Data Report
Phase 3 Groundwater Investigation
NBF/GTSP Remedial Investigation
Seattle, Washington

July 11, 2018

Prepared for

The Boeing Company
and
The City of Seattle

LANDAU ASSOCIATES

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Phase 3 Groundwater Investigation
NBF/GTSP Remedial Investigation
Seattle, Washington

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LIST OF ABBREVIATIONS AND ACRONYMS

AO ..... Agreed Order
AOC ..... Area of Concern
bgs ..... below ground surface
Boeing ..... The Boeing Company
BTEX ..... benzene, toluene, ethylbenzene, and xylenes
City ..... City of Seattle
cis-1,2-DCE cis-1,2-dichloroethene
cVOC ..... chlorinated volatile organic compound
1,1-DCE 1,1-dichloroethene
Ecology ..... Washington State Department of Ecology
EPA ..... US Environmental Protection Agency
FS ..... feasibility study
ft ..... feet
GTSP ..... Georgetown Steam Plant
GPS ..... global positioning system
LAI ..... Landau Associates, Inc.
µg/L ..... micrograms per liter
NBF ..... North Boeing Field
PCE ..... tetrachloroethene
PID ..... photoionization detector
PVC ..... polyvinyl chloride
QAPP ..... quality assurance project plan
RCW ..... Revised Code of Washington
RI ..... remedial investigation
SAP ..... sampling and analysis plan
Site ..... North Boeing Field/Georgetown Steam Plant Site
trans-1,2-DCE trans-1,2-dichloroethene
TCE ..... trichloroethene
TEQ ..... toxicity equivalency quotient
TPH ..... total petroleum hydrocarbons
VC ..... vinyl chloride
VOC ..... volatile organic compound
WAC ..... Washington Administrative Code

1.0 INTRODUCTION

This data report describes the implementation and results of the Phase 3 supplemental groundwater investigation (Phase 3 investigation) conducted as part of the North Boeing Field/Georgetown Steam Plant Site (NBF/GTSP Site or Site) Remedial Investigation/Feasibility Study (RI/FS). Phase 3 investigation activities were focused in the areas of concern (AOCs) where the Washington State Department of Ecology (Ecology) directed that additional groundwater data were needed to further define the downgradient extent of contaminants within those AOCs. This investigation was conducted in accordance with the NBF/GTSP Remedial Investigation (RI) Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP; Leidos 2014) and Addendum No. 6 to the SAP/QAPP (LAI 2017). The location of the NBF/GTSP Site and the surrounding area are shown on Figure 1. The current AOCs, which have been revised slightly from those shown in Addendum No. 6, are shown on Figure 2.

1.1 Background

The Boeing Company (Boeing) and the City of Seattle (City) are conducting an RI at the NBF/GTSP Site under an Agreed Order between Ecology, Boeing, the City, and King County (AO No. DE 5685; Ecology 2008). The Phase 3 investigation described in this data report is part of the RI. Planned Phase 3 investigation groundwater sample locations were identified in Addendum No. 6. Three additional groundwater grab sample locations were added to the Phase 3 investigation in early November 2017, along the western edge of the Site in AOC 10, based on additional communications with Ecology (Adams 2017a, b). The Phase 3 investigation included collection of groundwater grab samples from temporary borings and collection of groundwater samples from select existing groundwater monitoring wells at the Site. Soil gas and groundwater samples were collected from offsite locations west and south of the 3-360 area during the offsite soil vapor and groundwater investigation (Landau Associates, Inc.; LAI 2018); that data is also included in this data report.

2.0 PHASE 3 INVESTIGATION ACTIVITIES

In September and November 2017, groundwater grab samples were collected at 42 temporary boring locations. An additional deeper groundwater sample was collected at 7 of these 42 boring locations. Groundwater samples were also collected from 5 existing groundwater monitoring wells at the Site, using the sampling procedures described below. In general, borings were placed in the locations presented in Addendum No. 6 (LAI 2017). However, there were some adjustments necessary due to subsurface utilities; modifications from the Addendum No. 6 locations are described in Section 2.4. Phase 3 groundwater sample locations, including temporary borings for collection of groundwater grab samples and select groundwater monitoring wells, are shown on Figure 2.

Selected temporary borings, identified on Figure 2, were logged in accordance with Section 2.1.2 of the SAP/QAPP (Leidos 2014). Boring logs for these locations are included in Appendix A. Visual and physical observations were documented by Landau Associates (LAI) personnel during the subsurface explorations. Observations included soil lithology, presence of any sheen on the soil or groundwater, odor, and visible staining. In addition, soil samples from each 1-foot interval of the borings were screened for the presence of volatile organic compounds (VOCs) using a photoionization detector (PID). No sheen, odor, or staining was identified. VOCs were not detected in any soil samples during screening with the PID.

Field documentation, including field equipment calibration, sample storage and delivery, chain-of-custody forms, and waste disposal and handling, was performed in accordance with Section 2.7 of the SAP/QAPP (Leidos 2014). A complete record of all field activities was maintained during field sampling events. The coordinates for each sample location were documented using a hand-held Global Positioning System (GPS). Coordinates for each sample location are shown in Table 1.

2.1 Phase 3 Locations

The Phase 3 groundwater grab sample locations were targeted to further define the downgradient extent of contaminants within AOCs as described in Addendum No. 6 and subsequent communications with Ecology. Groundwater grab samples and groundwater samples from existing monitoring wells were collected from the following AOCs/locations:

1. AOC 4:
    a. Five locations in the area of Buildings 3-324, 3-335, and 3-626.
2. AOC 6:
    a. Two locations north of the PEL Area, west of the GTSP.
    b. Five locations along a transect south and southwest of Building 3-350.
    c. Six locations along a transect farther southwest of Building 3-350, five of which were along the unpaved right-of-way of South Myrtle Street.
    d. Four locations along a transect south and southwest of Building 7-27-1.
3. AOC 7:
    a. Three locations along a transect in between Buildings 3-800 and 3-801.
    b. Six locations along a transect west of Building 3-390.

4. AOC 9:
    a. Four locations along a transect south of Building 3-802
    b. One existing monitoring well between Building 3-802 and the Main Fuel Farm area.
    c. Four locations along a transect southwest of the Main Fuel Farm area.
5. AOC 10:
    a. Four existing downgradient perimeter monitoring wells along the west boundary of the Site (wells NGW620, NGW621, NGW623, and NGW624).
    b. Three locations along a transect in the Building 7-27-1 area (Markov area).

2.2 Groundwater Sampling Procedures

Phase 3 groundwater grab samples were collected from temporary borings following the sampling procedures described below and in detail in Addendum No. 6. Groundwater sampling from groundwater monitoring wells was conducted in accordance with Section 2.2 of the SAP/QAPP using low-flow groundwater sampling procedures. Temporary boring location and monitoring well details are shown in Table 1.

2.2.1 Groundwater Grab Sampling Procedures

Addendum No. 6 (LAI 2017) provides procedures for collection and analysis of groundwater grab samples using direct-push drilling methods. Groundwater grab sampling during the investigation was conducted in accordance with procedures detailed in Addendum No. 6, using low-flow groundwater sampling methods. Groundwater grab samples were collected at the locations shown on Figure 2.

Prior to drilling, all locations were cleared with public and private utility locating services and use of a low-impact utility clearance process. This included the use of a hand auger and/or vacuum truck air-knife to a depth of 5 feet (ft) below ground surface (bgs) or greater in order to avoid damaging any subsurface utilities or other structures.

Groundwater grab samples were collected using a shielded, temporary well screen to the target depth (e.g., the water table). The stainless-steel, temporary well screens were 4-ft long, with 1-inch outer-diameter and 0.004-inch slot size. Temporary well casings and screens were decontaminated between borings and between samples at locations where a deeper sample was collected. The top of the well screen was positioned at the approximate depth of the water table. Depth to the water table at the time of drilling varied across the AOCs and ranged from 6.72 ft bgs (AOC04-GW01) to 15.43 ft bgs (AOC07-GW03); screened intervals were adjusted based on the depth to water at each location. At locations where the water table intersected relatively thin silty layers, turbidity was reduced by adjusting the screened interval to below the silt layer where practicable, as agreed to in the field with the Leidos representative.

Using a peristaltic pump, groundwater was purged and sampled at a rate of no more than 1 liter per minute to help reduce turbidity. Low-flow purging using a peristaltic pump was performed for approximately 10 minutes or until the purge water was clear (i.e. the turbidity was low) and the parameters stabilized, whichever occurred first. Conductivity, pH, and temperature were measured

during purging using a flow-through cell. Field parameters were collected four times in succession and the average of each parameter was calculated. Turbidity was visually monitored during purging and a final turbidity measurement with a field meter was made prior to groundwater sample collection. Groundwater samples were collected in laboratory-supplied jars.

Groundwater samples were stored on ice and delivered to Analytical Resources, Inc. at the end of each sampling day. Samples to be analyzed for PCB congeners were stored on ice and shipped to Vista Analytical Laboratory within 48 hours of sample collection. All samples submitted for analysis were accompanied by a chain-of-custody form and analyzed according to the methods identified in Addendum No. 6 and in Table 2.

2.2.2 Groundwater Sample Analysis

For the Phase 3 investigation, groundwater samples from each AOC were analyzed for the analytes listed and using the analytical methods specified in Addendum No. 6 and as shown in Table 2. Total and dissolved metals analysis included arsenic, iron, and mercury. Other Phase 3 analytes included select chlorinated VOCs (cVOCs: vinyl chloride; trans-1,2-dichloroethene [trans-1,2-DCE]; cis-1,2-dichloroethene [cis-1,2-DCE]; 1-1-dicloroethene [1,1-DCE]; trichloroethene [TCE]; and tetrachloroethene [PCE]); polychlorinated biphenyls (PCBs) aroclors; diesel-range, motor oil-range, and gasoline-range organics; benzene, toluene, ethylbenzene, and xylenes (BTEX); and select phthalates.

During the Phase 3 investigation, groundwater samples were collected from four perimeter RI monitoring wells, along the western boundary of the Site, for PCB congener analysis by US Environmental Protection Agency (EPA) Method 1668C (wells NGW620, NGW621, NGW623, and NGW624). Due to the low-level PCB congener analysis that was performed, platinum-cured silicone tubing was used for the peristaltic pump to prevent cross contamination of PCBs from sample tubing to the groundwater sample. These samples were submitted to Vista Analytical Laboratory for PCB congener analysis on September 27 and 28, 2017.

During sampling of AOC 6 locations in the transect along East Marginal Way South, petroleum sheen and/or odor was noted at AOC06-GW01, AOC06-GW02, AOC06-GW03, and AOC06-GW04. (Figure 2). The purpose of this southern AOC 6 transect was to delineate the cVOC plume on the Site. The source of the petroleum sheen and odor appears to be releases from the Shell (former BP/ARCO) gasoline station northeast of the AOC 6 geoprobe transect, because the odor was observed to be stronger as the sampling locations proceeded to the north toward AOC06-GW03 and AOC06-GW04. Addendum No. 6 specifies that “additional sampling will not be performed if groundwater contamination is found to be originating from offsite sources.” Because the petroleum contamination observed in the field along the AOC 6 transect appears to be associated with the nearby Shell gasoline station and not the Site, groundwater samples from this transect were not analyzed for petroleum hydrocarbons. A review of groundwater gradient maps prepared for the Shell Station show that sampling locations

along this transect are downgradient of the Shell Station and, therefore, no additional analysis of petroleum hydrocarbons will be performed at this location for the NBF/GTSP RI.

2.2.3 Boring Decommissioning

Each direct-push boring was decommissioned in accordance with Chapter 173-160 Washington Administrative Code (WAC; *Minimum Standards for Construction and Maintenance of Wells*); and Chapter 18, 18.104 Revised Code of Washington (RCW; Water Well Construction Act). The borings were grouted to approximately 2 ft bgs with hydrated bentonite chips and backfilled to the surface with soil excavated from the boring location and finished with previously removed sod or patched with a quick setting, concrete-like material, such as Jet Set™ to match the surrounding surface material.

2.3 Waste Management

All investigation derived waste was temporarily contained in 5-gallon buckets with secure lids and then emptied into Boeing-provided drums at the onsite Boeing-designated waste handling facility. All drums were properly labeled throughout the investigation.

2.4 Modifications from the Work Plan

Modifications of sample locations or sampling procedures presented in Addendum No. 6 were documented by LAI and discussed with and approved by Ecology. Modifications to Addendum No. 6 are presented below.

2.4.1 Location Adjustments

Groundwater grab sample locations that needed to be moved greater than a 10-ft radius from the original sample location shown in Addendum No.6 were discussed with and approved by Ecology prior to the adjustments being made in the field. These adjustments are summarized below.

- For AOC 6, as shown on Figure 3 of the SAP QAPP Addendum No. 6, 16 groundwater grab sample locations and 9 contingent groundwater grab sample locations were identified. Based on site reconnaissance, utility locates, and communications with Ecology, the number of locations was increased to 17 groundwater grab sample locations.
- AOC06-GW07 was moved approximately 14 ft south to avoid subsurface utilities located in the parking stalls on the southern side of Building 3-350.
- AOC06-GW08 was moved approximately 14 ft south to avoid subsurface utilities located in the parking stalls on the southern side of Building 3-350.
- For AOC 7, as shown on Figure 4 of the SAP QAPP Addendum No. 6, 11 groundwater grab sample locations and 2 contingent groundwater grab sample locations were identified. Based on site reconnaissance, utility locates, and communications with Ecology, the number of locations was reduced to 9 groundwater grab sample locations.
- For AOC 9, as shown on Figure 5 of the SAP QAPP Addendum No. 6, six groundwater grab sample locations and one contingent groundwater grab sample location were identified. Based

on site reconnaissance, utility locates, and communications with Ecology, the number of locations was reduced to four groundwater grab sample locations and collection of groundwater samples from one groundwater monitoring well to the southwest of Building 3-802. The monitoring well is identified in this report as AOC09-UNKWELL.

- AOC09-GW03 would have required re-location approximately 44 ft to the northwest due to multiple subsurface utilities and concrete utility corridors in the area to the southwest of Building 3-802. AOC09-GW03 was not relocated, as discussed with and approved by Ecology. AOC09-GW03 is not shown on figures since this groundwater grab sample location was eliminated.
- For AOC 10, three additional groundwater grab sample locations were added by Ecology along the western edge of the Site, along East Marginal Way S., in the Building 7-27-1 area (Markov Property).

2.4.2 Other Modifications

Various other modifications to the SAP/QAPP were also proposed to, discussed with, and approved by Ecology. These changes are summarized below:

- For Phase 3 groundwater grab samples, well screen material and slot size deviated from what was specified in Addendum No. 6 (LAI 2017). Stainless-steel well screens were used instead of polyvinyl chloride (PVC) well screens; the stainless-steel screens were 4 ft long and had a 0.004-inch slot size instead of 5 ft with a 0.010-inch slot size.
- For the Phase 3 groundwater grab samples, based on the anticipated depth to water of 6 to 8 ft bgs, the target boring depth was 10 ft bgs. However, due to depth to water and soil conditions encountered in the field, the majority of the temporary wells were drilled deeper than the anticipated target depth of 10 ft bgs. The top of the well screen was positioned at the approximate depth of the water table and screened intervals were adjusted based on the depth to water at each location. At locations where the water table intersected relatively thin silty layers, turbidity was reduced by adjusting the screened interval to below the silt layer where practicable, as agreed to in the field with the Leidos representative. Phase 3 boring logs are included in Appendix A.

3.0 PHASE 3 INVESTIGATION RESULTS

Phase 3 investigation groundwater laboratory analytical results (with the exception of PCB congener results) are presented in Table 3. Data management for this data was performed in accordance with Section 3.0 of the SAP/QAPP (Leidos 2014) and Addendum No. 1 to the SAP/QAPP (LAI 2015). Level 2B data verification and validation was performed as required for all analytical data, and validation qualifiers were applied to sample results, as necessary, in accordance with EPA guidance, as outlined in the SAP/QAPP. Additional details regarding the data verification and validation are provided in the data validation report, which is presented in Appendix B. Laboratory data packages are also included in Appendix B.

The PCB congener groundwater laboratory analytical results for wells NGW620, NGW621, NGW623, and NGW624 are presented in Table 4. Data management for this data was performed in accordance with Addendum No. 6. Level IV data reports were provided by Vista Analytical Laboratory for data validation and are presented in Appendix B. Stage 4 data validation for PCB congeners was performed by Ecochem, in accordance with the SAP/QAPP, and the data validation report is provided in Appendix B. Laboratory data packages are also included in Appendix B.

Phase 3 groundwater sampling results are shown by AOC and by constituent class on Figures 3 through 13. Sampling results are discussed in the following subsections.

3.1 AOC 4

A total of five groundwater samples were collected in AOC 4, in the vicinity of Buildings 3-324, 3-335, and 3-626, to evaluate the downgradient extent of contaminant concentrations in groundwater in AOC 4. Groundwater samples collected in AOC 4 were analyzed for PCB Aroclors; gasoline-range, diesel-range, and oil-range petroleum hydrocarbons; and total and dissolved metals (arsenic, iron, and mercury). Groundwater results are presented in Table 3.

PCBs were not detected in groundwater samples from AOC 4. Gasoline- and diesel-range total petroleum hydrocarbons (TPH) were detected in four of the five samples, and oil-range TPH was detected in all five samples. Total and dissolved arsenic and iron were detected in all five samples. Total mercury was detected in two of the five samples and dissolved mercury was detected in three of the five samples[AJC1]. Arsenic, TPH, and PCB concentrations in groundwater are presented on Figures 3, 4, and 5, respectively. Results for other groundwater analytes that are presented in Table 3 are not presented on figures because the analyte was not detected, concentrations detected are close to reporting limits, or figures were not considered to be useful in demonstrating the extent of contamination.

3.2 AOC 6

A total of 20 groundwater samples were collected in AOC 6, from two locations north of the PEL Area and from locations along three transects located throughout AOC 6, to evaluate the upgradient,

downgradient, and off-property extent of the cVOC plume in AOC 6. Groundwater samples collected in AOC 6 were analyzed for cVOCs and BTEX. Groundwater results are presented in Table 3.

cVOCs were detected in 14 of 20 groundwater samples. BTEX constituents were either not-detected or were detected at concentrations close to reporting limits. VC, cis-1,2-DCE, and TCE concentrations are presented on Figure 6. Results for the other cVOCs analyzed and for BTEX are not presented on figures because the analyte was not detected, concentrations detected were close to reporting limits, or figures are not considered to be useful in demonstrating the extent of contamination.

In addition, eight soil gas and seven groundwater samples were collected from locations west of the 3-360 area (west of Ellis Avenue South) and nine soil gas and two groundwater samples were collected from locations south of the 3-360 area, as described in the Offsite Soil Vapor and Groundwater Investigation Data Report (LAI 2018). Soil gas samples were analyzed for TCE and VC; there were no detections of either analyte in any of the samples. Groundwater samples were analyzed for cis-1,2-DCE; PCE; TCE; and VC; no analytes were detected in any of the samples from west of Ellis Avenue South. cis-1,2-DCE; PCE; and TCE were detected at concentrations less than the screening levels protective of indoor air for commercial exposures in the sample from the monitoring well FS27-A, located south of the 3-360 area near the northeast corner of Seattle Fire Station 27; VC was not detected in this sample. No analytes were detected in the other groundwater sample collected south of the 3-360 area. Sample locations are shown on Figure 7. Soil gas and groundwater analytical results are presented in Tables 5 and 6, respectively.

3.3 AOC 7

A total of 13 groundwater samples were collected in AOC 7, from a transect between Buildings 3-800 and 3-801 and from a transect west of Building 3-390, to evaluate the downgradient extent of the cVOC plume in AOC 7. Groundwater samples collected in AOC 7 were analyzed for cVOCs. Groundwater results are presented in Table 3.

One or more cVOCs were detected in two of 13 groundwater samples. VC, cis-1,2--DCE, and TCE concentrations in groundwater are presented on Figure 8. Results for the other cVOCs analyzed are not presented on a figure because the analyte was not detected.

3.4 AOC 9

A total of nine groundwater samples were collected in AOC 9, from a transect south of Building 3-802 and from a transect southwest of the Main Fuel Farm area, to evaluate the downgradient extent of the total petroleum hydrocarbon (TPH) plume in AOC 9. Groundwater samples collected in AOC 9 were analyzed for gasoline-range, diesel-range, and oil-range petroleum hydrocarbons and BTEX. Groundwater results are presented in Table 3.

Gasoline- and/or diesel-range TPH were detected in four of the nine samples and motor oil-range TPH was detected in eight of nine samples. BTEX constituents were either not detected or were detected at concentrations close to reporting limits. TPH concentrations in groundwater are presented on

Figure 9. BTEX results are not presented on a figure because BTEX were not detected or concentrations detected were close to reporting limits.

3.5 AOC 10

A total of seven groundwater samples were collected from four monitoring wells located along the western boundary of the Site and three locations along a transect in the Markov area. Groundwater samples collected in the portion of AOC 10 that are also included in AOC 6 are described in Section 3.2.

3.5.1 Site Boundary Monitoring Wells

Groundwater samples were collected from four downgradient monitoring wells to evaluate the contaminant concentrations in groundwater in AOC 10 along the Site boundary at East Marginal Way South. Groundwater samples were collected from NGW620, NGW621, NGW623, and NGW624. Groundwater samples collected from these monitoring wells were analyzed for gasoline-range, diesel-range, and oil-range petroleum hydrocarbons; BTEX; phthalates; total and dissolved metals (arsenic, iron, and mercury); cVOCs; and PCB congeners. Groundwater results are presented in Tables 3 and 4.

Gasoline-range TPH and dissolved mercury were not detected in groundwater samples from the Site boundary monitoring wells. Diesel-range TPH was detected in three of the four samples and motor oil-range TPH was detected in all four samples. Total and dissolved arsenic and iron and total mercury were detected in all four groundwater samples. BTEX constituents were not detected or were detected at concentrations close to reporting limits in groundwater samples from the Site boundary monitoring wells. cis-1,2-DCE was detected in one sample; no other cVOCs were detected in samples from these monitoring wells. Bis(2-ethylhexyl)phthalate was detected in samples from two of the wells; no other phthalates were detected in samples from the monitoring wells. PCB congeners were detected in samples from all four monitoring wells.

Arsenic; TPH; VC, cis-1,2-DCE, and TCE; and total PCB congener and PCB congener toxicity equivalency quotient (TEQ) concentrations in groundwater are presented on Figures 10, 11, 12, and 13, respectively. Results for other groundwater analytes that are presented in Table 3 are not presented on figures because the analyte was not detected, concentrations detected are close to reporting limits, or figures were not considered to be useful in demonstrating the extent of contamination.

3.5.2 Markov Area

A total of three groundwater samples were collected in the Markov area of AOC 10 from a transect along the western edge of the Site near Building 7-27-1. Groundwater samples collected in the Markov area were analyzed for gasoline-range, diesel-range, and oil-range petroleum hydrocarbons and BTEX. Groundwater results are presented in Table 3.

Gasoline-range and oil-range TPH were each detected in one of three samples. BTEX constituents were either not detected or were detected at concentrations close to reporting limits. TPH concentrations in groundwater are presented on Figure 14. BTEX results are not presented on a figure, because BTEX were not detected, or concentrations detected were close to reporting limits.

4.0 USE OF THIS REPORT

This Data Report has been prepared for the exclusive use of The Boeing Company and the City of Seattle and applicable regulatory agencies for specific application to the North Boeing Field/Georgetown Steam Plant Site. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

5.0 REFERENCES

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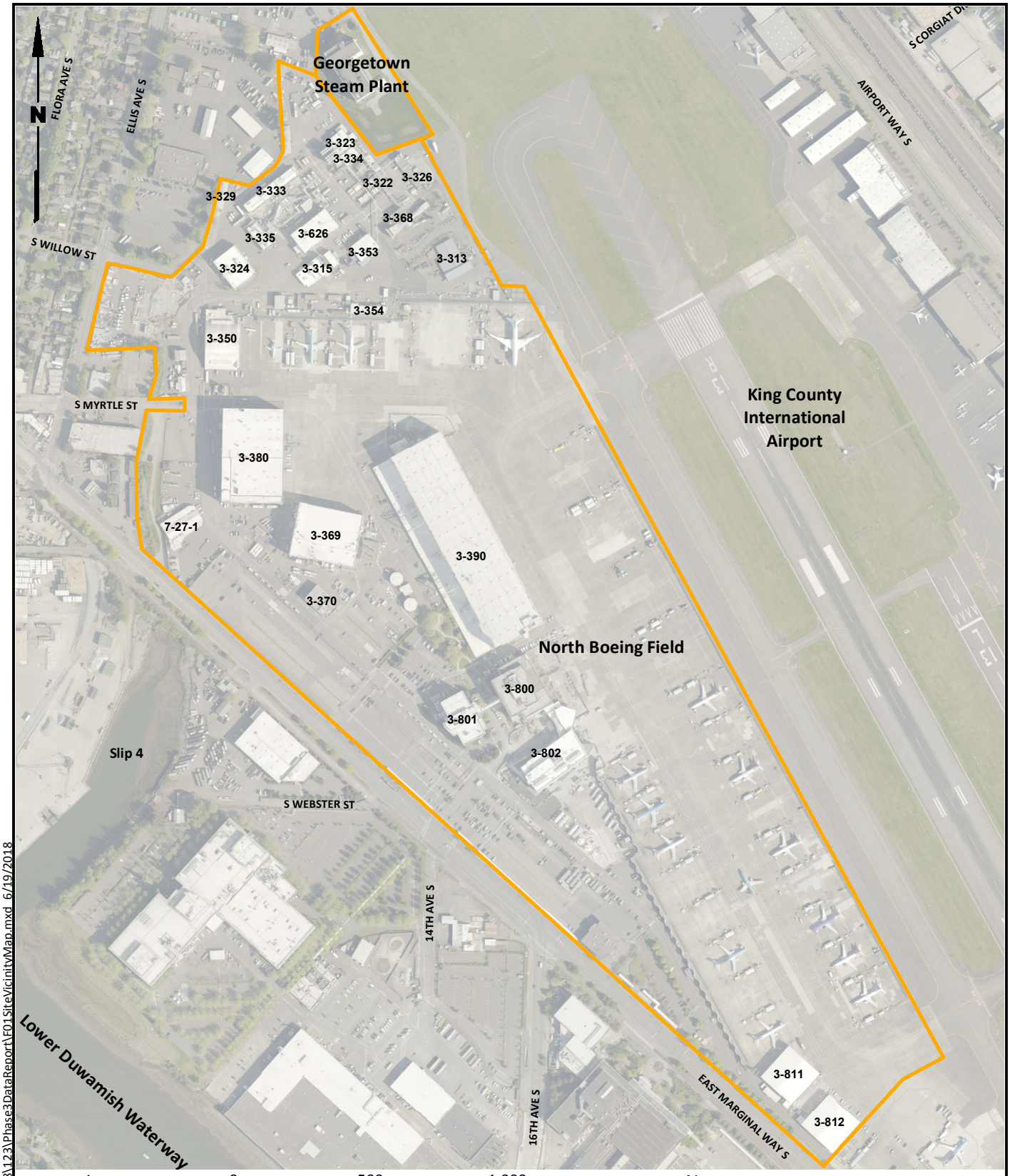

Legend

Site Boundary

0 500 1,000

Scale in Feet

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: King County Aerial Imagery.

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NBF/GTSP RI Seattle, Washington	**NBF/GTSP Site and Vicinity**	Figure 1

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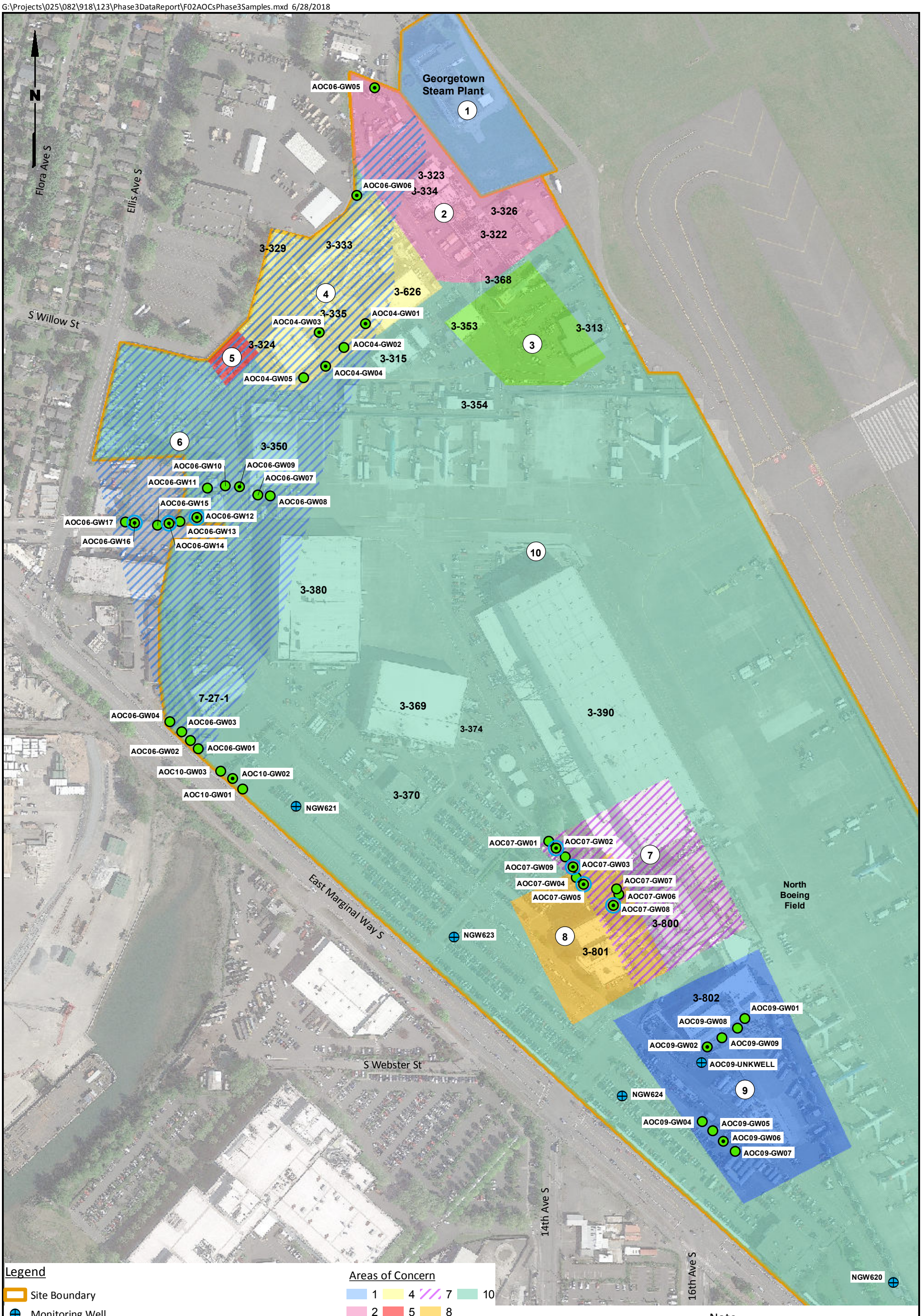

Legend

- Site Boundary
- Monitoring Well
- Geoprobe Groundwater Sample Location
- Geoprobe Groundwater Sample Location with Geologic Logging
- An Additional Groundwater Sample was Collected Approximately 20 feet Below the Depth of the Upper-Most Sample

Areas of Concern

1 2 3 4 5 6 7 8 9 10

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Google Earth Pro Imagery.

0 250 500

Scale in Feet

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NBF/GTSP RI
Seattle, Washington

NBF/GTSP RI Areas of Concern and Phase 3 Sample Locations

Figure 2

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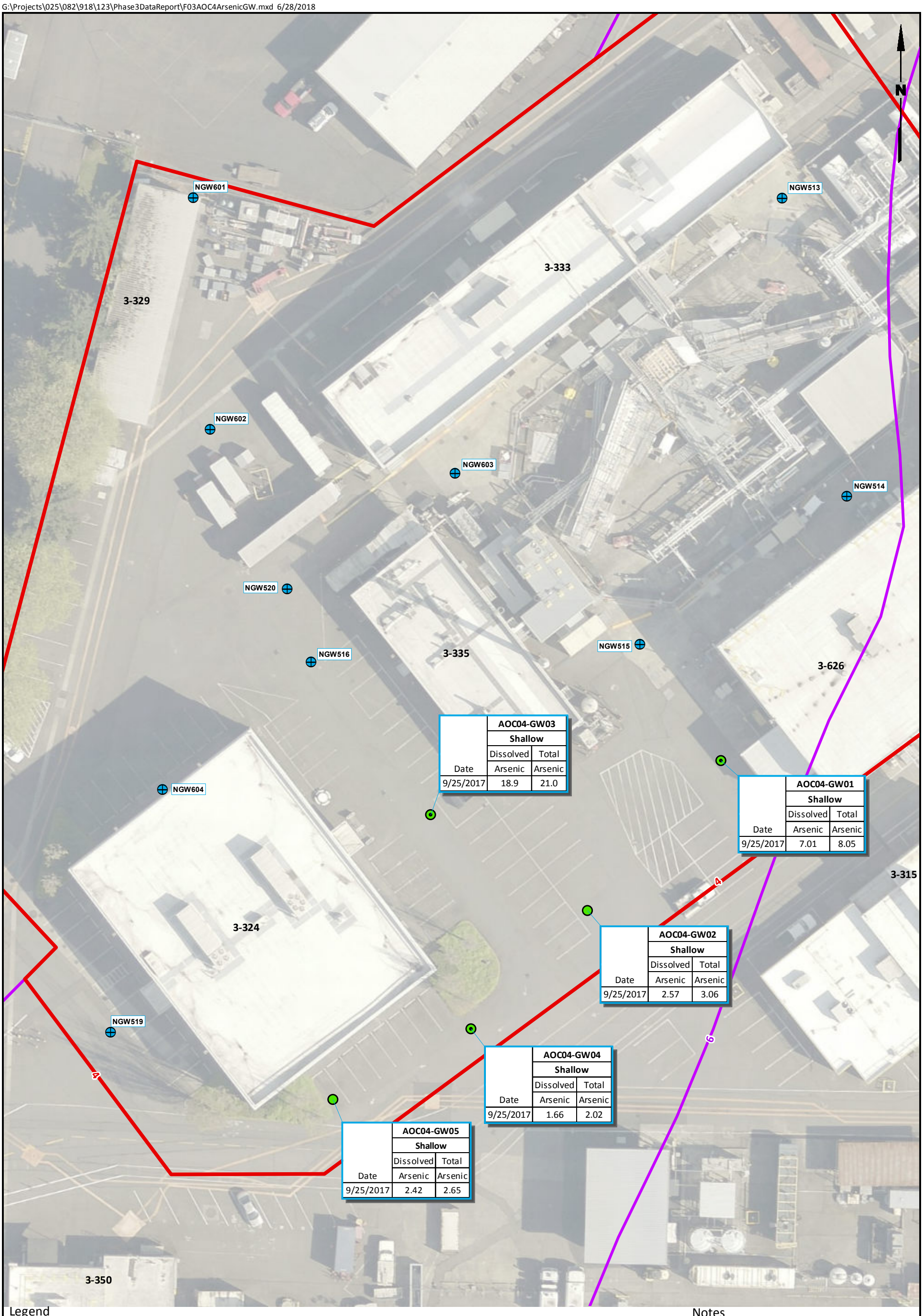

	AOC04-GW03	
	Shallow	
	Dissolved	Total
Date	Arsenic	Arsenic
9/25/2017	18.9	21.0

	AOC04-GW01	
	Shallow	
	Dissolved	Total
Date	Arsenic	Arsenic
9/25/2017	7.01	8.05

	AOC04-GW02	
	Shallow	
	Dissolved	Total
Date	Arsenic	Arsenic
9/25/2017	2.57	3.06

	AOC04-GW04	
	Shallow	
	Dissolved	Total
Date	Arsenic	Arsenic
9/25/2017	1.66	2.02

	AOC04-GW05	
	Shallow	
	Dissolved	Total
Date	Arsenic	Arsenic
9/25/2017	2.42	2.65

Legend

- Monitoring Well
- Geoprobe Groundwater Sample Location
- Geoprobe Groundwater Sample Location with Geologic Logging
- AOC 4
- Border of Area of Concern

0 40 80

Scale in Feet

Notes

1. All results for groundwater are shown in µg/L (micrograms per liter).
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: King County GIS.

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NBF/GTSP RI
Seattle, Washington

AOC 4
Arsenic Concentrations in Groundwater

Figure
3

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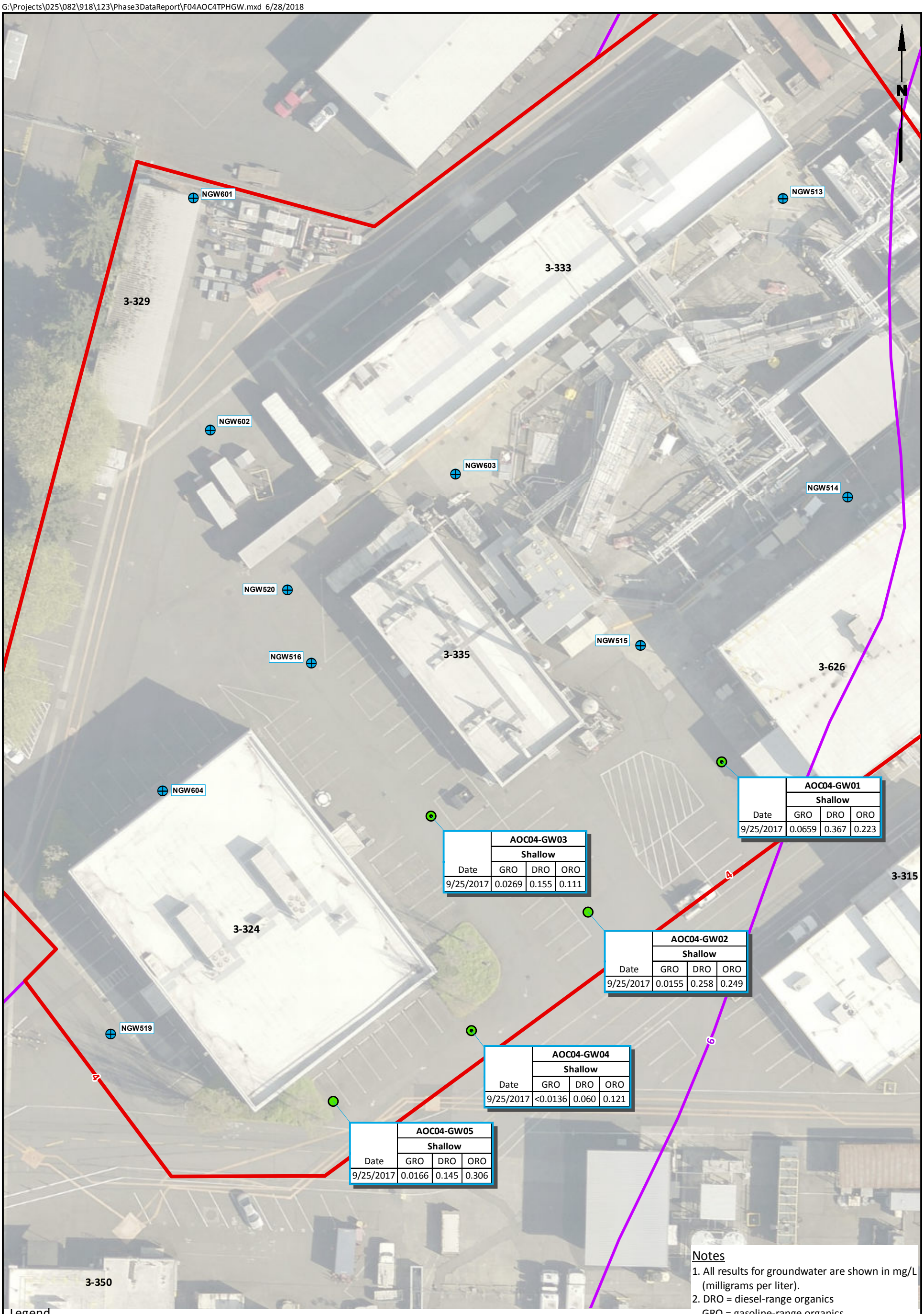


	AOC04-GW01		
	Shallow		
Date	GRO	DRO	ORO
9/25/2017	0.0659	0.367	0.223

	AOC04-GW03		
	Shallow		
Date	GRO	DRO	ORO
9/25/2017	0.0269	0.155	0.111

	AOC04-GW02		
	Shallow		
Date	GRO	DRO	ORO
9/25/2017	0.0155	0.258	0.249

	AOC04-GW04		
	Shallow		
Date	GRO	DRO	ORO
9/25/2017	<0.0136	0.060	0.121

	AOC04-GW05		
	Shallow		
Date	GRO	DRO	ORO
9/25/2017	0.0166	0.145	0.306

Notes

1. All results for groundwater are shown in mg/L (milligrams per liter).
2. DRO = diesel-range organics
   GRO = gasoline-range organics
   ORO = oil range-organics
   TPH = total petroleum hydrocarbons.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Monitoring Well
- Geoprobe Groundwater Sample Location
- Geoprobe Groundwater Sample Location with Geologic Logging
- AOC 4
- Border of Area of Concern

0 40 80

Scale in Feet

Data Source: King County GIS.

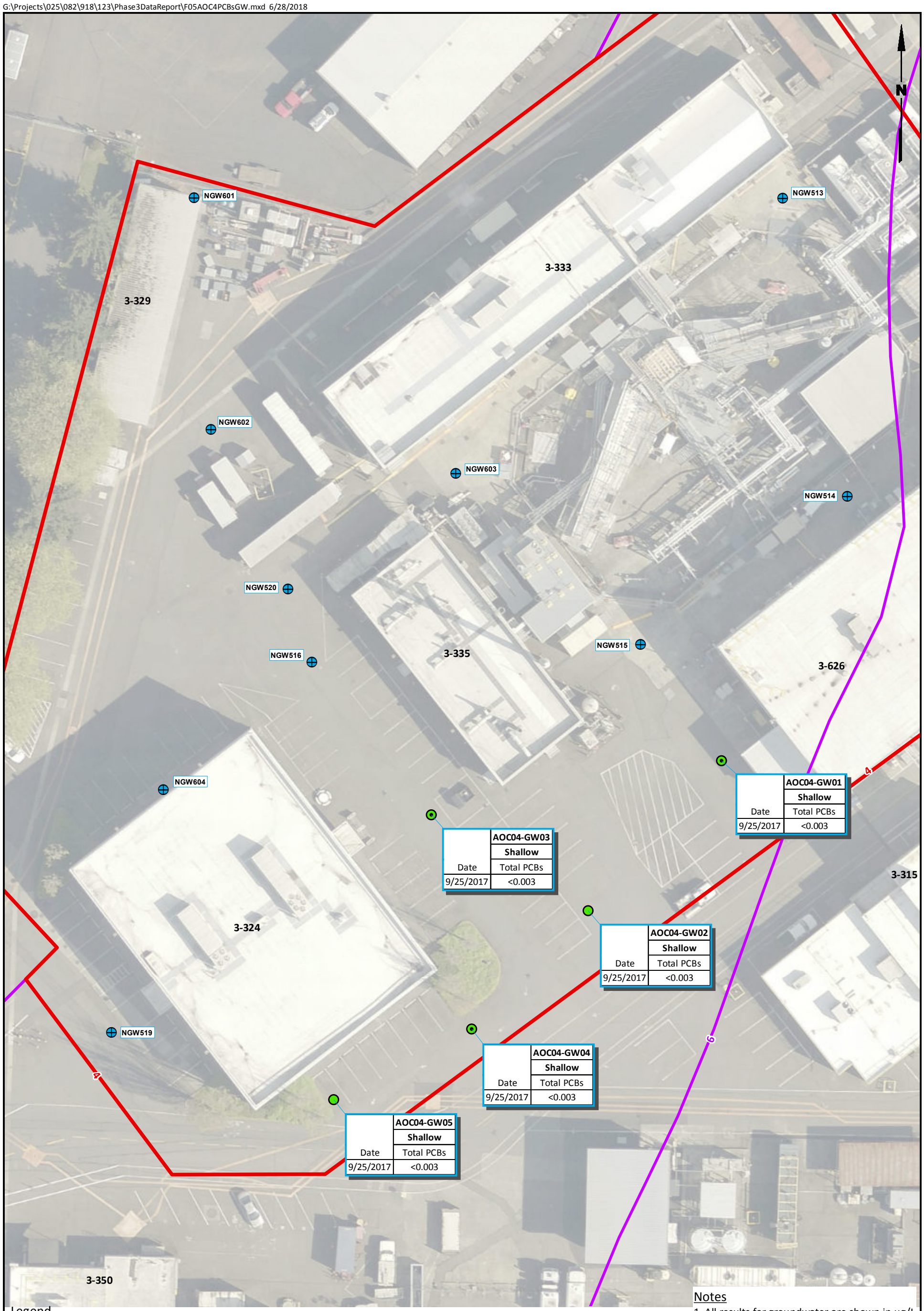
LANDAU ASSOCIATES

NBF/GTSP RI
Seattle, Washington

AOC 4
TPH Concentrations in Groundwater

Figure
4

G:\Projects\025\082\918\123\Phase3DataReport\F05AOC4PCBsGW.mxd 6/28/2018



Legend

- Monitoring Well
- Geoprobe Groundwater Sample Location
- Geoprobe Groundwater Sample Location with Geologic Logging
- AOC 4
- Border of Area of Concern

0 40 80

Scale in Feet

Notes

1. All results for groundwater are shown in µg/L (micrograms per liter).
2. PCBs = polychlorinated biphenyls.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: King County GIS.

LANDAU ASSOCIATES

NBF/GTSP RI
Seattle, Washington

AOC 4
PCB Concentrations in Groundwater

Figure 5

G:\Projects\025\082\918\123\Phase3DataReport\F06AOC6GWcVOCs.mxd 7/9/2018

	AOC06-GW05		
	Shallow		
Date	VC	TCE	cDCE
9/19/2017	<0.06	<0.05	<0.04

	AOC06-GW06		
	Shallow		
Date	VC	TCE	cDCE
9/19/2017	<0.06	0.07	<0.04

	AOC06-GW11		
	Shallow		
Date	VC	TCE	cDCE
9/26/2017	<0.06	0.13	0.21

	AOC06-GW13		
	Shallow		
Date	VC	TCE	cDCE
11/29/2017	<0.06	0.07	<0.04

	AOC06-GW16		
	Shallow		
Date	VC	TCE	cDCE
11/29/2017	<0.06	5.20	15.3
	Deep		
11/29/2017	0.35	0.07	0.38

	AOC06-GW17		
	Shallow		
Date	VC	TCE	cDCE
11/29/2017	<0.06	3.31	4.82

	AOC06-GW15		
	Shallow		
Date	VC	TCE	cDCE
11/29/2017	<0.06	<0.05	<0.04

	AOC06-GW14		
	Shallow		
Date	VC	TCE	cDCE
11/29/2017	<0.06	<0.05	<0.04
	Deep		
11/29/2017	1.31	0.08	0.84

	AOC06-GW04		
	Shallow		
Date	VC	TCE	cDCE
9/26/2017	<0.06	<0.05	0.39

	AOC06-GW02		
	Shallow		
Date	VC	TCE	cDCE
9/26/2017	<0.06	0.08	0.10

	AOC06-GW10		
	Shallow		
Date	VC	TCE	cDCE
9/19/2017	<0.06	<0.05	0.08

	AOC06-GW12		
	Shallow		
Date	VC	TCE	cDCE
9/27/2017	0.16	2.27	4.92
	Deep		
9/27/2017	2.02	0.13	1.45

	AOC06-GW07		
	Shallow		
Date	VC	TCE	cDCE
9/27/2017	<0.06	<0.05	<0.04

	AOC06-GW09		
	Shallow		
Date	VC	TCE	cDCE
9/19/2017	<0.06	<0.05	<0.04

	AOC06-GW08		
	Shallow		
Date	VC	TCE	cDCE
9/27/2017	<0.06	<0.05	<0.04

	AOC06-GW03		
	Shallow		
Date	VC	TCE	cDCE
9/26/2017	<0.06	0.09	0.15

	AOC06-GW01		
	Shallow		
Date	VC	TCE	cDCE
9/26/2017	<0.06	0.08	0.18

Georgetown Steam Plant

Flora Ave S

Ellis Ave S

S Willow St

East Marginal Way S

NGW511 NGW601 NGW513 NGW602 NGW603 NGW514 NGW520 NGW516 NGW515 NGW604 AOC4-GW01 AOC4-GW03 AOC4-GW02 AOC4-GW04 AOC4-GW05 NGW607 NGW519 NGW204 NGW209 NGW210 NGW211 NGW611 NGW202 NGW202 MW-B4 NGW254 NGW253

3-323 3-334 3-322 3-326 3-333 3-329 3-368 3-626 3-335 3-353 3-324 3-315 3-354 3-380 3-390 3-369 3-370

4 6

N

Legend

- Monitoring Well
- Geoprobe Groundwater Sample Location
- Geoprobe Groundwater Sample Location with Geologic Logging
- An Additional Groundwater Sample was Collected Approximately 20 feet Below the Depth of the Upper-Most Sample
- AOC 6
- Border of Area of Concern

Notes

1. All results for groundwater are shown in µg/L (micrograms per liter).
2. VC = vinyl chloride
   cDCE and cis-1,2-DCE = cis-1,2-Dichloroethene
   TCE = trichloroethylene
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: King County GIS.

0 150 300

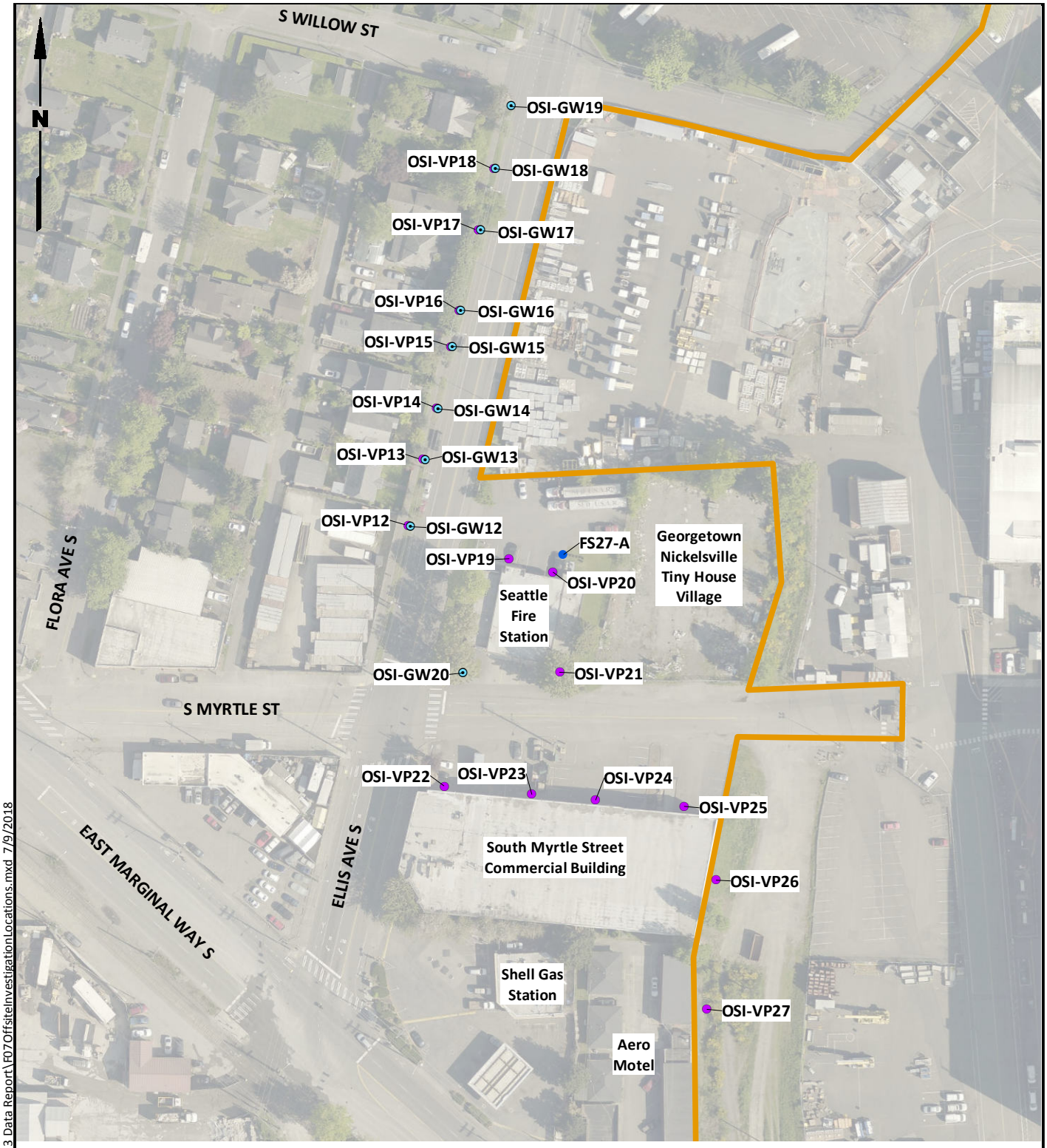
Scale in Feet

LANDAU ASSOCIATES

NBF/GTSP RI
Seattle, Washington

AOC 6
VC, cis-1,2-DCE, and TCE Concentrations in Groundwater

Figure 6



Legend

- City Monitoring Well FS27-A
- Soil Vapor Well Location
- Groundwater Grab Sample Location
- Site Boundary

0 120 240

Scale in Feet

Notes

1. Locations of features are approximate.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: King County Aerial Imagery

G:\Projects\025\082\918\124\Phase 3 Data Report\F07OffsiteInvestigationLocations.mxd 7/9/2018

LANDAU ASSOCIATES

NBF/GTSP RI Seattle, Washington	**Offsite Investigation Soil Gas and Groundwater Sample Locations**	Figure 7

G:\Projects\025\082\918\124\Phase 3 Data Report\F08AOC7GWcVOCs.mxd 7/9/2018

N

	AOC07-GW01		
	Shallow		
Date	VC	TCE	cDCE
9/20/2017	<0.06	<0.05	<0.04

	AOC07-GW02		
	Shallow		
Date	VC	TCE	cDCE
9/20/2017	<0.57	<0.49	<0.43
	Deep		
9/20/2017	<0.06	<0.05	<0.04

	AOC07-GW03		
	Shallow		
Date	VC	TCE	cDCE
9/20/2017	0.31	<0.05	<0.04
	Deep		
9/20/2017	<0.06	<0.05	<0.04

	AOC07-GW09		
	Shallow		
Date	VC	TCE	cDCE
9/21/2017	<0.06	<0.05	<0.04

	AOC07-GW05		
	Shallow		
Date	VC	TCE	cDCE
9/21/2017	<0.29	<0.24	<0.21
	Deep		
9/20/2017	<0.06	<0.05	<0.04

	AOC07-GW04		
	Shallow		
Date	VC	TCE	cDCE
9/21/2017	<0.29	<0.24	<0.21

	AOC07-GW07		
	Shallow		
Date	VC	TCE	cDCE
9/21/2017	<0.29	<0.24	<0.21

	AOC07-GW06		
	Shallow		
Date	VC	TCE	cDCE
9/21/2017	<0.29	<0.24	<0.21

	AOC07-GW08		
	Shallow		
Date	VC	TCE	cDCE
9/21/2017	<0.06	<0.05	<0.04
	Deep		
9/20/2017	0.17	<0.05	0.06

NGW308
NGW307
NGW311
NGW306
NGW305
NGW309
NGW303
NGW310
NGW301
NGW304
NGW302
NGW614
NGW626

3-390
3-800
3-801
3-802

Legend

- Monitoring Well
- Geoprobe Groundwater Sample Location
- Geoprobe Groundwater Sample Location with Geologic Logging
- An Additional Groundwater Sample was Collected Approximately 20 feet Below the Depth of the Upper-Most Sample
- AOC 7
- Border of Area of Concern

Notes

1. All results for groundwater are shown in µg/L (micrograms per liter).
2. VC = vinyl chloride
   cDCE and cis-1,2-DCE = cis-1,2-Dichloroethene
   TCE = trichloroethylene
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: King County GIS.

0 50 100
Scale in Feet

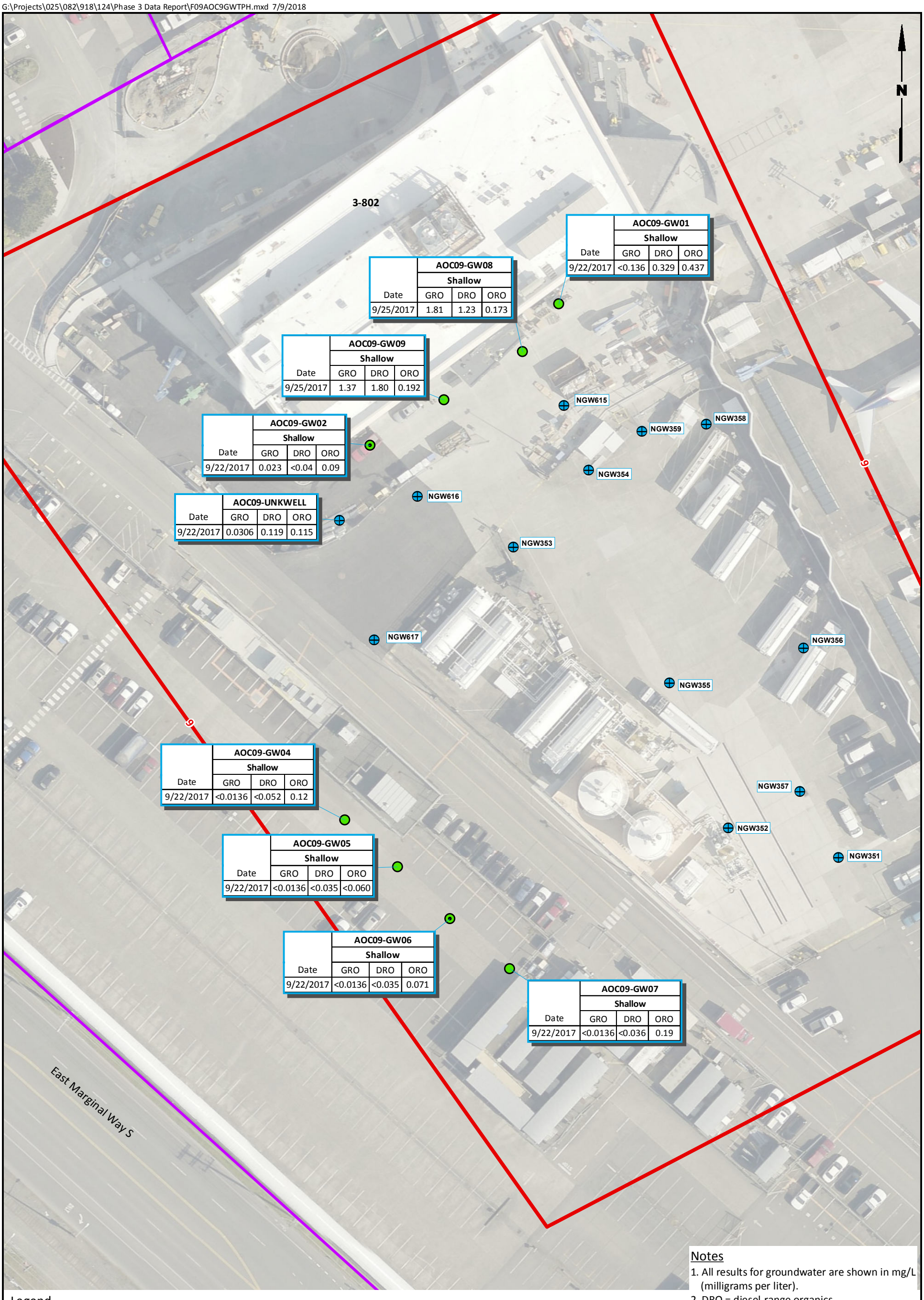
LANDAU ASSOCIATES

NBF/GTSP RI
Seattle, Washington

AOC 7
VC, cis-1,2-DCE, and TCE Concentrations in Groundwater

Figure
8

G:\Projects\025\082\918\124\Phase 3 Data Report\F09AOC9GWTPH.mxd 7/9/2018



Notes

1. All results for groundwater are shown in mg/L (milligrams per liter).
2. DRO = diesel-range organics
   GRO = gasoline-range organics
   ORO = oil-range organics
   TPH = total petroleum hydrocarbons.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Monitoring Well
- Geoprobe Groundwater Sample Location
- Geoprobe Groundwater Sample Location with Geologic Logging
- AOC 9
- Border of Area of Concern

0 50 100
Scale in Feet

Data Source: King County GIS.

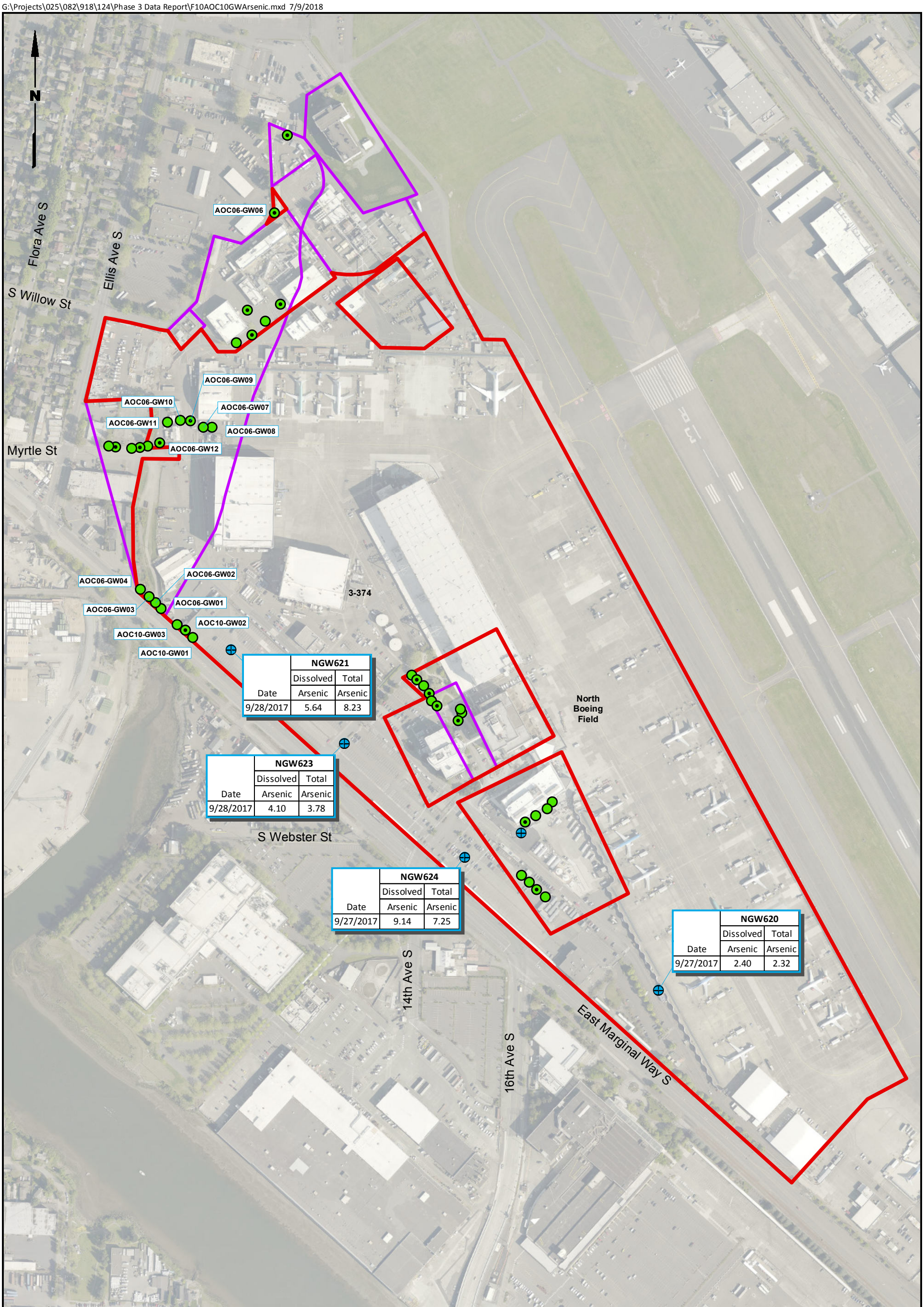
LANDAU ASSOCIATES

NBF/GTSP RI
Seattle, Washington

AOC 9
TPH Concentrations in Groundwater

Figure
9

G:\Projects\025\082\918\124\Phase 3 Data Report\F10AOC10GWArsenic.mxd 7/9/2018



	NGW621	
	Dissolved	Total
Date	Arsenic	Arsenic
9/28/2017	5.64	8.23

	NGW623	
	Dissolved	Total
Date	Arsenic	Arsenic
9/28/2017	4.10	3.78

	NGW624	
	Dissolved	Total
Date	Arsenic	Arsenic
9/27/2017	9.14	7.25

	NGW620	
	Dissolved	Total
Date	Arsenic	Arsenic
9/27/2017	2.40	2.32

Legend

- Monitoring Well
- Geoprobe Groundwater Sample Location
- Geoprobe Groundwater Sample Location with Geologic Logging
- AOC 10
- Border of Area of Concern

0 350 700
Scale in Feet

Data Source: King County GIS.

Notes

1. All results for groundwater are shown in µg/L (micrograms per liter).
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

LANDAU ASSOCIATES

NBF/GTSP RI
Seattle, Washington

AOC 10
Arsenic Concentrations in Groundwater

Figure
10

G:\Projects\025\082\918\124\Phase 3 Data Report\F11AOC10GWTPH.mxd 7/9/2018

N

Georgetown Steam Plant

AOC06-GW06

3-323
3-334
3-322
3-326
3-329
3-333
3-368
3-626
3-335
3-353
3-313
3-324
3-315
3-354

AOC06-GW09
3-350
AOC06-GW10
AOC06-GW07
AOC06-GW11
AOC06-GW08
AOC06-GW12

3-380

7-27-1
AOC06-GW04
AOC06-GW02
3-369
3-374
3-390
AOC06-GW03
AOC06-GW01
AOC10-GW02
AOC10-GW03
AOC10-GW01
3-370

	NGW621		
Date	GRO	DRO	ORO
9/28/2017	<0.0136	0.045	0.076

North Boeing Field

3-800
3-801
3-802

	NGW623		
Date	GRO	DRO	ORO
9/28/2017	<0.0136	0.075	0.21

	NGW624		
Date	GRO	DRO	ORO
9/27/2017	<0.0136	<0.033	0.099

	NGW620		
Date	GRO	DRO	ORO
9/27/2017	<0.0136	0.098	0.112

3-811
3-812

Flora Ave S
Ellis Ave S
S Willow St
Myrtle St
S Webster St
14th Ave S
16th Ave S
East Marginal Way S

Legend

- Monitoring Well
- Geoprobe Groundwater Sample Location
- Geoprobe Groundwater Sample Location with Geologic Logging
- AOC 10
- Border of Area of Concern

0 350 700
Scale in Feet

Data Source: King County GIS.

Notes

1. All results for groundwater are shown in mg/L (milligrams per liter).
2. DRO = diesel-range organics
   GRO = gasoline-range organics
   ORO = oil-range organics
   TPH = total petroleum hydrocarbons.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

LANDAU ASSOCIATES

NBF/GTSP RI
Seattle, Washington

AOC 10
TPH Concentrations in Groundwater

Figure
11

G:\Projects\025\082\918\124\Phase 3 Data Report\F12AOC10GWcVOCs.mxd 7/9/2018

N

Georgetown Steam Plant

AOC06-GW06

3-323

3-334

3-322

3-326

3-329

3-333

3-368

3-626

3-335

3-353

3-313

3-324

3-315

3-354

AOC06-GW09

3-350

AOC06-GW10

AOC06-GW07

AOC06-GW11

AOC06-GW08

AOC06-GW12

S Myrtle St

3-380

7-27-1

AOC06-GW04

AOC06-GW02

3-369

3-374

3-390

AOC06-GW03

AOC06-GW01

AOC10-GW02

AOC10-GW03

3-370

AOC10-GW01

	NGW621		
Date	VC	TCE	cDCE
9/28/2017	<0.06	<0.05	<0.04

North Boeing Field

3-800

3-801

3-802

	NGW623		
Date	VC	TCE	cDCE
9/28/2017	<0.06	<0.05	<0.04

S Webster St

	NGW624		
Date	VC	TCE	cDCE
9/27/2017	<0.06	<0.05	<0.04

	NGW620		
Date	VC	TCE	cDCE
9/27/2017	<0.06	<0.05	0.09

Flora Ave S

Ellis Ave S

S Willow St

14th Ave S

16th Ave S

East Marginal Way S

3-811

3-812

Notes

1. All results for groundwater are shown in µg/L (micrograms per liter).
2. VC = vinyl chloride
   cDCE and cis-1,2-DCE = cis-1,2-Dichloroethene
   TCE = trichloroethylene
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Monitoring Well
- Geoprobe Groundwater Sample Location
- Geoprobe Groundwater Sample Location with Geologic Logging
- AOC 10
- Border of Area of Concern

0 350 700

Scale in Feet

Data Source: King County GIS.

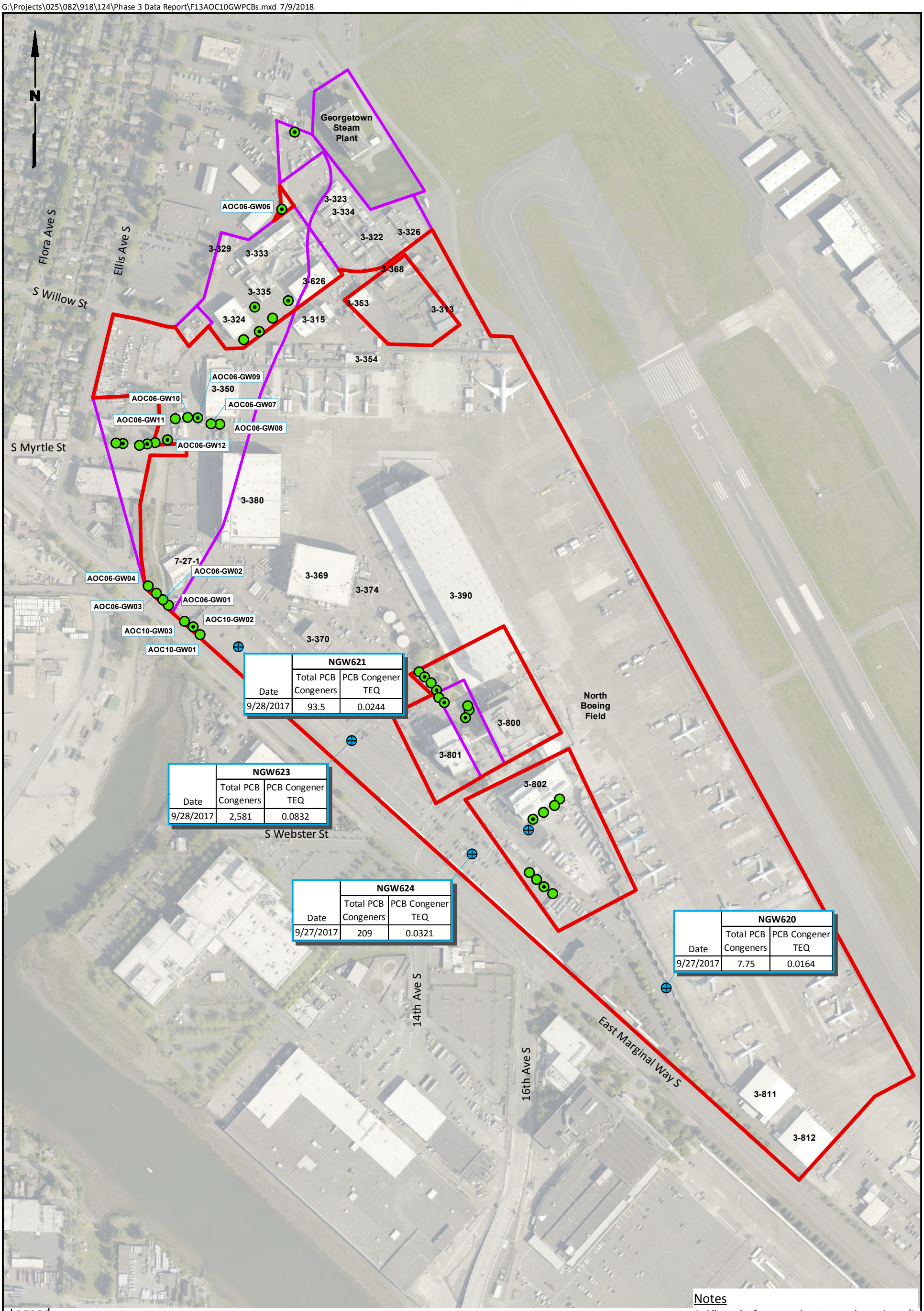
LANDAU ASSOCIATES

NBF/GTSP RI
Seattle, Washington

AOC 10
VC, cis-1,2-DCE, and TCE Concentrations in Groundwater

Figure
12

G:\Projects\025\082\918\124\Phase 3 Data Report\F13AOC10GWPCBs.mxd 7/9/2018



	NGW621	
Date	Total PCB Congeners	PCB Congener TEQ
9/28/2017	93.5	0.0244

	NGW623	
Date	Total PCB Congeners	PCB Congener TEQ
9/28/2017	2,581	0.0832

	NGW624	
Date	Total PCB Congeners	PCB Congener TEQ
9/27/2017	209	0.0321

	NGW620	
Date	Total PCB Congeners	PCB Congener TEQ
9/27/2017	7.75	0.0164

Legend

- Monitoring Well
- Geoprobe Groundwater Sample Location
- Geoprobe Groundwater Sample Location with Geologic Logging
- AOC 10
- Border of Area of Concern

0 350 700
Scale in Feet

Data Source: King County GIS.

Notes

1. All results for groundwater are shown in pg/L (picograms per liter).
2. PCBs = polychlorinated biphenyls.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

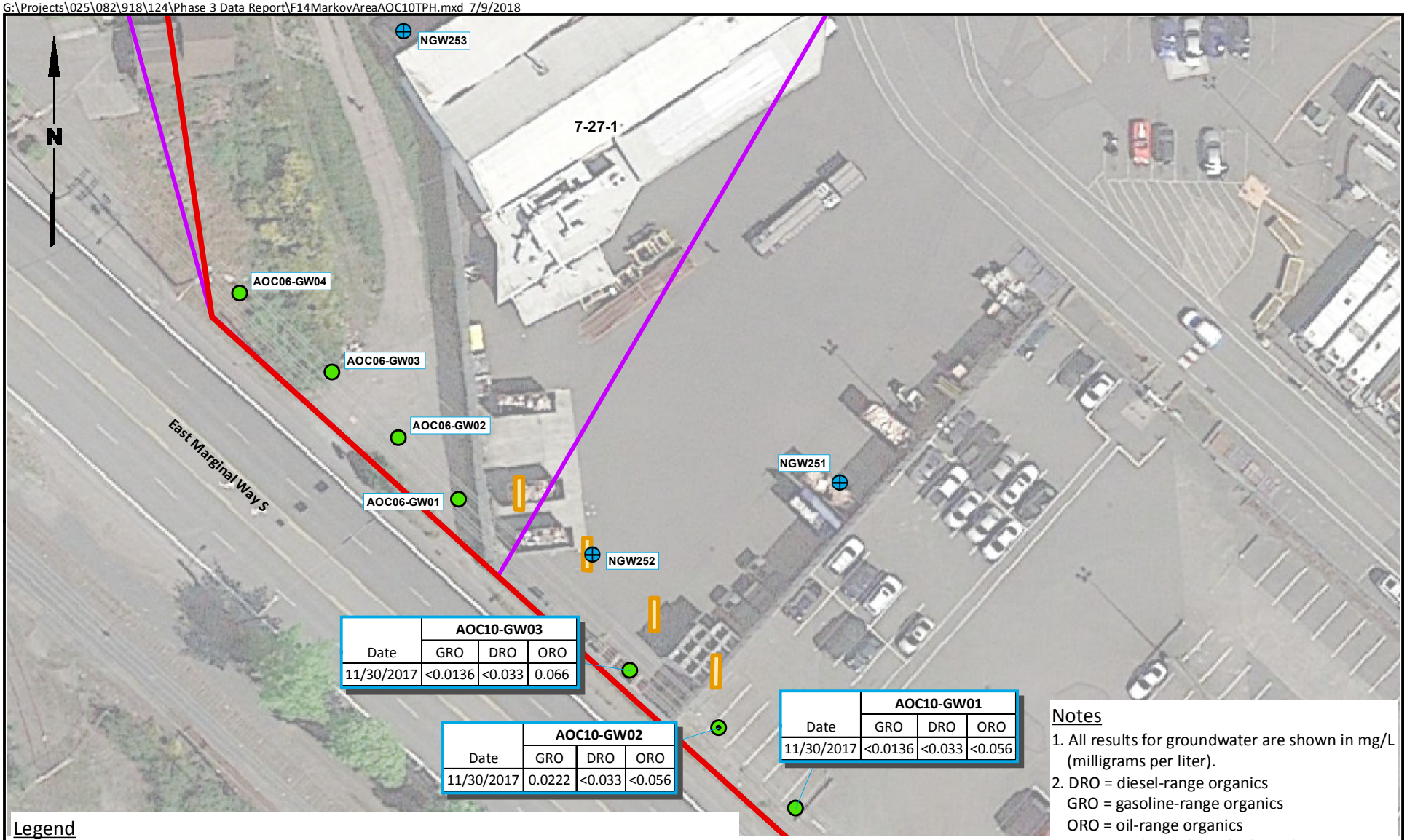
LANDAU ASSOCIATES

NBF/GTSP RI
Seattle, Washington

AOC 10
PCB Congener Concentrations in Groundwater

Figure
13

G:\Projects\025\082\918\124\Phase 3 Data Report\F14MarkovAreaAOC10TPH.mxd 7/9/2018



	AOC10-GW03		
Date	GRO	DRO	ORO
11/30/2017	<0.0136	<0.033	0.066

	AOC10-GW02		
Date	GRO	DRO	ORO
11/30/2017	0.0222	<0.033	<0.056

	AOC10-GW01		
Date	GRO	DRO	ORO
11/30/2017	<0.0136	<0.033	<0.056

Notes

1. All results for groundwater are shown in mg/L (milligrams per liter).
2. DRO = diesel-range organics
   GRO = gasoline-range organics
   ORO = oil-range organics
   TPH = total petroleum hydrocarbons.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Monitoring Well
- Geoprobe Groundwater Sample Location
- Geoprobe Groundwater Sample Location with Geologic Logging
- AOC 10
- Border of Area of Concern
- Former Pump Islands

Data Source: King County GIS.

0 50 100

Scale in Feet

LANDAU ASSOCIATES

NBF/GTSP RI
Seattle, Washington

AOC 10 - Markov Area
TPH Concentrations in Groundwater

Figure
14

Table 1
Sample Location Coordinates and Boring Details
NBF/GTSP RI Phase 3 Groundwater Investigation
Seattle, Washington

Sample Location	X Coordinates	Y Coordinates	Screen Depth Interval (feet)	Boring Depth (feet)	Boring Diameter (inches)
AOC04-GW01-S	1273956.45	200883.34	8-12	15.0	2.25
AOC04-GW02-S	1273898.14	200817.94	6-10	10.0	2.50
AOC04-GW03-S	1273829.83	200859.66	8-12	12.0	2.25
AOC04-GW04-S	1273847.33	200766.21	8-12	12.0	2.25
AOC04-GW05-S	1273787.28	200735.41	8-12	12.0	2.25
AOC06-GW01-S	1273500.66	199723.23	15-19	20.0	2.25
AOC06-GW02-S	1273479.26	199745.22	16-20	20.0	2.25
AOC06-GW03-S	1273455.47	199768.69	16-20	20.0	2.25
AOC06-GW04-S	1273422.42	199797.06	16-20	20.0	2.25
AOC06-GW05-S	1273981.52	201526.83	10-14	15.0	2.25
AOC06-GW06-S	1273932.76	201232.15	7.5-11.5	11.5	2.25
AOC06-GW07-S	1273662.31	200414.89	9-13	11.0	2.25
AOC06-GW08-S	1273695.79	200413.33	7-11	11.0	2.25
AOC06-GW09-S	1273612.81	200438.02	9-13	15.0	2.25
AOC06-GW10-S	1273574.37	200439.98	8.5-12.5	12.5	2.25
AOC06-GW11-S	1273525.78	200433.76	10-14	14.0	2.25
AOC06-GW12-S	1273495.88	200354.27	10-14	15.0	2.25
AOC06-GW12-D			30-34	35.0	
AOC06-GW13-S	1273450.05	200342.57	6.3-10.3	10.3	2.25
AOC06-GW14-S	1273419.69	200337.70	7-11	15.0	
AOC06-GW14-D			27-31	31.0	2.25
AOC06-GW15-S	1273389.08	200333.16	7-11	11.0	2.25
AOC06-GW16-S	1273326.96	200339.33	10-14	15.0	2.25
AOC06-GW16-D			30-34	35.0	
AOC06-GW17-S	1273300.94	200341.71	10-14	14.0	2.25
AOC07-GW01-S	1274456.27	199469.85	16-20	20.0	2.25
AOC07-GW02-S	1274476.07	199451.41	11-15	15.0	2.25
AOC07-GW02-D			31-35	35.0	
AOC07-GW03-S	1274522.78	199399.88	16-20	20.0	2.25
AOC07-GW03-D			36-40	40.0	
AOC07-GW04-S	1274531.63	199371.44	11-15	15.0	2.25
AOC07-GW05-S	1274551.81	199352.58	14-18	20.0	2.25
AOC07-GW05-D			34-38	40.0	
AOC07-GW06-S	1274647.15	199325.03	13-17	17.0	2.25
AOC07-GW07-S	1274640.96	199340.27	9.5-13.5	13.5	2.25
AOC07-GW08-S	1274632.82	199295.20	4-8	10.0	2.25
AOC07-GW08-D			24-28	30.0	
AOC07-GW09-S	1274501.31	199428.14	12.5-16.5	16.5	2.25
AOC09-GW01-S	1274991.80	198986.32	9-13	13.0	2.25
AOC09-GW02-S	1274889.05	198909.37	11.5-15.5	15.5	2.25
AOC09-GW04-S	1274875.21	198705.43	11-15	15.0	2.25
AOC09-GW05-S	1274903.84	198679.85	11-15	15.0	2.25
AOC09-GW06-S	1274932.39	198651.64	11-15	15.0	2.25
AOC09-GW07-S	1274964.92	198624.27	11-15	15.0	2.25
AOC09-GW08-S	1274971.89	198960.45	15-19	19.0	2.25
AOC09-GW09-S	1274929.15	198934.17	12-16	16.0	2.25
AOC09-UNKWELL	1274872.25	198868.55	N/A	approx. 15.3	N/A
AOC10-GW01	1273621.31	199612.72	11-15	15.0	2.25
AOC10-GW02	1273593.87	199641.47	13-17	20.0	2.25
AOC10-GW03	1273562.01	199662.01	16-20	20.0	2.25
NGW620	1275396.30	198267.96	4.8-14.8	15.1	3.75
NGW621	1273766.24	199566.97	4.8-14.8	15.1	3.75
NGW623	1274198.17	199210.10	4.6-14.6	14.9	4.00
NGW624	1274656.58	198777.06	4.6-14.6	14.9	4.00

Abbreviations and Acronyms:

N/A = not available

Notes:

Coordinate Datum: NAD 1983 StatePlane Washington North FIPS 4601 Feet.

Table 2
Groundwater Sample Analyses and Analytical Methods
NBF/GTSP RI Phase 3 Groundwater Investigation
Seattle, Washington

Sample Location	Sample Depth	Field Sample ID	Sample Date	Sample Type	Matrix	PCB Aroclors by SW-846 8082A	cVOCs by SW-846 8260 (a)	BTEX by SW-846 8260	TPH by NWTPH-Gx	TPH by NWTPH-Dx	Pthalates by SW-846 8270D	Total Metals by EPA 200.8, SW-846 7470A (b)	Dissolved Metals (Field Filtered) by EPA 200.8, SW-846 7470A (b)	PCB Congeners by SW-846 1668C
AOC04-GW01	Shallow	AOC4-GW01-S-092517	9/25/2017	N	GW	X			X	X		X	X	
AOC04-GW02	Shallow	AOC4-GW02-S-092517	9/25/2017	N	GW	X			X	X		X	X	
AOC04-GW03	Shallow	AOC4-GW03-S-092517	9/25/2017	N	GW	X			X	X		X	X	
AOC04-GW04	Shallow	AOC4-GW04-S-092517	9/25/2017	N	GW	X			X	X		X	X	
AOC04-GW05	Shallow	AOC4-GW05-S-092517	9/25/2017	N	GW	X			X	X		X	X	
		DUP01-092517	9/25/2017	FD	GW	X			X	X		X	X	
AOC06-GW01	Shallow	AOC6-GW01-S-092617	9/26/2017	N	GW		X	X						
AOC06-GW02	Shallow	AOC6-GW02-S-092617	9/26/2017	N	GW		X	X						
AOC06-GW03	Shallow	AOC6-GW03-S-092617	9/26/2017	N	GW		X	X						
AOC06-GW04	Shallow	AOC6-GW04-S-092617	9/26/2017	N	GW		X	X						
AOC06-GW05	Shallow	AOC06-GW05-S-091917	9/19/2017	N	GW		X	X						
AOC06-GW06	Shallow	AOC06-GW06-S-091917	9/19/2017	N	GW		X	X						
AOC06-GW07	Shallow	AOC6-GW07-S-092717	9/27/2017	N	GW		X	X						
AOC06-GW08	Shallow	AOC6-GW08-S-092717	9/27/2017	N	GW		X	X						
AOC06-GW09	Shallow	AOC06-GW09-S-091917	9/19/2017	N	GW		X	X						
AOC06-GW10	Shallow	AOC06-GW10-S-091917	9/19/2017	N	GW		X	X						
AOC06-GW11	Shallow	AOC6-GW11-S-092617	9/26/2017	N	GW		X	X						
AOC06-GW12	Shallow	AOC6-GW12-S-092717	9/27/2017	N	GW		X	X						
	Deep	AOC6-GW12-D-092717	9/27/2017	N	GW		X	X						
AOC06-GW13	Shallow	AOC6-GW13-S-112917	11/29/2017	N	GW		X	X						
	Shallow	DUP02-112917	11/29/2017	FD	GW		X	X						
AOC06-GW14	Shallow	AOC6-GW14-S-112917	11/29/2017	N	GW		X	X						
	Deep	AOC6-GW14-D-112917	11/29/2017	N	GW		X	X						
AOC06-GW15	Shallow	AOC6-GW15-S-112917	11/29/2017	N	GW		X	X						
AOC06-GW16	Shallow	AOC6-GW16-S-112917	11/29/2017	N	GW		X	X						
	Deep	AOC6-GW16-D-112917	11/29/2017	N	GW		X	X						
AOC06-GW17	Shallow	AOC6-GW17-S-112917	11/29/2017	N	GW		X	X						
AOC07-GW01	Shallow	AOC07-GW01-S-092017	9/20/2017	N	GW		X							
AOC07-GW02	Shallow	AOC07-GW02-S-092017	9/20/2017	N	GW		X							
	Deep	AOC07-GW02-D-092017	9/20/2017	N	GW		X							
AOC07-GW03	Shallow	AOC07-GW03-S-092017	9/20/2017	N	GW		X							
	Shallow	DUP03-092017	9/20/2017	FD	GW		X							
	Deep	AOC07-GW03-D-092017	9/20/2017	N	GW		X							
AOC07-GW04	Shallow	AOC07-GW04-S-092117	9/21/2017	N	GW		X							
AOC07-GW05	Shallow	AOC07-GW05-S-092117	9/21/2017	N	GW		X							
	Deep	AOC07-GW05-D-092117	9/21/2017	N	GW		X							
AOC07-GW06	Shallow	AOC07-GW06-S-092117	9/21/2017	N	GW		X							
AOC07-GW07	Shallow	AOC07-GW07-S-092117	9/21/2017	N	GW		X							
AOC07-GW08	Shallow	AOC07-GW08-S-092117	9/21/2017	N	GW		X							
	Deep	AOC07-GW08-D-092117	9/21/2017	N	GW		X							
AOC07-GW09	Shallow	AOC07-GW09-S-092017	9/20/2017	N	GW		X							
AOC09-GW01	Shallow	AOC09-GW01-S-092217	9/22/2017	N	GW		X		X	X				
AOC09-GW02	Shallow	AOC09-GW02-S-092217	9/22/2017	N	GW		X		X	X				
AOC09-GW04	Shallow	AOC09-GW04-S-092217	9/22/2017	N	GW		X		X	X				
AOC09-GW05	Shallow	AOC09-GW05-S-092217	9/22/2017	N	GW		X		X	X				
AOC09-GW06	Shallow	AOC09-GW06-S-092217	9/22/2017	N	GW		X		X	X				
AOC09-GW07	Shallow	AOC09-GW07-S-092217	9/22/2017	N	GW		X		X	X				
AOC09-GW08	Shallow	AOC9-GW08-S-092517	9/25/2017	N	GW		X		X	X				

Table 2
Groundwater Sample Analyses and Analytical Methods
NBF/GTSP RI Phase 3 Groundwater Investigation
Seattle, Washington

Sample Location	Sample Depth	Field Sample ID	Sample Date	Sample Type	Matrix	PCB Aroclors by SW-846 8082A	cVOCs by SW-846 8260 (a)	BTEX by SW-846 8260	TPH by NWTPH-Gx	TPH by NWTPH-Dx	Pthalates by SW-846 8270D	Total Metals by EPA 200.8, SW-846 7470A (b)	Dissolved Metals (Field Filtered) by EPA 200.8, SW-846 7470A (b)	PCB Congeners by SW-846 1668C
AOC09-GW09	Shallow	AOC9-GW09-S-092517	9/25/2017	N	GW		X		X	X				
	Shallow	DUP04-092517	9/25/2017	FD	GW		X		X	X				
AOC09-UNKWELL	N/A	AOC09-UNKWELL-092217	9/22/2017	N	GW		X		X	X				
AOC10-GW01	N/A	AOC10-GW01-113017	11/30/2017	N	GW		X	X	X	X				
	N/A	DUP06-113017	11/30/2017	FD	GW		X	X	X	X				
AOC10-GW02	N/A	AOC10-GW02-113017	11/30/2017	N	GW		X	X	X	X				
AOC10-GW03	N/A	AOC10-GW03-113017	11/30/2017	N	GW		X	X	X	X				
NGW620	N/A	NGW620-092717	9/27/2017	N	GW		X	X	X	X	X	X	X	X
NGW621	N/A	NGW621-092817	9/28/2017	N	GW		X	X	X	X	X	X	X	X
NGW623	N/A	NGW623-092817	9/28/2017	N	GW		X	X	X	X	X	X	X	X
NGW624	N/A	NGW624-092717	9/27/2017	N	GW		X	X	X	X	X	X	X	X
	N/A	DUP05-092717	9/27/2017	FD	GW		X	X	X	X	X	X	X	X

Notes:
(a) cVOCs consist of the following target analytes: vinyl chloride, trans-1,2-dichloroethene, cis-1,2-dichloroethene, 1-1-dichloroethene, trichloroethene, and tetrachloroethene.
(b) Metals consist of the following target analytes: arsenic, iron, and mercury.

Abbreviations and Acronyms:
BTEX = benzene, toluene, ethylbenzene, and xylenes
cVOC = chlorinated volatile organic compound
EPA = US Environmental Protection Agency
FD = field duplicate
GW = groundwater
ID = identification
N = original sample
N/A = not applicable
NWTPH = Northwest Total Petroleum Hydrocarbons
PCB = polychlorinated biphenyl

Table 3
Groundwater Analytical Results
NBF/GTSP RI Phase 3 Groundwater Investigation
Seattle, Washington

Sample Location:	AOC04-GW01	AOC04-GW02	AOC04-GW03	AOC04-GW04	AOC04-GW05	AOC04-GW05	AOC06-GW01	AOC06-GW02	AOC06-GW03	AOC06-GW04	AOC06-GW05
Sample Depth:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
Sample Date:	9/25/2017	9/25/2017	9/25/2017	9/25/2017	9/25/2017	9/25/2017	9/26/2017	9/26/2017	9/26/2017	9/26/2017	9/19/2017
Sample Type:	N	N	N	N	N	FD	N	N	N	N	N
Laboratory SDG:	17I0359	17I0359	17I0359	17I0359	17I0359	17I0359	17I0386	17I0386	17I0386	17I0386	17I0274
TOTAL METALS (µg/L; EPA 200.8/SW-846 7470A)											
Arsenic	**8.05**	**3.06 J**	**21.0**	**2.02**	**2.65**	**2.52**	--	--	--	--	--
Iron	**33,300**	**26,500**	**38,800**	**30,900**	**13,700**	**13,200**	--	--	--	--	--
Mercury	0.003 U	**0.016 J**	0.003 U	0.003 U	**0.052**	**0.02**	--	--	--	--	--
DISSOLVED METALS (µg/L; EPA 200.8/SW-846 7470A)											
Arsenic	**7.01**	**2.57 J**	**18.9**	**1.66**	**2.42**	**2.16**	--	--	--	--	--
Iron	**31,000**	**23,800**	**33,800**	**28,000**	**12,000**	**12,700**	--	--	--	--	--
Mercury	0.003 U	0.003 U	**0.003 J**	**0.003 J**	**0.004 J**	0.003 U	--	--	--	--	--
TOTAL PETROLEUM HYDROCARBONS (mg/L; NWTPH-Gx/-Dx)											
Gasoline-Range Organics	**0.0659 J**	**0.0155 J**	**0.0269 J**	0.0136 U	**0.0166 J**	0.0136 U	--	--	--	--	--
Diesel-Range Organics	**0.367**	**0.258**	**0.155**	0.060 U	**0.145**	**0.121**	--	--	--	--	--
Oil-Range Organics	**0.223**	**0.249**	**0.111 J**	**0.121 J**	**0.306**	**0.180 J**	--	--	--	--	--
POLYCHLORINATED BIPHENYLS (µg/L; SW-846 8082A; Aroclors)											
Aroclor 1016	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	--	--	--	--	--
Aroclor 1221	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	--	--	--	--	--
Aroclor 1232	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	--	--	--	--	--
Aroclor 1242	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	--	--	--	--	--
Aroclor 1248	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	--	--	--	--	--
Aroclor 1254	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	--	--	--	--	--
Aroclor 1260	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	--	--	--	--	--
Aroclor 1262	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	--	--	--	--	--
Aroclor 1268	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	--	--	--	--	--
Total PCBs	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	--	--	--	--	--
VOLATILE ORGANIC COMPOUNDS (µg/L; SW-846 8260C; BTEX)											
Benzene	--	--	--	--	--	--	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Toluene	--	--	--	--	--	--	**0.27**	**0.20**	**0.15 J**	**0.25**	0.04 U
Ethylbenzene	--	--	--	--	--	--	**0.05 J**	**0.05 J**	**0.06 J**	**0.08 J**	0.04 U
m,p-Xylene	--	--	--	--	--	--	**0.22 J**	**0.23 J**	**0.18 J**	**0.32 J**	0.05 U
o-Xylene	--	--	--	--	--	--	**0.05 J**	**0.07 J**	**0.05 J**	**0.10 J**	0.03 U
Total Xylenes	--	--	--	--	--	--	**0.27 J**	**0.30 J**	**0.23 J**	**0.42 J**	0.09 U
(µg/L; SW-846 8260C; cVOCs)											
1,1-Dichloroethene	--	--	--	--	--	--	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
cis-1,2-Dichloroethene	--	--	--	--	--	--	**0.18 J**	**0.10 J**	**0.15 J**	**0.39**	0.04 U
Tetrachloroethene	--	--	--	--	--	--	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
trans-1,2-Dichloroethene	--	--	--	--	--	--	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Trichloroethene	--	--	--	--	--	--	**0.08 J**	**0.08 J**	**0.09 J**	0.05 U	0.05 U
Vinyl Chloride	--	--	--	--	--	--	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
SEMIVOLATILE ORGANIC COMPOUNDS (µg/L; SW-846 8270D; Phthalates)											
bis(2-Ethylhexyl) Phthalate	--	--	--	--	--	--	--	--	--	--	--
Butyl Benzyl Phthalate	--	--	--	--	--	--	--	--	--	--	--
Diethyl Phthalate	--	--	--	--	--	--	--	--	--	--	--
Dimethyl Phthalate	--	--	--	--	--	--	--	--	--	--	--
Di-N-Butyl Phthalate	--	--	--	--	--	--	--	--	--	--	--
Di-n-octyl Phthalate	--	--	--	--	--	--	--	--	--	--	--

Table 3
Groundwater Analytical Results
NBF/GTSP RI Phase 3 Groundwater Investigation
Seattle, Washington

Sample Location:	AOC06-GW06	AOC06-GW07	AOC06-GW08	AOC06-GW09	AOC06-GW10	AOC06-GW11	AOC06-GW12		AOC6-GW13	AOC6-GW13	AOC6-GW14
Sample Depth:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Deep	Shallow	Shallow	Shallow
Sample Date:	9/19/2017	9/27/2017	9/27/2017	9/19/2017	9/19/2017	9/26/2017	9/27/2017	9/27/2017	11/29/2017	11/29/2017	11/29/2017
Sample Type:	N	N	N	N	N	N	N	N	N	FD	N
Laboratory SDG:	17I0274	17I0402	17I0402	17I0274	17I0274	17I0386	17I0402	17I0402	17L0030	17L0030	17L0030
TOTAL METALS (µg/L; EPA 200.8/SW-846 7470A)											
Arsenic	--	--	--	--	--	--	--	--	--	--	--
Iron	--	--	--	--	--	--	--	--	--	--	--
Mercury	--	--	--	--	--	--	--	--	--	--	--
DISSOLVED METALS (µg/L; EPA 200.8/SW-846 7470A)											
Arsenic	--	--	--	--	--	--	--	--	--	--	--
Iron	--	--	--	--	--	--	--	--	--	--	--
Mercury	--	--	--	--	--	--	--	--	--	--	--
TOTAL PETROLEUM HYDROCARBONS (mg/L; NWTPH-Gx/-Dx)											
Gasoline-Range Organics	--	--	--	--	--	--	--	--	--	--	--
Diesel-Range Organics	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	--	--	--	--	--	--	--	--	--	--	--
POLYCHLORINATED BIPHENYLS (µg/L; SW-846 8082A; Aroclors)											
Aroclor 1016	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1221	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1232	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1242	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1248	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1254	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1260	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1262	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1268	--	--	--	--	--	--	--	--	--	--	--
Total PCBs	--	--	--	--	--	--	--	--	--	--	--
VOLATILE ORGANIC COMPOUNDS (µg/L; SW-846 8260C; BTEX)											
Benzene	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Toluene	0.04 U	**0.17 J**	**0.36**	0.04 U	0.04 U	**0.19 J**	**0.20**	**0.36**	**0.04 J**	0.04 U	**0.06 J**
Ethylbenzene	0.04 U	0.04 U	**0.07 J**	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
m,p-Xylene	0.05 U	**0.16 J**	**0.34 J**	0.05 U	0.05 U	**0.19 J**	**0.19 J**	**0.28 J**	0.05 U	0.05 U	0.05 U
o-Xylene	0.03 U	**0.05 J**	**0.10 J**	0.03 U	0.03 U	**0.06 J**	**0.06 J**	**0.08 J**	0.03 U	0.03 U	0.03 U
Total Xylenes	0.09 U	**0.21 J**	**0.44 J**	0.09 U	0.09 U	**0.25 J**	**0.25 J**	**0.36 J**	0.09 U	0.09 U	0.09 U
(µg/L; SW-846 8260C; cVOCs)											
1,1-Dichloroethene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
cis-1,2-Dichloroethene	0.04 U	0.04 U	0.04 U	0.04 U	**0.08 J**	**0.21**	**4.92**	**1.45**	0.04 U	0.04 U	0.04 U
Tetrachloroethene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.44**	0.05 U	0.05 U	0.05 U	0.05 U
trans-1,2-Dichloroethene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.09 J**	**0.15 J**	0.05 U	0.05 U	0.05 U
Trichloroethene	**0.07 J**	0.05 U	0.05 U	0.05 U	0.05 U	**0.13 J**	**2.27**	**0.13 J**	**0.07 J**	**0.06 J**	0.05 U
Vinyl Chloride	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	**0.16 J**	**2.02**	0.06 U	0.06 U	0.06 U
SEMIVOLATILE ORGANIC COMPOUNDS (µg/L; SW-846 8270D; Phthalates)											
bis(2-Ethylhexyl) Phthalate	--	--	--	--	--	--	--	--	--	--	--
Butyl Benzyl Phthalate	--	--	--	--	--	--	--	--	--	--	--
Diethyl Phthalate	--	--	--	--	--	--	--	--	--	--	--
Dimethyl Phthalate	--	--	--	--	--	--	--	--	--	--	--
Di-N-Butyl Phthalate	--	--	--	--	--	--	--	--	--	--	--
Di-n-octyl Phthalate	--	--	--	--	--	--	--	--	--	--	--

Table 3
Groundwater Analytical Results
NBF/GTSP RI Phase 3 Groundwater Investigation
Seattle, Washington

Sample Location:	AOC6-GW14	AOC6-GW15	AOC6-GW16		AOC6-GW17	AOC07-GW01	AOC07-GW02		AOC07-GW03		
Sample Depth:	Deep	Shallow	Shallow	Deep	Shallow	Shallow	Shallow	Deep	Shallow		Deep
Sample Date:	11/29/2017	11/29/2017	11/29/2017	11/29/2017	11/29/2017	9/20/2017	9/20/2017	9/20/2017	9/20/2017	9/20/2017	9/20/2017
Sample Type:	N	N	N	N	N	N	N	N	N	FD	N
Laboratory SDG:	17L0030	17L0030	17L0030	17L0030	17L0030	17I0275	17I0275	17I0275	17I0275	17I0275	17I0275
TOTAL METALS (µg/L; EPA 200.8/SW-846 7470A)											
Arsenic	--	--	--	--	--	--	--	--	--	--	--
Iron	--	--	--	--	--	--	--	--	--	--	--
Mercury	--	--	--	--	--	--	--	--	--	--	--
DISSOLVED METALS (µg/L; EPA 200.8/SW-846 7470A)											
Arsenic	--	--	--	--	--	--	--	--	--	--	--
Iron	--	--	--	--	--	--	--	--	--	--	--
Mercury	--	--	--	--	--	--	--	--	--	--	--
TOTAL PETROLEUM HYDROCARBONS (mg/L; NWTPH-Gx/-Dx)											
Gasoline-Range Organics	--	--	--	--	--	--	--	--	--	--	--
Diesel-Range Organics	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Organics	--	--	--	--	--	--	--	--	--	--	--
POLYCHLORINATED BIPHENYLS (µg/L; SW-846 8082A; Aroclors)											
Aroclor 1016	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1221	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1232	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1242	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1248	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1254	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1260	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1262	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1268	--	--	--	--	--	--	--	--	--	--	--
Total PCBs	--	--	--	--	--	--	--	--	--	--	--
VOLATILE ORGANIC COMPOUNDS (µg/L; SW-846 8260C; BTEX)											
Benzene	**0.03 J**	0.03 U	0.03 U	**0.03 J**	0.03 U	--	--	--	--	--	--
Toluene	**0.06 J**	**0.04 J**	0.04 U	**0.05 J**	**0.04 J**	--	--	--	--	--	--
Ethylbenzene	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	--	--	--	--	--	--
m,p-Xylene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	--	--	--	--	--	--
o-Xylene	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	--	--	--	--	--	--
Total Xylenes	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	--	--	--	--	--	--
(µg/L; SW-846 8260C; cVOCs)											
1,1-Dichloroethene	0.05 U	0.05 U	**0.08 J**	0.05 U	0.05 U	0.05 U	0.54 U	0.05 U	0.05 U	0.05 U	0.05 U
cis-1,2-Dichloroethene	**0.84**	0.04 U	**15.3**	**0.38**	**4.82**	0.04 U	0.43 U	0.04 U	0.04 U	0.04 UJ	0.04 U
Tetrachloroethene	0.05 U	0.05 U	0.05 U	0.05 U	**0.06 J**	0.05 U	0.47 U	0.05 U	0.05 U	0.05 U	0.05 U
trans-1,2-Dichloroethene	**0.11 J**	0.05 U	**0.34**	**0.05 J**	**0.13 J**	0.05 U	0.49 U	0.05 U	0.05 U	0.05 U	0.05 U
Trichloroethene	**0.08 J**	0.05 U	**5.20**	**0.07 J**	**3.31**	0.05 U	0.49 U	0.05 U	0.05 U	0.05 U	0.05 U
Vinyl Chloride	**1.31**	0.06 U	0.06 U	**0.35**	0.06 U	0.06 U	0.57 U	0.06 U	**0.31**	**0.26**	0.06 U
SEMIVOLATILE ORGANIC COMPOUNDS (µg/L; SW-846 8270D; Phthalates)											
bis(2-Ethylhexyl) Phthalate	--	--	--	--	--	--	--	--	--	--	--
Butyl Benzyl Phthalate	--	--	--	--	--	--	--	--	--	--	--
Diethyl Phthalate	--	--	--	--	--	--	--	--	--	--	--
Dimethyl Phthalate	--	--	--	--	--	--	--	--	--	--	--
Di-N-Butyl Phthalate	--	--	--	--	--	--	--	--	--	--	--
Di-n-octyl Phthalate	--	--	--	--	--	--	--	--	--	--	--

Table 3
Groundwater Analytical Results
NBF/GTSP RI Phase 3 Groundwater Investigation
Seattle, Washington

Sample Location:	AOC07-GW04	AOC07-GW05		AOC07-GW06	AOC07-GW07	AOC07-GW08		AOC07-GW09	AOC09-GW01	AOC09-GW02	AOC09-GW04
Sample Depth:	Shallow	Shallow	Deep	Shallow	Shallow	Shallow	Deep	Shallow	Shallow	Shallow	Shallow
Sample Date:	9/21/2017	9/21/2017	9/21/2017	9/21/2017	9/21/2017	9/21/2017	9/21/2017	9/20/2017	9/22/2017	9/22/2017	9/22/2017
Sample Type:	N	N	N	N	N	N	N	N	N	N	N
Laboratory SDG:	17I0337	17I0337	17I0337	17I0337	17I0337	17I0337	17I0337	17I0275	17I0335	17I0335	17I0335
TOTAL METALS (µg/L; EPA 200.8/SW-846 7470A)											
Arsenic	--	--	--	--	--	--	--	--	--	--	--
Iron	--	--	--	--	--	--	--	--	--	--	--
Mercury	--	--	--	--	--	--	--	--	--	--	--
DISSOLVED METALS (µg/L; EPA 200.8/SW-846 7470A)											
Arsenic	--	--	--	--	--	--	--	--	--	--	--
Iron	--	--	--	--	--	--	--	--	--	--	--
Mercury	--	--	--	--	--	--	--	--	--	--	--
TOTAL PETROLEUM HYDROCARBONS (mg/L; NWTPH-Gx/-Dx)											
Gasoline-Range Organics	--	--	--	--	--	--	--	--	0.136 U	**0.0234 J**	0.0136 U
Diesel-Range Organics	--	--	--	--	--	--	--	--	**0.329**	0.040 U	0.052 U
Oil-Range Organics	--	--	--	--	--	--	--	--	**0.437**	**0.093 J**	**0.117 J**
POLYCHLORINATED BIPHENYLS (µg/L; SW-846 8082A; Aroclors)											
Aroclor 1016	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1221	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1232	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1242	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1248	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1254	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1260	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1262	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1268	--	--	--	--	--	--	--	--	--	--	--
Total PCBs	--	--	--	--	--	--	--	--	--	--	--
VOLATILE ORGANIC COMPOUNDS (µg/L; SW-846 8260C; BTEX)											
Benzene	--	--	--	--	--	--	--	--	0.27 U	0.03 U	0.03 U
Toluene	--	--	--	--	--	--	--	--	0.40 U	0.05 U	**0.34**
Ethylbenzene	--	--	--	--	--	--	--	--	0.37 U	0.04 U	**0.07 J**
m,p-Xylene	--	--	--	--	--	--	--	--	0.52 U	0.05 U	**0.22 J**
o-Xylene	--	--	--	--	--	--	--	--	0.35 U	0.03 U	**0.08 J**
Total Xylenes	--	--	--	--	--	--	--	--	0.87 U	0.09 U	**0.31 J**
(µg/L; SW-846 8260C; cVOCs)											
1,1-Dichloroethene	0.27 U	0.27 U	0.05 U	0.27 U	0.27 U	0.05 U	0.05 U	0.05 U	--	--	--
cis-1,2-Dichloroethene	0.21 U	0.21 U	0.04 U	0.21 U	0.21 U	0.04 U	**0.06 J**	0.04 U	--	--	--
Tetrachloroethene	0.24 U	0.24 U	0.05 U	0.24 U	0.24 U	0.05 U	0.05 U	0.05 U	--	--	--
trans-1,2-Dichloroethene	0.24 U	0.24 U	0.05 U	0.24 U	0.24 U	0.05 U	0.05 U	0.05 U	--	--	--
Trichloroethene	0.24 U	0.24 U	0.05 U	0.24 U	0.24 U	0.05 U	0.05 U	0.05 U	--	--	--
Vinyl Chloride	0.29 U	0.29 U	0.06 U	0.29 U	0.29 U	0.06 U	**0.17 J**	0.06 U	--	--	--
SEMIVOLATILE ORGANIC COMPOUNDS (µg/L; SW-846 8270D; Phthalates)											
bis(2-Ethylhexyl) Phthalate	--	--	--	--	--	--	--	--	--	--	--
Butyl Benzyl Phthalate	--	--	--	--	--	--	--	--	--	--	--
Diethyl Phthalate	--	--	--	--	--	--	--	--	--	--	--
Dimethyl Phthalate	--	--	--	--	--	--	--	--	--	--	--
Di-N-Butyl Phthalate	--	--	--	--	--	--	--	--	--	--	--
Di-n-octyl Phthalate	--	--	--	--	--	--	--	--	--	--	--

Table 3
Groundwater Analytical Results
NBF/GTSP RI Phase 3 Groundwater Investigation
Seattle, Washington

Sample Location:	AOC09-GW05	AOC09-GW06	AOC09-GW07	AOC09-GW08	AOC09-GW09	AOC09-GW09	AOC09-UNKWELL	AOC10-GW01	AOC10-GW01	AOC10-GW02	AOC10-GW03
Sample Depth:	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	N/A	N/A	N/A	N/A	N/A
Sample Date:	9/22/2017	9/22/2017	9/22/2017	9/25/2017	9/25/2017	9/25/2017	9/22/2017	11/30/2017	11/30/2017	11/30/2017	11/30/2017
Sample Type:	N	N	N	N	N	FD	N	N	FD	N	N
Laboratory SDG:	17I0335	17I0335	17I0335	17I0358	17I0358	17I0358	17I0335	17L0021	17L0021	17L0021	17L0021
TOTAL METALS (µg/L; EPA 200.8/SW-846 7470A)											
Arsenic	--	--	--	--	--	--	--	--	--	--	--
Iron	--	--	--	--	--	--	--	--	--	--	--
Mercury	--	--	--	--	--	--	--	--	--	--	--
DISSOLVED METALS (µg/L; EPA 200.8/SW-846 7470A)											
Arsenic	--	--	--	--	--	--	--	--	--	--	--
Iron	--	--	--	--	--	--	--	--	--	--	--
Mercury	--	--	--	--	--	--	--	--	--	--	--
TOTAL PETROLEUM HYDROCARBONS (mg/L; NWTPH-Gx/-Dx)								--	--	--	
Gasoline-Range Organics	0.0136 U	0.0136 U	0.0136 U	**1.81**	**1.37**	**1.39**	**0.0306 J**	0.0136 UJ	0.0136 UJ	**0.0222 J**	0.0136 UJ
Diesel-Range Organics	0.035 U	0.035 UJ	0.036 U	**1.23**	**1.80**	**1.91**	**0.119 J**	0.033 U	0.033 U	0.033 U	0.033 U
Oil-Range Organics	0.060 U	**0.071 J**	**0.190 J**	**0.173 J**	**0.192 J**	**0.217**	**0.115 J**	0.056 U	0.056 U	0.056 U	**0.066 J**
POLYCHLORINATED BIPHENYLS (µg/L; SW-846 8082A; Aroclors)											
Aroclor 1016	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1221	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1232	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1242	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1248	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1254	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1260	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1262	--	--	--	--	--	--	--	--	--	--	--
Aroclor 1268	--	--	--	--	--	--	--	--	--	--	--
Total PCBs	--	--	--	--	--	--	--	--	--	--	--
VOLATILE ORGANIC COMPOUNDS (µg/L; SW-846 8260C; BTEX)											
Benzene	0.03 U	0.03 U	0.03 U	**0.05 J**	0.03 U	**0.03 J**	0.03 U	0.03 U	0.03 U	**0.06 J**	**0.16 J**
Toluene	0.05 U	0.17 U	**0.23**	0.19 U	**0.29**	**0.30**	0.04 U	**0.06 J**	**0.05 J**	**0.07 J**	**0.12 J**
Ethylbenzene	0.04 U	0.04 U	0.04 U	**0.05 J**	**0.05 J**	**0.06 J**	0.04 U	0.04 U	0.04 U	**0.04 J**	**0.06 J**
m,p-Xylene	0.05 U	**0.11 J**	**0.13 J**	**0.32 J**	**0.53**	**0.58**	0.05 U	0.05 U	0.05 U	**0.10 J**	**0.21 J**
o-Xylene	0.03 U	0.03 U	**0.04 J**	**0.22**	**0.18 J**	**0.17 J**	0.03 U	0.03 U	0.03 U	0.03 U	**0.04 J**
Total Xylenes	0.09 U	**0.13 J**	**0.17 J**	**0.54 J**	**0.70**	**0.75**	0.09 U	0.09 U	0.09 U	**0.10 J**	**0.25 J**
(µg/L; SW-846 8260C; cVOCs)											
1,1-Dichloroethene	--	--	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	--	--	--	--	--	--	--	--	--	--	--
trans-1,2-Dichloroethene	--	--	--	--	--	--	--	--	--	--	--
Trichloroethene	--	--	--	--	--	--	--	--	--	--	--
Vinyl Chloride	--	--	--	--	--	--	--	--	--	--	--
SEMIVOLATILE ORGANIC COMPOUNDS (µg/L; SW-846 8270D; Phthalates)											
bis(2-Ethylhexyl) Phthalate	--	--	--	--	--	--	--	--	--	--	--
Butyl Benzyl Phthalate	--	--	--	--	--	--	--	--	--	--	--
Diethyl Phthalate	--	--	--	--	--	--	--	--	--	--	--
Dimethyl Phthalate	--	--	--	--	--	--	--	--	--	--	--
Di-N-Butyl Phthalate	--	--	--	--	--	--	--	--	--	--	--
Di-n-octyl Phthalate	--	--	--	--	--	--	--	--	--	--	--

Table 3
Groundwater Analytical Results
NBF/GTSP RI Phase 3 Groundwater Investigation
Seattle, Washington

Sample Location:	NGW620	NGW621	NGW623	NGW624	NGW624
Sample Depth:	N/A	N/A	N/A	N/A	N/A
Sample Date:	9/27/2017	9/28/2017	9/28/2017	9/27/2017	9/27/2017
Sample Type:	N	N	N	N	FD
Laboratory SDG:	17I0403	17I0433	17I0433	17I0403	17I0403
TOTAL METALS (µg/L; EPA 200.8/SW-846 7470A)					
Arsenic	**2.32**	**8.23**	**3.78**	**7.25**	**8.08**
Iron	**12,800**	**17,400**	**7,610**	**21,200**	**21,400**
Mercury	**0.004 J**	**0.005 J**	**0.006 J**	**0.004 J**	**0.006 J**
DISSOLVED METALS (µg/L; EPA 200.8/SW-846 7470A)					
Arsenic	**2.40**	**5.64**	**4.10**	**9.14**	**7.47**
Iron	**12,600**	**13,900**	**6,960**	**16,500**	**20,400**
Mercury	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U
TOTAL PETROLEUM HYDROCARBONS (mg/L; NWTPH-Gx/-Dx)					
Gasoline-Range Organics	0.0136 U	0.0136 U	0.0136 U	0.0136 U	0.0136 U
Diesel-Range Organics	**0.098 J**	**0.045 J**	**0.075 J**	0.033 U	0.033 U
Oil-Range Organics	**0.112 J**	**0.076 J**	**0.210**	**0.099 J**	**0.106 J**
POLYCHLORINATED BIPHENYLS (µg/L; SW-846 8082A; Aroclors)					
Aroclor 1016	--	--	--	--	--
Aroclor 1221	--	--	--	--	--
Aroclor 1232	--	--	--	--	--
Aroclor 1242	--	--	--	--	--
Aroclor 1248	--	--	--	--	--
Aroclor 1254	--	--	--	--	--
Aroclor 1260	--	--	--	--	--
Aroclor 1262	--	--	--	--	--
Aroclor 1268	--	--	--	--	--
Total PCBs	--	--	--	--	--
VOLATILE ORGANIC COMPOUNDS (µg/L; SW-846 8260C; BTEX)					
Benzene	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Toluene	0.04 U	**0.09 J**	**0.17 J**	0.04 U	0.04 U
Ethylbenzene	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
m,p-Xylene	0.05 U	**0.09 J**	**0.08 J**	0.05 U	0.05 U
o-Xylene	0.03 U	**0.05 J**	0.03 U	0.03 U	0.03 U
Total Xylenes	0.09 U	**0.14 J**	**0.11 J**	0.09 U	0.09 U
(µg/L; SW-846 8260C; cVOCs)					
1,1-Dichloroethene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
cis-1,2-Dichloroethene	**0.09 J**	0.04 U	0.04 U	0.04 U	0.04 U
Tetrachloroethene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
trans-1,2-Dichloroethene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Trichloroethene	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Vinyl Chloride	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
SEMIVOLATILE ORGANIC COMPOUNDS (µg/L; SW-846 8270D; Phthalates)					
bis(2-Ethylhexyl) Phthalate	0.5 U	**1.5 J**	**1.1 J**	0.5 U	0.5 U
Butyl Benzyl Phthalate	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Diethyl Phthalate	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Dimethyl Phthalate	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Di-N-Butyl Phthalate	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Di-n-octyl Phthalate	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U

Abbreviations and Acronyms:
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes
cVOCs = chlorinated Volatile Organic Compounds
EPA = US Environmental Protection Agency
FD = field duplicate
ID = Identification
µg/L = micrograms per liter
mg/L = milligrams per liter
-- = Not Analyzed
N = original sample
SDG = Sample Delivery Group

U = The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
UJ = The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
Bold = Detection

Table 4
PCB Congener Results
NBF/GTSP RI Phase 3 Groundwater Investigation
Seattle, Washington

Sample Location:	NGW620	NGW621	NGW623	NGW624	NGW624
Sample Depth:	N/A	N/A	N/A	N/A	N/A
Sample Date:	9/27/2017	9/28/2017	9/28/2017	9/27/2017	9/27/2017
Sample Type:	N	N	N	N	FD
Laboratory SDG:	1701354	1701354	1701354	1701354	1701354
POLYCHLORINATED BIPHENYLS (pg/L; SW-846 1668C; Congeners)					
PCB-1	1.49 U	0.232 U	4.81 U	0.990 U	1.03 U
PCB-2	0.767 U	1.03 U	2.27 U	1.05 U	1.06 U
PCB-3	1.49 U	1.07 U	4.41 U	1.64 U	0.243 U
PCB-4	0.748 U	0.811 U	16.3 U	1.05 U	0.719 U
PCB-5	0.437 U	0.450 U	0.665 U	0.467 U	0.392 U
PCB-6	0.454 U	0.467 U	**12.7**	0.485 U	0.407 U
PCB-7	0.410 U	0.422 U	0.624 U	0.438 U	0.368 U
PCB-8	1.57 U	1.73 U	**53.5**	1.81 U	**1.74 J**
PCB-9	0.477 U	0.490 U	0.725 U	0.509 U	0.427 U
PCB-10	0.463 U	0.502 U	0.847 U	0.648 U	0.445 U
PCB-11	7.96 U	9.40 U	38.5 U	8.87 U	11.3 UJ
PCB-12/13	0.421 U	0.425 U	**2.34 J**	0.452 U	0.356 U
PCB-14	0.368 U	0.371 U	0.582 U	0.394 U	0.311 U
PCB-15	0.372 U	0.375 U	17.2 U	0.399 U	0.314 U
PCB-16	0.395 U	0.854 U	39.4 U	0.678 U	0.435 U
PCB-17	0.288 U	1.11 U	34.6 U	0.496 U	0.318 U
PCB-18/30	0.843 U	1.75 U	68.8 U	0.432 U	1.47 UJ
PCB-19	0.338 U	0.472 U	10.0 U	0.585 U	0.410 U
PCB-20/28	1.51 U	2.05 U	54.7 U	2.22 U	2.00 U
PCB-21/33	0.785 U	1.72 U	**36.0**	0.550 U	0.951 U
PCB-22	0.536 U	0.971 U	22.8 U	0.369 U	0.709 U
PCB-23	0.213 U	0.280 U	0.478 U	0.355 U	0.236 U
PCB-24	0.222 U	0.295 U	1.35 U	0.381 U	0.245 U
PCB-25	0.203 U	0.266 U	5.68 U	0.337 U	0.225 U
PCB-26/29	0.200 U	0.264 U	**11.3**	0.334 U	0.222 U
PCB-27	0.212 U	0.283 U	**5.90**	0.365 U	0.234 U
PCB-31	0.808 U	1.61 U	51.7 U	1.80 U	1.43 U
PCB-32	0.565 U	0.838 U	22.9 U	0.344 U	0.903 U
PCB-34	0.204 U	0.268 U	0.458 U	0.340 U	0.226 U
PCB-35	0.270 U	0.330 U	0.809 U	0.409 U	0.387 U
PCB-36	0.248 U	0.303 U	0.787 U	0.375 U	0.354 U
PCB-37	0.477 U	0.500 U	7.68 U	0.744 U	0.358 U
PCB-38	0.263 U	0.322 U	0.836 U	0.398 U	0.376 U
PCB-39	0.239 U	0.292 U	0.760 U	0.362 U	0.342 U
PCB-40/41/71	0.231 U	1.25 U	20.8 U	1.56 U	1.05 U
PCB-42	0.237 U	0.499 U	10.5 U	0.516 U	0.492 U
PCB-43	0.283 U	0.569 U	0.705 U	0.629 U	0.560 U
PCB-44/47/65	50.1 U	33.2 U	103 U	34.3 U	12.2 U
PCB-45/51	10.2 U	10.7 U	9.62 U	10.0 U	2.91 U
PCB-46	0.494 U	0.824 U	4.87 U	0.924 U	0.668 U
PCB-48	0.239 U	0.481 U	9.11 U	0.531 U	0.473 U
PCB-49/69	1.23 U	2.39 U	**50.9**	2.10 U	2.17 U
PCB-50/53	0.414 U	0.690 U	18.9 U	0.774 U	0.559 U
PCB-52	1.76 U	9.61 U	**262**	7.28 U	10.2 U
PCB-54	0.343 U	0.572 U	1.75 U	0.642 U	0.464 U
PCB-55	0.247 U	0.325 U	0.639 U	0.316 U	0.331 U
PCB-56	0.255 U	1.08 U	10.2 U	0.326 U	1.25 U
PCB-57	0.238 U	0.311 U	0.662 U	0.349 U	0.331 U
PCB-58	0.227 U	0.297 U	0.632 U	0.333 U	0.316 U
PCB-59/62/75	0.172 U	0.363 U	**3.60 J**	0.375 U	0.357 U
PCB-60	0.239 U	0.314 U	4.41 U	0.306 U	0.444 U
PCB-61/70/74/76	1.74 U	7.27 U	**101**	5.94 U	8.57 U
PCB-63	0.213 U	0.279 U	1.17 U	0.313 U	0.297 U
PCB-64	0.161 U	0.959 U	24.8 U	1.35 U	1.27 U
PCB-66	0.481 U	0.322 U	24.7 U	1.88 U	2.40 U
PCB-67	0.220 U	0.288 U	0.613 U	0.323 U	0.306 U
PCB-68	6.20 U	3.44 U	0.586 U	5.78 U	0.683 U
PCB-72	0.229 U	0.300 U	0.639 U	0.337 U	0.319 U
PCB-73	0.188 U	0.377 U	0.467 U	0.417 U	0.371 U

Table 4
PCB Congener Results
NBF/GTSP RI Phase 3 Groundwater Investigation
Seattle, Washington

Sample Location:	NGW620	NGW621	NGW623	NGW624	NGW624
Sample Depth:	N/A	N/A	N/A	N/A	N/A
Sample Date:	9/27/2017	9/28/2017	9/28/2017	9/27/2017	9/27/2017
Sample Type:	N	N	N	N	FD
Laboratory SDG:	1701354	1701354	1701354	1701354	1701354
PCB-77	0.290 U	0.741 U	0.966 U	0.357 U	0.466 U
PCB-78	0.244 U	0.320 U	0.630 U	0.311 U	0.326 U
PCB-79	0.197 U	0.258 U	0.508 U	0.251 U	0.263 U
PCB-80	0.215 U	0.282 U	0.555 U	0.274 U	0.287 U
PCB-81	0.289 U	0.361 U	0.725 U	0.365 U	0.409 U
PCB-82	1.05 U	1.46 U	**10.6**	1.60 U	1.62 U
PCB-83/99	0.812 U	3.13 U	**56.2**	5.22 U	**8.23 J**
PCB-84	0.716 U	3.96 U	**50.2**	4.15 U	**4.99 J**
PCB-85/116/117	3.49 U	1.04 U	**15.9**	3.39 U	**3.91 J**
PCB-86/87/97/109/119/125	0.733 U	7.52 U	**42.5**	9.67 U	12.8 U
PCB-88/91	0.597 U	0.897 U	**26.8**	1.14 U	**1.93 J**
PCB-89	0.892 U	1.23 U	2.88 U	1.27 U	0.997 U
PCB-90/101/113	0.691 U	15.7 U	**126**	13.2 U	**17.4**
PCB-92	0.792 U	3.13 U	**24.0**	1.13 U	2.90 U
PCB-93/98/100/102	0.593 U	0.892 U	5.41 U	1.02 U	0.727 U
PCB-94	0.676 U	1.02 U	2.62 U	1.16 U	0.829 U
PCB-95	2.24 U	12.7 U	**178**	9.20 UJ	**14.7 J**
PCB-96	0.203 U	0.339 U	**2.41 J**	0.399 U	0.250 U
PCB-103	0.557 U	0.837 U	2.16 U	0.953 U	0.683 U
PCB-104	0.182 U	0.304 U	0.520 U	0.357 U	0.224 U
PCB-105	0.968 U	4.99 U	18.6 U	4.15 U	5.92 U
PCB-106	0.316 U	0.541 U	1.01 U	0.573 U	0.458 U
PCB-107	0.276 U	0.472 U	**3.97 J**	0.500 U	**0.929 J**
PCB-108/124	0.321 U	0.550 U	**3.68 J**	0.583 U	0.465 U
PCB-110/115	0.668 U	18.6 U	**131**	18.3 U	25.9 U
PCB-111	0.630 U	0.872 U	2.15 U	0.957 U	0.764 U
PCB-112	0.582 U	0.803 U	1.88 U	0.831 U	0.650 U
PCB-114	0.253 U	0.427 U	**0.985 J**	0.472 U	0.383 U
PCB-118	1.58 U	**11.7**	**45.1**	**9.52**	13.7 U
PCB-120	0.605 U	0.838 U	2.06 U	0.920 U	0.735 U
PCB-121	0.577 U	0.796 U	1.86 U	0.823 U	0.645 U
PCB-122	0.285 U	0.481 U	0.904 U	0.533 U	0.432 U
PCB-123	0.296 U	0.506 U	0.948 U	0.536 U	0.429 U
PCB-126	0.231 U	0.377 U	**0.711 J**	0.466 U	0.385 U
PCB-127	0.225 U	0.375 U	0.641 U	0.417 U	0.369 U
PCB-128/166	**0.730 J**	**3.40 J**	**30.6**	**7.66 J**	**7.99 J**
PCB-129/138/160/163	**5.05 J**	**20.3**	**144**	**36.7**	**43.4**
PCB-130	0.632 U	0.765 U	**10.1**	**2.49 J**	**3.75 J**
PCB-131	0.613 U	0.730 U	2.63 U	1.55 U	0.598 U
PCB-132	0.608 U	**7.36**	**44.7**	**8.65 J**	**12.4 J**
PCB-133	0.609 U	0.725 U	1.63 U	1.54 U	0.594 U
PCB-134/143	0.631 U	0.752 U	**5.86 J**	1.59 U	0.616 U
PCB-135/151	0.366 U	**5.35 J**	**42.9**	**7.05 J**	4.97 U
PCB-136	0.291 U	**2.32 J**	**21.3**	2.81 U	**4.28 J**
PCB-137	0.500 U	**1.37 J**	**4.62 J**	**2.84 J**	1.71 U
PCB-139/140	0.558 U	**0.747 J**	**3.18 J**	1.41 U	0.544 U
PCB-141	0.557 U	3.06 U	**23.4**	2.94 U	5.50 U
PCB-142	0.646 U	0.770 U	1.73 U	1.63 U	0.631 U
PCB-144	0.356 U	0.422 U	**5.62**	0.512 U	**0.971 J**
PCB-145	0.301 U	0.357 U	0.578 U	0.433 U	0.301 U
PCB-146	0.508 U	2.02 U	**21.5**	**4.52 J**	**5.60**
PCB-147/149	3.89 U	11.7 U	**100**	**21.3**	**25.3**
PCB-148	0.376 U	0.446 U	0.721 U	0.540 U	0.375 U
PCB-150	0.285 U	0.338 U	0.546 U	0.410 U	0.285 U
PCB-152	0.279 U	0.331 U	0.535 U	0.401 U	0.279 U
PCB-153/168	2.24 U	**13.1**	**86.1**	**22.8**	**25.9**
PCB-154	0.340 U	0.404 U	0.653 U	0.489 U	0.340 U
PCB-155	0.262 U	0.311 U	0.503 U	0.377 U	0.262 U
PCB-156/157	**0.948 J**	**3.32 J**	**15.0**	**3.61 J**	3.81 U
PCB-158	0.341 U	1.47 U	**13.2**	**3.85 J**	3.58 U
PCB-159	0.202 U	0.213 U	2.22 U	0.338 U	0.368 U

Table 4
PCB Congener Results
NBF/GTSP RI Phase 3 Groundwater Investigation
Seattle, Washington

Sample Location:	NGW620	NGW621	NGW623	NGW624	NGW624
Sample Depth:	N/A	N/A	N/A	N/A	N/A
Sample Date:	9/27/2017	9/28/2017	9/28/2017	9/27/2017	9/27/2017
Sample Type:	N	N	N	N	FD
Laboratory SDG:	1701354	1701354	1701354	1701354	1701354
PCB-161	0.441 U	0.526 U	1.18 U	1.12 U	0.431 U
PCB-162	0.194 U	0.204 U	0.401 U	0.373 U	0.398 U
PCB-164	0.391 U	**1.77 J**	**13.8**	**3.23 J**	2.98 U
PCB-165	0.452 U	0.539 U	1.21 U	1.14 U	0.442 U
PCB-167	0.186 U	0.969 U	**6.32**	1.07 U	**1.50 J**
PCB-169	0.316 U	0.327 U	0.635 U	0.548 U	0.624 U
PCB-170	**1.02 J**	**4.37 J**	**56.2**	10.7 U	8.08 U
PCB-171/173	0.488 U	0.465 U	0.408 U	**5.10 J**	**3.35 J**
PCB-172	0.517 U	1.10 U	10.4 U	0.763 U	**1.85 J**
PCB-174	0.479 U	3.81 U	**59.3**	**13.0**	10.1 U
PCB-175	0.438 U	0.528 U	**3.38 J**	0.652 U	0.936 U
PCB-176	0.349 U	0.421 U	**5.83**	1.20 U	**1.34 J**
PCB-177	0.504 U	**2.00 J**	**36.5**	7.55 U	7.99 U
PCB-178	0.454 U	0.763 U	11.7 U	**3.34 J**	2.31 U
PCB-179	0.369 U	1.59 U	**27.2**	**4.70 J**	3.47 U
PCB-180/193	1.20 U	**7.28 J**	**137**	**18.9**	**22.6**
PCB-181	0.445 U	1.25 U	**15.4**	0.657 U	0.643 U
PCB-182	0.414 U	0.500 U	0.950 U	0.617 U	0.505 U
PCB-183/185	0.437 U	2.51 U	**37.0**	**8.49 J**	**8.43 J**
PCB-184	0.380 U	0.459 U	0.873 U	0.567 U	0.464 U
PCB-186	0.349 U	0.421 U	0.800 U	0.519 U	0.425 U
PCB-187	2.29 U	2.91 U	**97.2**	14.8 U	**14.1**
PCB-188	0.347 U	0.419 U	0.797 U	0.518 U	0.424 U
PCB-189	0.410 U	0.347 U	**2.77 J**	0.682 U	0.477 U
PCB-190	0.467 U	0.765 U	**9.67**	**2.49 J**	0.676 U
PCB-191	0.415 U	0.395 U	1.88 U	0.612 U	0.599 U
PCB-192	0.427 U	0.407 U	0.357 U	0.630 U	0.617 U
PCB-194	1.40 U	**2.93 J**	**45.3**	**6.30**	**6.46**
PCB-195	0.475 U	0.974 U	**16.3**	**2.82 J**	2.80 U
PCB-196	0.465 U	**1.70 J**	25.3 U	2.91 U	**2.49 J**
PCB-197	0.243 U	0.227 U	1.46 U	0.670 U	0.829 U
PCB-198/199	0.477 U	**1.93 J**	**58.9**	6.47 U	**8.14 J**
PCB-200	0.324 U	0.302 U	5.65 U	0.893 U	1.11 U
PCB-201	0.263 U	**0.426 J**	**6.53**	**1.25 J**	0.898 U
PCB-202	0.288 U	**0.775 J**	**13.9**	1.68 U	**2.14 J**
PCB-203	0.440 U	1.15 U	**35.4**	**5.01**	**4.59 J**
PCB-204	0.296 U	0.276 U	0.241 U	0.815 U	1.01 U
PCB-205	0.350 U	0.208 U	**2.82 J**	1.29 U	0.859 U
PCB-206	0.738 U	**1.40 J**	**39.4**	**3.44 J**	**3.87 J**
PCB-207	0.766 U	0.481 U	3.48 U	0.689 U	0.891 U
PCB-208	0.784 U	0.493 U	**9.03**	1.38 U	0.912 U
PCB-209	0.822 U	0.373 U	**16.0**	1.15 U	1.60 U
Total PCB Congeners (a)	**7.75 J**	**93.5 J**	**2,581 J**	**209 J**	**264 J**
PCB Congeners TEQ (b)	**0.0164 J**	**0.0244 J**	**0.0832 J**	**0.0321 J**	**0.0291 J**

Acronyms/Abbreviations:
FD = field duplicate
N = primary sample
PCB = polychlorinated biphenyl
pg/L = picograms per liter
SDG = sample delivery group
TEF = toxic equivalency factor
TEQ = toxicity equivalency quotient

Notes:
U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
UJ = The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
Bold = Detection

(a) Total PCB congeners were calculated using only detected values for the individual congener results. If none of the 209 PCB congers are detected in a sample, the total PCB congener result will be equal to the highest reporting detection limit of the individual congeners and assigned a U-qualifier.

(b) TEQ concentrations for PCB congeners were calculated using the World Health Organization multiplied by one-half the U-qualified result consensus for TEF values (Van den Berg et al. 2006) for mammals. The TEQ concentration is calculated as the sum of each detected congener concentration multiplied by the corresponding TEF value. If the congener concentration is non-detect, the TEF is multiplied by one-half the U-qualified result.

Table 5
Soil Gas Sample Results
NBF/GTSP RI Soil Vapor and Groundwater Investigation
Seattle, Washington

Sample Location	Sample Date	Sample Type	Laboratory Sample ID	VOCs by TO-15 (µg/m3)	
				Trichloroethene	Vinyl Chloride
				Soil Gas Screening Levels Protective of Residential Indoor Air	
Locations West of Ellis Avenue S.				12	9.4
OSI-VP12	5/1/2018	N	1805074-09A	6.0 U	2.8 U
OSI-VP13	5/9/2018	N	1805211-05A	6.5 U	3.1 U
OSI-VP14	5/1/2018	N	1805074-08A	6.7 U	3.2 U
OSI-VP15	5/1/2018	N	1805074-07A	6.5 U	3.1 U
OSI-VP16	5/1/2018	N	1805074-06A	6.4 U	3.0 U
OSI-VP17	5/1/2018	N	1805074-05A	6.3 U	3.0 U
OSI-VP18	5/1/2018	N	1805074-04A	6.5 U	3.1 U
				Soil Gas Screening Levels Protective of Commercial Indoor Air	
Locations East of Ellis Avenue S.				80	37
OSI-VP19	5/9/2018	N	1805211-06A	6.5 U	3.1 U
OSI-VP20	5/9/2018	N	1805211-03A	6.3 U	3.0 U
OSI-VP21	5/9/2018	N	1805211-07A	6.0 U	2.9 U
OSI-VP22	5/9/2018	N	1805211-01A	6.8 U	3.2 U
OSI-VP23	5/9/2018	N	1805211-02A	6.3 U	3.0 U
OSI-VP24	5/9/2018	N	1805211-04A	6.7 U	3.2 U
OSI-VP25	5/9/2018	N	1805211-08A	6.3 U	3.0 U
OSI-VP26	5/1/2018	N	1805074-01A	6.3 U	3.0 U
OSI-VP27	5/1/2018	N	1805074-02A	6.6 U	3.2 U
OSI-VP27	5/1/2018	FD	1805074-03A	6.0 U	2.9 U

Notes:

Bold text indicates detected analyte

U = The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.

Abbreviations and Acronyms:

FD = field duplicate

ID = Identification

µg/m^3 = micrograms per cubic meter

N = primary sample

VOCs = volatile organic compounds

Table 6
Offsite Investigation Groundwater Sample Results
NBF/GTSP RI Phase 3 Groundwater Investigation Seattle, Washington

Sample Location	Sample Date	Sample Type	Laboratory Sample ID	VOCs by SW-846 8260C (µg/L)			
				cis-1,2-Dichloroethene	Tetrachloroethene	Trichloroethene	Vinyl Chloride
				Groundwater Screening Levels Protective of Residential Indoor Air			
Locations West of Ellis Avenue S.				N/A	24	1.6	0.35
OSI-GW12	4/24/2018	N	18D0373-03	0.20 U	0.20 U	0.20 U	0.20 U
OSI-GW13	5/3/2018	N	18E0073-01	0.20 U	0.20 U	0.20 U	0.20 U
OSI-GW14	4/24/2018	N	18D0373-02	0.20 U	0.20 U	0.20 U	0.20 U
OSI-GW15	4/24/2018	N	18D0373-01	0.20 U	0.20 U	0.20 U	0.20 U
OSI-GW16	4/23/2018	N	18D0353-04	0.20 U	0.20 U	0.20 U	0.20 U
OSI-GW17	4/23/2018	N	18D0353-03	0.20 U	0.20 U	0.20 U	0.20 U
OSI-GW18	4/23/2018	N	18D0353-02	0.20 U	0.20 U	0.20 U	0.20 U
OSI-GW19	4/23/2018	N	18D0353-01	0.20 U	0.20 U	0.20 U	0.20 U
				Groundwater Screening Levels Protective of Commercial Indoor Air			
Locations East of Ellis Avenue S.				N/A	94	10	1.4
OSI-GW20	5/4/2018	FD	18E0105-01	0.20 U	0.20 U	0.20 U	0.20 U
OSI-GW20	5/4/2018	N	18E0105-02	0.20 U	0.20 U	0.20 U	0.20 U
FS27-A	5/4/2018	N	18E0105-03	**4.31**	**0.06 J**	**2.48**	0.20 U

Notes:

Bold text indicates detected analyte

U = The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

Abbreviations and Acronyms:

FD = field duplicate

ID = Identification

µg/L = micrograms per liter

N = primary sample

N/A = not applicable

VOCs = volatile organic compounds

APPENDIX A

Boring Logs

Soil Classification System

MAJOR DIVISIONS			GRAPHIC SYMBOL	USCS LETTER SYMBOL[1]	TYPICAL DESCRIPTIONS [2][3]
COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (Little or no fines)		GW	Well-graded gravel; gravel/sand mixture(s); little or no fines
				GP	Poorly graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)		GM	Silty gravel; gravel/sand/silt mixture(s)
				GC	Clayey gravel; gravel/sand/clay mixture(s)
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No. 4 sieve)	CLEAN SAND (Little or no fines)		SW	Well-graded sand; gravelly sand; little or no fines
				SP	Poorly graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)		SM	Silty sand; sand/silt mixture(s)
				SC	Clayey sand; sand/clay mixture(s)
FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size)	SILT AND CLAY (Liquid limit less than 50)			ML	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with slight plasticity
				CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay
				OL	Organic silt; organic, silty clay of low plasticity
	SILT AND CLAY (Liquid limit greater than 50)			MH	Inorganic silt; micaceous or diatomaceous fine sand
				CH	Inorganic clay of high plasticity; fat clay
				OH	Organic clay of medium to high plasticity; organic silt
	HIGHLY ORGANIC SOIL			PT	Peat; humus; swamp soil with high organic content

OTHER MATERIALS	GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
PAVEMENT		AC or PC	Asphalt concrete pavement or Portland cement pavement
ROCK		RK	Rock (See Rock Classification)
WOOD		WD	Wood, lumber, wood chips
DEBRIS		DB	Construction debris, garbage

Notes:
1. USCS letter symbols correspond to symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e.g., SP-SM for sand or gravel) indicate soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.
2. Soil descriptions are based on the general approach presented in the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the Standard Test Method for Classification of Soils for Engineering Purposes, as outlined in ASTM D 2487.
3. Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:

Primary Constituent:	> 50% - "GRAVEL," "SAND," "SILT," "CLAY," etc.
Secondary Constituents:	> 30% and ≤ 50% - "very gravelly," "very sandy," "very silty," etc.
	> 15% and ≤ 30% - "gravelly," "sandy," "silty," etc.
Additional Constituents:	> 5% and ≤ 15% - "with gravel," "with sand," "with silt," etc.
	≤ 5% - "with trace gravel," "with trace sand," "with trace silt," etc., or not noted.

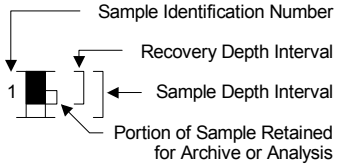
4. Soil density or consistency descriptions are based on judgement using a combination of sampler penetration blow counts, drilling or excavating conditions, field tests, and laboratory tests, as appropriate.

Drilling and Sampling Key

SAMPLER TYPE

Code	Description
a	3.25-inch O.D., 2.42-inch I.D. Split Spoon
b	2.00-inch O.D., 1.50-inch I.D. Split Spoon
c	Shelby Tube
d	Grab Sample
e	Single-Tube Core Barrel
f	Double-Tube Core Barrel
g	2.50-inch O.D., 2.00-inch I.D. WSDOT
h	3.00-inch O.D., 2.375-inch I.D. Mod. California
i	Other - See text if applicable
1	300-lb Hammer, 30-inch Drop
2	140-lb Hammer, 30-inch Drop
3	Pushed
4	Vibrocore (Rotosonic/Geoprobe)
5	Other - See text if applicable

SAMPLE NUMBER & INTERVAL



Field and Lab Test Data

Code	Description
PP = 1.0	Pocket Penetrometer, tsf
TV = 0.5	Torvane, tsf
PID = 100	Photoionization Detector VOC screening, ppm
W = 10	Moisture Content, %
D = 120	Dry Density, pcf
-200 = 60	Material smaller than No. 200 sieve, %
GS	Grain Size - See separate figure for data
AL	Atterberg Limits - See separate figure for data
GT	Other Geotechnical Testing
CA	Chemical Analysis

Groundwater

▽ Approximate water level at time of drilling (ATD)

▼ Approximate water level at time other than ATD

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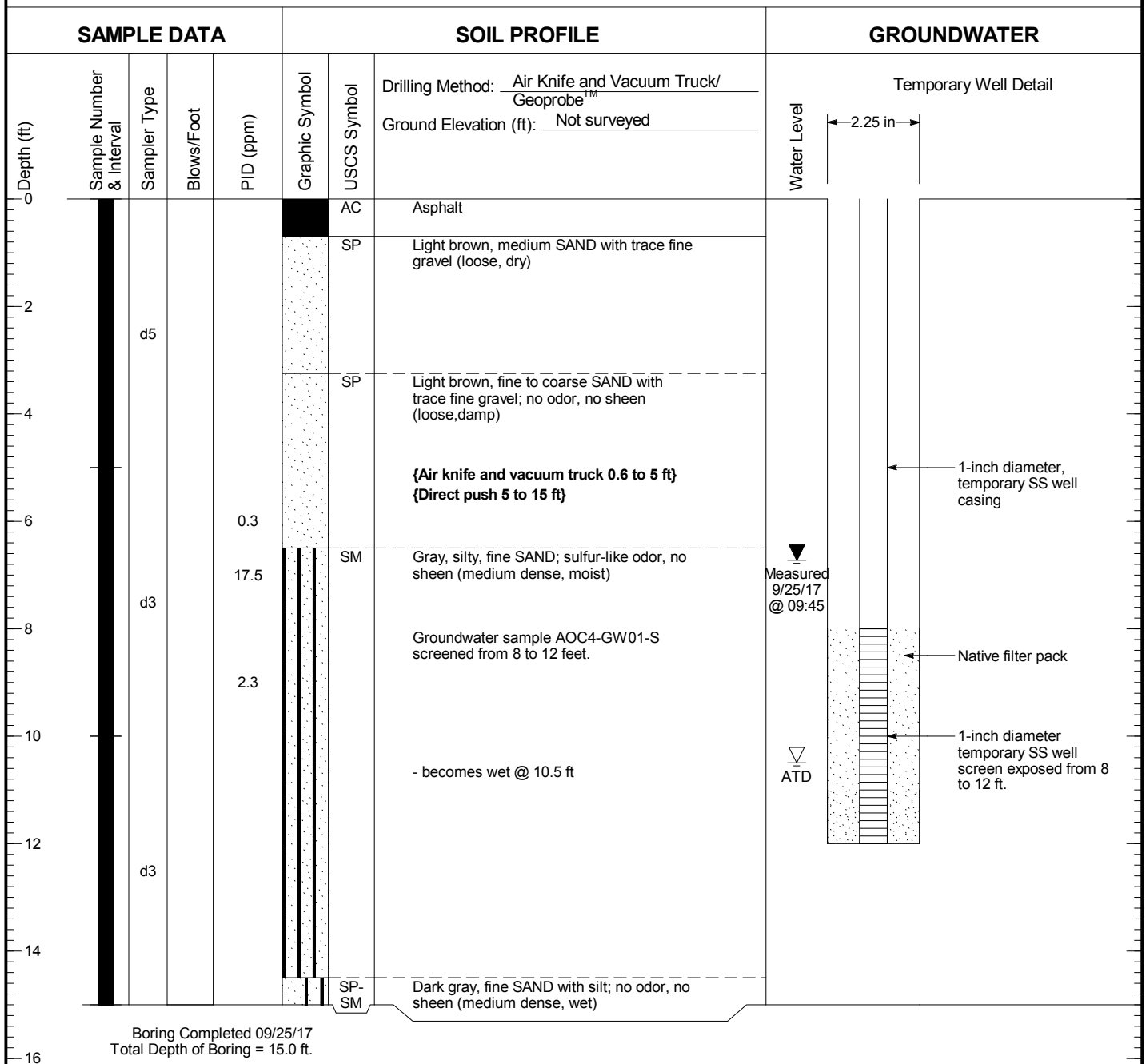
North Boeing Field - RI Phase III Seattle, WA

Soil Classification System and Key

Figure A-1

AOC4-GW01



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

25082.916 6/9/18 N:\PROJECTS\BOEING\025082.916.123.GPJ WELL LOG

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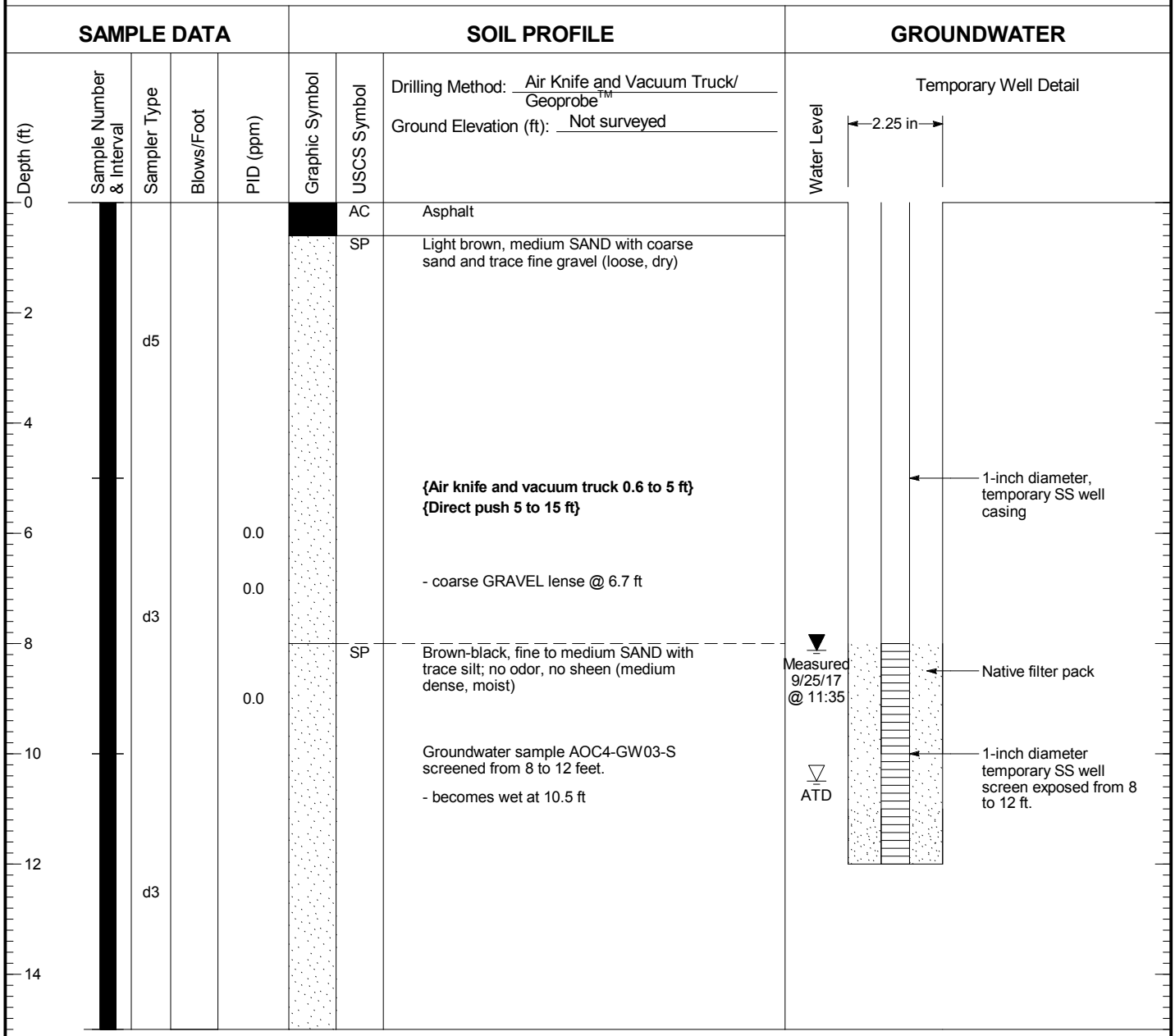
North Boeing Field - RI Phase III Seattle, WA

Log of Temporary Well AOC4-GW01

Figure A-2

AOC4-GW03



Boring Completed 09/25/17
Total Depth of Boring = 15.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

25082.916 6/9/18 N:\PROJECTS\BOEING\025082.916.123.GPJ WELL LOG

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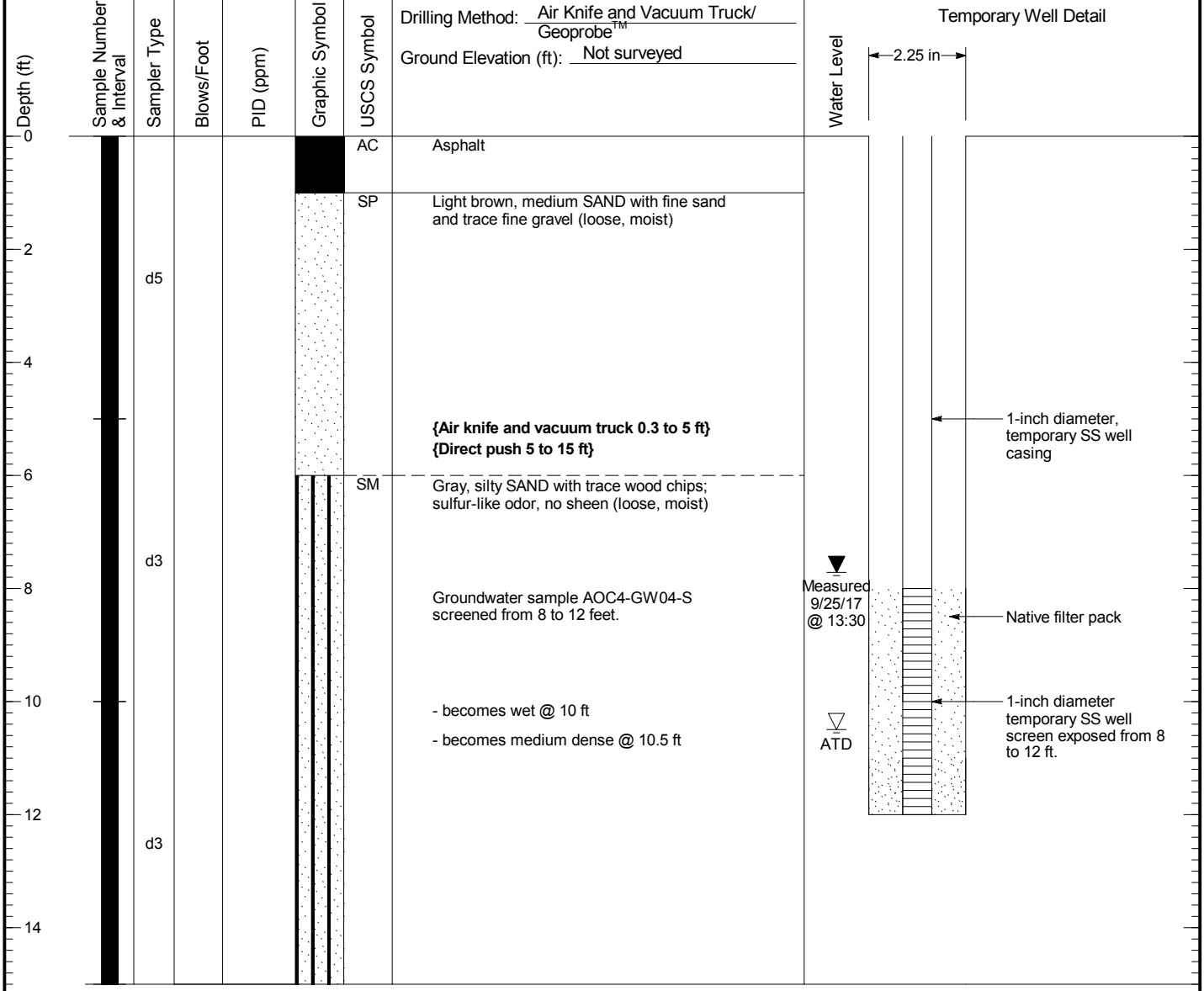
North Boeing Field - RI Phase III Seattle, WA	Log of Temporary Well AOC4-GW03	Figure A-3

AOC4-GW04

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Air Knife and Vacuum Truck/ Geoprobe™

Ground Elevation (ft): Not surveyed



Boring Completed 09/25/17
Total Depth of Boring = 15.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

25082.916 6/9/18 N:\PROJECTS\BOEING\025082.916.123.GPJ WELL LOG

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North Boeing Field - RI Phase III Seattle, WA

Log of Temporary Well AOC4-GW04

Figure A-4

AOC6-GW05

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	
0						AC	Asphalt
						SP	Light brown, fine SAND with trace fine gravel (loose, dry)
							- with trace medium sand @ 1.3 ft
2		d5					
4							**{Air knife and vacuum truck 0.3 to 5 ft}** **{Direct push 5 to 15 ft}**
6						SP	Brown, fine to medium SAND with trace silt; no odor, no sheen (loose, damp)
				0.0			- silt lense 1/4-inch thick @ 7.25 ft
8		d3		0.0		SP	Dark gray, fine to medium SAND with trace silt (loose, moist)
						ML	
				0.0			Gray, SILT with trace fine sand (medium stiff, moist)
10				0.0		SP	Dark grayish-black, fine to medium SAND (medium dense, wet)
				0.0			
12				0.0			Groundwater sample AOC6-GW05-S screened from 10 to 14 feet.
				0.0			
14				0.0			- silty SAND lense 2.4 inches thick @ 14 ft
16							
18							
20							

Water Level: Measured 9/19/17 @ 12:20 ATD

Temporary Well Detail (2.25 in)

- 1-inch diameter, temporary SS well casing
- Native filter pack
- 1-inch diameter temporary SS well screen exposed from 10 to 14 ft.

Boring Completed 09/19/17
Total Depth of Boring = 15.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

Drilling Method: Air Knife and Vacuum Truck/ Geoprobe™
Ground Elevation (ft): Not surveyed

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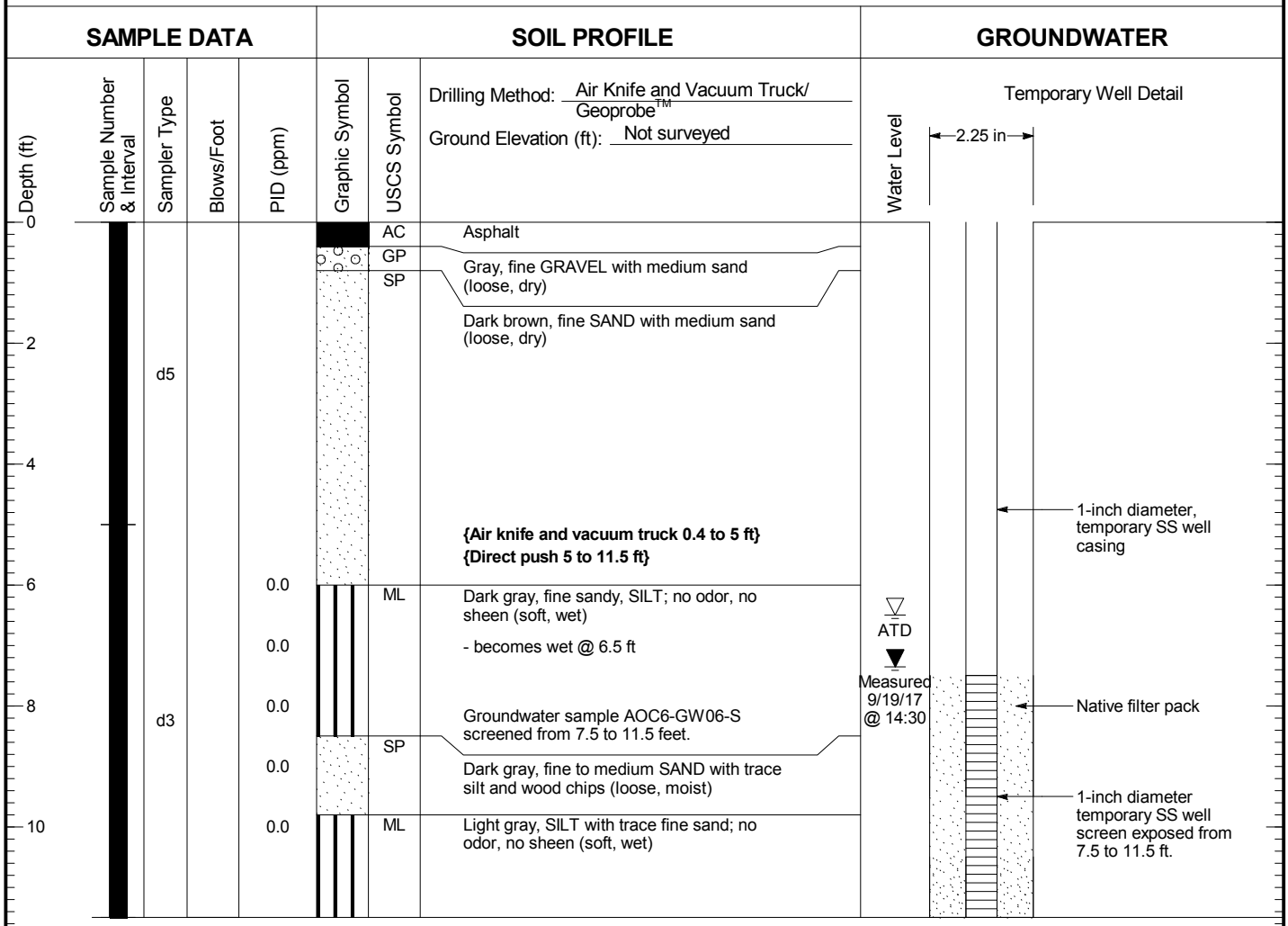
North Boeing Field - RI Phase III Seattle, WA

Log of Temporary Well AOC6-GW05

Figure A-5

AOC6-GW06



Boring Completed 09/19/17
Total Depth of Boring = 11.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

25082.916 6/9/18 N:\PROJECTS\BOEING\025082.916.123.GPJ WELL LOG

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North Boeing Field - RI Phase III Seattle, WA	Log of Temporary Well AOC6-GW06	Figure A-6

AOC6-GW09

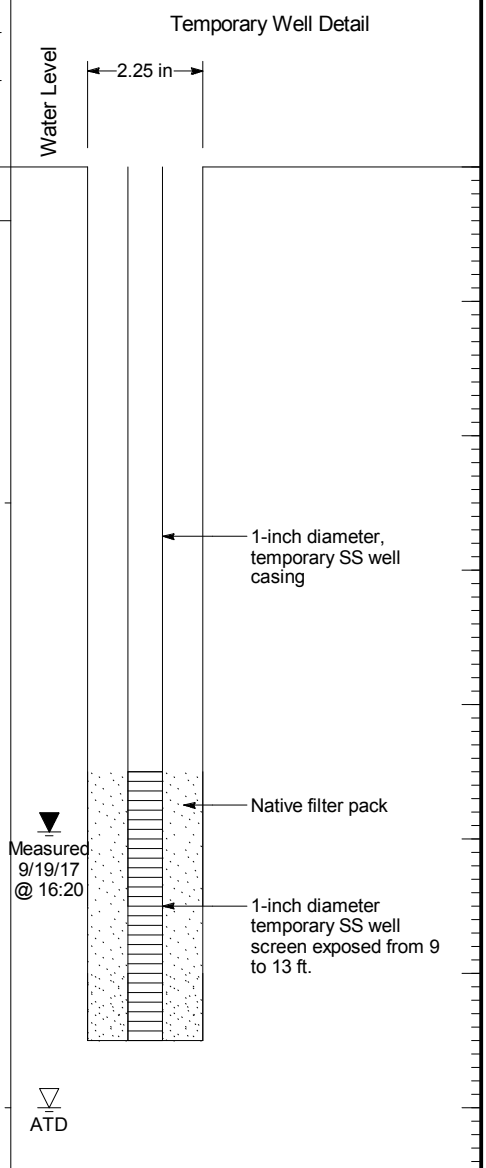
SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Air Knife and Vacuum Truck/ Geoprobe™

Ground Elevation (ft): Not surveyed

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Description
0						AC	Asphalt
						SP	Light brown, fine SAND with medium sand and trace fine gravel (loose, dry)
2		d5					
4							
				0.0		SP	Brown, fine to medium SAND with trace fine gravel; no odor, no sheen (medium dense, damp)
6				0.0			**{Air knife and vacuum truck 0.8 to 5 ft}** **{Direct push 5 to 15 ft}**
				0.0			
		d3					
8				0.0			
				0.0			
10				0.0			
				0.0			Groundwater sample AOC6-GW09-S screened from 9 to 13 feet.
12				0.0			
		d3					
				0.0			
14				0.0		SP	Black, fine to coarse SAND with trace silt; no odor, no sheen (loose, wet)
16							
18							
20							

Boring Completed 09/19/17
Total Depth of Boring = 15.0 ft.



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

25082.916 6/9/18 N:\PROJECTS\BOEING\025082.916.123.GPJ WELL LOG

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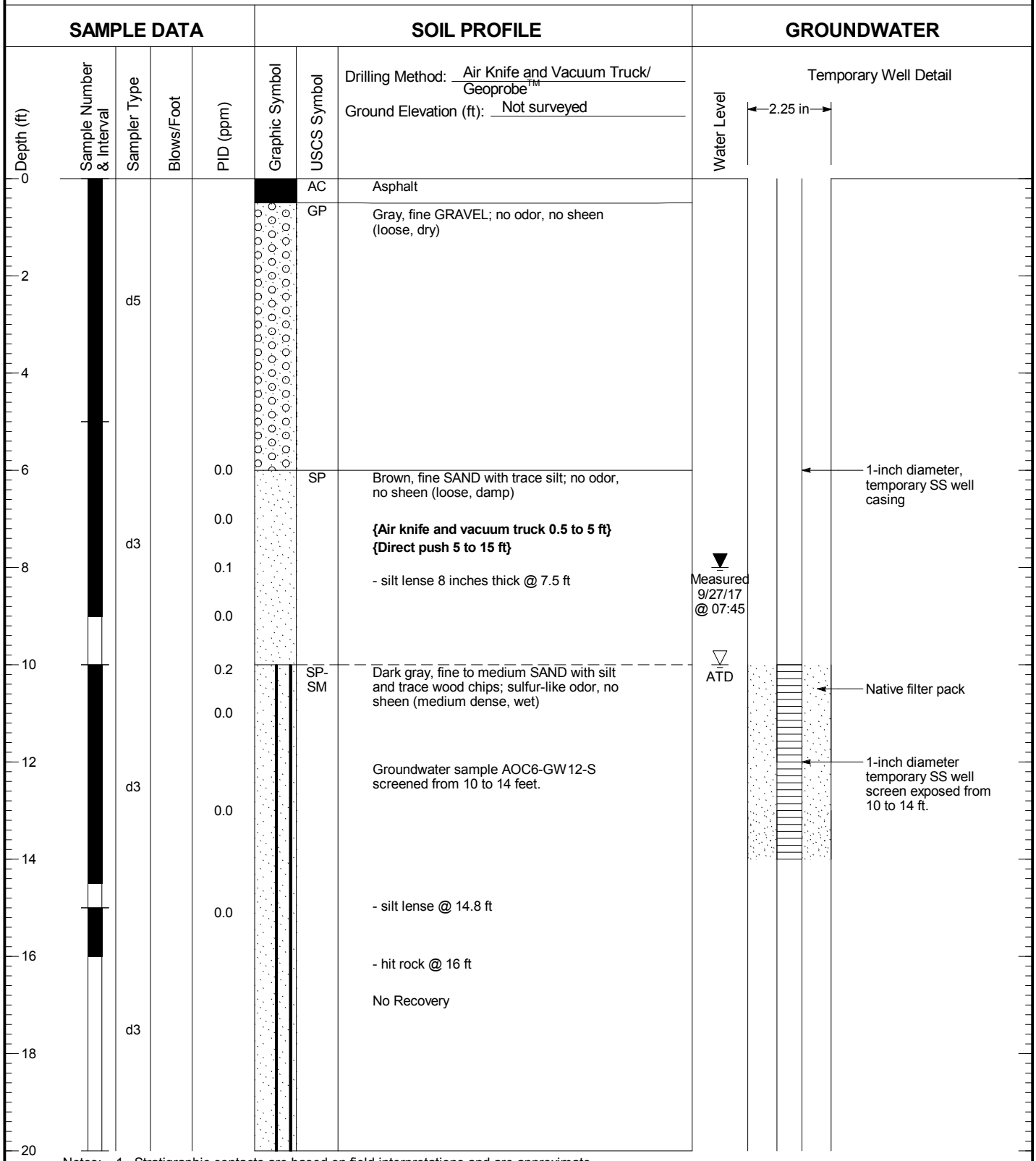
North Boeing Field - RI Phase III Seattle, WA	Log of Temporary Well AOC6-GW09	Figure A-7

AOC6-GW12



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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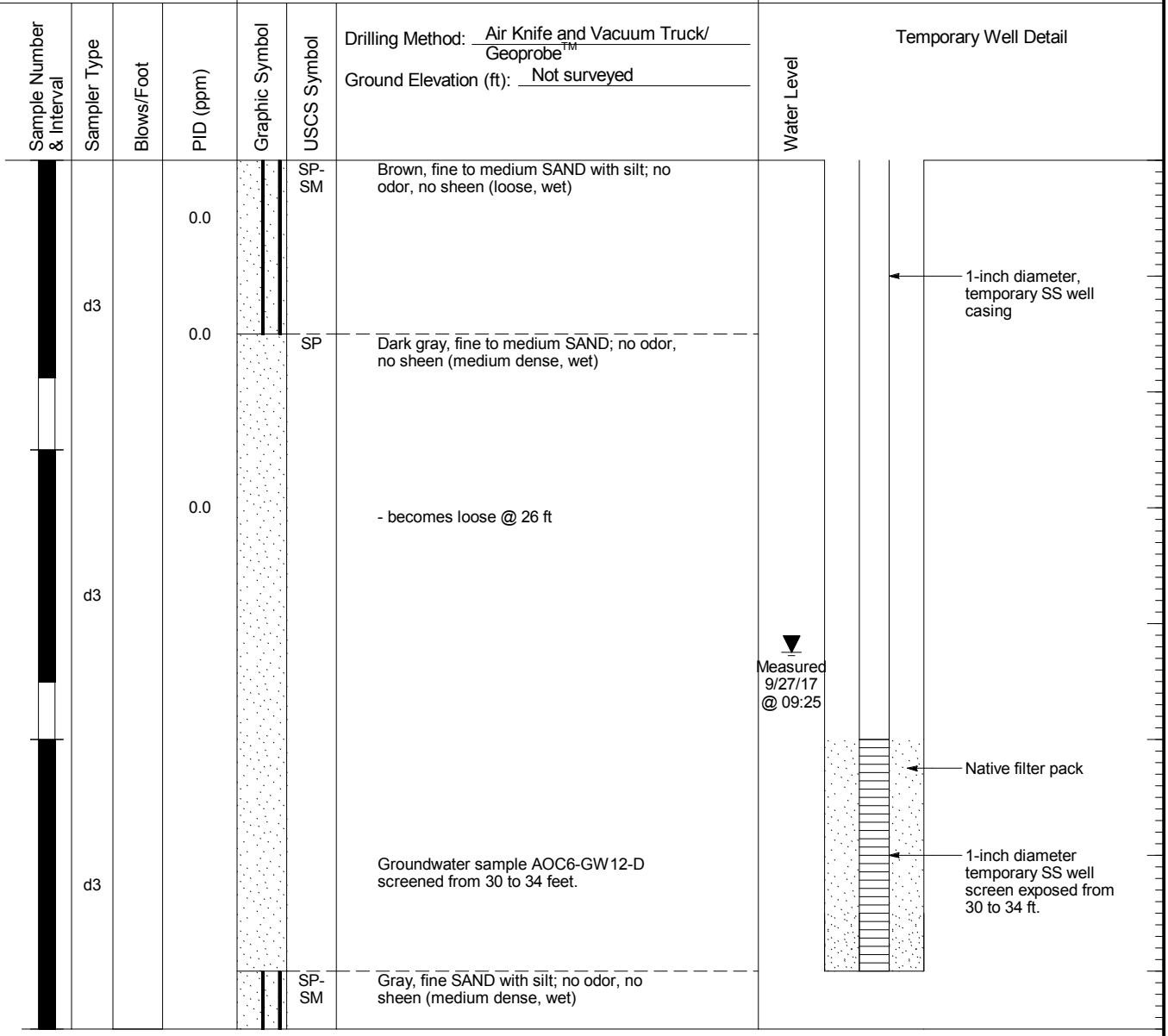
North Boeing Field - RI Phase III Seattle, WA

Log of Temporary Well AOC6-GW12

Figure A-8 (1 of 2)

AOC6-GW12



Boring Completed 09/27/17
Total Depth of Boring = 35.0 ft.

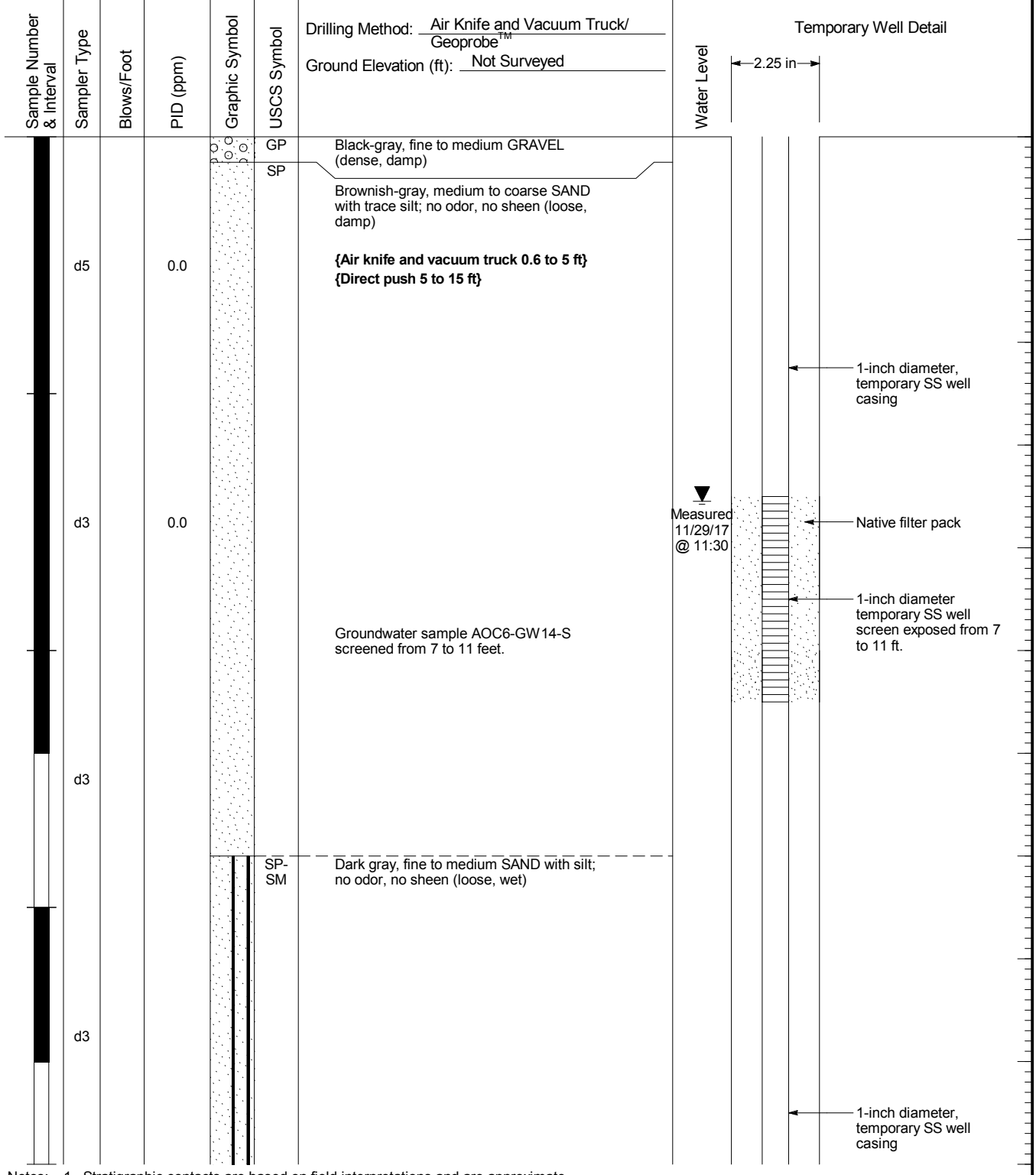
Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

25082.916 6/9/18 N:\PROJECTS\BOEING\025082.916.123.GPJ WELL LOG

LANDAU ASSOCIATES

North Boeing Field - RI Phase III Seattle, WA	Log of Temporary Well AOC6-GW12	Figure A-8 (2 of 2)

AOC6-GW14



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

25082.916 6/9/18 N:\PROJECTS\BOEING\025082.916.123.GPJ WELL LOG

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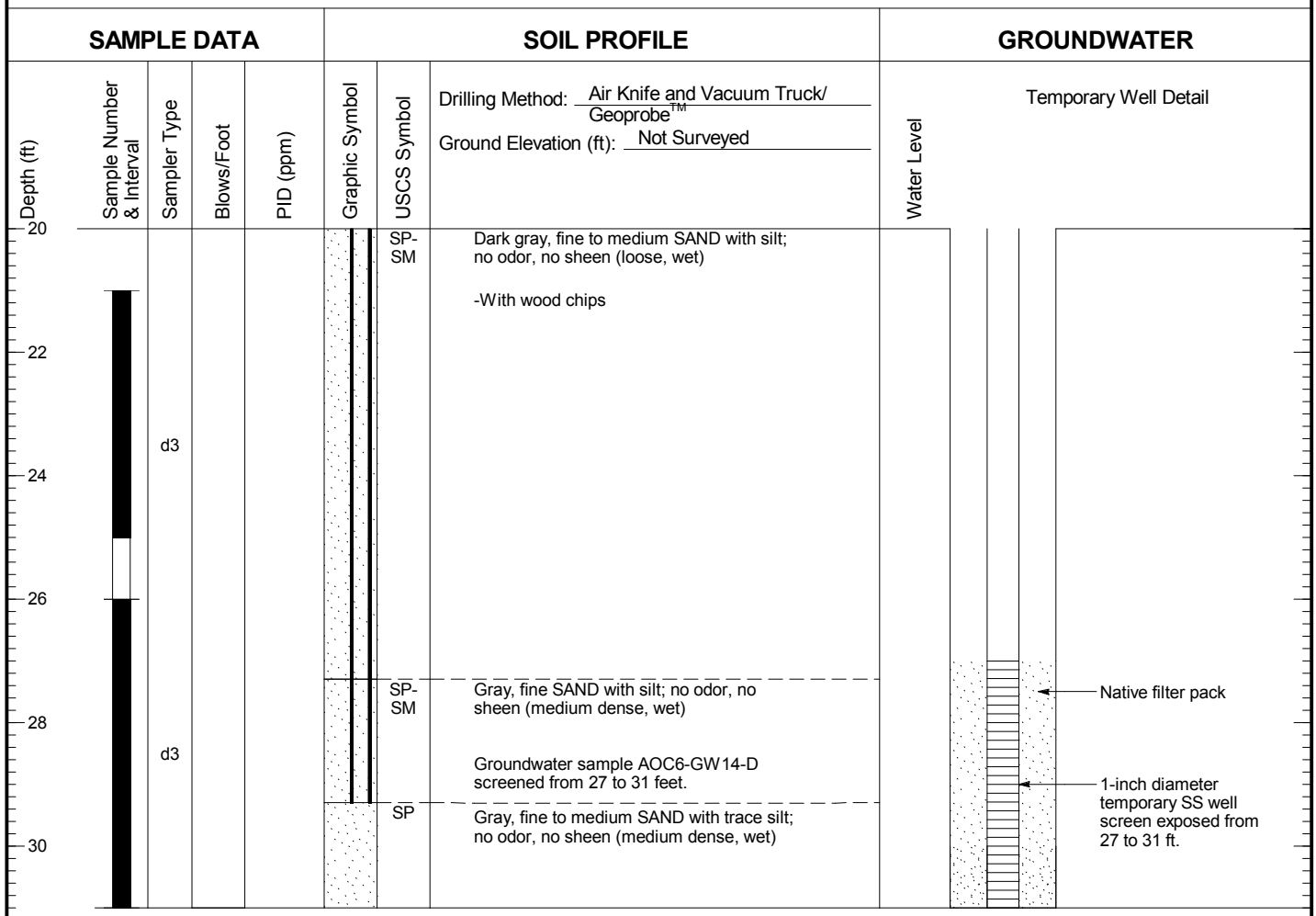
North Boeing Field - RI Phase III Seattle, WA

Log of Temporary Well AOC6-GW14

Figure A-9 (1 of 2)

AOC6-GW14



Boring Completed 11/29/17
Total Depth of Boring = 31.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

25082.916 6/9/18 N:\PROJECTS\BOEING\025082.916.123.GPJ WELL LOG

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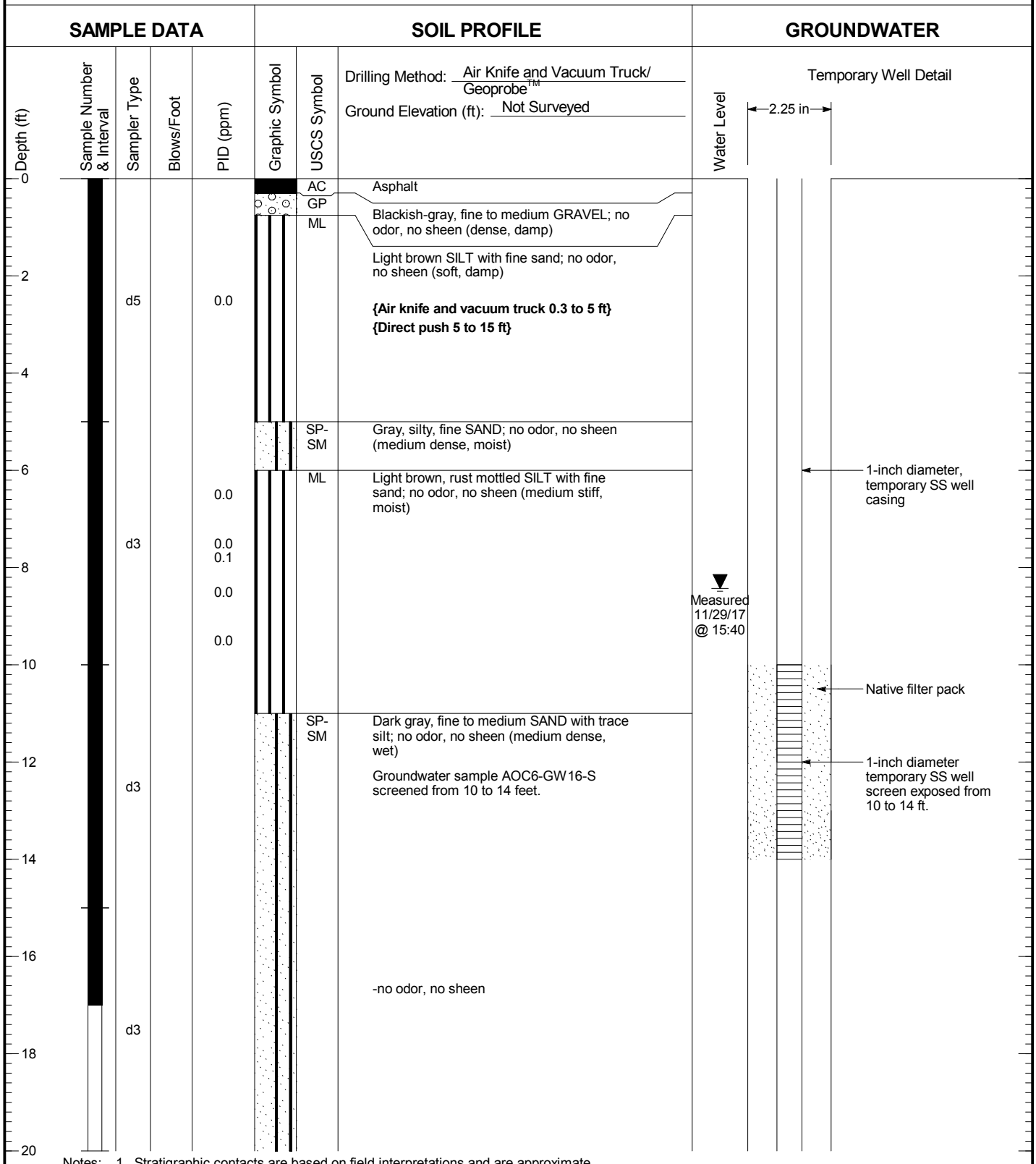
North Boeing Field - RI Phase III Seattle, WA	Log of Temporary Well AOC6-GW14	Figure A-9 (2 of 2)

AOC6-GW16



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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North Boeing Field - RI Phase III Seattle, WA

Log of Temporary Well AOC6-GW16

Figure A-10 (1 of 2)

AOC6-GW16

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Air Knife and Vacuum Truck/ Geoprobe™

Ground Elevation (ft): Not Surveyed

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level
20						SP-SM	
22		d3					
24							
26							
28		d3					
30							
32		d3					
34							
36							
38							
40							

Dark gray, fine to medium SAND with trace silt; no odor, no sheen (medium dense, wet)

-no odor, no sheen

Groundwater sample AOC6-GW16-D screened from 30 to 34 feet.

-no odor, no sheen

-Silt lense about 0.3 feet thick

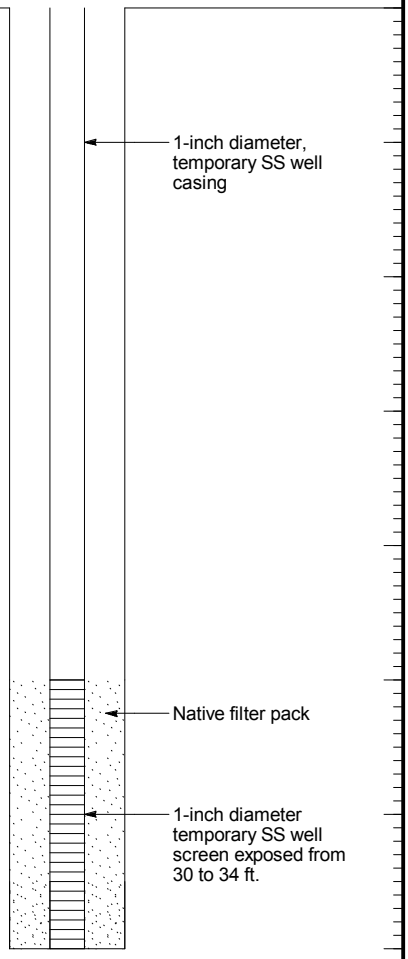
-Wood chips about 0.1 feet thick

-Silt lense about 0.3 feet thick

-no odor, no sheen

Boring Completed 11/29/17
Total Depth of Boring = 35.0 ft.

Temporary Well Detail



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

25082.916 6/9/18 N:\PROJECTS\BOEING\025082.916.123.GPJ WELL LOG

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North Boeing Field - RI Phase III Seattle, WA

Log of Temporary Well AOC6-GW16

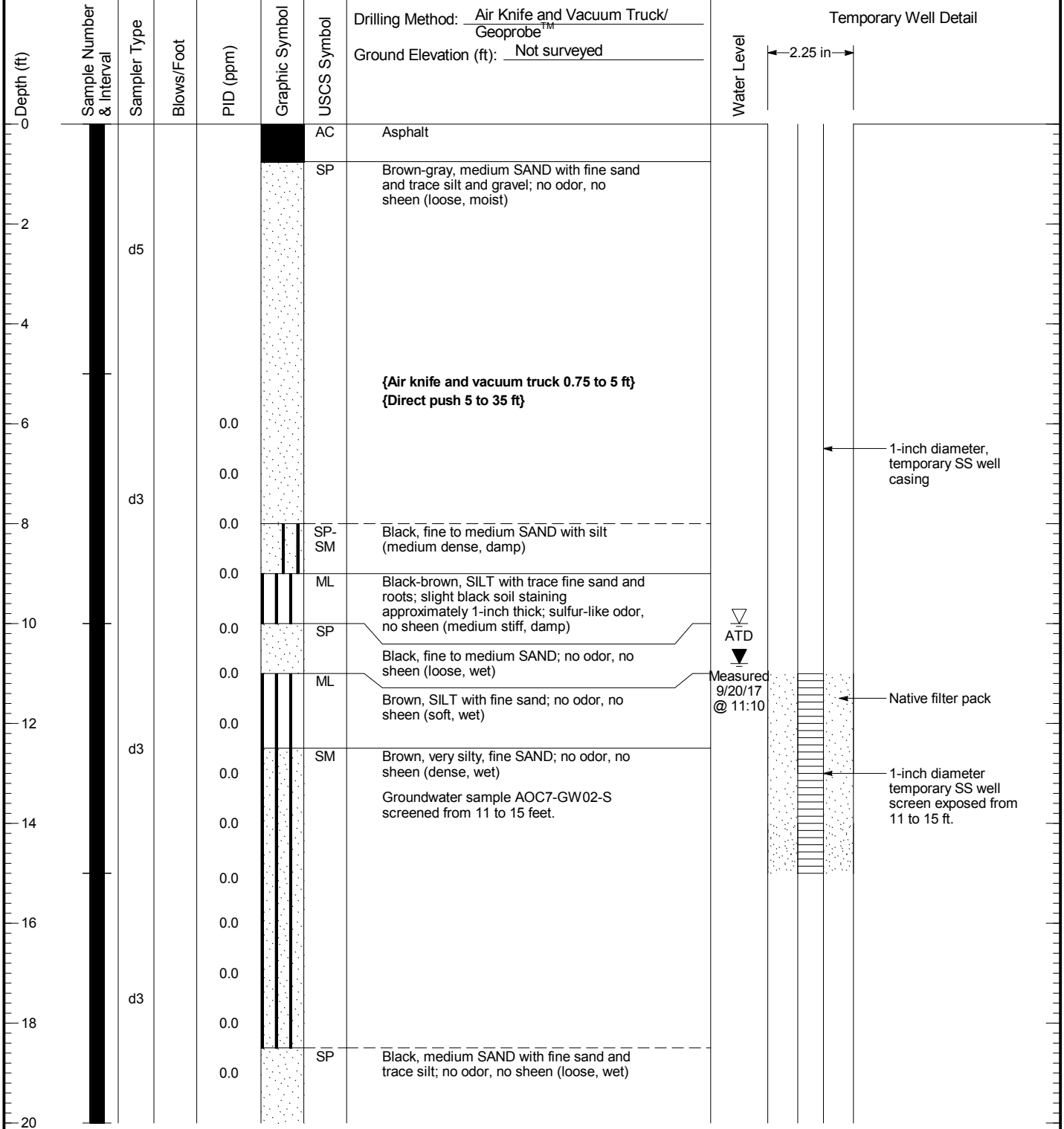
Figure A-10 (2 of 2)

AOC7-GW02

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Air Knife and Vacuum Truck/ Geoprobe™

Ground Elevation (ft): Not surveyed



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

25082.916 6/9/18 N:\PROJECTS\BOEING\025082.916.123.GPJ WELL LOG

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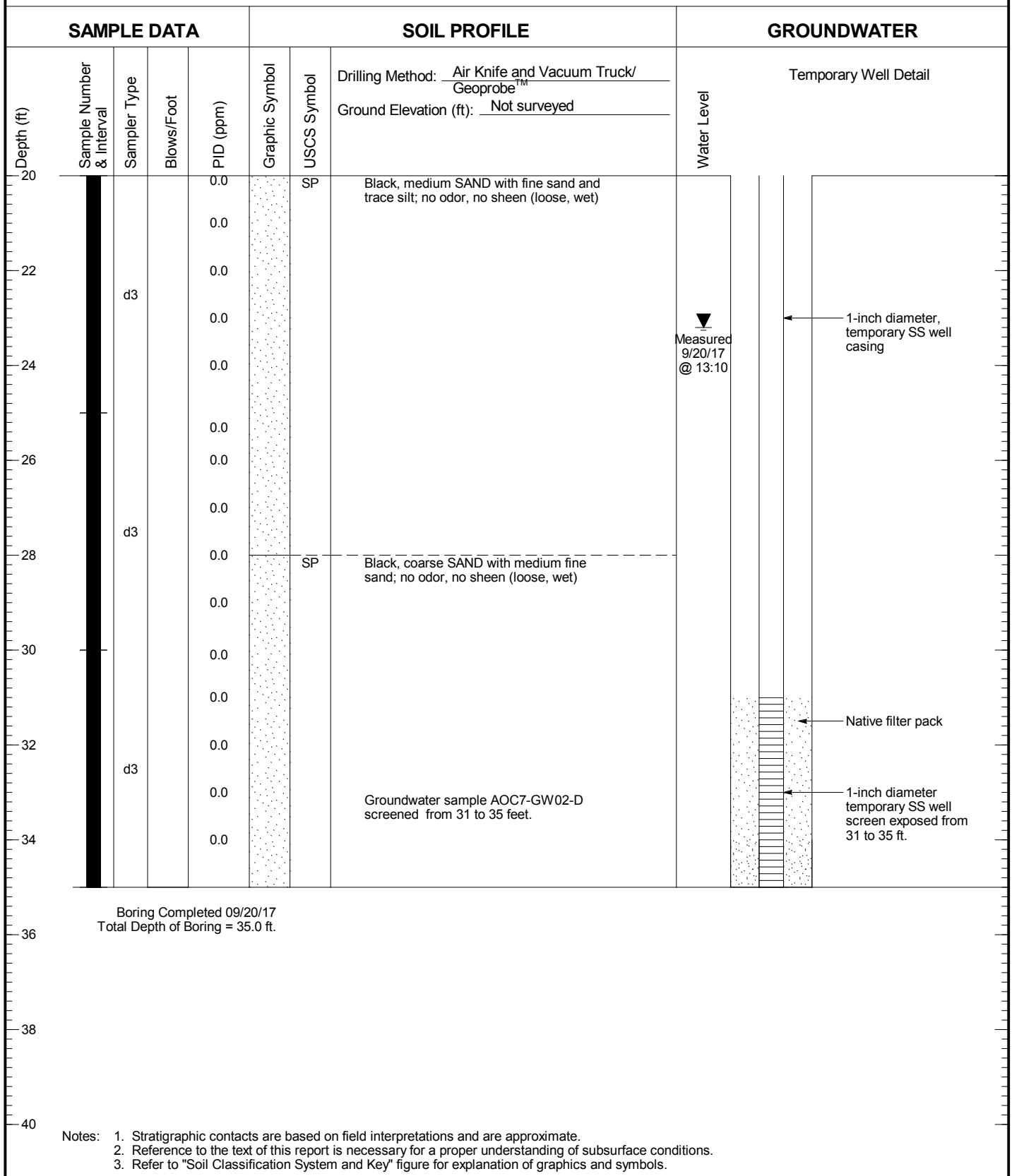
North Boeing Field - RI Phase III Seattle, WA

Log of Temporary Well AOC7-GW02

Figure A-11 (1 of 2)

AOC7-GW02



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

25082.916 6/9/18 N:\PROJECTS\BOEING\025082.916.123.GPJ WELL LOG

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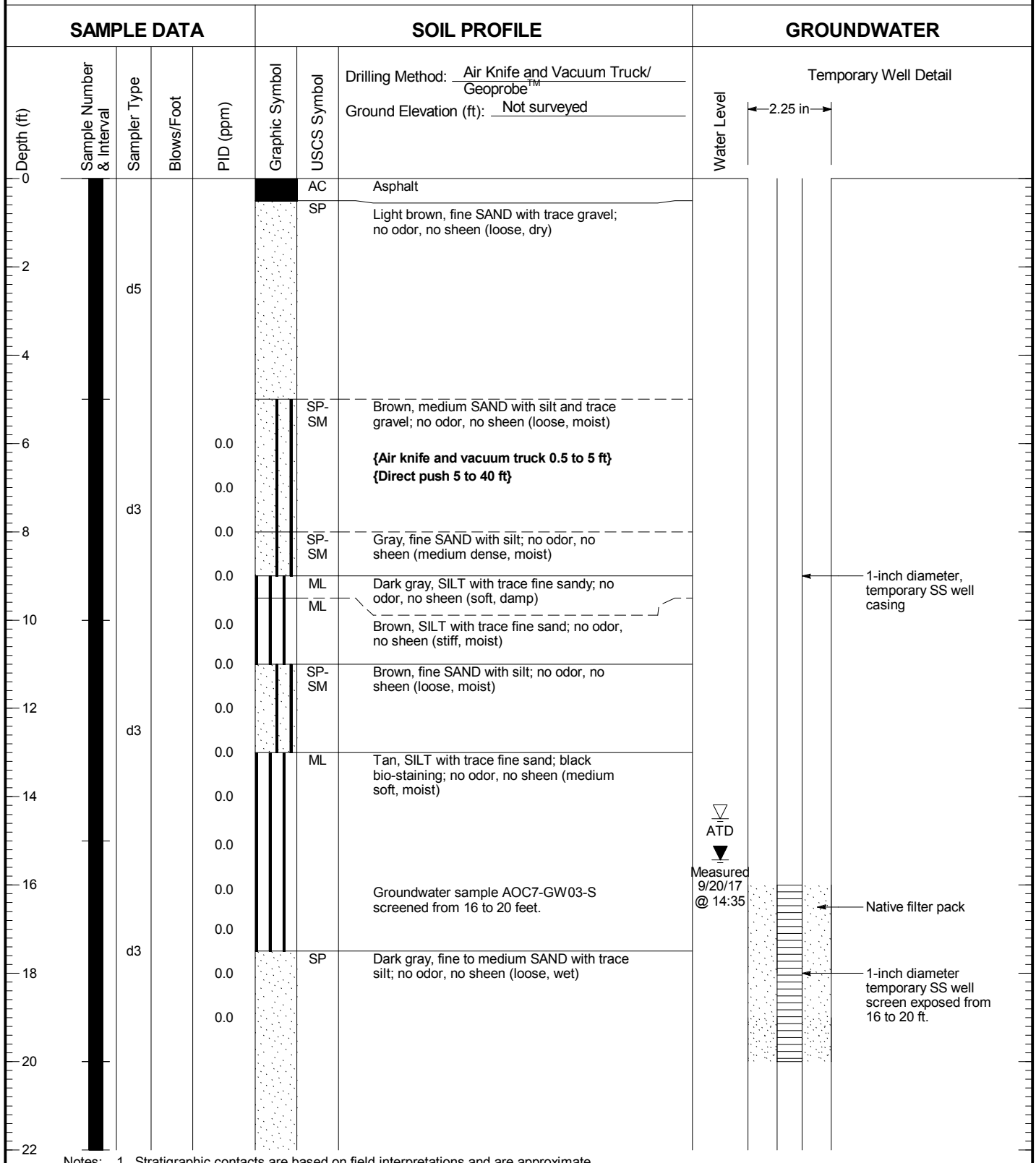
North Boeing Field - RI Phase III Seattle, WA	Log of Temporary Well AOC7-GW02	Figure A-11 (2 of 2)

AOC7-GW03



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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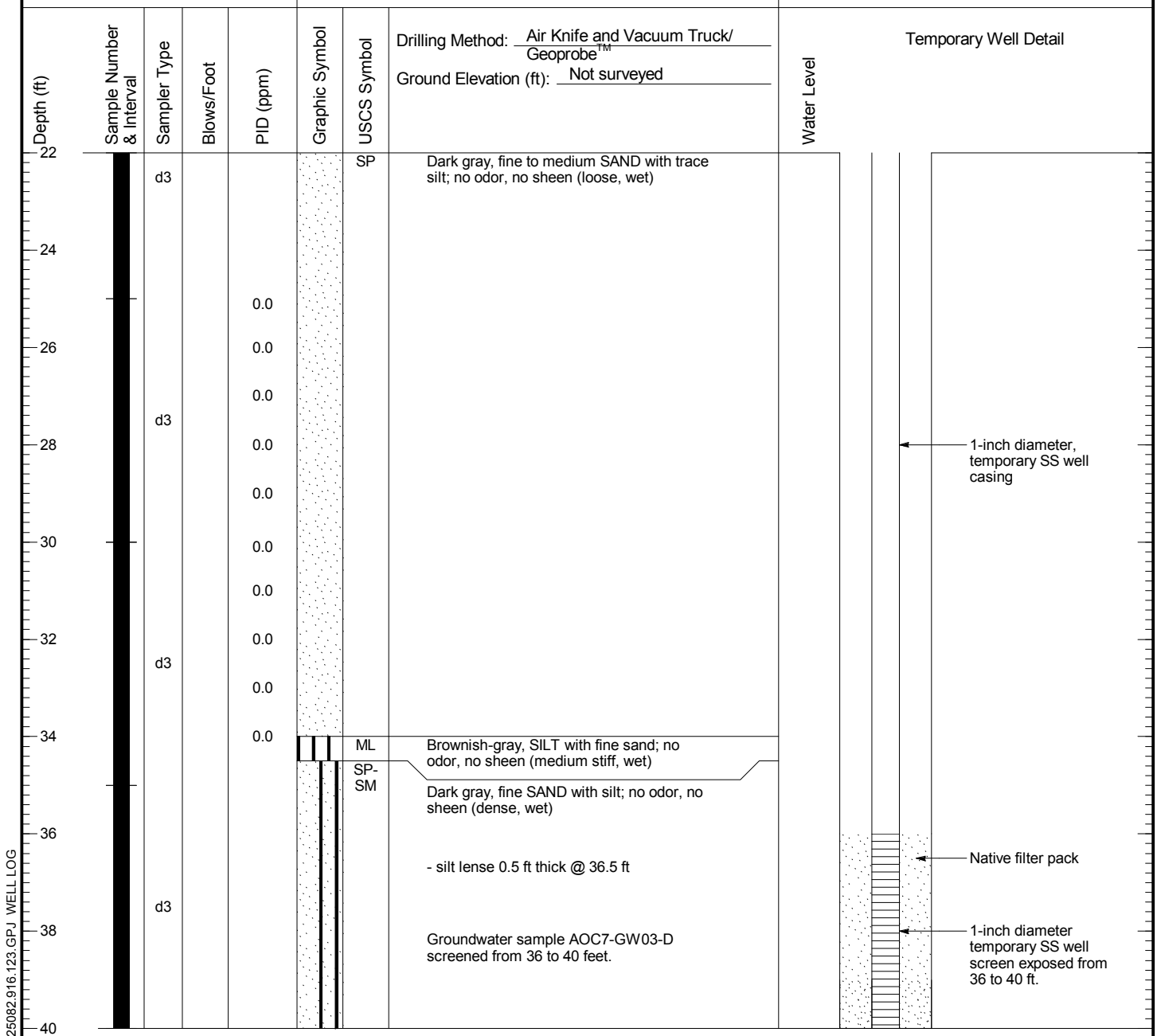
North Boeing Field - RI Phase III Seattle, WA

Log of Temporary Well AOC7-GW03

Figure A-12 (1 of 2)

AOC7-GW03



Boring Completed 09/20/17
Total Depth of Boring = 40.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

25082.916 6/9/18 N:\PROJECTS\BOEING\025082.916.123.GPJ WELL LOG

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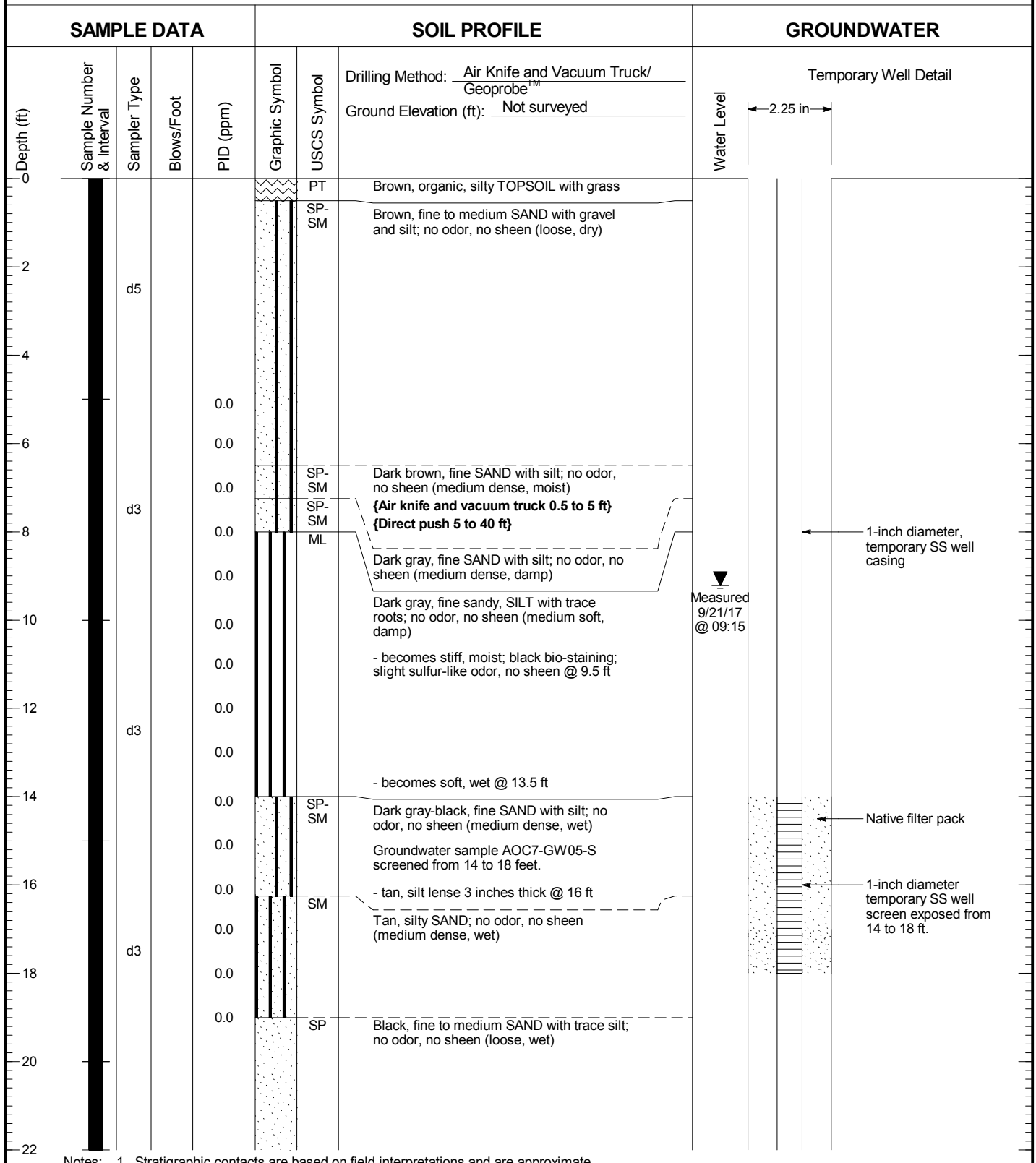
North Boeing Field - RI Phase III Seattle, WA

Log of Temporary Well AOC7-GW03

Figure A-12 (2 of 2)

AOC7-GW05



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

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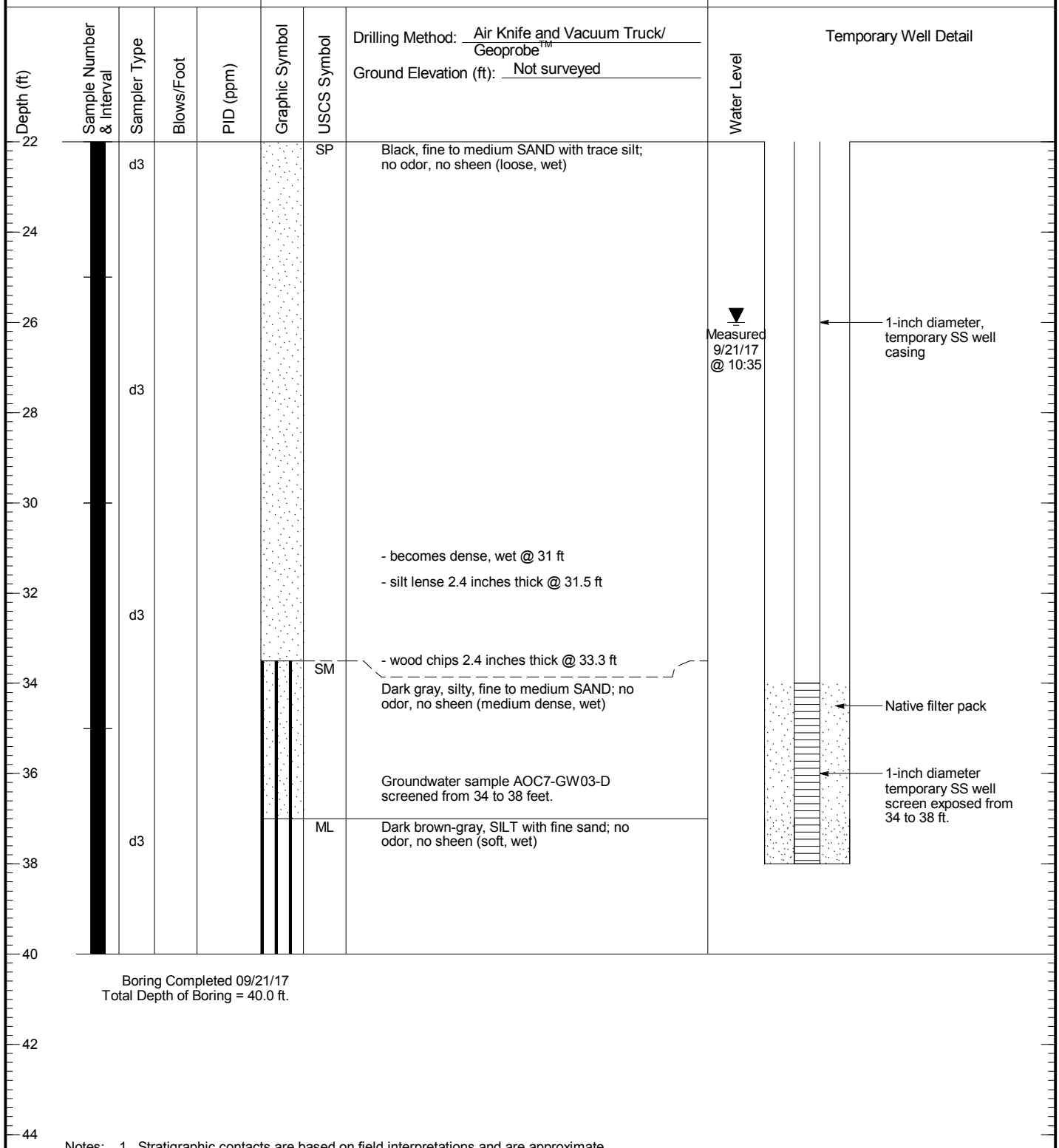
North Boeing Field - RI Phase III Seattle, WA

Log of Temporary Well AOC7-GW05

Figure A-13 (1 of 2)

AOC7-GW05



Boring Completed 09/21/17
Total Depth of Boring = 40.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

25082.916 6/9/18 N:\PROJECTS\BOEING\025082.916.123.GPJ WELL LOG

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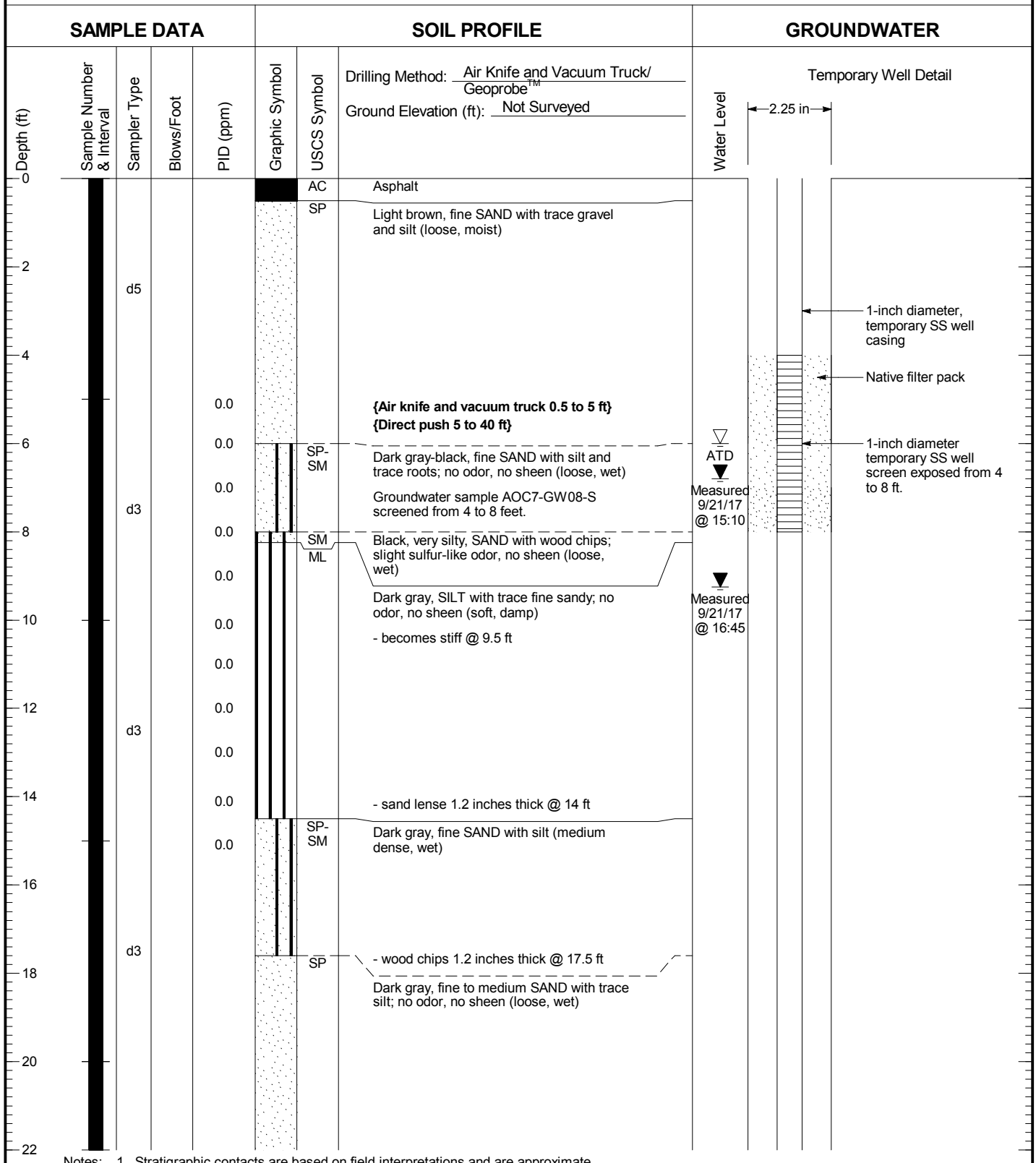
North Boeing Field - RI Phase III Seattle, WA

Log of Temporary Well AOC7-GW05

Figure A-13 (2 of 2)

AOC7-GW08



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

25082.916 6/9/18 N:\PROJECTS\BOEING\025082.916.123.GPJ WELL LOG

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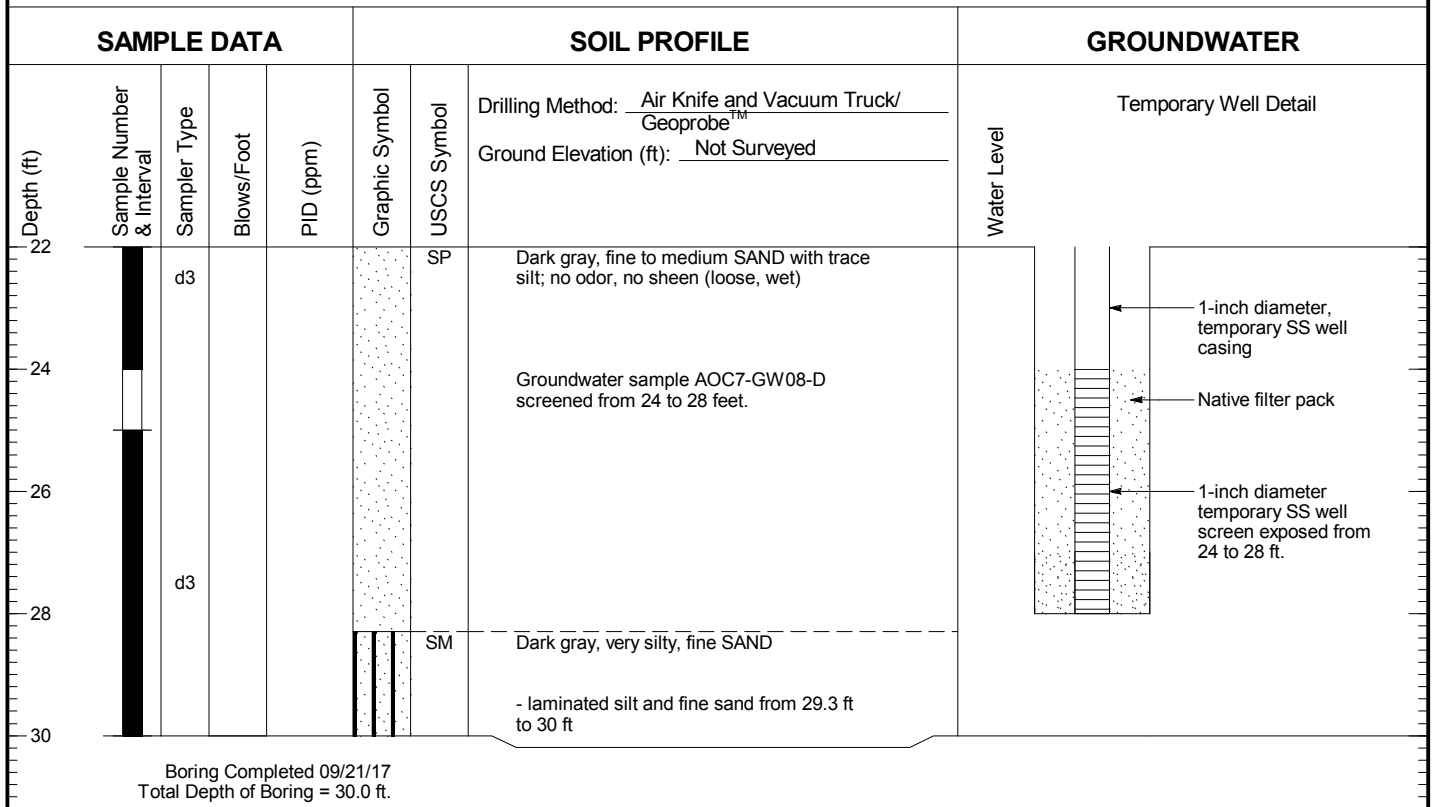
North Boeing Field - RI Phase III Seattle, WA

Log of Temporary Well AOC7-GW08

Figure A-14 (1 of 2)

AOC7-GW08



Boring Completed 09/21/17
Total Depth of Boring = 30.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

25082.916 6/9/18 N:\PROJECTS\BOEING\025082.916.123.GPJ WELL LOG

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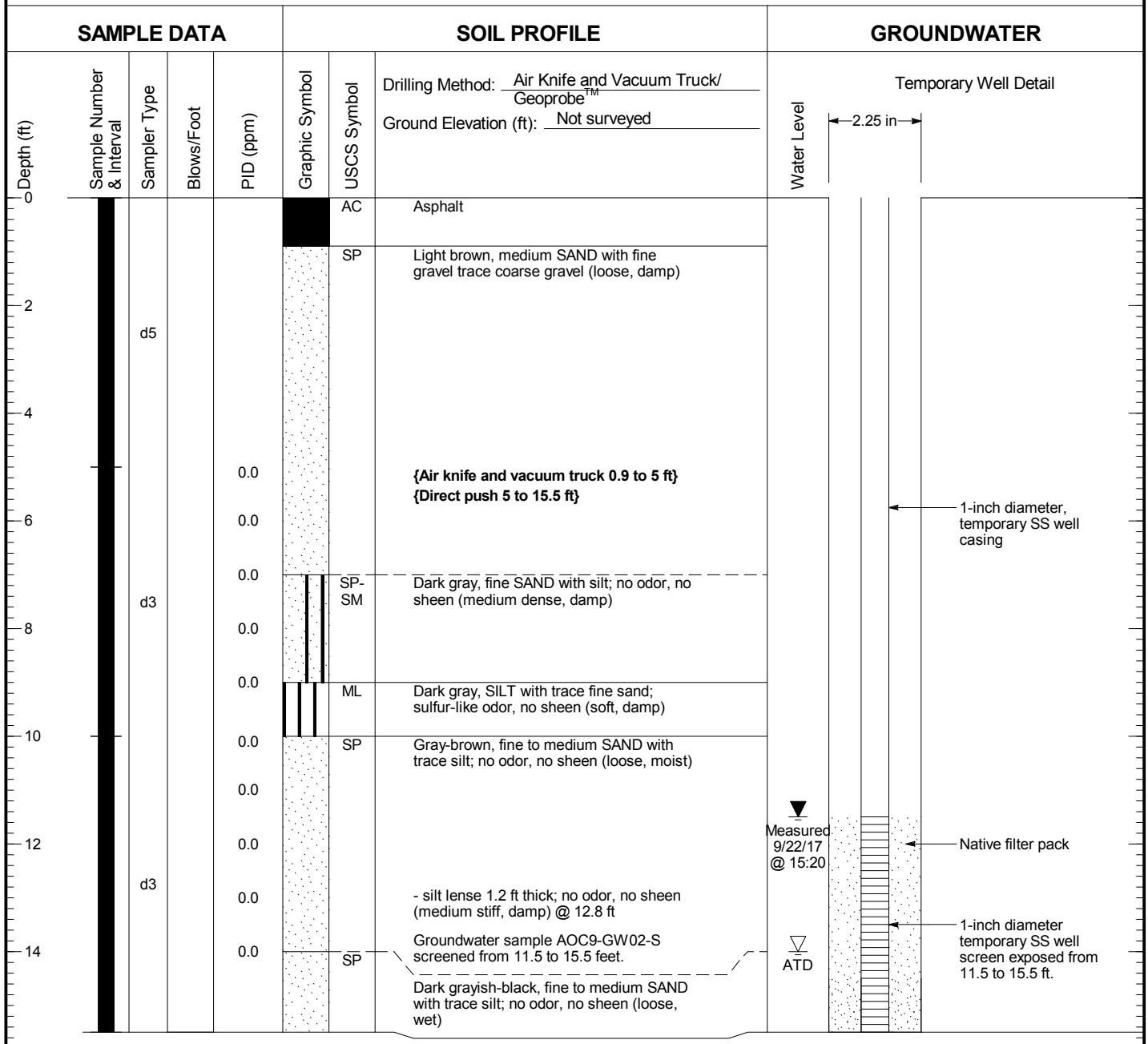
North Boeing Field - RI Phase III Seattle, WA

Log of Temporary Well AOC7-GW08

Figure A-14 (2 of 2)

AOC9-GW02



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

25082.916 6/9/18 N:\PROJECTS\BOEING\025082.916.123.GPJ WELL LOG

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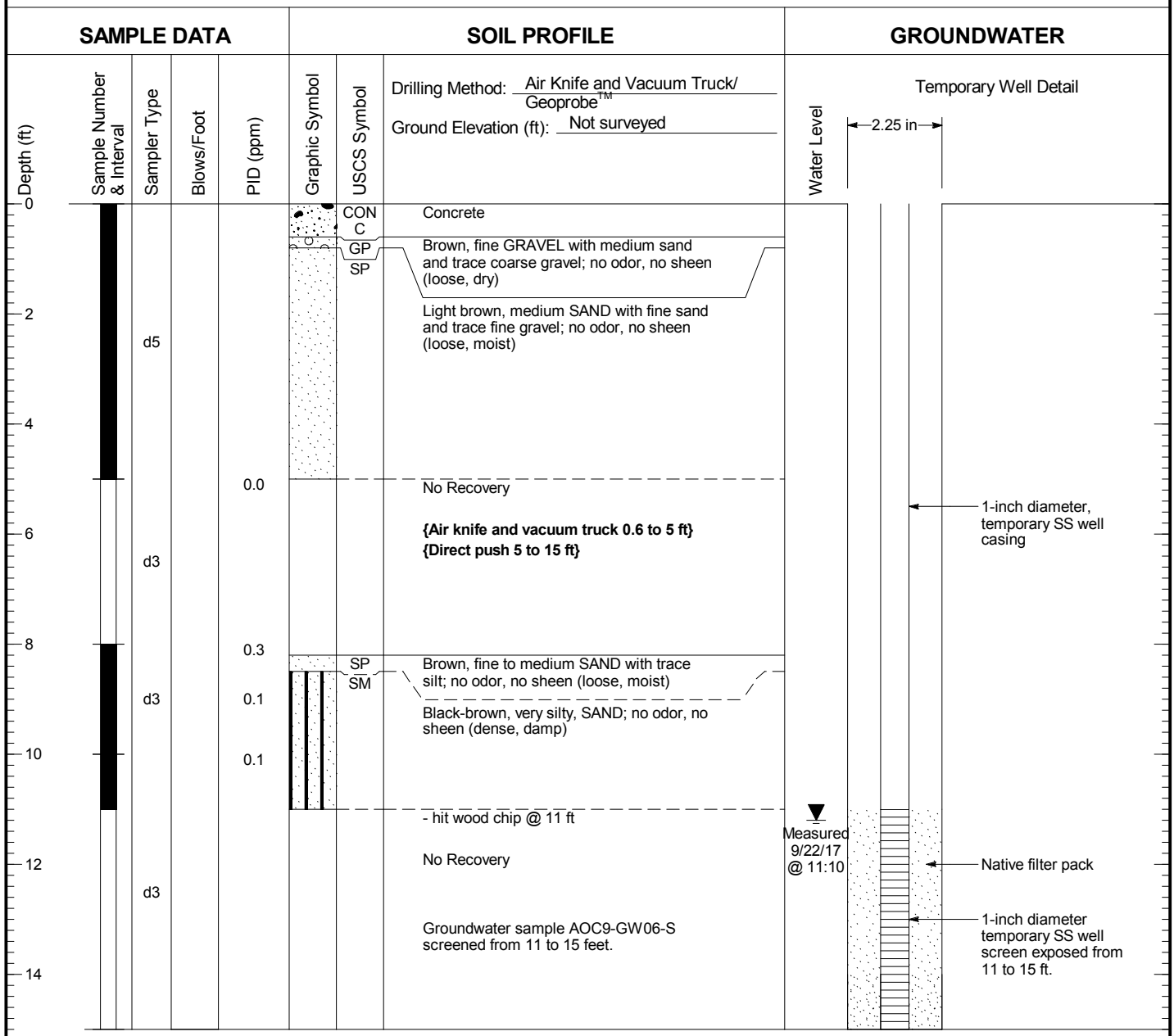
North Boeing Field - RI Phase III Seattle, WA

Log of Temporary Well AOC9-GW02

Figure A-15

AOC9-GW06



Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

25082.916 6/9/18 N:\PROJECTS\BOEING\025082.916.123.GPJ WELL LOG

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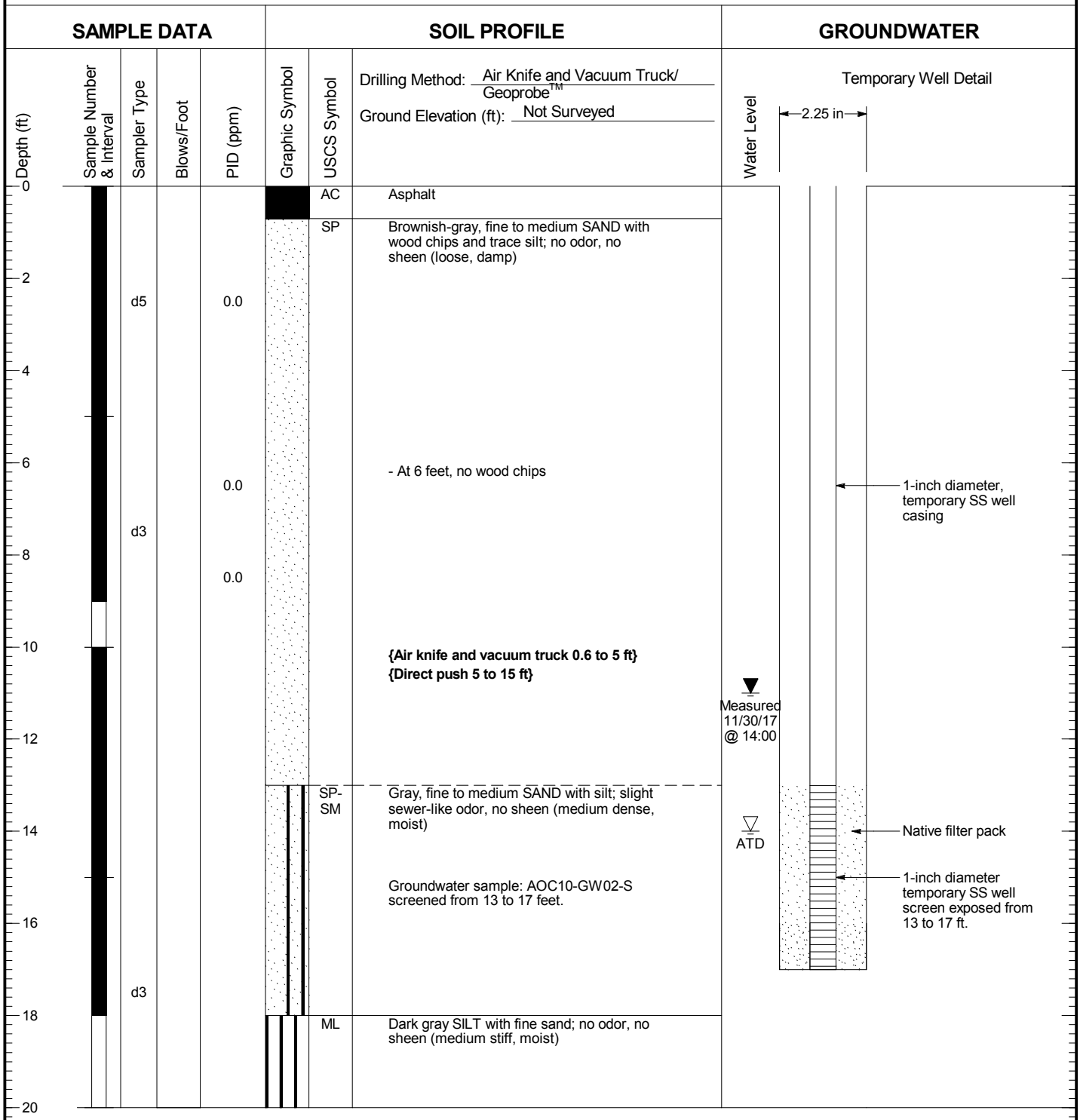
North Boeing Field - RI Phase III Seattle, WA

Log of Temporary Well AOC9-GW06

Figure A-16

AOC10-GW02



Boring Completed 11/30/17
Total Depth of Boring = 20.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

25082.916 6/9/18 N:\PROJECTS\BOEING\025082.916.123.GPJ WELL LOG

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North Boeing Field - RI Phase III Seattle, WA

Log of Temporary Well AOC10-GW02

Figure A-17

APPENDIX B

Data Validation Report including Laboratory Data Packages

Data Validation Report
Phase 3 Groundwater Investigation
NBF/GTSP Remedial Investigation
Seattle, Washington

July 9, 2018

Prepared for

The Boeing Company
and
The City of Seattle

LANDAU ASSOCIATES

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APPENDICES

1.0 INTRODUCTION

This report provides the results of a Stage 2B verification and validation check of analytical data for 60 groundwater samples, 15 trip blanks, 6 rinsate blanks, and the associated quality control (QC) samples as part of the North Boeing Field (NBF) Remedial Investigation/Feasibility Study (RI ~~/FS~~[TAM1]).

All sample analyses were conducted at Analytical Resources, Inc. (ARI) laboratory, located in Tukwila, Washington. The analytical results discussed herein are reported in the ARI laboratory data packages identified as 17I0274, 17I0275, 17I0335, 17I0337, 17I0358, 17I0359, 17I0385, 17I0386, 17I0402, 17I0403, 17I0432, 17I0433, 17L0020, 17L0021, and 17L0030. The analytical methods used for these samples are as follows:

Analysis	Method of Analysis
Benzene, toluene, ethylbenzene, xylenes (BTEX)	SW8260C
Chlorinated volatile organic compounds (cVOCs) including vinyl chloride; 1,1-dichloroethene; trans-1,2-dichloroethene; cis-1,2-dichloroethene; trichloroethene; and tetrachloroethene	SW8260C
Polychlorinated biphenyls (PCBs)	SW8082A
Phthalates including dimethylphthalate, diethylphthalate, di-n-butylphthalate, butylbenzylphthalate, bis(2-ethylhexyl)phthalate, and di-n-octylphthalate	SW8270D
Diesel- and oil-range petroleum hydrocarbons (TPH-D)	NWTPH-Dx
Gasoline-range petroleum hydrocarbons (TPH-G)	NWTPH-Gx
Total and dissolved metals, including arsenic, iron, and mercury	200.8/7470A

Data results were reviewed using guidance and quality control criteria documented in the analytical methods; the North Boeing Field/Georgetown Steam Plant Site Remedial Investigation/Feasibility Study Final Sampling and Analysis Plan and Quality Assurance Project Plan (Leidos 2014) and the associated Addendum #1 (Landau Associates [LAI] 2015); the US Environmental Protection Agency's (EPA's) Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use (EPA 2009); and with guidance from applicable portions of the National Functional Guidelines for Inorganic Data Review (EPA 2016a) and the National Functional Guidelines for Organic Data Review (EPA 2016b). The use of guidance from the 2016 National Functional Guidelines is a slight deviation from instructions provided in the 2014 Quality Assurance Project Plan (which specified using the 2008-2011 National Functional Guidelines that were the most recent publications available at the time); however, use of guidance from the 2016 National Functional Guidelines provided similar, if not more conservative, qualification of the data overall.

The Stage 2B verification and validation check for each laboratory data package included the following:

- Verification that the laboratory data package contained all necessary documentation (including chain-of-custody records; identification of samples received by the laboratory; date and time of receipt of the samples at the laboratory; sample conditions upon receipt at the

laboratory; date and time of sample analysis; and, if applicable, date of extraction, definition of laboratory data qualifiers, all sample-related QC data, and QC acceptance criteria).

- Verification that all requested analyses, special cleanups, and special handling methods were performed.
- Verification that QC samples were performed as specified in the Quality Assurance Project Plan (QAPP).
- Evaluation of sample holding times.
- Evaluation of quality control data compared to acceptance criteria, including method blanks, rinsate blanks, surrogate recoveries, matrix spike results, laboratory duplicate and/or replicate results, and laboratory control sample results.
- Evaluation of reporting limits compared to target reporting limits specified in the Quality Assurance Project Plan.
- Verification that initial and continuing calibration data are provided for all requested analytes and are linked to the field samples reported, and that reported samples are bracketed by continuing calibration verification (CCV) and continuing calibration blank (CCB) standards, as appropriate.
- Method-specific instrument performance checks are present as appropriate (e.g., dichlorodiphenyltrichloroethane [DDT]/Endrin breakdown checks for pesticides and aroclors).
- Frequency of instrument QC samples is checked for appropriateness (e.g., gas chromatography–mass spectrometry [GC-MS] tunes have been run every 12 hours).
- Sample results are evaluated by comparing instrument-related QC data to the requirements and guidelines present in national or regional data validation documents, analytical methods, or contract.

The goal of data validation and the possible assignment of data qualifiers is to assist in proper data interpretation. The absence of a data qualifier indicates that the reported result is acceptable without qualification and meets data quality goals as outlined in the above-mentioned reference documents. A summary of data qualifiers is included in Appendix A; electronic copies of the laboratory data packages included in this report are provided in Appendix B; a qualified laboratory electronic data deliverable (EDD) for each laboratory data package is included in Appendix C.

2.0 SAMPLE INDEX[TAM2][kjh3]

SDG	Sample ID	Lab ID	BTEX	cVOCs	PCBs	Phthalates	TPH-D	TPH-G	Total/ Dissolved Metals
17I0274	AOC06-GW05-S-091917	17I0274-01	X	X					
17I0274	AOC06-GW06-S-091917	17I0274-02	X	X					
17I0274	AOC06-GW09-S-091917	17I0274-03	X	X					
17I0274	AOC06-GW10-S-091917	17I0274-04	X	X					
17I0274	Trip Blanks	17I0274-05	X	X					
17I0275	AOC07-GW01-S-092017	17I0275-01		X					
17I0275	AOC07-GW02-S-092017	17I0275-02		X					
17I0275	AOC07-GW02-D-092017	17I0275-03		X					
17I0275	AOC07-GW03-S-092017	17I0275-04		X					
17I0275	AOC07-GW03-D-092017	17I0275-05		X					
17I0275	AOC07-GW09-S-092017	17I0275-06		X					
17I0275	Dup03	17I0275-07		X					
17I0275	Trip Blanks	17I0275-08		X					
17I0335	AOC09-GW04-S-092217	17I0335-01	X				X	X	
17I0335	AOC09-GW05-S-092217	17I0335-02	X				X	X	
17I0335	AOC09-GW06-S-092217	17I0335-03	X				X	X	
17I0335	AOC09-GW07-S-092217	17I0335-04	X				X	X	
17I0335	AOC09-GW02-S-092217	17I0335-05	X				X	X	
17I0335	AOC09-UNKWELL-092217	17I0335-06	X				X	X	
17I0335	AOC09-GW01-S-092217	17I0335-07	X				X	X	
17I0335	Trip Blanks	17I0335-08	X					X	
17I0337	AOC07-GW04-S-092117	17I0337-01		X					
17I0337	AOC07-GW05-S-092117	17I0337-02		X					
17I0337	AOC07-GW05-D-092117	17I0337-03		X					
17I0337	AOC07-GW06-S-092117	17I0337-04		X					
17I0337	AOC07-GW07-S-092117	17I0337-05		X					

SDG	Sample ID	Lab ID	BTEX	cVOCs	PCBs	Phthalates	TPH-D	TPH-G	Total/ Dissolved Metals
17I0337	AOC07-GW08-S-092117	17I0337-06		X					
17I0337	AOC07-GW08-D-092117	17I0337-07		X					
17I0337	Trip Blanks	17I0337-08		X					
17I0358	AOC9-GW09-S-092517	17I0358-01	X				X	X	
17I0358	AOC9-GW08-S-092517	17I0358-02	X				X	X	
17I0358	Dup04	17I0358-03	X				X	X	
17I0358	Trip Blank	17I0358-04	X					X	
17I0359	AOC4-GW01-S-092517	17I0359-01/ 17I0359-08			X		X	X	X
17I0359	AOC4-GW02-S-092517	17I0359-02/ 17I0359-09			X		X	X	X
17I0359	AOC4-GW03-S-092517	17I0359-03/ 17I0359-10			X		X	X	X
17I0359	AOC4-GW04-S-092517	17I0359-04/ 17I0359-11			X		X	X	X
17I0359	AOC4-GW05-S-092517	17I0359-05/ 17I0359-12			X		X	X	X
17I0359	Dup01	17I0359-06/ 17I0359-13			X		X	X	X
17I0359	Trip Blank	17I0359-07						X	
17I0385	ER-GW1-092617	17I0385-01/ 17I0385-04	X	X	X		X	X	X
17I0385	ER-GW2-092617	17I0385-02/ 17I0385-05	X	X	X		X	X	X
17I0385	Trip Blanks	17I0385-03	X	X				X	
17I0386	AOC6-GW01-S-092617	17I0386-01	X	X					
17I0386	AOC6-GW02-S-092617	17I0386-02	X	X					
17I0386	AOC6-GW03-S-092617	17I0386-03	X	X					
17I0386	AOC6-GW04-S-092617	17I0386-04	X	X					
17I0386	AOC6-GW11-S-092617	17I0386-05	X	X					
17I0386	Trip Blanks	17I0386-06	X	X					
17I0402	AOC6-GW12-S-092717	17I0402-01	X	X					
17I0402	AOC6-GW12-D-092717	17I0402-02	X	X					
17I0402	AOC6-GW07-S-092717	17I0402-03	X	X					
17I0402	AOC6-GW08-S-092717	17I0402-04	X	X					

SDG	Sample ID	Lab ID	BTEX	cVOCs	PCBs	Phthalates	TPH-D	TPH-G	Total/ Dissolved Metals
17I0402	Trip Blanks	17I0402-05	X	X					
17I0403	NGW624-092717	17I0403-01/ 17I0403-05	X	X		X	X	X	X
17I0403	NGW620-092717	17I0403-02/ 17I0403-06	X	X		X	X	X	X
17I0403	Dup05	17I0403-03/ 17I0403-07	X	X		X	X	X	X
17I0403	Trip Blanks	17I0403-04	X	X				X	
17I0432	ER-GW3-092817	17I0432-01				X			
17I0432	ER-GW4-092817	17I0432-02/ 17I0432-03	X	X		X	X	X	X
17I0432	Trip Blanks	17I0432-04	X	X				X	
17I0433	NGW621-092817	17I0433-01/ 17I033-04	X	X		X	X	X	X
17I0433	NGW623-092817	17I0433-02/ 17I033-05	X	X		X	X	X	X
17I0433	Trip Blanks	17I0433-03	X	X				X	
17L0020	ER-GW01-113017	17L0020-01	X				X	X	
17L0020	ER-GW02-113017	17L0020-02	X				X	X	
17L0021	AOC10-GW01-113017	17L0021-01	X				X	X	
17L0021	AOC10-GW03-113017	17L0021-02	X				X	X	
17L0021	AOC10-GW02-113017	17L0021-03	X				X	X	
17L0021	Dup06-113017	17L0021-04	X				X	X	
17L0021	Trip Blanks	17L0021-05	X					X	
17L0030	AOC6-GW13-S-112917	17L0030-01	X	X					
17L0030	AOC6-GW14-S-112917	17L0030-02	X	X					
17L0030	AOC6-GW14-D-112917	17L0030-03	X	X					
17L0030	AOC6-GW15-S-112917	17L0030-04	X	X					
17L0030	AOC6-GW16-S-112917	17L0030-05	X	X					
17L0030	AOC6-GW16-D-112917	17L0030-06	X	X					
17L0030	AOC6-GW17-S-112917	17L0030-071	X	X					
17L0030	Dup02-112917	17L0030-08	X	X					
17L0030	Trip Blanks	17L0030-09	X	X					

3.0 OVERALL DATA PACKAGE COMPLETENESS

The laboratory data packages contained a signed chain-of-custody, a cooler receipt form documenting the condition of the samples upon receipt at the laboratory, a cooler temperature compliance form, sample analytical results, and quality control results (method blanks, surrogate recoveries, laboratory control sample results, and replicate sample results). A case narrative identifying any complications was also provided with each laboratory data package. Definitions of laboratory qualifiers and quality control acceptance criteria were provided, as appropriate.

A complete (100 percent) verification of the EDD results was performed by comparison to the hard copy laboratory data package. Laboratory QC results were also verified (10 percent of samples).

3.1 Overall Sample Conditions and Analyses

The laboratory received the samples in good condition and all analyses were performed as requested. Preservation of samples, as specified by the analytical method, was verified by the laboratory and adjusted as appropriate.

Upon receipt by ARI, the sample container information was compared to the associated chain-of-custody and the cooler temperatures were recorded. Coolers were received with temperatures ranging from 0.3-10.2 degrees celsius (°C), most of which were within the EPA-recommended limit of ≤6°C. In those instances when the cooler temperature was >6°C, a verification of delivery time to the laboratory via the chain-of-custody confirmed samples were delivered to the laboratory soon after sample collection was complete, and the laboratory sample receipt checklist confirmed samples were received on ice (i.e. the chilling process had begun). No qualification was necessary due to the cooler temperatures.

3.2 Overall Data Quality and Completeness

The completeness for this data set is 100 percent, which meets the project-specified goal of 95 percent minimum.

Data precision was evaluated through blind field duplicates, matrix spike duplicates, and laboratory control sample duplicates. Data accuracy was evaluated through matrix spikes, laboratory control samples, and surrogate spikes. Representativeness was evaluated through blanks. Based on this Stage 2B data quality verification and validation, all of the data were determined to be acceptable. No data were rejected.

4.0 TECHNICAL DATA VALIDATION

The following sections describe the technical data validation review for each laboratory analytical group. A summary of data qualifiers is included in Appendix A.

4.1 Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX)

This section documents the review of analytical data from the analysis of 40 samples, 11 trip blanks, 5 rinsate blanks, and the associated laboratory QC samples. Please refer to the Sample Index in Section 2.0 for a cross reference of field and laboratory identifications.

SDG	Number of Samples/Trip Blanks/Rinsate Blanks
17I0274	4/1/0
17I0335	7/1/0
17I0358	3/1/0
17I0385	0/1/2
17I0386	5/1/0
17I0402	4/1/0
17I0403	3/1/0
17I0432	0/1/1
17I0433	2/1/0
17L0020	0/0/2
17L0021	4/1/0
17L0030	8/1/0

4.1.1 Holding Times

For all analyses and all samples, the time between sample collection, extraction (if applicable), and analysis was determined to be within EPA- and project-specified holding times. No qualification of the data was necessary.

4.1.2 Blank Results

4.1.2.1 Laboratory Method Blanks

At least one method blank was analyzed with each batch of samples. Target analytes were not detected at concentrations greater than detection limits in the associated method blanks, with the following exceptions:

- Toluene was detected in the method blanks associated with the BTEX analysis in data packages 17I0386 and 17I0402. All associated samples contained sufficiently greater concentrations of toluene than that detected in the method blank. No qualification of the data was necessary.
- Toluene; m,p-xylene; o-xylene; and total xylenes were detected in the method blank associated with the BTEX analysis in data package 17I0358. All associated samples contained sufficiently greater concentrations of the affected compounds than those detected in the method blank. No qualification of the data was necessary.
- Toluene was detected in the method blank associated with the BTEX analysis in data package 17I0403. Toluene was not detected at concentrations greater than the detection limits in the associated samples. No qualification of the data was necessary.

- Toluene was detected in the method blank associated with the BTEX analysis in data package 17I0432. The associated sample concentrations of toluene that were less than (or extremely close to) the concentration detected in the method blank were qualified as not detected (U), as indicated in Appendix A.
- Toluene; m,p-xylene; and total xylenes were detected in the method blank associated with the BTEX analysis in data package 17I0433. All associated samples contained sufficiently greater concentrations of toluene than that detected in the method blank. No qualification of the associated toluene results was necessary. The associated sample concentrations of m,p-xylenes and total xylenes that were less than the concentrations detected in the method blank were qualified as not detected (U), as indicated in Appendix A.

4.1.2.2 Trip Blanks

A trip blank was submitted and analyzed with each batch of samples analyzed for BTEX, with the exception of data package 17L0020; this data package contained rinsate blank samples and all associated samples contained no detections greater than the detection limits. Target analytes were not detected at concentrations greater than the detection limits in the associated trip blanks, with the following exceptions:

- Toluene was detected in the trip blank associated with the BTEX analysis in data package 17I0386. All associated samples contained sufficiently greater concentrations of toluene than that detected in the trip blank. No qualification of the data was necessary.
- M,p-xylene and total xylenes were detected in the trip blank associated with the BTEX analysis in data package 17I0433. Due to the associated method blank contamination, the detection of m,p-xylene was qualified as not detected (U), as indicated in Appendix A, and had no impact on project sample concentrations. The associated sample concentrations of total xylenes that were less than the concentration detected in the trip blank were qualified as not detected (U), as indicated in Appendix A.

4.1.2.3 Rinsate Blanks

Five rinsate blanks were analyzed in conjunction with the BTEX analyses. Target analytes were not detected at concentrations greater than the detection limits in the associated rinsate blanks, with the following exceptions:

- A low concentration of toluene was detected in rinsate blank ER-GW1-092617. The associated sample concentrations of toluene that were less than the concentration detected in the rinsate blank were qualified as not detected (U), as indicated in Appendix A.
- A low concentration of toluene was detected in rinsate blank ER-GW2-092617. The associated samples either contained sufficiently greater concentrations of toluene than that detected in the rinsate blank, or toluene was not detected at concentrations greater than the detection limit. No qualification of the data was necessary.
- A low concentration of toluene was detected in rinsate blank ER-GW4-092817. Due to associated method blank contamination, the detection of toluene in the rinsate blank was qualified as not detected (U), as indicated in Appendix A, and had no impact on project sample concentrations.

4.1.3 Surrogate Recoveries

Appropriate compounds were used as BTEX surrogate spikes. Recovery values for the surrogate spikes were within the current laboratory-specified control limits for all project samples. No qualification of the data was necessary.

4.1.4 Matrix Spike (MS)/Matrix Spike Duplicate (MSD) Results

Five MS/MSD samples were analyzed as part of the BTEX analyses (13 percent of samples). This is considered acceptable as the minimum requirement per the QAPP (Leidos 2014) is for MS/MSDs to be analyzed at a rate of 5 percent of the samples per matrix. Recoveries for the MS/MSDs were within the current laboratory-specified control limits, with the following exceptions:

- The MSD recoveries for benzene and m,p-xylene associated with the BTEX analysis of sample AOC09-UNKWELL-092217 in data package 17I0335 exceeded the laboratory-specified control limits; the corresponding MS recoveries were within the laboratory-specified control limits. No qualification of the data was necessary.

A project-specified control limit of 30 percent was used to evaluate the relative percent differences (RPDs) between the BTEX MS/MSDs. The RPDs between the MS/MSDs were within the project-specified control limits. No qualification of the data was necessary.

4.1.5 Laboratory Control Sample (LCS) and Laboratory Control Sample Duplicate (LCSD) Results

At least one LCS and/or LCSD was analyzed with the BTEX samples. Recoveries for each LCS and/or LCSD and the RPDs were within the current laboratory- or project-specified control limits. No qualification of the data was necessary.

4.1.6 Blind Field Duplicates

Four pairs of blind field duplicate groundwater samples were submitted for analysis for BTEX (10 percent of samples). This is considered acceptable as the minimum requirement per the QAPP (Leidos 2014) is for blind field duplicate pairs to be collected at a rate of 5 percent of the samples per matrix. The blind field duplicate pairs were identified as follows:

- AOC09-GW09-S-092517 / Dup04
- NGW624-092717 / Dup05
- AOC10-GW01-113017 / Dup06
- AOC6-GW13-S-112917 / Dup02.

A project-specified control limit of 30 percent was used to evaluate the RPDs between the duplicate groundwater samples, except when the sample results were within five times the reporting limit. In these cases, a project-specified control limit of plus or minus the reporting limit was used. RPDs for the duplicate sample pairs submitted for analysis were within the project-specified control limits. No qualification of the data was necessary.

4.1.7 Instrument Performance Checks, Initial and Continuing Calibrations, and Internal Standards

Instrument performance and QC checks were appropriate in number and frequency based on the laboratory and QAPP requirements. Laboratory-specified limits for instrument performance checks, initial and continuing calibrations, and internal standards were met for the BTEX analyses. No qualification of the data was necessary.

4.1.8 Reported Results

The laboratory noted the following additional issue with the BTEX analyses:

- Sample AOC09-GW01-S-092217 in data package 17I0335 was analyzed at a dilution due to sample foaming; associated reporting limits were elevated accordingly.

Target reporting limits were met for all other samples. Groundwater results were reported to the method detection limit, and detected concentrations less than the laboratory reporting limit were qualified by the laboratory as estimated results (J). No additional qualification of the data was necessary.

4.2 Chlorinated Volatile Organic Compounds (cVOCs)

This section documents the review of analytical data from the analysis of 40 samples, 10 trip blanks, 3 rinsate blanks, and the associated laboratory QC samples. Please refer to the Sample Index in Section 2.0 for a cross reference of field and laboratory identifications.

SDG	Number of Samples/Trip Blanks/Rinsate Blanks
17I0274	4/1/0
17I0275	7/1/0
17I0337	7/1/0
17I0385	0/1/2
17I0386	5/1/0
17I0402	4/1/0
17I0403	3/1/0
17I0432	0/1/1
17I0433	2/1/0
17L0030	8/1/0

4.2.1 Holding Times

For all analyses and all samples, the time between sample collection, extraction (if applicable), and analysis was determined to be within EPA- and project-specified holding times. No qualification of the data was necessary.

4.2.2 Blank Results

4.2.2.1 Laboratory Method Blanks

At least one method blank was analyzed with each batch of samples. Target analytes were not detected at concentrations greater than detection limits in the associated method blanks. No qualification of the data was necessary.

4.2.2.2 Trip Blanks

A trip blank was submitted and analyzed with each batch of samples analyzed for cVOCs. Target analytes were not detected at concentrations greater than the detection limits in the associated trip blank. No qualification of the data was necessary.

4.2.2.3 Rinsate Blanks

Three rinsate blanks were analyzed in conjunction with the cVOCs analyses. Target analytes were not detected at concentrations greater than the detection limits in the associated rinsate blanks. No qualification of the data was necessary.

4.2.3 Surrogate Recoveries

Appropriate compounds were used as cVOC surrogate spikes. Recovery values for the surrogate spikes were within the current laboratory-specified control limits for all project samples. No qualification of the data was necessary.

4.2.4 Matrix Spike (MS)/Matrix Spike Duplicate (MSD) Results

Five MS/MSD sample were analyzed as part of the cVOCs analyses (13 percent of samples). This is considered acceptable as the minimum requirement per the QAPP (Leidos 2014) is for MS/MSDs to be analyzed at a rate of 5 percent of the samples per matrix. Recoveries for the MS/MSDs were within the current laboratory-specified control limits. No qualification of the data was necessary.

A project-specified control limit of 30 percent was used to evaluate the RPDs between the cVOCs MS/MSDs. The RPDs between the MS/MSDs were within the project-specified control limits. No qualification of the data was necessary.

4.2.5 Laboratory Control Sample (LCS) and Laboratory Control Sample Duplicate (LCSD) Results

At least one LCS and/or LCSD was analyzed with the cVOCs samples. Recoveries for each LCS and/or LCSD and the RPDs were within the current laboratory- or project-specified control limits, with the following exception:

- The LCS/LCSD recoveries for cis-1,2-dichloroethene associated with the cVOCs analysis in data package 17I0275 were less than the laboratory-specified control limit. The associated sample results were qualified as estimated (J, UJ), as indicated in Appendix A.

4.2.6 Blind Field Duplicates

Three pairs of blind field duplicate groundwater samples were submitted for analysis for cVOCs (10 percent of samples). This is considered acceptable as the minimum requirement per the QAPP (Leidos 2014) is for blind field duplicate pairs to be collected at a rate of 5 percent of the samples per matrix. The blind field duplicate pairs were identified as follows:

- AOC07-GW03-S-092017 / Dup03
- NGW624-092717 / Dup05

- AOC6-GW13-S-112917 / Dup02.

A project-specified control limit of 30 percent was used to evaluate the RPDs between the duplicate groundwater samples, except when the sample results were within five times the reporting limit. In these cases, a project-specified control limit of plus or minus the reporting limit was used. RPDs for the duplicate sample pairs submitted for analysis were within the project-specified control limits. No qualification of the data was necessary.

4.2.7 Instrument Performance Checks, Initial and Continuing Calibrations, and Internal Standards

Instrument performance and QC checks were appropriate in number and frequency based on the laboratory and QAPP requirements. Laboratory-specified limits for instrument performance checks, initial and continuing calibrations, and internal standards were met for the cVOCs analyses, with the following exception:

- The continuing calibration (CCAL) recovery for cis-1,2-dichloroethene associated with the cVOCs analysis in data package 17I0275 was lower than the laboratory-specified control limit. The associated sample results were qualified as estimated (J, UJ), as indicated in Appendix A.

4.2.8 Reported Results

The laboratory noted the following additional issues with the cVOCs analyses.

- Reporting limits were elevated for several samples in data package 17I0337 due to required dilution because of limited sample volume.

Target reporting limits were met for all other samples. Groundwater results were reported to the method detection limit, and detected concentrations less than the laboratory reporting limit were qualified by the laboratory as estimated results (J). No additional qualification of the data was necessary.

4.3 Polychlorinated Biphenyls (PCBs)

This section documents the review of analytical data from the analysis of 6 samples, 2 rinsate blanks, and the associated laboratory QC samples. Please refer to the Sample Index in Section 2.0 for a cross reference of field and laboratory identifications.

SDG	Number of Samples/ Rinsate Blanks
17I0359	6/0
17I0385	0/2

4.3.1 Holding Times

For all analyses and all samples, the time between sample collection, extraction (if applicable), and analysis was determined to be within EPA- and project-specified holding times. No qualification of the data was necessary.

4.3.2 Blank Results

4.3.2.1 Laboratory Method Blanks

At least one method blank was analyzed with each batch of samples. Target analytes were not detected at concentrations greater than detection limits in the associated method blanks. No qualification of the data was necessary.

4.3.2.2 Rinsate Blanks

Two rinsate blanks were analyzed in conjunction with the PCB analyses. Target analytes were not detected at concentrations greater than the detection limits in the associated rinsate blanks. No qualification of the data was necessary.

4.3.3 Surrogate Recoveries

Appropriate compounds were used as PCBs surrogate spikes. Recovery values for the surrogate spikes were within the current laboratory-specified control limits for all project samples. No qualification of the data was necessary.

4.3.4 Matrix Spike (MS)/Matrix Spike Duplicate (MSD) Results

One MS/MSD sample was analyzed as part of the PCBs analyses (17 percent of samples). This is considered acceptable as the minimum requirement per the QAPP (Leidos 2014) is for MS/MSDs to be analyzed at a rate of 5 percent of the samples per matrix. Recoveries for the MS/MSD were within the current laboratory-specified control limits. No qualification of the data was necessary

A project-specified control limit of 30 percent was used to evaluate the RPDs between the PCBs MS/MSD. The RPDs between the MS/MSD were within the project-specified control limits for all project samples. No qualification of the data was necessary.

4.3.5 Laboratory Control Sample (LCS) and Laboratory Control Sample Duplicate (LCSD) Results

At least one LCS and/or LCSD was analyzed with the batch of PCBs samples. Recoveries for each LCS and/or LCSD and the RPDs were within the current laboratory- or project-specified control limits. No qualification of the data was necessary.

4.3.6 Blind Field Duplicates

One pair of blind field duplicate groundwater samples was submitted for analysis for PCBs (17 percent of samples). This is considered acceptable as the minimum requirement per the QAPP (Leidos 2014) is for blind field duplicate pairs to be collected at a rate of 5 percent of the samples per matrix. The blind field duplicate pair was identified as follows:

- AOC04-GW05-S-092517 / Dup01.

A project-specified control limit of 30 percent was used to evaluate the RPDs between the duplicate groundwater samples, except when the sample results were within five times the reporting limit. In

these cases, a project-specified control limit of plus or minus the reporting limit was used. RPDs for the duplicate sample pair submitted for analysis were within the project-specified control limits. No qualification of the data was necessary.

4.3.7 Instrument Performance Checks, Initial and Continuing Calibrations, and Internal Standards

Instrument performance and QC checks were appropriate in number and frequency based on the laboratory and QAPP requirements. Laboratory-specified limits for instrument performance checks, initial and continuing calibrations, and internal standards were met for the PCBs analyses, with the following exceptions:

- The secondary calibration checks associated with data packages 17I0359 (batch SFH0204-SCV6) and 17I0385 (batch SFJ0107-SCV6) were high for the surrogate decachlorobiphenyl on both analytical columns; surrogate recoveries were acceptable for all project samples. No qualification of the data was determined necessary.
- The CCAL associated with data package 17I0359 (batch SFJ0042-CCV5) was low for aroclor 1254 on column 2; associated sample results were reported from column 1, which was within the laboratory-specified control limits. No qualification of the data was necessary.
- The CCAL associated with data package 17I0385 (batch SFJ0188-CCV2) was low for aroclor 1260 on column 2; associated sample results were reported from column 1, which was within the laboratory-specified control limits. No qualification of the data was necessary.
- The CCAL associated with data package 17I0385 (batch SFJ0188-CCV4) was high for aroclor 1260 on column 1; aroclor 1260 was not detected in the associated samples. No qualification of the data was necessary.

4.3.8 Reported Results

The laboratory noted no additional issues with the PCBs analyses. Target reporting limits were met for all samples. Groundwater results were reported to the method detection limit, and detected concentrations less than the laboratory reporting limit were qualified by the laboratory as estimated results (J). No additional qualification of the data was necessary.

4.4 Phthalates

This section documents the review of analytical data from the analysis of 5 samples, 2 rinsate blanks, and the associated laboratory QC samples. Please refer to the Sample Index in Section 2.0 for a cross reference of field and laboratory identifications.

SDG	Number of Samples/ Rinsate Blanks
17I0403	3/0
17I0432	0/2
17I0433	2/0

4.4.1 Holding Times

For all analyses and all samples, the time between sample collection, extraction (if applicable), and analysis was determined to be within EPA- and project-specified holding times. No qualification of the data was necessary.

4.4.2 Blank Results

4.4.2.1 Laboratory Method Blanks

At least one method blank was analyzed with each batch of samples. Target analytes were not detected at concentrations greater than detection limits in the associated method blanks. No qualification of the data was necessary.

4.4.2.2 Rinsate Blanks

Two rinsate blanks were analyzed in conjunction with the phthalates analyses. Target analytes were not detected at concentrations greater than the detection limits in the associated rinsate blanks, with the following exception:

- A low concentration of bis(2-ethylhexyl)phthalate was detected in rinsate blank ER-GW4-092817. The associated sample concentration of bis(2-ethylhexyl)phthalate that was less than the concentration detected in the rinsate blank was qualified as not detected (U), as indicated in Appendix A.

4.4.3 Surrogate Recoveries

Appropriate compounds were used as phthalates surrogate spikes. Recovery values for the surrogate spikes were within the current laboratory-specified control limits for all project samples. No qualification of the data was necessary.

4.4.4 Matrix Spike (MS)/Matrix Spike Duplicate (MSD) Results

One MS/MSD sample was analyzed as part of the phthalates analyses (20 percent of samples). This is considered acceptable as the minimum requirement per the QAPP (Leidos 2014) is for MS/MSDs to be analyzed at a rate of 5 percent of the samples per matrix. Recoveries for the MS/MSD were within the current laboratory-specified control limits. No qualification of the data was necessary.

A project-specified control limit of 30 percent was used to evaluate the RPDs between the phthalates MS/MSD. The RPDs between the MS/MSD were within the project-specified control limits for all project samples. No qualification of the data was necessary.

4.4.5 Laboratory Control Sample (LCS) and Laboratory Control Sample Duplicate (LCSD) Results

At least one LCS and/or LCSD was analyzed with the batch of phthalates samples. Recoveries for each LCS and/or LCSD and the RPDs were within the current laboratory- or project-specified control limits. No qualification of the data was necessary.

4.4.6 Blind Field Duplicates

One pair of blind field duplicate groundwater samples was submitted for analysis for phthalates (20 percent of samples). This is considered acceptable as the minimum requirement per the QAPP (Leidos 2014) is for blind field duplicate pairs to be collected at a rate of 5 percent of the samples per matrix. The blind field duplicate pair was identified as follows:

- NGW624-092717 / Dup05.

A project-specified control limit of 30 percent was used to evaluate the RPDs between the duplicate groundwater samples, except when the sample results were within five times the reporting limit. In these cases, a project-specified control limit of plus or minus the reporting limit was used. RPDs for the duplicate sample pair submitted for analysis were within the project-specified control limits. No qualification of the data was necessary.

4.4.7 Instrument Performance Checks, Initial and Continuing Calibrations, and Internal Standards

Instrument performance and QC checks were appropriate in number and frequency based on the laboratory and QAPP requirements. Laboratory-specified limits for instrument performance checks, initial and continuing calibrations, and internal standards were met for the phthalates analyses, with the following exceptions:

- The internal standard recoveries for the continuing calibration following sample analysis (batch AFJ0110-CCV1) in data packages 17I0403, 17I0432, and 17I0433 were less than the laboratory-specified control limits. The CCAL recoveries for requested compounds were within control limits for associated samples; no qualification of the data was determined necessary.

4.4.8 Reported Results

The laboratory noted no additional issues with the phthalates analyses. Target reporting limits were met for all samples. Groundwater results were reported to the method detection limit, and detected concentrations less than the laboratory reporting limit were qualified by the laboratory as estimated results (J). No additional qualification of the data was necessary.

4.5 Diesel- and Oil-range Petroleum Hydrocarbons (TPH-D)

This section documents the review of analytical data from the analysis of 25 samples, 4 rinsate blanks, and the associated laboratory QC samples. Please refer to the Sample Index in Section 2.0 for a cross reference of field and laboratory identifications.

SDG	Number of Samples/ Rinsate Blanks
17I0335	7/0
17I0358	3/0
17I0359	6/0
17I0385	0/1
17I0403	3/0
17I0432	0/1
17I0433	2/0
17L0020	0/2
17L0021	4/0

4.5.1 Holding Times

For all analyses and all samples, the time between sample collection, extraction (if applicable), and analysis was determined to be within EPA- and project-specified holding times. No qualification of the data was necessary.

4.5.2 Blank Results

4.5.2.1 Laboratory Method Blanks

At least one method blank was analyzed with each batch of samples. Target analytes were not detected at concentrations greater than detection limits in the associated method blanks. No qualification of the data was necessary.

4.5.2.2 Rinsate Blanks

Four rinsate blanks were analyzed in conjunction with the TPH-D analyses. Target analytes were not detected at concentrations greater than the detection limits in the associated rinsate blanks, with the following exception:

- Low concentrations of diesel-range petroleum hydrocarbons were detected in rinsate blanks ER-GW1-092617 and ER-GW2-092617. The associated sample concentrations of diesel-range petroleum hydrocarbons that were less than the concentrations detected in the rinsate blanks were qualified as not detected (U), as indicated in Appendix A.

4.5.3 Surrogate Recoveries

Appropriate compounds were used as TPH-D surrogate spikes. Recovery values for the surrogate spikes were within the current laboratory-specified control limits for all project samples, with the following exceptions:

- Recoveries of the surrogate o-terphenyl associated with the TPH-D analysis of samples AOC09-GW06-S-092217, AOC09-GW02-S-092217, and AOC09-UNKWELL-092217 were less than the laboratory-specified control limit. Associated sample results were qualified as estimated (J, UJ), as indicated in Appendix A.
- Recovery of the surrogate o-terphenyl associated with the TPH-D analysis of sample ER-GW1-092617 was less than the laboratory-specified control limit. Associated sample results were qualified as estimated (J, UJ), as indicated in Appendix A.

4.5.4 Matrix Spike (MS)/Matrix Spike Duplicate (MSD) Results

Four MS/MSD samples were analyzed as part of the TPH-D analyses (15 percent of samples). This is considered acceptable as the minimum requirement per the QAPP (Leidos 2014) is for MS/MSDs to be analyzed at a rate of 5 percent of the samples per matrix. Recoveries for the MS/MSDs were within the current laboratory-specified control limits. No qualification of the data was necessary.

A project-specified control limit of 30 percent was used to evaluate the RPDs between the TPH-D MS/MSDs. The RPDs between the MS/MSDs were within the project-specified control limits for all project samples. No qualification of the data was necessary.

4.5.5 Laboratory Control Sample (LCS) and Laboratory Control Sample Duplicate (LCSD) Results

At least one LCS and/or LCSD was analyzed with each batch of TPH-D samples. Recoveries for each LCS and/or LCSD and the RPDs were within the current laboratory- or project-specified control limits. No qualification of the data was necessary.

4.5.6 Blind Field Duplicates

Four pairs of blind field duplicate groundwater samples were submitted for analysis for TPH-D (15% of samples). This is considered acceptable as the minimum requirement per the QAPP (Leidos 2014) is for blind field duplicate pairs to be collected at a rate of 5% of the samples per matrix. The blind field duplicate pairs were identified as follows:

- AOC09-GW09-S-092517 / Dup04
- AOC04-GW05-S-092517 / Dup01
- NGW624-092717 / Dup05
- AOC10-GW01-113017 / Dup06.

A project-specified control limit of 30 percent was used to evaluate the RPDs between the duplicate groundwater samples, except when the sample results were within five times the reporting limit. In these cases, a project-specified control limit of plus or minus the reporting limit was used. RPDs for the duplicate sample pairs submitted for analysis were within the project-specified control limits. No qualification of the data was necessary.

4.5.7 Initial and Continuing Calibrations

Initial and continuing calibrations were appropriate in number and frequency based on the laboratory and QAPP requirements. Laboratory-specified limits for initial and continuing calibrations were met for the TPH-D analyses. No qualification of the data was necessary.

4.5.8 Reported Results

The laboratory indicated the following additional issues with the TPH-D analyses:

- The case narrative for data package 17I0335 noted failures during the extraction process were due to 100 percent emulsions. No qualification of the data was determined necessary.
- The case narrative for data package 17I0385 noted the vial for sample ER-GW1-092617 had cracked during the extraction process. No qualification of the data was determined necessary.
- Sample ER-GW1-092617 in data package 17I0385 was re-extracted outside the method-recommended hold time; both sets of results were provided by the laboratory. The original analysis results will be reported, as indicated in Appendix A.

Target reporting limits were met for all samples. Groundwater results were reported to the method detection limit, and detected concentrations less than the laboratory reporting limit were qualified by the laboratory as estimated results (J). No additional qualification of the data was necessary.

4.6 Gasoline-range Petroleum Hydrocarbons (TPH-G)

This section documents the review of analytical data from the analysis of 25 samples, 8 trip blanks, 5 rinsate blanks, and the associated laboratory QC samples. Please refer to the Sample Index in Section 2.0 for a cross reference of field and laboratory identifications.

SDG	Number of Samples/Trip Blanks/Rinsate Blanks
17I0335	7/1/0
17I0358	3/1/0
17I0359	6/1/0
17I0385	0/1/2
17I0403	3/1/0
17I0432	0/1/1
17I0433	2/1/0
17L0020	0/0/2
17L0021	4/1/0

4.6.1 Holding Times

For all analyses and all samples, the time between sample collection, extraction (if applicable), and analysis was determined to be within EPA- and project-specified holding times. No qualification of the data was necessary.

4.6.2 Blank Results

4.6.2.1 Laboratory Method Blanks

At least one method blank was analyzed with each batch of samples. Target analytes were not detected at concentrations greater than detection limits in the associated method blanks, with the following exceptions:

- Gasoline was detected in the method blanks associated with data packages 17I0358 and 17I0359. The associated samples either contained sufficiently greater concentrations of gasoline than that detected in the method blank, or gasoline was not detected at concentrations greater than the detection limit. No qualification of the data was necessary.

4.6.2.2 Trip Blanks

A trip blank was submitted and analyzed with each batch of samples analyzed for TPH-G, with the exception of data package 17L0020; this data package contained rinsate blank samples and all associated samples contained no detections greater than the detection limits. Target analytes were not detected at concentrations greater than the detection limits in the associated trip blanks. No qualification of the data was necessary.

4.6.2.3 Rinsate Blanks

Five rinsate blanks were analyzed in conjunction with the TPH-G analyses. Target analytes were not detected at concentrations greater than the detection limits in the associated rinsate blanks. No qualification of the data was necessary.

4.6.3 Surrogate Recoveries

Appropriate compounds were used as TPH-G surrogate spikes. Recovery values for the surrogate spikes were within the current laboratory-specified control limits for all project samples, with the following exceptions:

- Recovery of the surrogate 4-bromofluorobenzene associated with the TPH-G analysis of the trip blank in data package 17I0359 exceeded the laboratory-specified control limit. Target analytes were not detected at concentrations greater than the detection limits in the trip blank. No qualification of the data was necessary.

4.6.4 Matrix Spike (MS)/Matrix Spike Duplicate (MSD) Results

Four MS/MSD samples were analyzed as part of the TPH-G analyses (16 percent of samples). This is considered acceptable as the minimum requirement per the QAPP (Leidos 2014) is for MS/MSDs to be analyzed at a rate of 5 percent of the samples per matrix. Recoveries for each MS and/or MSD were within the current laboratory-specified control limits. No qualification of the data was necessary.

A project-specified control limit of 30 percent was used to evaluate the RPDs between the TPH-G MS/MSDs. The RPDs between the MS/MSDs were within the project-specified control limits for all project samples. No qualification of the data was necessary.

4.6.5 Laboratory Control Sample (LCS) and Laboratory Control Sample Duplicate (LCSD) Results

At least one LCS and/or LCSD was analyzed with each batch of TPH-G samples. Recoveries for each LCS and/or LCSD and the RPDs were within the current laboratory- or project-specified control limits. No qualification of the data was necessary.

4.6.6 Blind Field Duplicates

Four pairs of blind field duplicate groundwater samples were submitted for analysis for TPH-G (16 percent of samples). This is considered acceptable as the minimum requirement per the QAPP (Leidos 2014) is for blind field duplicate pairs to be collected at a rate of 5 percent of the samples per matrix. The blind field duplicate pairs were identified as follows:

- AOC09-GW09-S-092517 / Dup04
- AOC04-GW05-S-092517 / Dup01
- NGW624-092717 / Dup05
- AOC10-GW01-113017 / Dup06.

A project-specified control limit of 30 percent was used to evaluate the RPDs between the duplicate groundwater samples, except when the sample results were within five times the reporting limit. In these cases, a project-specified control limit of plus or minus the reporting limit was used. RPDs for the duplicate sample pairs submitted for analysis were within the project-specified control limits. No qualification of the data was necessary.

4.6.7 Initial and Continuing Calibrations

Initial and continuing calibrations were appropriate in number and frequency based on the laboratory and QAPP requirements. Laboratory-specified limits for initial and continuing calibrations were met for the TPH-G analyses, with the following exception:

- The CCAL recovery for gasoline-range petroleum hydrocarbons (SFL0058-CCV1) associated with the TPH-G analysis in data package 17L0021 was less than the laboratory-specified control limit. The associated sample results were qualified as estimated (J, UJ), as indicated in Appendix A.

4.6.8 Reported Results

The laboratory indicated the following additional issues with the TPH-G analyses:

- Sample AOC09-GW01-S-092217 in data package 17I0335 was analyzed at a dilution due to sample foaming; associated reporting limits were elevated accordingly.

Target reporting limits were met for all other samples. Groundwater results were reported to the method detection limit, and detected concentrations less than the laboratory reporting limit were qualified by the laboratory as estimated results (J). No additional qualification of the data was necessary.

4.7 Total and Dissolved Metals

This section documents the review of analytical data from the analysis of 11 samples, 3 rinsate blanks, and the associated laboratory QC samples. Please refer to the Sample Index in Section 2.0 for a cross reference of field and laboratory identifications.

SDG	Number of Samples/ Rinsate Blanks
17I0359	6/0
17I0385	0/2
17I0403	3/0
17I0432	0/1
17I0433	2/0

4.7.1 Holding Times

For all analyses and all samples, the time between sample collection, extraction (if applicable), and analysis was determined to be within EPA- and project-specified holding times. No qualification of the data was necessary.

4.7.2 Blank Results

4.7.2.1 Laboratory Method Blanks

At least one method blank was analyzed with each batch of samples. No contamination was detected in any of the method blanks, with the following exceptions:

- Low concentrations of total mercury were detected in the method blanks associated with the total metals analyses in data packages 17I0358, 17I0359, 17I0403, 17I0432, and 17I0433. The associated samples either contained sufficiently greater concentrations of total mercury than

that detected in the rinsate blank, or total mercury was not detected at concentrations greater than the detection limit. No qualification of the data was necessary.

4.7.2.2 Rinsate Blanks

Three rinsate blanks were analyzed in conjunction with the total and dissolved metals analyses. Target analytes were not detected at concentrations greater than the detection limits in the associated rinsate blanks, with the following exception:

- A low concentration of total mercury was detected in rinsate blank ER-GW4-092817. The associated sample concentrations of total mercury that were less than (or extremely close to) the concentration detected in the rinsate blank were qualified as not detected (U), as indicated in Appendix A.

4.7.3 Matrix Spike (MS)/Laboratory Duplicate [kjh4][DJ5]Results

Two laboratory duplicates and/or matrix spikes (MS) were analyzed with the total and dissolved metals project samples (18 percent of samples). This is considered acceptable as the minimum requirement per the QAPP (Leidos 2014) is for MS/laboratory duplicates to be analyzed at a rate of 5 percent of the samples per matrix. The percent recovery for the MS were within the project-specified control limits, with the following exceptions:

- The MS recovery for dissolved iron associated with the dissolved metals analysis of sample AOC4-GW02-S-092517 in data package 17I0359 was less than the laboratory-specified control limit. The original sample concentration was greater than four times the spike concentration; therefore, no qualification of the data was necessary.

A project-specified control limit of 20 percent was used to evaluate the RPDs between the total and dissolved metals laboratory duplicates. The RPDs between the laboratory duplicates were within the project-specified control limits for all project samples, with the following exceptions:

- The laboratory duplicate RPDs for total and dissolved arsenic associated with the total and dissolved metals analysis of sample AOC4-GW02-S-092517 in data package 17I0359 exceeded the project-specified control limit. The associated sample results were qualified as estimated (J), as indicated in Appendix A.

4.7.4 Laboratory Control Sample (LCS) Results

At least one LCS was analyzed with each batch of total metals samples. Recoveries for each LCS were within the current laboratory-specified control limits. No qualification of the data was necessary.

4.7.5 Blind Field Duplicates

Two pairs of blind field duplicate groundwater samples were submitted for analysis for total nad dissolved metals (18 percent of samples). This is considered acceptable as the minimum requirement per the QAPP (Leidos 2014) is for blind field duplicate pairs to be collected at a rate of 5 percent of the samples per matrix. The blind field duplicate pairs were identified as follows:

- AOC04-GW05-S-092517 / Dup01
- NGW624-092717 / Dup05.

A project-specified control limit of 20 percent was used to evaluate the RPDs between the duplicate groundwater samples, except when the sample results were within five times the reporting limit. In these cases, a project-specified control limit of plus or minus the reporting limit was used. RPDs for the duplicate sample pairs submitted for analysis were within the project-specified control limits, with the following exceptions:

- The RPDs for dissolved arsenic and dissolved iron for sample pair NGW624-092717 / Dup05 in data package 17I0403 exceeded the project-specified control limit. The associated sample results should be considered estimated[kjh6][DJ7].

4.7.6 Total and Dissolved Metals Concentrations Comparison

The analytical results for total and dissolved metals were compared for each project sample. A project-specified control limit of 20 percent was used to evaluate the RPDs between the total and dissolved metals results, except when the sample results were within five times the reporting limit. In these cases, a project-specified control limit of plus or minus the reporting limit was used. The RPDs between the total and dissolved metals results were within the project-specified control limits for all project samples, with the following exception:

- The RPD between the total and dissolved arsenic concentrations for sample NGW624-092717 in data package 17I0403 exceeded the project-specified control limit. The associated sample results were qualified as estimated (J), as indicated in Appendix A.

4.7.7 Calibration Verification, Calibration Blanks, and ICP Interference Checks

Calibration verification, calibration blanks, and ICP interference checks were performed for the requested analyses and were appropriate in number and frequency based on the laboratory and QAPP requirements. No qualification of the data was necessary.

4.7.8 Reported Results

The laboratory indicated the following additional issues with the total and dissolved metals analyses:

- The reporting limits were elevated for multiple samples in data package 17I0359 due to dilution. All associated samples contained concentrations of the affected compounds greater than the elevated reporting limits. No qualification of the data was determined necessary.

Target reporting limits were met for all other samples. Groundwater results were reported to the method detection limit, and detected concentrations less than the laboratory reporting limit were qualified by the laboratory as estimated results (J). No additional qualification of the data was necessary.

5.0 USE OF THIS REPORT

This data validation summary report has been prepared for the exclusive use of The Boeing Company and the City of Seattle and applicable regulatory agencies for specific application to the North Boeing Field/Georgetown Steam Plant Remedial Investigation/Feasibility Study. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates, Inc. (LAI). Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by LAI, shall be at the user's sole risk. LAI warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

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