

March 16, 2012
9L-22-N410-JLF-049

Washington State Department of Ecology
Northwest Regional Office
Hazardous Waste and Toxics Reduction Program
3190 160th Avenue SE
Bellevue, Washington 98008-5452



Attn: Byung Maeng, P.E.

**RE: ADDITIONAL EVALUATION OF ARSENIC IN GROUNDWATER
BOEING SPACE CENTER AREA
KENT, WASHINGTON**

Dear Mr. Maeng:

The Boeing Company (Boeing) has submitted a request to the Washington State Department of Ecology (Ecology) for removal of the Striker Property (subject property) from the Boeing Space Center (BSC) Resource Conservation and Recovery Act (RCRA) Interim Status Facility (WAD 061670766; Boeing 2011). As part of its review, Ecology requested additional information regarding the dissolved arsenic concentrations detected in groundwater at the BSC. Boeing responded with our October 11, 2011 letter that presents a summary of the available data regarding arsenic in groundwater at the subject property and the BSC.

During our meeting at Ecology's Northwest Regional Office on December 13, 2011, Ecology requested that additional data be collected to evaluate the concentrations of dissolved arsenic in groundwater including any existing data from other properties in the area around the BSC, and/or the collection and analysis of additional groundwater samples from around the subject property on the BSC or on nearby properties. We were unable to find additional existing arsenic in groundwater data for the BSC beyond what was provided in our October 11, 2011 letter. There are currently no monitoring wells located at the BSC and no offsite monitoring wells (except wells associated with the Western Processing site discussed below) were identified in the proximity of the BSC. Additional groundwater samples were collected using direct-push drilling and sampling techniques from locations at the BSC and on City of Kent Property in the area around the BSC. Samples were also collected from existing monitoring wells associated with the nearby Western Processing site.

The sampling locations were provided for Ecology's review and concurrence in advance of sample collection, and our correspondence with Ecology regarding the locations is documented in e-mails dated January 5 and 18, 2012, and February 6, 2012. The groundwater sampling was conducted between January 25 and February 9, 2012. This letter provides a summary of the additional data for dissolved arsenic in groundwater.

BACKGROUND

Direct-push drilling and soil and groundwater sampling were conducted at the subject property in 2010 and 2011 as part of due diligence prior to the potential sale of the Striker Property. The results of the subsurface investigations indicate that the BSC and subject property are underlain by approximately 10 feet (ft) of fill material underlain by alluvium. The fill generally consists of brown, fine to medium sand to a maximum depth of 8 ft below ground surface (BGS). Beneath the fill, the native soil consists of gray sands and silts. Groundwater was encountered during drilling at depths ranging from 3 to 8 ft BGS (Landau Associates 2010). Based on topography, the groundwater gradient within the Kent Valley and the BSC area is locally very flat, with the overall direction of groundwater flow to the west-northwest toward the Green River. Elevation measurements from monitoring wells at the BSC in 2001 indicate local variability in groundwater elevations and direction of flow (Landau Associates 2002).

The dissolved arsenic concentrations detected in groundwater samples collected throughout the subject property during the 2010 and 2011 investigations range from 0.3 micrograms per liter ($\mu\text{g/L}$) to 115 $\mu\text{g/L}$, and the concentrations detected at many locations were greater than the screening level of 5 $\mu\text{g/L}$, which was developed based on the Model Toxics Control Act (MTCA) Method B cleanup level for protection of groundwater as drinking water (Landau Associates 2010). The investigations conducted to date, which included assessment of the nature and extent of the dissolved arsenic concentrations detected in groundwater, have not identified a potential source of arsenic at the subject property or at the BSC. Based on the available data, and as discussed below, the elevated concentrations of arsenic in groundwater are isolated/localized, reflect area-wide conditions, are not attributable to sources at the BSC, and do not pose a risk to human health or the environment.

ADDITIONAL ARSENIC GROUNDWATER DATA

As noted above, in January and February 2012 Boeing collected groundwater samples to document dissolved arsenic concentrations in shallow groundwater at locations on and around the BSC, including locations that are hydraulically upgradient and downgradient based on overall shallow groundwater flow to the west-northwest toward the Green River. The groundwater samples were collected on the BSC, on the Western Processing site (located to the northeast of the BSC), and on City of Kent property. As requested in the e-mail correspondence with Ecology noted above, the selected City of Kent locations include the closest, upgradient, accessible locations that appeared to be the least affected by development/human activities. The selected Western Processing wells consist of a background/upgradient well, and a shallow downgradient well that are part of the Western Processing monitoring network, but that have not been affected by site activities.

Eighteen groundwater samples were collected from fifteen locations, as shown on Figure 1. The groundwater samples were submitted to Lancaster Laboratories for analysis of dissolved arsenic by U.S. Environmental Protection Agency (EPA) Method 6020. The arsenic analytical data are summarized in Table 1. Field screening conducted during direct push drilling and groundwater sample collection did not identify evidence of potential soil or

groundwater contamination at any of the sampling locations. A summary of the information regarding the groundwater sampling and analysis is presented below:

BSC Property

- Nine groundwater samples were collected at six direct-push sampling locations (including DP-40 and -41, which are just outside the northern BSC property boundary).
- Co-located samples were collected at three locations.
- Depths to groundwater ranged from about 5 to 8 ft BGS.
- Dissolved arsenic was detected above the laboratory reporting limit in all nine samples, at concentrations ranging from 3.3 to 58.4 µg/L.

Western Processing Site

- Groundwater samples were collected from two shallow monitoring wells that have not been affected by activities at the Western Processing site.
- Depth to groundwater was about 5 ft BGS.
- Dissolved arsenic was detected above the laboratory reporting limit in one of the two samples at a concentration of 10.8 µg/L.

City of Kent Property

- Groundwater samples were collected at seven direct-push sampling locations.
- Depths to groundwater ranged from about 16 to 18 ft BGS at locations near the Green River (Kent-1 through -4) and from about 7 to 9 ft BGS at locations farther away from the river.
- Dissolved arsenic was detected above the laboratory reporting limit at four of the seven locations at concentrations ranging from 3.9 to 115 µg/L.
- Sampling was planned for one additional location (Kent-5), but a sample could not be collected due to the presence of utilities that prevented drilling.

DISSOLVED ARSENIC CONCENTRATIONS

The dissolved arsenic concentrations detected in the additional groundwater samples are shown on Figure 1. The analytical results for dissolved arsenic are summarized as follows:

- Dissolved arsenic was detected at concentrations above the laboratory reporting limit in 14 of the 18 groundwater samples, and at concentrations ranging from 3.3 to 115 µg/L. Of the detected dissolved arsenic concentrations, 11 concentrations were greater than the screening level of 5 µg/L.
- The highest concentration of dissolved arsenic (115 µg/L) was detected in the groundwater sample collected from southeast of the BSC at location Kent-7. The

nearest sample (Kent-8 collected approximately 1,300 ft to the east of Kent-7) indicated a concentration of 14.5 µg/L.

- The next highest concentrations were detected southwest of the BSC near the Green River (Kent-1; 59.6 µg/L), from the north portion of the BSC (DP-39; 58.4 µg/L), and near the east boundary of the BSC (DP-36; 47.1 µg/L).
- The co-located samples indicated concentrations with relative percent differences (RPDs) of 0 percent (DP-40 and -41; both 3.3 µg/L), 4.35 percent (DP-34 and -35; 12.6 and 15.0 µg/L), and 34 percent (DP-37 and -38; 5.2 and 27.9 µg/L). Concentrations with RPD's less than 20 are considered similar and concentrations with RPDs greater than 20 are considered different.
- The sample from Western Processing shallow monitoring well 13M30A indicated a concentration of 10.8 µg/L.
- The samples collected from east-southeast of the BSC, and hydraulically upgradient based on a west-northwest direction of groundwater flow, indicated dissolved arsenic concentrations ranging from 3.9 to 115 µg/L.
- The samples collected along the Green River to the west-northwest of the BSC, and hydraulically downgradient based on a west-northwest direction of groundwater flow, did not indicate dissolved arsenic concentrations above the laboratory reporting limit.

CONCLUSIONS

Dissolved arsenic was detected in 11 of the 18 groundwater samples collected at and around the BSC at concentrations greater than the screening level. The concentrations above the screening level were detected in samples collected upgradient and cross gradient of the subject property. As noted above, the detected concentrations varied locally, including in one pair of the co-located samples. Based on the investigations conducted to date, the available analytical data, and the historical data presented in our October 11, 2011 letter, the elevated concentrations of dissolved arsenic detected in groundwater are isolated/localized, are the result of regional conditions, and are not the result of sources associated with Boeing operations. Groundwater downgradient of the subject property does not indicate concentrations of dissolved arsenic greater than the laboratory reporting limit.

As we have discussed, groundwater at the BSC or in the surrounding area is not used for drinking water. Boeing's purchase and sale agreement with the prospective buyer of the Striker Property includes a restriction on the use of groundwater. The City of Kent does not allow the installation of private wells in areas serviced by a municipal water purveyor, which includes the BSC area. As an added level of protection, Boeing is willing to pursue a formal environmental covenant to restrict the use of groundwater. The dissolved arsenic concentrations present in groundwater at the Striker Property are similar to those detected at other locations in the Kent Valley near the BSC and do not pose a potential threat to human health or the environment; therefore, Boeing requests that the site not be listed on the Confirmed and Suspected Contaminated Sites List.

We would appreciate the opportunity to discuss the information presented in this letter with you and to answer questions that you may have regarding the detected concentrations of dissolved arsenic in groundwater in the BSC area, and at the Striker Property. Please e-mail or call me to schedule a time to discuss this request.

Sincerely,

A handwritten signature in black ink, appearing to read "Joe Flaherty". The signature is fluid and cursive, with the first name "Joe" and last name "Flaherty" clearly distinguishable.

Joe Flaherty
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EHS Remediation Group
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REFERENCES

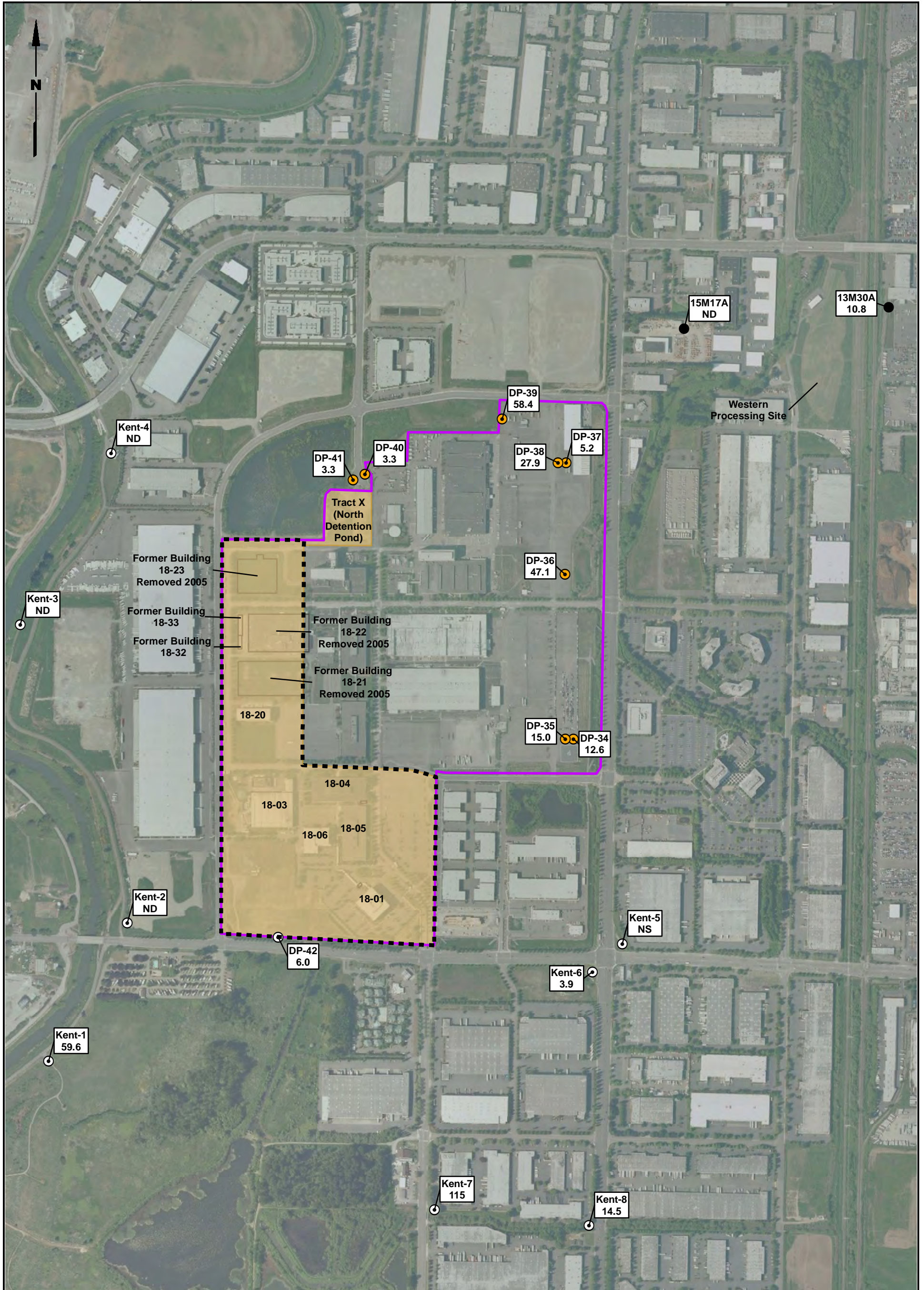
Landau Associates. 2010. Report: *Phase II Environmental Site Assessment, Striker Property South, Boeing Space Center, 20403 68th Avenue South, Kent, Washington*. November 30.

Landau Associates. 2002b. Report: *Phase II Environmental Site Assessment, Boeing Clearwater, Kent, Washington*. June 4.

ATTACHMENTS

Figure 1: Striker Property Sampling Locations and Arsenic Concentrations

Table 1: Groundwater Analytical Results for Dissolved Arsenic

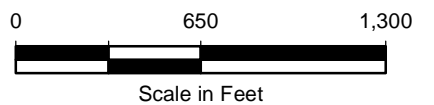


Legend

- Direct Push Sample - Boeing Property
- Direct Push Sample - City of Kent Property
- Monitoring Well - Western Processing
- Striker Project Boundary
- Property to Be Sold and Removed From RCRA Interim Status Facility
- Current Boeing Kent Space Center Boundary
- Historic Buildings

Notes

1. All Arsenic results shown in µg/L.
2. ND = Not Detected, NS = Not Sampled
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.



Data Source: ESRI World Imagery

TABLE 1
GROUNDWATER ANALYTICAL RESULTS FOR DISSOLVED ARSENIC
BOEING STRIKER
KENT, WASHINGTON

Location	LLI SDG	Lab ID	Date Collected	Arsenic (Dissolved) EPA Method 6020 µg/L
KSC-DP-34	1286934	6533689	1/25/2012	12.6
KSC-DP-35	1286934	6533690	1/25/2012	15.0
KSC-DP-36	1286934	6533691	1/25/2012	47.1
KSC-DP-37	1286934	6533692	1/25/2012	5.2
KSC-DP-38	1286934	6533693	1/25/2012	27.9
KSC-DP-39	1286934	6533694	1/25/2012	58.4
KSC-DP-40	1286934	6533695	1/25/2012	3.3
KSC-DP-41	1286934	6533696	1/25/2012	3.3
KSC-DP-42	1289491	6546694	2/9/2012	6.0
Kent-1	1289491	6546687	2/9/2012	59.6
Kent-2	1289491	6546688	2/9/2012	2.0 U
Kent-3	1289491	6546689	2/8/2012	2.0 U
Kent-4	1289491	6546690	2/8/2012	2.0 U
Kent-6	1289491	6546691	2/8/2012	3.9
Kent-7	1289491	6546692	2/9/2012	115.0
Kent-8	1289491	6546693	2/9/2012	14.5
15M17S	1289491	6546695	2/9/2012	2.0 U
15M30A	1289491	6546696	2/9/2012	10.8

U = Indicates the compound was not detected at the reported concentration.

Bold = Detected compound.