

Technical Memorandum

TO: Carl Bach, The Boeing Company, and Allison Crowley, Seattle City Light
FROM: Colette Gaona and Kristy J. Hendrickson, P.E.
DATE: October 29, 2015
RE: **Addendum No. 4**
North Boeing Field/Georgetown Steam Plant Site
Remedial Investigation/Feasibility Study
Sampling and Analysis Plan and Quality Assurance Project Plan
Seattle, Washington

This technical memorandum presents Addendum No. 4 to the North Boeing Field/Georgetown Steam Plant Site (NBF/GTSP) Remedial Investigation/Feasibility Study (RI/FS) Sampling and Analysis Plan and Quality Assurance Project Plan (SAP/QAPP, Leidos 2014). This addendum provides a summary of the planned Phase 2 soil and groundwater sample locations, which were discussed and approved by the Washington State Department of Ecology (Ecology) at a meeting with The Boeing Company, the city of Seattle, and King County on August 31, 2015 (Dube 2015a).

Phase 2 soil and groundwater sample locations were selected based on the results of the Phase 1 soil samples and two quarters of groundwater monitoring at the Phase 1 groundwater monitoring locations.

Phase 2 soil and groundwater sample locations are summarized in Table 1. For each sample location, Table 1 includes the proposed sample ID, sample medium, and laboratory analyses. Approximate Phase 2 soil and groundwater locations are shown on Figures 1, 2, and 3 for the NBF PEL Area, NBF North Flightline Area, and NBF Central Flightline Area, respectively. There are no Phase 2 soil or groundwater sample locations planned in any other site subdivision areas that are part of the NBF/GTSP RI activities. An initial utility locate of the locations shown on Figures 1, 2, and 3 was performed on September 28, 2015. On September 29, 2015, Leidos provided some additional guidance on selection of sample locations (Dube 2015b). The final sample locations will be adjusted accordingly in the field. Final sample locations will be within 10 feet of the locations provided by Leidos, if possible, in accordance with the SAP/QAPP Addendum No. 1 (Landau Associates 2015).

The Phase 2 soil and groundwater investigation will be conducted in accordance with the SAP/QAPP (Leidos 2014) and any applicable changes in the associated addenda.

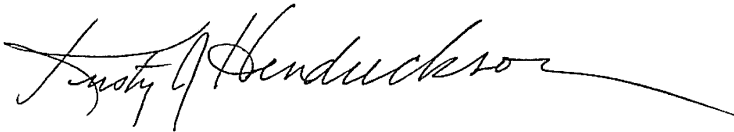
Phase 2 soil and groundwater field activities are anticipated to take place in November 2015. Phase 2 groundwater monitoring locations will be sampled for two quarters per the schedule established in the Agreed Order Amendment No. 1 (Ecology 2015).

This Addendum has been prepared under the supervision and direction of the following key staff.

LANDAU ASSOCIATES, INC.



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ATTACHMENTS

- Figure 1 – Planned Phase 2 Soil and Groundwater Sample Locations, PEL Area
- Figure 2 – Planned Phase 2 Soil and Groundwater Sample Locations, North Flightline Area
- Figure 3 – Planned Phase 2 Soil and Groundwater Sample Locations, Central Flightline Area
- Table 1 – Planned Phase 2 Soil and Groundwater Sample Locations

References

Dube, Tom E. 2015a. Email message from Tom E. Dube, Leidos, to Carl Bach, Boeing, Allison Crowley, City of Seattle, Peter Dumaliang, King County International Airport, and Kris Hendrickson, Landau Associates. Re: *Recommendations for NBF-GTSP RI Phase 2 Soil-Groundwater Sampling*. September 4.

Dube, Tom E. 2015b. Email message from Tom E. Dube, Leidos, to Kris Hendrickson, Landau Associates, Inc., and Mark Edens, Washington State Department of Ecology. Re: *NBF/GTSP RI/FS SAP/QAPP Addendum No. 4*. September 29.

Ecology. 2015. *First Amendment to North Boeing Field/Georgetown Steam Plant Agreed Order No. DE. 5685*. In the matter of Remedial Action by: The Boeing Company, King County, and City of Seattle. Washington State Department of Ecology. Effective date of February 6, 2015.

Landau Associates. 2015. Technical Memorandum Re: *Addendum No. 1, North Boeing Field/Georgetown Steam Plant Site, Remedial Investigation/Feasibility Study Sampling and Analysis Plan and Quality Assurance Project Plan, Seattle, Washington*. From Colette Gaona and Kristy Hendrickson, Landau Associates, to Carl Bach, The Boeing Company, and Allison Crowley, Seattle City Light. February 9.

Leidos (formerly SAIC). 2014. *North Boeing Field/Georgetown Steam Plant Site, Remedial Investigation/Feasibility Study, Final Sampling and Analysis Plan and Quality Assurance Project Plan*. Prepared for Toxics Cleanup Program, Northwest Regional Office, Washington State Department of Ecology, Bellevue, Washington. April.

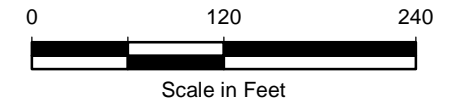


Legend

- ◆ Planned Phase 2 Soil Boring
- ⊕ Existing Monitoring Well
- ◆ Existing Soil Boring
- ▲ Existing Soil Vapor Point
- Site Subdivision Areas
- PEL-SB03 Planned Phase 2 Sample Location

Notes

1. Planned Phase 2 sample locations located at existing borings will be placed adjacent to the existing boring and sampled at deeper depths per Table 1 of the SAP/QAAP Addendum No. 4.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.



Data Source: Esri World Imagery.

North Boeing Field
Seattle, Washington

**Planned Phase 2 Soil and
Groundwater Sample Locations
PEL Area**



Legend

- ◆ Planned Phase 2 Soil Boring
- ⊕ Existing Monitoring Well
- ◆ Existing Soil Boring
- ▲ Existing Soil Vapor Point
- Site Subdivision Areas
- NGW253 Planned Phase 2 Sample Location

Notes

1. Planned Phase 2 sample locations located at existing borings will be placed adjacent to the existing boring and sampled at deeper depths per Table 1 of the SAP/QAAP Addendum No. 4.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Esri World Imagery.

North Boeing Field
Seattle, Washington

**Planned Phase 2 Soil and
Groundwater Sample Locations
North Flightline Area**

Figure
2



Legend

- ◆ Planned Phase 2 Soil Boring
- ⊕ Planned Phase 2 Monitoring Well
- ⊕ Existing Monitoring Well
- ◆ Existing Soil Boring
- ▲ Existing Soil Vapor Point
- Site Subdivision Areas
- CFA-SB05 Planned Phase 2 Sample Location

Notes

1. Planned Phase 2 sample locations located at existing borings will be placed adjacent to the existing boring and sampled at deeper depths per Table 1 of the SAP/QAAP Addendum No. 4.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Esri World Imagery.



TABLE 1

**PLANNED PHASE 2 SOIL AND GROUNDWATER SAMPLE LOCATIONS
NORTH BOEING FIELD/GEORGETOWN STEAM PLANT RI**

Site Subdivision Area	Area of Concern	Sample ID	Media	Sample Depth (bgs)	Proposed Analyses
PEL Area	3-323 Area	PEL-SB06a	Soil	6 ft, 8 ft	PAHs, TPH-Dx
		PEL-SB03a	Soil	6 ft, 8 ft	PAHs, TPH-Dx
		PEL-SB05a	Soil	6 ft, 8 ft	PCBs, TPH-Dx
		PEL-SB30	Soil	1 ft, 8 ft	PAHs, PCBs, TPH-Dx
		PEL-SB31	Soil	1 ft, 8 ft	PAHs, PCBs, TPH-Dx
	3-302, 3-322 Area	PEL-SB07a	Soil	5 ft, 7 ft	PCBs
		PEL-SB43	Soil	1 ft, 7 ft	PCBs
		PEL-SB44	Soil	1 ft, 7 ft	PCBs
	3-333, 3-335 Area	NGW515	Groundwater	NA	PCBs
		NGW514	Groundwater	NA	TPH-Gx
	Green Hornet, Wind Tunnel	PEL-SB32	Soil	4 ft, 9 ft	TPH-Gx, TPH-Dx, BTEX
		PEL-SB23a	Soil	7 ft, 9 ft	TPH-Gx
		PEL-SB33	Soil	4 ft, 9 ft	TPH-Gx, TPH-Dx, BTEX
		PEL-SB34	Soil	4 ft, 9 ft	TPH-Gx, TPH-Dx, BTEX
		PEL-SB35	Soil	4 ft, 9 ft	TPH-Gx, TPH-Dx, BTEX
		PEL-SB25a	Soil	7 ft, 9 ft	TPH-Gx
		PEL-SB36	Soil	1 ft, 9 ft	TPH-Gx, BTEX
		PEL-SB37	Soil	1 ft, 9 ft	TPH-Gx, BTEX
		PEL-SB38	Soil	1 ft, 9 ft	TPH-Gx, BTEX
		3-353 Area	PEL-SB39	Soil	0 ft, 5 ft
PEL-SB40	Soil		0 ft, 5 ft	PCBs	
3-324 Area	PEL-SB18a	Soil	11 ft, 13 ft	TPH-Gx	
	PEL-SB41	Soil	7 ft, 13 ft	TPH-Gx, BTEX	
	PEL-SB42	Soil	7 ft, 13 ft	TPH-Gx, BTEX	
North Flightline Area	7-27-1 Area	NGW253	Groundwater	NA	cVOCs
Central Flightline Area	Main Fuel Farm	CFA-SB05a	Soil	11 ft, 13 ft, 15 ft (a)	PAHs, TPH-Gx, BTEX
		CFA-SB16	Soil	7 ft, 15 ft (a)	PAHs, TPH-Gx, TPH-Dx, BTEX
		CFA-SB17	Soil	7 ft, 15 ft (a)	PAHs, TPH-Gx, TPH-Dx, BTEX
		CFA-SB18	Soil	6 ft, 12 ft	TPH-Gx, TPH-Dx, BTEX
		CFA-SB19	Soil	6 ft, 12 ft	TPH-Gx, TPH-Dx, BTEX
		NGW355	Groundwater	NA	PAHs, TPH-Gx, BTEX
	3-800, 3-801 Area	CFA-SB01a	Soil	7 ft, 9 ft	TPH-Gx, TPH-Dx
		NGW626	Soil/ Groundwater	4 ft, 10 ft	TPH-Gx, TPH-Dx, BTEX

bgs = below ground surface
 PAH = polycyclic aromatic hydrocarbon
 TPH-Dx = total petroleum hydrocarbon diesel range
 PCB = polychlorinated biphenyl
 TPH-Gx = TPH gasoline range
 BTEX = benzene, toluene, ethylbenzene, and xylenes
 cVOC = chlorinated volatile organic compound
 trans-1,2-DCE = trans-1,2-dichloroethene
 TCE = trichloroethene

(a) Or to depth of field contamination

Notes:

- Where letter designations are included after sample IDs (i.e., PEL-SB06a), new soil boring locations will be placed in the immediate vicinity of prior soil boring locations with the same sample ID.
- TPH-Dx refers to analysis for both diesel and oil ranges.
- PAHs refers to analysis for full suite of PAHs using SIM (including carcinogenic and non-carcinogenic PAHs).
- cVOC analysis in groundwater will include vinyl chloride, trans-1,2-DCE, cis-1,2-DCE, TCE, and PCE.