CORRECTIVE MEASURE IMPLEMENTATION REPORT

Duwamish Sediment Other Area and Southwest Bank
Corrective Measure
Boeing Plant 2
Seattle/Tukwila, Washington

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ACRONYMS & ABBREVIATIONS

µg/kg	micrograms per kilogram
µg/L	microgram per liter
ARI	Analytical Resources, Inc.
AU	approval unit
Boeing	The Boeing Company
BMP	best management practice
°C	degrees Celsius
CFR	Code of Federal Regulations
cm	centimeter
COC	chemical of concern
CS1	Construction Season 1
CS2	Construction Season 2
CS3	Construction Season 3
CSM	conceptual site model
cy	cubic yard
DGPS	digital global positioning system
DRWS	dredge return water system
DSOA	Duwamish Sediment Other Area
EC	electro-coagulation
Ecology	Washington State Department of Ecology
EMJ RAB	Jorgensen Forge Early Action Area Removal Action Boundary
EPA	Environmental Protection Agency
ERA	Early Removal Area
GAC	granulated activated carbon
gpm	gallons per minute
GPS	global positioning system
HDPE	high-density polyethylene
LCS	laboratory control sample

ACRONYMS & ABBREVIATIONS (continued)

mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MLLW	mean lower low water
MS/MSD	matrix spike/matrix-spike duplicate
ng/kg	nanograms per kilogram
NTU	nephelometric turbidity unit
Order	Administrative Order on Consent, RCRA Docket No 1092- 01-22-3008(h)
PCB	polychlorinated biphenyl
POTW	publicly owned treatment works
ppb	parts per billion
ppm	parts per million
QA	quality assurance
QC	quality control
RBDA	Risk-Based Disposal Approval
RCRA	Resource Conservation and Recovery Act
RL	reporting limit
RTK	real-time kinematic
Services	National Marine Fisheries Service and U.S. Fish and Wildlife Service
SMS	Washington State Sediment Management Standards
SPA	sediment processing area
SQS	Washington State Sediment Management Standards, Sediment Quality Standards
SRM	sediment reference material
TEQ	toxicity equivalency quotient
TOC	total organic carbon
TS	total solids
TSCA	Toxic Substances Control Act
WAC	Washington Administrative Code

CORRECTIVE MEASURE IMPLEMENTATION REPORT

Duwamish Sediment Other Area and
Southwest Bank Corrective Measure
Boeing Plant 2
Seattle/Tukwila, Washington

1.0 INTRODUCTION

The Duwamish Sediment Other Area (DSOA) and Southwest Bank Corrective Measure was conducted pursuant to the Administrative Order on Consent, Resource Conservation and Recovery Act (RCRA) Docket No 1092-01-22-3008(h) (Order), issued to The Boeing Company (Boeing) in 1994 by the U.S. Environmental Protection Agency (EPA) under authority of RCRA Section 3008(h), as amended (42 United States Code 6928[h]).

The construction of the DSOA and Southwest Bank Corrective Measure was conducted over three construction seasons (September 2012 through March 2015) and was comprised of two major components; dredging and shoreline excavation. All work was conducted as per the EPA approved design documents.

At the end of each construction season, Boeing submitted a completion report describing the work that had been conducted and results of environmental monitoring that was associated with the construction activity. The previously submitted completion reports are:

- *2012-2013 Construction Season Completion Report* (AMEC 2013) which summarized the first season of dredging that was conducted between January and March 2013 and is provided as Exhibit 1;
- *Shoreline Completion Report* (AMEC and Floyd|Snider 2014) which described the shoreline excavation and backfilling of the south shoreline and the Southwest Bank and the North Shoreline habitat construction conducted between September 2012 and October 2013 (provided as Exhibit 2); and
- *Dredging Construction Season 2 (January to March 2014) Completion Report* (DOF et al. 2014) which summarized the second season of dredging that was conducted between January and March 2014. This report is provided as Exhibit 3.

The previous three reports and this report collectively serve as the Corrective Measure Implementation Report and fulfills the reporting requirements specified in the Corrective Measure Implementation Scope of Work in the Order.

During the 3 construction seasons:

- Approximately 163,000 cubic yards (cy) of sediment was dredged within the DSOA and Slip 4;
- Approximately 160,000 cy of backfill was placed within the DSOA and Slip 4;
- Approximately 46,200 cy of material was excavated along the south Plant 2 shoreline;
- Approximately 31,300 cy of backfill material was placed along the south Plant 2 shoreline;
- Approximately 383,000 tons of sediment and soil was disposed of in accordance with the Toxic Substances Control Act (TSCA) Risked-Based Disposal Approvals (RBDAs) issued by the EPA; and
- Approximately 44,200,000 gallons of water was discharged though the dredge return water treatment system.

All work was conducted in accordance with the EPA-approved design submittals (AMEC et al. 2012a) and modifications approved by EPA and the Washington State Department of Ecology (Ecology). The work met the requirements of the *Statement of Basis for Proposed Corrective Action, Duwamish Sediment Other Area and Southwest Bank* (EPA 2011a) and the *Final Decision and Response to Comments for Boeing Plant 2 Sediments, Duwamish Sediment Other Area and Southwest Bank* (EPA 2011b).

This report documents work conducted during the third and final dredging construction season (Construction Season 3 [CS3]) which was conducted between August 2014 and March 2015. The work included:

- Southwest Bank shoreline excavation and backfilling (Figure 1);
- In-water construction, including:
  - Installation and/or removal of temporary construction structures (Figure 2):
    - Mooring and water quality instrument piles,
    - Outfall sheetpile,
    - Slip 4 sheetpile, and
    - Temporary Outfall Z;
  - Construction of permanent outfalls;
  - Sediment dredging in the following areas (Figure 3):
    - DSOA, including the Early Removal Areas (ERAs) and diver-assisted hydraulic dredging area, and
    - Slip 4;
  - Backfilling;

- Transloading of dredged sediments;
- Dredge return water processing;
- Water quality monitoring, which included:
  - Southwest Bank re-excavation monitoring,
  - In situ instrument monitoring,
  - Dredge monitoring,
  - Dredge return water monitoring,
  - Backfill placement monitoring, and
  - Slip 4 sheetpile removal monitoring;
- Sediment Investigations/monitoring which included:
  - Pre- and post-construction perimeter sediment monitoring,
  - Slip 4 additional sediment data collection,
  - Post-construction core sampling, and
  - Year 0 Post-Construction Surface Sediment Monitoring;
- Jorgensen backfill monitoring; and
- Archaeological monitoring.

In addition, this report provides a summary of salient elements of water quality and sediment quality monitoring over the entire course of the project.

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2.0 SOUTHWEST BANK SHORELINE EXCAVATION

Sediment remediation in the Southwest Bank Area during CS3 included both in-water dredging and land-based sediment excavation. Prior to the sediment remediation activities in the Southwest Bank area, portions of the previously constructed bank were re-excavated to allow nearshore sediment remediation activities to proceed without destabilizing the slope and to create an access corridor for land-based equipment. This section describes the land-based excavation activities performed during CS3 for the Southwest Bank shoreline. In-water dredging activities in the Southwest Bank area are documented in Section 3.4.1.1.

2.1 BACKGROUND

Excavation and remediation of the south shoreline were previously performed during Construction Season 1 in the general area from the South Park Bridge southward to temporary Outfall Z near the Jorgensen Forge property line, which includes the Southwest Bank area (Figure 1). Upon completion of excavation, backfilling of the south shoreline was performed to create slopes in accordance with the design for the habitat along the shoreline. This work was originally scheduled to be performed in conjunction with dredging of the DSOA, with shoreline reconstruction and habitat restoration occurring after completion of dredging and dredging-related backfill in the area. Due to a variety of scheduling and coordination issues, including the South Park Bridge construction delays, dredging along the south shoreline did not occur during Construction Season 1 (CS1); however, the shoreline work proceeded as originally scheduled. As a result, the constructed shoreline and habitat could potentially be undermined by the required dredging to be completed during CS3.

To address this potential slope stability issue, the shoreline was re-excavated to remove a portion of the previously placed backfill prior to conducting the required dredging during CS3. At the same time, an access corridor was created to allow land-based equipment to access the nearshore sediment within the DSOA (Figure 1). Use of land-based dredge equipment allowed the shoreline to be reconstructed and revegetated within the fall planting season.

2.2 SOUTHWEST BANK SHORELINE: EXCAVATION AND SEDIMENT REMOVAL

The CS3 Southwest Bank re-excavation was begun in July 2014. Previously placed backfill material was removed to create a more stable slope and thereby facilitate excavation of nearshore sediment from the shoreline. The excavated material was segregated between clean habitat material and habitat material mixed with native subgrade. The clean habitat material was reused for shoreline reconstruction to the extent practicable.

Once the Southwest Bank shoreline was re-excavated to create a stable slope, excavation of impacted nearshore sediment began in August 2014 (Table 1). This excavation was conducted to remove impacted sediment from the nearshore portions of the DSOA (Figure 1 and Figure 3).

Impacted sediment was removed using an instrumented excavator and loaded into sealed off-road haul trucks. The sediment was hauled and stockpiled at the on-site sediment processing area (SPA; see Section 5.0), where it was stabilized (as necessary) to pass the paint filter test before being transported to the transload facility (see Section 4.0) for disposal. A sorbent boom and debris curtains were deployed prior to the start of excavation.

3.0 IN-WATER CONSTRUCTION ACTIVITIES

Section 3.0 describes the in-water work activities conducted during CS3. During CS3, the following in-water construction activities were conducted:

- Installation and removal of temporary construction structures (Figure 2),
- Construction of permanent outfalls,
- Sediment dredging (Figure 3), and
- Backfilling (Figure 3).

All in-water construction work during CS3 was conducted in compliance with local, state, and federal agencies' permit requirements. In addition, this work was conducted in accordance with a Toxic Substances Control Act (TSCA) Risked-Based Disposal Approval (RBDA) issued by the EPA on December 20, 2012, with subsequent related approvals issued on May 22, 2013, December 17, 2013, August 29, 2014, September 24, 2014, and October 23, 2014 (EPA 2012, 2013a, 2013b, 2014a, 2014b, 2014c).

3.1 EXTENSION OF IN-WATER CONSTRUCTION WINDOW

The in-water construction work window originally authorized for CS3 ended February 15, 2015; however, EPA requested an extension of the in-water work window from the natural resources trust agencies (National Marine Fisheries Service and the U.S. Fish and Wildlife Service, collectively referred to as the Services) under the Endangered Species Act. The Services agreed to an extension of the work window through March 15, 2015; this extension was subsequently authorized by the U.S. Army Corps of Engineers (Section 10/404 Permit) and the Washington Department of Fish and Wildlife (Hydraulic Project Approval).

3.2 TEMPORARY CONSTRUCTION STRUCTURES

At the beginning and during CS3, it was necessary for the contractor to install a number of temporary structures prior to and in support of ongoing dredging operations (Figure 2). These structures included temporary mooring piles installed by the contractor for sediment barges and other vessels, water quality monitoring piles, and sheetpile walls for the North Basin Outfall, South Basin Outfall, and the work in Slip 4 (Section 3.2.3). Prior to completing CS3 in-water work, temporary Outfall Z (Figure 2), which had been installed at the beginning of CS1, was removed from the waterway.

3.2.1 Mooring and Water Quality Instrument Piles

Prior to the start of DSOA dredging, platforms for telemetered in situ water quality monitoring equipment and a tide gauge were installed at the northern (downstream) and southern (upstream) extents of the CS3 work area (Figure 2). These platforms consisted of surplus U.S. Coast Guard Aids

to Navigation structures (platforms) fixed to a single pile to provide a safe working area during the upkeep of these stations. After completion of dredging and backfill activities for CS3, these structures were removed from the waterway.

One of the water quality monitoring piles was placed within the Jorgensen Forge Early Action Area Removal Action Boundary (EMJ RAB). EPA required sediment sampling in the vicinity of the pile prior to and after pile removal. This sampling was required to address concerns about the possible release of sediments containing polychlorinated biphenyls (PCBs) above the Removal Action Level (of 12 parts per million organic carbon [ppm OC]) left in place following the EMJ RAB dredging in the vicinity of the pile. Surface sediments were sampled at three locations in the immediate vicinity of the water quality monitoring pile before and after pile removal. At two of the locations, all Sediment Management Standards (SMS; WAC 173-204) metals and PCBs measured were below the SMS Sediment Quality Standards (SQS; WAC 173-204-320) before and after pile removal. At one location, the SMS metals were below the SQS before and after the pile removal; however, the PCBs were above the SQS before and after removal. Observed PCB concentrations in these samples were within the range of concentrations observed in the Jorgensen backfill before the start of in-water dredging at the south end of the DSOA. Based on this, it appears that best management practices (BMPs) designed to limit sediment disturbance associated with removal of this pile were successful.

The results of this monitoring are presented in Appendix A.

3.2.2 Outfall Sheetpile Wing Walls

Sheetpile wing walls were driven at the North and South Basin stormwater outfalls (Figure 2). The wing walls allowed recovery of blind flanges that were installed when the shoreline work was performed. After installation of the permanent outfalls (Section 3.3), the wing walls were removed.

3.2.3 Slip 4 Sheetpile Walls

In order to remove material in the Slip 4 area without destabilizing the shoreline, approximately 300 lineal feet of sheetpiling was placed along the shoreline (Figure 2). Additionally, approximately 640 lineal feet of sheetpiling was placed on the property line down the middle of Slip 4 to avoid disturbance of sediment on the adjacent DeNovo property (see Section 3.4.1.4; Figure 2). Upon successful removal of impacted sediment, and backfilling the dredge area to original grades, the Slip 4 sheetpile walls were removed from the waterway prior to the end of the in-water construction window.

3.2.4 Temporary Outfall Z Removal

Temporary Outfall Z was initially constructed prior to the start of CS1 dredging in late November 2012 (Figure 2). The purpose of this work was to temporarily extend the existing Outfall Z along the south

shoreline to reduce potential erosion in the intertidal and subtidal zones. The temporary outfall extension at Outfall Z was removed in its entirety upon completion of CS3 mechanical dredging south of the South Park Bridge.

3.3 CONSTRUCTION OF PERMANENT OUTFALLS

Three permanent, submerged outfalls were installed during CS3: Outfall Z, the North Basin Outfall, and the South Basin Outfall (Figure 2). All CS3 outfalls were constructed of high-density polyethylene. The outfall discharge pipe inverts were all between elevations -10.0 and -10.7 feet relative to mean lower low water (MLLW).

3.4 DREDGE AND BACKFILL

Dredging and backfill operations during CS3 were conducted in the DSOA and Slip 4. Dredging within the DSOA included dredging in the early removal areas (ERAs) and diver-assisted hydraulic dredging near the South Park Bridge (Figure 3). Figure 3 presents a summary of the dredging and backfill work completed during CS3. Similar to the two previous construction seasons, dredging was typically conducted during two shifts per day (target of 10 hours on water per shift), six days per week. All in-water work for CS3 was completed on March 12, 2015.

This section describes the general work methods for dredging and backfilling in each of the dredge areas. As-built drawings for CS3 are provided in Appendix B.

3.4.1 Dredging

Dredging during CS3 was conducted in the DSOA and in Slip 4. Within the DSOA, specialized dredging methods were required in the following locations:

- The two localized ERAs where concentrations of PCBs greater than 50 milligrams per kilogram (mg/kg) (equivalent to 50 parts per million) were present; and
- The area immediately adjacent to the eastern support pier of the South Park Bridge due to access restrictions.

A summary of CS3 dredging activities is presented below:

- Dredging was completed in 110 Approval Units in the DSOA.
- Dredging was completed in a new dredge prism in Slip 4.
- The total volume of sediment dredged was approximately 78,604 cy.
- Total tonnage of sediment removed and offloaded at the transload facility was approximately 117,000 tons.

This section describes the specific dredging methods used in each area.

3.4.1.1 DSOA

CS3 dredging in the DSOA began on September 24, 2014, and placement of backfill began on October 8, 2014 (Table 2). The DSOA dredging area was subdivided into Approval Units (AUs; Figure 3). The AU system was used to track the status of dredging and backfilling work and as a basis to approve the final work as dredging and then backfilling were completed within each AU. Each AU occupied an area of approximately 2,500 square feet, and the AUs were combined into Approval Groups, which comprised a row of AUs extending from the shoreline outward to the navigation channel (Figure 3).

Dredging in the DSOA during CS3 began at approximately Station 27+00 (Approval Group 55) and progressed northward (downstream) to approximately Station 13+00 (Approval Group 28) (Figure 3). After dredging within an AU was completed, surveyed, and accepted as meeting the requirements of the RCRA Order, initial backfill was placed in approximate 6-inch- to 1-foot-thick lifts over the AU. This initial backfill material was intended to prevent the potential loss of residuals within the dredged AU, which is a project BMP. Approval Groups 66 through a portion of 55 were dredged, and intermediate backfill was placed, during Construction Season 2 (CS2). Limited dredging was also performed in Approval Groups 54 and 55 and 67 and 68 during CS2 to create transition slopes from the dredged to undredged areas. Dredging continued during CS3 at the upstream end of the DSOA at approximately Station 39+00 (Approval Group 81) and continued to approximately Station 32+50 (Approval Group 67; Figure 3). The dredging, backfilling, and final backfilling completed during CS3 are shown on Figure 3.

Dredging equipment included a barge-mounted, instrumented excavator (described below), binned sediment barges (flat-decked barges with watertight bin walls), a dewatering barge, and auxiliary equipment, such as tugboats, survey vessel, and crew boats. The derrick barge Skookum (floating crane), which was primarily used for backfill placement, also functioned as a service crane to support dredging operations. A total of five sediment barges were used with sediment load capacities ranging from approximately 300 to 600 tons. These sediment barges were flat-deck barges with watertight bin walls approximately 4 to 5 feet high.

Most dredging was performed from the vessel Aberdeen using an instrumented Komatsu PC800 excavator fitted with a long-reach Jewel® droop stick and a 4-cubic-yard Young® Manufacturing clamshell bucket modified for environmental dredging. On board the excavator was a navigation system that provided a real-time kinematic (RTK) global positioning system (GPS) in conjunction with sensor input to calculate x, y, and z coordinates for the bucket. Sensors also provided information on bucket rotation, open/close status of the bucket, and dredge position. This system provided the dredge contractor with a bucket placement accuracy of ±10-centimeter (cm), monitored by the dredge operator with oversight from the Boeing engineering oversight team. Dredge instrumentation was

checked during each shift (twice daily) by comparing readings against an RTK-GPS rover station on the dredge.

3.4.1.2 Early Removal Areas

The DSOA project included two localized areas offshore of the Southwest Bank (the ERAs, as shown on Figure 3) where PCB concentrations were found to be greater than 50 mg/kg. These well-defined areas consisted of approximately 300 cubic yards of sediment potentially contaminated with PCBs at concentrations greater than 50 mg/kg. Early removal in the ERAs occurred prior to the main dredging portion of the removal action in those areas and consisted of removing materials to the limit of the mapped 25 mg/kg isoconcentration line.

ERA dredging was completed using a hybrid system of mechanical dredging and hydraulic transport. The excavator equipped with the Young's bucket was used to remove sediment from the waterway in the early removal areas and then place it into a slurry box that was staged inside the watertight sediment bin of a sediment barge. The slurry box was constructed of steel, was roughly octagonal in overall shape, and was approximately 3 to 4 feet deep during operation. Water was then pumped from the Duwamish Waterway into the slurry box containing the dredged material. Water jets within the slurry box were used to liquefy the fine-grained dredged sediment into a slurry with a consistency similar to that produced by a hydraulic dredge. This slurry was then pumped to the dredge return water system (DRWS) for processing (as described in Section 5.2 below).

The remaining coarse material that had been segregated from the fine-grained material by the slurry process was allowed to dewater within a watertight sediment barge before being loaded into super sacks, which were double bagged so they remained watertight. The super sacks were offloaded from the barge onto Boeing property and then transported directly to the disposal site. The super sacks were offloaded directly to the Boeing uplands using a crane with a bin. Decanted water produced by dewatering the coarse-grained fraction was pumped to the DRWS and processed. The first leg of the DRWS was cleaned of accumulated sediment before and after dredging of the ERAs. In this way, solids pumped to the DRWS from the ERAs were kept separate from all other sediment material. Sediments removed from the DRWS following ERA dredging, along with material collected from the Tri-Flo™ portion of the DRWS during ERA dredging, were segregated, stabilized, and sent to a subtitle C landfill for disposal.

All ERA dredging and disposal methods were performed in accordance with the TSCA RBDAs issued by the EPA.

3.4.1.3 Diver-Assisted Hydraulic Dredging

A new South Park Bridge across the Duwamish Waterway was constructed by King County within the DSOA during CS1 and CS2. This new bridge was substantially completed during CS3, allowing dredging to be performed in the area under and immediately adjacent to the new bridge. However, vertical clearance under the east approach to the bridge is very limited.

Due to limited access and the need to avoid damage or impacts to the newly constructed South Park Bridge, diver-assisted hydraulic dredging was performed in selected areas adjacent to the bridge (Figure 3) to remove impacted sediments to the design grade. Diver-assisted dredging is a commonly accepted practice in areas where access to sediment may be restricted by existing structures or where a low-impact dredging method is needed so that the dredge cannot damage structures within the dredge area. One tradeoff with diver-assisted dredging is that sediment production rates are very low compared to environmental mechanical dredging.

Commercial divers, using surface-supplied air systems, used two 6-inch-diameter suction dredge heads to hydraulically remove sediments to design grade from under the South Park Bridge around the east pier (Figure 3). The dredge slurry produced by the diver dredges was hydraulically transported directly to the DRWS, where the solids were separated and the water was treated prior to discharge back to the Duwamish Waterway. Collected solids were then stabilized and sent off site for disposal (Section 5.1).

3.4.1.4 Slip 4

As part of the EPA approved DSOA Project Plans, dredging was performed in four limited areas within Slip 4 in December 2014 (see Section 8.0). After this initial dredging of these areas was completed, confirmation samples were taken in December 2014 in accordance with project documents. Three of the four areas met the SMS SQS, but sediments containing elevated concentrations of PCBs remained in one of the areas. The vertical limit of remaining contaminated sediments in this area was not bounded at depth by the initial core sample. Additional coring was performed that identified additional contamination within the Boeing property in Slip 4 (Section 8.0).

Based on the additional sampling and historical dredging data, a new dredge prism was created for re-dredging the Slip 4 area (Figure 3). A second round of dredging was conducted in February 2015 following the new dredge prism.

The Boeing Property line in Slip 4 abuts the Slip 4 property currently owned by DeNovo Seattle LLC (formerly the Crowley Marine Services Inc. 8th Avenue South Property; Figure 1). The property is the subject of an Agreed Order issued by Ecology requiring a Remedial Investigation/Feasibility Study for the DeNovo-owned portion of Slip 4. Ecology would not allow dredging in Slip 4 to proceed if the

dredging would remove any sediment from the DeNovo-owned portion of Slip 4; therefore, it was necessary to construct a temporary sheetpile wall down the middle of Slip 4 along the Boeing property line prior to the start of dredging (Figure 2).

Prior to the start of the second round of dredging, sheetpiles were placed in the area as described in Section 3.2.3 and shown on Figure 2. Dredging and management of dredged material were performed using the same equipment, methods, and procedures as used for the DSOA dredging (Section 3.4.1.1) and in accordance with all project BMPs. In addition, to verify that contaminated sediment was removed to the extent practicable, as the required dredge depth was approached, the dredge observer observed the contents of each bucket of dredge material as it was placed within the sediment barge. The dredge observer is a part of the Boeing engineering oversight team and was located in the dredge cab alongside the operator.

Based on observations by the dredge observer, the dredging depth could be adjusted to optimize removal of the impacted sediments and reduce removal of nonimpacted native materials. The native materials are generally sandier and have a different color than the overlying, more recent depositional material, which is typically impacted. Dredging was performed as close to the sheetpile wall as practicable. Dredging depths were documented by hydrographic survey.

The Slip 4 dredge and final backfill area is shown on Figure 3. After final dredging was complete and prior to placement of any backfill, nine post-construction confirmation samples were collected in February 2015. Results of these samples are provided in Section 9.2.2. CS3 dredging and placement of final backfill within Slip 4 were completed by February 26, 2015.

3.4.2 Backfilling

Backfilling was primarily conducted with a derrick barge and clamshell bucket mounted aboard the vessel DB Skookum, assisted by the Komatsu PC800 excavator with 4-cy Young's clamshell bucket onboard the Aberdeen. Upon completion of CS3 dredging, the contractor decontaminated the dredge excavator and then used it, along with the derrick barge, to place backfill material for the remaining weeks of the season. The derrick barge (and dredge excavator when used for backfill) was used to offload backfill material from a barge and place the material in consistent arcs from the barge platform. The derrick barge was equipped with a digital GPS (DGPS) positioning and WinOps Navigation software so that the backfill material placed within an AU could be evenly distributed to the extent practicable. Weighted "rain gauge" buckets were placed within the AUs prior to initial backfilling and used to verify even distribution of backfill within the AU. In addition, at the end of each day, the backfill area was surveyed to confirm the backfill placement met project specifications. Visual inspection of backfill placement was also performed during low tides on the intertidal flats near the shoreline to confirm that no low spots were present that could potentially trap fish.

Three backfill sequences were conducted during CS3:

- An initial 6-inch lift of material was placed promptly following completion of dredging for each AU (a BMP to limit potential mobilization of residuals).
- A second lift of intermediate backfill of varying thickness was placed.
- A final layer of sand was used to fill from approximately 2 feet below Final Backfill Surface grade up to Final Backfill Surface grade.

The intermediate layer generally followed the initial layer by days or weeks, although in some cases the intermediate layer immediately followed placement of the initial layer. Backfill material for the initial, intermediate, and final layers was obtained from CalPortland's pits in Shelton, Washington, and Dupont, Washington. Chemical and grain-size testing for this material was conducted prior to delivery of the material to the site as specified in the *Final Construction Quality Assurance Project Plan* (AMEC et al. 2012b). Quality assurance (QA) and quality control (QC) testing for grain size was conducted on the backfill during the project; laboratory testing results for the QA/QC samples are presented in Appendix C.

The following is a summary of the backfill material placed during CS3:

- Approximately 18,000 tons of initial backfill material was placed.
- Approximately 93,000 tons of intermediate backfill was placed.
- Approximately 78,600 tons of final backfill was placed within the DSOA and Slip 4.

Four flat-decked material barges (ITB 140, KP-1, KP-2, and KP-3) were used to transport backfill from either CalPortland's Seattle facility or Slip 4 to the placement location. During the 2014/2015 dredge season, a potential scheduling issue was identified related to loading all material barges solely at CalPortland's Seattle facility. To address the potential scheduling issue, Initial and Intermediate Backfill material was hauled from a source pit in Shelton to the CalPortland facility on the Duwamish Waterway, where the material was offloaded to shore. CalPortland then either reloaded the backfill material onto project barges or trucked material to Slip 4, where it was stockpiled for use as backfill at the site.

3.5 BEST MANAGEMENT PRACTICES

BMPs for dredging operations on this project were outlined in the *Final Design Report* (AMEC et al. 2012a). These BMPs were developed to reduce suspension of sediment into the water column and generation of post-dredging residuals to the extent practicable.

Dredging proceeding from upstream to downstream (roughly south to north for the Duwamish Waterway) was adopted as a BMP to reduce the potential for recontamination in a flowing waterway. Ideally, this would have meant starting dredging during the first construction season at the southern DSOA limit adjacent to the Jorgensen Forge Cleanup Area (Figure 1), and then continuing through the project area from south to north. However, due to potential conflicts with the South Park Bridge project, the T117 Cleanup Area (Figure 1) project across the Duwamish Waterway, and the Jorgensen Forge Cleanup Area project immediately adjacent to the southern (upstream) limit of the DSOA, work at the southern limit of the DSOA was not practicable during CS1 or CS2. Work at the T117 Cleanup Area was performed during the same time period as the CS2 work, requiring coordination between the projects. Due to the potential for conflicts with work in the T117 and Jorgensen Cleanup Areas, dredging during CS2 started approximately 650 feet downstream from the southern limit of the DSOA and then proceeded to the north (downstream). The most upstream portion was then dredged during CS3 (Figure 3).

Based on results of monitoring conducted during CS1, CS2, and CS3, the project BMPs appear to have provided the intended effect of limiting resuspension and residuals. See Sections 6.2 and 9.0 for information that supports this conclusion.

The use of the environmental-style Young's bucket with precision GPS mounted on an excavator appeared to reduce the loss of sediment from the bucket during dredging, prevented the dredge bucket from being overfilled, and reduced the total amount of sediment dredged, because it was possible to make cuts that were much more precise than those made using a clamshell bucket. In addition, the placement of initial backfill immediately after the AU was approved decreased the potential for any residual layer that may have been present to be mobilized.

Water quality monitoring was conducted to identify potential dredging problems so that adaptive management techniques could be implemented to rectify any water quality issues being caused by the construction. Water quality monitoring for the dredging operations included active compliance monitoring within the working area of the equipment (Section 6.2). During compliance monitoring, the sampling crew was able to document a potential exceedance of conventional water quality parameters and immediately bring it to the attention of the dredging contractor so that the situation could be responded to promptly.

Additionally, two full-time automated stationary monitoring instruments were located near each end of the dredge area (Section 6.6; Figure 2). Data transmitted from these instruments documented several very short-term increases in turbidity on the upstream and downstream instruments. Many of these short-term transient increases were a single turbidity measurement (5-minute intervals) that could not be tied to a specific dredging activity. Other longer duration increases in turbidity were attributed to construction operations, most commonly to the backfilling activities or general river flow conditions.

During CS1, some short-term increases in turbidity could be attributed to barge movements (tugboat propeller surges during barge movements in shallow water appeared to be the cause). As a result, during the later portion of CS1 and during CS2 and CS3, the contractor restricted tugboat movements to deeper water and moved the dredging activities to deeper water sooner in the tidal cycle to minimize propeller wash.

4.0 TRANSLOADING OF DREDGE SEDIMENTS

Dredge material from the DSOA and Slip 4 was initially transported by barge to the Lafarge Cement facility for transloading, where it was stabilized and transferred for shipment to Waste Management Inc. for disposal. During CS3, a total of approximately 117,000 tons of sediment from the DSOA and Slip 4 was offloaded from barges, stabilized, placed in railcars, and sent by rail to the Waste Management, Inc., solid waste landfill in Oregon for disposal. A total of 335 barge loads were offloaded during CS3 (approximately 350 tons per barge average). Waste tickets for the materials sent to the landfill are included in Appendix D. A copy of the waste profile is also included in Appendix D.

This section describes transload procedures for dredge material from each of the dredging areas during CS3.

4.1 DSOA DREDGE MATERIAL

The transload facility used during CS3, which was also used for CS1 and CS2, is located at the Lafarge Cement Plant at 5400 West Marginal Way Southwest in Seattle, Washington, on the west shore of the Duwamish Waterway. The facility is just south of Kellogg Island, and is designed to receive bulk materials via barge, railcar, or truck. As such, the Lafarge facility was equipped for the offloading of sediment from barges, the stabilization of sediment using cement kiln dust or cement, and the loading of stabilized sediment onto railcars for off-site disposal.

4.1.1 Transload Facility Description

The main offloading dock is approximately 900 feet long and serviced by a large track-mounted crane capable of unloading 150 tons of material per hour. The waterfront crane utilizes an 8 cy clamshell bucket to unload sediment from the barges. The excavated sediment from each barge was placed in a concrete containment vault that was 68 feet wide, 186 feet long, and 12 feet deep, and had a capacity of 5,600 cy (1.1 million gallons) or approximately 8,000 tons of wet material.

The wet sediment in the vault was then stabilized with cement kiln dust or cement to absorb the excess free water prior to loading the sediment into railcars. For CS3, the operator performed the sediment stabilization in a similar fashion as done during CS1 and CS2, performing stabilizing and mixing within a corner of the larger vault. Once stabilized, sediment was removed from the vault and placed into a rehandling area just outside the vault, where front-end loaders could then pick up material and carry it to lined, staged railcars (gondola cars) for transport to landfill. Liners were placed in the railcars prior to placement of the stabilized sediment, and these liners were wrapped over the top of the sediments in an approach referred to colloquially as a “burrito wrap.”

4.1.2 Stormwater Management

Stormwater in the area where barges were offloaded and material was transferred to railcars was segregated from stormwater generated from the rest of the Lafarge facility. The segregated stormwater, was captured, treated, and discharged to the King County publicly owned treatment works (POTW) under a King County Minor Discharge Authorization (No. 919-01). The Lafarge facility also has a King County Solid Waste Permit (PR0034434), a National Pollutant Discharge Elimination System permit (WA0002232), and an Ecology-approved Stormwater Pollution Prevention Plan.

The stormwater treatment system consisted of a series of holding tanks, sand filters, bag filters, and granular activated carbon (GAC). The King County discharge authorization required Lafarge personnel to routinely sample all treated stormwater prior to discharge, and analyze the samples for PCBs. Routine sampling was performed by Waste Management/Lafarge personnel in accordance with a *Sampling and Analysis Plan and Quality Assurance Project Plan* (Waste Management, Inc. 2013). No violations of discharge requirements were recorded. Copies of the analytical reports are included in Appendix D. A total of approximately 2,150,500 gallons of water was discharged from the Lafarge facility during CS3 (Appendix D).

4.1.3 Best Management Practices

The Lafarge facility employed BMPs for offloading material from barges, placing and stabilizing sediment in the containment vault, and transferring the sediment to the railcars, where the material was contained within a liner “burrito wrap.” The barges were docked adjacent to the containment vault, and a spill apron was extended over the barge so that any spills during transfer of sediment from the barge to the dock would fall back into the barge. The offloading area between the barge and vault was covered with Visqueen so that any incidental drips or spills could be cleaned up quickly and efficiently. A full-time spotter was present during unloading to help guide the crane operator and to spot potential problems, such as debris in the bucket. In addition, the Boeing engineering team employed a full-time observer at the transload facility to record tonnage offloaded, coordinate barges between the transload facility and dredging operation, and identify and address environmental concerns or issues.

4.2 EARLY REMOVAL AREA DREDGE MATERIAL

Dredge material removed from the ERAs was placed into a slurry box using the mechanical dredge. This material was segregated in the slurry box. The fine-grained material was pumped to the DRWS, while the gravel-sized material was loaded into double-bagged super sacks, which were offloaded from the barge onto Boeing property and then later trucked directly to the disposal facility. The solids that were pumped to the DRWS were segregated at the TriFlow™ and the first leg of the settling basin (see Section 5.2). These solids were processed separately from the rest of the dredge material, loaded into trucks, and hauled directly to the disposal facility.

All methods and disposal performed for the ERA dredging was done in accordance with the TSCA RBDAs issued by the EPA.

4.3 SLIP 4 DREDGE MATERIAL

Dredge material removed from Slip 4 was transferred to the same transload facility and handled in the same manner as dredge material from the DSOA, as described in Section 4.1.

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5.0 DREDGE RETURN WATER PROCESSING

The DRWS began water treatment for CS3 on September 24, 2014, and completed water treatment on March 6, 2015. The DRWS operated during CS3 in two main phases of operation:

- DSOA dredging and
- ERA dredging (for areas with PCB concentrations greater than 50 mg/kg; Figure 3).

The DRWS for CS3 operated on the Plant 2 uplands just north of the 2-81 Building.

The DRWS was designed to treat from 250 to 800 gallons per minute (gpm) of dredge return water. The DRWS comprised the following components, listed in order of water flow (Figure 4, Figure 5, and Figure 6):

- A shaker screen system called a Tri-Flo™ (maximum flow of 2,000 gpm) used a series of shaker screens to remove the coarse fraction (debris, gravel, and sand down to 120 mesh sieve size, approximately 125 microns) directly from the water in the dredge water return influent pipeline (Figure 5).
- A large volume settling basin (approximately 2 million gallons) removed the easily settleable solids (heavy sands and silts) still entrained in the water and provided surge capacity during dredging operations (Figure 4).
  - Settled solids in the first leg of the settling basin were mechanically removed by long-reach excavator as they accumulated. These solids were placed into a sealed dump truck and dumped into the sediment processing area (SPA; Figure 4).
  - The sediments in the SPA were further dewatered over a period of several days, mixed with stabilizer (as necessary), and loaded onto trucks for off-site disposal at an appropriately designated facility.
- An 800 gpm electro-coagulation (EC) treatment system consisted of dual 400 gpm units that used an electrical charge designed to coagulate and flocculate the fines (Figure 6).
- A three-chambered defoam tank (approximately 18,000 gallons with under over weir configuration) allowed flocculent to form after EC treatment.
- A 44-foot-diameter rake bottom clarifier (approximately 140,000 gallons) was used to settle out flocculated material in sludge that consisted of approximately 1 percent solids.
- A post treatment tank (approximately 20,000 gallons) was used to buffer surges and provide a constant water stream to the polishing step.
- A turbidity recycle valve directed water back to the settlement basin for retreatment when turbidity of water in the post-treatment tank was greater than 25 nephelometric turbidity units (NTUs).

- A polishing step consisted of the following elements:
  - Two sand filters (1,280 gpm total, 640 gpm each) in parallel to remove any remaining large particulate in the water stream;
  - Two bag filters (1,200 gpm total, 600 gpm each) in parallel with 1 micron filter socks; and
  - Two GAC skids containing two 10,000 pound canisters (1,000 gpm total, 500 gpm each) operated in series to remove any dissolved organic constituents in the water, including PCBs.
- A pH/turbidity recycle valve recycled water back to the settlement basin when the pH at the system discharge differed from pH in the Duwamish Waterway by more than 0.5 standard unit.
- The solids-handling step consisted of the following elements:
  - Two sludge-thickening cone tanks (approximately 20,000 gallons each) to thicken sludge from the clarifier containing 1 percent solids to 5 to 10 percent solids;
  - A sludge pump that pumped the thickened sludge back to the head of the settling basin, for mechanical removal with the heavy sands.

Figure 5 and Figure 6 show the DRWS flow diagram and layout at the start of CS3. All components of the DRWS were situated inside secondary containment.

During CS3, there were 100 days when the DRWS operated normally, 7 days of limited operations due to ERA dredging recirculation requirements and operational issues, and 9 days when the system did not operate due to lack of need (either no dredging was performed that day or the settling basin was at a low enough level that processing was not required at that time).

During CS3, a total of approximately 45,400,000 gallons of water were processed by the system, and approximately 28,600,000 gallons were treated and discharged to the Duwamish Waterway. The difference between process volume and discharge volume is the additional water volume recirculated back to the settling basin during daily system startup, recirculation due to double treatment of water produced during ERA dredging, and water generated during maintenance operations on the system.

During both DSOA and ERA dredging, the DRWS successfully treated water to meet water quality criteria at the discharge point.

5.1 DSOA DREDGING

DSOA dredging during CS3 consisted of mechanical dredging as performed during CS1 and CS2 and a short period of diver-assisted hydraulic dredging that occurred between January 5 and February 9,

2015. Hydraulic dredging was performed in order to reach the contaminated sediments under the newly finished South Park Bridge (which precluded use of the mechanical dredge under the bridge).

On average for the mechanical dredging, the water produced was about equal in volume to the sediment removed. However, the amount of water generated at any specific time varied significantly. A full dredge bucket of sediment entrained relatively small volumes of free water. The initial dredge cuts typically consisted mostly of sediment with little water. However, material generated during deeper subsequent cuts typically consisted of less than a full bucket of sediment, with the rest water. Final shallow cleanup cuts consisted mostly of water. The mechanical dredging crew used a large pump on the sediment barge to pump the accumulated water via 6-inch high-density polyethylene (HDPE) pipe to the DRWS on the shoreline.

On average, the ratio of water to sediment was much higher for hydraulic dredging than for mechanical dredging, with solids content ranging from 5 to 10 percent. Divers manually directed suction hoses to pick up a mixture of sediment and water (consisting of roughly 5 to 10% solids). This mixture was then pumped through 6-inch HDPE pipe to the DRWS on the shoreline.

In addition to variation in flow rate to the DRWS, the turbidity and type of sediment entrained in the water were highly variable, depending on where in the Waterway dredging was being performed. Because the amount and contents of the water generated at any specific time was highly variable, the DRWS was designed to buffer this variability with a large settling basin and a scalable treatment system.

5.1.1 System Operation

The DRWS was operated as needed to support dredging operations. Due to the treatment capacity of the system, the capacity of the settling basin, and typical dredge water production rates from the dredge, it was generally possible to run the DRWS (excluding the Tri-Flo™) for only one shift per day to support two shifts of dredging. The system was typically operated for a single 10-hour shift, six days a week (approximately 8 AM to 5:00 PM), but during some weeks, the system was operated over two shifts (approximately 4:30 PM to 2:30 AM) or three shifts (24 hour operations) to accommodate higher water flow rates due to storm events or high rates of water production from dredging (hydraulic dredging or final shallow cut dredging). Typically, the Tri-Flo™ was manned and operational during all dredging shifts. When the rest of the DRWS was not operating, the Tri-Flo™ would remove bulk solids and pump the screened water to the settling basin for storage until final processing the following day.

The DRWS operated at limited capacity for the first two days of DSOA dredging due to startup and troubleshooting of equipment. These issues did not slow or restrict dredging due to the retention capacity of the settling basin. Nor did these issues result in any exceedance of water quality criteria.

5.1.2 Best Management Practices

BMPs for the water processing system consisted of good housekeeping practices within the area of the system and monitoring requirements in accordance with the *Water Quality Monitoring Work Plan* (AMEC et al. 2012c). Sampling of the GAC vessels for breakthrough was performed bi-weekly to check that the lead GAC vessels were effectively removing PCBs. Breakthrough was not reached during CS3; the results for the breakthrough sampling are provided in Appendix E.

As a condition of the use of the settling basin, EPA required that water levels be measured around the perimeter of the basin as well as within the basin to detect potential leaks. Eight well points (piezometers) were installed between the liner and ecology block wall around the perimeter of the settling basin, and water levels were measured weekly (Figure 6). Water levels within the basin were recorded daily. Measurements indicated the settling basin performed according to the design specifications during in CS3. Table 3 shows data collected from the monitoring points during CS3.

5.1.3 System Modifications

Several modifications were made to the DRWS prior to CS3. These modifications were made to increase the average flow capacity of the system and improve reliability. The modifications and timing of installation are provided below:

- Prior to mobilization for CS3:
  - A complete rebuild was performed on the Tri-Flo™ unit to increase throughput of the unit and improve performance.
  - Additional design improvements were considered by the design team.
- During mobilization for CS3:
  - Pulleys on the post-treatment tank discharge pump were replaced to increase the pressure head of the pump, effectively increasing overall throughput.
  - Small bubble diffusers were installed in the defoam tank to improve aeration compared to CS2.
  - A variable-frequency drive was installed for the clarifier rake to allow for adjustment of rake speeds internal to the clarifier.
  - Modifications were made to the influent piping of the clarifier to improve energy dissipation in the stilling well and to reduce breaking of flocculated particles.
  - A turbidimeter was added at the pH recycle valve (after the activated carbon units, but before the final water quality monitoring point). This addition increased quality control for water discharged by the system as the system would automatically change to recirculation mode if any spikes in turbidity were detected.

- During the operational period of CS3:
  - The polyvinyl chloride piping between the discharge of the EC trailers and the defoam tank was increased from 4-inch to 6-inch piping to reduce the head pressure and increase flow rates through the EC trailers.
  - Several repairs were made to a leaking activated carbon unit. After the first leak was reported and repaired (a patch was welded onto the unit), a sheet of Visqueen was hung around the unit so that additional leaks could be detected while protecting workers from spraying water.
  - All other repairs and modifications involved routine operation and maintenance of system equipment.

5.2 EARLY REMOVAL AREA DREDGING

Amec Foster Wheeler, DOF, Boeing, EPA, and Ecology held several meetings and conference calls at the end of September and start of October 2014 to devise BMPs for ERA dredging. As a result of those communications, a memorandum ("Sampling during Dredging of the Early Removal Areas") dated October 7, 2014, was provided to EPA and Ecology. This memorandum detailed the preparations and modifications needed to properly manage dredging of ERAs and treat dredge return water that could carry sediments containing greater than 50 mg/kg of PCBs.

However, ERA dredging did not occur in one solid block of time as initially planned. ERA dredging started and stopped over several weeks between October 27 and December 12, 2014. As a result, while the overall procedures remained the same, the following modifications were agreed to via email communications with EPA and Ecology:

- Water recirculation and sampling prior to discharge:
  - For every period of ERA dredging, the total volume of ERA water in the basin was measured.
  - The DRWS was set to recirculation mode for the start of each ERA dredging period. Once one complete volume of ERA water had been treated, a sample was taken from the recirculation pipe downstream of the GAC units and submitted to the lab for rapid-turnaround PCB analysis by EPA Method 8082.
  - Once PCB results confirmed that water met the PCB water quality criteria (Section 6.3.2), the DRWS was switched from recirculation mode to discharge to the Duwamish Waterway.
  - After four rounds and four sampling results with no detections of PCBs, EPA and Ecology approved discharge for the remaining water from ERA sediments to the Duwamish through the DRWS (November 18, 2014).
  - Monitoring on the DRWS was performed according to intensive monitoring requirements (i.e., a sample was collected, but if turbidity was less than 5 NTUs, no samples were sent to the laboratory) for the remainder of ERA dredging. Turbidity never exceeded 5 NTUs, so no additional laboratory samples were analyzed.

- Management of bulk sediments under the Toxic Substances Control Act (TSCA):
  - Bulk solids derived from the ERAs were collected from the Tri-Flo™ and the first leg of the settling basin (Figure 6).
  - Solids were dewatered and stabilized following standard DSOA DRWS operations described above. However, ERA sediments were segregated and kept in their own containment areas separate from any standard DSOA sediments.
  - Stabilized solids were loaded into lined trucks for disposal at an appropriately designated off-site facility.

- Return to standard DSOA operations:
  - The complete volume of ERA water must be treated and discharged as noted above prior to return to standard operations.
  - TSCA bulk sediments from the Tri-Flo™ and the first leg of the setting basin must be removed from the Tri-Flo™ and settling basin prior to return to standard operations.

The DRWS was operated as needed to support ERA dredging operations. During the first four rounds of ERA dredging, the system was typically operated for two shifts (approximately 4:30 PM to 2:30 AM), but occasionally operated for three shifts, 24 hours per day, to accommodate higher water flow days due to storm events or recirculation periods. Once the recirculation requirement was dropped, the DRWS was typically operated for one standard 10-hour shift, six days per week.

The DRWS operated with a limited discharge capability for the first five days of ERA dredging in October and November due to the ERA recirculation requirements.

5.3 SLIP 4 DREDGING

The same DRWS used for DSOA dredging was used for dredging of Slip 4, as described in Section 5.1.

6.0 WATER QUALITY MONITORING

Water quality monitoring was conducted pursuant to Ecology Water Quality Certification (Order #9623 and U.S. Army Corps of Engineers' Permit NWS-2011-0384) and the EPA- and Ecology-approved *Water Quality Monitoring Work Plan* (AMEC et al. 2012c).

Water quality monitoring was conducted during:

- Shoreline excavation of the Southwest Bank (see Section 2.0 for a description of the work),
- DSOA dredging (including Early Removal Area Dredging), Slip 4 dredging, and backfilling (see Section 3.4 for a description of the work),
- Discharge of dredge return water from the DRWS, and
- Slip 4 sheetpile removal (see Section 3.2.3 for a description of the work).

A description of the water quality monitoring activities conducted during CS3 for the Southwest Bank re-excavation, the DSOA and Slip 4 dredge monitoring, the dredge return water monitoring, the final backfill monitoring, and the Slip 4 sheetpile removal monitoring are presented in Sections 6.1, 6.2, 6.3, 6.4, and 6.5, respectively. Table 1 provides a schedule of the activities conducted during the Southwest Bank re-excavation in CS3. Table 2 provides a schedule of activities during the dredging and final backfilling within the DSOA and Slip 4 in CS3.

Table 4 lists the days water quality monitoring was conducted during CS1, CS2, and CS3 and lists the water quality samples analyzed during the dredge monitoring (including the Southwest Bank re-excavation). Table 4 also summarizes the results of the chemical testing and the samples used to determine chemical compliance. Table 5 lists the monitoring days with one (or more) confirmed turbidity exceedances and the largest observed turbidity difference between a monitoring station and the corresponding ambient station. Table 5 provides data from CS1 and CS2 in addition to the results from CS3.

Prior to the start of dredging in the DSOA, water quality instruments were installed upstream and downstream of the DSOA to record in situ water quality parameters (Section 3.2.1). A description of the monitoring conducted using the in situ instruments is presented in Section 6.6. These in situ water quality measurements are presented in Appendix F. These instruments, although not required by EPA, were used to provide continuous monitoring of near-surface water conditions upstream and downstream of the active construction area during times when active compliance monitoring was not being conducted.

6.1 SOUTHWEST BANK RE-EXCAVATION MONITORING

Prior to the start of in-water activities during CS3, Boeing submitted a technical memorandum to EPA and Ecology (AMEC 2014) covering additional field procedures for water quality monitoring during nearshore excavation and reconstruction of the Southwest Bank shoreline. When the *Water Quality Monitoring Work Plan* (AMEC et al. 2012c) was originally developed, in-water dredging from the shoreline was not anticipated, and selection of suitable monitoring stations and ambient stations was not covered in detail. Appropriate monitoring locations were selected based on discussions with Ecology and EPA.

Surface river flows and tidal flows on incoming tides were considered in the selection of suitable monitoring stations and ambient stations during each round of monitoring. Monitoring stations were established at nearshore (referred to as “inshore”) and offshore locations to capture possible offshore movement of turbidity generated during nearshore in-water activities.

During the Southwest Bank re-excavation work at Plant 2, dredging and backfilling were being conducted concurrently at the Jorgensen Cleanup Area just upriver of the Boeing site. The proximity of the Jorgensen cleanup activities made identifying the cause of any exceedances of the turbidity criterion problematic.

Water quality monitoring during shoreline excavation was conducted on 10 of the 16 days of nearshore excavation (August 5, 2014, through August 22, 2014). Monitoring activities and results are summarized in Table 1. Intermediate backfill was placed between August 22 and August 29, 2014. A single round of routine water quality monitoring was conducted during placement of intermediate backfill on August 25, 2014. The results of the monitoring are presented below.

6.1.1 Results of Conventional Parameter Compliance Monitoring

Daily water quality monitoring reports are provided in Appendix G, and the conventional water quality results are summarized in Table 1.

No exceedances of conventional water quality criteria were observed during the 11 days of monitoring. Intensive monitoring was conducted for seven days from August 5 through August 11, 2015. Routine monitoring began August 12, 2014, after consultation with EPA and Ecology.

6.1.2 Results of Chemical Analysis of Water Samples

During the seven days of intensive water quality monitoring (August 5 through August 11, 2015), samples were collected and analyzed for the chemicals of concern (COCs) identified in the *Water Quality Monitoring Work Plan* (PCBs; dissolved cadmium, chromium, copper, lead, mercury, silver,

zinc; and total mercury) (AMEC et al. 2012c): The results of samples analyzed for chemical compliance are provided in Table 6.

The dissolved metals (and total mercury) results from the dredge monitoring water quality samples (BP2WQ-0416, BP2WQ-0434, and BP2WQ-0454) submitted during the initial week of intensive monitoring were all below the applicable chronic and acute water quality criteria shown in Table 6. The sample collected on the first day of intensive monitoring (BP2WQ-0416) had levels of total PCBs greater than the applicable chronic criterion, triggering the analysis of additional archived water samples, as described below. The sampling was conducted during debris removal and on a flood tide. All monitoring was conducted outside of the debris boom placed around the work area.

The concentration of total PCBs in sample BP2WQ-0416 was greater than the chronic criterion; however, this result does not represent an exceedance of the water quality criterion, because the point of compliance for the chronic criterion was identified in the *Water Quality Monitoring Work Plan* (AMEC et al. 2012c) as 300 feet from dredging operations.

Four samples collected on August 5, 2015 were analyzed for PCBs (Table 6), and the arithmetic mean of the sample results was calculated. Non-detected results were assigned a value of half of the reporting limit when calculating the mean concentrations. The mean concentration of total PCBs from stations 300 feet upriver of dredging was 0.043 micrograms per liter (µg/L), which was greater than the chronic criterion of 0.03 µg/L.

Because the water quality criterion for total PCBs is based on a 24-hour average concentration, additional samples collected on August 6, 2014 (approximately 24 hours later), 300 feet from the dredging activity, were analyzed for PCBs, and the results were averaged (Table 6). The mean concentration of total PCBs in samples collected 300 feet from the dredging activity on August 6, 2014, was 0.019 µg/L (Table 6). When combined with the average concentration for August 5, 2014, the mean total PCB concentration was 0.031 µg/L, which was still greater than the chronic criterion of 0.03 µg/L. Turbidity associated with the initial phases of the nearshore debris removal along the Southwest Bank shoreline was identified as the probable source of the elevated PCBs. Although the 24-hour average PCB concentration was slightly above the chronic water quality criterion, the elevated average concentration was driven by samples collected on August 5, 2014; samples analyzed from the following day (August 6, 2014) were all below the chronic criterion. Based on the log of field activities conducted during the Southwest Bank excavation, there did not appear to be any debris removal during excavation on August 6, 2014. These data suggest that the exceedance of the chronic PCB criterion was of a relatively short duration (less than 24-hours). In addition, samples collected on August 7, 2014 and August 9, 2014 were below the chronic PCB criterion.

Field-duplicate water samples (BP2WQ-0436 and BP2WQ-0437) collected August 7, 2014, were submitted to the analytical laboratory as quality assurance samples. The filter blank (BP2WQ-0439) and rinsate blank (BP2WQ-0438) were prepared using deionized water provided by the analytical laboratory as quality assurance samples. The results for the field-duplicate samples and the filter and rinsate blanks are presented in Table 6.

6.2 DREDGE MONITORING

Dredge monitoring was conducted in accordance with the *Water Quality Monitoring Work Plan* (AMEC et al. 2012c) and in consultation with EPA and Ecology. Dredge monitoring was conducted on 51 of the 103 days of dredging, as summarized in Table 4.

Limited dredge monitoring was conducted during hydraulic dredging in the areas under the South Park Bridge inaccessible to the barge-mounted excavator. A majority of the material hydraulically dredged originated from areas immediately adjacent to the South Park Bridge footings. The diver-operated suction dredge did not use a cutter head assembly, and turbidity associated with the suction dredging was limited. Monitoring of hydraulic dredging was conducted on January 6 and January 8, 2015, in consultation with EPA and Ecology. No exceedances of conventional water quality criteria occurred, and no discernible turbidity plume associated with the hydraulic dredging was observed. No further monitoring of hydraulic dredge operations was conducted, as approved by EPA and Ecology.

Results of water quality monitoring conducted during dredging within the DSOA (including dredging in the Early Removal Areas and hydraulic dredging) and Slip 4 are summarized below.

6.2.1 Results of Conventional Parameter Compliance Monitoring

The daily water quality monitoring reports are provided in Appendix G and the conventional monitoring data are summarized in Table 4. Table 5 presents the results of turbidity monitoring during CS3, as well as during CS1 and CS2, on days when there was a turbidity exceedance. Multiple rounds of water quality monitoring were conducted on some days when there was an exceedance of the turbidity criterion.

When monitoring values greater than the applicable water quality criterion (shown in red type in Appendix G) are recorded, an exceedance of the applicable water quality criteria is not confirmed until the station has been reoccupied and the values confirm the exceedance (AMEC et al. 2012c). None of the monitoring data exceeded the conventional water quality criteria during 45 of the 51 days of monitoring. Confirmed exceedances of the turbidity criterion that were attributable to dredging occurred on six of the days during CS3 when dredging was being monitored (Table 5). With the completion of the dredging in Slip 4 on February 20, 2015, dredge monitoring was complete for the project.

6.2.2 Results of Chemical Analysis of Water Samples

During the first week of intensive water quality monitoring, three representative samples—BP2WQ-0485, BP2WQ-0543, and BP2WQ-0559—were collected and analyzed for the COCs identified in the Water Quality Monitoring Work Plan (dissolved cadmium, chromium, copper, lead, mercury, silver, and zinc; total metals; and PCBs; Table 4). Intensive water quality monitoring (including analysis of additional representative samples) was also conducted during dredging in selected Special Areas and Early Removal Areas (Table 4). Water samples collected from compliance stations with turbidity exceedances were also analyzed. Additional archived samples were analyzed as appropriate to confirm that concentrations of COCs were below the applicable chronic and acute water quality criteria. The samples analyzed for chemical compliance during dredging are listed in Table 4. The results of these analyses are presented in Table 7.

The dissolved metals (and total mercury) results from the dredge monitoring water quality samples submitted during intensive monitoring and following subsequent turbidity exceedances were all less than the chronic and acute water quality criteria except for one sample (BP2WQ-0822; collected on February 18, 2015) that exceeded the chronic copper criterion (3.1 µg/L); however, this result was not considered an exceedance, since the point of compliance for the chronic criterion was identified in the *Water Quality Monitoring Work Plan* (AMEC et al. 2012) as 300 feet from dredging operations and the chronic criterion for metals is based on a 4-day average. The near-bottom sample collected on February 18, 2015 at 300 feet upstream of the dredging operation was not analyzed for dissolved copper due to an oversight. A sample collected on February 17, 2015 was analyzed for dissolved metals, including copper. The mean of the copper results from the February 17 and February 18, 2015, samples, was 2.47 µg/L. Both samples were collected near-bottom at 150 feet upstream from the dredging activities (during an incoming tide) in Slip 4. Although a comparison of the dissolved copper results at 300 feet against the chronic criterion cannot be done, the mean of the sample results available from 150 feet upstream of the dredging operations (on an incoming tide) suggests that dissolved copper would have been below the chronic criterion.

Total PCBs in several of the samples collected as representative samples during dredge monitoring (including Special Areas and Early Removal Areas) were greater than the chronic criterion; however, these results did not represent an exceedance of the water quality criterion, since the point of compliance for the chronic criterion was defined in the *Water Quality Monitoring Work Plan* (AMEC et al. 2012c) as the average concentration at a distance of 300 feet (both upstream and downstream, near-surface and near-bottom) of the dredging activity. The additional samples analyzed for chemical compliance during dredging are listed in Table 4. The results of these analyses are presented in Table 7. During CS3, there were no exceedances of the PCB chronic water quality criterion that were attributable to dredging.

6.3 DREDGE RETURN WATER MONITORING

All dredge return water monitoring was conducted in accordance with the *Water Quality Monitoring Work Plan* (AMEC et al. 2012c) and in consultation with EPA and Ecology. Dredge return water quality was monitored in two ways:

- Conventional parameters were measured and logged using an automated water quality instrument installed in the DRWS discharge line.
- Water samples were collected for chemical analysis during selected dredging activities.

6.3.1 Results of Conventional Parameter Monitoring

An automated water quality instrument installed in the discharge line of the DRWS was used to measure and record conventional parameters every 30 seconds or every minute while the DRWS was discharging to the Duwamish Waterway. Results from conventional parameter monitoring were recorded for 107 of the 108 days of normal or limited operation (Table 8). Data on the conventional parameters were not logged on October 23, 2014, due to an unknown error during the electronic data logging. Table 8 presents the average (arithmetic mean) value for each conventional parameter over the period of time the plant was discharging during the 24-hour period starting in the morning of each work day that the DRWS system was discharging. The mean of the conventional parameters from the water quality instrument installed in the discharge line was compared to the mean of the same parameters (except for turbidity) measured by the upstream (ambient) in situ instrument during the period that the plant was discharging (Table 8). The water quality criterion for turbidity from the discharge line was 5 NTUs and was not compared to the ambient turbidity for compliance. During monitoring of turbidity in the dredge return water, no exceedances of the turbidity criterion occurred (see Table 8).

6.3.2 Results of Chemical Analysis of Water Samples

Samples of water discharging from the DRWS were collected during periods of intensive monitoring and routine monitoring, as described in the *Water Quality Monitoring Work Plan* (AMEC et al. 2012c). Table 2 indicates periods of routine and intensive monitoring of discharge water from the DRWS.

DRWS water quality discharge samples (Table 9) were analyzed based on the criteria specified in the *Water Quality Monitoring Work Plan* (AMEC et al. 2012c) and in consultation with EPA and Ecology. Representative samples of the DRWS just prior to discharge to the waterway were collected during DSOA dredging, dredging in the Special Areas, and dredging in the ERAs. The results for all of these analyses are presented in Table 10. Results for dissolved metals, total mercury, and total PCBs from all of these samples were below the chronic water quality criterion.

Four additional samples (TSCA-GAC-1 through TSCA-GAC-4; Table 10) were collected from the system after recirculating the total volume of the DRWS process water through the system. The samples were analyzed for total PCBs (Table 10). Total PCBs were all below the chronic water quality criterion. Following a review of the results from the sampling conducted during the dredging of the Early Removal Areas, EPA and Ecology approved direct discharge for the remaining process water from the ERA sediments (November 18, 2014).

6.4 BACKFILL MONITORING

Monitoring of final backfill placement was conducted in accordance with the *Water Quality Monitoring Work Plan* (AMEC et al. 2012) and in consultation with EPA and Ecology. Backfill monitoring was conducted on 32 of the 37 days of final backfill placement, as summarized in Table 4. Monitoring was also conducted during placement of intermediate backfill in the vicinity of the South Park Bridge on February 14, 2015, and in Slip 4 on February 24, 2015. The daily water quality monitoring reports are provided in Appendix G, and the conventional water quality results are summarized in Table 4.

No exceedances of conventional water quality criteria occurred on 19 of the 32 days of monitoring during final backfill placement (Table 4). Confirmed exceedances of the turbidity criterion that were attributable to final backfilling occurred on 13 of the days when final backfill placement was being monitored (Table 5). Confirmed exceedances of the turbidity criterion that were attributable to placement of intermediate backfill occurred on two days (February 14 and February 24, 2015; Table 5).

Measured turbidity at a compliance station was greater than 59 NTUs over the background during the placement of the final backfill within the DSOA on February 4, 2015 (83 NTUs versus ambient 3.3 NTUs at near-bottom station 150 feet downstream), and during placement of the intermediate backfill in Slip 4 on February 24, 2015 (87 NTUs versus ambient 4.4 NTUs at near-bottom station 150 feet downstream) (Table 5). Additional monitoring was conducted at a location 800 feet from the backfilling operation as a condition of the U.S. Fish and Wildlife Service Biological Opinion for the project. On both occasions, the turbidity measured at a distance of 800 feet was less than 18 NTUs over the background (see Appendix G). Additional monitoring was not required.

At the request of Ecology, additional monitoring of turbidity plumes associated with placement of backfill material was undertaken on five separate occasions (February 4, February 5, February 13, February 14, and February 23, 2015). Figures showing the results of the additional monitoring of the turbidity plumes is included in Appendix G.

6.5 SLIP 4 SHEETPILE REMOVAL MONITORING

Prior to additional dredging in Slip 4, sheetpiling was installed along a portion of the shoreline to stabilize the shoreline and along the property lines to the east and north of the dredge area to avoid

impacting sediments on the adjacent properties. The sheetpiling was installed over multiple days during daylight working hours. After completion of dredging and placement of backfill, the sheetpiling was removed in sections.

Ecology requested that water quality monitoring be conducted during removal of the sheetpiling along the shoreline and property line. A separate Slip 4 *Water Quality and Sediment Monitoring Work Plan* was submitted to Ecology and EPA on February 6, 2015 (AMEC et al. 2015), to outline the water quality monitoring procedures for sheetpile removal. Water quality monitoring of the sheetpile removal was conducted twice daily on four days and once a day on one day (Appendix G). No exceedances of the conventional water quality parameters were recorded during monitoring of the sheetpile removal (Table 4).

6.6 IN SITU WATER QUALITY INSTRUMENTS

Water quality instruments were installed on piles in the Duwamish Waterway upstream and downstream of the DSOA remedial dredging area on September 18, 2014. Installation of these instruments was not required by EPA, but were used to provide continuous monitoring of near-surface water conditions upstream and downstream of the active construction area during times when active compliance monitoring was not being conducted. The locations of the installed instruments are labeled “upstream in-situ” and “downstream in-situ” on Figure 2. The instruments, installed approximately 2 to 3 feet below the water surface, recorded data for the following parameters:

- temperature in degrees Celsius (°C),
- salinity in parts per thousand (ppt),
- pH (unitless),
- dissolved oxygen in milligrams per liter (mg/L), and
- turbidity in NTU.

Instruments began recording these parameters on the morning of September 19, 2014. Each of these parameters was measured every 5 minutes, and the values were downloaded every 15 minutes to a website accessible to the public. The instruments ceased recording data at the end of construction on March 5, 2015.

The water quality instruments occasionally recorded anomalous data. These anomalous data occurred when the instrument was out of the water (during maintenance or when the instrument and the surface float became stuck in the stilling well), when sensors malfunctioned or recorded transient phenomena, or when there were problems or interruptions in data transmission. In consultation with

EPA, rules were applied for displaying data in the water quality graphs on the web page. Based on these rules, data were not displayed on the website when:

- The depth of instrument was less than 1 foot (the instrument was out of the water or was being serviced);
- Any parameter returned a result of -99 (logger was not sending data);
- A turbidity reading (representing a 5-minute interval) was greater than a 1,000 percent difference in turbidity between the next AND previous records;
- pH was <5 or >9 (the instrument was out of the water or was being serviced);
- Temperature was <3°C or >20°C (the instrument was out of the water or was being serviced);
- Dissolved oxygen was <3 mg/L or >14 mg/L (the instrument was out of the water or was being serviced);
- Salinity was <0.01 ppt or >30 ppt (the instrument was out of the water or was being serviced); and
- Two or more parameters were = 0 (this may have occurred when the instrument did not send valid data).

The data collected by the in situ instruments were meant to supplement water quality information that was being collected pursuant to the Water Quality Certification and *Water Quality Monitoring Work Plan* (AMEC et al. 2012c). All data collected from the in situ instruments are provided in Appendix F. The upstream in situ instrument was also used to represent an ambient station for comparison to discharge from the DRWS for all conventional parameters except turbidity (the end of the pipe criterion for turbidity was 5 NTUs). The recorded conventional water quality parameters were averaged (arithmetic mean) over the period of time the DRWS was discharging over a 24-hour period starting in the morning of each work day, and the mean values were compared to the conventional parameters measured in water discharged from the DRWS (Section 6.3.1).

6.7 DATA QUALITY REVIEW

The data validation report for water quality monitoring samples collected from August 2014 through February 2015 is presented in Appendix H in the Boeing Plant 2 Water Quality Samples – August 2014 through February 2015 data validation report. Analyses of samples for PCBs and mercury (total and dissolved) were performed by Analytical Resources, Inc. (ARI), except for three samples analyzed for PCBs by Freidman and Bruya, Inc. The remaining dissolved metals (cadmium, chromium, copper, lead, silver, and zinc) analyses were performed by Frontier Global Sciences, Inc. The data quality review was based on project-specific control limits or laboratory control limits. The summary data validation review found that all data were acceptable as qualified.

For the PCB analyses performed by ARI, the overall assessment found the documentation to be clear and complete, with one exception. Calibration data demonstrated acceptable instrument performance. Laboratory quality control sample results demonstrated acceptable accuracy and precision. The PCB data were acceptable for use as reported.

For the PCB analyses performed by Freidman and Bruya, Inc., the overall assessment found that the documentation met the requirements for summary validation. Surrogate and laboratory quality control sample results demonstrated acceptable accuracy and precision. The PCB data were acceptable for use as reported.

For the total and dissolved mercury analyses performed by ARI, the overall assessment found the documentation to be clear and complete. Calibration data and results of quality control samples demonstrated acceptable accuracy and precision.

Samples were analyzed for dissolved metals (cadmium, chromium, copper, lead, silver, and zinc) by Frontier Global Sciences, Inc. Documentation was found to be clear and complete. With minor exceptions, calibration results demonstrated acceptable instrument performance. Quality control sample results demonstrated acceptable laboratory precision and accuracy. Individual results for selected dissolved metals were qualified as estimated due to blank contamination, and because matrix spike and matrix-spike duplicate (MS/MSD) recoveries and relative percent differences were outside control limits. The metals data were acceptable for use as qualified.

6.8 SUMMARY OF THE RESULTS OF THE CONVENTIONAL WATER QUALITY MONITORING AND CHEMICAL COMPLIANCE SAMPLING DURING DREDGING AND BACKFILLING DURING ALL CONSTRUCTION SEASONS

During CS1 there were 31 days of water quality monitoring during DSOA dredging activities (Table 4). Twenty five days of water quality monitoring during DSOA dredging activities were conducted during CS2. During CS3 there were 10 days of water quality monitoring during the Southwest Bank re-excavation and there were an additional 51 days of dredge monitoring during dredging within the DSOA and Slip 4.

Monitoring of conventional water quality parameters was conducted on 37 days during placement of the final backfill in CS3. Rounds of dredge monitoring and final backfill monitoring were conducted on the same day on three occasions. In addition, the monitoring of conventional water quality parameters during the removal of sheetpile in Slip 4 occurred on the same day as monitoring of the final backfill placement on five occasions.

During the 149 days of water quality monitoring conducted during CS1 through CS3 there were 29 days with confirmed exceedances of the turbidity criterion (and one unconfirmed exceedance; see

Table 4). Fourteen of the days were during dredging and 15 of the days were during placement of backfill (final and intermediate). There was one unconfirmed exceedance of the pH criterion (Table 4). An additional 40 rounds of monitoring were conducted following a confirmed exceedance of the turbidity criterion to monitor the persistence of the elevated turbidity. During the additional rounds of monitoring there were 21 rounds that had one (or more) turbidity readings that were greater than 5 NTUs over the corresponding ambient readings.

Chemical exceedance of the PCB chronic water quality criterion occurred on two occasions during the 3 years of construction. During CS2, samples collected during dredge monitoring exceeded the PCB chronic water quality criterion (at 300 feet from the dredge operations) over a 24-hour period (PCB concentration 0.067 µg/L). Dredging was being conducted close to the shoreline. A review of the dredging operations during this time period identified debris removal as the probable cause of the increased turbidity and resulting chemical exceedance.

The second chemical exceedance occurred during the Southwest Bank re-excavation conducted in CS3. Turbidity associated with the initial phases of the nearshore debris removal along the Southwest Bank shoreline was identified as the probable source of the elevated PCBs. Although the 24-hour average PCB concentration was slightly above the chronic water quality criterion (0.031 µg/L), the elevated average concentration was driven by samples collected on August 5, 2014 (the first day of shoreline excavation); samples analyzed from the following day (August 6, 2014) were all below the chronic criterion. Based on the log of field activities conducted on August 6, 2014, there did not appear to be any debris removal during excavation. These data suggest that the exceedance of the chronic PCB criterion was of a relatively short duration (less than 24-hours) since the elevated concentrations were likely attributable to debris removal along the shoreline.

An exceedance of the chronic criteria for copper was reported in a sample analyzed from a 150-foot compliance monitoring station on February 18, 2015 (BP2WQ-0822, Table 7); however, this result was not considered an exceedance, since the point of compliance for the chronic criterion was identified in the *Water Quality Monitoring Work Plan* (AMEC et al. 2012c) as 300 feet from dredging operations. The near-bottom sample at 300 feet upstream of the dredging operation was not analyzed for dissolved copper due to an oversight. A sample collected on February 17, 2015 was analyzed for dissolved metals, including copper. The mean of the copper results from the February 17 and February 18, 2015 samples was 2.47 µg/L. Both samples were collected near-bottom at 150 feet upstream from the dredging activities (during an incoming tide) in Slip 4. Although a comparison of the dissolved copper results at 300 feet against the chronic criterion cannot be done, the mean of the sample results available from 150 feet upstream of the dredging operations (on an incoming tide) suggests that dissolved copper would have been below the chronic criterion.

Additional monitoring was conducted at 800 feet downstream of the final backfill placement on two occasions when turbidity associated with the placement of the final backfill was greater than 59 NTUs over the ambient turbidity at any monitoring station (i.e., the turbidity trigger specified by the U.S. Fish and Wildlife Service Biological Opinion for conducting additional monitoring at 800 feet). Turbidity at 800 feet was less than 18 NTUs over the turbidity at the corresponding ambient station and there were no exceedances of the requirements of the Biological Opinion.

Additional monitoring of turbidity plumes associated with turbidity exceedances during the placement of the final backfill was conducted on five occasions to investigate the width and length of the plume (see last section in Appendix G).

7.0 PRE- AND POST-CONSTRUCTION PERIMETER MONITORING

A pre- and post-construction perimeter sediment monitoring program was conducted to determine if material increases in concentrations of COCs occurred in the post-remediation perimeter surface sampling areas outside the DSOA relative to their pre-remediation concentrations. All perimeter monitoring was conducted in accordance with the *Pre- and Post-Construction Perimeter Sediment Monitoring Work Plan* (AMEC et al. 2012d) and associated *quality assurance project plan* (AMEC et al. 2012e) or in accordance with modifications approved by EPA. A total of 56 sampling stations (plus 5 duplicate stations) were sampled in five separate areas:

- Area 1: downstream reference area,
- Area 2: DSOA downstream of South Park Bridge,
- Area 3: DSOA upstream of South Park Bridge,
- Area 4: Upstream reference area, and
- Area 5: Slip 4.

The approximate sample locations for the pre- and post-construction sampling are shown on Figure 7, and the averaged sampling coordinates for grabs collected during the sampling events in CS3 are presented in Table 11. Sediment samples from both the pre-construction and post-construction sediment monitoring events were analyzed for the COCs (cadmium, chromium, copper, lead, mercury, silver, zinc, and PCBs) identified in the *Pre- and Post-Construction Perimeter Sediment Monitoring Work Plan* (AMEC et al. 2012d). In addition, total solids (TS) and total organic carbon (TOC) were measured in each sample.

The results of pre- and post-construction perimeter monitoring for Areas 1 through 5 for all construction seasons are presented in Table 12 through Table 16, respectively. Results for total PCBs for all construction seasons are presented on Figure 7. The PCB concentrations presented on Figure 7 are given on a dry-weight basis (micrograms per kilogram [µg/kg], equivalent to parts per billion [ppb]) and on carbon-normalized basis (milligrams per kilogram organic carbon, equivalent to parts per million [ppm]) when TOC was within the carbon-normalization range of 0.5% to 4%. PCB results were not carbon-normalized for samples with TOC results outside this range.

7.1 PRE-CONSTRUCTION PERIMETER MONITORING

Sediment grab samples were collected in July 2014 prior to implementation of the Southwest Bank re-excavation and in September 2014 prior to dredging work in the DSOA and Slip 4.

7.1.1 Southwest Bank Re-excavation Field Sampling Activities and Results

A total of 20 sediment grab samples were collected at 18 perimeter sampling locations in Area 3 and Area 4 (Table 11 and Figure 7) during the pre-construction sampling event (July 14 to 16, 2014) prior to the start of the Southwest Bank re-excavation. This sampling event also occurred prior to the start of dredging at the Jorgensen Cleanup Area, located upriver of the DSOA. Pre-construction sampling for the Southwest Bank re-excavation work was not conducted in Area 5, Area 1, or Area 2, as approved by EPA and Ecology.

Sampling was conducted using the methods and procedures presented in the *Pre- and Post-Construction Perimeter Sediment Monitoring Work Plan* (AMEC et al. 2012d). Surface samples (upper 0 to 10 cm) were collected using a powered grab sampler. Three grab samples were collected at each sample location. The coordinates for each acceptable grab collected at a sample location were recorded. Equal volumes of sediment from each grab (representing the 0- to 10-cm surface interval) were placed in a 1-liter glass container. Sample homogenization was performed by the analytical laboratory prior to analysis. Field duplicates were collected at two sample locations to meet quality assurance requirements.

Analytical results are presented in Table 14 and Table 15. Sample locations for the individual grab samples collected in CS3 are provided on the Qualitative Sample Characteristics forms (Appendix I). Additional field forms (i.e., chain-of-custody forms) for CS3 samples are also provided in Appendix I.

7.1.2 DSOA Dredging and Backfilling Field Sampling Activities and Results

A total of 61 sediment grab samples were collected at 56 perimeter sampling locations (Table 11 and Figure 7) during the pre-construction sampling event (September 10 to 25, 2014) prior to the start of dredging within the DSOA. Samples included five field duplicates collected for quality control purposes. This sampling was completed after the completion of dredging and backfilling in the Jorgensen Cleanup Area.

Sampling was conducted using the methods and procedures presented in the *Pre- and Post-Construction Perimeter Sediment Monitoring Work Plan* (AMEC et al. 2012d). A majority of the surface samples (0 to 10 cm) were collected using a powered grab sampler, with three grab samples collected at each sample location. At three sample locations in Area 5 (Slip 4), hand cores were used by divers to collect sediment samples from the installed cap at the head the slip. A single hand core was collected at each of these three locations from areas with sufficient sand and fine silt for analysis. Estimated coordinates for each acceptable hand core were recorded and are presented in Table 11.

The coordinates for each acceptable grab collected at a sample location were recorded. Equal volumes of sediment from each grab (representing the 0 to 10 cm surface interval) were placed in a

1-liter glass container. Sample homogenization was performed by the analytical laboratory prior to analysis. Field duplicates were collected at five sample locations to meet quality assurance requirements.

The averaged sample locations for the pre-construction sampling are presented in Table 11 and on Figure 7. Sample locations for the individual grab samples are provided on the Qualitative Sample Characteristics forms (Appendix I). Additional field forms (i.e., chain-of-custody forms) are also provided in Appendix I.

The results of the pre-construction perimeter monitoring are presented in Table 12 through Table 16, and PCB results are presented on Figure 7.

7.2 POST-CONSTRUCTION PERIMETER MONITORING – FIELD SAMPLING ACTIVITIES AND RESULTS

A total of 61 sediment grab samples were collected at 56 perimeter sampling locations (Table 11 and Figure 7) once the CS3 dredging was complete (February 25 through March 20, 2015). The stations previously sampled during pre- and post-construction sampling events were reoccupied. Sampling was conducted using the methods and procedures used during the pre-construction sampling.

The averaged sample locations for the post-construction sampling event are presented in Table 11 and on Figure 7. Sample locations for the individual grab samples are provided on the Qualitative Sample Characteristics forms (Appendix I). Additional field forms (i.e., chain-of-custody forms) are also provided in Appendix I.

The results of post-construction perimeter monitoring are presented in Table 12 through Table 16. The results for total PCBs are presented on Figure 7.

7.3 DATA QUALITY REVIEW

Separate data quality reviews were conducted for the pre- and post-construction monitoring events. Data quality review was based on project-specific control limits (AMEC et al. 2012e) or laboratory control limits. These data quality reviews are summarized in the following sections. The complete data validation evaluations are presented in Appendix H.

7.3.1 Pre-Construction Perimeter Monitoring

The Stage 2B data validation report for pre-construction perimeter monitoring results is presented in Appendix H. The data validation review found that all data were acceptable as qualified.

For the PCB analyses, the overall assessment found that the documentation was clear and complete. Calibration data demonstrated acceptable instrument performance. Laboratory control sample (LCS) results demonstrated acceptable accuracy and precision. For samples with results from multiple analyses, results were reduced to the most appropriate. Selected results were qualified as estimated due to sample coolers received at elevated temperatures outside the control range and for continuing calibration results, MS recoveries, MS/MSD variability, field-duplicate variability, and dual column variability outside the control range. Except for data replaced by another result, PCB data are acceptable for use as qualified.

For the metals analyses, the overall assessment found documentation to be clear and complete. Calibration data demonstrated acceptable instrument performance. Method blank, LCS, and MS results demonstrated acceptable accuracy. Selected results were qualified as estimated based on sediment reference material (SRM) recoveries and laboratory and field-duplicate variability outside specified control limits. The metals data are acceptable for use as qualified.

For the general chemistry analyses the overall assessment found documentation to be clear and complete. Calibration data demonstrated acceptable performance. Method blank, LCS, and SRM results demonstrated acceptable laboratory accuracy. Laboratory triplicates demonstrated acceptable laboratory precision. Selected sample results were qualified as estimated based on matrix-spike recoveries and field-duplicate variability outside specified control limits. The general chemistry results are acceptable for use as qualified.

7.3.2 Post-Construction Perimeter Monitoring

The results of the Stage 2B data validation for the post-construction perimeter monitoring samples are presented in the data validation report in Appendix H. The data validation found all data to be acceptable as qualified.

For the PCB analyses, the overall assessment found the documentation to be clear and complete. Calibration data demonstrated acceptable instrument performance. Surrogate, SRM, and MS/MSD results demonstrated acceptable accuracy and precision. Results from multiple analyses for one sample were reduced to the most appropriate result for use following conservative criteria. Selected results were qualified as estimated due to blank contamination and dual column variability outside control limits. PCB data were acceptable for use as qualified.

For the metals analyses, the overall assessment found documentation to be clear and complete. Calibration data demonstrated acceptable instrument performance. Method blank, LCS, and SRM results demonstrated acceptable accuracy. Selected results were qualified as estimated based on MS recoveries and field-duplicate variability outside control limits. Metals data are acceptable for use as qualified.

For the general chemistry analyses, the overall assessment found documentation to be clear and complete. Calibration data indicated acceptable performance. Method blank and LCS results demonstrated acceptable laboratory accuracy. Selected results were qualified as estimated based on MS and SRM recoveries outside control limits. General chemistry results are acceptable for use as qualified.

7.4 SUMMARY OF PRE- AND POST-CONSTRUCTION PERIMETER MONITORING CONDUCTED FOR ALL CONSTRUCTION SEASONS

A total of 332 samples were used to monitor pre- and post-construction impacts of the DSOA and Southwest Bank Corrective Measure implementation (Table 12 through Table 16) before, during, and after CS1, CS2, and CS3. This total includes samples collected at seven sample locations (and a field split analyzed as a QC sample) in Slip 4 that were collected by the City of Seattle in 2012 prior to start of CS1. The City of Seattle samples were analyzed for PCBs (by Aroclor) and TOC. The remaining samples collected by Boeing in Slip 4 and within the Lower Duwamish Waterway were analyzed for PCBs (by Aroclor), TOC, and the SMS metals (arsenic, cadmium, chromium, copper, lead, mercury, silver, and zinc).

Samples were collected at 46 stations prior to the start of construction (CS1). Field-duplicate samples were collected at five of the locations. The analysis results from the samples collected by the City of Seattle at seven stations (and the field spilt) and the 51 samples collected by Boeing were used to calculate a mean concentration for the pre-construction sampling event (Table 17). After the completion of in-water work for CS1, samples were collected at 43 locations (including 4 field-duplicate stations) in 4 areas (upstream, downstream, and adjacent to the CS1 work areas).

Pre-construction and post-construction samples were collected at 38 locations (including 4 field-duplicate stations) upstream, downstream, and adjacent to the CS2 work areas. Prior to the start of construction in CS3 (including the start of the Southwest Bank re-excavation) samples were collected at 18 locations (including 2 field-duplicate stations) upstream and adjacent to the Southwest Bank work area. This sampling event was also conducted before the start of dredging at the EMJ RAB, located immediately upstream of the DSOA.

Following the completion of the Southwest Bank re-excavation and the completion of the EMJ RAB dredging, sampling was conducted at 56 locations (including 5 field-duplicate stations). The samples were collected upstream, downstream, and adjacent to the DSOA and Slip 4 dredging and final backfill areas. Following completion the CS3 in-water work, sampling was conducted at 56 locations (including 5 field-duplicate stations) upstream, downstream, and adjacent to the CS3 work areas.

Table 17 provides summary statistics (mean value, maximum value, and minimum value) for each sampling event. Analytes where one or more of the samples had results reported as undetected at the

reporting limit (RL) were assigned a value of one-half the RL when calculating the means. Total PCBs were calculated for each sample by summing the results for the detected Aroclors. Total PCBs expressed as a carbon-normalized value were calculated for samples where the TOC were within the range of values (≥0.5% and ≤4.0%) where normalization is appropriate. If TOC was outside the range where normalization is appropriate, then the sample was not included in the calculation of a mean carbon-normalized total PCB value. Seventeen of the 332 samples analyzed for PCBs were not expressed as a carbon-normalized value.

During the pre-construction sampling for CS2, a location in Area 2 downstream of the South Park Bridge (under construction during CS2), one of the sample locations (SD-PER211; December 19, 2013) had substantially elevated concentrations of PCBs (Table 13). The total PCB concentration for sample SD-PER211-1213 was 20,600 ppb dry weight; this sample result appears to be an anomaly. This value (and the corresponding organic carbon normalized value [1,151 ppm organic carbon]) were treated as outliers because the PCB concentration in this sample was 1 to 2 orders of magnitude greater than samples collected at this and close by locations before and after this sample was collected. This sample was not included in the calculated pre-construction season 2 means (Table 17).

8.0 SLIP 4 ADDITIONAL SEDIMENT DATA COLLECTION

As documented in Section 3.4.1.4, Boeing completed dredging in four designated areas in Slip 4 early in December 2014. Post-construction core samples were collected at five locations (SD-PCC001 through SD-PCC005) (see Appendix J) in accordance with the approved *Post-Construction Core Sampling Work Plan* (AMEC et al. 2012f). Results of the post-construction core sampling indicated that elevated concentrations of PCBs remained at the bottom of the dredge cuts in one of the four designated dredge areas (i.e., SD-PCC003, see Appendix J). The results also demonstrated that metals concentrations were below the SQS (Washington Administrative Code [WAC] 173-204-320) in all four areas. Based on these data, Boeing conducted additional sediment investigations in Slip 4, as described in Appendix J. Provided below is a summary of the additional investigations.

8.1 SUMMARY OF SAMPLING

Two phases of additional core collection were conducted to characterize the horizontal and vertical distribution of elevated concentrations of PCBs within the Boeing-owned portion of Slip 4. Phase 1 sampling included collection of cores at locations SD-SL4-001 to -004, and Phase 2 sampling included collection of cores at locations SD-SL4-005 to -012 (see Appendix J).

8.2 RESULTS

The results from the Phase 1 and the 2 sampling showed that elevated concentrations of PCBs along the shoreline did not generally extend below 1 to 2 feet below the mudline (Appendix J). Offshore, elevated PCBs concentrations appeared to be confined to what appeared to be recently deposited material, and native underlying sediments did not appear to contain PCBs.

With a few exceptions, the vertical extent of elevated PCB concentrations was consistent with the conceptual site model (CSM) presented in the corrective measure alternatives study (AMEC and FSI 2011), whereby the depth of elevated PCB concentrations was shallower along the shoreline and deeper offshore.

8.3 DATA QUALITY REVIEW

Results of the Stage 2B data validation for the Slip 4 sediment samples are reported in the data validation report (Attachment C in Appendix J). The data validation report found all data to be acceptable as qualified.

For the PCB analyses, documentation was found to be clear and complete. Calibration data demonstrated acceptable instrument performance. LCS results demonstrate acceptable accuracy and precision. Multiple analysis results were reduced to the most appropriate for use. Selected results

were qualified as estimated due to dual-column variability. Except for data replaced by another result, PCB data were acceptable for use as qualified.

For the metals analysis, the documentation was found to be clear and complete. Calibration data demonstrated acceptable instrument performance. Method blank, LCS, and SRM results demonstrated acceptable laboratory precision and accuracy. One zinc result was qualified as estimated based on MS recovery outside control limits. The metals data were acceptable for use as qualified.

For the general chemistry analyses, documentation was found to be clear and complete. Calibration data indicated acceptable performance. Method blank and LCS results demonstrated acceptable laboratory accuracy. Selected results were qualified as estimated based on laboratory triplicate and MS/MSD variability, and MS and SRM recoveries outside of control limits. The general chemistry results were acceptable for use as qualified.

8.4 SUMMARY

The additional Slip 4 core sampling showed that the depth of sediments containing elevated PCB concentrations was shallower near the shoreline and deeper offshore. These findings were consistent with the CSM for the DSOA (AMEC and FSI 2011), which suggested that navigation dredging likely influenced the depth of contamination.

The CSM, the depth of elevated PCB concentrations, and the knowledge that native sediments were “clean” were used to develop a new dredge plan, which was subsequently implemented with approval by EPA on February 10, 2015.

9.0 POST-CONSTRUCTION CORE SAMPLING

Post-construction core sampling was conducted using the methods and procedures presented in the *Post-Construction Core Sampling Work Plan* (AMEC et al. 2012f). Additional confirmation cores were collected in Slip 4 as per the EPA-approved Boeing Plant 2 DSOA Corrective Measure and Habitat Project Work Plan for Slip 4 Additional Sediment Remediation and Associated Sheetpiling (DOF 2015). The objective of post-construction core sampling is to characterize sediments that are left in place after completion of remedial dredging.

9.1 SUMMARY OF SAMPLING ACTIVITIES

Sediment samples were collected at 13 post-construction coring locations during CS3, as shown on Figure 8 and in Table 18. Figure 8 also includes the locations of samples collected during previous construction seasons. There was a single post-construction core (SD-PCC014; collected after the completion of dredging within the Approval Unit [AU] during CS2) that had additional dredging activity conducted within the same AU during CS3. The additional dredging activity included the removal of the intermediate backfill placed at the core sample location and removal of additional material previously characterized and left in place. This additional dredging was conducted to establish stable side slopes prior to dredging of remediation areas upriver of the core location during CS3.

The MudMole™ pneumatic core sampler was used for sampling the post-dredge sediment surface and deeper sediment intervals. Cores were collected after dredging activities were completed, verified by a bathymetric survey, and accepted by Boeing in the relevant AU. Coring was conducted prior to placement of the initial backfill layer. The intent of core sampling was to collect sediment samples at and below the excavated sediment surface (i.e., leave surface). Cores collected within the DSOA were to be divided into sample intervals representing the 0- to 1-foot, 1- to 2-foot, and 2- to 3-foot in situ intervals below the dredge surface (if available). Cores collected within Slip 4 were to be divided into sample intervals representing the 0- to 0.33-foot, 0.33-foot to 1-foot, 1- to 2-foot, and 2- to 3- foot in situ intervals below the dredge surface at a minimum. Additional deeper sample intervals were collected in Slip 4 if available.

A field duplicate core was collected at location SD-PCC010 during CS3. The field duplicate (identified as SD-PCC210) was collected within 2.4 feet of the parent core. Additional field-duplicate cores were collected at location SD-PCC006 and SD-PCC013 during previous construction seasons. A single sample interval was analyzed from the field duplicate to meet quality assurance requirements. The remaining sample intervals (1- to 2-foot and 2- to 3-foot in situ intervals) from the field duplicate sample were archived.

Cores were processed within 4 hours of collection. Penetration and recovery measurements were used to estimate the in situ depth of sediment structures and sample intervals. A qualified field

geologist logged each based on the Unified Soil Classification System and noted the presence of soil structures, odors, or visible oil sheens. Summary logs and photographs of each accepted core are provided in Appendix K. The chain-of-custody forms are also provided in Appendix K.

9.2 RESULTS

The results of post-construction core sampling conducted in the DSOA and Slip 4 are presented in Table 19. Table 19 also includes the results from prior construction seasons. Results for total PCBs for all construction seasons are presented on Figure 8. The PCB results presented on Figure 8 are expressed on a dry-weight basis (µg/kg or ppb); in addition, carbon-normalized results (milligrams per kilogram or ppm organic carbon) are given when TOC is within the carbon-normalization range of 0.5 percent to 4 percent.

9.2.1 DSOA Cores

Post-construction core samples within the DSOA CS3 were collected at locations SD-PCC009, SD-PCCC010, SD-PCC210 (duplicate of SD-PCC010), SD-PCC011, and SD-PCC015 (Figure 8). Except for the core collected at SD-PCC010, the remaining post-construction cores collected within the DSOA during CS3 had thin surface layers (less than about 0.25 inch [approximately 6 millimeters]) of fine unconsolidated silts on the surface of the core overlying sands and silts that appeared to be native alluvial material. The sediments retained in the core collected at SD-PCC010 appeared to have an approximately 0.8-foot layer of fine silts with woody material at the surface of the core that did not appear to be native material. The remaining material in the core consisted of sands with scattered silt inclusions and some wood material indicative of native alluvium. The field duplicate core of SD-PCC010 (SD-PCC210) collected within 3 feet of the parent core had a thin surface layer (less than about 0.25 inch [approximately 6 millimeters]) of silty sand overlying the remaining core material that appeared to be native alluvial sands and silts.

Samples were collected at SD-PCC009, SD-PCC010, SD-PCC011, and SD-PCC015 representing the surface to 1-foot (A) interval, the 1- to 2-foot (B) interval, and the 2- to 3-foot (C) interval. The 0- to 1-foot and 1- to 2-foot samples were analyzed at every location for the COCs (arsenic, cadmium, chromium, copper, lead, mercury, silver, zinc, and PCBs), TS, and TOC. The 2- to 3-foot sample at each location, except for SD-PCC011, was also analyzed for the COCs, TS, and TOC. The 0-to 1-foot interval of the field duplicate sample (SD-PCC210-A) was analyzed for the COCs, TS, and TOC to assess the field duplicate variability.

CS3 metals and total PCB concentrations were low or undetected in all of the samples. Table 19 lists the applicable SQS criteria (WAC 173-204-320) for the COCs for comparison purposes and shows that all detected CS3 analytical results were well below the SQS criteria. All of the remaining samples with undetected Aroclors had reporting limits well below the SQS criteria with the exception of a single

sample. The analytical laboratory reported an elevated reporting limit for Aroclor 1232 in sample SD-PCC011-B (Table 19). The reporting limit was elevated due to chromatographic interference by an unknown compound. Aroclor 1232 has not been detected in any of the other cores collected at the Plant 2 site and the elevated reporting limit is unlikely to mask a detection of Aroclor 1232. The "A" interval sample (surface to 1-foot) had no detected Aroclors and the reporting limit for each Aroclor (including 1232) was 3.8 ppb dry weight.

9.2.2 Slip 4 Cores

All of the samples collected from the post-construction cores collected in Slip 4 (SD-PCC-016, SD-PCC-017, SD-PCC-018, SD-PCC-019, SD-PCC-020, SD-PCC-021, SD-PCC-022, SD-PCC-023, and SD-PCC-024) were analyzed for the COCs, TS, and TOC. No measurable silt was present on the surface of any of the post-construction cores collected in Slip 4. The sediment in the cores consisted of sands and silts that appeared to be native material.

Results of chemical analyses for samples representing the 0- to 0.33-foot, 0.33- to 1-foot, 1- to 2-foot, 2- to 3-foot intervals, and deeper intervals (if available) are presented in Table 19. Results for total PCBs are presented on Figure 8. Metals and total PCB concentrations were low or undetected in all of the samples. Table 19 lists the SQS criteria for the COCs for comparison purposes and shows that all concentrations of COCs were below the SQS.

9.3 DATA QUALITY REVIEW

Results of the Stage 2B data validation for the post-construction confirmation core samples are presented in the data validation report in Appendix H in the following data validation report: Boeing Plant 2 Sediment Samples – Jorgensen Backfill Samples – November 2014 and March 2015; Post-construction Confirmation Core Samples – October 2014 through February 2015; and Post-construction Perimeter Monitoring Samples – February and March 2015 data validation report.

The data validation found all data to be acceptable as qualified.

For the PCB analyses, the overall assessment found the documentation to be clear and complete. Calibration data demonstrated acceptable instrument performance. Laboratory QC sample results demonstrated acceptable accuracy and precision. Selected results were qualified as estimated due to field duplicate variability and LCS recoveries outside control limits. PCB data were acceptable for use as qualified.

For the metals analyses, the overall assessment found the documentation to be clear and complete. Calibration data demonstrated acceptable instrument performance. Method blank, LCS, and SRM results demonstrated acceptable accuracy. Selected results were qualified as estimated based on MS

recoveries, and laboratory and field-duplicate variability outside control limits. Metals data are acceptable for use as qualified.

For the general chemistry analyses, the overall assessment found the documentation to be clear and complete. Calibration data indicated acceptable performance. Method blank and LCS results demonstrated acceptable laboratory accuracy. Selected results were qualified as estimated based on laboratory triplicate, field-duplicate variability, and low MS recoveries outside control limits. General chemistry results are acceptable for use as qualified.

9.4 SUMMARY OF THE RESULTS OF POST-CONSTRUCTION CORE SAMPLING DURING ALL THREE CONSTRUCTION SEASONS

Penetration in each of the processed cores collected in CS2 and CS3 met the penetration target of 4 feet below mudline proposed in the Post-Construction Core Sampling Work Plan (AMEC et al. 2012f). During CS1 a vibratory core sampler was used for sampling the post-dredge sediment surface and deeper sediment intervals. Penetration of the cores collected in CS1 was consistently less than the penetration target of 4 feet below mudline but penetration was usually sufficient to collect samples representing the 0- to 1-foot, 1- to 2-foot, and sediments from the 2- to 3-foot in situ intervals below the dredge surface. The core collected at sample location SD-PCC008 had a total penetration of 2.3 feet and recovery of sediments representing the surface to 1.8 feet below the sediment surface (i.e., 0- to 1-foot, 1- to 1.8-foot). All of the cores that were sampled contained sediments that appeared to be undisturbed by dredging activities (i.e., no or little material visible in the cores that appeared to be dredge residuals).

The sample results showed low or undetected levels of COCs in a majority of the samples that were analyzed. Two samples had elevated levels of PCBs in the 0- to 1-foot intervals. Sample SD-PCC014-A analyzed during CS2 had total PCBs (Aroclor 1248) of 200 ppb dry weight (Table 19). The carbon-normalized total PCB concentration was 33.6 ppm organic carbon and was above the SQS criteria. The “B” interval sample at SD-PCC014 had total PCBs of 7.8 ppb dry weight (Table 19). Total PCBs could not be carbon-normalized since the TOC was outside the range where carbon-normalization is appropriate. This sample location is also within the AU where additional dredging was conducted during CS3 (see Section 9.1).

Sample SD-PCC024-A was collected in Slip 4 during CS3. The sample represents the 0- to 0.33-foot interval and total PCBs were 212 ppb dry weight; however the carbon-normalized total PCB concentration was 8.1 ppm organic carbon and was below the SQS criteria. In addition, the “B” interval sample (0.33- to 1-foot) at SD-PCC024 had total PCBs of 24.8 ppb dry weight (Table 19). Total PCBs could not be carbon-normalized since the TOC was outside the range where carbon-normalization is appropriate.

The average total PCB concentration of the post-construction surface (0- to 1-foot in the DSOA and 0- to 0.33-foot in Slip 4) was 19 ppb dry weight (using one-half the RL for samples with undetected PCBs). These results demonstrated that the dredging has met the project goals and that the sampling effort has met the study objectives.

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10.0 YEAR 0 POST-CONSTRUCTION SURFACE SEDIMENT MONITORING

Post-construction monitoring was conducted upon completion of all dredging, shoreline construction, and final backfilling to grade in March 2015. Post-construction surface sediment sampling is designed to achieve two objectives:

- Evaluate if recontamination of the clean post-construction sediment surface is occurring and
- Determine if any recontamination observed originates from on-site or off-site sources.

Post-construction sampling was conducted using the methods and procedures presented in the *Post-Construction Surface Sediment Monitoring Work Plan* (AMEC et al. 2012f). A report detailing the results of the Year 0 sampling effort is presented in Appendix L. Provided below is a summary of the Year 0 monitoring results.

10.1 SUMMARY OF SAMPLING ACTIVITIES

The Year 0 samples were collected at 36 locations (plus four duplicate samples) following the procedures specified in the work plan (AMEC et al. 2014). Sampling locations are shown on Figure 9 and details on the sampling design and sampling procedures are presented in Appendix L. Samples in the in-water work area below -5 feet MLLW, and above -5 feet MLLW and below +4 feet MLLW, the shoreline area samples at approximately +4 feet MLLW, and the outfall samples were collected using a 0.2-square-meter stainless-steel powered grab sampler at the locations presented in the work plan (AMEC et al. 2014). The shoreline area samples at approximately +7 feet MLLW were collected during low tides using stainless-steel spoons to limit damage to the habitat plantings. The samples were analyzed for the SMS list of COCs, TS, and TOC. In addition, six samples were analyzed for dioxins and furans, and six samples were analyzed for grain size.

At each sample location, the top 10 cm of sediment was collected for chemistry analyses. For a majority of the sample locations, sediments were placed directly into a single-sample container; these samples were homogenized at the analytical laboratory. Samples collected for analysis of the SMS list of COCs and either dioxins/furans or grain-size were homogenized in the field before being placed into multiple sample containers.

10.2 RESULTS

The results of the Year 0 post-construction surface sediment monitoring are presented in Appendix L. All of the results for the SMS list of COCs are presented as dry-weight concentrations (mg/kg for metals and µg/kg for organics). TOC results were below the carbon-normalization range of 0.5% to 4%, except for five of the six shoreline samples collected at approximately +7 feet MLLW and

one of the shoreline samples collected at approximately +4 feet MLLW. The samples with TOC values greater than 0.5% were located within the habitat project area.

All of the samples had SMS metals that were either undetected or well below the SQS. All of the SMS polycyclic aromatic hydrocarbons, chlorobenzenes, phthalate esters, and miscellaneous extractable organic compounds were either undetected or well below the SQS. Two samples (SD-PCM020 and SD-PCM031) had one ionizable organic compound (benzoic acid) that was above the SQS (Figure 9). Sample SD-PCM032 had three ionizable organic compounds (benzoic acid, benzyl alcohol, and phenol) that exceeded the SQS (Figure 9). The samples that exceeded the SQS had the three highest TOC values (2.07 to 8.7 percent) and were collected within the embayment at the North Shoreline habitat project. These compounds are frequently associated with decomposing plant material and may reflect the accumulation of organic matter within and adjacent to the embayment.

PCBs were detected in four samples. Detected concentrations of total PCBs ranged from 4.8 ppb dry weight to 121 ppb dry weight and were below the SQS. The toxic equivalency quotient for the dioxin and furan congeners ranged from 0.07 to 0.37 nanograms per kilogram (ng/kg) toxicity equivalency quotient (TEQ) when calculated using the Toxicity Equivalency Factors presented in The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds (Van den Berg et al. 2006) using non-detected values (U) = to ½ the estimated detection limits.

10.3 DATA QUALITY REVIEW

The results of the Stage 2B data validation for PCBs, metals, semivolatile organic compounds, and conventionals, and the Stage 4 data validation for dioxins and furans for the Year 0 post-construction surface sediment monitoring samples are reported in the data validation report included as Attachment C in Appendix L. The data validation found all data to be acceptable as qualified.

For the PCB analyses, the overall assessment found documentation to be clear and complete. Calibration data demonstrated acceptable instrument performance. Blank, surrogate, LCS, MS/MSD, and field duplicate results demonstrated acceptable accuracy and precision. Two results were qualified as estimated due to dual-column variability. PCB data are acceptable for use as qualified.

For the metals analysis, the overall assessment found documentation to be clear and complete. Calibration data demonstrated acceptable instrument performance. Method blank, LCS, SRM, and MS results demonstrated acceptable laboratory accuracy. Selected results were qualified as estimated based on laboratory and field duplicate variability outside control limits. The metals data were acceptable for use as qualified.

For results of analyses of semivolatile organic compounds, the overall assessment found the documentation to be clear and complete. Selected results were qualified as estimated due to continuing calibration results outside control limits, blank contamination, and surrogate, LCS, and MS results outside of control limits. Rejected results for benzyl alcohol and 2,4-dimethylphenol were replaced by acceptable or estimated re-extraction results. Except for data replaced by another analysis, semivolatile organic data are acceptable for use as qualified.

For results of analyses of semivolatile organic compounds analyzed using selective ion monitoring, documentation was found to be clear and complete. The majority of results were accepted without qualification. Some results were qualified as estimated due to calibration results or surrogate or MS recoveries outside control limits. Rejected results for benzyl alcohol and 2,4-dimethylphenol were replaced by acceptable or estimated re-extraction results. One result was qualified as presumed present due to poor spectral match. Except for data replaced by another analysis, results for semivolatile organic compounds analyzed using selective ion monitoring are acceptable for use as qualified.

For the dioxin/furan analyses, the overall assessment found documentation to be clear and complete. No discrepancies were noted in the analyte identification or result quantitation. Calibration data and system performance checks demonstrated acceptable instrument performance. Quality control results indicated acceptable accuracy. Blank contamination resulted in selected results to be qualified as estimated and reporting limits to be elevated but acceptable. The dioxin/furan data are acceptable for use as qualified.

For the general chemistry analyses, documentation was found to be clear and complete. Calibration data indicated acceptable performance. Method blank, LCS, SRM, and MS results demonstrated acceptable laboratory accuracy. Selected results were qualified as estimated based on laboratory triplicate and field duplicate variability outside control limits. The general chemistry and grain size results were acceptable for use as qualified.

10.4 SUMMARY

As described in the *Statement of Basis* (EPA 2011a) and the Final Decision and Response to Comments for the DSOA and Southwest Bank corrective action, the performance criteria were excavation to the target depth with subsequent backfilling with material that met the Final Media Cleanup Levels (EPA 2011b). Subsequent to EPA issuing the decision documents, EPA approved the backfill criteria that were presented in Table 3.1 of Appendix 3 of the EPA-approved Request for Approval of Quarry Sites (Floyd|Snider 2012).

The backfill material that was placed along the Plant 2 shoreline, within the DSOA, and in Slip 4 met the EPA-approved backfill criteria. Although the backfill criteria were for the material before it was

placed, a comparison of the Year 0 samples to the backfill criteria provides additional confirmation that the corrective measure was constructed in accordance with the EPA decision documents. All of the sampling results presented in Section 3.3.1 of Appendix L were less than the backfill criteria, except for one phenol result, three benzoic acid results, and two total PCBs results (Figure 9).

Measured concentrations of benzoic acid, benzyl alcohol, and phenol in the approved compost material were greater than the backfill criteria (the approved backfill criteria for these constituents were equivalent to the SQS); thus, detections of phenol and benzoic acid in the Year 0 samples at levels greater than the SQS/Lowest Apparent Effects Threshold were not unexpected. EPA approved the use of compost material with elevated concentrations of benzyl alcohol, benzoic acid, and phenol in April 2013, with the understanding that these compounds are natural degradation products of woody debris, and are commonly found in plant matter and wood (Floyd|Snider 2013). Because the compost material used to amend the sand and gravel backfill was composed primarily of aged duff (i.e., leaves, branches, bark, and stems from the forest floor) and other clearings from forested areas, it was anticipated that these compounds may occasionally be present at levels higher than the backfill criteria (SQS) during subsequent sampling events.

The two total PCB results were higher than the backfill criterion of 30 µg/kg dry weight (i.e., SD-PCM020 and SD-PCM032) are located within the North Shoreline Area embayment. The embayment is a depositional area where construction was completed in the fall of 2013. The presence of PCBs 1½ years after construction completion at concentrations greater than the backfill criteria is believed to be a result of deposition of fine-grained material from upstream sources.

In context of these factors, the results of Year 0 sampling indicate that all requirements of the *Statement of Basis* (EPA 2011a) and the *Final Decision and Response to Comments* (EPA 2011b) were met.

11.0 JORGENSEN BACKFILL MONITORING

As part of the DSOA and Southwest Bank Corrective Measure, dredging was required to be conducted at the southern end of the DSOA adjacent to the Jorgensen Forge Removal Action (Jorgensen Removal Action) area (Figure 10). Work was performed associated with the Jorgensen Forge Removal Action prior to Boeing conducting dredging in the South Shoreline Area adjacent to the Jorgensen Cleanup Area (Figure 1).

EPA required Boeing to conduct sampling of the Jorgensen Removal Action backfill prior to and after dredging of the southern end of the DSOA. This sampling was required because of the concern that dredging of the DSOA could potentially recontaminate the newly placed backfill in the Jorgensen Cleanup Area.

Boeing submitted a plan to EPA (DOF 2014) for sample collection on the Jorgensen backfill, which was subsequently approved by EPA. This section describes the results of the Jorgensen backfill sampling.

11.1 SUMMARY OF SAMPLING ACTIVITIES

Sampling of the Jorgensen backfill was conducted prior to and after dredging of the southern end of the DSOA. Samples were collected at six locations following procedures specified in *the Pre- and Post-construction Perimeter Sediment Monitoring Work Plan* (AMEC et al. 2012d). Sampling locations are shown on Figure 10, and sample coordinates are presented in Table 20. Sediment samples were collected using a 0.2-square-meter stainless-steel powered grab sampler. Three individual grab samples were collected at each sample location. Each individual sample was collected within approximately 2 meters (approximately 6 feet) of the other sample locations. The centroid of the sample cluster was within approximately 3 meters (10 feet) of each of the proposed sample locations.

During pre-construction sampling at one of the sample locations (SD-JOR03), repeated attempts were made to collect a sample; however, the presence of large gravel inhibited the complete closure of the grab sampler resulting in washed samples (partial loss of sediment). Following discussions with EPA, the station was relocated as shown in Table 20 and Figure 10.

At each sampling station, equal-volume subsamples of the surface sediments were collected to a depth of 10 cm (approximately 4 inches) from each of the three grabs. Sediment touching the sides of the grab sampler was not collected. Large amounts of coarse gravel present in sediments from some of the grabs indicated signs of partial washing of these samples, and therefore these samples were rejected. Partial washing of sediments collected at the other sample locations resulted in the loss of some of the finer sediments as the overlying water drained through the partially closed sampler. Sediment was collected from areas within the grab that did not appear to be washed or disturbed.

Larger gravel pieces (1- to 2-inch diameter) were not included in the sample. Equal volumes (approximately 0.3 liter of sediment) were collected from each grab and placed in a 1-liter glass jar. The sediment was homogenized in the laboratory and analyzed for selected metals (arsenic, cadmium, chromium, copper, lead, mercury, silver, and zinc), PCBs, TOC, and TS.

11.2 RESULTS

The qualitative sample characteristics forms, photographs of each grab sample, and the chain-of-custody forms are provided in Appendix M. Analytical results are presented in Table 21.

11.2.1 Pre-DSOA Dredging

Backfill placement within the Jorgensen Cleanup Area was complete on September 13, 2014. Sampling of the Jorgensen backfill just prior to dredging of the southern end of the DSOA was conducted on November 24, 2014, approximately 2.5 months after completion of the Jorgensen backfill. All of the sample locations had a silt layer present on the surface that ranged from a trace (SD-JOR04, Table 21) to about 3.5 cm thick (SD-JOR05, Table 21). The original location planned for SD-JOR03 had no silt present; however, up to about 2.5 cm of silt was present on the surface of the sediment in the grabs from the relocated SD-JOR03 location (Table 21).

All of the metals results were below the SQS in the pre-DSOA dredging samples (Table 21). The average dry-weight concentration of PCBs in the pre-DSOA dredging samples was approximately 400 µg/kg (18 mg/kg organic carbon) and ranged from 13.1 to 800 µg/kg (10.8 to 28.1 mg/kg organic carbon). The result for total PCBs in one sample (SD-JOR04) was not carbon normalized due to low organic carbon content in the sample (0.149%). Results for three of the five samples with carbon normalized values reported exceeded the SQS criterion of 12 mg/kg organic carbon (SD-JOR01, SD-JOR05, and SD-JOR06). At SD-JOR04, the dry-weight concentration did not exceed the SQS dry-weight equivalent criterion of 130 µg/kg.

11.2.2 Post-DSOA Dredging

Post-DSOA dredging grab samples on the Jorgensen backfill were collected on March 6, 2015, and March 17, 2015. All of the grabs at the post-DSOA dredging sample locations, except for SD-JOR03, had less than 2 cm of silt on the surface of the sediment (Table 21). At SD-JOR03, at least 15 cm of silt was present in the three grabs collected (Table 21). As discussed above, SD-JOR03 was moved during the November sampling event due to the inability to collect samples because of the coarse substrate; however, the original location was inadvertently sampled on the first day of sampling during the March sampling event. At the original sample location the silt layer was approximately 8 to 10 cm thick.

All of the metals results were below the SQS in the post-DSOA dredging samples (Table 21. The average dry-weight concentration of PCBs in the post-DSOA dredging samples was approximately 290 µg/kg (11.2 mg/kg organic carbon) and ranged from 174 to 380 µg/kg (7.9 to 16.2 mg/kg organic carbon), including results for the original SD-JOR03 location (Table 21). Total PCB results for two of the sample locations (SD-JOR01 and SD-JOR02) exceeded the SQS criterion of 12 mg/kg organic carbon.

11.3 DATA QUALITY REVIEW

The results of the Stage 2B data validation for the Jorgensen backfill monitoring samples are presented in the data validation report in Appendix H following data validation report: Boeing Plant 2 Sediment Samples – Jorgensen Backfill Samples – November 2014 and March 2015; Post-construction Confirmation Core Samples – October 2014 through February 2015; and Post-construction Perimeter Monitoring Samples – February and March 2015 data validation report. The data validation review found all data to be acceptable as qualified.

For the PCB analyses, the overall assessment found the documentation to be clear and complete. Calibration data demonstrated acceptable instrument performance. LCS results demonstrated acceptable accuracy and precision. Results from multiple analyses for a single sample were reduced to the most appropriate for use. Selected results were qualified as estimated due to dual column variability outside of control limits. Except for data replaced by another result, PCB data were acceptable for use as qualified.

For the metals analyses, the overall assessment found the documentation to be clear and complete. Calibration data demonstrated acceptable instrument performance. Method blank, LCS, and SRM results demonstrated acceptable laboratory accuracy. Selected results were qualified as estimated based on the laboratory duplicate variability outside of control limits. The metals data were acceptable for use as qualified.

For the general chemistry analyses, the overall assessment found the documentation to be clear and complete. Calibration data indicated acceptable performance. Method blank and LCS results demonstrate acceptable laboratory accuracy. The general chemistry results were acceptable for use as qualified.

11.4 SUMMARY

The pre-DSOA dredging grab samples were collected approximately 2.5 months after Jorgensen completed the backfill. During the pre-DSOA dredging grab sample collection, coarse gravel material was unexpectedly encountered. The coarse substrate made sample collection somewhat difficult;

however, all the samples were collected as planned except at sampling location SD-JOR03, which was moved during the pre-DSOA dredging sampling to facilitate sampling.

Approximately 3 months passed between the pre- and post-DSOA dredging sampling events. During the pre-dredging sampling, the presence of significant amount of depositional material on the surface of the backfill was not expected, since sampling was conducted only 2.5 months after Jorgensen completed construction of the remedial action. The average thickness of the depositional material during the pre-DSOA sampling event was approximately 1.5 cm with a maximum thickness of about 3.5 cm. The thickness of the depositional material in the post-DSOA dredging sampling averaged about 3.5 cm, with a maximum of about 15 cm.

During both sampling events, metals concentrations were all below the SQS criteria. The average dry-weight PCB concentration was approximately 400 µg/kg (18 mg/kg organic carbon) during the pre-DSOA dredging sampling and approximately 290 µg/kg (11.2 mg/kg organic carbon) during the post-DSOA dredging sampling.

Pre-DSOA dredge samples collected at SD-JOR01, SD-JOR05, and SD-JOR06 were above the SQS of 12 mg/kg organic carbon (Table 21). Post-DSOA dredge samples collected at SD-JOR01 and SD-JOR02 were above the SQS of 12 mg/kg organic carbon (Table 21).

12.0 END OF CONSTRUCTION SEASON DEMOBILIZATION AND DECONTAMINATION

After the completion of CS3, dedicated equipment and structures that came in contact with dredged material throughout the course of CS3 were decontaminated to achieve a visually clean debris surface in accordance with 40 CFR 268.45, Table 1, footnote 3. This equipment included barges, dredge equipment (buckets, cranes, etc.), offloading and loading equipment at the Lafarge facility, the vault at the Lafarge facility, and the Waste Management, Inc., railcars that were dedicated to this project. Documentation of equipment decontamination is provided in Appendix N.

Water used to decontaminate equipment after dismantling the DRWS was captured and trucked either to North Boeing Field or to Lafarge for treatment before discharge to the POTW.

Water used to decontaminate the equipment at the Lafarge facility was captured and treated through the LaFarge stormwater treatment system (described in Section 4.1.2) prior to discharge to the POTW.

All methods and procedures used for demobilization and decontamination were performed in accordance with the TSCA RBDA for demobilization issued by the EPA on March 10, 2015 (EPA 2015).

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13.0 ARCHAEOLOGICAL MONITORING

Archaeological monitoring of the Project was performed in accordance with the *Archaeological Work Plan* (AMEC et al. 2012g). All on-site construction personnel were trained by being shown an archaeological training video. The video provided training to help workers identify a wide range of cultural resources that could potentially be uncovered during construction excavation or dredging. During these training meetings, the appropriate chain of communication was established and contact information was disseminated to the construction personnel for use in the event of an inadvertent discovery. Also discussed were the requirements for artifact discovery. No archaeological material was identified during archaeological monitoring and surveillance activities during CS3. A synopsis of the monitoring program and the results of the CS3 monitoring are presented in Appendix O.

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14.0 REFERENCES

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TABLES

TABLE 1

SCHEDULE OF SOUTHWEST BANK EXCAVATION AND BACKFILLING
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

	Activity in Approval Units		Water Quality Monitoring of Dredging and Backfill			
Date	Dredging	Backfill	Dredge Monitoring Activities	Dredge Monitoring Conventional Results	Backfill Monitoring	Backfill Conventional Results
8/5/14	C71, C72, C73, C74		Intensive Monitoring	No Exceedances		
8/6/14	C72, B72		Intensive Monitoring	No Exceedances		
8/7/14	C72, B72		Intensive Monitoring	No Exceedances		
8/8/14	C72, B72, C73		Intensive Monitoring	No Exceedances		
8/9/14	C72, B72		Intensive Monitoring	No Exceedances		
8/10/14	C72, C74, C75	C72	Intensive Monitoring	No Exceedances	Limited Backfill Placement; No Monitoring Conducted	
8/11/14	C72, C73, B73	C72	Intensive Monitoring	No Exceedances	Limited Backfill Placement; No Monitoring Conducted	
8/12/14	B71, B73		Routine–No Monitoring Conducted			
8/13/14	B72, C73, B73, C74, B74		Routine Monitoring	No Exceedances		
8/14/14	B72, C73, B73, C74, B74		Routine–No Monitoring Conducted			
8/17/14	C73, B73, C74, B74, C75, B75		Routine–No Monitoring Conducted			

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Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

	Activity in Approval Units		Water Quality Monitoring of Dredging and Backfill			
Date	**Dredging**	**Backfill**	**Dredge Monitoring Activities**	**Dredge Monitoring Conventional Results**	**Backfill Monitoring**	**Backfill Conventional Results**
8/18/14	C74, B74, C75, B75		Routine Monitoring	No Exceedances		
8/19/14	C74, B74, C75, B75, B76		Routine–No Monitoring Conducted			
8/20/14	C74, B74, C75, B75, C76, B76		Routine Monitoring	No Exceedances		
8/21/14	C74, B74, C75, B75, C76, B76		Routine–No Monitoring Conducted			
8/22/14	C75, B75, C76, B76	B71-B76	Routine–No Monitoring Conducted		Limited Backfill Placement; No Monitoring Conducted	
8/23/14		C72-C74, B72-B74			Routine–No Monitoring Conducted	
8/24/14		C71,C72, B71, C71, C74-C76, B74-B76			Routine–No Monitoring Conducted	
8/25/14		C73-C76, B74-B76			Routine Monitoring	No Exceedances
8/26/14		C71-C73, C75, C76			Routine–No Monitoring Conducted	
8/27/14		C71,C72			Routine–No Monitoring Conducted	
8/29/14		C74-C76, B74-B76			Routine–No Monitoring Conducted	

TABLE 2

SCHEDULE OF DREDGING, BACKFILLING, AND WATER QUALITY MONITORING
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

	Activity in Approval Units								Water Quality Monitoring Activities				Dredge Return Water Plant Water Quality Monitoring		
		Initial Backfill		Intermediate Backfill		Final Backfill									
Date	Dredging	Aberdeen	Skookum	Aberdeen	Skookum	Aberdeen	Skookum	Other Activities	Dredge Monitoring Activities	Final Backfill Monitoring	Sheetpile Removal Monitoring	Comments	Plant Operation	Monitoring Activities [1]	Comments
9/24/14	A52, A53, A54, A55								Intensive Monitoring				Operating Normally	Intensive Monitoring	
9/25/14	A50, A51, A52, B54, B55								Intensive Monitoring				Operating Normally	Intensive Monitoring	
9/26/14	A53, A54, B50, B51, B52, B53, C52, C53								Intensive Monitoring				Operating Normally	Intensive Monitoring	
9/27/14	A51, A52, A53, B52, B53, B54								Intensive Monitoring				Operating Normally	Intensive Monitoring	
9/28/14	No Work (Sunday)								No Dredging				No Operations		
9/29/14	No Dredging								No Dredging				No Operations		
9/30/14	A54, C53, C54								Limited Dredging-No Monitoring Conducted				No Operations		
10/1/14	A51, A52, A53, B49, B50, C49, C50, C51, C52, C53								Intensive Monitoring				Operating Normally	Intensive Monitoring	
10/2/14	A50, A51, A54, A55, B49, B50, C49, C50, C51, C52, C53, C54								Intensive Monitoring				Operating Normally	Intensive Monitoring	
10/3/14	A52, A53, A54, B52, B53, B54, C53, C54								Intensive Monitoring				Operating Normally	Intensive Monitoring	
10/4/14	A51, A52, A53, B52, B53, C51, C52, C53, C54, C55								Intensive Monitoring				No Operations		
10/5/14	No Work (Sunday)								No Dredging				No Operations		
10/6/14	No Dredging								No Dredging				No Operations		
10/7/14	A51, A52, A53, B50, B51, B52, B53, B54, C52, C53, C54								Routine Monitoring				Operating Normally	Routine Monitoring	
10/8/14	A44, A45, B48, B49, C48, C49, C50, C51				A63, B63				Routine–No Monitoring Conducted				Operating Normally	Routine Monitoring-No Sample Collection	

TABLE 2

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Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

	Activity in Approval Units								Water Quality Monitoring Activities				Dredge Return Water Plant Water Quality Monitoring		
		Initial Backfill		Intermediate Backfill		Final Backfill									
Date	Dredging	Aberdeen	Skookum	Aberdeen	Skookum	Aberdeen	Skookum	Other Activities	Dredge Monitoring Activities	Final Backfill Monitoring	Sheetpile Removal Monitoring	Comments	Plant Operation	Monitoring Activities [1]	Comments
10/9/14	A40, A41, A42, A43, A44, B45				A58, A59, A62				Routine Monitoring				Operating Normally	Routine Monitoring	
10/10/14	A42, A43, A44, A45, C43, C44				A58				Intensive Monitoring				Operating Normally	Routine Monitoring-No Sample Collection	
10/11/14	A40, A41, B39, B40, B41, B42				A55-A57				Intensive Monitoring				No Operations		
10/12/14	No Work (Sunday)								No Dredging				No Operations		
10/13/14	C48, C52, Slip 4				B56-B59				Intensive Monitoring				Operating Normally	Routine Monitoring	
10/14/14	Slip 4								Intensive Monitoring				Operating Normally	Routine Monitoring-No Sample Collection	
10/15/14	No Dredging								No Dredging				No Operations		
10/16/14	No Dredging				A55, B55				No Dredging				Operating Normally	Routine Monitoring	
10/17/14	A44, A45, Slip 4				A52-A54				Intensive Monitoring				Operating Normally	Routine Monitoring-No Sample Collection	
10/18/14	A41, A42, A43, A44, A50, B48, B49, C47				A52-A54				Routine–No Monitoring Conducted				No Operations		
10/19/14	No Work (Sunday)								No Dredging				No Operations		
10/20/14	A43, A44, A45, B40, B41, B42, B43, B44, C44				A52-A54				Routine–No Monitoring Conducted				Operating Normally	Routine Monitoring	
10/21/14	A42, B48, B49, C47, C50, Slip 4				A53, Z56, Z60				Routine Monitoring				Operating Normally	Routine Monitoring-No Sample Collection	
10/22/14	A38, A39, A40, A41		B52, B53						Routine–No Monitoring Conducted				Operating Normally	Routine Monitoring	
10/23/14	A37, A38, A39, A40, A41		B53, C52, C53		B52, C52, C53				Intensive Monitoring			Special Area	Operating Normally	Intensive Monitoring	Special Area Data Log Failed
10/24/14	A39, A40, A41, A42		C54		B53, C54				Intensive Monitoring				Operating Normally	Intensive Monitoring	

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Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

	Activity in Approval Units								Water Quality Monitoring Activities				Dredge Return Water Plant Water Quality Monitoring		
		Initial Backfill		Intermediate Backfill		Final Backfill									
Date	Dredging	Aberdeen	Skookum	Aberdeen	Skookum	Aberdeen	Skookum	Other Activities	Dredge Monitoring Activities	Final Backfill Monitoring	Sheetpile Removal Monitoring	Comments	Plant Operation	Monitoring Activities [1]	Comments
10/25/14	A37, A38								Intensive Monitoring			Special Area	Operating Normally	Intensive Monitoring	Special Area
10/26/14	No Work (Sunday)								No Dredging				No Operations		
10/27/14	Slip 4								Intensive Monitoring			Early Removal Areas	Operating Normally	Intensive Monitoring	
10/28/14	A35, A36, B42, B43, C41, C42, Slip 4								Intensive Monitoring				Plant Recirculating		Early Removal; Area Recirculation Sample
10/29/14	A40, A41, A42, A43, C39, C40, C41								Intensive Monitoring				Operating Normally	Intensive Monitoring	Early Removal Areas
10/30/14	A39, B36, B37, B38, B39, B40		B54		B53, B54				Intensive Monitoring				Plant Recirculating	Intensive Monitoring	Early Removal Area Recirculation Sample
10/31/14	A38, A43, A44, B34, B35, B36, C37, C38		A51, B51, Z51		B52, Z51, A51				Intensive Monitoring				Operating Normally	Intensive Monitoring	
11/1/14	No Dredging								No Dredging				Operating Normally	Intensive Monitoring	Early Removal Area
11/2/14	No Work (Sunday)								No Dredging				No Operations		
11/3/14	A38, A40, A41, A42, A43, A44, A45, B44, B45, C42, C43, C44		B50, C48-C51		B50				Routine–No Monitoring Conducted				Operating Normally	Intensive Monitoring	
11/4/14	A38, A39, A40, A41, B41				A55, B55, C55				Intensive Monitoring			Early Removal Areas	Plant Recirculating		Early Removal; Area Recirculation Sample
11/5/14	A35, A36, A37, A42, B41, B42, C40				A56, A58, B56, C56, C57				Intensive Monitoring				Plant Recirculating		Early Removal; Area Recirculation Sample
11/6/14	A31, A32, A33, A34, A35, C39, C40, C41, C42				B53-B55, B57, B58, A54, A55, C54, C58				Routine–No Monitoring Conducted				Operating Normally	Intensive Monitoring	
11/7/14	A30, A31, A32, A33, A34, A35, A36, A39				C52, C53, B52, B53, A52, A53				Intensive Monitoring			Special Area	Operating Normally	Intensive Monitoring	
11/8/14	A35, A36, A37, A38, A39, A40, C40, C41, C42								Routine–No Monitoring Conducted				Operating Normally	Intensive Monitoring	

TABLE 2

SCHEDULE OF DREDGING, BACKFILLING, AND WATER QUALITY MONITORING
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Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

	Activity in Approval Units								Water Quality Monitoring Activities				Dredge Return Water Plant Water Quality Monitoring		
		Initial Backfill		Intermediate Backfill		Final Backfill									
Date	Dredging	Aberdeen	Skookum	Aberdeen	Skookum	Aberdeen	Skookum	Other Activities	Dredge Monitoring Activities	Final Backfill Monitoring	Sheetpile Removal Monitoring	Comments	Plant Operation	Monitoring Activities [1]	Comments
11/9/14	No Work (Sunday)								No Dredging				No Operations		
11/10/14	A34, A35, A36, A37, A38, B34, B35, B36, C52								Routine–No Monitoring Conducted				Operating Normally	Intensive Monitoring	
11/11/14	A29, A30, A31, A32, A33, B33, B34		Z43						Routine Monitoring				Operating Normally	Intensive Monitoring	
11/12/14	A28, A33, A34, A35, B30, B31, B32, B33		Z42, Z41		Z41-Z43				Routine–No Monitoring Conducted				Operating Normally	Intensive Monitoring	
11/13/14	A31, A32, A33, B28, B29, B30, B31, B32, B33, C35, C36		A42, A43		A43, Z41				Routine Monitoring				No Operations		
11/14/14	A33, A34, B28, B29, B30, B31, C33, C34, C35		A41		A41-A43				Routine–No Monitoring Conducted				Operating Normally	Intensive Monitoring	
11/15/14	No Dredging								No Dredging				Operating Normally	Intensive Monitoring	
11/16/14	No Work (Sunday)								No Dredging				Operating Normally	Intensive Monitoring	
11/17/14	A32, A33, A34, B31, B32, B33, B34, C32, C33				A41-A43, Z41-Z43				Routine–No Monitoring Conducted				Operating Normally	Intensive Monitoring	
11/18/14	A30, A31, A32, C29, C30, C31, C38, C39, C40, C41								Routine Monitoring				Operating Normally	Routine Monitoring	
11/19/14	A31, A33, A34, A37, A39, B32, C37, C39, C41, Slip 4				A54-A56, B52-B56, C52, C53, C55, C56				Intensive Monitoring			Early Removal Areas	Operating Normally	Routine Monitoring-No Sample Collection	
11/20/14	No Dredging				A59-A61, B54, B59, B60, C53-C55, C59-C61				No Dredging				Operating Normally	Routine Monitoring	
11/21/14	No Dredging				A54-A61, C53, Z54-Z61				No Dredging				Operating Normally	Routine Monitoring	
11/22/14	No Dredging				A51, A52, A54, A55, A59, A60, B51, C51, C52, Z54-Z59, Z62				No Dredging				Operating Normally	Routine Monitoring	
11/23/14	No Work (Sunday)								No Dredging				No Operations		

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	Activity in Approval Units								Water Quality Monitoring Activities				Dredge Return Water Plant Water Quality Monitoring		
		Initial Backfill		Intermediate Backfill		Final Backfill									
Date	Dredging	Aberdeen	Skookum	Aberdeen	Skookum	Aberdeen	Skookum	Other Activities	Dredge Monitoring Activities	Final Backfill Monitoring	Sheetpile Removal Monitoring	Comments	Plant Operation	Monitoring Activities [1]	Comments
11/24/14	A28, A29, A30, A34, A37, A39, C31, C32, C33, C34, C35, C36, C37, C41, Slip 4				A62-A64, B62-B64				Routine–No Monitoring Conducted				Operating Normally	Routine Monitoring	
11/25/14	A28, A29, A37, A38, A50, C28, C29, C30, C45		A32, Z32, Z33		A65, B64-B66, B67, C66-C68				Routine Monitoring				Operating Normally	Routine Monitoring	
11/26/14	No Work								No Dredging				No Operations		
11/27/14	No Work								No Dredging				No Operations		
11/28/14	No Work								No Dredging				No Operations		
11/29/14	No Work								No Dredging				No Operations		
11/30/14	No Work (Sunday)								No Dredging				No Operations		
12/1/14	A77, A78, B75		A32-A35, Z32-Z34-Z39		Z37-Z39				Limited Dredging-No Monitoring Conducted				Operating Normally	Routine Monitoring	
12/2/14	A75, A76		A35-A38, Z38, Z39		A33, A34, Z40				Limited Dredging-No Monitoring Conducted				Operating Normally	Routine Monitoring	
12/3/14	A78, A79, A80, B74, B79		A38-A40, Z38-Z41		A34-A39, B38, Z33, Z34, Z36-Z39, Z40				Limited Dredging-No Monitoring Conducted				Operating Normally	Intensive Monitoring	Early Removal Area and Special Areas
12/4/14	A71, A72, B73, B74, C28, C29, C47		A28, A29, B33-B38, Z28-Z33		A28, A29, Z31, Z32				Routine Monitoring				Operating Normally	Intensive Monitoring	
12/5/14	A49, A50, A69, A70, A71, C28, C45, C46, C47		A30, A31, A32, A33		A30, A31, A32, Z31, Z32				Intensive Monitoring				Operating Normally	Intensive Monitoring	Early Removal Area and Special Areas
12/6/14	A74, A75, A76, A77, A78, A79				A36, A37, A38, A39, A40, A41, Z36, Z37, Z38, Z39, Z40, Z41				Intensive Monitoring			Special Area	No Operations		
12/7/14	No Work (Sunday)								No Dredging				No Operations		

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	Activity in Approval Units								Water Quality Monitoring Activities				Dredge Return Water Plant Water Quality Monitoring		
		Initial Backfill		Intermediate Backfill		Final Backfill									
Date	Dredging	Aberdeen	Skookum	Aberdeen	Skookum	Aberdeen	Skookum	Other Activities	Dredge Monitoring Activities	Final Backfill Monitoring	Sheetpile Removal Monitoring	Comments	Plant Operation	Monitoring Activities [1]	Comments
12/8/14	A75, A76, A77, A78, A79, B72, B73, B74, B75		B30-B32		A28-A41, B32, Z30, Z36, Z37, Z40				Intensive Monitoring			Special Area	Operating Normally	Intensive Monitoring	
12/9/14	A45, A71, A72, A73, A74, C44, C45, C46				A28-A40, Z30, Z31, Z33, Z34				Intensive Monitoring				Operating Normally	Intensive Monitoring	
12/10/14	A69, A75, A76, A77, A78, A79, B72, B73, B74		B28, B29, B39-B41		A28, A29, A32, A35, A38, A39, A41, B32-B34, Z31-Z33, Z39-Z41				Intensive Monitoring			Special Area	Operating Normally	Intensive Monitoring	
12/11/14	A48, A78, A79, B69, B70, B77, B78, C68				B55, B56, C54-C57				Intensive Monitoring			Special Area	Operating Normally	Intensive Monitoring	
12/12/14	A76, B71, B72, B73, B74, B75, B76, B77				A66, B59-B66, C62-C67, Z57-Z64, Z66				Intensive Monitoring			Special Area	Operating Normally	Intensive Monitoring	
12/13/14	A71, A72, A73, A74, A75, A76, B71, B72, B73, B74, B75, B76, B78				A28-A36, A38-A41, B28, B30-B34, B39-B41, Z31-Z34, Z36-Z42				No Daylight Dredging, No Monitoring Conducted			Limited Dredge Operations	No Operations		
12/14/14	No Work (Sunday)								No Dredging				No Operations		
12/15/14	A71, A72, A74, A75, A76, B74, B75, B77, B78			A55, A56, A57, A58, A60, A61, A62	A28, A30-A35, A37-A42, B28-B30, B35-B38, B40-B42, C28, C56-C59, Z31, Z32, Z34				No Daylight Dredging, No Monitoring Conducted			Limited Dredge Operations	No Operations		
12/16/14	A69, A70, A72, B70, B71, B73, C68, C69		Slip 4		A59-A61, B54-B56, B59-B61, B66, C60, C61, C64-C66, Slip 4				Intensive Monitoring			pH probe malfunction	Operating Normally	Intensive Monitoring	
12/17/14	A45, A68, A69, A70, A71, A73, A75, B68, B69, B75, C29, C30, C31, C33, C34, C36, C37, C69, C70				A52-A55, A62-A65, B52-B54, B62-B65, C53-C56, C58, Z63-Z65, Slip 4				Intensive Monitoring			pH probe malfunction	Operating Normally	Routine Monitoring	
12/18/14	A68, A69, A71, B68, B69, B70, C68, C69		A78-A80, B79, B80	A56	A60, A61, A78-A80, B59-B61, B79, B80, Z60				Intensive Monitoring			pH probe malfunction	Operating Normally	Routine Monitoring-No Sample Collection	

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		Initial Backfill		Intermediate Backfill		Final Backfill									
Date	Dredging	Aberdeen	Skookum	Aberdeen	Skookum	Aberdeen	Skookum	Other Activities	Dredge Monitoring Activities	Final Backfill Monitoring	Sheetpile Removal Monitoring	Comments	Plant Operation	Monitoring Activities [1]	Comments
12/19/14	A68, A69, B45, B46, B77, B78, C36, C44		A76, A77, C28-C30, Z78, Z79	A53, A54, A55, A56, A57, A58, A59, A61, A62, A63, A64, A65	A41, A77-A80, B41, B42, C29, Z78, Z79				Intensive Monitoring				Operating Normally	Routine Monitoring-No Sample Collection	
12/20/14	No Dredging		A75, A76, C31-C36, Z75, Z76	A63, A64, A65, B64, B65, B66, B74, C57, C58, C59, C60, C61, C62, C63	Z75, Z76				No Dredging				Operating Normally	Routine Monitoring-No Sample Collection	
12/21/14	No Dredging		A70-A75, B78, C74, Z70-Z74	A39, A40, A41, A42, B33, C29, C30, C31, C32	A70-A74, Z70, Z72				No Dredging				Operating Normally	Routine Monitoring-No Sample Collection	
12/22/14	No Dredging		B70-B73, C70		Z70-Z77, A72-A76, B74				No Dredging				No Operations		
12/23/14	No Work								No Dredging				No Operations		
12/24/14	No Work								No Dredging				No Operations		
12/25/14	No Work								No Dredging				No Operations		
12/26/14	No Work								No Dredging				No Operations		
12/27/14	No Work								No Dredging				No Operations		
12/28/14	No Work								No Dredging				No Operations		
12/29/14	No Work								No Dredging				No Operations		
12/30/14	No Work								No Dredging				No Operations		
12/31/14	No Work								No Dredging				No Operations		
1/1/15	No Work								No Dredging				No Operations		
1/2/15	No Work								No Dredging				No Operations		
1/3/15	No Work								No Dredging				No Operations		
1/4/15	No Work								No Dredging				No Operations		

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	Activity in Approval Units								Water Quality Monitoring Activities				Dredge Return Water Plant Water Quality Monitoring		
		Initial Backfill		Intermediate Backfill		Final Backfill									
Date	Dredging	Aberdeen	Skookum	Aberdeen	Skookum	Aberdeen	Skookum	Other Activities	Dredge Monitoring Activities	Final Backfill Monitoring	Sheetpile Removal Monitoring	Comments	Plant Operation	Monitoring Activities [1]	Comments
1/5/15			A68, Z68, Z69	A73, A74, B73, B74, B75	A68, B31, C27-C32, Z68, Z69			Hydraulic Dredging	Limited Hydraulic Dredging-No Monitoring Conducted				Operating Normally	Routine Monitoring	
1/6/15			A67-A70, B67-B69, C68, C69, Z68, Z69	A31, A32, A33, A34, A35, A36, A37, A38, A39, A40, A73, B70, B71, B72, B74	A69, C36-C41, C68			Hydraulic Dredging	Intensive Monitoring			Hydraulic Dredge Monitoring	Operating Normally	Routine Monitoring-No Sample Collection	
1/7/15			B68, B69	A70, A71, A72, A73, A74, B72	A52, A53, B52, B53, B67-B69, C52, C53			Hydraulic Dredging	No Dredging				Operating Normally	Routine Monitoring	
1/8/15			C42	A52, A53, A55, B53, B54, B56, B57, C51, C53, C54, C56, C57	A67, A69, A70, B27, B28, B32, B38, B41, B67-B69, C28, C29, C31-C33, C36-C41, Z69			Hydraulic Dredging	Intensive Monitoring			Hydraulic Dredge Monitoring-Additional Monitoring During Hydraulic Dredging Not Required	Operating Normally	Routine Monitoring-No Sample Collection	
1/9/15				A73, A79, A80, B72, B73, B74, B78, B79, B80	A67-A71, A73, B67-B69, B73, C48-C50, C67, C68, Z71, Z73, Z76			Hydraulic Dredging	Hydraulic Dredging-No Monitoring Conducted				Operating Normally	Routine Monitoring-No Sample Collection	
1/10/15			B77	A60, A61, A62, A63, A64, A65, A66, A73, A74, A75, B55, B56, B57, B59, B68, C52, C53, C54, C55	A69-A71, A75-A79, B69, B75-B79, C67-C70, Z58, Z69-Z71, Z76, Z79	C46, C47		Hydraulic Dredging	Hydraulic Dredging-No Monitoring Conducted				No Operations		
1/11/15	No Work (Sunday)								No Dredging				No Operations		
1/12/15				A29, A80, B29, B30, B31, B32, B34, B35, B36, B37, B38, B40, B75, B76, B77, C33, C37	A10, A17, A21, A5, A6, A66-A71, A9, B14-B21, B66-B72, C16, C17, C19, C20, C66, C68, C69, Z67-Z71			Hydraulic Dredging	Hydraulic Dredging-No Monitoring Conducted				Operating Normally	Routine Monitoring	

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	Activity in Approval Units								Water Quality Monitoring Activities				Dredge Return Water Plant Water Quality Monitoring		
		Initial Backfill		Intermediate Backfill		Final Backfill									
Date	Dredging	Aberdeen	Skookum	Aberdeen	Skookum	Aberdeen	Skookum	Other Activities	Dredge Monitoring Activities	Final Backfill Monitoring	Sheetpile Removal Monitoring	Comments	Plant Operation	Monitoring Activities [1]	Comments
1/13/15				A72, A73, A75, A76, A77, A78, A79, A80, B74, B75, B76, B77, B78, B79	A16-A18, A21, A69-A71, B14, B15, B17, B19, B24-B28, B60-B63, B67-B70, C17, C21, C22, C24, C26, C55, C56, C64, C65, C67, Z70, Z71			Hydraulic Dredging	Hydraulic Dredging-No Monitoring Conducted				Operating Normally	Routine Monitoring-No Sample Collection	
1/14/15				A53, A59, A60, A61, A62, A63, A64, A65, A66, A67, A68, A71, A72, A73, A74, A75, A76, A79, A80, B52, B53, B54, B55, B56, B57, B58, B63, B64, B65, B66, B67, B71, B72, B73, B74, B76, B77, B78, B79, C54, C55, C57, C58, C63, C64, C66, C67, C68	A15, A17, A18, A21, A27, A29, A31, A33, A34, A38, A39, A41, B16, B17, B20, B21, B26-B33, B35, B37-B42, C16, C17, C19, C26, C27, C29, C31, C34, C40-C42, Z33, Z37-Z42			Hydraulic Dredging	Hydraulic Dredging-No Monitoring Conducted				Operating Normally	Routine Monitoring	
1/15/15	A45, C44				A5, A6, A17, A18, A29, A32, A33, A37, A39, A40, A41, A59-A67, A69-A71, A75-A78, B14, B19, B21, B24-B26, B29, B30, B32-B38, B41, B55-B59, B61-B63, B67-B69, B73-B80, C27, C30-C32, C38, C56, C67-C69, Z42, Z59, Z63-Z68, Z76, Z78, Z79			Removing sandy gravel from A68, A69, B70, B72, B77 for Outfall Z, Hydraulic Dredging	Limited Dredging, No Monitoring Conducted				Operating Normally	Routine Monitoring-No Sample Collection	

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	Activity in Approval Units								Water Quality Monitoring Activities				Dredge Return Water Plant Water Quality Monitoring		
		Initial Backfill		Intermediate Backfill		Final Backfill									
Date	Dredging	Aberdeen	Skookum	Aberdeen	Skookum	Aberdeen	Skookum	Other Activities	Dredge Monitoring Activities	Final Backfill Monitoring	Sheetpile Removal Monitoring	Comments	Plant Operation	Monitoring Activities [1]	Comments
1/16/15				B72	A37, A43, A51, A53-A58, A60, A62, A64-A66, A69-A72, A74, A78, A79, B42, B43, B51, B52, B54, B55, B58-B60, B65, B66, B69, B70, B72, B73, B78, B79, C39, C51, C53-C61, C65-C67, C69, Z64, Z65, Z67-Z69			Removing gravelly sand from A56, A57, A58, B72, B77 for Outfall Z and Backfill Maintenance, Hydraulic Dredging	Hydraulic Dredging-No Monitoring Conducted				Operating Normally	Routine Monitoring-No Sample Collection	
1/17/15					A77, B77			Backfill maintenance in A54, A55, A61, A62, B53, C64, Hydraulic Dredging	Hydraulic Dredging-No Monitoring Conducted				Operating Normally	Routine Monitoring-No Sample Collection	
1/18/15	No Work (Sunday)								No Dredging				No Operations		
1/19/15					A43, A51, A52, A54, A55, A62, A66, A68-A75, B43, B51, B52, B55, B62, B70, B74, C39, C51, C52, Z60, Z69, Z70			Backfill maintenance and Outfall Z and South Outfall work in A60, A61, A62, A64, A65, A67, A68, A69, A71, B70, B71, B72, B77, Hydraulic Dredging	Hydraulic Dredging-No Monitoring Conducted				Operating Normally	Routine Monitoring	
1/20/15					A43, A51, A55-A57, A59-A65, A67, A69, A70, A76, B60, B62-B65, B68, B70, B71, B75, B76, B78, C60, C61, C64, Z70			Backfill maintenance and South Outfall work in A57, A68, A69, A70, B72, C62, C63, C64, C65, Hydraulic Dredging	Hydraulic Dredging-No Monitoring Conducted				Operating Normally	Routine Monitoring-No Sample Collection	

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		Initial Backfill		Intermediate Backfill		Final Backfill									
Date	Dredging	Aberdeen	Skookum	Aberdeen	Skookum	Aberdeen	Skookum	Other Activities	Dredge Monitoring Activities	Final Backfill Monitoring	Sheetpile Removal Monitoring	Comments	Plant Operation	Monitoring Activities [1]	Comments
1/21/15						A64, A65, A66, A67	A61-A63, B58, B60, B61, C57-C62, Z61-Z63	Backfill maintenance in A54, A55, A58, B72, Hydraulic Dredging	Hydraulic Dredging-No Monitoring Conducted	Intensive Monitoring			Operating Normally	Routine Monitoring	
1/22/15						A63, A64, A65, A66, A67	A59-A63, B56, B57, B61-B63, C56, C57, C62-C64, Z61, Z62	Backfill maintenance in A55, A56, Hydraulic Dredging	Hydraulic Dredging-No Monitoring Conducted	Intensive Monitoring			Operating Normally	Routine Monitoring-No Sample Collection	
1/23/15						A57, A58, A59, A60, B58, B59, B60	B60--B63, B65-B67, C62, C64-C68	Backfill maintenance in A55, A56, Hydraulic Dredging	Hydraulic Dredging-No Monitoring Conducted	Intensive Monitoring			Operating Normally	Routine Monitoring-No Sample Collection	
1/24/15					B76, B77	B63, B64, B65, B66, B67	A56-A59, B57, B58, B61, C56-C67	Backfill maintenance in A55, A56, Hydraulic Dredging	Hydraulic Dredging-No Monitoring Conducted	Intensive Monitoring			Operating Normally	Routine Monitoring-No Sample Collection	
1/25/15	No Work (Sunday)								No Dredging				No Operations		
1/26/15	B72					A62, A63, B62, B64, B65, B66, B67	A55-A61, B54-B61, C55-C57, Z54-Z56	Hydraulic Dredging	Limited Dredging-No Monitoring Conducted	Intensive Monitoring			Operating Normally	Routine Monitoring	
1/27/15	B72					A61, A62, A63, A64, A65, A66, A67, B63, B64, B65, C63, C64, C65, C66	A55-A60, B55, B57-B60, B77, C56-C62, Z55-Z57, Z59, Z60	Hydraulic Dredging	Limited Dredging-No Monitoring Conducted	Intensive Monitoring			Operating Normally	Routine Monitoring-No Sample Collection	
1/28/15	A78, B72					A74, A75, A76, A77, A78, A79, A80, B75, B76, B78, B79, B80	A55, A56, A60, A61, B55-B57, B61, C55-C59, C62-C68, Z55, Z56, Z60, Z61	Hydraulic Dredging	Limited Dredging-No Monitoring Conducted	Intensive Monitoring			Operating Normally	Routine Monitoring	
1/29/15				C69	B72, B77	A68, A69, A70, A76, A79, A80, B68, B69, B75, B77, B78, B79, B80, C68	A72-A75, B73-B75, Z72, Z73	Hydraulic Dredging	Hydraulic Dredging-No Monitoring Conducted	Intensive Monitoring			Operating Normally	Routine Monitoring-No Sample Collection	

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		Initial Backfill		Intermediate Backfill		Final Backfill									
Date	Dredging	Aberdeen	Skookum	Aberdeen	Skookum	Aberdeen	Skookum	Other Activities	Dredge Monitoring Activities	Final Backfill Monitoring	Sheetpile Removal Monitoring	Comments	Plant Operation	Monitoring Activities [1]	Comments
1/30/15				B72, B74, B75, B76, B77		A71, A72, A73, B69, B70, B71, B73, B74, B75, C68, C70	A52-A54, B53, B54, C53-C55, Z52-Z54	Hydraulic Dredging	Hydraulic Dredging-No Monitoring Conducted	Intensive Monitoring			Operating Normally	Routine Monitoring-No Sample Collection	
1/31/15	A48, A50, B46, B47					A68, B72, C68, C69, C70	A52-A56, B53-B56, C52-C55, Z53-Z56	Hydraulic Dredging	Limited Dredging-No Monitoring Conducted	Intensive Monitoring			Operating Normally	Routine Monitoring-No Sample Collection	
2/1/15	No Work (Sunday)								No Dredging				No Operations		
2/2/15						A36, A37, A38, A39, A40, B35, B36, B37, B38, B39, B40, C39, C40	A31-A35, A71, A72, A74, A75, A77, B30-B34, B70-B78, C30, C65-C70, C78, Z31-Z34	Hydraulic Dredging	Hydraulic Dredging-No Monitoring Conducted	Intensive Monitoring			Operating Normally	Routine Monitoring	
2/3/15					B72	A28, A29, A30, B28, B29, B30, C32, C33, C34, C35, C36, C37, C38	A34-A37, A71, A73-A75, A77-A79, B32, B36, B71-B75, B77-B79, C32, Z35, Z36, Z38-Z41, Z72-Z79	Hydraulic Dredging	Hydraulic Dredging-No Monitoring Conducted	Intensive Monitoring			Operating Normally	Routine Monitoring-No Sample Collection	
2/4/15	A29, A45, B46, C48					A26, A27, A35, A36, A37, B26, B27, B28, B33, B34, C31, C32	A54-A57, A65, A69, A71, B52-B71, C52-C70, Z55-Z57, Z71	Hydraulic Dredging	Limited Dredging-No Monitoring Conducted	Intensive Monitoring			Operating Normally	Routine Monitoring	
2/5/15						A22, A23, A24, A25, A26, A27, A29, B22, B23, B24, B25, C26, C27, C28, C29, C30, C39	A56-A68, A70-A76, B54-B59, B67-B69, C53, C55, C58, C64-C68, Z57-Z75	Hydraulic Dredging	Hydraulic Dredging-No Monitoring Conducted	Intensive Monitoring			Operating Normally	Routine Monitoring-No Sample Collection	
2/6/15						A16, A17, A18, A19, A24, A25, A31, A32, A33, A34, A77, A78, A79, A80, B18, B80, C24, C25, C26	A19-A21, A29-A31, B20-B23, B28-B32, C20-C23, C29-C31, Z19-Z21	Hydraulic Dredging	Hydraulic Dredging-No Monitoring Conducted	Intensive Monitoring			Operating Normally	Routine Monitoring-No Sample Collection	

TABLE 2

SCHEDULE OF DREDGING, BACKFILLING, AND WATER QUALITY MONITORING
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

	Activity in Approval Units								Water Quality Monitoring Activities				Dredge Return Water Plant Water Quality Monitoring		
		Initial Backfill		Intermediate Backfill		Final Backfill									
Date	Dredging	Aberdeen	Skookum	Aberdeen	Skookum	Aberdeen	Skookum	Other Activities	Dredge Monitoring Activities	Final Backfill Monitoring	Sheetpile Removal Monitoring	Comments	Plant Operation	Monitoring Activities [1]	Comments
2/7/15						A13, A14, A16, C16, C17, C18, C19	A26, A28-A31, A38-A40, B20, B21, B26-B34, B38-B40, C26-C34, Z38, Z39	Backfill maintenance in A35, A36, Hydraulic Dredging	Hydraulic Dredging-No Monitoring Conducted	Intensive Monitoring			Operating Normally	Routine Monitoring-No Sample Collection	
2/8/15	No Work (Sunday)								No Dredging				No Operations		
2/9/15	A44, A45					A9, A21, A22, A24, A25, A26, A27, A28, A29, A30, A31, A32, A33, A34, A35, A36, A37, A38, A39, A40, B22, B23, B24, B26, B27, B28, B29, B30, B32, B34, B35, B40, C22, C23, C32	A10-A20, B13-B20, C13-C21, Z9-Z13	Hydraulic Dredging	Limited Dredging-No Monitoring Conducted	Intensive Monitoring			Operating Normally	Routine Monitoring	
2/10/15	Slip 4, A49					A3, A34, A35, A36, A37, B1, B2	A5-A16, B6-B18, C15-C18, Z4-Z10, Z13, Z17-Z19	Hydraulic Dredging	No Daylight Dredging, No Monitoring Conducted	Intensive Monitoring		Nighttime Dredging in Slip 4	Operating Normally	Routine Monitoring-No Sample Collection	
2/11/15	Slip 4		A44-A46, B44-B46, B49, C43, C44, Z44, Z45		B48-B50, C49, C50	B5, B6, B7, B8, B11, B12, B13, B14, B15, B17, C20, C21, C22, C23			No Daylight Dredging, No Monitoring Conducted	Intensive Monitoring		Nighttime Dredging in Slip 4	Operating Normally	Routine Monitoring	
2/12/15	Slip 4		A48, B47, B48, C47, C48	A45, B45	A48, B47-B49, C48		A3, A4, A19-A21, A48, B4, B19-B21, B47-B49, C26-C35, C47, C48, Z4-Z7		No Daylight Dredging, No Monitoring Conducted	Intensive Monitoring		Nighttime Dredging in Slip 4	Operating Normally	Routine Monitoring-No Sample Collection	
2/13/15	Slip 4		C46, C47	A44	B47, B48, C46, C47		A1-A13, A80, B1-B4, B6, B8-B10, B13, Z1-Z4, Z7-Z13		Intensive Monitoring (partial round)	Intensive Monitoring		Slip 4 Dredging and Final Backfill Monitoring	Operating Normally	Routine Monitoring-No Sample Collection	

TABLE 2

SCHEDULE OF DREDGING, BACKFILLING, AND WATER QUALITY MONITORING
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

	Activity in Approval Units								Water Quality Monitoring Activities				Dredge Return Water Plant Water Quality Monitoring		
		Initial Backfill		Intermediate Backfill		Final Backfill									
Date	Dredging	Aberdeen	Skookum	Aberdeen	Skookum	Aberdeen	Skookum	Other Activities	Dredge Monitoring Activities	Final Backfill Monitoring	Sheetpile Removal Monitoring	Comments	Plant Operation	Monitoring Activities [1]	Comments
2/14/15	Slip 4			A44, B45	B47, B48, C46-C48				No Daylight Dredging, No Monitoring Conducted	Intensive Monitoring (Intermediate Backfill)		Nighttime Dredging in Slip 4 Monitoring of Intermediate Backfill Placement	No Operations		
2/15/15	No Work (Sunday)								No Dredging				No Operations		
2/16/15	Slip 4			A43, A44, C45, C47, C48			A2, Z2, Z3		No Daylight Dredging, No Monitoring Conducted	Intensive Monitoring		Nighttime Dredging in Slip 4	Operating Normally	Routine Monitoring	
2/17/15	Slip 4						A4, A6-A11, A14-A17, A20, A22-A23, A29, A30, A37, A38, A40, B4, B7, B8, B11, B16, B17, B35, B38, C15, C34, C67-C69, Z5-Z7, Z9-Z11, Z14-Z20, Z23, Z30, Z36-Z39		Intensive Monitoring				Operating Normally	Routine Monitoring-No Sample Collection	
2/18/15	Slip 4				A48-A51, B48-B51, C47-C50, Z50, Z51		Z41-43, A41, A42, Z42, C60, C61, C63, C64		Intensive Monitoring				Operating Normally	Routine Monitoring	
2/19/15	Slip 4			B46	Z50, Z51, A49-A51, B49, B50, C49		A41, A42, Z42, C57-C60, C62, C63, C65, C66		Intensive Monitoring	Intensive Monitoring			Operating Normally	Routine Monitoring-No Sample Collection	
2/20/15	Slip 4				A44, A45, B44, B45, B48, C47-C49		A49-A52, B50-B52, Z49-Z52, Z80, C49-C54		Intensive Monitoring	Intensive Monitoring			Operating Normally	Routine Monitoring-No Sample Collection	
2/21/15	Slip 4						A50-A52, B49-B51, C50, C51, Z49-Z51		Limited Dredging-No Monitoring Conducted				No Operations		
2/22/15	No Work (Sunday)								No Dredging				No Operations		

TABLE 2

SCHEDULE OF DREDGING, BACKFILLING, AND WATER QUALITY MONITORING
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

	Activity in Approval Units								Water Quality Monitoring Activities				Dredge Return Water Plant Water Quality Monitoring		
		Initial Backfill		Intermediate Backfill		Final Backfill									
Date	Dredging	Aberdeen	Skookum	Aberdeen	Skookum	Aberdeen	Skookum	Other Activities	Dredge Monitoring Activities	Final Backfill Monitoring	Sheetpile Removal Monitoring	Comments	Plant Operation	Monitoring Activities [1]	Comments
2/23/15	Dredging Completed	Slip 4	Slip 4	Slip 4	Slip 4		A50-A53, B50-B54, C50-C52, Z50-Z53, Z80, Z81		No Dredging	Intensive Monitoring			Operating Normally	Routine Monitoring	
2/24/15		Slip 4	Slip 4	B46, B47, B48, Slip 4	Slip 4				No Dredging	Intensive Monitoring (Intermediate Backfill)		Monitoring of Intermediate Backfill Placement Conducted	Operating Normally	Routine Monitoring-No Sample Collection	
2/25/15				A45, A48, B43, B44, B47, C46, Slip 4		Slip 4	Slip 4		No Dredging	Intensive Monitoring			Operating Normally	Routine Monitoring	
2/26/15				B46, C46	Slip 4	Slip 4, A43, A44	Slip 4		No Dredging	Intensive Monitoring			Operating Normally	Routine Monitoring-No Sample Collection	
2/27/15				B49, C45, C46, Slip 4		B41, C41, C42, Slip 4			No Dredging	Intensive Monitoring	Intensive Monitoring	Slip 4 Sheet Pile Removal & Final Backfilling	Operating Normally	Routine Monitoring-No Sample Collection	
2/28/15						A43, A44, A45, B42, B43, C43, C44, C45, Slip 4			No Dredging	Intensive Monitoring	Intensive Monitoring	Slip 4 Sheet Pile Removal & Final Backfilling	No Operations		
3/1/15	No Work (Sunday)								No Dredging				No Operations		
3/2/15						A47, B46, B47, B51, C46, C50, C51			No Dredging	Intensive Monitoring	Intensive Monitoring	Slip 4 Sheet Pile Removal & Final Backfilling	Operating Normally	Routine Monitoring	
3/3/15				C41		B40, B41, B42, B43, B44, B45, B46, C41, C43, C50			No Dredging	Intensive Monitoring	Intensive Monitoring	Slip 4 Sheet Pile Removal & Final Backfilling	Operating Normally	Routine Monitoring-No Sample Collection	
3/4/15						A48, B40, B42, B47, B48, B49, B54, B55, C47, C48, C49, C50, C51, C52, C53, C54			No Dredging	Intensive Monitoring	Intensive Monitoring	Slip 4 Sheet Pile Removal & Final Backfilling	Operating Normally	Routine Monitoring	
3/5/15									No Dredging				Operating Normally	Routine Monitoring-No Sample Collection	

TABLE 2

SCHEDULE OF DREDGING, BACKFILLING, AND WATER QUALITY MONITORING
Corrective Measure Implementation Report
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Boeing Plant 2
Seattle/Tukwila, Washington

	Activity in Approval Units								Water Quality Monitoring Activities				Dredge Return Water Plant Water Quality Monitoring		
		Initial Backfill		Intermediate Backfill		Final Backfill									
Date	Dredging	Aberdeen	Skookum	Aberdeen	Skookum	Aberdeen	Skookum	Other Activities	Dredge Monitoring Activities	Final Backfill Monitoring	Sheetpile Removal Monitoring	Comments	Plant Operation	Monitoring Activities [1]	Comments
3/6/15						A55, B36, B38, B39, B41, B42, B53, B55, B57, C48, C49			No Dredging				Operating Normally	Routine Monitoring-No Sample Collection	
3/7/15									No Dredging				Operation Completed		
3/8/15	No Work (Sunday)								No Dredging				No Operations		
3/9/15									No Dredging				No Operations		
3/10/15									No Dredging				No Operations		
3/11/15									No Dredging				No Operations		
3/12/15									No Dredging				No Operations		

Note(s)
1. Routine monitoring requirements for the Dredge Return Water processing plant included monitoring twice a week on non-consecutive days. Turbidity of a composite water sample collected over the time period that the system was discharging would be used to determine a turbidity exceedance. Boeing conducted daily monitoring of the DRW plant discharge. Water samples were collected twice a week on non-consecutive days and discarded if turbidity was less than 5 NTUs.

Abbreviation(s)
DRW = dredge return water
NTU = nephelometric turbidity unit

TABLE 3

SETTLING BASIN PIEZOMETER MONITORING
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Date	9/8/2014		9/15/2014		9/22/2014		10/1/2014		10/7/2014		10/13/2014		10/20/2014		10/27/2014		11/3/2014	
Time	12:08		16:30		14:15		13:35		17:00		11:58		8:47		16:57		11:10	
Basin Staff Gauge	0.19		0.15		0.47		0.42		1		0.6		0.99		0.15		1.22	
Cumulative Rain During CS3 (in.)	0		0		0		0.33		0.33		0.33		0.98		3.89		5.82	
Monitoring Point ID	Depth (ft btoc)	Elevation (ft MLLW)	Depth (ft btoc)	Elevation (ft MLLW)	Depth (ft btoc)	Elevation (ft MLLW)	Depth (ft btoc)	Elevation (ft MLLW)	Depth (ft btoc)	Elevation (ft MLLW)	Depth (ft btoc)	Elevation (ft MLLW)	Depth (ft btoc)	Elevation (ft MLLW)	Depth (ft btoc)	Elevation (ft MLLW)	Depth (ft btoc)	Elevation (ft MLLW)
MP1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MP2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MP3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MP4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MP5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MP6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MP7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MP8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.45	19.708	ND	ND	4.67	19.488
Staff Gauge ID	Depth (ft above ground surface)	Elevation (ft MLLW)	Depth (ft above ground surface)	Elevation (ft MLLW)	Depth (ft above ground surface)	Elevation (ft MLLW)	Depth (ft above ground surface)	Elevation (ft MLLW)	Depth (ft above ground surface)	Elevation (ft MLLW)	Depth (ft above ground surface)	Elevation (ft MLLW)	Depth (ft above ground surface)	Elevation (ft MLLW)	Depth (ft above ground surface)	Elevation (ft MLLW)	Depth (ft above ground surface)	Elevation (ft MLLW)
MP1 Staff Gauge	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND
MP2 Staff Gauge	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND
MP7 Staff Gauge	0	ND	0	ND	0	ND	0	ND	0	ND	0.01	19.88	0.04	19.91	0.04	19.91	0.04	19.91
MP8 Staff Gauge	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0.03	19.94	0.02	19.93	0.03	19.94

Date	11/10/2014		11/17/2014		11/24/2014		12/2/2014		12/8/2014		12/16/2014		12/22/2015		12/29/2015		1/5/2015	
Time	13:21		10:20		17:40		10:32		9:31		13:20		8:52		8:04		17:35	
Basin Staff Gauge	0.78		0.65		0.33		0.96		1.08		0.84		0.08		0.51		0.59	
Cumulative Rain During CS3 (in.)	7.03		7.03		8.27		10.11		10.53		12.24		13.8		13.94		14.25	
Monitoring Point ID	Depth (ft btoc)	Elevation (ft MLLW)	Depth (ft btoc)	Elevation (ft MLLW)	Depth (ft btoc)	Elevation (ft MLLW)	Depth (ft btoc)	Elevation (ft MLLW)	Depth (ft btoc)	Elevation (ft MLLW)	Depth (ft btoc)	Elevation (ft MLLW)	Depth (ft btoc)	Elevation (ft MLLW)	Depth (ft btoc)	Elevation (ft MLLW)	Depth (ft btoc)	Elevation (ft MLLW)
MP1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MP2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MP3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MP4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MP5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MP6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MP7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MP8	ND	ND	ND	ND	ND	ND	ND	ND	4.70	19.458	ND	ND	ND	ND	ND	ND	4.64	19.518

TABLE 3

SETTLING BASIN PIEZOMETER MONITORING
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Staff Gauge ID	Depth (ft above ground surface)	Elevation (ft MLLW)	Depth (ft above ground surface)	Elevation (ft MLLW)	Depth (ft above ground surface)	Elevation (ft MLLW)	Depth (ft above ground surface)	Elevation (ft MLLW)	Depth (ft above ground surface)	Elevation (ft MLLW)	Depth (ft above ground surface)	Elevation (ft MLLW)	Depth (ft above ground surface)	Elevation (ft MLLW)	Depth (ft above ground surface)	Elevation (ft MLLW)	Depth (ft above ground surface)	Elevation (ft MLLW)
MP1 Staff Gauge	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND
MP2 Staff Gauge	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND
MP7 Staff Gauge	0.04	19.91	0	ND	0.02	19.89	0.02	19.89	0.04	19.91	0	ND	0.02	19.89	0.03	19.90	0.01	19.88
MP8 Staff Gauge	0.01	19.92	0	ND	0	ND	0	ND	0.03	19.94	0	ND	0	ND	0.04	19.95	0.02	19.93

Date	**1/12/2015**		**1/19/2015**		**1/26/2015**		**2/2/2015**		**2/10/2015**		**2/16/2015**		**2/23/2015**		**3/2/2015**	
Time	**13:00**		**7:41**		**8:53**		**11:00**		**9:46**		**10:51**		**16:15**		**7:59**	
Basin Staff Gauge	**0.48**		**0.96**		**0.42**		**0.46**		**1.02**		**0.99**		**0.22**		**0.16**	
Cumulative Rain During CS3 (in.)	**14.58**		**15.88**		**16.25**		**16.28**		**19.6**		**19.79**		**19.84**		**20.86**	
Monitoring Point ID	**Depth (ft btoc)**	**Elevation (ft MLLW)**	**Depth (ft btoc)**	**Elevation (ft MLLW)**	**Depth (ft btoc)**	**Elevation (ft MLLW)**	**Depth (ft btoc)**	**Elevation (ft MLLW)**	**Depth (ft btoc)**	**Elevation (ft MLLW)**	**Depth (ft btoc)**	**Elevation (ft MLLW)**	**Depth (ft btoc)**	**Elevation (ft MLLW)**	**Depth (ft btoc)**	**Elevation (ft MLLW)**
MP1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MP2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MP3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MP4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MP5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MP6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MP7	ND	ND	4.84	19.53	ND	ND	ND	ND	4.80	19.57	ND	ND	ND	ND	ND	ND
MP8	ND	ND	4.6	19.56	4.71	19.45	4.66	19.50	4.55	19.61	ND	ND	ND	ND	ND	ND
Staff Gauge ID	**Depth (ft above ground surface)**	**Elevation (ft MLLW)**	**Depth (ft above ground surface)**	**Elevation (ft MLLW)**	**Depth (ft above ground surface)**	**Elevation (ft MLLW)**	**Depth (ft above ground surface)**	**Elevation (ft MLLW)**	**Depth (ft above ground surface)**	**Elevation (ft MLLW)**	**Depth (ft above ground surface)**	**Elevation (ft MLLW)**	**Depth (ft above ground surface)**	**Elevation (ft MLLW)**	**Depth (ft above ground surface)**	**Elevation (ft MLLW)**
MP1 Staff Gauge	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND
MP2 Staff Gauge	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND	0	ND
MP7 Staff Gauge	0.03	19.90	0.03	19.90	0.03	19.90	0.01	19.88	0.03	19.90	0	ND	0	ND	0	ND
MP8 Staff Gauge	0.04	19.95	0.04	19.95	0	ND	0.04	19.95	0.05	19.96	0	ND	0	ND	0	ND

Abbreviation(s)

btoc = below top of casing
ft = feet
in. = inches
MLLW = mean lower low water
ND = not detected (monitoring point was dry)
YTD - year to date

TABLE 4

CONVENTIONAL WATER QUALITY MONITORING RESULTS AND SAMPLES ANALYZED FOR COMPLIANCE FOR ALL CONSTRUCTION SEASONS

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Construction Season	Date	Water Quality Monitoring Activities							
		Dredging		Final Backfill Monitoring		Sheetpile Removal			
		Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Samples Analyzed	Comments
Season 1	1/5/13	Intensive Monitoring	No Exceedances					BP2WQ-0020	No exceedance of the chemical criteria.
Season 1	1/6/13	No Dredging							
Season 1	1/7/13	Intensive Monitoring	No Exceedances						
Season 1	1/8/13	Intensive Monitoring	No Exceedances					BP2WQ-0035 BP2WQ-0036 (FB) BP2WQ-0037 (RB) BP2WQ-0038/39 (FD)	No exceedance of the chemical criteria.
Season 1	1/9/13	Intensive Monitoring	No Exceedances						
Season 1	1/10/13	Intensive Monitoring	No Exceedances					BP2WQ-0059	No exceedance of the chemical criteria.
Season 1	1/11/13	Intensive Monitoring	No Exceedances						
Season 1	1/12/13	Intensive Monitoring	No Exceedances						
Season 1	1/13/13	No Dredging							
Season 1	1/14/13	Intensive Monitoring	No Exceedances						
Season 1	1/15/13	Intensive Monitoring	No Exceedances						
Season 1	1/16/13	Intensive Monitoring	No Exceedances						
Season 1	1/17/13	Intensive Monitoring	Unconfirmed pH Exceedance						
Season 1	1/18/13	Routine–No Monitoring Conducted							
Season 1	1/19/13	Routine–No Monitoring Conducted							
Season 1	1/20/13	No Dredging							
Season 1	1/21/13	No Dredging							
Season 1	1/22/13	Routine Monitoring	No Exceedances						
Season 1	1/23/13	Routine–No Monitoring Conducted							
Season 1	1/24/13	Routine Monitoring	**Turbidity Exceedance**					BP2WQ-0137	No exceedance of the chemical criteria.
Season 1	1/25/13	Intensive Monitoring	No Exceedances					BP2WQ-0145 (FB) BP2WQ-0146 (RB) BP2WQ-0147/148 (FD)	No exceedance of the chemical criteria.
Season 1	1/26/13	Intensive Monitoring	No Exceedances						
Season 1	1/27/13	No Dredging							
Season 1	1/28/13	Intensive Monitoring	**Turbidity Exceedance**					BP2WQ-0170 BP2WQ-0171 BP2WQ-0173 BP2WQ-0174 BP2WQ-0175	Samples BP2WQ-0170, BP2WQ-0171, BP2WQ-0172, and BP2WQ-0174 were averaged to determine compliance for total mercury. There were no exceedances of the water quality chemical criteria.
Season 1	1/29/13	Intensive Monitoring	No Exceedances						
Season 1	1/30/13	No Dredging							
Season 1	1/31/13	Intensive Monitoring	No Exceedances						
Season 1	2/1/13	No Dredging							
Season 1	2/2/13	No Dredging							
Season 1	2/3/13	No Dredging							

TABLE 4

CONVENTIONAL WATER QUALITY MONITORING RESULTS AND SAMPLES ANALYZED FOR COMPLIANCE FOR ALL CONSTRUCTION SEASONS

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Construction Season	Date	Water Quality Monitoring Activities							
		Dredging		Final Backfill Monitoring		Sheetpile Removal			
		Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Samples Analyzed	Comments
Season 1	2/4/13	Intensive Monitoring	No Exceedances						
Season 1	2/5/13	Intensive Monitoring	No Exceedances						
Season 1	2/6/13	Intensive Monitoring	No Exceedances						
Season 1	2/7/13	Intensive Monitoring	No Exceedances						
Season 1	2/8/13	Intensive Monitoring	No Exceedances						
Season 1	2/9/13	Intensive Monitoring	No Exceedances						
Season 1	2/10/13	No Dredging							
Season 1	2/11/13	Intensive Monitoring	**Unconfirmed turbidity exceedance**						
Season 1	2/12/13	Intensive Monitoring	No Exceedances						
Season 1	2/13/13	Routine–No Monitoring Conducted							
Season 1	2/14/13	Routine–No Monitoring Conducted							
Season 1	2/15/13	Routine Monitoring	No Exceedances						
Season 1	2/16/13	Routine–No Monitoring Conducted							
Season 1	2/17/13	No Dredging							
Season 1	2/18/13	Routine Monitoring	No Exceedances						
Season 1	2/19/13	Routine–No Monitoring Conducted							
Season 1	2/20/13	Routine–No Monitoring Conducted							
Season 1	2/21/13	Routine Monitoring	No Exceedances						
Season 1	2/22/13	Routine–No Monitoring Conducted							
Season 1	2/23/13	Routine–No Monitoring Conducted							
Season 1	2/24/13	No Dredging							
Season 1	2/25/13	Routine Monitoring	No Exceedances						
Season 1	2/26/13	Routine–No Monitoring Conducted							
Season 1	2/27/13	Routine–No Monitoring Conducted							
Season 1	2/28/13	Routine–No Monitoring Conducted							
Season 1	3/1/13	Routine Monitoring	No Exceedances						
Season 1	3/2/13	Routine–No Monitoring Conducted							

TABLE 4

CONVENTIONAL WATER QUALITY MONITORING RESULTS AND SAMPLES ANALYZED FOR COMPLIANCE FOR ALL CONSTRUCTION SEASONS

Corrective Measure Implementation Report
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Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Construction Season	Date	Water Quality Monitoring Activities							
		Dredging		Final Backfill Monitoring		Sheetpile Removal			
		Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Samples Analyzed	Comments
Season 2	1/2/14	Limited Dredging-No Monitoring Conducted							
Season 2	1/3/14	Intensive Monitoring	No Exceedances					BP2WQ-0270 BP2WQ-0271 BP2WQ-0273	Samples BP2WQ-0271 and BP2WQ-0273 were averaged to determine compliance for PCBs. There were no exceedances of the water quality chemical criteria.
Season 2	1/4/14	Intensive Monitoring	No Exceedances						
Season 2	1/5/14	No Dredging							
Season 2	1/6/14	Intensive Monitoring	No Exceedances					BP2WQ-0285	No exceedance of the chemical criteria.
Season 2	1/7/14	Intensive Monitoring	No Exceedances					BP2WQ-0293 (FB) BP2WQ-0294 (RB)	No exceedance of the chemical criteria.
Season 2	1/8/14	Intensive Monitoring	No Exceedances					BP2WQ-0301/302 (FD)	No exceedance of the chemical criteria.
Season 2	1/9/14	Intensive Monitoring	No Exceedances						
Season 2	1/10/14	Intensive Monitoring	No Exceedances						
Season 2	1/11/14	Routine–No Monitoring Conducted							
Season 2	1/12/14	No Dredging							
Season 2	1/13/14	Routine–No Monitoring Conducted							
Season 2	1/14/14	Routine Monitoring	**Turbidity Exceedance**					BP2WQ-0319 BP2WQ-0320 BP2WQ-0321	Samples BP2WQ-0320 and BP2WQ-0321 (collected 1/14/14) and samples BP2WQ-0327, BP2WQ-0329, and BP2WQ-0330 (collected 1/15/14) were analyzed for PCBs. The samples from both days were averaged to determine compliance during a 24-hour period. There were no exceedances of the water quality chemical criteria.
Season 2	1/15/14	Intensive Monitoring	**Turbidity Exceedance**					BP2WQ-0327 BP2WQ-0329 BP2WQ-0330	
Season 2	1/16/14	Intensive Monitoring	No Exceedances					BP2WQ-0332 BP2WQ-0335	Samples BP2WQ-0332 and BP2WQ-0335 (collected 1/16/14) and samples BP2WQ-0337,BP2WQ-0340, and BP2WQ-0341 (collected 1/17/14) were analyzed for PCBs. The samples from both days were averaged to determine compliance during a 24-hour period. PCBs exceeded the water quality chemical criteria for the 24-hour period.
Season 2	1/17/14	Intensive Monitoring	**Turbidity Exceedance**					BP2WQ-0336 BP2WQ-0337 BP2WQ-0340 BP2WQ-0341	
Season 2	1/18/14	No Dredging							
Season 2	1/19/14	No Dredging							
Season 2	1/20/14	No Daylight Dredging, No Monitoring Conducted							
Season 2	1/21/14	Intensive Monitoring	**Turbidity Exceedance**					BP2WQ-0345	No exceedance of the chemical criteria.
Season 2	1/22/14	Intensive Monitoring	No Exceedances						
Season 2	1/23/14	Intensive Monitoring	No Exceedances						
Season 2	1/24/14	Intensive Monitoring	No Exceedances						

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CONVENTIONAL WATER QUALITY MONITORING RESULTS AND SAMPLES ANALYZED FOR COMPLIANCE FOR ALL CONSTRUCTION SEASONS

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Construction Season	Date	Water Quality Monitoring Activities							
		Dredging		Final Backfill Monitoring		Sheetpile Removal			
		Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Samples Analyzed	Comments
Season 2	1/25/14	Intensive Monitoring	No Exceedances						
Season 2	1/26/14	No Dredging							
Season 2	1/27/14	Intensive Monitoring	No Exceedances						
Season 2	1/28/14	Intensive Monitoring	No Exceedances						
Season 2	1/29/14	Routine–No Monitoring Conducted							
Season 2	1/30/14	Routine Monitoring	No Exceedances						
Season 2	1/31/14	Routine–No Monitoring Conducted							
Season 2	2/1/14	Routine–No Monitoring Conducted							
Season 2	2/2/14	No Dredging							
Season 2	2/3/14	Routine–No Monitoring Conducted							
Season 2	2/4/14	Routine Monitoring	**Turbidity Exceedance**						EPA and Ecology determined that turbidity exceedance not related to dredging.
Season 2	2/5/14	Routine–No Monitoring Conducted							
Season 2	2/6/14	Routine Monitoring	No Exceedances						
Season 2	2/7/14	Routine–No Monitoring Conducted							
Season 2	2/8/14	Routine–No Monitoring Conducted							
Season 2	2/9/14	No Dredging							
Season 2	2/10/14	Routine–No Monitoring Conducted							
Season 2	2/11/14	Routine Monitoring	No Exceedances						
Season 2	2/12/14	Routine–No Monitoring Conducted							
Season 2	2/13/14	Routine Monitoring	No Exceedances						
Season 2	2/14/14	Routine–No Monitoring Conducted							
Season 2	2/15/14	Routine–No Monitoring Conducted							
Season 2	2/16/14	No Dredging							
Season 2	2/17/14	Routine–No Monitoring Conducted							
Season 2	2/18/14	Routine Monitoring	No Exceedances						
Season 2	2/19/14	Routine–No Monitoring Conducted							
Season 2	2/20/14	Routine Monitoring	**Turbidity Exceedance**						EPA and Ecology determined that turbidity exceedance not related to dredging.
Season 2	2/21/14	Routine–No Monitoring Conducted							

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Seattle/Tukwila, Washington

Construction Season	Date	Water Quality Monitoring Activities							
		Dredging		Final Backfill Monitoring		Sheetpile Removal			
		Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Samples Analyzed	Comments
Season 2	2/22/14	Routine–No Monitoring Conducted							
Season 2	2/23/14	No Dredging							
Season 2	2/24/14	No Dredging							
Season 2	2/25/14	Limited Dredging-No Monitoring Conducted							Routine monitoring not conducted (limited dredge operations).
Season 2	2/26/14	Dredging Completed							
Season 3	8/5/2014	Intensive Monitoring (SWB Re-excavation)	No Exceedances					BP2WQ-0416, BP2WQ-0418, BP2WQ-0419, BP2WQ-0413, and BP2WQ-0414	Samples BP2WQ-0418, BP2WQ-0419, BP2WQ-0413, and BP2WQ-0414 (collected 8/5/14) and samples BP2WQ-0422, BP2WQ-0423, and BP2WQ-0427 (collected 8/6/14) were analyzed for PCBs. The samples from both days were averaged to determine compliance during a 24-hour period. PCBs exceeded the water quality chemical criteria for the 24-hour period.
Season 3	8/6/2014	Intensive Monitoring (SWB Re-excavation)	No Exceedances					BP2WQ-0422, BP2WQ-0423, and BP2WQ-0427	
Season 3	8/7/2014	Intensive Monitoring (SWB Re-excavation)	No Exceedances					BP2WQ-0434 BP2WQ-0436/-0437 (FD) BP2WQ-0438 (RB) BP2WQ-0439 (FB)	No exceedance of the chemical criteria.
Season 3	8/8/2014	Intensive Monitoring (SWB Re-excavation)	No Exceedances						
Season 3	8/9/2014	Intensive Monitoring (SWB Re-excavation)	No Exceedances					BP2WQ-0454	No exceedance of the chemical criteria.
Season 3	8/10/2014	Intensive Monitoring (SWB Re-excavation)	No Exceedances						
Season 3	8/11/2014	Intensive Monitoring (SWB Re-excavation)	No Exceedances						
Season 3	8/12/2014	Routine–No Monitoring Conducted (SWB Re-excavation)							
Season 3	8/13/2014	Routine Monitoring (SWB Re-excavation)	No Exceedances						
Season 3	8/14/2014	Routine–No Monitoring Conducted (SWB Re-excavation)							
Season 3	8/17/2014	Routine–No Monitoring Conducted (SWB Re-excavation)							
Season 3	8/18/2014	Routine Monitoring (SWB Re-excavation)	No Exceedances						
Season 3	8/19/2014	Routine–No Monitoring Conducted (SWB Re-excavation)							

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CONVENTIONAL WATER QUALITY MONITORING RESULTS AND SAMPLES ANALYZED FOR COMPLIANCE FOR ALL CONSTRUCTION SEASONS

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Construction Season	Date	Water Quality Monitoring Activities							
		Dredging		Final Backfill Monitoring		Sheetpile Removal			
		Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Samples Analyzed	Comments
Season 3	8/20/2014	Routine Monitoring (SWB Re-excavation)	No Exceedances						
Season 3	8/21/2014	Routine–No Monitoring Conducted (SWB Re-excavation)							
Season 3	8/22/2014	Routine–No Monitoring Conducted (SWB Re-excavation)							
Season 3	8/23/2014			Routine–No Monitoring Conducted (Intermediate backfill)					
Season 3	8/24/2014			Routine–No Monitoring Conducted (Intermediate backfill)					
Season 3	8/25/2014			Routine Monitoring (intermediate backfill)	No Exceedances				
Season 3	8/26/2014			Routine–No Monitoring Conducted (Intermediate backfill)					
Season 3	8/27/2014			Routine–No Monitoring Conducted (Intermediate backfill)					
Season 3	8/29/2014			Routine–No Monitoring Conducted (Intermediate backfill)					
Season 3	9/24/14	Intensive Monitoring	No Exceedances					BP2WQ-0485	No exceedance of the chemical criteria.
Season 3	9/25/14	Intensive Monitoring	No Exceedances						
Season 3	9/26/14	Intensive Monitoring	No Exceedances					BP2WQ-0543	No exceedance of the chemical criteria.
Season 3	9/27/14	Intensive Monitoring	No Exceedances						
Season 3	9/28/14	No Dredging							
Season 3	9/29/14	No Dredging							
Season 3	9/30/14	Limited Dredging-No Monitoring Conducted							
Season 3	10/1/14	Intensive Monitoring	No Exceedances						
Season 3	10/2/14	Intensive Monitoring	No Exceedances					BP2WQ-0559	No exceedance of the chemical criteria.
Season 3	10/3/14	Intensive Monitoring	No Exceedances						
Season 3	10/4/14	Intensive Monitoring	No Exceedances						
Season 3	10/5/14	No Dredging							
Season 3	10/6/14	No Dredging							
Season 3	10/7/14	Routine Monitoring	No Exceedances						
Season 3	10/8/14	Routine–No Monitoring Conducted							
Season 3	10/9/14	Routine Monitoring	**Turbidity Exceedance**					BP2WQ-0582	No exceedance of the chemical criteria.

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CONVENTIONAL WATER QUALITY MONITORING RESULTS AND SAMPLES ANALYZED FOR COMPLIANCE FOR ALL CONSTRUCTION SEASONS

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Construction Season	Date	Water Quality Monitoring Activities							
		Dredging		Final Backfill Monitoring		Sheetpile Removal			
		Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Samples Analyzed	Comments
Season 3	10/10/14	Intensive Monitoring	No Exceedances						
Season 3	10/11/14	Intensive Monitoring	No Exceedances						
Season 3	10/12/14	No Dredging							
Season 3	10/13/14	Intensive Monitoring	**Turbidity Exceedance**					BP2WQ-0607	No exceedance of the chemical criteria.
Season 3	10/14/14	Intensive Monitoring	No Exceedances						
Season 3	10/15/14	No Dredging							
Season 3	10/16/14	No Dredging							
Season 3	10/17/14	Intensive Monitoring	No Exceedances						
Season 3	10/18/14	Routine–No Monitoring Conducted							
Season 3	10/19/14	No Dredging							
Season 3	10/20/14	Routine–No Monitoring Conducted							
Season 3	10/21/14	Routine Monitoring	No Exceedances						
Season 3	10/22/14	Routine–No Monitoring Conducted							
Season 3	10/23/14	Intensive Monitoring	**Turbidity Exceedance**					BP2WQ-0627, BP2WQ-0636	Special Area No exceedance of the chemical criteria.
Season 3	10/24/14	Intensive Monitoring	No Exceedances						
Season 3	10/25/14	Intensive Monitoring	No Exceedances					BP2WQ-0656	Special Area No exceedance of the chemical criteria.
Season 3	10/26/14	No Dredging							
Season 3	10/27/14	Intensive Monitoring	No Exceedances					BP2WQ-0657	Early Removal Area No exceedance of the chemical criteria.
Season 3	10/28/14	Intensive Monitoring	No Exceedances						
Season 3	10/29/14	Intensive Monitoring	No Exceedances						
Season 3	10/30/14	Intensive Monitoring	No Exceedances						
Season 3	10/31/14	Intensive Monitoring	No Exceedances						
Season 3	11/1/14	No Dredging							
Season 3	11/2/14	No Dredging							
Season 3	11/3/14	Routine–No Monitoring Conducted							
Season 3	11/4/14	Intensive Monitoring	No Exceedances					BP2WQ-0688	Early Removal Area No exceedance of the chemical criteria.
Season 3	11/5/14	Intensive Monitoring	No Exceedances						
Season 3	11/6/14	Routine–No Monitoring Conducted							
Season 3	11/7/14	Intensive Monitoring	No Exceedances					BP2WQ-0702	Special Area No exceedance of the chemical criteria.
Season 3	11/8/14	Routine–No Monitoring Conducted							
Season 3	11/9/14	No Dredging							

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Construction Season	Date	Water Quality Monitoring Activities							
		Dredging		Final Backfill Monitoring		Sheetpile Removal			
		Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Samples Analyzed	Comments
Season 3	11/10/14	Routine–No Monitoring Conducted							
Season 3	11/11/14	Routine Monitoring	No Exceedances						
Season 3	11/12/14	Routine–No Monitoring Conducted							
Season 3	11/13/14	Routine Monitoring	No Exceedances						
Season 3	11/14/14	Routine–No Monitoring Conducted							
Season 3	11/15/14	No Dredging							
Season 3	11/16/14	No Dredging							
Season 3	11/17/14	Routine–No Monitoring Conducted							
Season 3	11/18/14	Routine Monitoring	No Exceedances						
Season 3	11/19/14	Intensive Monitoring	No Exceedances						Early Removal Area No exceedance of the chemical criteria.
Season 3	11/20/14	No Dredging							
Season 3	11/21/14	No Dredging							
Season 3	11/22/14	No Dredging							
Season 3	11/23/14	No Dredging							
Season 3	11/24/14	Routine–No Monitoring Conducted							
Season 3	11/25/14	Routine Monitoring	No Exceedances						
Season 3	11/26/14	No Dredging							
Season 3	11/27/14	No Dredging							
Season 3	11/28/14	No Dredging							
Season 3	11/29/14	No Dredging							
Season 3	11/30/14	No Dredging							
Season 3	12/1/14	Limited Dredging-No Monitoring Conducted							
Season 3	12/2/14	Limited Dredging-No Monitoring Conducted							
Season 3	12/3/14	Limited Dredging-No Monitoring Conducted							
Season 3	12/4/14	Routine Monitoring	**Turbidity Exceedance**					BP2WQ-0717 BP2WQ-0722	Samples BP2WQ-0717 and BP2WQ-0722 were averaged to determine compliance for PCBs. There were no exceedances of the water quality chemical criteria.
Season 3	12/5/14	Intensive Monitoring	No Exceedances						
Season 3	12/6/14	Intensive Monitoring	No Exceedances					BP2WQ-0736 BP2WQ-0734 BP2WQ-0733 BP2WQ-0739 BP2WQ-0740	Special Area Samples BP2WQ-0734, BP2WQ-0733, BP2WQ-0739, and BP2WQ-0740 were analyzed for PCBs. The samples were averaged to determine compliance. There were no exceedances of the water quality chemical criteria.

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Construction Season	Date	Water Quality Monitoring Activities							
		Dredging		Final Backfill Monitoring		Sheetpile Removal			
		Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Samples Analyzed	Comments
Season 3	12/7/14	No Dredging							
Season 3	12/8/14	Intensive Monitoring	No Exceedances						Special Area
Season 3	12/9/14	Intensive Monitoring	No Exceedances						
Season 3	12/10/14	Intensive Monitoring	No Exceedances					BP2WQ-0764	Special Area No exceedance of the chemical criteria.
Season 3	12/11/14	Intensive Monitoring	No Exceedances						Special Area
Season 3	12/12/14	Intensive Monitoring	No Exceedances					BP2WQ-0775 BP2WQ-0777	Special Area Sample BP2WQ-0777 was analyzed for PCBs to determine compliance. There were no exceedances of the water quality chemical criteria.
Season 3	12/13/14	No Daylight Dredging, No Monitoring Conducted							Limited Dredge Operations
Season 3	12/14/14	No Dredging							
Season 3	12/15/14	No Daylight Dredging, No Monitoring Conducted							Limited Dredge Operations
Season 3	12/16/14	Intensive Monitoring	No Exceedances						pH probe malfunction
Season 3	12/17/14	Intensive Monitoring	No Exceedances						pH probe malfunction
Season 3	12/18/14	Intensive Monitoring	No Exceedances						pH probe malfunction
Season 3	12/19/14	Intensive Monitoring	No Exceedances						
Season 3	12/20/14	No Dredging							
Season 3	12/21/14	No Dredging							
Season 3	12/22/14	No Dredging							
Season 3	12/23/14	No Dredging							
Season 3	12/24/14	No Dredging							
Season 3	12/25/14	No Dredging							
Season 3	12/26/14	No Dredging							
Season 3	12/27/14	No Dredging							
Season 3	12/28/14	No Dredging							
Season 3	12/29/14	No Dredging							
Season 3	12/30/14	No Dredging							
Season 3	12/31/14	No Dredging							
Season 3	1/1/15	No Dredging							
Season 3	1/2/15	No Dredging							
Season 3	1/3/15	No Dredging							
Season 3	1/4/15	No Dredging							
Season 3	1/5/15	Limited Hydraulic Dredging-No Monitoring Conducted							
Season 3	1/6/15	Intensive Monitoring	No Exceedances						Hydraulic Dredge Monitoring
Season 3	1/7/15	No Dredging							
Season 3	1/8/15	Intensive Monitoring	No Exceedances						Hydraulic Dredge Monitoring - Additional Monitoring During Hydraulic Dredging Not Required.
Season 3	1/9/15	Hydraulic Dredging-No Monitoring Conducted							

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Construction Season	Date	Water Quality Monitoring Activities							
		Dredging		Final Backfill Monitoring		Sheetpile Removal			
		Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Samples Analyzed	Comments
Season 3	1/10/15	Hydraulic Dredging-No Monitoring Conducted							
Season 3	1/11/15	No Dredging							
Season 3	1/12/15	Hydraulic Dredging-No Monitoring Conducted							
Season 3	1/13/15	Hydraulic Dredging-No Monitoring Conducted							
Season 3	1/14/15	Hydraulic Dredging-No Monitoring Conducted							
Season 3	1/15/15	Limited Dredging, No Monitoring Conducted							
Season 3	1/16/15	Hydraulic Dredging-No Monitoring Conducted							
Season 3	1/17/15	Hydraulic Dredging-No Monitoring Conducted							
Season 3	1/18/15	No Dredging							
Season 3	1/19/15	Hydraulic Dredging-No Monitoring Conducted							
Season 3	1/20/15	Hydraulic Dredging-No Monitoring Conducted							
Season 3	1/21/15	Hydraulic Dredging-No Monitoring Conducted		Intensive Monitoring	No Exceedances				
Season 3	1/22/15	Hydraulic Dredging-No Monitoring Conducted		Intensive Monitoring	**Turbidity Exceedance**				
Season 3	1/23/15	Hydraulic Dredging-No Monitoring Conducted		Intensive Monitoring	No Exceedances				
Season 3	1/24/15	Hydraulic Dredging-No Monitoring Conducted		Intensive Monitoring	**Turbidity Exceedance**				
Season 3	1/25/15	No Dredging							
Season 3	1/26/15	Limited Dredging-No Monitoring Conducted		Intensive Monitoring	**Turbidity Exceedance**				
Season 3	1/27/15	Limited Dredging-No Monitoring Conducted		Intensive Monitoring	No Exceedances				
Season 3	1/28/15	Limited Dredging-No Monitoring Conducted		Intensive Monitoring	**Turbidity Exceedance**				
Season 3	1/29/15	Hydraulic Dredging-No Monitoring Conducted		Intensive Monitoring	No Exceedances				
Season 3	1/30/15	Hydraulic Dredging-No Monitoring Conducted		Intensive Monitoring	No Exceedances				
Season 3	1/31/15	Limited Dredging-No Monitoring Conducted		Intensive Monitoring	**Turbidity Exceedance**				
Season 3	2/1/15	No Dredging							
Season 3	2/2/15	Hydraulic Dredging-No Monitoring Conducted		Intensive Monitoring	**Turbidity Exceedance**				

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Construction Season	Date	Water Quality Monitoring Activities							
		Dredging		Final Backfill Monitoring		Sheetpile Removal			
		Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Samples Analyzed	Comments
Season 3	2/3/15	Hydraulic Dredging-No Monitoring Conducted		Intensive Monitoring	**Turbidity Exceedance**				
Season 3	2/4/15	Limited Dredging-No Monitoring Conducted		Intensive Monitoring	**Turbidity Exceedance**				
Season 3	2/5/15	Hydraulic Dredging-No Monitoring Conducted		Intensive Monitoring	**Turbidity Exceedance**				
Season 3	2/6/15	Hydraulic Dredging-No Monitoring Conducted		Intensive Monitoring	No Exceedances				
Season 3	2/7/15	Hydraulic Dredging-No Monitoring Conducted		Intensive Monitoring	No Exceedances				
Season 3	2/8/15	No Dredging							
Season 3	2/9/15	Limited Dredging-No Monitoring Conducted		Intensive Monitoring	No Exceedances				
Season 3	2/10/15	No Daylight Dredging, No Monitoring Conducted		Intensive Monitoring	No Exceedances				Nighttime Dredging in Slip 4
Season 3	2/11/15	No Daylight Dredging, No Monitoring Conducted		Intensive Monitoring	No Exceedances				Nighttime Dredging in Slip 4
Season 3	2/12/15	No Daylight Dredging, No Monitoring Conducted		Intensive Monitoring	No Exceedances				Nighttime Dredging in Slip 4
Season 3	2/13/15	Intensive Monitoring (partial round)	No Exceedances	Intensive Monitoring	**Turbidity Exceedance**				Slip 4 Dredging and Final Backfill Monitoring
Season 3	2/14/15	No Daylight Dredging, No Monitoring Conducted		Intensive Monitoring (Intermediate Backfill)	**Turbidity Exceedance**				Nighttime Dredging in Slip 4 Monitoring of Intermediate Backfill Placement
Season 3	2/15/15	No Dredging							
Season 3	2/16/15	No Daylight Dredging, No Monitoring Conducted		Intensive Monitoring	No Exceedances				Nighttime Dredging in Slip 4
Season 3	2/17/15	Intensive Monitoring	**Turbidity Exceedance**					BP2WQ-0814 BP2WQ-0817	Sample BP2WQ-0817 was analyzed for PCBs to determine compliance. There were no exceedances of the water quality chemical criteria.
Season 3	2/18/15	Intensive Monitoring	**Turbidity Exceedance**					BP2WQ-0822 BP2WQ-0825	Sample BP2WQ-0825 was analyzed for PCBs to determine compliance; there was no exceedance of the PCB water quality chemical criterion. This sample was not analyzed for copper due to an oversight (see Section 6.2.2).
Season 3	2/19/15	Intensive Monitoring	No Exceedances	Intensive Monitoring	No Exceedances				
Season 3	2/20/15	Intensive Monitoring	No Exceedances	Intensive Monitoring	No Exceedances				
Season 3	2/21/15	Limited Dredging-No Monitoring Conducted							
Season 3	2/22/15	No Dredging							
Season 3	2/23/15	No Dredging		Intensive Monitoring	**Turbidity Exceedance**				
Season 3	2/24/15	No Dredging		Intensive Monitoring (Intermediate Backfill)	**Turbidity Exceedance**				Monitoring of Intermediate Backfill Placement Conducted
Season 3	2/25/15	No Dredging		Intensive Monitoring	No Exceedances				

TABLE 4

CONVENTIONAL WATER QUALITY MONITORING RESULTS AND SAMPLES ANALYZED FOR COMPLIANCE FOR ALL CONSTRUCTION SEASONS

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Construction Season	Date	Water Quality Monitoring Activities							
		Dredging		Final Backfill Monitoring		Sheetpile Removal			
		Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Monitoring Activity	Conventional Results	Samples Analyzed	Comments
Season 3	2/26/15	No Dredging		Intensive Monitoring	**Turbidity Exceedance**				
Season 3	2/27/15	No Dredging		Intensive Monitoring	No Exceedances	Intensive Monitoring	No Exceedances		Slip 4 Sheet Pile Removal & Final Backfilling
Season 3	2/28/15	No Dredging		Intensive Monitoring	**Turbidity Exceedance**	Intensive Monitoring	No Exceedances		Slip 4 Sheet Pile Removal & Final Backfilling
Season 3	3/1/15	No Dredging							
Season 3	3/2/15	No Dredging		Intensive Monitoring	No Exceedances	Intensive Monitoring	No Exceedances		Slip 4 Sheet Pile Removal & Final Backfilling
Season 3	3/3/15	No Dredging		Intensive Monitoring	No Exceedances	Intensive Monitoring	No Exceedances		Slip 4 Sheet Pile Removal & Final Backfilling
Season 3	3/4/15	No Dredging		Intensive Monitoring	No Exceedances	Intensive Monitoring	No Exceedances		Slip 4 Sheet Pile Removal & Final Backfilling
Season 3	3/5/15	No Dredging							
Season 3	3/6/15	No Dredging							
Season 3	3/7/15	No Dredging							
Season 3	3/8/15	No Dredging							
Season 3	3/9/15	No Dredging							
Season 3	3/10/15	No Dredging							
Season 3	3/11/15	No Dredging							
Season 3	3/12/15	No Dredging							

Abbreviation(s)

FB = filter blank
FD = field duplicate
NTU = nephelometric turbidity unit
PCB = polychlorinated biphenyls
RB = rinsate blank
SWB = Southwest Bank

TABLE 5

SUMMARY OF EXCEEDANCES OF THE TURBIDITY CRITERION DURING DREDGING AND BACKFILLING FOR ALL CONSTRUCTION SEASONS

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

		Water Quality Monitoring Activities							
		Dredging				Final Backfill Monitoring			
				Turbidity Readings				Turbidity Readings	
Construction Season	Date	Monitoring Activity	Confirmed/Additional Unconfirmed	Monitoring Location Value	Ambient Location Value	Monitoring Activity	Confirmed/Additional Unconfirmed	Monitoring Location Value	Ambient Location Value
Season 1	1/24/13	Routine Monitoring	**Confirmed Turbidity Exceedance** Additional Monitoring Rounds [1]	9.7 NTU Not conducted (monitoring suspended with darkness)	3.2 NTU	No Backfilling			
Season 1	1/28/13	Intensive Monitoring	**Confirmed Turbidity Exceedance** Additional Monitoring Rounds [1]	8.9 NTU 3.5 NTU	3.7 NTU 3.4 NTU	No Backfilling			
Season 1	2/11/13	Intensive Monitoring	Unconfirmed Turbidity Exceedance	7.9 NTU Confirmation not conducted (monitoring suspended with darkness)	2.0 NTU	No Backfilling			
Season 2	1/14/14	Routine Monitoring	**Confirmed Turbidity Exceedance** Additional Monitoring Rounds [1]	45.3 NTU 26.9 NTU	31.9 NTU 24.0 NTU	No Backfilling			
Season 2	1/15/14	Intensive Monitoring	**Confirmed Turbidity Exceedance** Additional Monitoring Rounds [1]	31.4 NTU 22.0 NTU 31.5 NTU	21.8 NTU 19.5 NTU 18.9 NTU	No Backfilling			
Season 2	1/17/14	Intensive Monitoring	**Confirmed Turbidity Exceedance** Additional Monitoring Rounds [1]	17.0 NTU 18.8 NTU	8.8 NTU 8.2 NTU	No Backfilling			
Season 2	1/21/14	Intensive Monitoring	**Confirmed Turbidity Exceedance** Additional Monitoring Rounds [1]	16.4 NTU 18.7 NTU	10.0 NTU 9.4 NTU	No Backfilling			
Season 2	2/4/14	Routine Monitoring	**Confirmed Turbidity Exceedance** Additional Monitoring Rounds [1]	21.0 NTU Not conducted (monitoring suspended with darkness)	4.2 NTU	No Backfilling			
Season 2	2/20/14	Routine Monitoring	**Confirmed Turbidity Exceedance** Additional Monitoring Rounds [1]	25.6 NTU 18.1 NTU 15.0 NTU	6.7 NTU 15.4 NTU 13.2 NTU	No Backfilling			

TABLE 5

SUMMARY OF EXCEEDANCES OF THE TURBIDITY CRITERION DURING DREDGING AND BACKFILLING FOR ALL CONSTRUCTION SEASONS

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

		Water Quality Monitoring Activities							
		Dredging				Final Backfill Monitoring			
				Turbidity Readings				Turbidity Readings	
Construction Season	Date	Monitoring Activity	Confirmed/Additional Unconfirmed	Monitoring Location Value	Ambient Location Value	Monitoring Activity	Confirmed/Additional Unconfirmed	Monitoring Location Value	Ambient Location Value
Season 3	10/9/14	Routine Monitoring	**Confirmed Turbidity Exceedance**	14.4 NTU	3.3 NTU	No Backfilling			
			Additional Monitoring Rounds [1]	8.3 NTU	2.2 NTU				
				8.6 NTU	3.2 NTU				
				4.7 NTU	2.8 NTU				
Season 3	10/13/14	Intensive Monitoring	**Confirmed Turbidity Exceedance**	10.9 NTU	2.4 NTU	No Backfilling			
			Additional Monitoring Rounds [1]	5.7 NTU	4.7 NTU				
				9.2 NTU [2]	2.2 NTU				
Season 3	10/23/14	Intensive Monitoring	**Confirmed Turbidity Exceedance**	15 NTU	5 NTU	No Backfilling			
			Additional Monitoring Rounds [1]	8.0 NTU	3.9 NTU				
				4.2 NTU	1.6 NTU				
Season 3	12/4/14	Routine Monitoring	**Confirmed Turbidity Exceedance**	14.6 NTU	4.3 NTU	No Backfilling			
			Additional Monitoring Rounds [1]	Not conducted (monitoring suspended with darkness)					
Season 3	1/22/15	No Dredging				Intensive Monitoring	**Confirmed Turbidity Exceedance**	15.0 NTU	4.5 NTU
							Additional Monitoring Rounds [1]	60.0 NTU	7.1 NTU
								6.0 NTU	4.5 NTU
Season 3	1/24/15	No Dredging				Intensive Monitoring	**Confirmed Turbidity Exceedance**	34.0 NTU	7.9 NTU
							Additional Monitoring Rounds [1]	36.6 NTU	7.0 NTU
								23.6 NTU	5.1 NTU
Season 3	1/26/15	Limited Dredging-No Monitoring Conducted				Intensive Monitoring	**Confirmed Turbidity Exceedance**	25.5 NTU	15.7 NTU
							Additional Monitoring Rounds [1]	35.1 NTU	13.6 NTU
Season 3	1/28/15	Limited Dredging-No Monitoring Conducted				Intensive Monitoring	**Confirmed Turbidity Exceedance**	18.2 NTU	5.9 NTU
							Additional Monitoring Rounds [1]	25.0 NTU	6.9 NTU

TABLE 5

SUMMARY OF EXCEEDANCES OF THE TURBIDITY CRITERION DURING DREDGING AND BACKFILLING FOR ALL CONSTRUCTION SEASONS

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

		Water Quality Monitoring Activities							
		Dredging				Final Backfill Monitoring			
				Turbidity Readings				Turbidity Readings	
Construction Season	Date	Monitoring Activity	Confirmed/Additional Unconfirmed	Monitoring Location Value	Ambient Location Value	Monitoring Activity	Confirmed/Additional Unconfirmed	Monitoring Location Value	Ambient Location Value
Season 3	1/31/15	Limited Dredging-No Monitoring Conducted				Intensive Monitoring	**Confirmed Turbidity Exceedance** Additional Monitoring Rounds [1]	39.4 NTU 17.3 NTU	1.7 NTU 2.0 NTU
Season 3	2/2/15	No Dredging				Intensive Monitoring	**Confirmed Turbidity Exceedance** Additional Monitoring Rounds [1]	24.6 NTU Not conducted (monitoring suspended with darkness)	5.7 NTU
Season 3	2/3/15	No Dredging				Intensive Monitoring	**Confirmed Turbidity Exceedance** Additional Monitoring Rounds [1]	19.5 NTU 40.9 NTU 6.5 NTU	2.7 NTU 4.4 NTU 2.7 NTU
Season 3	2/4/15	Limited Dredging-No Monitoring Conducted				Intensive Monitoring	**Confirmed Turbidity Exceedance** Additional Monitoring Rounds [1]	24.6 NTU 83.0 NTU 11.0 NTU Additional monitoring conducted at 800 ft, additional plume tracking (see Appendix G)	3.0 NTU 3.3 NTU 2.8 NTU
Season 3	2/5/15	No Dredging				Intensive Monitoring	**Confirmed Turbidity Exceedance** Additional Monitoring Rounds [1]	26.0 NTU 10.3 NTU Additional plume tracking conducted (see Appendix G)	7.9 NTU 6.4 NTU
Season 3	2/13/15	Intensive Monitoring (partial round)	No Exceedances			Intensive Monitoring	**Confirmed Turbidity Exceedance** Additional Monitoring Rounds [1]	42.3 NTU 5.2 NTU 8.0 NTU Additional plume tracking conducted (see Appendix G)	3.9 NTU 4.8 NTU 9.0 NTU
Season 3	2/14/15	No Daylight Dredging, No Monitoring Conducted				Intensive Monitoring (Intermediate Backfill)	**Confirmed Turbidity Exceedance** Additional Monitoring Rounds [1]	47.5 NTU 6.9 NTU 1.8 NTU Additional plume tracking conducted (see Appendix G)	0.2 NTU 1.3 NTU 0.7 NTU

TABLE 5

SUMMARY OF EXCEEDANCES OF THE TURBIDITY CRITERION DURING DREDGING AND BACKFILLING FOR ALL CONSTRUCTION SEASONS
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

		Water Quality Monitoring Activities							
		Dredging				Final Backfill Monitoring			
				Turbidity Readings				Turbidity Readings	
Construction Season	Date	Monitoring Activity	Confirmed/Additional Unconfirmed	Monitoring Location Value	Ambient Location Value	Monitoring Activity	Confirmed/Additional Unconfirmed	Monitoring Location Value	Ambient Location Value
Season 3	2/17/15	Intensive Monitoring	**Confirmed Turbidity Exceedance** Additional Monitoring Rounds [1]	12.2 NTU 4.0 NTU	0 NTU 0 NTU	No Backfilling			
Season 3	2/18/15	Intensive Monitoring	**Confirmed Turbidity Exceedance** Additional Monitoring Rounds [1]	12.1 NTU 12.3 NTU 17.3 NTU	1.4 NTU 0.3 NTU 0 NTU	No Backfilling			
Season 3	2/23/15	No Dredging				Intensive Monitoring	**Confirmed Turbidity Exceedance** Additional Monitoring Rounds [1]	36.5 NTU Additional plume tracking conducted (see Appendix G)	3.1 NTU
Season 3	2/24/15	No Dredging				Intensive Monitoring (Intermediate Backfill)	**Confirmed Turbidity Exceedance** Additional Monitoring Rounds [1]	94.7 NTU 6.2 NTU 87.0 NTU [2] 21.40 NTU [2] Additional monitoring conducted at 800 ft (see Appendix G)	4.5 NTU 2.5 NTU 4.4 NTU 4.3 NTU
Season 3	2/26/15	No Dredging				Intensive Monitoring	**Confirmed Turbidity Exceedance** Additional Monitoring Rounds [1]	28.6 NTU 5.6 NTU 40.0 NTU [2]	2.8 NTU 2.0 NTU 4.3 NTU
Season 3	2/28/15	No Dredging				Intensive Monitoring	**Confirmed Turbidity Exceedance** Additional Monitoring Rounds [1]	22.6 NTU 5.0 NTU	5.4 NTU 4.6 NTU

Note(s)
1. Turbidity values for additional rounds of monitoring represent the paired values representing the largest difference between a turbidity measurement at a monitoring station and the corresponding ambient value.
2. Turbidity exceedance confirmed in additional monitoring rounds; not included in count of confirmed exceedances in Section 6.8 if earlier round had a confirmed exceedance.

Abbreviation(s)
ft = feet
NTU = nephelometric turbidity unit

TABLE 6

ANALYTICAL RESULTS FOR WATER SAMPLES COLLECTED DURING SHORELINE RE-EXCAVATION MONITORING

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Sample ID	BP2WQ-0416	BP2WQ-0418	BP2WQ-0419	BP2WQ-0413	BP2WQ-0414	BP2WQ-0422	BP2WQ-0423	BP2WQ-0427	BP2WQ-0434	BP2WQ-0436	BP2WQ-0437	BP2WQ-0438	BP2WQ-0439	BP2WQ-0454
Monitoring Location (ft below water surface)	150 ft Up River Near-Bottom Inshore (8.6 ft)	300 ft Up River Near-Bottom Inshore (9.7 ft)	300 ft Up River Near-Bottom Offshore (22.5 ft)	300 ft Down River Near-Surface Inshore (2 ft)	300 ft Down River Near-Surface Offshore (2 ft)	300 ft Down River Mid-depth Inshore (2 ft)	300 ft Down River Near-Surface Offshore (2 ft)	300 ft Up River Near-Bottom Offshore (10.8 ft)	150 ft Up River Near-Bottom Offshore (15 ft)	Down River Ambient Near-Bottom (Field Duplicates)		Rinsate Blank	Filter Blank	150 ft Down River Mid-Depth Inshore (3.7 ft)
Sample Date	8/5/2014	8/5/2014	8/5/2014	8/5/2014	8/5/2014	8/6/2014	8/6/2014	8/6/2014	8/7/2014	8/7/2014		8/7/2014	8/7/2014	8/9/2014
Sample Time	10:40	11:17	11:30	9:45	10:02	9:24	9:43	11:04	10:52	11:32		12:30	12:30	10:08
Sample Turbidity (NTU)	12.3	10.2	4.2	5.3	5.9	4.4	3.5	10.6	10.1	5.3		Laboratory supplied reagent water		8.7
Background Turbidity (NTU)	9.5	8.5	5.7	4	4	3	3	13.6	5.3	—		—	—	5.2
Difference	2.8	1.7	-1.5	1.3	1.9	1.4	0.5	-3	4.8	—		—	—	3.5

Analyte	Acute Criteria[1]	Chronic Criteria[1]	0416 Result	Q1[2]	Q2[3]	0418 Result	Q1[2]	Q2[3]	0419 Result	Q1[2]	Q2[3]	0413 Result	Q1[2]	Q2[3]
Dissolved Metals (µg/L)														
Cadmium	40	8.8	0.129	J		—			—			—		
Chromium	1100	50	0.30	J		—			—			—		
Copper	4.8	3.1	1.03			—			—			—		
Lead	210	8.1	0.258	J	U	—			—			—		
Mercury	1.8		0.02	U		—			—			—		
Silver	1.9	1.9	0.139	J	U	—			—			—		
Zinc	90	81	4.38	J	U	—			—			—		
Total Metals (µg/L)														
Mercury		0.025	0.02	U		—			—			—		
PCBs (µg/L)														
Aroclor 1016	NE	NE	0.010	U		0.010	U		0.010	U	UJ	0.010	U	UJ
Aroclor 1242	NE	NE	0.010	U		0.010	U		0.010	U	UJ	0.010	U	UJ
Aroclor 1248	NE	NE	0.012	Y	UY	0.012	Y	UY	0.010	U	UJ	0.012	Y	UJY
Aroclor 1254	NE	NE	0.056			0.050			0.010	U	UJ	0.040		J
Aroclor 1260	NE	NE	0.034			0.022			0.010	U	UJ	0.016		J
Aroclor 1221	NE	NE	0.010	U		0.010	U		0.010	U	UJ	0.010	U	UJ
Aroclor 1232	NE	NE	0.010	U		0.010	U		0.010	U	UJ	0.010	U	UJ
Total PCBs[4]	10	0.03	0.090			0.072			0.010	U	UJ	0.056		J

Analyte	0414 Result	Q1[2]	Q2[3]	0422 Result	Q1[2]	Q2[3]	0423 Result	Q1[2]	Q2[3]	0427 Result	Q1[2]	Q2[3]	0434 Result	Q1[2]	Q2[3]
Dissolved Metals (µg/L)															
Cadmium	—			—			—			—			0.248		
Chromium	—			—			—			—			0.25	J	
Copper	—			—			—			—			1.02		
Lead	—			—			—			—			0.058	J	U
Mercury	—			—			—			—			0.02	U	
Silver	—			—			—			—			0.177	J	U
Zinc	—			—			—			—			4.40	J	
Total Metals (µg/L)															
Mercury	—			—			—			—			0.02	U	
PCBs (µg/L)															
Aroclor 1016	0.010	U	UJ	0.010	U	UJ	0.010	U	UJ	0.010	U	UJ	0.010	U	
Aroclor 1242	0.010	U	UJ	0.010	U	UJ	0.010	U	UJ	0.010	U	UJ	0.010	U	
Aroclor 1248	0.010	U	UJ	0.010	U	UJ	0.010	U	UJ	0.010	U	UJ	0.010	U	
Aroclor 1254	0.028		J	0.012		J	0.009	J	J	0.011		J	0.010	U	
Aroclor 1260	0.012		J	0.010	J	J	0.007	J	J	0.007	J	J	0.010	U	
Aroclor 1221	0.010	U	UJ	0.010	U	UJ	0.010	U	UJ	0.010	U	UJ	0.010	U	
Aroclor 1232	0.010	U	UJ	0.010	U	UJ	0.010	U	UJ	0.010	U	UJ	0.010	U	
Total PCBs[4]	0.040		J	0.022	J	J	0.016	J	J	0.018	J	J	0.010	U	

Analyte	0436 Result	Q1[2]	Q2[3]	0437 Result	Q1[2]	Q2[3]	0438 Result	Q1[2]	Q2[3]	0439 Result	Q1[2]	Q2[3]	0454 Result	Q1[2]	Q2[3]
Dissolved Metals (µg/L)															
Cadmium	0.153	J		0.209						0.197	U		0.197	U	
Chromium	0.25	J		0.27	J					0.99	U		0.99	U	
Copper	0.91	J		0.94	J					0.99	U		0.52	J	
Lead	0.394	U		0.394	U					0.090	J		0.394	U	
Mercury	0.02	U		0.02	U					0.02	U		0.02	U	
Silver	0.168	J	U	0.076	J	U				0.197	U		0.050	J	U
Zinc	3.07	J		2.91	J					4.93	U		4.16	J	
Total Metals (µg/L)															
Mercury	0.02	U		0.02	U		0.02	U					0.02	U	
PCBs (µg/L)															
Aroclor 1016	0.010	U		0.010	U		0.010	U					0.010	U	
Aroclor 1242	0.010	U		0.010	U		0.010	U					0.010	U	
Aroclor 1248	0.010	U		0.010	U		0.010	U					0.010	U	
Aroclor 1254	0.010	U		0.010	U		0.010	U					0.016		
Aroclor 1260	0.010	U		0.010	U		0.010	U					0.0070	J	
Aroclor 1221	0.010	U		0.010	U		0.010	U					0.010	U	
Aroclor 1232	0.010	U		0.010	U		0.010	U					0.010	U	
Total PCBs[4]	0.010	U		0.010	U		0.010	U					0.023	J	

Average for August 5, 2014 = 0.043 µg/L[5] | **Average for August 6, 2014 = 0.019 µg/L**

24-Hour Average Between ~11:00 August 5, 2014 and ~11:00 August 6, 2014 = 0.031 µg/L[5]

Note(s)
1. Criteria obtained from the following:
   a. Lowest of National Recommended Water Quality Criteria: Aquatic Life Criteria. U.S. Environmental Protection Agency, http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm or Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A-240).
   b. Acute and chronic criteria for metals (except for mercury) are based on the dissolved fraction. For mercury, chronic criterion is based on total recoverable and the acute criterion is based on the dissolved fraction.
   c. Acute and chronic criteria for chromium are for the hexavalent form. Hexavalent chromium is not one of the chemicals of concern at the Boeing Plant 2 site; therefore, total chromium will be reported.
   d. There is no chronic criterion for silver; the acute criterion of 1.9 µg/L is used as the chronic criterion.
   e. Criteria for total PCBs are based on total recoverable fraction (EPA 2002).
2. Laboratory qualifiers (Q1) are defined as follows:
   U = analyte not detected at associated reporting limit value.
   Y = the analyte is not detected at or above the associated reporting limit value. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.
   J = analyte positively identified; value is approximate concentration in sample.
3. Validation qualifiers (Q2) are defined as follows:
   U = analyte not detected above the level of the associated reporting limit value.
   UJ = analyte was not detected at or above the associated reporting limit value shown; value is an estimate.
   Y = the analyte is not detected at or above the associated reporting limit value. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.
4. Total PCBs calculated by summing detections or, if all not detected, using the highest highest reporting limit.
5. Averages calculated using one-half of reporting limit for non-detected results.

Abbreviation(s)
— = not analyzed
EPA = U.S. Environmental Protection Agency
ft = feet
NE = not established
NTU = nephelometric turbidity unit
PCBs = polychlorinated biphenyls
µg/L = micrograms per liter
WAC = Washington Administrative Code

Reference(s)
U.S. Environmental Protection Agency (EPA). 2002. National Recommended Water Quality Criteria: 2002. EPA, Office of Water, Office of Science and Technology, EPA-822-R-02-047, Washington, D.C.

TABLE 7

ANALYTICAL RESULTS FOR WATER SAMPLES COLLECTED DURING CS3 DREDGE SEASON

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Sample ID			**BP2WQ-0485**			**BP2WQ-0543**			**BP2WQ-0559**			**BP2WQ-0582**			**BP2WQ-0607**			**BP2WQ-0627**			**BP2WQ-0636**			**BP2WQ-0656**			**BP2WQ-0657**			**BP2WQ-0688**			**BP2WQ-0702**		
Monitoring Location (ft below water surface)			**150 ft Up River Near-Bottom (14.8 ft)**			**150 ft Down River Near-Bottom (10.83 ft)**			**150 ft Down River Near-Bottom (23.35 ft)**			**150 ft Down River Near-Bottom (15.3 ft)**			**150 ft Down River Near-Bottom (12.8 ft)**			**150 ft Down River Near-Bottom (3.9 ft)**			**Special Area 300 ft Up River Near-Bottom (14.6 ft)**			**Special Area 150 ft Up River Near-Bottom (21.4 ft)**			**Early Removal Area 150 ft Up River Near-Surface**			**Early Removal Area 300 ft Up River Near-Bottom**			**Special Area 150 ft Up River Near-Bottom (19.4 ft)**		
Sample Date			**9/24/2014**			**9/26/2014**			**10/2/2014**			**10/9/2014**			**10/13/2014**			**10/23/2014**			**10/23/2014**			**10/25/2014**			**10/27/2014**			**11/4/2014**			**11/7/2014**		
Sample Time			**14:16**			**13:23**			**12:45**			**10:04**			**12:50**			**11:06**			**16:53**			**13:00**			**19:54**			**14:21**			**13:06**		
Sample Turbidity (NTU)			**7**			**5.3**			**3.7**			**14.4**			**10.9**			**11.9**			**9.5**			**6.8**			**5.5**			**6**			**7.8**		
Background Turbidity (NTU)			**3.6**			**3.9**			**2.6**			**3.3**			**2.4**			**5**			**1.6**			**3.6**			**4.4**			**1.3**			**5.5**		
Difference			**3.4**			**1.4**			**1.1**			**11.1**			**8.5**			**6.9**			**7.9**			**3.2**			**1.1**			**4.7**			**2.3**		
Analyte	**Acute Criteria[1]**	**Chronic Criteria[1]**	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**
Dissolved Metals (µg/L)																																		
Cadmium	40	8.8	0.115	J		0.199	U		0.197	U		0.199	U		0.232			0.199	U		0.124	J		0.144	J		0.199	U		0.097	J		0.305		
Chromium	1100	50	0.27	J		0.22	J		0.99	U		1	U		0.39	J		1	U		0.27	J		0.23	J		1	U		0.25	J		0.42	J	
Copper	4.8	3.1	1.3			1.93			1.87			2.18			0.6	J		2.75			0.75	J		0.64	J		1.14			0.63	J		0.69	J	
Lead	210	8.1	0.398	U		0.398	U		0.394	U		0.398	U		0.398	U		0.398	U		0.055	J	U	0.398	U		0.398	U		0.106	J	U	0.115	J	U
Mercury	1.8		0.02	U		0.02	U		0.02	U		0.02	U		0.02	U		0.02	U		0.02	U		0.02	U		0.02	U		0.02	U		0.02	U	
Silver	1.9	1.9	0.101	J	U	0.186	J	U	0.094	J	U	0.189	J	U	0.148	J	U	0.021	J	U	0.067	J	U	0.035	J		0.085	J	U	0.102	J	U	0.132	J	U
Zinc	90	81	1.73	J		3.84	J		3.17	J		5.54			5.82			4.63	J		2.13	J		4.98	U		4.98	U		2.95	J		3.26	J	
Total Metals (µg/L)																																		
Mercury		0.025	0.02	U		0.02	U		0.02	U		0.02	U		0.02	U		0.02	U		0.02	U		0.02	U		0.02	U		0.02	U		0.02	U	
PCBs (µg/L)																																		
Aroclor 1016	NE	NE	0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U	
Aroclor 1242	NE	NE	0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U	
Aroclor 1248	NE	NE	0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U	
Aroclor 1254	NE	NE	0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.012			0.008	J		0.010	U		0.010	U		0.010	U		0.010	U	
Aroclor 1260	NE	NE	0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.012			0.010	U		0.010	U		0.010	U		0.010	U		0.010	U	
Aroclor 1221	NE	NE	0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U	
Aroclor 1232	NE	NE	0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U	
Total PCBs[4]	10	0.03	0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.024			0.008	J		0.010	U		0.010	U		0.010	U		0.010	U	

TABLE 7

ANALYTICAL RESULTS FOR WATER SAMPLES COLLECTED DURING CS3 DREDGE SEASON

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Sample ID			BP2WQ-0717			BP2WQ-0722			BP2WQ-0736			BP2WQ-0734			BP2WQ-0733			BP2WQ-0739			BP2WQ-0740		
Monitoring Location (ft below water surface)			300 ft Up River Near-Bottom (9.6 ft)			300 ft Down River Near-Bottom (9.3 ft)			Special Area 150 ft Down River Near-Bottom (13.9 ft)			Special Area 300 ft Down River Near-Bottom (12.2 ft)			300 ft Down River Near-Surface (2 ft)			300 ft Up River Near-Surface (2 ft)			300 ft Up River Near-Bottom (21.8 ft)		
Sample Date			12/4/2014			12/4/2014			12/6/2014			12/6/2014			12/6/2014			12/6/2014			12/6/2014		
Sample Time			13:19			14:27			12:56			12:27			12:17			14:06			14:18		
Sample Turbidity (NTU)			14.6			4.8			7.8			7.4			4.7			5.1			3.9		
Background Turbidity (NTU)			4.3			5.1			3.4			3.6			4.6			4.7			3.3		
Difference			10.3			-0.3			4.4			3.8			0.1			0.4			0.6		
Analyte	**Acute Criteria[1]**	**Chronic Criteria[1]**	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**
Dissolved Metals (µg/L)																							
Cadmium	40	8.8	0.199	U		—			0.169	J		—			—			—			—		
Chromium	1100	50	0.27	J		—			0.23	J		—			—			—			—		
Copper	4.8	3.1	0.74	J		—			0.61	J		—			—			—			—		
Lead	210	8.1	0.143	J	U	—			0.151	J	U	—			—			—			—		
Mercury	1.8		0.02	U		—			0.02	U		—			—			—			—		
Silver	1.9	1.9	0.199	U		—			0.199	U		—			—			—			—		
Zinc	90	81	2.34	J		—			3.59	J		—			—			—			—		
Total Metals (µg/L)																							
Mercury		0.025	0.02	U		—			0.02	U		—			—			—			—		
PCBs (µg/L)																							
Aroclor 1016	NE	NE	0.010	U		0.010	U		0.010	U		0.010	U	UJ	0.010	U	UJ	0.010	U	UJ	0.010	U	UJ
Aroclor 1242	NE	NE	0.010	U		0.010	U		0.038			0.010	U	UJ	0.010	U	UJ	0.010	U	UJ	0.010	U	UJ
Aroclor 1248	NE	NE	0.010	U		0.010	U		0.010	U		0.075	Y	UY	0.010	U	UJ	0.010	U	UJ	0.010	U	UJ
Aroclor 1254	NE	NE	0.011			0.010	U		0.035			0.077		UJ	0.010	U	UJ	0.010	U	UJ	0.010	U	UJ
Aroclor 1260	NE	NE	0.019			0.010	U		0.014			0.022		UJ	0.010	U	UJ	0.010	U	UJ	0.010	U	UJ
Aroclor 1221	NE	NE	0.010	U		0.010	U		0.010	U		0.010	U	UJ	0.010	U	UJ	0.010	U	UJ	0.010	U	UJ
Aroclor 1232	NE	NE	0.010	U		0.010	U		0.010	U		0.010	U	UJ	0.010	U	UJ	0.010	U	UJ	0.010	U	UJ
Total PCBs[4]	10	0.03	0.030			0.010	U		0.087			0.099		UJ	0.010	U	UJ	0.010	U	UJ	0.010	U	UJ
			Average = 0.0175									Average = 0.0285											

Sample ID	BP2WQ-0764			BP2WQ-0775			BP2WQ-0777			BP2WQ-0814			BP2WQ-0817			BP2WQ-0822			BP2WQ-0825		
Monitoring Location (ft below water surface)	Special Area 300 ft Up River Near-Bottom (13.0 ft)			Special Area 150 ft Down River Near-Bottom (16.2 ft)			Special Area 300 ft Down River Near-Bottom (11.3 ft)			Slip 4 Additional 150 ft Up Stream Near-Bottom (21.0 ft)			Slip 4 Additional 300 ft Up Stream Near-Bottom (17.8 ft)			Slip 4 Additional 150 ft Up Stream Near-Bottom (17.8 ft)			Slip 4 Additional 300 ft Up Stream Near-Bottom (17.8 ft)		
Sample Date	12/10/2014			12/12/2014			12/12/2014			2/17/2015			2/17/2015			2/18/2015			2/18/2015		
Sample Time	13:48			11:40			11:17			12:57			11:17			12:34			12:15		
Sample Turbidity (NTU)	7.8			7			3.1			12.2			7.2			12.1			5.8		
Background Turbidity (NTU)	3.7			2.2			2.2			0			0			1.4			2.4		
Difference	4.1			4.8			0.9			12.2			7.2			10.7			3.4		
Analyte	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**	**Result**	**Q1[2]**	**Q2[3]**
Dissolved Metals (µg/L)																					
Cadmium	0.199	U		0.625			—			0.273			—			0.437			—		
Chromium	0.46	J		0.36	J		—			1.02			—			1.55			—		
Copper	1.1			1.84			—			0.85	J		—			4.09		J	—		
Lead	0.21	J	U	0.104	J	U	—			0.103	J	U	—			1.61			—		
Mercury	0.02	U		0.02	U		—			0.02	U		—			0.02	U		—		
Silver	0.021	J		0.217			—			0.214			—			0.168	J		—		
Zinc	15.4			7.7			—			9.6		J	—			7.13		J	—		
Total Metals (µg/L)																					
Mercury	0.02	U		0.02	U		—			0.02	U		—			0.02	U		—		
PCBs (µg/L)																					
Aroclor 1016	0.010	U	UJ	0.010	U		0.010	U	UJ	0.010	U		0.010	U	UJ	0.010	U		0.010	U	UJ
Aroclor 1242	0.010	U	UJ	0.010	U		0.010	U	UJ	0.010	U		0.010	U	UJ	0.010	U		0.010	U	UJ
Aroclor 1248	0.010	U	UJ	0.022			0.010	U	UJ	0.010	U		0.010	U	UJ	0.010	U		0.010	U	UJ
Aroclor 1254	0.010	U	UJ	0.034			0.010	U	UJ	0.035			0.021		J	0.033			0.020		J
Aroclor 1260	0.010	U	UJ	0.015			0.010	U	UJ	0.011			0.010	U	UJ	0.010	U		0.010	U	UJ
Aroclor 1221	0.010	U	UJ	0.010	U		0.010	U	UJ	0.010	U		0.010	U	UJ	0.010	U		0.010	U	UJ
Aroclor 1232	0.025	BY	UJ	0.010	U		0.010	U	UJ	0.010	U		0.010	U	UJ	0.010	U		0.010	U	UJ
Total PCBs[4]	0.025	BY	UJ	0.071			0.010	U	UJ	0.046			0.021		J	0.033			0.020		J

Note(s)

1. Criteria obtained from the following:
   a. Lowest of National Recommended Water Quality Criteria: Aquatic Life Criteria. U.S. Environmental Protection Agency, http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm or Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A-240).
   b. Acute and chronic criteria for metals (except for mercury) are based on the dissolved fraction. For mercury, the chronic criterion is based on total recoverable and the acute criterion is based on the dissolved fraction.
   c. Acute and chronic criteria for chromium are for the hexavalent form. Hexavalent chromium is not one of the chemicals of concern at the Boeing Plant 2 site; therefore, total chromium will be reported.
   d. There is no chronic criterion for silver; the acute criterion of 1.9 µg/L is used as the chronic criterion.
   e. Criteria for total PCBs based on total recoverable fraction (EPA 2002).
2. Laboratory qualifiers (Q1) are defined as follows:
   U = analyte not detected at associated reporting limit value.
   Y = the analyte is not detected at or above the associated reporting limit value. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.
   J = analyte positively identified; value is approximate concentration in sample.
3. Validation qualifiers (Q2) are defined as follows:
   U = analyte not detected above the level of the associated reporting limit value.
   UJ = analyte was not detected at or above the associated reporting limit value shown; value is an estimate.
4. Total PCBs calculated by summing detections or, if all not detected, using the highest reporting limit.
5. Averages calculated using one-half of reporting limit for non-detected results.

Abbreviation(s)

— = not analyzed
EPA = U.S. Environmental Protection Agency
ft = feet
NE = not established
NTU = nephelometric turbidity unit
PCBs = polychlorinated biphenyls
µg/L = micrograms per liter
WAC = Washington Administrative Code

Reference(s)

U.S. Environmental Protection Agency (EPA). 2002. National Recommended Water Quality Criteria: 2002. EPA, Office of Water, Office of Science and Technology, EPA-822-R-02-047, Washington, D.C.

TABLE 8

SUMMARY OF WATER QUALITY PARAMETERS RECORDED DURING DREDGE RETURN WATER QUALITY MONITORING

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Discharge Day		Salinity (ppt)		Temp (°C)		pH		Turbidity (NTU)	DO (mg/L)		Comments[3]
		DRW[1]	Ambient[2]	DRW[1]	Ambient[2]	DRW[1]	Ambient[2]	DRW[1]	DRW[1]	Ambient[2]	
9/24/2014	Average	12.4	4.0	19.4	16.5	7.6	7.3	0.0	2.9	8.1	Water sample 0 NTUs
9/25/2014	Average	11.5	4.9	19.7	16.5	7.6	7.3	0.0	3.6	7.8	Water sample 0 NTUs
9/26/2014	Average	11.0	5.8	19.9	16.4	7.4	7.3	0.0	4.3	8.0	Water sample 0.01 NTUs
9/27/2014	Average	12.4	5.4	19.9	16.2	7.4	7.3	0.0	4.1	8.0	Water sample 0 NTUs
10/1/2014	Average	14.3	6.2	18.0	15.2	7.4	7.3	0.0	3.5	8.2	Water sample 0 NTUs
10/2/2014	Average	16.1	5.6	19.1	15.9	7.4	7.3	0.0	5.6	8.3	Water sample 0.08 NTUs
10/3/2014	Average	16.5	5.3	18.8	14.9	7.4	7.3	0.0	5.1	8.5	Water sample 0.02 NTUs
10/7/2014	Average	18.5	5.9	20.1	15.7	7.4	7.3	0.0	4.4	8.3	Water sample 0 NTUs
10/8/2014	Average	19.6	6.8	19.5	15.6	7.3	7.3	0.0	5.4	8.2	Not sampled
10/9/2014	Average	18.8	7.4	19.3	15.6	7.4	7.4	0.0	5.5	8.2	Water sample 0.02 NTUs
10/10/2014	Average	18.2	10.7	18.1	14.7	7.4	7.4	0.0	4.9	7.7	Not sampled
10/13/2014	Average	18.3	7.2	17.4	14.7	7.3	7.3	0.0	4.8	8.3	Water sample 0.02 NTUs
10/14/2014	Average	16.6	5.4	16.8	14.7	7.4	7.3	0.0	5.3	8.5	Not sampled
10/16/2014	Average	14.7	5.0	16.1	14.1	7.2	7.3	0.0	4.3	8.4	Water sample 0.38 NTUs
10/17/2014	Average	14.3	5.8	16.1	13.8	7.3	7.3	0.0	4.4	8.6	Not sampled
10/20/2014	Average	15.0	5.1	17.3	14.5	7.3	7.3	0.0	5.4	8.6	Water sample 0.21 NTUs
10/21/2014	Average	14.8	4.2	16.4	14.0	7.3	7.3	0.0	6.2	8.7	Not sampled
10/22/2014	Average	14.7	5.6	15.0	13.4	7.4	7.3	0.0	6.2	8.6	Water sample 0.36 NTUs
10/23/2014	Average	NA	3.4	NA	13.3	NA	7.3	NA	NA	8.9	DRWS YSI logging failure
10/24/2014	Average	12.7	2.2	13.5	12.7	7.3	7.2	0.0	7.7	9.3	Not sampled
10/25/2014	Average	13.1	2.4	13.5	12.1	7.3	7.2	0.0	6.9	9.5	Not sampled
10/27/2014	Average	12.3	1.4	11.7	11.3	7.3	7.2	0.0	5.1	10.0	Water sample 0.09 NTUs
10/29/2014	Average	10.4	1.3	15.2	11.0	7.3	7.2	0.0	8.1	10.2	Not sampled
10/30/2014	Average	11.3	0.5	14.6	10.7	7.4	7.1	0.0	7.1	10.4	Water sample 0.17 NTUs
10/31/2014	Average	8.6	1.1	14.5	11.1	7.3	7.2	0.0	7.0	10.1	Water sample 0.17 NTUs
11/3/2014	Average	7.8	2.0	13.3	10.6	7.3	7.2	0.0	7.7	10.0	Water sample 0.16 NTUs
11/6/2014	Average	12.6	1.0	14.2	10.7	7.3	7.2	0.1	7.5	10.4	Water sample 0.11 NTUs
11/7/2014	Average	12.0	0.9	12.6	10.2	7.4	7.2	0.0	8.7	10.5	Water sample 0.13 NTUs
11/8/2014	Average	12.0	1.8	11.0	10.0	7.4	7.2	0.0	8.9	10.5	Water sample 0.06 NTUs
11/10/2014	Average	12.3	1.7	11.7	9.3	7.3	7.2	0.0	7.1	10.7	Water sample 0.38 NTUs
11/11/2014	Average	13.2	2.1	10.4	8.5	7.3	7.3	0.0	7.2	10.9	Water sample 0.19 NTUs

TABLE 8

SUMMARY OF WATER QUALITY PARAMETERS RECORDED DURING DREDGE RETURN WATER QUALITY MONITORING

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Discharge Day		Salinity (ppt)		Temp (°C)		pH		Turbidity (NTU)	DO (mg/L)		Comments[3]
		DRW[1]	Ambient[2]	DRW[1]	Ambient[2]	DRW[1]	Ambient[2]	DRW[1]	DRW[1]	Ambient[2]	
11/12/2014	Average	13.6	1.6	5.4	6.4	7.5	7.3	0.0	9.0	11.6	Water sample 0.12 NTUs
11/14/2014	Average	12.0	1.1	4.9	3.6	7.4	7.2	0.0	7.8	12.4	Water sample 0.19 NTUs
11/15/2014	Average	11.2	1.0	5.4	3.6	7.4	7.2	0.0	7.7	12.1	Water sample 0.34 NTUs
11/16/2014	Average	10.6	1.5	5.6	3.9	7.4	7.2	0.0	10.2	12.2	Water sample 0.13 NTUs
11/17/2014	Average	10.6	2.1	5.3	4.0	7.3	7.2	0.0	9.9	12.0	Water sample 0.21 NTUs
11/18/2014	Average	11.4	2.6	6.1	4.2	7.4	7.2	0.0	10.0	11.9	Water sample 0.15 NTUs
11/19/2014	Average	11.7	2.8	6.7	4.5	7.3	7.2	0.0	8.3	11.7	Not sampled
11/20/2014	Average	12.8	3.8	9.3	5.9	7.3	7.2	0.0	8.2	11.0	Water sample 0.17 NTUs
11/21/2014	Average	14.9	5.2	10.5	7.3	7.2	7.2	0.0	7.1	10.3	Water sample 0.15 NTUs
11/22/2014	Average	15.5	5.4	9.3	8.0	7.2	7.2	0.0	7.6	9.9	Water sample 0.07 NTUs
11/24/2014	Average	14.3	2.7	7.8	7.4	7.1	7.3	0.0	7.1	11.1	Water sample 0.18 NTUs
11/25/2014	Average	12.4	1.3	10.2	7.3	7.2	7.3	0.0	7.0	11.6	Water sample 0.01 NTUs
12/1/2014	Average	10.1	1.0	5.2	3.7	6.9	7.1	0.0	7.7	12.2	Water sample 0.01 NTUs
12/2/2014	Average	9.4	0.3	4.6	3.2	7.0	7.1	0.0	8.0	12.5	Water sample 0.22 NTUs
12/3/2014	Average	10.2	0.9	4.9	3.9	7.1	7.2	0.0	10.1	12.2	Water sample 0.16 NTUs
12/4/2014	Average	10.6	1.4	5.8	4.4	7.2	7.2	0.0	9.3	12.0	Water sample 0.21 NTUs
12/5/2014	Average	9.7	2.3	6.6	5.7	7.2	7.2	0.0	8.1	11.4	Water sample 0.13 NTUs
12/8/2014	Average	9.2	3.1	10.1	7.5	7.0	7.2	0.0	8.1	10.8	Water sample 0.3 NTUs
12/9/2014	Average	8.4	3.3	12.0	8.2	7.0	7.2	0.0	7.8	10.6	Water sample 0.04 NTUs
12/10/2014	Average	8.2	3.2	12.6	8.8	7.0	7.2	0.0	7.2	10.5	Water sample 0.06 NTUs
12/11/2014	Average	9.4	2.3	11.0	8.8	7.1	7.2	0.0	7.5	10.3	Water sample 0.05 NTUs
12/12/2014	Average	9.9	2.5	10.6	8.5	7.1	7.2	0.0	7.7	10.4	Water sample 0.03 NTUs
12/16/2014	Average	13.3	2.4	8.5	6.6	7.1	7.2	0.0	7.5	11.1	Water sample 0.02 NTUs
12/17/2014	Average	13.4	1.8	8.6	6.6	7.2	7.2	0.0	7.6	11.2	Water sample 0.1 NTUs
12/18/2014	Average	13.6	2.0	9.2	6.8	7.2	7.2	0.0	7.3	11.1	
12/19/2014	Average	11.4	2.6	10.2	7.7	7.1	7.2	0.0	7.0	10.6	
12/20/2014	Average	10.0	2.9	9.0	7.8	7.1	7.2	0.0	7.2	10.5	
12/21/2014	Average	8.5	3.4	10.1	8.2	7.0	7.2	0.0	5.8	10.4	
1/5/2015	Average	6.0	1.5	10.8	6.8	6.8	7.3	0.0	7.5	11.6	Water sample 0 NTUs
1/6/2015	Average	10.3	0.3	10.4	6.3	7.1	7.0	0.0	7.5	12.3	
1/7/2015	Average	11.9	0.1	9.7	6.2	7.2	7.0	0.0	7.9	12.3	Water sample 0.01 NTUs

TABLE 8

SUMMARY OF WATER QUALITY PARAMETERS RECORDED DURING DREDGE RETURN WATER QUALITY MONITORING

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Discharge Day		Salinity (ppt)		Temp (°C)		pH		Turbidity (NTU)	DO (mg/L)		Comments[3]
		DRW[1]	Ambient[2]	DRW[1]	Ambient[2]	DRW[1]	Ambient[2]	DRW[1]	DRW[1]	Ambient[2]	
1/8/2015	Average	12.6	0.2	8.9	6.1	7.1	7.1	0.0	8.4	12.3	
1/9/2015	Average	18.1	0.3	9.4	6.0	7.1	7.1	0.0	7.6	12.2	
1/12/2015	Average	21.6	0.5	10.8	6.9	7.0	7.1	0.0	6.7	11.6	Water sample 0.06 NTUs
1/13/2015	Average	24.6	0.5	9.7	6.5	7.0	7.2	0.0	7.5	11.9	
1/14/2015	Average	25.4	0.5	8.7	5.9	7.0	7.2	0.0	6.7	12.0	Water sample 0.04 NTUs
1/15/2015	Average	25.0	0.7	7.1	5.2	7.0	7.2	0.0	5.3	12.1	
1/16/2015	Average	23.5	1.1	10.0	5.8	6.9	7.2	0.0	6.4	11.7	
1/17/2015	Average	24.4	1.3	9.6	6.0	6.9	7.1	0.0	6.6	11.5	
1/19/2015	Average	23.9	0.5	10.8	6.8	6.9	7.2	0.0	5.5	11.9	Water sample 0.01 NTUs
1/20/2015	Average	24.4	0.5	11.0	6.6	6.9	7.2	0.0	5.4	12.1	
1/21/2015	Average	24.5	0.5	10.1	5.8	7.0	7.2	0.0	6.6	12.3	Water sample 0.01 NTUs
1/22/2015	Average	24.3	0.5	10.8	6.0	7.1	7.2	0.0	6.9	12.3	
1/23/2015	Average	24.1	0.9	11.4	6.9	7.0	7.2	0.0	6.2	11.9	
1/24/2015	Average	24.4	1.0	12.7	7.9	7.1	7.2	0.0	6.3	11.3	
1/26/2015	Average	21.2	0.6	12.6	7.7	7.0	7.2	0.0	6.0	11.7	Water sample 0 NTUs
1/27/2015	Average	17.9	0.5	11.4	7.2	7.1	7.2	0.0	6.7	11.8	
1/28/2015	Average	20.4	0.3	12.0	7.5	7.0	7.2	0.0	6.6	11.8	Water sample 0 NTUs
1/29/2015	Average	19.6	0.5	10.9	7.4	7.1	7.1	0.0	7.0	11.6	
1/30/2015	Average	22.5	0.8	10.4	6.9	7.2	7.1	0.0	7.1	11.5	
1/31/2015	Average	25.4	1.2	10.1	6.7	7.2	7.1	0.0	6.8	11.4	
2/2/2015	Average	24.9	1.9	10.4	7.2	7.1	7.2	0.0	6.9	11.2	Water sample 0.01 NTUs
2/3/2015	Average	26.3	1.7	10.4	7.3	7.1	7.2	0.0	6.7	11.3	
2/4/2015	Average	27.2	1.7	10.1	7.4	7.2	7.2	0.0	6.8	11.3	Water sample 0.01 NTUs
2/5/2015	Average	21.7	1.7	12.0	8.0	7.1	7.2	0.0	6.7	10.9	
2/6/2015	Average	18.8	1.3	12.4	8.7	7.1	7.2	0.0	7.0	10.8	
2/7/2015	Average	18.2	0.9	11.8	8.8	7.1	7.2	0.0	7.1	10.8	
2/9/2015	Average	20.5	0.9	12.4	8.6	7.0	7.2	0.0	6.7	11.1	Water sample 0.03 NTUs
2/10/2015	Average	20.2	0.7	12.7	8.8	7.1	7.2	0.0	6.8	11.3	
2/11/2015	Average	20.8	0.6	12.8	8.3	7.1	7.2	0.0	6.3	11.6	Water sample 0.02 NTUs
2/12/2015	Average	18.9	0.5	13.1	8.3	7.1	7.2	0.0	6.1	11.6	
2/13/2015	Average	17.3	0.6	13.8	8.9	7.0	7.2	0.0	5.5	11.3	

TABLE 8

SUMMARY OF WATER QUALITY PARAMETERS RECORDED DURING DREDGE RETURN WATER QUALITY MONITORING

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Discharge Day		Salinity (ppt)		Temp (°C)		pH		Turbidity (NTU)	DO (mg/L)		Comments[3]
		DRW[1]	Ambient[2]	DRW[1]	Ambient[2]	DRW[1]	Ambient[2]	DRW[1]	DRW[1]	Ambient[2]	
2/16/2015	Average	17.1	0.8	12.1	8.2	6.9	7.2	0.0	4.3	11.4	Water sample 0.02 NTUs
2/17/2015	Average	17.5	1.2	11.1	8.0	7.0	7.2	0.0	5.6	11.2	
2/18/2015	Average	17.7	2.1	10.7	7.6	7.1	7.2	0.0	5.1	11.1	Water sample 0.08 NTUs
2/19/2015	Average	17.6	1.7	10.7	7.9	7.1	7.2	0.0	5.4	11.0	
2/20/2015	Average	17.7	1.9	11.2	8.7	7.1	7.1	0.0	5.5	10.5	
2/23/2015	Average	18.5	2.4	9.8	8.0	7.1	7.2	0.0	6.9	10.7	Water sample 0.01 NTUs
2/24/2015	Average	19.2	3.3	10.2	7.5	7.2	7.2	0.0	6.9	10.7	
2/25/2015	Average	18.2	2.7	10.0	7.4	7.2	7.1	0.0	5.8	10.6	Water sample 0 NTUs
2/26/2015	Average	16.6	2.1	11.2	8.3	7.2	7.1	0.0	5.5	10.4	
2/27/2015	Average	11.0	1.6	12.1	9.1	7.1	7.2	0.0	5.5	10.5	
3/2/2015	Average	10.3	3.1	9.7	7.7	7.0	7.2	0.0	6.0	10.6	Water sample 0.11 NTUs
3/3/2015	Average	11.7	2.7	7.5	7.7	7.1	7.2	0.0	2.5	10.4	
3/4/2015	Average	12.0	2.9	7.4	7.5	7.0	7.2	0.0	1.2	10.4	Water sample 0.02 NTUs
3/5/2015	Average	12.4	3.9	8.8	7.2	7.0	7.2	0.0	2.1	10.6	
3/6/2015	Average	12.6	NA	8.0	NA	7.1	NA	0.0	1.9	NA	Ambient water quality instrument removed

Note(s)

1. Average of values recorded by the instrument installed in the dredge return water system discharge line during the time that the system was discharging on given calendar day. The instrument recorded salinity (ppt), temperature (°C), pH, turbidity (NTU), and dissolved oxygen (mg/L) every 30 seconds or every minute when the system was discharging.
2. Ambient is the average of the measurements collected at the upstream *in situ* water quality instrument that was installed approximately 2 feet below the water surface. The *in situ* instrument recorded salinity (ppt), temperature (°C), pH, and dissolved oxygen (mg/L) every 5 minutes continuously. The average for each parameter was calculated from the readings recorded during the time the dredge return water system was discharging on given calendar day.
3. Water Sample NTUs – Turbidity of composite water sample collected during the time the dredge return water system was operating as measured by a portable turbidimeter.

Abbreviation(s)

°C = degrees Celsius	NA = data not recorded
DO = dissolved oxygen	NTU = nephelometric turbidity unit
DRW = dredge return water	NM = not measured
mg/L = milligrams per liter	ppt = parts per thousand

TABLE 9

DREDGE RETURN WATER SYSTEM CONVENTIONAL WATER QUALITY MONITORING RESULTS AND SAMPLES ANALYZED FOR COMPLIANCE (CS3)

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

	Dredge Return Water Plant Water Quality Monitoring				
Date	Plant Operation	Monitoring Activities	Conventional Results	Samples Analyzed	Comments
9/24/14	Operating Normally	Intensive Monitoring	No Exceedances	BP2WQ-0490	
9/26/14	Operating Normally	Intensive Monitoring	No Exceedances	BP2WQ-0492	
10/23/14	Operating Normally	Intensive Monitoring	No Exceedances	BP2WQ-0498	Special Area, Data Log Failed
10/25/14	Operating Normally	Intensive Monitoring	No Exceedances	BP2WQ-0501	Special Area
10/28/14	Plant Recirculating			TSCA-GAC-1	Early Removal; Area Recirculation Sample
10/29/14	Operating Normally	Intensive Monitoring	No Exceedances	BP2WQ-0502	Early Removal Areas
10/30/14	Plant Recirculating	Intensive Monitoring	No Exceedances	TSCA-GAC-2	Early Removal Area Recirculation Sample
11/1/14	Operating Normally	Intensive Monitoring	No Exceedances	BP2WQ-0504	Early Removal Area
11/4/14	Plant Recirculating			TSCA-GAC-3	Early Removal; Area Recirculation Sample
11/5/14	Plant Recirculating			TSCA-GAC-4	Early Removal; Area Recirculation Sample
12/3/14	Operating Normally	Intensive Monitoring	No Exceedances	BP2WQ-0517	Early Removal Area and Special Areas
12/5/14	Operating Normally	Intensive Monitoring	No Exceedances	BP2WQ-0519	Early Removal Area and Special Areas

Note(s)

1. Routine monitoring requirements for the Dredge Return Water processing plant included monitoring twice a week on non-consecutive days. Turbidity of a composite water sample collected over the time period that the system was discharging would be used to determine a turbidity exceedance. Boeing conducted daily monitoring of the DRW plant discharge. Water samples were collected twice a week on non-consecutive days and discarded if turbidity was less than 5 NTUs.

Abbreviation(s)

DRW = dredge return water
NTU = nephelometric turbidity unit

TABLE 10

ANALYTICAL RESULTS FOR DREDGE RETURN WATER SAMPLES COLLECTED DURING CS3 DREDGE SEASON

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

			Sample ID	BP2WQ-0490			BP2WQ-0492			BP2WQ-0498			BP2WQ-0501			TSCA-GAC-1			BP2WQ-0502			TSCA-GAC-2			BP2WQ-0504			TSCA-GAC-3			TSCA-GAC-4			BP2WQ-0517			BP2WQ-0519		
			Monitoring Location	DRW Plant Discharge Line			DRW Plant Discharge Line			Special Area DRW Plant Discharge Line			Special Area DRW Plant Discharge Line			Early Removal Area DRW Plant Recirc. Line			Early Removal Area DRW Plant Discharge Line			Early Removal Area DRW Plant Recirc. Line			Early Removal Area DRW Plant Discharge Line			Early Removal Area DRW Plant Recirc. Line			Early Removal Area DRW Plant Recirc. Line			Special Areas DRW Plant Discharge Line			Special Areas DRW Plant Discharge Line		
			Sample Date	9/24/2014			9/26/2014			10/23/2014			10/25/2014			10/28/2014			10/30/2014			10/30/2014			11/1/2014			11/4/2014			11/5/2014			12/3/2014			12/5/2014		
			Sample Time	19:35			18:30			19:20			21:00			15:20			1:20			17:25			1:18			17:15			17:45			17:40			13:50		
Analyte	Acute Criteria[1]	Chronic Criteria[1]	Result	Q1[2]	Q2[3]	Result	Q1[2]	Q2[3]	Result	Q1[2]	Q2[3]	Result	Q1[2]	Q2[3]	Result	Q1[2]	Q2[3]	Result	Q1[2]	Q2[3]	Result	Q1[2]	Q2[3]	Result	Q1[2]	Q2[3]	Result	Q1[2]	Q2[3]	Result	Q1[2]	Q2[3]	Result	Q1[2]	Q2[3]	Result	Q1[2]	Q2[3]
Dissolved Metals (µg/L)																																						
Cadmium	40	8.8	0.199	U		0.199	U		0.199	U		0.199	U		—			0.086	J		—			0.154	J		—			—			0.199	U		0.082	J	
Chromium	1100	50	0.42	J		0.59	J		0.46	J		0.52	J		—			0.51	J		—			0.49	J		—			—			0.37	J		0.53	J	
Copper	4.8	3.1	0.22	J		0.33	J		0.21	J		0.3	J		—			0.47	J		—			1	U		—			—			1	U		0.35	J	
Lead	210	8.1	0.398	U		0.398	U		0.398	U		0.398	U		—			0.398	U		—			0.398	U		—			—			0.398	U		0.054	J	U
Mercury	1.8		0.02	U		0.02	U		0.02	U		0.02	U		—			0.02	U		—			0.02	U		—			—			0.02	U		0.02	U	
Silver	1.9	1.9	0.259		J	0.114	J	U	0.085	J		0.11	J		—			0.115	J	U	—			0.04	J	U	—			—			0.026	J		0.199	U	
Zinc	90	81	5.71			4.72	J		4.98	U		4.98	U		—			4.98	U		—			3.01	J		—			—			4.98	U		4.98	U	
Total Metals (µg/L)																																						
Mercury		0.025	0.02	U		0.02	U		0.02	U		0.02	U		—			0.02	U		—			0.02	U		—			—			0.02	U		0.02	U	
PCBs (µg/L)																																						
Aroclor 1016	NE	NE	0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U	UJ	0.010	U		0.010	U		0.010	U		0.010	U	
Aroclor 1242	NE	NE	0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U	UJ	0.010	U		0.010	U		0.010	U		0.010	U	
Aroclor 1248	NE	NE	0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U	UJ	0.010	U		0.010	U		0.010	U		0.010	U	
Aroclor 1254	NE	NE	0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U	UJ	0.010	U		0.010	U		0.010	U		0.010	U	
Aroclor 1260	NE	NE	0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U	UJ	0.010	U		0.010	U		0.010	U		0.010	U	
Aroclor 1221	NE	NE	0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U	UJ	0.010	U		0.010	U		0.010	U		0.010	U	
Aroclor 1232	NE	NE	0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U	UJ	0.010	U		0.010	U		0.010	U		0.010	U	
Total PCBs[4]	10	0.03	0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U		0.010	U	UJ	0.010	U		0.010	U		0.010	U		0.010	U	

Note(s)

1. Criteria obtained from the following:
   a. Lowest of National Recommended Water Quality Criteria: Aquatic Life Criteria. U.S. Environmental Protection Agency, http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm or Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A-240).
   b. Acute and chronic criteria for metals (except for mercury) are based on the dissolved fraction. For mercury, the chronic criterion is based on total recoverable and the acute criterion is based on the dissolved fraction.
   c. Acute and chronic criteria for chromium are for the hexavalent form. Hexavalent chromium is not one of the chemicals of concern at the Boeing Plant 2 site; therefore, total chromium will be reported.
   d. There is no chronic criterion for silver; the acute criterion of 1.9 µg/L is used as the chronic criterion.
   e. Criteria for total PCBs based on total recoverable fraction (EPA 2002).
2. Laboratory qualifiers (Q1) are defined as follows:
   U = analyte not detected at reporting limit presented.
   J = analyte positively identified; value is approximate concentration in sample.
3. Validation qualifiers (Q2) are defined as follows:
   U = analyte not detected above the level of the associated reporting limit value.
   UJ = analyte was not detected at or above the associated reporting limit value; reporting limit is estimated.
4. Total PCBs calculated by summing detections or, if all not detected, using the highest reporting limit.
5. Averages calculated using one-half reporting limit for non-detected results.

Abbreviation(s)

— = not analyzed
DRW = dredge return water
EPA = U.S. Environmental Protection Agency
NE = not established
PCBs = polychlorinated biphenyls
Q1 = laboratory qualifiers
Q2 = validation qualifiers
Recirc. Line = Recirculation Line
µg/L = micrograms per liter
WAC = Washington Administrative Code

Reference(s)

U.S. Environmental Protection Agency (EPA). 2002. National Recommended Water Quality Criteria: 2002. EPA, Office of Water, Office of Science and Technology, EPA-822-R-02-047, Washington, D.C.

TABLE 11

PERIMETER MONITORING SAMPLE LOCATIONS
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Sample Location	Pre-Southwest Bank Excavation Monitoring		WA State Plane, North Zone, NAD 83, Survey Feet (Average Location of Three Grabs for Composite Sample)		Pre-Dredge 2015 Monitoring		WA State Plane, North Zone, NAD 83, Survey Feet (Average Location of Three Grabs for Composite Sample)		End of Season 2015 Monitoring		WA State Plane, North Zone, NAD 83, Survey Feet (Average Location of Three Grabs for Composite Sample)	
	Sample ID [1]	Date Sampled	Easting	Northing	Sample ID [1]	Date Sampled	Easting	Northing	Sample ID [1]	Date Sampled	Easting	Northing
SD-PER501					SD-PER501-0914	9/10/2014	1273442 [3]	199190 [3]	SD-PER501-0315	3/20/2015	1273437 [3]	199194 [3]
SD-PER502					SD-PER502-0914	9/10/2014	1273412 [3]	199041 [3]	SD-PER502-0315	3/20/2015	1273402 [3]	199044 [3]
SD-PER503					SD-PER503-0914	9/10/2014	1273335 [3]	198899 [3]	SD-PER503-0315	3/20/2015	1273335 [3]	198899 [3]
SD-PER504					SD-PER504-0914	9/10/2014	1273282	198820	SD-PER504-0315	3/16/2015	1273282	198818
SD-PER505					SD-PER505-0914	9/10/2014	1273132	198658	SD-PER505-0315	3/16/2015	1273130	198654
SD-PER525 [2]					SD-PER525-0914	9/10/2014	1273128	198656	SD-PER525-0315	3/16/2015	1273130	198657
SD-PER506					SD-PER506-0914	9/11/2014	1272917	198487	SD-PER506-0315	3/13/2015	1272919	198490
SD-PER507					SD-PER507-0914	9/11/2014	1272778	198477	SD-PER507-0315	3/13/2015	1272779	198477
SD-PER508					SD-PER508-0914	9/10/2014	1273193	198870	SD-PER508-0315	3/11/2015	1273194	198870
SD-PER509					SD-PER509-0914	9/10/2014	1273227	198833	SD-PER509-0315	3/12/2015	1273228	198834
SD-PER510					SD-PER510-0914	9/10/2014	1273119	198767	SD-PER510-0315	3/11/2015	1273120	198769
SD-PER511					SD-PER511-0914	9/10/2014	1273146	198698	SD-PER511-0315	3/16/2015	1273145	198697
SD-PER512					SD-PER512-0914	9/11/2014	1272599	198650	SD-PER512-0315	3/12/2015	1272600	198651
SD-PER513					SD-PER513-0914	9/10/2014	1273053	198708	SD-PER513-0315	3/11/2015	1273052	198705
SD-PER514					SD-PER514-0914	9/12/2014	1273063	198633	SD-PER514-0315	3/13/2015	1273065	198632
SD-PER515					SD-PER515-0914	9/12/2014	1272975	198640	SD-PER515-0315	3/13/2015	1272977	198642
SD-PER516					SD-PER516-0914	9/12/2014	1272911	198570	SD-PER516-0315	3/13/2015	1272915	198572
SD-PER517					SD-PER517-0914	9/12/2014	1272881	198541	SD-PER517-0315	3/13/2015	1272881	198541
SD-PER518					SD-PER518-0914	9/11/2014	1272812	198599	SD-PER518-0315	3/12/2015	1272812	198601
SD-PER101					SD-PER101-0914	9/15/2014	1271445	199744	SD-PER101-0315	3/16/2015	1271449	199742
SD-PER102					SD-PER102-0914	9/16/2014	1271396	199655	SD-PER102-0315	3/17/2015	1271397	199654
SD-PER103					SD-PER103-0914	9/17/2014	1271499	199660	SD-PER103-0315	3/17/2015	1271502	199658
SD-PER104					SD-PER104-0914	9/16/2014	1271351	199569	SD-PER104-0315	3/17/2015	1271353	199568
SD-PER105					SD-PER105-0914	9/16/2014	1271446	199571	SD-PER105-0315	3/17/2015	1271448	199570
SD-PER106					SD-PER106-0914	9/15/2014	1271456	199431	SD-PER106-0315	3/19/2015	1271461	199430
SD-PER126 [2]					SD-PER126-0914	9/15/2014	1271456	199434	SD-PER126-0315	3/19/2015	1271459	199433
SD-PER201					SD-PER201-0914	9/16/2014	1272558	198396	SD-PER201-0315	3/16/2015	1272557	198392
SD-PER202					SD-PER202-0914	9/19/2014	1272923	198121	SD-PER202-0315	3/17/2015	1272926	198121
SD-PER203					SD-PER203-0914	9/17/2014	1272622	198134	SD-PER203-0315	3/16/2015	1272623	198136
SD-PER204					SD-PER204-0914	9/17/2014	1273014	197916	SD-PER204-0315	3/18/2015	1273010	197917
SD-PER205					SD-PER205-0914	9/19/2014	1273381	197722	SD-PER205-0315	3/18/2015	1273379	197719
SD-PER206					SD-PER206-0914	9/17/2014	1273137	197705	SD-PER206-0315	3/18/2015	1273136	197707
SD-PER207					SD-PER207-0914	9/19/2014	1273485	197501	SD-PER207-0315	3/18/2015	1273482	197500

TABLE 11

PERIMETER MONITORING SAMPLE LOCATIONS
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Sample Location	Pre-Southwest Bank Excavation Monitoring		WA State Plane, North Zone, NAD 83, Survey Feet (Average Location of Three Grabs for Composite Sample)		Pre-Dredge 2015 Monitoring		WA State Plane, North Zone, NAD 83, Survey Feet (Average Location of Three Grabs for Composite Sample)		End of Season 2015 Monitoring		WA State Plane, North Zone, NAD 83, Survey Feet (Average Location of Three Grabs for Composite Sample)	
	Sample ID [1]	Date Sampled	Easting	Northing	Sample ID [1]	Date Sampled	Easting	Northing	Sample ID [1]	Date Sampled	Easting	Northing
SD-PER208					SD-PER208-0914	9/25/2014	1273795	197343	SD-PER208-0315	3/19/2015	1273793	197347
SD-PER209					SD-PER209-0914	9/17/2014	1273587	197310	SD-PER209-0315	3/18/2015	1273587	197311
SD-PER210					SD-PER210-0914	9/22/2014	1273947	197086	SD-PER210-0315	3/18/2015	1273945	197086
SD-PER230 [2]					SD-PER230-0914	9/22/2014	1273947	197088	SD-PER230-0315	3/18/2015	1273945	197087
SD-PER211					SD-PER211-0914	9/22/2014	1274301	196841	SD-PER211-0315	3/19/2015	1274299	196841
SD-PER212					SD-PER212-0914	9/17/2014	1274129	196823	SD-PER212-0315	3/19/2015	1274128	196821
SD-PER213					SD-PER213-0914	9/17/2014	1274380	196678	SD-PER213-0315	3/19/2015	1274380	196679
SD-PER301	SD-PER301-0714	7/14/2014	1274638	196476	SD-PER301-0914	9/12/2014	1274636	196478	SD-PER301-0315	3/9/2015	1274640	196475
SD-PER302	SD-PER302-0714	7/14/2014	1274773	196414	SD-PER302-0914	9/12/2014	1274773	196411	SD-PER302-0315	3/9/2015	1274772	196413
SD-PER303	SD-PER303-0714	7/14/2014	1274855	196260	SD-PER303-0914	9/11/2014	1274851	196262	SD-PER303-0315	2/26/2015	1274850	196263
SD-PER304	SD-PER304-0714	7/14/2014	1275030	196186	SD-PER304-0914	9/12/2014	1275027	196189	SD-PER304-0315	2/27/2015	1275026	196191
SD-PER305	SD-PER305-0714	7/14/2014	1275099	196038	SD-PER305-0914	9/11/2014	1275100	196039	SD-PER305-0315	2/27/2015	1275096	196035
SD-PER306	SD-PER306-0714	7/14/2014	1275277	196015	SD-PER306-0914	9/15/2014	1275276	196016	SD-PER306-0315	2/27/2015	1275276	196013
SD-PER307	SD-PER307-0714	7/15/2014	1275275	195873	SD-PER307-0914	9/15/2014	1275274	195865	SD-PER307-0315	3/9/2015	1275278	195868
SD-PER327 [2]	SD-PER327-0714	7/15/2014	1275275	195861	SD-PER327-0914	9/15/2014	1275279	195868	SD-PER327-0315	3/9/2015	1275278	195868
SD-PER308	SD-PER308-0714	7/15/2014	1275487	195828	SD-PER308-0914	9/15/2014	1275487	195829	SD-PER308-0315	3/9/2015	1275486	195832
SD-PER309	SD-PER309-0714	7/15/2014	1275550	195659	SD-PER309-0914	9/16/2014	1275550	195655	SD-PER309-0315	3/9/2015	1275547	195655
SD-PER310	--- [4]	---	---	---	SD-PER310-0914	9/16/2014	1275763	195590	SD-PER310-0315	2/27/2015	1275761	195590
SD-PER311	SD-PER311-0714	7/15/2014	1275681	195408	SD-PER311-0914	9/16/2014	1275682	195403	SD-PER311-0315	2/27/2015	1275684	195402
SD-PER312	SD-PER312-0714	7/14/2014	1274836	196223	SD-PER312-0914	9/11/2014	1274832	196225	SD-PER312-0315	2/26/2015	1274835	196224
SD-PER313	SD-PER313-0714	7/14/2014	1275091	195991	SD-PER313-0914	9/11/2014	1275090	195989	SD-PER313-0315	2/27/2015	1275092	195985
SD-PER401	SD-PER401-0714	7/15/2014	1276140	194403	SD-PER401-0914	9/19/2014	1276138	194399	SD-PER401-0315	2/25/2015	1276138	194399
SD-PER402	SD-PER402-0714	7/15/2014	1275990	194312	SD-PER402-0914	9/19/2014	1275994	194315	SD-PER402-0315	2/25/2015	1275993	194314
SD-PER403	SD-PER403-0714	7/15/2014	1276092	194312	SD-PER403-0914	9/19/2014	1276091	194313	SD-PER403-0315	2/25/2015	1276089	194315
SD-PER404	SD-PER404-0714	7/16/2014	1275945	194227	SD-PER404-0914	9/19/2014	1275943	194226	SD-PER404-0315	2/26/2015	1275944	194223
SD-PER405	SD-PER405-0714	7/16/2014	1276042	194228	SD-PER405-0914	9/22/2014	1276044	194230	SD-PER405-0315	2/26/2015	1276047	194231
SD-PER406	SD-PER406-0714	7/16/2014	1276145	194228	SD-PER406-0914	9/22/2014	1276148	194229	SD-PER406-0315	2/26/2015	1276146	194230
SD-PER426 [2]	SD-PER426-0714	7/16/2014	1276147	194230	SD-PER426-0914	9/22/2014	1276144	194226	SD-PER426-0315	2/26/2015	1276145	194224

Note(s)
1. Sample ID includes sampling station location plus four-digit code (MMYY) to indicate month/hear of sample collection (e.g., 0714 following station location indicates the July 2014 sampling event).
2. Field duplicate sample collected at this location. Duplicate sample is identified by a 20 or 30 series sequential location ID (e.g., SD-PER426-[MMYY] is field duplicate of SD-PER406-MMYY).
3. Diver core: approximate location of sample collection.
4. Station blocked by Jorgensen dredge barge; not sampled.

Abbreviation(s)
NAD = North American Datum
WA State Plane = Washington State Plane Coordinates

Table 12

AREA 1 PERIMETER MONITORING SAMPLE RESULTS[1, 2]

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER101																SD-PER102														
Construction Season		Construction Season 1						Construction Season 2						Construction Season 3				Construction Season 1						Construction Season 2						Construction Season 3			
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction	Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction		
Collection Date		12/4/2012			3/8/2013			12/13/2013			3/12/2014			9/15/2014			3/16/2015	12/4/2012			3/8/2013			12/17/2013			3/13/2014			9/16/2014			3/17/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33		
Sample ID		SD-PER101-1212			SD-PER101-0313			SD-PER101-1213			SD-PER101-0314			SD-PER101-0914			SD-PER101-0315	SD-PER102-1212			SD-PER102-0313			SD-PER102-1213			SD-PER102-0314			SD-PER102-0914			SD-PER102-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																				
Total Organic Carbon (percent)	—	2.78			3			3.18			1.96			2.73			1.57	2.33			2.73			2.46			1.73			1.2			2.11		
Metals (mg/kg)																																				
Arsenic	57	12.3			12.5			8.2			9			9.4			12.4	11.9			11.7			9			8.2			8.3			11.3		
Cadmium	5.1	0.6			1			0.4	U		0.7			0.4	U		0.7	0.5			0.9			0.4	U		0.7			0.4	U		0.6		
Chromium	260	29			31			30			30.9			29			31	26			29			24			31			31			26		
Copper	390	47.6			49.4			46.8			44.1			44.4			52.9	42.4			45.2			33.6			35.4			42.3			38.3		
Lead	450	18			18			17			19			17			22	15			17			11			14			13			15		
Mercury	0.41	0.11			0.19		J	0.07			0.11			0.11			0.12	0.11			0.15			0.19			0.07			0.09			0.12		
Silver	6.1	0.6	U		0.6	U		0.6	U		0.6	U		0.6	U		0.6	U	0.6	U		0.6	U		0.6	U		0.6	U		0.6	U		0.6	U	
Zinc	410	102		J	102			96			92			94			106	90		J	96			72			79			90			80		
PCBs (µg/kg)																																				
Aroclor 1016	NE	3.9	U		3.9	U		20	U		3.9	U		3.9	U		4	U	3.9	U		3.9	U		3.7	U		3.9	U		3.9	U		3.9	U	
Aroclor 1221	NE	3.9	U		3.9	U		20	U		3.9	U		3.9	U		4	U	3.9	U		3.9	U		3.7	U		3.9	U		3.9	U		3.9	U	
Aroclor 1232	NE	3.9	U		3.9	U		20	U		3.9	U		3.9	U		4	U	3.9	U		3.9	U		3.7	U		3.9	U		3.9	U		3.9	U	
Aroclor 1242	NE	3.9	U		3.9	U		20	U		3.9	U		3.9	U		4	U	3.9	U		3.9	U		3.7	U		3.9	U		3.9	U		3.9	U	
Aroclor 1248	NE	27			46			60	Y	UY	31			19			78		24			45			26	Y	UY	12			18			34		
Aroclor 1254	NE	61			72			71			57			39			110		58			70			49			36			36			57		
Aroclor 1260	NE	36			46			42			50			31			56		31			42			31			66			18			31		
Total PCBs (µg/kg Dry-Weight) [4]	130	124			164			113			138			89			244		113			157			80			114			72			122		
Total PCBs (mg/kg OC) [5]	12	4.5			5.5			3.6			7.0			3.3			15.5		4.8			5.8			3.3			6.6			6.0			5.8		

Table 12

AREA 1 PERIMETER MONITORING SAMPLE RESULTS [1, 2]

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER103																SD-PER104														
Construction Season		Construction Season 1						Construction Season 2						Construction Season 3				Construction Season 1						Construction Season 2						Construction Season 3			
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction	Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction		
Collection Date		12/4/2012			3/8/2013			12/17/2013			3/12/2014			9/17/2014			3/17/2015	12/4/2012			3/8/2013			12/17/2013			3/12/2014			9/16/2014			3/17/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33		
Sample ID		SD-PER103-1212			SD-PER103-0313			SD-PER103-1213			SD-PER103-0314			SD-PER103-0914			SD-PER103-0315	SD-PER104-1212			SD-PER104-0313			SD-PER104-1213			SD-PER104-0314			SD-PER104-0914			SD-PER104-0315		
Analyte	SMS SQS Criteria [3]	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2
Conventionals																																		
Total Organic Carbon (percent)	—	2.43			3.3			4.26			1.67			2.53			2.66	2.79			2.98			3.1			2.22			2.19			1.83		
Metals (mg/kg)																																		
Arsenic	57	12.4			11.1			14.1			8.8			8.6			10.9	10.2			11.8			12.4			10.5			10.2			10.8		
Cadmium	5.1	0.6			0.9			0.5	U		0.7			0.4	U		0.7	0.5			0.9			0.5	U		0.8			0.5			0.7		
Chromium	260	29			30			33			30			32			33	28			28			25			31			34			31		
Copper	390	48.6			47.9			61.9			63.1			47.9			48.6	46.3			45.5			43.8			45.5			51.2			51		
Lead	450	18			18			25			20			20			19	16			19			16			20			20			20		
Mercury	0.41	0.13			0.14			0.11			0.15			0.04	U		0.09	0.08			0.19			0.12			0.12			0.11			0.11		
Silver	6.1	0.6	U		0.6	U		0.8	U		0.6	U		0.6	U		0.6	U		0.6	U		0.7	U		0.6	U		0.6	U		0.6	U	
Zinc	410	127		J	104			125			95			104			99	96		J	94			90			96			113			103		
PCBs (µg/kg)																																		
Aroclor 1016	NE	3.9	U		4	U		3.9	U		3.9	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		3.9	U		3.9	U	
Aroclor 1221	NE	3.9	U		4	U		3.9	U		3.9	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		3.9	U		3.9	U	
Aroclor 1232	NE	3.9	U		4	U		3.9	U		3.9	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		3.9	U		3.9	U	
Aroclor 1242	NE	3.9	U		4	U		3.9	U		3.9	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		3.9	U		3.9	U	
Aroclor 1248	NE	26			49			49	Y	UY	29			31			48	22			40			35	Y	UY	26			39			42		
Aroclor 1254	NE	58			80			100			60			65			77	42			63			77			56			62			72		
Aroclor 1260	NE	39			80			72			60			43			48	26			110	P	J	120			70			42			83		
Total PCBs (µg/kg Dry-Weight) [4]	130	123			209			172			149			139			173	90			213		J [6]	197			152			143			197		
Total PCBs (mg/kg OC) [5]	12	5.1			6.3			NA			8.9			5.5			6.5	3.2			7.1		J [7]	6.4			6.8			6.5			10.8		

Table 12

AREA 1 PERIMETER MONITORING SAMPLE RESULTS [1, 2]

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER105																		
Construction Season		Construction Season 1						Construction Season 2						Construction Season 3						
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			
Collection Date		12/4/2012			3/8/2013			12/19/2013			3/13/2014			9/16/2014			3/17/2015			
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			
Sample ID		SD-PER105-1212			SD-PER105-0313			SD-PER105-1213			SD-PER105-0314			SD-PER105-0914			SD-PER105-0315			
Analyte	SMS SQS Criteria [3]	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	
Conventionals																				
Total Organic Carbon (percent)	—	2.04			1.62			2.99			2.5			2.47			1.97			
Metals (mg/kg)																				
Arsenic	57	11			9.7			9.2			8.7			8.4			10			
Cadmium	5.1	0.5			0.8			0.4	U		0.6			0.4	U		0.6			
Chromium	260	26			27.8			29			30			30.5			28.3			
Copper	390	38.2			41			49.6			35.8			43			40.4			
Lead	450	14			14			18			15			15			15			
Mercury	0.41	0.09			0.12			0.16			0.15			0.1			0.08			
Silver	6.1	0.6	U		0.6	U		0.6	U		0.6	U		0.5	U		0.5	U		
Zinc	410	84		J	96			100			80			95			83			
PCBs (µg/kg)																				
Aroclor 1016	NE	3.9	U		4	U		20	U		3.9	U		4	U		4	U		
Aroclor 1221	NE	3.9	U		4	U		20	U		3.9	U		4	U		4	U		
Aroclor 1232	NE	3.9	U		4	U		20	U		3.9	U		4	U		4	U		
Aroclor 1242	NE	3.9	U		4	U		20	U		3.9	U		4	U		4	U		
Aroclor 1248	NE	19			42			46			17			24			35			
Aroclor 1254	NE	54			62			88			42			48			56			
Aroclor 1260	NE	73			41			54			48			36			30			
Total PCBs (µg/kg Dry-Weight) [4]	130	146			145			188			107			108			121			
Total PCBs (mg/kg OC) [5]	12	7.2			9.0			6.3			4.3			4.4			6.1			

Table 12

AREA 1 PERIMETER MONITORING SAMPLE RESULTS [1, 2]

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER106																SD-PER126 (Field Dup. of SD-PER106)														
Construction Season		Construction Season 1						Construction Season 2						Construction Season 3				Construction Season 1						Construction Season 2						Construction Season 3			
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction	Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction		
Collection Date		12/11/2012			3/12/2013			12/13/2013			3/13/2014			9/15/2014			3/19/2015	12/11/2012			3/12/2013			12/13/2013			3/13/2014			9/15/2014			3/19/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33		
Sample ID		SD-PER106-1212			SD-PER106-0313			SD-PER106-1213			SD-PER106-0314			SD-PER106-0914			SD-PER106-0315	SD-PER126-1212			SD-PER126-0313			SD-PER126-1213			SD-PER126-0314			SD-PER126-0914			SD-PER126-0315		
Analyte	SMS SQS Criteria [3]	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2
Conventionals																																					
Total Organic Carbon (percent)	—	2.64			3		J	3.1			1.76		J	1.4		J	2.58			2.35			1.7		J	3.11			2.4			2.35		J	2.12		
Metals (mg/kg)																																					
Arsenic	57	14.8			13.9			8.1		J	9.8			9.8		J	12.2			13.5			12.6			13.2			10			12.1		J	11.1		
Cadmium	5.1	0.6			1.2			0.4			0.8			0.4			0.6			0.6			1			0.4	U		0.7			0.4			0.5		
Chromium	260	30			35			32			33			27.7			29			29			31			31			32			29.8			28.6		
Copper	390	47.7			56.2			53.8			50.2			45			45.9			45.6			46			53.7			46.4			45.7			40.9		
Lead	450	21			22			22			26			19			18			20			18			24			23			20			16		
Mercury	0.41	0.15			0.19			0.05	U		0.13			0.08			0.09			0.14			0.14			0.06			0.12			0.11			0.09		
Silver	6.1	0.6	U		0.6	U		0.6	U		0.6	U		0.5	U		0.6	U		0.6	U		0.6	U		0.6	U		0.6	U		0.6	U		0.5	U	
Zinc	410	107			117			112			107			92			92			104			101			118			101			104			87		
PCBs (µg/kg)																																					
Aroclor 1016	NE	3.9	U		3.9	U		18	U		3.8	U		4	U		3.9	U		19	U		3.8	U		18	U		3.9	U		3.9	U		4	U	
Aroclor 1221	NE	3.9	U		3.9	U		18	U		3.8	U		4	U		3.9	U		19	U		3.8	U		18	U		3.9	U		3.9	U		4	U	
Aroclor 1232	NE	3.9	U		3.9	U		18	U		3.8	U		4	U		3.9	U		19	U		3.8	U		18	U		3.9	U		3.9	U		4	U	
Aroclor 1242	NE	3.9	U		3.9	U		18	U		3.8	U		4	U		3.9	U		19	U		3.8	U		18	U		3.9	U		3.9	U		4	U	
Aroclor 1248	NE	27			17		J	73	Y	UY	30			32			34	P	J	34			33		J	52			32			28			35		
Aroclor 1254	NE	59			31		J	190		J	65			61			56			86			52		J	94			66			52			58		
Aroclor 1260	NE	36		J	26			200		J	56			34			35			79		J	40			64			72			27			58		
Total PCBs (µg/kg Dry-Weight) [4]	130	122		J [6]	74		J [6]	390		J [6]	151			127			125		J [6]	199		J [6]	125		J [6]	210			170			107			151		
Total PCBs (mg/kg OC) [5]	12	4.6		J [7]	2.5		J [7]	12.6		J [7]	8.6		J [7]	9.1		J [7]	4.8		J [7]	8.5		J [7]	7.4		J [7]	6.8			7.1			4.6		J [7]	7.1		

Note(s)

1. Laboratory qualifiers (Q1) are as follows:
   U = analyte not detected at the associated reporting limit value.
   P = analyte detected on both chromatographic columns; RPD >40% with no chromatographic interference.
2. Validation qualifiers (Q2) are defined as follows:
   J = analyte positively identified; value is approximate concentration in sample.
3. Criteria obtained from Table 3 of Construction and Post-Construction Sediment Monitoring QAPP (AMEC et al. 2012e).
4. Total PCBs calculated by summing results for detected Aroclors.
5. NA: TOC outside the range for normalization (<0.5% or >4.0%).
6. If 20% or more of total detected Aroclors are qualified as estimated, the total calculated PCB concentration will also be considered estimated and assigned a "J" qualifier.
7. If the total calculated PCB concentration is considered to be estimated and assigned a "J" qualifier, then the organic carbon normalized value will also be assigned a "J" qualifier. Organic carbon-normalized PCB values will also be considered estimated if the TOC value is qualified as estimated.

Abbreviation(s)

ft = feet
mg/kg = milligrams per kilogram
mg/kg OC = milligrams per kilogram organic carbon
NE = not established
PCBs = polychlorinated biphenyls
Q1 = laboratory qualifiers
Q2 = validation qualifiers
QAPP = Quality Assurance Project Plan
RPD = relative percent difference
SMS SQS = Washington Sediment Management Standards Sediment Quality Standards (WAC 173-204-320)
TOC = total organic carbon
µg/kg = micrograms per kilogram
µg/kg Dry-Weight = micrograms per kilogram dry weight
WAC = Washington Administrative Code

Reference(s)

AMEC Environment & Infrastructure, Inc., Dalton, Olmsted & Fuglevand, Inc., and Floyd|Snider, Inc. (AMEC et al.). 2012e. Construction and Post-Construction Sediment Monitoring Quality Assurance Project Plan, Duwamish Sediment Other Area and Southwest Bank Corrective Measure and Habitat Project, Boeing Plant 2, Seattle/Tukwila, Washington. Prepared for The Boeing Company, Seattle, Washington.

Table 13

AREA 2 PERIMETER MONITORING SAMPLE RESULTS[1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER201																SD-PER202											
Construction Season		Construction Season 1						Construction Season 2						Construction Season 3				Construction Season 1						Construction Season 2				Construction Season 3			
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction	Pre-Construction			Post-Construction			Pre-Construction			Post-Construction	Pre-Construction			Post-Construction		
Collection Date		12/11/2012			3/11/2013			12/10/2013			3/14/2014			9/16/2014			3/16/2015	12/5/2012			3/11/2013			12/10/2013			3/14/2014	9/19/2014			3/17/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33		
Sample ID		SD-PER201-1212			SD-PER201-0313			SD-PER201-1213			SD-PER201-0314			SD-PER201-0914			SD-PER201-0315	SD-PER202-1212			SD-PER202-0313			SD-PER202-1213			SD-PER202-0314	SD-PER202-0914			SD-PER202-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																	
Total Organic Carbon (percent)	—	2.06			1.77			2.09			2.26			2.26			0.927	2.2		J	2.06			2.75			2.13		2.25			2.09		
Metals (mg/kg)																																	
Arsenic	57	10.1			11.9			11			10.5			9.4			9.7	14.1			10.4			11.5			10.3		11.7			12.4		
Cadmium	5.1	0.5			0.9			0.4	U		0.6			0.4			0.6	0.5			1			0.4	U		0.7		0.4	U		0.7		
Chromium	260	24.1			29			31			30			30.5			28.8	28.6			30.7			29.9			33.8		29.9			32.2		
Copper	390	32.8			44.4			52.7			38.6			43.8			42.8	41.9			44.6			48.4			43.8		46.6			49.9		
Lead	450	32			16			21			17			18			17	15			17			20			21		20			20		
Mercury	0.41	0.14			0.13		J	0.15			0.1			0.1			0.11	0.44			0.15			0.12			0.12		0.15			0.1		
Silver	6.1	0.6	U		0.6	U		0.6	U		0.6	U		0.6	U		0.5	U	0.5	U		0.5	U		0.6	U		0.6	U	0.5	U		0.5	U	
Zinc	410	75			96			113			87			96			88		93		J	95			102			95		98			93		
PCBs (µg/kg)																																	
Aroclor 1016	NE	3.8	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		3.9	U		4	U		3.8	U		3.9	U		4	U	
Aroclor 1221	NE	3.8	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		3.9	U		4	U		3.8	U		3.9	U		4	U	
Aroclor 1232	NE	3.8	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		3.9	U		4	U		3.8	U		3.9	U		4	U	
Aroclor 1242	NE	3.8	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		3.9	U		4	U		3.8	U		3.9	U		4	U	
Aroclor 1248	NE	16			41			34			25			40			35	20	Y	UY	41			36			38		37			59		
Aroclor 1254	NE	45			65			70			54			85			66	68	Y	UY	66			91			90		110			98		
Aroclor 1260	NE	31			45			56			92			56			50	360			49			73			120		100			100		
Total PCBs (µg/kg Dry-Weight) [4]	130	92			151			160			171			181			151	360			156			200			248		247			257		
Total PCBs (mg/kg OC) [5]	12	4.5			8.5			7.7			7.6			8.0			16.3	16.4		J [7]	7.6			7.3			11.6		11.0			12.3		

Table 13

AREA 2 PERIMETER MONITORING SAMPLE RESULTS[1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER203																SD-PER204															
Construction Season		Construction Season 1						Construction Season 2						Construction Season 3				Construction Season 1						Construction Season 2						Construction Season 3			
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction	Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction		
Collection Date		12/11/2012			3/11/2013			12/11/2013			3/14/2014			9/17/2014			3/16/2015	12/5/2012			3/11/2013			12/11/2013			3/17/2014			9/17/2014			3/18/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33		
Sample ID		SD-PER203-1212			SD-PER203-0313			SD-PER203-1213			SD-PER203-0314			SD-PER203-0914			SD-PER203-0315	SD-PER204-1212			SD-PER204-0313			SD-PER204-1213			SD-PER204-0314			SD-PER204-0914			SD-PER204-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																			
Total Organic Carbon (percent)	—	2.07			1.93			2.35			2.76			2.66			1.34	2.37		J	2.6			2.9			2.09			2.43			2.31		
Metals (mg/kg)																																			
Arsenic	57	14.9			12.7			11.3			11.7			12			11.9	11.8			12.1			10.7			11.6			11.4			10.8		
Cadmium	5.1	0.6			1			0.4	U		0.8			0.6			0.6	0.5			1			0.4	U		0.8			0.5			0.7		
Chromium	260	32			31			31			32			39			32	28			28.6			29			35			31			33.2		
Copper	390	61.9			74.4			65			69.8			104			74.2	42.9			43.8			47.2			43.2			43.4			49.3		
Lead	450	29			35			31			35			118			29	16			25			18			21			18			21		
Mercury	0.41	0.17			0.13			0.11			0.12			0.08			0.13	0.1			0.14			0.12			0.11			0.06			0.12		
Silver	6.1	0.7	U		0.6	U		0.6	U		0.6	U		0.7	U		0.7	U	0.6	U		0.6	U		0.6	U		0.7	U		0.6	U		0.6	U	
Zinc	410	158			154			139			140			230			123	93		J	97			101			95			94			102		
PCBs (µg/kg)																																			
Aroclor 1016	NE	4	U		4	U		3.9	U		3.9	U		3.9	U		3.9	U	4	U		4	U		3.9	U		3.9	U		3.9	U		4	U	
Aroclor 1221	NE	4	U		4	U		3.9	U		3.9	U		3.9	U		3.9	U	4	U		4	U		3.9	U		3.9	U		3.9	U		4	U	
Aroclor 1232	NE	4	U		4	U		3.9	U		3.9	U		3.9	U		3.9	U	4	U		4	U		3.9	U		3.9	U		3.9	U		4	U	
Aroclor 1242	NE	4	U		4	U		3.9	U		3.9	U		3.9	U		3.9	U	4	U		4	U		3.9	U		3.9	U		3.9	U		4	U	
Aroclor 1248	NE	15			29			20			29			27			38		20	Y	UY	38			28			35			40			44		
Aroclor 1254	NE	32			46			42			59			54			63		54			60			67			74			90			80		
Aroclor 1260	NE	24			38			32			59			35			36		36			43			68			120			65			95		
Total PCBs (µg/kg Dry-Weight) [4]	130	71			113			94			147			116			137		90			141			163			229			195			219		
Total PCBs (mg/kg OC) [5]	12	3.4			5.9			4.0			5.3			4.4			10.2		3.8		J [7]	5.4			5.6			11.0			8.0			9.5		

Table 13

AREA 2 PERIMETER MONITORING SAMPLE RESULTS[1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER205																SD-PER206													
Construction Season		Construction Season 1						Construction Season 2						Construction Season 3				Construction Season 1						Construction Season 2						Construction Season 3			
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction	Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction		
Collection Date		12/6/2012			3/11/2013			12/11/2013			3/17/2014			9/19/2014			3/18/2015	12/5/2012			3/11/2013			12/12/2013			3/14/2014			9/17/2014			3/18/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33		
Sample ID		SD-PER205-1212			SD-PER205-0313			SD-PER205-1213			SD-PER205-0314			SD-PER205-0914			SD-PER205-0315	SD-PER206-1212			SD-PER206-0313			SD-PER206-1213			SD-PER206-0314			SD-PER206-0914			SD-PER206-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																				
Total Organic Carbon (percent)	—	2.46			2.13			2.77			2.5			2.42			1.18	1.83		J	1.21			1.36			1.39			1.2			0.53		
Metals (mg/kg)																																				
Arsenic	57	10.3			11.4			12.4			12.4			11.2			9.7	9.6			5.3			3.7			7.1			6.9			6.4		
Cadmium	5.1	0.5			0.9			0.4	U		0.7			0.4			0.7	0.3	U		0.5			0.3	U		0.4			0.3	U		0.3		
Chromium	260	32.3			27.9			30			33			30.2			30.7	23.4			19.5			16			19.8			19.4			18.2		
Copper	390	35.4			41.3			52.5			44.7			47.3			44.6	30.9			26.2			23.6			24.4			24.8			24.6		
Lead	450	14			18			22			22			21			18	19			18			19			18			16			17		
Mercury	0.41	0.1			0.15			0.18			0.13			0.14			0.08	0.1			0.12			0.04			0.07			0.03	U		0.06		
Silver	6.1	0.6	U		0.5	U		0.6	U		0.6	U		0.5	U		0.5	U	0.5	U		0.5	U		0.5	U		0.5	U		0.4	U		0.4	U	
Zinc	410	110		J	96			111			97			100			90	75		J	59			64			57			60			54		
PCBs (µg/kg)																																				
Aroclor 1016	NE	3.9	U		3.9	U		3.9	U		3.9	U		3.9	U		3.9	U	3.9	U		4	U		19	U		3.9	U		3.8	U		3.8	U	
Aroclor 1221	NE	3.9	U		3.9	U		3.9	U		3.9	U		3.9	U		3.9	U	3.9	U		4	U		19	U		3.9	U		3.8	U		3.8	U	
Aroclor 1232	NE	3.9	U		3.9	U		3.9	U		3.9	U		3.9	U		3.9	U	3.9	U		4	U		19	U		3.9	U		3.8	U		3.8	U	
Aroclor 1242	NE	3.9	U		3.9	U		3.9	U		3.9	U		3.9	U		3.9	U	3.9	U		4	U		19	U		3.9	U		3.8	U		3.8	U	
Aroclor 1248	NE	25			84			32			51			52			53	16	Y	UY	25			40			13			16			20		
Aroclor 1254	NE	61			140			80			110			120			90	35			42			78			31			44			41		
Aroclor 1260	NE	52			180			100			290			110			110	28			28			48			37			23			32		
Total PCBs (µg/kg Dry-Weight) [4]	130	138			404			212			451			282			253	63			95			166			81			83			93		
Total PCBs (mg/kg OC) [5]	12	5.6			19.0			7.7			18.0			11.7			21.4	3.4		J [7]	7.9			12.2			5.8			6.9			17.5		

Table 13

AREA 2 PERIMETER MONITORING SAMPLE RESULTS[1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER207																SD-PER208													
Construction Season		Construction Season 1						Construction Season 2						Construction Season 3				Construction Season 1						Construction Season 2						Construction Season 3			
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction	Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction		
Collection Date		12/5/2012			3/12/2013			12/12/2013			3/17/2014			9/19/2014			3/18/2015	12/6/2012			3/12/2013			12/12/2013			3/17/2014			9/25/2014			3/19/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33		
Sample ID		SD-PER207-1212			SD-PER207-0313			SD-PER207-1213			SD-PER207-0314			SD-PER207-0914			SD-PER207-0315	SD-PER208-1212			SD-PER208-0313			SD-PER208-1213			SD-PER208-0314			SD-PER208-0914			SD-PER208-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																				
Total Organic Carbon (percent)	—	2.71		J	3.62			3.19			2.77			2.55			1.92	2.13			2.26			2.53			2.42			2.09			1.53		
Metals (mg/kg)																																				
Arsenic	57	10.5			12.5			11.6			12.4			13.5			10.9	11.5			11.5			11.6			10.8			10.8			9.6		
Cadmium	5.1	0.4			0.9			0.4	U		0.8			0.4	U		0.7	0.5			1			0.4	U		0.7			0.4			0.6		
Chromium	260	24.4			26			24			33			33			31	26.8			29.9			29			31			34.2			30.5		
Copper	390	35.7			40.6			37.6			46.7			50.4			46.9	38.1			42.3			47.4			39.9			43.2			37.7		
Lead	450	14			17			14			22			21			20	14			17			19			20			22			19		
Mercury	0.41	0.09			0.12		J	0.1			0.13			0.3			0.1	0.11			0.13			0.09			0.12			0.11			0.09		
Silver	6.1	0.6	U		0.6	U		0.7	U		0.6	U		0.6	U		0.6	U	0.5	U		0.6	U		0.6	U		0.6	U		0.5	U		0.5	U	
Zinc	410	79		J	86			79			101			106			95		86		J	96			98			91			97			84		
PCBs (µg/kg)																																				
Aroclor 1016	NE	4	U		3.8	U		19	U		3.9	U		4	U		3.9	U	3.8	U		4	U		18	U		8.4	U		3.9	U		4	U	
Aroclor 1221	NE	4	U		3.8	U		19	U		3.9	U		4	U		3.9	U	3.8	U		4	U		18	U		8.4	U		3.9	U		4	U	
Aroclor 1232	NE	4	U		3.8	U		19	U		3.9	U		4	U		3.9	U	3.8	U		4	U		18	U		8.4	U		3.9	U		4	U	
Aroclor 1242	NE	4	U		3.8	U		19	U		3.9	U		4	U		3.9	U	3.8	U		4	U		18	U		8.4	U		3.9	U		4	U	
Aroclor 1248	NE	20	Y	UY	29	Y	UY	52			31			43			42		27			36			56			46			47			71		
Aroclor 1254	NE	46			62			100			64			100			76		66		J	57			120			96			120			160		
Aroclor 1260	NE	28			44			95			84			76			89		53			37			130			160			100			370		
Total PCBs (µg/kg Dry-Weight) [4]	130	74			106			247			179			219			207		146		J [6]	130			306			302			267			601		
Total PCBs (mg/kg OC) [5]	12	2.7		J [7]	2.9			7.7			6.5			8.6			10.8		6.9		J [7]	5.8			12.1			12.5			12.8			39.3		

Table 13

AREA 2 PERIMETER MONITORING SAMPLE RESULTS[1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER209																		
Construction Season		Construction Season 1						Construction Season 2						Construction Season 3						
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			
Collection Date		12/5/2012			3/12/2013			12/12/2013			3/14/2014			9/17/2014			3/18/2015			
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			
Sample ID		SD-PER209-1212			SD-PER209-0313			SD-PER209-1213			SD-PER209-0314			SD-PER209-0914			SD-PER209-0315			
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																			
Total Organic Carbon (percent)	—	1.09		J	0.438			1.23			1.22			0.652			0.412		
Metals (mg/kg)																			
Arsenic	57	6.7			3.9			5.9			9.6			5.8			6.3		
Cadmium	5.1	0.3	U		0.5			0.3	U		0.4			0.3	U		0.3		
Chromium	260	23			11.6			15.2			18.9			14.3			18.2		
Copper	390	12.9			10.2			20.8			20.4			17			17.4		
Lead	450	7			4			26			18			9			10		
Mercury	0.41	0.03	U		0.03	U		0.03	U		0.03			0.03	U		0.04		
Silver	6.1	0.4	U		0.4	U		0.4	U		0.4	U		0.4	U		0.4	U	
Zinc	410	36		J	25			47			49			38			39		
PCBs (µg/kg)																			
Aroclor 1016	NE	3.9	U		3.7	U		19	U		3.9	U		4	U		3.8	U	
Aroclor 1221	NE	3.9	U		3.7	U		19	U		3.9	U		4	U		3.8	U	
Aroclor 1232	NE	3.9	U		3.7	U		48	Y	UY	3.9	U		4	U		3.8	U	
Aroclor 1242	NE	3.9	U		3.7	U		19	U		3.9	U		4	U		3.8	U	
Aroclor 1248	NE	5.8	Y	UY	3.7	U		19	U		17			10			37	P	J
Aroclor 1254	NE	18			3.5	J		68			43			23			80		
Aroclor 1260	NE	13			3.7	U		33			28			12			26		
Total PCBs (µg/kg Dry-Weight) [4]	130	31			3.5	J		101			88			45			143		J [6]
Total PCBs (mg/kg OC) [5]	12	2.8		J [7]	NA			8.2			7.2			6.9			NA		

Table 13

AREA 2 PERIMETER MONITORING SAMPLE RESULTS[1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER210																SD-PER230 (Field Dup. of SD-PER210)														
Construction Season		Construction Season 1						Construction Season 2						Construction Season 3				Construction Season 1						Construction Season 2						Construction Season 3		
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction	Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction		
Collection Date		12/6/2012			3/13/2013			12/13/2013			3/21/2014			9/22/2014			3/18/2015	12/6/2012			3/13/2013			12/13/2013			3/21/2014			9/22/2014			3/18/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33		
Sample ID		SD-PER210-1212			SD-PER210-0313			SD-PER210-1213			SD-PER210-0314			SD-PER210-0914			SD-PER210-0315	SD-PER230-1212			SD-PER230-0313			SD-PER230-1213			SD-PER230-0314			SD-PER230-0914			SD-PER230-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																				
Total Organic Carbon (percent)	—	2.66			2.35			2.4			1.95			2.11			2.06	2.21			2.53			1.99			2			2.19			1.85		
Metals (mg/kg)																																				
Arsenic	57	12.1			10.7			8.3			10.8			10.5			9.8	11.5			9.8			9.5			10.8			9.5			10.8		
Cadmium	5.1	0.5			0.9			0.4	U		0.4	U		0.5			0.7	0.5			0.9			0.4	U		0.4	U		0.4			0.6		
Chromium	260	28.5			26.3			28			36		J	30.9			32	28.3			28			29			28.1			29.5			29		
Copper	390	39.5			39.1			40.2			41.7			44.2			48.1	39.5			39			45.5			41.9			41.6			42.8		
Lead	450	15			16		J	16			17			19			19	16			15			18			16			18			17		
Mercury	0.41	0.1			0.11		J	0.09		J	0.21		J	0.11			0.1	0.11			0.11			0.31			0.11			0.12			0.09		
Silver	6.1	0.6	U		0.6	U		0.6	U		0.6	U		0.6	U		0.6	U		0.6	U		0.6	U		0.5	U		0.5	U		0.6	U	
Zinc	410	90		J	88			90			91			97			98	89		J	87			94			88			92			89		
PCBs (µg/kg)																																				
Aroclor 1016	NE	3.9	U		3.7	U		19	U		3.9	U		3.9	U		4	U		3.8	U		3.9	U		19	U		3.9	U		4	U		3.9	U	
Aroclor 1221	NE	3.9	U		3.7	U		19	U		3.9	U		3.9	U		4	U		3.8	U		3.9	U		19	U		3.9	U		4	U		3.9	U	
Aroclor 1232	NE	3.9	U		3.7	U		19	U		3.9	U		3.9	U		4	U		3.8	U		3.9	U		19	U		3.9	U		4	U		3.9	U	
Aroclor 1242	NE	3.9	U		3.7	U		19	U		3.9	U		3.9	U		4	U		3.8	U		3.9	U		19	U		3.9	U		4	U		3.9	U	
Aroclor 1248	NE	26			30			38	Y	UY	28			42			30			19			34			48			26			33			35		
Aroclor 1254	NE	48		J	49			74			64			98			53			39		J	48			93			49			82			58		
Aroclor 1260	NE	50			38			60			77			72			56	P	J	35			32			69			50			66			56		
Total PCBs (µg/kg Dry-Weight) [4]	130	124		J [6]	117			134			169			212			139		J [6]	93		J [6]	114			210			125			181			149		
Total PCBs (mg/kg OC) [5]	12	4.7		J [7]	5.0			5.6			8.7			10.0			6.7		J [7]	4.2		J [7]	4.5			10.6			6.3			8.3			8.1		

Table 13

AREA 2 PERIMETER MONITORING SAMPLE RESULTS[1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER211																		
Construction Season		Construction Season 1						Construction Season 2						Construction Season 3						
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			
Collection Date		12/6/2012			3/13/2013			12/19/2013			3/17/2014			9/22/2014			3/19/2015			
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			
Sample ID		SD-PER211-1212			SD-PER211-0313			SD-PER211-1213			SD-PER211-0314			SD-PER211-0914			SD-PER211-0315			
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																			
Total Organic Carbon (percent)	—	2.03			2.66			1.79			2.48			2.05			1.7		
Metals (mg/kg)																			
Arsenic	57	9.2			9.4			10.7			11.8			9.9			8.2		
Cadmium	5.1	0.4			0.9			0.3	U		0.7			0.4			0.5		
Chromium	260	23.8			25.4			24.6			30.6			27.8			25.2		
Copper	390	33.6			36.8			35.7			36.4			72.5			34		
Lead	450	15			16			15			19			17			15		
Mercury	0.41	0.08			0.17			0.11			0.1			0.1			0.08		
Silver	6.1	0.4	U		0.6	U		0.5	U		0.5	U		0.5	U		0.5	U	
Zinc	410	77		J	85			79			87			95			73		
PCBs (µg/kg)																			
Aroclor 1016	NE	3.8	U		3.8	U		20	U		3.8	U		3.8	U		3.8	U	
Aroclor 1221	NE	3.8	U		3.8	U		20	U		3.8	U		3.8	U		3.8	U	
Aroclor 1232	NE	3.8	U		3.8	U		20	U		3.8	U		3.8	U		3.8	U	
Aroclor 1242	NE	3.8	U		3.8	U		20	U		3.8	U		3.8	U		3.8	U	
Aroclor 1248	NE	43			190	Y	UY	2400	EY	UY	28			96	Y	UY	43		
Aroclor 1254	NE	77		J	600			17000			63			550			70		
Aroclor 1260	NE	45			79			3600			85			190			75		
Total PCBs (µg/kg Dry-Weight) [4]	130	165		J [6]	679			20600			176			740			188		
Total PCBs (mg/kg OC) [5]	12	8.1		J [7]	25.5			1150.8			7.1			36.1			11.1		

Table 13

AREA 2 PERIMETER MONITORING SAMPLE RESULTS[1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER212																SD-PER213													
Construction Season		Construction Season 1						Construction Season 2						Construction Season 3				Construction Season 1						Construction Season 2						Construction Season 3			
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction	Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction		
Collection Date		12/6/2012			3/13/2013			12/17/2013			3/24/2014			9/17/2014			3/19/2015	12/11/2012			3/13/2013			12/17/2013			3/24/2014			9/17/2014			3/19/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33		
Sample ID		SD-PER212-1212			SD-PER212-0313			SD-PER212-1213			SD-PER212-0314			SD-PER212-0914			SD-PER212-0315	SD-PER213-1212			SD-PER213-0313			SD-PER213-1213			SD-PER213-0314			SD-PER213-0914			SD-PER213-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																				
Total Organic Carbon (percent)	—	1.39			1.37			0.37			1.09			0.7			0.543	2.22			2.67			1.78			1.6			0.978			2.52		
Metals (mg/kg)																																				
Arsenic	57	9			6.4			5.2			4.9		J	4.4			5.2	9.4			8.2			5.8			9.5			7.2			10		
Cadmium	5.1	0.3	U		0.6			0.3	U		0.3	U		0.3	U		0.3	0.6			1			0.3	U		0.4			0.3			0.7		
Chromium	260	15.2			20			12.5			13.4			14.9			13.5	27			32			18.9			29.7			34			30		
Copper	390	26.5			54.4			15.8			26.3		J	17.5			15.6	41.7			49.3			26.3			50.9			33.3			48		
Lead	450	17			37			12			12			14			11	18			21			11			23			15			22		
Mercury	0.41	0.04			0.08			0.03	U		0.03	U		0.03	U		0.04	0.1			0.15			0.06			0.12			0.04			0.13		
Silver	6.1	0.4	U		0.5	U		0.4	U		0.4	U		0.4	U		0.4	U	0.6	U		0.6	U		0.5	U		0.5	U		0.5	U		0.6	U	
Zinc	410	67		J	98			39			44			42			39	90			108			59			99			79			97		
PCBs (µg/kg)																																				
Aroclor 1016	NE	3.8	U		3.9	U		3.8	U		3.9	U		4	U		3.9	U	4	U		3.8	U		3.8	U		3.9	U		3.9	U		3.8	U	
Aroclor 1221	NE	3.8	U		3.9	U		3.8	U		3.9	U		4	U		3.9	U	4	U		3.8	U		3.8	U		3.9	U		3.9	U		3.8	U	
Aroclor 1232	NE	3.8	U		3.9	U		3.8	U		3.9	U		4	U		3.9	U	4	U		3.8	U		3.8	U		3.9	U		3.9	U		3.8	U	
Aroclor 1242	NE	3.8	U		3.9	U		3.8	U		3.9	U		4	U		3.9	U	4	U		3.8	U		3.8	U		3.9	U		3.9	U		3.8	U	
Aroclor 1248	NE	15			43			19	Y	UY	14			9.1			13		28			61			25	Y	UY	57			27			44		
Aroclor 1254	NE	34		J	81			34			32			28			27		61			120			47			86			56			73		
Aroclor 1260	NE	27			96			32			79		J	18			84		34			70			31			74			36			37		
Total PCBs (µg/kg Dry-Weight) [4]	130	76		J [6]	220			66			125		J [6]	55.1			124		123			251			78			217			119			154		
Total PCBs (mg/kg OC) [5]	12	5.5		J [7]	16.1			NA			11.5		J [7]	7.9			22.8		5.5			9.4			4.4			13.6			12.2			6.1		

Note(s)

1. Laboratory qualifiers (Q1) are as follows:
   EY = Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte. Value raised due to chromatographic interferences.
   P = analyte detected on both chromatographic columns; RPD >40% with no chromatographic interference.
   U = analyte not detected at the associated reporting limit value.
   Y = analyte not detected at the associated reporting limit value. The reporting limit is raised due to chromatographic interferences.
2. Validation qualifiers (Q2) are defined as follows:
   UY = analyte was not detected; raised reporting limit.
   J = analyte positively identified; value is approximate concentration in sample.
3. Criteria obtained from Table 3 of Construction and Post-Construction Sediment Monitoring QAPP (AMEC et al. 2012e).
4. Total PCBs calculated by summing results for detected Aroclors.
5. NA: TOC outside the range for normalization (<0.5% or >4.0%).
6. If 20% or more of total detected Aroclors are qualified as estimated, the the total calculated PCB concentration will also be considered estimated and assigned a "J" qualifier.
7. If the total calculated PCB concentration is considered to be estimated and assigned a "J" qualifier, then the organic carbon normalized value will also be assigned a "J" qualifier. Organic carbon-normalized PCB values will also be considered estimated if the TOC value is qualified as estimated.

Abbreviation(s)

ft = feet
mg/kg = milligrams per kilogram
mg/kg OC = milligrams per kilogram organic carbon
NE = not established
PCBs = polychlorinated biphenyls
Q1 = laboratory qualifiers
Q2 = validation qualifiers
QAPP = Quality Assurance Project Plan
SMS SQS = Washington Sediment Management Standards Sediment Quality Standards (WAC 173-204-320)
TOC = total organic carbon
µg/kg = micrograms per kilogram
µg/kg Dry-Weight = micrograms per kilogram dry weight
WAC = Washington Administrative Code

Reference(s)

AMEC Environment & Infrastructure, Inc., Dalton, Olmsted & Fuglevand, Inc., and Floyd|Snider, Inc. (AMEC et al.). 2012e. Construction and Post-Construction Sediment Monitoring Quality Assurance Project Plan, Duwamish Sediment Other Area and Southwest Bank Corrective Measure and Habitat Project, Boeing Plant 2, Seattle/Tukwila, Washington. Prepared for The Boeing Company, Seattle, Washington.

Table 14

AREA 3 PERIMETER MONITORING SAMPLE RESULTS [1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER301																SD-PER302													
Construction Season		Construction Season 1			Construction Season 2						Construction Season 3							Construction Season 1			Construction Season 2				Construction Season 3					
Sampling Event		Pre-Construction			Pre-Construction			Post-Construction			Pre-Construction [8]			Pre-Construction [9]			Post-Construction	Pre-Construction			Pre-Construction			Post-Construction	Pre-Construction [8]			Pre-Construction [9]			Post-Construction		
Collection Date		12/11/2012			12/13/2013			3/14/2014			7/14/2014			9/12/2014			3/9/2015	12/10/2012			12/16/2013			3/13/2014	7/14/2014			9/12/2014			3/9/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33			0 - 0.33		
Sample ID		SD-PER301-1212			SD-PER301-1213			SD-PER301-0314			SD-PER301-0714			SD-PER301-0914			SD-PER301-0315	SD-PER302-1212			SD-PER302-1213			SD-PER302-0314	SD-PER302-0714			SD-PER302-0914			SD-PER302-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																	
Total Organic Carbon (percent)	—	1.72			1.87			1.82		J	1.1			1.73			1.83		J	1.75			1.69			1.59			2.67			0.789			1.57		J
Metals (mg/kg)																																	
Arsenic	57	8.5			6.2			4.2			7.2		UJ	10.2			9.3			8.3			6.5			5.6			6.6		UJ	5.5			6.5		
Cadmium	5.1	0.5			0.4	U		0.5			0.5			0.4	U		0.4			0.4			0.3	U		0.5			0.4			0.3	U		0.5		
Chromium	260	23.8			23			34.4			29.4			29.1			27			19.3			26.8			25.1			24			24.9			26.3		
Copper	390	29.3			32.6			29			34.1			40			31.2			22.5			29			27.1			26.7			27.3			33.6		
Lead	450	10			13			8			9			19			11			8			11			11			10			10			13		
Mercury	0.41	0.06			0.06			0.05		J	0.08			0.07			0.24			0.06			0.06			0.06			0.07			0.06			0.07		
Silver	6.1	0.5	U		0.6	U		0.4	U		0.5			0.5	U		0.6	U		0.5	U		0.5	U		0.5	U		0.5			0.5	U		0.5	U	
Zinc	410	68			66			52			69	U		99			75			59			73			67			68	U		72			79		
PCBs (µg/kg)																																	
Aroclor 1016	NE	3.8	U		20	U		3.9	U		3.9	U		3.9	U		3.9	U		3.8	U		3.9	U		4	U		3.8	U		4	U		3.8	U	
Aroclor 1221	NE	3.8	U		20	U		3.9	U		3.9	U		3.9	U		3.9	U		3.8	U		3.9	U		4	U		3.8	U		4	U		3.8	U	
Aroclor 1232	NE	3.8	U		20	U		3.9	U		3.9	U		3.9	U		3.9	U		3.8	U		3.9	U		4	U		3.8	U		4	U		3.8	U	
Aroclor 1242	NE	3.8	U		20	U		3.9	U		3.9	U		3.9	U		3.9	U		3.8	U		3.9	U		4	U		3.8	U		4	U		3.8	U	
Aroclor 1248	NE	9.8			32			7.9			8.7			34			24			7.1			12	Y	UY	14			15			24			28		
Aroclor 1254	NE	21			55			16			23	P	J	69			39			13			24			25			34			39			50		
Aroclor 1260	NE	17			51			21			16			36			29			8.6			16			33			27			31			47		
Total PCBs (µg/kg Dry-Weight) [4]	130	47.8			138			44.9			47.7		J [6]	139			92			28.7			40			72			76			94			125		
Total PCBs (mg/kg OC) [5]	12	2.8			7.4			2.5		J [7]	4.3		J [7]	8.0			5.0		J [7]	1.6			2.4			4.5			2.8			11.9			8.0		J [7]

Table 14

AREA 3 PERIMETER MONITORING SAMPLE RESULTS [1, 2]

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER303																SD-PER304													
Construction Season		Construction Season 1			Construction Season 2						Construction Season 3							Construction Season 1			Construction Season 2				Construction Season 3					
Sampling Event		Pre-Construction			Pre-Construction			Post-Construction			Pre-Construction [8]			Pre-Construction [9]			Post-Construction	Pre-Construction			Pre-Construction			Post-Construction	Pre-Construction [8]			Pre-Construction [9]			Post-Construction		
Collection Date		12/7/2012			12/16/2013			3/13/2014			7/14/2014			9/11/2014			2/26/2015	12/6/2012			12/20/2013			3/17/2014	7/14/2014			9/12/2014			2/27/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33			0 - 0.33		
Sample ID		SD-PER303-1212			SD-PER303-1213			SD-PER303-0314			SD-PER303-0714			SD-PER303-0914			SD-PER303-0315	SD-PER304-1212			SD-PER314-1213			SD-PER304-0314	SD-PER304-0714			SD-PER304-0914			SD-PER304-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																	
Total Organic Carbon (percent)	—	2.17			1.95			1.45			1.15			1.32			2.24		J	1.38			1.35			1.49			0.452			0.646			2.28		
Metals (mg/kg)																																	
Arsenic	57	10.9			9.1			7.4			8		UJ	8.4			8.3			7.6			5.7			7.2			5.8		UJ	7.4			6.6		
Cadmium	5.1	0.5			0.4	U		0.5			0.4			0.4	U		0.5			0.4			0.3	U		0.6			0.3			0.3	U		0.4		
Chromium	260	20			25			28.3			25.5			28.4			26.3			24			24.5			25.9			22.5			25.6			27.4		
Copper	390	27.2			36.2			31.9			30.5			36.4			32.6			27.2			28.8			30			22.8			29.1			30.1		
Lead	450	9			13			13			10			13			12			8			10			15			7			12			11		
Mercury	0.41	0.09			0.08			0.07			0.08			0.07			0.06			0.06			0.08			0.12		J	0.06			0.04			0.08		
Silver	6.1	0.6	U		0.6	U		0.5	U		0.5	U		0.6	U		0.5	U		0.5	U		0.5	U		0.5	U		0.5	U		0.4	U		0.5	U	
Zinc	410	62			76			74			72			83			75			68		J	71			73			60			75			71		
PCBs (µg/kg)																																	
Aroclor 1016	NE	3.9	U		3.9	U		3.8	U		3.9	U		3.9	U		3.9	U		3.8	U		20	U		3.8	U		3.9	U		3.8	U		3.9	U	
Aroclor 1221	NE	3.9	U		3.9	U		3.8	U		3.9	U		3.9	U		3.9	U		3.8	U		20	U		3.8	U		3.9	U		3.8	U		3.9	U	
Aroclor 1232	NE	3.9	U		3.9	U		3.8	U		3.9	U		3.9	U		3.9	U		3.8	U		30	Y	UY	3.8	U		3.9	U		3.8	U		3.9	U	
Aroclor 1242	NE	3.9	U		3.9	U		3.8	U		3.9	U		3.9	U		3.9	U		3.8	U		20	U		3.8	U		3.9	U		3.8	U		3.9	U	
Aroclor 1248	NE	9.8	Y	UY	19	Y	UY	13			14			24			24			8			20	U		19			5.9			19			32		
Aroclor 1254	NE	23			52			28			36			56			42	B		14		J	41			35			14	P	J	40			48	B	
Aroclor 1260	NE	22			100			41			28			41			29	P	J	10			120		J	40			8.3			20			64		
Total PCBs (µg/kg Dry-Weight) [4]	130	45			152			82			78			121			95		J [6]	32		J [6]	161		J [6]	94			28.2		J [6]	79			144		
Total PCBs (mg/kg OC) [5]	12	2.1			7.8			5.7			6.8			9.2			4.2		J [7]	2.3		J [7]	11.9		J [7]	6.3			NA			12.2			6.3		

Table 14

AREA 3 PERIMETER MONITORING SAMPLE RESULTS [1, 2]

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER305																SD-PER306													
Construction Season		Construction Season 1			Construction Season 2						Construction Season 3							Construction Season 1			Construction Season 2						Construction Season 3					
Sampling Event		Pre-Construction			Pre-Construction			Post-Construction			Pre-Construction [8]			Pre-Construction [9]			Post-Construction	Pre-Construction			Pre-Construction			Post-Construction			Pre-Construction [8]			Pre-Construction [9]			Post-Construction		
Collection Date		12/7/2012			12/16/2013			3/11/2014			7/14/2014			9/11/2014			2/27/2015	12/10/2012			12/19/2013			3/11/2014			7/14/2014			9/15/2014			2/27/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33		
Sample ID		SD-PER305-1212			SD-PER305-1213			SD-PER305-0314			SD-PER305-0714			SD-PER305-0914			SD-PER305-0315	SD-PER306-1212			SD-PER306-1213			SD-PER306-0314			SD-PER306-0714			SD-PER306-0914			SD-PER306-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																				
Total Organic Carbon (percent)	—	2.18			2.25			1.93			1.04			1.34			1.69	2.98			1.87			1.46			0.877			1.72			2.23		
Metals (mg/kg)																																				
Arsenic	57	9.7			10.2			7.8			8.7		UJ	7.7			8	10.9			8.6			7.7			8.9		UJ	9.3			8.7		
Cadmium	5.1	0.4			0.4	U		0.6			0.4			0.3	U		0.4	0.5			0.4	U		0.6			0.5			0.3			0.5		
Chromium	260	21			27			26.2			25.2			27			24.9	25			31.2			25			29.7			26.7			29.5		
Copper	390	26.7			38.7			33.4			30.7			31.2			31	36.9			44.7			31.8			31.5			31.6			38.3		
Lead	450	9			13			13			10			11			11	13			17			17			11			19			16		
Mercury	0.41	0.08			0.08			0.09			0.08			0.07			0.06	0.13			0.1			0.09			0.1			0.08			0.14		
Silver	6.1	0.6	U		0.7	U		0.5	U		0.5	U		0.5	U		0.5	U	0.6	U		0.6	U		0.5	U		0.5	U		0.5	U		0.6	U	
Zinc	410	63			81			74			71			74			69	84			103			77			75			79			85		
PCBs (µg/kg)																																				
Aroclor 1016	NE	3.9	U		3.8	U		3.8	U		3.8	U		3.9	U		3.9	U	3.8	U		20	U		3.8	U		3.8	U		3.9	U	UJ	3.9	U	
Aroclor 1221	NE	3.9	U		3.8	U		3.8	U		3.8	U		3.9	U		3.9	U	3.8	U		20	U		3.8	U		3.8	U		3.9	U	UJ	3.9	U	
Aroclor 1232	NE	3.9	U		3.8	U		3.8	U		3.8	U		3.9	U		3.9	U	3.8	U		20	U		3.8	U		3.8	U		3.9	U	UJ	3.9	U	
Aroclor 1242	NE	3.9	U		3.8	U		3.8	U		3.8	U		3.9	U		3.9	U	3.8	U		20	U		3.8	U		3.8	U		3.9	U	UJ	3.9	U	
Aroclor 1248	NE	12	Y	UY	17	Y	UY	9.6	Y	UY	10			17			25	P	J	21			37			31			28			34		J	39		
Aroclor 1254	NE	25			40			27			25			38			43	B		35			71			61			65			85		J	62	B	
Aroclor 1260	NE	20			70			28			23			23			35	P	J	22			52			66			50			38		J	59		
Total PCBs (µg/kg Dry-Weight) [4]	130	45			110			55			58			78			103		J [6]	78			160			158			143			157		J [6]	160		
Total PCBs (mg/kg OC) [5]	12	2.1			4.9			2.8			5.6			5.8			6.1		J [7]	2.6			8.6			10.8			16.3			9.1		J [7]	7.2		

Table 14

AREA 3 PERIMETER MONITORING SAMPLE RESULTS [1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER307																SD-PER327 (Field Dup. of SD-PER307)														
Construction Season		Construction Season 1			Construction Season 2						Construction Season 3							Construction Season 1			Construction Season 2						Construction Season 3					
Sampling Event		Pre-Construction			Pre-Construction			Post-Construction			Pre-Construction [8]			Pre-Construction [9]			Post-Construction	Pre-Construction			Pre-Construction			Post-Construction			Pre-Construction [8]			Pre-Construction [9]			Post-Construction		
Collection Date		12/7/2012			12/16/2013			3/11/2014			7/15/2014			9/15/2014			3/9/2015	12/7/2012			12/16/2013			3/11/2014			7/15/2014			9/15/2014			3/9/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33		
Sample ID		SD-PER307-1212			SD-PER307-1213			SD-PER307-0314			SD-PER307-0714			SD-PER307-0914			SD-PER307-0315	SD-PER327-1212			SD-PER327-1213			SD-PER327-0314			SD-PER327-0714			SD-PER327-0914			SD-PER327-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																				
Total Organic Carbon (percent)	—	2.25			2.94			1.55		J	1.51		J	1.84		J	3.53		2.05			2.88			2.41			0.886		J	2.45		J	3.91		
Metals (mg/kg)																																				
Arsenic	57	9			13.3		J	6.5		J	8.1		UJ	6.9		J	7.8		8.6			9.8			8.1			7			10.2		J	8		
Cadmium	5.1	0.4			0.4	U		0.6			0.5			0.4	U		0.4		0.4			0.4	U		0.6			0.5			0.4	U		0.5		
Chromium	260	22.4			28			27			26.7			26.4			24		22			31			26			26.8			31			26		
Copper	390	29.3			39.2			116		J	35.1			33.2		J	28.8		29			34.7			35.2			35.6			43.6		J	32.6		
Lead	450	11			14			13			11			11			9		9			10			15			9			18			10		
Mercury	0.41	0.06			0.07			0.09			0.09			0.07			0.09		0.09			0.08			0.09			0.12			0.09			0.06		
Silver	6.1	0.6	U		0.7	U		0.6	U		0.6	U		0.6	U		0.6	U	0.6	U		0.6	U		0.6	U		0.5	U		0.6	U		0.6	U	
Zinc	410	65			83			73			77			75		J	63		63			72			74			72			98		J	70		
PCBs (µg/kg)																																				
Aroclor 1016	NE	4	U		3.8	U		3.9	U		3.8	U		4	U		3.9	U	3.9	U		3.9	U		3.9	U		3.8	U		3.8	U		3.9	U	
Aroclor 1221	NE	4	U		3.8	U		3.9	U		3.8	U		4	U		3.9	U	3.9	U		3.9	U		3.9	U		3.8	U		3.8	U		3.9	U	
Aroclor 1232	NE	4	U		3.8	U		3.9	U		3.8	U		4	U		3.9	U	3.9	U		3.9	U		3.9	U		3.8	U		3.8	U		3.9	U	
Aroclor 1242	NE	4	U		3.8	U		3.9	U		3.8	U		4	U		3.9	U	3.9	U		3.9	U		3.9	U		3.8	U		3.8	U		3.9	U	
Aroclor 1248	NE	9.9	Y	UY	17	Y	UY	9.8	Y	UY	10			12		J	16		9.8	Y	UY	17	Y	UY	9.8	Y	UY	8.5			32		J	16		
Aroclor 1254	NE	20			53	P	J	25			19			25		J	27	P	J	20			44			20			24	P	J	64		J	28	P	J
Aroclor 1260	NE	19			55			34			12			15		J	15			22			56			30			18			28		J	17		
Total PCBs (µg/kg Dry-Weight) [4]	130	39			108		J [6]	59			41			52		J [6]	58		J [6]	42			100			50			50.5		J [6]	124		J [6]	61		J [6]
Total PCBs (mg/kg OC) [5]	12	1.7			3.7		J [7]	3.8		J [7]	2.7		J [7]	2.8		J [7]	1.6		J [7]	2.0			3.5			2.1			5.7		J [7]	5.1		J [7]	1.6		J [7]

Table 14

AREA 3 PERIMETER MONITORING SAMPLE RESULTS [1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER308																SD-PER309													
Construction Season		Construction Season 1			Construction Season 2						Construction Season 3							Construction Season 1			Construction Season 2						Construction Season 3					
Sampling Event		Pre-Construction			Pre-Construction			Post-Construction			Pre-Construction [8]			Pre-Construction [9]			Post-Construction	Pre-Construction			Pre-Construction			Post-Construction			Pre-Construction [8]			Pre-Construction [9]			Post-Construction		
Collection Date		12/10/2012			12/19/2013			3/11/2014			7/15/2014			9/15/2014			3/9/2015	12/10/2012			12/19/2013			3/21/2014			7/15/2014			9/16/2014			3/9/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33		
Sample ID		SD-PER308-1212			SD-PER308-1213			SD-PER308-0314			SD-PER308-0714			SD-PER308-0714			SD-PER308-0315	SD-PER309-1212			SD-PER309-1213			SD-PER309-0314			SD-PER309-0714			SD-PER309-0914			SD-PER309-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																				
Total Organic Carbon (percent)	—	3.47			2.32			2.16			1.64			1.74			1.34		2.67			2.41			1.1			1.38			0.668			1.8		J
Metals (mg/kg)																																				
Arsenic	57	8.2			9.9			8.3			9.6		UJ	8.8			7.3		7.3			6.1			4.7			4.3		UJ	3.2			5.9		
Cadmium	5.1	0.5			0.4			0.7			0.5			0.3	U		0.3		0.4			0.4	U		0.3	U		0.4			0.3	U		0.4		
Chromium	260	25			28			30.5			26.2			29.2			25.1		21.8			24.5			24.5			24.2			31			25.9		
Copper	390	36.2			42.2			39.4			33.2			33.9			29		25.6			31.4			25.7			25.8			31.9		J	30.4		
Lead	450	13			16			20			13			15			14		8			10			6			6			4			9		
Mercury	0.41	0.13			0.18			0.11			0.11			0.07			0.07		0.05			0.09			0.04			0.04			0.03	U		0.1		
Silver	6.1	0.6	U		0.6	U		0.6	U		0.5			0.5	U		0.5	U	0.5	U		0.6	U		0.4	U		0.4	U		0.4	U		0.5	U	
Zinc	410	85			93			89			77	U		79			68		64			72			55			56			55			67		
PCBs (µg/kg)																																				
Aroclor 1016	NE	3.9	U		19	U		4	U		3.8	U		3.9	U		3.8	U	4	U		20	U		4	U		3.8	U		4	U		3.9	U	
Aroclor 1221	NE	3.9	U		19	U		4	U		3.8	U		3.9	U		3.8	U	4	U		20	U		4	U		3.8	U		4	U		3.9	U	
Aroclor 1232	NE	3.9	U		19	U		4	U		3.8	U		3.9	U		3.8	U	4	U		20	U		4	U		3.8	U		4	U		3.9	U	
Aroclor 1242	NE	3.9	U		19	U		4	U		3.8	U		3.9	U		3.8	U	4	U		20	U		4	U		3.8	U		4	U		3.9	U	
Aroclor 1248	NE	30			46			34			26			29			43		11			20	U		7.7			6.8			5.3			14		
Aroclor 1254	NE	44			81			72			79			60			86		23			42			13			13			12			23	P	J
Aroclor 1260	NE	24			48			95			89			30		J	150		14			46			16			10			9.4			24		
Total PCBs (µg/kg Dry-Weight) [4]	130	98			175			201			194			119		J [6]	279		48			88			36.7			29.8			26.7			61		J [6]
Total PCBs (mg/kg OC) [5]	12	2.8			7.5			9.3			11.8			6.8		J [7]	20.8		1.8			3.7			3.3			2.2			4.0			3.4		J [7]

Table 14

AREA 3 PERIMETER MONITORING SAMPLE RESULTS [1, 2]

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER310														SD-PER311													
Construction Season		Construction Season 1			Construction Season 2						Construction Season 3					Construction Season 1			Construction Season 2						Construction Season 3				
Sampling Event		Pre-Construction			Pre-Construction			Post-Construction			Pre-Construction [9]			Post-Construction		Pre-Construction			Pre-Construction			Post-Construction			Pre-Construction [8]			Pre-Construction [9]			Post-Construction		
Collection Date		12/10/2012			12/19/2013			3/12/2014			9/16/2014			2/27/2015		12/10/2012			12/20/2013			3/12/2014			7/15/2014			9/16/2014			2/27/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33		
Sample ID		SD-PER310-1212			SD-PER310-1213			SD-PER310-0314			SD-PER310-0914			SD-PER310-0315		SD-PER311-1212			SD-PER311-1213			SD-PER311-0314			SD-PER311-0714			SD-PER311-0914			SD-PER311-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																	
Total Organic Carbon (percent)	—	2.62			2.68			2.77			2.31			2.49			2.15			1.94			1.44			1.6			1.85			2.06		
Metals (mg/kg)																																	
Arsenic	57	8.1			9			9			9.5			9.7			26.8			9.4			6.2			10		UJ	9			8.9		
Cadmium	5.1	0.7			0.5			0.9			0.6			0.6			0.5			0.4	U		0.5			0.6			0.4			0.4		
Chromium	260	33			37			36			35			31			26			30.1			24.3			28			32.1			28		
Copper	390	56.3			64.2			57.9			54.6			43.9			32.4			38.3			28.7			37.2			33.5			36.3		
Lead	450	28			31			33			40			21			11			19			11			13			25			13		
Mercury	0.41	0.14			0.13			0.16			0.16			0.12			0.09			0.09			0.07			0.12			0.07			0.06		
Silver	6.1	0.6	U		0.6	U		0.6	U		0.6	U		0.6	U		0.6	U		0.6	U		0.5	U		0.6	U		0.5	U		0.6	U	
Zinc	410	119			133			121			126			94			81			94			67			82			96			82		
PCBs (µg/kg)																																	
Aroclor 1016	NE	3.8	U		19	U		3.8	U		4	U		4	U		3.8	U		19	U		4	U		3.8	U		3.8	U		4	U	
Aroclor 1221	NE	3.8	U		19	U		3.8	U		4	U		4	U		3.8	U		19	U		4	U		3.8	U		3.8	U		4	U	
Aroclor 1232	NE	3.8	U		19	U		3.8	U		4	U		4	U		3.8	U		19	U		4	U		3.8	U		3.8	U		4	U	
Aroclor 1242	NE	3.8	U		19	U		3.8	U		4	U		4	U		3.8	U		19	U		4	U		3.8	U		3.8	U		4	U	
Aroclor 1248	NE	47			76			56			86			56			14			30			9.9	Y	UY	15			35			23		
Aroclor 1254	NE	87			150			92			130			90	B		29			66			24			37			68			39	B	
Aroclor 1260	NE	51			84			62			60			51			27			46			22			20			29			24		
Total PCBs (µg/kg Dry-Weight) [4]	130	185			310			210			276			197			70			142			46			72			132			86		
Total PCBs (mg/kg OC) [5]	12	7.1			11.6			7.6			11.9			7.9			3.3			7.3			3.2			4.5			7.1			4.2		

Table 14

AREA 3 PERIMETER MONITORING SAMPLE RESULTS [1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER312																SD-PER313														
Construction Season		Construction Season 1			Construction Season 2						Construction Season 3							Construction Season 1			Construction Season 2						Construction Season 3					
Sampling Event		Pre-Construction			Pre-Construction			Post-Construction			Pre-Construction [8]			Pre-Construction [9]			Post-Construction	Pre-Construction			Pre-Construction			Post-Construction			Pre-Construction [8]			Pre-Construction [9]			Post-Construction		
Collection Date		12/7/2012			12/16/2013			3/12/2014			7/14/2014			9/11/2014			2/26/2015	12/7/2012			12/16/2013			3/12/2014			7/14/2014			9/11/2014			2/27/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33		
Sample ID		SD-PER312-1212			SD-PER312-1213			SD-PER312-0314			SD-PER312-0714			SD-PER312-0914			SD-PER312-0315	SD-PER313-1212			SD-PER313-1213			SD-PER313-0314			SD-PER313-0714			SD-PER313-0914			SD-PER313-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																				
Total Organic Carbon (percent)	—	2.19			2.36			2.05		J	1.84			1.73		J	1.93		J	2.15			2.63			2.14			1.32			2.01			2.34		
Metals (mg/kg)																																				
Arsenic	57	10			9.3			8.6			9.8		UJ	9.6			11.5			12			9.5			8.2			10		UJ	8.3			9		
Cadmium	5.1	0.5			0.4	U		0.6			0.5			0.4	U		0.6			0.5			0.5	U		0.5			0.6			0.4	U		0.5		
Chromium	260	25			26			26			29			28			30			26			28			26.3			31			28.2			27		
Copper	390	37.8			39			34.5			37.7			37.9			42.7			37.8			41.1			32.7			42.6			36			36.6		
Lead	450	11			12			14			12			13			14			12			12			13			24			11			11		
Mercury	0.41	0.07			0.11			0.1			0.09			0.08			0.1			0.1			0.07			0.09			0.11			0.06			0.08		
Silver	6.1	0.7	U		0.6	U		0.6	U		0.6	U		0.6	U		0.6	U		0.7	U		0.7	U		0.6	U		0.6	U		0.5	U		0.6	U	
Zinc	410	79			78			71			82			81			87			80			83			70			91			77			75		
PCBs (µg/kg)																																				
Aroclor 1016	NE	3.9	U		3.8	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		3.8	U		3.9	U		4	U		3.9	U		4	U	
Aroclor 1221	NE	3.9	U		3.8	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		3.8	U		3.9	U		4	U		3.9	U		4	U	
Aroclor 1232	NE	3.9	U		3.8	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		3.8	U		3.9	U		4	U		3.9	U		4	U	
Aroclor 1242	NE	3.9	U		3.8	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		3.8	U		3.9	U		4	U		3.9	U		4	U	
Aroclor 1248	NE	9.7	Y	UY	12	Y	UY	14			11			15			27			9.7	Y	UY	15	Y	UY	15			14			20			19	P	J
Aroclor 1254	NE	27			29			44			33			41			53	B		24			45			42			47			50			31	B	
Aroclor 1260	NE	27			28			66			29			31			48			29			70			62			49			39			19	P	J
Total PCBs (µg/kg Dry-Weight) [4]	130	54			57			124			73			87			128			53			115			119			110			109			69		J [6]
Total PCBs (mg/kg OC) [5]	12	2.5			2.4			6.0		J [7]	4.0			5.0		J [7]	6.6		J [7]	2.5			4.4			5.6			8.3			5.4			2.9		J [7]

Note(s)

1. Laboratory qualifiers (Q1) are as follows:
   U = analyte not detected at the associated reporting limit value.
   Y = analyte not detected at the associated reporting limit value. The reporting limit is raised due to chromatographic interferences.
   P = analyte detected on both chromatographic columns; RPD >40% with no chromatographic interference.
   B = analyte detected in an associated method blank at a concentration greater than one-half of ARI's reporting limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample
2. Validation qualifiers (Q2) are defined as follows:
   UJ = analyte was not detected at or above the associated reporting limit value; reporting limit is estimated and may be inaccurate or imprecise.
   UY = analyte was not detected at or above associated reporting limit value; raised reporting limit.
   J = analyte positively identified; value is approximate concentration in sample.
3. Criteria obtained from Table 3 of Construction and Post-Construction Sediment Monitoring QAPP (AMEC et al. 2012e).
4. Total PCBs calculated by summing results for detected Aroclors.
5. NA: TOC outside the range for normalization (<0.5% or >4.0%).
6. If 20% or more of total detected Aroclors are qualified as estimated, the total calculated PCB concentration will also be considered estimated and assigned a "J" qualifier.
7. If the total calculated PCB concentration is considered to be estimated and assigned a "J" qualifier, then the organic carbon normalized value will also be assigned a "J" qualifier. Organic carbon-normalized PCB values will also be considered estimated if the TOC value is qualified as estimated.
8. Pre-Southwest Bank excavation and Jorgensen dredging.
9. Pre-DSOA dredging.

Abbreviation(s)

ARI = Analytical Resources, Inc.
ft = feet
mg/kg = milligrams per kilogram
mg/kg OC = milligrams per kilogram organic carbon
NA = not applicable, percent carbon less than 0.5 percent
NE = not established
PCBs = polychlorinated biphenyls
Q1 = laboratory qualifiers
Q2 = validation qualifiers
QAPP = Quality Assurance Project Plan
RPD = relative percent difference
SMS SQS = Washington Sediment Management Standards Sediment Quality Standards (WAC 173-204-320)
TOC = total organic carbon
µg/kg = micrograms per kilogram
µg/kg Dry-Weight = micrograms per kilogram dry weight
WAC = Washington Administrative Code

Reference(s)

AMEC Environment & Infrastructure, Inc., Dalton, Olmsted & Fuglevand, Inc., and Floyd|Snider, Inc. (AMEC et al.). 2012e. Construction and Post-Construction Sediment Monitoring Quality Assurance Project Plan, Duwamish Sediment Other Area and Southwest Bank Corrective Measure and Habitat Project, Boeing Plant 2, Seattle/ Tukwila, Washington. Prepared for The Boeing Company, Seattle, Washington.

Table 15

AREA 4 PERIMETER MONITORING SAMPLE RESULTS [1, 2]

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER401																			SD-PER402														
Construction Season		Construction Season 1						Construction Season 2						Construction Season 3							Construction Season 1						Construction Season 2						Construction Season 3					
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction [7]			Pre-Construction [8]			Post-Construction																	
Collection Date		12/10/2012			3/14/2013			12/10/2013			3/21/2014			7/15/2014			9/19/2014			2/25/2015																	
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33																	
Sample ID		SD-PER401-1212			SD-PER401-0313			SD-PER401-1213			SD-PER401-0314			SD-PER401-0714			SD-PER401-0914			SD-PER401-0315																	
Analyte	SMS SQS Criteria [3]	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2	Value	Q1	Q2
Conventionals																																						
Total Organic Carbon (percent)	—	2.05			1.91			2.65			1.88			1.48			1.87			2.49			1.94			3.76			2.9			2.08			1.33			3.12			2.35		
Metals (mg/kg)																																						
Arsenic	57	8.6			10.6			7.9			11.6			8.3		UJ	11.6			8.7			9.9			8.4			6.9			8.6			8.2		UJ	8.1			8.8		
Cadmium	5.1	0.5			0.9			0.4	U		0.4	U		0.4			0.4			0.5			0.5			0.8			0.4	U		0.4	U		0.6			0.4	U		0.6		
Chromium	260	29			31			31			31			18.7			32			31			25.4			28			31			29			28.8			28.4			29		
Copper	390	35.7			42.5			42.6			44.7			24.9			44.3			38.1			33.2			40.3			39.5			36.6			36.6			36.8			38.2		
Lead	450	18			23			22			24			15			38			33			11			13			13			12			12			14			14		
Mercury	0.41	0.1			0.16			0.13			0.11			0.07			0.14			0.1			0.08			0.1			0.08			0.09			0.09			0.14			0.1		
Silver	6.1	0.6	U		0.7	U		0.6	U		0.6	U		0.6	U		0.5	U		0.6	U		0.6	U		0.7	U		0.6	U		0.6	U		0.6	U		0.5	U		0.6	U	
Zinc	410	88			98			101			100			58			109			92			82			93			93			81			86			83			87		
PCBs (µg/kg)																																						
Aroclor 1016	NE	3.9	U		3.9	U		4	U		4	U		3.8	U		3.9	U		3.9	U		3.9	U		3.9	U		3.8	U		4	U		3.8	U		4	U		4	U	
Aroclor 1221	NE	3.9	U		3.9	U		4	U		4	U		3.8	U		3.9	U		3.9	U		3.9	U		3.9	U		3.8	U		4	U		3.8	U		4	U		4	U	
Aroclor 1232	NE	3.9	U		3.9	U		4	U		4	U		3.8	U		3.9	U		3.9	U		3.9	U		3.9	U		3.8	U		4	U		3.8	U		4	U		4	U	
Aroclor 1242	NE	3.9	U		3.9	U		4	U		4	U		3.8	U		3.9	U		3.9	U		3.9	U		3.9	U		3.8	U		4	U		3.8	U		4	U		4	U	
Aroclor 1248	NE	26			38			35			41			32			110			52			13			23			13			13			13			20			21		
Aroclor 1254	NE	50			63			110			87			92			260			100	B		26			33			25			25			32			48			37	B	J
Aroclor 1260	NE	29			28			52			54			44			100			51			21			18			20			23			18			31			24	P	J
Total PCBs (µg/kg Dry-Weight) [4]	130	105			129			197			182			168			470			203			60			74			58			61			63			99			82		J [5]
Total PCBs (mg/kg OC)	12	5.1			6.8			7.4			9.7			11.4			25.1			8.2			3.1			2.0			2.0			2.9			4.7			3.2			3.5		J [6]

Table 15

AREA 4 PERIMETER MONITORING SAMPLE RESULTS [1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER403																			SD-PER404														
Construction Season		Construction Season 1						Construction Season 2						Construction Season 3							Construction Season 1						Construction Season 2						Construction Season 3					
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction [7]			Pre-Construction [8]			Post-Construction																	
Collection Date		12/10/2012			3/14/2013			12/10/2013			3/24/2014			7/15/2014			9/19/2014			2/25/2015																	
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33																	
Sample ID		SD-PER403-1212			SD-PER403-0313			SD-PER403-1213			SD-PER403-0314			SD-PER403-0714			SD-PER403-0914			SD-PER403-0315			SD-PER404-1212			SD-PER404-0313			SD-PER404-1213			SD-PER404-0314			SD-PER404-0714			SD-PER404-0914			SD-PER404-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																										
Total Organic Carbon (percent)	—	1.95			1.66			2.3			1.55			1.03			2.25			2.19			1.54			1.34			1.72			1.36			1.14		J	2.83			1.46		J
Metals (mg/kg)																																										
Arsenic	57	7.9			9.6			8.4			9.8			8.1		UJ	8.6			10.1			9.9			8			7.4			7			7.3			7.9			6.8		
Cadmium	5.1	0.5			0.8			0.4	U		0.4	U		0.5			0.4	U		0.6			0.4			0.6			0.3	U		0.3	U		0.4			0.4	U		0.5		
Chromium	260	27			28			29			31			26.4			30.2			28			25.4			23.5			25.4			27.7			23.8			25.1			24.9		
Copper	390	33.7			36			38.7			40.1			33.5			36.1			37.5			31.8			30			34.2			34.4			29.5			34.6			31.7		
Lead	450	11			12			14			13			12			15			15			16			14			16			14			12			15			15		
Mercury	0.41	0.05	U		0.08			0.1			0.08			0.08			0.08			0.09			0.08			0.14			0.07			0.08			0.07			0.07			0.06		
Silver	6.1	0.6	U		0.6	U		0.6	U		0.6	U		0.5	U		0.5	U		0.6	U		0.4	U		0.5	U		0.5	U		0.5	U		0.5	U		0.5	U		0.5	U	
Zinc	410	80			87			93			91			78			83			84			82			77			84			81			71			78			75		
PCBs (µg/kg)																																										
Aroclor 1016	NE	4	U		3.9	U		3.9	U		4	U		3.8	U		3.9	U		3.9	U		3.8	U		4	U		4	U		4	U		3.9	U	UJ	4	U		4	U	
Aroclor 1221	NE	4	U		3.9	U		3.9	U		4	U		3.8	U		3.9	U		3.9	U		3.8	U		4	U		4	U		4	U		3.9	U	UJ	4	U		4	U	
Aroclor 1232	NE	4	U		3.9	U		3.9	U		4	U		3.8	U		3.9	U		3.9	U		3.8	U		4	U		4	U		4	U		3.9	U	UJ	4	U		4	U	
Aroclor 1242	NE	4	U		3.9	U		3.9	U		4	U		3.8	U		3.9	U		3.9	U		3.8	U		4	U		4	U		4	U		3.9	U	UJ	4	U		4	U	
Aroclor 1248	NE	10			16			17			15			13			28			28			19			29			42			17			12		J	26			41		
Aroclor 1254	NE	17			25			34			31			37			62			50	B		48			40			57			30			32		J	61			51	B	
Aroclor 1260	NE	11			13			28			28			24			30			33	P	J	26			24			33			25			17		J	32			26		
Total PCBs (µg/kg Dry-Weight) [4]	130	38			54			79			74			74			120			111		J [5]	93			93			132			72			61		J [5]	119			118		
Total PCBs (mg/kg OC)	12	1.9			3.3			3.4			4.8			7.2			5.3			5.1		J [6]	6.0			6.9			7.7			5.3			5.4		J [6]	4.2			8.1		J [6]

Table 15

AREA 4 PERIMETER MONITORING SAMPLE RESULTS [1, 2]

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER405																					
Construction Season		Construction Season 1						Construction Season 2						Construction Season 3									
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction [7]			Pre-Construction [8]			Post-Construction		
Collection Date		12/14/2012			3/14/2013			12/12/2013			3/24/2014			7/16/2014			9/22/2014			2/26/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33		
Sample ID		SD-PER405-1212			SD-PER405-0313			SD-PER405-1213			SD-PER405-0314			SD-PER405-0714			SD-PER405-0914			SD-PER405-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																						
Total Organic Carbon (percent)	—	2.14			2.58			1.71		J	1.11			1.04			1.31			2.06		J
Metals (mg/kg)																						
Arsenic	57	10.2			8.3			7.7			8.5			7			8			8.7		
Cadmium	5.1	0.4			0.7			0.4	U		0.4	U		0.5			0.4	U		0.5		
Chromium	260	25			23.3			27			27.8			25.6			26.7			26.3		
Copper	390	29.7			31.6			34.5			35.1			33.2			32.5			31.2		
Lead	450	12			10			18			11			13			14			11		
Mercury	0.41	0.09			0.07			0.06			0.08			0.07			0.09			0.09		
Silver	6.1	0.6	U		0.6	U		0.6	U		0.5	U		0.5	U		0.5	U		0.5	U	
Zinc	410	75			75			80			79			79			80			73		
PCBs (µg/kg)																						
Aroclor 1016	NE	3.9	U		3.9	U		19	U		3.9	U		3.8	U	UJ	4	U		3.9	U	
Aroclor 1221	NE	3.9	U		3.9	U		19	U		3.9	U		3.8	U	UJ	4	U		3.9	U	
Aroclor 1232	NE	3.9	U		3.9	U		19	U		3.9	U		3.8	U	UJ	4	U		3.9	U	
Aroclor 1242	NE	3.9	U		3.9	U		19	U		3.9	U		3.8	U	UJ	4	U		3.9	U	
Aroclor 1248	NE	11			17			24	Y	UY	11			13		J	23			19	Y	UY
Aroclor 1254	NE	39			26			44			22			34		J	52			32	BP	J
Aroclor 1260	NE	55			17			22			22			19		J	56			23		
Total PCBs (µg/kg Dry-Weight) [4]	130	105			60			66			55			66		J [5]	131			55		J [5]
Total PCBs (mg/kg OC)	12	4.9			2.3			3.9		J [6]	5.0			6.3		J [6]	10.0			2.7		J [6]

Table 15

AREA 4 PERIMETER MONITORING SAMPLE RESULTS [1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER406																			SD-PER426 (Field Dup. of SD-PER406)														
Construction Season		Construction Season 1						Construction Season 2						Construction Season 3									Construction Season 1						Construction Season 2						Construction Season 3					
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction [7]			Pre-Construction [8]			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction [7]			Pre-Construction [8]			Post-Construction		
Collection Date		12/19/2012			3/13/2013			12/11/2013			3/24/2014			7/16/2014			9/22/2014			2/26/2015			12/19/2012			3/13/2013			12/11/2013			3/24/2014			7/16/2014			9/22/2014			2/26/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33		
Sample ID		SD-PER406-1212			SD-PER406-0313			SD-PER406-1213			SD-PER406-0314			SD-PER406-0714			SD-PER406-0914			SD-PER406-0315			SD-PER426-1212			SD-PER426-0313			SD-PER426-1213			SD-PER426-0314			SD-PER426-0714			SD-PER426-0914			SD-PER426-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																											
Total Organic Carbon (percent)	—	2.84		J	1.15			2.42			1.3		J	1.22			0.97		J	2.74		J	2.31		J	1.21			2.1			1			1.09			1.9		J	2.53		J
Metals (mg/kg)																																											
Arsenic	57	10.1			8.6			9.8		J	10.2		J	8			8.9			9.8			9.4			7			7.7			7.9			9.5			9.1			9.6		
Cadmium	5.1	0.6			0.9			0.5			0.4	U		0.5			0.4			0.6			0.7			0.9			0.4	U		0.4	U		0.6			0.4			0.5		
Chromium	260	26.3		J	29			28			28.4			28.4		J	29.7			30			36.3		J	28.6			29			28.5			45.6			31.2			28		
Copper	390	34.4		J	31.4			40.5			36.2			35.6			37.5			38.7			52.1		J	35			39.2			35.8			35			40			37.3		
Lead	450	18		J	10			16			13			14		J	25			23			131		J	12			15			14			33			22			17		
Mercury	0.41	0.1			0.08			0.08			0.12			0.1			0.08			0.08			0.09			0.11			0.09			0.09			0.08			0.09			0.09		
Silver	6.1	0.6	U		0.6	U		0.6	U		0.5	U		0.5	U		0.5	U		0.6	U		0.6	U		0.5	U		0.6	U		0.6	U		0.5	U		0.6	U		0.6	U	
Zinc	410	82		J	82			98			87			84		J	93			90			136		J	85			94			86			135			95			86		
PCBs (µg/kg)																																											
Aroclor 1016	NE	3.9	U		3.8	U		3.9	U		3.8	U		3.7	U	UJ	3.9	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		3.8	U	UJ	4	U		8.1	U	
Aroclor 1221	NE	3.9	U		3.8	U		3.9	U		3.8	U		3.7	U	UJ	3.9	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		3.8	U	UJ	4	U		8.1	U	
Aroclor 1232	NE	3.9	U		3.8	U		3.9	U		3.8	U		3.7	U	UJ	3.9	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		3.8	U	UJ	4	U		8.1	U	
Aroclor 1242	NE	3.9	U		3.8	U		3.9	U		3.8	U		3.7	U	UJ	3.9	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		3.8	U	UJ	4	U		8.1	U	
Aroclor 1248	NE	27			27			22			17			18		J	53			58			25			20			16			17			19		J	47			48		
Aroclor 1254	NE	45			44			51			40			46		J	120			120	B		63			35			31			35			54		J	110			91	B	
Aroclor 1260	NE	29			26			39		J	84		J	43		J	49		J	53			33			20			21			28			27		J	91		J	46		
Total PCBs (µg/kg Dry-Weight) [4]	130	101			97			112		J [5]	141		J [5]	107		J [5]	222		J [5]	231			121			75			68			80			100		J [5]	248		J [5]	185		
Total PCBs (mg/kg OC)	12	3.6		J [6]	8.4			4.6		J [6]	10.8		J [6]	8.8		J [6]	22.9		J [6]	8.4		J [6]	5.2		J [6]	6.2			3.2			8.0			9.2		J [6]	13.1		J [6]	7.3		J [6]

Note(s)

1. Laboratory qualifiers (Q1) are as follows:
   U = analyte not detected at the associated reporting limit value.
   Y = analyte not detected at the associated reporting limit value. The reporting limit is raised due to chromatographic interferences.
   P = analyte detected on both chromatographic columns; RPD >40% with no chromatographic interference.
   B = analyte detected in an associated method blank at a concentration greater than one-half of ARI's reporting limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.
2. Validation qualifiers (Q2) are defined as follows:
   UY = analyte was not detected at or above associated reporting limit value; raised reporting limit.
   UJ = analyte was not detected at or above associated reporting limit value; reporting limit is estimated and may be inaccurate or imprecise.
   J = analyte positively identified; value is approximate concentration in sample.
3. Criteria obtained from Table 3 of Construction and Post-Construction Sediment Monitoring QAPP (AMEC et al. 2012e).
4. Total PCBs calculated by summing results for detected Aroclors.
5. If 20% or more of total detected Aroclors are qualified as estimated, the total calculated PCB concentration will also be considered estimated and assigned a "J" qualifier.
6. If the total calculated PCB concentration is considered to be estimated and assigned a "J" qualifier, then the organic carbon normalized value will also be assigned a "J" qualifier. Organic carbon-normalized PCB values will also be considered estimated if the TOC value is qualified as estimated.
7. Pre-Southwest Bank excavation and Jorgensen dredging.
8. Pre-DSOA dredging.

Abbreviation(s)

ARI = Analytical Resources, Inc.
ft = feet
mg/kg = milligrams per kilogram
mg/kg OC = milligrams per kilogram organic carbon
NE = not established
PCBs = polychlorinated biphenyls
Q1 = laboratory qualifiers
Q2 = validation qualifiers
QAPP = Quality Assurance Project Plan
RPD = relative percent difference
SMS SQS = Washington Sediment Management Standards Sediment Quality Standards (WAC 173-204-320)
TOC = total organic carbon
µg/kg = micrograms per kilogram
µg/kg Dry-Weight = micrograms per kilogram dry weight
WAC = Washington Administrative Code

Reference(s)

AMEC Environment & Infrastructure, Inc., Dalton, Olmsted & Fuglevand, Inc., and Floyd|Snider, Inc. (AMEC et al.). 2012e. Construction and Post-Construction Sediment Monitoring Quality Assurance Project Plan, Duwamish Sediment Other Area and Southwest Bank Corrective Measure and Habitat Project, Boeing Plant 2, Seattle/ Tukwila, Washington. Prepared for The Boeing Company, Seattle, Washington.

Table 16

AREA 5 PERIMETER MONITORING SAMPLE RESULTS [1, 2]

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER501												SD-PER502												SD-PER503											
Construction Season		Construction Season 1						Construction Season 3						Construction Season 1						Construction Season 3						Construction Season 1						Construction Season 3					
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction		
Collection Date		12/21/2012			3/27/2013			9/10/2014			3/20/2015			12/21/2012			3/27/2013			9/10/2014			3/20/2015			12/21/2012			3/27/2013			9/10/2014			3/20/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33		
Sample ID		SD-PER501-1212			SD-PER501-0313			SD-PER501-0914			SD-PER501-0315			SD-PER502-1212			SD-PER502-0313			SD-PER502-0914			SD-PER502-0315			SD-PER503-1212			SD-PER503-0313			SD-PER503-0914			SD-PER503-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																					
Total Organic Carbon (percent)	—	2.13		J	0.805			3.47			2.38			1.48		J	1.26			2.44			2.26			2.73		J	4.14			2.82			2.3		
Metals (mg/kg)																																					
Arsenic	57	7.4			3.2			13.3			17.1			4.2			4.2			11.4			11.9			11.5			11.7			14.4			16.1		
Cadmium	5.1	0.6			0.4			0.8			0.8			0.4			0.5			0.6	U		0.8			0.6			0.9			0.5	U		0.9		
Chromium	260	27.2			14.5		J	43			36			25.6			17.6			40			35			34			29			38			35		
Copper	390	41.1			20.9		J	83.6			74.9			20.9			19.4			72.3			63.9			43.6			50.6			72.6			63.6		
Lead	450	17			3			41			36			5			4			30			26			15			18			31			26		
Mercury	0.41	0.06			0.02	U		0.13			0.13			0.06			0.03			0.14			0.13			0.11			0.12			0.16			0.14		
Silver	6.1	0.5	U		0.3	U		0.9	U		0.9	U		0.4	U		0.4	U		0.9	U		0.8	U		0.5	U		0.7	U		0.8	U		0.7	U	
Zinc	410	99			33			233			167			45			38			156			132			93			98			147			118		
PCBs (µg/kg)																																					
Aroclor 1016	NE	4	U		3.7	U		11	U		3.9	U		3.9	U		3.8	U		10	U		4	U		3.9	U		3.9	U		10	U		3.9	U	
Aroclor 1221	NE	4	U		3.7	U		11	U		3.9	U		3.9	U		3.8	U		10	U		4	U		3.9	U		3.9	U		10	U		3.9	U	
Aroclor 1232	NE	4	U		3.7	U		11	U		3.9	U		3.9	U		3.8	U		10	U		4	U		3.9	U		3.9	U		10	U		3.9	U	
Aroclor 1242	NE	4	U		3.7	U		11	U		3.9	U		3.9	U		3.8	U		10	U		4	U		3.9	U		3.9	U		10	U		3.9	U	
Aroclor 1248	NE	30			5.6	Y	UY	130			120			13			9.6	Y	UY	87			85			26			50			120			62		
Aroclor 1254	NE	57			9.9			170			230			31			18			120			110			54			83			140			110		
Aroclor 1260	NE	30			4.6			94			280			14			11			83			100			36			61			97			100		
Total PCBs (µg/kg Dry-Weight) [4]	130	117			14.5			394			630			58			29			290			295			116			194			357			272		
Total PCBs (mg/kg OC) [5]	12	5.5		J [7]	1.8			11.4			26.5			3.9		J [7]	2.3			11.9			13.1			4.2		J [7]	NA			12.7			11.8		

Table 16

AREA 5 PERIMETER MONITORING SAMPLE RESULTS [1, 2]

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER504												SD-PER505										SD-PER525 (Field Dup. for SD-PER505)									
Construction Season		Construction Season 1						Construction Season 3						Construction Season 1						Construction Season 3				Construction Season 1				Construction Season 3			
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction	Pre-Construction			Post-Construction	Pre-Construction			Post-Construction		
Collection Date		12/14/2012			3/6/2013			9/10/2014			3/16/2015			12/13/2012			3/6/2013			9/10/2014			3/16/2015	12/13/2012			3/6/2013	9/10/2014			3/16/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33		
Sample ID		SD-PER504-1212			SD-PER504-0313			SD-PER504-0914			SD-PER504-0315			SD-PER505-1212			SD-PER505-0313			SD-PER505-0914			SD-PER505-0315	SD-PER525-1212			SD-PER525-0313	SD-PER525-0914			SD-PER525-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																	
Total Organic Carbon (percent)	—	3.21			3.86			3			0.058			3.05			2.34		J	2.73		J	0.049			2.64			3.39		J	1.47		J	0.056		
Metals (mg/kg)																																	
Arsenic	57	15.8			14.7			15.3			3.1			13			13.1			16.3			2.5			10.4			13.1			14			2.2		
Cadmium	5.1	0.7			1.1			0.5	U		0.3			0.7			0.9			0.5			0.2	U		0.7			1.2			0.5			0.2		
Chromium	260	35			35			37			17.4			33			30			51		J	17.1			29			34			36		J	21.2		
Copper	390	64.7			68.8			63.5			16.4			58.4			52.8			63.6			15			48.2			65			62.9			15.2		
Lead	450	25			23			25			2			25			20			25			2	U		22			26			26			2	U	
Mercury	0.41	0.19			0.17			0.15			0.02	U		0.14			0.12			0.11			0.02	U		0.08			0.17			0.16			0.02	U	
Silver	6.1	0.8	U		0.8	U		0.8	U		0.3	U		0.7	U		0.7	U		0.7	U		0.3	U		0.7	U		0.7	U		0.7	U		0.3	U	
Zinc	410	123			122			131			34			116			103			131			27			101			124			127			29		
PCBs (µg/kg)																																	
Aroclor 1016	NE	20	U		3.9	U		4	U		3.7	U		20	U		3.9	U		3.9	U		3.8	U		19	U		3.9	U		4	U		3.7	U	
Aroclor 1221	NE	20	U		3.9	U		4	U		3.7	U		20	U		3.9	U		3.9	U		3.8	U		19	U		3.9	U		4	U		3.7	U	
Aroclor 1232	NE	20	U		3.9	U		4	U		3.7	U		20	U		3.9	U		3.9	U		3.8	U		19	U		3.9	U		4	U		3.7	U	
Aroclor 1242	NE	20	U		3.9	U		4	U		3.7	U		20	U		3.9	U		3.9	U		3.8	U		19	U		3.9	U		4	U		3.7	U	
Aroclor 1248	NE	44			51			64		J	3.7	U		99			100		J	80			3.8	U		99			190		J	64			3.7	U	
Aroclor 1254	NE	110			86			110			3.3	J		230			160		J	120			3.8	U		200			300		J	100			3.7	U	
Aroclor 1260	NE	75			64			84			3.7	U		93			99			98			3.8	U		86			120			80			3.7	U	
Total PCBs (µg/kg Dry-Weight) [4]	130	229			201			258		J [6]	3.3	J		422			359		J [6]	298			3.8	U		385			610		J [6]	244			3.7	U	
Total PCBs (mg/kg OC) [5]	12	7.1			5.2			8.6		J [7]	NA			13.8			15.3		J [7]	10.9		J [7]	NA			14.6			18.0		J [7]	16.6		J [7]	NA		

Table 16

AREA 5 PERIMETER MONITORING SAMPLE RESULTS [1, 2]

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER506												SD-PER507										SD-PER508									
Construction Season		Construction Season 1						Construction Season 3						Construction Season 1						Construction Season 3				Construction Season 1						Construction Season 3			
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction	Pre-Construction			Post-Construction			Pre-Construction			Post-Construction		
Collection Date		12/13/2012			3/7/2013			9/11/2014			3/13/2015			12/5/2012			3/7/2013			9/11/2014			3/13/2015	2/14/2012			3/5/2013			9/10/2014			3/11/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33		
Sample ID		SD-PER506-1212			SD-PER506-0313			SD-PER506-0914			SD-PER506-0315			SD-PER507-1212			SD-PER507-0313			SD-PER507-0914			SD-PER507-0315	SD0052 [8]			SD-PER508-0313			SD-PER508-0914			SD-PER508-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																	
Total Organic Carbon (percent)	—	3.02			3.53			2.74			0.103		J	3.35		J	3.56			3			3.67		J	0.085			3.54			2.87		J	3.33		
Metals (mg/kg)																																	
Arsenic	57	10.6			10.1			10.6			2			19.3			11.8			12.1			12.9			15.3			17			15.7		
Cadmium	5.1	0.8			0.9			0.5			0.2	U		0.6			0.9			0.5			0.7			1.1			0.5	U		0.7		
Chromium	260	32			28			34			18.5			31			27			77			31			35			39			42		
Copper	390	54.3			46.7			57.5			14.4			53.3			42.4			58.7			64.5			69.4			70			69.8		
Lead	450	20			18			24			2	U		21			13			24			18			24			29			26		
Mercury	0.41	0.13		J	0.13			0.16			0.02			0.13			0.17			0.13			0.13			0.18			0.15			0.15		
Silver	6.1	0.7	U		0.7	U		0.6	U		0.3	U		0.7	U		0.8	U		0.7	U		0.6	U		0.7	U		0.8	U		0.8	U	
Zinc	410	110			97			116			27			110		J	88			125			101			128			141			118		
PCBs (µg/kg)																																	
Aroclor 1016	NE	3.9	U		4	U		9	U		3.9	U		3.8	U		3.9	U		9.2	U		3.9	U	4	U		3.8	U		9.9	U		3.9	U	
Aroclor 1221	NE	3.9	U		4	U		9	U		3.9	U		3.8	U		3.9	U		9.2	U		3.9	U	4	U		3.8	U		9.9	U		3.9	U	
Aroclor 1232	NE	3.9	U		4	U		9	U		3.9	U		3.8	U		3.9	U		9.2	U		3.9	U	4	U		3.8	U		9.9	U		3.9	U	
Aroclor 1242	NE	3.9	U		4	U		9	U		3.9	U		3.8	U		3.9	U		9.2	U		3.9	U	4	U		3.8	U		9.9	U		3.9	U	
Aroclor 1248	NE	32			62			67			3.9	U		38	Y	UY	64			62			49		4	U		68			82		J	71		
Aroclor 1254	NE	66			100			120			3.9	U		83			100			130			81		4	U		100			120			130		
Aroclor 1260	NE	35			55			64			3.9	U		55			59			76			94		4	U		73			95			140		
Total PCBs (µg/kg Dry-Weight) [4]	130	133			217			251			3.9	U		138			223			268			224		4	U		241			297		J [6]	341		
Total PCBs (mg/kg OC) [5]	12	4.4			6.1			9.2			NA			4.1		J [7]	6.3			8.9			6.1		J [7]	NA			6.8			10.3		J [7]	10.2		

Table 16

AREA 5 PERIMETER MONITORING SAMPLE RESULTS [1, 2]

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER509												SD-PER510										SD-PER511											
Construction Season		Construction Season 1						Construction Season 3						Construction Season 1						Construction Season 3				Construction Season 1								Construction Season 3			
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction	Pre-Construction						Post-Construction			Pre-Construction			Post-Construction	
Collection Date		2/14/2012			3/6/2013			9/10/2014			3/12/2015			10/31/2012			3/5/2013			9/10/2014			3/11/2015	10/31/2012						3/6/2013			9/10/2014			3/16/2015	
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33						0 - 0.33			0 - 0.33			0 - 0.33	
Sample ID		SD0051 [8]			SD-PER509-0313			SD-PER509-0914			SD-PER509-0315			SD0058 [8]			SD-PER510-0313			SD-PER510-0914			SD-PER510-0315	SD0062 [8,9]			SD0063 [8,9]			SD-PER511-0313			SD-PER511-0914			SD-PER511-0315	
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																			
Total Organic Carbon (percent)	—	0.171			2.57			2.96			3.55	J		3.19			3.85			2.83			3.86	3.14			3.14			4.55			1.79			1.65	
Metals (mg/kg)																																			
Arsenic	57				14.9			15.5			14.2						16			14.9			13.3						13.2			16.2			9.1	
Cadmium	5.1				1.1			0.5			0.9						1.2			0.5	U		0.9						1.2			0.6			0.6	
Chromium	260				34			36			35						36			38			38						33			38			27.8	
Copper	390				67.8			62.7			61.9						75.5			65			71.3						61.2			64			44.7	
Lead	450				21			27			26						24			27			28						23			26			19	
Mercury	0.41				0.16			0.27			0.24						0.2			0.16			0.18						0.15			0.22			0.07	
Silver	6.1				0.8	U		0.8	U		0.6	U					0.7	U		0.8	U		0.7	U					0.8	U		0.8	U		0.5	U	
Zinc	410				117			130			117						124			134			131						120			132			77	
PCBs (µg/kg)																																			
Aroclor 1016	NE	3.9	U		3.9	U		10	U		3.9	U		19	U		3.8	U		4	U		3.9	U	19	U		20	U		3.9	U		10	U		4	U	
Aroclor 1221	NE	3.9	U		3.9	U		10	U		3.9	U		19	U		3.8	U		4	U		3.9	U	19	U		20	U		3.9	U		10	U		4	U	
Aroclor 1232	NE	3.9	U		3.9	U		10	U		3.9	U		19	U		3.8	U		4	U		3.9	U	19	U		20	U		3.9	U		10	U		4	U	
Aroclor 1242	NE	3.9	U		3.9	U		10	U		3.9	U		19	U		3.8	U		4	U		3.9	U	19	U		20	U		3.9	U		10	U		4	U	
Aroclor 1248	NE	3.9	U		63			83		J	66			150			95			70			74		130			160			69			94			67	
Aroclor 1254	NE	3.9	U		110			140			120			320			130			130			120		300			370			120			210			130	
Aroclor 1260	NE	3.9	U		73			100			110			150			84			100			110		110			150			78			160			42	
Total PCBs (µg/kg Dry-Weight) [4]	130	3.9	U		246			323		J [6]	296			620			309			300			304		540			680			267			464			239	
Total PCBs (mg/kg OC) [5]	12	NA			9.6			10.9		J [7]	8.3			19.4			8.0			10.6			7.9		17.2			21.7			NA			25.9			14.5	

Table 16

AREA 5 PERIMETER MONITORING SAMPLE RESULTS [1, 2]

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER512												SD-PER513										SD-PER514									
Construction Season		Construction Season 1						Construction Season 3						Construction Season 1						Construction Season 3				Construction Season 1						Construction Season 3			
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Pre-Construction			Post-Construction	Pre-Construction			Post-Construction			Pre-Construction			Post-Construction		
Collection Date		12/5/2012			3/8/2013			9/11/2014			3/12/2015			10/31/2012			3/5/2013			9/10/2014			3/11/2015	10/30/2012			3/6/2013			9/12/2014			3/13/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33		
Sample ID		SD-PER512-1212			SD-PER512-0313			SD-PER512-0914			SD-PER512-0315			SD0059 [8]			SD-PER513-0313			SD-PER513-0914			SD-PER513-0315	SD0061 [8]			SD-PER514-0313			SD-PER514-0914			SD-PER514-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																	
Total Organic Carbon (percent)	—	2.48			2.21			1.62			2.01		J	3.78			3.89			2.33			3.65	2.92			4.73			1.99			2.74		J
Metals (mg/kg)																																	
Arsenic	57	16			31.7			26.1			14.5						14.7			14.6			11.5				11.7			13.3			10.9		
Cadmium	5.1	0.4			0.8			0.3	U		0.7						1.2			0.5	U		1				1.1			0.4	U		0.7		
Chromium	260	29			27.3			30.7			28.1						36			38			39				32			35			30.5		
Copper	390	49.1			58.1			60.1			70.5						73.5			70.2			71.9				57.8			61.9			53.8		
Lead	450	23			27			26			35						24			29			29				21			25			23		
Mercury	0.41	0.1			0.07			0.05			0.07						0.23			0.19			0.16				0.18			0.12			0.11		
Silver	6.1	0.6	U		0.5	U		0.5	U		0.5	U					0.8	U		0.8	U		0.8	U			0.7	U		0.6	U		0.6	U	
Zinc	410	146			160			158			184						120			135			128				111			126			103		
PCBs (µg/kg)																																	
Aroclor 1016	NE	3.9	U		4	U		3.9	U		4	U		19	U		3.8	U		10	U		5.7	U	40	U		4	U		3.9	U		4	U	
Aroclor 1221	NE	3.9	U		4	U		3.9	U		4	U		19	U		3.8	U		10	U		5.7	U	40	U		4	U		3.9	U		4	U	
Aroclor 1232	NE	3.9	U		4	U		3.9	U		4	U		19	U		3.8	U		10	U		5.7	U	40	U		4	U		3.9	U		4	U	
Aroclor 1242	NE	3.9	U		4	U		3.9	U		4	U		19	U		3.8	U		10	U		5.7	U	40	U		4	U		3.9	U		4	U	
Aroclor 1248	NE	19	Y		36			22			20	Y	UY	68			130			90			120		38			81			57			64		
Aroclor 1254	NE	55			63			56			57			150			150			150			200		84			130			120			110		
Aroclor 1260	NE	37			37			35			60	P	J	98			82			110			230		48			97			74			98		
Total PCBs (µg/kg Dry-Weight) [4]	130	92			136			113			77		J [6]	316			362			350			550		170			308			251			272		
Total PCBs (mg/kg OC) [5]	12	3.7			6.2			7.0			3.8		J [7]	8.4			9.3			15.0			15.1		5.8			NA			12.6			9.9		J [7]

Table 16

AREA 5 PERIMETER MONITORING SAMPLE RESULTS [1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location		SD-PER515												SD-PER516								SD-PER517								SD-PER518					
Construction Season		Construction Season 1						Construction Season 3							Construction Season 3								Construction Season 3								Construction Season 3				
Sampling Event		Pre-Construction			Post-Construction			Pre-Construction			Post-Construction			Post-Construction	Pre-Construction			Post-Construction			Post-Construction	Pre-Construction			Post-Construction			Post-Construction	Pre-Construction			Post-Construction		
Collection Date		10/30/2012			3/5/2013			9/12/2014			3/13/2015			3/7/2013	9/12/2014			3/13/2015			3/7/2013	9/12/2014			3/13/2015			3/7/2013	9/11/2014			3/12/2015		
Sample Depth (ft)		0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33			0 - 0.33	0 - 0.33			0 - 0.33		
Sample ID		SD0060 [8]			SD-PER515-0313			SD-PER515-0914			SD-PER515-0315			SD-PER516-0313	SD-PER516-0914			SD-PER516-0315			SD-PER517-0313	SD-PER517-0914			SD-PER517-0315			SD-PER518-0313	SD-PER518-0914			SD-PER518-0315		
Analyte	**SMS SQS Criteria [3]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Conventionals																																				
Total Organic Carbon (percent)	—	3.35			4.07			2.19			2.93		J	3.41			1.14			3.33		J	6.27			2.72			2.97		J	2.34			3			4.47		J
Metals (mg/kg)																																				
Arsenic	57				13.1			14.3			13			9.6			12.1			11			11.2			12.4			12.3			13.9			12.2			13.2		
Cadmium	5.1				1.1			0.5			0.9			0.9			0.5			0.7			0.7			0.5			0.8			0.9			0.5			0.8		
Chromium	260				34			35			34			26			35			32			19			34			35			30			56			34		
Copper	390				62.5			66.4			64.7			46.1			65.4			54.9			33			57.6			61.8			58.1			62.4			58		
Lead	450				24			27			29			18			25			21			14			24			25			23			25			23		
Mercury	0.41				0.17			0.12			0.16			0.15			0.11			0.15			0.11			0.15			0.16			0.15		J	0.14			0.13		
Silver	6.1				0.7	U		0.7	U		0.7	U		0.7	U		0.7	U		0.6	U		0.8	U		0.6	U		0.7	U		0.7	U		0.7	U		0.6	U	
Zinc	410				116			129			121			94			122			104			67			121			118			109			119			110		
PCBs (µg/kg)																																				
Aroclor 1016	NE	38	U		3.9	U		4	U		3.9	U		3.8	U		4	U		3.9	U		4	U		3.8	U		3.9	U		4	U		9.2	U		3.9	U	
Aroclor 1221	NE	38	U		3.9	U		4	U		3.9	U		3.8	U		4	U		3.9	U		4	U		3.8	U		3.9	U		4	U		9.2	U		3.9	U	
Aroclor 1232	NE	38	U		3.9	U		4	U		3.9	U		3.8	U		4	U		3.9	U		4	U		3.8	U		3.9	U		4	U		9.2	U		3.9	U	
Aroclor 1242	NE	38	U		3.9	U		4	U		3.9	U		3.8	U		4	U		3.9	U		4	U		3.8	U		3.9	U		4	U		9.2	U		3.9	U	
Aroclor 1248	NE	29			68			62			68			60			58			54			75			55			62			86			72			78	Y	UY
Aroclor 1254	NE	64			100			120			120			100			110			83			130			110			100			140			140			110		
Aroclor 1260	NE	47			82			73			120			53			64			96			76			67			94			100			80			130	P	J
Total PCBs (µg/kg Dry-Weight) [4]	130	140			250			255			308			213			232			233			281			232			256			326			292			240		J [6]
Total PCBs (mg/kg OC) [5]	12	4.2			NA			11.6			10.5		J [7]	6.2			20.4			7.0		J [7]	NA			8.5			8.6		J [7]	13.9			9.7			NA		

Note(s)

1. Laboratory qualifiers (Q1) are as follows:
   U = analyte not detected at the associated reporting limit value.
   Y = analyte not detected at the associated reporting limit value. The reporting limit is raised due to chromatographic interferences.
   J = analyte positively identified; value is approximate concentration in sample.
   P = analyte detected on both chromatographic columns; RPD >40% with no chromatographic interference.
2. Validation qualifiers (Q2) are defined as follows:
   UY = analyte was not detected at the associated reporting limit value; raised reporting limit.
   J = analyte positively identified; value is approximate concentration in sample.
3. Criteria obtained from Table 3 of Construction and Post-Construction Sediment Monitoring QAPP (AMEC et al. 2012e).
4. Total PCBs calculated by summing results for detected Aroclors.
5. NA: TOC outside the range for normalization (<0.5 % or >4.0%).
6. If 20% or more of total detected Aroclors are qualified as estimated, the total calculated PCB concentration will also be considered estimated and assigned a "J" qualifier.
7. If the total calculated PCB concentration is considered to be estimated and assigned a "J" qualifier, then the organic carbon normalized value will also be assigned a "J" qualifier. Organic carbon-normalized PCB values will also be considered estimated if the TOC value is qualified as estimated.
8. These samples were collected by the City of Seattle and reported analytes were determined by the City.
9. Split sample analyzed at this location

Abbreviation(s)

ft = feet
mg/kg = milligrams per kilogram
mg/kg OC = milligrams per kilogram organic carbon
NE = not established
PCBs = polychlorinated biphenyls
Q1 = laboratory qualifiers
Q2 = validation qualifiers
QAPP = Quality Assurance Project Plan
RPD = relative percent difference
SMS SQS = Washington Sediment Management Standards Sediment Quality Standards (WAC 173-204-320)
TOC = total organic carbon
µg/kg = micrograms per kilogram
µg/kg Dry-Weight = micrograms per kilogram dry weight
WAC = Washington Administrative Code

Reference(s)

AMEC Environment & Infrastructure, Inc., Dalton, Olmsted & Fuglevand, Inc., and Floyd|Snider, Inc. (AMEC et al.). 2012e. Construction and Post-Construction Sediment Monitoring Quality Assurance Project Plan, Duwamish Sediment Other Area and Southwest Bank Corrective Measure and Habitat Project, Boeing Plant 2, Seattle/ Tukwila, Washington. Prepared for The Boeing Company, Seattle, Washington.

TABLE 17

SUMMARY OF PERIMETER MONITORING SAMPLE RESULTS BY EVENT [1]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Construction Season		Construction Season 1								Construction Season 2								Construction Season 3											
Sampling Event		Pre-Construction				Post-Construction				Pre-Construction				Post-Construction				Pre-Southwest Bank Excavation and Jorgenson Dredging				Pre-DSOA Dredging				Post-Construction			
Areas Sampled		1, 2, 3, 4, and a Portion of 5 [2]				1, 2, 4, and 5				1, 2, 3, and 4				1, 2, 3, and 4				3 and 4				1, 2, 3, 4, and 5				1, 2, 3, 4, and 5			
Date Sampled		Dec-12 [2]				Mar-13				Dec-13				Mar-14				Jul-14				Sep-15				Mar-15			
Sample Depth (ft)		0 - 0.33				0 - 0.33				0 - 0.33				0 - 0.33				0 - 0.33				0 - 0.33				0 - 0.33			
Analyte	**SMS SQS Criteria [3]**	**Mean**	**Min.**	**Max.**	**N**	**Mean**	**Min.**	**Max.**	**N**	**Mean**	**Min.**	**Max.**	**N**	**Mean**	**Min.**	**Max.**	**N**	**Mean**	**Min.**	**Max.**	**N**	**Mean**	**Min.**	**Max.**	**N**	**Mean**	**Min.**	**Max.**	**N**
Conventionals																													
Total Organic Carbon (percent)	—	2.32	0.09	3.78	59	2.68	0.43	6.27	47	2.35	0.37	4.26	42	1.87	1.00	2.77	42	1.29	0.45	2.67	20	2.05	0.65	3.47	61	2.10	0.05	4.47	61
Metals (mg/kg)																													
Arsenic	57	10.9	4.2	26.8	51	11.2	3.2	31.7	47	9.1	3.7	14.1	42	8.9	4.2	12.4	42	5.0	4.3	10.0	20	10.7	3.2	26.1	61	9.8	2.0	17.1	61
Cadmium	5.1	0.50	0.30	0.80	51	0.90	0.40	1.20	47	0.22	0.30	0.50	42	0.52	0.30	0.90	42	0.48	0.30	0.60	20	0.33	0.30	0.80	61	0.58	0.20	1.00	61
Chromium	260	26.8	15.2	36.3	51	28.2	11.6	36.0	47	27.2	12.5	37.0	42	28.8	13.4	36.0	42	27.3	18.7	45.6	20	32.6	14.3	77.0	61	28.7	13.5	42.0	61
Copper	390	38.6	12.9	64.7	51	46.7	10.2	75.5	47	40.7	15.8	65.0	42	40.6	20.4	116.0	42	32.6	22.8	42.6	20	48.4	17.0	104.0	61	43.2	14.4	74.9	61
Lead	450	17.9	5.0	131.0	51	18.3	3.0	37.0	47	16.9	10.0	31.0	42	17.2	6.0	35.0	42	12.8	6.0	33.0	20	22.1	4.0	118.0	61	17.7	2.0	36.0	61
Mercury	0.41	0.10	0.03	0.44	51	0.13	0.02	0.23	47	0.10	0.03	0.31	42	0.10	0.03	0.21	42	0.09	0.04	0.12	20	0.11	0.03	0.30	61	0.10	0.02	0.24	61
Silver	6.1	0.29	0.40	0.80	51	0.31	0.30	0.80	47	0.30	0.40	0.80	42	0.28	0.40	0.70	42	0.26	0.40	0.60	20	0.30	0.40	0.90	61	0.28	0.30	0.90	61
Zinc	410	88.9	36.0	158.0	51	96.7	25.0	160.0	47	89.3	39.0	139.0	42	83.6	44.0	140.0	42	77.2	56.0	135.0	20	105.2	38.0	233.0	61	88.6	27.0	184.0	61
Polychlorinated Biphenyls																													
Total PCBs (µg/kg Dry-Weight) [4]	130	139.2	3.9 U	680.0	59	194.4	3.5 J	679.0	47	147.7 [6]	40.0	390 [7]	41	135.8	36.7	451.0	42	82.0	28.2	194.0	20	200.0	26.7	740.0	61	183.2	3.3	630.0	61
Total PCBs (mg/kg OC) [5]	12	5.62	1.60	21.70	57	7.76	1.80	25.50	41	6.45 [6]	2.00	12.6 [7]	39	7.19	2.10	18.00	42	6.74	2.20	16.30	19	10.05	2.8 J	36.10	61	9.69	1.6 J	39.30	55

Note(s)

1. Undetected values are assigned a value of 1/2 U in calculation of mean value.
2. Includes pre-construction sampling conducted by the City of Seattle at 7 locations in Slip 4. Sampling was conducted in February or October 2012.
3. Criteria obtained from Table 3 of Construction and Post-Construction Sediment Monitoring QAPP (AMEC et al. 2012e).
4. Total PCBs calculated by summing results for detected Aroclors.
5. If TOC is outside the range for normalization (<0.5% or >4.0%) then total PCBs are not carbon normalized and not included in summary statistics for event.
6. Mean value calculated without maximum values found at SD-PER211-1213 (20,600 µg/kg Dry-Weight; 1,151 mg/kg OC). See Section 7.4. Mean value calculated with maximum value included is 634.6 µg/kg Dry-Weight and 35.06 mg/kg OC.
7. Maximum value without results from sample SD-PER211-1213.

Abbreviation(s)

DSOA = Duwamish Sediment Other Area
ft = feet
J = estimated value
max = maximum detected or undetected value
mg/kg = milligrams per kilogram
mg/kg OC = milligrams per kilogram organic carbon
min = minimum detected or undetected value (RL)
N = number used in calculation of average
PCBs = polychlorinated biphenyls
RL = reporting limit
SMS SQS = Washington Sediment Management Standards Sediment Quality Standards (WAC 173-204-320)
TOC = total organic carbon
U = undetected at the reporting limit
µg/kg Dry-Weight = micrograms per kilogram dry weight
WAC = Washington Administrative Code

Reference(s)

AMEC Environment & Infrastructure, Inc., Dalton, Olmsted & Fuglevand, Inc., and Floyd|Snider, Inc. (AMEC et al.). 2012e. Construction and Post-Construction Sediment Monitoring Quality Assurance Project Plan, Duwamish Sediment Other Area and Southwest Bank Corrective Measure and Habitat Project, Boeing Plant 2, Seattle/Tukwila, Washington. Prepared for The Boeing Company, Seattle, Washington.

TABLE 18

POST-CONSTRUCTION CORING SAMPLE LOCATIONS FOR CONSTRUCTION SEASON 3

Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location	Date	WA State Plane, North Zone, NAD 83, Survey Feet		Total Penetration (Feet)	Maximum Depth of Recovered Sediment (Feet)	Sample ID	Depth Interval (Feet Below Sediment Surface)
		Easting	Northing				
DSOA							
SD-PCC009	11/25/2014	1274023	197261	4.3	4.3	SD-PCC009-A SD-PCC009-B SD-PCC009-C	0 to 1 1 to 2 2 to 3
SD-PCC010 [1]	11/12/2014	1274306	196948	4.2	4.2	SD-PCC010-A SD-PCC010-B SD-PCC010-C	0 to 1 1 to 2 2 to 3
SD-PCC210 [1]	11/12/2014	1274307	196946	4.3	4.3	SD-PCC210-A SD-PCC210-B SD-PCC210-C	0 to 1 1 to 2 2 to 3
SD-PCC011	10/10/2014	1274795	196621	4.5	4.5	SD-PCC011-A SD-PCC011-B SD-PCC011-C	0 to 1 1 to 2 2 to 3 [2]
SD-PCC015	1/7/2015	1275640	195828	4.4	3.0	SD-PCC015-A SD-PCC015-B SD-PCC015-C	0 to 1 1 to 2 2 to 3
Slip 4							
SD-PCC016	2/20/2015	1272920	198499	4.0	2.8	SD-PCC016-A SD-PCC016-B SD-PCC016-C SD-PCC016-D	0 to 0.33 0.33 to 1 1 to 2 2 to 3
SD-PCC017	2/20/2015	1273006	198557	4.6	4.6	SD-PCC017-A SD-PCC017-B SD-PCC017-C SD-PCC017-D SD-PCC017-E	0 to 0.33 0.33 to 1 1 to 2 2 to 3 3 to 4

TABLE 18

POST-CONSTRUCTION CORING SAMPLE LOCATIONS FOR CONSTRUCTION SEASON 3
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location	Date	WA State Plane, North Zone, NAD 83, Survey Feet		Total Penetration (Feet)	Maximum Depth of Recovered Sediment (Feet)	Sample ID	Depth Interval (Feet Below Sediment Surface)
		Easting	Northing				
Slip 4 (cont.)							
SD-PCC018	2/18/2015	1273097	198618	5.0	5.0	SD-PCC018-A	0 to 0.33
						SD-PCC018-B	0.33 to 1
						SD-PCC018-C	1 to 2
						SD-PCC018-D	2 to 3
						SD-PCC018-E	3 to 4
						SD-PCC018-F	4 to 5
SD-PCC019	2/18/2015	1273138	198621	5.0	5.0	SD-PCC019-A	0 to 0.33
						SD-PCC019-B	0.33 to 1
						SD-PCC019-C	1 to 2
						SD-PCC019-D	2 to 3
						SD-PCC019-E	3 to 4
						SD-PCC019-F	4 to 5
SD-PCC020	2/18/2015	1273149	198683	5.4	4.2	SD-PCC020-A	0 to 0.33
						SD-PCC020-B	0.33 to 1
						SD-PCC020-C	1 to 2
						SD-PCC020-D	2 to 3
						SD-PCC020-E	3 to 4
SD-PCC021	2/17/2015	1273225	198751	4.5	4.5	SD-PCC021-A	0 to 0.33
						SD-PCC021-B	0.33 to 1
						SD-PCC021-C	1 to 2
						SD-PCC021-D	2 to 3
						SD-PCC021-E	3 to 4
						SD-PCC021-F	4 to 5
SD-PCC022	2/17/2015	1273264	198792	4.5	4.5	SD-PCC022-A	0 to 0.33
						SD-PCC022-B	0.33 to 1
						SD-PCC022-C	1 to 2
						SD-PCC022-D	2 to 3
						SD-PCC022-E	3 to 4
						SD-PCC022-F	4 to 5

TABLE 18

POST-CONSTRUCTION CORING SAMPLE LOCATIONS FOR CONSTRUCTION SEASON 3
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Location	Date	WA State Plane, North Zone, NAD 83, Survey Feet		Total Penetration (Feet)	Maximum Depth of Recovered Sediment (Feet)	Sample ID	Depth Interval (Feet Below Sediment Surface)
		Easting	Northing				
Slip 4 (cont.)							
SD-PCC023	2/17/2015	1273284	198800	4.4	4.4	SD-PCC023-A	0 to 0.33
						SD-PCC023-B	0.33 to 1
						SD-PCC023-C	1 to 2
						SD-PCC023-D	2 to 3
						SD-PCC023-E	3 to 4
						SD-PCC023-F	4 to 5
SD-PCC024	2/17/2015	1273286	198825	4.4	4.4	SD-PCC024-A	0 to 0.33
						SD-PCC024-B	0.33 to 1
						SD-PCC024-C	1 to 2
						SD-PCC024-D	2 to 3
						SD-PCC024-E	3 to 4
						SD-PCC024-F	4 to 5

Note(s)

1. Field duplicate sample collected at this location. Sample ID identified by a 200 series sequential location ID (e.g., SD-PCC010, SD-PCC210).
2. Sample intervals collected but not analyzed.

Abbreviation(s)

DSOA = Duwamish Sediment Other Area
NAD = North American Datum
WA State Plane = Washington State Plane Coordinates

TABLE 19

POST-CONSTRUCTION CORING SAMPLE RESULTS[1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Sample_ID		SD-PCC006-A			SD-PCC006-B			SD-PCC206-A Field Dup. for SD-PCC006-A			SD-PCC007-A			SD-PCC007-B			SD-PCC008-A			SD-PCC008-B			SD-PCC009-A			SD-PCC009-B			SD-PCC009-C			SD-PCC010-A			SD-PCC010-B		
Sample Date		**2/18/2013**			**2/18/2013**			**2/18/2013**			**2/1/2013**			**2/1/2013**			**3/4/2013**			**3/4/2013**			**11/25/2014**			**11/25/2014**			**11/25/2014**			**11/12/2014**			**11/12/2014**		
Sample Interval		**0 to 1 ft**			**1 to 2 ft**			**0 to 1 ft**			**0 to 1 ft**			**1 to 2 ft**			**0 to 1 ft**			**1 to 2 ft**			**0 to 1 ft**			**1 to 2 ft**			**2 to 3 ft**			**0 to 1 ft**			**1 to 2 ft**		
Analyte	**SMS SQS Criteria**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Total Organic Carbon	—	2.84		J	0.553			0.522		J	0.639			0.411			0.318			0.59			0.194			0.272			0.180			5.40		J	1.26		J
Metals (mg/kg Dry-Weight)																																					
Arsenic	57	1.9			1.3			1.6			1.7			1.5			0.9		J	1.7		J	2.5			3.7			2.7			4.6		J	2.7		
Cadmium	5.1	0.4			0.2			0.3			0.2	U		0.2	U		0.3			0.3			0.3	U		0.3	U		0.3	U		0.3			0.3	U	
Chromium	260	13.7		J	10.5			10.2		J	11.7			9.8			14.5			11.7			14.4			17.5			14.2			17.5		J	15.0		
Copper	390	15.7		J	8.6		J	9.9		J	12.8			10.5			8			10.9			14.8			16.6			13.7			19.2		J	15.7		
Lead	450	8		J	2	U	J	3			2	U		2	U		2	U		2	U		3	U		3			3	U		6			4		
Mercury	0.41	0.02	U		0.03	U		0.03	U		0.02	U		0.02	U		0.03	U		0.02	U		0.03	U		0.03			0.04			0.04			0.04		
Silver	6.1	0.4	U		0.4	U		0.4	U		0.4	U		0.3	U		0.4	U		0.3	U		0.4	U		0.4	U		0.4	U		0.4	U		0.4	U	
Zinc	410	31		J	21			22		J	24			23			22			23			31			38			30			43		J	35		
PCBs (µg/kg Dry-Weight)																																					
Aroclor 1016	—	3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.6	U		3.9	U		3.8	U		3.8	U		3.9	U		4.0	U	
Aroclor 1221	—	3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.6	U		3.9	U		3.8	U		3.8	U		3.9	U		4.0	U	
Aroclor 1232	—	3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.6	U		3.9	U		3.8	U		9.4	Y	UY	3.9	U		4.0	U	
Aroclor 1242	—	3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.6	U		12	Y	UY	3.8	U		3.8	U		3.9	U		4.0	U	
Aroclor 1248	—	3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.6	U		3.9	U		3.8	U		3.8	U		9.7	Y	UY	4.0	U	
Aroclor 1254	—	3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.6	U		9.2			3.8	U		3.8	U		47		J	4.0	U	
Aroclor 1260	—	3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.6	U		7.8			3.8	U		3.8	U		28		J	4.0	U	
Total PCBs [3]	130	3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.6	U		17			3.8	U		9.4	Y	UY	75		J [5]	4.0	U	
Total PCBs (mg/kg-OC) [4]	12	0.1	U	UJ [6]	0.7	U		0.7	U	UJ [6]	0.6	U		NA			NA			0.6	U		NA			NA			NA			NA			0.3	U	J [6]

TABLE 19

POST-CONSTRUCTION CORING SAMPLE RESULTS[1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Sample_ID		SD-PCC010-C			SD-PCC210-A Field Dup. for SD-PCC010-A			SD-PCC011-A			SD-PCC011-B			SD-PCC012-A			SD-PCC012-B			SD-PCC013-A			SD-PCC013-B			SD-PCC213-A Field Dup. for SD-PCC013-A			SD-PCC014-A			SD-PCC014-B			SD-PCC015-A			SD-PCC015-B		
Sample Date		11/12/2014			11/12/2014			10/10/2014			10/10/2014			2/13/2014			2/13/2014			2/4/2014			2/4/2014			2/4/2014			1/21/2014			1/21/2014			1/7/2015			1/7/2015		
Sample Interval		2 to 3 ft			0 to 1 ft			0 to 1 ft			1 to 2 ft			0 to 1 ft			1 to 2 ft			0 to 1 ft			1 to 2 ft			0 to 1 ft			0 to 1 ft			1 to 2 ft			0 to 1 ft			1 to 2 ft		
Analyte	**SMS SQS Criteria**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1[1]**	**Q2[2]**	**Value**	**Q1[1]**	**Q2[2]**	**Value**	**Q1[1]**	**Q2[2]**	**Value**	**Q1[1]**	**Q2[2]**	**Value**	**Q1[1]**	**Q2[2]**	**Value**	**Q1[1]**	**Q2[2]**	**Value**	**Q1[1]**	**Q2[2]**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Total Organic Carbon	—	1.11		J	1.12			0.685			1.23			0.517			1.22			0.454		J	0.363			0.157			0.596			0.133			0.092		J	0.051		
Metals (mg/kg Dry-Weight)																																								
Arsenic	57	4.7			2.6			1.1			2.1			2.1			7			2.3		J	1			2.3			2.4			2.2			2.5		J	1		
Cadmium	5.1	0.3	U		0.3	U		0.2	U		0.2	U		0.2	U		0.2	U		0.2	U		0.2	U		0.2	U		0.3			0.2	U		0.2	U		0.2	U	
Chromium	260	14.0			14.0			11.7			12.2			11.5			13.4			11.2		J	9.6			13.8			15		J	10.5			10.5			9.9		
Copper	390	19.1			14.0			10.5			12.9			11.2			15.7			14.3			9.5			16.5			11.2			7.7			15.6		J	15		
Lead	450	6			3			2	U		3			6		J	8			2	U		2	U		4			8			2	U		8			3		
Mercury	0.41	0.06			0.03			0.02	U		0.03	U		0.03	U		0.03			0.03	U		0.03	U		0.03			0.03		J	0.02	U		0.02	U		0.02	U	
Silver	6.1	0.4	U		0.4	U		0.4	U		0.4	U		0.4	U		0.4	U		0.4	U		0.4	U		0.4	U		0.3	U		0.4	U		0.3	U		0.4	U	
Zinc	410	33			35			25			28			41		J	43			26		J	20			32			32			20			29		J	26		
PCBs (µg/kg Dry-Weight)																																								
Aroclor 1016	—	3.8	U		3.8	U		3.8	U		3.8	U		3.9	U		3.9	U		4	U		3.9	U		3.8	U		38	U		3.9	U		4.0	U		3.8	U	
Aroclor 1221	—	3.8	U		3.8	U		3.8	U		3.8	U		3.9	U		3.9	U		4	U		3.9	U		3.8	U		38	U		3.9	U		4.0	U		3.8	U	
Aroclor 1232	—	3.8	U		3.8	U		3.8	U		190	Y	UY	9.8	Y	UY	5.9	Y	UY	6	Y	UY	3.9	U		9.4	Y	UY	130	Y	UY	5.9	Y	UY	4.0	U		3.8	U	
Aroclor 1242	—	3.8	U		3.8	U		3.8	U		3.8	U		33			29	Y	UY	12	Y	UY	3.9	U		19	Y	UY	96	Y	UY	4.9	Y	UY	4.0	U		3.8	U	
Aroclor 1248	—	3.8	U		3.8	U		3.8	U		3.8	U		56			96			22		J	3.9	U		60			200			7.8			4.0	U		3.8	U	
Aroclor 1254	—	3.8	U		14			3.8	U		3.8	U		3.9	U		3.9	U		4	U		3.9	U		3.8	U		38	U		3.9	U		9.2			3.8	U	
Aroclor 1260	—	3.8	U		13			3.8	U		3.8	U		3.9	U		3.9	U		4	U		5.9	Y	UY	3.8	U		38	U		3.9	U		5.1		J	3.8	U	
Total PCBs [3]	130	3.8	U		27			3.8	U		190	Y	UY	89			96			22		J [5]	5.9	Y	UY	60			200			7.8			14.3		J [5]	3.8	U	
Total PCBs (mg/kg-OC) [4]	12	0.3	U	J [6]	2.4			0.6	U		15.4	Y	UY	17.2			7.9			NA			NA			NA			33.6			NA			NA			NA		

TABLE 19

POST-CONSTRUCTION CORING SAMPLE RESULTS[1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Sample_ID		SD-PCC015-C			SD-PCC016-A			SD-PCC016-B			SD-PCC016-C			SD-PCC016-D			SD-PCC017-A			SD-PCC017-B			SD-PCC017-C			SD-PCC017-D			SD-PCC017-E			SD-PCC018-A			SD-PCC018-B			SD-PCC018-C		
Sample Date		1/7/2015			2/20/2015			2/20/2015			2/20/2015			2/20/2015			2/20/2015			2/20/2015			2/20/2015			2/20/2015			2/20/2015			2/18/2015			2/18/2015			2/18/2015		
Sample Interval		2 to 3 ft			0 to 0.33 ft			0.33 to 1 ft			1 to 2 ft			2 to 3 ft			0 to 0.33 ft			0.33 to 1 ft			1 to 2 ft			2 to 3 ft			3 to 4 ft			0 to 0.33 ft			0.33 to 1 ft			1 to 2 ft		
Analyte	**SMS SQS Criteria**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Total Organic Carbon	—	0.038			0.085			0.088			0.061			0.039			0.461			0.347			0.418			0.279			0.269			1.55			0.532			0.283		
Metals (mg/kg Dry-Weight)																																								
Arsenic	57	1.1			1.7			1.7			1.3			1.5			2.9			3			1.6			1.5			1.5			3.4			1.9			1.8		
Cadmium	5.1	0.3	U		0.2	U		0.2	U		0.2	U		0.2	U		0.2	U		0.2			0.2	U		0.2	U		0.2	U		0.3	U		0.3	U		0.2	U	
Chromium	260	8.7			9.4			11.3			8.1			8			12.4			12.5			9.2			9.8			10.2			13.3			11.2			9.4		
Copper	390	10			9.9		J	9.3			6.9			7.1			13.2			13.4			9.9			12.8			12.5			20.7			15.9			9.9		
Lead	450	3			2	U		2	U		2	U		2	U		2	U		2	U		2	U		2	U		2	U		3	U		3	U		2	U	
Mercury	0.41	0.02	U		0.02	U		0.03	U		0.03	U		0.03	U		0.03	U		0.03	U		0.03	U		0.03	U		0.02	U		0.03	U		0.03			0.02	U	
Silver	6.1	0.4	U		0.3	U		0.3	U		0.3	U		0.3	U		0.4	U		0.3	U		0.4	U		0.4	U		0.4	U		0.4	U		0.4	U		0.4	U	
Zinc	410	22			21			23			16			16			28			27			17			18			19			26			22			18		
PCBs (µg/kg Dry-Weight)																																								
Aroclor 1016	—	3.8	U		3.8	U		3.7	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		4	U		3.9	U		3.9	U		3.9	U		3.9	U	
Aroclor 1221	—	3.8	U		3.8	U		3.7	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		4	U		3.9	U		3.9	U		3.9	U		3.9	U	
Aroclor 1232	—	3.8	U		3.8	U		3.7	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		4	U		3.9	U		3.9	U		3.9	U		3.9	U	
Aroclor 1242	—	3.8	U		3.8	U		3.7	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		4	U		3.9	U		3.9	U		3.9	U		3.9	U	
Aroclor 1248	—	3.8	U		3.8	U		3.7	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		4	U		3.9	U		3.9	U		3.9	U		3.9	U	
Aroclor 1254	—	3.8	U		6.4			3.7	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		4	U		3.9	U		3.9	U		3.9	U		3.9	U	
Aroclor 1260	—	3.8	U		3.8	U		3.7	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		4	U		3.9	U		3.9	U		3.9	U		3.9	U	
Total PCBs [3]	130	3.8	U		6.4			3.7	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		4	U		3.9	U		3.9	U		3.9	U		3.9	U	
Total PCBs (mg/kg-OC) [4]	12	NA			NA			NA			NA			NA			NA			NA			NA			NA			NA			0.3	U		0.7	U		NA		

TABLE 19

POST-CONSTRUCTION CORING SAMPLE RESULTS[1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Sample_ID		**SD-PCC018-D**			**SD-PCC018-E**			**SD-PCC018-F**			**SD-PCC019-A**			**SD-PCC019-B**			**SD-PCC019-C**			**SD-PCC019-D**			**SD-PCC019-E**			**SD-PCC019-F**			**SD-PCC020-A**			**SD-PCC020-B**			**SD-PCC020-C**		
Sample Date		**2/18/2015**			**2/18/2015**			**2/18/2015**			**2/18/2015**			**2/18/2015**			**2/18/2015**			**2/18/2015**			**2/18/2015**			**2/18/2015**			**2/18/2015**			**2/18/2015**			**2/18/2015**		
Sample Interval		**2 to 3 ft**			**3 to 4 ft**			**4 to 5 ft**			**0 to 0.33 ft**			**0.33 to 1 ft**			**1 to 2 ft**			**2 to 3 ft**			**3 to 4 ft**			**4 to 5 ft**			**0 to 0.33 ft**			**0.33 to 1 ft**			**1 to 2 ft**		
Analyte	**SMS SQS Criteria**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Total Organic Carbon	—	0.376			0.04			0.557			0.131			0.043			0.325			0.061			0.379			0.191			0.082			0.049			0.285		
Metals (mg/kg Dry-Weight)																																						
Arsenic	57	2.1			0.7			1.9			1.5			1.1			1.5			1.6			2.4			1.9			1.5			1.3			1.9		
Cadmium	5.1	0.3	U		0.2	U		0.2	U		0.2	U		0.2	U		0.2	U		0.2	U		0.3	U		0.2	U		0.2	U		0.2	U		0.2	U	
Chromium	260	10.2			9.6			9.7			8.9			9.7			9.2			9.3			12.4			8.6			10.8			11.2			9.9		
Copper	390	13.3			7.4			11.1			10.3			9.7			9.3			9.2			18.4			10			9.6			9.5			10.4		
Lead	450	3	U		2	U		2	U		2	U		2	U		2	U		2	U		3	U		2	U		2	U		2	U		2	U	
Mercury	0.41	0.02	U		0.03	U		0.03	U		0.02	U		0.02	U		0.03	U		0.02	U		0.03	U		0.03	U		0.03	U		0.02	U		0.02	U	
Silver	6.1	0.4	U		0.3	U		0.4	U		0.4	U		0.3	U		0.3	U		0.3	U		0.4	U		0.4	U		0.4	U		0.3	U		0.3	U	
Zinc	410	20			17			19			18			18			19			18			24			20			23			23			22		
PCBs (µg/kg Dry-Weight)																																						
Aroclor 1016	—	3.8	U		3.7	U		3.7	U		3.8	U		3.8	U		3.7	U		3.8	U		3.8	U		3.8	U		3.9	U		3.7	U		3.9	U	
Aroclor 1221	—	3.8	U		3.7	U		3.7	U		3.8	U		3.8	U		3.7	U		3.8	U		3.8	U		3.8	U		3.9	U		3.7	U		3.9	U	
Aroclor 1232	—	3.8	U		3.7	U		3.7	U		3.8	U		3.8	U		3.7	U		3.8	U		3.8	U		3.8	U		3.9	U		3.7	U		3.9	U	
Aroclor 1242	—	3.8	U		3.7	U		3.7	U		3.8	U		3.8	U		3.7	U		3.8	U		3.8	U		3.8	U		3.9	U		3.7	U		3.9	U	
Aroclor 1248	—	3.8	U		3.7	U		3.7	U		3.8	U		3.8	U		3.7	U		3.8	U		3.8	U		3.8	U		9.7	Y	UY	5.6	Y	UY	3.9	U	
Aroclor 1254	—	3.8	U		3.7	U		3.7	U		3.8	U		3.8	U		3.7	U		3.8	U		3.8	U		3.8	U		24			11			3.9	U	
Aroclor 1260	—	3.8	U		3.7	U		3.7	U		3.8	U		3.8	U		3.7	U		3.8	U		3.8	U		3.8	U		3.9	J		3.7	U		3.9	U	
Total PCBs [3]	130	3.8	U		3.7	U		3.7	U		3.8	U		3.8	U		3.7	U		3.8	U		3.8	U		3.8	U		27.9			11			3.9	U	
Total PCBs (mg/kg-OC) [4]	12	NA			NA			0.7	U		NA			NA			NA			NA			NA			NA			NA			NA			NA		

TABLE 19

POST-CONSTRUCTION CORING SAMPLE RESULTS[1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Sample_ID		SD-PCC020-D			SD-PCC020-E			SD-PCC021-A			SD-PCC021-B			SD-PCC021-C			SD-PCC021-D			SD-PCC021-E			SD-PCC021-F			SD-PCC022-A			SD-PCC022-B			SD-PCC022-C			SD-PCC022-D			SD-PCC022-E		
Sample Date		2/18/2015			2/18/2015			2/17/2015			2/17/2015			2/17/2015			2/17/2015			2/17/2015			2/17/2015			2/17/2015			2/17/2015			2/17/2015			2/17/2015			2/17/2015		
Sample Interval		2 to 3 ft			3 to 4 ft			0 to 0.33 ft			0.33 to 1 ft			1 to 2 ft			2 to 3 ft			3 to 4 ft			4 to 5 ft			0 to 0.33 ft			0.33 to 1 ft			1 to 2 ft			2 to 3 ft			3 to 4 ft		
Analyte	**SMS SQS Criteria**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Total Organic Carbon	—	0.452			0.082			0.143			0.215			0.369			0.41			0.317			0.299			0.168			0.077			0.537			1.5			0.337		
Metals (mg/kg Dry-Weight)																																								
Arsenic	57	1.7			1.1			1.8			2			1.8			1.7			1.6			1.7			3.2			5.2			2.8			3.7			1.8		
Cadmium	5.1	0.2	U		0.2	U		0.2	U		0.2	U		0.2	U		0.2	U		0.2	U		0.2	U		0.2	U		0.2	U		0.2			0.3			0.2	U	
Chromium	260	9.3			8.9			10.9			9			10.9			10.2			10.6			10.1			14			11.3			11.5			13.4			9.4		
Copper	390	10.3			7.5			10.7			8.7			11.9			10.2			14.7			11.8			11			12.2			14.6			20.9			10.1		
Lead	450	2	U		2	U		2	U		2	U		2	U		2	U		2	U		2	U		2	U		2	U		2	U		3	U		2	U	
Mercury	0.41	0.02	U		0.04			0.02	U		0.03	U		0.02	U		0.02	U		0.05			0.03	U		0.03			0.02	U		0.03	U		0.04			0.02	U	
Silver	6.1	0.4	U		0.4	U		0.4	U		0.3	U		0.4	U		0.4	U		0.4	U		0.3	U		0.4	U		0.3	U		0.4	U		0.4	U		0.4	U	
Zinc	410	19			17			23			19			19			18			20			18			26			24			21			26			18		
PCBs (µg/kg Dry-Weight)																																								
Aroclor 1016	—	3.8	U		3.9	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.9	U		3.8	U		3.8	U	
Aroclor 1221	—	3.8	U		3.9	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.9	U		3.8	U		3.8	U	
Aroclor 1232	—	3.8	U		3.9	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.9	U		3.8	U		3.8	U	
Aroclor 1242	—	3.8	U		3.9	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.9	U		3.8	U		3.8	U	
Aroclor 1248	—	3.8	U		3.9	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		5.8	Y	UY	3.8	U		3.9	U		3.8	U		3.8	U	
Aroclor 1254	—	3.8	U		3.9	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		24			3.8	U		3.9	U		3.8	U		3.8	U	
Aroclor 1260	—	3.8	U		3.9	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.2	J		3.8	U		3.9	U		3.8	U		3.8	U	
Total PCBs [3]	130	3.8	U		3.9	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		3.8	U		27.2			3.8	U		3.9	U		3.8	U		3.8	U	
Total PCBs (mg/kg-OC) [4]	12	NA			NA			NA			NA			NA			NA			NA			NA			NA			NA			0.7	U		0.3	U		NA		

TABLE 19

POST-CONSTRUCTION CORING SAMPLE RESULTS[1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Sample_ID		SD-PCC022-F			SD-PCC023-A			SD-PCC023-B			SD-PCC023-C			SD-PCC023-D			SD-PCC023-E			SD-PCC023-F			SD-PCC024-A			SD-PCC024-B			SD-PCC024-C			SD-PCC024-D			SD-PCC024-E			SD-PCC024-F		
Sample Date		2/17/2015			2/17/2015			2/17/2015			2/17/2015			2/17/2015			2/17/2015			2/17/2015			2/17/2015			2/17/2015			2/17/2015			2/17/2015			2/17/2015			2/17/2015		
Sample Interval		4 to 5 ft			0 to 0.33 ft			0.33 to 1 ft			1 to 2 ft			2 to 3 ft			3 to 4 ft			4 to 5 ft			0 to 0.33 ft			0.33 to 1 ft			1 to 2 ft			2 to 3 ft			3 to 4 ft			4 to 5 ft		
Analyte	**SMS SQS Criteria**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Total Organic Carbon	—	0.32		J	2.28			0.877			0.379			0.546			2.09			0.701			2.61			0.091			0.147			0.9			1.05			0.524		
Metals (mg/kg Dry-Weight)																																								
Arsenic	57	1.6			5.7			3			2.4			5.6			2.8			5.2			3.6			1.3			1.1			1.9			1.8			1.7		
Cadmium	5.1	0.2	U		0.3	U		0.2	U		0.3	U		0.2	U		0.2	U		0.3	U		0.3			0.2	U		0.2	U		0.3	U		0.2	U		0.3	U	
Chromium	260	9			15.8			11.9			14.2			14.2			11.9			13.9			14.9			9.4			10.2			10.7			10.4			11.2		
Copper	390	9.4			20.8			13.6			13.2			15.5			13.4			16.6			19.7			8			9.4			12			10.4			14.2		
Lead	450	2	U		5			3			3	U		3			3			3			7			2	U		2	U		3	U		2	U		3	U	
Mercury	0.41	0.02	U		0.04			0.02	U		0.05			0.02	U		0.02	U		0.05			0.04			0.03	U		0.03	U		0.03	U		0.02	U		0.03	U	
Silver	6.1	0.4	U		0.4	U		0.4	U		0.4	U		0.4	U		0.4	U		0.4	U		0.4	U		0.4	U		0.4	U		0.4	U		0.4	U		0.4	U	
Zinc	410	18			33			27			30			31			27			32			37			19			18			19			18			20		
PCBs (µg/kg Dry-Weight)																																								
Aroclor 1016	—	3.9	U		3.9	U		3.9	U		3.8	U		4	U		3.8	U		4	U		19	U		3.7	U		3.7	U		3.9	U		3.8	U		3.9	U	
Aroclor 1221	—	3.9	U		3.9	U		3.9	U		3.8	U		4	U		3.8	U		4	U		19	U		3.7	U		3.7	U		3.9	U		3.8	U		3.9	U	
Aroclor 1232	—	3.9	U		3.9	U		3.9	U		3.8	U		4	U		3.8	U		4	U		19	U		3.7	U		3.7	U		3.9	U		3.8	U		3.9	U	
Aroclor 1242	—	3.9	U		3.9	U		3.9	U		3.8	U		4	U		3.8	U		4	U		19	U		7.8			3.7	U		3.9	U		3.8	U		3.9	U	
Aroclor 1248	—	3.9	U		3.9	U		3.9	U		3.8	U		4	U		3.8	U		4	U		76	Y	UY	9.3	Y	UY	3.7	U		3.9	U		3.8	U		3.9	U	
Aroclor 1254	—	3.9	U		3.9	U		3.9	U		3.8	U		4	U		3.8	U		4	U		180			17			3.7	U		3.9	U		3.8	U		3.9	U	
Aroclor 1260	—	3.9	U		3.9	U		3.9	U		3.8	U		4	U		3.8	U		4	U		32			3.7	U		3.7	U		3.9	U		3.8	U		3.9	U	
Total PCBs [3]	130	3.9	U		3.9	U		3.9	U		3.8	U		4	U		3.8	U		4	U		212			24.8			3.7	U		3.9	U		3.8	U		3.9	U	
Total PCBs (mg/kg-OC) [4]	12	NA			0.2	U		0.4	U		NA			0.7	U		0.2	U		0.6	U		8.1			NA			NA			0.4	U		0.4	U		0.7	U	

Note(s)

1. Laboratory qualifiers (Q1) are defined as follows:
   U = analyte not detected at associated reporting limit value.
   Y = Analyte was not detected at or above the associated reported limit value. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.
   J = Estimated concentration when the value is less than ARI's established reporting limit.
2. Validation qualifiers (Q2) are defined as follows:
   UY = The reporting limit was elevated due to chromatographic overlap with related compounds. The material was analyzed for, but was not detected above the level of the associated value.
   J = The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample.
3. Total PCBs calculated by summing results for detected congeners or, if all not detected, using the highest reporting limit for non-detected congeners.
4. NA: TOC outside the range for normalization (<0.5% or >4.0%).
5. If 20% or more of total detected Aroclors are qualified as estimated, the total calculated PCB concentration will also be considered estimated and assigned a "J" qualifier.
6. If the total calculated PCB concentration is considered to be estimated and assigned a "J" qualifier, then the organic carbon normalized value will also be assigned a "J" qualifier. Organic carbon-normalized PCB values will also be considered estimated if the TOC value is qualified as estimated.

Abbreviation(s)

ARI = Analytical Resources, Inc.
ft = feet
mg/kg Dry-Weight = milligrams per kilogram dry weight
mg/kg-OC = milligrams per kilogram organic carbon
NA = not applicable, percent carbon less than 0.5 percent
Q1 = laboratory qualifiers
Q2 = validation qualifiers
PCBs = polychlorinated biphenyls
SMS SQS = Sediment Management Standards
Sediment Quality Standards (173-204-320 WAC)
TOC = total organic carbon
µg/kg Dry-Weight = micrograms per kilogram dry weight
WAC = Washington Administrative Code

TABLE 20

JORGENSEN BACKFILL GRAB SAMPLE LOCATIONS
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Sample Location	WA State Plane, North Zone, NAD 83, Survey Feet — Original Proposed Sampling Locations		Pre-Construction Sampling		WA State Plane, North Zone, NAD 83, Survey Feet (Average Location of Three Grabs for Composite Sample)		End of Season 2015 Monitoring		WA State Plane, North Zone, NAD 83, Survey Feet (Average Location of Three Grabs for Composite Sample)	
	Easting	Northing	Sample ID	Date Sampled	Easting	Northing	Sample ID	Date Sampled	Easting	Northing
SD-JOR01	1275781	195632	SD-JOR01	11/24/2014	1275782	195631	SD-JOR01	3/6/2015	1275780	195634
SD-JOR02	1275811	195632	SD-JOR02	11/24/2014	1275813	195638	SD-JOR02	3/6/2015	1275810	195633
SD-JOR03 [1]	1275847	195498	—	—	—	—	SD-JOR03 [3]	3/6/2015	1275825	195536
SD-JOR03 [2]	1275824	195537	SD-JOR03	11/24/2014	1275847	195498	SD-JOR03 R2	3/17/2015	1275845	195497
SD-JOR04	1275844	195537	SD-JOR04	11/24/2014	1275844	195539	SD-JOR04	3/6/2015	1275844	195538
SD-JOR05	1275862	195397	SD-JOR05	11/24/2014	1275862	195397	SD-JOR05	3/6/2015	1275861	195399
SD-JOR06	1275892	195397	SD-JOR06	11/24/2014	1275890	195397	SD-JOR06	3/6/2015	1275892	195396

Note(s)

1. Original proposed location; during pre-construction sampling it was found that there was no fine-grain sediment at the location and the coarse backfill material at the surface of the backfill could not be sampled. The station was relocated to Easting 1275824 Northing 195537.
2. Relocated sample station.
3. On March 6, 2015, sampling station SD-JOR03 was inadvertently sampled at the original proposed sampling location rather than the relocated sampling location that had been sampled in November 2014. The previously sampled location was sampled on March 17, 2015 (sample ID SD-JOR03 R2). Both samples were analyzed.

Abbreviation(s)

NAD = North American Datum
WA State Plane = Washington State Plane Coordinates

TABLE 21

JORGENSEN BACKFILL GRAB SAMPLE RESULTS [1, 2]
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

Sample ID	SD-JOR01						SD-JOR02						SD-JOR03									SD-JOR04						SD-JOR05						SD-JOR06					
													Relocated Station			Relocated Station			Original Proposed Station [3]																					
Sample Date	11/24/2014			3/6/2015			11/24/2014			3/6/2015			11/24/2014			3/17/2015			3/6/2015			11/24/2014			3/6/2015			11/24/2014			3/6/2015			11/24/2014			3/6/2015		
Sample Interval	0 to 10 cm			0 to 10 cm			0 to 10 cm			0 to 10 cm			0 to 10 cm			0 to 10 cm			0 to 10 cm			0 to 10 cm			0 to 10 cm			0 to 10 cm			0 to 10 cm			0 to 10 cm			0 to 10 cm		
Surface Silt Layer (cm) [4]	2.5			Trace			0.5			Trace			2.5			> 15			8 to 10			Trace			1.5			3.5			1.5			2			1.5		
Analyte	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**	**Value**	**Q1**	**Q2**
Total Organic Carbon (Percent)	3.53			2.75			1.57			1.94			3.35			2.85		J	3.94			0.149			3.01			2.56			1.82			1.74			2.4		J
Metals (mg/kg Dry weight)																																							
Arsenic	18.1			7.3			4.9			12.1			14.1			16.5		J	11.9			0.7			10.4			17.8			8.2			5.9			9.4		
Cadmium	1.1			0.6			0.5			0.9			0.8			0.9			0.8			0.2	U		0.7			0.9			0.5			0.4			0.6		
Chromium	42			26.1			25.6			41			33			32			32			30			32			39			25.4			30.7			34.9		J
Copper	76.6			38.6			45.1			58.9			61.7			56.3			53.7			22.3			59.3			59.1			36.5			42.1			40.1		
Lead	39			20			21			28			28			25			27			2	U		24			27			17			11			20		
Mercury	0.19			0.07			0.07			0.08			0.07			0.13			0.15			0.02			0.09			0.12			0.18			0.08			0.06		
Silver	0.9	U		0.5	U		0.5	U		0.6	U		0.7	U		0.7	U		0.7	U		0.3	U		0.6	U		0.9	U		0.6	U		0.4	U		0.5	U	
Zinc	157			81			76			108			124			107			111			24			96			122			84			63			79		
PCBs (µg/kg Dry-Weight)																																							
Aroclor 1016	4	U		4	U		3.8	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		3.9	U		3.9	U		3.8	U		3.9	U		3.8	U	
Aroclor 1221	4	U		4	U		3.8	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		3.9	U		3.9	U		3.8	U		3.9	U		3.8	U	
Aroclor 1232	4	U		4	U		3.8	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		3.9	U		3.9	U		3.8	U		3.9	U		3.8	U	
Aroclor 1242	4	U		4	U		3.8	U		3.9	U		3.9	U		3.9	U		4	U		3.9	U		3.9	U		3.9	U		3.8	U		3.9	U		3.8	U	
Aroclor 1248	200			120			45			100			110			95			93			4.8	Y	UY	96			170			37			84			64		
Aroclor 1254	360			160			85			150			180			150			130			9			140			330			76			140			110		
Aroclor 1260	240			100			40			64			100			60			87			4.1			74	P	J	220			61	P	J	61			62		
Total PCBs [5]	800			380			170			314			390			305			310			13.1			310		J [7]	720			174		J [7]	285			236		
Total PCBs (mg/kg-OC) [6]	23			14			10.8			16			11.6			10.7		J [8]	7.9			NA			10.3		J [8]	28			9.6		J [8]	16			9.8		J [8]

Note(s)

1. Laboratory qualifiers (Q1) are as follows:
   U = analyte not detected at the associated reporting limit value.
   P = The analyte was detected on both chromatographic columns but the quantified values differ by >40% RPD with no obvious chromatographic interference.
   Y = analyte not detected at the associated reporting limit value.
   The reporting limit is raised due to chromatographic interferences.
2. Validation qualifiers (Q2) are defined as follows:
   UY = The reporting limit was elevated due to chromatographic overlap with related compounds. The material was analyzed for, but was not detected above the level of the associated value.
   J = The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample.
3. The original sample location was inadvertently reoccupied during the initial sampling event on March 6, 2015. The comparison of before and after DSOA dredging should be made between the relocated station locations.
4. Average thickness of surficial silt layer from qualitative sample characteristics forms.
5. Total PCBs calculated by summing results for detected congeners or, if all not detected, using the highest reporting limit for non-detected congeners.
6. NA: TOC outside the range for normalization (<0.5% or >4.0%).
7. If 20% or more of total detected Aroclors are qualified as estimated, the total calculated PCB concentration will also be considered estimated and assigned a "J" qualifier.
8. If the total calculated PCB concentration is considered to be estimated and assigned a "J" qualifier, then the organic carbon normalized value will also be assigned a "J" qualifier. Organic carbon-normalized PCB values will also be considered estimated if the TOC value is qualified as estimated.

Abbreviation(s)

cm = centimeters
DSOA = Duwamish Sediment Other Area
mg/kg Dry-Weight = milligrams per kilogram dry weight
mg/kg-OC = milligrams per kilogram organic carbon
NA = not applicable, percent carbon less than 0.5 percent
PCBs = polychlorinated biphenyls
Q1 = laboratory qualifiers
Q2 = validation qualifiers
RPD = relative percent difference
TOC = total organic carbon
µg/kg Dry-Weight = micrograms per kilogram dry weight

FIGURES

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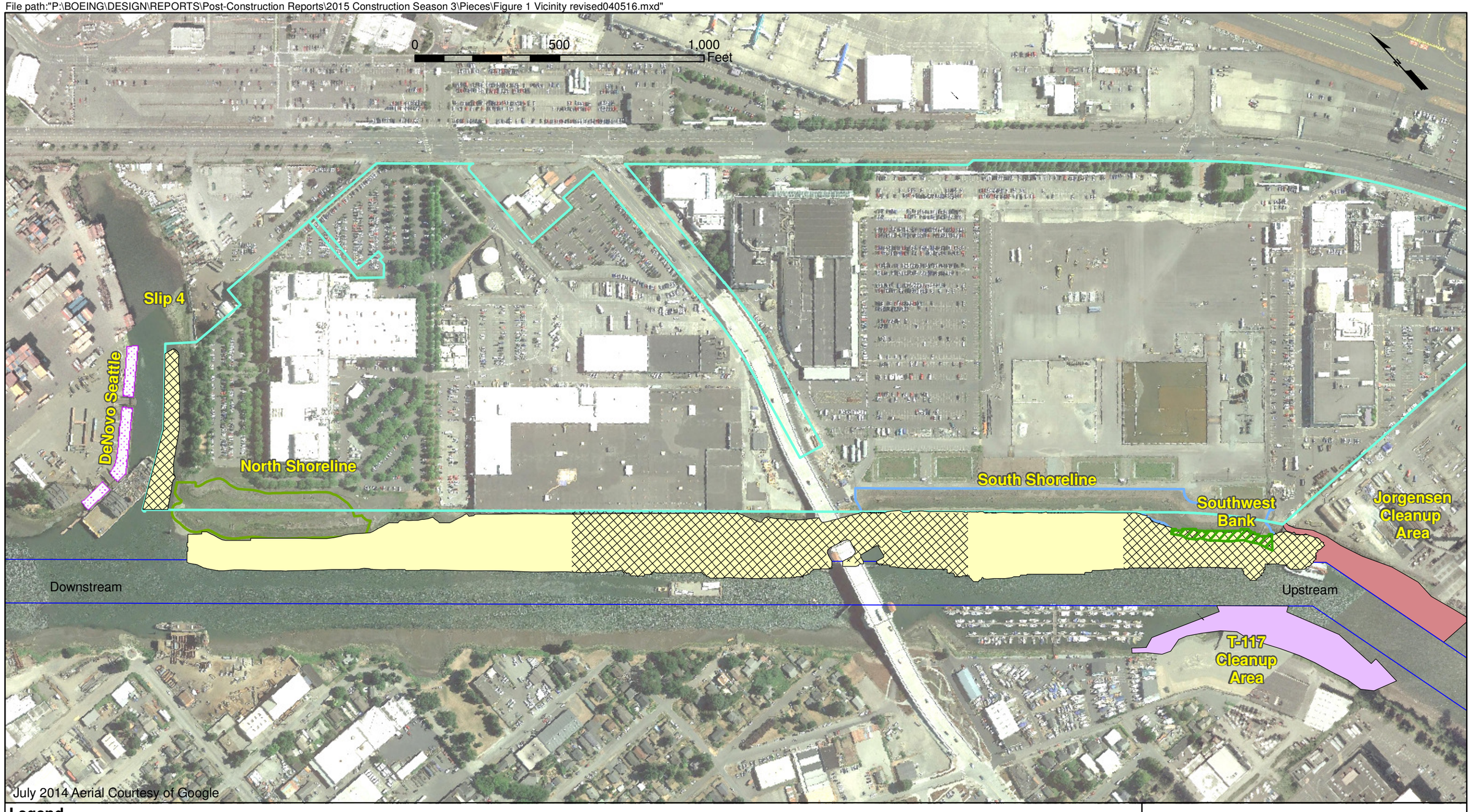

Legend

- North Shoreline Area
- South Shoreline Area
- T-117 Cleanup Area
- Jorgensen Cleanup Area
- SWB Re-excavation Area (approximate)
- Area Dredged During CS3
- Area Backfilled During CS3
- DeNovo Seattle (formerly the Crowley Marine Services dock)
- Navigation Channel
- Boeing Plant 2 Parcel

BOEING

BOEING PLANT 2 VICINITY
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank Corrective Measure and Habitat Project,
Boeing Plant 2, Seattle/Tukwila, Washington

By: RHG	Date:4/5/2016	Project No. 0131320090
		Figure 1

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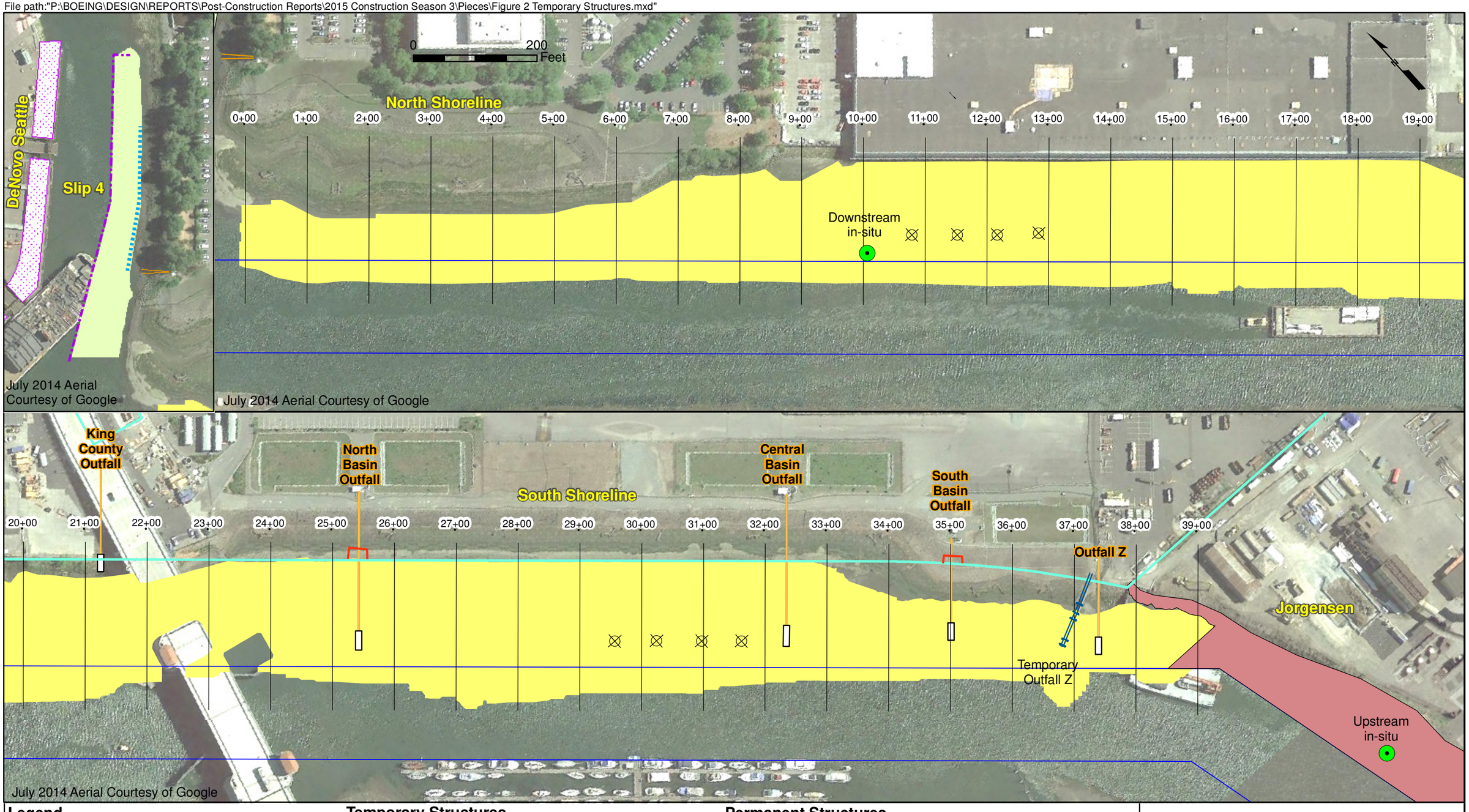


Legend

- Slip 4 Limits of Work
- DSOA Limits of Work
- Jorgensen Cleanup Area
- DeNovo Seattle (formerly the Crowley Marine Services dock)

Temporary Structures

- Slip 4 Shoreline Sheetpile
- Slip 4 Centerline Sheetpile
- Outfall Wing Walls
- Temporary Mooring Piles
- In-situ Water Quality Monitoring Piles

Permanent Structures

- Outfall and Pad

BOEING

TEMPORARY AND PERMANENT STRUCTURES
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest
Bank Corrective Measure and Habitat Project,
Boeing Plant 2, Seattle/Tukwila, Washington

By: RHG	Date:10/9/2015	Project No. 0131320090
		Figure 2

File path:"P:\BOEING\DESIGN\REPORTS\Post-Construction Reports\2015 Construction Season 3\Pieces\Figure 4 AUs Status.mxd"

Construction Season 3 Work Areas

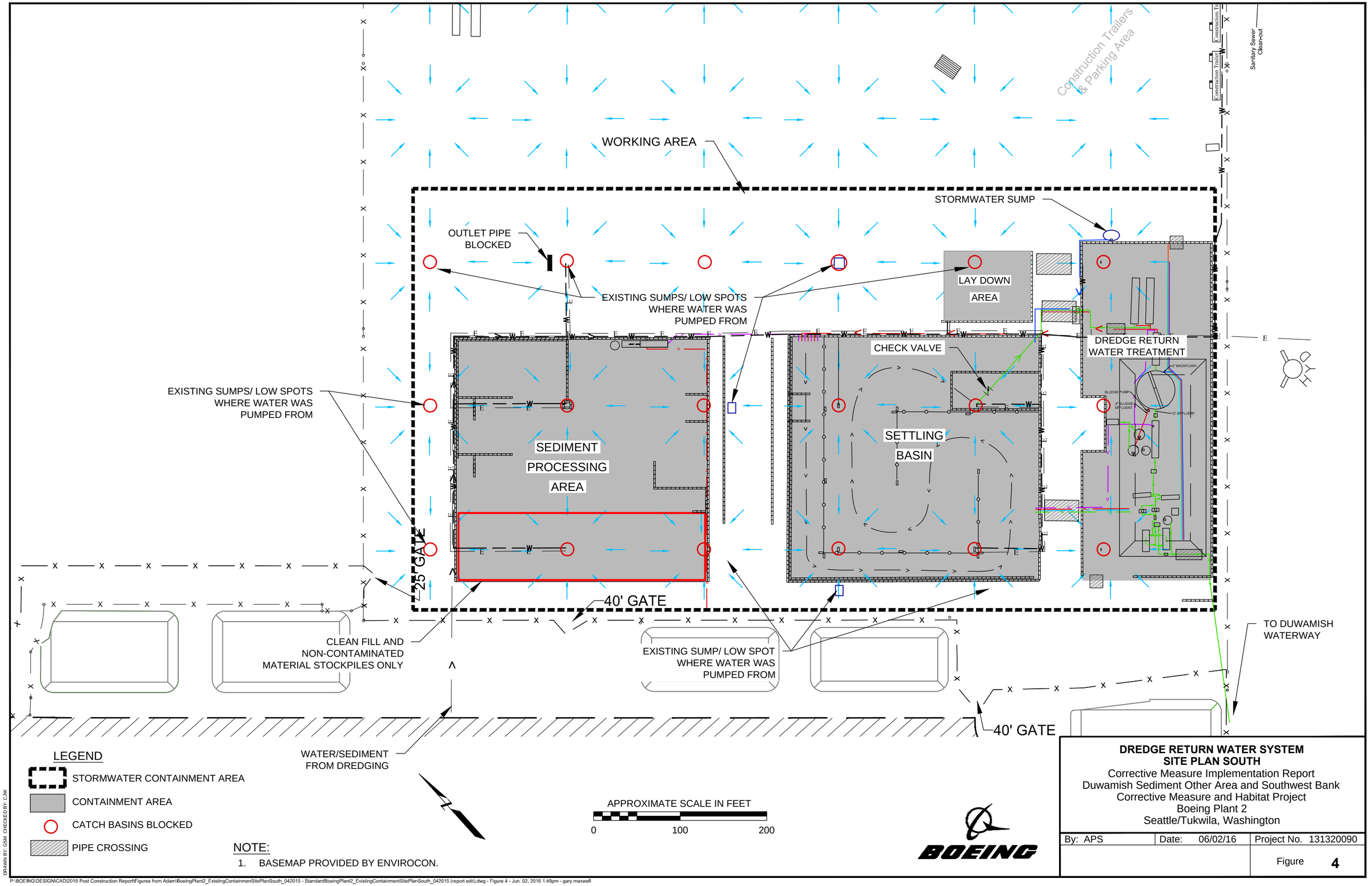
- Slip 4 Dredge and Final Backfill Area
- DSOA Dredge and Final Backfill Area
- DSOA Final Backfill Area
- Hydraulic Dredging Conducted (limited area)
- Special Areas
- Early Removal Areas
- A39 — DSOA Approval Units
- SWB Re-excavation Area (approximate)

Other Areas

- Jorgensen Cleanup Area
- Slip 4 Cap Area
- DeNovo Seattle (formerly the Crowley Marine Services dock)

DREDGING AND BACKFILLING COMPLETED IN CONSTRUCTION SEASON 3
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank Corrective Measure and Habitat Project,
Boeing Plant 2, Seattle/Tukwila, Washington

By: RHG	Date:5/16/2016	Project No. 0131320090
		Figure 3



LEGEND

- STORMWATER CONTAINMENT AREA
- CONTAINMENT AREA
- CATCH BASINS BLOCKED
- PIPE CROSSING

NOTE:

1. BASEMAP PROVIDED BY ENVIROCON.

APPROXIMATE SCALE IN FEET

0 100 200

BOEING

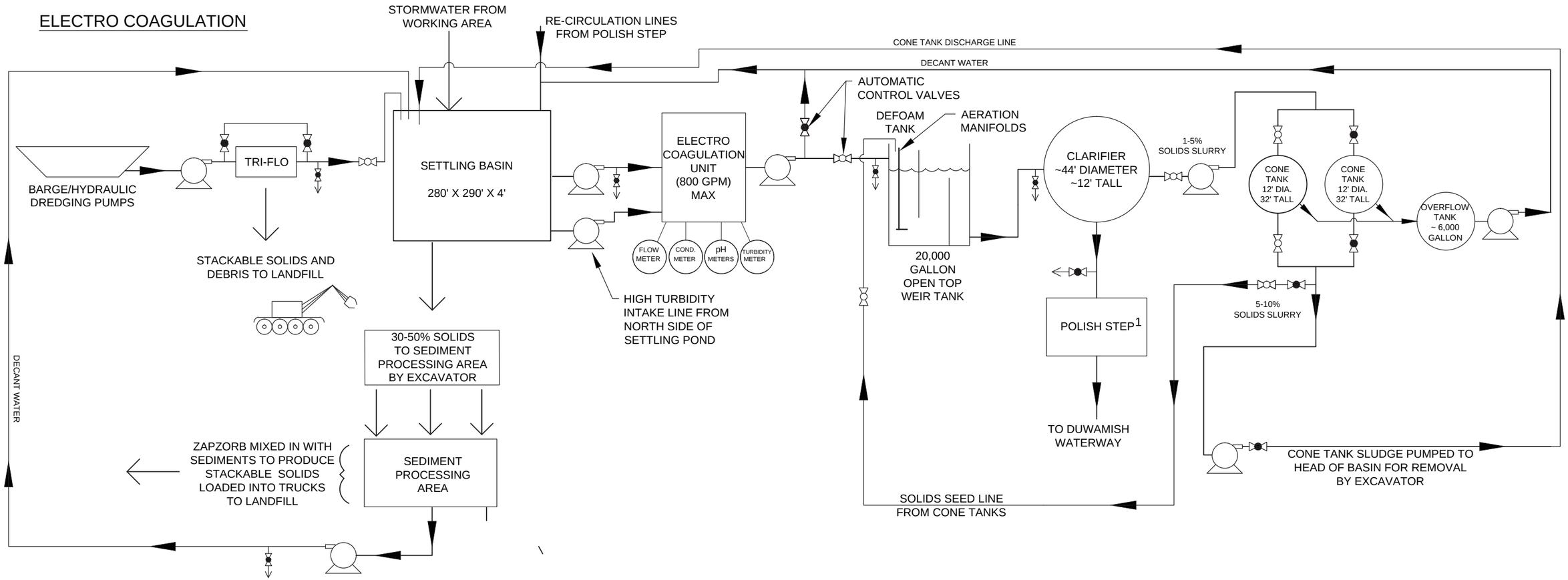
DREDGE RETURN WATER SYSTEM
SITE PLAN SOUTH
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle/Tukwila, Washington

By: APS	Date: 06/02/16	Project No. 131320090
		Figure **4**

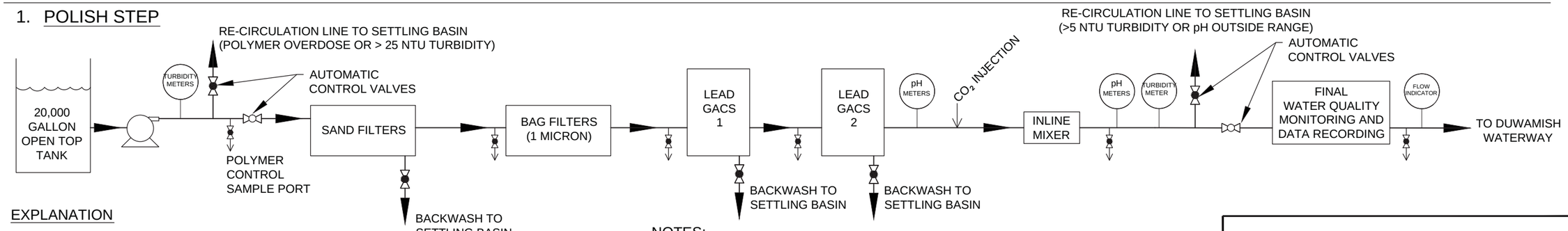
DRAWN BY: GSM CHECKED BY: CJW

P:\BOEING\DESIGN\CAD\2015 Post Construction Report\Figures from Adam\BoeingPlant2_ExistingContainmenSitePlanSouth_042015 - StandardBoeingPlant2_ExistingContainmentSitePlanSouth_042015 (report edit).dwg - Figure 4 - Jun. 02, 2016 1:49pm - gary.maxwell

ELECTRO COAGULATION



1. POLISH STEP



EXPLANATION

- PROCESS STEP
- PIPE FLOW DIRECTION
- NORMALLY OPEN BALL VALVE
- NORMALLY CLOSED BALL VALVE
- SAMPLE TAP
- PUMP

NOTES:

SETTLING BASIN:
WORKING VOLUME = ~810,000 GALLONS
TOTAL VOLUME = 2,000,000 GALLONS

CLARIFIER:
WORKING VOLUME = 83,000 GALLONS
TOTAL VOLUME = 132,000 GALLONS

CONE TANK (2):

WORKING VOLUME = 27,000 GALLONS EACH
TOTAL VOLUME = 27,000 GALLONS EACH

TURBIDITY AND pH METERS:
ALL pH SENSING LOCATIONS HAVE TWO METERS TO ENSURE THE REDUNDANT MEASUREMENT FOR ALL AUTOMATIC CONTROL FEATURES. TURBIDITY METERS AT START AND END OF SYSTEM ARE SINGLE. REDUNDANT METERS ARE USED AT THE START OF THE POLISH STEP.

COND. = CONDUCTIVITY

WATER QUALITY TREATMENT SYSTEM FLOW DIAGRAM
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank
Corrective Measure and Habitat Project
Boeing Plant 2
Seattle, Washington

By: APS	Date: 10/09/15	Project No. 131320090
		Figure 5

DRAWN BY: GSM CHECKED BY: CJW

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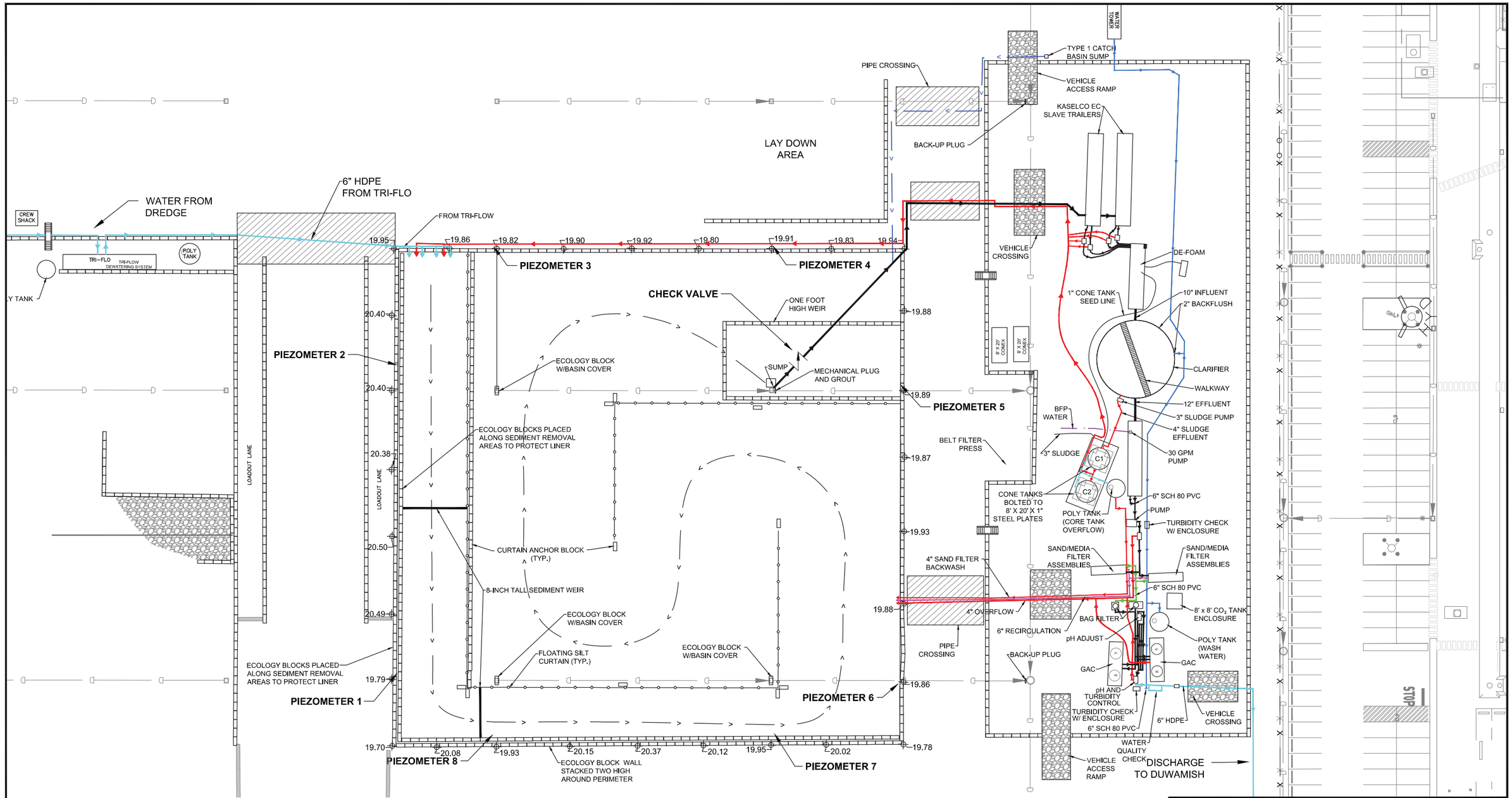


NOTE:

1. BASEMAP PROVIDED BY ENVIROCON.

APPROXIMATE SCALE IN FEET

0 55 110

DREDGE RETURN WATER TREATMENT SYSTEM LAYOUT
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank Corrective Measure
Boeing Plant 2
Seattle/Tukwila, Washington

By: APS	Date: 10/09/15	Project No. 131320090
		Figure 6

DRAWN BY: GSM CHECKED BY: CJW

P:\BOEING\DESIGN\CAD\2015 Post Construction Report\Figures from Adam\Treatment System Layout\BoeingPlant2_DredgeWaterTreatment_042015 (report edits).dwg - Fig 7 DredgeTreatmentSystem - Oct. 09, 2015 10:10am - gary.maxwell

SD-PER101			
CS1	Pre-	124	4.5
CS1	Post-	164	5.5
CS2	Pre-	113	3.6
CS2	Post-	138	7.0
CS3	Pre-	89	3.3
CS3	Post-	244	15.5

SD-PER102			
CS1	Pre-	113	4.8
CS1	Post-	157	5.8
CS2	Pre-	80	3.3
CS2	Post-	114	6.6
CS3	Pre-	72	6.0
CS3	Post-	122	5.8

SD-PER103			
CS1	Pre-	123	5.1
CS1	Post-	209	6.3
CS2	Pre-	172	NA
CS2	Post-	149	8.9
CS3	Pre-	139	5.5
CS3	Post-	173	6.5

SD-PER104			
CS1	Pre-	90	3.2
CS1	Post-	213 J	7.1 J
CS2	Pre-	197	6.4
CS2	Post-	152	6.8
CS3	Pre-	143	6.5
CS3	Post-	197	10.8

SD-PER105			
CS1	Pre-	146	7.2
CS1	Post-	145	9.0
CS2	Pre-	188	6.3
CS2	Post-	107	4.3
CS3	Pre-	108	4.4
CS3	Post-	121	6.1

SD-PER106			
CS1	Pre-	122 J	4.6 J
CS1	Post-	74 J	2.5 J
CS2	Pre-	390 J	12.6 J
CS2	Post-	151	8.6 J
CS3	Pre-	127	9.1 J
CS3	Post-	125 J	4.8 J

SD-PER126			
CS1	Pre-	199 J	8.5 J
CS1	Post-	125 J	7.4 J
CS2	Pre-	210	6.8
CS2	Post-	170	7.1
CS3	Pre-	107	4.6 J
CS3	Post-	151	7.1

SD-PER501			
CS1	Pre-	117	5.5 J
CS1	Post-	14.5	1.8
CS3	Pre-	394	11.4
CS3	Post-	630	26.5

SD-PER502			
CS1	Pre-	56	3.9 J
CS1	Post-	29	2.3
CS3	Pre-	290	11.9
CS3	Post-	295	13.1

SD-PER503			
CS1	Pre-	116	4.2 J
CS1	Post-	194	NA
CS3	Pre-	357	12.7
CS3	Post-	272	11.8

SD-PER504			
CS1	Pre-	229	7.1
CS1	Post-	201	5.2
CS3	Pre-	258 J	8.6 J
CS3	Post-	3.3 J	NA

SD-PER505			
CS1	Pre-	422	13.8
CS1	Post-	359 J	15.3 J
CS3	Pre-	298	10.9 J
CS3	Post-	3.8 U	NA

SD-PER506			
CS1	Pre-	133	4.4
CS1	Post-	217	6.1
CS3	Pre-	251	9.2
CS3	Post-	3.9 U	NA

SD-PER507			
CS1	Pre-	138	4.1 J
CS1	Post-	223	6.3
CS3	Pre-	268	8.9
CS3	Post-	224	6.1 J

SD-PER508			
CS1	Pre-	4 U	NA
CS1	Post-	241	6.8
CS3	Pre-	297 J	10.3 J
CS3	Post-	341	10.2

SD-PER509			
CS1	Pre-	3.9 U	NA
CS1	Post-	246	9.6
CS3	Pre-	323 J	10.9 J
CS3	Post-	296	8.3

SD-PER510			
CS1	Pre-	620	19.4
CS1	Post-	309	8.0
CS3	Pre-	300	10.6
CS3	Post-	304	7.9

SD-PER511			
CS1	Pre-	540	17.2
CS1	Post-	680	21.7
CS1	Post-	267	NA
CS3	Pre-	464	25.9
CS3	Post-	239	14.5

SD-PER513			
CS1	Pre-	316	8.4
CS1	Post-	362	9.3
CS3	Pre-	350	15.0
CS3	Post-	550	15.1

SD-PER515			
CS1	Pre-	140	4.2
CS1	Post-	250	NA
CS3	Pre-	255	11.6
CS3	Post-	308	10.5 J

SD-PER516			
CS1	Post-	213	6.2
CS3	Pre-	232	20.4
CS3	Post-	233	7.0 J

SD-PER517			
CS1	Post-	281	NA
CS3	Pre-	232	8.5
CS3	Post-	256	8.6 J

SD-PER518			
CS1	Post-	326	13.9
CS3	Pre-	292	9.7
CS3	Post-	240 J	NA

SD-PER512			
CS1	Pre-	92	3.7
CS1	Post-	136	6.2
CS3	Pre-	113	7.0
CS3	Post-	77 J	3.8 J

SD-PER514			
CS1	Pre-	170	5.8
CS1	Post-	308	NA
CS3	Pre-	251	12.6
CS3	Post-	272	9.9 J

SD-PER525			
CS1	Pre-	385	14.6
CS1	Post-	610 J	18.0 J
CS3	Pre-	244	16.6 J
CS3	Post-	3.7 U	NA

SD-PER401			
CS1	Pre-	105	5.1
CS1	Post-	129	6.8
CS2	Pre-	197	7.4
CS2	Post-	182	9.7
CS3	Pre-	168	11.4
CS3	Pre-	470	25.1
CS3	Post-	203	8.2

SD-PER402			
CS1	Pre-	60	3.1
CS1	Post-	74	2.0
CS2	Pre-	58	2.0
CS2	Post-	61	2.9
CS3	Pre-	63	4.7
CS3	Pre-	99	3.2
CS3	Post-	82 J	3.5 J

SD-PER403			
CS1	Pre-	38	1.9
CS1	Post-	54	3.3
CS2	Pre-	79	3.4
CS2	Post-	74	4.8
CS3	Pre-	74	7.2
CS3	Pre-	120	5.3
CS3	Post-	111 J	5.1 J

SD-PER404			
CS1	Pre-	93	6.0
CS1	Post-	93	6.9
CS2	Pre-	132	7.7
CS2	Post-	72	5.3
CS3	Pre-	61 J	5.4 J
CS3	Pre-	119	4.2
CS3	Post-	118	8.1 J

SD-PER405			
CS1	Pre-	105	4.9
CS1	Post-	60	2.3
CS2	Pre-	66	3.9 J
CS2	Post-	55	5.0
CS3	Pre-	66 J	6.3 J
CS3	Pre-	131	10.0
CS3	Post-	55 J	2.7 J

SD-PER406			
CS1	Pre-	101	3.6 J
CS1	Post-	97	8.4
CS2	Pre-	112 J	4.6 J
CS2	Post-	141 J	10.8 J
CS3	Pre-	107 J	8.8 J
CS3	Pre-	222 J	22.9 J
CS3	Post-	231	8.4 J

SD-PER426			
CS1	Pre-	121	5.2 J
CS1	Post-	75	6.2
CS2	Pre-	68	3.2
CS2	Post-	80	8.0
CS3	Pre-	100 J	9.2 J
CS3	Pre-	248 J	13.1 J
CS3	Post-	185	7.3 J

Legend

- Reference Areas
- Boeing Plant 2 Parcel
- Jorgensen Cleanup Area
- Navigation Channel Boundary
- Slip 4 Dredge and Final Backfill Area (CS3)
- T117 Cleanup Area
- CS1 Dredge Area
- CS2 Dredge Area
- CS3 Dredge Area

Station ID ⊕

SD-PER101			
CS1	Pre-	124	4.5
CS1	Post-	164	5.5
CS2	Pre-	113	3.6
CS2	Post-	138	7.0
CS3	Pre-	89	3.3
CS3	Post-	244	15.5

Construction Season | Event | Total PCBs (ppb-dw) | Total PCBs (ppm-OC)

Notes:
Markers are positioned at approximate location.
Total PCBs in ppb dry weight (ppb-dw) and ppm OC (ppm-OC; where appropriate).
Carbon normalization of total PCBs is not appropriate (NA entry) when TOC is < 0.5% or >4 %.

Construction Seasons identified as CS1 (2012-2013), CS2 (2013-2014), and CS3 (2014-2015). Sampling Events include Pre-construction sampling (Pre-) and Post-construction sampling (Post-).

Laboratory and Data Validation Qualifiers:
U = undetected at the reporting limit
J = estimated concentration

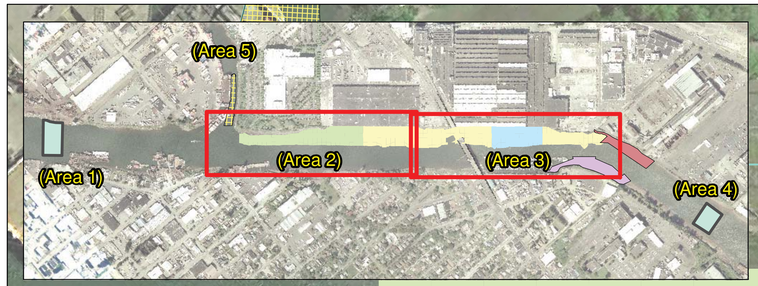
BOEING

RESULTS OF PERIMETER MONITORING
PRE- AND POST-CONSTRUCTION CS1 THROUGH CS3
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest
Bank Corrective Measure and Habitat Project,
Boeing Plant 2, Seattle/Tukwila, Washington

By: RHG | Date: 10/30/2015 | Project No. 0131320090

Figure 7a

File path: "P:\BOEING\DESIGN\DATA\Perimeter_Monitoring\Perimeter_all Grabs[A].mxd"



North Area

SD-PER201			
CS1	Pre-	92	4.5
CS1	Post-	151	8.5
CS2	Pre-	160	7.7
CS2	Post-	171	7.6
CS3	Pre-	181	8.0
CS3	Post-	151	16.3

SD-PER202			
CS1	Pre-	360	16.4 J
CS1	Post-	156	7.6
CS2	Pre-	200	7.3
CS2	Post-	248	11.6
CS3	Pre-	247	11.0
CS3	Post-	257	12.3

SD-PER203			
CS1	Pre-	71	3.4
CS1	Post-	113	5.9
CS2	Pre-	94	4.0
CS2	Post-	147	5.3
CS3	Pre-	116	4.4
CS3	Post-	137	10.2

SD-PER204			
CS1	Pre-	90	3.8 J
CS1	Post-	141	5.4
CS2	Pre-	163	5.6
CS2	Post-	229	11.0
CS3	Pre-	195	8.0
CS3	Post-	219	9.5

SD-PER205			
CS1	Pre-	138	5.6
CS1	Post-	404	19.0
CS2	Pre-	212	7.7
CS2	Post-	451	18.0
CS3	Pre-	282	11.7
CS3	Post-	253	21.4

SD-PER206			
CS1	Pre-	63	3.4 J
CS1	Post-	95	7.9
CS2	Pre-	166	12.2
CS2	Post-	81	5.8
CS3	Pre-	83	6.9
CS3	Post-	93	17.5

SD-PER207			
CS1	Pre-	74	2.7 J
CS1	Post-	106	2.9
CS2	Pre-	247	7.7
CS2	Post-	179	6.5
CS3	Pre-	219	8.6
CS3	Post-	207	10.8

SD-PER208			
CS1	Pre-	146 J	6.9 J
CS1	Post-	130	5.8
CS2	Pre-	306	12.1
CS2	Post-	302	12.5
CS3	Pre-	267	12.8
CS3	Post-	601	39.3

SD-PER209			
CS1	Pre-	31	2.8 J
CS1	Post-	3.5 J	NA
CS2	Pre-	101	8.2
CS2	Post-	88	7.2
CS3	Pre-	45	6.9
CS3	Post-	143 J	NA

SD-PER210			
CS1	Pre-	124 J	4.7 J
CS1	Post-	117	5.0
CS2	Pre-	134	5.6
CS2	Post-	169	8.7
CS3	Pre-	212	10.0
CS3	Post-	139 J	6.7 J

SD-PER230			
CS1	Pre-	93 J	4.2 J
CS1	Post-	114	4.5
CS2	Pre-	210	10.6
CS2	Post-	125	6.3
CS3	Pre-	181	8.3
CS3	Post-	149	8.1

(Area 2)

Aerial Courtesy of Google July 2014

South Area

Jorgensen

SD-PER211			
CS1	Pre-	165 J	8.1 J
CS1	Post-	679	25.5
CS2	Pre-	20,600	1,151
CS2	Post-	176	7.1
CS3	Pre-	740	36.1
CS3	Post-	188	11.1

SD-PER212			
CS1	Pre-	76 J	5.5 J
CS1	Post-	220	16.1
CS2	Pre-	66	NA
CS2	Post-	125 J	11.5 J
CS3	Pre-	55.1	7.9
CS3	Post-	124	22.8

SD-PER213			
CS1	Pre-	123	5.5
CS1	Post-	251	9.4
CS2	Pre-	78	4.4
CS2	Post-	217	13.6
CS3	Pre-	119	12.2
CS3	Post-	154	6.1

SD-PER301			
CS1	Pre-	47.8	2.8
CS2	Pre-	138	7.4
CS2	Post-	44.9	2.5 J
CS3	Pre-	47.7 J	4.3 J
CS3	Pre-	139	8.0
CS3	Post-	92	5.0 J

SD-PER302			
CS1	Pre-	28.7	1.6
CS2	Pre-	40	2.4
CS2	Post-	72	4.5
CS3	Pre-	76	2.8
CS3	Pre-	94	11.9
CS3	Post-	125	8.0 J

SD-PER303			
CS1	Pre-	45	2.1
CS2	Pre-	152	7.8
CS2	Post-	82	5.7
CS3	Pre-	78	6.8
CS3	Pre-	121	9.2
CS3	Post-	95 J	4.2 J

SD-PER304			
CS1	Pre-	32 J	2.3 J
CS2	Pre-	161 J	11.9 J
CS2	Post-	94	6.3
CS3	Pre-	28.2 J	NA
CS3	Pre-	79	12.2
CS3	Post-	144	6.3

SD-PER305			
CS1	Pre-	45	2.1
CS2	Pre-	110	4.9
CS2	Post-	55	2.8
CS3	Pre-	58	5.6
CS3	Pre-	78	5.8
CS3	Post-	103 J	6.1 J

SD-PER306			
CS1	Pre-	78	2.6
CS2	Pre-	160	8.6
CS2	Post-	158	10.8
CS3	Pre-	143	16.3
CS3	Pre-	157 J	9.1 J
CS3	Post-	160	7.2

SD-PER307			
CS1	Pre-	39	1.7
CS2	Pre-	108 J	3.7 J
CS2	Post-	59	3.8 J
CS3	Pre-	41	2.7 J
CS3	Pre-	52 J	2.8 J
CS3	Post-	58 J	1.6 J

SD-PER308			
CS1	Pre-	98	2.8
CS2	Pre-	175	7.5
CS2	Post-	201	9.3
CS3	Pre-	194	11.8
CS3	Pre-	119 J	6.8 J
CS3	Post-	279	20.8

SD-PER309			
CS1	Pre-	48	1.8
CS2	Pre-	88	3.7
CS2	Post-	36.7	3.3
CS3	Pre-	29.8	2.2
CS3	Pre-	26.7	4.0
CS3	Post-	61 J	3.4 J

SD-PER310			
CS1	Pre-	185	7.1
CS2	Pre-	310	11.6
CS2	Post-	210	7.6
CS3	Pre-	276	11.9
CS3	Post-	197	7.9

SD-PER311			
CS1	Pre-	70	3.3
CS2	Pre-	142	7.3
CS2	Post-	46	3.2
CS3	Pre-	72	4.5
CS3	Pre-	132	7.1
CS3	Post-	86	4.2

SD-PER312			
CS1	Pre-	54	2.5
CS2	Pre-	57	2.4
CS2	Post-	124	6.0 J
CS3	Pre-	73	4.0
CS3	Pre-	87	5.0 J
CS3	Post-	128	6.6 J

SD-PER313			
CS1	Pre-	53	2.5
CS2	Pre-	115	4.4
CS2	Post-	119	5.6
CS3	Pre-	110	8.3
CS3	Pre-	109	5.4
CS3	Post-	69 J	2.9 J

SD-PER327			
CS1	Pre-	42	2.0
CS2	Pre-	100	3.5
CS2	Post-	50	2.1
CS3	Pre-	50.5 J	5.7 J
CS3	Pre-	124 J	5.1 J
CS3	Post-	61 J	1.6 J

(Area 2)

(Area 3)

T-117

Aerial Courtesy of the US Department of Agriculture
Aerial Photography Field Office 2013

Legend

- Reference Areas
- Boeing Plant 2 Parcel
- Jorgensen Cleanup Area
- Navigation Channel Boundary
- Slip 4 Dredge and Final Backfill Area (CS3)
- T117 Cleanup Area
- CS1 Dredge Area
- CS2 Dredge Area
- CS3 Dredge Area

Station ID ⊕

SD-PER101			
CS1	Pre-	124	4.5
CS1	Post-	164	5.5
CS2	Pre-	113	3.6
CS2	Post-	138	7.0
CS3	Pre-	89	3.3
CS3	Post-	244	15.5

Construction Season | Event | Total PCBs (ppb-dw) | Total PCBs (ppm-OC)

Notes:
Markers are positioned at approximate location.
Total PCBs in ppb dry weight (ppb-dw) and ppm OC (ppm-OC; where appropriate).
Carbon normalization of total PCBs is not appropriate (NA entry) when TOC is < 0.5% or >4 %.

Construction Seasons identified as CS1 (2012-2013), CS2 (2013-2014), and CS3 (2014-2015). Sampling Events include Pre-construction sampling (Pre-) and Post-construction sampling (Post-).

Laboratory and Data Validation Qualifiers:
U = undetected at the reporting limit
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BOEING

RESULTS OF PERIMETER MONITORING
PRE- AND POST-CONSTRUCTION CS1 THROUGH CS3
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest
Bank Corrective Measure and Habitat Project,
Boeing Plant 2, Seattle/Tukwila, Washington

By: RHG | Date: 10/30/2015 | Project No. 0131320090

Figure 7b

File path: "P:\BOEING\DESIGN\DATA\Perimeter_Monitoring\Perimeter all Grabs(B).mxd"

SD-PCC024			
A	0 to 0.33 ft	212 ppb	8.1 ppm-OC
B	0.33 to 1 ft	24.8 ppb	—
C	1 to 2 ft	3.7U ppb	—
D	2 to 3 ft	3.9U ppb	0.4U ppm-OC
E	3 to 4 ft	3.8U ppb	0.4U ppm-OC
F	4 to 5 ft	3.9U ppb	0.7U ppm-OC

SD-PCC023			
A	0 to 0.33 ft	3.9U ppb	0.2U ppm-OC
B	0.33 to 1 ft	3.9U ppb	0.4U ppm-OC
C	1 to 2 ft	3.8U ppb	—
D	2 to 3 ft	4U ppb	0.7U ppm-OC
E	3 to 4 ft	3.8U ppb	0.2U ppm-OC
F	4 to 5 ft	4U ppb	0.6U ppm-OC

SD-PCC022			
A	0 to 0.33 ft	27 ppb	—
B	0.33 to 1 ft	3.8U ppb	—
C	1 to 2 ft	3.9U ppb	0.7U ppm-OC
D	2 to 3 ft	3.8U ppb	0.3U ppm-OC
E	3 to 4 ft	3.8U ppb	—
F	4 to 5 ft	3.9U ppb	—

SD-PCC021			
A	0 to 0.33 ft	3.8U ppb	—
B	0.33 to 1 ft	3.8U ppb	—
C	1 to 2 ft	3.8U ppb	—
D	2 to 3 ft	3.8U ppb	—
E	3 to 4 ft	3.8U ppb	—
F	4 to 5 ft	3.8U ppb	—

SD-PCC020			
A	0 to 0.33 ft	28 ppb	—
B	0.33 to 1 ft	11 ppb	—
C	1 to 2 ft	3.9U ppb	—
D	2 to 3 ft	3.8U ppb	—
E	3 to 4 ft	3.9U ppb	—

SD-PCC019			
A	0 to 0.33 ft	3.8U ppb	—
B	0.33 to 1 ft	3.8U ppb	—
C	1 to 2 ft	3.7U ppb	—
D	2 to 3 ft	3.8U ppb	—
E	3 to 4 ft	3.8U ppb	—
F	4 to 5 ft	3.8U ppb	—

SD-PCC018			
A	0 to 0.33 ft	3.9U ppb	0.3U ppm-OC
B	0.33 to 1 ft	3.9U ppb	0.7U ppm-OC
C	1 to 2 ft	3.9U ppb	—
D	2 to 3 ft	3.8U ppb	—
E	3 to 4 ft	3.7U ppb	—
F	4 to 5 ft	3.7U ppb	0.7U ppm-OC

SD-PCC017			
A	0 to 0.33 ft	3.9U ppb	—
B	0.33 to 1 ft	4U ppb	—
C	1 to 2 ft	3.9U ppb	—
D	2 to 3 ft	4U ppb	—
E	3 to 4 ft	3.9U ppb	—

SD-PCC016			
A	0 to 0.33 ft	6.4 ppb	—
B	0.33 to 1 ft	3.7U ppb	—
C	1 to 2 ft	3.9U ppb	—
D	2 to 3 ft	3.9U ppb	—

SD-PCC008			
A	0 to 1 ft	3.8U ppb	—
B	1 to 2 ft	3.6U ppb	0.6U ppm-OC

SD-PCC012			
A	0 to 1 ft	89 ppb	17.2 ppm-OC
B	1 to 2 ft	96 ppb	7.9 ppm-OC

SD-PCC014			
A	0 to 1 ft	200 ppb	33.6 ppm-OC
B	1 to 2 ft	7.8 ppb	—

SD-PCC006			
A	0 to 1 ft	3.8U ppb	0.1UJ ppm-OC
B	1 to 2 ft	3.8U ppb	0.7U ppm-OC

SD-PCC206 (Field Duplicate)			
A	0 to 1 ft	3.8U ppb	0.7UJ ppm-OC

SD-PCC007			
A	0 to 1 ft	3.8U ppb	0.6U ppm-OC
B	1 to 2 ft	3.8U ppb	—

SD-PCC009			
A	0 to 1 ft	17 ppb	—
B	1 to 2 ft	3.8U ppb	—
C	2 to 3 ft	9.4UY ppb	—

SD-PCC010			
A	0 to 1 ft	75J ppb	—
B	1 to 2 ft	4U ppb	0.3UJ ppm-OC
C	2 to 3 ft	3.8U ppb	0.3UJ ppm-OC

SD-PCC210 (Field Duplicate)			
A	0 to 1 ft	27 ppb	2.4 ppm-OC

SD-PCC011			
A	0 to 1 ft	3.8U ppb	0.6U ppm-OC
B	1 to 2 ft	190UY ppb	15.4UY ppm-OC

SD-PCC013			
A	0 to 1 ft	22J ppb	—
B	1 to 2 ft	5.9UY ppb	—

SD-PCC213 (Field Duplicate)			
A	0 to 1 ft	60 ppb	—

SD-PCC015			
A	0 to 1 ft	14.3J ppb	—
B	1 to 2 ft	3.8U ppb	—
C	2 to 3 ft	3.8U ppb	—

Legend

Post-construcion Confirmation Cores
- Cores collected in CS3
- Cores collected in CS1 and CS2

Values in parentheses are feet of backfill placed over dredge surface

- CS1 Dredge Area
- CS2 Dredge Area
- CS3 Dredge Area
- Slip 4 Dredge and Final Backfill Area (CS3)

SD-PCC010			
A	0 to 1 ft	75J ppb	—
B	1 to 2 ft	4U ppb	0.3UJ ppm-OC
C	2 to 3 ft	3.8U ppb	0.3UJ ppm-OC

Station ID

Sample Interval | Total PCBs (ppb-dw) | Total PCBs (ppm-OC)

Notes:
Total PCBs in ppb dry weight (ppb-dw) and ppm OC (ppm-OC; where appropriate).
Carbon normalization of total PCBs is not appropriate (— entry) when TOC is < 0.5% or >4%.

Laboratory and Data Validation Qualifiers:
U = undetected at the reporting limit
J = estimated concentration
Y = analyte is not detected at or above the reported concentration.
The reporting limit is raised due to chromatographic interference.
The Y flag is equivalent to the U flag with a raised reporting limit.

BOEING

POST-CONSTRUCTION CORE SAMPLE LOCATIONS AND RESULTS—CS1, CS2, AND CS3
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank Corrective Measure and Habitat Project,
Boeing Plant 2, Seattle/Tukwila, Washington

By: RHG | Date:10/30/2015 | Project No. 0131320090

Figure 8

File path= "P:\BOEING\DESIGN\DATA\Post_Construction Core Sampling\PCC Cores all.mxd"

File path:"P:\BOEING\DESIGN\REPORTS\Post-Construction Reports\2015 Construction Season 3\Pieces\Figure 10 PCM Stations revised 042916.mxd"

SD-PCM020	
Analyte	**2015**
Benzoic acid	1,300 J

SD-PCM032	
Analyte	**2015**
Phenol	570
Benzoic acid	2,600 J
Benzyl alcohol	360

SD-PCM031	
Analyte	**2015**
Benzoic acid	680 J

SD-PCM010
SD-PCM020
SD-PCM032
SD-PCM031
SD-PCM021
North Shoreline
SD-PCM033
SD-PCM025
SD-PCM011
SD-PCM001
SD-PCM012
SD-PCM212
SD-PCM002
SD-PCM003
SD-PCM004
SD-PCM005
SD-PCM013
SD-PCM014
SD-PCM015
SD-PCM020
SD-PCM031
SD-PCM021
July 2014 Aerial Courtesy of Google
July 2014 Aerial Courtesy of Google

King County Outfall
North Basin Outfall
Central Basin Outfall
South Basin Outfall
Outfall Z
SD-PCM034
SD-PCM035
South Shoreline
SD-PCM022
SD-PCM023
SD-PCM223
SD-PCM036
SD-PCM009
SD-PCM005
SD-PCM026
SD-PCM006
SD-PCM206
SD-PCM007
SD-PCM008
SD-PCM024
SD-PCM015
SD-PCM016
SD-PCM027
SD-PCM017
SD-PCM018
SD-PCM218
SD-PCM028
SD-PCM029
SD-PCM019
SD-PCM030
July 2014 Aerial Courtesy of Google

Legend

- Shoreline Area Samples (at approximately +7 ft MLLW)
- Shoreline Area Samples (at approximately +4 ft MLLW)
- Sampling Locations (above -5 ft MLLW and below + 4 ft MLLW)
- Sampling Location (below -5 ft MLLW)
- Outfall Sample Locations
- North Shoreline Area
- South Shoreline Area
- Slip 4 Approximate Dredge Area
- DSOA Limits of Dredging

SD-PCM031	
Analyte	**2015**
Benzoic acid	680 J

Sample Location

Detected SMS Analyte(s) That Exceed the SQS

Qualifiers:

J = Estimated value

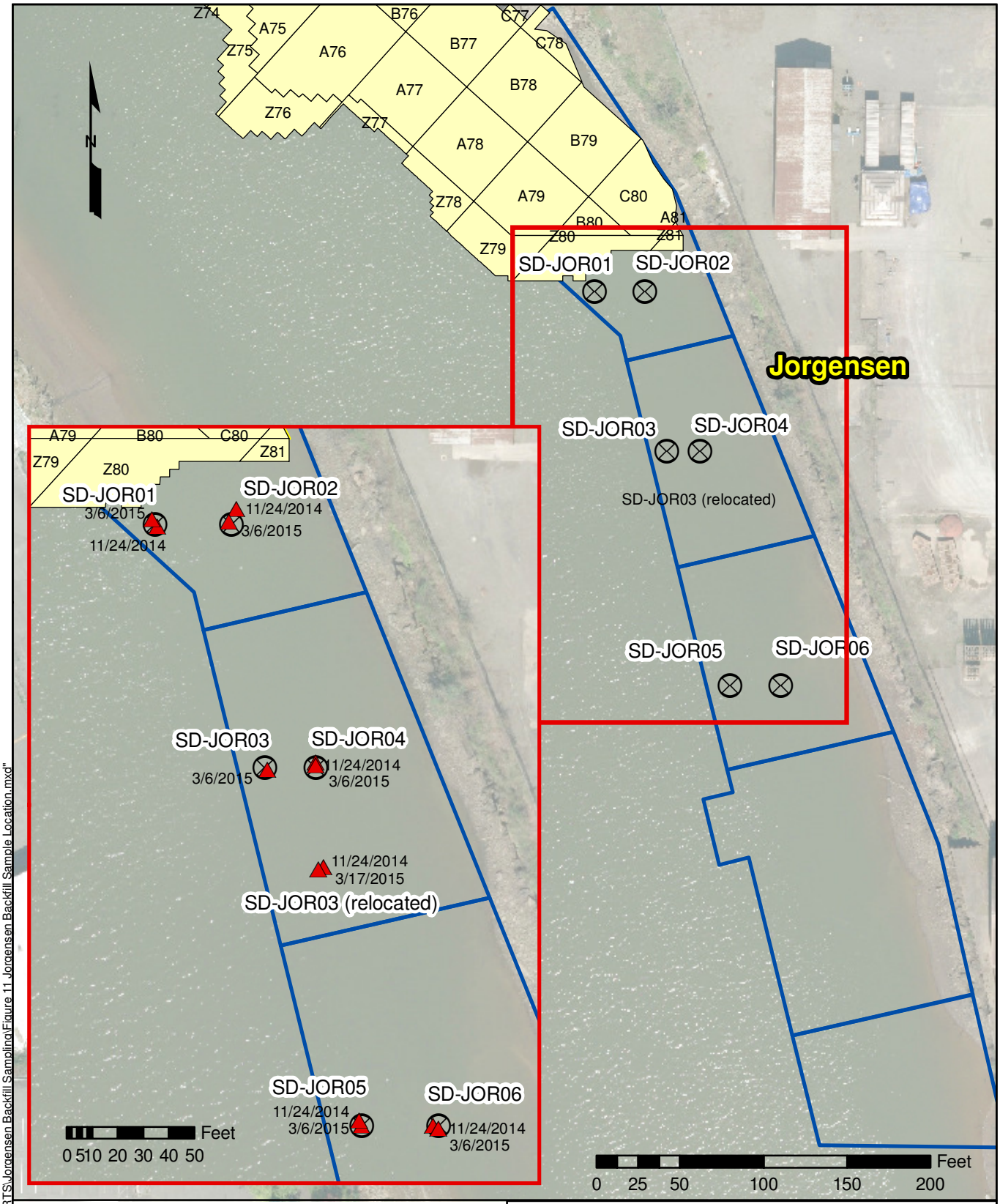
Abbreviations:

SMS = Sediment Management Standards
SQS = Sediment Quality Standards

BOEING

POST-CONSTRUCTION SURFACE MONITORING SAMPLING LOCATIONS
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank Corrective Measure and Habitat Project,
Boeing Plant 2, Seattle/Tukwila, Washington

By: RHG	Date: 04/29/16	Project No. 0131320090
		Figure 9



Legend

- Jorgensen Dredge Management Units
- DSOA Dredge and Final Backfill Area
- Proposed Grab Sampling Locations
- Pre- and Post-dredging Grab Sampling Locations (by date)

BOEING

JORGENSEN BACKFILL GRAB SAMPLE LOCATIONS
Corrective Measure Implementation Report
Duwamish Sediment Other Area and Southwest Bank Corrective Measure and Habitat Project,
Boeing Plant 2, Seattle/Tukwila, Washington

By: rhg	Date: 10/27/2015	Project No. 0131320090
		Figure 10

File path: "P:\BOEING\DESIGN\REPORTS\Jorgensen Backfill Sampling\Figure 11 Jorgensen Backfill Sample Location.mxd"

EXHIBITS

Exhibits are located in separate pdf files due to large file size

APPENDIX A

Jorgensen Water Quality Pile Removal

APPENDIX B

Construction Season 3 As-Built Drawings

APPENDIX C

Backfill Quality Assurance/Quality Control

APPENDIX D

Transload Waste Tickets and Waste Profile

(Provided in PDF Format on CD)

APPENDIX E

Granulated Activated Carbon Breakthrough Monitoring

APPENDIX F

In situ Water Quality Parameter Measurements

(Provided in Excel Format on CD)

APPENDIX G

Daily Water Quality Monitoring Forms

(Provided in PDF Format on CD)

APPENDIX H

Data Validation Reports

APPENDIX I

Qualitative Sample Characteristics Forms and
Field Forms for Perimeter Sampling

(Provided in PDF Format on CD)

APPENDIX J

Slip 4 Additional Data Collection

APPENDIX K

Core Summary Logs, Photographs, and
Field Forms for Post-Construction Coring

APPENDIX L

Post-Construction Surface Sediment Monitoring—Year 0

APPENDIX M

Qualitative Sample Characteristics, Photographs, and
Chain-of-Custody Forms for Jorgensen Backfill Sampling

APPENDIX N

End of Construction Season Decontamination

APPENDIX O

Archaeological Monitoring Program Synopsis,
Construction Season 3: Dredging