TECHNICAL MEMORANDUM

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

TO: James Bet, The Boeing Company

FROM: Sarah Fees and Jennifer Wynkoop

DATE: June 19, 2014

RE: JULY 2013 SURFACE WATER INVESTIGATION
BOEING AUBURN FACILITY
AUBURN, WASHINGTON

INTRODUCTION

This technical memorandum presents and evaluates surface water data collected during the July 2013 surface water investigation conducted as part of the remedial investigation (RI) for the Boeing Company's (Boeing) Auburn Fabrication Division property (facility) located in Auburn, Washington. The RI is part of the corrective action requirements that are documented in an Agreed Order (Order; No. DE 01HWTRNR-3345) dated August 14, 2002 and the First Amended Agreed Order dated February 21, 2006 both with Washington State Department of Ecology (Ecology). The Order includes a requirement to conduct an RI under Ecology's oversight. The Boeing Auburn property is shown on Figure 1.

The July 2013 surface water investigation was conducted to address data gaps as part of the RI in accordance with the *Surface Water Investigation Work Plan, Second Addendum, Boeing Auburn Facility, Auburn, Washington* (work plan; Landau Associates 2013a). Data from this investigation are used to address two primary objectives:

1) To evaluate the hydrologic relationship between groundwater and surface water
2) Determine the extent of volatile organic compounds (VOCs) in surface water and whether VOCs are discharging to Mill Creek.

A draft of this technical memorandum was presented to Ecology on August 27, 2013. Ecology provided comments on January 23, 2014 (Ecology 2014) to be addressed in the final version of this document and in a work plan for additional 2014 surface water investigations (Landau Associates 2014). This technical memorandum has been revised based on the January 2014 Ecology comments.

Ecology approved the Auburn portion of the work plan, second addendum on July 1, 2013 (Ecology 2013a). A response to Ecology's comments is presented in Attachment 1 of this memorandum. Ecology's conditional approval of the work plan included, by reference, comments from the City of Auburn dated April 19, 2013[1]. Boeing's responses to City of Auburn comments are also presented in Attachment 1. The City of Auburn initially requested the addition of three sampling locations. Sampling

[1] City of Auburn comments were transmitted to Boeing by Ecology in an email from Hideo Fujita dated May 16, 2013.

locations were discussed with the City of Auburn during a series of biweekly conference calls[2]. These discussions resulted in agreement between Ecology, the City of Auburn, and Boeing that two of the requested locations did not warrant sampling. However, the parties did agree to include the third location in a future surface water sampling event. This third location is at the southeast edge of the open water area in the Auburn Environmental Park northwest of well AGW217 and is presented in the Conclusions and Recommendations section below

Ecology also requested that the portion of proposed field work in Algona be delayed until the City of Algona has an opportunity to comment on the work plan (Ecology 2013a). Therefore, the Algona portion of work was deferred pending Ecology's approval. The deferred portion of work included placement of dataloggers in the Chicago Avenue ditch and adjacent well AGW225, and quarterly surface water sampling at one location in the Chicago Avenue ditch. Ecology recommended two additional surface water sampling locations at the Chicago Avenue ditch in a letter dated August 29, 2013 (Ecology 2013b). Boeing and Ecology agreed that Boeing would collect quarterly samples from three locations in the Chicago Avenue ditch and Ecology gave final approval for the Algona portion of the work plan on September 20, 2013 (Ecology 2013c). The Algona portion of the work plan has been initiated and the proposed scope is presented in the 2014 Surface Water Work Plan (Landau Associates 2014).

BACKGROUND AND SITE CONDITIONS

Groundwater and surface water interaction northwest of the Boeing facility is complex. In places, groundwater is located within a few feet below ground surface. Consequently, many of the surface water features appear to intersect groundwater and represent groundwater discharge locations resulting in VOC detections in surface water. Numerous ditches, wetlands, ponds, stormwater pipes, and culverts are present in the area northwest of the facility. These features come together in a channelized surface water system that forms the headwaters of the east branch of Mill Creek.

Surface Water Flow

Mill Creek originates on Auburn's West Hill, descends down Peasley Canyon, and then flows northward through various wetland complexes before it merges with the Green River (Auburn Environmental Park website 2014). Surface water, stormwater, and water in the wetlands in the southwestern portion of the City of Auburn and the northern portion of the City of Algona flow from the south and east beneath State Route (SR) 167 and combine with Mill Creek at the east end of Peasley Canyon Road South. These surface water, wetland, and stormwater features include the Chicago Avenue

[2] Boeing, Landau Associates, Ecology, and the City of Auburn have a regular biweekly conference call every other Wednesday to discuss the status of RI activities within the City of Auburn limits. The first call occurred in May 2013.

ditch, the O Street wetland, the Auburn 400 north and south flood storage ponds (Auburn 400 north and south ponds), The Outlet Collection stormwater ponds, and various unnamed ditches. These features form a channelized system on the east side of SR 167; the channel from SR 167 to Peasley Canyon Road South is herein termed the east branch of Mill Creek. The locations of these features and Mill Creek are shown on Figure 2.

Water in the Chicago Avenue ditch flows north and enters the City of Auburn's piped stormwater system at Boundary Boulevard. Water from the O Street wetland is also channelized and flows into the City of Auburn's piped stormwater system. The piped water flows west to the Auburn 400 south pond, which in turn discharges to the Auburn 400 north pond. The Auburn 400 north pond discharges to the east branch of Mill Creek. The Auburn 400 south pond also captures stormwater from 15th Street Southwest and the southern portion of The Outlet Collection complex. Water from The Outlet Collection stormwater ponds appears to seep into the ditch on the northwest side of the stormwater ponds. This ditch combines with flow from the Auburn 400 north pond and discharges to the east branch of Mill Creek. Standing water is present in the Auburn 400 north and south ponds and The Outlet Collection stormwater ponds throughout the year. Figure 2 provides a diagram of surface water flow in the study area.

Groundwater Flow

Groundwater flow in the Auburn Valley is generally northward, parallel to the valley sidewalls (Pacific Groundwater Group 1999). However, in the vicinity of the northern portion of the Boeing facility, there is a strong northwestern component to groundwater flow. The northwestern component of flow appears to be caused by groundwater discharge to surface water features mentioned above. This northwestern component of flow is most pronounced in the shallow zone[3] probably because groundwater is in direct hydraulic connection with the surface water features. Recent shallow zone groundwater contours are shown on Figure 3.

Groundwater Volatile Organic Compound Concentrations

VOC plumes have been defined in the uppermost aquifer in the shallow, intermediate, and deep zones. The plumes are defined by detections of trichloroethene (TCE); cis-1,2-dichloroethene (cis-1,2-DCE); and vinyl chloride (VC). The plumes appear to originate on the Boeing facility and extend off of the property. The shallow zone plume extends off Boeing property in a northwesterly direction. Shallow zone TCE, cis-1,2-DCE, and VC plumes are shown on Figures 4, 5, and 6. The intermediate and deep

[3] The uppermost aquifer in the Auburn Valley is about 90 feet (ft) thick in the vicinity of the site. The aquifer is separated into three zones based on depth beneath ground surface. The shallow zone is between about 0 and 30 ft below ground surface (BGS), the intermediate zone is between 40 and 60 ft BGS, and the deep zone is between 80 and 100 ft BGS.

zone plumes are oriented in a more northern direction. The more northern orientation of the intermediate zone TCE plume is shown on Figure 7 for comparison. Existing surface water sample locations and selected surface water VOC data are also shown on Figures 4, 5, and 6.

Previous Surface Water Investigations

Previous surface water investigation activities were conducted in June and September of 2012. The scope of the June field activities was presented in the April 23, 2012 draft surface water investigation work plan (Landau Associates 2012a) and in the June 14, 2012 addendum to the work plan (Landau Associates 2012b); the addendum was prepared in response to Ecology's comments dated June 4, 2012 (Ecology 2012a). Eleven locations (SW-1 to SW-11) were sampled during the June 2012 surface water investigation. TCE, cis-1,2-DCE, and VC were detected in the Chicago Avenue ditch; cis-1,2-DCE and VC were detected in the Auburn 400 north pond. These detections are assumed to be related to groundwater discharge of VOCs to the stormwater system. Tetrachloroethene (PCE), toluene, and acetone were other VOCs that were intermittently detected during the June 2012 sampling event. These detections do not appear to be related to the groundwater plumes (Landau Associates 2012c). The June 2012 surface water data, surface water screening levels, and recommendations for additional data collection were presented to Ecology in a surface water investigation technical memorandum (Landau Associates 2012c) on August 8, 2012.

September 2012 field activities consisted of sampling at four locations (SW-CD1 through SW-CD4) along the Chicago Avenue ditch extending from Boundary Boulevard south approximately 2,000 ft. This "dry season" sampling was performed to assess spatial variability in VOC concentrations and to determine a representative monitoring location for future quarterly sample collection. The results indicated the presence of VOCs in the northern 1,200 ft of the ditch. Results were consistent with the June 2012 sample (SW-4) from the ditch. The September 2012 data were submitted to Ecology in the 3rd quarter 2012 status report dated October 15, 2012 (Landau Associates 2012d). The previous surface water VOC detections from the June and September 2012 surface water sampling are presented with the shallow zone groundwater VOC plumes in Figures 4, 5, and 6.

Surface Water Screening Levels

Screening levels for surface water under the Model Toxics Control Act (MTCA), which governs environmental cleanup in Washington, are based on exposure scenarios related to drinking water and consumption of fish. While these scenarios are applicable to portions of the site that include Mill Creek and its headwaters, they are not applicable to exposure in stormwater collection ditches in northern Algona. Ecology has approved site-specific surface water screening levels for ditches in northern Algona

based on a more typical exposure scenario (worker scenario) for this type of surface water feature. The worker scenario assumes the population most frequently exposed to water in the ditches is public works employees who are responsible for regularly cleaning the ditches. The worker scenario includes an evaluation of dermal contact, inhalation, and incidental ingestion. The Algona ditch screening levels based on direct contact exposure scenarios for adult workers were provided for Ecology review in the Screening Levels for Yard and Ditch Surface Water technical memorandum (Landau Associates 2013b). Ecology approved these screening levels in a letter dated November 22, 2013 (Ecology 2013d) and indicated that these screening levels are applicable to ditches within the project area in northern Algona.

Screening levels for Mill Creek and its headwaters are based on an assumption that water from the creek may be used as drinking water. Ecology defines the Mill Creek headwaters, including the Auburn 400 ponds, The Outlet Collection stormwater ponds, and related ditches, as waters that may be used as drinking water (Ecology 2012b). Domestic water supply is a listed use designation for Mill Creek under the Washington Administrative Code 173-201A-602. The approved surface water screening levels for VOCs of concern are provided in the table below.

Compound	PCE	TCE	cis-1,2-DCE	VC
Screening Level for Algona ditches (µg/L)	--	58 (a)	--	98 (a)
Screening Level for Mill Creek and its headwaters (µg/L) (b)	0.69 (b)	2.5 (b)	16 (c)	0.025 (b)

µg/L = micrograms per liter

(a) Ecology-approved screening level based on site-specific exposure scenario for ditches. Site specific screening criteria for PCE and cis-1,2-DCE have not been calculated.

(b) Surface Water, Applicable or Relevant and Appropriate Requirement – based on human health risk, developed for fresh water, Clean Water Act (Section 304a).

(c) Screening level based on MTCA Method B standard formula value for groundwater as drinking water. No surface water criteria available.

JULY 2013 SURFACE WATER INVESTIGATIONS

Surface Water Sampling

The approved Auburn work plan scope for 2013 consisted of the collection of surface water samples at six new locations. Surface water samples were located in the Auburn 400 north and south ponds, the O Street wetland, and along Mill Creek. These sample locations are downstream of the Chicago Avenue ditch in an area where there are relatively high VOC concentrations in the shallow groundwater zone. VOC sample locations SW-12 and SW-14 through SW-18 are shown on Figure 2 along with relevant surface water features and previous surface water sampling locations. Prior to sampling, the City of Auburn and the property owner for the O Street wetland (Terhune-Barrier, LLC)

were contacted for permission to access sampling locations. Sampling locations were recorded with a GPS and photographed.

Surface water sampling was completed on July 2, 2013. Sampling was conducted after a dry period with no trace of precipitation occurring in the previous 72 hours (King County website 2013). Sampling was conducted using a peristaltic pump and dedicated tubing for each sample or a dedicated composite liquid waste sampler (COLIWASA). COLIWASAs were used to collect the water samples in locations where access was difficult and electricity to operate the peristaltic pump was not available. Samples were collected from no more than 4 inches above the substrate and at least 2 inches below the water surface. When using the peristaltic pump, sample tubing was attached to a rigid pole to control the sampling location and depth. Field parameters (pH, conductivity, dissolved oxygen, temperature, and oxidation-reduction potential) were measured with a multi-parameter probe (YSI 556 MPS) either via a peristaltic pump and flow-through cell or by placing the probe directly in the water at the sampling depth. Samples were examined for color, odor, and sheen. The probe was decontaminated with de-ionized water after each use. Field parameter data are summarized in Attachment 2.

Samples were collected in laboratory-provided 40 milliliter volatile organic analysis (VOA) glass vials and preserved with hydrochloric acid. Five VOA vials were collected for each sample location[4]. Samples were preserved in coolers on ice and submitted under chain-of-custody protocols to Eurofins Lancaster Laboratories, Inc. in Lancaster, Pennsylvania for delivery within 48 hours of collection. Samples were analyzed for VOCs by U.S. Environmental Protection Agency Methods 8260C and 8260C selected ion monitoring. Trip blanks and blind duplicate samples were analyzed for quality assurance. VOC detections are summarized in Table 1; complete analytical tables and the laboratory data packages are presented in Attachment 2.

Water Level Measurements

The staff gauge (SWSG-1) was installed in a swale south of well AGW235 on June 19, 2013. Monthly water level measurements at the staff gauge (SWSG-1) and adjacent wells (AGW235 and AGW236) began in June 2013 and are continuing in accordance with the work plan. The swale, where SWSG-1 is located, was initially thought to be connected to the Auburn 400 north pond. However, during a site visit on August 19, 2013, it was discovered that a narrow berm separates the swale from the Auburn 400 north pond. The staff gauge and adjacent well locations are shown on Figure 8. Water level data collected for the first 3 months at the staff gauge and adjacent wells are presented on Table 2. Continued water level monitoring at the Auburn 400 north pond and adjacent wells after August 2013 is

[4] Five VOA vials were collected for each location except at SW-18, where only four vials were collected. The fifth vial at this location was overturned and the preservative was lost.

discussed in the Conclusions and Recommendations section below and data will be presented in the report following the conclusion of the 2014 surface water investigations.

JULY 2013 INVESTIGATION RESULTS

Investigation results provide additional information on contaminant distribution and groundwater to surface water interactions. The distribution of detected surface water concentrations and groundwater to surface water interactions are discussed below.

Volatile Organic Compound Results

VOCs detected at low concentrations in surface water samples during the July 2013 sampling event were TCE, cis-1,2-DCE, VC, and toluene. Results from the July 2013 sampling event are presented in Table 1. Excluding toluene, VOC results are also presented on Figures 4, 5, and 6.

TCE was detected at two of the six sampling locations. One of the detections was in the Auburn 400 south pond (SW-14) at 1.0 µg/L. The other detection was in the Auburn 400 north pond (SW-16) at 1.1 µg/L. Both TCE detections were below the surface water screening level (2.5 µg/L) for TCE.

Cis-1,2-DCE and VC were detected at the Auburn 400 north and south ponds (SW-14, SW-16) and in the east branch of Mill Creek (SW-17). Concentrations of cis-1,2-DCE were all below the surface water screening level (16 µg/L) with values of 0.8 µg/L, 1.5 µg/L, and 0.12 µg/L, respectively. VC concentrations were all above the surface water screening level (0.025 µg/L) with values of 0.12 µg/L, 0.31 µg/L, and 0.063 µg/L, respectively.

Toluene was detected at all of the sampling locations except SW-14. Toluene does not appear to be related to shallow groundwater discharge since this constituent is generally not detected in shallow groundwater northwest of the Auburn site. Toluene can be formed biogenically through fermentation and other microbial processes (NCASI 2011). Wetland environments typically have high microbial activity, anoxic conditions, and high biomass input that would be conducive to toluene formation. Another possible source of the toluene detected is stormwater runoff. In a study completed by the U.S. Geological Survey, toluene was the most commonly detected VOC in stormwater (Lopez and Bender1998). Acetone was detected during previous sampling events and is described in the 2012 Surface Water Technical Memorandum (Landau Associates 2012c).

Hydraulic Gradients

Surface water level measurements at the staff gauge (SWSG-1) and groundwater level measurements collected from wells AGW236 and AGW235 indicate the potentiometric surface of the groundwater crosses the surface water plane of the swale where SWSG-1 is located. This may indicate

that groundwater discharge is occurring on the east end of the swale while groundwater recharge is occurring on the west end of the swale. Groundwater recharge at the west end of the swale may also explain why the VOC plume is not present in shallow groundwater (channels 1 and 2 at 9 ft and 19 ft BGS, respectively) at well AGW235. This groundwater recharge may also explain the downward gradient between channels 1 and 2, while an upward gradient is present between channels 2 and 4 (19 and 49 ft BGS, respectively). Water level data are presented in Table 2.

Measurements have been collected on only three occasions at SWSG-1 and are not considered adequate to develop final conclusions about groundwater and surface water interaction. Additional data analysis will be presented in future surface water reports.

DISCUSSION

TCE, cis-1,2-DCE, and VC were previously detected in the northern portion of the Chicago Avenue ditch. The source of the VOCs is believed to be VOC-impacted groundwater discharge to the ditch because:

- Groundwater levels measured in wells adjacent to the ditch appear to be higher than the surface water level in the ditch (indicating that groundwater discharge is occurring)
- The water in the ditch is believed to consist entirely of groundwater discharge during the dry season (September 2012) when VOCs were detected
- The VOC signature is similar in groundwater and surface water.

During the July 2013 investigation, TCE, cis-1,2-DCE, and VC were also detected in both the Auburn 400 ponds (SW-14 and SW-16), but not at the outlet of the Auburn 400 south pond (SW-15). These ponds are downstream in the stormwater system from the Chicago Avenue ditch. Two possible explanations for the detections in the Auburn 400 north and south ponds are that 1) VOCs in the water captured by the Chicago Avenue ditch are traveling downstream to the ponds; 2) VOCs in the ponds are the result of the contaminated groundwater discharge directly to the ponds. Several factors support the second hypothesis as the more likely scenario.

- VOC concentrations in the ponds are similar to the concentrations in the Chicago Avenue ditch. Since the water from the ditch mixes with other clean water (i.e., water from the O Street wetland) between the ditch and the pond, concentrations in the pond should be appreciably lower than in the Chicago Avenue ditch due to dilution.
- The Auburn 400 ponds are located in an area where concentrations are relatively high in the shallow zone groundwater (Figures 4, 5, and 6). In this area, VOC concentrations in groundwater are higher than detected in the ponds; however, some dilution and evaporation would be expected to occur in the ponds.
- VOCs were not detected at the outlet from the Auburn 400 south pond where it discharges to the Auburn 400 north pond. This suggests that VOCs are not being transmitted to the Auburn 400 north pond via surface water.

Cis-1,2-DCE and VC were also detected in the east branch of Mill Creek (SW-17) but not in the main stem of Mill Creek north of Peasley Canyon Road South (SW-18). Additional sampling is needed to determine the source of the VOCs in the east branch of Mill Creek.

Groundwater discharge to surface water likely varies temporally as well as spatially. Consequently, additional time series VOC sampling and water level monitoring will be helpful to more fully evaluate the groundwater to surface water pathway. Proposed additional surface water investigations are discussed in the Conclusions and Recommendations section below.

CONCLUSIONS AND RECOMMENDATIONS

Low levels of VOCs were detected in surface water; concentrations were below the screening criteria for all of the constituents except for VC. Low levels of toluene were detected in a number of locations that do not appear to be associated with VOC-impacted groundwater. Low levels of acetone and PCE were detected during previous surface water sampling events and do not appear to be associated with VOC-impacted groundwater. Other sources of toluene, acetone, and PCE include stormwater runoff and, for toluene and acetone, biogenic formation.

VOC detections at SW-14 and SW-16 in the Auburn 400 ponds and SW-17 in Mill Creek may be the result of shallow, VOC-impacted groundwater discharging to surface water. Additional sampling and water level measurements are recommended to evaluate shallow groundwater discharge and VOC impacts to surface water. Recommendations for additional sampling and water level measurements in Auburn are discussed below. All recommended 2014 surface water investigations are presented in the 2014 Surface Water Work Plan (Landau Associates 2014).

Additional Water Level Measurements

Monitoring of a staff gauge at the outlet of the Auburn 400 north pond is recommended. During a site visit on August 19, 2013, an existing staff gauge was observed at the outlet of the Auburn 400 north pond. This staff gauge (SWSG-3) was monitored monthly starting in November 2013 and is proposed to continue for 11 months, through September 2014. SWSG-3 was surveyed on January 28, 2014 and the staff gauge location is shown on Figure 9. Water level data collected from the Auburn 400 north pond and adjacent monitoring wells (AGW235 and AGW236) will be used to evaluate hydraulic gradients in the vicinity of the Auburn 400 north pond and Mill Creek. The previously installed staff gauge (SWSG-1) will be decommissioned.

Additional Surface Water Volatile Organic Compound Sampling

Additional samples from the Auburn 400 ponds and Mill Creek will be useful in evaluating how VOC-impacted water is entering the ponds and how VOC-impacted water is being transmitted through the surface water system. The following additional sampling in Auburn is recommended:

- **Ditch north of The Outlet Collection stormwater ponds (SW-3):** Collection of one additional wet season sample is recommended at the ditch north of The Outlet Collection stormwater ponds to address Ecology's request for sampling at this location (Ecology 2014).
- **The Outlet Collection stormwater ponds (SW-10):** Collection of one additional wet season sample is recommended at the southern stormwater pond north of the Auburn 400 north pond to address Ecology's request for sampling at this location (Ecology 2014).
- **O Street wetland (SW-12)**: Collection of one additional wet season sample is recommended at the O Street wetland to determine if VOCs are detected when groundwater elevations are higher.
- **SW-14 through SW-18:** Two additional sampling events (one in the dry season and one in the wet season) are recommended at sample locations SW-14 through SW-18. Once additional sampling has been completed, Boeing will propose a long-term monitoring schedule for selected locations.
- **Auburn 400 north pond (SW-19):** Collection of surface water samples is proposed at the outlet of the Auburn 400 north pond where the water passes through a culvert under the on-ramp to SR 167. A sample from this location would help determine if the VOC detections at SW-17 in the east branch of Mill Creek were due to the movement of surface water through the system or if VOC-impacted groundwater may be discharging farther downstream.
- **East branch of Mill Creek (SW-20):** Collection of surface water samples is proposed in the east branch of Mill Creek upstream of the culvert passing under SR 18. The proposed location is upstream of the confluence of the east branch of Mill Creek with Mill Creek at Peasley Canyon Road South and West Valley Highway. Samples from this location, along with SW-21 discussed below, will help define the extent of VOCs in Mill Creek.
- **Mill Creek (SW-21):** Collection of surface water samples is proposed in Mill Creek downstream of the culvert passing under SR 18. Samples from this location will help define the extent of VOCs in Mill Creek. This location is downstream of the confluence of the east branch of Mill Creek with Mill Creek and appears to be the final accessible location upstream of SW 18.
- **Auburn Environmental Park (SW-22):** Collection of one surface water sample at the southeast edge of the open water area in the Auburn Environmental Park located northwest of well AGW217 is proposed to address comments from the City of Auburn. This sample may need to be collected in the wet season depending on the availability of surface water.

Landau Associates recommends sampling at the above-mentioned locations (SW-14 through SW-22) one time during the wet season (1st Quarter 2014) and one time during the dry season (3rd quarter 2014) unless otherwise noted. Proposed surface water sampling locations in Auburn are shown on Figure 9. The proposed surface water sampling matrix for Auburn sampling locations is provided in Table 3.

SEF/JWW/jrc

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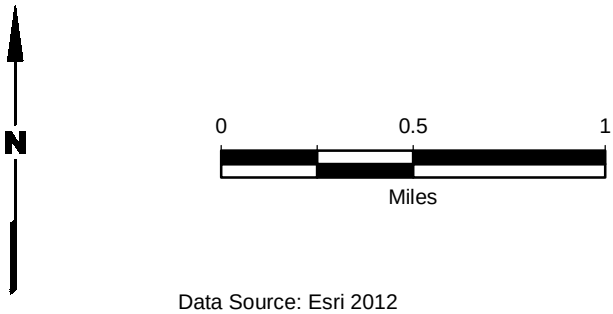
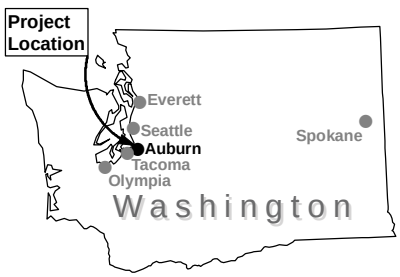
ATTACHMENTS

Figure 1: Vicinity Map
Figure 2: Surface Water Bodies and Sampling Locations
Figure 3: Surface Water Sampling Locations and June 2013 Shallow Zone Groundwater Contours
Figure 4: Surface Water TCE Detections and June 2013 Shallow Zone TCE Groundwater Concentrations
Figure 5: Surface Water cis-1,2-DCE Detections and June 2013 Shallow Zone cis-1,2-DCE Groundwater Concentrations
Figure 6: Surface Water Vinyl Chloride Detections and June 2013 Shallow Zone Vinyl Chloride Groundwater Concentrations
Figure 7: Surface Water TCE Detections and June 2013 Intermediate Zone TCE Groundwater Concentrations
Figure 8: Staff Gauge and Adjacent Well Locations
Figure 9: Proposed Staff Gauge and Surface Water Sampling Locations in Auburn

Table 1: Surface Water Sampling Event Results
Table 2: Staff Gauge and Adjacent Well Water Elevation Data
Table 3: Proposed Surface Water Sampling Matrix

Attachment 1: Response to Ecology Comment Memorandum
Attachment 2: Analytical Tables and Laboratory Data Package





Data Source: Esri 2012

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Boeing Auburn Auburn, Washington	**Vicinity Map**	Figure 1

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Notes

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

Legend

- Staff Gauge
- Previous Surface Water Sample
- July 2013 Surface Water Sample
- Open Waterways
- Piped Waterways
- Water Bodies
- Stormwater Ponds

N

0 400 800

Scale in Feet

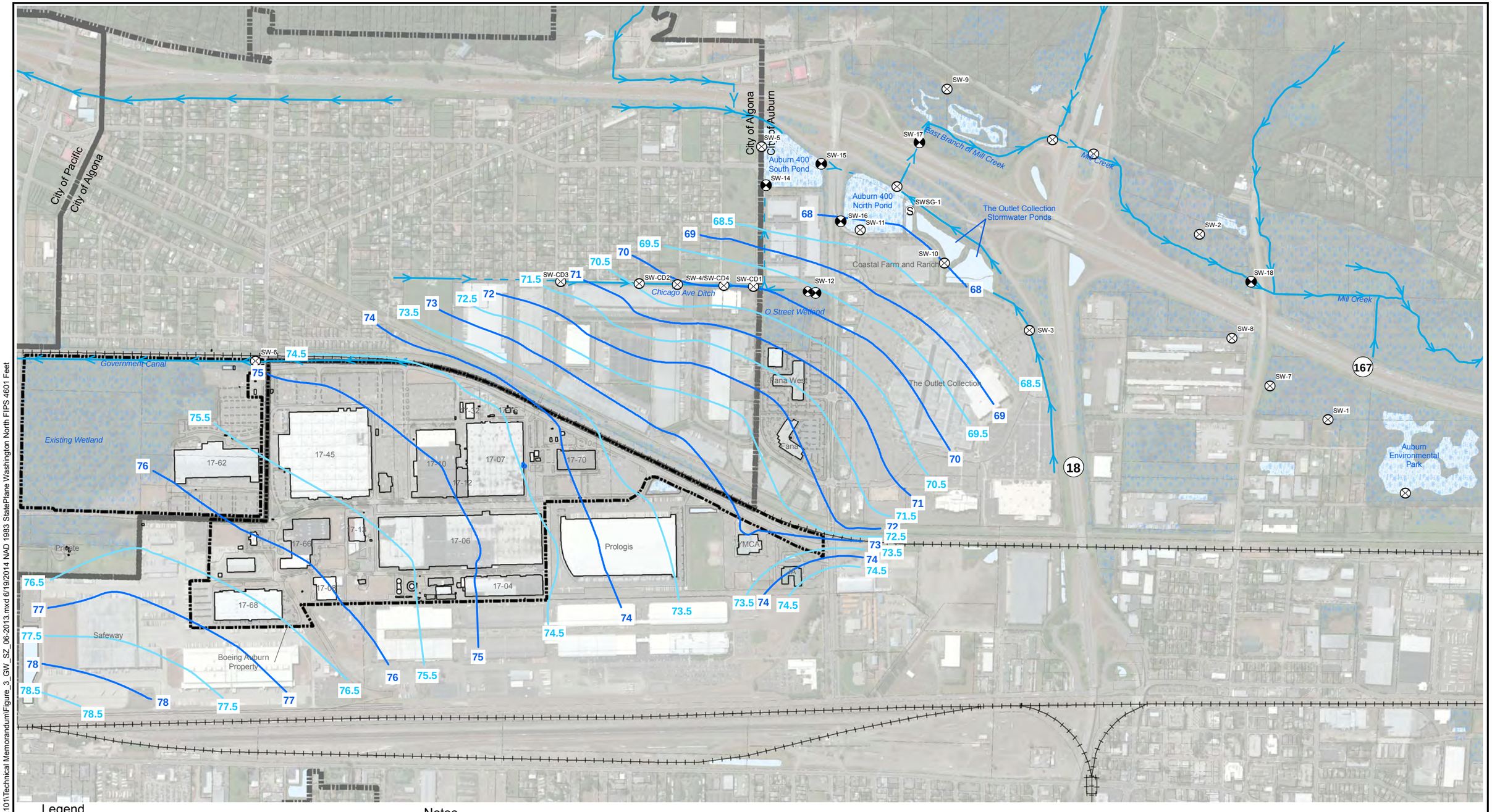
Base map source: Geometrix 2003; Aerial Photo Source: ESRI World Imagery; Parcel Data Source: King County GIS 2012

LANDAU ASSOCIATES

Boeing Auburn
Auburn, Washington

Surface Water Bodies and Sampling Locations

Figure 2



Legend

- Staff Gauge
- Previous Surface Water Sample
- July 2013 Surface Water Sample
- 72 / 72.5 Groundwater Contours
- Boeing Property
- Open Waterways
- Piped Waterways
- Wetland Area
- Surface Waterbody
- Parcel Boundary
- City Limits

Notes

1. All groundwater level data in ft, MSL. Data collected in June 2013.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 1,000 2,000

Scale in Feet

Base map source: Geometrix 2003; Aerial Photo Source: Esri World Imagery; Parcel Data Source: King County GIS 2013

LANDAU ASSOCIATES

Boeing Auburn Auburn, Washington	**Surface Water Sampling Locations and June 2013 Shallow Zone Groundwater Contours**	Figure 3

G:\Projects\025\164\110\101\Technical Memorandum\Figure_3_GW_SZ_06-2013.mxd 6/19/2014 NAD 1983 StatePlane Washington North FIPS 4601 Feet

SW-5	9/20/2012
TCE	ND

SW-14	7/2/2013
TCE	**1**

SW-CD1	9/17/2012
TCE	**1.3**

SW-16	7/2/2013
TCE	**1.1**

SW-4/ SW-CD4	6/20/2012	9/17/2012
TCE	**1.2**	**1.7**

SW-6	9/20/2012
TCE	ND

SW-CD3	9/17/2012
TCE	ND

SW-CD2	9/17/2012
TCE	ND

SW-15	7/2/2013
TCE	ND

SW-9	6/19/2012
TCE	ND

SW-17	7/2/2013
TCE	ND

SW-2	6/19/2012
TCE	ND

SW-18	7/2/2013
TCE	ND

SW-11	6/19/2012
TCE	ND

SW-10	6/19/2012
TCE	ND

SW-8	6/19/2012
TCE	ND

SW-7	6/19/2012
TCE	ND

SW-12	7/2/2013
TCE	ND

SW-1	6/19/2012
TCE	ND

SW-3	9/20/2012
TCE	ND

City of Pacific
City of Algona
City of Algona
City of Auburn
Auburn 400 South Pond
Auburn 400 North Pond
SWSG-1
East Branch of Mill Creek
Mill Creek
Mill Creek
5 µg/L
2.4 µg/L
0.5 µg/L
0.5 µg/L
Coastal Farm and Ranch
The Outlet Collection Stormwater Ponds
O Street Wetland
Chicago Ave Ditch
Government Canal
Existing Wetland
Fana West
The Outlet Collection
Fana
Auburn Environmental Park
167
18
17-62
17-45
17-10
17-07
17-70
17-12
17-06
17-66
17-13
17-06
17-08
17-04
17-68
Private
Safeway
Boeing Auburn Property
Prologis
YMCA
JA
GSA
Unincorporated King County

Notes

1. All concentrations shown in µg/L.
2. **Bold** = detection
   ND = Not detected at the reporting limit
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Staff Gauge
- Previous Surface Water Sample
- July 2013 Surface Water Sample
- TCE Contour = > 5.0 µg/L
- TCE Contour = > 2.4 µg/L
- TCE Contour = ≥ 0.5 µg/L
- Wetland Areas
- Open Waterways
- Piped Waterways
- Boeing Property
- City Limits

N

0 1,000 2,000

Scale in Feet

Base map source: Geometrix 2003; Aerial Photo Source: Esri World Imagery; Parcel Data Source: King County GIS 2013

G:\Projects\025\164\110\101\Technical Memorandum\Figure_4_TCE_SZ.mxd 6/19/2014 NAD 1983 StatePlane Washington North FIPS 4601 Feet

LANDAU ASSOCIATES

Boeing Auburn
Auburn, Washington

Surface Water TCE Detections and June 2013 Shallow Zone TCE Groundwater Concentrations

Figure 4

SW-5	9/20/2012
cis-1,2-DCE	ND

SW-15	7/2/2013
cis-1,2-DCE	ND

SW-9	6/19/2012
cis-1,2-DCE	ND

SW-17	7/2/2013
cis-1,2-DCE	**0.2**

SW-2	6/19/2012
cis-1,2-DCE	ND

SW-16	7/2/2013
cis-1,2-DCE	**1.5**

SW-14	7/2/2013
cis-1,2-DCE	**0.8**

SW-18	7/2/2013
cis-1,2-DCE	ND

SW-CD1	9/17/2012
cis-1,2-DCE	**1.1**

SW-11	6/19/2012
cis-1,2-DCE	**0.5**

SW-4/ SW-CD4	6/20/2012	9/17/2012
cis-1,2-DCE	**1.4**	**1.5**

SW-10	6/19/2012
cis-1,2-DCE	ND

SW-8	6/19/2012
cis-1,2-DCE	ND

SW-7	6/19/2012
cis-1,2-DCE	ND

SW-6	9/20/2012
cis-1,2-DCE	ND

SW-CD3	9/17/2012
cis-1,2-DCE	ND

SW-CD2	9/17/2012
cis-1,2-DCE	ND

SW-12	7/2/2013
cis-1,2-DCE	ND

SW-1	6/19/2012
cis-1,2-DCE	ND

SW-3	9/20/2012
cis-1,2-DCE	ND

City of Pacific
City of Algona
City of Algona
City of Auburn
Auburn 400 South Pond
Auburn 400 North Pond
SWSG-1
East Branch of Mill Creek
Mill Creek
Coastal Farm and Ranch
The Outlet Collection Stormwater Ponds
Chicago Ave Ditch
O Street Wetland
Government Canal
Existing Wetland
Fana West
Fana
The Outlet Collection
5 µg/L
2.4 µg/L
0.5 µg/L
167
18
Auburn Environmental Park
Mill Creek
17-62
17-45
17-10
17-07
17-70
17-12
17-66
17-06
17-08
17-04
17-68
Private
Safeway
Prologis
YMCA
GSA
Boeing Auburn Property
Unincorporated King County

Notes

1. All concentrations shown in µg/L.
2. **Bold** = detection
   ND = Not detected at the reporting limit
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Staff Gauge
- Previous Surface Water Sample
- July 2013 Surface Water Sample
- cis-1,2-DCE Contour = > 5.0 µg/L
- cis-1,2-DCE Contour = > 2.4 µg/L
- cis-1,2-DCE Contour = ≥ 0.5 µg/L
- Wetland Areas
- Open Waterways
- Piped Waterways
- Boeing Property
- City Limits

N

0 1,000 2,000

Scale in Feet

Base map source: Geometrix 2003; Aerial Photo Source: Esri World Imagery; Parcel Data Source: King County GIS 2013

G:\Projects\025\164\110\101\Technical Memorandum\Figure_5_DCE_SZ.mxd 6/19/2014 NAD 1983 StatePlane Washington North FIPS 4601 Feet

LANDAU ASSOCIATES

Boeing Auburn Auburn, Washington	**Surface Water cis-1,2-DCE Detections and June 2013 Shallow Zone cis-1,2-DCE Groundwater Concentrations**	Figure 5

SW-5	9/20/2012
VC	ND

SW-14	7/2/2013
VC	**0.12**

SW-16	7/2/2013
VC	**0.31**

SW-CD2	9/17/2012
VC	**0.056**

SW-6	9/20/2012
VC	ND

SW-CD3	9/17/2012
VC	ND

SW-4/ SW-CD4	6/20/2012	9/17/2012
VC	**0.3**	**0.14**

SW-CD1	9/17/2012
VC	**0.059**

SW-15	7/2/2013
VC	ND

SW-9	6/19/2012
VC	ND

SW-17	7/2/2013
VC	**0.063**

SW-2	6/19/2012
VC	ND

SW-18	7/2/2013
VC	ND

SW-10	6/19/2012
VC	ND

SW-11	6/19/2012
VC	**0.087**

SW-8	6/19/2012
VC	ND

SW-7	6/19/2012
VC	ND

SW-12	7/2/2013
VC	ND

SW-1	6/19/2012
VC	ND

SW-3	9/20/2012
VC	ND

City of Pacific
City of Algona
City of Algona
City of Auburn
Auburn 400 South Pond
Auburn 400 North Pond
SWSG-1
East Branch of Mill Creek
Mill Creek
Mill Creek
Coastal Farm and Ranch
The Outlet Collection Stormwater Ponds
Chicago Ave Ditch
O Street Wetland
Government Canal
Existing Wetland
Pana West
Pana
The Outlet Collection
2.4 µg/L
0.5 µg/L
2.4 µg/L
0.5 µg/L
167
18
Auburn Environmental Park
17-06
17-07
17-70
17-10
17-12
17-45
17-62
17-66
17-13
17-06
17-08
17-04
17-68
Private
Safeway
Boeing Auburn Property
Prologis
YMCA
GSA
Unincorporated King County

Notes

1. All concentrations shown in µg/L.
2. **Bold** = detection
   ND = Not detected at the reporting limit
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Staff Gauge
- Previous Surface Water Sample
- July 2013 Surface Water Sample
- Vinyl Chloride Contour = > 5.0 µg/L
- Vinyl Chloride Contour = > 2.4 µg/L
- Vinyl Chloride Contour = ≥ 0.5 µg/L
- Wetland Areas
- Open Waterways
- Piped Waterways
- Boeing Property
- City Limits

N

0 1,000 2,000

Scale in Feet

Base map source: Geometrix 2003; Aerial Photo Source: Esri World Imagery; Parcel Data Source: King County GIS 2013

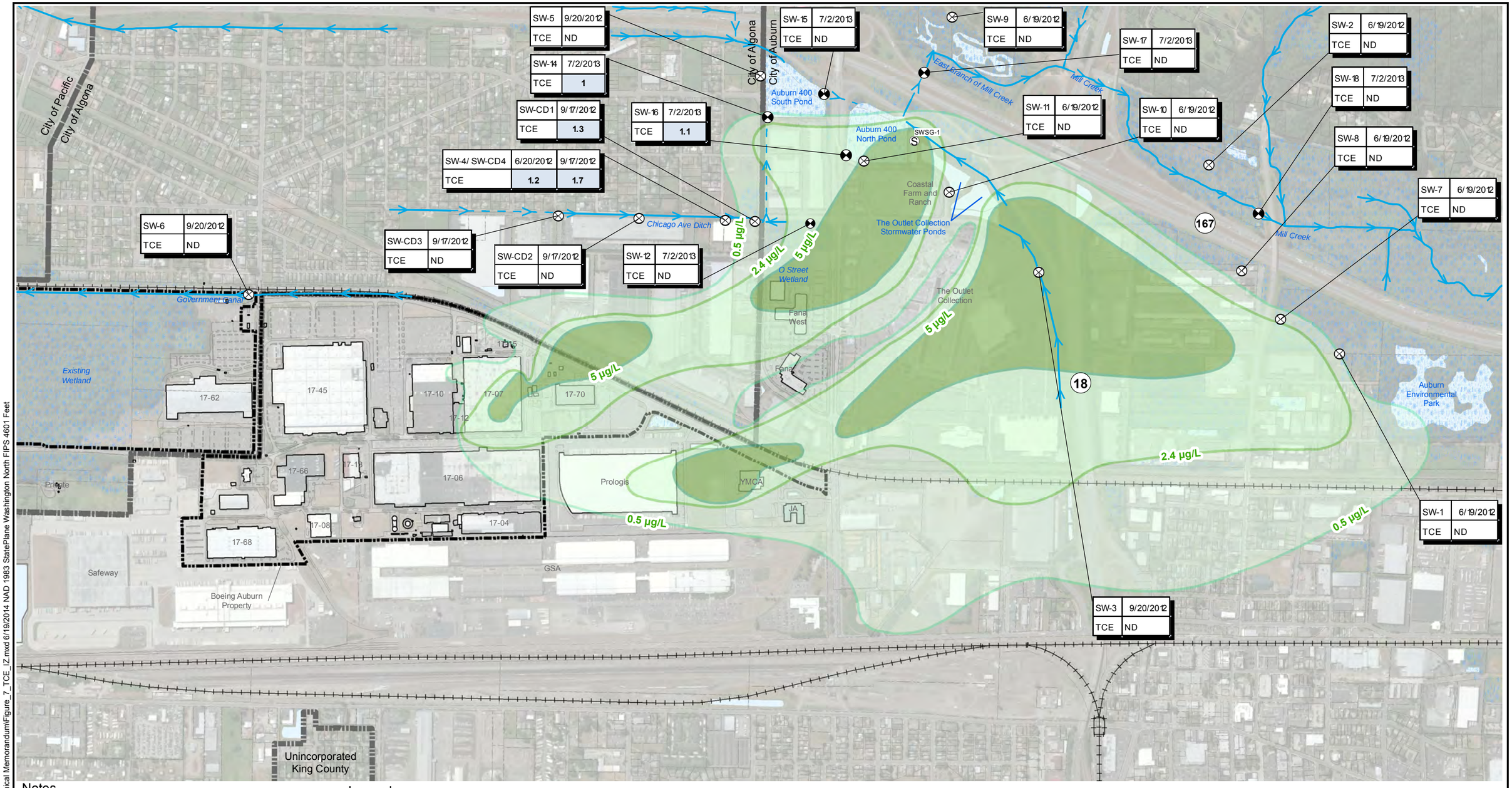
G:\Projects\025\164\110\101\Technical Memorandum\Figure_6_VC_SZ.mxd 6/19/2014 NAD 1983 StatePlane Washington North FIPS 4601 Feet

LANDAU ASSOCIATES

Boeing Auburn
Auburn, Washington

Surface Water Vinyl Chloride Detections and June 2013 Shallow Zone Vinyl Chloride Groundwater Concentrations

Figure
6



Notes

1. All concentrations shown in µg/L.
2. **Bold** = detection
   ND = Not detected at the reporting limit
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Staff Gauge
- Previous Surface Water Sample
- July 2013 Surface Water Sample
- TCE Contour = > 5.0 µg/L
- TCE Contour = > 2.4 µg/L
- TCE Contour = ≥ 0.5 µg/L
- Wetland Areas
- Open Waterways
- Piped Waterways
- Boeing Property
- City Limits

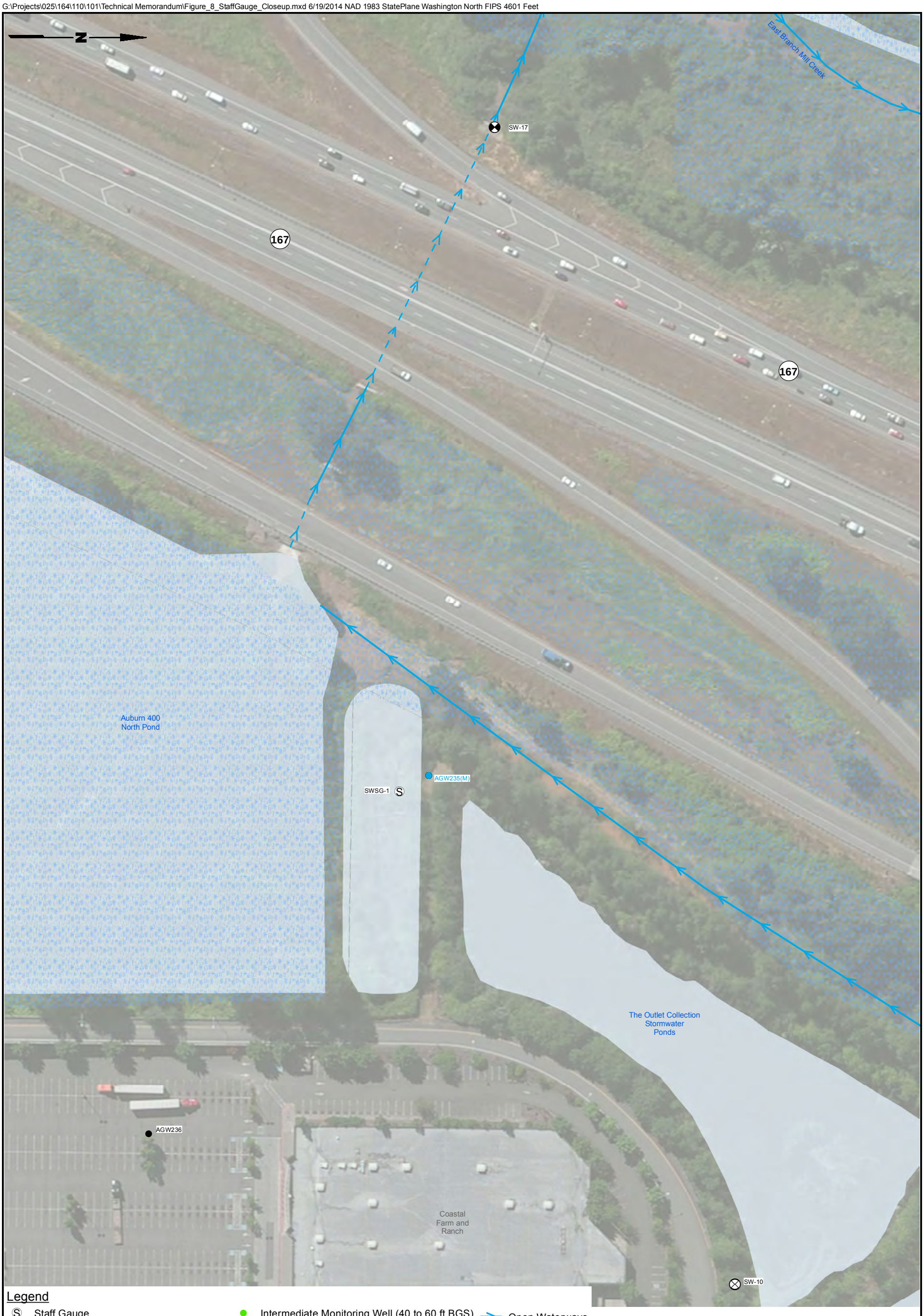
Base map source: Geometrix 2003; Aerial Photo Source: Esri World Imagery; Parcel Data Source: King County GIS 2013

LANDAU ASSOCIATES

Boeing Auburn Auburn, Washington	**Surface Water TCE Detections and June 2013 Intermediate Zone TCE Groundwater Concentrations**	Figure 7

G:\Projects\025\164\110\101\Technical Memorandum\Figure_7_TCE_IZ.mxd 6/19/2014 NAD 1983 StatePlane Washington North FIPS 4601 Feet

G:\Projects\025\164\110\101\Technical Memorandum\Figure_8_StaffGauge_Closeup.mxd 6/19/2014 NAD 1983 StatePlane Washington North FIPS 4601 Feet



Legend

- Staff Gauge
- Previous Surface Water Sample
- July 2013 Surface Water Sample
- Shallow Monitoring Well (10 to 30 ft BGS) (Unless Otherwise Indicated)
- Intermediate Monitoring Well (40 to 60 ft BGS)
- Deep Monitoring Well (80 to 100 ft BGS)
- Multi-Level Well
- Wetland Areas
- Water Bodies
- Open Waterways
- Piped Waterways

0 100 200

Scale in Feet

Base map source: Geometrix 2003; Aerial Photo Source: ESRI World Imagery
Parcel Data Source: King County GIS 2012

Notes

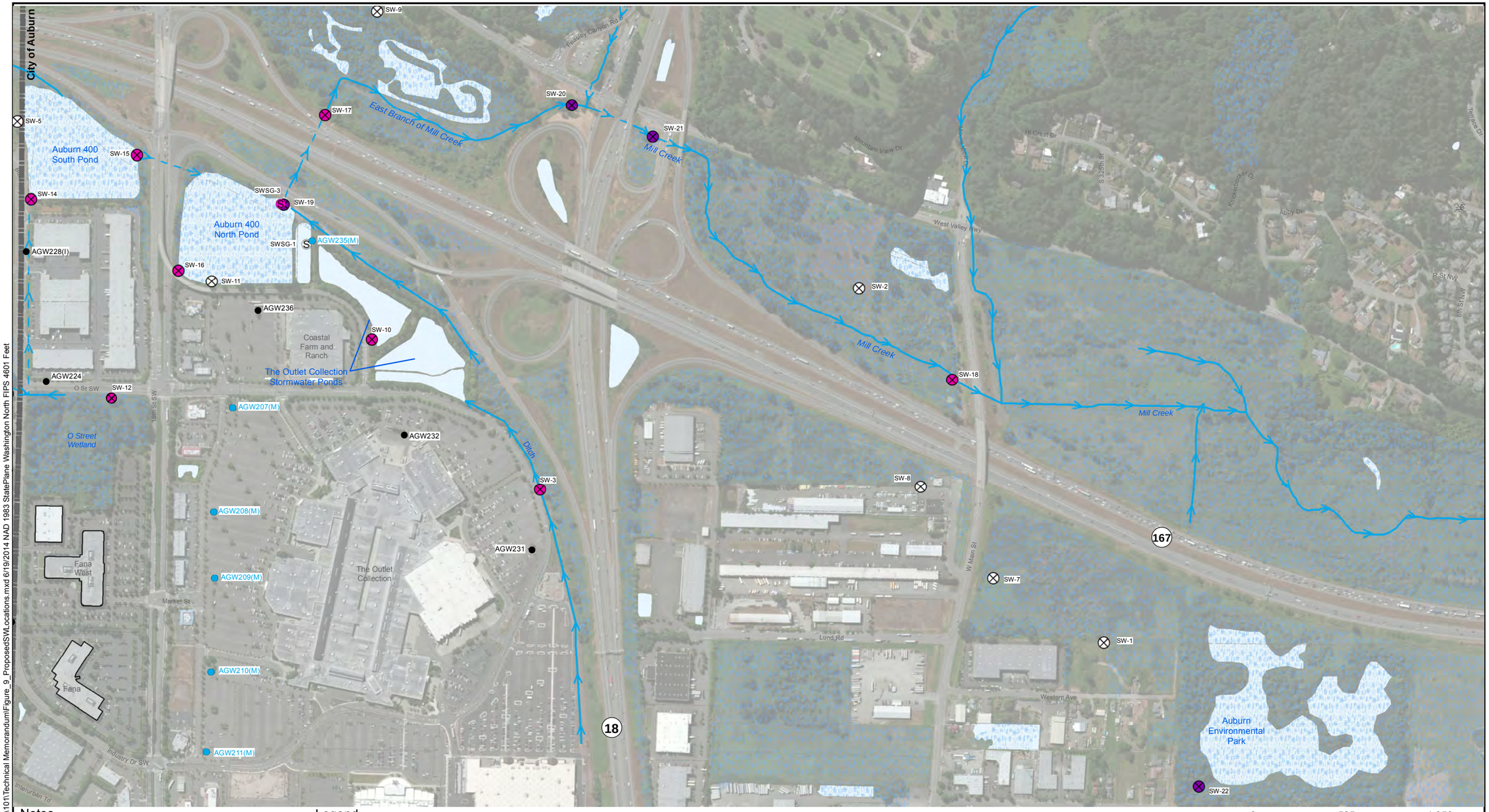
1. The locations of surface water features are approximate.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

LANDAU ASSOCIATES

Boeing Auburn
Auburn, Washington

Staff Gauge and Adjacent Well Locations

Figure 8



G:\Projects\025\164\110\101\Technical Memorandum\Figure_9_ProposedSWLocations.mxd 6/19/2014 NAD 1983 StatePlane Washington North FIPS 4601 Feet

Notes

1. Proposed surface water samples include some existing locations.
2. The location of surface water features are approximate.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend

- Existing Staff Gauge
- Proposed Staff Gauge
- Previous Surface Water Sample
- Proposed Surface Water Resample
- Proposed Surface Water Sample
- Shallow Monitoring Well (2 to 30 ft BGS)
- Multi-Level Well
- Open Waterways
- Piped Waterways
- Wetland Areas
- Water Bodies

N

0 525 1,050

Scale in Feet

Base map source: Geometrix 2003; Aerial Photo Source: ESRI World Imagery; Parcel Data Source: King County GIS 2012

LANDAU ASSOCIATES

Boeing Auburn
Auburn, Washington

Proposed Staff Gauge and Surface Water Sampling Locations in Auburn

Figure 9

TABLE 1
2013 SURFACE WATER SAMPLING EVENT RESULTS
BOEING AUBURN
AUBURN, WASHINGTON

Sample ID:	SW-12	SW-14	SW-15	SW-16	SW-17	Dup of SW-17 SW-900	SW-18	
SDG:	1401613	1401613	1401613	1401613	1401613	1401613	1401613	
Lab ID:	7116689	7116691	7116690	7116688	7116685	7116687	7116686	Screening levels
Sample Date:	07/02/2013	07/02/2013	07/02/2013	07/02/2013	07/02/2013	07/02/2013	07/02/2013	
VOLATILES (µg/L) Method SW8260C								
cis-1,2-Dichloroethene	0.4 U	**0.8**	0.2 U	**1.5**	**0.2**	**0.2**	0.2 U	16
Toluene	**1.9**	0.2 U	**0.8**	**0.2**	**1.0**	**1.0**	**0.4**	
Trichloroethene	0.4 U	**1.0**	0.2 U	**1.1**	0.2 U	0.2 U	0.2 U	2.5
Vinyl Chloride	0.4 U	0.2 U	0.2 U	**0.3**	0.2 U	0.2 U	0.2 U	0.025
VOLATILES (µg/L) Method 8260C SIM								
Vinyl Chloride	0.020 U	**0.12**	0.020 U	**0.31**	**0.063**	**0.068**	0.020 U	0.025

Bold = Detected compound.
U = Indicates the compound was undetected at the reported concentration.
µg/L = micrograms per liter

TABLE 2
STAFF GAUGE AND ADJACENT WELL WATER ELEVATION DATA
BOEING AUBURN
AUBURN, WASHINGTON

	SWSG-1	AGW235-1	AGW235-2	AGW235-4	AGW236
WATER ELEVATION (ft)					
6/21/2013	67.69	66.97	66.85	67.59	N/A
7/19/2013	67.52	66.73	66.6	67.24	67.71
8/19/2013	67.44	66.58	66.3	66.84	67.29

TABLE 3
SURFACE WATER SAMPLING MATRIX - AUBURN LOCATIONS
BOEING AUBURN
AUBURN, WASHINGTON

Surface Water Body	Sample ID	Sample Location Description	Schedule			
			1Q2014	2Q2014	3Q2014	4Q2014
Ditch north of The Outlet Collection stormwater ponds	SW-3	In ditch north of The Outlet Collection.	X			
The Outlet Collection stormwater ponds	SW-10	In the northeast corner of The Outlet Collection southern stormwater pond.	X			
O Street Wetland	SW-12	Within wetland where access allows and adequate surface water is present.	X			
Auburn 400 south pond	SW-14	Stormwater inlet structure discharge pipe located at southeast corner of pond.	X		X	
	SW-15	Stormwater outlet culvert located at northwest corner of pond.	X		X	
Auburn 400 north pond	SW-16	Near previous SW-11 along southeastern edge of pond where access allows.	X		X	
	SW-19	Stormwater outlet culvert from the Auburn 400 north pond where water passes beneath the on ramp for SR 167.	X		X	
East branch of Mill Creek	SW-17	Stormwater inlet culvert to the east branch of Mill Creek on the west side of SR 167, where drainage from the Auburn 400 north pond becomes the east branch of Mill Creek.	X		X	
	SW-20	Before the east branch of Mill Creek passes connects with Mill Creek just south of the intersection of Peasley Canyon Road South with the West Valley Highway near SR 18.	X		X	
Mill Creek	SW-21	After Mill Creek passes under SR 18 near the West Valley Highway where access allows.	X		X	
	SW-18	Channelized portion of Mill Creek where it passes beneath West Main Street via a box culvert.	X		X	
Auburn Environmental Park	SW-22	At the southeast edge of the open water area northwest of AGW217 where access allows.	X			

SW = surface water
Field parameters pH, conductivity, dissolved oxygen , temperature, and oxidation-reduction potential will be collected at all sample locations.
All surface water samples will be analyzed by U.S. Environmental Protection Agency Method 8260 (standard Boeing volaitle organic compound list) and 8260 selected ion method (for vinyl chloride only).

ATTACHMENT 1

Response to Ecology Comment Memorandum

DRAFT
MEMORANDUM

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

TO: Robin Harrover, Washington State Department of Ecology

FROM: Jennifer Wynkoop

DATE: August 22, 2013

RE: RESPONSE TO ECOLOGY COMMENT LETTER
SURFACE WATER WORK PLAN, SECOND ADDENDUM
BOEING AUBURN FACILITY
AUBURN, WASHINGTON

INTRODUCTION

On January 23, 2013, The Boeing Company (Boeing) submitted a *Second Addendum to the Surface Water Work Plan* (Landau Associates 2013) to Washington State Department of Ecology (Ecology) regarding surface water investigations. These surface water investigations are being conducted as part of the remedial investigation activities near the Boeing Auburn Fabrication Division facility. Boeing received conditional approval to this addendum on July 1, 2013 (Ecology 2013) that included comments from both Ecology and the City of Auburn[1]. The following is Boeing's response to comments from Ecology and the City of Auburn.

ECOLOGY COMMENTS

1. **Ecology Comment:** In concurrence with the comments provided by the City of Auburn, Ecology requests that all surface water stations are sampled more than once to verify chemical concentrations under different seasonal conditions. The Boeing Company (Boeing), the City of Auburn (Auburn) and Ecology can jointly determine the number of stations and the number of sampling events after the field work for this work plan is finished (reference page 1-3, section 1.3., Surface Water Quality Characterization).

   Boeing Response: Boeing agrees that surface water stations will need to be sampled more than once. Boeing will present the results of the July surface water sampling in the *July 2013 Surface Water Investigation Technical Memorandum.* Boeing will discuss these results with Ecology and the City of Auburn to determine the number and timing of additional sampling events. Boeing recommends one additional sampling event in the dry season and one sampling event in the wet season after a period of no rain for 48 hours. These sampling events are recommended in order to determine the maximum levels of volatile organic compounds (VOCs) in the surface water. These maximum levels are most likely to occur during dry periods when there is limited dilution for stormwater runoff.

2. **Ecology Comment:** Installation of barologger is included for both the surface water station and well, which implies that the transducers to be used in the study are not pressure

[1] Initial conditional approval and comments from the City of Auburn were provided via email on May 16, 2013 (Fujita, H. 2013).

compensated. Use of pressure compensated transducers is generally recommended because its use can largely eliminate the need for correction of the data. The transducers and data correction process should be clearly identified before the program is implemented. The Data Logger used needs to be vented for atmospheric pressure compensation (reference page 2-2, section 2.3. Surface Water and Data Logger station, pages 2-3 and 2-4).

Boeing Response: Boeing understands Ecology's concern as datalogger operation can be complicated. Boeing has been using dataloggers in conjunction with a barrologger in wells at the site for a number of years and has a good understanding of the requirements for a properly functioning datalogger. Boeing intends to continue following the existing datalogger procedure which does include use of a barrologger for atmospheric pressure compensation. Periodic water level measurements are also collected with a handheld electronic water level and used to verify that the datalogger is operating correctly.

3. **Ecology Comment:** Ecology incorporates, by reference, Auburn's 4/19/2013 comments into the second addendum workplan. Ecology understands Boeing is in the process of working through the comments provided by Auburn. Boeing is to submit to Ecology a document summarizing the incorporation of Auburn's comments. For all Auburn comments that were not included in the work plan, Boeing will provide a justification for the change. Include in the justification how Auburn and Boeing jointly agreed to omit comments.

   Boeing Response: Please see responses to City of Auburn comments below.

4. **Ecology Comment:** Ecology has **not** received confirmation from the City of Algona (Algona) for the installation of the data logger in the Chicago Avenue Ditch. Boeing is not to proceed with any of the fieldwork for this work plan in Algona until Boeing receives access verification from Ecology.

   Boeing Response: City of Algona fieldwork has been deferred until Boeing receives approval.

5. **Ecology Comment:** The value for the TCE (b) Screening Levels (page 1-2) needs to be consistent with the indoor air screening level that is going to be used if different from the 1.6 (ug/L) shown in the work plan.

   Boeing Response: Boeing is currently planning on using 1.6 micrograms per liter (µg/L). This value will be adjusted as appropriate if indoor air screening levels change.

CITY OF AUBURN COMMENTS

1. **City of Auburn Comment:** Additional surface water sampling locations need to be added to the plan for the following locations:

   a. The stormwater pond at the YMCA property. Because this property is used regularly by families with children, it serves as one of the properties in the Auburn portion of the plume area with the greatest potential for children to be exposed if TCE is present in surface water at this location. While a storm pond also exists at the Junior Achievement site, we believe at this time that because the YMCA property is closer to the suspected source of the plume, it will exhibit the greater a concentration of TCE if present.

Therefore sampling here will serve to provide information that is most conservative in representing the potential level of human exposure at both sites.

b. The drainage ditch along the Interurban Trail between 15th Street SW and West Main Street. Because City of Auburn vegetation maintenance crews maintain this surface water conveyance feature regularly, this drainage offers a high potential for worker exposure if TCE is present in surface water at this location.

c. At the southeast edge of the open water area in the Auburn Environmental Park located northwest of existing Monitoring Well No. AGW 217. Based on December 2012 sampling results provided by Boeing, this location approximates the current known northernmost extent of the TCE groundwater plume. While the plume extent in this area is associated with intermediate depth aquifer monitoring, there is little shallow aquifer information in this area. This location if a federally-permitted wetland mitigation site that has been the object of significant federal, City, and private sector investment, and in recent year has seen the successful establishment of many species of native aquatic plants and animals, including the establishment of an active Great Blue Heron nesting area. Sampling at this location will help to understand whether there is any interchange between contaminated groundwater and surface water in this area.

Boeing Response: Boeing discussed the stormwater pond at the YMCA and the drainage ditch along the Interurban Trail with City of Auburn representatives on June 12, 2013. It was agreed that these two locations were not necessary for surface water sampling (see explanation below). The decision about sampling at the open water area in the Auburn Environmental Park was not finalized at the initial July sampling event. This location is proposed as an additional sampling point in the recommendations section of the *July 2013 Surface Water Investigation Technical Memorandum*.

a. The stormwater pond at the YMCA property: There is at least 6 feet (ft) of separation between the bottom of the pond and the shallow groundwater table based on the as-built drawings of the pond and historical groundwater elevations recorded at nearby wells. The pond is at elevation 80 ft and the maximum groundwater elevation at wells located in the vicinity (AGW 064, 069, 136, 137, and 138) is at elevation 73.97 ft. Therefore, it doesn't appear that contaminated groundwater is entering the pond.

b. The drainage ditch along the Interurban Trail: The shallow groundwater VOC plume does not extend north of 15th Street Southwest (SW) in the vicinity of the Interurban Trail. The ditch segment suggested for sampling is north of 15th Street SW between 15th Street SW and West Main Street. Since the shallow groundwater VOC plume is not present in this area, VOC-contaminated groundwater would not be entering the ditch.

c. Open water area in the Auburn Environmental Park: The Auburn Environmental Park is outside the furthest extent of the shallow groundwater VOC plume from the Boeing Facility. VOCs related to the plume are not expected to be present in surface water where they are not present in shallow groundwater. Additionally, surface water samples collected from the Auburn Environmental Park South of the open water area did not detect VOCs related to the Boeing plume. The City of Auburn expressed concern over the intermediate zone groundwater plume and whether an upward gradient could pull VOCs into the surface water. While this scenario is unlikely, given that VOCs are not detected in shallow groundwater at the

Auburn Environmental Park, Boeing has agreed to sample this location. This sample is proposed in the recommendation section of the July *2013 Surface Water Investigation Technical Memorandum.*

2. **City of Auburn Comment:** We feel strongly that all surface water sample sites should be sampled more than one time, and suggest that at a minimum each site should be sampled at least twice during the wet season and once during the dry season. Groundwater, surface water, and the interactions between the two exhibit pronounced seasonal fluctuation in this area of the City. A single sample once during the year from these locations will not provide sufficient information about the presence or movement of TCE in surface water as hydrologic conditions change during the course of the year.

   Boeing Response: See response to Ecology's comment #1.

3. **City of Auburn Comment:** We request additional information regarding the planned sampling schedule for the monitoring wells shown as "New Approved" wells on Figure 3 of the sampling plan. To date, we are not aware of receiving any information regarding when these wells will be installed, or what the frequency of monitoring the wells will be.

   Boeing Response: In May 2013, Boeing initiated biweekly conference calls with the City of Auburn. The new wells and the installation schedule have since been discussed with the City of Auburn during the conference calls. All new wells will initially be sampled quarterly.

4. **City of Auburn Comment:** The surface water sampling plan identifies the Mill Creek sampling location designated as SW-17 as owned by the City of Auburn. Please be advised that the culvert inlet/discharge at this location is located in WSDOT right-of-way, and is not owned or controlled by the City.

   Boeing Response: Comment noted.

This response is intended to acknowledge concerns and requests made by Ecology and the City of Auburn, and to present Boeing's attempt to address requests and comments.

LANDAU ASSOCIATES, INC.

Jennifer W. Wynkoop
Senior Scientist

JWW/SEF/jrc

REFERENCES

Ecology. 2013. Letter: *Ecology Contingent Approval of the Surface Water Investigation Work Plan Second Addendum, Boeing Auburn Facility, dated January 23, 2013, WAD04133130, State FS ID: 2018.* From Robin Harrover, Washington State Department of Ecology to James Bet, The Boeing Company. July 1.

Fujita, H. 2013. Email message from Hideo Fujita, Hazardous Waste Program, Washington State Department of Ecology, to James Bet, The Boeing Company, and Robin Harrover, Washington State Department of Ecology. Re: *SW Sampling 2nd Addendum*. May 16.

Landau Associates, 2013. *Surface Water Investigation Work Plan, Second Addendum, Boeing Auburn Facility, Auburn, Washington.* Prepared for the Boeing Company. January 23.

cc: James Bet, The Boeing Company (email only)
James Swortz, The Boeing Company

ATTACHMENT 2

Analytical Tables and Laboratory Data Package

TABLE 1
SURFACE WATER SAMPLING EVENT RESULTS
3rd QUARTER 2013
BOEING AUBURN

Sample ID:	SW-12	SW-14	SW-15	SW-16	SW-17	Dup of SW-17 SW-900	SW-18
SDG:	1401613	1401613	1401613	1401613	1401613	1401613	1401613
Lab ID:	7116689	7116691	7116690	7116688	7116685	7116687	7116686
Sample Date:	07/02/2013	07/02/2013	07/02/2013	07/02/2013	07/02/2013	07/02/2013	07/02/2013
VOLATILES (µg/L)							
Method SW8260C							
Acetone	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	0.4 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromodichloromethane	1.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromoform	1.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromomethane	1.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Butanone	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon Disulfide	1.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon Tetrachloride	0.4 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chlorobenzene	1.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroethane	1.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	0.4 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chloromethane	1.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	1.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethane	1.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethane	0.4 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1-Dichloroethene	0.4 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
cis-1,2-Dichloroethene	0.4 U	**0.8**	0.2 U	**1.5**	**0.2**	**0.2**	0.2 U
trans-1,2-Dichloroethene	0.4 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dichloropropane	1.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	0.4 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
trans-1,3-Dichloropropene	0.4 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Ethylbenzene	1.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
2-Hexanone	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-Pentanone (MIBK)	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methylene Chloride	1.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	1.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-Tetrachloroethane	0.4 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Tetrachloroethene	0.4 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Toluene	**1.9**	0.2 U	**0.8**	**0.2**	**1.0**	**1.0**	**0.4**
1,1,2-Trichloro-1,2,2-trifluoroethane	1.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane	1.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	0.4 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Trichloroethene	0.4 U	**1.0**	0.2 U	**1.1**	0.2 U	0.2 U	0.2 U
Trichlorofluoromethane	1.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl Acetate	1.0 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
Vinyl Chloride	0.4 U	0.2 U	0.2 U	**0.3**	0.2 U	0.2 U	0.2 U
m,p-Xylene	1.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
o-Xylene	1.0 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
VOLATILES (µg/L)							
Method 8260C SIM							
Vinyl Chloride	0.020 U	**0.12**	0.020 U	**0.31**	**0.063**	**0.068**	0.020 U

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

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

Bold = Detected compound.

TABLE 2
FIELD PARAMETERS
SURFACE WATER SAMPLING
BOEING AUBURN
AUBURN, WASHINGTON

Sample ID:	SW-12	SW-14	SW-15	SW-16	SW-17	SW-18
Sample Date:	07/02/2013	07/02/2013	07/02/2013	07/02/2013	07/02/2013	07/02/2013
FIELD PARAMETERS						
Temperature (°C)	18.74	16.72	19.7	15.99	17.6	20.65
Conductivity (µS/cm)	287	234	252	279	206	197
Dissolved Oxygen (mg/L)	0.41	1.13	0.42	0.49	0.3	0.42
pH	6.53	6.41	6.34	6.23	6.43	6.55
ORP (mV)	91.8	n/a	n/a	100.6	33.25	6.6

°C = degrees celsius
mg/L = milligrams per liter
mV = miilivolt
SW = surface water
µS/cm = microSiemens per centimeter

ANALYTICAL RESULTS

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

The Boeing Company
PO Box 3707 MC 9U4-26
Seattle WA 98124

July 15, 2013

Project: Boeing Auburn

Submittal Date: 07/03/2013
Group Number: 1401613
State of Sample Origin: WA

Client Sample Description	Lancaster Labs (LL) #
SW-17-20130702 NA Water	7116685
SW-18-20130702 NA Water	7116686
SW-900-20130702 NA Water	7116687
SW-16-20130702 NA Water	7116688
SW-12-20130702 NA Water	7116689
SW-15-20130702 NA Water	7116690
SW-14-20130702 NA Water	7116691
Trip Blank NA Water	7116692

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Landau Associates	Attn: Anne Halvorsen
ELECTRONIC COPY TO	Landau Associates	Attn: Terry McGourty
ELECTRONIC COPY TO	The Boeing Company	Attn: Jim Bet
ELECTRONIC COPY TO	Landau Associates	Attn: Jennifer Wynkoop
ELECTRONIC COPY TO	Landau	Attn: Eric Weber
ELECTRONIC COPY TO	Landau Associates	Attn: Sarah Weeks
ELECTRONIC COPY TO	Landau Associates	Attn: Sarah Fees

Respectfully Submitted,

Kay Hower
Principal Specialist Group Leader

(510) 232-8894

Project Name: Boeing Auburn
LLI Group #: 1401613

General Comments:

See the Laboratory Sample Analysis Record section of the Analysis Report for the method references.

All QC met criteria unless otherwise noted in an Analysis Specific Comment below. Refer to the QC Summary for specific values and acceptance criteria.

Project specific QC samples are not included in this data set

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Surrogate recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in an Analysis Specific Comment below.

The samples were received at the appropriate temperature and in accordance with the chain of custody unless otherwise noted.

Analysis Specific Comments:

SW-846 8260C, GC/MS Volatiles

Sample #s: 7116685, 7116686, 7116687, 7116688, 7116690, 7116691, 7116692

The referenced method allows a maximum of 20% of the analytes in the calibration to exceed the 20% Drift continuing calibration verification criteria. The Analyte(s) exceeding 20% Drift is not detected in this sample.
The affected analyte(s) and response(s) are:

Analyte	Response (%Drift)
vinyl acetate	-25%

Sample #s: 7116689

The referenced method allows a maximum of 20% of the analytes in the calibration to exceed the 20% Drift continuing calibration verification criteria. The Analyte(s) exceeding 20% Drift is not detected in this sample.
The affected analyte(s) and response(s) are:

Analyte	Response (%Drift)
vinyl acetate	-25%

Reporting limits were raised due to sample foaming.

SW-846 8260C SIM, GC/MS Volatiles

Sample #s: 7116689

Reporting limits were raised due to sample foaming.

Sample Description: SW-17-20130702 NA Water
Boeing Auburn

LL Sample # WW 7116685
LL Group # 1401613
Account # 13419

Project Name: Boeing Auburn

Collected: 07/02/2013 12:09 by SMM

Submitted: 07/03/2013 09:25
Reported: 07/15/2013 16:12

The Boeing Company
PO Box 3707 MC 9U4-26
Seattle WA 98124

AUB17

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260C**		**ug/l**		**ug/l**	
11996	Acetone	67-64-1	5.0	U	5.0	1
11996	Benzene	71-43-2	0.2	U	0.2	1
11996	Bromodichloromethane	75-27-4	0.5	U	0.5	1
11996	Bromoform	75-25-2	0.5	U	0.5	1
11996	Bromomethane	74-83-9	0.5	U	0.5	1
11996	2-Butanone	78-93-3	5.0	U	5.0	1
11996	Carbon Disulfide	75-15-0	0.5	U	0.5	1
11996	Carbon Tetrachloride	56-23-5	0.2	U	0.2	1
11996	Chlorobenzene	108-90-7	0.5	U	0.5	1
11996	Chloroethane	75-00-3	0.5	U	0.5	1
11996	Chloroform	67-66-3	0.2	U	0.2	1
11996	Chloromethane	74-87-3	0.5	U	0.5	1
11996	Dibromochloromethane	124-48-1	0.5	U	0.5	1
11996	1,1-Dichloroethane	75-34-3	0.5	U	0.5	1
11996	1,2-Dichloroethane	107-06-2	0.2	U	0.2	1
11996	1,1-Dichloroethene	75-35-4	0.2	U	0.2	1
11996	**cis-1,2-Dichloroethene**	156-59-2	**0.2**		0.2	1
11996	trans-1,2-Dichloroethene	156-60-5	0.2	U	0.2	1
11996	1,2-Dichloropropane	78-87-5	0.5	U	0.5	1
11996	cis-1,3-Dichloropropene	10061-01-5	0.2	U	0.2	1
11996	trans-1,3-Dichloropropene	10061-02-6	0.2	U	0.2	1
11996	Ethylbenzene	100-41-4	0.5	U	0.5	1
11996	2-Hexanone	591-78-6	5.0	U	5.0	1
11996	4-Methyl-2-pentanone	108-10-1	5.0	U	5.0	1
11996	Methylene Chloride	75-09-2	0.5	U	0.5	1
11996	Styrene	100-42-5	0.5	U	0.5	1
11996	1,1,2,2-Tetrachloroethane	79-34-5	0.2	U	0.2	1
11996	Tetrachloroethene	127-18-4	0.2	U	0.2	1
11996	**Toluene**	108-88-3	**1**		0.2	1
11996	112Trichloro122Trifluoroethane	76-13-1	0.5	U	0.5	1
11996	1,1,1-Trichloroethane	71-55-6	0.5	U	0.5	1
11996	1,1,2-Trichloroethane	79-00-5	0.2	U	0.2	1
11996	Trichloroethene	79-01-6	0.2	U	0.2	1
11996	Trichlorofluoromethane	75-69-4	0.5	U	0.5	1
11996	Vinyl Acetate	108-05-4	0.5	U	0.5	1
11996	Vinyl Chloride	75-01-4	0.2	U	0.2	1
11996	m+p-Xylene	179601-23-1	0.5	U	0.5	1
11996	o-Xylene	95-47-6	0.5	U	0.5	1

The referenced method allows a maximum of 20% of the analytes in the calibration to exceed the 20% Drift continuing calibration verification criteria. The Analyte(s) exceeding 20% Drift is not detected in this sample.
The affected analyte(s) and response(s) are:

Analyte	Response (%Drift)
vinyl acetate	-25%

GC/MS Volatiles	**SW-846 8260C SIM**		**ug/l**		**ug/l**	
12030	**Vinyl chloride**	75-01-4	**0.063**		0.020	1

Sample Description: SW-17-20130702 NA Water
Boeing Auburn

LL Sample # WW 7116685
LL Group # 1401613
Account # 13419

Project Name: Boeing Auburn

Collected: 07/02/2013 12:09 by SMM

Submitted: 07/03/2013 09:25
Reported: 07/15/2013 16:12

The Boeing Company
PO Box 3707 MC 9U4-26
Seattle WA 98124

AUB17

General Sample Comments

State of Washington Lab Certification No. C259

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11996	8260C Boeing 38	SW-846 8260C	1	H131891AA	07/08/2013 13:50	Jason M Long	1
12030	8260C SIM VC Only	SW-846 8260C SIM	1	E131892AA	07/08/2013 19:25	Jason M Long	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	H131891AA	07/08/2013 13:50	Jason M Long	1
01163	GC/MS VOA Water Prep	SW-846 5030B	2	E131892AA	07/08/2013 19:25	Jason M Long	1

Sample Description: SW-18-20130702 NA Water
Boeing Auburn

LL Sample # WW 7116686
LL Group # 1401613
Account # 13419

Project Name: Boeing Auburn

Collected: 07/02/2013 13:03 by SMM

Submitted: 07/03/2013 09:25
Reported: 07/15/2013 16:12

The Boeing Company
PO Box 3707 MC 9U4-26
Seattle WA 98124

AUB18

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260C**		**ug/l**		**ug/l**	
11996	Acetone	67-64-1	5.0	U	5.0	1
11996	Benzene	71-43-2	0.2	U	0.2	1
11996	Bromodichloromethane	75-27-4	0.5	U	0.5	1
11996	Bromoform	75-25-2	0.5	U	0.5	1
11996	Bromomethane	74-83-9	0.5	U	0.5	1
11996	2-Butanone	78-93-3	5.0	U	5.0	1
11996	Carbon Disulfide	75-15-0	0.5	U	0.5	1
11996	Carbon Tetrachloride	56-23-5	0.2	U	0.2	1
11996	Chlorobenzene	108-90-7	0.5	U	0.5	1
11996	Chloroethane	75-00-3	0.5	U	0.5	1
11996	Chloroform	67-66-3	0.2	U	0.2	1
11996	Chloromethane	74-87-3	0.5	U	0.5	1
11996	Dibromochloromethane	124-48-1	0.5	U	0.5	1
11996	1,1-Dichloroethane	75-34-3	0.5	U	0.5	1
11996	1,2-Dichloroethane	107-06-2	0.2	U	0.2	1
11996	1,1-Dichloroethene	75-35-4	0.2	U	0.2	1
11996	cis-1,2-Dichloroethene	156-59-2	0.2	U	0.2	1
11996	trans-1,2-Dichloroethene	156-60-5	0.2	U	0.2	1
11996	1,2-Dichloropropane	78-87-5	0.5	U	0.5	1
11996	cis-1,3-Dichloropropene	10061-01-5	0.2	U	0.2	1
11996	trans-1,3-Dichloropropene	10061-02-6	0.2	U	0.2	1
11996	Ethylbenzene	100-41-4	0.5	U	0.5	1
11996	2-Hexanone	591-78-6	5.0	U	5.0	1
11996	4-Methyl-2-pentanone	108-10-1	5.0	U	5.0	1
11996	Methylene Chloride	75-09-2	0.5	U	0.5	1
11996	Styrene	100-42-5	0.5	U	0.5	1
11996	1,1,2,2-Tetrachloroethane	79-34-5	0.2	U	0.2	1
11996	Tetrachloroethene	127-18-4	0.2	U	0.2	1
11996	**Toluene**	108-88-3	**0.4**		0.2	1
11996	112Trichloro122Trifluoroethane	76-13-1	0.5	U	0.5	1
11996	1,1,1-Trichloroethane	71-55-6	0.5	U	0.5	1
11996	1,1,2-Trichloroethane	79-00-5	0.2	U	0.2	1
11996	Trichloroethene	79-01-6	0.2	U	0.2	1
11996	Trichlorofluoromethane	75-69-4	0.5	U	0.5	1
11996	Vinyl Acetate	108-05-4	0.5	U	0.5	1
11996	Vinyl Chloride	75-01-4	0.2	U	0.2	1
11996	m+p-Xylene	179601-23-1	0.5	U	0.5	1
11996	o-Xylene	95-47-6	0.5	U	0.5	1

The referenced method allows a maximum of 20% of the analytes in the calibration to exceed the 20% Drift continuing calibration verification criteria. The Analyte(s) exceeding 20% Drift is not detected in this sample.
The affected analyte(s) and response(s) are:

Analyte	Response (%Drift)
vinyl acetate	-25%

GC/MS Volatiles	**SW-846 8260C SIM**		**ug/l**		**ug/l**	
12030	Vinyl chloride	75-01-4	0.020	U	0.020	1

Sample Description: SW-18-20130702 NA Water
Boeing Auburn

LL Sample # WW 7116686
LL Group # 1401613
Account # 13419

Project Name: Boeing Auburn

Collected: 07/02/2013 13:03 by SMM

Submitted: 07/03/2013 09:25
Reported: 07/15/2013 16:12

The Boeing Company
PO Box 3707 MC 9U4-26
Seattle WA 98124

AUB18

General Sample Comments

State of Washington Lab Certification No. C259

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11996	8260C Boeing 38	SW-846 8260C	1	H131891AA	07/08/2013 14:10	Jason M Long	1
12030	8260C SIM VC Only	SW-846 8260C SIM	1	E131892AA	07/08/2013 19:45	Jason M Long	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	H131891AA	07/08/2013 14:10	Jason M Long	1
01163	GC/MS VOA Water Prep	SW-846 5030B	2	E131892AA	07/08/2013 19:45	Jason M Long	1

Sample Description: SW-900-20130702 NA Water
Boeing Auburn

LL Sample # WW 7116687
LL Group # 1401613
Account # 13419

Project Name: Boeing Auburn

Collected: 07/02/2013 12:13 by SMM

Submitted: 07/03/2013 09:25
Reported: 07/15/2013 16:12

The Boeing Company
PO Box 3707 MC 9U4-26
Seattle WA 98124

AUB90

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260C**		**ug/l**		**ug/l**	
11996	Acetone	67-64-1	5.0	U	5.0	1
11996	Benzene	71-43-2	0.2	U	0.2	1
11996	Bromodichloromethane	75-27-4	0.5	U	0.5	1
11996	Bromoform	75-25-2	0.5	U	0.5	1
11996	Bromomethane	74-83-9	0.5	U	0.5	1
11996	2-Butanone	78-93-3	5.0	U	5.0	1
11996	Carbon Disulfide	75-15-0	0.5	U	0.5	1
11996	Carbon Tetrachloride	56-23-5	0.2	U	0.2	1
11996	Chlorobenzene	108-90-7	0.5	U	0.5	1
11996	Chloroethane	75-00-3	0.5	U	0.5	1
11996	Chloroform	67-66-3	0.2	U	0.2	1
11996	Chloromethane	74-87-3	0.5	U	0.5	1
11996	Dibromochloromethane	124-48-1	0.5	U	0.5	1
11996	1,1-Dichloroethane	75-34-3	0.5	U	0.5	1
11996	1,2-Dichloroethane	107-06-2	0.2	U	0.2	1
11996	1,1-Dichloroethene	75-35-4	0.2	U	0.2	1
11996	**cis-1,2-Dichloroethene**	156-59-2	**0.2**		0.2	1
11996	trans-1,2-Dichloroethene	156-60-5	0.2	U	0.2	1
11996	1,2-Dichloropropane	78-87-5	0.5	U	0.5	1
11996	cis-1,3-Dichloropropene	10061-01-5	0.2	U	0.2	1
11996	trans-1,3-Dichloropropene	10061-02-6	0.2	U	0.2	1
11996	Ethylbenzene	100-41-4	0.5	U	0.5	1
11996	2-Hexanone	591-78-6	5.0	U	5.0	1
11996	4-Methyl-2-pentanone	108-10-1	5.0	U	5.0	1
11996	Methylene Chloride	75-09-2	0.5	U	0.5	1
11996	Styrene	100-42-5	0.5	U	0.5	1
11996	1,1,2,2-Tetrachloroethane	79-34-5	0.2	U	0.2	1
11996	Tetrachloroethene	127-18-4	0.2	U	0.2	1
11996	**Toluene**	108-88-3	**1**		0.2	1
11996	112Trichloro122Trifluoroethane	76-13-1	0.5	U	0.5	1
11996	1,1,1-Trichloroethane	71-55-6	0.5	U	0.5	1
11996	1,1,2-Trichloroethane	79-00-5	0.2	U	0.2	1
11996	Trichloroethene	79-01-6	0.2	U	0.2	1
11996	Trichlorofluoromethane	75-69-4	0.5	U	0.5	1
11996	Vinyl Acetate	108-05-4	0.5	U	0.5	1
11996	Vinyl Chloride	75-01-4	0.2	U	0.2	1
11996	m+p-Xylene	179601-23-1	0.5	U	0.5	1
11996	o-Xylene	95-47-6	0.5	U	0.5	1

The referenced method allows a maximum of 20% of the analytes in the calibration to exceed the 20% Drift continuing calibration verification criteria. The Analyte(s) exceeding 20% Drift is not detected in this sample.
The affected analyte(s) and response(s) are:

Analyte	Response (%Drift)
vinyl acetate	-25%

GC/MS Volatiles	**SW-846 8260C SIM**		**ug/l**		**ug/l**	
12030	**Vinyl chloride**	75-01-4	**0.068**		0.020	1

Sample Description: SW-900-20130702 NA Water
Boeing Auburn

LL Sample # WW 7116687
LL Group # 1401613
Account # 13419

Project Name: Boeing Auburn

Collected: 07/02/2013 12:13 by SMM

Submitted: 07/03/2013 09:25
Reported: 07/15/2013 16:12

The Boeing Company
PO Box 3707 MC 9U4-26
Seattle WA 98124

AUB90

General Sample Comments

State of Washington Lab Certification No. C259

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11996	8260C Boeing 38	SW-846 8260C	1	H131891AA	07/08/2013 14:30	Jason M Long	1
12030	8260C SIM VC Only	SW-846 8260C SIM	1	E131892AA	07/08/2013 20:06	Jason M Long	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	H131891AA	07/08/2013 14:30	Jason M Long	1
01163	GC/MS VOA Water Prep	SW-846 5030B	2	E131892AA	07/08/2013 20:06	Jason M Long	1

Sample Description: SW-16-20130702 NA Water
Boeing Auburn

LL Sample # WW 7116688
LL Group # 1401613
Account # 13419

Project Name: Boeing Auburn

Collected: 07/02/2013 11:03 by SMM

Submitted: 07/03/2013 09:25
Reported: 07/15/2013 16:12

The Boeing Company
PO Box 3707 MC 9U4-26
Seattle WA 98124

AUB16

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260C**		**ug/l**		**ug/l**	
11996	Acetone	67-64-1	5.0	U	5.0	1
11996	Benzene	71-43-2	0.2	U	0.2	1
11996	Bromodichloromethane	75-27-4	0.5	U	0.5	1
11996	Bromoform	75-25-2	0.5	U	0.5	1
11996	Bromomethane	74-83-9	0.5	U	0.5	1
11996	2-Butanone	78-93-3	5.0	U	5.0	1
11996	Carbon Disulfide	75-15-0	0.5	U	0.5	1
11996	Carbon Tetrachloride	56-23-5	0.2	U	0.2	1
11996	Chlorobenzene	108-90-7	0.5	U	0.5	1
11996	Chloroethane	75-00-3	0.5	U	0.5	1
11996	Chloroform	67-66-3	0.2	U	0.2	1
11996	Chloromethane	74-87-3	0.5	U	0.5	1
11996	Dibromochloromethane	124-48-1	0.5	U	0.5	1
11996	1,1-Dichloroethane	75-34-3	0.5	U	0.5	1
11996	1,2-Dichloroethane	107-06-2	0.2	U	0.2	1
11996	1,1-Dichloroethene	75-35-4	0.2	U	0.2	1
11996	**cis-1,2-Dichloroethene**	156-59-2	**1.5**		0.2	1
11996	trans-1,2-Dichloroethene	156-60-5	0.2	U	0.2	1
11996	1,2-Dichloropropane	78-87-5	0.5	U	0.5	1
11996	cis-1,3-Dichloropropene	10061-01-5	0.2	U	0.2	1
11996	trans-1,3-Dichloropropene	10061-02-6	0.2	U	0.2	1
11996	Ethylbenzene	100-41-4	0.5	U	0.5	1
11996	2-Hexanone	591-78-6	5.0	U	5.0	1
11996	4-Methyl-2-pentanone	108-10-1	5.0	U	5.0	1
11996	Methylene Chloride	75-09-2	0.5	U	0.5	1
11996	Styrene	100-42-5	0.5	U	0.5	1
11996	1,1,2,2-Tetrachloroethane	79-34-5	0.2	U	0.2	1
11996	Tetrachloroethene	127-18-4	0.2	U	0.2	1
11996	**Toluene**	108-88-3	**0.2**		0.2	1
11996	112Trichloro122Trifluoroethane	76-13-1	0.5	U	0.5	1
11996	1,1,1-Trichloroethane	71-55-6	0.5	U	0.5	1
11996	1,1,2-Trichloroethane	79-00-5	0.2	U	0.2	1
11996	**Trichloroethene**	79-01-6	**1.1**		0.2	1
11996	Trichlorofluoromethane	75-69-4	0.5	U	0.5	1
11996	Vinyl Acetate	108-05-4	0.5	U	0.5	1
11996	**Vinyl Chloride**	75-01-4	**0.3**		0.2	1
11996	m+p-Xylene	179601-23-1	0.5	U	0.5	1
11996	o-Xylene	95-47-6	0.5	U	0.5	1

The referenced method allows a maximum of 20% of the analytes in the calibration to exceed the 20% Drift continuing calibration verification criteria. The Analyte(s) exceeding 20% Drift is not detected in this sample.
The affected analyte(s) and response(s) are:

Analyte	Response (%Drift)
vinyl acetate	-25%

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260C SIM**		**ug/l**		**ug/l**	
12030	**Vinyl chloride**	75-01-4	**0.31**		0.020	1

Sample Description: SW-16-20130702 NA Water
Boeing Auburn

LL Sample # WW 7116688
LL Group # 1401613
Account # 13419

Project Name: Boeing Auburn

Collected: 07/02/2013 11:03 by SMM

Submitted: 07/03/2013 09:25
Reported: 07/15/2013 16:12

The Boeing Company
PO Box 3707 MC 9U4-26
Seattle WA 98124

AUB16

General Sample Comments

State of Washington Lab Certification No. C259

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11996	8260C Boeing 38	SW-846 8260C	1	H131891AA	07/08/2013 14:51	Jason M Long	1
12030	8260C SIM VC Only	SW-846 8260C SIM	1	E131892AA	07/08/2013 20:26	Jason M Long	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	H131891AA	07/08/2013 14:51	Jason M Long	1
01163	GC/MS VOA Water Prep	SW-846 5030B	2	E131892AA	07/08/2013 20:26	Jason M Long	1

Sample Description: SW-12-20130702 NA Water
Boeing Auburn

LL Sample # WW 7116689
LL Group # 1401613
Account # 13419

Project Name: Boeing Auburn

Collected: 07/02/2013 10:03 by SMM

Submitted: 07/03/2013 09:25
Reported: 07/15/2013 16:12

The Boeing Company
PO Box 3707 MC 9U4-26
Seattle WA 98124

AUB12

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260C**		**ug/l**		**ug/l**	
11996	Acetone	67-64-1	10	U	10	2
11996	Benzene	71-43-2	0.4	U	0.4	2
11996	Bromodichloromethane	75-27-4	1.0	U	1.0	2
11996	Bromoform	75-25-2	1.0	U	1.0	2
11996	Bromomethane	74-83-9	1.0	U	1.0	2
11996	2-Butanone	78-93-3	10	U	10	2
11996	Carbon Disulfide	75-15-0	1.0	U	1.0	2
11996	Carbon Tetrachloride	56-23-5	0.4	U	0.4	2
11996	Chlorobenzene	108-90-7	1.0	U	1.0	2
11996	Chloroethane	75-00-3	1.0	U	1.0	2
11996	Chloroform	67-66-3	0.4	U	0.4	2
11996	Chloromethane	74-87-3	1.0	U	1.0	2
11996	Dibromochloromethane	124-48-1	1.0	U	1.0	2
11996	1,1-Dichloroethane	75-34-3	1.0	U	1.0	2
11996	1,2-Dichloroethane	107-06-2	0.4	U	0.4	2
11996	1,1-Dichloroethene	75-35-4	0.4	U	0.4	2
11996	cis-1,2-Dichloroethene	156-59-2	0.4	U	0.4	2
11996	trans-1,2-Dichloroethene	156-60-5	0.4	U	0.4	2
11996	1,2-Dichloropropane	78-87-5	1.0	U	1.0	2
11996	cis-1,3-Dichloropropene	10061-01-5	0.4	U	0.4	2
11996	trans-1,3-Dichloropropene	10061-02-6	0.4	U	0.4	2
11996	Ethylbenzene	100-41-4	1.0	U	1.0	2
11996	2-Hexanone	591-78-6	10	U	10	2
11996	4-Methyl-2-pentanone	108-10-1	10	U	10	2
11996	Methylene Chloride	75-09-2	1.0	U	1.0	2
11996	Styrene	100-42-5	1.0	U	1.0	2
11996	1,1,2,2-Tetrachloroethane	79-34-5	0.4	U	0.4	2
11996	Tetrachloroethene	127-18-4	0.4	U	0.4	2
11996	**Toluene**	108-88-3	**1.9**		0.4	2
11996	112Trichloro122Trifluoroethane	76-13-1	1.0	U	1.0	2
11996	1,1,1-Trichloroethane	71-55-6	1.0	U	1.0	2
11996	1,1,2-Trichloroethane	79-00-5	0.4	U	0.4	2
11996	Trichloroethene	79-01-6	0.4	U	0.4	2
11996	Trichlorofluoromethane	75-69-4	1.0	U	1.0	2
11996	Vinyl Acetate	108-05-4	1.0	U	1.0	2
11996	Vinyl Chloride	75-01-4	0.4	U	0.4	2
11996	m+p-Xylene	179601-23-1	1.0	U	1.0	2
11996	o-Xylene	95-47-6	1.0	U	1.0	2

The referenced method allows a maximum of 20% of the analytes in the calibration to exceed the 20% Drift continuing calibration verification criteria. The Analyte(s) exceeding 20% Drift is not detected in this sample.
The affected analyte(s) and response(s) are:

Analyte	Response (%Drift)
vinyl acetate	-25%

Reporting limits were raised due to sample foaming.

GC/MS Volatiles	**SW-846 8260C SIM**		**ug/l**		**ug/l**	
12030	Vinyl chloride	75-01-4	0.020	U	0.020	1

Sample Description: SW-12-20130702 NA Water
Boeing Auburn

LL Sample # WW 7116689
LL Group # 1401613
Account # 13419

Project Name: Boeing Auburn

Collected: 07/02/2013 10:03 by SMM

Submitted: 07/03/2013 09:25
Reported: 07/15/2013 16:12

The Boeing Company
PO Box 3707 MC 9U4-26
Seattle WA 98124

AUB12

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Limit of Quantitation	Dilution Factor

Reporting limits were raised due to sample foaming.

General Sample Comments

State of Washington Lab Certification No. C259

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11996	8260C Boeing 38	SW-846 8260C	1	H131891AA	07/08/2013 15:11	Jason M Long	2
12030	8260C SIM VC Only	SW-846 8260C SIM	1	E131892AA	07/08/2013 20:47	Jason M Long	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	H131891AA	07/08/2013 15:11	Jason M Long	2
01163	GC/MS VOA Water Prep	SW-846 5030B	2	E131892AA	07/08/2013 20:47	Jason M Long	1

Sample Description: SW-15-20130702 NA Water
Boeing Auburn

LL Sample # WW 7116690
LL Group # 1401613
Account # 13419

Project Name: Boeing Auburn

Collected: 07/02/2013 08:55 by SMM

Submitted: 07/03/2013 09:25
Reported: 07/15/2013 16:12

The Boeing Company
PO Box 3707 MC 9U4-26
Seattle WA 98124

AUB15

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260C**		**ug/l**		**ug/l**	
11996	Acetone	67-64-1	5.0	U	5.0	1
11996	Benzene	71-43-2	0.2	U	0.2	1
11996	Bromodichloromethane	75-27-4	0.5	U	0.5	1
11996	Bromoform	75-25-2	0.5	U	0.5	1
11996	Bromomethane	74-83-9	0.5	U	0.5	1
11996	2-Butanone	78-93-3	5.0	U	5.0	1
11996	Carbon Disulfide	75-15-0	0.5	U	0.5	1
11996	Carbon Tetrachloride	56-23-5	0.2	U	0.2	1
11996	Chlorobenzene	108-90-7	0.5	U	0.5	1
11996	Chloroethane	75-00-3	0.5	U	0.5	1
11996	Chloroform	67-66-3	0.2	U	0.2	1
11996	Chloromethane	74-87-3	0.5	U	0.5	1
11996	Dibromochloromethane	124-48-1	0.5	U	0.5	1
11996	1,1-Dichloroethane	75-34-3	0.5	U	0.5	1
11996	1,2-Dichloroethane	107-06-2	0.2	U	0.2	1
11996	1,1-Dichloroethene	75-35-4	0.2	U	0.2	1
11996	cis-1,2-Dichloroethene	156-59-2	0.2	U	0.2	1
11996	trans-1,2-Dichloroethene	156-60-5	0.2	U	0.2	1
11996	1,2-Dichloropropane	78-87-5	0.5	U	0.5	1
11996	cis-1,3-Dichloropropene	10061-01-5	0.2	U	0.2	1
11996	trans-1,3-Dichloropropene	10061-02-6	0.2	U	0.2	1
11996	Ethylbenzene	100-41-4	0.5	U	0.5	1
11996	2-Hexanone	591-78-6	5.0	U	5.0	1
11996	4-Methyl-2-pentanone	108-10-1	5.0	U	5.0	1
11996	Methylene Chloride	75-09-2	0.5	U	0.5	1
11996	Styrene	100-42-5	0.5	U	0.5	1
11996	1,1,2,2-Tetrachloroethane	79-34-5	0.2	U	0.2	1
11996	Tetrachloroethene	127-18-4	0.2	U	0.2	1
11996	**Toluene**	108-88-3	**0.8**		0.2	1
11996	112Trichloro122Trifluoroethane	76-13-1	0.5	U	0.5	1
11996	1,1,1-Trichloroethane	71-55-6	0.5	U	0.5	1
11996	1,1,2-Trichloroethane	79-00-5	0.2	U	0.2	1
11996	Trichloroethene	79-01-6	0.2	U	0.2	1
11996	Trichlorofluoromethane	75-69-4	0.5	U	0.5	1
11996	Vinyl Acetate	108-05-4	0.5	U	0.5	1
11996	Vinyl Chloride	75-01-4	0.2	U	0.2	1
11996	m+p-Xylene	179601-23-1	0.5	U	0.5	1
11996	o-Xylene	95-47-6	0.5	U	0.5	1

The referenced method allows a maximum of 20% of the analytes in the calibration to exceed the 20% Drift continuing calibration verification criteria. The Analyte(s) exceeding 20% Drift is not detected in this sample.
The affected analyte(s) and response(s) are:

Analyte	Response (%Drift)
vinyl acetate	-25%

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260C SIM**		**ug/l**		**ug/l**	
12030	Vinyl chloride	75-01-4	0.020	U	0.020	1

Sample Description: SW-15-20130702 NA Water
Boeing Auburn

LL Sample # WW 7116690
LL Group # 1401613
Account # 13419

Project Name: Boeing Auburn

Collected: 07/02/2013 08:55 by SMM

Submitted: 07/03/2013 09:25
Reported: 07/15/2013 16:12

The Boeing Company
PO Box 3707 MC 9U4-26
Seattle WA 98124

AUB15

General Sample Comments

State of Washington Lab Certification No. C259

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11996	8260C Boeing 38	SW-846 8260C	1	H131891AA	07/08/2013 15:32	Jason M Long	1
12030	8260C SIM VC Only	SW-846 8260C SIM	1	E131892AA	07/08/2013 21:07	Jason M Long	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	H131891AA	07/08/2013 15:32	Jason M Long	1
01163	GC/MS VOA Water Prep	SW-846 5030B	2	E131892AA	07/08/2013 21:07	Jason M Long	1

Sample Description: SW-14-20130702 NA Water
Boeing Auburn

LL Sample # WW 7116691
LL Group # 1401613
Account # 13419

Project Name: Boeing Auburn

Collected: 07/02/2013 08:03 by SMM

Submitted: 07/03/2013 09:25
Reported: 07/15/2013 16:12

The Boeing Company
PO Box 3707 MC 9U4-26
Seattle WA 98124

AUB14

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260C**		**ug/l**		**ug/l**	
11996	Acetone	67-64-1	5.0	U	5.0	1
11996	Benzene	71-43-2	0.2	U	0.2	1
11996	Bromodichloromethane	75-27-4	0.5	U	0.5	1
11996	Bromoform	75-25-2	0.5	U	0.5	1
11996	Bromomethane	74-83-9	0.5	U	0.5	1
11996	2-Butanone	78-93-3	5.0	U	5.0	1
11996	Carbon Disulfide	75-15-0	0.5	U	0.5	1
11996	Carbon Tetrachloride	56-23-5	0.2	U	0.2	1
11996	Chlorobenzene	108-90-7	0.5	U	0.5	1
11996	Chloroethane	75-00-3	0.5	U	0.5	1
11996	Chloroform	67-66-3	0.2	U	0.2	1
11996	Chloromethane	74-87-3	0.5	U	0.5	1
11996	Dibromochloromethane	124-48-1	0.5	U	0.5	1
11996	1,1-Dichloroethane	75-34-3	0.5	U	0.5	1
11996	1,2-Dichloroethane	107-06-2	0.2	U	0.2	1
11996	1,1-Dichloroethene	75-35-4	0.2	U	0.2	1
11996	**cis-1,2-Dichloroethene**	156-59-2	**0.8**		0.2	1
11996	trans-1,2-Dichloroethene	156-60-5	0.2	U	0.2	1
11996	1,2-Dichloropropane	78-87-5	0.5	U	0.5	1
11996	cis-1,3-Dichloropropene	10061-01-5	0.2	U	0.2	1
11996	trans-1,3-Dichloropropene	10061-02-6	0.2	U	0.2	1
11996	Ethylbenzene	100-41-4	0.5	U	0.5	1
11996	2-Hexanone	591-78-6	5.0	U	5.0	1
11996	4-Methyl-2-pentanone	108-10-1	5.0	U	5.0	1
11996	Methylene Chloride	75-09-2	0.5	U	0.5	1
11996	Styrene	100-42-5	0.5	U	0.5	1
11996	1,1,2,2-Tetrachloroethane	79-34-5	0.2	U	0.2	1
11996	Tetrachloroethene	127-18-4	0.2	U	0.2	1
11996	Toluene	108-88-3	0.2	U	0.2	1
11996	112Trichloro122Trifluoroethane	76-13-1	0.5	U	0.5	1
11996	1,1,1-Trichloroethane	71-55-6	0.5	U	0.5	1
11996	1,1,2-Trichloroethane	79-00-5	0.2	U	0.2	1
11996	**Trichloroethene**	79-01-6	**1**		0.2	1
11996	Trichlorofluoromethane	75-69-4	0.5	U	0.5	1
11996	Vinyl Acetate	108-05-4	0.5	U	0.5	1
11996	Vinyl Chloride	75-01-4	0.2	U	0.2	1
11996	m+p-Xylene	179601-23-1	0.5	U	0.5	1
11996	o-Xylene	95-47-6	0.5	U	0.5	1

The referenced method allows a maximum of 20% of the analytes in the calibration to exceed the 20% Drift continuing calibration verification criteria. The Analyte(s) exceeding 20% Drift is not detected in this sample.
The affected analyte(s) and response(s) are:

Analyte	Response (%Drift)
vinyl acetate	-25%

GC/MS Volatiles	**SW-846 8260C SIM**		**ug/l**		**ug/l**	
12030	**Vinyl chloride**	75-01-4	**0.12**		0.020	1

Sample Description: SW-14-20130702 NA Water
Boeing Auburn

LL Sample # WW 7116691
LL Group # 1401613
Account # 13419

Project Name: Boeing Auburn

Collected: 07/02/2013 08:03 by SMM

Submitted: 07/03/2013 09:25
Reported: 07/15/2013 16:12

The Boeing Company
PO Box 3707 MC 9U4-26
Seattle WA 98124

AUB14

General Sample Comments

State of Washington Lab Certification No. C259

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11996	8260C Boeing 38	SW-846 8260C	1	H131891AA	07/08/2013 15:52	Jason M Long	1
12030	8260C SIM VC Only	SW-846 8260C SIM	1	E131892AA	07/08/2013 21:28	Jason M Long	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	H131891AA	07/08/2013 15:52	Jason M Long	1
01163	GC/MS VOA Water Prep	SW-846 5030B	2	E131892AA	07/08/2013 21:28	Jason M Long	1

Sample Description: Trip Blank NA Water
Boeing Auburn

LL Sample # WW 7116692
LL Group # 1401613
Account # 13419

Project Name: Boeing Auburn

Collected: 05/31/2013

Submitted: 07/03/2013 09:25
Reported: 07/15/2013 16:12

The Boeing Company
PO Box 3707 MC 9U4-26
Seattle WA 98124

AUBTB

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260C**		**ug/l**		**ug/l**	
11996	Acetone	67-64-1	5.0	U	5.0	1
11996	Benzene	71-43-2	0.2	U	0.2	1
11996	Bromodichloromethane	75-27-4	0.5	U	0.5	1
11996	Bromoform	75-25-2	0.5	U	0.5	1
11996	Bromomethane	74-83-9	0.5	U	0.5	1
11996	2-Butanone	78-93-3	5.0	U	5.0	1
11996	Carbon Disulfide	75-15-0	0.5	U	0.5	1
11996	Carbon Tetrachloride	56-23-5	0.2	U	0.2	1
11996	Chlorobenzene	108-90-7	0.5	U	0.5	1
11996	Chloroethane	75-00-3	0.5	U	0.5	1
11996	Chloroform	67-66-3	0.2	U	0.2	1
11996	Chloromethane	74-87-3	0.5	U	0.5	1
11996	Dibromochloromethane	124-48-1	0.5	U	0.5	1
11996	1,1-Dichloroethane	75-34-3	0.5	U	0.5	1
11996	1,2-Dichloroethane	107-06-2	0.2	U	0.2	1
11996	1,1-Dichloroethene	75-35-4	0.2	U	0.2	1
11996	cis-1,2-Dichloroethene	156-59-2	0.2	U	0.2	1
11996	trans-1,2-Dichloroethene	156-60-5	0.2	U	0.2	1
11996	1,2-Dichloropropane	78-87-5	0.5	U	0.5	1
11996	cis-1,3-Dichloropropene	10061-01-5	0.2	U	0.2	1
11996	trans-1,3-Dichloropropene	10061-02-6	0.2	U	0.2	1
11996	Ethylbenzene	100-41-4	0.5	U	0.5	1
11996	2-Hexanone	591-78-6	5.0	U	5.0	1
11996	4-Methyl-2-pentanone	108-10-1	5.0	U	5.0	1
11996	Methylene Chloride	75-09-2	0.5	U	0.5	1
11996	Styrene	100-42-5	0.5	U	0.5	1
11996	1,1,2,2-Tetrachloroethane	79-34-5	0.2	U	0.2	1
11996	Tetrachloroethene	127-18-4	0.2	U	0.2	1
11996	Toluene	108-88-3	0.2	U	0.2	1
11996	112Trichloro122Trifluoroethane	76-13-1	0.5	U	0.5	1
11996	1,1,1-Trichloroethane	71-55-6	0.5	U	0.5	1
11996	1,1,2-Trichloroethane	79-00-5	0.2	U	0.2	1
11996	Trichloroethene	79-01-6	0.2	U	0.2	1
11996	Trichlorofluoromethane	75-69-4	0.5	U	0.5	1
11996	Vinyl Acetate	108-05-4	0.5	U	0.5	1
11996	Vinyl Chloride	75-01-4	0.2	U	0.2	1
11996	m+p-Xylene	179601-23-1	0.5	U	0.5	1
11996	o-Xylene	95-47-6	0.5	U	0.5	1

The referenced method allows a maximum of 20% of the analytes in the calibration to exceed the 20% Drift continuing calibration verification criteria. The Analyte(s) exceeding 20% Drift is not detected in this sample.
The affected analyte(s) and response(s) are:

Analyte	Response (%Drift)
vinyl acetate	-25%

GC/MS Volatiles	**SW-846 8260C SIM**		**ug/l**		**ug/l**	
12030	Vinyl chloride	75-01-4	0.020	U	0.020	1

Sample Description: Trip Blank NA Water
Boeing Auburn

LL Sample # WW 7116692
LL Group # 1401613
Account # 13419

Project Name: Boeing Auburn

Collected: 05/31/2013

Submitted: 07/03/2013 09:25
Reported: 07/15/2013 16:12

The Boeing Company
PO Box 3707 MC 9U4-26
Seattle WA 98124

AUBTB

General Sample Comments

State of Washington Lab Certification No. C259

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
11996	8260C Boeing 38	SW-846 8260C	1	H131891AA	07/08/2013 13:29	Jason M Long	1
12030	8260C SIM VC Only	SW-846 8260C SIM	1	E131892AA	07/08/2013 19:04	Jason M Long	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	H131891AA	07/08/2013 13:29	Jason M Long	1
01163	GC/MS VOA Water Prep	SW-846 5030B	2	E131892AA	07/08/2013 19:04	Jason M Long	1

Quality Control Summary

Client Name: The Boeing Company Group Number: 1401613
Reported: 07/15/13 at 04:12 PM

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Laboratory Compliance Quality Control

Analysis Name	Blank Result		Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: E131892AA	Sample number(s): 7116685-7116692								
Vinyl chloride	0.020	U	0.020	ug/l	100	101	70-130	1	30
Batch number: H131891AA	Sample number(s): 7116685-7116692								
Acetone	5.0	U	5.0	ug/l	85	89	73-135	5	30
Benzene	0.2	U	0.2	ug/l	103	103	80-120	0	30
Bromodichloromethane	0.5	U	0.5	ug/l	98	99	80-120	1	30
Bromoform	0.5	U	0.5	ug/l	93	94	63-132	1	30
Bromomethane	0.5	U	0.5	ug/l	100	99	38-146	1	30
2-Butanone	5.0	U	5.0	ug/l	93	99	70-130	6	30
Carbon Disulfide	0.5	U	0.5	ug/l	103	102	80-128	1	30
Carbon Tetrachloride	0.2	U	0.2	ug/l	105	106	74-133	1	30
Chlorobenzene	0.5	U	0.5	ug/l	99	99	80-120	0	30
Chloroethane	0.5	U	0.5	ug/l	98	98	67-124	1	30
Chloroform	0.2	U	0.2	ug/l	104	104	80-120	0	30
Chloromethane	0.5	U	0.5	ug/l	95	96	55-135	1	30
Dibromochloromethane	0.5	U	0.5	ug/l	97	97	80-126	0	30
1,1-Dichloroethane	0.5	U	0.5	ug/l	104	104	80-120	0	30
1,2-Dichloroethane	0.2	U	0.2	ug/l	102	102	80-127	0	30
1,1-Dichloroethene	0.2	U	0.2	ug/l	111	109	80-123	1	30
cis-1,2-Dichloroethene	0.2	U	0.2	ug/l	105	104	80-120	1	30
trans-1,2-Dichloroethene	0.2	U	0.2	ug/l	109	109	80-120	0	30
1,2-Dichloropropane	0.5	U	0.5	ug/l	106	104	80-120	1	30
cis-1,3-Dichloropropene	0.2	U	0.2	ug/l	104	104	74-120	0	30
trans-1,3-Dichloropropene	0.2	U	0.2	ug/l	97	97	73-126	0	30
Ethylbenzene	0.5	U	0.5	ug/l	96	97	80-120	0	30
2-Hexanone	5.0	U	5.0	ug/l	93	99	80-129	6	30
4-Methyl-2-pentanone	5.0	U	5.0	ug/l	95	98	69-135	3	30
Methylene Chloride	0.5	U	0.5	ug/l	104	104	80-120	0	30
Styrene	0.5	U	0.5	ug/l	103	102	80-120	0	30
1,1,2,2-Tetrachloroethane	0.2	U	0.2	ug/l	97	98	80-125	1	30
Tetrachloroethene	0.2	U	0.2	ug/l	98	97	80-120	0	30
Toluene	0.2	U	0.2	ug/l	97	97	80-120	0	30
112Trichloro122Trifluoroethane	0.5	U	0.5	ug/l	107	105	78-132	1	30
1,1,1-Trichloroethane	0.5	U	0.5	ug/l	104	104	79-127	0	30
1,1,2-Trichloroethane	0.2	U	0.2	ug/l	101	97	80-120	4	30
Trichloroethene	0.2	U	0.2	ug/l	101	103	80-120	1	30
Trichlorofluoromethane	0.5	U	0.5	ug/l	101	99	77-132	2	30
Vinyl Acetate	0.5	U	0.5	ug/l	95	95	40-137	0	30
Vinyl Chloride	0.2	U	0.2	ug/l	100	99	65-127	1	30
m+p-Xylene	0.5	U	0.5	ug/l	100	101	80-120	0	30
o-Xylene	0.5	U	0.5	ug/l	102	102	80-120	0	30

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: The Boeing Company Group Number: 1401613
Reported: 07/15/13 at 04:12 PM

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed
unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: Waters by GC/MS SIM 8260C
Batch number: E131892AA

	Toluene-d8	1,4-Difluorobenzene
7116685	109	97
7116686	109	98
7116687	109	98
7116688	110	98
7116689	109	98
7116690	109	98
7116691	109	97
7116692	110	97
Blank	110	99
LCS	110	98
LCSD	111	99
Limits:	80-120	80-120

Analysis Name: 8260C Water(25ml) Master
Batch number: H131891AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
7116685	108	103	98	101
7116686	107	102	98	100
7116687	107	106	98	100
7116688	107	105	97	100
7116689	107	108	97	100
7116690	108	106	98	101
7116691	106	102	98	100
7116692	107	107	99	100
Blank	107	105	99	100
LCS	107	103	99	102
LCSD	107	103	100	101
Limits:	77-114	74-113	77-110	78-110

*- Outside of specification
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Boeing Chain of Custody

eurofins | Lancaster Laboratories

Acct. # 13419 For Eurofins Lancaster Laboratories use only Group # 1401613 Sample # 7116685-92

Please print. Instructions on reverse side correspond.

(1) Client Information

Site Location: Auburn WA
Site Project: Boeing Auburn
Site Program/#: 25164.100.101
Boeing PM: Jim Bet
Consultant Contact: Jennifer Wynkoop
Report To: Anne Halvorsen etc. (see LIMS list)
Invoice To: [X] Boeing EHS [ ] Other (specify): ____
Sampler: SMM / SEF # of Coolers: 1

(4) Analyses Requested

(2) Sample Identification	Collected Date	Collected Time	(3) Matrix	No. of Containers	Boeing 36 VOCs - 8260 PEE &	SIM VOCs - Vinyl Chloride
SW-17-20130702	7/2/13	1209	H20	5	X	X
SW-18-20130702		1303		4	X	X
SW-900-20130702		1213		5	X	X
SW-16-20130702		1103		5	X	X
SW-12-20130703		1003		5	X	X
SW-15-20130702		0855		5	X	X
SW-14-20130702	↓	0803	↓	5	X	X
Trip Blanks	5/31/13	—	↓	4	X	X

(5) Remarks/Comments

Allow Samples to settle, analyze from clear portion.

(6) Turnaround Time Requested (please circle)

(Standard) 5 day 4 day
72 hour 48 hour 24 hour
Date needed: ____

Relinquished by:	Date/Time	Received by:	Date/Time (7)
[signature]	7/2/13 1353		
Relinquished by:	Date/Time	Received by:	Date/Time
Relinquished by:	Date/Time	Received by: [signature]	Date/Time 7/3/13 0925

Relinquished by commercial carrier (circle): UPS (FedEx) Other: ____

Temperature upon Receipt: 1.3 °C

Custody Seals Intact?: (Yes) No

Rachel L. Kreamer A# 13419 Gr# 1401613

From: Kay G. Hower
Sent: Wednesday, July 03, 2013 5:52 PM
To: Rachel L. Kreamer
Subject: FW: Changes to Surface Water COC
Attachments: SKMBT_C55013070313280.pdf

Please scan with 140613. Thanks!

From: Sierra Mott [mailto:smott@landauinc.com]
Sent: Wednesday, July 03, 2013 5:39 PM
To: Kay G. Hower
Cc: Sarah Fees; Jennifer Wynkoop
Subject: Changes to Surface Water COC

Hi Kay-

Sorry, one more thing about the surface water samples!! Attached is an updated COC; I mistakenly included PCE for SIM, but it is just Vinyl Chloride for this event.

Thank you,

Sierra Mott ♦ Support Staff

Landau Associates, Inc.
950 Pacific Avenue, Suite 515, Tacoma, WA 98402
253.926.2493 ♦ fax 253.926.2531
smott@landauinc.com ♦ www.landauinc.com

From: copier@landauinc.com [mailto:copier@landauinc.com]
Sent: Wednesday, July 03, 2013 2:29 PM
To: Sierra Mott
Subject: Message from KMBT_C550

Boeing Chain of Custody

eurofins | Lancaster Laboratories

Acct. # 13419 For Eurofins Lancaster Laboratories use only Group # 1401613 Sample # 7716685-92

Please print. Instructions on reverse side correspond.

(1) Client Information

Site Location: Auburn WA
Site Project: Boeing Auburn
Site Program/#: 25164.100.101
Boeing PM: Jim Bet
Consultant Contact: Jennifer Wynkoop
Report To: Anne Halvorsen etc. (See LIMS list)
Invoice To: [X] Boeing EHS [ ] Other (specify): ____
Sampler: SMM / SEF # of Coolers: 1

(4) Analyses Requested

Boeing 36 VOCs-8260
SIM VOCs- Vinyl Chloride

(5) Remarks/Comments

Allow Samples to settle, analyze from clear portion.

(2) Sample Identification	Collected Date	Collected Time	(3) Matrix	No. of Containers	Analyses	Remarks
SW-17-20130702	7/2/13	1209	H2O	5	X X	CC reset 7/3/13
SW-18-20130702	"	1303	"	4	X X	
SW-900-20130702	"	1213	"	5	X X	Run SIM for Vinyl Chloride only
SW-16-20130702	"	1103	"	5	X X	
SW-12-20130703	"	1003	"	5	X X	
SW-15-20130702	"	0855	"	5	X X	
SW-14-20130702	"	0803	"	5	X X	
Trip Blanks	5/31/13	—	"	4	X X	

(6) Turnaround Time Requested (please circle)

(Standard) 5 day 4 day
72 hour 48 hour 24 hour
Date needed: ____

Relinquished by:	Date/Time	Received by:	Date/Time (7)
Sumamoto	7/2/13 1353		
Relinquished by:	Date/Time	Received by:	Date/Time
Relinquished by:	Date/Time	Received by:	Date/Time

Relinquished by commercial carrier (circle): UPS (FedEx) Other: ____
Temperature upon Receipt: ____ °C
Custody Seals Intact?: Yes No

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C# 1401613

Environmental Sample Administration Receipt Documentation Log

Client/Project: Boeing

Date of Receipt: 7/3/13

Time of Receipt: 0925

Source Code: 501

Shipping Container Sealed: (YES) NO

Custody Seal Present * : (YES) NO

* Custody seal was intact unless otherwise noted in the discrepancy section

Package: (Chilled) Not Chilled

Temperature of Shipping Containers							
Cooler #	Thermometer ID	Temperature (°C)	Temp Bottle (TB) or Surface Temp (ST)	Wet Ice (WI) or Dry Ice (DI) or Ice Packs (IP)	Ice Present? Y/N	Loose (L) Bagged Ice (B) or NA	Comments
1	DT121	1.3	TB	WI	Y	B	
2							
3							
4							
5							
6							

Number of Trip Blanks received NOT listed on chain of custody: ∅

Paperwork Discrepancy/Unpacking Problems:

Unpacker Signature/Emp#: [signature] 3647

Date/Time: ③ CC 7/3/13. 7/3/13 1114

Issued by Dept. 6042 Management

2174.06

G# 1401613

ORIGIN ID:SEAA
SHIP DATE: 02JUL13
ACTWGT: 26.2 LB
CAD: /OFFC1400
DIMS: 21x13x11 IN
BILL SENDER
TO
LANCASTER LABORATORIES
2425 NEW HOLLAND PIKE
LANCASTER PA 17601
(717) 656-2300
INV:
PO:
REF:
DEPT:
FedEx
Express
J13111302120126
TRK# 8013 1777 7734
0667
WED - 03 JUL 10:30A
PRIORITY OVERNIGHT
XH LNSA
17601
PA-US MDT

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
µg	microgram(s)	**mg**	milligram(s)
mL	milliliter(s)	**L**	liter(s)
m3	cubic meter(s)	**µL**	microliter(s)
		pg/L	picogram/liter

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Data Qualifiers:

C – result confirmed by reanalysis.

J - estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers		Inorganic Qualifiers	
A	TIC is a possible aldol-condensation product	**B**	Value is <CRDL, but ≥IDL
B	Analyte was also detected in the blank	**E**	Estimated due to interference
C	Pesticide result confirmed by GC/MS	**M**	Duplicate injection precision not met
D	Compound quantitated on a diluted sample	**N**	Spike sample not within control limits
E	Concentration exceeds the calibration range of the instrument	**S**	Method of standard additions (MSA) used for calculation
N	Presumptive evidence of a compound (TICs only)	**U**	Compound was not detected
P	Concentration difference between primary and confirmation columns >25%	**W**	Post digestion spike out of control limits
U	Compound was not detected	*****	Duplicate analysis not within control limits
X,Y,Z	Defined in case narrative	**+**	Correlation coefficient for MSA <0.995

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR part 136 Table II as “analyze immediately” are not performed within 15 minutes.