

April 23, 2018

Washington State Department of Ecology  
Northwest Regional Office  
3190 160th Ave SE  
Bellevue, WA 98008-5452

Attn: Robin Harrover

Transmitted via email to: *rhar461@ecy.wa.gov*

**Re: Status Report No. 62, January through March 2018 Activity Period  
WAD 041337130, RCRA Corrective Action Agreed Order No. 01HWTRNR-3345  
Boeing Auburn Facility  
Auburn, Washington  
Project No.0025164.150.501**

Dear Ms. Harrover:

The Resource Conservation and Recovery Act (RCRA) Corrective Action Agreed Order (Auburn Agreed Order) became effective on August 14, 2002. As required under Section VI.13 of the Auburn Agreed Order, The Boeing Company (Boeing) is providing Status Report No. 62, which covers the 3-month activity period of January through March 2018. This report is being submitted on April 23, instead of the standard, April 15, due to an extension request discussed with Washington State Department of Ecology (Ecology; Reference #26).

## References

1. January 5, 2018. Email: Ecology will be in northeastern Algona and Auburn, Jan 9 – 10. From Thea Levkovitz, Ecology) to representatives of Boeing, City of Algona, and City of Auburn. (Attachments: Boeing Auburn Fabrication Site Cleanup – 2017 Year-End Update Postcard and Flier.)
2. January 5, 2018. Ecology Listserv: Ecology staff will be in Northeast Algona, January 10.
3. January 15, 2018. Letter: Groundwater Concentration Figures, June 2017. From Sarah Fees and Jennifer Wynkoop, Landau Associates, Inc. (LAI) to Robin Harrover and Neal Hines, Ecology. (Attachments: Trichloroethene and vinyl chloride plume figures updated with June 2017 data.)
4. January 15, 2018. Letter: Status Report No. 61, October Through December 2017 Activity Period, Boeing Auburn Facility, WAD 041337130, RCRA Corrective Action Agreed Order No. 01HWTRNR-3345, Auburn, Washington. From Jennifer Wynkoop and Sarah Fees, LAI, to Robin Harrover, Ecology.
5. January 18, 2018. Ecology Listserv: Algona Family Social, Feb. 3, 6-8 PM – Stop by to talk with Ecology!

6. January 24, 2018. Email: Boeing Fabrication Auburn Site – Status Report 61, Oct – Dec 2017. From Robin Harrover, Ecology, to Representatives of City of Auburn, City of Algona, and City of Pacific.
7. January 26, 2018. Letter: Ecology Request for Submittal of RCRA Permit Application to Issue a New Dangerous Waste Management Permit for Corrective Action; FS #2018; CS #5049; EPA WAD041337130. From Robin Harrover, Ecology, to Carl Bach, Boeing.
8. January 26, 2018. Email: Review of Boeing Auburn Bldg. 17-06, Dec. 8th Data Submittal. From Robin Harrover, Ecology, to Carl Bach, Boeing.
9. February 1, 2018. Meeting: Ecology concerns with Cyanide Analysis. Attendees: Neal Hines, Robin Harrover, and Samuel Iwenofu, Ecology; and Jennifer Wynkoop and Sarah Fees, LAI.
10. February 12, 2018. Agency Review Draft Technical Memorandum: Phase 8 Interim Groundwater Monitoring Program. From Jennifer Wynkoop and Sarah Fees, LAI, to Robin Harrover and Neal Hines, Ecology; and Carl Bach and James Swartz, Boeing.
11. February 13, 2018. Meeting: Boeing Auburn Cleanup Levels. Attendees: Neal Hines, Robin Harrover, and Nels Johnson, Ecology; Jennifer Wynkoop and Sarah Fees, LAI; and Carl Bach, Boeing.
12. February 15, 2018. Email: 01Feb2018 Meeting Summary. From Robin Harrover, Ecology, to Carl Bach, Boeing; Jennifer Wynkoop and Sarah Fees, LAI; and Neal Hines and Samuel Iwenofu, Ecology. (Attachment: Summary of the meeting regarding cyanide sampling and analytical methodologies).
13. February 15, 2018. Email: Follow up on adjustment of CULs based on MCLs. From Jennifer Wynkoop, LAI, to Robin Harrover, Neal Hines, and Nels Johnson, Ecology; and Carl Bach, Boeing. (Attachment: CLARC guidance that explains adjustment of cleanup levels).
14. February 15, 2018. Email: Boeing Auburn Permit Kickoff Meeting. From Robin Harrover, Ecology, to Neal Hines and Thea Levkovitz, Ecology; Carl Bach and Jim Swartz, Boeing; and Jennifer Wynkoop, LAI. (Attachments: Updated version of permitting schedule, draft Permit Lite language, and Agreed Order updates.)
15. February 16, 2018. Conference Call: Boeing Auburn RCRA Permit Meeting. Attendees: Neal Hines and Robin Harrover, Ecology; Jennifer Wynkoop and Sarah Fees, LAI; and Carl Bach, Boeing.
16. February 27, 2018. Email: Cleanup Technology Tables. From Jennifer Wynkoop, LAI, to Robin Harrover and Neal Hines, Ecology. (Attachment: draft of the FS Cleanup Technology Tables.)
17. March 2, 2018. Email: 2nd Quarter GW Sampling. From Robin Harrover, Ecology, to Jennifer Wynkoop, LAI.
18. March 9, 2018. Email: Ecology Comment and Approval of Boeing Auburn Groundwater Monitoring Program, Phase 8. From Robin Harrover, Ecology, to Carl Bach, Boeing.
19. March 12, 2018. Email: RCRA Permit Draft Language. From Jennifer Wynkoop, LAI, to Robin Harrover, Ecology.
20. March 14, 2018. Technical Memorandum: Phase 8 Interim Groundwater Monitoring Program. From Jennifer Wynkoop and Sarah Fees, LAI, to Robin Harrover and Neal Hines, Ecology; and Carl Bach and James Swartz, Boeing.

21. March 15, 2018. Email: For review – Folio update language Boeing Auburn Fabrication Site. From Thea Levkovitz, Ecology, to representatives of Boeing, Futurewise, City of Algona, City of Auburn, LAI, ICF International (ICF). (Attachments: Folio for City of Algona’s City Hall grand opening.)
22. March 19, 2018. Ecology Listserv: Ribbon Cutting Algona Community Center, April 5 – Stop by to talk with Ecology.
23. March 22, 2018. Email: Re: For review – Folio update language Boeing Auburn Fabrication Site. From Kamara Sams, Boeing, to Thea Levkovitz, Ecology; and Liz Mack, EnviroIssues. (Attachments: Boeing and LAI’s comments on the Folio for City of Algona’s City Hall grand opening.)
24. March 29, 2018. Letter: Groundwater Monitoring Results: September, November, and December 2017, City of Algona Wells, Algona, Washington. From Jennifer Wynkoop, LAI, to Mayor David Hill, City of Algona.
25. March 30, 2018. Newforma File Transfer: Draft RCRA Permit Renewal Application. From Sarah Fees, LAI, to Robin Harrover and Neal Hines, Ecology. (Attachment: Draft The Boeing Company’s Auburn Fabrication Division Plant Permit No. WAD 041337130 RCRA Permit Renewal Volume 1.)
26. March 30, 2018. Email: 1Q18 Status Report – Extension Request. From Sarah Fees, LAI, to Robin Harrover and Neal Hines, Ecology.

## Work Conducted

### General Site-wide Corrective Action Activities

On January 15, 2018, LAI submitted Status Report No. 61 regarding fourth quarter 2017 activities to Ecology and other stakeholders<sup>1</sup> for their records (Reference #4). Ecology project managers, Robin Harrover and Neal Hines, continued to attend regularly scheduled monthly<sup>2</sup> conference calls with Boeing, LAI, and the City of Algona’s environmental consultant, ICF. The primary purpose of these calls is to discuss technical aspects of the project scope and schedule, data results, and public outreach. Boeing and Ecology communication personnel also attend these calls.

During a conference call, Ecology requested that Boeing provide updated groundwater concentration contour figures from the June 2016 sampling event. Boeing provided updated groundwater concentration figures to Ecology for trichloroethene (TCE) and vinyl chloride (VC) plumes on January 15, 2018 (Reference #3). Boeing will continue to provide annual updates of the concentration plume figures after the annual groundwater sampling events, per Ecology’s request.

As part of offsite monitoring well access agreement and right-of-way (ROW) permits, Boeing provides groundwater data submittals to stakeholders. Currently, all groundwater data submittals are provided annually, except for the submittal to the City of Algona, which is provided semiannually. Data for the

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<sup>1</sup> A list of stakeholders that receive copies of the quarterly status reports are listed at the end of this document. Ecology also forwards quarterly status reports via email to representatives of the cities of Algona, Auburn, and Pacific (Reference #6).

<sup>2</sup> Conference calls occurred in January, February, and March.

35 wells located on City of Algona ROW from the third quarter (September 2017) and fourth quarter (November and December 2017) sampling events was distributed to the City of Algona on March 29, 2018 (Reference #24).

### **Dangerous Waste Management Permit for Corrective Action**

During the first quarter 2018, Ecology notified Boeing that the State of Washington's Dangerous Waste Management Permit for Corrective Action at the Boeing Auburn Facility expired on April 27, 2016. The US Environmental Protection Agency (EPA) requested that Ecology have a new permit in place by September 30, 2018. In order to comply with the EPA request, Ecology requested that Boeing submit a RCRA permit application to renew the dangerous waste management permit on January 26, 2018 (Reference #7). Ecology also provided a checklist for the permit application. Boeing and Ecology discussed the requirements of the permit application and the timeline of submittal during regularly scheduled conference calls and emails and conference calls specifically for the RCRA permit application. Ecology provided an updated schedule, a draft of the Permit Lite language, and proposed updates to the Agreed Order on February 15, 2018 (Reference #14). On February 16, 2018, Boeing and Ecology had a conference call to discuss the permit submittal schedule and permit requirements (Reference #15). Boeing provided comments on the RCRA permit draft language on March 12, 2018 (Reference #19). On March 30, 2018, Boeing provided Ecology with a draft of the RCRA permit renewal application (Reference #25). Boeing expects to receive comments from Ecology on the draft application and submit the final application in the second quarter 2018.

### **Groundwater and Surface Water Sampling**

Boeing submitted a draft Phase 8 groundwater monitoring plan (GWMP) to Ecology on February 12, 2018 (Reference #10). Ecology provided comments and approved the Phase 8 GWMP on March 9, 2018 (Reference #18). Boeing finalized the Phase 8 GWMP on March 14, 2018 (Reference #20). Ecology-approved changes to the GWMP for Phase 8 included:

- Reduction in well sampling frequency from quarterly to semiannual sampling for 19 sampling points.
- AGW278 CMT channel selection from the seven installed channels to four channels for continued monitoring.
- Reduction in analysis for volatile organic compounds from the list of 38 analytes to a shorter list of 6 analytes.

Phase 8 quarterly groundwater sampling took place from March 12 through March 14, 2018. Groundwater sampling was delayed to accommodate the review process on the Phase 8 GWMP (Reference #17). The quarterly groundwater sampling data are provided in Attachment 1. The current monitoring well network is shown on Figure 1-1. A sampling matrix for the March 2018 quarterly sampling event is presented in Table 1-1. A complete summary of analytical results for groundwater is presented in Table 1-2. Detected compounds for groundwater are summarized in Table 1-3.

Surface water sampling activities include semiannual (wet season) sampling at one location at the Chicago Avenue ditch. The wet season surface water sampling occurred on March 6, 2018. The wet season surface water sampling data are provided in Attachment 1. Surface water sampling locations are shown on Figure 1-1. A complete summary of analytical results for surface water is presented in Table 1-4.

### **Algona Enhanced Natural Attenuation Pilot Test**

The enhanced natural attenuation pilot test injection began on August 18, 2015 and was completed on September 4, 2015. Approximately 80,000 gallons of electron donor solution was injected into the shallow water-bearing zone. Boeing is performing post-injection sampling to monitor the effectiveness of the pilot test injection. Post-injection sampling was conducted quarterly through December 2017. As part of the update in the Phase 8 GWMP, quarterly sampling for the pilot test was discontinued. Ongoing pilot test sampling will now be continued on a semiannual basis and summaries will be provided in the quarterly reports following the June and December sampling events.

### **Feasibility Study Investigation**

The feasibility study (FS) work plan was submitted to Ecology in May 2017. Ecology agreed to provide approval of portions of the work plan as needed to complete field activities in a timely manner. Prior to the first quarter 2018, Ecology and Boeing completed a number of meetings to discuss the FS work plan and FS cleanup technologies, which were described in previous status reports. On February 13, 2018, Boeing and Ecology had a meeting to further discuss the Boeing Auburn cleanup levels (Reference #11). Boeing followed up this meeting with an email containing Ecology's Cleanup Levels and Risk Calculation (CLARC) guidance explaining the rationale for cleanup level selection (Reference #13). Based on Ecology comments of the FS work plan, Boeing submitted an FS cleanup technologies screening table to add to the FS work plan on February 27, 2018 (Reference #16). Boeing expects to receive full Ecology approval and finalize the FS work plan in the second quarter 2018.

FS fieldwork investigation activities began in June 2017. Initial investigation activities in June consisted of sub-slab soil gas sampling in Building 17-07, soil gas sampling at former Building 17-03, and soil and groundwater sampling at Area of Concern (AOC) A-01. Additional FS investigation activities were completed in August and September 2017 and included soil and groundwater sampling from borings drilled at the former Building 17-03, AOC A-01, and Building 17-06 (AOC A-13) and installation of monitoring wells AGW277 (Building 17-06) and AGW278 (continuous multichannel tubing [CMT] well, Building 17-07). Submittals of data for each investigation were provided to Ecology following the investigation activities. Ecology provided an update on review status of the data submittals on January 26, 2018 (Reference #8). Boeing expects to receive Ecology comments and finalize these data submittals in the second quarter 2018.

Additional FS investigation activities were completed in Building 17-06 (AOC A-13) in December 2017 and included soil and groundwater sampling from four borings and installation of four groundwater monitoring wells (AGW279 through AGW282). FS investigation activities in the first quarter 2018 included well development and sampling for the newly installed wells in Building 17-06 and continued cyanide investigation activities for AOC A-09. An update on FS activities and pending data submittals to Ecology are described below.

### **Building 17-06 (Area of Concern A-13)**

Well development and initial sampling of the newly installed wells in Building 17-06 (AGW279 through AGW282) occurred on January 5 and January 16, 2018, respectively. All of the newly installed wells and borings in Building 17-06 were surveyed on January 19, 2018. Results of the additional Building 17-06 investigation activities will be summarized in a data submittal for Ecology review in the second quarter 2018.

### **Cyanide Investigation (Area of Concern A-09)**

Boeing and Ecology discussed Ecology's concerns about the cyanide sampling and methodology at a meeting on February 1, 2018 (Reference #9). Ecology provided Boeing with a summary of this meeting on February 15, 2018 (Reference #12). During first quarter groundwater monitoring in March 2018, groundwater samples were collected from six monitoring wells for total cyanide analysis. These groundwater samples were collected using field-filtration techniques and both preserved and unpreserved samples were analyzed. Only the preserved sample results are included in the project database and these results are presented in Attachment 1. Comparison of preserved and unpreserved results will be provided to Ecology in a separate data submittal after additional sampling has been completed in June 2018.

### **Pore Water Investigation at Mill Creek (Area of Concern A-15)**

During the fourth quarter 2017, pore water monitoring piezometers were installed at three locations in Mill Creek. A data submittal summarizing results of the pore water installation and sampling will be provided to Ecology in the second quarter 2018.

## **Communications**

Ecology and Boeing are working together to ensure that all stakeholders are aware of the progress of investigation and cleanup activities at the Boeing Auburn Site. The City of Algona continues to be notified of all fieldwork occurring in Algona. The City of Algona's consultant, ICF, continues to participate in project conference calls with Boeing and Ecology and continues to review Algona-related deliverables (e.g., work plans and reports). Boeing and Ecology also continue to update the City of Auburn on activities, as needed.

Ecology posted several update notifications to their Listserv in the first quarter 2018. Updates included: notification regarding Ecology staff delivering 2017 year-end update flyers to homes and

businesses in northeast Algona on January 10 (Reference #2), Ecology staff present at the Algona Family Social on February 3 (Reference #5), and Ecology staff present at the grand opening of the new Community Center and City Hall on April 5 (Reference #22). Ecology also provides stakeholders with updates on Ecology's schedule and opportunities to review Ecology presentation materials. Ecology provided a 2017 year-end update flyer and postcard to stakeholders on January 5, 2018 (Reference #1). Ecology also provided a folio for the City of Algona's community center opening for stakeholder review on March 15, 2018 (Reference #21). Boeing provided comments on the folio language on March 22, 2018 (Reference #23).

### **Building 17-06 Ongoing Monitoring**

Boeing is continuing to monitor for petroleum hydrocarbons in wells AGW128 and AGW277 located in Building 17-06. During the first quarter, free-phase product was detected in well AGW128 in January; however, free-phase product was not observed in March<sup>3</sup>. Free-phase product has not been detected in any of the other wells in Building 17-06. A sorbent sock has been placed in well AGW128 to extract free-phase product and is replaced approximately monthly. Boeing will continue to replace the sorbent sock in well AGW128 as long as product is present in the sock and will check for product regularly.

### **Occurrence of Problems**

One of the wells along Perimeter Road (AGW105) was discovered damaged during annual groundwater sampling in June 2017. The well was decommissioned in August 2017 and the decommissioning log was submitted to Ecology in the third quarter status report. AGW105 was replaced with AGW105R on January 4, 2018. The monitoring well log for AGW105R is provided in Attachment 2. Well development was completed on January 5, 2018. The location of this new well was surveyed on January 19, 2018. The survey information for AGW105R is presented in Table 2-1. A passive diffusion bag (PDB) was installed at this location on March 27, 2018 and will be sampled during regularly scheduled semiannual sampling beginning in June 2018.

### **Projected Work for Next Reporting Period April through June 2018**

Activities projected for the next reporting period pertain to FS fieldwork, Algona pilot test, reporting, and ongoing monitoring of groundwater and surface water. Tasks during second quarter 2018 are expected to include:

- Submit final RCRA permit application to Ecology
- Finalize the FS work plan
- Providing Ecology with a data submittal summarizing additional FS investigation results that occurred in December 2017 at Building 17-06

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<sup>3</sup> Monitoring for petroleum hydrocarbons was not completed in February.

- Providing Ecology with a data submittal summarizing Mill Creek pore water piezometer installation and initial sampling results
- Submitting a draft Site-wide natural attenuation assessment report
- Submitting a draft contaminant transport model report
- Preparation of the FS report
- Conducting the annual groundwater sampling event in June 2018.

## Other Significant Findings, Changes, and Contacts

Neal Hines is no longer with Ecology. Once his replacement is identified, this new contact will be added to the status report contact list.

If you have any questions regarding this status report, or need any other information, please do not hesitate to contact Boeing or LAI.

LANDAU ASSOCIATES, INC.



Sarah Fees, LG  
Senior Project Geologist



Jennifer Wynkoop  
Principal Scientist

SEF/JWW/jrc

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cc: Carl Bach, Boeing (email only)  
Thomas MacMannis, Boeing (email only)  
Kamara Sams, Boeing (email only)  
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Christine Garrison, DCT Industrial (email only)  
Steve Campbell, Prologis (email only)  
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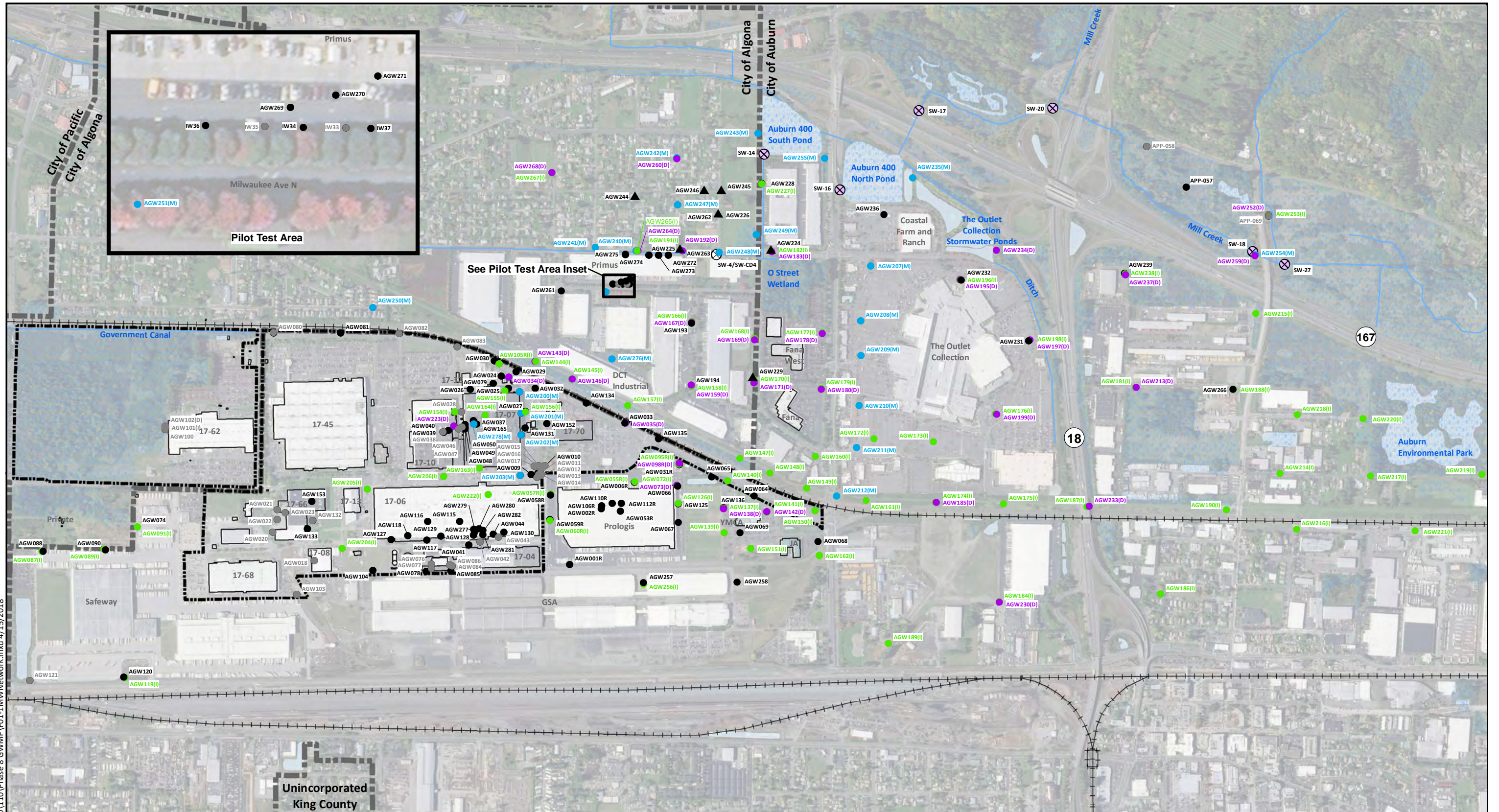
Attachments: Attachment 1: Groundwater and Surface Water Sampling Results  
Attachment 2: AGW105R Well Log and Survey Results  
Laboratory Data Packages (only included in final hard copy on DVD)



# **Groundwater and Surface Water Sampling Results**



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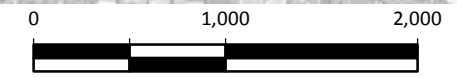
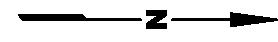


**Notes**

1. Groundwater wells are identified by the AGW prefix. The designations behind the identifications indicate the zone. If there is no designation, the well is screened in the shallow zone. (I) = intermediate zone, (D) = deep zone, (M) = multi-level well; screens in multiple groundwater zones.
2. Well designations beginning with APP are installed and owned by WSDOT.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

**Legend**

- ▲ Offsite Water Table Well
- Shallow Monitoring Well (2 to 30 ft bgs)
- (I) Intermediate Monitoring Well (40 to 60 ft bgs)
- (D) Deep Monitoring Well (80 to 100 ft bgs)
- (M) Multi-Level Well
- Wells Not Currently Sampled
- ⊗ Annual Surface Water Sample Location
- ⊗ Semiannual Surface Water Sampling Location
- Wetland Areas
- Water Bodies
- Waterways



Base Map Source: Geometrix 2003; Parcel Data Source: King County 2015; Aerial Photo Source: Esri World Imagery.

Boeing Auburn Auburn, Washington	<b>Current Monitoring Well Network</b>	Figure <b>1-1</b>
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**Table 1-1**  
**1Q2018 Groundwater Sampling Matrix**  
**Boeing Auburn Facility**  
**Auburn, Washington**

Sample Location	Field Sample Identification	Sample Date	Sample Type	Laboratory SDG	Laboratory Sample Identification	Total Cyanide ASTM D7511	TPH-D by NWTPH-Dx	Select VOCs by SW-846 8260C	Boeing 38 VOCs by SW-846 8260C
AGW037	AGW037-NAOH-20180312	3/12/2018	N	A8C0444	A8C0444-01RE3	X			
AGW047	AGW047-NAOH-20180312	3/12/2018	N	A8C0444	A8C0444-03RE3	X			
AGW048	AGW048-NAOH-20180312	3/12/2018	N	A8C0444	A8C0444-05RE3	X			
AGW049	AGW049-NAOH-20180312	3/12/2018	N	A8C0444	A8C0444-07RE3	X			
AGW050	AGW050-NAOH-20180312	3/12/2018	N	A8C0444	A8C0444-09RE3	X			
AGW247-1	AGW247-1-6-20180313	3/13/2018	N	580-75797-1	580-75797-10			X	
AGW251-3	AGW251-3-40-20180313	3/13/2018	N	580-75797-1	580-75797-11			X	
AGW273	AGW273-20180313	3/13/2018	N	580-75797-1	580-75797-7			X	
AGW277	AGW277-20180314	3/14/2018	N	580-75793-1	580-75793-4		X		
AGW278-1	AGW278-1-17-20180312	3/12/2018	N	580-75797-1	580-75797-2			X	
AGW278-1	AGW900-20180312	3/12/2018	FD	580-75797-1	580-75797-3			X	
AGW278-1	AGW278-1-17-NAOH-20180312	3/12/2018	N	A8C0444	A8C0444-11RE4	X			
AGW278-1	AGW900-NAOH-20180312	3/12/2018	FD	A8C0444	A8C0444-13RE4	X			
AGW278-2	AGW278-2-25-20180312	3/12/2018	N	580-75797-1	580-75797-4			X	
AGW278-4	AGW278-4-45-20180312	3/12/2018	N	580-75797-1	580-75797-5			X	
AGW278-6	AGW278-6-80-20180312	3/12/2018	N	580-75797-1	580-75797-6			X	
AGW279	AGW279-20180314	3/14/2018	N	580-75793-1	580-75793-2		X		
AGW279	AGW901-20180314	3/14/2018	FD	580-75793-1	580-75793-3		X		
AGW280	AGW280-20180314	3/14/2018	N	580-75793-1	580-75793-1		X		
AGW281	AGW281-20180313	3/13/2018	N	580-75797-1	580-75797-13		X		
AGW282	AGW282-20180313	3/13/2018	N	580-75797-1	580-75797-12		X		
IW36	IW36-20180313	3/13/2018	N	580-75797-1	580-75797-8			X	
IW37	IW37-20180313	3/13/2018	N	580-75797-1	580-75797-9			X	
SW-CD4	SW-CD4-20180306	3/6/2018	N	580-75550-1	580-75550-2				X
SW-CD4	SW-900-20180306	3/6/2018	FD	580-75550-1	580-75550-3				X

**Notes:**

1. Samples were analyzed for Total Cyanide by Apex Laboratories; all other analytical methods were performed by TestAmerica.

**Abbreviations/Acronyms:**

FD = field duplicate  
N = primary sample  
NWTPH = Northwest Total Petroleum Hydrocarbon  
SDG = sample delivery group  
VOC = volatile organic compound

**Table 1-2  
1Q2018 Groundwater Analytical Results  
Boeing Auburn Facility  
Auburn, Washington**

Sample Location	Zone	Laboratory SDG	Sample Date	Sample Type	Select Volatile Organic Compounds (µg/L; SW-846 8260C)						General Chemistry (mg/L; ASTM D7511)	Petroleum Hydrocarbons (mg/L; NWTPH-Dx)	
					Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,1-Dichloroethene	Vinyl Chloride	Total Cyanide (a)	Diesel Range Organics (C12-C24)	Oil Range Organics (C24-C40)
AGW037	Shallow-WT	A8C0444	3/12/2018	N	--	--	--	--	--	--	0.00500 U	--	--
AGW047	Shallow	A8C0444	3/12/2018	N	--	--	--	--	--	--	<b>0.0977</b>	--	--
AGW048	Shallow	A8C0444	3/12/2018	N	--	--	--	--	--	--	<b>0.0798</b>	--	--
AGW049	Shallow	A8C0444	3/12/2018	N	--	--	--	--	--	--	<b>0.0185</b>	--	--
AGW050	Shallow	A8C0444	3/12/2018	N	--	--	--	--	--	--	<b>3.62</b>	--	--
AGW247-1	Shallow-WT	580-75797-1	3/13/2018	N	0.20 U	0.20 U	0.20 U	<b>0.41</b>	0.20 U	<b>5.8</b>	--	--	--
AGW251-3	Intermediate	580-75797-1	3/13/2018	N	0.20 U	0.20 U	<b>0.26</b>	0.20 U	0.20 U	<b>7.8</b>	--	--	--
AGW273	Shallow	580-75797-1	3/13/2018	N	0.20 U	0.20 U	<b>1.7</b>	<b>0.37</b>	0.20 U	<b>4.1</b>	--	--	--
AGW277	Shallow-WT	580-75793-1	3/14/2018	N	--	--	--	--	--	--	--	<b>0.14</b>	0.35 U
AGW278-1	Shallow-WT	580-75797-1	3/12/2018	N	0.20 U	<b>0.74</b>	<b>1.5</b>	0.20 U	0.20 U	<b>0.64</b>	--	--	--
AGW278-1	Shallow-WT	A8C0444	3/12/2018	N	--	--	--	--	--	--	<b>0.00890 J</b>	--	--
AGW278-1	Shallow-WT	580-75797-1	3/12/2018	FD	0.20 U	<b>0.75</b>	<b>1.4</b>	0.20 U	0.20 U	<b>0.63</b>	--	--	--
AGW278-1	Shallow-WT	A8C0444	3/12/2018	FD	--	--	--	--	--	--	<b>0.00900</b>	--	--
AGW278-2	Shallow	580-75797-1	3/12/2018	N	0.20 U	<b>1.0</b>	<b>1.3</b>	0.20 U	0.20 U	<b>0.29</b>	--	--	--
AGW278-4	Intermediate	580-75797-1	3/12/2018	N	0.20 U	0.20 U	<b>0.88</b>	0.20 U	0.20 U	<b>3.2</b>	--	--	--
AGW278-6	Deep	580-75797-1	3/12/2018	N	0.20 U	0.20 U	<b>0.26</b>	0.20 U	0.20 U	0.020 U	--	--	--
AGW279	Shallow-WT	580-75793-1	3/14/2018	N	--	--	--	--	--	--	--	0.11 U	0.35 U
AGW279	Shallow-WT	580-75793-1	3/14/2018	FD	--	--	--	--	--	--	--	0.11 U	0.35 U
AGW280	Shallow-WT	580-75793-1	3/14/2018	N	--	--	--	--	--	--	--	0.11 U	0.35 U
AGW281	Shallow-WT	580-75797-1	3/13/2018	N	--	--	--	--	--	--	--	<b>0.15</b>	<b>0.54</b>
AGW282	Shallow-WT	580-75797-1	3/13/2018	N	--	--	--	--	--	--	--	<b>0.66</b>	<b>3.6</b>
IW36	On-Shallow	580-75797-1	3/13/2018	N	0.20 U	0.20 U	<b>0.39</b>	<b>0.30</b>	0.20 U	<b>6.2</b>	--	--	--
IW37	Shallow	580-75797-1	3/13/2018	N	0.20 U	0.20 U	<b>0.36</b>	0.20 U	0.20 U	<b>1.3</b>	--	--	--

**Notes:**

(a) Total Cyanide was collected, filtered with a 0.1 µm filter and preserved with sodium hydroxide (NaOH).

**Bold** text indicates detected analyte.

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

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

**Abbreviations/Acronyms:**

ASTM = ASTM International

FD = field duplicate

µg/L = micrograms per liter

mg/L = milligrams per liter

µm = micrometer (micron)

N = primary sample

SDG = sample delivery group

WT = water table

**Table 1-3  
1Q2018 Groundwater Detections  
Boeing Auburn Facility  
Auburn, Washington**

Sample Location	Zone	Laboratory SDG	Sample Date	Sample Type	Select Volatile Organic Compounds (µg/L; SW-846 8260C)				General Chemistry (mg/L; ASTM D7511)	Petroleum Hydrocarbons (mg/L; NWTPH-Dx)	
					Trichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Vinyl Chloride	Total Cyanide (a)	Diesel Range Organics (C12-C24)	Oil Range Organics (C24-C40)
AGW037	Shallow-WT	A8C0444	3/12/2018	N	--	--	--	--	0.00500 U	--	--
AGW047	Shallow	A8C0444	3/12/2018	N	--	--	--	--	<b>0.0977</b>	--	--
AGW048	Shallow	A8C0444	3/12/2018	N	--	--	--	--	<b>0.0798</b>	--	--
AGW049	Shallow	A8C0444	3/12/2018	N	--	--	--	--	<b>0.0185</b>	--	--
AGW050	Shallow	A8C0444	3/12/2018	N	--	--	--	--	<b>3.62</b>	--	--
AGW247-1	Shallow-WT	580-75797-1	3/13/2018	N	0.20 U	0.20 U	<b>0.41</b>	<b>5.8</b>	--	--	--
AGW251-3	Intermediate	580-75797-1	3/13/2018	N	0.20 U	<b>0.26</b>	0.20 U	<b>7.8</b>	--	--	--
AGW273	Shallow	580-75797-1	3/13/2018	N	0.20 U	<b>1.7</b>	<b>0.37</b>	<b>4.1</b>	--	--	--
AGW277	Shallow-WT	580-75793-1	3/14/2018	N	--	--	--	--	--	<b>0.14</b>	0.35 U
AGW278-1	Shallow-WT	580-75797-1	3/12/2018	N	<b>0.74</b>	<b>1.5</b>	0.20 U	<b>0.64</b>	--	--	--
AGW278-1	Shallow-WT	A8C0444	3/12/2018	N	--	--	--	--	<b>0.00890 J</b>	--	--
AGW278-1	Shallow-WT	580-75797-1	3/12/2018	FD	<b>0.75</b>	<b>1.4</b>	0.20 U	<b>0.63</b>	--	--	--
AGW278-1	Shallow-WT	A8C0444	3/12/2018	FD	--	--	--	--	<b>0.00900</b>	--	--
AGW278-2	Shallow	580-75797-1	3/12/2018	N	<b>1.0</b>	<b>1.3</b>	0.20 U	<b>0.29</b>	--	--	--
AGW278-4	Intermediate	580-75797-1	3/12/2018	N	0.20 U	<b>0.88</b>	0.20 U	<b>3.2</b>	--	--	--
AGW278-6	Deep	580-75797-1	3/12/2018	N	0.20 U	<b>0.26</b>	0.20 U	0.020 U	--	--	--
AGW279	Shallow-WT	580-75793-1	3/14/2018	N	--	--	--	--	--	0.11 U	0.35 U
AGW279	Shallow-WT	580-75793-1	3/14/2018	FD	--	--	--	--	--	0.11 U	0.35 U
AGW280	Shallow-WT	580-75793-1	3/14/2018	N	--	--	--	--	--	0.11 U	0.35 U
AGW281	Shallow-WT	580-75797-1	3/13/2018	N	--	--	--	--	--	<b>0.15</b>	<b>0.54</b>
AGW282	Shallow-WT	580-75797-1	3/13/2018	N	--	--	--	--	--	<b>0.66</b>	<b>3.6</b>
IW36	On-Shallow	580-75797-1	3/13/2018	N	0.20 U	<b>0.39</b>	<b>0.30</b>	<b>6.2</b>	--	--	--
IW37	Shallow	580-75797-1	3/13/2018	N	0.20 U	<b>0.36</b>	0.20 U	<b>1.3</b>	--	--	--

**Notes:**

- (a) Total Cyanide was collected, filtered with a 0.1 µm filter and preserved with sodium hydroxide (NaOH).
- Bold** text indicates detected analyte.
- J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- U = The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.

**Abbreviations/Acronyms:**

- ASTM = ASTM International
- FD = field duplicate
- µg/L = micrograms per liter
- mg/L = milligrams per liter
- µm = micrometer (micron)
- N = primary sample
- SDG = sample delivery group
- WT = water table

**Table 1-4**  
**1Q2018 Surface Water Analytical Results**  
**Boeing Auburn Facility**  
**Auburn, Washington**

Analyte	Sample Location, Zone, Laboratory SDG, Sample Date and Sample Type	
	SW-CD4	SW-CD4
	SW-CD4-20180306 580-75550-1 3/6/2018 N	SW-900-20180306 580-75550-1 3/6/2018 FD
<b>Volatile Organic Compounds (µg/L; SW-846 8260C)</b>		
1,1,1-Trichloroethane	0.50 U	0.50 U
1,1,2,2-Tetrachloroethane	0.20 U	0.20 U
1,1,2-Trichloroethane	0.20 U	0.20 U
1,1,2-Trichlorotrifluoroethane	0.50 U	0.50 U
1,1-Dichloroethane	0.50 U	0.50 U
1,1-Dichloroethene	0.20 U	0.20 U
1,2-Dichloroethane	0.20 U	0.20 U
1,2-Dichloropropane	0.50 U	0.50 U
2-Butanone/MEK	5.0 UJ	5.0 UJ
2-Hexanone	5.0 U	5.0 U
4-Methyl-2-pentanone (MIBK)	5.0 U	5.0 U
Acetone	5.0 U	<b>5.9</b>
Benzene	0.20 U	0.20 U
Bromodichloromethane	0.50 U	0.50 U
Bromoform	0.50 U	0.50 U
Bromomethane	0.50 U	0.50 U
Carbon Disulfide	0.50 U	0.50 U
Carbon Tetrachloride	0.20 U	0.20 U
Chlorobenzene	0.50 U	0.50 U
Chloroethane	0.50 U	0.50 U
Chloroform	0.20 U	0.20 U
Chloromethane	0.50 U	0.50 U
cis-1,2-Dichloroethene	<b>0.48</b>	<b>0.48</b>
cis-1,3-Dichloropropene	0.20 U	0.20 U
Dibromochloromethane	0.50 U	0.50 U
Ethylbenzene	0.50 U	0.50 U
m,p-Xylene	0.50 U	0.50 U
Methylene Chloride	0.50 U	0.50 U
o-Xylene	0.50 U	0.50 U
Styrene	0.50 U	0.50 U
Tetrachloroethene	0.20 U	0.20 U
Toluene	0.20 U	0.20 U
trans-1,2-Dichloroethene	0.20 U	0.20 U
trans-1,3-Dichloropropene	0.20 U	0.20 U
Trichloroethene	<b>0.47</b>	<b>0.49</b>
Trichlorofluoromethane (CFC 11)	0.50 U	0.50 U
Vinyl Acetate	1.0 UJ	1.0 UJ
Vinyl Chloride	<b>0.23</b>	<b>0.22</b>

**Notes:**

**Bold** text indicates detected analyte.

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

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

UJ = The analyte was analyzed for but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

**Abbreviations/Acronyms:**

FD = field duplicate

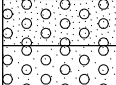
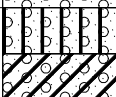
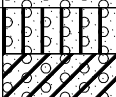

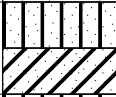
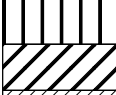
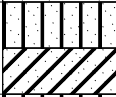
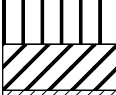


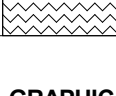

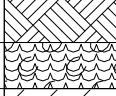
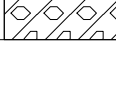
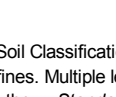
µg/L = micrograms per liter




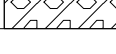
N = primary sample

SDG = sample delivery group

# **AGW105R Well Log and Survey Results**

# Soil Classification System

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

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

**NOTES:**

- 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.
- 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.
- 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% - "trace gravel," "trace sand," "trace silt," etc., or not noted.

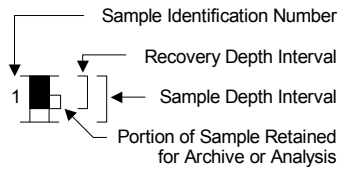


## Drilling and Sampling Key

### 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	Other - See text if applicable
1	300-lb Hammer, 30-inch Drop
2	140-lb Hammer, 30-inch Drop
3	Pushed
4	Rotosonic
5	Air Rotary (Rock)
6	Wash Rotary (Rock)
7	Other - See text if applicable

### SAMPLE NUMBER & INTERVAL



## Field and Lab Test Data

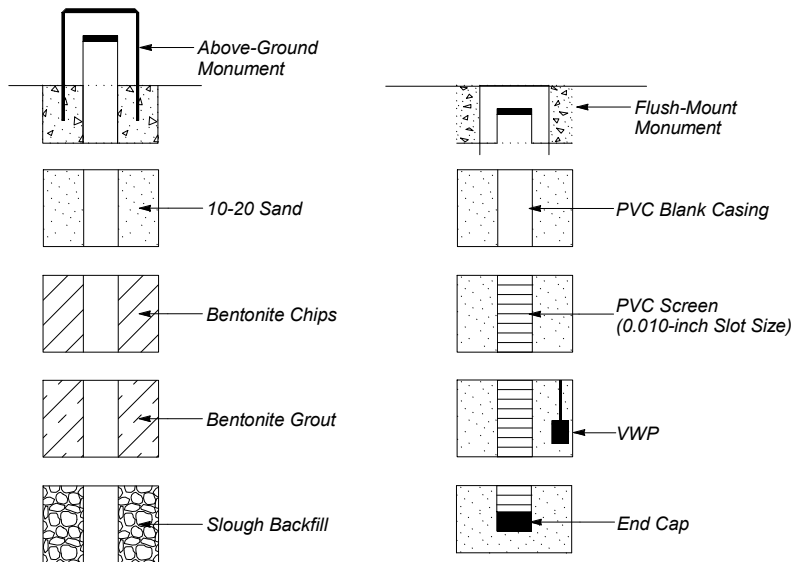
Code	Description
PP = 1.0	Pocket Penetrometer, tsf
TV = 0.5	Torvane, tsf
PID = 100	Photoionization Detector VOC screening, ppm
W = 10	Moisture Content, %
D = 120	Dry Density, pcf
-200 = 60	Material smaller than No. 200 sieve, %
GS	Grain Size - See separate figure for data
AL	Atterberg Limits - See separate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

## Groundwater

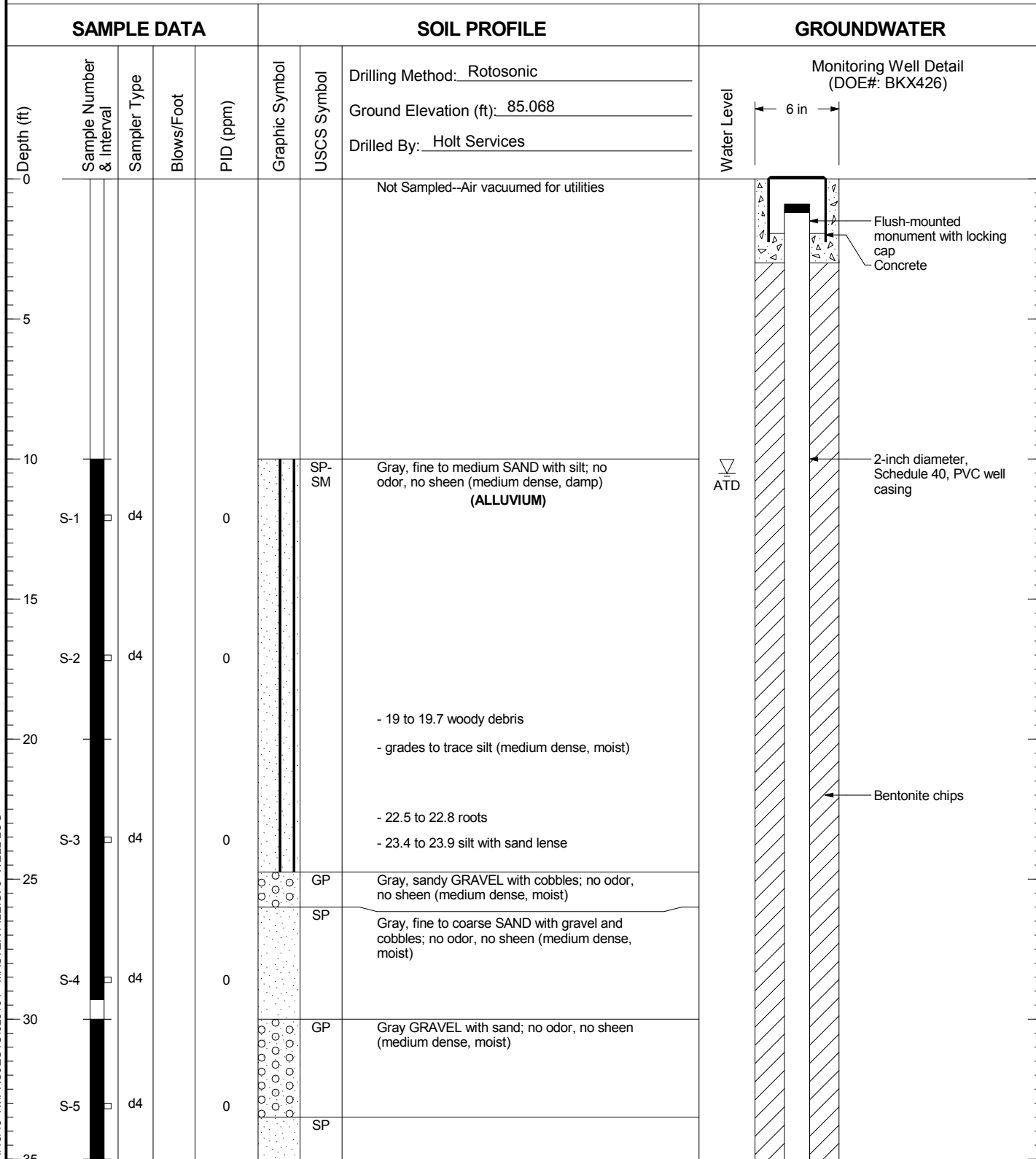
- ▽ Approximate water elevation at time of drilling (ATD).
- ▼ Approximate water elevation at other time(s). When multiple water levels are obtained other than ATD, only a representative range is shown. See text for additional information.

**Note:** Groundwater levels can fluctuate due to precipitation, seasonal conditions, and other factors.

## Well Log Graphics



# AGW105R



- 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.
  4. National Geodetic Vertical Datum of 1929, US ft (+/-0.01 ft), mean sea level.

025164.201 4/18/18 N:\PROJECTS\025164 - MASTER FILE.GPJ WELL LOG

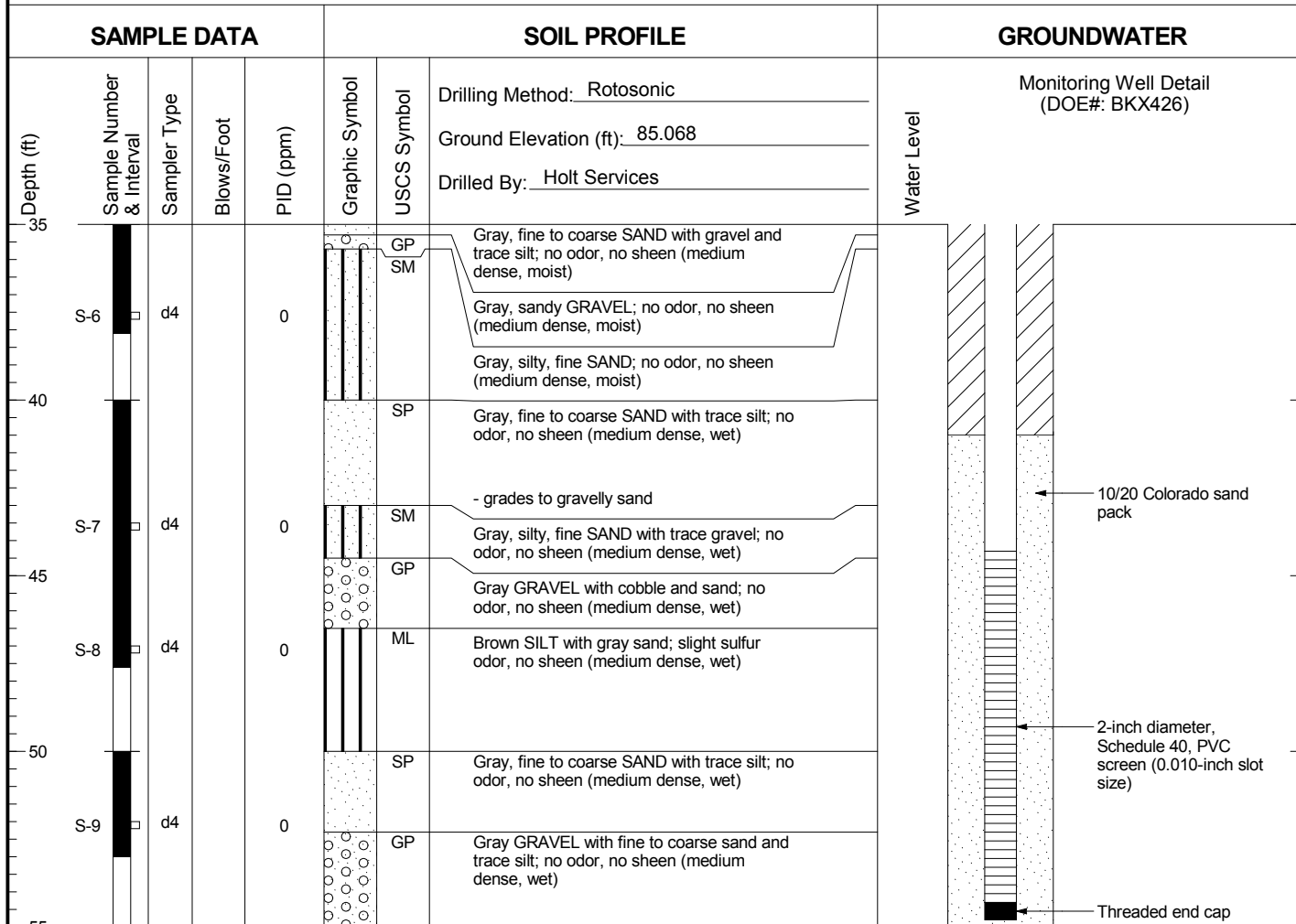


Boeing Auburn  
Auburn, Washington

Log of Monitoring Well AGW105R

Figure  
2-2  
(1 of 2)

# AGW105R



Boring Completed 01/04/18  
Total Depth of Boring = 55.0 ft.

Monitoring Well Completed 01/04/18  
Elevation at Top of Protective Casing = Not Measured  
Elevation at Top of Monitoring Well Casing = 84.77 ft.  
Total Depth of Monitoring Well = 54.3 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.
  4. National Geodetic Vertical Datum of 1929, US ft (+/-0.01 ft), mean sea level.

025164.201 4/18/18 N:\PROJECTS\025164 - MASTER FILE.GPJ WELL LOG



Boeing Auburn  
Auburn, Washington

Log of Monitoring Well AGW105R

Figure  
2-2  
(2 of 2)

**Table 2-1  
AGW105R Installation Matrix  
Boeing Auburn Facility  
Auburn, Washington**

Well ID	Well Type	Coordinates		Well Rim Elevation	Top of Casing Elevation (ft)	Date of Installation	Groundwater Zone	Well Permanent Screen Interval (ft bgs)	Boring Bottom Depth (ft bgs)
		Northing	Easting						
AGW105R	Conventional	107571.898	1290050.164	85.068	84.774	1/4/2018	I	44.3 to 54.3	55

**Notes:**

1. Coordinate System and Zone: Washington State Plane, North Zone Coordinates. Survey completed on 1/19/2018.
2. Horizontal Datum: North American Datum of 1983 (91), North Zone, US feet.
3. Vertical Datum: National Geodetic Vertical Datum of 1929, US feet.
4. To convert elevations shown hereon to North American Vertical Datum of 1988 elevations please add 3.49 ft.
5. Conventional well type: Well with a single screen located in either the shallow, intermediate, or deep zone.

**Abbreviations and Acronyms:**

- bgs = below ground surface
- ft = feet
- I = intermediate zone