Report
Property Boundary Investigation
Thompson-Isaacson Property
Tukwila, Washington

September 9, 2009

Prepared for

The Boeing Company

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1.0 INTRODUCTION

This report presents the results of a soil and groundwater sampling investigation conducted at The Boeing Company's (Boeing's) Thompson-Isaacson property (Property) located at 8625-8811 East Marginal Way South in the City of Tukwila, King County, Washington (Figure 1). The purpose of this investigation was to evaluate the soil conditions at the Property boundary adjacent to the Port of Seattle (Port) property and soil and groundwater conditions at the Property boundary adjacent to the PACCAR (Merrill Creek Holdings/8801 E. Marginal Way S.) site.

1.1 BACKGROUND

The Thompson-Isaacson property is comprised of two parcels of land. Parcel #0001600014 is a 9.84-acre parcel of land located approximately 60 feet (ft) east of the eastern bank of the Lower Duwamish Waterway (LDW). This parcel is known as the Boeing Isaacson parcel because it was purchased by Boeing from the Isaacson Corporation in 1984. Parcel #0007400033 is a 19.35-acre parcel of land located on the eastern bank of the LDW. This parcel is known as the Boeing Thompson parcel because the property was purchased from Charles Thompson in 1956. The total size of the Property is 29.19 acres. The Property slopes slightly to the west and is at an average elevation of approximately 10 ft above mean sea level (MSL).

The Property is located in an area of industrial properties and is bordered on the north by the Jorgensen Forge Corporation; on the east by East Marginal Way South, followed by hangars and structures associated with King County International Airport (KCIA)/Boeing Field; on the south by Insurance Auto Auctions [formerly Kenworth Truck Company (PACCAR), currently owned by Merrill Creek Holdings, and also known as the 8801 E. Marginal Way S. site]; and on the west at the Boeing Isaacson property by a strip of land owned by the Port, followed by the LDW, and at the Boeing Thompson property by the LDW. A site plan identifying adjacent properties is provided as Figure 2.

The Property geology/hydrogeology and history are discussed in the Phase I Environmental Site Assessment reports for Boeing Thompson and Boeing Isaacson (Landau Associates 2008a,b). Based on available historical information, including topographic maps, aerial photographs, and Sanborn fire insurance maps, a meander of the Duwamish River formerly flowed from west to east through the approximate center of the Property. After channelization of the Duwamish River, a portion of the river channel known as Slip 5 remained on the Property and extended from the waterway across approximately two-thirds of the Property. The slip was filled in the 1950s and 1960s to support development of the Property by the Isaacson Steel Corporation (to the north of the slip) and by Boeing (to the south of the slip).

Based on subsurface explorations completed at and near the Property, soil conditions at the Property consist of approximately 6.5 to 17.5 ft of fill overlying native tideflat and river deposits with the thickest layers of fill occurring in the area of the former Slip 5. The fill generally consists of silty sand to sandy gravel. Fill materials within the former Slip 5 area include bricks, wood debris, and slag material (ERM 2002). The native deposits typically consist of fine sand and silty fine sand with silt lenses. The native surficial deposits are characterized by the presence of small in-place roots, wood fragments, and peat, which are indicators of the original ground surface elevation prior to filling. Underlying the silt and silty fine sand is a series of interbedded alluvial sand and silt layers that were deposited within the floodplain of the Duwamish River. Beneath the interbedded alluvial silt and fine sand is a layer of very dark to black, fine to medium sand. This naturally deposited sand is found throughout the Duwamish River Valley and was likely deposited from flood waters.

The near-surface groundwater regime within the Duwamish River Valley is generally characterized as a shallow, single aquifer system. Shallow groundwater [generally less than 15 ft below ground surface (BGS)] is present throughout the area of the Property. Based on topography and groundwater investigations conducted in the area of the Property by Landau Associates and others, the direction of groundwater flow is generally to the west toward the LDW; however, there is also localized groundwater flow toward the former Slip 5.

Historical records indicate several industries operated on the Isaacson property prior to Boeing's purchase of the property including a saw mill, a planing mill, a wood treatment facility, a galvanizing plant, and the Isaacson Iron Works facility. The Mineralized Cell Wood Preserving Company, which operated on the northern side of the former Slip 5 circa 1945, treated wood by heating a solution of arsenic and sulfate salts of copper and zinc, and applying the solution to the base of logs under pressure. Storage tanks associated with this operation were reportedly cleaned twice per day and sludge and remaining chemicals in the tanks were drained directly to the ground surface.

Boeing purchased the Isaacson property from the Isaacson Corporation in 1984. The Isaacson Steel facility was dismantled prior to 1990. No structures are visible on the Isaacson property in aerial photographs from 1990. With the exception of various earthwork projects, which are discussed in the Boeing Isaacson Phase I Environmental Site Assessment (Landau Associates 2008a), the layout of the Isaacson property has remained relatively unchanged since 1990.

2.0 BOEING ISAACSON/PORT OF SEATTLE PROPERTY BOUNDARY INVESTIGATION

This section describes the field activities conducted to characterize soil along the Boeing Isaacson/Port property boundary, the results of the investigation, and an evaluation of the available information with respect to the potential for similar soil quality conditions to extend west of the Boeing Isaacson property.

2.1 INVESTIGATION ACTIVITIES

The property boundary investigation along the Boeing Isaacson/Port property boundary consisted of collecting soil samples from 10 direct-push borings (PBI-1 through PBI-10) on July 28, 2009. The soil boring locations are shown on Figure 3. Soil samples were continuously collected from the full extent of each boring (from the ground surface to 10 ft BGS) following the procedures described in the work plan (Landau Associates 2009). The soil was described using the Unified Soil Classification System and logs were prepared based on the field observations. The soil borings are provided in Appendix A. Soil samples for chemical analysis were collected from three depth intervals: 2 to 3 ft BGS, 5 to 6 ft BGS, and 8 to 9 ft BGS. The samples were analyzed for arsenic, cadmium, chromium, copper, lead, and zinc by U.S. Environmental Protection Agency (EPA) Method 200.8 and for mercury by EPA Method 7471.

2.2 INVESTIGATION RESULTS

The results of the investigation along the Boeing Isaacson/Port property boundary were validated and tabulated and are presented in Table 1 and are shown on Figure 3. All seven metals analyzed for (arsenic, cadmium, chromium, copper, lead, mercury, and zinc) were detected at each location (PBI-1 through PBI-10). Only mercury and cadmium were not detected at some depth intervals. Because previous investigations at the Isaacson parcel have identified elevated concentrations of arsenic in groundwater and in the LDW sediment adjacent to the Port property, the focus of this discussion is arsenic. Results for the remaining metals will be evaluated and incorporated into the remedial investigation (RI).

Arsenic concentrations for the soil samples collected during the property boundary investigation ranged from 0.5 milligrams per kilogram (mg/kg) to 774 mg/kg. The highest concentrations, 329 mg/kg and 754 mg/kg, were detected in the 5 ft to 6 ft BGS interval at locations PBI-2 and PBI-3 (Figure 3). Concentrations greater than 20 mg/kg were present in soil at seven of the 10 sampling locations. As previously mentioned, soil samples were collected from 2 to 3 ft BGS, 5 to 6 ft BGS, and 8 to 9 ft BGS and each soil boring was advanced to 10 ft BGS. The ranges of arsenic concentrations by depth interval were as follows:

- 2 ft to 3 ft BGS: 1.4 mg/kg to 28.9 mg/kg
- 5 ft to 6 ft BGS: 4.8 mg/kg to 754 mg/kg
- 8 ft to 9 ft BGS: 0.5 mg/kg to 75.4 mg/kg.

Groundwater was not encountered at any of the borings, except at PBI-06. Therefore, except the soil sample collected from the 8 to 9 ft BGS depth interval at PBI-06, all of the soil samples were collected from the vadose (unsaturated) zone.

2.3 EVALUATION

For the following reasons, it is very likely that elevated concentrations of arsenic are present on the Port property located between the Boeing Isaacson property and the LDW:

- Elevated arsenic concentrations are present on Boeing property along the Boeing Isaacson/Port property boundary, as indicated by the results of this and previous investigations. The presence of arsenic in this portion of the property is consistent with soil conditions found throughout the property during previous investigations, which date back as far as 1983.
- Elevated arsenic concentrations are present in LDW sediments west of the Port property. Arsenic concentrations in the sediments adjacent to the Port property are the highest found in the LDW, with the highest concentration of 19 times the Sediment Quality Standard of 57 mg/kg. Arsenic concentrations in LDW sediments near the Boeing Thompson and Isaacson properties (Ecology 2009a) are shown on Figure 3. The shoreline of the Port property is apparently eroding into the LDW, as shown in the June 29, 2009 photograph included as Figure 4.
- Arsenic was present in soil at the Isaacson property prior to Boeing purchase and there is no evidence that Boeing activities resulted in arsenic releases; therefore, there is no reason to expect the arsenic in soil would be limited to Boeing property. Elevated concentrations of arsenic have been detected in soil throughout the Isaacson property dating back as early as 1983. Results for the 1983 investigation identified elevated concentrations of arsenic and other metals in soil in the eastern portion of the property and resulted in removal of approximately 500 cubic yards of arsenic-impacted soil. In 1988, a total of 44 soil borings were advanced on the Isaacson parcel and the Thompson parcel. Elevated concentrations of arsenic were detected in the soil on the Isaacson parcel. Based on the results of the investigation, approximately 4,800 cubic yards of soil were excavated from the parcel. During the Phase II investigation conducted in February 2009, 15 soil borings were advanced in the northern portion of the Isaacson parcel. Elevated concentrations of arsenic were found in soil samples collected from along the northern Slip 5 boundary and along the northern boundary of the Isaacson parcel.
- The likely arsenic sources operated prior to separation of the Port property from the adjacent property to the east. The most likely source of arsenic is the use of arsenic and other metals by the wood treatment company, the Mineralized Cell Wood Preserving Company, which operated north of the former Slip 5 circa 1945.

As described above, it is very likely that elevated concentrations of arsenic are present on the Port property and have impacted and may continue to impact LDW sediments.

3.0 BOEING THOMPSON/PACCAR PROPERTY BOUNDARY INVESTIGATION

This section describes the field activities conducted to further characterize soil and groundwater along the Boeing Thompson/PACCAR property boundary, the results of the investigation, and an evaluation of results with respect to soil and groundwater conditions at the Boeing Thompson and PACCAR properties.

3.1 INVESTIGATION ACTIVITIES

The property boundary investigation along the Boeing Thompson/PACCAR property boundary consisted of collecting soil samples from five locations (PBI-11 through PBI-15) and groundwater samples from four of these locations (PBI-11, PBI-12, PBI-13, and PBI-15). No groundwater sample was collected from location PBI-14 due to an apparent buried concrete slab that did not allow drilling deep enough to encounter groundwater. The soil boring locations are shown on Figures 5 and 6. Soil samples were continuously collected from the full extent of each boring following the procedures described in the work plan (Landau Associates 2009). All soil borings were advanced to 18 ft BGS except PBI-14, which was advanced to 8 ft BGS. The soil was described using the Unified Soil Classification System and logs were prepared based on the field observations. The soil boring logs are provided in Appendix A. Soil samples for chemical analysis were collected from three depth intervals: 2 to 3 ft BGS, 5 to 6 ft BGS, and 8 to 9 ft BGS at each soil boring except at boring PBI-14 where samples from only the upper two depth intervals were collected. The soil and groundwater samples were analyzed for the following halogenated volatile organic compounds (HVOCs): vinyl chloride; 1,1-dichloroethene (1,1-DCE); cis-1,2-dichloroethene (cis-1,2-DCE); trichloroethene (TCE); tetrachloroethene (PCE); and 1,1,2,2-tetrachloroethane using EPA Method 8260C with selected ion monitoring to achieve low reporting limits. Two of the groundwater samples, PBI-11 and PBI-13, were also analyzed by EPA Method 8260C without selected ion monitoring due to high concentrations of some volatile organic compounds (VOCs) in the samples.

3.2 INVESTIGATION RESULTS

The results of the soil and groundwater investigation along the Boeing Thompson/PACCAR property boundary were validated and tabulated and are presented in Tables 2 and 3, respectively. Laboratory data packages are provided in Appendix B. The results of the investigation indicate the presence of TCE and PCE in soil along the property boundary. The highest concentrations were detected at PBI-13, which is the most central of the boring locations in this investigation. Concentrations decreased to the east and west, as shown on Figure 5. No HVOCs were detected in the soil at the eastern

most location, PBI-15. The concentrations of TCE detected in the soil at PBI-13 were 20 micrograms per kilogram (µg/kg) at the 2 ft to 3 ft depth interval, 28 µg/kg at the 5 ft to 6 ft depth interval, and 35 µg/kg at the 8 ft to 9 ft depth interval. PCE concentrations at this location at these intervals were 1.7 µg/kg, 2.3 µg/kg, and 5.3 µg/kg, respectively, with concentrations increasing with depth. Because groundwater was encountered at depths of about 15 to 16 ft BGS, all of the soil samples were collected from the vadose zone.

More HVOCs were detected in the groundwater samples than were detected in the soil samples. Vinyl chloride was detected at three locations PBI-11, PBI-12, and PBI-13 at concentrations of 1.3 micrograms per liter (µg/L), 0.18 µg/L, and 0.051 µg/L, respectively. DCE was detected at PBI-13 and PBI-15 at concentrations of 0.58 µg/L and 0.4 µg/L, respectively, and cis-1,2-dichloroethene was detected at PBI-11 and PBI-13 at concentrations of 100 µg/L and 190 µg/L, respectively. TCE and PCE were detected only in the groundwater sample collected at PBI-13 at concentrations of 1,000 µg/L and 78 µg/L, respectively. Groundwater concentrations are shown on Figure 6.

3.3 EVALUATION

Concentrations of HVOCs detected at the Boeing Thompson property during the 2008 and 2009 investigations were compared to available concentration data from the PACCAR property. The PACCAR data include soil and groundwater data from the Interim Action Work Plan (AMEC 2008) and data provided in the PACCAR soil and groundwater tables provided to Boeing by the Washington State Department of Ecology (2009b). AMEC identified releases from an underground storage tank (UST) in the area north of the former manufacturing building adjacent to the Boeing Thompson/PACCAR property boundary and in the vicinity of MW-28A as apparent sources of HVOCs on the PACCAR property (AMEC 2008). Soil concentrations in Boeing and PACCAR samples collected near the Boeing Thompson/PACCAR property boundary are shown on Figures 5 and 7; groundwater concentrations are shown on Figure 6.

For the following reasons, it is very likely that the source of HVOCs present on the southern portion of the Boeing Thompson property is on the adjacent PACCAR property:

- The only identified areas of HVOC releases are on the PACCAR property, one a UST north of the former manufacturing building and one near MW-28A.
- The highest HVOC concentrations in groundwater at PACCAR are nineteen times greater than the highest concentrations detected at the Boeing Thompson property. Additionally, the highest concentrations at Boeing Thompson were found adjacent to the property boundary with PACCAR.
  - At the Boeing Thompson property, the highest concentrations of VOCs in groundwater were detected at boring PBI-13 and the Phase II boring TDP-26, located along the central portion of the property boundary, in the apparent vicinity of the UST release. No groundwater samples have been collected within 50 ft of PBI-13 on the PACCAR

property; however, analytical results for soil collected at a location (identified as G0) approximately 20 ft south of PBI-13 on the PACCAR property reportedly contained TCE and PCE at concentrations of 78,200 µg/kg and 10,600 µg/kg in the upper 2 ft of soil. Comparatively, the highest TCE and PCE soil concentrations detected in soil at PBI-13 were 35 µg/kg and 5.3 µg/kg, respectively.

  - Located near the western portion of the property boundary, the highest groundwater concentrations of vinyl chloride and cis-1,2-DCE at the Boeing Thompson property were 1.3 µg/L and 100 µg/L, respectively, at PBI-11; the concentrations at A1 on the PACCAR property were 4,580 µg/L and 8,940 µg/L, respectively.
  - The total HVOC concentrations in groundwater are significantly higher on the PACCAR property than on the Boeing Thompson property. Degradation of PCE and TCE is apparently occurring, making it more difficult to compare concentrations on individual compounds from one location to another. To compare the total HVOC concentrations in groundwater at each location, the measured concentration of each compound was converted from µg/L to micromoles/L (µmoles per liter) by dividing the concentration in µg/L by the gram molecular weight of the compound and correcting for units. The resulting concentrations at each location are provided in Table C-1 in Appendix C and are shown on Figure 8. The two highest total HVOC concentrations are 190 µmoles/L at location A1 and 54 µmoles/L at location F1; both of these locations are on the PACCAR property. The two highest concentrations on the Boeing Thompson property are much lower, 10 µmoles/L at PBI-13 and 8.8 µmoles/L at TDP-26. Both of these samples were located adjacent to the Boeing Thompson/PACCAR property boundary.

- The PCE and TCE concentrations in soil at PACCAR are three orders of magnitude greater than the highest concentrations detected at the Boeing Thompson property, as shown on Figures 5 and 7. The highest concentrations at Boeing Thompson were found adjacent to the property boundary. The highest soil concentrations of TCE at locations near the Boeing Thompson/PACCAR property boundary are shown on Figure 9.
- Concentrations of groundwater HVOCs in an area of a release are typically higher than those detected at the Boeing Thompson property. Concentrations of groundwater HVOCs at the PACCAR property are consistent with a nearby release such as those already identified; those at Boeing Thompson are not consistent with a nearby release.

As described above, it is very likely that the source or sources of HVOCs detected at the Boeing Thompson property in the vicinity of the property boundary with PACCAR are on the PACCAR property. Source areas have been identified on the PACCAR property including adjacent to the property boundary, the highest concentrations in soil and groundwater on the PACCAR property are much greater than the highest concentrations on the Boeing Thompson property, and soil and groundwater concentrations on the Boeing Thompson property are not consistent with a release on the Boeing Thompson property. It is likely that HVOCs are continuing to migrate from the PACCAR property to the Boeing Thompson property.

4.0 CONCLUSIONS

The Property Boundary Investigation near the western Isaacson property boundary and southern Thompson property boundary was conducted to provide additional information regarding the potential source and extent of contamination in these areas. The investigation demonstrated that arsenic is present in soil adjacent to the Boeing Isaacson/Port property boundary. Based on historical information regarding the presence of arsenic at the Boeing Isaacson property, former activities at and near the Boeing Isaacson and Port properties, and likely sources of arsenic on the Boeing Isaacson and Port properties, it is very likely that arsenic is present on Port property.

Data from the investigation near the Boeing Thompson/PACCAR property boundary, together with available data from the PACCAR property, indicate the sources of HVOCs found on the Boeing Thompson property are on the PACCAR property. The highest concentrations of HVOCs found in soil are three orders of magnitude larger on the PACCAR property than on the Thompson property and the highest concentrations in groundwater are 19 times greater. Soil and groundwater concentrations at the Thompson property are not consistent with a release at the Thompson property, while releases have been identified on the PACCAR property. In addition, the only locations where HVOCs have been detected on the Boeing Thompson property are adjacent to the Boeing Thompson/PACCAR property boundary, near an identified source on the PACCAR property. Therefore, the data indicate that HVOCs in soil and groundwater have apparently migrated from the PACCAR property onto the Thompson property.

5.0 USE OF REPORT

This Property Boundary Investigation Report has been prepared for the exclusive use of Boeing for specific application to the Thompson-Isaacson Site in Tukwila, Washington. 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.

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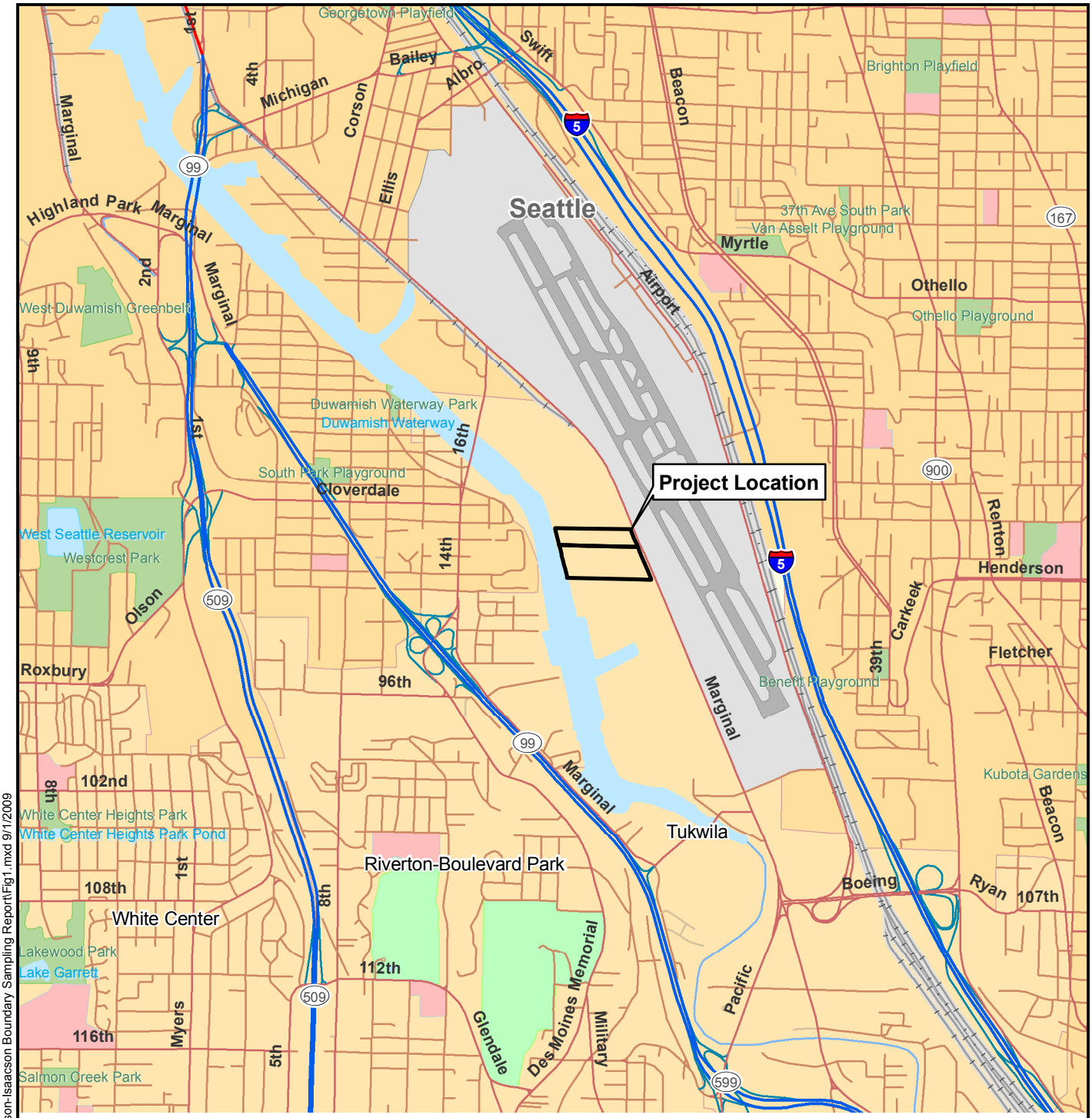

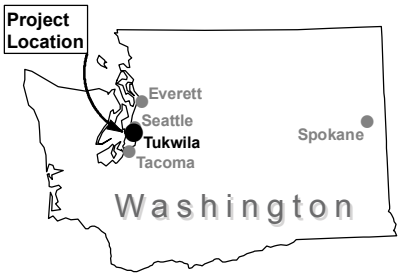

N

0 0.5 1

Miles

Data Source: ESRI 2008; King County Parcel Data

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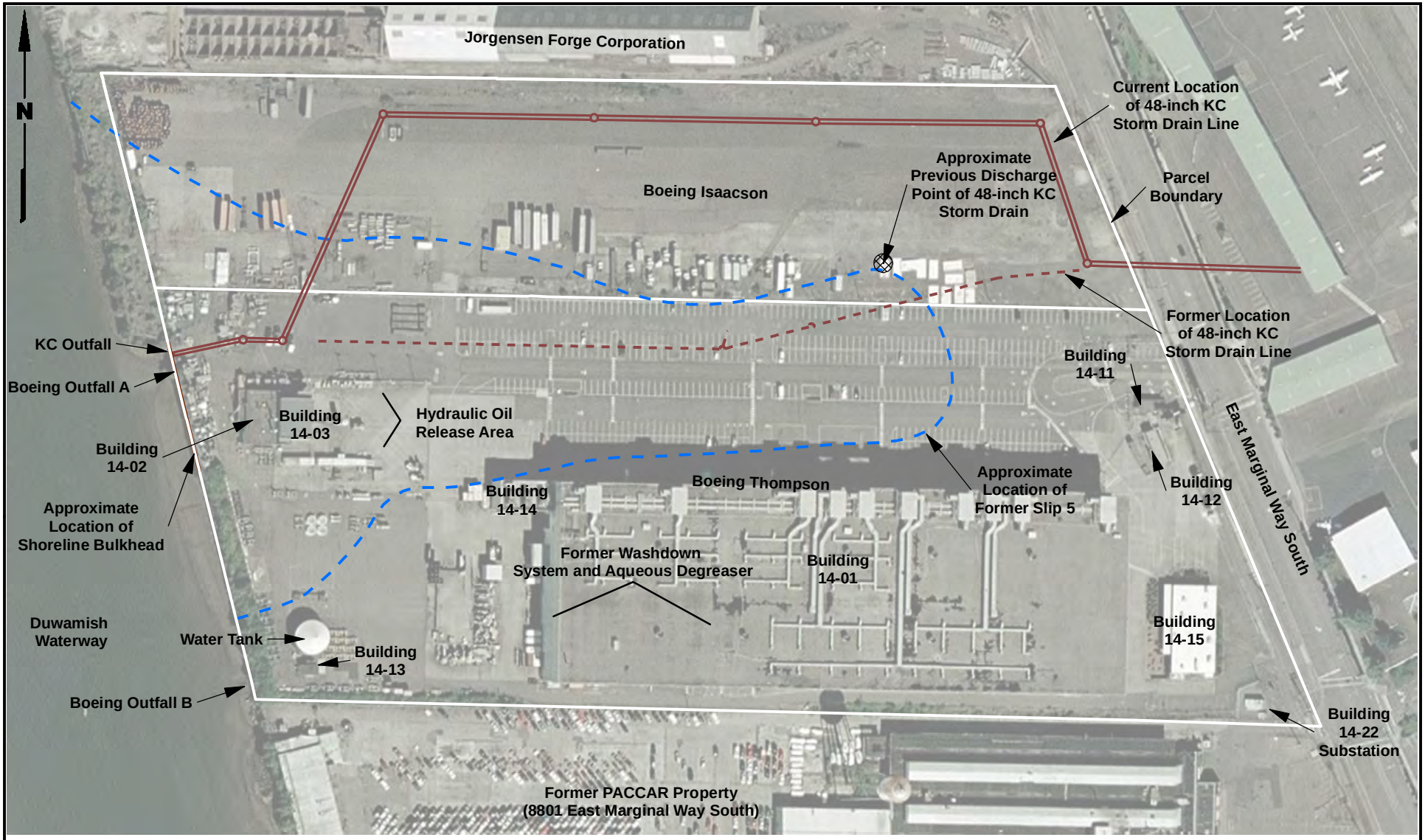
Boeing Thompson-Isaacson Property Tukwila, Washington	**Vicinity Map**	Figure 1

Y:\Projects\025190\MapDocs\090\012\Boeing Thompson-Isaacson Boundary Sampling Report\Fig2_SitePlan.mxd 9/4/2009 NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet



Data Source: ESRI Image Server; King County Parcel Data

0 200 400

Scale in Feet

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Boeing Thompson Isaacson Property Tukwila, Washington	**Site Plan**	Figure 2

Y:\Projects\025190\MapDocs\090\012\Boeing Thompson-Isaacson Boundary Sampling Report\Fig3.mxd 9/9/2009 NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

Legend

- 2009 Boundary Soil Sampling Location
- Phase II Soil Sample Location
- Sediment Sample Location

Note:
ND = Not Detected

Sample Location	Depth in Feet
As (Arsenic)	Result mg/kg

0 80 160
Scale in Feet

Data Source: ESRI Image Server; King County Parcel Data

Note
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.
2. Results shown are the maximum concentration detected at a location. The depth shown is the depth corresponding to the maximum concentration.

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Boeing Thompson-Isaacson Property
Tukwila, Washington

Boeing Isaacson / Port of Seattle Property Boundary Soil Sampling Locations and Arsenic Concentrations

Figure 3

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Boeing Thompson-Isaacson Property
Tukwila, Washington

Port of Seattle Property Shoreline
June 29, 2009

Figure
4

TDP-19	TCE	PCE
4-5	ND	ND

TDP-17	TCE	PCE
4-5	ND	ND

TDP-18	TCE	PCE
4-5	ND	ND

TDP-9	TCE	PCE
8-9	ND	ND

TDP-10	TCE	PCE
7-8	ND	ND
8-9	ND	ND

TDP-8	TCE	PCE
8-9	ND	ND

TDP-13	TCE	PCE
7-8	ND	ND

TDP-12	TCE	PCE
7-8	ND	ND

TDP-11	TCE	PCE
7-8	ND	ND
9-10	ND	ND

PBI-13	TCE	PCE
2-3	20	1.7
5-6	28	2.3
8-9	35	5.3

G0	TCE	PCE
0.5-2.0	78200	10600
3-4.5	189	22.30
6-7.5	13.4	2.98

PBI-14	TCE	PCE
2-3	ND	ND
5-6	1.5	ND

PBI-15	TCE	PCE
2-3	ND	ND
5-6	ND	ND
8-9	ND	ND

H0	TCE	PCE
0.5-2.0	31.6	1.46
3-4.5	37.5	3.23
6-7.5	221	15.20

TDP-5	TCE	PCE
5-6	ND	ND

TDP-3	TCE	PCE
5-6	ND	ND

TDP-16	TCE	PCE
3-4	ND	ND

TDP-6	TCE	PCE
8-9	ND	ND

TDP-14	TCE	PCE
4-5	ND	ND

TDP-7	TCE	PCE
8-9	ND	ND

TDP-2	TCE	PCE
5-6	ND	ND

PBI-12	TCE	PCE
2-3	3.7	ND
5-6	8.3	2.1
8-9	ND	ND

PBI-11	TCE	PCE
2-3	2.1	ND
5-6	11	2.9
8-9	7.0	2.0

TDP-15	TCE	PCE
4-5	ND	1.5

TDP-1	TCE	PCE
9-10	6.2	ND

B0	TCE	PCE
0.5-2.0	24.8	4.0
3-4.5	2.95	1.57

A1	TCE	PCE
0.5-2.0	15.5	ND
5.5-7	ND	ND
7.5-8.5	ND	ND
14.5-16.0	ND	ND

C0	TCE	PCE
0.-2.0	ND	1.53

D0	TCE	PCE
0.5-2.0	1650	45.70
3-4.5	62.1	2.52
7.5-9.0	43.6	2.70

E0	TCE	PCE
0.5-2.0	93.5	ND
3-4.5	11.2	ND

TDP-25	TCE	PCE
9-10	6.2	ND

TDP-26	TCE	PCE
8-9	66	1.0

TDP-4	TCE	PCE
4-5	ND	ND

WP-3	TCE	PCE
3-5.0	ND	ND
5-7.0	ND	ND

BPH-1	TCE	PCE
0.5-2.0	ND	21.9
3-4.5	ND	502
5-6.5	ND	301

C1	TCE	PCE
0.5-2.0	117	2.33
3-4.5	4.04	ND

F0	TCE	PCE
0.5-2.0	639	ND
3-4.5	13.7	ND

TSA-2	TCE	PCE
1-2.5	8.28	ND
3-4.0	5.07	1.76
5-6.5	ND	ND
8-10.0	21.6	ND
16-18.0	ND	ND

TSA-1	TCE	PCE
0.5-2.0	ND	ND
3-4.5	ND	ND
8-9.5	ND	ND

B1	TCE	PCE
0.5-2.0	24	NA
6-7.5	22.5	2.63

D1	TCE	PCE
0.5-2.0	43.9	ND
2-4.5	6.88	ND

E1	TCE	PCE
0.5-2.0	21.3	ND
6-7.5	12.9	ND

F1	TCE	PCE
0-0.5	3510	ND
3-4.5	429	ND
6-7.5	301	ND

G1	TCE	PCE
0.5-2.0	1200	ND
3-4.5	197	2.29
6-7.5	331	6.72

WP-5	TCE	PCE
6-7.0	ND	ND

WP-4	TCE	PCE
5-6.0	ND	ND

TSA-3	TCE	PCE
0.5-2.0	5.0	ND
6-7.5	ND	ND

MBS-1	TCE	PCE
1-2.5	2.75	2.78
3.5-5.0	12.9	23.40
5.5-7.0	2.36	6.20

WP-1	TCE	PCE
3-5.0	3.2	5.5
5-7.0	ND	ND

WP-6	TCE	PCE
1-2.0	ND	1.4
5-6.0	24	30

D2	TCE	PCE
1-2.5	71.1	ND
3.5-5.0	ND	ND

E2	TCE	PCE
0.5-2.0	57.2	ND
3-4.5	8.24	ND

MW-28A	TCE	PCE
0-8.0	36	ND
0-6.0	4.9	ND

MBS-2	TCE	PCE
1-2.5	ND	17.80
3.5-5.0	ND	79.40
5.5-7.0	ND	ND

WP-2	TCE	PCE
3-5.0	2.2	ND
5-7.0	2.1	ND

FPD-1	TCE	PCE
0.5-2.0	130	1.8
4.5-5.0	ND	ND
7-8.5	ND	ND
10.5-12.0	ND	ND

E3	TCE	PCE
0.5-2.0	71.5	ND
3-4.5	203	ND
5.5-7.0	35.6	ND

D3	TCE	PCE
0.5-2.0	16.3	23.70
6-7.5	ND	ND

FPD-5	TCE	PCE
0.5-2.0	4010	ND
2.5-4.0	1560	15.20
7-8.5	930	ND
9-10.5	130	ND
12.5-14.0	ND	ND

FPD-4	TCE	PCE
0.5-2.0	ND	ND
4.5-6.0	ND	ND
6.5-8.0	ND	ND

PZ-8

MW-33A

See Figure 7

Former PACCAR Property
(8801 East Marginal Way South)

N

Legend

- Phase II 2008 Soil Sample Location
- Phase II 2008 Soil and Groundwater Sample Location
- 2009 Soil and Groundwater Sampling Location
- Existing Monitoring Well
- PACCAR Soil Sampling Location
- Approximate Location of Former Slip 5

Sample Location	TCE (Trichloroethene)	PCE (Tetrachloroethene)
Sample Depth Interval (ft)	Result µg/kg	Result µg/kg

Note:
ND = Not Detected.

0 80 160
Scale in Feet

Data Source: ESRI Image Server, King County Parcel Data

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

LANDAU ASSOCIATES

Boeing Thompson-Isaacson Property
Tukwila, Washington

Boeing Thompson / PACCAR Property Boundary TCE and PCE Soil Concentrations

Figure 5

Y:\Projects\025190\MapDocs\090012\Boeing Thompson-Isaacson Boundary Sampling Report\Soil2.mxd 9/3/2009 NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

PZ-8	
VC	ND
1,1-DCE	ND
cis-1,2-DCE	ND
TCE	ND
PCE	ND

I-206	
VC	1.8
1,1-DCE	ND
cis-1,2-DCE	0.7
TCE	ND
PCE	ND

PBI12	
VC	0.18
1,1-DCE	ND
cis-1,2-DCE	0.6
TCE	0.28
PCE	0.071

TDP-18	
VC	ND
1,1-DCE	ND
cis-1,2-DCE	ND
TCE	ND
PCE	ND

TDP-16	
VC	0.3
1,1-DCE	ND
cis-1,2-DCE	ND
TCE	ND
PCE	ND

TDP-7	
VC	0.2
1,1-DCE	ND
cis-1,2-DCE	ND
TCE	ND
PCE	ND

TDP-8	
VC	0.7
1,1-DCE	ND
cis-1,2-DCE	0.4
TCE	ND
PCE	ND

TDP-11	
VC	ND
1,1-DCE	ND
cis-1,2-DCE	ND
TCE	ND
PCE	ND

TDP-26	
VC	140
1,1-DCE	1
cis-1,2-DCE	460
TCE	240
PCE	1.9

PBI11	
VC	1.3
1,1-DCE	1.2
cis-1,2-DCE	100
TCE	2.4
PCE	0.038

TDP-1	
VC	ND
1,1-DCE	ND
cis1,2-DCE	ND
TCE	ND
PCE	ND

TDP-25	
VC	1.8
1,1-DCE	ND
cis-1,2-DCE	45
TCE	71
PCE	2.6

PBI13	
VC	0.051
1,1-DCE	0.58
cis-1,2-DCE	190
TCE	1,000
PCE	78

PBI15	
VC	ND
1,1-DCE	0.14
cis-1,2-DCE	ND
TCE	ND
PCE	ND

A1	
VC	4580
1,1-DCE	1150
cis-1,2-DCE	8940
TCE	892
PCE	1000

B1	
VC	108
1,1-DCE	1.15
cis-1,2-DCE	16.3
TCE	0.892
PCE	1

MW-25A	
VC	3.2
1,1-DCE	ND
cis-1,2-DCE	4.8
TCE	4.6
PCE	0.7

MW-32A	
VC	7.5
1,1-DCE	0.7
cis-1,2-DCE	11
TCE	4.2
PCE	ND

F1	
VC	2660
1,1-DCE	57.4
cis-1,2-DCE	1000
TCE	58.9
PCE	50

MW-24A	
VC	13
1,1-DCE	ND
cis-1,2-DCE	4.5
TCE	2.9
PCE	ND

MW-14A	
VC	23
1,1-DCE	32
cis-1,2-DCE	24
TCE	170
PCE	4.1

MW-33A	
VC	4.2
1,1-DCE	0.2
cis-1,2-DCE	32
TCE	64
PCE	0.6

MW-23A	
VC	ND
1,1-DCE	0.4
cis-1,2-DCE	1.7
TCE	8.5
PCE	4.2

MW-8A	
VC	0.2
1,1-DCE	ND
cis-1,2-DCE	3.5
TCE	6.2
PCE	19

MW-8B	
VC	2.6
1,1-DCE	ND
cis,1,2-DCE	2.8
TCE	0.8
PCE	0.4.

MW-34A	
VC	ND
1,1-DCE	ND
cis-1,2-DCE	0.2
TCE	2.4
PCE	0.4

MW-22A	
VC	ND
1,1-DCE	ND
cis-1,2-DCE	0.6
TCE	1.2
PCE	0.3

MW-28A	
VC	140
1,1-DCE	1.9
cis-1,2-DCE	270
TCE	0.3
PCE	0.2U

I-205

N

Water Tank

Building 14-13

Former Washdown System and Aqueous Degreaser

TDP-19 TDP-17 TDP-14 TDP-15 TDP-5 TDP-10 TDP-13 TDP-6 TDP-9 TDP-12 TDP-2 TDP-3 TDP-4 PBI14

Former PACCAR Property
(8801 East Marginal Way South)

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Legend

- Phase II (2008) Soil Sample Location
- Phase II (2008) Soil and Groundwater Sample Location
- 2009 Soil and Groundwater Sampling Location
- Existing Monitoring Well
- PACCAR Soil Sampling Location
- PACCAR Groundwater Sampling Location
- Approximate Location of Former Slip 5

Sample Location	
VC (Vinyl Chloride)	Result µg/L
1,1-DCE (1,1-Dichloroethene)	
cis-1,2-DCE (cis-1,2-Dichloroethene)	
TCE (Trichloroethene)	
PCE (Tetrachloroethene)	

Note:
ND = Not Detected.

0 80 160
Scale in Feet

Data Source: ESRI Image Server, King County Parcel Data

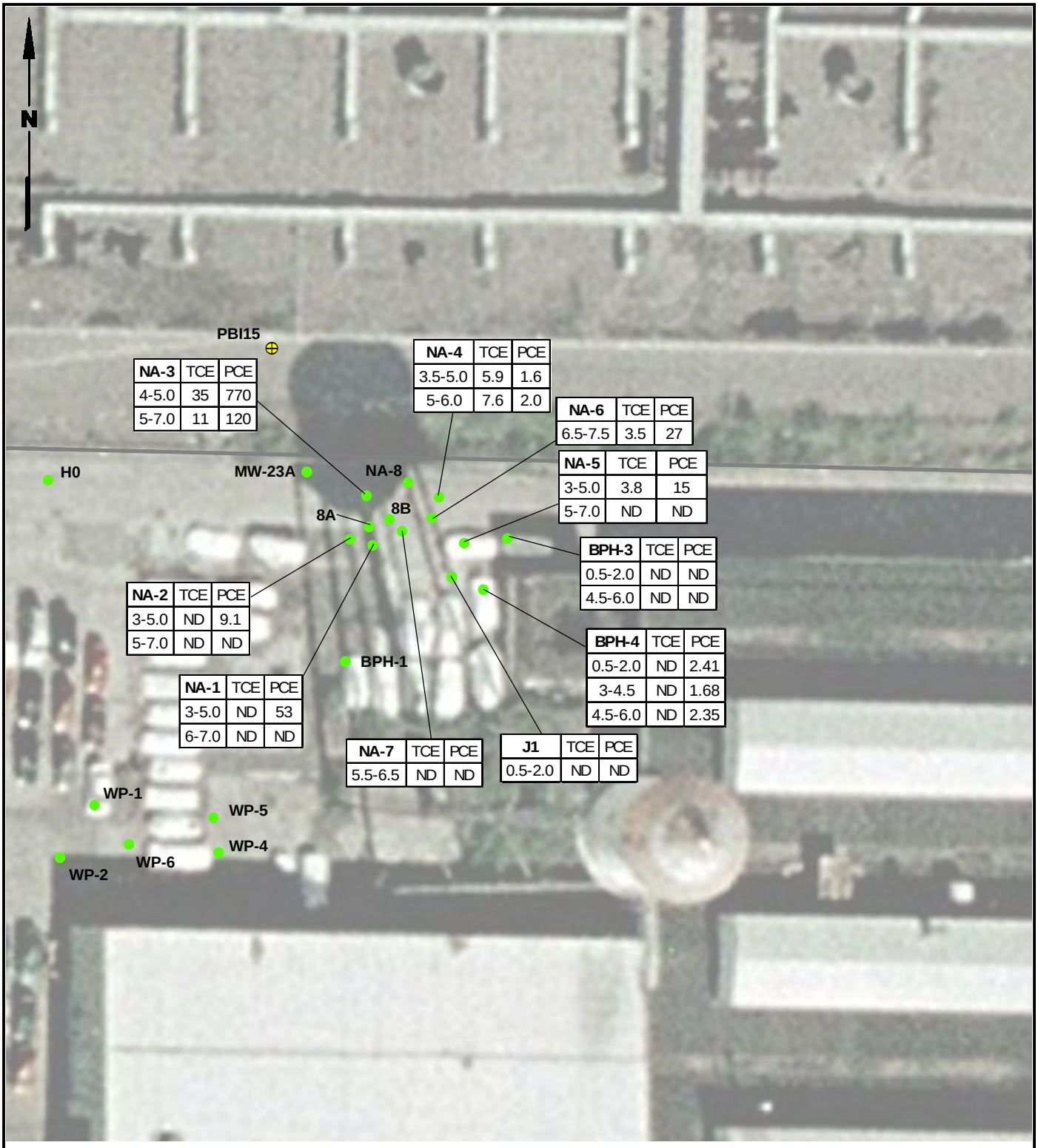
Note
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

LANDAU ASSOCIATES

Boeing Thompson-Isaacson Property
Tukwila, Washington

Boeing Thompson / PACCAR Property Boundary Sampling Locations and Groundwater Analytical Results

Figure 6



Legend

- PACCAR Soil Sampling Location
- 2009 Soil and Groundwater Sampling Location

Note
ND = Not Detected.

Sample Location	TCE (Trichloroethene)	PCE (Tetrachloroethene)
Sample Depth Interval (ft)	Result µg/kg	Result µg/kg

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

0 40 80
Scale in Feet

Data Source: ESRI Image Server; Amec 2008

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LANDAU ASSOCIATES

Boeing Thompson-Isaacson Property
Tukwila, Washington

Boeing Thompson / PACCAR Property Boundary TCE and PCE Soil Concentrations (Close Up of Area North of Former Mfg Building)

Figure 7

I-205

N

PZ-8 ND

I-206 0.04

Water Tank

Building 14-13

PBI11 1.1

PBI12 0.01

TDP-19

TDP-18 ND

TDP-17

TDP-16 0.00

TDP-14

TDP-15

TDP-1 ND

TDP-25 1.0

Former Washdown System and Aqueous Degreaser

TDP-5 TDP-10 TDP-13

TDP-6 TDP-9

TDP-12

TDP-7 0.00 TDP-8 0.02 TDP-11 ND

TDP-2 TDP-3 TDP-4

TDP-26 8.8

PBI13 10

PBI14

PBI15 0.00

MW-25A 0.06

MW-32A 0.26

MW-24A 0.02

A1 190

B1 1.9

F1 54

MW-33A 0.89

MW-14A 0.81

MW-23A 0.11

MW-8B 0.07

MW-8A 0.09

MW-34A 0.02

MW-22A 0.02

MW-28A 6.1

Former PACCAR Property
(8801 East Marginal Way South)

Legend

- Phase II (2008) Soil Sample Location
- Phase II (2008) Soil and Groundwater Sample Location
- 2009 Soil and Groundwater Sampling Location
- Existing Monitoring Well
- PACCAR Soil Sampling Location
- PACCAR Groundwater Sampling Location
- Approximate Location of Former Slip 5

Sample Location	Total HVOCs (µmoles/L)

- # Total HVOCs > 10
- # Total HVOCs > 1-10
- # Total HVOCs ≤ 1

Notes:
1. ND = Not Detected.
2. Total HVOCs = Sum of detected concentrations of vinyl chloride, 1,1-dichloroethene, cis-1,2-dichloroethene, trichloroethene, and tetrachloroethene in µmoles/L. For PACCAR samples, sample with highest concentration is shown.

0 80 160

Scale in Feet

Data Source: ESRI Image Server, King County Parcel Data

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

LANDAU ASSOCIATES

Boeing Thompson-Isaacson Property
Tukwila, Washington

Boeing Thompson / PACCAR Property Boundary Sampling Locations and Total HVOC Concentrations in Groundwater

Figure 8

Y:\Projects\025190\MapDocs\090012\Boeing Thompson-Isaacson Boundary Sampling Report\Fig8-TotalHVOCs.mxd 9/3/2009 NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

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Legend

- Approximate Location of Former Slip 5
- Existing Monitoring Well

Soil Sample Locations (See Note 1)

- TCE Not Detected
- <50 µg/kg TCE
- >50 µg/kg TCE
- >100 µg/kg TCE
- >500 µg/kg TCE
- >1,000 µg/kg TCE
- >50,000 µg/kg TCE

Notes

1. Only selected soil sample locations are shown for the PACCAR Property.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 80 160

Scale in Feet

Data Source: ESRI Image Server, King County Parcel Data

LANDAU ASSOCIATES

Boeing Thompson-Isaacson Property Tukwila, Washington	**Boeing Thompson / PACCAR Maximum TCE Soil Concentrations**	Figure 9

TABLE 1
SOIL ANALYTICAL RESULTS
BOEING ISAACSON PROPERTY
TUKWILA, WASHINGTON

	PBI-1-2 PI24A 7/27/2009	PBI-1-5 PI24B 7/27/2009	PBI-1-8 PI24C 7/27/2009	PBI-2-2 PI24D 7/27/2009	PBI-2A-5 PI24E 7/27/2009	PBI-2A-8 PI24F 7/27/2009	PBI-3-2 PI24G 7/27/2009	PBI-3-5 PI24H 7/27/2009	PBI-3-8 PI24I 7/27/2009	PBI-4-2 PI24J 7/27/2009	PBI-4-5 PI24K 7/27/2009	PBI-4-8 PI24L 7/27/2009	PBI-5-2 PI24M 7/27/2009	PBI-5-5 PI24N 7/27/2009	PBI-5-8 PI24O 7/27/2009
TOTAL METALS (mg/kg)															
EPA Methods 200.8/SW7471A															
Arsenic	**28.9** J	**5.8**	**14.7**	**23.5**	**329**	**58.2**	**8.4**	**754**	**4.8**	**6.2**	**6.9**	**75.4**	**9.3**	**6.4**	**6.7**
Cadmium	**1.3**	**0.7**	**1.1**	**9.1**	**0.8**	**2.1**	**5.7**	0.6 U	0.6 U	**2.6**	**11.1**	**1.4**	**3.5**	**1.9**	**2.3**
Chromium	**561** J	**299**	**486**	**652**	**54**	**117**	**621**	**16**	**33**	**564**	**940**	**359**	**127**	**101**	**47**
Copper	**107** J	**46**	**128**	**394**	**152**	**136**	**1,300**	**526**	**21**	**103**	**190**	**60**	**152**	**145**	**56**
Lead	**141**	**86**	**113**	**1,200**	**29**	**164**	**768**	**37**	**29**	**209**	**796**	**114**	**138**	**166**	**59**
Mercury	**0.05**	0.02 U	0.02 U	**0.39**	**0.07**	**0.09**	**2.00**	**0.19**	**0.07**	**0.12**	**0.22**	**0.06**	**0.14**	**0.11**	**0.04**
Zinc	**380** J	**190**	**270**	**3,030**	**170**	**560**	**2,520**	**210**	**120**	**650**	**3,290**	**500**	**430**	**540**	**190**

TABLE 1
SOIL ANALYTICAL RESULTS
BOEING ISAACSON PROPERTY
TUKWILA, WASHINGTON

	PBI-6-2 PI24P 7/27/2009	PBI-6-5 PI24Q 7/27/2009	PBI-6-8 PI24R 7/27/2009	PBI-7-2 PI24S 7/27/2009	PBI-7-5 PI24T 7/27/2009	PBI-7-8 PI25A 7/27/2009	PBI-8-2 PI25B 7/27/2009	PBI-8-5 PI25C 7/27/2009	PBI-8-8 PI25D 7/27/2009	PBI-9-2 PI25E 7/27/2009	PBI-9-5 PI25F 7/27/2009	PBI-9-8 PI25G 7/27/2009	PBI-10-2 PI25H 7/27/2009	PBI-10-5 PI25I 7/27/2009	PBI-10-8 PI25J 7/27/2009
TOTAL METALS (mg/kg)															
EPA Methods 200.8/SW7471A															
Arsenic	**2.7**	**185**	**74.0**	**6.2**	**14.7**	**0.5** J	**23.4**	**4.8**	**7.0**	**1.4**	**8.6**	**6.3**	**4.7**	**6.3**	**32.7**
Cadmium	**0.6**	0.6 U	**0.6**	**1.6**	**5.4**	**8.3** J	**1.0**	**1.2**	**6.7**	0.2 U	**6.5**	**0.6**	**0.3**	**0.3**	**1.5**
Chromium	**46**	**14**	**26**	**295**	**361**	**561** J	**30.1**	**57.2**	**123**	**15.0**	**52.2**	**233**	**26.6**	**51.9**	**790**
Copper	**152**	**60**	**62**	**96**	**118**	**281**	**138**	**75.2**	**47.9**	**82.4**	**102**	**62.5**	**68.7**	**78.6**	**301**
Lead	**55**	**7**	**32**	**200**	**400**	**660**	**205**	**698**	**460**	**3**	**212**	**189**	**65**	**175**	**4,200**
Mercury	**0.07**	**0.08**	**0.07**	**0.16**	**0.26**	**0.14**	**0.17**	**0.12**	0.02 U	0.02 U	**0.12**	**0.03**	**0.03**	**0.03**	0.02 U
Zinc	**230**	**120**	**140**	**360**	**890**	**1,420**	**460**	**249**	**530**	**56**	**550**	**180**	**131**	**194**	**630**

U = Indicates the compound was undetected at the reported concentration.

J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

Bold = Detected compound.

TABLE 2
GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON PROPERTY
TUKWILA, WASHINGTON

	PBI-11 PI41A 7/28/2009	PBI-12 PI41B 7/28/2009	PBI-13 PI41C 7/28/2009	PBI-15 PI41D 7/28/2009
VOLATILES (µg/L)				
Method SW8260CSIM				
Vinyl Chloride	**1.3**	**0.18**	**0.051** J	0.020 U
1,1-Dichloroethene	**1.2**	0.020 U	**0.58** J	**0.14**
cis-1,2-Dichloroethene	(a)	**0.68**	(a)	0.020 U
Trichloroethene	**2.3**	**0.28**	(a)	0.020 U
Tetrachloroethene	**0.038**	**0.071**	(a)	0.020 U
1,1,2,2-Tetrachloroethane	0.020 U	0.020 U	0.020 UJ	0.020 U
VOLATILES (µg/L)				
Method SW8260C				
Vinyl Chloride	**1.3**	NA	1.0 U	NA
1,1-Dichloroethene	**1.2**	NA	1.0 U	NA
cis-1,2-Dichloroethene	**100**	NA	**190**	NA
Trichloroethene	**2.4**	NA	**1,000**	NA
Tetrachloroethene	1.0 U	NA	**78**	NA
1,1,2,2-Tetrachloroethane	1.0 U	NA	1.0 U	NA

U = Indicates the compound was undetected at the reported concentration.

J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

UJ = The analyte was not detected in the sample; the reported sample detection limit is an estimate.

Bold = Detected compound.

NA = Not analyzed.

(a) Due to high sample concentrations, samples were analyzed by standard SW8260C VOC analysis.

TABLE 3
SOIL ANALYTICAL RESULTS
BOEING THOMPSON PROPERTY
TUKWILA, WASHINGTON

	PBI-11-2 PI42A 7/28/2009	PBI-11-5 PI42B 7/28/2009	PBI-11-8 PI42C 7/28/2009	PBI-12-2 PI42D 7/28/2009	PBI-12-5 PI42E 7/28/2009	PBI-12-8 PI42F 7/28/2009	PBI-13-2 PI42G 7/28/2009	PBI-13-5 PI42H 7/28/2009	PBI-13-8 PI42I 7/28/2009	PBI-14-2 PI42J 7/28/2009	PBI-14-5 PI42K 7/28/2009	PBI-15-2 PI42L 7/28/2009	PBI-15-5 PI42M 7/28/2009	PBI-15-8 PI42N 7/28/2009
VOLATILES (µg/kg)														
Method SW8260C														
Vinyl Chloride	0.6 U	1.0 U	0.9 U	1.0 U	0.9 U	1.1 U	0.9 U	0.9 U	0.9 U	0.9 U	0.8 U	0.9 U	1.0 U	0.8 U
1,1-Dichloroethene	0.6 U	1.0 U	0.9 U	1.0 U	0.9 U	1.1 U	0.9 U	0.9 U	0.9 U	0.9 U	0.8 U	0.9 U	1.0 U	0.8 U
cis-1,2-Dichloroethene	0.6 U	1.0 U	0.9 U	1.0 U	0.9 U	1.1 U	0.9 U	0.9 U	0.9 U	0.9 U	0.8 U	0.9 U	1.0 U	0.8 U
Trichloroethene	**2.1**	**11**	**7.0**	**3.7**	**8.3**	1.1 U	**20**	**28**	**35**	0.9 U	**1.5**	0.9 U	1.0 U	0.8 U
Tetrachloroethene	0.6 U	**2.9**	**2.0**	1.0 U	**2.1**	1.1 U	**1.7**	**2.3**	**5.3**	0.9 U	0.8 U	0.9 U	1.0 U	0.8 U
1,1,2,2-Tetrachloroethane	0.6 U	1.0 U	0.9 U	1.0 U	0.9 U	1.1 U	0.9 U	0.9 U	0.9 U	0.9 U	0.8 U	0.9 U	1.0 U	0.8 U

U = Indicates the compound was undetected at the reported concentration.

Bold = Detected compound.