GROUNDWATER MONITORING REPORT

RCRA CORRECTIVE ACTION PROGRAM
BOEING RENTON FACILITY
PROJECT # PS20203450.2022

Prepared for:

THE BOEING COMPANY

Seattle, Washington

NOVEMBER 30, 2022

GROUNDWATER MONITORING REPORT

RCRA CORRECTIVE ACTION PROGRAM
PROJECT LOCATION
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Prepared for:

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Seattle, Washington

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November 30, 2022

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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 point of compliance
CUL	cleanup level
DO	dissolved oxygen
Ecology	Washington State Department of Ecology
EDR	Engineering Design Report
ERD	enhanced reductive dechlorination
Facility	Boeing Renton facility
MA	monitored attenuation
MCL	Maximum contaminant level
MNA	monitored natural attenuation
MTCA	Model Toxics Control Act (Chapter 173-340 WAC)
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
TOC	total organic carbon
TPH	total petroleum hydrocarbons
VC	vinyl chloride
VOC	volatile organic compound

1 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 2022 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, 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: (MA);
- AOC-004: (MA);
- AOC-060: (bioremediation and MA);
- AOC-090: (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 submitted proposed updates to the CULs (CALIBRE, 2021) 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 2022 for the period from May 1 through October 31, 2022. In accordance with the requirements of the Order, corrective action activities were conducted at the Facility as described in this report.

1.1 WORK COMPLETED IN THE DRY SEASON OF 2022

The following work was completed during the dry season of 2022 (the period from May 1 through October 31):

- Boeing submitted the wet season 2022 Groundwater Monitoring Report to Ecology and City of Renton on May 27, 2022.
- CALIBRE completed the more recent bioremediation injections in June 2022. Areas injected were SWMU172/174, Building 4-78/79 (including injections for enhanced reductive dechlorination [ERD] and benzene treatment), AOC-060, AOC-090, Apron A, and AOC-003. See Section 3 for details.
- The soil vapor extraction (SVE) system in SWMU-172 and SWMU-174 operated throughout the dry season until October 24, 2022. The system was shut down temporarily, as approved by Ecology (Email communication to N. Garson, September 20, 2022). Boeing is retaining all equipment and infrastructure pending future discussions with Ecology regarding permanent shutdown and removal.
- CALIBRE installed monitoring wells GW-031S-R and GW-244S-R to replace wells GW0315 and GW244S, which were decommissioned during excavation activities in 2021.
- Landau Associates completed the 2022 site-wide dry season sampling from August 15 through 19, 2022.

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.

1.4 SCHEDULE OF MONITORING

Ecology approved the modifications to the monitoring plan in CMP Addendum #3 (CALIBRE, 2020) on July 31, 2020, changing to a sitewide semiannual sampling program with sampling events to occur 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 and will continue through 2023.

1.5 WORK PROJECTED FOR THE NEXT REPORTING PERIOD

The following work is projected for the upcoming 2023 wet season (November 1, 2022, to April 30, 2023):

- Surveying of the replacement wells in the Building 4-78/79 area and the Apron A area is planned for the next reporting period.
- Apron R construction schedule delays were incurred due to a recent concrete workers strike. Based on the most current schedule provided by the Boeing Facilities Group, ongoing Apron R construction activities at the Boeing Renton site are planned for completion in Summer 2023. Selected monitoring wells in the area of construction at Apron R were decommissioned in November 2019 and October 2022; four additional wells will be decommissioned in December 2022 or January 2023. Upon completion of the Apron R construction work, estimated for mid 2023, the Apron R wells that were a part of the CMP Addendum #1 sampling program area (AOC-001 and -002) will be replaced and Boeing will evaluate if continued ERD treatment is needed for VOCs in groundwater in AOC 001/002.The Apron R well abandonment memo (Wood, 2021) provides more details and a comprehensive list of the plan of wells to be decommissioned and/or replaced.
- A technical memorandum recommending decommissioning of wells that are no longer required for investigative, bioremediation, or compliance monitoring purposes was submitted to Ecology on January 5, 2022 (CALIBRE, 2022). Ecology approved the well decommissioning plan on January 18, 2022, and the decommissioning activities began in May 2022. Most wells approved for decommissioning within the Boeing Facility were closed by October 2022 (Phases 1 and 2 with 57 of 89 wells decommissioned). Wells in the City Park and on the Renton Airport side of the Cedar River have not yet been closed due to delays completing the City of Renton License Agreement. Phase 3, the remaining wells, are planned to be decommissioned in the Spring of 2023.
- Boeing recommended shutdown of the SVE system at SWMU 172/174 based on the shutdown criteria in the EDR and CMP, Ecology approved shutdown of the SVE system subject to the results of sub-slab vapor verification sampling and other criteria. The sub-slab sampling is planned for Winter 2023, subject to Ecology's approval of the work plan.
- Based on evaluation of the biannual monitoring data (see Table 3-1 in Appendix E), the following areas will be considered for continued ERD treatment of VOCs in groundwater: SWMU-172/174, Building 4-78/4-79 SWMU/AOC Group, AOC-060, and Apron A. The following areas, AOC-003 and AOC-090, will transition from the ERD program to Monitored Attenuation in accordance with the CAP.
- 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 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 also 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 CORRECTIVE ACTION ACTIVITIES COMPLETED DURING THE REPORTING PERIOD

This section describes the corrective action activities conducted at the Facility during the dry season of 2022. 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 for which sampling is required under CMP Addendum #3 (CALIBRE, 2020) and the groundwater elevation at the remaining well 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 this monitoring period.

3.1.2 COMPLIANCE MONITORING PLAN DEVIATIONS

No deviations from the CMP occurred for this area during this monitoring period. The wells monitored in this group and the COC remained the same.

3.1.3 WATER LEVELS

The groundwater elevation measured during this 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 on Figure 2 is based on historical information.

3.1.4 GROUNDWATER MONITORING RESULTS

Results for primary geochemical indicators are presented in Table 2; results for the single SWMU-168 COC, vinyl chloride, 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 6.22. The CPOC well showed reducing conditions with low dissolved oxygen (DO) and a low but positive 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

Table 3 lists the analytical result for the SWMU-168 area. The concentration of VC in the groundwater from CPOC area well GW230I was above the CUL of 0.11 micrograms per liter (µg/L), at 0.539 µg/L; this detection is below the maximum contaminant level (MCL) for VC (2.0 µg/L) but above Model Toxics Control Act (MTCA) Method C criterion for potable water supply (0.29 µg/L). The MTCA criteria for potable water supply values were proposed in the five-year review cleanup memo, which is currently pending Ecology response. Historical trends for VC in GW230I are shown in Appendix D and depicted on Figure 3. VC concentrations show an apparent seasonal pattern with higher concentrations in the dry season; the recent dry season concentration increased since the last monitoring event, in keeping with the trend.

3.2 SWMU-172 AND SWMU-174

This section describes corrective action activities conducted at these two SWMUs. The cleanup remedy for SWMU-172 and SWMU-174 is a combination of SVE, bioremediation, and MA. Figure 4 shows the layout of the groundwater monitoring wells for which sampling is required under CMP Addendum #3 (CALIBRE, 2020) 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 this monitoring period.

3.2.1.2 Soil Vapor Extraction and Bioremediation Operations

The SVE system operated throughout the dry season of 2022 until October 24, 2022. The system was shut down temporarily, as approved by Ecology (email to N. Garson, September 20, 2022). The last bioremediation injection was completed in June 2022, including ERD treatments. Details of system operations are included in the SVE operations and monitoring summary prepared by CALIBRE and included as Appendix E. All of the SVE system equipment and infrastructure has been retained pending future discussions with Ecology regarding permanent shutdown and removal.

3.2.2 COMPLIANCE MONITORING PLAN DEVIATIONS

No deviations from the CMP occurred for this area during this monitoring period. The wells monitored in this group and the COCs remained the same.

3.2.3 WATER LEVELS

The groundwater elevations measured during this groundwater monitoring event at SWMU-172 and SWMU-174 are summarized in Table 4 and shown on Figure 4. The groundwater elevation data show a flow direction generally to the southeast, 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 ranged between 220.1 and 781.0 microsiemens per centimeter across the area, which are normal observed values for the groundwater in this SWMU, with one exception: the specific conductivity in GW152S was 4,841.0 microsiemens per centimeter, which is significantly higher than past sampling events. pH was slightly acidic across SWMU-172 and SWMU-174. ORP was positive in well GW152S, and negative for all other wells; 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 1.52 to 2,389 milligrams per liter for all SWMU-172 and SWMU-174 monitoring wells.

3.2.4.2 COC Results for Source and Downgradient Plume Areas

Table 6 lists the analytical results for the SWMU-172 and SWMU-174 COCs. 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 are shown on Figure 5, in downgradient plume area wells GW172S and GW173S on Figure 6, and\in downgradient plume area well GW226S on Figure 7. Groundwater flows generally from the vicinity of source area well GW152S to downgradient plume area well GW172S; groundwater from source area well GW153S is also expected to generally flow toward the downgradient plume area. PCE and TCE are the chlorinated solvents that were used at the Facility, and cis 1,2-DCE and VC are breakdown products resulting from biodegradation processes.

As shown in Figures 5 through 7, the concentrations of VOCs 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 in this SWMU area. As shown on Figure 8, the arsenic concentrations in groundwater from source and downgradient plume area wells have generally remained stable over the past two years, with the exception of source area well GW152S. The observed range of arsenic in groundwater is within the naturally occurring background arsenic range reported by Ecology for Washington State (Ecology 2022).

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

- GW152S:cis-1,2-DCE, PCE, TCE, VC, arsenic, copper, and lead; and
- GW153S: cis-1,2-DCE, TCE, VC, and arsenic.

Downgradient plume area groundwater CUL exceedances (Table 6) consisted of:

- GW172S: cis-1,2-DCE, arsenic, and lead;
- GW173S: TCE and VC, and arsenic; and
- GW226S: VC and arsenic.

For both the source area and downgradient plume areas the detected concentrations of cis-1,2-DCE, PCE, and TCE are below both the MCLs and the MTCA criteria for potable water supply. For VC, the detected concentrations are below the MCL but are above the MTCA criteria for potable water supply.

3.2.4.3 COC Results for Conditional Point of Compliance Area

As shown in Table 6, cis-1,2-DCE was detected above the CUL in the groundwater from all CPOC area wells; TCE was detected above the CUL in the groundwater from GW235I; and VC was detected above the CUL in the groundwater from GW232S and GW234S. VC was also detected in GW235I, but below the CUL. Trend charts for cis-

1,2-DCE, TCE, and VC for all CPOC area wells are presented in Figure 9. Figure 9 shows the COCs in the CPOC area have increased since the previous sampling event, keeping in trend with the historical patterns of higher concentrations detected during the dry season event.

Arsenic was detected in the groundwater from all CPOC area wells except for GW235I, but only exceeded the CUL in the groundwater from well GW232S (Table 6) Lead and copper were detected in GW234S and 236S below the CUL, and lead was detected below the CUL in GW232S. Figure 10 shows arsenic, copper, and lead concentration trends in groundwater from the CPOC area wells since the beginning of compliance monitoring. As shown in Figure 10, these COCs have remained within a stable range or decreased since the last monitoring 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. The cleanup remedy for this SMWU/AOC group is bioremediation and MA as well as excavation of soils contaminated with total petroleum hydrocarbons (TPH); discontinuation of SVE was approved by Ecology on November 1, 2018, and the system was decommissioned during the first quarter of 2019. Figure 11 shows the location of the September 2021 TPH source area soil excavation, groundwater monitoring wells for which sampling is required under CMP Addendum #3 (CALIBRE, 2020), extraction wells, decommissioned wells, horizontal SVE wells, and bioremediation injection wells for this area.

3.3.1 CLEANUP ACTION ACTIVITIES

3.3.1.1 Installation/Construction Activities

Monitoring wells GW031S and GW244S were replaced during the dry season 2022. Surveying of the replacement wells is planned for the wet season 2023. Details on the replacement wells are included in Appendix E. No other installation or construction activities were conducted during this season.

3.3.1.2 Soil Vapor Extraction and Bioremediation Activities

SVE operations were discontinued in late 2018; anaerobic biodegradation of benzene by nitrate/sulfate injections is the current remediation method. Certain bioremediation injection wells are still sampled to monitor the status of COCs. Trend charts for cis-1,2-DCE and benzene in nitrate/sulfate injection wells are presented in Figure 12, and trend charts for TCE and VC in the injection wells are presented in Figure 13.

A nitrate/sulfate solution was injected in this area for benzene and ERD treatment in June 2022. More details are presented (Appendix E). These two wells are not regularly monitored; therefore, trend charts have not been created to include their results.

3.3.2 COMPLIANCE MONITORING PLAN DEVIATIONS

No deviations from the CMP occurred for this area during this monitoring period. The wells monitored in this group and the COCs remained the same.

3.3.3 WATER LEVELS

The groundwater elevations measured during this groundwater monitoring event at Building 4-78/79 SWMU/AOC group are summarized in Table 7 and shown on Figure 11. The observed direction of groundwater flow from the source area during August was generally westerly toward Building 4-79 and a piezometric low area.

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 Building 4-78/79 SWMU/AOC Group COCs 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 and CPOC area wells had moderate to low levels of DO and high specific conductivity. The pH was slightly acidic, ranging between 5.87 and 6.41 standard units in all wells. The source area wells showed reducing conditions favorable for dechlorination of VOCs. Results for the other primary geochemical indicators were generally consistent in all wells. TOC concentrations in source area wells ranged from 4.65 to 14.78 mg/L.

3.3.4.2 COC Results for Source Area

Table 9 lists the analytical results for Building 4-78/79 SWMU/AOC Group COCs. Figures 14 and 15 are trend charts showing historical trends for COCs for the source area wells.

VC was detected above the CUL in all the source area wells, and benzene was also detected above the CUL in source area well GW033S (and the duplicate sample). In the source area wells the detected concentrations of cis-1,2-DCE, and TCE are below both the MCLs and the MTCA criteria for potable water supply. For VC in the source area wells the detected concentrations are below the MCL but are above the MTCA criteria for potable water supply. TPH as gasoline was not detected above the CUL in any source area wells, which shows a significant improvement from the last dry season's TPH level likely attributed to the removal of TPH-contaminated soil which took place September 9 and 10, 2021.

Figure 14 shows trends for VOCs in source area wells GW031S and GW033S. COCs in GW033S appear to be stabilizing over the past four monitoring events.

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 ten monitoring events. Concentrations of COCs in GW244S have remained below the CUL (except VC) and appear to be stabilizing over the last three monitoring events for which samples were collected from this location (samples were not collected during wet season 2022).

3.3.4.3 COC Results for Conditional Point of Compliance Area

As shown in Table 6, cis-1,2-DCE and TCE were detected above their respective CULs in groundwater from GW143S. All other CPOC area results were below laboratory detection limits. Trend charts for CPOC area wells are shown in Figures 16 through 18.

Figure 16 shows that benzene and cis-1,2-DCE have been sporadically detected above the CUL in CPOC area wells GW237S and GW143S, respectively. However, benzene was not detected in any CPOC area wells during this monitoring period, and cis-1,2-DCE was detected only in GW143S. This improvement is also likely due to the removal of TPH-contaminated soil during the dry season of 2021.

Figure 17 shows that TCE has not been detected in the CPOC area for four consecutive events, with the exception of GW143S during this sampling event. VC was only detected in GW237S over the last six monitoring events and was not detected in any of the CPOC area wells during this event. Figure 18 shows that TPH as gasoline was detected only in GW237S since monitoring began and has been steadily decreasing, with no detections above the CUL during the last six monitoring events.

In the downgradient CPOC wells the measured concentrations of benzene, cis-1,2-DCE, TCE, and VC are below both the MCLs and MTCA criteria for potable water supply.

3.4 FORMER FUEL FARM AOC GROUP

This section describes corrective action activities conducted at the Former Fuel Farm AOC Group. Figure 19 shows the layout of the groundwater monitoring wells for which sampling is required under CMP Addendum #3 (CALIBRE, 2020). 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 this monitoring period.

3.4.2 COMPLIANCE MONITORING PLAN DEVIATIONS

No deviations from the CMP occurred for this area during this monitoring period. The wells monitored and the COCs remained the same for this group.

3.4.3 WATER LEVELS

The groundwater elevations measured during this groundwater monitoring event at the Former Fuel Farm AOC group 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 to the northeast is based on historical information from this AOC.

3.4.4 GROUNDWATER MONITORING RESULTS

Results for primary geochemical indicators are presented in Table 11; results for the Former Fuel Farm AOC Group COCs 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. Slightly acidic pH was observed in CPOC area wells ranging from 5.35 to 6.27 standard units. Low to moderate DO and low ORP was observed in all monitored wells. 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

Table 12 lists the analytical results for the Former Fuel Farm AOC group COCs. 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 (, as motor oil, and Jet A. TPH as diesel was detected above the CUL in GW221S and GW224S (and its duplicate sample). TPH as motor oil was not detected in any of the CPOC area wells. Jet A was detected above the CUL in GW221S, GW224S, and its associated duplicate sample. None of the COCs were detected in GW211S. It is worth noting that both TPH-D and Jet-A have been below the CUL in GW211S for the previous nine monitoring events. COC concentrations in GW221S remain in a stable range. Concentrations in GW224S appear to be decreasing steadily, with annual fluctuations in both TPH as diesel and Jet A.

3.5 AOC-001 AND AOC-002

Apron R near AOC-001 and AOC-002 is under construction. Therefore, no monitoring was conducted for this area during this monitoring period. Monitoring wells in these areas were decommissioned on November 25, 2019, and October 2022 (three wells). Four additional wells are scheduled to be decommissioned in December 2022 or January 2023. Monitoring wells are planned to be reinstalled after construction is complete, which is currently anticipated for late 2023. Groundwater monitoring activities are anticipated to resume in 2024 after the wells are replaced.

3.6 AOC-003

This section describes corrective action activities conducted at AOC-003. The cleanup remedy for this AOC is bioremediation and MA. Figure 21 shows the location of groundwater monitoring wells for which sampling is required under CMP Addendum #3 (CALIBRE, 2020) and bioremediation wells, 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 this monitoring period. A substrate injection for ERD treatment was implemented in June 2022.

3.6.2 COMPLIANCE MONITORING PLAN DEVIATIONS

No deviations from the CMP occurred for this area during this monitoring period. The wells monitored and COCs remained the same for this AOC.

3.6.3 WATER LEVELS

The groundwater elevations measured during this groundwater monitoring event at AOC-003 are summarized in Table 13 and shown on Figure 21. Groundwater elevations measured during this event are consistent with historical groundwater flow patterns to the northwest.

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

Table 15 lists the analytical results for the AOC-003 COCs. Samples from wells in this group were analyzed for VC. The concentrations in both the source area and downgradient plume area wells were above the CUL; the VC levels detected are below the MCL but remain above the MTCA criteria for potable water supply. The result for the source area well is qualified as estimated (see Appendix C for more information). Figure 22 shows the historical trends for 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 above the CUL in both CPOC area wells (Table 15). Figure 23 shows the historical trends for VC in CPOC area wells GW247S and GW248I. VC concentrations in GW248I appear to be increasing slightly (0.144 µg/L since the previous monitoring event) with annual fluctuations. The VC levels detected in CPOC wells (all below 1 µg/L) are below the MCL but remain above the MTCA criteria for potable water supply

3.7 AOC-004

This section describes corrective action activities conducted at AOC-004. The cleanup remedy for this AOC is bioremediation and MA. Figure 24 shows the location of the groundwater monitoring well for which sampling is required under CMP Addendum #3 (CALIBRE, 2020) and bioremediation wells, as well as the groundwater elevation measured during this monitoring event.

3.7.1 CLEANUP ACTION ACTIVITIES

No installation/construction activities were conducted for this cleanup action area during this monitoring period.

3.7.2 COMPLIANCE MONITORING PLAN DEVIATIONS

No deviations from the CMP occurred for this area during this monitoring period and COCs remained the same for this AOC.

3.7.3 WATER LEVELS

The groundwater elevation measured during this groundwater monitoring event at AOC-004 is summarized in Table 16 and shown on Figure 24. 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 6.82 standard units. Moderate specific conductivity, DO, and ORP readings were observed during this monitoring event.

3.7.4.2 COC Results for Source Area

Table 18 lists the analytical results for the AOC-004 COCs. The source area well in this group was analyzed for lead and the result was slightly above the CUL of 1 µg/L, at 1.31 µg/L. Figure 25 shows the historical trend chart for lead in GW250S.

3.8 AOC-060

This section describes corrective action activities conducted at AOC-060. The cleanup remedy for this AOC is bioremediation and MA. Figure 26 shows the location of groundwater monitoring wells for which sampling is required under CMP Addendum #3 (CALIBRE, 2020) and bioremediation wells, 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 this monitoring period. substrate injection for ERD treatment was implemented in June 2022.

3.8.2 COMPLIANCE MONITORING PLAN DEVIATIONS

No deviations from the CMP occurred for this area during this monitoring period. The wells monitored and COCs remained the same for this AOC.

3.8.3 WATER LEVELS

The groundwater elevations measured during this groundwater monitoring event at AOC-060 are summarized in Table 19 and shown on Figure 26. Groundwater flow direction is generally to the west southwest, toward the Cedar River Waterway.

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 DO. The pH ranged between near neutral and somewhat acidic in this AOC, between 4.62 and 6.29 standard units. TOC results from all wells varied greatly, with a range from 4.74 to 10,260 mg/L.

3.8.4.2 COC Results for Source and Downgradient Plume Areas

Table 21 lists the analytical results for the AOC-060 COCs. Wells in this group were analyzed for cis-1,2-DCE, TCE, and VC. Groundwater from all source area and downgradient plume area wells exceeded the CULs for all three COCs. In the source and downgradient plume area wells the detected concentrations of cis-1,2-DCE, and TCE are below both the MCLs and the MTCA criteria for potable water supply. For VC in the source and downgradient plume area wells the detected concentrations are below the MCL in all wells except GW147S which exceeds the MCL at 3.39 µg/L, and all samples are above the MTCA criteria for potable water supply.

The results for GW012S, GW014S, and its duplicate were qualified as estimated (details in Appendix C). Figure 27 shows historical trends for COCs in source area well 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. TCE in GW012S appears to have increased during this monitoring period, departing from its stabilization over the past several monitoring events, but still within the historical range for TCE concentrations in this well.

3.8.4.3 COC Results for Conditional Point of Compliance Area

As shown in the Table 21, groundwater from both CPOC area wells exceeded the CUL for cis-1,2-DCE and TCE. VC was detected in groundwater from both CPOC area wells but did not exceed the CUL. .In the downgradient CPOC wells the measured concentrations of cis-1,2-DCE, TCE, and VC are below both the MCLs and MTCA criteria for potable water supply. Figure 29 shows historical trends for COCs in CPOC area wells GW150S and GW253I. Considerable fluctuation is still present for cis-1,2-DCE and VC, but TCE appears to be stabilizing in both CPOC area wells.

3.9 AOC-090

This section describes corrective action activities conducted at AOC-090. The cleanup remedy for this AOC is bioremediation and MA. Figure 30 shows the location of groundwater monitoring wells for which sampling is required under CMP Addendum #3 (CALIBRE, 2020) and bioremediation wells, 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 this monitoring period. substrate injection for ERD treatment was implemented in June 2022.

3.9.2 COMPLIANCE MONITORING PLAN DEVIATIONS

During this sampling event, the water levels at GW010S and GW011D were inadvertently not measured. This is not a deviation from the CMP; however, it is a gap in data that is normally collected. No other deviations occurred during this monitoring period. The wells monitored and COCs remained the same for this AOC.

3.9.3 WATER LEVELS

The groundwater elevations measured during this groundwater monitoring event at AOC-090 are summarized in Table 22 and shown on Figure 30. Groundwater flow direction is to the west, toward the Cedar River Waterway; however, the sheet pile wall to the west of this area prevents a direct groundwater connection to the river, as depicted by the contours.

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 slightly acidic in this AOC, with all wells ranging between 5.25 and 5.87 standard units. Specific conductivity was moderate to high across the wells in this area and DO was relatively low. TOC was measured at 21.83 mg/L in source area well GW189S. The trend plot for TOC in GW189S shows TOC has decreased significantly since the last substrate injection in 2017 (Figure 31).

3.9.4.2 COC Results for Source and Downgradient Plume Areas

Table 24 lists the analytical results for the AOC-090 COCs. Groundwater from source area well GW189S exceeded the CUL for TCE, VC, TPH as diesel, and TPH as motor oil. Historical trends for GW189S show chlorinated VOCs have been trending downward since the start of monitoring, with seasonal fluctuations at a high during this monitoring event (Figure 31). Downgradient plume area well GW176S exceeded the CUL for VC. For the source area and downgradient plume area wells the measured concentrations of PCE and TCE are below both the MCLs and MTCA criteria for potable water supply. VC is below the MCL in all wells (source area, downgradient plume area, and CPOC wells) but remains above the MTCA criteria for potable water supply.

3.9.4.3 COC Results for Conditional Point of Compliance Area

Groundwater from all CPOC area wells exceeded the CUL for VC (Table 24).

3.10 APRON A AREA

This section describes corrective action activities conducted at the Apron A area. 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 for which sampling is required under CMP Addendum #3 (CALIBRE, 2020).

3.10.1 CLEANUP ACTION ACTIVITIES

No construction or operations work was conducted in the Apron A area during this monitoring period. A substrate injection for ERD treatment was implemented in June 2022.

3.10.2 COMPLIANCE MONITORING PLAN DEVIATIONS

During this sampling event, the water levels at GW263S and GW264S were inadvertently not measured. This is not a deviation from the CMP; however, it is a gap in data that is normally collected. No other deviations occurred during this monitoring period. The wells monitored in this group and COCs remained the same.

3.10.3 WATER LEVELS

The depth to groundwater measurements during this groundwater monitoring event at Apron A are summarized in Table 25 and shown on Figure 32. Groundwater elevations are not available because the top of casing elevations were not surveyed. Surveying of wells in this area is planned for the wet season 2023. Groundwater flow direction is estimated based on historical information and an expected flow east toward the Cedar River Waterway.

3.10.4 GROUNDWATER MONITORING RESULTS

Results for primary geochemical indicators presented in Table 26; results for the Apron A area COCs are presented in Table 27.

3.10.4.1 Monitored Attenuation/Geochemical Indicators

The geochemical indicator results are presented in Table 26. Observations included high specific conductivity, moderate DO, somewhat acidic pH, and a low ORP reading. TOC was detected in GW264S and its associated field duplicate at concentrations over 2,000 mg/L, which is high and is associated with the substrate injection in this area.

3.10.4.2 COC Results

Table 27 lists the analytical results for the Apron A area COCs. Analytes from Apron A samples do not have established CULs 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 or its associated field duplicate sample. VC was detected in the groundwater from monitoring well GW264S and its associated field duplicate sample at concentrations of 1.41 µg/L and 1.57 µg/L, respectively. These values are below the MCL (2.0 µg/L) but exceed the MTCA Method C criteria for potable groundwater (0.29 µg/L).. The trend plot for COCs in GW264S is shown in Figure 33. Cis-1,2-DCE has not been detected for four consecutive monitoring periods, but VC still appears to fluctuate.

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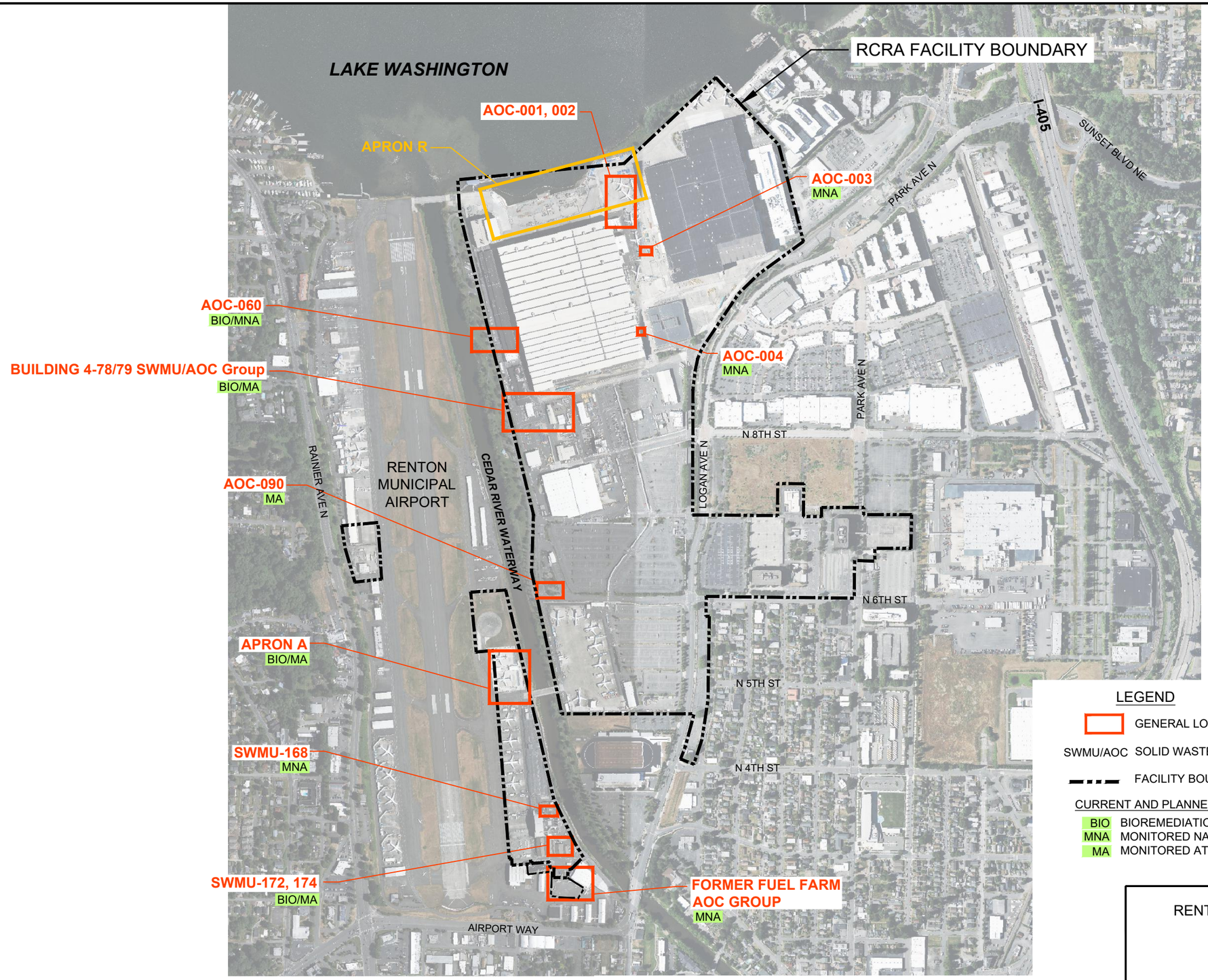
FIGURES



LEGEND

- GENERAL LOCATION OF SWMUs AND AOCs
- SWMU/AOC SOLID WASTE MANAGEMENT UNIT/AREA OF CONCERN
- FACILITY BOUNDARY

CURRENT AND PLANNED CLEANUP REMEDIES:

- BIO BIOREMEDIATION
- MNA MONITORED NATURAL ATTENUATION
- MA MONITORED ATTENUATION

0 400 800

APPROXIMATE SCALE IN FEET

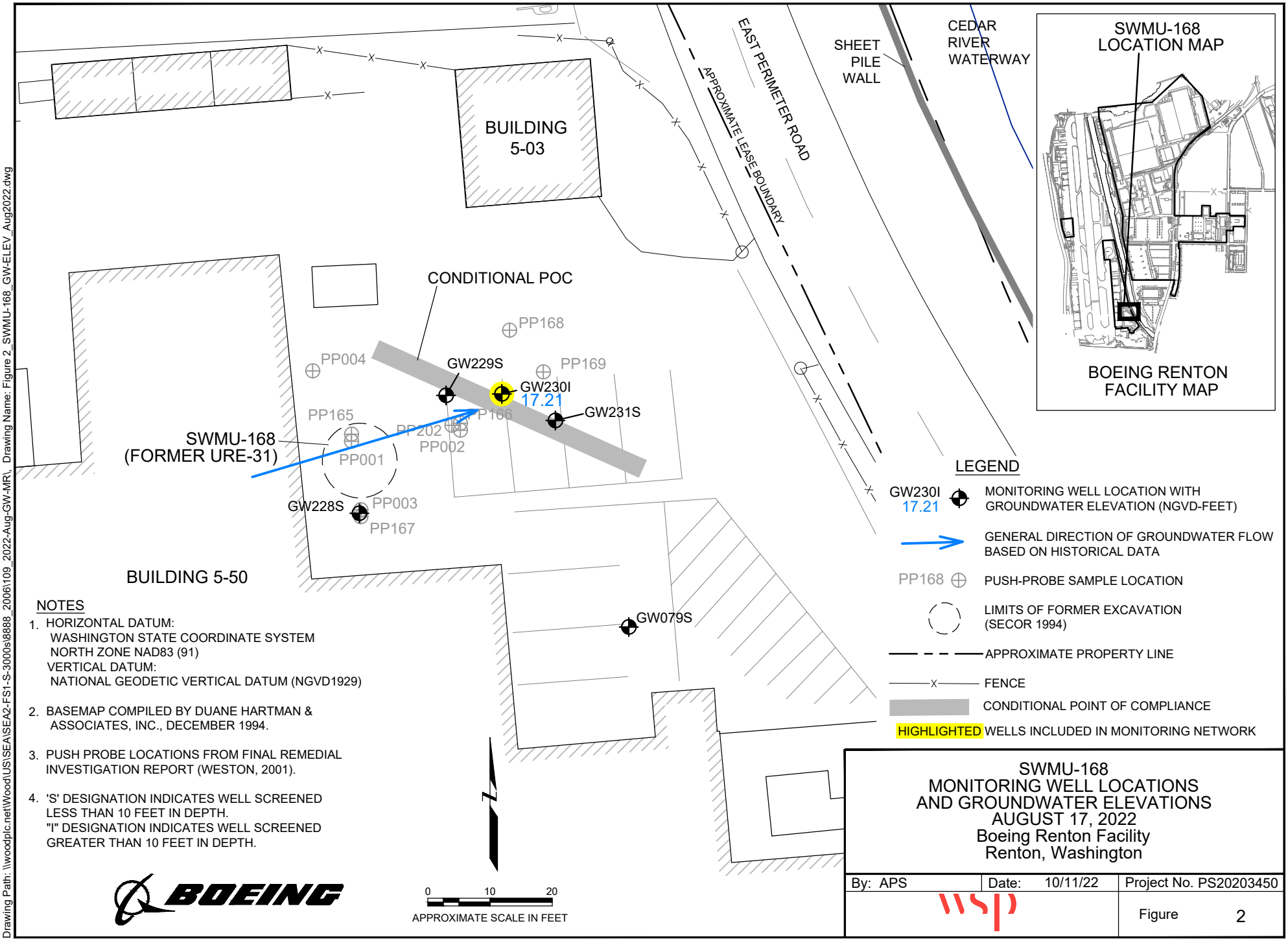
BOEING

RENTON SWMU AND AOC LOCATIONS

Boeing Renton Facility
Renton, Washington

By: APS	Date: 11/23/22	Project No. PS20203450
WSP USA Environment & Infrastructure Inc.		Figure 1

Plot Date: 11/23/22 - 11:26am. Plotted by: adam.stenberg
Drawing Path: \\woodplc.net\Wood\US\SEA\SEA2-FS1-S-3000s\8888_2006\. Drawing Name: BoeingRentonSiteMap_2022.dwg



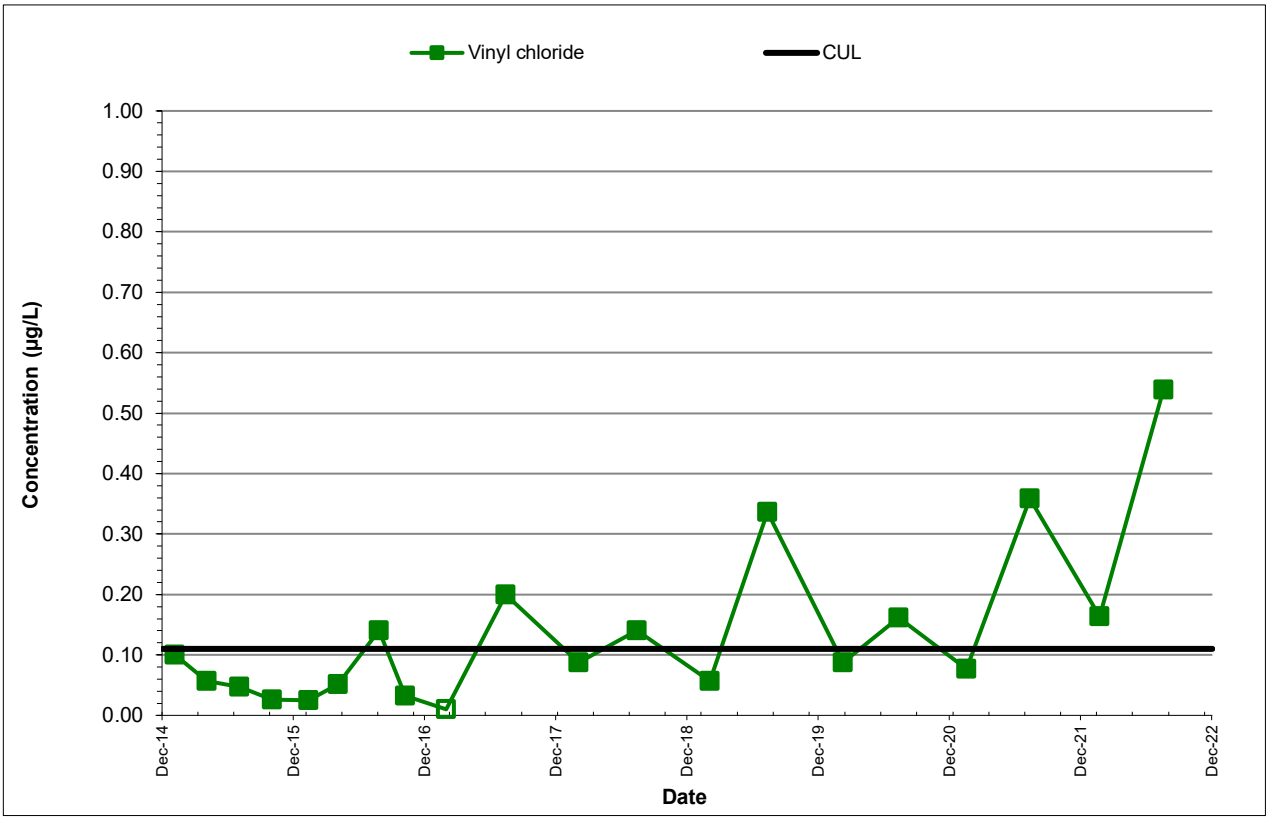
NOTES

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 17, 2022
Boeing Renton Facility
Renton, Washington

By: APS	Date: 10/11/22	Project No. PS20203450
WSP		Figure 2



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

CPOC AREA WELL GW230I

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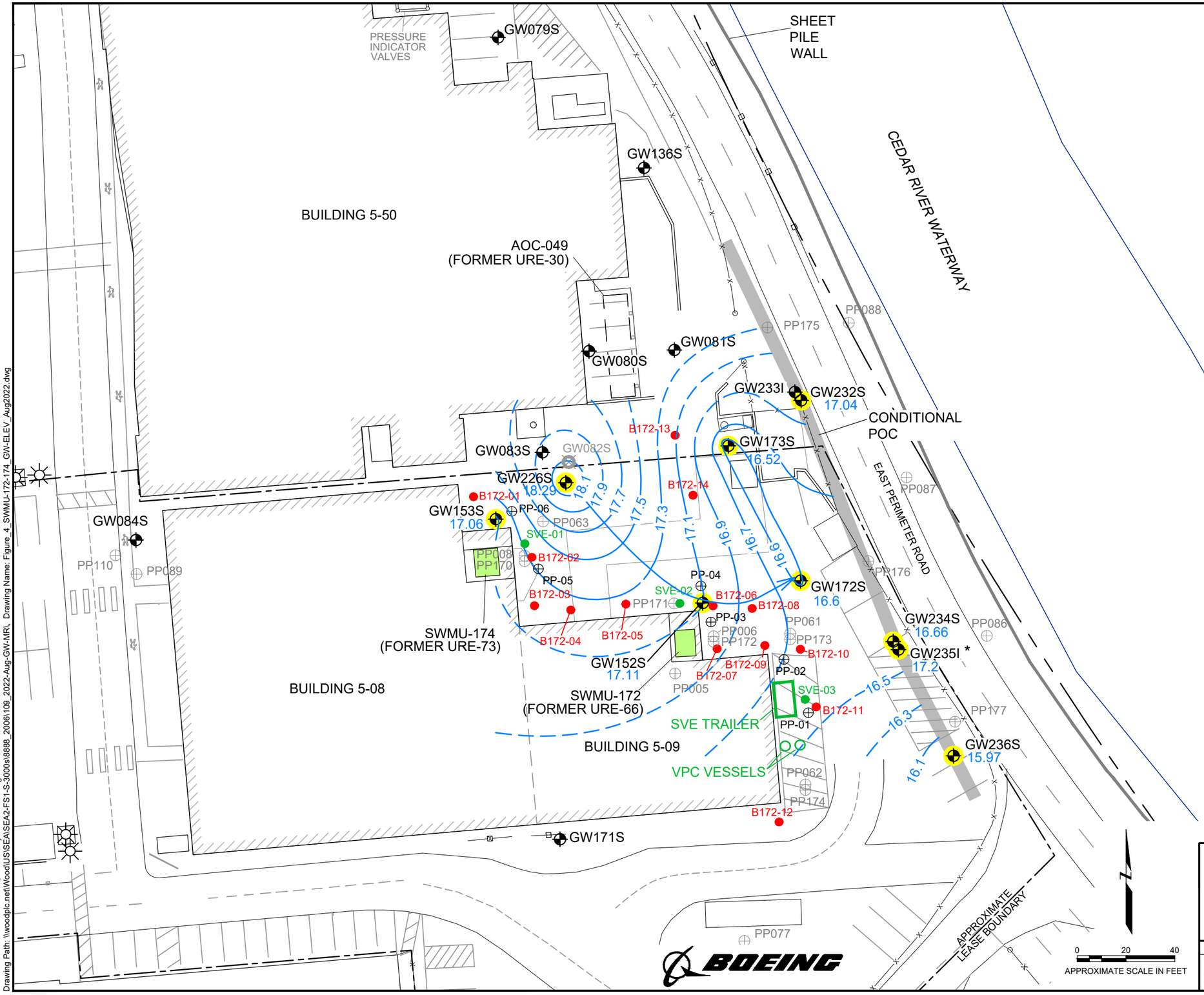
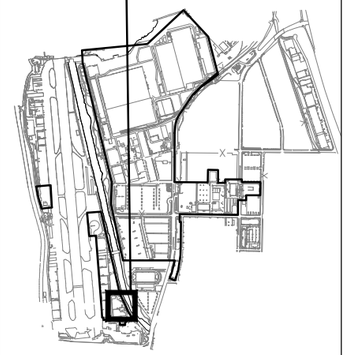
wsp	SWMU-168 TREND PLOT FOR CPOC AREA WELL GW230I Boeing Renton Facility Renton, Washington	Project No. PS20203450 Figure 3



SWMU-172 AND SWMU-174 LOCATION MAP



BOEING RENTON FACILITY MAP

LEGEND

- GW173S 16.52 — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION (NGVD-FEET)
- * — WELL SCREENED IN UPPER AND LOWER PORTION OF AQUIFER, SO WATER LEVEL IS NOT USED FOR CONTOURING.
- 17.7 — GROUNDWATER ELEVATION CONTOUR (IN FEET) (DASHED WHERE INFERRED)
- GENERAL DIRECTION OF GROUNDWATER FLOW
- GW082S — DECOMMISSIONED MONITORING WELL
- APPROXIMATE PROPERTY LINE
- FENCE
- CONDITIONAL POINT OF COMPLIANCE
- SOLID WASTE MANAGEMENT UNIT (SWMU)
- 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 24, 2022 Boeing Renton Facility Renton, Washington

By: APS	Date: 10/31/22	Project No. PS20203450
WSP USA Environment & Infrastructure Inc.		Figure 4

Plot Date: 10/31/22 - 10:44am Plotted by: adam.stenberg
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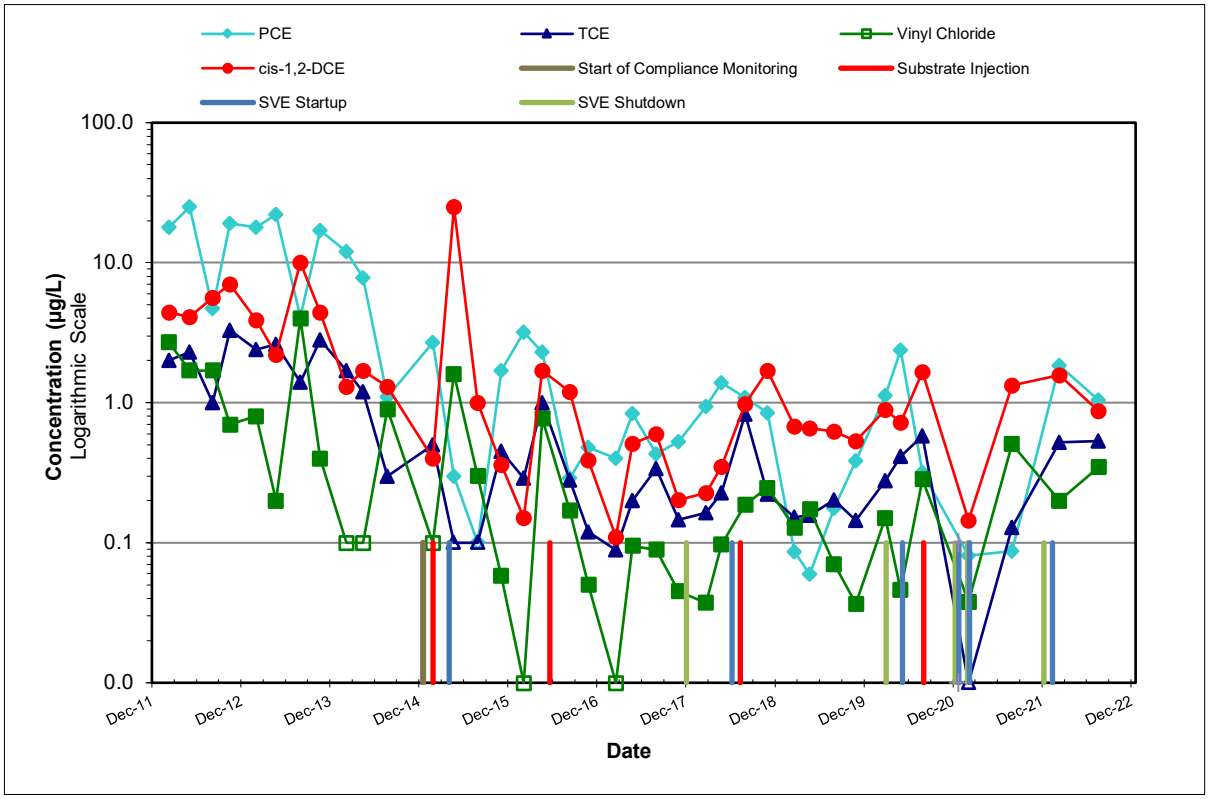
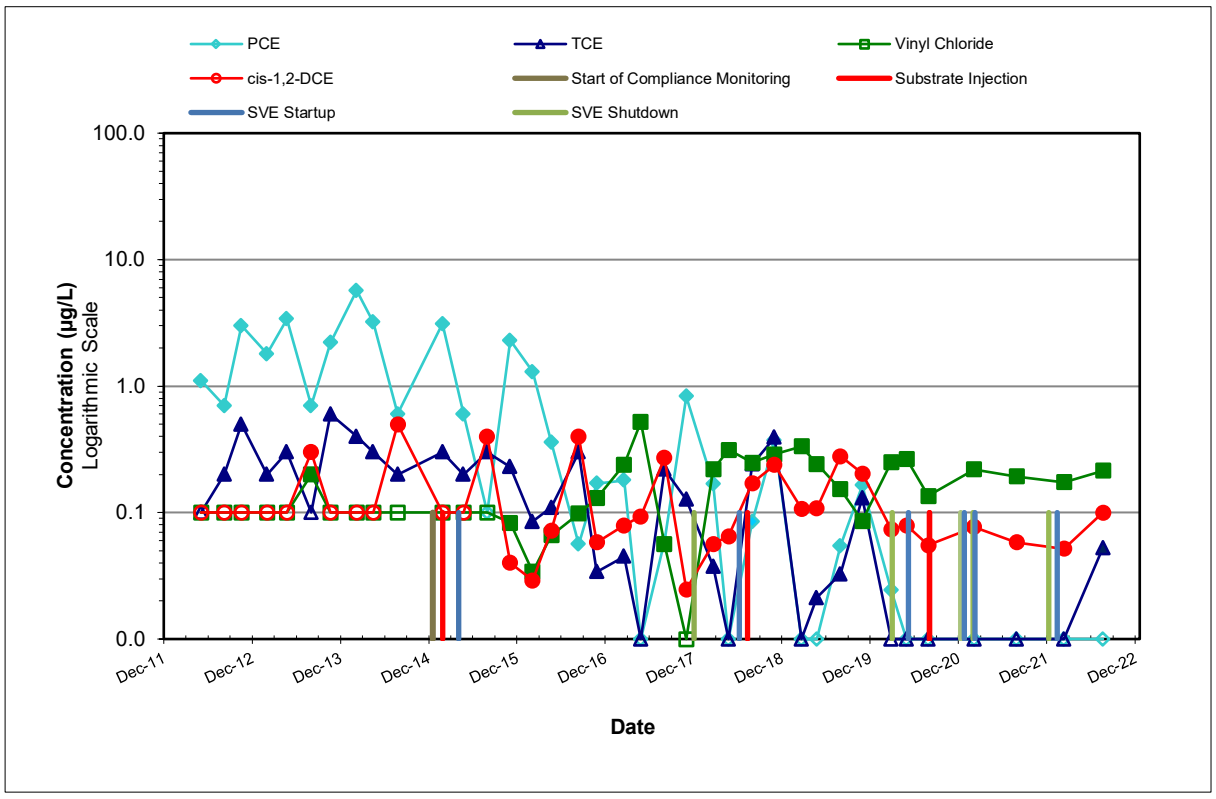


SOURCE AREA WELL GW152S



SOURCE AREA WELL GW153S

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

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

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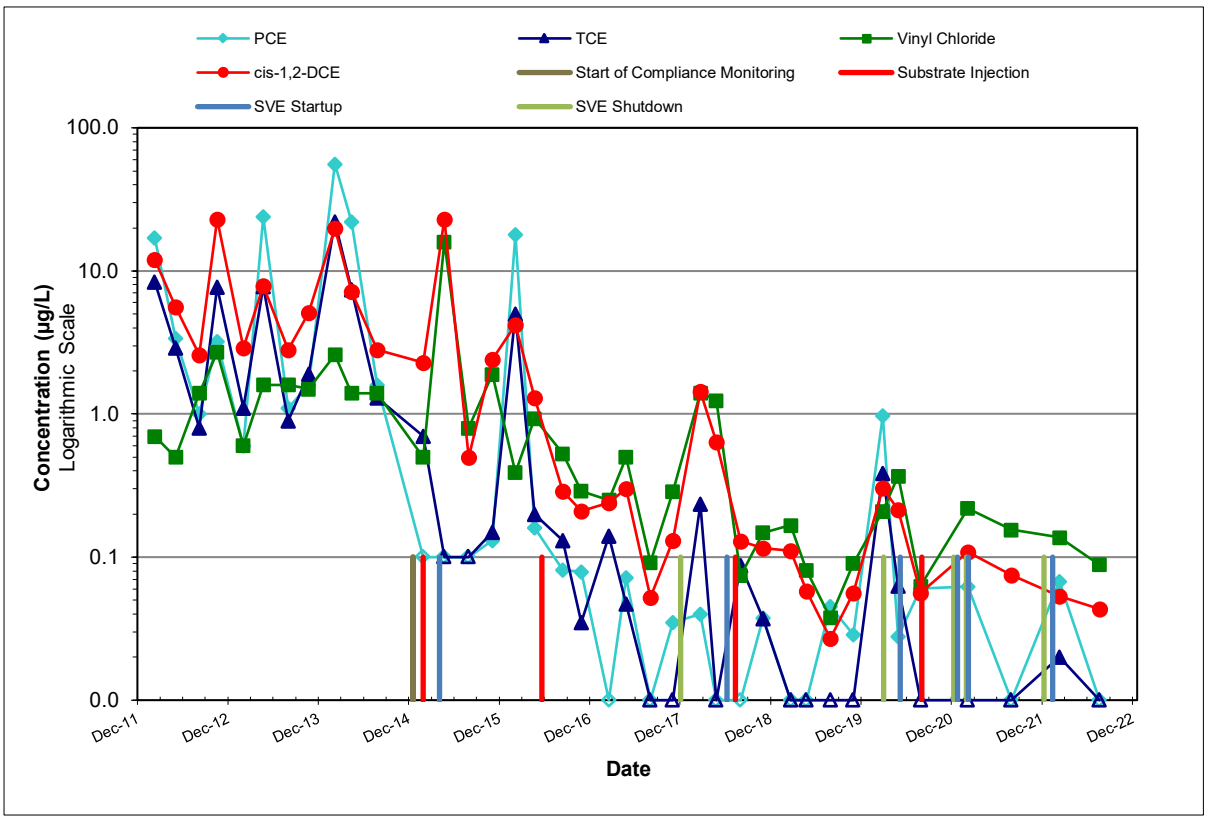
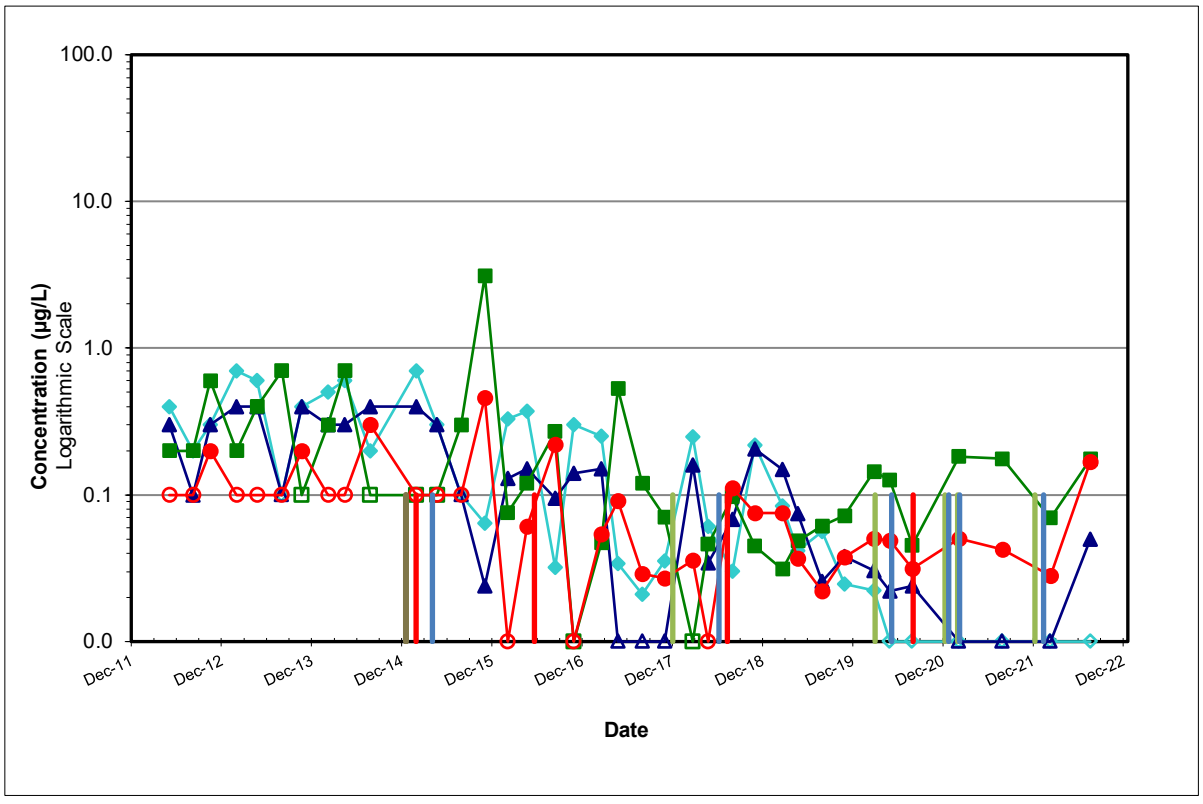


DOWNGRADIENT PLUME AREA WELL GW172S



DOWNGRADIENT PLUME AREA WELL GW173S

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

wsp	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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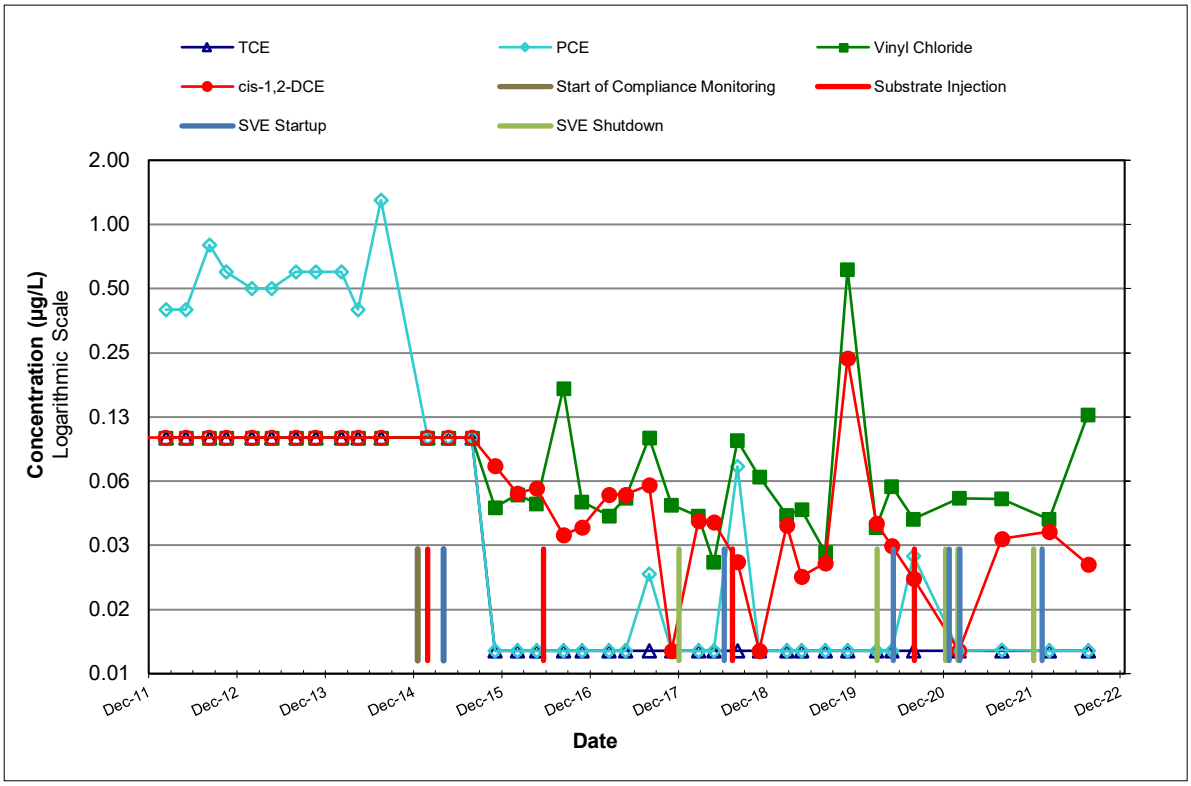

Note: Non-detected values shown at one-half the reporting limit and with an open symbol.

DOWNGRADIENT PLUME AREA WELL GW226S

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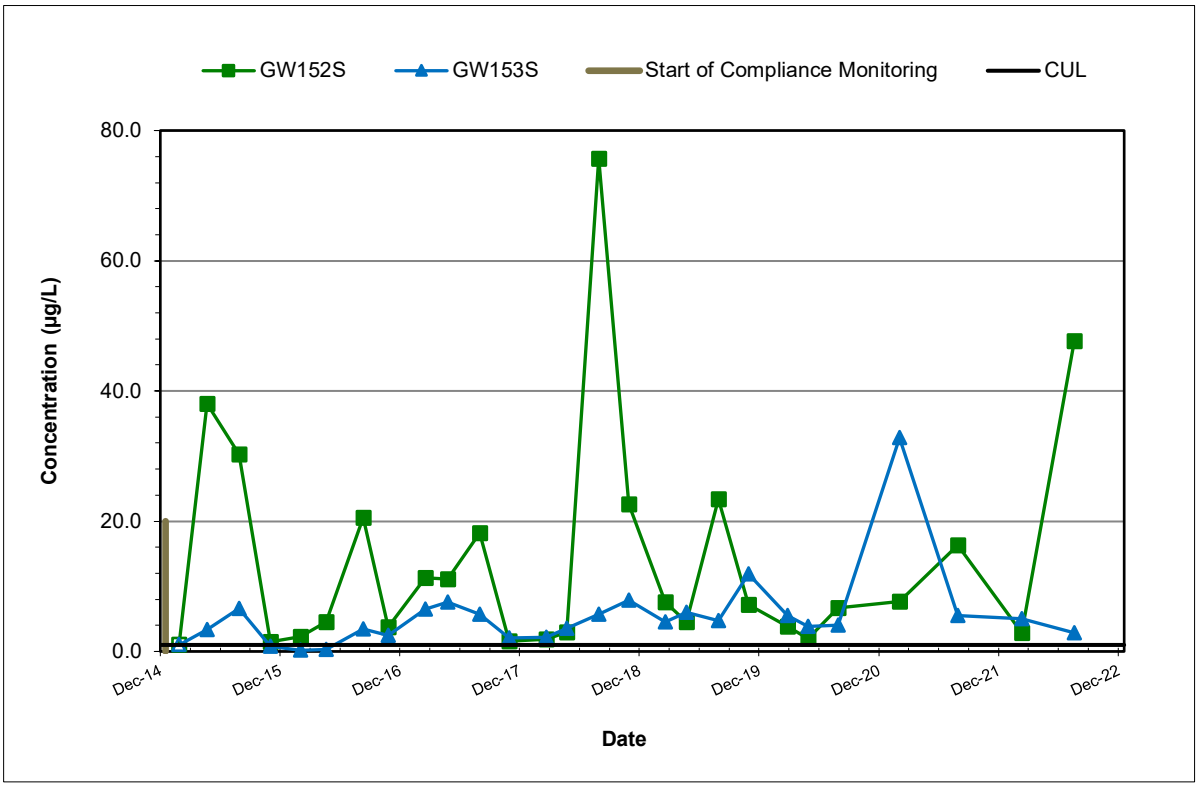
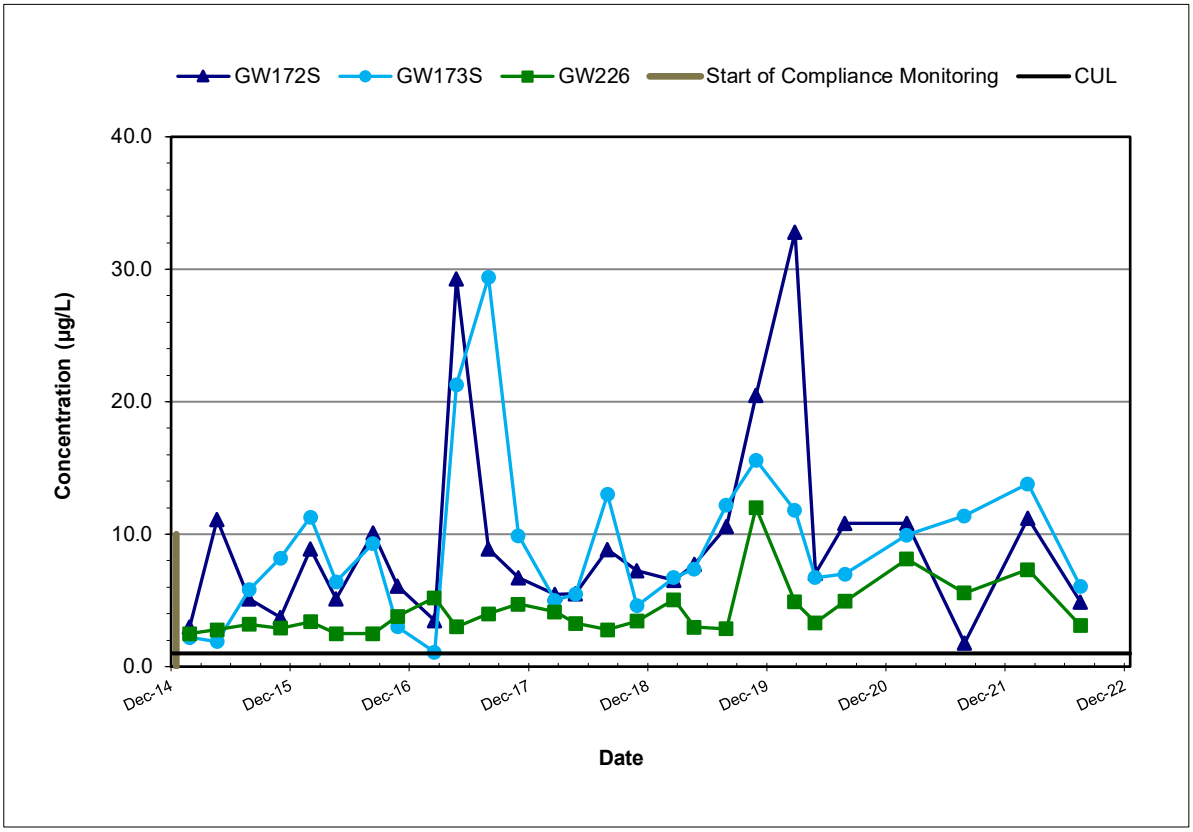
wsp	SWMU-172 AND SWMU-174 TREND PLOT FOR DOWNGRADIENT PLUME AREA WELL GW226S Boeing Renton Facility Renton, Washington	Project No. PS20203450 Figure 7



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 with an open symbol.

SWMU-172 AND SWMU-174 TREND PLOTS FOR ARSENIC IN SELECT SOURCE AREA AND DOWNGRADIENT PLUME AREA WELLS
START OF COMPLIANE MONITORING TO PRESENT
Boeing Renton Facility, Renton, Washington

Project No. PS20203450

Figure 8

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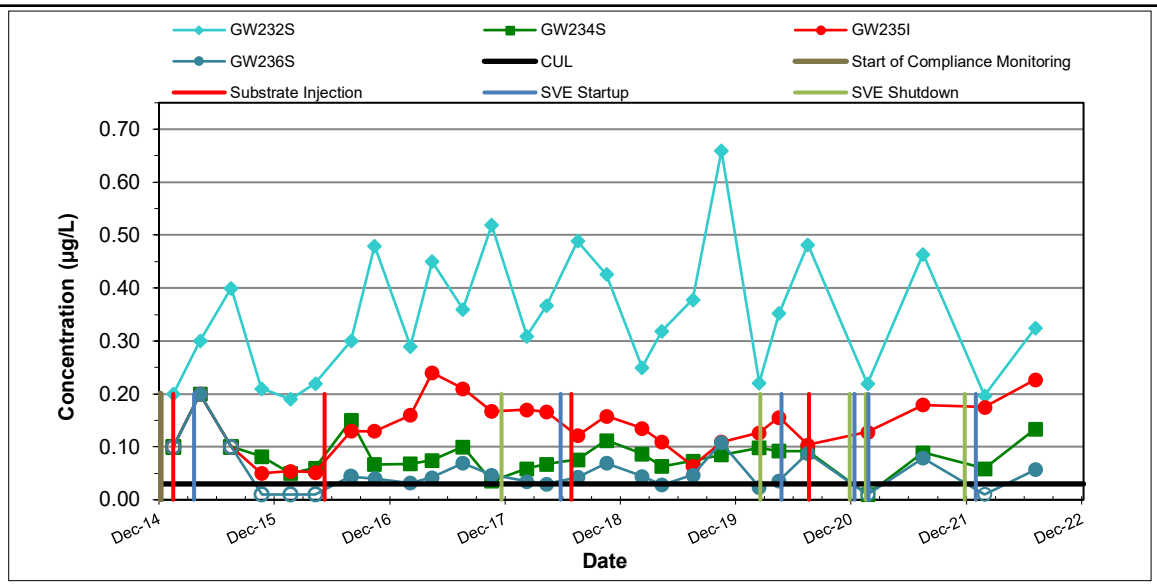
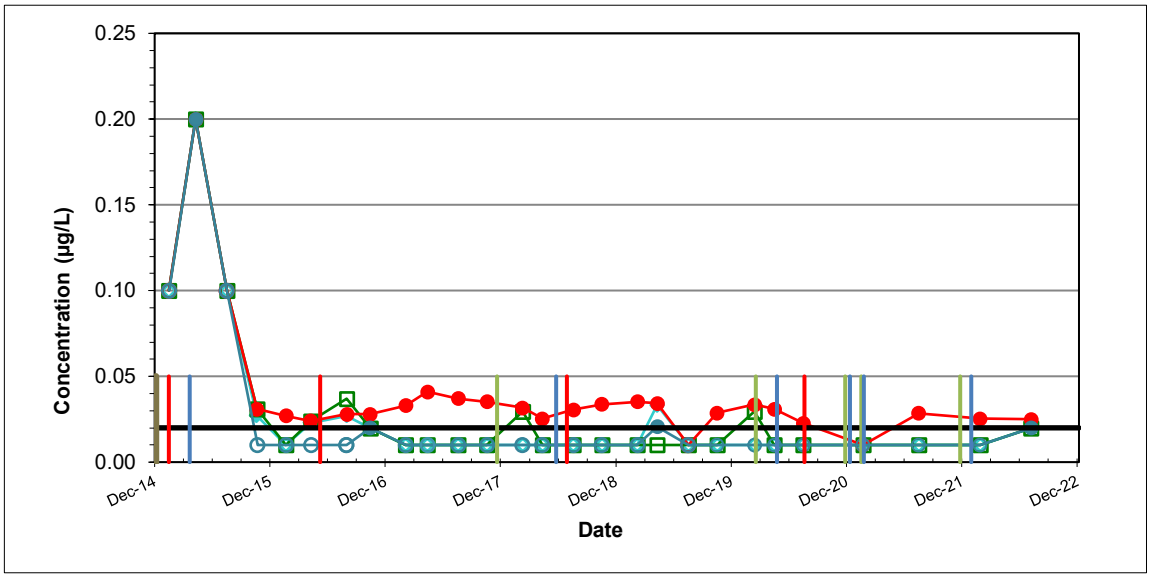
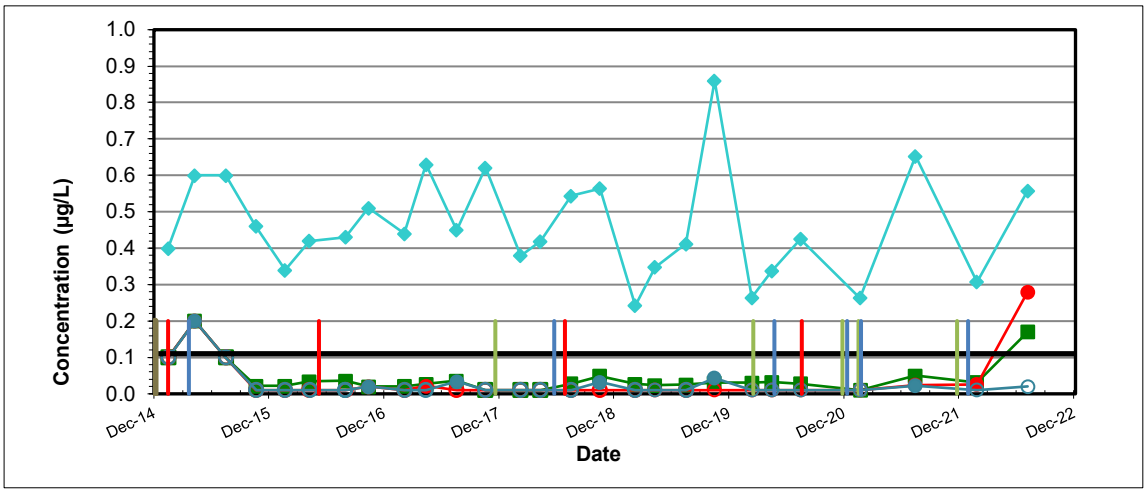


cis-1,2-Dichloroethene



Trichloroethene



Vinyl Chloride

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

SWMU-172 AND SWMU-174 TREND PLOTS FOR CIS-1,2-DICHLROETHENE, TRICHLOROETHENE, AND VINYL CHLORIDE IN CPOC AREA WELLS
START OF COMPLIANCE MONITORING TO PRESENT
Boeing Renton Facility, Renton, Washington

Project No. PS20203450

Figure 9

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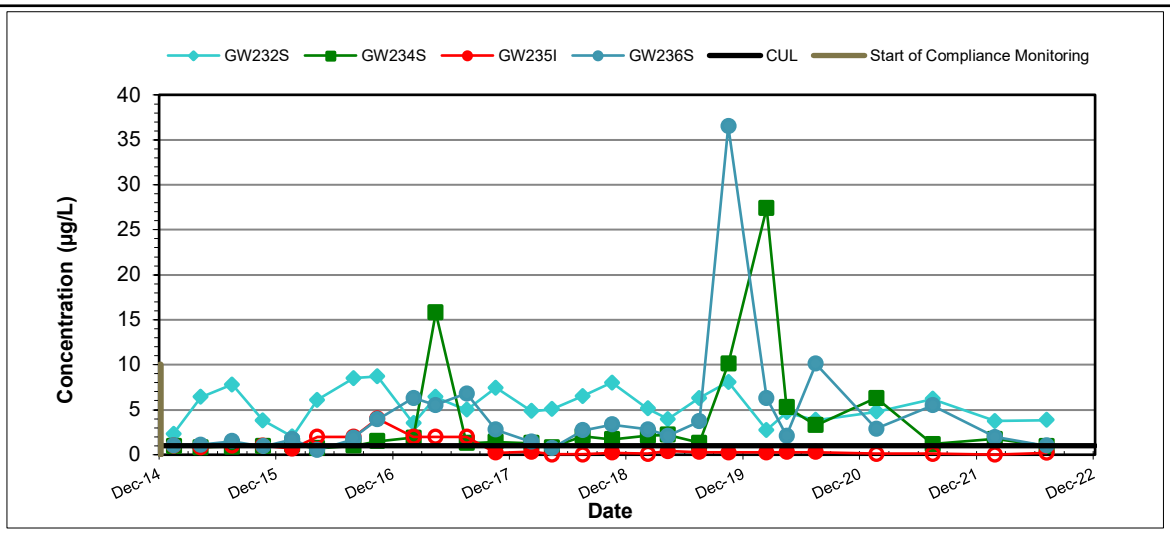
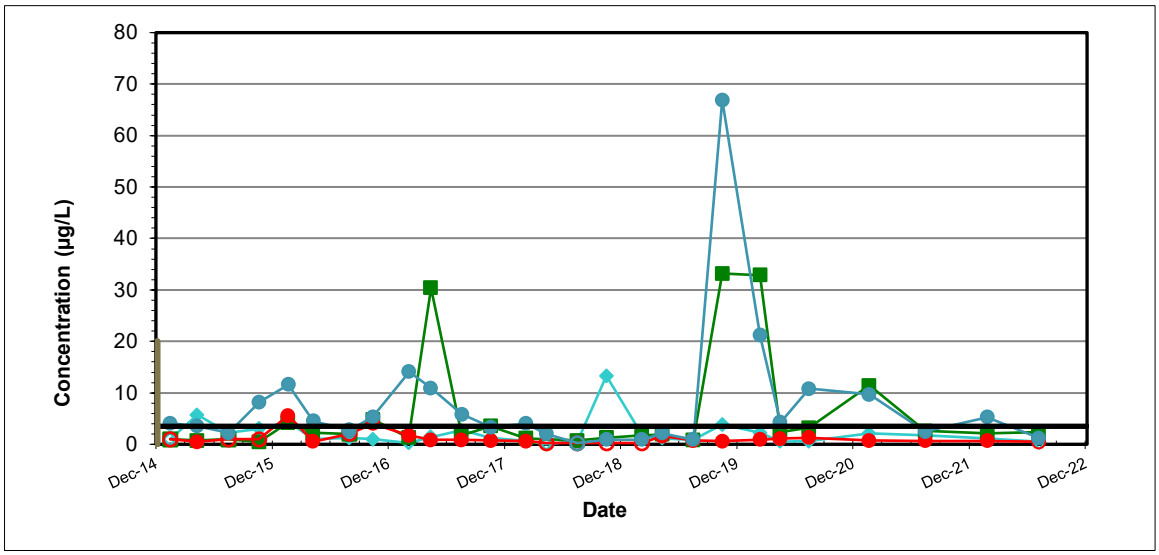
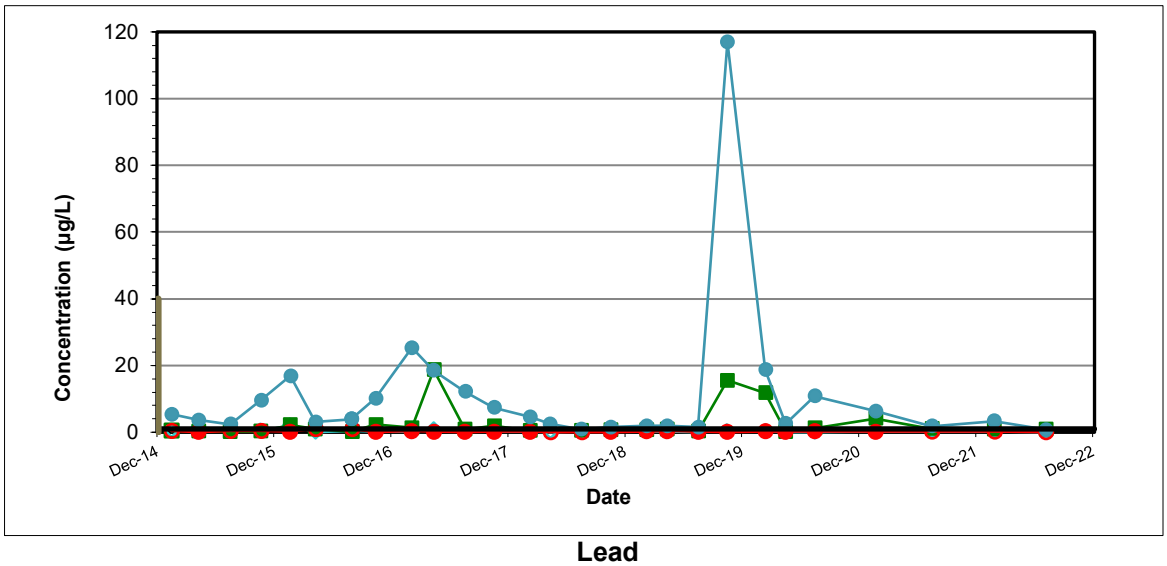


Arsenic



Copper

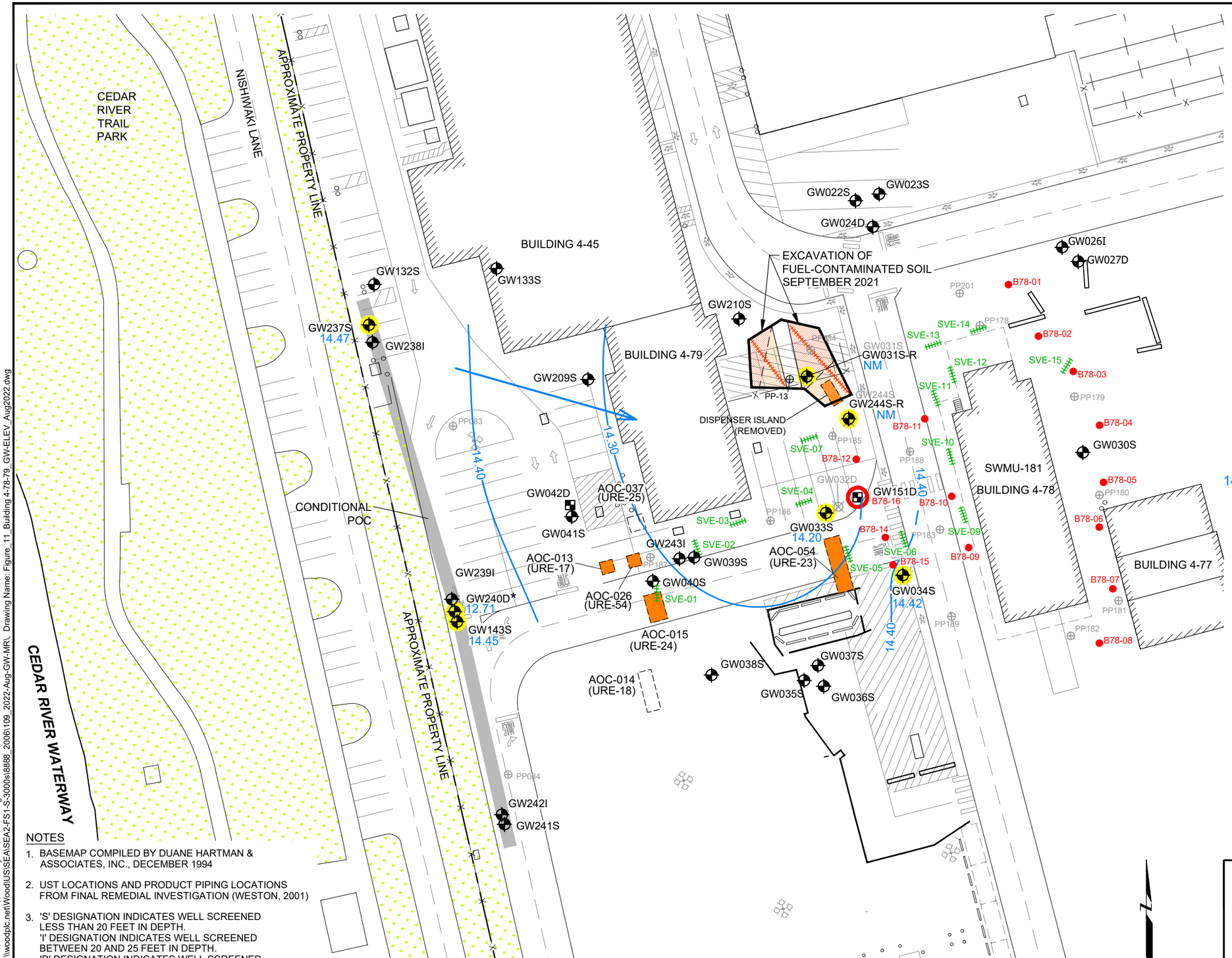


Lead

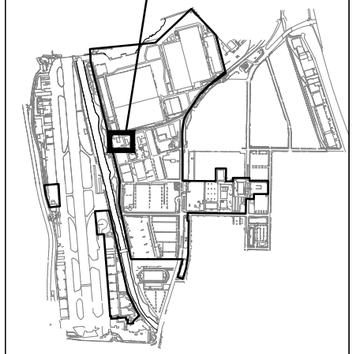
Note: Non-detected values shown at one-half the reporting limit and with an open symbol.

P:\8888 - Boeing Renton\9.0 Field & Lab Data Mgmt\Grapher and Excel Figure Files\excel\2022 Update\Figure 5 to 10_ SWMU_172-174.xlsx

wsp	SWMU-172 AND SWMU-174 TREND PLOTS FOR ARSENIC, COPPER AND LEAD IN CPOC AREA WELLS START OF COMPLIANCE MONITORING TO PRESENT Boeing Renton Facility, Renton, Washington	Project No. PS20203450 Figure 10



4-78/79 SWMU/AOC GROUP LOCATION MAP



BOEING RENTON FACILITY MAP

LEGEND

GW033S 14.20 — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION (NGVD-FEET)

NM — NOT MEASURED: SURVEY INFORMATION FOR REPLACEMENT WELLS NOT YET AVAILABLE.

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

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

GENERAL GROUNDWATER FLOW DIRECTION

GW042D — EXTRACTION WELL

GW032D — DECOMMISSIONED 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.

N

0 25 50

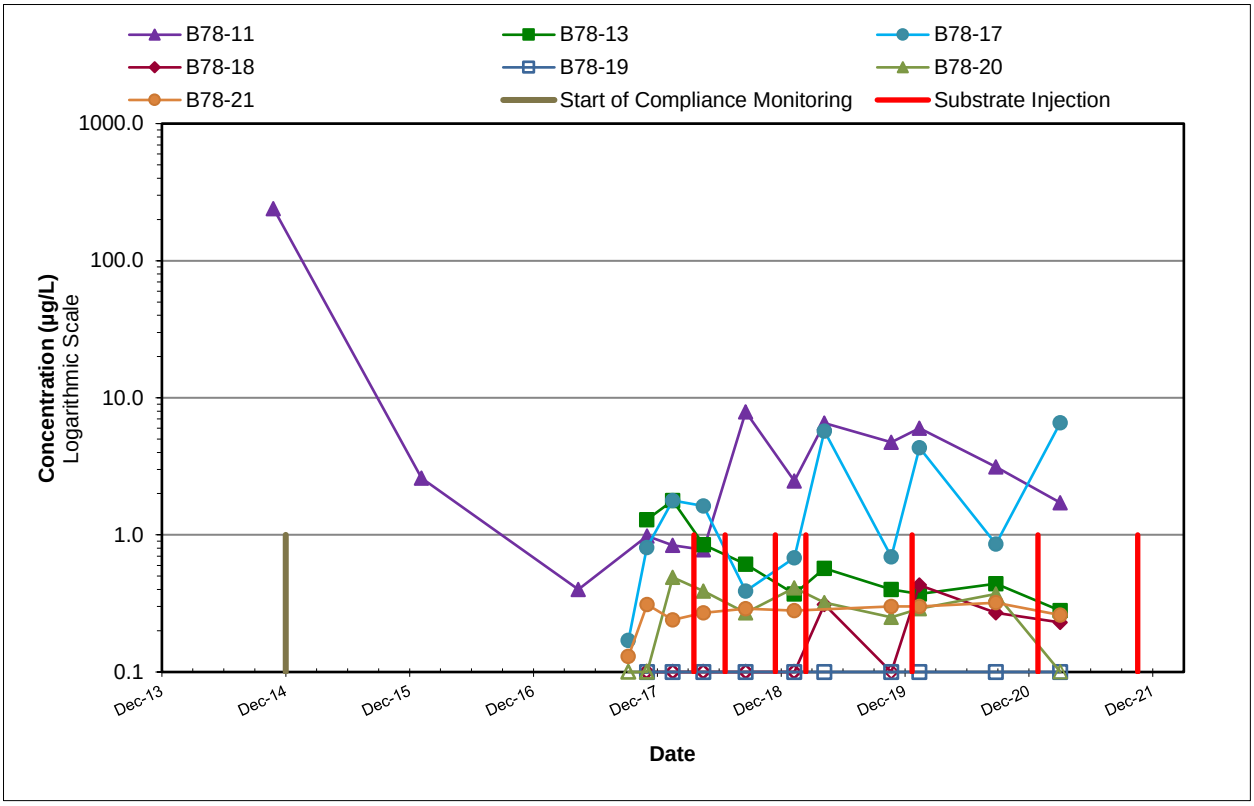
APPROXIMATE SCALE IN FEET

BOEING

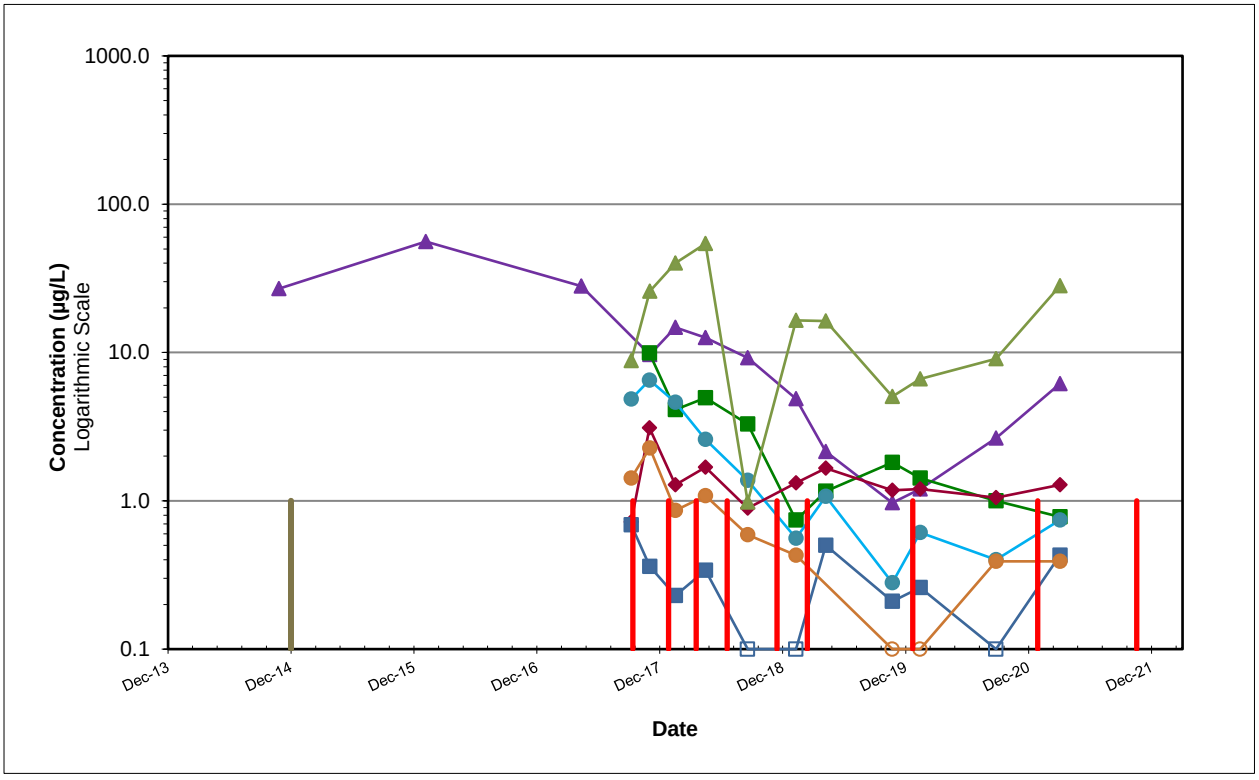
BUILDING 4-78/79 SWMU/AOC GROUP MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS AUGUST 23, 2022 Boeing Renton Facility Renton, Washington

By: APS	Date: 11/22/22	Project No. PS20203450
WSP USA Environment & Infrastructure Inc.		Figure 11

Plot Date: 11/22/22 - 9:36am Plotted by: adam stenberg
Drawing Path: \\woodplc.net\Wood\US\SEA\SEA2-FS1-S-3000s\8888_2006\109_2022-Aug-GW-MR\ Drawing Name: Figure_11_Building 4-78-79_GW-ELEV_Aug2022.dwg



cis-1,2-Dichloroethene



Benzene

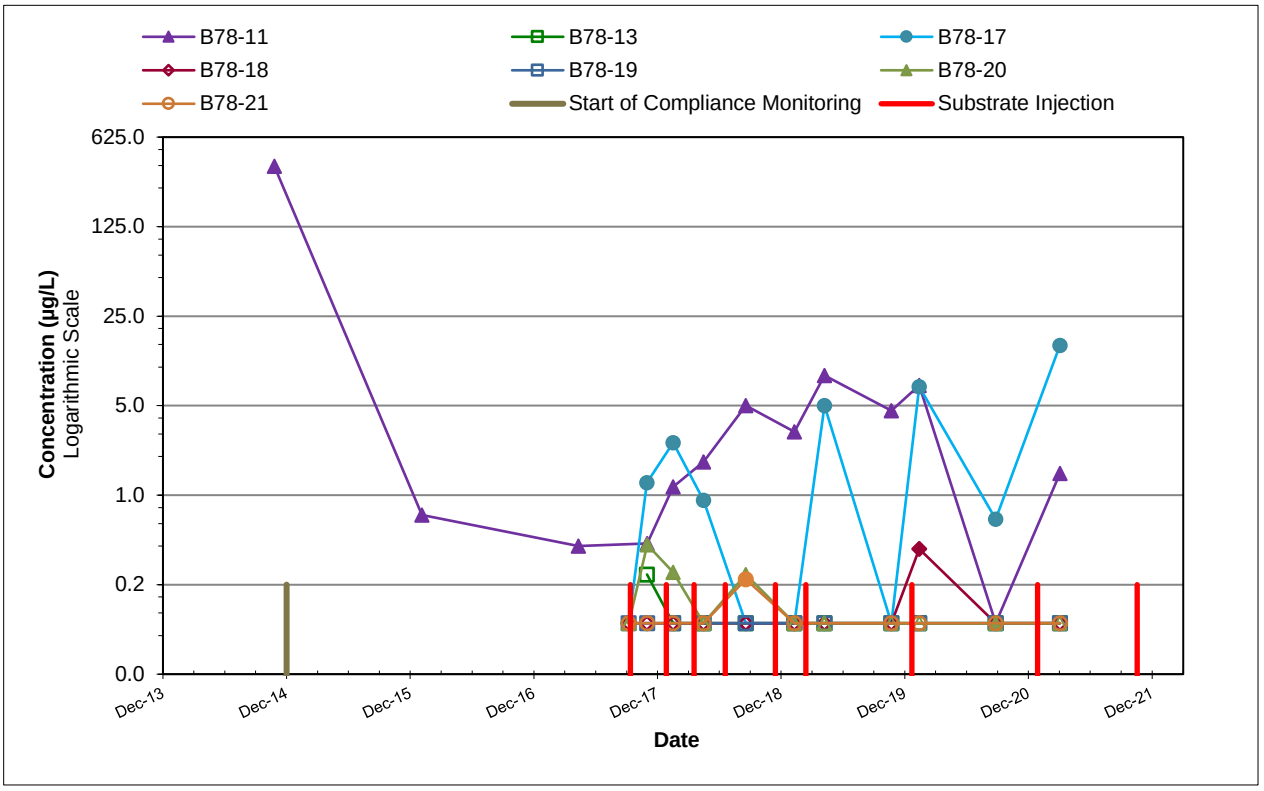
Note: Non-detected values shown at one-half the reporting limit and with an open symbol.

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

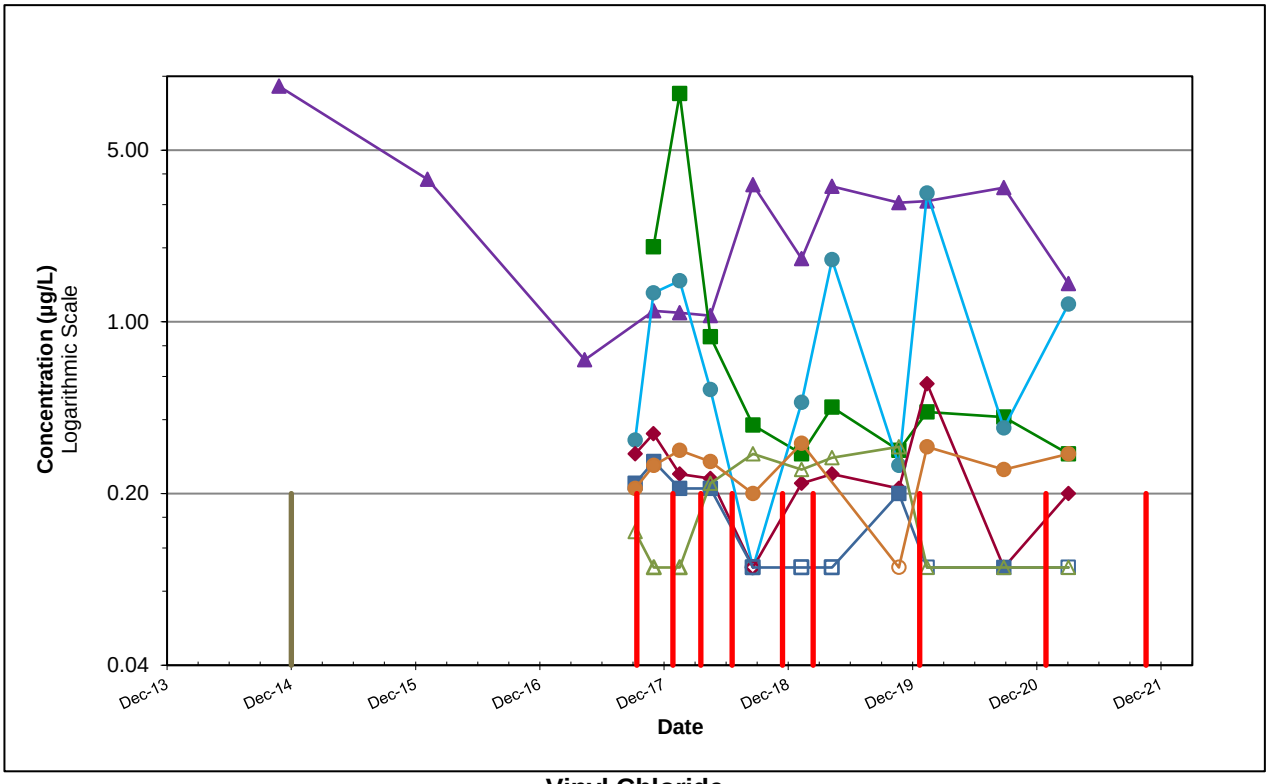
Project No.
PS20203450

Figure
12

\\woodplc.net\Wood\US\SEA\SEA2-FS1-projects\8888 - Boeing Renton\9.0 Field & Lab Data Mgmt\Grapher and Excel Figure Files\excel\2022 Update\Figu



Trichloroethene



Vinyl Chloride

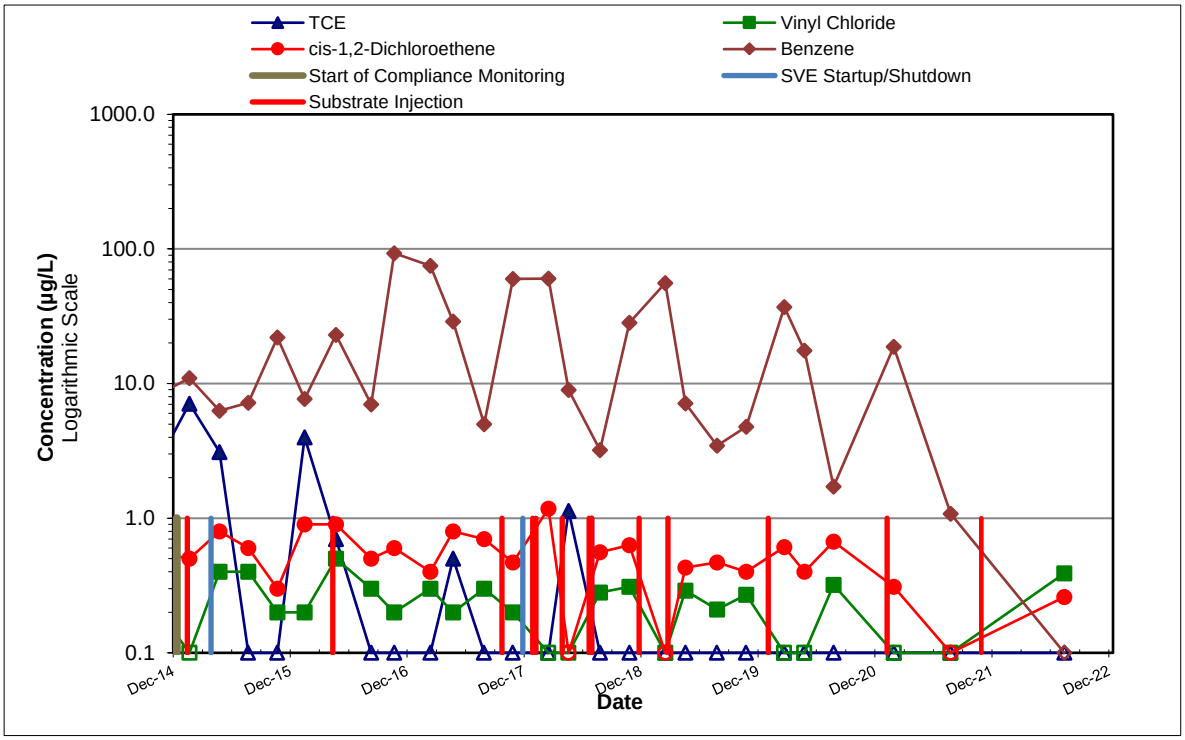
Note: Non-detected values shown at one-half the reporting limit and with an open symbol.

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

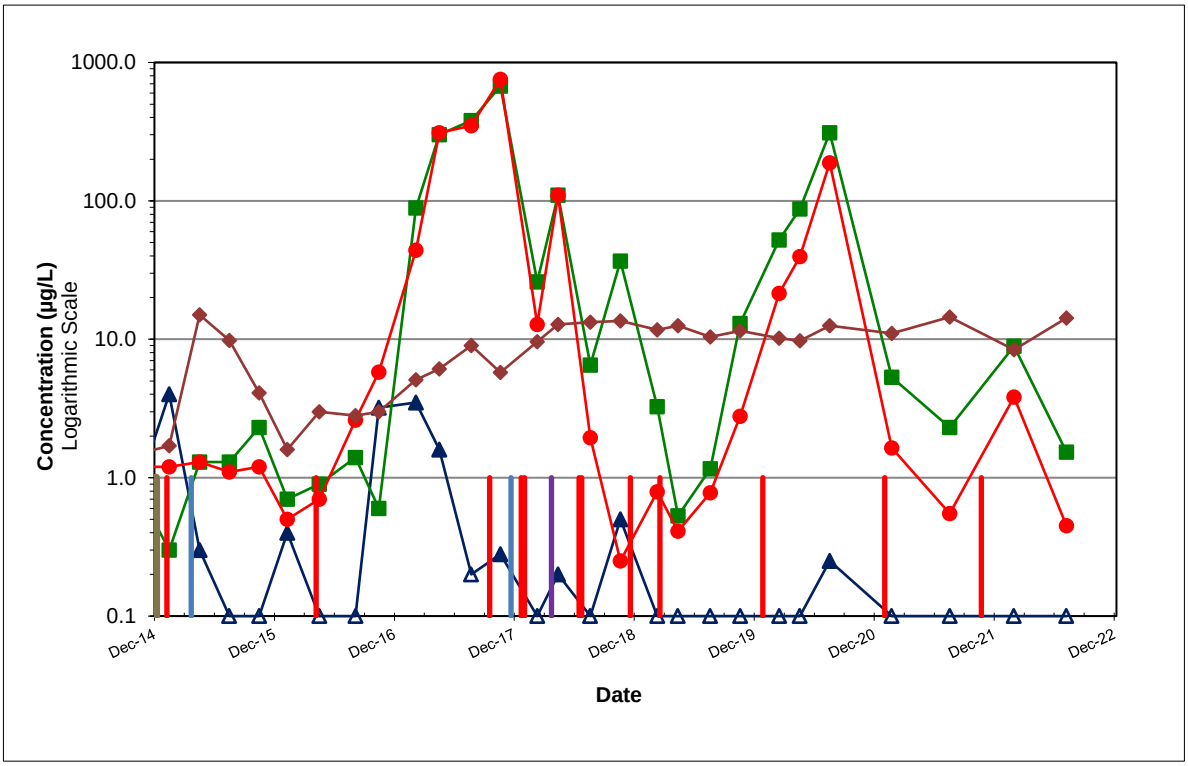
Project No.
PS20203450

Figure
13

\\woodplc.net\Wood\US\SEA\SEA2-FS1-projects\8888 - Boeing Renton\9.0 Field & Lab Data Mgmt\Grapher and Excel Figure Files\excel\2022 Update\Fig



SOURCE AREA WELL GW031S

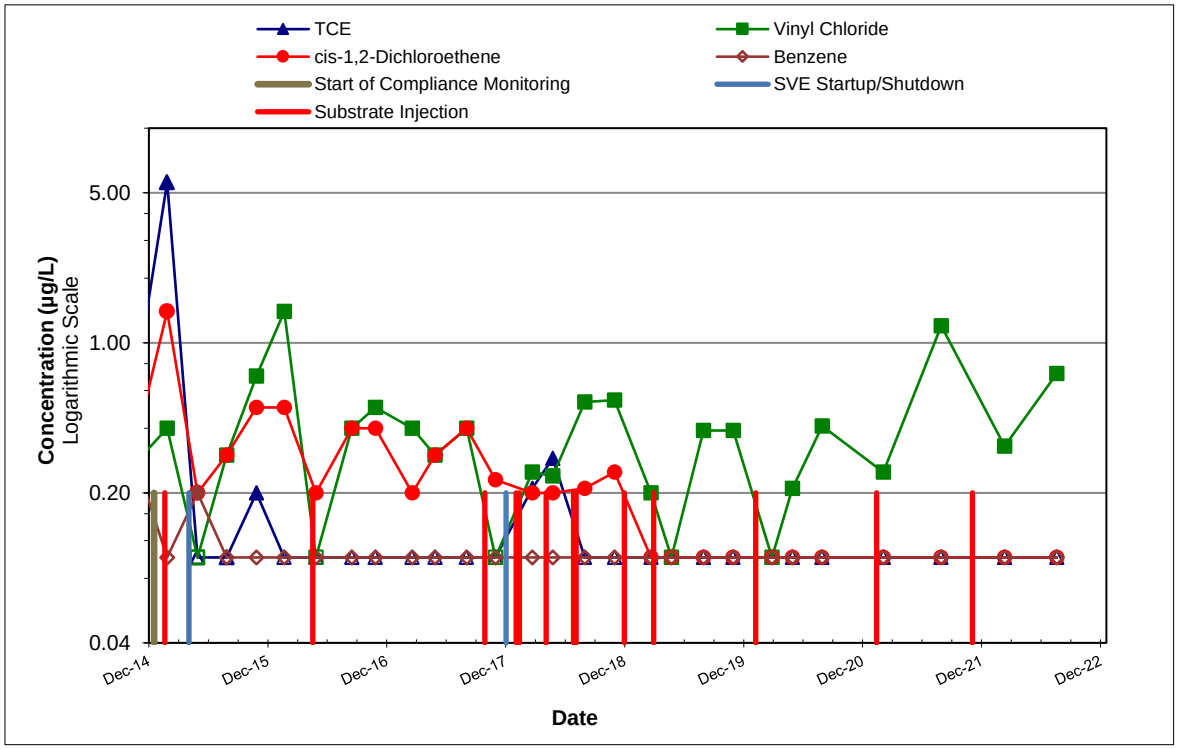


SOURCE AREA WELL GW033S

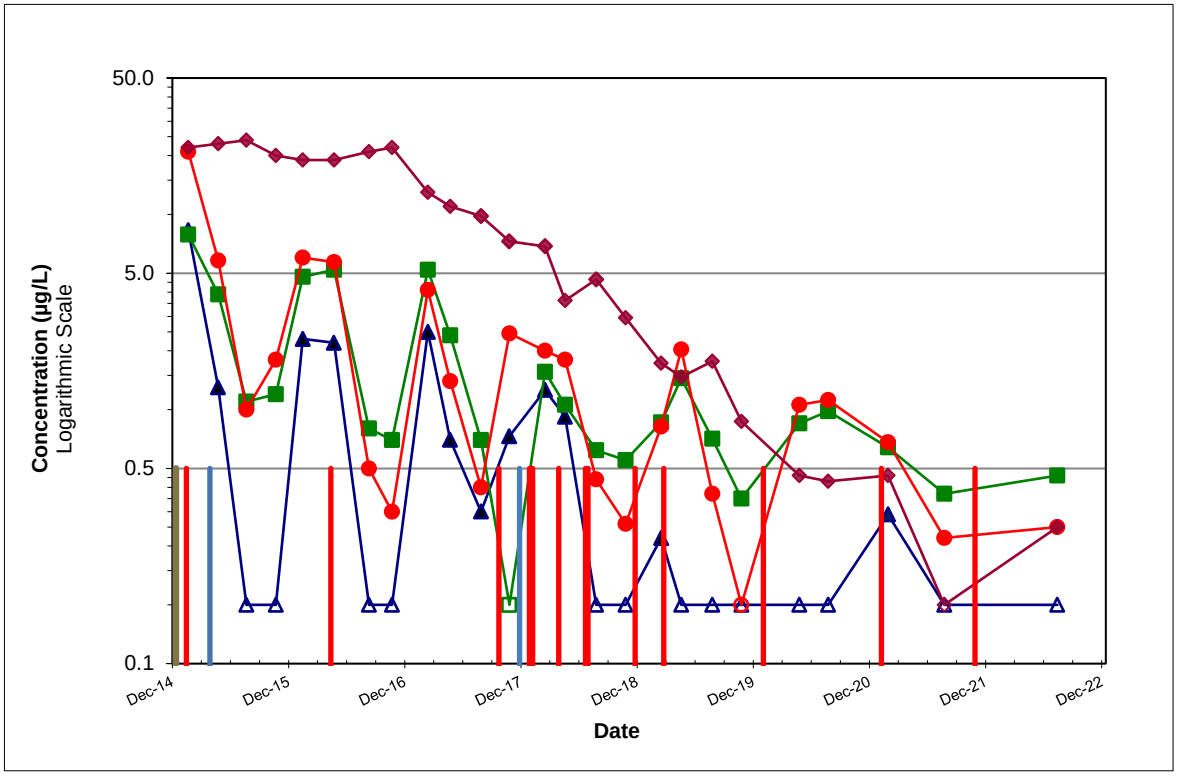
Note: Non-detected values shown at one-half the reporting limit and with an open symbol.

wsp	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

\\woodplc.net\Wood\US\SEA\SEA2-FS1-projects\8888 - Boeing Renton\9.0 Field & Lab Data Mgmt\Grapher and Excel Figure Files\excel\2022 Update\



SOURCE AREA WELL GW034S

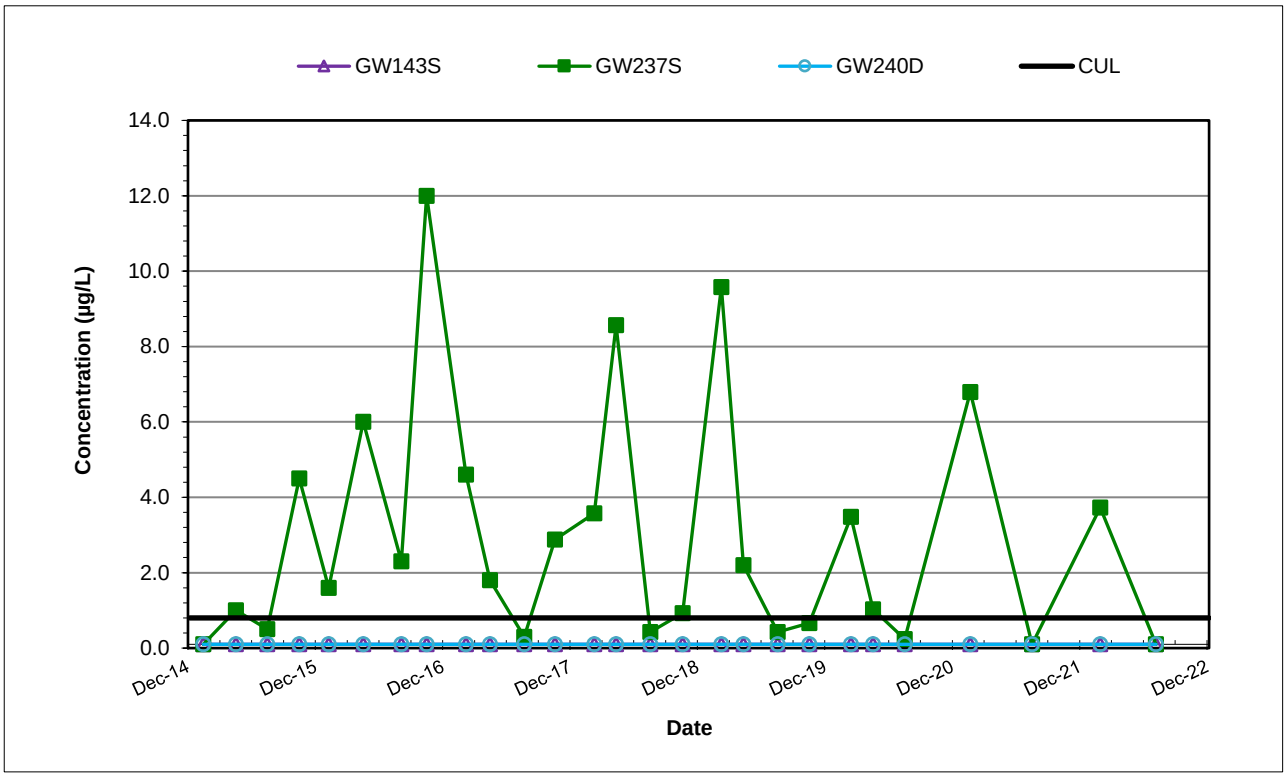


SOURCE AREA WELL GW244S

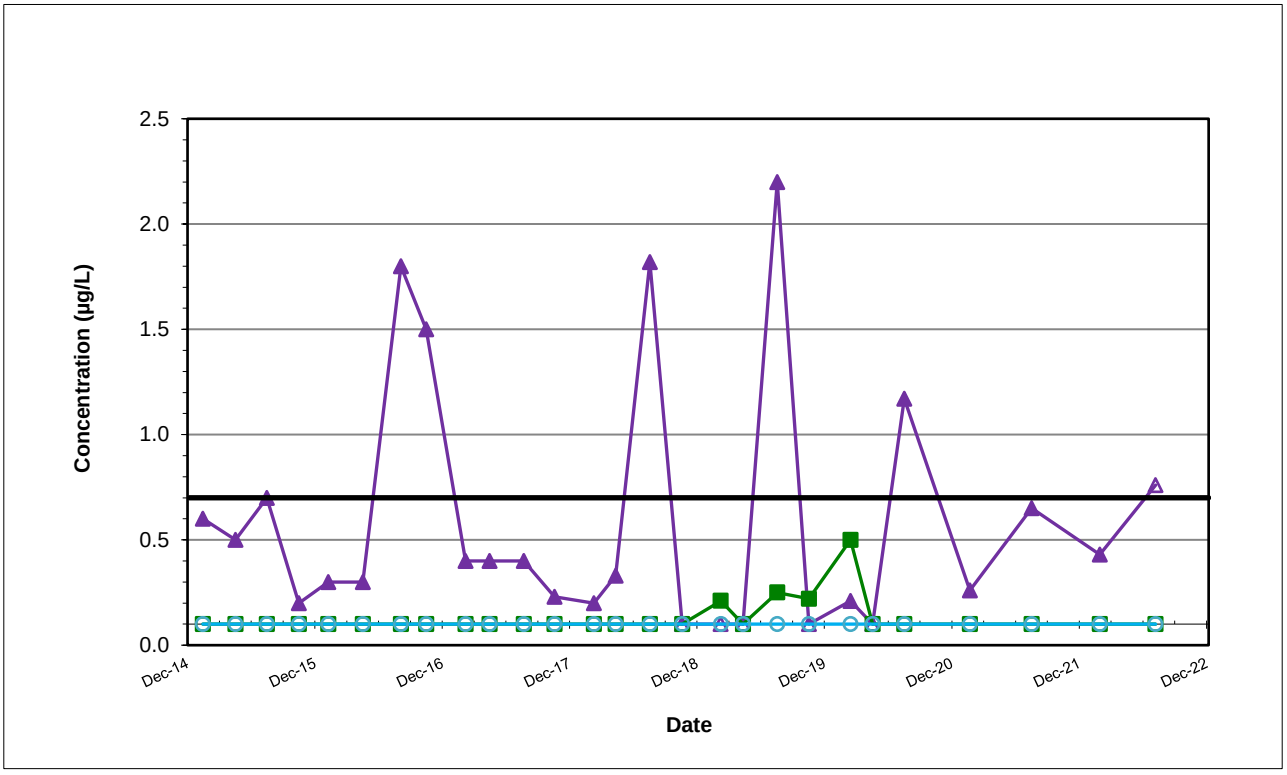
Note: Non-detected values shown at one-half the reporting limit and with an open symbol.

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

\\woodplc.net\Wood\US\SEA\SEA2-FS1-projects\8888 - Boeing Renton\9.0 Field & Lab Data Mgmt\Grapher and Excel Figure Files\excel\2022 Update\



Benzene



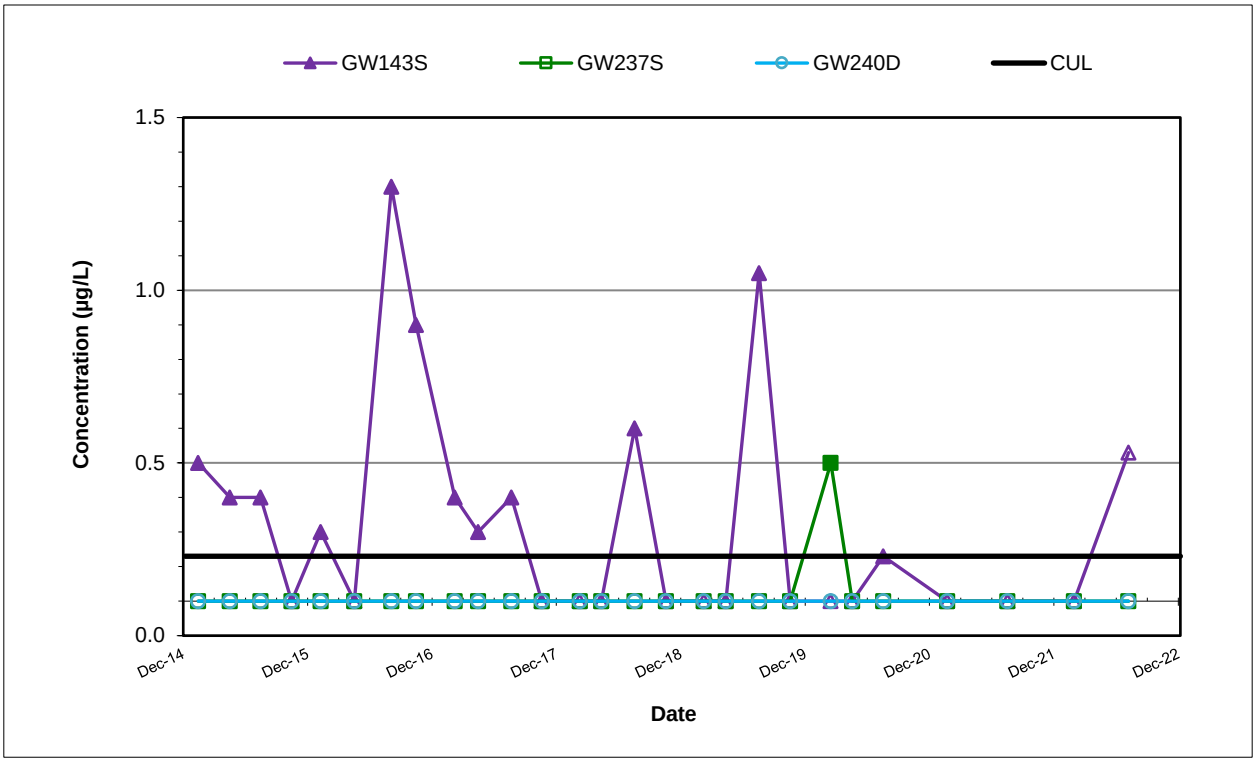
cis-1,2-Dichloroethene

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

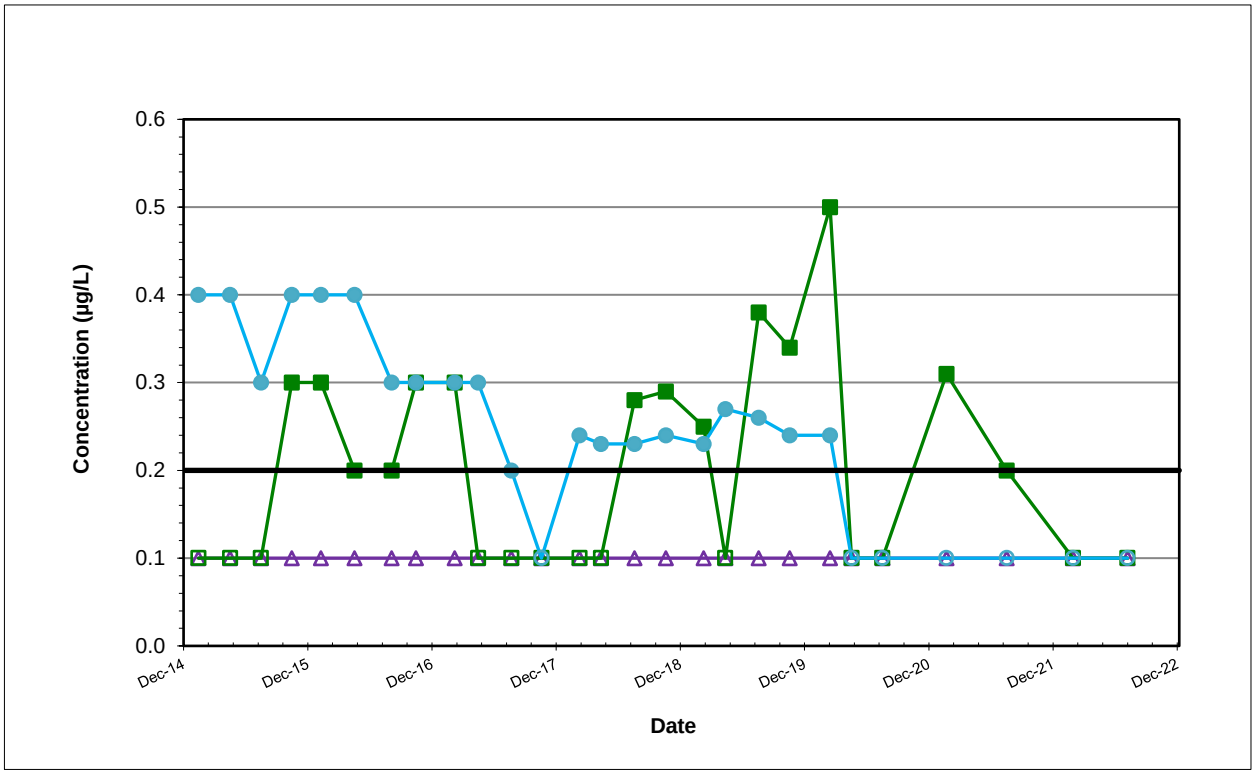
BUILDING 4-78/79 SWMU/AOC GROUP TREND PLOTS FOR BENZENE AND CIS-1,2-DICHLOROETHENE IN CPOC AREA WELLS
Boeing Renton Facility
Renton, Washington

Project No. PS20203450

Figure 16



Trichloroethene



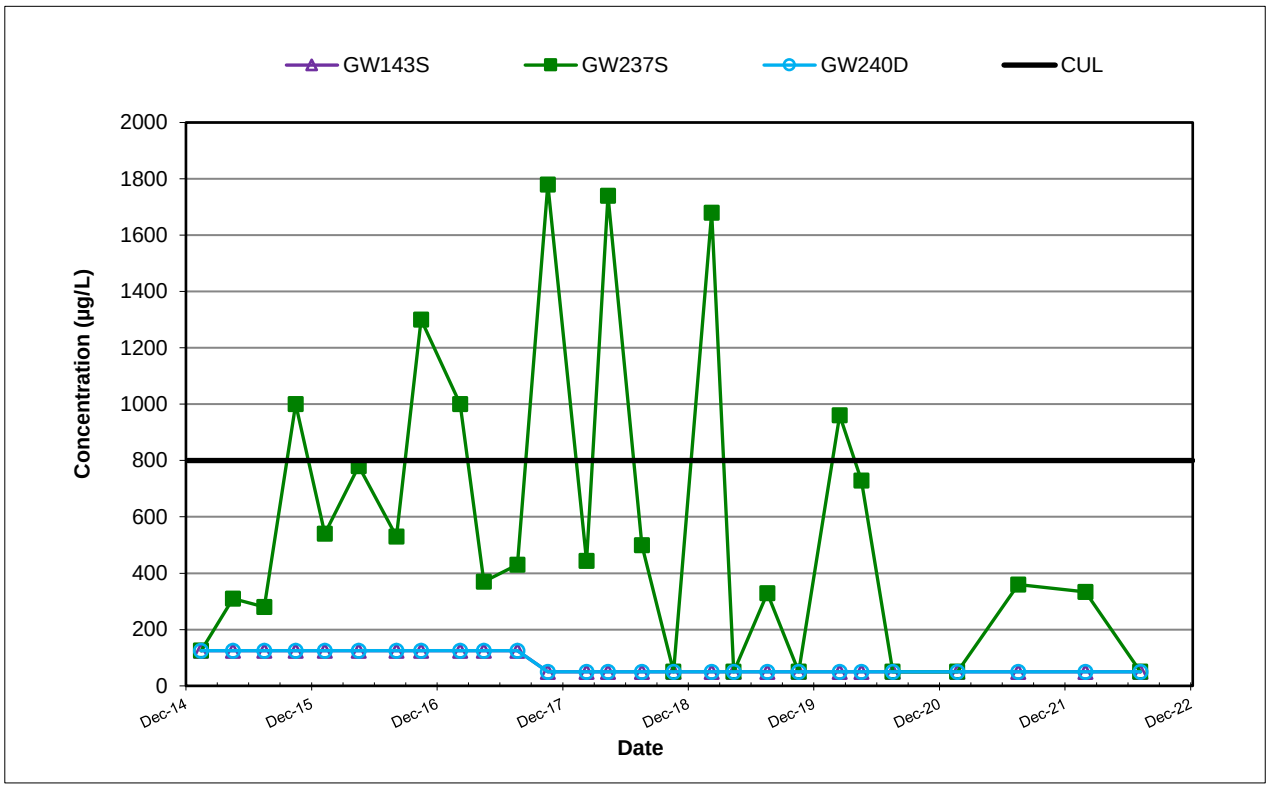
Vinyl Chloride

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

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

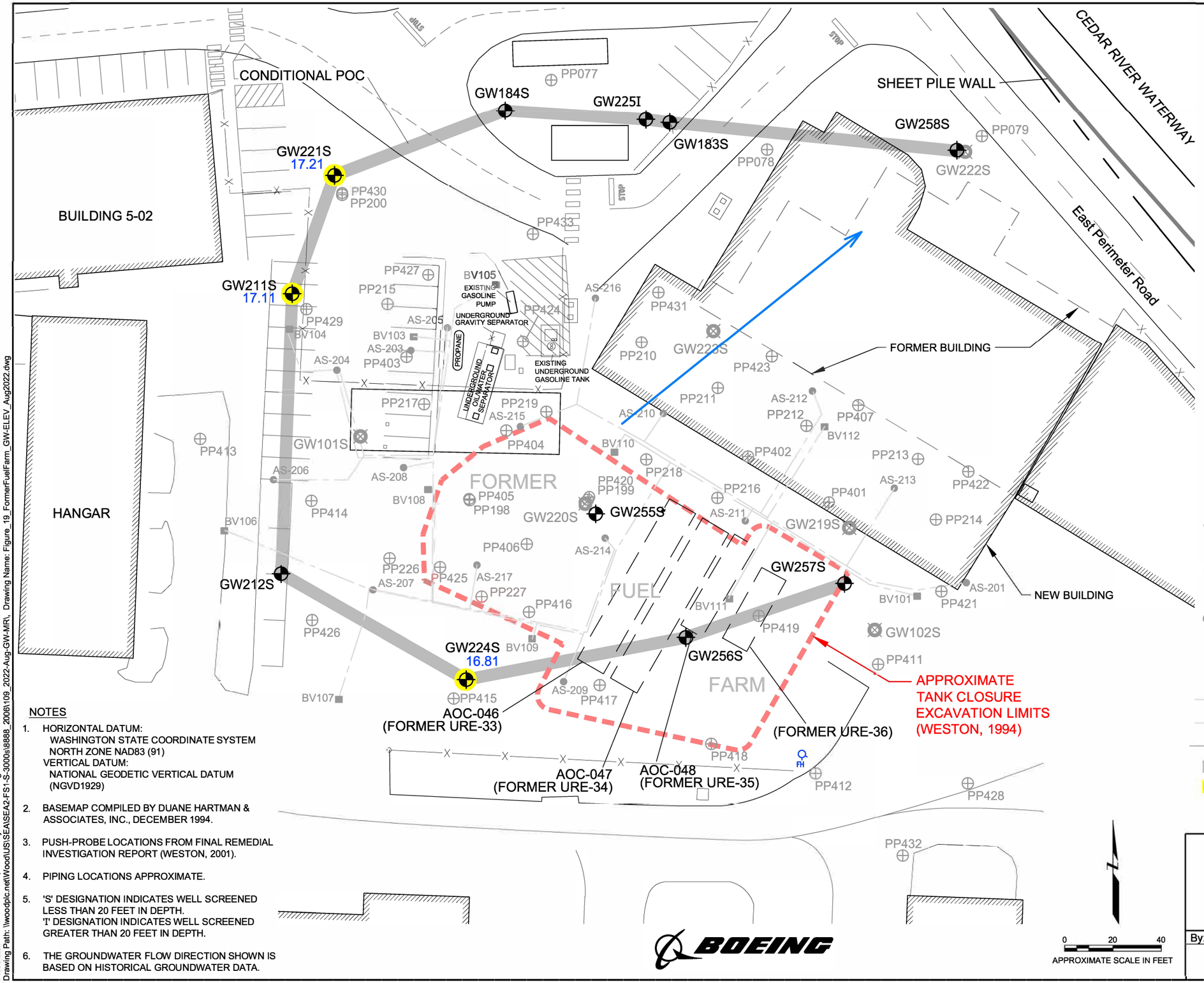
Figure
17

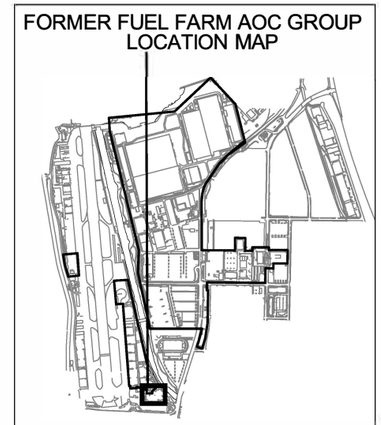


TPH as Gasoline

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

wsp	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





LEGEND

- GW224S 16.81 — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION (NGVD-FEET)
- GENERAL DIRECTION OF GROUNDWATER FLOW BASED ON HISTORICAL DATA
- PP042 — PUSH PROBE LOCATION
- GW222S — DECOMMISSIONED GROUNDWATER MONITORING WELL
- AS-204 — FORMER UNDERGROUND AIR SPARGING WELL
- BV112 — FORMER UNDERGROUND BIOVENTING WELL
- FORMER UNDERGROUND BIOVENTING LINE
- FORMER UNDERGROUND AIR SPARGING LINE
- FENCE
- CONDITIONAL POINT OF COMPLIANCE
- HIGHLIGHTED WELLS INCLUDED IN MONITORING NETWORK

NOTES

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

0 20 40
APPROXIMATE SCALE IN FEET

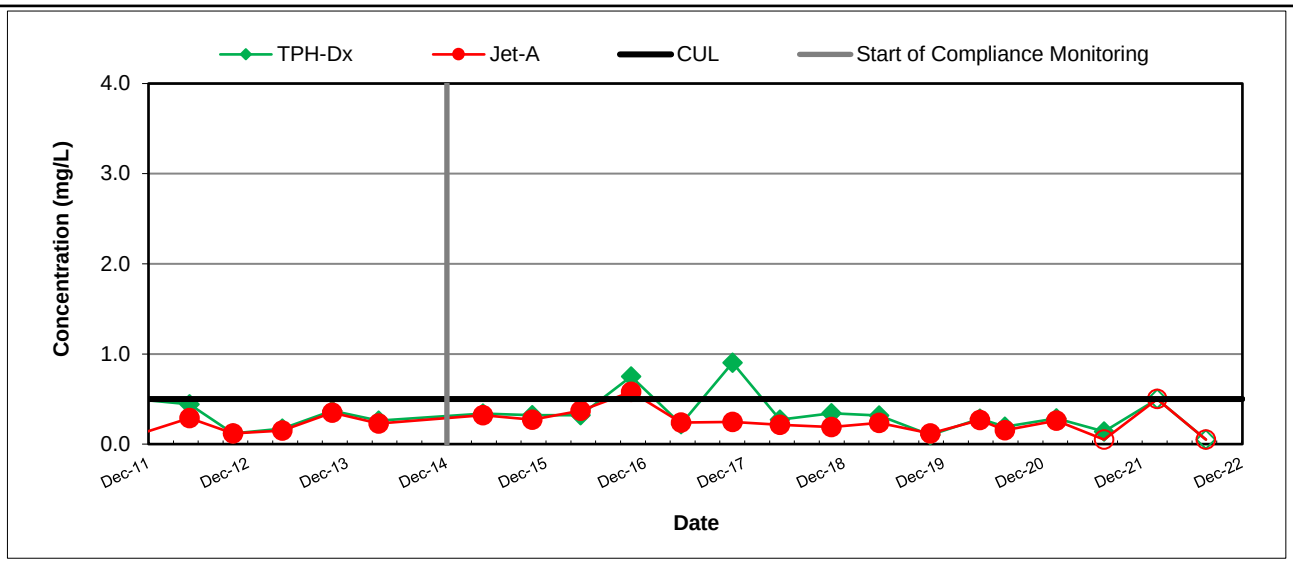
BOEING

FORMER FUEL FARM AOC GROUP MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS AUGUST 19, 2022

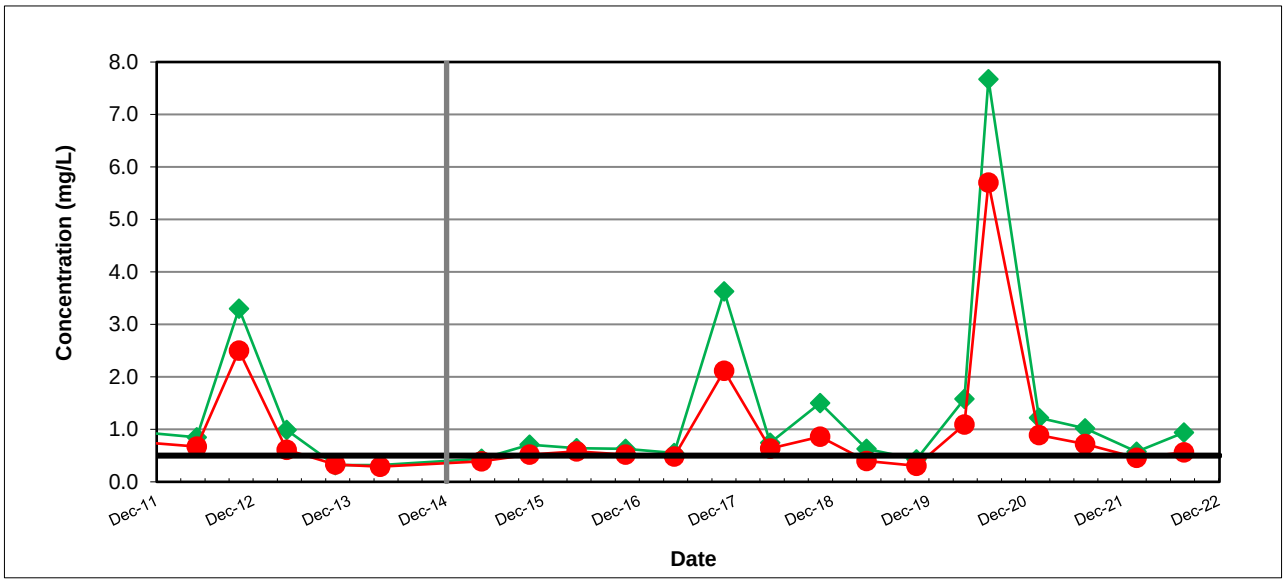
Boeing Renton Facility
Renton, Washington

By: APS	Date: 10/14/22	Project No. PS20203450
wsp		Figure 19

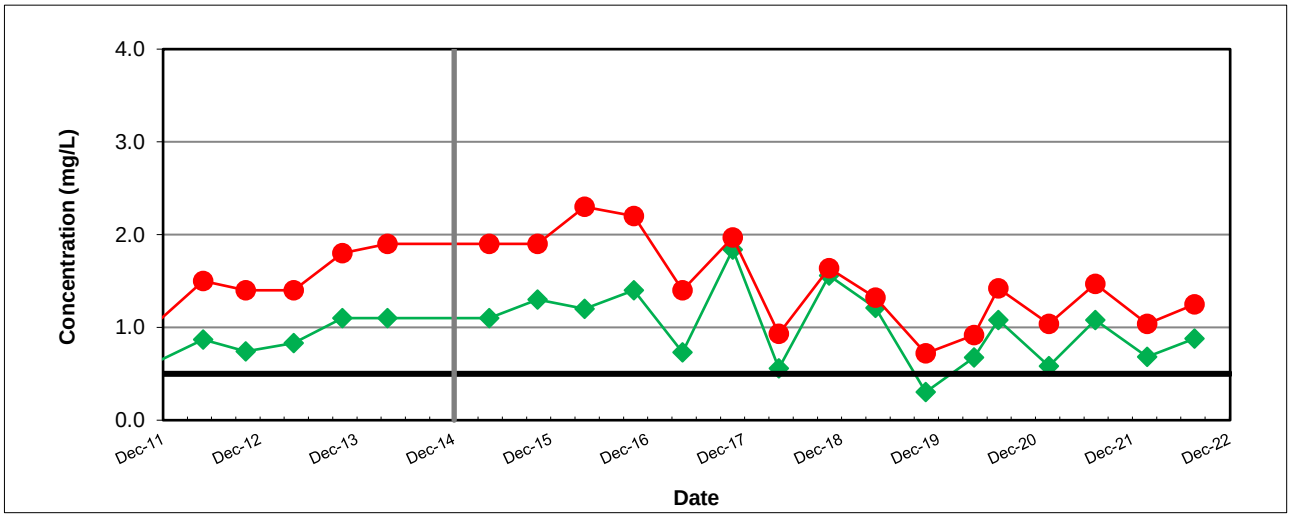
Plot Date: 10/14/22 - 9:47am, Plotted by: adam.stenberg
Drawing Path: \\woodpic.net\Wood\US\SEA\SEA2-FS1-S-3000\s\8888_2006\109_2022-Aug-GW-MR\, Drawing Name: Figure_19_FormerFuelFarm_GW-ELEV_Aug2022.dwg



CPOC WELL GW211S



CPOC WELL GW221S



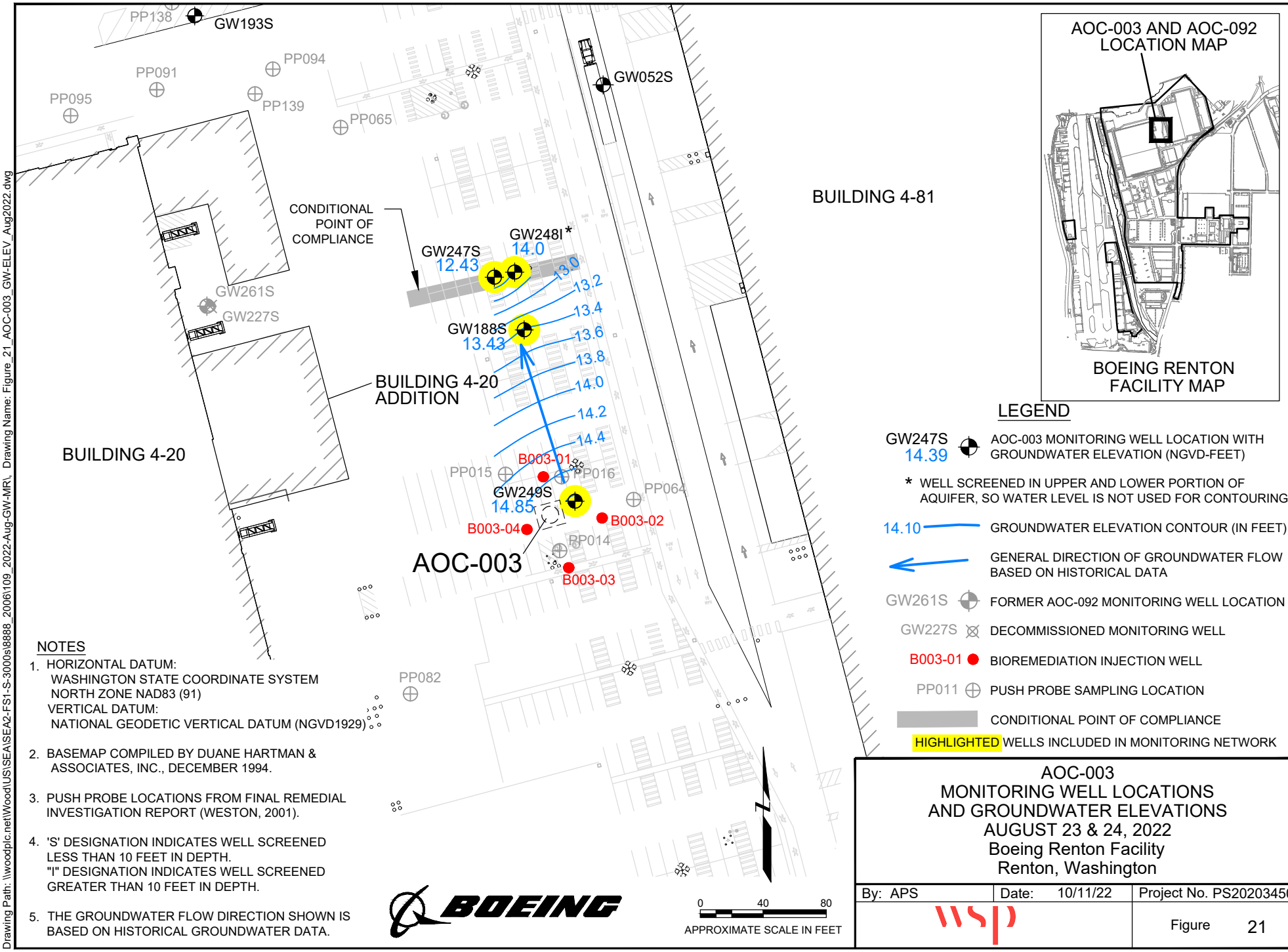
CPOC WELL GW224S

Note: Non-detected values shown at one-half the reporting limit and with an open symbol. Reporting limits were elevated for February 2022 results in GW211S.

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



LEGEND

- GW247S 14.39 — AOC-003 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.
- 14.10 — GROUNDWATER ELEVATION CONTOUR (IN FEET)
- GENERAL DIRECTION OF GROUNDWATER FLOW BASED ON HISTORICAL DATA
- GW261S — FORMER AOC-092 MONITORING WELL LOCATION
- GW227S — DECOMMISSIONED MONITORING WELL
- B003-01 — BIOREMEDIATION INJECTION WELL
- PP011 — PUSH PROBE SAMPLING LOCATION
- CONDITIONAL POINT OF COMPLIANCE
- HIGHLIGHTED WELLS INCLUDED IN MONITORING NETWORK

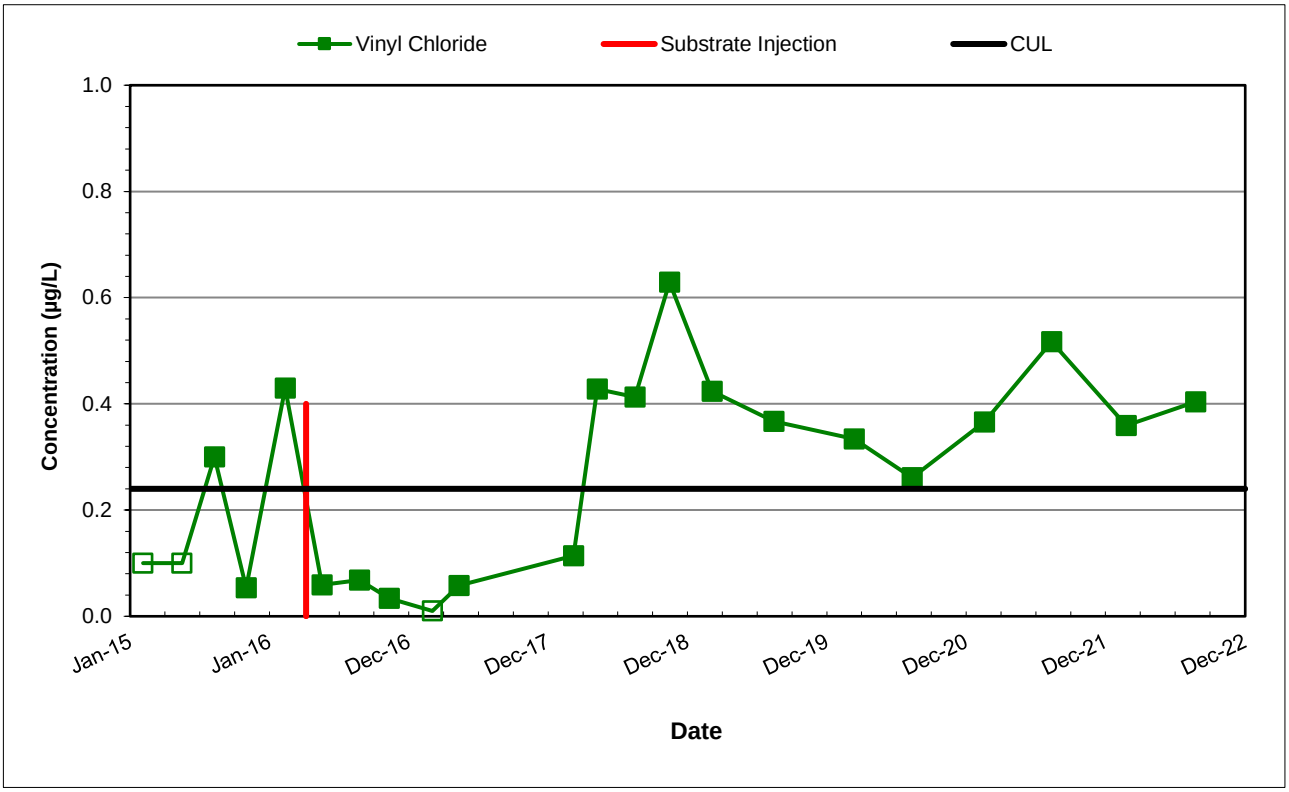
NOTES

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

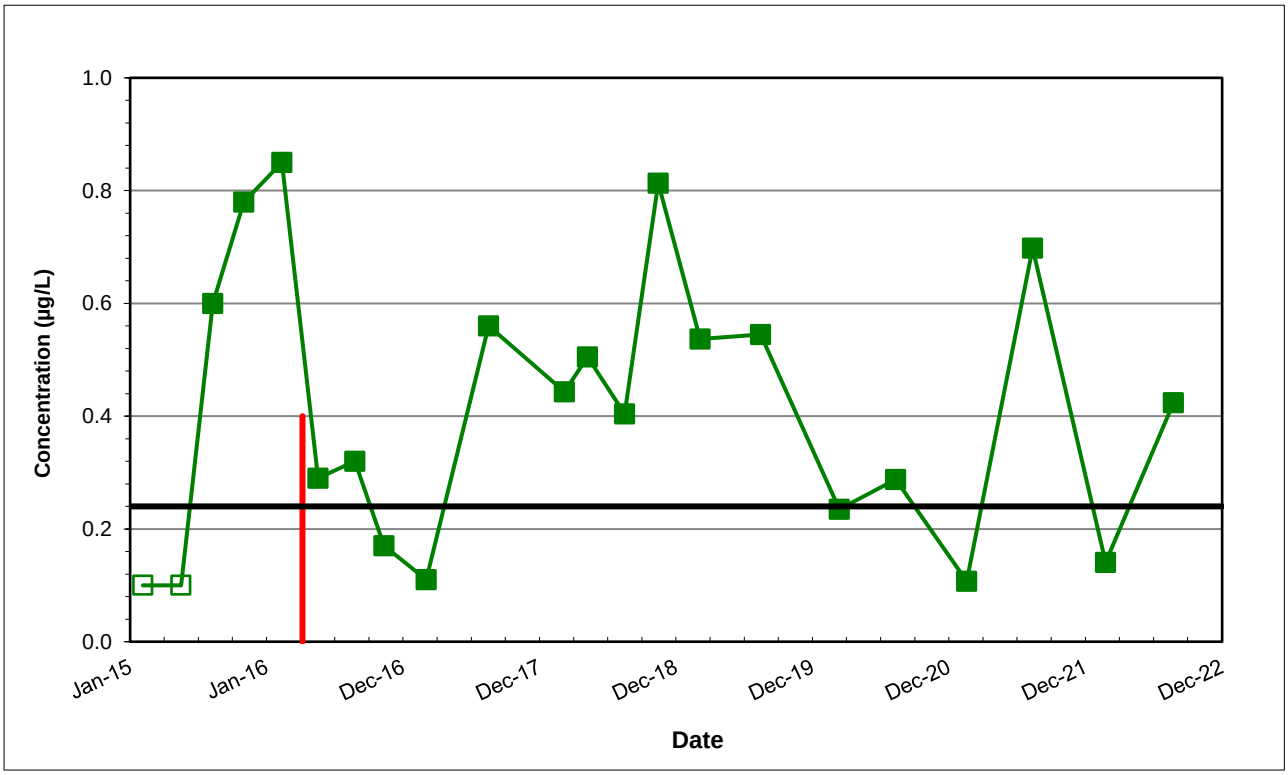
AOC-003
MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS
AUGUST 23 & 24, 2022
Boeing Renton Facility
Renton, Washington

By: APS	Date: 10/11/22	Project No. PS20203450
WSP		Figure 21

Plot Date: 10/11/22 - 2:21pm, Plotted by: adam.stenberg
Drawing Path: \\woodplc.net\Wood\US\SEA\SEA2-FS1-S-3000s\8888_2006\109_2022-Aug-GW-MR\, Drawing Name: Figure_21_AOC-003_GW-ELEV_Aug2022.dwg



SOURCE AREA WELL GW249S



DOWNGRADIENT PLUME AREA WELL GW188S

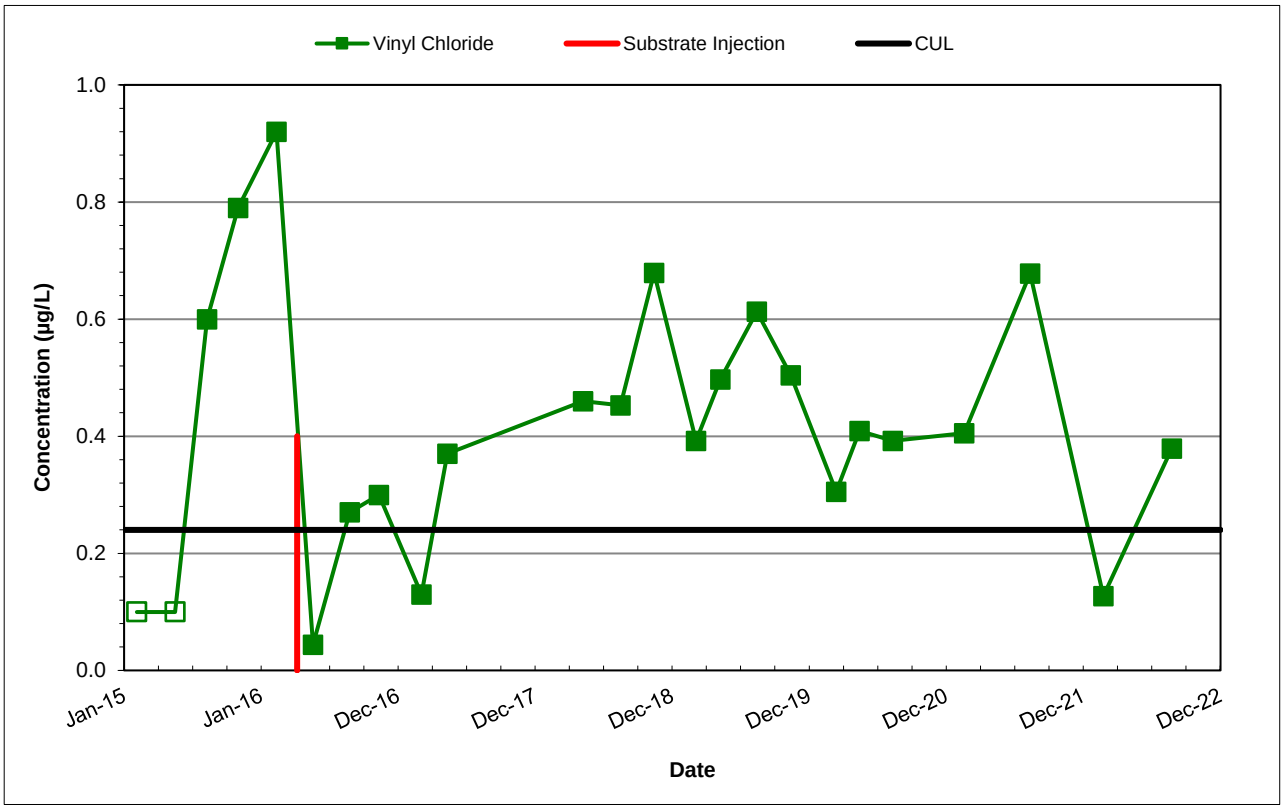
Note: Non-detected values shown at one-half the reporting limit and with an open symbol

AOC-003 TREND PLOTS FOR SOURCE AREA WELL GW249S
AND DOWNGRADIENT PLUME AREA WELL GW188S
Boeing Renton Facility
Renton, Washington

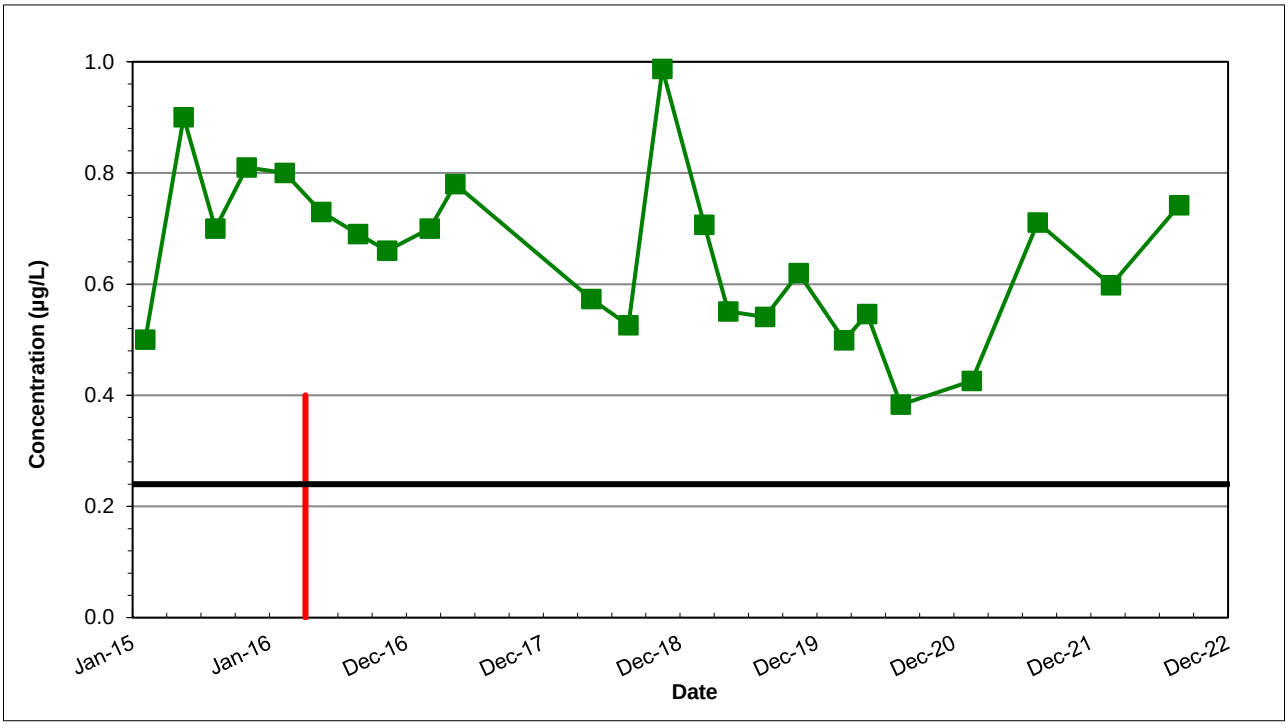
Project No.
PS20203450

Figure
22

P:\8888 - Boeing Renton\9.0 Field & Lab Data Mgmt\Grapher and Excel Figure Files\excel\2022 Update\Figure 22 to 25_AOC 003-4.xlsx



CPOC WELL GW247S



CPOC WELL GW248I

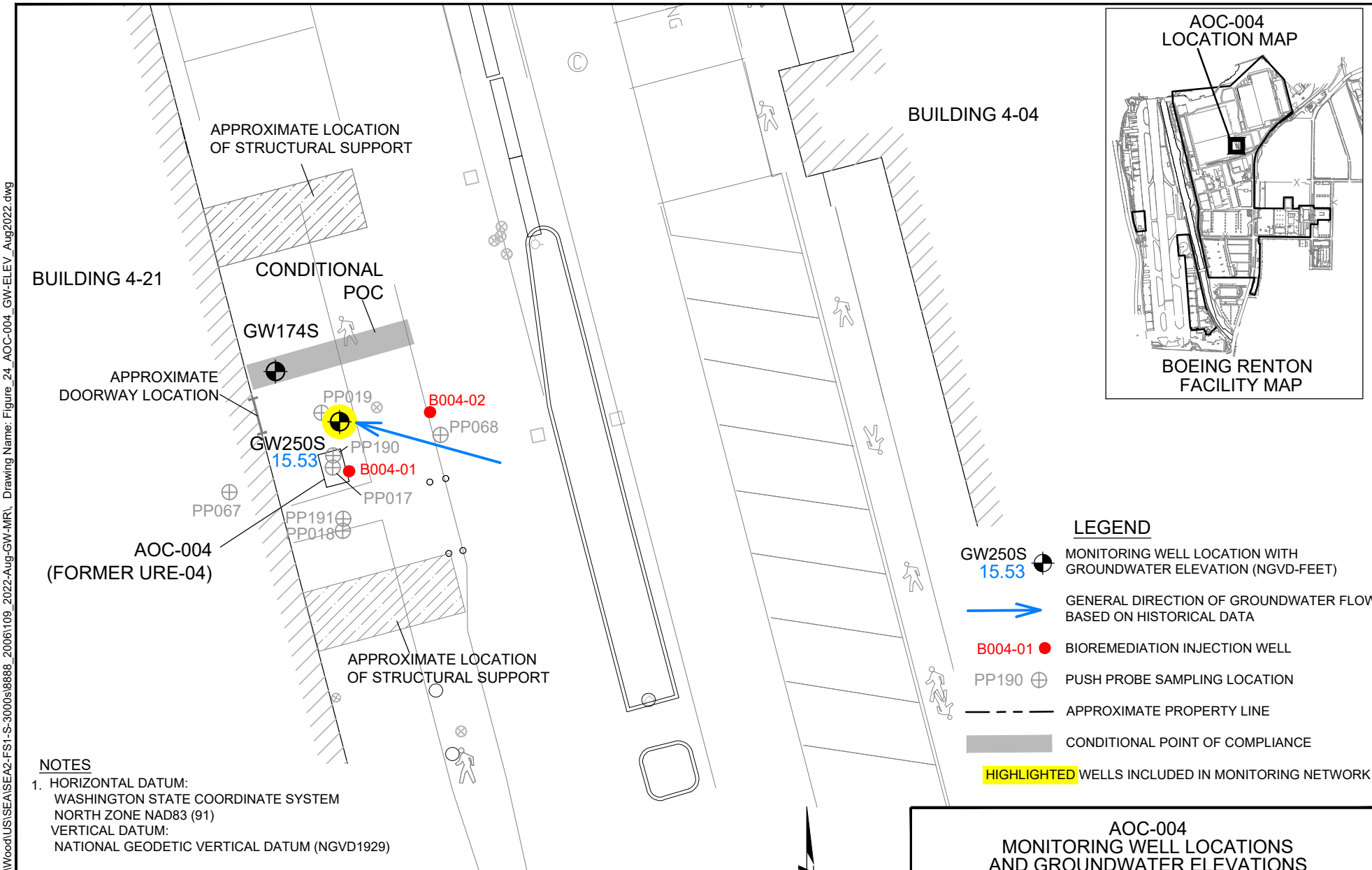
Note: Non-detected values shown at one-half the reporting limit and with an open symbol

AOC-003 TREND PLOTS FOR CPOC WELLS GW247S AND GW248I
Boeing Renton Facility
Renton, Washington

Project No. PS20203450

Figure 23

\\woodplc.net\Wood\US\SEA\SEA2-FS1-projects\8888 - Boeing Renton\9.0 Field & Lab Data Mgmt\Grapher and Excel Figure Files\excel\2022 Update\Figu



LEGEND

- GW250S 15.53 — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION (NGVD-FEET)
- GENERAL DIRECTION OF GROUNDWATER FLOW BASED ON HISTORICAL DATA
- B004-01 — BIOREMEDIATION INJECTION WELL
- PP190 — PUSH PROBE SAMPLING LOCATION
- APPROXIMATE PROPERTY LINE
- CONDITIONAL POINT OF COMPLIANCE
- HIGHLIGHTED WELLS INCLUDED IN MONITORING NETWORK

NOTES

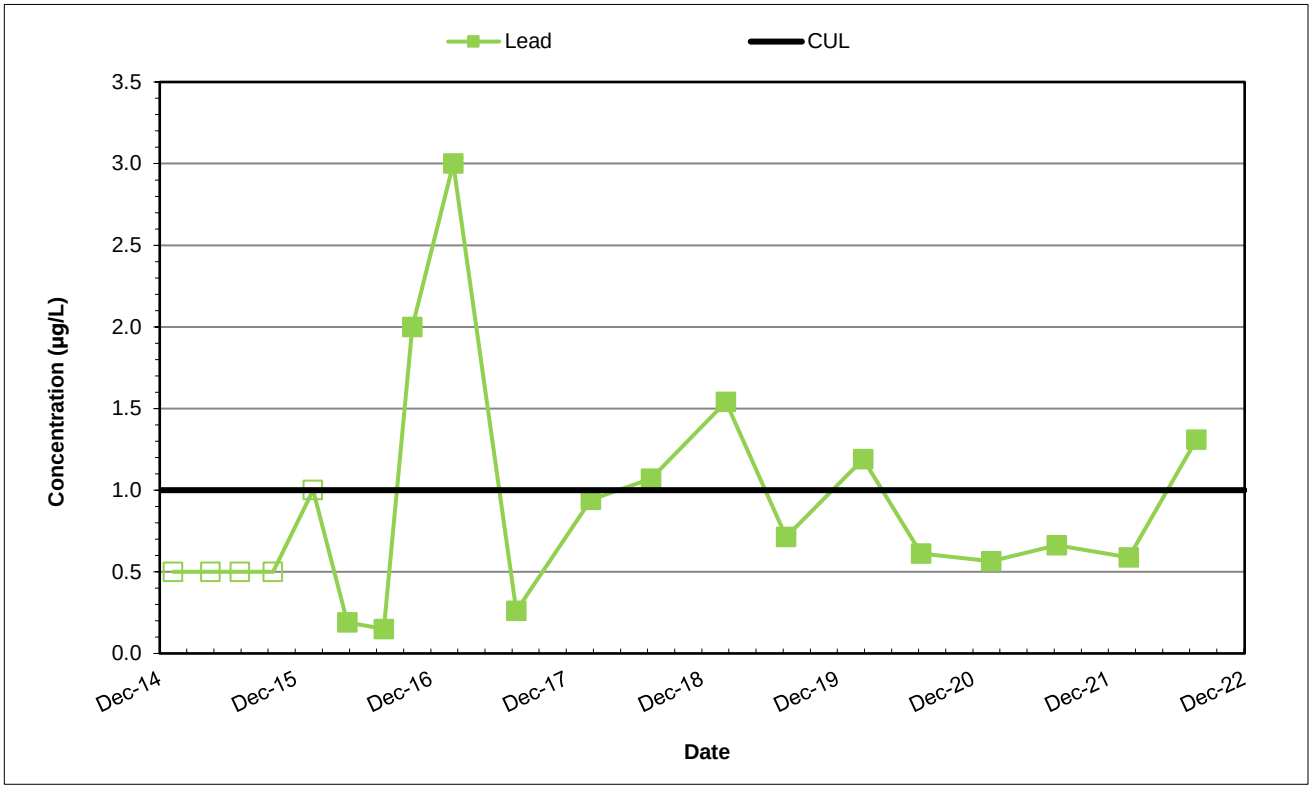
1. HORIZONTAL DATUM:
   WASHINGTON STATE COORDINATE SYSTEM
   NORTH ZONE NAD83 (91)
   VERTICAL DATUM:
   NATIONAL GEODETIC VERTICAL DATUM (NGVD1929)
2. BASEMAP COMPILED BY DUANE HARTMAN & ASSOCIATES, INC., DECEMBER 1994.
3. PUSH PROBE LOCATIONS FROM FINAL REMEDIAL INVESTIGATION REPORT (WESTON, 2001).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

BOEING

0 10 20
APPROXIMATE SCALE IN FEET

AOC-004
MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS
AUGUST 23, 2022
Boeing Renton Facility
Renton, Washington

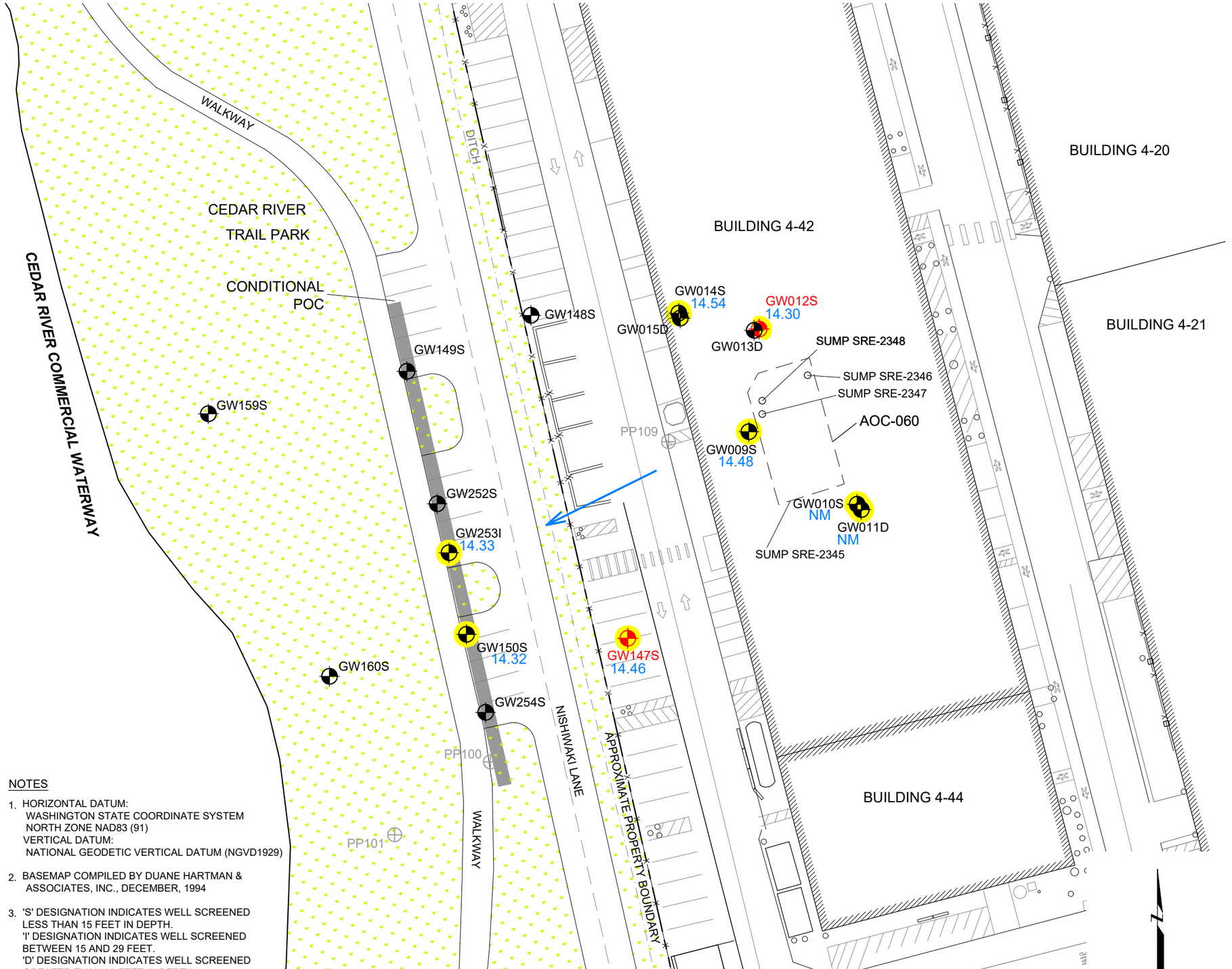
By: APS	Date: 10/11/22	Project No. PS20203450
WSP		Figure 24

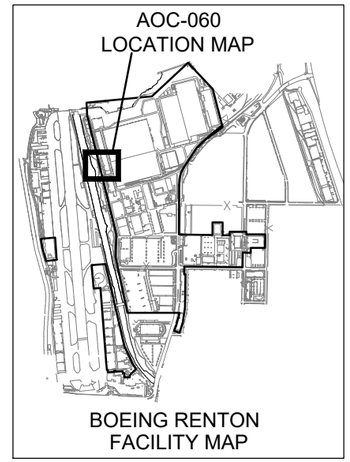


SOURCE AREA WELL GW250S

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

wsp	AOC-004 TREND PLOT FOR SOURCE AREA WELL GW250S Boeing Renton Facility Renton, Washington	Project No. PS20203450 Figure 25





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.

LEGEND

- GW150S 13.86 — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION (NGVD-FEET)
- GW147S — BIOREMEDIATION 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

N

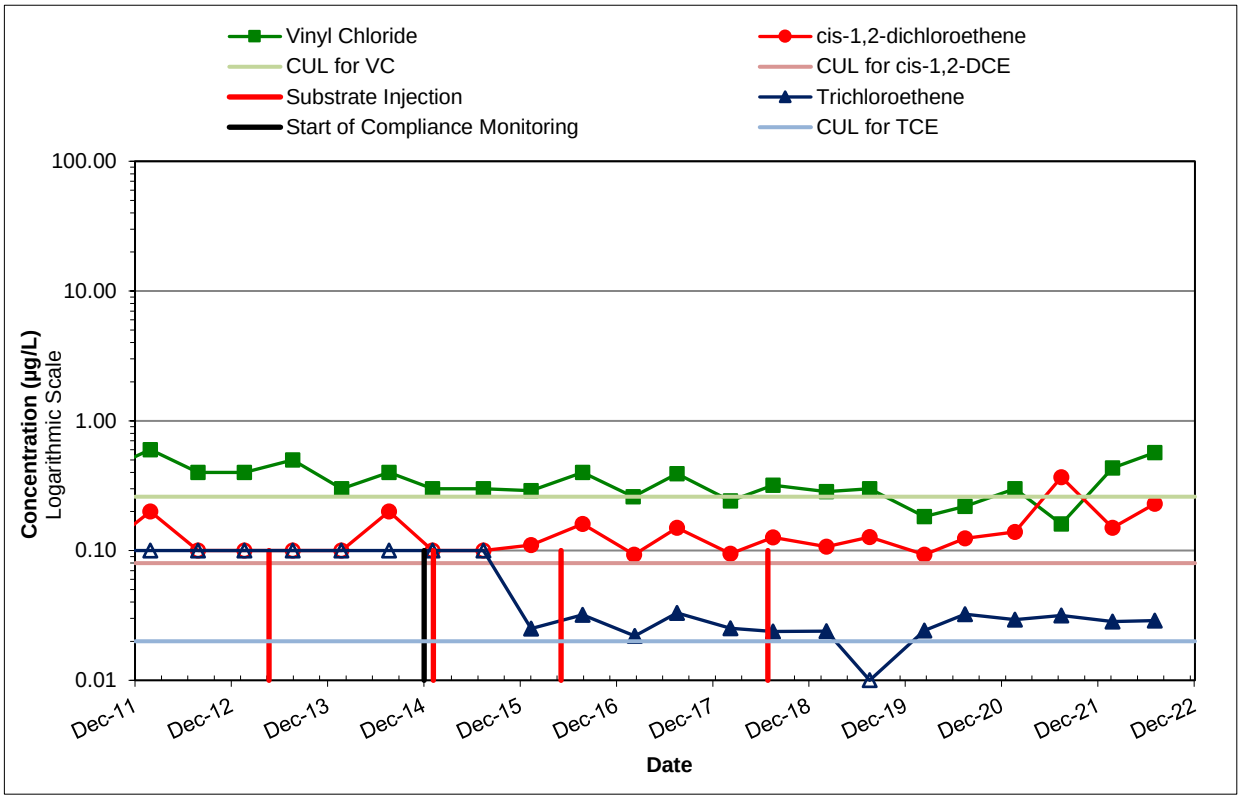
0 20 40
APPROXIMATE SCALE IN FEET

BOEING

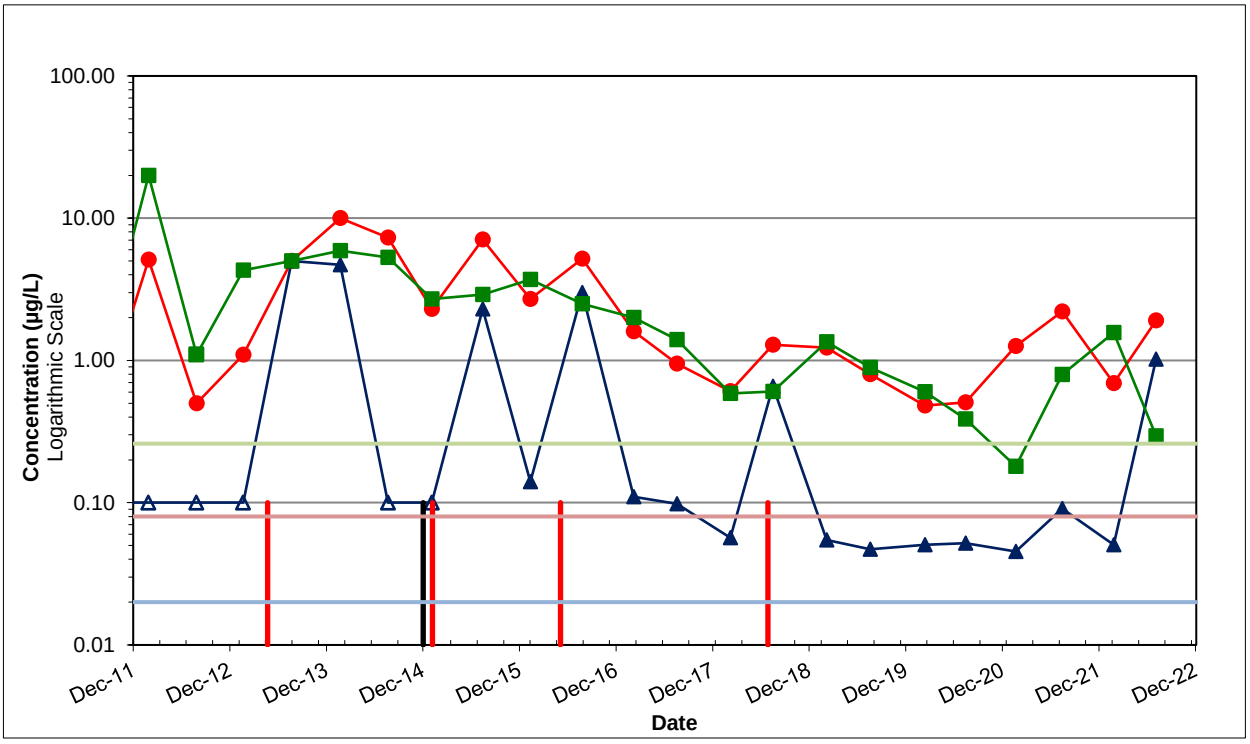
AOC-060
MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS
AUGUST 18-19 & 22, 2022
Boeing Renton Facility
Renton, Washington

By: APS	Date: 10/31/22	Project No. PS20203450
WSP USA Environment & Infrastructure Inc.	Figure	26

Plot Date: 10/31/22 - 10:49am, Plotted by: adam.stenberg
Drawing Path: \\woodplc.net\Wood\US\SEA\SEA2-FS1-S-3000s\8888_2006\109_2022-Aug-GW-MR\, Drawing Name: Figure_26_AOC-060_GW-ELEV_Aug2022.dwg



SOURCE AREA WELL GW009S



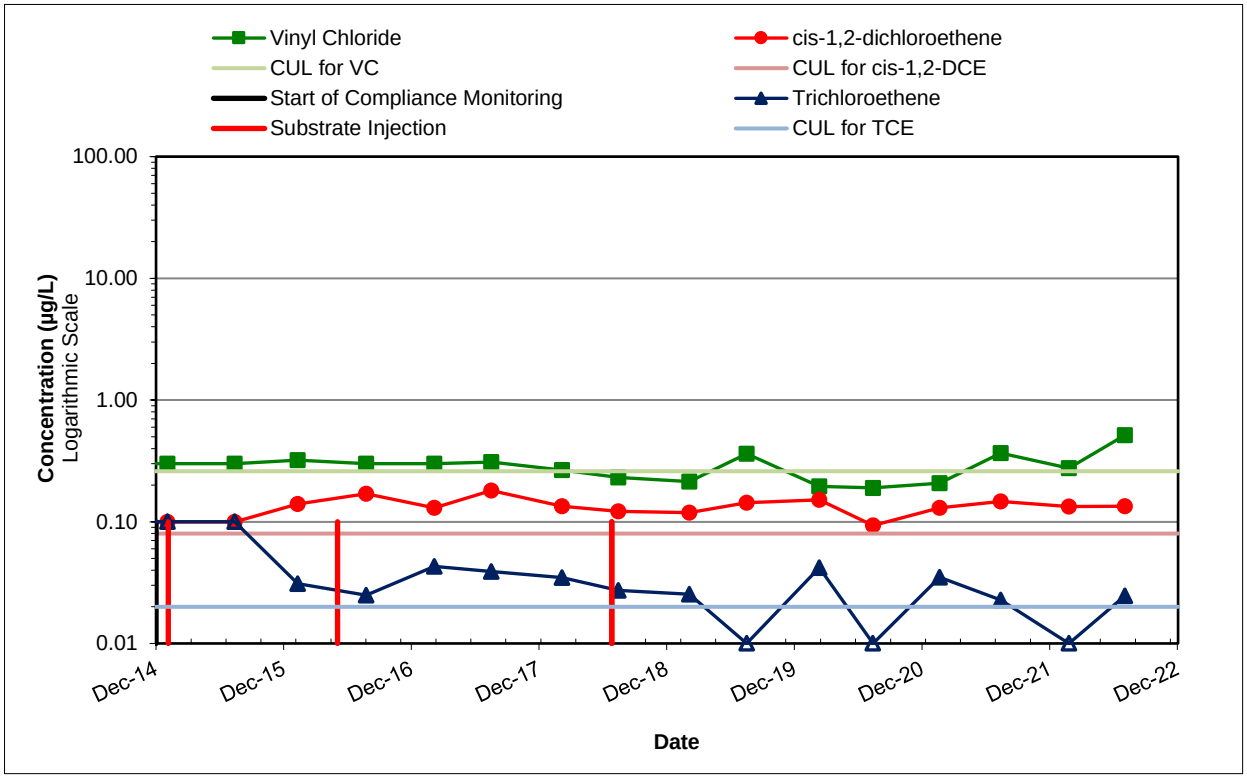
DOWNGRADIENT PLUME AREA WELL GW012S

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

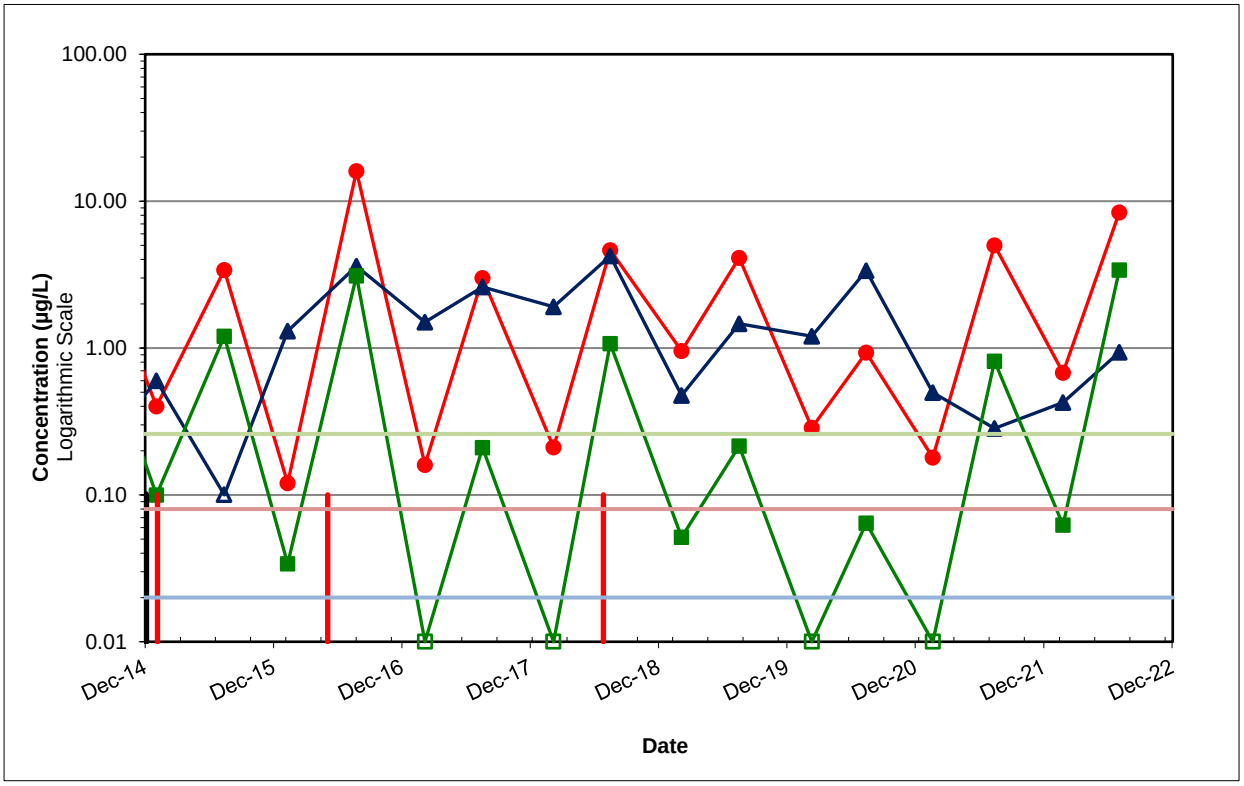
AOC-060 TREND PLOTS FOR SOURCE AREA WELL
GW009S AND DOWNGRADIENT PLUME AREA WELL GW012S
Boeing Renton Facility
Renton, Washington

Project No.
PS20203450

Figure
27



DOWNGRADIENT PLUME AREA WELL GW014S

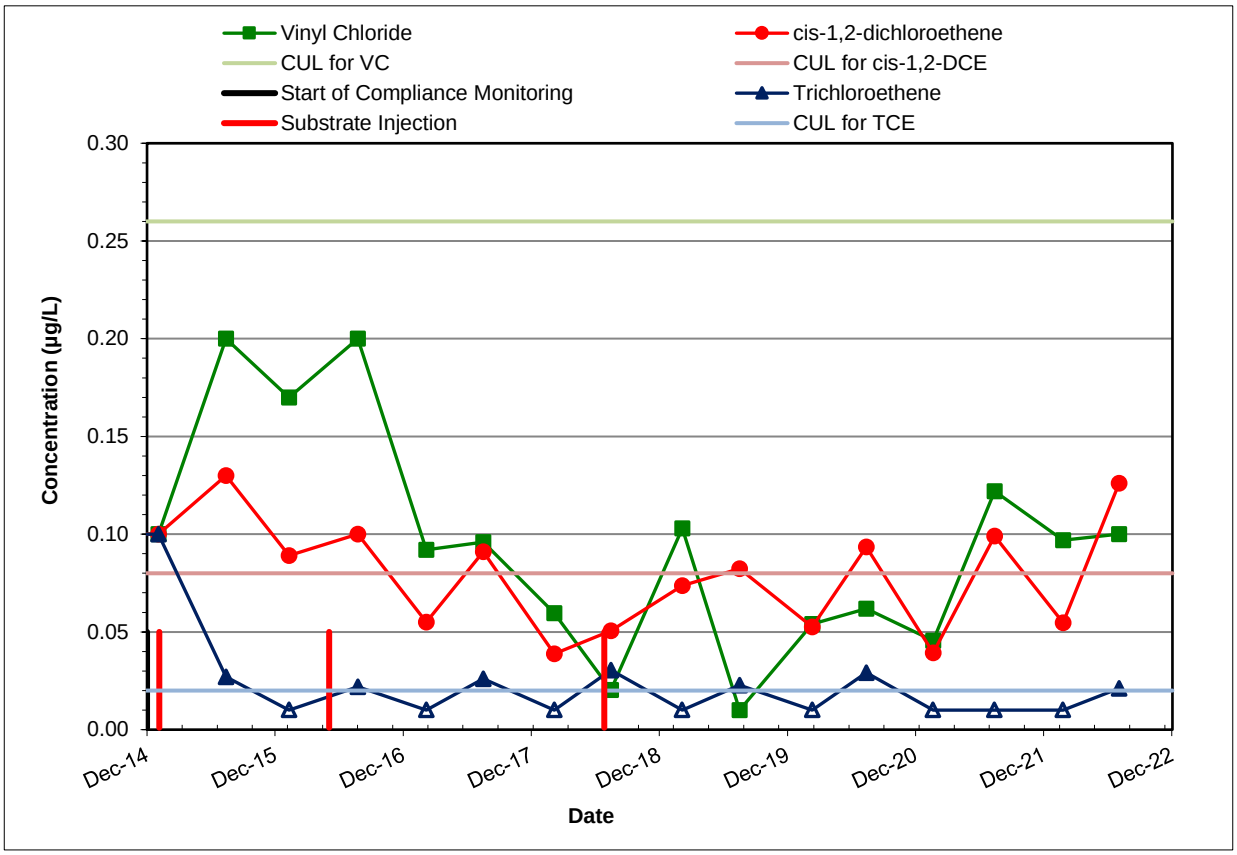


DOWNGRADIENT PLUME AREA WELL GW147S

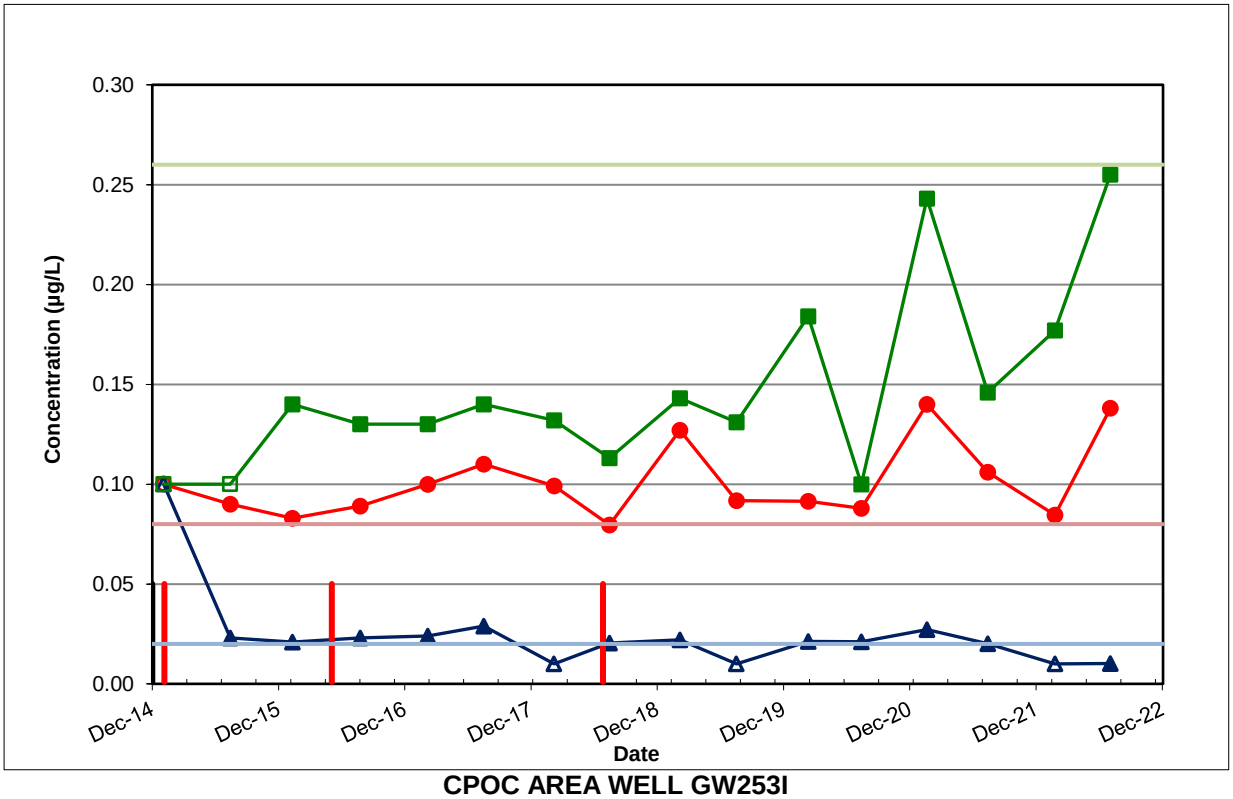
Note: Non-detected values shown at one-half the reporting limit and with an open symbol.

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

\\woodplc.net\Wood\US\SEA\SEA2-FS1-projects\8888 - Boeing Renton\9.0 Field & Lab Data Mgmt\Grapher and Excel Figure Files\excel\2022 Update\Figure



CPOC AREA WELL GW150S



CPOC AREA WELL GW253I

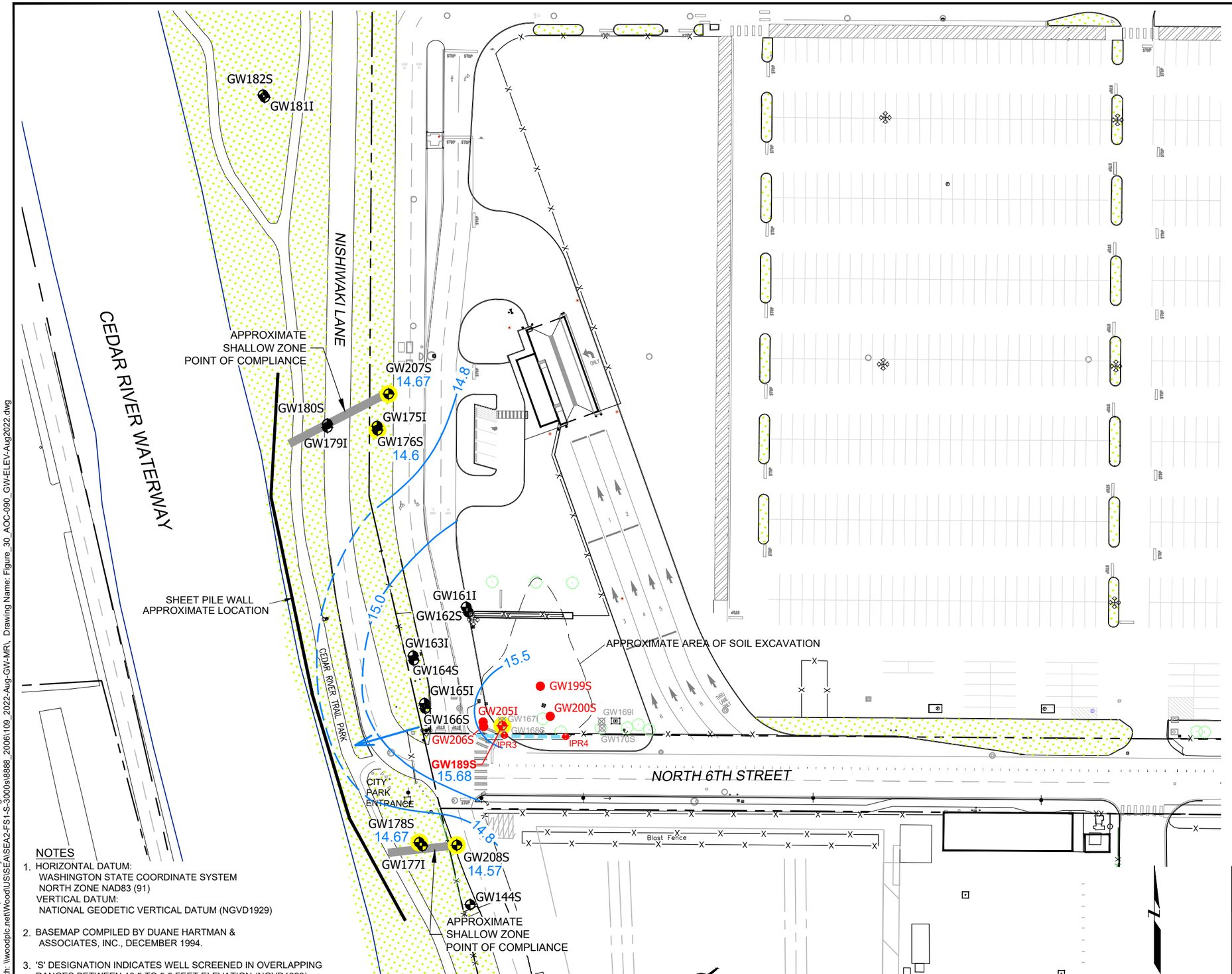
Note: Non-detected values shown at one-half the reporting limit and with an open symbol.

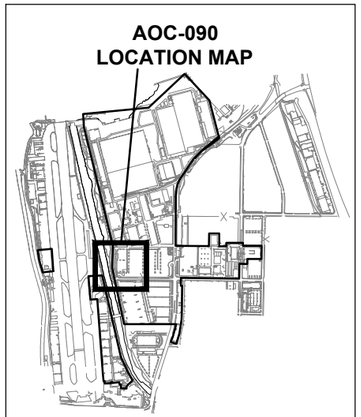
AOC-060 TREND PLOTS FOR
CPOC AREA WELLS GW150S AND GW253I
Boeing Renton Facility
Renton, Washington

Project No.
PS20203450

Figure
29

\\woodplc.net\Wood\US\SEA\SEA2-FS1-projects\8888 - Boeing Renton\9.0 Field & Lab Data Mgmt\Grapher and Excel Figure Files\excel\2022 Update\Figure





LEGEND

- GW178S 15.07 — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION (NGVD-FEET)
- 15.0 — GROUNDWATER ELEVATION CONTOUR (IN FEET) (DASHED WHERE INFERRED)
- GENERAL DIRECTION OF GROUNDWATER FLOW
- GW201S — EXISTING BIOREMEDIATION SUBSTRATE INJECTION WELL
- GW189S 15.62 — EXISTING BIOREMEDIATION SUBSTRATE INJECTION WELL AND MONITORING WELL GROUNDWATER ELEVATION (NGVD-FEET)
- IPR4 — EXISTING INJECTION PIPE RISER
- GW170S — DECOMMISSIONED MONITORING WELL
- APPROXIMATE PROPERTY LINE
- FENCE
- APPROXIMATE LOCATION OF 4-INCH DIAMETER PERFORATED PIPE
- CONDITIONAL POINT OF COMPLIANCE
- HIGHLIGHTED WELLS INCLUDED IN MONITORING NETWORK

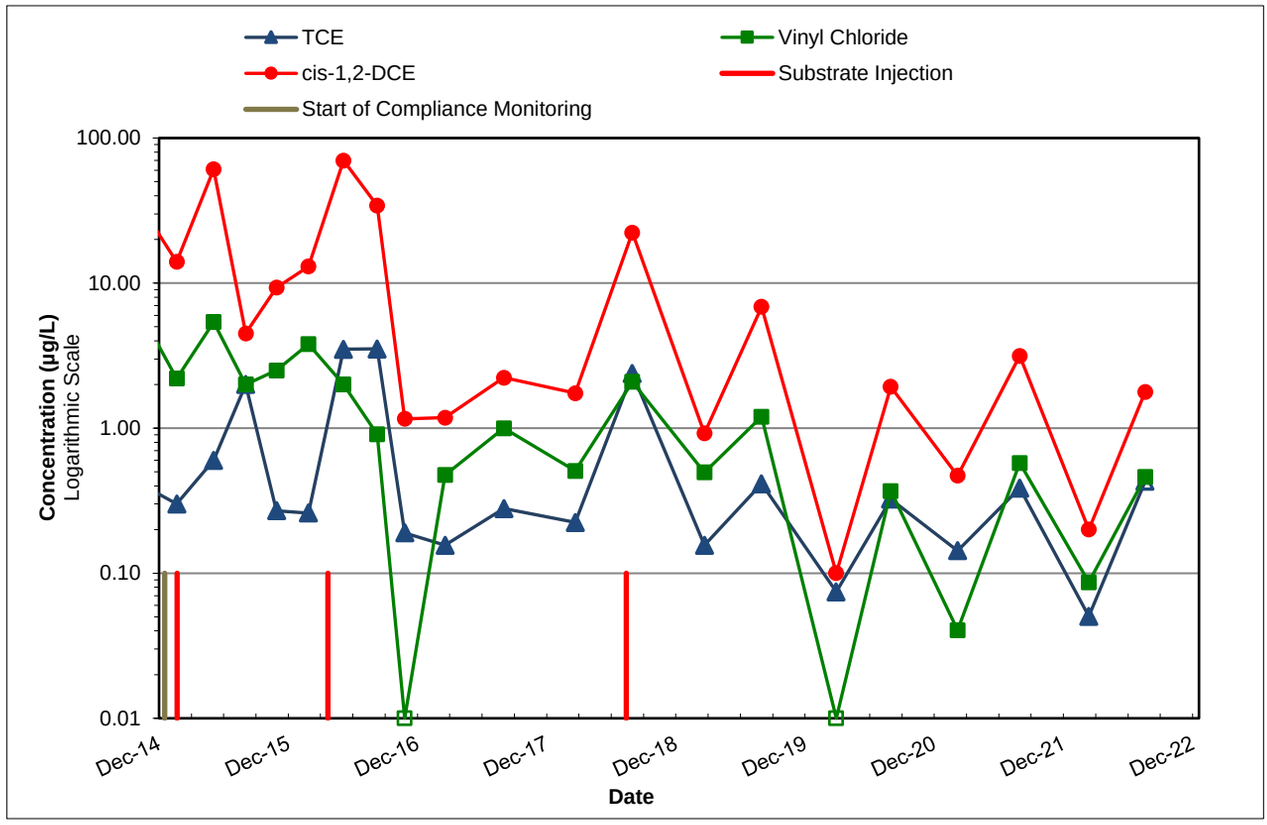
NOTES

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).

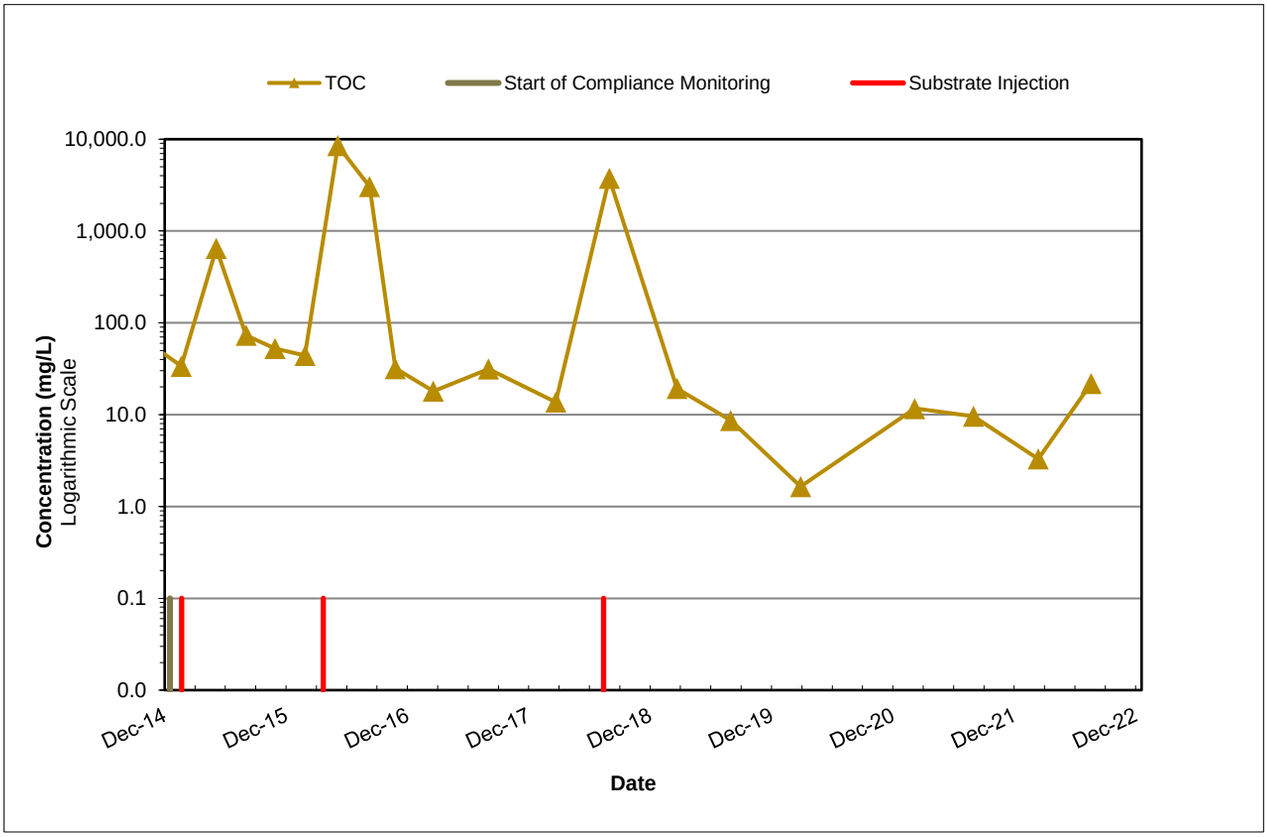
AOC-090
MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS
AUGUST 23 & 24, 2022
Boeing Renton Facility
Renton, Washington

By: APS	Date: 10/31/22	Project No. PS20203450
WSP USA Environment & Infrastructure Inc.		Figure 30

Plot Date: 10/31/22 - 10:55am, Plotted by: adam stenberg
Drawing Path: \\woodplc.net\WoodUS\SEA\SEA2-FS1-S-3000s\8888_2006\109_2022-Aug-GW-MR\, Drawing Name: Figure_30_AOC-090_GW-ELEV-Aug2022.dwg



SOURCE AREA WELL GW189S



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

wsp	AOC-090 TREND PLOTS FOR SOURCE AREA WELL GW189S Boeing Renton Facility Renton, Washington	Project No. PS20203450 Figure 31

\\woodplc.net\Wood\US\SEA\SEA2-FS1-projects\8888 - Boeing Renton\9.0 Field & Lab Data Mgmt\Grapher and Excel Figure Files\excel\2022 Update\Figure

Plot Date: 10/14/22 - 9:50am, Plotted by: adam.stenberg
Drawing Path: \\woodplc.net\Wood\US\SEA\SEA2-FS1-S-3000s\8888_2006\109_2022-Aug-GW-MR\, Drawing Name: Figure_32_APRON A_GW-ELEV_Aug2022.dwg

CEDAR RIVER WATERWAY

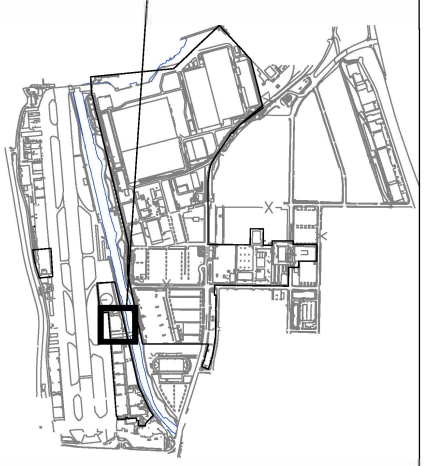
EAST PERIMETER ROAD

B-4
B-3
B-6
B-10
B-12
B-2
B-9
B-8
B-7
B-1
B-16
B-17
B-13
B-14
B-15
GW262S
GW265S
GW263S
NM
GW264S
6.47' DTW

SHED
CB
BUILDING

APPROXIMATE AREA
OF TRENCH INJECTION

APRON A
LOCATION MAP



BOEING RENTON
FACILITY MAP

LEGEND

GW264S 6.47' DTW	MONITORING WELL LOCATION WITH DEPTH TO WATER (BGS IN FEET)
NM	NOT MEASURED
	PRESUMED GENERAL DIRECTION OF GROUNDWATER FLOW
B-1	SOIL SAMPLE LOCATION
	APPROXIMATE PROPERTY LINE
x	FENCE

HIGHLIGHTED WELLS INCLUDED IN MONITORING NETWORK

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

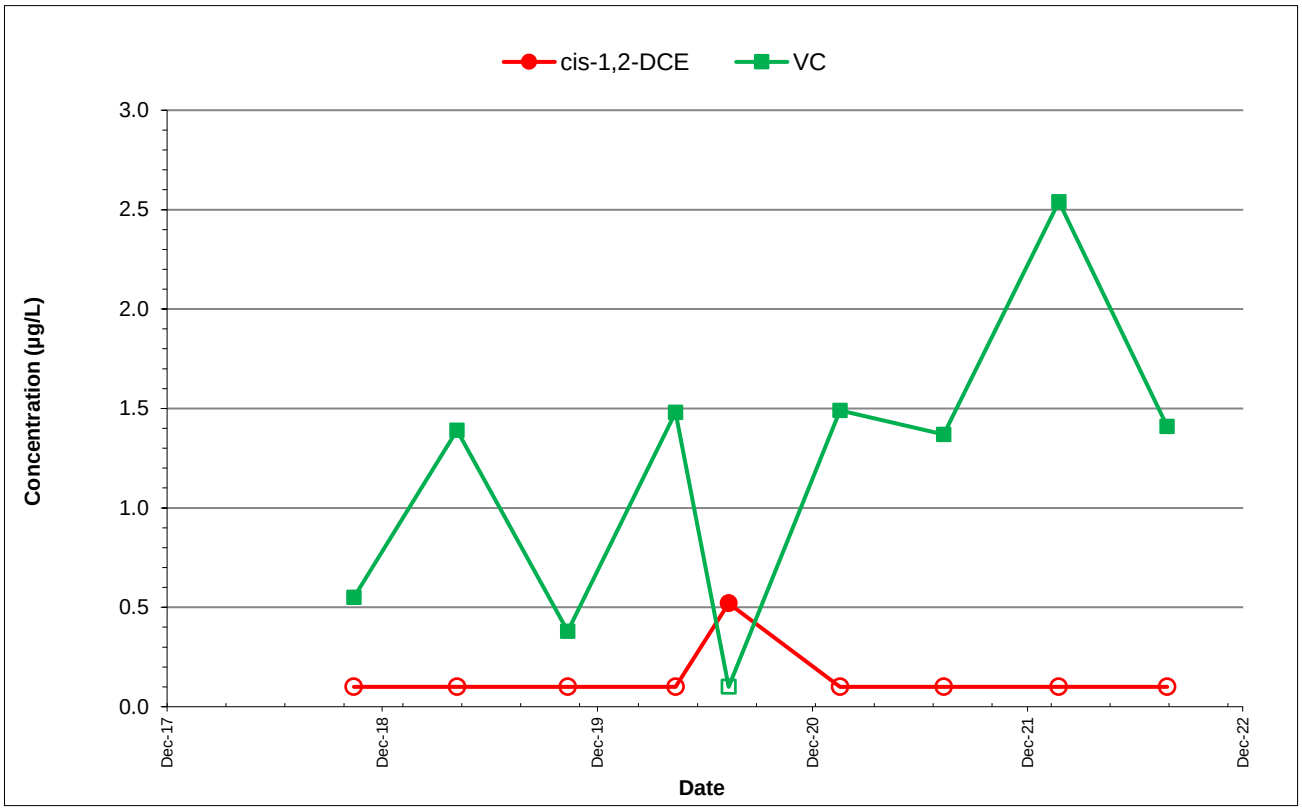
N

0 20 40
APPROXIMATE SCALE IN FEET

BOEING

APRON A AREA
MONITORING WELL LOCATIONS AND DEPTH TO GROUNDWATER
AUGUST 24, 2022
Boeing Renton Facility
Renton, Washington

By: APS	Date: 10/14/22	Project No. PS20203450
WSP		Figure 32



SOURCE AREA WELL GW264S

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

APRON A TREND PLOT FOR WELL GW264S
Boeing Renton Facility
Renton, Washington

Project No.
PS20203450

Figure
33

TABLES

Table 1: SWMU-168 Groundwater Elevation Data

August 17, 2022

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	7.65	17.21

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 17, 2022
Boeing Renton Facility, Renton, Washington

Parameter	Well ID [2]
	CPOC Area
	GW230I
Temperature (degrees C)	27.6
Specific Conductivity (µS/cm)	483.2
Dissolved Oxygen (mg/L)	0.10
pH (standard units)	6.22
Oxidation/Reduction Potential (mV)	27.6

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 17, 2022
Boeing Renton Facility, Renton, Washington

Analyte	Cleanup Level [3]	Well ID [4] CPOC Area GW230I
Volatile Organic Compounds (µg/L)		
Vinyl Chloride	0.11	**0.539 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 24, 2022

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	9.87	17.11
GW153S	5 to 20[2]	27.47	10.41	17.06
GW172S	8 to 18[2]	26.44	9.84	16.6
GW173S	8 to 18[2]	26.51	9.99	16.52
GW226S	5 to 20[2]	26.86	8.57	18.29
GW232S	4 to 14	24.45	7.41	17.04
GW234S	3 to 13	24.95	8.29	16.66
GW235I	15 to 25	24.90	7.70	17.2
GW236S	5 to 15	24.36	8.39	15.97

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 24, 2022
Boeing Renton Facility, Renton, Washington

Parameter	Well ID[2]								
	Source Area		Downgradient Plume Area			CPOC Area			
	GW152S	GW153S	GW172S	GW173S	GW226S	GW232S	GW234S	GW235I	GW236S
Temperature (degrees C)	24.9	18.1	25.2	19.8	24.7	24.8	27.1	27.6	19.0
Specific Conductivity (µS/cm)	4841.0	234.7	781.0	341.4	354.6	600.0	731.0	220.1	326.4
Dissolved Oxygen (mg/L)	0.02	0.32	0.00	0.32	0.52	3.14	0.22	0.63	0.65
pH (standard units)	5.00	6.06	6.68	6.12	6.02	5.85	6.44	6.17	6.11
Oxidation/Reduction Potential (mV)	8.8	-64.0	-118.5	-81.7	-79.9	-93.3	-71.5	-71.4	-67.9
Total Organic Carbon (mg/L)	2,389	5.09	3.74	5.88	8.90	9.84	4.06	1.52	2.67

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

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

Table 6: SWMU-172 and SWMU-174 Group Concentrations of Constituents of Concern[1, 2]
August 24, 2022
Boeing Renton Facility, Renton, Washington

Analyte	Cleanup Level [4]	Well ID [3]								
		Source Area		Downgradient Plume Area			CPOC Area			
		GW152S	GW153S	GW172S	GW173S	GW226S	GW232S	GW234S	GW235I	GW236S
Volatile Organic Compounds (µg/L)										
cis -1,2-Dichloroethene	0.03	**0.877**	**0.100**	**0.0436**	0.168	0.0255	**0.325**	**0.134**	**0.227**	**0.0572**
Tetrachloroethene	0.02	**1.05**	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.0200 U
Trichloroethene	0.02	**0.534**	**0.0525**	0.0200 U	**0.0496**	0.0200 U	0.0200 U	0.0200 U	**0.0250**	0.0200 U
Vinyl Chloride	0.11	**0.346**	**0.214**	0.0887	**0.175**	**0.128**	**0.558**	**0.170**	0.0280	0.0200 U
Total Metals (µg/L)										
Arsenic	1.0	**47.7**	**2.85**	**4.86**	**6.04**	**3.09**	**3.83**	0.974	0.200 U	0.995
Copper	3.5	**9.17**	0.641	1.52	1.54	0.500 U	0.500 U	2.31	0.500 U	1.22
Lead	1.0	**5.75**	0.123	**1.32**	0.468	0.100 U	0.122	0.830	0.100 U	0.798

Notes:

1. Data qualifiers are as follows:
   U = The analyte was not detected at the reporting limit indicated.
   J = the value is estimated.
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
SWMU = solid waste management unit

Table 7: Building 4-78/79 SWMU/AOC Group Groundwater Elevation Data

August 17 & 23, 2022

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	NA	5.26	NA
GW033S	5 to 25	19.49	5.29	14.20
GW034S	5 to 25	19.65	5.4	14.42
GW143S	10 to 15	19.81	5.36	14.45
GW237S	5 to 15	18.85	4.38	14.47
GW240D	22 to 27	19.81	7.10	12.71
GW244S	5 to 15	NA	5.08	NA

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
NA = not available
SWMU = solid waste management unit
TOC = top of casing

Table 8: Building 4-78/79 SWMU/AOC Group Primary Geochemical Indicators[1]
August 17 & 23, 2022
Boeing Renton Facility, Renton, Washington

Parameter	Well ID[2]							
	Source Area					CPOC Area		
	GW031S	GW033S	GW033S (field dup.)	GW034S	GW244S	GW143S	GW237S	GW240D
Temperature (degrees C)	22.6	23.6	NA	26.9	18.0	27.2	23.9	27.7
Specific Conductivity (µS/cm)	452.2	518.0	NA	329.0	448.0	474.2	347.1	363.7
Dissolved Oxygen (mg/L)	1.88	0.72	NA	0.43	1.84	0.01	0.02	0.96
pH (standard units)	5.87	6.14	NA	6.34	5.92	6.41	6.26	6.39
Oxidation/Reduction Potential (mV)	-100.9	-53.8	NA	-72.1	-86.4	54.7	51.2	16.9
Total Organic Carbon (mg/L)	13.58	14.33 J	14.41 J	9.04 J	14.78	4.65 J	7.55 J	6.36 J

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 17 & 23, 2022
Boeing Renton Facility, Renton, Washington

Analyte	Cleanup Level [4]	Well ID [3]							
		Source Area					CPOC Area		
		GW031S	GW033S	GW033S (field dup.)	GW034S	GW244S	GW143S	GW237S	GW240D
Volatile Organic Compounds (µg/L)									
Benzene	0.80	0.20 U	**14.2 J**	**15.2 J**	0.20 U	0.25	0.20 U	0.20 U	0.20 U
cis -1,2-Dichloroethene	0.70	0.26	0.45 J	0.48 J	0.20 U	0.25	**0.76 J**	0.20 U	0.20 U
Trichloroethene	0.23	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	**0.53 J**	0.20 U	0.20 U
Vinyl Chloride	0.20	**0.39**	**1.53 J**	**1.61 J**	**0.72 J**	**0.46**	0.20 U	0.20 U	0.20 U
Total Petroleum Hydrocarbons (µg/L)									
TPH-G (C7-C12)	800	100 U	300 J	304 J	100 U	100 U	100 U	100 U	100 U

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

Table 10: Former Fuel Farm Groundwater Elevation Data

August 19, 2022

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	10.66	17.11
GW221S	5 to 15	27.93	10.72	17.21
GW224S	5 to 15	27.98	11.17	16.81

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 19, 2022
Boeing Renton Facility, Renton, Washington

Parameter	Well ID[2]		
	CPOC Area		
	GW211S	GW221S	GW224S
Temperature (degrees C)	20.6	22.5	21.5
Specific Conductivity (µS/cm)	340.9	232.2	190.5
Dissolved Oxygen (mg/L)	0.40	0.93	4.49
pH (standard units)	6.27	5.49	5.35
Oxidation/Reduction Potential (mV)	-184.0	-31.2	-33.5

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

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

Table 12: Former Fuel Farm Concentrations of Constituents of Concern[1, 2]
August 19, 2022
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	0.100 U	**0.940**	**0.881**	**1.07**
TPH-O (C24-C38)	NE	0.200 U	0.200 U	0.200 U	0.200 U
Jet A (C10-C18)	0.5	0.100 U	**0.562**	**1.25**	**1.69**

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
NE = not established
TPH-D = total petroleum hydrocarbons as diesel
TPH-O = total petroleum hydrocarbons as motor oil

Table 13: AOC-003 Groundwater Elevation Data

August 23 & 24, 2022

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	5.35	13.43
GW247S	4 to 14	18.91	6.48	12.43
GW248I	10 to 20	18.78	4.78	14.0
GW249S	4 to 14	18.85	3.99	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 23 & 24, 2022
Boeing Renton Facility, Renton, Washington

Parameter	Well ID[2]			
	Source Area	Downgradient Plume Area	CPOC Area	
	RGW249S	RGW188S	GW247S	GW248I
Temperature (degrees C)	21.9	21.2	27.2	21.5
Specific Conductivity (µS/cm)	944	467.2	563.0	470
Dissolved Oxygen (mg/L)	0	0.28	0.24	0.6
pH (standard units)	6.19	6.38	6.55	6.33
Oxidation/Reduction Potential (mV)	-88.1	63.4	45.7	67.7
Total Organic Carbon (mg/L)	NA	12.55	12.3	12.61

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

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

Table 15: AOC-003 Concentrations of Constituents of Concern[1, 2]
August 23 & 24, 2022
Boeing Renton Facility, Renton, Washington

Analyte	Cleanup Level [4]	Well ID [3]			
		Source Area	Downgradient Plume Area	CPOC Area	
		GW249S	GW188S	GW247S	GW248I
Volatile Organic Compounds (µg/L)					
Vinyl Chloride	0.24	**0.404 J**	**0.424**	**0.379**	**0.742**

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

Abbreviations:
µg/L = micrograms per liter
AOC = area of concern
CPOC = conditional point of compliance

Table 16: AOC-004 Groundwater Elevation Data

August 23, 2022

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	3.78	15.53

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 23, 2022
Boeing Renton Facility, Renton, Washington

Parameter	Well ID [2] Source Area GW250S
Temperature (degrees C)	20.9
Specific Conductivity (µS/cm)	137.8
Dissolved Oxygen (mg/L)	0.30
pH (standard units)	6.82
Oxidation/Reduction Potential (mV)	68.1

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 23, 2022
Boeing Renton Facility, Renton, Washington

Analyte	Cleanup Level [2]	Well ID [1]
		Source Area
		GW250S
Metals (µg/L)		
Lead	1	**1.31**

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

Abbreviations:
AOC = area of concern
µg/L = micrograms per liter

Table 19: AOC-060 Groundwater Elevation Data
August 18–19 & 22, 2022
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	4.88	14.48
GW010S	4.5 to 14.5	19.47	NM	NM
GW011D	29 to 39	19.49	NM	NM
GW012S	4.5 to 14.5	19.11	4.81	14.30
GW014S	4.5 to 14.5	19.24	4.70	14.54
GW147S	5 to 15	18.73	4.27	14.46
GW150S	5 to 15	19.10	4.78	14.32
GW253I	10 to 20	19.02	4.69	14.33

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 18–19 & 22, 2022
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)	20.8	23.4	23.0	NA	24.0	26.3	21.4
Specific Conductivity (µS/cm)	399.9	711.0	599	NA	340.6	447.0	400.7
Dissolved Oxygen (mg/L)	0.72	0.26	0.33	NA	1.65	2.39	0.96
pH (standard units)	5.72	6.03	6.29	NA	4.62	5.89	5.87
Oxidation/Reduction Potential (mV)	-88.1	-62.6	-26.8	NA	43.1	-75.8	-96.9
Total Organic Carbon (mg/L)	8.93	10,260 J	4.74 J	4.69 J	140.7	5.44	5.46

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 18–19 & 22, 2022
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	**0.229**	**1.91 J**	**0.134 J**	**0.132 J**	**8.37**	**0.126**	**0.138**
Trichloroethene	0.02	**0.0288**	**1.02 J**	**0.0246 J**	**0.0221 J**	**0.937**	**0.0212**	**0.0205**
Vinyl Chloride	0.26	**0.570**	**0.294 J**	**0.514 J**	**0.518 J**	**3.39**	0.100	0.255

Notes:

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

Abbreviations:

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

Table 22: AOC-090 Groundwater Elevation Data
August 23–24, 2022
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]
GW176S	10 to 14.3	20.15	5.55	14.6
GW178S	11.2 to 15.5	22.73	8.06	14.67
GW189S	4 to 14	22.01	6.33	15.68
GW207S	7.3 to 12	21.12	6.45	14.67
GW208S	6.3 to 11	22.45	7.88	14.57

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 23–24, 2022
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)	18.0	17.1	16.3	16.2	20.7
Specific Conductivity (µS/cm)	256.6	547.0	335.6	418.6	488.6
Dissolved Oxygen (mg/L)	2.20	2.98	0.68	1.95	0.71
pH (standard units)	5.25	5.86	5.71	5.87	5.75
Oxidation/Reduction Potential (mV)	-0.7	-101.9	-49.9	-90.6	-73.1
Total Organic Carbon (mg/L)	21.83	NA	NA	NA	NA

Notes:
1. Primary geochemical indicators are measured in the field, with the exception of total organic carbon, which is measured in the laboratory.
2. S = shallow well.
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 23–24, 2022
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	0.158	NA	NA	NA	NA
1,1,2-Trichloroethane	0.2	0.20 U	NA	NA	NA	NA
1,1-Dichloroethene	0.057	0.0432	NA	NA	NA	NA
Acetone	300	6.28	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	1.78	NA	NA	NA	NA
Methylene Chloride	2	1.00 U	NA	NA	NA	NA
Toluene	75	43.7	NA	NA	NA	NA
trans-1,2-Dichloroethene	53.9	0.20 U	NA	NA	NA	NA
Tetrachloroethene	0.05	0.0206	NA	NA	NA	NA
Trichloroethene	0.08	**0.43**	NA	NA	NA	NA
Vinyl Chloride	0.13	**0.460**	**0.364**	**0.390**	**0.326**	**0.400**
Total Petroleum Hydrocarbons (µg/L)						
TPH-G (C7-C12)	800	555	NA	NA	NA	NA
TPH-D (C12-C24)	500	**521**	NA	NA	NA	NA
TPH-O (C24-C40)	500	**586**	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 as diesel
TPH-G = total petroleum hydrocarbons as gasoline
TPH-O = total petroleum hydrocarbons as motor oil

Table 25: Apron A Groundwater Elevation Data
August 24, 2022
Boeing Renton Facility, Renton, Washington

Well ID[1]	Screen Interval Depth (feet bgs)	TOC Elevation (feet)	Depth to Groundwater (feet below TOC)	Groundwater Elevation (feet)
GW263S	8 to 18	NA	NM	NA
GW264S	8 to 18	NA	6.47	NA

Notes
1. S = shallow well.

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

Table 26: Apron A Primary Geochemical Indicators[1]
August 24, 2022
Boeing Renton Facility, Renton, Washington

Parameter	Well ID[2]	
	Source Area	
	GW264S	GW264S (field dup.)
Temperature (degrees C)	19.6	NA
Specific Conductivity (µS/cm)	2,308	NA
Dissolved Oxygen (mg/L)	5.68	NA
pH (standard units)	4.69	NA
Oxidation/Reduction Potential (mV)	51.3	NA
Total Organic Carbon (mg/L)	2,189	2,224

Notes

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

Abbreviations

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

Table 27: Apron A Concentrations of Constituents of Concern[1]
August 24, 2022
Boeing Renton Facility, Renton, Washington

Analyte	Cleanup Levels	Well ID[2]	
		GW264S	GW264S (field dup)
Volatile Organic Compounds (µg/L)			
cis- 1,2-Dichloroethene	NE	0.200 U	0.200 U
Vinyl Chloride	NE	1.41	1.57

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
field dup. = field duplicate
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	Additional Water 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: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 19 /2022@ 1427

Sample Number: RGW009S- 220819 | Weather: indoor

Landau Representative: JAM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 4.88 | Time: 1401 | Flow through cell vol. 200 mL | GW Meter No.(s Heron 2

Begin Purge: Date/Time: 8/ 19 /2022 @ | End Purge: Date/Time: 8/ 19 /2022 @ 1423 | 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	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1405	21.0	391.8	0.36	5.60	-51.9		4.88		
1408	20.9	403.2	0.46	5.65	-74.4		4.88		
1411	20.8	401.4	0.62	5.69	-83.4		4.88		
1414	20.8	400.9	0.65	5.70	-85.1				
1417	20.8	399.9	0.72	5.72	-88.1				

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.): colorless / clear / no odor / no sheen

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	20.8	399.7	0.72	5.72	-88.5				
2	20.8	399.4	0.72	5.72	-88.8				
3	20.8	399.4	0.73	5.73	-89.1				
4	20.8	399.2	0.74	5.73	-89.1				
Average:	20.8	399.4	0.73	5.73	-88.9				

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

Duplicate Sample No(s):

Comments:

Signature: JAM | Date: 8/19/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/18 /2022@ 1415

Sample Number: RGW012S- 2208 | Weather:

Landau Representative: Joe Marin

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 4.81 | Time: 1400 | Flow through cell vol. | GW Meter No.(s Heron 2

Begin Purge: Date/Time: 8/18/22 @ 1402 | End Purge: Date/Time: 8/18 /2022 @ 1415 | 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**	
	22.9	909	0.23	6.16	-61.8		4.84		
	23.3	823	0.27	6.13	-65.4		4.84		
	23.3	793	0.29	6.11	-65.3		4.84		
	23.4	759	0.3	6.08	-64.6				
	23.4	741	0.27	6.06	-62.9				
	23.4	716	0.26	6.04	-62.1				
	23.4	711	0.26	6.03	-62.6				

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.): clear and colorless

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	6.05	-62.8				
2	23.5	710	0.26	6.05	-62.7				
3	23.5	711	0.25	6.05	-62.8				
4	23.5	711	0.26	6.04	-62.8				
Average:	23.5	710.5	0.3	6.0	-62.8	#DIV/0!			

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

Duplicate Sample No(s):

Comments:

Signature: Joe Marin | Date: 8/18/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 18 /2022@ 1321

Sample Number: RGW014S- 2208 | Weather: sunny

Landau Representative: Joe Marin

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 4.7 | Time: 1300 | Flow through cell vol. | GW Meter No.(s Heron2

Begin Purge: Date/Time: 8/ 18/2022 @ 1305 | End Purge: Date/Time: 8/18/2022 @ 1321 | Gallons Purged: 1

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

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

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 and colorless

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	602	0.32	6.28	-27.6				
2	23.5	601	0.32	6.27	-28.0				
3	23.5	601	0.33	6.27	-28.3				
4	23.5	601	0.20	6.27	-28.4				
Average:	23.4	601.3	0.3	6.3	-28.1	#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) (Silic
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
	others

Duplicate Sample No(s): Duplicate location (DUP4)

Comments:

Signature: Joe Marin | Date: 8/18/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 18 /2022@ 1322

Sample Number: RGWDUP4 2208 | Weather: sunny

Landau Representative: Joe Marin

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 4.7 | Time: 1300 | Flow through cell vol. | GW Meter No.(s Heron2

Begin Purge: Date/Time: 8/ 18/2022 @ 1305 | End Purge: Date/Time: 8/18/2022 @ 1321 | Gallons Purged: 1

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

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

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 and colorless

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	602	0.32	6.28	-27.6				
2	23.5	601	0.32	6.27	-28.0				
3	23.5	601	0.33	6.27	-28.3				
4	23.5	601	0.20	6.27	-28.4				
Average:	23.4	601.3	0.3	6.3	-28.1	#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) (Silic
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
	others

Duplicate Sample No(s): RGW014S

Comments:

Signature: Joe Marin | Date: 8/18/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 23 /2022@ 1200

Sample Number: RGW031S- 220823 | Weather: Sunny

Landau Representative: BLH

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft): 5.26 | Time: 1107 | Flow through cell vol.: 200 ml | GW Meter No.(s): Slope #2

Begin Purge: Date/Time: 8/ 23 /2022 @ 1107 | End Purge: Date/Time: 8/ 23 /2022 @ 1208 | Gallons Purged: 2

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 vol.**	
1147	22.4	471.5	1.83	7.00	-101.3	8.94	5.26	~200ml/min	YSI calibration took ti
1152	22.7	459.4	1.59	6.15	-107.9		5.25		
1158	22.6	452.2	1.88	5.87	-100.9		5.25		

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.): Colorless / Clear / NO / NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	22.5	450.2	1.77	5.83	-98.7				
2	22.5	450.3	1.76	5.83	-98.4				
3	22.5	450.3	1.74	5.82	-98.2				
4	22.5	449.9	1.74	5.82	-98.2	10.17			
Average:	22.5	450.2	1.75	5.83	-98.4	10.17			

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: BLH | Date: 8/23/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton
Project Number: 0025217.002.099.099
Event: Aug-22
Date/Time: 8/17 /2022@ 1453
Sample Number: RGW033S- 2208
Weather:
Landau Representative: Joe Marin

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe:
DTW Before Purging (ft) 5.29 Time: 1440 Flow through cell vol. GW Meter No Heron 2
Begin Purge: Date/Time: 8/17 /2022 @ 1441 End Purge: Date/Time: 8/17 /2022 @ 1453 Gallons Purged: 0.5
Purge water disposed to: 55-gal Drum Storage Tank Ground Other SITE TREATMENT SYSTEM

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
	+/- 3%	+/- 3%	+/- 10%	limits +/- 0.1 units	+/- 10 mV	+/- 10%	< 0.3 ft	through cell vol.	
	22.2	541	0.41	6.14	-37.2				
	23.2	537	0.46	6.16	-43.2				
	23.4	535	0.46	6.16	-46.3				
	23.6	529	0.54	6.16	-51.5				
	23.6	524	0.61	6.16	-52.4				
	23.6	519	0.67	6.13	-53.7				
	23.6	518	0.72	6.14	-53.8				

SAMPLE COLLECTION DATA

Sample Collected With: Bailer Pump/Pump Typ 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 and colorless

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	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)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s):
Comments:
Signature: J Marin Date: 8/17/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name:	Boeing Renton	Project Number:	0025217.002.099.099
Event:	Aug-22	Date/Time:	8/17 /2022@ 1455
Sample Number:	RGWDUP2-2 2208	Weather:	
Landau Representative:	Joe Marin		

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 5.29 Time: 1440 Flow through cell vol. GW Meter No Heron 2

Begin Purge: Date/Time: 8/17 /2022 @ 1441 End Purge: Date/Time: 8/17 /2022 @ 1453 Gallons Purged: 0.5

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
				limits				through cell	
	+/- 3%	+/- 3%	+/- 10%	+/- 0.1 units	+/- 10 mV	+/- 10%	< 0.3 ft	vol.	
	22.2	541	0.41	6.14	-37.2				
	23.2	537	0.46	6.16	-43.2				
	23.4	535	0.46	6.16	-46.3				
	23.6	529	0.54	6.16	-51.5				
	23.6	524	0.61	6.16	-52.4				
	23.6	519	0.67	6.13	-53.7				
	23.6	518	0.72	6.14	-53.8				

SAMPLE COLLECTION DATA

Sample Collected With: Bailer Pump/Pump Typ 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 and colorless

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	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)		
	VOC (Boeing short list)		
	Methane Ethane Ethene Acetylene		
	others		

Duplicate Sample No(s): RGW033S

Comments:

Signature: J Marin Date: 8/17/2022

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton
Project Number: 0025217.002.099.099
Event: Aug-22
Date/Time: 8/17 /2022@ 1359
Sample Number: RGW034S- 2208
Weather:
Landau Representative: SJL/AHA

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) Damaged (NO) Describe:
DTW Before Purging (ft) 5.4 Time: 1345 Flow through cell vol. GW Meter No.(s)
Begin Purge: Date/Time: 8/ 17 /2022 @ 1345 End Purge: Date/Time: 8/ 17/2022 @ 1359 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
	+/- 3%	+/- 3%	+/- 10%	limits +/- 0.1 units	+/- 10 mV	+/- 10%	< 0.3 ft	through cell vol.	
	23.6	327.3	0.29	6.36	-42.2				
	25.1	329.0	0.26	6.33	-54.7				
	25.9	329.5	0.27	6.35	-61.4				
	26.4	330.4	0.31	6.34	-64.8				
	26.7	330.6	0.29	6.34	-69.1				
	26.8	329.7	0.34	6.34	-71.1				
	26.9	329.0	0.43	6.34	-72.1				

SAMPLE COLLECTION DATA

Sample Collected With: Bailer Pump/Pump Typ 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 and colorless

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	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)
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
	others

Duplicate Sample No(s):
Comments:
Signature: J Marin Date: 8/17/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 17 /2022@ 1408

Sample Number: RGW143S- 220817 | Weather: Sunny, 90s

Landau Representative: SJL/AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 5.36 | Time: 1339 | Flow through cell vol. | GW Meter No.(s Heron #4

Begin Purge: Date/Time: 8/ 17/2022 (1340 | End Purge: Date/Time: 8/ 17 /2022 @ 1404 | 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		
1343	22.5	349.8	0.02	6.44	50.3		5.36		
1346	23.1	364.6	0.02	6.43	51.2		5.36		
1349	24.9	416.3	0.02	6.41	53.7		5.36		
1352	26.3	447.2	0.01	6.41	54.2				
1355	26.9	461.3	0.01	6.41	54.4				
1358	27	465.8	0.01	6.41	54.4				
1401	27.2	474.2	0.01	6.41	54.7				

SAMPLE COLLECTION DATA

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

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

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

(By Numerical Order) ☐ Other

Sample Description (color, turbidity, odor, sheen, etc.): Clear, colorless, no/ns

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	27.2	474.4	0.01	6.41	54.8				
2	27.2	474.4	0.01	6.41	54.9				
3	27.2	476.2	0.01	6.41	54.9				
4	27.2	476.3	0.01	6.4	55				
Average:	27.2	475.3	0.0	6.4	54.9	#DIV/0!			

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

Duplicate Sample No(s):

Comments:

Signature: Samantha Lindstrom | Date: 8/17/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 19 /2022@ 1527

Sample Number: RGW147S- 220819 | Weather:

Landau Representative: JAM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 4.27 Time: 1453 Flow through cell vol. 200 mL GW Meter No.(s Heron 2

Begin Purge: Date/Time: 8/ 19 /2022 (1455 End Purge: Date/Time: 8/ 19 /2022 @ 1515 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	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1458	21.8	325.3	1.04	4.69	49.4		4.29		
1501	22.6	330.4	1.58	4.65	47.0		4.29		
1504	23.4	335.9	1.57	4.64	44.8		4.29		
1507	24.0	340.6	1.65	4.62	43.1				

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.): Sheen / strong odor / medium turbidity / some suspended solids / brownish

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	341.3	1.72	4.62	42.8				
2	24.2	341.4	1.74	4.62	42.6				
3	24.2	341.5	1.73	4.62	42.5				
4	24.2	341.8	1.74	4.62	42.4				
Average:	24.2	341.5	1.73	4.62	42.6				

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

Duplicate Sample No(s):

Comments:

Signature: JAM Date: 8/19/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 22 /2022@ 1223

Sample Number: RGW150S- 220822 | Weather:

Landau Representative: JAM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 4.78 Time: 1157 Flow through cell vol. 200mL GW Meter No.(s Heron 2

Begin Purge: Date/Time: 8/ 22 /2022 @ 1159 End Purge: Date/Time: 8/ 22 /2022 @ 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	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1202	21.0	407.6	0.98	5.83	-58.8		4.78		
1205	22.1	409.9	0.86	5.84	-64.7		4.78		
1208	23.0	414.5	1.11	5.85	-67.4		4.78		
1211	23.8	421.0	1.40	5.85	-69.7				
1214	24.5	427.2	2.74	5.86	-71.8				
1217	25.1	432.4	2.94	5.88	-73.9				
1220	26.3	447.0	2.39	5.89	-75.8				

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.): colorless / no odor / no sheen / low turbidity

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	26.3	441.7	2.43	5.89	-76.1				
2	26.4	442.1	2.26	5.89	-76.2				
3	26.4	442.2	2.19	5.89	-76.5				
4	26.4	442.5	2.16	5.89	-76.7				
Average:	26.4	442.1	2.26	5.89	-76.4				

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
1	(8260) (8010) (8021) (NWTPH-G) (NWTPH-Gx) (BTEX) (8260D) WA ☐ OR ☐
	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease) WA ☐ OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO4) (NO3) (NO2) (F)
1	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)
	(Total Cyanide) (WAD Cyanide) (Free Cyanide)
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silic
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
	others

Duplicate Sample No(s):

Comments:

Signature: JAM Date: 8/22/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 24 /2022@ 1635

Sample Number: RGW152S- 220824 | Weather: Sunny

Landau Representative: JAM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 9.87 Time: 1609 Flow through cell vol. 200 mL GW Meter No.(s) Heron 4

Begin Purge: Date/Time: 8/ 24 /2022 @ 1610 End Purge: Date/Time: 8/ 24 /2022 @ 1633 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		
1613	25.9	5095	0.42	5.01	13.5		10.10		
1616	25.8	5080	0.33	5.01	13.3		10.10		
1619	25.6	5057	0.26	5.00	13.0		10.10		
1622	25.5	5013	0.18	5.00	12.4				
1625	25.0	4976	0.12	5.00	9.3				
1628	24.9	4854	0.03	5.00	9.2				
1631	24.9	4841	0.02	5.00	8.8				

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.): sour odor / sheen / yellow / medium turbidity

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	24.9	4839	0.02	5.00	8.7				
2	24.9	4833	0.02	5.00	8.6				
3	24.9	4833	0.02	5.00	8.5				
4	24.9	4831	0.02	5.01	8.3				
Average:	24.9	4834	0.02	5.00	8.5				

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: No Dup taken as ran dry with low recharge rate. D.O. has been reading very low today

Signature: JAM Date: 8/24/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 24 /2022@ 1510

Sample Number: RGW153S- 220824 | Weather: Sunny ~80 F

Landau Representative: BLH

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 10.41 Time: 1447 Flow through cell vol. 200 mL GW Meter No.(s) Slope #2

Begin Purge: Date/Time: 8/ 24 /2022 @ 1450 End Purge: Date/Time: 8/ 24 /2022 @ 1525 Gallons Purged: ~1.5

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1457	18.9	271.8	0.57	5.97	1.2		10.63	yes	
1500	18.1	258.1	0.41	6.03	-23.5		10.62		
1503	18.1	250.2	0.39	6.06	-39.6		10.65		
1506	18.1	241.8	0.34	6.06	-56.9				
1509	18.1	234.7	0.32	6.06	-64.0				

SAMPLE COLLECTION DATA

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

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.): initially grayish tint, with pumping Colorless / Clear / No odor / No sheen

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	18.1	234.1	0.32	6.06	-64.9				
2	18.1	233.9	0.33	6.06	-65.3				
3	18.2	233.2	0.33	6.06	-65.8				
4	18.1	232.9	0.33	6.06	-66.2				
Average:	18.1	233.5	0.33	6.06	-65.6				

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: BLH Date: 8/24/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 24 /2022@ 1531

Sample Number: RGW172S- 220824 | Weather: Sunny

Landau Representative: JAM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 9.84 | Time: 1501 | Flow through cell vol. | 200 mL | GW Meter No.(s) heron 4

Begin Purge: Date/Time: 8/ 24 /2022 @ 1504 | End Purge: Date/Time: 8/ 24 /2022 @ 1528 | 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		
1507	25.78	801	0.09	6.59	-87.5		10.32		
1510	25.79	803	0.09	6.59	-98.0		10.36		
1513	25.79	800	0.09	6.59	-108.5		10.36		
1516	25.80	798	0.09	6.59	-115.1		10.36		
1519	25.53	787	0.01	6.69	-116.2		10.37		
1522	25.40	786	0.00	6.68	-116.2		10.37		
1525	25.20	781	0.00	6.68	-118.5		10.38		

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 / Clear / No odor / No sheen

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	25.20	783	0.00	6.68	-115.5				
2	25.20	780	0.00	6.67	-115.4				
3	25.20	773	0.00	6.68	-115.2				
4	25.20	778	0.00	6.67	-115.2				
Average:	25.20	779	0.00	6.68	-115.3				

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: D.O. has been reading very low today

Signature: JAM | Date: 8/24/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 24 /2022@ 1620

Sample Number: RGW173S- 220824 | Weather: Sunny ~83 F

Landau Representative: BLH

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 9.99 Time: 1558 Flow through cell vol. 200 mL GW Meter No.(s) Slope #2

Begin Purge: Date/Time: 8/ 24 /2022 @ 1600 End Purge: Date/Time: 8/ 24 /2022 @ 1710 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	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1603	19.7	356.2	0.37	5.85	1.1		10.42	Yes	YSI in sun. Initially some gray in water
1607	19.8	354.4	0.29	6.01	-37.7		10.35		
1610	19.7	349.9	0.27	6.07	-59.8		10.35		
1615	20.0	345.9	0.26	6.12	-78.3		10.51		
1618	19.8	341.4	0.32	6.12	-81.7				

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.): Colorless / Clear / No odor / No sheen

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	19.8	340.7	0.33	6.12	-82.5				
2	19.8	339.1	0.34	6.12	-82.8				
3	19.8	339.4	0.34	6.12	-83.1				
4	19.8	339.7	0.34	6.12	-83.5				
Average:	19.8	339.7	0.34	6.12	-83.0				

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: BLH Date: 8/24/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 23 /2022@ 1510

Sample Number: RGW176S- 220823 | Weather: Sunny 70's

Landau Representative: BLH

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft): 5.55 | Time: 1445 | Flow through cell vol. 200mL | GW Meter No.(s) Slope #2

Begin Purge: Date/Time: 8/ 23/2022 @ 1454 | End Purge: Date/Time: 8/ 23 /2022 @ 1510 | 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	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell vol.**	
1458	16.9	566	2.26	5.80	-72.6		5.77	200 mL/min	
1501	16.8	557	2.66	5.83	-87.7		5.77		
1504	16.9	553	2.71	5.85	-95.4				
1507	16.9	548	2.79	5.86	-99.5				
1510	17.1	547	2.98	5.86	-101.9				

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.): Colorless / Clear / No odor / No sheen

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	17.0	547	2.94	5.86	-102.1				
2	17.0	547	2.90	5.86	-102.2				
3	17.0	546	2.90	5.86	-102.3				
4	17.0	546	2.90	5.86	-102.4				
Average:	17.0	547	2.91	5.86	-102.3				

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)		
	(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		
x2	DUP		
	others		

Duplicate Sample No(s): DUP5-220823 @ 930

Comments:

Signature: BLH | Date: 8/23/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 23 /2022@ 930

Sample Number: RGWDUP5- 220823 | Weather:

Landau Representative: BLH

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/ /2022 @ End Purge: Date/Time: 8/ /2022 @ 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 vol.**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		
		DUPLICATE TO RGW176S							

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ☒ Pump/Pump Type

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

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

(By Numerical Order) ☐ Other

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

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

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

Duplicate Sample No(s): Duplicate to RGW176S

Comments:

Signature: BLH Date: 8/23/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 24 /2022@ 1105

Sample Number: RGW178S- 2208 | Weather: Sunny ~75 F

Landau Representative: BLH

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 8.06 | Time: 1043 | Flow through cell vol. 200 mL | GW Meter No.(s Slope #2

Begin Purge: Date/Time: 8/ 24 /2022 1045 | End Purge: Date/Time: 8/ 24 /2022 @ 1107 | Gallons Purged: 0.75

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1050	16.7	361.8	0.57	5.53	11.6		8.14	~200 mL/min	
1055	16.4	339.1	0.37	5.66	-30.4		8.18		
1058	16.2	335.7	0.55	5.69	-41.2				
1101	16.3	335.6	0.68	5.71	-49.9		8.14		

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 / Clear / faint chemically 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	16.3	337.4	0.87	5.78	-48.6				
2	16.2	336.8	0.80	5.76	-48.6				
3	16.2	336.0	0.79	5.76	-48.7				
4	16.1	335.4	0.79	5.75	-48.9				
Average:	16.2	336.4	0.81	5.76	-48.7				

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

Duplicate Sample No(s):

Comments:

Signature: BLH | Date: 8/24/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 23 /2022@ 1436

Sample Number: RGW188S- 220823 | Weather: Sunny, 80s

Landau Representative: SJL/AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 5.35 | Time: 1409 | Flow through cell vol. | GW Meter No.(s Heron Yellow

Begin Purge: Date/Time: 8/ 23 /2022 1409 | End Purge: Date/Time: 8/ 23 /2022 @ 1432 | 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**	
1412	18.2	393.4	0.87	6.38	72.8		5.42		
1415	20.5	442.8	0.39	6.37	71.3		5.42		
1418	20.8	452.2	0.31	6.37	69.6		5.42		
1421	21.0	459.2	0.28	6.37	67.9				
1424	21.2	467.2	0.28	6.38	63.4				

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.): Gray cloudy color, floating particulates, no/ns

b

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	465.6	0.28	6.38	62.5				
2	21.2	465.7	0.23	6.38	62.2				
3	21.3	465.7	0.28	6.38	62.0				
4	21.2	466.0	0.28	6.38	61.7				
Average:	21.2	465.8	0.27	6.38	62.1				

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

Duplicate Sample No(s):

Comments:

Signature: Samantha Lindstrom | Date: 8.23.22

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 24 /2022@ 948

Sample Number: RGW189S- 220824 | Weather: Sunny ~69 F

Landau Representative: BLH

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 6.33 | Time: 9.27 | Flow through cell vol. 200 mL | GW Meter No.(s Slope #2

Begin Purge: Date/Time: 8/ 24 /2022 (928 | End Purge: Date/Time: 8/ 24 /2022 @ 1020 | Gallons Purged: 2

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**	
935	18.0	295.4	1.82	5.40	26.2		6.92	Yes	
938	17.9	272.4	1.79	5.30	13.0	10.77	8.08	Yes	Slowed flow rate
942	18.0	262.8	2.39	5.26	4.4		7.83		
945	18.0	256.6	2.20	5.25	-0.7	10.71	7.74		

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 / Clear / No odor / No sheen

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	18.0	254.4	2.19	5.25	-2.1				
2	18.0	254.0	2.14	5.24	-2.5				
3	18.0	254.0	2.12	5.24	-2.8				
4	18.0	254.0	2.13	5.24	-3.2				
Average:	18.0	254.1	2.15	5.24	-2.7				

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
7	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX) WA ☐ OR ☐
1	(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) (Silic
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
x 3	MSMSD
	others

Duplicate Sample No(s): MSMSD Location

Comments:

Signature: BLH | Date: 8/24/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 23 /2022@ 1435

Sample Number: RGW207S- 220823 | Weather: Sunny 70's

Landau Representative: BLH

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft): 6.45 | Time: 1414 | Flow through cell vol. 200 mL | GW Meter No.(s) Slope #2

Begin Purge: Date/Time: 8/ 23 /2022 @ 1417 | End Purge: Date/Time: 8/ 23 /2022 @ 1437 | Gallons Purged: 1.5

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell vol.**	
1421	16.1	416.0	1.67	5.69	-39.4	16.77		>200 mL/min	
1424	16.2	417.1	1.82	5.77	-64.5	8.74	6.80		
1427	16.3	419.8	1.52	5.83	-79.6		6.78		
1430	16.3	418.9	1.82	5.84	-86.6		6.78		
1433	16.2	418.6	1.95	5.87	-90.6		6.78		

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 / Clear / No odor / No sheen

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	16.2	417.6	1.87	5.86	-79.7				
2	16.2	417.3	1.91	5.87	-82.4				
3	16.3	417.5	2.03	5.87	-83.7				
4	16.3	417.1	2.14	5.88	-84.6				
Average:	16.3	417.4	1.99	5.87	-82.6				

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)		
	(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: BLH | Date: 8/23/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 24 /2022@ 1145

Sample Number: RGW208S- 220824 | Weather: Sunny ~75 F

Landau Representative: BLH

WATER LEVEL/WELL/PURGE DATA

Well Condition: Secure (YES) | Damaged (NO) | Describe: 6 ft into road

DTW Before Purging (ft) 7.88 | Time: 1124 | Flow through cell vol. 200 | GW Meter No.(s Slope #2

Begin Purge: Date/Time: 8/ 24 /2022 1125 | End Purge: Date/Time: 8/ 24 /2022 @ 1150 | 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	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1137	21.1	486.8	0.47	5.58	-3.00		7.91	Yes	
1140	20.7	489.4	0.38	5.69	-49.0		7.92		
1143	20.7	488.6	0.71	5.75	-73.1		7.97		

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 / Clear / No odor / Slight sheen

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	20.7	489.3	0.78	5.76	-75.5				
2	20.7	489.1	0.80	5.76	-76.5				
3	20.7	488.9	0.82	5.76	-77.2				
4	20.8	489.0	0.87	5.76	-77.9				
Average:	20.7	489.1	0.82	5.76	-76.8				

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

Duplicate Sample No(s):

Comments: Poor recharge, slowed pump rate.

Signature: BLH | Date: 8/24/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 19 /2022@ 1207

Sample Number: RGW211S- 220819 | Weather:

Landau Representative: JAM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 10.66 Time: 1140 Flow through cell vol. 200 mL GW Meter No.(s) Heron 2

Begin Purge: Date/Time: 8/ 19 /2022 @ 1142 End Purge: Date/Time: 8/ 19 /2022 @ 1205 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	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1145	19.1	587.0	0.45	6.10	-175.0		10.66		
1148	20.5	413.5	0.37	6.28	-183.3		10.66		
1151	20.6	39839	0.36	6.26	-184.3		10.66		
1154	20.7	376.5	0.35	6.27	-184.5				
1157	20.7	368.6	0.37	6.27	-184.6				
1200	20.7	350.7	0.40	6.27	-184.9				
1203	20.6	340.9	0.40	6.27	-184.0				

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.): High turbidity / sheen / brown / petroleum odor

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	20.6	340.7	0.44	6.26	-184.0				
2	20.6	339.6	0.45	6.26	-183.4				
3	20.6	339.3	0.45	6.26	-183.7				
4	20.6	337.4	0.45	6.26	-183.7				
Average:	20.6	339.3	0.45	6.26	-183.7				

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) for TPH-Jet fuel/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: Brown sludge in flowcell, did not sink in water immediately

Signature: JAM Date: 8/19/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 19 /2022@ 1317

Sample Number: RGW221S- 220819 | Weather:

Landau Representative: JAM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 10.72 Time: 1247 Flow through cell vol. 200 mL GW Meter No.(s) Heron 2

Begin Purge: Date/Time: 8/ 19 /2022 @ 1249 End Purge: Date/Time: 8/ 19 /2022 @ 1310 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	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1252	20.7	235.8	0.93	5.48	-28.7		10.72		
1255	21.3	235.9	0.70	5.49	-33.4		10.72		
1258	21.9	234.2	0.89	5.50	-32.0		10.72		
1301	22.5	232.2	0.93	5.49	-31.2				

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.): sheen / medium turbidity / brown / no odor

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	22.5	232.2	0.93	5.49	-30.8				
2	22.6	232.2	0.92	5.49	-30.7				
3	22.7	232.1	0.92	5.49	-30.7				
4	22.7	232.0	0.93	5.49	-30.7				
Average:	22.6	232.1	0.93	5.49	-30.7				

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) for TPH-Jet fuel/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: JAM Date: 8/19/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 19 /2022@ 1107

Sample Number: RGW224S- 220819 | Weather: 70, clouds

Landau Representative: JAM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 11.17 Time: 1043 Flow through cell vol. 200 mL GW Meter No.(s) Heron 2

Begin Purge: Date/Time: 8/ 19 /2022 @ 1043 End Purge: Date/Time: 8/ 19 /2022 @ 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		
1046	19.9	204.6	6.86	5.75	-31.4		11.21		
1049	20.0	214.4	6.02	5.59	-40.8		11.21		
1052	20.6	199.4	5.23	5.50	-43.4		11.21		
1055	21.0	191.8	4.89	5.44	-41.6				
1058	21.2	190.9	4.72	5.40	-39.2				
1101	21.3	193.4	4.64	5.37	-36.4				
1104	21.5	190.5	4.49	5.35	-33.5				

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.): Colorless / low turbidity / 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	21.5	190.1	4.42	5.35	-33.2				
2	21.5	189.9	4.39	5.35	-33.1				
3	21.5	189.6	4.38	5.35	-32.6				
4	21.5	189.9	4.38	5.35	-32.5				
Average:	21.5	189.9	4.39	5.35	-32.9				

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) for TPH-Jet fuel/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): RGWDUP3-220819 @ 1108

Comments:

Signature: JAM Date: 8/19/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 19 /2022@ 1108

Sample Number: RGWDUP3-220819 | Weather:

Landau Representative: JAM

WATER LEVEL/WELL/PURGE DATA

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

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

Begin Purge: Date/Time: 8/ /2022 @ End Purge: Date/Time: 8/ /2022 @ 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 RGW224S

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ☐ Pump/Pump Type

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

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

(By Numerical Order) ☐ Other

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

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 ☐
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: JAM Date: 8/19/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 24 /2022@ 1414

Sample Number: RGW226S- 220824 | Weather: Sunny, high 70s

Landau Representative: BLH

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 8.57 Time: 1353 Flow through cell vol. 200 GW Meter No.(s) Slope #2

Begin Purge: Date/Time: 8/ 24 /2022 @ 1353 End Purge: Date/Time: 8/ 24 /2022 @ 1439 Gallons Purged: 0.75

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1402	20.5	327.8	0.54	6.01	-56.6		9.91		
1405	21.7	335.6	0.45	6.02	-65.7		9.81		
1408	24.0	348.4	0.40	6.02	-73.6		9.83		
1411	24.7	354.6	0.52	6.02	-79.9		9.82		

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 / Clear / No odor / No sheen

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	24.8	345.9	0.56	6.01	-81.2				
2	24.8	356.4	0.58	6.01	-81.4				
3	24.9	355.4	0.55	6.01	-82.0				
4	24.9	355.5	0.55	6.01	-82.3				
Average:	24.9	353.3	0.56	6.01	-81.7	#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: BLH Date: 8/24/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 17 /2022@ 1532

Sample Number: RGW230I- 220817 | Weather: Sunny, 90s

Landau Representative: SJL/AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 7.65 Time: 1506 Flow through cell vol. GW Meter No.(s) Heron #4

Begin Purge: Date/Time: 8/ 17 /2022 @ 1507 End Purge: Date/Time: 8/ 17 /2022 @ 1530 Gallons Purged: 0.5

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
	Purge Goals: Stablization of Parameters for three consecutive readings within the following limits							>/= 1 flow	
	+/- 3%	+/- 3%	+/- 10%	+/- 0.1 units	+/- 10 mV	+/- 10%	< 0.3 ft	through cell	
1510	22.3	393.6	0.14	6.13	66.4		7.66		
1513	24.2	426.5	0.15	6.14	58.0		7.68		
1516	24.5	431.7	0.15	6.14	56.3		7.67		
1519	26.3	462.5	0.10	6.20	32.8				
1522	27.0	475.0	0.10	6.22	28.7				
1525	27.6	483.2	0.10	6.22	27.6				

SAMPLE COLLECTION DATA

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

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

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

(By Numerical Order) ☐ Other

Sample Description (color, turbidity, odor, sheen, etc.): Cloudy, colorless, floating particulates (off-white colored), no/ns

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	27.8	485.2	0.1	6.22	26.7				
2	27.8	485.9	0.1	6.22	26.4				
3	27.9	486.4	0.1	6.22	25.9				
4	27.9	487.3	0.1	6.22	25.4				
Average:	27.9	486.2	0.1	6.22	26.1				

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: Samantha Lindstrom Date: 8.17.22

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 24 /2022@ 1351

Sample Number: RGW232S- 220824 | Weather: Sunny

Landau Representative: JAM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 7.41 Time: 1322 Flow through cell vol. 200 mL/min GW Meter No.(s) Heron 2

Begin Purge: Date/Time: 8/ 24 /2022 @ 1322 End Purge: Date/Time: 8/ 24 /2022 @ 1346 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	
	+/- 3%	+/- 3%	+/- 10%	+/- 0.1 units	+/- 10 mV	+/- 10%	< 0.3 ft	through cell	
1327	21.5	561	2.29	5.74	-68.6		7.85		
1330	23.2	581	2.51	5.79	-80.9		7.95		
1333	24.4	595	2.93	5.83	-88.5		8.03		
1336	24.9	600	2.90	5.84	-92.1		8.09		
1339	24.8	600	3.14	5.85	-93.3		8.15		

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.): low to medium turbidity / no odor / no sheen / slightly brownish

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	24.8	599	3.35	5.85	-93.7				
2	24.8	599	3.17	5.85	-93.9				
3	24.8	599	3.13	5.85	-94.0				
4	24.8	599	3.11	5.86	-94.2				
Average:	24.8	599	3.19	5.85	-94.0				

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: JAM Date: 8/22/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 24 /2022@ 1435

Sample Number: RGW234S- 220824 | Weather: Sunny

Landau Representative: JAM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 8.29 Time: 1410 Flow through cell vol. 200 mL GW Meter No.(s) Heron 2

Begin Purge: Date/Time: 8/ 24 /2022 @ 1410 End Purge: Date/Time: 8/ 24 /2022 @ 1430 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	
	+/- 3%	+/- 3%	+/- 10%	+/- 0.1 units	+/- 10 mV	+/- 10%	< 0.3 ft	through cell	
1413	24.00	691	0.25	6.45	-70.1		8.32		
1416	24.50	699	0.23	6.45	-71.0		8.32		
1419	25.68	718	0.21	6.45	-72.5		8.32		
1422	26.70	734	0.22	6.45	-72.5				
1428	27.10	731	0.22	6.44	-71.5				

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.): Medium turbidity/ sheen / Grayish brown / sharp odor

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	27.1	723	0.20	6.44	-71.5				
2	27.1	727	0.20	6.44	-71.5				
3	27.0	726	0.19	6.44	-71.5				
4	27.0	724	0.19	6.45	-71.5				
Average:	27.1	725	0.20	6.44	-71.5				

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: Aquaread meter - no data saved

Signature: JAM Date: 8/24/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 22 /2022@ 1541

Sample Number: RGW235I- 220822 | Weather:

Landau Representative: JAM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 7.7 Time: 1508 Flow through cell vol. 200 mL GW Meter No.(s) Heron 2

Begin Purge: Date/Time: 8/ 22 /2022 @ 1512 End Purge: Date/Time: 8/ 22 /2022 @ 1539 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	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1518	26.1	225.5	2.21	6.13	-50.00		7.70		
1521	27.0	223.7	2.10	6.13	-50.4		7.70		
1524	27.4	223.9	1.02	6.13	-62.4		7.70		
1527	27.6	223.4	0.54	6.14	-66.6				
1530	27.6	221.3	0.57	6.16	-70.2				
1533	27.6	220.5	0.78	6.17	-71.4				
1536	27.6	220.1	0.63	6.17	-71.4				

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.): Sulfur odor / low turbidity / colorless / no sheen

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	27.6	220.0	0.64	6.17	-71.6				
2	27.6	220.1	0.79	6.17	-71.7				
3	27.6	220.1	0.92	6.17	-71.7				
4	27.6	220.0	0.98	6.17	-71.8				
Average:	27.6	220.1	0.83	6.17	-71.7				

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: JAM Date: 8/22/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 24 /2022@ 1316

Sample Number: RGW236S- 220824 | Weather: Sunny 70's

Landau Representative: BLH

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 8.39 Time: 1255 Flow through cell vol. 200 mL GW Meter No.(s) Slope #2

Begin Purge: Date/Time: 8/ 24 /2022 @ 1256 End Purge: Date/Time: 8/ 24 /2022 @ 1324 Gallons Purged: 1.5

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1258	18.7	356.1	0.70	6.05	-15.3		8.41	yes	
1301	18.8	344.9	0.46	6.10	-46.2		8.40		
1304	18.9	338.8	0.42	6.12	-59.6				
1307	19.1	334.7	0.38	6.13	-65.6		8.52		
1310	19.1	330.5	0.36	6.12	-67.9		8.59		
1313	19.0	326.4	0.65	6.11	-67.9		8.51		

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.): Colorless / Clear / No odor / No sheen

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	19.0	324.7	0.93	6.11	-67.2				
2	19.1	324.4	0.91	6.10	-67.4				
3	19.1	324.4	0.89	6.10	-67.5				
4	19.1	324.5	0.72	6.10	-67.5				
Average:	19.1	324.5	0.86	6.10	-67.4				

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: BLH Date: 8/24/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 17 /2022@ 1258

Sample Number: RGW237S- 220817 | Weather: Sunny, 80s

Landau Representative: SJL/AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 4.38 | Time: 11.36 | Flow through cell vol. | GW Meter No.(s Heron #4

Begin Purge: Date/Time: 8/ 17 /2022 1232 | End Purge: Date/Time: 8/ 17 /2022 @ 1255 | 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**	
1235	23.1	356.6	0.02	6.11	68.5		4.38		
1238	22.0	348.2	0.02	6.19	64.6		4.40		
1241	23.1	346.3	0.02	6.24	58.4		4.38		
1244	23.8	348.1	0.02	6.25	53.2				
1247	23.9	347.1	0.02	6.26	51.2				

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.): Cloudy, no color, bioinjection material 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	348.7	0.02	6.27	50.2				
2	24.1	348.2	0.02	6.27	49.8				
3	24.1	348.1	0.02	6.27	49.3				
4	24.1	349.4	0.01	6.28	48.0				
Average:	24.1	348.6	0.02	6.27	49.3	#DIV/0!			

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

Duplicate Sample No(s):

Comments:

Signature: Samantha Lindstrom | Date: 8.17.22

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 17 /2022@ 1338

Sample Number: RGW240D- 220817 | Weather: Sunny, 90s

Landau Representative: SJL/AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 7.1 | Time: 1310 | Flow through cell vol. | GW Meter No.(s Heron #4

Begin Purge: Date/Time: 8/ 17 /2022 @1312 | End Purge: Date/Time: 8/ 17 /2022 @ 1336 | 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		
1315	22.6	328.2	1.36	6.39	54.8		6.63		Pressurized well, wa
1318	25.1	337.4	0.73	6.36	44.0		6.12		
1321	25.7	343.3	0.22	6.35	40.6		6.05		
1324	26.0	351.2	0.59	6.36	35.0		5.98		
1327	26.8	355.2	0.84	6.37	29.2		6.85		
1330	27.2	358.2	0.88	6.38	24.9		5.74		
1333	27.7	363.7	0.96	6.39	16.9				

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ☒ Pump/Pump Type Bladder

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

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

(By Numerical Order) ☐ Other

Sample Description (color, turbidity, odor, sheen, etc.): Cloudy, no color, bioinjection material 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	28.2	368.4	1.11	6.39	12.8				
2	28.2	366.4	1.11	6.39	11.7				
3	28.2	367.0	1.11	6.39	10.8				
4	28.3	367.1	1.09	6.40	10.4				
Average:	28.2	367.2	1.11	6.39	11.4	#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) (Silic
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
	others

Duplicate Sample No(s):

Comments:

Signature: Samantha Lindstrom | Date: 8.17.22

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 23 /2022@ 1255

Sample Number: RGW-244S- 2208 | Weather:

Landau Representative: BLH

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft): 5.08 | Time: 1224 | Flow through cell vol. 200 ml | GW Meter No.(s) Slope #2

Begin Purge: Date/Time: 8/ 23 /2022 @ 1224 | End Purge: Date/Time: 8/ 23 /2022 @ 1300 | Gallons Purged: 1.5

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

Time	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Internal Purge Volume (gal)	Comments/ Observations
Purge Goals: Stablization of Parameters for three consecutive readings within the following limits								**>/= 1 flow through cell vol.**	
	+/- 3%	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**		
1243	18.0	443.9	1.15	5.77	-64.8	51.38	5.07	200ml/min	
1246	18.0	443.4	1.32	5.83	-73.7	42.57	5.08		
1249	18.0	446.4	1.69	5.88	-80.8	49.41	5.09		
1252	18.0	448	1.84	5.92	-86.4				

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 installed dedicated tubing

Sample Description (color, turbidity, odor, sheen, etc.): Colorless / Clear / NO / NS

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	18.0	442.9	1.91	5.92	-87.2				
2	18.0	448.4	1.89	5.93	-87.7				
3	18.0	448.9	1.92	5.92	-88.0				
4	18.0	448.9	1.93	5.92	-88.3				
Average:	18.0	447.3	1.91	5.92	-87.8	#DIV/0!			

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

Duplicate Sample No(s):

Comments:

Signature: BLH | Date: 8/23/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 23 /2022@ 1400

Sample Number: RGW247S- 2208 | Weather: Sunny, 70s

Landau Representative: SJL/AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 6.48 | Time: 1336 | Flow through cell vol. | GW Meter No.(s Heron Yellow

Begin Purge: Date/Time: 8/ 23 /2022 1337 | End Purge: Date/Time: 8/ 23 /2022 @ 1359 | 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		
1340	21.7	448.6	0.46	6.42	67.0		6.68		
1343	22.5	459.4	0.39	6.44	66.6		6.68		
1346	24.2	499.2	0.20	6.50	62.4		6.69		
1349	25.5	534	0.23	6.53	54.5				
1352	27.0	557	0.23	6.54	47.5				
1355	27.2	563	0.24	6.55	45.7				

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.): Gray/brown color, very cloudy, no/ns

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	27.2	564	0.24	6.55	45.3				
2	27.2	564	0.23	6.55	44.9				
3	27.2	565	0.22	6.55	44.6				
4	27.5	565	0.22	6.55	44.3				
Average:	27.3	565	0.23	6.55	44.8				

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

Duplicate Sample No(s):

Comments:

Signature: Samantha Lindstrom | Date: 8.23.22

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 23 /2022@ 1328

Sample Number: RGW248I- 220823 | Weather: Sunny, 70s

Landau Representative: SJL/AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 4.78 | Time: 1305 | Flow through cell vol. | GW Meter No.(s Heron Yellow

Begin Purge: Date/Time: 8/ 23 /2022 1306 | End Purge: Date/Time: 8/ 23 /2022 @ 1327 | 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**	
1309	20.2	451	1.39	6.28	69.2		4.88		
1312	21.4	464.1	0.90	6.31	71.1		4.90		
1315	22.9	498.6	0.74	6.33	69.5		4.90		
1318	21.8	479.8	0.64	6.33	68.7				
1321	21.8	473.4	0.62	6.33	68.7				
1324	21.5	470.2	0.60	6.33	67.7				

SAMPLE COLLECTION DATA

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

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

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

(By Numerical Order) ☐ Other

Sample Description (color, turbidity, odor, sheen, etc.): Clear, colorless, no/ns

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	21.5	469.1	0.62	6.33	67.5				
2	21.6	469.2	0.61	6.33	67.4				
3	21.5	468.8	0.62	6.33	67.3				
4	21.5	468.9	0.62	6.33	67.2				
Average:	21.5	469.0	0.62	6.33	67.4				

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

Duplicate Sample No(s):

Comments:

Signature: Samantha Lindstrom | Date: 8.23.22

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 24 /2022@ 1839

Sample Number: RGW249S- 220824 | Weather:

Landau Representative: JAM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 3.99 Time: 1613 Flow through cell vol. 200 mL GW Meter No.(s Heron 4

Begin Purge: Date/Time: 8/ 24 /2022 (1614 End Purge: Date/Time: 8/ 24 /2022 @ 1835 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		
1817	20.3	946	0.03	6.08	-50.0				
1820	20.4	946	0.00	6.14	-69.9				
1823	21.3	949	0.00	6.17	-80.0				
1826	21.9	947	0.00	6.20	-86.1				
1829	21.9	944	0.00	6.19	-88.1				

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.): Colorless / Clear / No odor / No sheen

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	22.0	945	0.00	6.20	-88.7				
2	22.0	945	0.00	6.20	-88.8				
3	22.0	942	0.00	6.20	-89.1				
4	22.0	946	0.00	6.20	-89.0				
Average:	22.0	945	0.00	6.20	-88.9				

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

Duplicate Sample No(s):

Comments: D.O. reading very low today

Signature: JAM Date: 8/24/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 23 /2022@ 1538

Sample Number: RGW250S- 220823 | Weather: Sunny, 80s

Landau Representative: SJL/AHA

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 3.78 | Time: 1509 | Flow through cell vol. | GW Meter No.(s Heron Yellow

Begin Purge: Date/Time: 8/ 23 /2022 1510 | End Purge: Date/Time: 8/ 23 /2022 @ 1532 | 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**	
1513	19.2	118.3	0.35	6.98	69.5		3.94		
1516	20.0	135.1	0.33	6.76	69.1		4.01		
1519	20.7	137.0	0.32	6.80	69.2		4.05		
1522	20.9	137.8	0.30	6.82	68.1				

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.): Pale yellow color, turbid, no/ns

Replicate	Temp (°F/°C)	Cond. (uS/cm)	D.O. (mg/L)	pH	ORP (mV)	Turbidity (NTU)	DTW (ft)	Ferrous iron (Fe II)	Comments/ Observations
1	20.9	137.8	0.31	6.82	67.8				
2	20.9	137.9	0.3	6.82	67.7				
3	21.0	137.9	0.3	6.83	67.5				
4	21.0	137.9	0.3	6.83	67.4				
Average:	21.0	137.9	0.3	6.83	67.6				

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

Duplicate Sample No(s):

Comments:

Signature: Samantha Lindstrom | Date: 8.23.22

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 22 /2022@ 1141

Sample Number: RGW253I- 220822 | Weather: 75 and sunny

Landau Representative: JAM

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 4.69 | Time: 1116 | Flow through cell vol. 200mL | GW Meter No.(s Heron 2

Begin Purge: Date/Time: 8/ 22 /2022 @ 1119 | End Purge: Date/Time: 8/ 22 /2022 @ 1138 | 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	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1122	21.4	414.4	1.18	5.97	-92.2		4.69		
1125	21.7	405.7	1.02	5.88	-92.6		4.69		
1128	21.5	403.6	0.91	5.86	-94.5		4.69		
1131	21.4	400.7	0.96	5.87	-96.9				

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.): Colorless / low turbididty / 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	21.3	400.00	1.00	5.87	-97.0				
2	21.4	399.4	1.02	5.87	-97.3				
3	21.3	399.9	1.01	5.87	-97.6				
4	21.4	398.6	1.00	5.87	-98.0				
Average:	21.4	399.5	1.01	5.87	-97.5				

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

Duplicate Sample No(s):

Comments:

Signature: JAM | Date: 8/22/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 24 /2022 @ 1835

Sample Number: RGW264S- 220824 | Weather: Sunny ~80's

Landau Representative: BLH

WATER LEVEL/WELL/PURGE DATA

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

DTW Before Purging (ft) 6.47 | Time: 18.11 | Flow through cell vol. 200 mL | GW Meter No.(s Slope #2

Begin Purge: Date/Time: 8/ 24/2022 @ 1814 | End Purge: Date/Time: 8/ 24 /2022 @ 1832 | 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	**+/- 3%**	**+/- 3%**	**+/- 10%**	**+/- 0.1 units**	**+/- 10 mV**	**+/- 10%**	**< 0.3 ft**	**>/= 1 flow through cell**	
1819	20.7	2531	3.14	4.64	-61.1		7.18	Yes	Extremely stinky. Bu
1824	19.8	2363	4.59	4.66	55.9		8.11		Slowed pump rate. N
1827	20.7	2385	4.03	4.68	53.1		8.21		
1830	19.6	2308	5.68	4.69	51.3		7.59		

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.): Colorless / Clear / Very strong odor / no sheen / bubbles forming in purge bucket

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	2296	5.77	4.70	49.2				
2	19.7	2297	5.37	4.70	48.9				
3	19.6	2298	5.03	4.74	48.7				
4	19.6	2287	5.71	4.74	48.4				
Average:	19.7	2295	5.47	4.7	48.8				

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) (Silic
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
x2	Duplicate
	others

Duplicate Sample No(s): DUP-1-220824 at 1215

Comments: Well monument full of reddish-brown water, has putrid odor.

Signature: BLH | Date: 8/24/2022

LANDAU ASSOCIATES

Groundwater Low-Flow Sample Collection Form

Project Name: Boeing Renton | Project Number: 0025217.002.099.099

Event: Aug-22 | Date/Time: 8/ 24 /2022@ 1215

Sample Number: RGWDUP-1-220824 | Weather:

Landau Representative: SJL/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/ /2022 @ End Purge: Date/Time: 8/ /2022 @ 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 RGW264S							

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ☒ Pump/Pump Type Bladder

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

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

(By Numerical Order) ☐ Other

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

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

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
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) (Silic
	VOC (Boeing short list)
	Methane Ethane Ethene Acetylene
	others

Duplicate Sample No(s): Duplicate to RGW152S

Comments:

Signature: BLH Date: 8/24/2022

APPENDIX C

Data Validation Memos

Memo

To:	Kathleen Goodman, Project Manager	Project:	PS20203450.2022
From:	Caitlin Riechmann	c:	Project File
Tel:	425-368-1000		
Fax:	425-368-1001		
Date:	September 20, 2022		

Re: Summary Data Quality Review
August 2022 Boeing Renton Groundwater Sampling
SWMU-168
ARI Work Order Number: 22H0340

This memo presents the summary data quality review of one primary groundwater sample and one trip blank sample collected on August 17, 2022. 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 volatile organic compound 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
RGW230I-220817	22H0340-01	vinyl chloride
Trip blanks	22H0340-02	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 17, 2022. The temperature of the coolers was recorded upon receipt and the cooler was above the maximum acceptable temperature of 6 degrees Celsius.

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Kirkland, Washington 98033
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wsp.com

Organic analyses

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

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

1. Preservation and Holding Times – Acceptable except as noted:

   The temperature of the cooler upon receipt at ARI was above the maximum acceptable temperature, at 11.6 degrees Celsius. The vinyl chloride result for sample RGW230I-220817 is flagged with a "J."

   One sampling vial contained a bubble upon arrival at ARI. We assume that the lab used another vial with acceptable preservation and the samples were able to be analyzed normally within acceptable results. The data is not qualified 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 ARI work order number 22H0340 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	Qualified Analyte	Qualified Result (ng/L)
RGW230I-220817	vinyl chloride	Elevated cooler temperature	539
Trip Blanks	none	NA	none

Abbreviations:

NA = not applicable
ng/L = nanograms per liter

References

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

U.S. Environmental Protection Agency (EPA), 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:	PS20203450.2022
From:	Caitlin Riechmann	c:	Project File
Tel:	425-368-1000		
Fax:	425-368-1001		
Date:	September 14, 2022		

Re: Summary Data Quality Review
August 2022 Boeing Renton Groundwater Sampling
SWMU-172/174
ARI Work Order Number: 22H0442, 22H0495

This memo presents the summary data quality review of nine primary groundwater samples and one trip blank sample collected on August 22 and 24, 2022. 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-220822	22H0442-01	all
RGW235I-220822	22H0442-02	all
Trip Blanks	22H0442-03	VOCs
RGW 236S-220824	22H0495-01	all
RGW 226S-220824	22H0495-02	all
RGW 234S-220824	22H0495-03	all
RGW 153S-220824	22H0495-04	all
RGW 172S-220824	22H0495-05	all

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Sample ID	Laboratory Sample ID	Requested Analyses
RGW 173S-220824	22H0495-06	all
Trip blanks	22H0340-02	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, 2014a and b).

ARI received the samples on August 22 and 26, 2022. The temperature of the coolers was recorded upon receipt and the coolers were below the maximum acceptable temperature of 6 degrees Celsius. The laboratory logged the samples with the time on the chain-of-custody (COC) and proceeded with analysis. The containers used for sample RGW 236S-220824 were incorrectly labelled. The sample ID on the containers with a sample time of 13:16 was labelled RGW 226S-220824, whereas the sample ID on the COC with a sample time of 13:16 was labelled RGW 236S-220824. The laboratory logged the sample per the sample ID on the COC and proceeded with analysis.

Organic analyses

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

1. Preservation and Holding Times – Acceptable except as noted:

   Three bottles were received at the laboratory with a pH greater than two. ARI added an acidic solution of sulfuric acid to lower the pH and proceeded with analysis.

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.

Inorganic analyses

Samples were analyzed for TOC and total metals. 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 analysis of MS/MSD samples. The project frequency requirement was achieved with MS/MSD analysis conducted at other sites included in this sampling event.

5. Laboratory Duplicates – Acceptable

   The laboratory did not perform duplicate analyses on the samples reviewed in this report.

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 22H0442 and 22H0495 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
RGW232S-220822	none
RGW235I-220822	none
Trip Blanks	none
RGW 236S-220824	none
RGW 226S-220824	none
RGW 234S-220824	none
RGW 153S-220824	none
RGW 172S-220824	none
RGW 173S-220824	none
RGW 152S-220824	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.

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Memo

To:	Kathleen Goodman, Project Manager	Project:	PS20203450.2022
From:	Caitlin Riechmann	c:	Project File
Tel:	425-368-1000		
Fax:	425-368-1001		
Date:	September 21, 2022		

Re: Summary Data Quality Review
August 2022 Boeing Renton Groundwater Sampling
Building 4 78/79 SWMU/AOC Group
ARI Work Order Numbers: 22H0339, 22H0470

This memo presents the summary data quality review of two primary groundwater samples collected on August 17 and 23, 2022. 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) (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 Washington State Department of Total organic carbon (TOC) by Standard Method 5310B 00.

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

Sample ID[1]	Laboratory Sample ID	Requested Analyses
RGW237S-220817	22H0339-01	all
RGW240D-220817	22H0339-02	all
RGW143S-220817	22H0339-03	all
RGW034S-220817	22H0339-04	all
RGW033S-220817	22H0339-05	all
RGWDUP2-220817	22H0339-06	all
TRIP BLANKS	22H0339-07	VOCs, TPH-G
RGW031S-220823	22H0470-01	all

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Sample ID[1]	Laboratory Sample ID	Requested Analyses
RGW-244S-220823	22H0470-02	all

Note:

1. Samples RGW237S-220817, RGW143S-220817, RGW034S-220817, and RGW-033S-220817 were incorrectly logged as RGW2375-220817, RGW1435-220817, RGW0345-220817, and RGW0335-220817, respectively, in the report. Based on associated sample naming from previous sampling events, the samples are referred to as RGW237S-220817, RGW143S-220817, RGW034S-220817, and RGW033S-220817 in this memo.

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

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

ARI received the samples on August 17 and 23, 2022. The temperature of the coolers was recorded upon receipt and one cooler was above the maximum acceptable temperature of 6 degrees Celsius (˚C), at 11.6˚C. The laboratory logged the samples with the time on the chain of custody and proceeded with analysis.

Organic analyses

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

1. Preservation and Holding Times – Acceptable except as noted:

   The temperature of the cooler for samples RGW237S-220817, RGW240D-220817, RGW143S-220817, RGW034S-220817, RGW033S-220817, and RGWDUP2-220817 upon receipt at ARI was above the maximum acceptable temperature, at 11.6˚C. Detected results are flagged with a "J."

   Two sample vials contained bubbles upon arrival at ARI. We assume that the laboratory used another vial with acceptable preservation for the associated samples and the samples were able to be analyzed normally with acceptable results. The data is not qualified 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

   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 (%)
RGW033S-220817/ RGWDUP2-220817	vinyl chloride	1.53	1.61	0.20	5
	cis-1,2-dichloroethene	0.45	0.48	0.20	NC
	benzene	14.2	15.2	0.20	7
	trichloroethene	ND	ND	0.20	NC
	TPH-G	300	304	100	NC
	TOC	14.33	14.41	0.50	1

Abbreviations

µg/L = micrograms per liter
NC = not calculated
ND = not detected
RPD = relative percent difference
TOC = total organic carbon
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 analysis of MS/MSD samples. The project frequency requirement was achieved with MS/MSD analysis conducted at other sites included in this sampling event.

5. Laboratory Duplicates – Acceptable

   The laboratory did not perform duplicate analyses on the samples reviewed in this report.

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 22H0339 and 22H0470 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	Qualifier Reason	Qualified Result[1]
RGW237S-220817	TOC	Elevated cooler temperature	7.55 J mg/L
RGW240D-220817	TOC	Elevated cooler temperature	6.36 J mg/L
RGW143S-220817	cis-1,2-dichloroethene	Elevated cooler temperature	0.76 J µg/L
	Trichloroethene	Elevated cooler temperature	0.53 J µg/L
	TOC	Elevated cooler temperature	4.65 J mg/L
RGW034S-220817	vinyl chloride	Elevated cooler temperature	0.72 J µg/L
	TOC	Elevated cooler temperature	9.04 J mg/L
RGW033S-220817	vinyl chloride	Elevated cooler temperature	1.53 J µg/L
	cis-1,2-dichloroethene	Elevated cooler temperature	0.45 J µg/L
	benzene	Elevated cooler temperature	14.2 J µg/L
	TPH-G	Elevated cooler temperature	300 J µg/L
	TOC	Elevated cooler temperature	14.33 J mg/L
RGWDUP2-220817	vinyl chloride	Elevated cooler temperature	1.61 J µg/L
	cis-1,2-dichloroethene	Elevated cooler temperature	0.48 J µg/L
	benzene	Elevated cooler temperature	15.2 J µg/L
	TPH-G	Elevated cooler temperature	304 J µg/L
	TOC	Elevated cooler temperature	14.41 J mg/L
TRIP BLANKS	none	NA	none
RGW031S-220823	none	NA	none
RGW-244S-220823	none	NA	none

Note:

1. Data qualifiers are as follows:
   J = The value is an estimate.

Abbreviations:

µg/L = micrograms per liter
mg/L = milligrams per liter
NA = not applicable
TOC = total organic carbon
TPH-G = total petroleum hydrocarbons as gasoline

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:	PS20203450.2022
From:	Caitlin Riechmann	c:	Project File
Tel:	425-368-1000		
Fax:	425-368-1001		
Date:	September 19, 2022		

Re: Summary Data Quality Review
August 2022 Boeing Renton Groundwater Sampling
Former Fuel Farm AOC Group
ARI Work Order Number: 22H0416

This memo presents the summary data quality review of three primary groundwater samples and one field duplicate collected on August 19, 2022. The samples were submitted to Analytical Resources Inc. (ARI), a Washington State Department of Ecology-accredited laboratory located in Tukwila, Washington. The samples were analyzed for total petroleum hydrocarbons as diesel (TPH-D), as motor oil (TPH-O) and as Jet A (TPH-Jet A) by Washington State Department of Ecology Method NWTPH-Dx.

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

Sample ID[1]	Laboratory Sample ID	Requested Analyses
RGW224S-220819	22H0416-01	all
RGWDUP3-220819	22H0416-02	all
RGW211S-220819	22H0416-03	all
RGW221S-220819	22H0416-04	all

Note:

1. Sample RGW224S-220819 was incorrectly logged as RGW2245-220819 in the report. Based on associated sample naming from previous sampling events, the sample is referred to as RGW224S-220819 in this memo.

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

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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 19, 2022. The temperature of the coolers was recorded upon receipt and the cooler was below the maximum acceptable temperature of 6 degrees Celsius. Sample RGW224S 220819 was incorrectly logged as RGW2245-220819 in the report. Based on associated sample naming from previous sampling events, the sample is referred to as RGW224S-220819 in this memo.

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/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:

   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-220819/ RGWDUP3-220819	TPH-D (C12–C24)	0.881	1.07	0.100	19
	TPH-O (C24–C38)	ND	ND	0.200	NC
	TPH-Jet A (C10–C18)	1.25	1.69	0.100	30

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 as Jet A
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 22H0416 is 100 percent. Evaluation of the usefulness of these data is based on EPA guidance

documents listed in the introduction to this report. No problems were identified, and analytical performance was within specified limits. The data meet the project's data quality objectives.

Sample ID	Qualified Analyte
RGW224S-220819	none
RGWDUP3-220819	none
RGW211S-220819	none
RGW221S-220819	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.

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Memo

To:	Kathleen Goodman, Project Manager	Project:	PS20203450.2022
From:	Caitlin Riechmann	c:	Project File
Tel:	425-368-1000		
Fax:	425-368-1001		
Date:	September 21, 2022		

Re: Summary Data Quality Review
August 2022 Boeing Renton Groundwater Sampling
AOC-001, -002, and -003
ARI Work Order Number: 22H0341, 22H0472, 22H0489

This memo presents the summary data quality review of five primary groundwater samples and two trip blank samples collected between August 17 and 24, 2022. 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-00. The samples and the analyses conducted on the samples are listed below.

Sample ID[1]	Laboratory Sample ID	Requested Analyses
RGW249S-220817	22H0341-01	Vinyl chloride
Trip blanks	22H0341-02	Vinyl chloride
RGW248I-220823	22H0472-01	all
RGW247S-220823	22H0472-02	all
RGW188S-220823	22H0472-03	all
Trip blanks	22H0472-04	Vinyl chloride
RGW 249S-220824	22H0489-01	TOC

Note:

1. Sample RGW249S-220817 was incorrectly logged as RGW2495-220817 in the report. Based on associated sample naming from previous sampling events, the sample is referred to as RGW249S-220817 in this memo.

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

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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 between August 17 and 26, 2022. The temperature of the coolers was recorded upon receipt and one of the coolers was below the minimum acceptable temperature of 2 degrees Celsius (˚C) and one of the coolers was above the maximum acceptable temperature of 6˚C. The laboratory logged the samples with the time on the chain-of-custody and proceeded with analysis.

Organic analyses

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

1. Preservation and Holding Times – Acceptable except as noted:

   The temperature of the cooler containing sample RGW249S-220817 was above the maximum acceptable temperature, at 11.6˚C. The vinyl chloride result for sample RGW249S-220817 is flagged with a "J."

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.

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 analysis of MS/MSD samples. The project frequency requirement was achieved with MS/MSD analysis conducted at other sites included in this sampling event.

5. Laboratory Duplicates – Acceptable

The laboratory did not perform duplicate analyses on the samples reviewed in this report.

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 22H0341, 22H0472, and 22H0489 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	Qualifier Reason	Qualified Result[1] (ng/L)
RGW249S-220817	vinyl chloride	Elevated cooler temperature	404 J
Trip blanks	none	NA	none
RGW248I-220823	none	NA	none
RGW247S-220823	none	NA	none
RGW188S-220823	none	NA	none
Trip blanks	none	NA	none
RGW 249S-220824	none	NA	none

Note:

1. Data qualifiers are as follows:
   J = The value is an estimate.

Abbreviations:

NA = not applicable
ng/L = nanograms per liter

References

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

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

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

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Memo

To:	Kathleen Goodman, Project Manager	Project:	PS20203450.2022
From:	Caitlin Riechmann	c:	Project File
Tel:	425-368-1000		
Fax:	425-368-1001		
Date:	September 9, 2022		

Re: **Summary Data Quality Review**
August 2022 Boeing Renton Groundwater Sampling
AOC-004
ARI Work Order Number: 22H0473

This memo presents the summary data quality review of one primary groundwater sample collected on August 23, 2022. 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-220823	22H0473-1	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 23, 2022. The temperature of the coolers was recorded upon receipt; and were below the maximum acceptable temperature of 6 degrees Celsius (˚C).

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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. The project frequency requirement was achieved with MS/MSD analysis conducted at other sites included in this sampling event.
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 22H0473 is 100 percent. The usefulness of these data was evaluated based on EPA guidance documents listed in the introduction to this report. No problems were identified, and analytical performance was within specified limits.

Sample ID	Qualified Analyte
RGW250S-220823	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.

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

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Memo

To:	Kathleen Goodman, Project Manager	Project:	PS20203450.2022
From:	Caitlin Riechmann	c:	Project File
Tel:	425-368-1000		
Fax:	425-368-1001		
Date:	September 14, 2022		

Re: Summary Data Quality Review
August 2022 Boeing Renton Groundwater Sampling
AOC-060
ARI Work Order Numbers: 22H0354, 22H0428, 22H0468

This memo presents the summary data quality review of six primary groundwater samples, one field duplicate, and three trip blank samples collected between August 18 and 22, 2022. 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
RGW014S-220818	22H0354-01	all
RGWDUP4-220818	22H0354-02	all
RGW012S-220818	22H0354-03	all
Trip Blanks	22H0354-04	VOCs
RGW1475-220819	22H0428-01	all
RGW0095-220819	22H0428-02	all
Tripblanks	22H0428-03	VOCs
RGW253I-220822	22H0468-01	all
RGW150S-220822	22H0468-02	all
Trip Blanks	22H0468-03	VOCs

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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 between August 18 and 22, 2022. The temperature of the cooler was recorded upon receipt; one cooler was above the maximum acceptable temperature of 6 degrees Celsius (˚C). Samples were received in good condition. 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 except as noted:

   The cooler containing samples RGW014S-220818, RGWDUP4-220818, and RGW012S-220818 arrived at ARI at a temperature of 9.7˚C, above the maximum acceptable temperature of 6˚C. The detected VOC results from the associated samples are flagged with a "J."

   Three sample vials contained bubbles upon arrival at ARI. We assume that the laboratory used another vial with acceptable preservation for the associated samples and the samples were able to be analyzed normally with acceptable results. The data is not qualified 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

   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-220818/ RGWDUP4-220818	vinyl chloride	514	518	20.0	1
	cis-1,2-dichloroethene	134	132	20.0	2
	trichloroethene	24.6	22.1	20.0	NC

Abbreviations

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

7. Reporting Limits and Laboratory Flags – Acceptable.

Inorganic analyses

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

1. Preservation and Holding Times – – Acceptable except as noted:

   The cooler containing samples RGW014S-220818, RGWDUP4-220818, and RGW012S-220818 arrived at ARI at a temperature of 9.7˚C, above the maximum acceptable temperature of 6˚C. The detected TOC results from the associated samples are flagged with a "J."

2. Blanks – Acceptable
3. LCS – Acceptable
4. 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.

5. Laboratory Duplicates – Acceptable

   The laboratory did not perform duplicate analyses on the samples reviewed in this report.

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 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 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-220818/ RGWDUP4-228018	TOC	4.74	4.69	0.50	1

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

7. Reporting Limits and Laboratory Flags – Acceptable

Overall assessment of data

A summary of the data assessment is presented in the table below. The completeness of work order numbers 22H0354, and 22H0428, and 22HO468 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	Reason for Qualifier	Qualified Result1
RGW014S-220818	vinyl chloride	Elevated cooler temperature	514 J ng/L
	cis-1,2-dichloroethene	Elevated cooler temperature	134 J ng/L
	trichloroethene	Elevated cooler temperature	24.6 J ng/L
	TOC	Elevated cooler temperature	4.74 J mg/L
RGWDUP4-220818	vinyl chloride	Elevated cooler temperature	518 J ng/L
	cis-1,2-dichloroethene	Elevated cooler temperature	132 J ng/L
	trichloroethene	Elevated cooler temperature	22.1 J ng/L
	TOC	Elevated cooler temperature	4.69 J mg/L
RGW012S-220818	vinyl chloride	Elevated cooler temperature	294 J ng/L
	cis-1,2-dichloroethene	Elevated cooler temperature	1,910 J ng/L
	trichloroethene	Elevated cooler temperature	1,020 J ng/L
	TOC	Elevated cooler temperature	10,260 J mg/L
Trip Blanks	none	NA	none
RGW1475-220819	none	NA	none
RGW0095-220819	none	NA	none
Tripblanks	none	NA	none
RGW253I-220822	none	NA	none
RGW150S-220822	none	NA	none
Trip Blanks	none	NA	none

Note:

1. Data qualifiers are as follows:
   J = The value is an estimate.

Abbreviations:

NA = not applicable
mg/L = milligrams per liter
ng/L = nanograms per liter
TOC = total organic carbon

References

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

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

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

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Memo

To:	Kathleen Goodman, Project Manager	Project:	PS20203450.2022
From:	Caitlin Riechmann	c:	Project File
Tel:	425-368-1000		
Fax:	425-368-1001		
Date:	September 14, 2022		

Re: Summary Data Quality Review
August 2022 Boeing Renton Groundwater Sampling
AOC-090
ARI Work Order Numbers: 22H0471, 22H0477

This memo summarizes the data quality review of five primary groundwater samples, one field duplicate, and two trip blank samples collected on August 23 and 24, 2022. 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;
- 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-MO) by Ecology Method NWTPH-Dx (with silica gel cleanup); 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
DUP5-220823	22H0471-01	vinyl chloride
RGW207S-220823	22H0471-02	vinyl chloride
RGW176S-220823	22H0471-03	vinyl chloride
Trip Blank-220823	22H0471-04	vinyl chloride, TPH-G

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Sample ID	Laboratory Sample ID	Requested Analyses
RGW 189S-220824	22H0477-01	All
RGW 178S-220824	22H0477-02	vinyl chloride
RGW 208S-220824	22H0477-03	vinyl chloride
TRIP BLANK	22H0477-04	VOCs, TPH-G

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

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

ARI received the samples on August 23 and 26, 2022. The temperature of the coolers was recorded upon receipt and the coolers 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 and TPH. Laboratory data were evaluated for the following parameters:

1. Preservation and Holding Times – Acceptable except as noted:

   1,1,2-Trichloroethane was detected at a concentration of 0.57 micrograms per liter in the laboratory blank associated with samples RGW 189S-220824, RGW 178S-220824, and RGW 208S-220824. 1,1,2-Trichloroethane was not detected in the associated samples and no data is qualified for use.

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

   ARI performed MS and MSD analyses on sample RGW-189S-220824. Toluene recovery was low at 61.1 percent in the MSD performed on sample RGW-189S-220824. The concentration detected in the unspiked native sample was greater than the spike concentration and data usability could be assessed based on MS recoveries. No data were qualified.

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 – Acceptable
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 completeness of ARI work order numbers 22H0471 and 22H0477 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 meet the project's data quality objectives.

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

Sample ID	Qualified Analyte
DUP5-220823	none
RGW207S-220823	none
RGW176S-220823	none
Trip Blank-220823	none
RGW 189S-220824	none
RGW 178S-220824	none
RGW 208S-220824	none
TRIP BLANK	none

References

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

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

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

Memo

To:	Kathleen Goodman, Project Manager	Project:	PS20203450.2022
From:	Caitlin Riechmann	c:	Project File
Tel:	425-368-1000		
Fax:	425-368-1001		
Date:	September 19, 2022		

Re: Summary Data Quality Review
August 2022 Boeing Renton Groundwater Sampling
Apron A
ARI Work Order Number: 22H0488

This memo presents the summary data quality review of one primary groundwater sample and one field duplicate sample collected on August 24, 2022. 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
DUP-1-220824	22H0488-01	all
RGW264S-220824	22H0488-02	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, 2014a and b).

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ARI received the samples on August 26, 2022. The temperature of the coolers was recorded upon receipt and was below the maximum acceptable temperature of 6 degrees Celsius. The laboratory logged the samples with the time on the chain-of-custody and proceeded with analysis.

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 except as noted:

   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 project-specific control limit for field duplicate relative percent differences (RPDs) is 30 percent for concentrations greater than five times the reporting limit. The RPD is not calculated for results that are less than five times the reporting limit, as indicated on the table below by "NC." In these cases, the absolute value of the difference between the primary and duplicate result should not exceed the value of the reporting limit. The field duplicate RPDs were within the control limits.

Sample ID/ Field Duplicate ID	Analyte	Primary Result (µg/L)	Duplicate Result (µg/L)	Reporting Limit (µg/L)	RPD (%)
RGW264S-220824/ DUP-1-220824	vinyl chloride	1.41	1.57	0.20	11
	cis-1,2-dichloroethene	ND	ND	0.20	NC

Abbreviations

µg/L = micrograms per liter
NC = not calculated
ND = not detected
RPD = relative percent difference

7. Reporting Limits and Laboratory Flags – Acceptable

Inorganic analyses

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

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

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

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

   Two field duplicates were 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 (mg/L)	Duplicate Result (mg/L)	Reporting Limit (mg/L)	RPD (%)
RGW264S-220824/ DUP-1-220824	TOC	2,189	2,224	23.065	2

Abbreviations

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

7. Reporting Limits and Laboratory Flags – Acceptable

Overall assessment of data

The table below summarizes the data assessment. The completeness of work order number 22H0488 is 100 percent. The usefulness of these data was evaluated based on EPA guidance documents listed in the introduction to this report. No problems were identified, and analytical performance was within specified limits. The data meet the project's data quality objectives.

Sample ID	Qualified Analyte
DUP-1-220824	none
RGW264S-220824	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.

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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							
		3/4/2019	8/12/2019	3/9/2020	8/10/2020	2/15/2021	8/10/2021	2/21/2022	8/17/2022
Volatile Organic Compounds (µg/L)									
Vinyl Chloride	0.11	0.0566	**0.336**	0.087	**0.162**	0.076	0.359 J	**0.164**	**0.539 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							
		11/11/2019	3/9/2020	8/10/2020	2/15/2021	8/10/2021	2/21/2022	2/21/2022	8/24/2022	8/12/2019	11/11/2019	3/9/2020	5/11/2020	8/10/2020	2/15/2021	8/10/2021	2/21/2022	8/24/2022
Volatile Organic Compounds (µg/L)																		
cis-1,2-Dichloroethene	0.03	**0.530**	**0.892**	**1.66**	**0.144**	**1.330**	**1.57**	**1.59**	**0.877**	**0.278**	**0.204**	**0.0736**	**0.0789**	**0.0551**	**0.077**	**0.0582 J**	**0.0517**	0.100
Tetrachloroethene	0.02	**0.384**	**1.12**	**0.319**	**0.081**	**0.0872**	**1.84**	**1.71**	**1.05**	**0.0544**	**0.164**	**0.024**	0.020 U	0.020 U	0.020 U	0.020 UJ	0.0200 U	0.0200 U
Trichloroethene	0.02	**0.145**	**0.278**	**0.579**	0.020 U	**0.129**	**0.522**	**0.497**	**0.534**	**0.0326**	**0.131**	0.02 U	0.020 U	0.020 U	0.020 U	0.020 UJ	0.0200 U	0.0525
Vinyl Chloride	0.11	0.0366	**0.15**	**0.284**	0.0378	**0.506**	**0.200**	**0.219**	**0.346**	**0.153**	0.0859	**0.249**	**0.266**	**0.135**	**0.220**	**0.193 J**	**0.174**	**0.214**
Total Metals (µg/L)																		
Arsenic	1.0	**7.48**	**3.84**	**6.72**	**7.67**	**16.3**	**2.88**	**2.34**	**47.7**	**4.72**	**11.9**	**5.48**	**3.85**	**4.05**	**32.8**	**32.8**	**4.98**	**2.85**
Copper	3.5	**16.6**	**8.03**	**7.45 J**	**17.2 J**	**9.08 J**	**5.07**	**3.88**	**9.17**	1.58	**10.2**	3.09	1.73	1.68	**33.9**	**33.9**	1.45	0.641
Lead	1.0	**12.1**	**6.13**	**3.89**	**12.5 J**	**5.38 J**	**2.78 J**	**1.90 J**	**5.75**	0.351	**2.76**	0.712	0.372	0.326	**5.80**	**5.80**	0.302	0.123

Analyte	Current Cleanup Level[4]	Well ID[3]															
		Downgradient Plume Area															
		GW172S								GW173S							
		5/6/2019	8/12/2019	5/11/2020	8/10/2020	2/15/2021	8/10/2021	2/21/2022	8/24/2022	11/11/2019	3/9/2020	5/11/2020	8/10/2020	2/15/2021	8/10/2021	2/21/2022	8/24/2022
Volatile Organic Compounds (µg/L)																	
cis-1,2-Dichloroethene	0.03	**0.0581**	0.027	**0.214**	**0.0561**	**0.108**	**0.0746**	**0.0532**	**0.0436**	**0.0378**	**0.0504**	**0.0488**	**0.0313**	**0.0505**	**0.0424 J**	0.0280	0.168
Tetrachloroethene	0.02	0.020 U	**0.0451**	**0.0625**	**0.0603**	**0.0624**	0.020 U	**0.0677**	0.0200 U	**0.0246**	**0.0224**	0.020 U	0.020 U	0.020 U	0.020 UJ	0.0200 U	0.0200 U
Trichloroethene	0.02	0.020 U	0.020 U	**0.028**	0.020 U	0.020 U	0.020 U	**0.0201**	0.0200 U	**0.0379**	**0.0305**	**0.0215**	**0.0239**	0.020 U	0.020 UJ	0.0200 U	**0.0496**
Vinyl Chloride	0.11	0.0808	0.0376	**0.369**	0.0628	**0.219**	**0.155**	**0.137**	0.0887	0.072	0.144	0.126	0.0455	**0.183**	**0.176 J**	0.0696	**0.175**
Total Metals (µg/L)																	
Arsenic	1.0	**7.71**	**10.6**	**7.03**	**10.8**	**10.8**	**7.18**	**11.2**	**4.86**	**15.6**	**11.8**	**6.72**	**7.00**	**9.94**	**11.4**	**13.8**	**6.04**
Lead	1.0	0.991	**1.02**	**1.07**	**2.58**	**1.98**	**1.33**	**1.37**	**1.32**	**1.36**	0.442	0.215	0.470	0.850	**1.65**	0.788	0.468

Analyte	Current Cleanup Level[4]	Well ID[3]															
		Downgradient Plume Area								CPOC Area							
		GW226S								GW232S							
		5/6/2019	8/12/2019	5/11/2020	8/10/2020	2/15/2021	8/10/2021	2/21/2022	8/24/2022	11/11/2019	3/9/2020	5/11/2020	8/10/2020	2/15/2021	8/10/2021	2/21/2022	8/24/2022
Volatile Organic Compounds (µg/L)																	
cis-1,2-Dichloroethene	0.03	0.0223	0.0259	**0.0305**	0.0218	0.020 U	**0.0335 J**	**0.0363**	0.0255	**0.659**	**0.221**	**0.352**	**0.482**	**0.219**	**0.464 J**	**0.197**	**0.325**
Tetrachloroethene	0.02	0.020 U	0.020 U	0.020 U	**0.0279**	0.020 U	**0.0202 J**	0.0200 U	0.0200 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 UJ	0.0200 U	0.0200 U
Trichloroethene	0.02	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 UJ	0.0200 U	0.0200 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 UJ	0.0200 U	0.0200 U
Vinyl Chloride	0.11	0.0459	0.029	0.0594	0.0415	0.0519	0.0516 J	0.0414	**0.128**	**0.860**	**0.264**	**0.337**	**0.425**	**0.263**	**0.653 J**	**0.307**	**0.558**
Total Metals (µg/L)																	
Arsenic	1.0	**2.97**	**2.85**	**3.33**	**4.93**	**8.12**	**5.57**	**7.33**	**3.09**	**8.09**	**2.73**	**4.71**	**3.83**	**4.78**	**6.19**	**3.75**	**3.83**
Copper	3.5	0.500 U	0.626	0.704	1.48	**3.92**	1.48	2.40	0.500 U	**3.85**	2.22	0.539	0.627	2.09	1.79	1.09	0.500 U
Lead	1.0	0.100 U	0.100 U	0.190	0.136	0.513	0.124	0.237	0.100 U	0.378	0.354	0.100 U	0.100 U	0.318	0.262	0.234	0.122

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	5/11/2020	8/10/2020	2/15/2021	8/10/2021	2/21/2022	8/24/2022	11/11/2019	3/9/2020	5/11/2020	8/10/2020	2/15/2021	8/10/2021	2/21/2022	8/24/2022
Volatile Organic Compounds (µg/L)																	
cis-1,2-Dichloroethene	0.03	**0.0630**	**0.0738**	**0.092**	**0.0914**	0.020 U	**0.0892**	**0.0591**	**0.134**	**0.109**	**0.127**	**0.156**	**0.104**	**0.128**	**0.179**	**0.175**	**0.227**
Tetrachloroethene	0.02	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.0200 U	0.0200 U	0.020 U	0.020 U	0.020 U	0.020 U	**0.0292**	0.020 U	0.0200 U	0.0200 U
Trichloroethene	0.02	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.0200 U	0.0200 U	**0.0287**	**0.0336**	**0.031**	**0.0227**	0.020 U	**0.0285**	**0.0253**	**0.0250**
Vinyl Chloride	0.11	0.0235	0.0252	0.032	0.0279	0.020 U	0.0497	0.0318	**0.170**	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	**0.24**	0.0259	0.0280
Total Metals (µg/L)																	
Arsenic	1.0	**2.22**	**1.31**	**5.31**	**3.26**	**6.29**	**1.18**	**1.76**	0.974	0.237	0.251	0.289	0.288	0.200 U	0.200 U	0.200 U	0.200 U
Copper	3.5	1.93	0.869	2.43	3.21	**11.4**	2.58	2.13	2.31	0.573	0.935	1.08	1.30	0.727	0.689	0.687	0.500 U
Lead	1.0	0.843	0.280	0.671	**1.25**	**4.13**	**1.01**	0.930	0.830	0.127	0.235	0.223	0.304	0.174	0.179	0.159	0.100 U

Analyte	Current Cleanup Level[4]	Well ID[3]							
		CPOC Area							
		GW236S							
		5/6/2019	8/12/2019	5/11/2020	8/10/2020	2/15/2021	8/10/2021	2/21/2022	8/24/2022
Volatile Organic Compounds (µg/L)									
cis-1,2-Dichloroethene	0.03	0.0281	**0.0468**	**0.036**	**0.0881**	0.020 U	**0.0791**	0.0200 U	**0.0572**
Tetrachloroethene	0.02	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	**0.0206**	0.0200 U
Trichloroethene	0.02	**0.0206**	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.0200 U	0.0200 U
Vinyl Chloride	0.11	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.0223	0.0200 U	0.0200 U
Total Metals (µg/L)									
Arsenic	1.0	**2.10**	**3.70**	**2.10**	**10.1**	**2.89**	**5.49**	**1.97**	**0.995**
Copper	3.5	2.17	0.893	**4.24**	**10.8**	**9.70**	2.47	**5.27**	**1.22**
Lead	1.0	**1.90**	**1.53**	**2.61**	**10.8**	**6.31**	**1.79**	**3.32**	**0.798**

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							
		8/13/2019	11/12/2019	3/11/2020	5/11/2020	8/11/2020	2/15/2021	8/11/2021	8/23/2022	3/11/2020	5/11/2020	8/11/2020	2/16/2021	8/11/2021	2/22/2022	2/22/2022	8/17/2022
Volatile Organic Compounds (µg/L)																	
Benzene	0.80	**3.47**	**4.77**	**37.1**	**17.6**	**1.72 J**	**18.8 J**	**1.08**	0.20 U	**10.2**	**9.75**	**12.5**	**11.0**	**14.5**	**8.41**	**8.57**	**14.2 J**
cis-1,2-Dichloroethene	0.70	0.47	0.40	0.61	0.40 J	0.67 J	0.31 J	0.20 U	0.26	**21.4**	**39.5**	**188**	**1.64**	0.55	**3.82**	**4.04**	0.45 J
Trichloroethene	0.23	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	**0.25**	0.20 U	0.20 U	0.200 U	0.200 U	0.20 U
Vinyl Chloride	0.20	**0.21**	**0.25**	0.20 U	0.20 U	**0.32 J**	0.20 UJ	0.20 U	**0.39**	**52.2**	**87.3**	**310**	**5.31**	**2.31**	**8.90**	**9.28**	**1.53 J**
Total Petroleum Hydrocarbons (µg/L)																	
TPH-G (C7-C12)	800	**1390**	**1540**	**2,980**	**1,880**	**1,160**	**2,340**	**1,540**	100 U	296	301	255	323	360	168	166	300 J

Analyte	Current Cleanup Level[4]	Well ID[3]															
		Source Area															
		GW034S								GW244S							
		11/12/2019	3/11/2020	5/11/2020	8/11/2020	2/15/2021	8/11/2021	2/22/2022	8/17/2022		11/12/2019	3/11/2020	5/11/2020	8/11/2020	2/15/2021	8/11/2021	8/23/2022
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	0.200 U	**1.47**		**0.87**	0.52	0.46	0.43	0.46	0.20 U	0.25
cis-1,2-Dichloroethene	0.70	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.200 U	**2.03**		0.20 U	0.68	**1.06**	**1.12**	0.68	0.22	0.25
Trichloroethene	0.23	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.200 U	0.20 U		0.20 U	0.23	0.20 U	0.20 U	**0.29**	0.20 U	0.20 U
Vinyl Chloride	0.20	**0.39**	0.20 U	**0.21**	**0.41**	**0.25**	**1.20**	**0.330**	**1.45**		**0.35**	**0.7**	**0.85**	**0.98**	**0.64**	**0.37**	**0.46**
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

Analyte	Current Cleanup Level[4]	Well ID[3]															
		CPOC Area															
		GW143S								GW237S							
		11/12/2019	3/10/2020	5/11/2020	8/11/2020	2/15/2021	8/11/2021	2/22/2022	8/17/2022	11/12/2019	3/10/2020	5/11/2020	8/11/2020	2/16/2021	8/11/2021	2/22/2022	8/17/2022
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	0.200 U	0.20 U	0.66	**3.48**	**1.03**	0.24	**6.79 J**	0.20 U	**3.73**	0.20 U
cis-1,2-Dichloroethene	0.70	0.20 U	0.21	0.20 U	**1.17**	0.26	0.65	0.430	**0.76 J**	0.22	**1.00 U**	0.20 U	0.20 U	0.20 UJ	0.20 U	0.200 U	0.20 U
Trichloroethene	0.23	0.20 U	0.20 U	0.20 U	0.23	0.20 U	0.20 U	0.200 U	**0.53 J**	0.20 U	**1.00 U**	0.20 U	0.20 U	0.20 UJ	0.20 U	0.200 U	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	0.200 U	0.20 U	**0.34**	**1.00 U**	0.20 U	0.20 U	**0.31 J**	0.20	0.200 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	100 U	**961**	729	100 U	100 UJ	360	664	100 U

Analyte	Current Cleanup Level[4]	Well ID[3]							
		CPOC Area							
		GW240D							
		11/12/2019	3/10/2020	5/11/2020	8/11/2020	2/15/2021	8/11/2021	2/22/2022	8/17/2022
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	0.200 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	0.200 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	0.200 U	0.20 U
Vinyl Chloride	0.20	**0.24**	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.200 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							
		5/7/2019	11/11/2019	5/11/2020	8/10/2020	2/15/2021	8/10/2021	2/21/2022	8/19/2022	5/7/2019	11/11/2019	5/11/2020	8/10/2020	2/15/2021	8/10/2021	2/21/2022	8/19/2022
Total Petroleum Hydrocarbons (mg/L)																	
TPH-D (C12-C24)	0.5	0.124	0.120	0.282	0.192	0.284	0.140	1.00 U	0.100 U	**0.630**	**1.65**	**1.58**	**7.67**	**1.22**	**1.02**	**0.575**	**0.940**
Jet A	0.5	0.117	0.117	0.267	0.155	0.262	0.100 U	1.00 U	0.100 U	**0.397**	**1.09**	**1.09**	**5.70**	**0.89**	**0.718**	0.460	**0.562**

Analyte	Current Cleanup Level[3]	Well ID[2]							
		CPOC Area							
		GW224S							
		11/11/2019	5/11/2020	8/10/2020	2/15/2021	8/10/2021	2/21/2022	2/21/2022	8/19/2022
Total Petroleum Hydrocarbons (mg/L)									
TPH-D (C12-C24)	0.5	**1.46**	**0.675**	**1.08**	**0.584**	**1.08**	**0.682**	**1.01**	**0.881**
Jet A	0.5	**1.80**	**0.918 J**	**1.42**	**1.04**	**1.47**	**1.04**	**1.76**	**1.25**

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							
		3/5/2019	8/14/2019	3/12/2020	8/10/2020	2/16/2021	8/12/2021	2/23/2022	8/24/2022	3/5/2019	8/14/2019	3/12/2020	8/10/2020	2/16/2021	8/12/2021	2/22/2022	8/23/2022
Volatile Organic Compounds (µg/L)																	
cis-1,2-Dichloroethene	0.78	0.079	0.0526	0.0604	NA	NA	NA	NA	NA	0.0493	0.0361	0.0362	NA	NA	NA	NA	NA
Tetrachloroethene	0.02	0.0105	0.020 U	0.020 U	NA	NA	NA	NA	NA	0.0107	0.020 U	0.0244	NA	NA	NA	NA	NA
Trichloroethene	0.16	0.0157	0.020 U	0.020 U	NA	NA	NA	NA	NA	0.0125	0.020 U	0.020 U	NA	NA	NA	NA	NA
Vinyl Chloride	0.24	**0.424**	**0.367**	**0.334**	**0.261**	**0.366**	**0.517**	**0.359 J**	**0.404 J**	**0.537**	**0.545**	**0.235**	**0.288**	**0.107**	**0.698**	0.141 J	**0.404**

Analyte	Current Cleanup Level[4]	Well ID[3]															
		CPOC Area															
		GW247S								GW248I							
		11/12/2019	3/12/2020	5/13/2020	8/10/2020	2/16/2021	8/11/2021	2/23/2022	8/23/2022	11/12/2019	3/12/2020	5/13/2020	8/10/2020	2/16/2021	8/11/2021	2/23/2022	8/23/2022
Volatile Organic Compounds (µg/L)																	
cis-1,2-Dichloroethene	0.78	0.0635	0.039	0.584	NA	NA	NA	NA	NA	0.020 U	0.02 U	0.020 U	NA	NA	NA	NA	NA
Tetrachloroethene	0.02	0.020 U	0.02 U	0.020 U	NA	NA	NA	NA	NA	0.020 U	0.020 U	0.020 U	NA	NA	NA	NA	NA
Trichloroethene	0.16	0.148	0.02 U	0.020 U	NA	NA	NA	NA	NA	0.0514	0.020 U	0.020 U	NA	NA	NA	NA	NA
Vinyl Chloride	0.24	**0.504**	**0.305**	**0.409**	**0.392**	**0.405**	**0.678**	0.127 J	**0.379**	**0.62**	**0.499**	**0.546**	**0.383**	**0.426**	**0.711**	**0.598 J**	**0.742**

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									
		3/6/2018	8/15/2018	3/5/2019	8/14/2019	3/9/2020	8/12/2020	2/16/2021	8/12/2021	2/22/2022	8/23/2022
Metals (mg/L)											
Lead	0.001	0.000941	**0.00107**	**0.00154**	0.000714	**0.00119**	**0.000611**	**0.000564**	**0.000663**	0.000588	**0.00131**

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							
		3/5/2019	8/14/2019	3/10/2020	8/11/2020	2/17/2021	8/11/2021	2/22/2022	8/19/2022	3/5/2019	8/14/2019	3/10/2020	8/11/2020	2/17/2021	8/11/2021	2/22/2022	8/18/2022
Volatile Organic Compounds (µg/L)																	
cis -1,2-Dichloroethene	0.08	**0.107**	**0.127**	**0.093**	**0.124**	**0.139**	**0.368**	**0.15**	**0.229**	**1.23**	**0.798**	**0.482**	**0.508**	**1.260**	**2.210**	**0.693**	**1.91 J**
Trichloroethene	0.02	**0.0239**	0.020 U	**0.0242**	**0.0324**	**0.0294**	**0.0316**	**0.0284**	**0.0288**	**0.0546**	**0.0471**	**0.0505**	**0.0518**	**0.0454**	**0.0908**	**0.0506**	**1.02 J**
Vinyl Chloride	0.26	**0.285**	**0.300**	0.183	0.219	**0.300**	0.160	**0.434**	**0.570**	**1.35**	**0.893**	**0.603**	**0.387**	0.180	**0.795**	**1.57**	**0.294 J**

Analyte	Current Cleanup Levels[4]	Well ID[3]															
		Downgradient Plume Area															
		GW014S								GW147S							
		3/5/2019	8/14/2019	3/10/2020	8/11/2020	2/17/2021	8/11/2021	2/22/2022	8/18/2022	3/5/2019	8/14/2019	3/10/2020	8/11/2020	2/17/2021	8/11/2021	2/22/2022	8/19/2022
Volatile Organic Compounds (µg/L)																	
cis -1,2-Dichloroethene	0.08	**0.119**	**0.143**	**0.151**	**0.0932**	**0.130**	**0.147**	**0.133**	**0.134 J**	**0.955**	**4.11**	**0.287**	**0.931**	**0.180**	**0.180**	**0.679**	**8.37**
Trichloroethene	0.02	**0.0254**	0.020 U	**0.0419**	0.020 U	**0.035**	**0.0227**	0.020 U	**0.0246 J**	**0.475**	**1.46**	**1.20**	**3.37**	**0.498**	**0.498**	**0.425**	**0.937**
Vinyl Chloride	0.26	0.214	**0.365**	0.195	0.190	0.207	**0.367**	**0.276**	**0.514 J**	0.0514	0.215	0.020 U	0.0643	0.020 U	0.020 U	**0.0623**	**3.39**

Analyte	Current Cleanup Levels[4]	Well ID[3]															
		CPOC Area															
		GW150S								GW253I							
		3/5/2019	8/14/2019	3/10/2020	8/11/2020	2/17/2021	8/11/2021	2/22/2022	8/22/2022	3/5/2019	8/14/2019	3/10/2020	8/11/2020	2/17/2021	8/11/2021	2/22/2022	8/22/2022
Volatile Organic Compounds (µg/L)																	
cis -1,2-Dichloroethene	0.08	0.0737	**0.0824**	0.0525	**0.0935**	0.0393	**0.0991**	**0.0547**	**0.126**	**0.127**	**0.0917**	**0.0915**	**0.0879**	**0.140**	**0.106**	**0.0846**	**0.138**
Trichloroethene	0.02	0.020 U	**0.0228**	0.02 U	**0.0291**	0.020 U	0.020 U	0.020 U	**0.0212**	**0.0221**	0.020 U	**0.0212**	**0.0211**	**0.0272**	**0.0202**	0.020 U	**0.0205**
Vinyl Chloride	0.26	0.103	0.020 U	0.0541	0.0619	0.0455	0.122	0.0969	0.100	0.143	0.131	0.184	0.100	0.243	0.146	0.177	0.255

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							
		8/13/2018	3/5/2019	8/12/2019	8/12/2020	2/17/2021	8/12/2021	2/23/2022	8/24/2022	3/5/2019	8/12/2019	3/11/2020	8/12/2020	2/17/2021	8/17/2021	2/23/2022	8/23/2022
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	0.24 U	0.158	0.020 U	0.020 U	0.020 U	NM	NM	NM	NM	NM
1,1,2-Trichloroethane	0.2	**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	NM	NM	NM	NM	NM
1,1-Dichloroethene	0.057	0.020 U	0.020 U	0.020 U	0.0529	0.020 U	0.020 U	0.0200 U	0.0432	0.020 U	0.020 U	0.020 U	NM	NM	NM	NM	NM
Acetone	300	70	5.00 U	5.0 U	5.00 U	10.6 J	5.00 U	5.00 U	6.28	5.00 U	5.0 U	5.0 U	NM	NM	NM	NM	NM
Benzene	0.8	**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	NM	NM	NM	NM	NM
Carbon Tetrachloride	0.23	**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	NM	NM	NM	NM	NM
Chloroform	2	**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	NM	NM	NM	NM	NM
cis-1,2-Dichloroethene	2.4	**22.3**	0.92	**6.87**	1.93	0.47	**3.15**	0.20 U	1.78	0.25	0.27	0.25	NM	NM	NM	NM	NM
Methylene Chloride	2	**10.9 UJ**	1.00 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	NM	NM
Tetrachloroethene	0.05	**0.20 U**	0.028	0.020 U	0.020 U	0.0283	0.020 U	0.0200 U	0.0206	0.020 U	0.020 U	0.020 U	NM	NM	NM	NM	NM
Toluene	75	21.7	4.96	3.11	1.05	5.21	2.42	0.47 J	43.7	0.20 U	0.20 U	0.20 U	NM	NM	NM	NM	NM
trans-1,2-Dichloroethene	53.9	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	NM	NM	NM	NM	NM
Trichloroethene	0.08	**2.38**	**0.156**	**0.414**	**0.324**	**0.143**	**0.386**	0.0505 UJ	**0.43**	0.020 U	0.020 U	0.020 U	NM	NM	NM	NM	NM
Vinyl Chloride	0.13	**2.09 J**	**0.50**	**1.20**	**0.369**	0.0405	**0.575**	0.0867 J	**0.460**	**0.294**	**0.301**	**0.207**	**0.232**	**0.138**	**0.431**	**0.311 J**	**0.364**
Total Petroleum Hydrocarbons (µg/L)																	
TPH-G (C7-C12)	800	**9,440**	**1,070**	**943**	699	507	504	370 J	555	100 U	100 U	100 U	NM	NM	NM	NM	NM
TPH-D (C12-C24)	500	**4,120**	362	432	150	**2160**	390	192 J	521	100 UJ	100 U	100 U	NM	NM	NM	NM	NM
TPH-O (C24-C40)	500	**2,000 U**	**522**	**853**	379	**3990**	**689**	263 J	586	200 UJ	200 U	200 U	NM	NM	NM	NM	NM

Analyte	Current Cleanup Levels[4]	Well ID[3]																							
		Shallow Zone CPOC Area																							
		GW178S								GW207S								GW208S							
		8/13/2018	3/5/2019	8/12/2019	8/12/2020	2/17/2021	8/12/2021	2/23/2022	8/24/2022	3/5/2019	8/12/2019	3/11/2020	8/12/2020	2/17/2021	8/12/2021	2/23/2022	8/23/2022	3/5/2019	8/12/2019	3/11/2020	8/12/2020	2/17/2021	8/12/2021	2/23/2022	8/24/2022
Volatile Organic Compounds (µg/L)																									
1,1,2,2-Tetrachloroethane	0.17	0.020 U	0.020 U	0.020 U	NM	NM	NM	NM	NM	0.020 U	0.020 U	0.020 U	NM	NM	NM	NM	NM	0.020 U	0.020 U	0.020 U	NM	NM	NM	NM	NM
1,1,2-Trichloroethane	0.2	0.20 U	0.20 U	0.20 U	NM	NM	NM	NM	NM	0.20 U	0.20 U	0.20 U	NM	NM	NM	NM	NM	0.20 U	0.20 U	0.20 U	NM	NM	NM	NM	NM
1,1-Dichloroethene	0.057	0.020 U	0.020 U	0.020 U	NM	NM	NM	NM	NM	0.020 U	0.020 U	0.020 U	NM	NM	NM	NM	NM	0.020 U	0.020 U	0.020 U	NM	NM	NM	NM	NM
Acetone	300	5.00 U	5.54	5.0 U	NM	NM	NM	NM	NM	5.00 U	5.0 U	5.0 U	NM	NM	NM	NM	NM	5.00 U	5.0 U	5.0 U	NM	NM	NM	NM	NM
Benzene	0.8	0.20 U	0.20 U	0.20 U	NM	NM	NM	NM	NM	0.20 U	0.20 U	0.20 U	NM	NM	NM	NM	NM	0.20 U	0.20 U	0.20 U	NM	NM	NM	NM	NM
Carbon Tetrachloride	0.23	0.20 U	0.20 U	0.20 U	NM	NM	NM	NM	NM	0.20 U	0.20 U	0.20 U	NM	NM	NM	NM	NM	0.20 U	0.20 U	0.20 U	NM	NM	NM	NM	NM
Chloroform	2	0.20 U	0.20 U	0.20 U	NM	NM	NM	NM	NM	0.20 U	0.20 U	0.20 U	NM	NM	NM	NM	NM	0.20 U	0.20 U	0.20 U	NM	NM	NM	NM	NM
cis-1,2-Dichloroethene	2.4	0.20 U	0.20 U	0.20 U	NM	NM	NM	NM	NM	0.20 U	0.20 U	0.20 U	NM	NM	NM	NM	NM	0.21	0.20 U	0.20 U	NM	NM	NM	NM	NM
Methylene Chloride	2	1.00 U	1.00 U	1.00 U	NM	NM	NM	NM	NM	1.00 U	1.00 U	1.00 U	NM	NM	NM	NM	NM	1.00 U	1.0 U	1.0 U	NM	NM	NM	NM	NM
Tetrachloroethene	0.05	0.020 U	0.020 U	0.020 U	NM	NM	NM	NM	NM	0.020 U	0.020 U	0.020 U	NM	NM	NM	NM	NM	0.020 U	0.020 U	0.020 U	NM	NM	NM	NM	NM
Toluene	75	0.20 U	0.20 U	0.20 U	NM	NM	NM	NM	NM	0.20 U	0.20 U	0.20 U	NM	NM	NM	NM	NM	0.20 U	0.20 U	0.20 U	NM	NM	NM	NM	NM
trans-1,2-Dichloroethene	53.9	0.20 U	0.20 U	0.20 U	NM	NM	NM	NM	NM	0.20 U	0.20 U	0.20 U	NM	NM	NM	NM	NM	0.20 U	0.20 U	0.20 U	NM	NM	NM	NM	NM
Trichloroethene	0.08	0.0213	0.0213	0.020 U	NM	NM	NM	NM	NM	0.020 U	0.0305	0.020 U	NM	NM	NM	NM	NM	0.020 U	0.0293	0.020 U	NM	NM	NM	NM	NM
Vinyl Chloride	0.13	**0.378**	**0.392**	**0.3840**	**0.141**	**0.224**	**0.182**	**0.361 J**	**0.390**	0.0692	0.020 U	0.020 U	**0.377**	0.066	**0.232**	**0.356 J**	**0.326**	**0.437**	**0.245**	**0.419**	**0.343**	**0.349**	**0.313**	**0.404 J**	**0.400**
Total Petroleum Hydrocarbons (µg/L)																									
TPH-G (C7-C12)	800	100 U	100 U	100 U	NM	NM	NM	NM	NM	100 U	100 U	100 U	NM	NM	NM	NM	NM	100 U	100 U	100 U	NM	NM	NM	NM	NM
TPH-D (C12-C24)	500	100 U	100 UJ	100 U	NM	NM	NM	NM	NM	100 UJ	100 U	100 U	NM	NM	NM	NM	NM	100 UJ	100 U	100 U	NM	NM	NM	NM	NM
TPH-O (C24-C40)	500	200 U	200 UJ	200 U	NM	NM	NM	NM	NM	200 UJ	200 U	200 U	NM	NM	NM	NM	NM	200 UJ	200 U	200 U	NM	NM	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							
	5/7/2019	11/11/2019	5/12/2020	8/10/2020	2/15/2021	8/10/2021	2/21/2022	8/24/2022
Volatile Organic Compounds (µg/L)								
cis-1,2-Dichloroethene	0.20 U	0.20 U	0.20 U	0.52	0.20 U	0.20 U	0.200 U	0.200 U
Vinyl Chloride	1.39	0.38	1.48	0.20 U	1.49	1.37	2.54	1.41

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

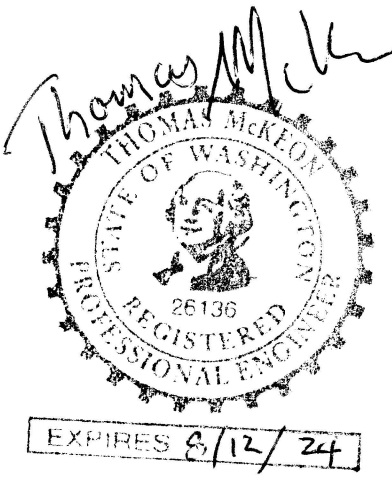
Summary of Remedial Actions at the Boeing Renton Facility
May 2022 – October 2022

Boeing Renton Site
Renton, Washington

Prepared for:
The Boeing Company
EHS Remediation

Prepared by:
CALIBRE Systems, Inc.
Project No. T0014538

November 22, 2022



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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, 2022 and October 31, 2022. 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 Building 4-78/79.

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 Building 4-78/79 (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
Attachment B - Laboratory Data Package

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).

During the prior May 2021 to October 2021 operating period, PID monitoring results from the SWMU-172/174 SVE system had shown VOC concentrations removed at asymptotically low levels, therefore a rebound test for the system was completed in December 2021 to January 2022. The rebound results showed marginal increases in PCE concentrations and estimated mass removal after a 35-day rest period; with mass removal increasing from 0.003 lbs/day prior to rebound start to 0.005 lbs/day after the rest period. The slight increase in PCE mass removal was diminished back to prior asymptote levels after 16 days of operation. SVE system shutdown was recommended as the system continues to show asymptotic low level vapor concentrations following rebound testing. Ecology provided approval for the SWMU-172/174 system to be shut down on September 20, 2022 and the system was turned off on October 24, 2022. Groundwater monitoring and biostimulation for groundwater treatment will continue at the SWMU-172/174 area. The following sections summarize the SVE operation while the system was operating during the May to October 2022 monitoring period.

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 has continued to operate 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. Table 2-1 summarizes the TO-15 detections for the SWMU-172/174 SVE system for prior TO-15 sampling events[1] that have been implemented since system startup. 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.

2.1.1 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 prior TO-15 sampling events that have been implemented since system startup.

2.1.2 Mass Removal Estimate

Between April 17, 2015 and October 24, 2022 the SWMU-172/174 SVE system has recovered an estimated 25.5 pounds of VOCs (primarily PCE), as shown in Table 2-3. Approximately 0.9 pounds of VOCs were removed during the current reporting period (May 2022 to October 2022) based on the PID measurements collected while the system was operating. 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.

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.

3.1 Groundwater Treatment Completed May 2022 – October 2022

Substrate injections were completed at selected wells during this reporting period in June 2022 at SWMU-172/174, Building 4-78/79, AOC-60, AOC-90, Apron A, and AOC-003. The list of wells by area including substrate volume and mass are summarized in Table 3-2.

Following substrate injections at the 4-78/79 area, well B78-16 was injected with 150 gallons of a diluted 6% solution containing water and Newman Zone 55 vegetable oil emulsion and then bio-augmented with a

[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.

TSI-DC® DHC Bio-Augmentation culture, a microbial culture containing species of Dehalococcoides. For the bio-augmentation process, tap water was mixed with sodium ascorbate following the manufacturer's recommendations to quench residual oxygen and chlorine in the water. A pre-determined amount of TSI-DC® was added to the de-oxygenated water and then transferred into the screen interval following the substrate addition for the well. The quantity of TSI-DC® added was based on a target abundance of 3×10^6 organisms/liter (in-situ after mixing), an estimated radius of influence, thickness of the water column, and estimated porosity of the surrounding soils. The bio-augmentation included six liters of TSI-DC® culture added to injection well B78-16.

Well GW264S, located within the Apron A area, was re-developed prior to substrate injections. Prior injections in this well have been limited due to very slow injection rate and marginal volumes injected The development process included using a surge block to surge the length of the well screen followed by pumping to remove any fine sediments around the screen interval. This process was repeated three times, with the well pumping dry each time and a total volume of approximately 16 gallons of water removed from the well. The well- development water generated was transported and disposed of at the on-site Boeing Wastewater Treatment Facility. Subsequent injection at GW264S did not result in any increased volume and the substrate volume initially intended for this well was instead injected into nearby upgradient wells GW263S and GW265S.

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 June 2022 (11^{th} 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. The June 2022 injection event utilized the two new horizontal injection wells and upgradient well B78-11. Injections were completed with a target concentration of 1,600 mg/L for nitrate and 800 mg/L for sulfate per well (similar to prior events) to provide additional nitrate and sulfate to the impacted area. The injection volumes and mass of nitrate/sulfate are included in Table 3-3.

3.2 Building 4-78/79 Building Groundwater Monitoring Well Replacement

Two new replacement monitoring wells were installed at the Building 4-78/79 area on July 29, 2022. Cascade drilling completed the well installation utilizing a push-probe rig and installing two 2-inch PVC wells screened 10 to 20 feet below ground surface. The wells were named GW031S-R and GW244S-R as replacements for GW031S and GW244S which were decommissioned prior to the soil excavation work completed in September 2021. Following installation, Cascade Drilling completed well development at the two replacements wells by surging and pumping over the length of the well screen. All water generated

was transported and disposed of at the Boeing Wastewater Treatment Facility. The well locations are presented in Figure 3-1. The well logs are included in Attachment B.

4.0 Conclusions and Recommendations

Boeing received Ecology approval in September 2022 to shut down the SWMU 172/174 SVE system. The SVE system and associated equipment will remain on site subject to the results of Ecology-requested sub-slab vapor verification sampling and and related evaluations. The sub-slab vapor sampling is planned for Winter 2023. Results will be compared to CLARC Vapor Intrusion: screening levels for Method C as well as the soil cleanup levels established for this area.

Additional substrate injections were completed for the SWMU-172/174, Building 4-78/79, AOC-60, AOC-90, Apron A, and AOC-003 areas along with additional nitrate/sulfate injections for benzene treatment at the Building 4-78/79 area in June 2022. Two replacement monitoring wells, GW031S-R and GW244S-R were installed at the Building 4-78/79 area in July 2022.

4.1 Proposed Modifications to the Bioremediation Program

Based on evaluation of the biannual monitoring data (see Table 3-1), the following areas may be considered for continued ERD treatment of VOCs in groundwater: SWMU-172/174, Building 4-78/4-79 SWMU/AOC Group, AOC-060, and Apron A. The following areas, AOC-003 and AOC-090, will transition from the ERD program to Monitored Attenuation in accordance with the CAP.

Upon completion of the Apron R construction work estimated for mid 2023, the AOC 001/002 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. The next sampling event is scheduled for May, 2023

5.0 References

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Wood 2019. Quarterly report, third quarter 2019. RCRA Corrective Action Program Boeing Renton Facility. Prepared by Wood and CALIBRE Systems, Inc. for the Boeing Company, EHS Remediation. November 2019.

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
12/2/2021	39	3.3	1.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	44	44
1/24/2022	58	4.9	1.6	ND	ND	1.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	66	66
1/25/2022	71	5.1	2.2	ND	ND	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	80	80
2/9/2022	38	2.7	1	ND	ND	ND	ND	9.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	42	51

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
12/2/2021	70	5.7	2.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	79	79
1/24/2022	110	8.9	2.8	ND	ND	3.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	125	125
1/25/2022	120	7.7	3.2	ND	ND	2.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	133	133
2/9/2022	68	4.5	1.8	ND	ND	ND	ND	ND	ND	ND	1.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	74	76

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
10/29/2021	2,157	Vent	27	304	236		0	2 gallons condensate
11/17/2021	2,176	Vent						Stopped by system to check oil and drain condensate, 7 gallons removed.
11/23/2021	2,182	Vent	81	253	247		0	Picked up new cal gas can from national safety, 2 gal condensate
12/2/2021	2,191	Vent	42	124	80		0	Collected TO-15 samples from influent and SVE-3.
12/13/2021	2,202	Vent	2	108	77		0	10 gal condensate removed
12/20/2021	2,209	Vent						Shut system down for Boeing Christmas break and rebound rest period.
5/13/2022	2,353	Vent	0	0	0		0	
5/18/2022	2,358	Vent	35	131	96		0	
5/24/2022	2,364	Vent	2	293	151		0	
6/17/2022	2,388	Vent	28	337	295		0	
7/26/2022	2,427	Vent	0	287	127		0	
8/11/2022	2,443	Vent	15	131	103		0	Added 1 oz oil to left blower lobe.
9/8/2022	2,471	Vent	9	97	80		0	System off on arrival. Added 2 oz oil to blower and restarted system. Took initial readings and rescreened after an hour of operation.
9/12/2022	2,475	Vent	29	177	170		0	Picked up new cal gas can from national safety
9/23/2022	2,486	Vent	26	357	327		0	System off on arrival. Changed blower oil. Took initial readings and rescreened after an hour of operation.
9/29/2022	2,492	Vent	0	196	175		0	
10/5/2022	2,498	Vent	40	524	432		0	
10/24/2022	2,517	Vent	79	301	209		0	Turned system off after taking readings, 2 gal 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)
5/13/2022	0	0	105	46,815	0.000	24.59
5/18/2022	96	55	105	46,931	0.016	24.61
5/21/2022	151	86	105	47,079	0.033	24.64
6/17/2022	295	169	105	47,651	0.247	24.89
7/26/2022	127	73	105	48,589	0.174	25.06
8/11/2022	103	59	105	48,972	0.058	25.12
9/8/2022	80	46	105	49,186	0.025	25.15
9/12/2022	170	97	105	49,280	0.023	25.17
9/23/2022	327	187	105	49,421	0.067	25.24
9/29/2022	175	100	105	49,563	0.036	25.27
10/5/2022	432	248	105	49,710	0.093	25.37
10/24/2022	209	120	105	50,166	0.139	25.50

Notes:

PID = photoionization detector

ppbv = parts per billion by volume

cfm = cubic feet per minute

lbs = pounds

[1] A correction factor of 0.57 has been applied to the PID vapor measurement for VOCs based on the mixture of analytes detected in the TO-15 analysis at the influent sample point from 12/2/21. This number is much higher than the TO-15 results.

[2] These are based solely on the PID measurements collected this period; the prior TO-15 analyses indicates much lower mass.
TO-15 analysis results showed Tetrachloroethene made up 89% of the total VOCs removed at the influent on 12/2/21.

Table 3-1 Groundwater Monitoring Results Summary August 2022 and Recommended ERD Treatment

GW Treatment Area	Source and down gradient MWs	CPOC wells	Treatment IWs	ERD Treatment Recommendation
SWMU-172/174	PCE and cis-1,2DCE showed decreases from prior monitoring at GW-152S; all results are below 1.1 ug/L.; VC at 0.35 ug/L.	All detections are at or below 0.60 ug/L	*Prior data Feb 2022; North IW B172-01 is ND for CVOCs, South IW B172-08 near GW-152S show PCE at 1.6 ug/L and cisDCE at 0.3 ug/L. TOC near background.*	**Plan for additional injections in area of GW-152S which may continue driving CVOCs down.**
Building 4-78/4-79 SWMU/AOC Group	TCE is nondetect, cis-1,2DCE is under 0.5 ug/L; VC reduced from 9.0 ug/L to under 1.5 ug/L. Benzene at 15 ug/L in GW033S; benzene less than 0.25 ug/L in benzene treatment area.	GW143S shows estimated TCE and cisDCE below 0.80 ug/L; all other wells are ND.	*Prior data Feb 2022; B78-16 showed TCE less than 1.0 ug/L and elevated cisDCE at 300 ug/L and VC at 290 ug/L.* This well was injected with sucrose, emulsified oil and bioaugmented in June 2022.	**Plan for substrate injection in selected IWs/areas around GW033S for ERD, Nitrate/sulfate injections not recommended 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 estimated and below 0.43 ug/L.	VC less than 0.74 ug/L.	*Prior data Feb 2022; B003-01 showed VC at <0.2 ug/L and TOC near background*	**End ERD and transition to MA per the CAP**
AOC-60	Results are primarily cis-1,2DCE and VC. Treatment MWs with total CVOCs less than 13.5 ug/L, other MWs with total CVOCs less than 0.80 ug/L.	MW's with total CVOCs less than 0.42 ug/L, primarily as cis-1,2DCE and VC.	-	**Plan for additional injections which may continue driving CVOCs down.**
AOC – 90	Source with VC of 0.46 ug/L, total CVOCs of 2.7 ug/L; primarily cisDCE; down gradient well with VC at 0.36 ug/L.	VC less than 0.40 ug/L.	-	**End ERD and transition to MA per the CAP**
Apron A	cis-1,2DCE is nondetect and VC reduced to 1.57 ug/L	-	-	**Consider for additional injections which may continue driving CVOCs down.**
SWMU-168	-	VC estimated at 0.54 ug/L.	-	**No action at this time.**

Table 3-2 - June 2022 Injection Summary at Renton AOCs

Area	Injection Well	Volume of Solution - ERD (gallons)	Brix (^{o}Bx)	Pounds Substrate in the Solution (lbs)
SWMU-172/174	B172-05	390	13.6	442
	B172-06	411	9.5	326
	B172-06	109	13.6	124
	B172-07	422	9.5	334
	B172-07	98	13.6	111
	B172-08	360	9.5	285
	B172-08	160	13.6	181
	B172-09	422	9.5	334
	B172-09	98	13.6	111
	B172-10	360	9.5	285
	B172-10	160	13.6	181
Building 4-78/79	B78-12	625	9.6	500
	B78-14	625	9.6	500
	B78-15	625	9.6	500
	B78-16*	625	9.6	500
AOC-060	GW012S	739	9.5	586
	GW147S	736	9.5	583
AOC-090	IPR3	558	13.6	633
	IPR4	550	13.6	624
	GW 189S	556	13.6	631
	GW 199S	550	13.6	624
	GW 200S	559	13.6	634
Apron A	GW 263S	247	13.6	280
	GW 264S	5	13.6	6
	GW 265S	239	13.6	271
AOC-003	B003-01	488	9.5	387
	B003-02	493	9.5	391
	B003-03	497	9.5	394
	B003-04	500	9.5	396
	Total (gal)	12,207	Total (lbs)	11,156

Notes:

^{o}Bx (degrees brix) is a measure of the sugar content in an aqueous solution. One degree Brix is 1 gram of sucrose in 100 grams of solution and represents the strength of the solution as percantage by mass.
*Well B78-16 was injected with 150 gallons of Newman Zone 55 vegetable oil emulsion diluted to a 6% solution following sugar substrate injections and was then injected with 6 liters of TSI-DC DHC bioaugmentation culture following substrate injections.

Table 3-3 - June 2022 Injection Volumes at 4-78/79 Benzene Treatment Wells

Area	Injection Well	Volume Total (gal)	NaNO3 (lbs)	MgSO4 (lbs)	DAP (lbs)	Concentration NO3 Injected (mg/L)	Concentration SO4 Injected (mg/L)
Building 4-78/79	Injection Gallery A	2000	36.5	16.7	21.4	1,599	803
	Injection Gallery B	1500	27.4	12.5	16.1	1,599	803
	B78-11	250	4.6	2.1	2.7	1,599	803

Notes:
NaNO3 - Sodium Nitrate
MgSO4 - Magnesium Sulfate
DAP - Diammonium Phosphate

FIGURES

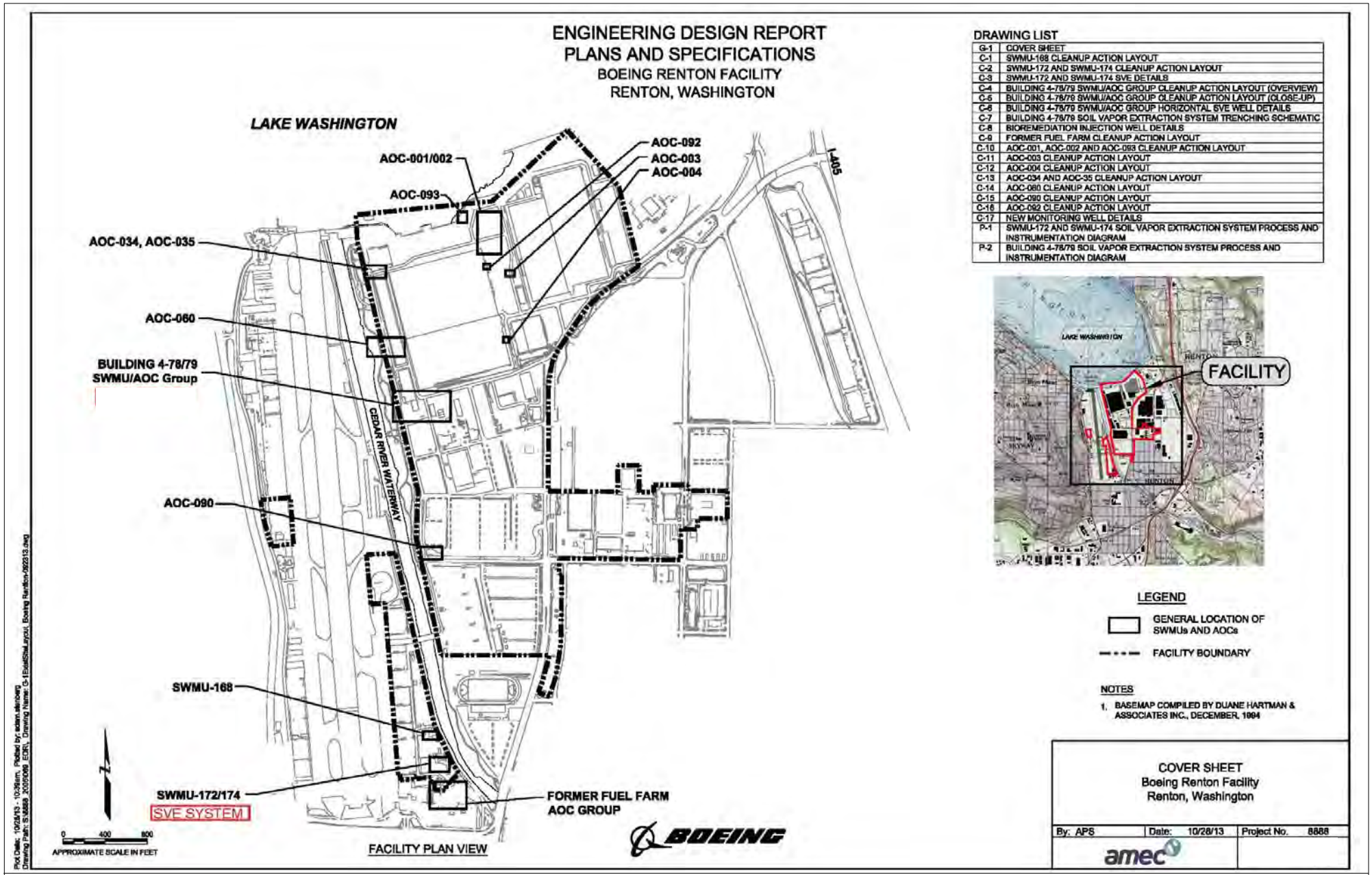

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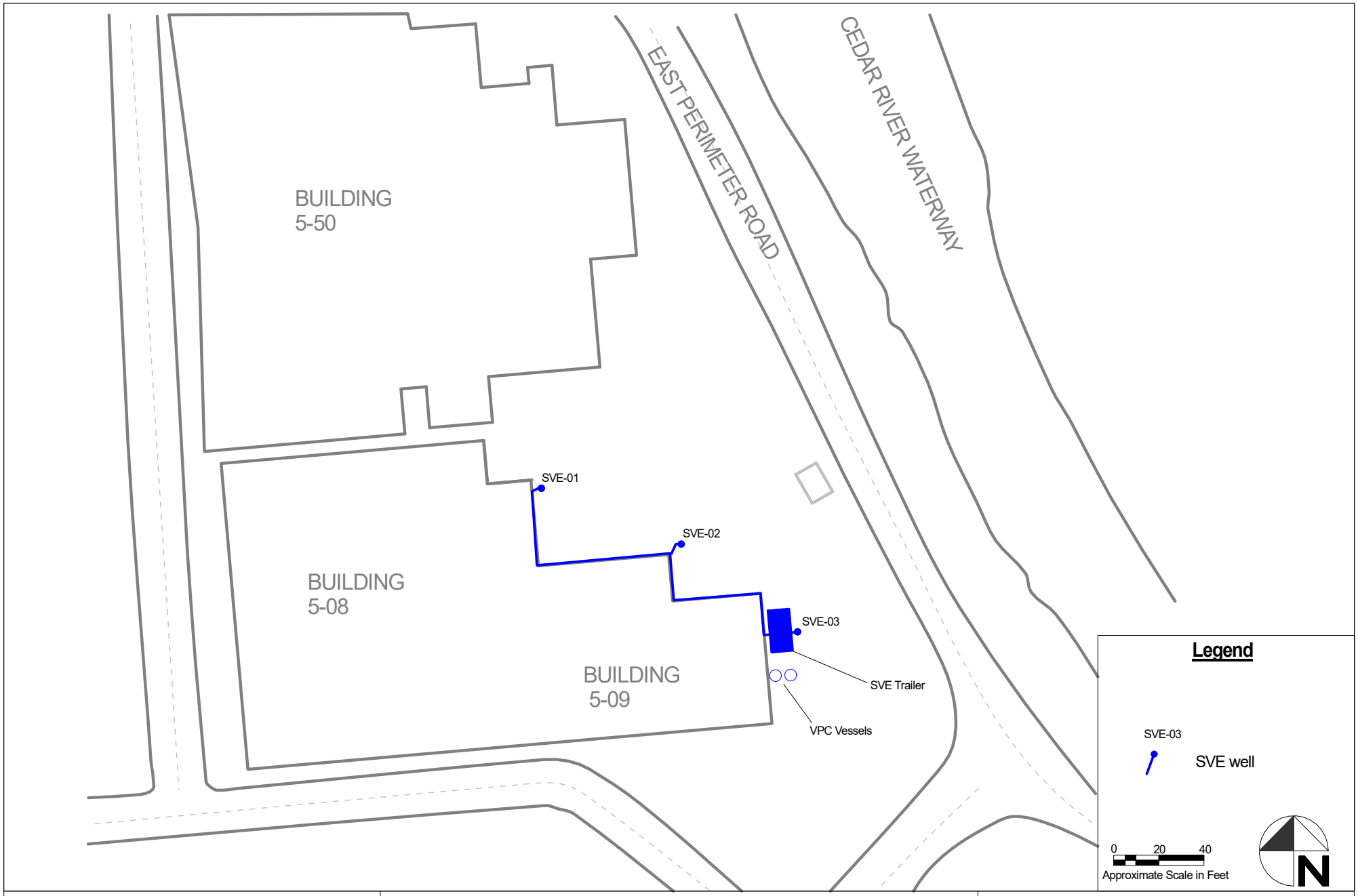
Figure 1-1 Site Location/ AOC Outlines



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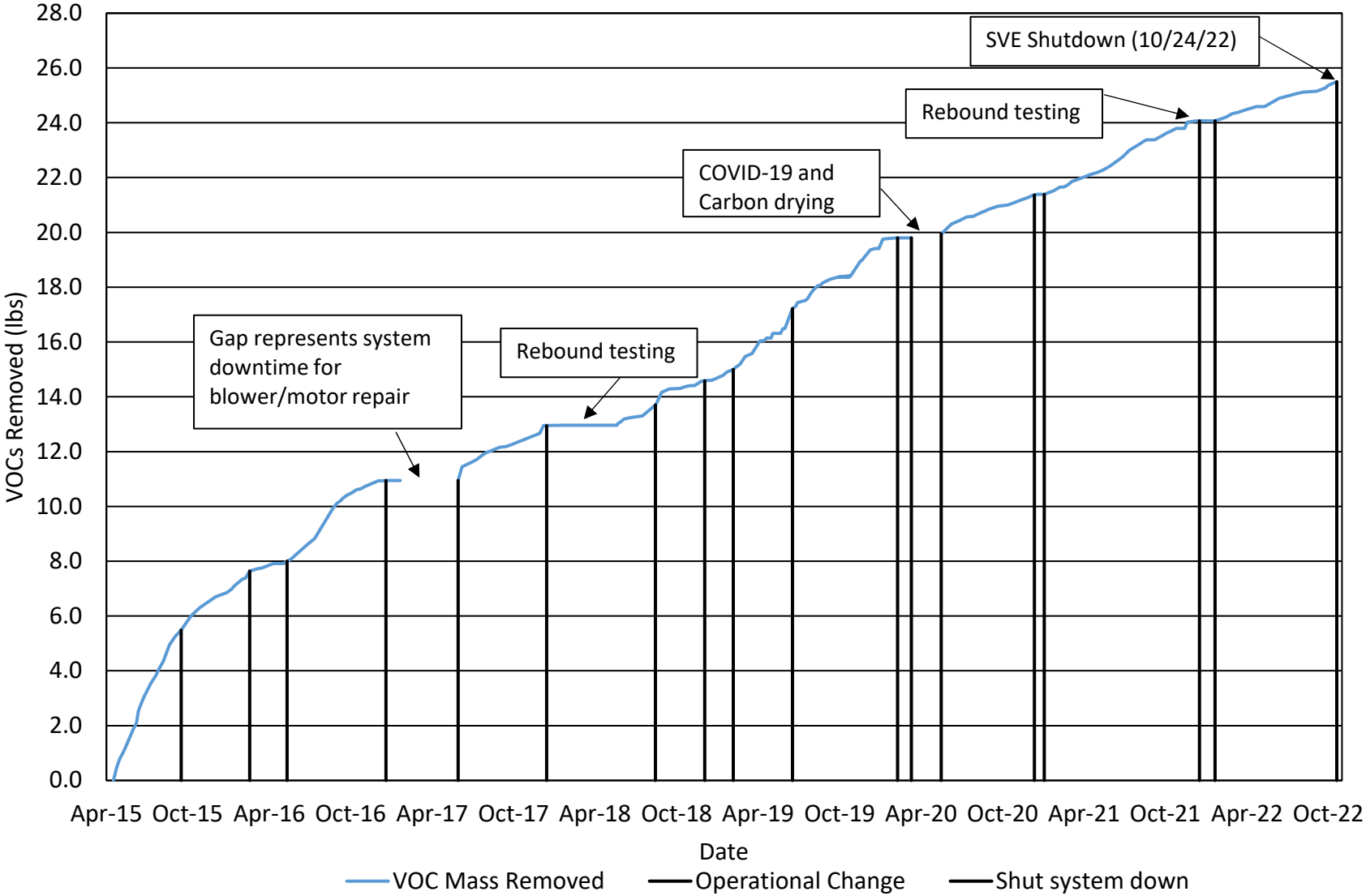
Spring 2017 SVE Quarterly Summary Report

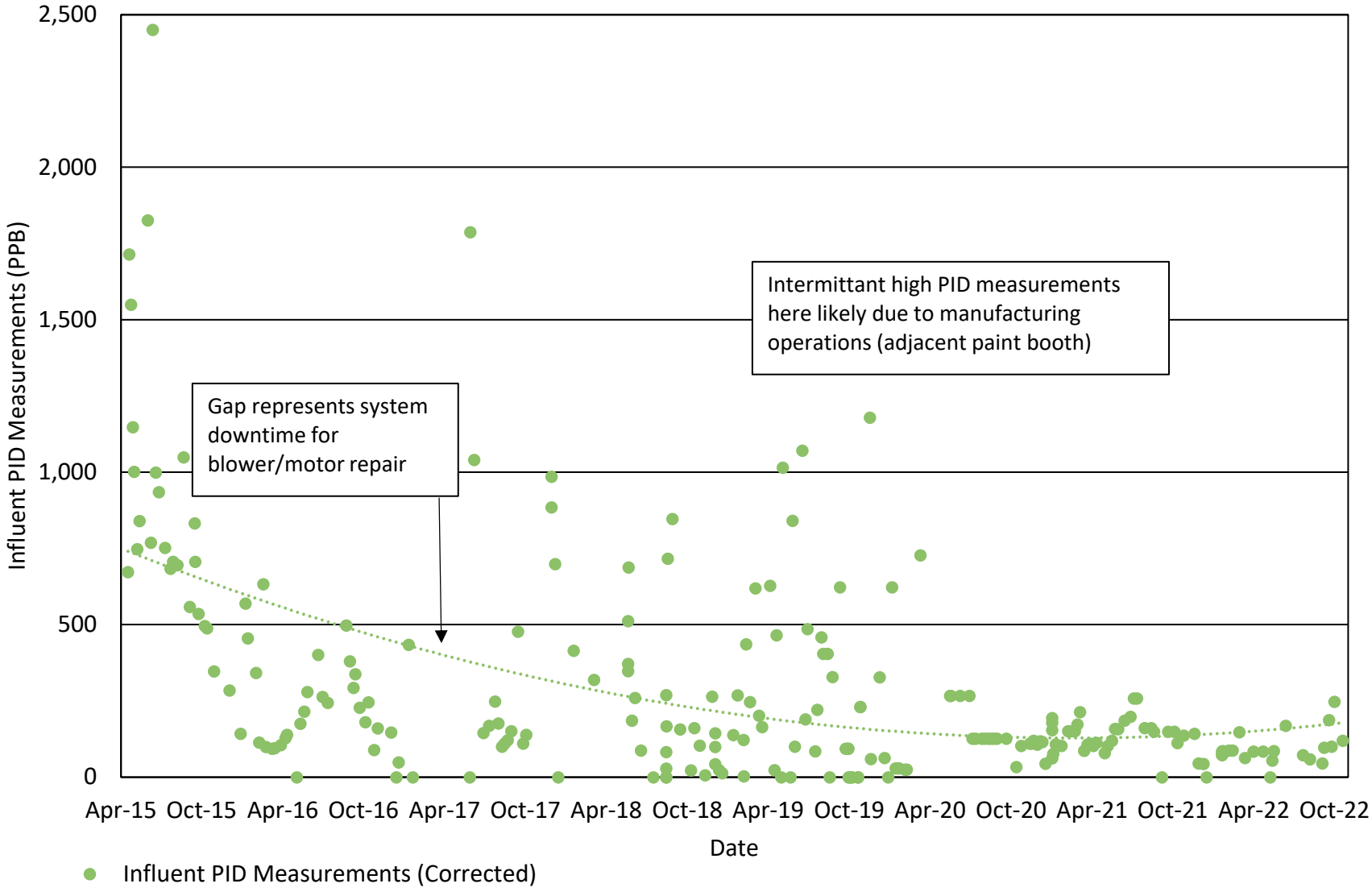
Figure 2-1 SWMU-172/174 Area
SVE System Layout

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

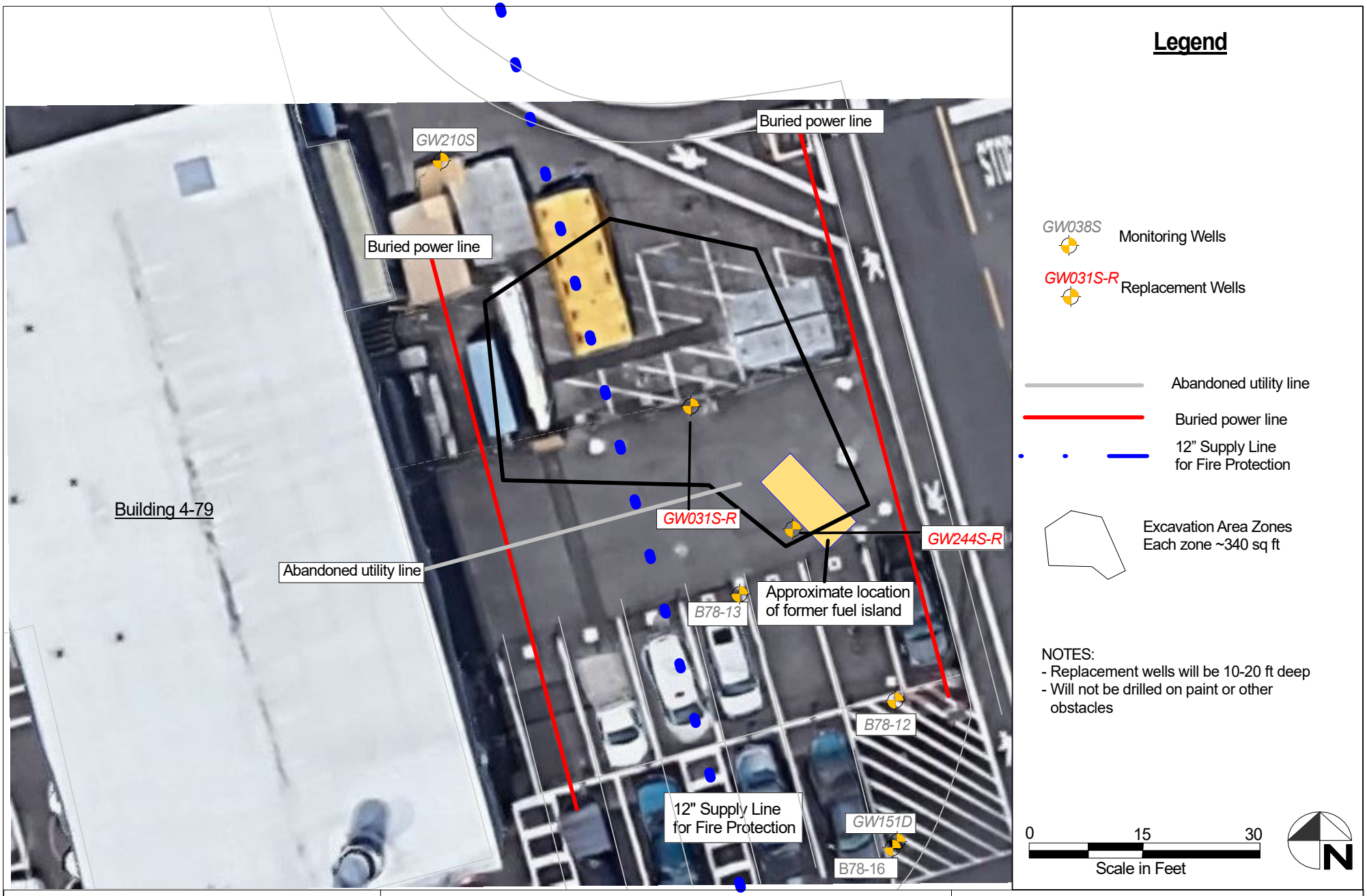


*SWMU 172/174 SVE system did not run Winter 2017 due to equipment failure.
Feb 2020 - System adjusted to dry carbon with hot ambient air due to condensate
Mar 2020 to May 2020 - System shut down due to Govenors Stay at Home order related to Covid-19

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



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4-78/79 Soil Excavation Well Replacement

Figure 3-1
4-78/79 Replacement Wells

Attachment A: Field Log Forms

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

Inspection Date: 5/13/22 Date of last inspection: 4/27/22

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: 8034.4
Blower	**Current Value**	**Other Notes**
Vacuum gauge	32" H_2O	
Pressure gauge	5" H_2O	
System flow rate	110 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: 0/10.64 PPM
Calibration time/ date: 5/13/22	PID check after monitoring: 10.01 PPM

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01	~~1140~~	~~0~~					
SVE-02	1144	0	0				
SVE-03	1140	0	0				
VPC Inlet	1146	0	0				
VPC Midpoint		0	0				
VPC Outlet	1148	0	0				
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 Rune Lassen (Printed Name) _____ (Signature) 5/13/22 (Date)

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

Inspection Date: 5/18/22 Date of last inspection: 5/13/22

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: 8150.3
Blower	**Current Value**	**Other Notes**
Vacuum gauge	33" H_2O	
Pressure gauge	5" H_2O	
System flow rate	105 scfm	
Blower Temperature	107°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: 0/10.02 ppm

Calibration time/ date: 5/18/22 0730 PID check after monitoring:

Sampling Point	Time	PID Reading (1)	PID Reading (2)	Vacuum	Flow Rate (gauge)	Differential Pressure	Flow Rate Calculated[1]
SVE-01	off	NA					
SVE-02	0742	34 ppb	35ppb				
SVE-03	0746	117 ppb	145ppb				
VPC Inlet	0755	98 ppb	94 ppb				
VPC Midpoint							
VPC Outlet	0738	0	0				
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) 5/18/22 (Date)

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

Inspection Date: 5/24/22 Date of last inspection: 5/18/22

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: 1140 Motor Hours: 8298.4

Blower	Current Value	Other Notes
Vacuum gauge	32"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: PPBRAE 3000 Details: 0/10.04 ppm

Calibration time/ date: 5/24/22 1145 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	off	NA					
SVE-02		0 ppb	4 ppb				
SVE-03		341 ppb	244 ppb				
VPC Inlet		146 ppb	155 ppb				
VPC Midpoint		0 ppb	0 ppb				
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 Justin Neste (Printed Name) (Signature) 5/24/22 (Date)

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

Inspection Date: 6/17/22 Date of last inspection: 5/24/22

Periodic systems check:

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

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

Operational Parameters - Monitoring interval is variable.		
Inspection Time: 0800		Motor Hours: 8810.6
Blower	**Current Value**	**Other Notes**
Vacuum gauge	32" H2O	oil level ok No condensate
Pressure gauge	5" H2O	
System flow rate	1055 SCFM	
Blower Temperature	112°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: 6/17/22 0810	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	0830	22 ppb	34 ppb				
SVE-03	0853	355 ppb	349 ppb				
VPC Inlet	0841	293 ppb	297 ppb				
VPC Midpoint	0820	0 ppb	0 ppb				
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 Justin Neste (Printed Name) (Signature) 6/17/22 (Date)

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

Inspection Date: 7/26/22 Date of last inspection: _____

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: 0953		Motor Hours: 9808.5
Blower	**Current Value**	**Other Notes**
Vacuum gauge	32" H_2O	
Pressure gauge	5" H_2O	
System flow rate	105 SCFM	
Blower Temperature	126°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: RAE 3000	Details: 0 / 13.02 ppm
Calibration time/ date: 7/26/22 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	off						
SVE-02	1013	0 ppb	0 ppb				
SVE-03	1017	315 ppb	258 ppb				
VPC Inlet	1009	122 ppb	131 ppb				
VPC Midpoint							
VPC Outlet	1005	0 ppb	0 ppb				
Other vapor point _____							

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

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

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

Signature _____ Printed Name _____ Signature _____ Date

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

Inspection Date: 8/11/22 Date of last inspection: 7/26/22

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: 0925	Motor Hours: 10191

Blower	Current Value	Other Notes
Vacuum gauge	32" H_2O	Added 1oz oil to Left blower (obl
Pressure gauge	5" H_2O	
System flow rate	105scfm	
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 RAE 3000	Details: 1 ppb / 10.02 ppm
Calibration time/ date: 0935 8/11/22	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	off						
SVE-02	0945	12 ppb	18 ppb				
SVE-03	0950	126 ppb	130 ppb				
VPC Inlet	0940	110 ppb	96 ppb				
VPC Midpoint	—						
VPC Outlet	0937	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) 8/11/22 (Date)

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

Inspection Date: 9/8/22 Date of last inspection: 8/11/22

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

Operational Parameters - Monitoring interval is variable.

Inspection Time: 1100 Motor Hours: 10405

Blower	Current Value
Vacuum gauge	32" H20
Pressure gauge	5" H20
System flow rate	105scfm
Blower Temperature	97°F
Temp.at lag VPC discharge	N/A

Other Notes

System off on arrival
Added 2oz oil to blower & restarted system.
Took initial readings & readings after ~1 hr.

Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration

PID Model: PPBRAE3000 Details: 0/10.00 ppm

Calibration time/ date: 1110 9/8/22 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	off						
SVE-02	1120	0/0 ppb	1244-9/8 ppb				
SVE-03	1125	64/63ppb	1250-99/94 ppb				
VPC Inlet	1117	52/61ppb	1242-81/79 ppb				
VPC Midpoint							
VPC Outlet	1115	0/0 ppb	1239-0/0 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) 9/8/22 (Date)

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

Inspection Date: 9/12/22 Date of last inspection: 9/8/22

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: 0933	Motor Hours: 10499

Blower	Current Value	Other Notes
Vacuum gauge	32" H_2O	Picked up new cal gas can from national Safety. oil ok
Pressure gauge	10" H_2O	
System flow rate	1053 CFM	
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 / 10.01 ppm
Calibration time/ date: 9/12/22 0935	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	off						
SVE-02	0950	31 ppb	26 ppb				
SVE-03	0956	176 ppb	178 ppb				
VPC Inlet	0947	171 ppb	168 ppb				
VPC Midpoint							
VPC Outlet	0943	0	0				
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) 9/12/22 (Date)

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

Inspection Date: 09/23/22 Date of last inspection: 09/12/22

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: 0839	Motor Hours: 10640

Blower	Current Value	Other Notes
Vacuum gauge	33"H20	System off on arrival change blower oil - 0900 Restart Screen @ Startup + ~1 Hr after
Pressure gauge	10"H20	
System flow rate	105 scfm	
Blower Temperature	87°F / 114°F 1105	
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: 9/23/22 0850	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	0926 - 57/52 ppb	1016 ~~353/361~~ 1009		1009 - 25/26 ppb			
SVE-03	0933 - 252/279 ppb	~~1009 - 25/26 ppb~~		1616 - 353/361 ppb			
VPC Inlet	0920 - 397/363 ppb	1004 - 324/329 ppb					
VPC Midpoint							
VPC Outlet	0916 0/0	1000 - 0/0					
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) 9/23/22 (Date)

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

Inspection Date: 9/29/22 Date of last inspection: 9/23/22

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: 0645	Motor Hours: 10782	
Blower	**Current Value**	**Other Notes**
Vacuum gauge	33 "H20	
Pressure gauge	16 "H20	
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: 0/10.06 ppm
Calibration time/ date: 9/29 @ 0646	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	~~off~~						
SVE-02	0700	0 ppb	0 ppb				
SVE-03	0705	201 ppb	190 ppb				
VPC Inlet	0654	188 ppb	161 ppb				
VPC Midpoint							
VPC Outlet	0649	0 ppb	0 ppb				
Other vapor point _____							

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

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

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

Signature _____ Printed Name Justin Neste Signature 9/29/22 Date

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

Inspection Date: 10/5/22 Date of last inspection: 9/29/22

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: 1023	Motor Hours: 10929	
Blower	**Current Value**	**Other Notes**
Vacuum gauge	32"Hg	
Pressure gauge	10"H20	
System flow rate	105scfm	
Blower Temperature	119°F	
Temp.at lag VPC discharge		
Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration		

PID Model: PPB RAE 3000	Details: 0 / 10.00ppm
Calibration time/ date: 10/5 1027	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	off						
SVE-02	1035	37ppb	47ppb				
SVE-03	1041	547ppb	500ppb				
VPC Inlet	1049	416ppb	447ppb				
VPC Midpoint							
VPC Outlet	1030	0	0				
Other vapor point _____							

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

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

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

Signature Justin Neste (Printed Name) (Signature) 10/5/22 (Date)

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

Inspection Date: 10/24/22 Date of last inspection: 10/5/22

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: 1004 Motor Hours: 11385

Blower	Current Value
Vacuum gauge	33"H20
Pressure gauge	10"H2O
System flow rate	105scfm
Blower Temperature	112°F
Temp.at lag VPC discharge	

Other Notes

Turned system off after taking readings.
2 gal condensate

Other notes: check oil level, drive belts, TEFC motor fan, any unusual noise/vibration

PID Model: PPB RAE 3000 Details: 0/10.0 ppm

Calibration time/ date: 1010 10/24 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	off						
SVE-02	1020	76 ppb	82 ppb				
SVE-03	1026	391 ppb	300 ppb				
VPC Inlet	1016	218 ppb	199 ppb				
VPC Midpoint							
VPC Outlet	1012	0	0				
Other vapor point _____							

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

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

Signature Justin Neste (Printed Name) (Signature) 10/24/22 (Date)

Attachment B: Building 4-78/79 Replacement Well Logs

Resource Protection Well Report

Notice of Intent No. RE23258

Type of Work:

[X] Construction

[ ] Decommission → Original NOI No. _____

Ecology Well ID Tag No. **BNE 654**

Site Well Name _____

Consulting Firm **Calibre Systems / Boeing**

Was a variance approved for this well/boring? [ ] Yes [X] No

If yes, what was the variance for? _____

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported are true to my best knowledge and belief.

[X] Driller [ ] Trainee

Name (Print Last, First Name) **Tim Watson**

Driller/Trainee Signature _____

License No. **3203**

Company Name **Cascade Drilling - Seattle**

If trainee box is checked, sponsor's license number: _____

Sponsor's signature _____

Type of Well:

[X] Resource Protection Well [ ] Injection Point

[ ] Remediation Well [ ] Grounding Well

[ ] Geotechnical Soil Boring [ ] Ground Source Heat Pump

[ ] Environmental Boring [ ] Other _____

↳ [ ] Soil [ ] Vapor [ ] Water Sampling

Property Owner **The Boeing Company**

Well Street Address **N 6th St & Logan Ave N**

City **Renton** County **King**

Tax Parcel No. **072305-9001**

Location (see instructions): WWM [EWM]

¼-¼ **NE** ¼ **SE** Sec **7** Twn **23N** R **5E**

Latitude (Example: 47.12345) **47.49627**

Longitude (Example: -120.12345) **-122.21252**

Borehole Diameter **3.75"** inches Casing Diameter **2"** inches

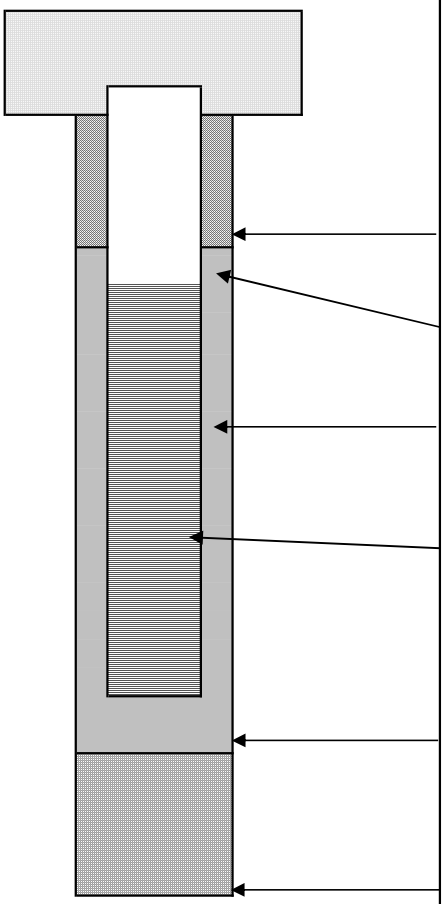
Static Water Level **n/a** ft below top of casing

[ ] Above-ground completion w/bollards [X] Flush Monument

↳ Stick-up of top of well casing _____ ft above ground surface

Start Date **7/29/2022** Completed Date **7/29/2022**

Construction Design



Well Data 103-22-1279

Concrete Surface		
Seal Depth	**2'**	**FT**
Blank Casing (dia x dep)	**2" x 10'**	
Material	**PVC**	
Backfill		**FT**
Type		
Seal	**7'**	
Material	**Bentonite Chips**	
Gravel Pack	**11'**	**FT**
Material	**2/12 Sand**	
Screen (dia x dep)	**2" x 10'**	
Slot Size	**.010**	
Material	**PVC**	
Well Depth	**20'**	**FT**
Backfill	**x**	
Material	**x**	
Total Hole Depth	**20'**	**FT**

Formation Description

0 - **3** **FT**
Brown sand and gravel

3 - **12** **FT**
Fine gray silty sand

12 - **20** **FT**
Gray sand and gravel

Scale 1" = _____ Page _____ of _____

BORING NUMBER GW 031S-R

Calibre Systems, Inc

CLIENT Boeing **PROJECT NAME** Boeing Renton

PROJECT NUMBER T0014118 **PROJECT LOCATION** Building 4-78/79 Area

DATE STARTED 7/29/22 **COMPLETED** 7/29/22 **GROUND ELEVATION** _____ **HOLE SIZE** 3.75

DRILLING CONTRACTOR Cascade Drilling Services **GROUND WATER LEVELS:**

DRILLING METHOD Geoprobe Direct Push **DRILLER** Tim Watson **AT TIME OF DRILLING** ---

LOGGED BY Tom McKeon **CHECKED BY** Rune Lassen **AT END OF DRILLING** ---

NOTES Ecology ID: BNE 654

DEPTH (ft)	SAMPLE NUMBER RECOVERY(%)	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	GRAPHIC LOG		MATERIAL DESCRIPTION
0						
						No samples collected from 0-10 bgs, in prior excavation, fill material.
5	1					
10					10.0	
						CLAYEY SAND (SC)---- 75 % fine to medium, sand; 25 % fines, wet, gray, Trace roots, wood chunks in core.
	2 50%				13.0	
15						Poorly-Graded SAND (SP)---- 100 % medium to coarse, sand, wet, black.
					15.0	
					16.0	SILTY SAND (SM)---- 75 % hard, sand; 25 % fines, wet, gray.
	3 50%					Well-Graded GRAVEL (GW)---- 90 % fine to coarse, rounded gravel; 10 % sand, wet, gray.
20					18.0	
						Poorly-Graded SAND (SP)---- 100 % coarse, sand, wet, black.
	4				21.0	
					22.0	Well-Graded GRAVEL (GW)---- 95 % fine to coarse, rounded gravel; 5 % fine to medium, sand, wet, black.

Bottom of borehole at 22.00 feet.

WELL DIAGRAM

Casing Type: 2" PVC, with PPS

Bentonite seal
Blank casing

Filter sand
10 Slot screen

End cap

Resource Protection Well Report

Notice of Intent No. RE23258

Type of Work:

[X] Construction

[ ] Decommission → Original NOI No. _____

Ecology Well ID Tag No. **BNE 655**

Site Well Name _____

Consulting Firm **Calibre Systems / Boeing**

Was a variance approved for this well/boring? [ ] Yes [X] No

If yes, what was the variance for? _____

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported are true to my best knowledge and belief.

[X] Driller [ ] Trainee

Name (Print Last, First Name) **Tim Watson**

Driller/Trainee Signature _____

License No. **3203**

Company Name **Cascade Drilling - Seattle**

If trainee box is checked, sponsor's license number: _____

Sponsor's signature _____

Type of Well:

[X] Resource Protection Well [ ] Injection Point

[ ] Remediation Well [ ] Grounding Well

[ ] Geotechnical Soil Boring [ ] Ground Source Heat Pump

[ ] Environmental Boring [ ] Other _____

↳ [ ] Soil [ ] Vapor [ ] Water Sampling

Property Owner **The Boeing Company**

Well Street Address **N 6th St & Logan Ave N**

City **Renton** County **King**

Tax Parcel No. **072305-9001**

Location (see instructions): WWM [EWM]

¼-¼ **NE** ¼ **SE** Sec **7** Twn **23N** R **5E**

Latitude (Example: 47.12345) **47.49627**

Longitude (Example: -120.12345) **-122.21252**

Borehole Diameter **3.75"** inches Casing Diameter **2"** inches

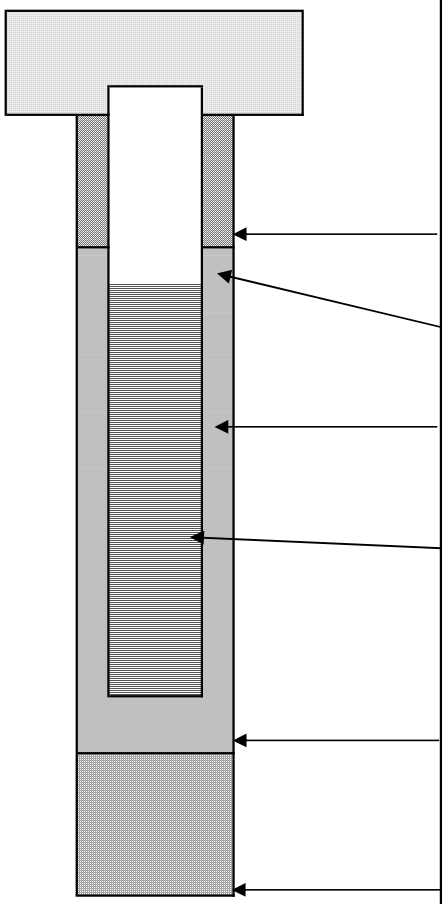
Static Water Level **n/a** ft below top of casing

[ ] Above-ground completion w/bollards [X] Flush Monument

↳ Stick-up of top of well casing _____ ft above ground surface

Start Date **7/29/2022** Completed Date **7/29/2022**

Construction Design



Well Data 103-22-1279

Concrete Surface		
Seal Depth	**2'**	**FT**
Blank Casing (dia x dep)	**2" x 10'**	
Material	**PVC**	
Backfill		**FT**
Type		
Seal	**7'**	
Material	**Bentonite Chips**	
Gravel Pack	**11'**	**FT**
Material	**2/12 Sand**	
Screen (dia x dep)	**2" x 10'**	
Slot Size	**.010**	
Material	**PVC**	
Well Depth	**20'**	**FT**
Backfill	**x**	
Material	**x**	
Total Hole Depth	**20'**	**FT**

Formation Description

0 - **3** **FT**
Brown sand and gravel

3 - **12** **FT**
Fine gray silty sand

12 - **20** **FT**
Gray sand and gravel

Scale 1" = _____

BORING NUMBER GW 244S-R

Calibre Systems, Inc

CLIENT Boeing **PROJECT NAME** Boeing Renton

PROJECT NUMBER T0014118 **PROJECT LOCATION** Building 4-78/79 Area

DATE STARTED 7/29/22 **COMPLETED** 7/29/22 **GROUND ELEVATION** _____ **HOLE SIZE** 3.75

DRILLING CONTRACTOR Cascade Drilling Services **GROUND WATER LEVELS:**

DRILLING METHOD Geoprobe Direct Push **DRILLER** Tim Watson **AT TIME OF DRILLING** ---

LOGGED BY Tom McKeon **CHECKED BY** Rune Lassen **AT END OF DRILLING** ---

NOTES Ecology ID: BNE 655

DEPTH (ft)	SAMPLE NUMBER RECOVERY(%)	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0						Casing Type: 2" PVC , with PPS
5	1				No samples collected 0-10' bgs, in prior excavation, fill material.	Bentonite seal Blank casing
10	2 30%				10.0 SILTY SAND (SM)---- 75 % fine to coarse, sand; 25 % fines, wet, gray, Trace gravel up to 1/2 ".	
15					12.0 Poorly-Graded SAND (SP)---- 100 % medium, sand, wet, black. 15.0	Filter sand 10 Slot screen
20	3 75%				Poorly-Graded SAND (SP)---- 100 % medium to coarse, sand, wet, black. 17.5 Well-Graded GRAVEL (GW)---- 95 % fine to coarse, rounded gravel; 5 % sand, wet, black. 20.0	End cap
	4				21.0 Poorly-Graded SAND (SP)---- 100 % medium to coarse, sand, wet, black. 22.0 Well-Graded GRAVEL (GW)---- 95 % fine to coarse, gravel; 5 % sand, wet, black.	

Bottom of borehole at 22.00 feet.