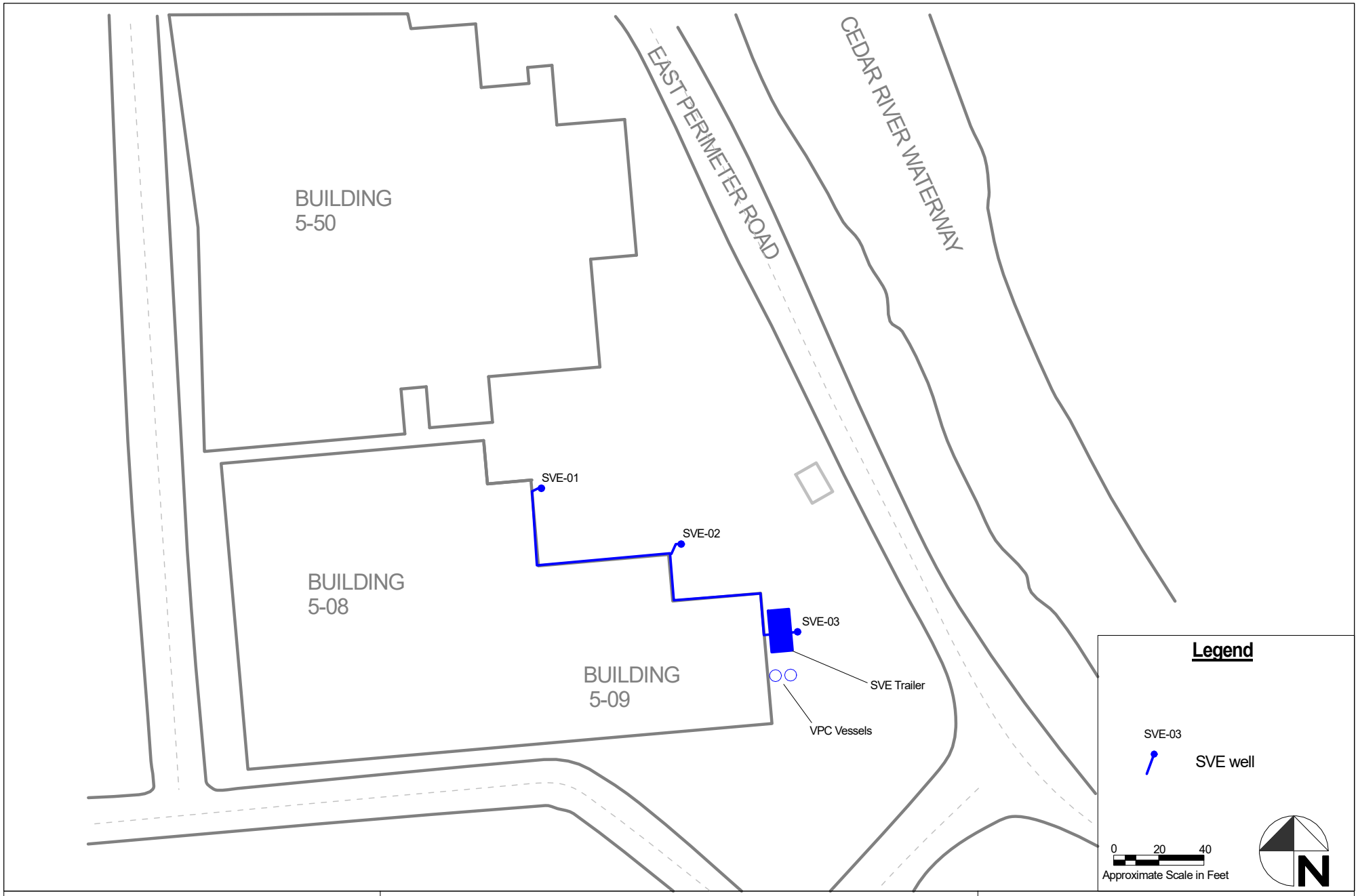


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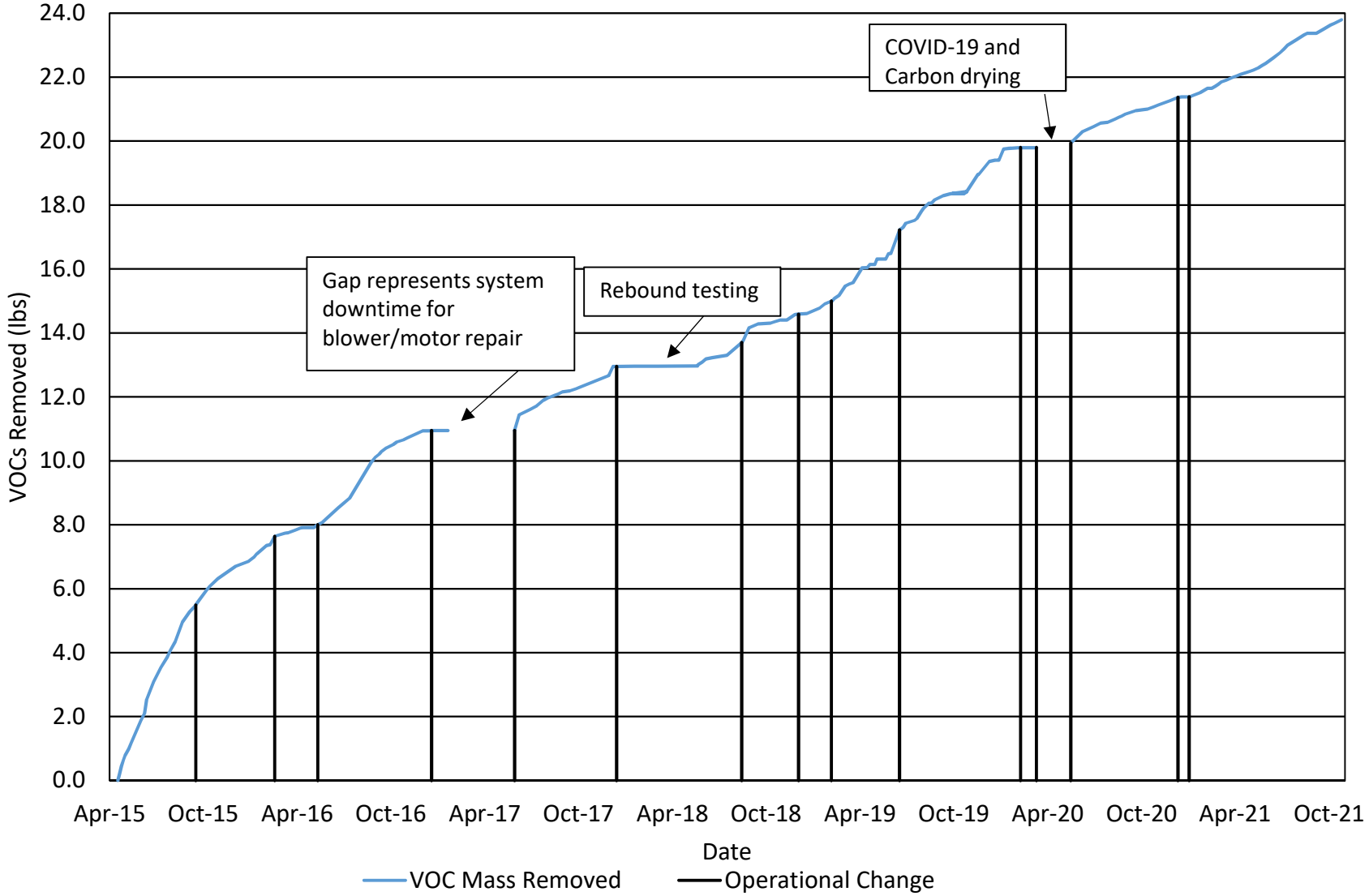
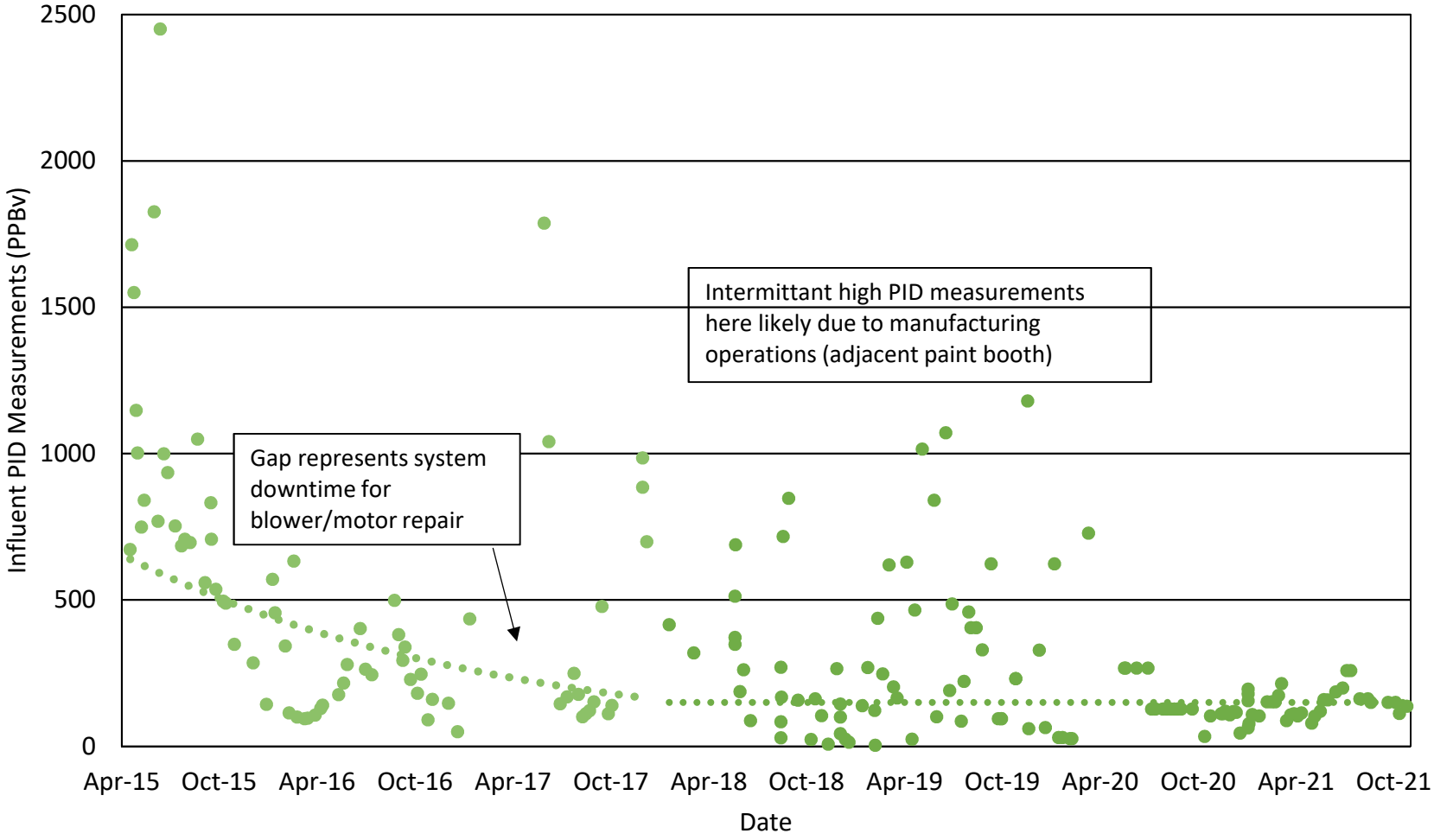
Figure 2-1 SWMU-172/174 Area
SVE System Layout

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.
Feb 2020 - System adjusted to dry carbon with hot ambient air due to condensate
Mar 2020 to May 2020 - System shut down due to Govenors Stay at Home order related to Covid-19

Figure 2-3 Influent PID Measurements - 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: 5/4/21 Date of last inspection: 4/15/21

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: 0930	Motor Hours: 0.0 (Installed new hr meter

Blower	Current Value	Other Notes
Vacuum gauge	31" H_2O	No condensate
Pressure gauge	3" H_2O	
System flow rate	1055 cfm	
Blower Temperature	109°F	
Temp.at lag VPC discharge		

Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration

PID Model: PPB RAE 3000 Details: 0 ppb / 9,999 ppb

Calibration time/ date: 5/4/21 0930 PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01							
SVE-02		20 ppb	25 ppb				
SVE-03		136 ppb	147 ppb				
VPC Inlet		132 ppb	140 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) 5/4/21 (Date)

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

Inspection Date: 5/10/21 Date of last inspection: 5/4/21

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: 0840		Motor Hours: 143
Blower	**Current Value**	**Other Notes**
Vacuum gauge	30" H_2O	No condensate in knockout
Pressure gauge	5" H_2O	
System flow rate	105 SCFM	
Blower Temperature	112°F	
Temp.at lag VPC discharge	Not Taken	
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPB RAE 3000			Details: 0ppb / 10.01 ppb				
Calibration time/ date: 5/10/21 0840			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	Venting						
SVE-02	0915	43 ppb	51 ppb	2" H_2O		>5" H_2O	
SVE-03	0925	269 ppb	240 ppb	10" H_2O		>5" H_2O	
VPC Inlet	0900	170 ppb	181 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] (Signature) 5/10/21 (Date)

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

Inspection Date: 5/20/21 Date of last inspection: 5/10/21

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: 0826		Motor Hours: 3828
Blower	**Current Value**	**Other Notes**
Vacuum gauge	33"H_2O	Topped off blower oil
Pressure gauge	5"H_2O	
System flow rate	105 scfm	
Blower Temperature	109°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: 5/20/21 0830	PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01		vent					
SVE-02	0910	60 ppb	50 ppb				
SVE-03	0858	197 ppb	202 ppb				
VPC Inlet	0850	202 ppb	210 ppb				
VPC Midpoint	0845	18 ppb	10 ppb				
VPC Outlet	0840	0 ppb	0 ppb				
Other vapor point _____							

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

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Signature: Justin Neste (Printed Name) _____ (Signature) 5/20/21 (Date)

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

Inspection Date: 5/27/21 Date of last inspection: 5/20/21

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: 1322		Motor Hours: 558.7
Blower	**Current Value**	**Other Notes**
Vacuum gauge	31 "H20	
Pressure gauge	7 "H20	
System flow rate	108 scfm	
Blower Temperature	115 °F	
Temp.at lag VPC discharge	\	
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPBRAE 3000		Details: 0 / 10.03 ppm	
Calibration time/ date: 5/27/21 1322		PID check after monitoring:	

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01							
SVE-02		56 ppb	44 ppb				
SVE-03		382 ppb	388 ppb				
VPC Inlet		276 ppb	271 ppb				
VPC Midpoint							
VPC Outlet							
Other vapor point _____							

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

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

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Signature _____ Printed Name _____ Signature _____ Date

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

Inspection Date: 6/3/21 Date of last inspection: 5/27/21

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: 0834		Motor Hours: 718.9
Blower	**Current Value**	**Other Notes**
Vacuum gauge	31 "H_2O	
Pressure gauge	5" H_2O	
System flow rate	105 SCFM	
Blower Temperature	114°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPB RAE 3000 Details: 0 PPB / 10.13 ppm

Calibration time/ date: 6/3/21 0834 PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01							
SVE-02	0930	50 ppb	62 ppb				
SVE-03	0920	261 ppb	202 ppb				
VPC Inlet	0905	301 ppb	242 ppb				
VPC Midpoint	0900	0 ppb	0 ppb				
VPC Outlet	0845	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 a Pure Lassen (Printed Name) (Signature) 6/3/21 (Date)

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

Inspection Date: 6/18/21 Date of last inspection: 6/3/21

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

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 0730		Motor Hours: 1077.9
Blower	**Current Value**	**Other Notes**
Vacuum gauge	30 "H2O	
Pressure gauge	5" H2O	
System flow rate	105 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: 0.0 ppb / 10.00 ppm
Calibration time/ date: 6/18/21 0735	PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01							
SVE-02	0815	134 ppb	126 ppb				
SVE-03	0825	290 ppb	273 ppb				
VPC Inlet	0805	330 ppb	309 ppb				
VPC Midpoint	0755	24 ppb	13 ppb				
VPC Outlet	0750	0 ppb	0 ppb				
Other vapor point ____							

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

Questions? Call Justin Neste @ (360) 981-5606
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Signature Justin Neste (Printed Name) (Signature) 6/18/21 (Date)

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

Inspection Date: 7/1/21 Date of last inspection: 6/18/21

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: 1394.3
Blower	**Current Value**	**Other Notes**
Vacuum gauge	30" H_2O	
Pressure gauge	5" H_2O	
System flow rate	105 SCFM	
Blower Temperature	119°F	
Temp.at lag VPC discharge	✓	
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

4175 Amps
PTW in F
B78-17 4.00
B78-20 4.35

PID Model: PPB RAE 300				Details: 0.0 / 10.12 ppm			
Calibration time/ date: 7/1/21 1210				PID check after monitoring:			
Sampling Point	**Time**	**PID Reading (1)**	**PID Reading (2)**	**Vacuum**	**Flow Rate (gauge)**	**Differential Pressure**	**Flow Rate Calculated[1]**
SVE-01							
SVE-02		179 ppb	202 ppb				
SVE-03		329 ppb	213 ppb				
VPC Inlet		387 ppb	296 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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Signature _____ Printed Name _____ Signature _____ Date

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

Inspection Date: 7/9/21 Date of last inspection: 7/1/21

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: 1586.3
Blower	**Current Value**	**Other Notes**
Vacuum gauge	30"	
Pressure gauge	10 " H20	
System flow rate	105 scfm	
Blower Temperature	127°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPB RAE 3000			Details: 0 / 10.02 ppm				
Calibration time/ date: 7/9/21 1210			PID check after monitoring:				
Sampling Point	**Time**	**PID Reading (1)**	**PID Reading (2)**	**Vacuum**	**Flow Rate (gauge)**	**Differential Pressure**	**Flow Rate Calculated[1]**
SVE-01							
SVE-02		0 ppb	10 ppb				
SVE-03		129 ppb	47 ppb				
VPC Inlet		473 ppb	416 ppb				
VPC Midpoint							
VPC Outlet							
Other vapor point _____							

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

Questions? Call Justin Neste @ (360) 981-5606
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Signature _____ Printed Name _____ Signature _____ Date

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

Inspection Date: 7/16/21 Date of last inspection: 7/9/21

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

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 1240		Motor Hours: 1754.8
Blower	**Current Value**	**Other Notes**
Vacuum gauge	30" H_2O	
Pressure gauge	5" H_2O	
System flow rate	105 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: PPB RAE 3000			Details: 0.0 / 10.08 ppm				
Calibration time/ date: 7/16/21 1240			PID check after monitoring:				
Sampling Point	**Time**	**PID Reading (1)**	**PID Reading (2)**	**Vacuum**	**Flow Rate (gauge)**	**Differential Pressure**	**Flow Rate Calculated[1]**
SVE-01							
SVE-02		208 ppb	250 ppb				
SVE-03		268 ppb	257 ppb				
VPC Inlet		1408 ppb	1246 ppb				
VPC Midpoint							
VPC Outlet							
Other vapor point _____							

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

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

Signature _____ Printed Name _____ Signature _____ Date

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

Inspection Date: 8/2/21 Date of last inspection: 7/16/21

Periodic systems check:

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

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

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 1130		Motor Hours: 2161.5
Blower	**Current Value**	**Other Notes**
Vacuum gauge	30 "H20	Changed Blower Oil
Pressure gauge	5 "H20	
System flow rate	88 SCFM	
Blower Temperature	127°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPB RAE 3000	Details: 0.0 / 10.01 ppm
Calibration time/ date: 8/2/21 1130	PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01							
SVE-02	1220	12 ppb	16 ppb				
SVE-03	1210	302 ppb	284 ppb				
VPC Inlet	1200	282 ppb	274 ppb				
VPC Midpoint							
VPC Outlet	1150	0 ppb	0 ppb				
Other vapor point _____							

1. Flow rate calculated from the equation $F = 12.24 \times \sqrt{differential\ pressure}$.

Questions? Call Justin Neste @ (360) [illegible]

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

Signature Justin Neste (Printed Name) [signature] (Signature) 8/2/21 (Date)

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

Inspection Date: 8/17/21 Date of last inspection: 8/2/21

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: 1113	Motor Hours: 25209	
Blower	**Current Value**	**Other Notes**
Vacuum gauge	30" H_2O	
Pressure gauge	5" H_2O	
System flow rate	1055 CFM	
Blower Temperature	117°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPB RAE 3000	Details: 0.0 | 10.01 PPM
Calibration time/ date: 8/17/21 1115	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	3 ppb				
SVE-03		60 ppb	53 ppb				
VPC Inlet		4,430 ppb	4,210 ppb				
VPC Midpoint							
VPC Outlet							
Other vapor point _____							

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

Questions? Call Justin Neste @ (360) 981-5606
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Signature _____ Printed Name _____ Signature _____ Date

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

Inspection Date: 8/23/21 Date of last inspection: 8/17/21

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: 0840		Motor Hours: 2662.4
Blower	**Current Value**	**Other Notes**
Vacuum gauge	32" H_2O	Top of Blower oil
Pressure gauge	5" H_2O	
System flow rate	105 SCFM	
Blower Temperature	117°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPB RAE 3000	Details: 0 / 9,997 ppb
Calibration time/ date: 8/23/21 0845	PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01							
SVE-02	0920	62 ppb	63 ppb				
SVE-03	0910	294 ppb	252 ppb				
VPC Inlet	0900	256 ppb	258 ppb				
VPC Midpoint							
VPC Outlet	0855	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) 8/23/21 (Date)

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

Inspection Date: 9/10/21 Date of last inspection: 8/23/21

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: 1055		Motor Hours: 2997.8
Blower	**Current Value**	**Other Notes**
Vacuum gauge	30" H2O	System Down. oil level low on S lobe Added oil & Restart. Screen @ 1210
Pressure gauge	10" H2O	
System flow rate	105 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:
Calibration time/ date: 9/10/21 1200	PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01							
SVE-02	1240	0 ppb	0 ppb				
SVE-03	1230	0 ppb	0 ppb				
VPC Inlet	1220	0 ppb	0 ppb				
VPC Midpoint							
VPC Outlet	1210	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] (Signature) 9/10/21 (Date)

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

Inspection Date: 9/24/21 Date of last inspection: 9/10/21

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: 0948		Motor Hours: 3332.7
Blower	**Current Value**	**Other Notes**
Vacuum gauge	32" H_2O	Added oil
Pressure gauge	5" H_2O	
System flow rate	105 SCFM	
Blower Temperature	116°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPBRAE 3000	Details: 0 / 10.16 ppm
Calibration time/ date: 9/24/21 0955	PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01							
SVE-02		0 ppb	0 ppb				
SVE-03		2,450 ppb	4,001 ppb				
VPC Inlet		2,350 ppb	1,710 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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Signature _____ Printed Name _____ Signature _____ Date

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

Inspection Date: 10/6/21 Date of last inspection: 9/24/21

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: 1256		Motor Hours: 3671.7
Blower	**Current Value**	**Other Notes**
Vacuum gauge	34" H_2O	
Pressure gauge	5" H_2O	
System flow rate	105 SCFM	
Blower Temperature	115°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPB 2AE 3000	Details: 0 / 10.10 PPM
Calibration time/ date: 10/8/21 1300	PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01							
SVE-02		0 ppb	0 ppb				
SVE-03		11,000 ppb	10,580 ppb				
VPC Inlet		8,800 ppb	9,785 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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Signature _____ Printed Name _____ Signature _____ Date

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

Inspection Date: 10/15/21 Date of last inspection: 10/8/21

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: 0748		Motor Hours: 3834.6
Blower	**Current Value**	**Other Notes**
Vacuum gauge	34" H20	7 gal Condensate Added oil to blower
Pressure gauge	10" H20	
System flow rate	1055 CFM	
Blower Temperature	111°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 / 9,993 ppb
Calibration time/ date: 10/15/21 0750	PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01							
SVE-02	0825	63 ppb	62 ppb				
SVE-03	0815	186 ppb	200 ppb				
VPC Inlet	0810	206 ppb	199 ppb				
VPC Midpoint							
VPC Outlet	0800	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) 10/15/21 (Date)

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

Inspection Date: 10/29/21 Date of last inspection: 10/15/21

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: 1036		Motor Hours: 4172.8
Blower	**Current Value**	**Other Notes**
Vacuum gauge	35 "H_2O	2 gal Condensate Topped off blower oil
Pressure gauge	8 "H_2O	
System flow rate	105 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: 0 / 10.04 ppm
Calibration time/ date: 10/29/21 1040	PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01							
SVE-02		35 ppb	41 ppb				
SVE-03		350 ppb	257 ppb				
VPC Inlet		245 ppb	226 ppb				
VPC Midpoint							
VPC Outlet		0	0				
Other vapor point _____							

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

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Signature _____ Printed Name _____ Signature _____ Date