Annual Performance Evaluation Report
Long-Term Stormwater Treatment
2011 - 2012
North Boeing Field
Seattle, Washington

March 4, 2013

Prepared for

The Boeing Company
Seattle, Washington

Landau Associates
130 2nd Avenue South
Edmonds, WA 98020
(425) 778-0907

TABLE OF CONTENTS

Page

FIGURES

TABLES

APPENDICES

LIST OF ABBREVIATIONS AND ACRONYMS

µg/kg	Micrograms per Kilogram
µg/L	Micrograms per Liter
µm	Micron
AKART	All Known, Available, and Reasonable Methods of Prevention, Control, and Treatment
ARI	Analytical Resources, Inc.
ASAOC	Administrative Settlement Agreement and Order on Consent
Boeing	The Boeing Company
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESF	Chitosan-Enhanced Sand Filtration
City	City of Seattle, Washington
EAA	Early Action Area
Ecology	Washington State Department of Ecology
EOF	Emergency Overflow
EPA	U.S. Environmental Protection Agency
FSP	Field Sampling Plan
FWAAC	Flow-Weighted Average Annual Concentration
ft	Foot
GAC	Granular Activated Carbon
gpm	Gallons per Minute
GTSP	Georgetown Steam Plant
g/yr	Grams per Year
hp	Horsepower
ISCO	*In Situ* Chemical Oxidation
KBFI	Seattle Boeing Field-King County International Airport Rain Gauge
KCBYP	Re-routed North Lateral Storm Drain Pipe from King County
KCIA	King County International Airport
LDW	Lower Duwamish Waterway
LLI	Eurofins Lancaster Laboratories
ISGP	Industrial Stormwater General Permit
LSIV	Lift Station Inlet Vault
LTST	Long-Term Stormwater Treatment
MBPS	Media Bed Pilot Study
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
mL	Milliliter
NBF	North Boeing Field
NPDES	National Pollutant Discharge Elimination System
PAHs	Polycyclic Aromatic Hydrocarbons
Panel	NBF Stormwater Expert Panel
PCBs	Polychlorinated Biphenyls
POC	Point of Compliance
ppb	Parts per Billion
ppm	Parts per Million
PSD	Particle Size Distribution
PSDDA	Puget Sound Dredged Disposal Analysis
PSEP	Puget Sound Estuary Program
QAPP	Quality Assurance Project Plan
RAWP	Removal Action Work Plan
RI	Remedial Investigation

LIST OF ABBREVIATIONS AND ACRONYMS Con't

SAP	Sampling and Analysis Plan
SIM	Selected Ion Monitoring
SM	Standard Method
SMS	Sediment Management Standards
SQS	Sediment Quality Standards
STST	Short-Term Stormwater Treatment
SVOCs	Semivolatile Organic Compounds
TAPE	Technology Assessment Protocol
TOC	Total Organic Carbon
TSS	Total Suspended Solids

1.0 INTRODUCTION

This document presents an annual performance evaluation of long-term stormwater treatment (LTST) at North Boeing Field (NBF) for the first year of system operation, covering the period from November 1, 2011 through October 31, 2012. This annual performance evaluation report follows the planned annual evaluation criteria described in the Sampling and Analysis Plan for Long-Term Stormwater Treatment (SAP; Landau Associates 2012a). The conclusion of this annual evaluation is that the SAP monitoring procedures were followed and the LTST system met the applicable interim goals for removal of polychlorinated biphenyls (PCBs) and discharge water quality, as described in detail in this report.

A figure showing the vicinity of the site is provided for reference as Figure 1. The U.S. Environmental Protection Agency (EPA) and Washington State Department of Ecology (Ecology) have been working with The Boeing Company (Boeing); the City of Seattle (City), Washington; and King County to eliminate sources of PCBs in stormwater discharges to Slip 4 of the Lower Duwamish Waterway (LDW). On September 23, 2010, EPA issued an *Action Memorandum for the Time-Critical Removal Action at North Boeing Field near the Slip 4 Early Action Area of the Lower Duwamish Waterway Superfund Site* (Action Memorandum; EPA 2010). On September 29, 2010, Boeing entered into an Administrative Settlement Agreement and Order on Consent for Removal Action (ASAOC) with the EPA (EPA and Boeing 2010). The ASAOC required that Boeing address the discharge of PCBs to the Slip 4 Early Action Area (EAA) through short-term and long-term stormwater treatment removal actions.

The LTST system has been functional and operational since October 28, 2011, and consists of a chitosan-enhanced sand filtration (CESF) system that preferentially treats storm flows from the onsite NBF North Lateral, while also treating storm drain base flow and a portion of all the storm flow that drains to the lift station and to Slip 4 (Figure 2). Monitoring of LTST system performance and of compliance with LTST interim goals from the Action Memorandum (EPA 2010) has been conducted according to the SAP.

1.1 PROJECT SITE DESCRIPTION

NBF is located east of East Marginal Way South, adjacent to the King County International Airport (KCIA) and the City's Georgetown Steam Plant (GTSP). The approximate street address is 7370 East Marginal Way South, Seattle, Washington. NBF is approximately 150 feet (ft) from the head of Slip 4, which is an EAA at approximately River Mile 2.8 on the Duwamish Waterway within the LDW Superfund Site. The location of the site is shown on Figure 1.

1.2 PROJECT BACKGROUND

Boeing has conducted operations at NBF since the 1940s. NBF is used for research, flight testing, aircraft finishing, and delivery facilities. Stormwater from NBF is collected and conveyed by storm drains to Slip 4 of the LDW. In 2001, the LDW was placed on the National Priorities List (Superfund) pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In 2003, the sediments and portions of the bank in Slip 4 were identified as an EAA due to the presence of PCBs in the sediment. Prior to cleanup of Slip 4, Ecology determined that ongoing sources of PCBs discharging to Slip 4 should be controlled to reduce the likelihood of recontamination of the sediment following cleanup. Previous investigations at the NBF site identified the presence of PCBs in solids in manholes, catch basins, and sediment traps, and in water in the NBF storm drain system, which discharges to Slip 4 via the KCIA Storm Drain #3 PS44 Emergency Overflow (EOF).

As defined in the ASAOC, "stormwater" shall mean all liquids, including any particles dissolved therein, in the form of base flow, stormwater runoff, snow melt runoff, and surface runoff and drainage, as well as all solids that enter the storm drainage system. "System," when used in the context of storm drainage, shall mean the combination of all manholes, catch basins, pipes, and other drainage devices and conveyances designed, constructed, and used for the purpose of carrying stormwater from NBF to Slip 4 of the LDW, and the drainage basin associated with these devices and conveyances.

The highest concentrations of PCBs in stormwater in the NBF storm drain system (which discharges to Slip 4) were previously identified to be from the North Lateral portion of the storm drain (SAIC 2011 and Landau Associates 2011a). Under the ASAOC, Boeing installed a short-term stormwater treatment (STST) facility to remove PCBs from a large portion of the North Lateral of the NBF storm drain system prior to discharge to Slip 4 (Landau Associates 2010, 2011a). The STST facility, consisting of a 500 gallon per minute (gpm)-capacity CESF system, was placed into continuous operation on September 15, 2010 and operation continued until the 1,500 gpm LTST facility was installed and operating. STST monitoring results, available in the November 2011 Progress Report (Landau Associates 2011b), demonstrate that CESF was very effective at reducing the mass of total suspended solids (TSS) and PCBs in stormwater. Therefore, the LTST facility was designed around a similar CESF system, although significantly larger in footprint and capacity. Operation of the LTST facility officially began on October 28, 2011. Monitoring, as described in the SAP (Landau Associates 2012a), is ongoing at the LTST facility.

1.3 LTST TREATMENT SYSTEM DESIGN

The CESF treatment process starts by settling out coarse solids in an aboveground settling/storage tank, then the coagulated solids [via chitosan acetate dosage (less than one part per million {ppm} of chitosan acetate solution containing the natural biopolymer chitin)] settle out in additional aboveground settling/storage tanks, and, finally, sand filtration (through a bank of sand filter units) removes the remaining coagulated solids. The sand filter units are automated to perform sequential backflushing. The backflush water discharges to a settling tank and the settled solids are removed periodically for disposal. Greater detail on the design of the LTST facility can be found in the *100% Design Report, Long-Term Stormwater Treatment* (Landau Associates 2011c).

Stormwater is preferentially pumped from MH130A (which drains a portion of the onsite North Lateral) directly into the inlet weir tank of the LTST system for treatment at a design capacity of 500 gpm. The remaining LTST capacity (after treating the flows from MH130A) is utilized by pumping available stormwater flow from the lift station inlet vault (LSIV). The location of the LSIV pump in relation to the four King County lift station pumps is provided in Appendix B of the Removal Action/Stormwater Treatment Completion Report (Landau Associates 2012b). All stormwater from the four main NBF storm drain laterals and King County re-route storm line (with the exception of water pumped from MH130A) mixes together in the LSIV and is pumped to the LTST system (at a flow rate up to the 1,500 gpm treatment capacity of the LTST system). The LTST system operates at full capacity whenever sufficient stormwater is present. The LSIV submersible pump is set to produce the full design flow rate of 1,500 gpm at a level below which any of the four 50-horsepower (hp) King County pumps activate. Figure 3 shows the current on/off settings for both the LTST LSIV pump and the four King County lift station pumps. The on/off settings of the King County lift station pumps were adjusted 18 inches higher and the on/off settings of the LSIV pump were adjusted to be slightly lower during the first year of LTST system operation to try to maximize the volume of stormwater treated and to minimize the amount of infiltrating groundwater that is pumped and treated (which complicates operation of the treatment system due to increased amounts of solids from high iron concentrations and iron-related bacterial growth in infiltrating groundwater). A schematic diagram of LTST system components is provided as Figure 4.

The CESF system was anticipated to achieve a long-term average volume capture at the lift station of 81 percent of runoff from only onsite drainage, and 59 percent of runoff from combined onsite and offsite drainage basins. As described in the *LTST Removal Action Work Plan* (RAWP) and RAWP Addendum (Geosyntec Consultants 2011a,b), the LTST system was predicted to achieve a total PCB load reduction of approximately 73 percent annually [or approximately 96 percent in dry weather, reduced from 6.7 to 0.24 grams per year (g/yr), and approximately 68 percent in wet weather, reduced from 32 to 10.4 g/yr]. See Section 4.1 for an analysis of PCB load reduction during the first year of LTST operation. It was also estimated that the LTST system would comply with the interim goal for PCBs for water [0.030 micrograms per liter (μg/L)] approximately 96 percent of the time during a "typical" year (or 100 percent of dry days and 90 percent of wet days per year) based on rough estimates using limited available water and filtered solids dry and wet weather monitoring data. A more detailed description of the interim goals for the LTST system is presented in Section 1.4.

Operation of the LTST system is automated, with the exception of weekly calibration, routine inspections, and troubleshooting. The CESF system is in continuous operation; maintenance and other site activities sometimes require the CESF system to be shut down from time to time. The goal for operation of the LTST system is to achieve no more than 3 percent downtime on an annual basis. During the first year of operation, the percent downtime was less than 1 percent.

1.4 PERFORMANCE STANDARDS AND CLEANUP GOALS

LTST system performance standards were developed during the design process (including the 60% and 90% design report submittals); final performance standards are summarized in the *100% Design Report* (Landau Associates 2011c). Treatment goals for LTST were listed in the ASAOC for PCB concentrations in both whole water and in solids discharged in stormwater. The treatment goal for PCBs in solids was actively reviewed and redeveloped with EPA. LTST system performance standards and cleanup goals are described in more detail in the following sections.

1.4.1 LTST System Performance Standards

As described in the *100% Design report*, the design basis and performance standards for the LTST system include:

- The LTST system was constructed adjacent to and south of the King County lift station. The system treats all dry weather base flows from the LSIV and from MH130A (which collects a portion of onsite North Lateral drainage) and preferentially treats wet weather storm flows from MH130A and, as capacity allows, additional flows from the LSIV (sometimes referred to in prior LTST documents as OWS421, based on Boeing's identification number). The LTST system was designed to capture and treat approximately 91 percent of onsite storm flows to MH130A (12.8 acres) and 100 percent of onsite and offsite dry weather base flows to the LSIV (approximately 106 acres onsite plus approximately 191 acres offsite). Additional treatment of low storm flows at the LSIV is provided as capacity is available. The system is set to operate at full capacity (1,500 gpm) whenever sufficient stormwater is present.
- The submersible pump at MH130A (initially used for the STST System) is connected to a new force main and routes base and wet weather storm flows from MH130A directly to the LTST system. When the LTST system has capacity beyond that which is required to treat the flows from MH130A, additional storm flows from the LSIV will be pumped to the system.
- Offsite stormwater that formerly drained to the North Lateral (41.1 acres of King County drainage) was re-routed at a storm drain manhole that is located 16 ft upstream of MH178. The re-routed line is routed directly to the LSIV. The re-route minimizes overflow bypass at MH130A and allows preferential capture and treatment of onsite North Lateral storm flows. The re-route also allows some treatment of offsite North Lateral flows (as well as other laterals) at the LSIV when capacity allows.
- 100 percent of dry weather base flows from onsite and offsite laterals discharging to the LSIV are pumped to the LTST system.
- All treated flows from the LTST system are discharged to the Lift Station outlet structure, located downstream of the LSIV and the King County Lift Station pumps. The sampling location at the outlet structure is referred to as LS431.

NBF onsite and offsite drainage basins that drain to the LSIV (the inlet structure for both the King County Lift Station and for the LTST system) and are treated by the LTST system, up to its maximum 1,500 gpm, are shown on Figure 2. The boundary of the specific drainage basin that drains to MH130A and is preferentially treated at the LTST system is also shown on Figure 2.

1.4.2 LTST Treatment Goals

Interim goals for the LTST facility were set by EPA in the ASAOC as follows:

- Water discharged to Slip 4 must be below the Aquatic Life – Marine/Chronic water quality standard of 0.030 µg/L total PCBs. Boeing conducted (AMEC Geomatrix Inc. 2011) and EPA approved (EPA 2011) a salinity study in Slip 4 that demonstrates that the use of the Marine/Chronic water quality standard for total PCBs is appropriate.
- In-line storm drain solids discharged to Slip 4 must be below 100 parts per billion (ppb) dry weight total PCBs. This interim goal shall be used as a point of departure in considering whether the long-term interim goal for in-line storm drain solids discharged to Slip 4 should be modified in accordance with the all known, available, and reasonable methods of prevention, control, and treatment (AKART) (Geosyntec Consultants 2011c).

However, a recommended alternative interim goal was approved by EPA in place of the storm drain solids interim goal above. The development of the alternative interim goal is described in Section 1.4.3. The alternative interim goal for the LTST facility is as follows:

- A flow-weighted annual average concentration (FWAAC) for total PCBs in water of 0.018 µg/L.

Both the water quality and FWAAC goals are to be met at the Point of Compliance (POC), also referred to as LS431, which is shown on Figures 4, 5, and 6. Ecology has not approved the alternative interim goal identified in this report, and has not identified the POC for the NBF-GTSP Remedial Investigation (RI).

1.4.3 AKART Analysis and Estimation of a Load-Based Interim Goal

An analysis of AKART was prepared to present the evaluation of stormwater treatment alternatives. The AKART Analysis Report (Geosyntec Consultants 2011c) describes how the EPA interim goal of solids (100 ppb dry weight total PCBs) was not a technically achievable goal. Therefore, Boeing brought a Stormwater Expert Panel (Panel), working jointly with Geosyntec Consultants, into the project to evaluate an alternative to the interim goal for solids that would be both technically achievable and be protective of Slip 4 sediment. The expert Panel members consist of Jon Jones, P.E., of Wright Water Engineers; Dr. Michael Stenstrom from UCLA; and Dr. Robert Pitt from the University of Alabama. The Panel conducted an analysis of the methodology used and proposed a seven-step approach to estimate a site-specific mass load-based interim goal in a memorandum to EPA (Jones et. al. 2011). The approach included:

The anticipated post-LTST loading of solids and associated PCBs from NBF to Slip 4 was estimated based on existing available monitoring data and calibrated hydrologic model output, assuming steady-state (average) conditions for NBF storm drain base flows and storm flows (both treated and bypassed).

- The effect of varying settling distances in Slip 4 for different sized particles can be accounted for by inclusion of percentage (by mass) of solids settling in Slip 4 as a parameter.
- A mass balance of PCB solids depositing in Slip 4 over the course of a year fully mixed in 10 centimeters of clean sand cap (to protect the benthos) was computed.
- A time series plot of average surface sediment PCB concentrations in Slip 4 over a 50-year period was developed.
- Computed Slip 4 average surface sediment PCB concentrations were then compared with the Washington Sediment Management Standards (SMS) sediment quality standards (SQS). The SQS is 12 milligrams per kilogram (mg/kg) organic carbon normalized; however, the dry weight criteria considered by Ecology to be equivalent to the SQS is 130 micrograms per kilogram (µg/kg) total PCBs equating to 1.08% total organic carbon (TOC). Higher TOC concentrations typically found in Slip 4 (resulting in higher allowable dry weight PCB concentrations) were not considered. Using the time series plots, the number of years until the State standard 130 µg/kg dry weight sediment criteria would be exceeded was determined for a number of different scenarios.
- Use of the time series plots and estimates of the mass of solids that would exit Slip 4 based on particle size to establish an allowable average annual total filterable PCBs mass load (g/yr), such that State dry weight criteria is not exceeded within 50 years.
- In order to avoid exceedances of this average annual PCBs load during above-average rainfall years, this load was divided by average annual runoff volume to compute a mass load-based allowable concentration (µg/L total filterable PCBs). For compliance assessment purposes, this interim goal can be compared annually with a volume-weighted average of the lift station discharge concentrations.

The recommended alternative interim goal was presented in a subsequent memorandum, *Amended Monitoring Approach Recommendations for North Boeing Field Long-Term Stormwater Treatment System* (Jones et. al. 2012). EPA approved the amended monitoring approach for the alternative solids interim goal in a letter dated January 19, 2012 (EPA 2012).

2.0 SAMPLE AND DATA COLLECTION METHODOLOGY

This section presents the sampling objectives, sample locations, and the sample collection methodologies, frequency, and laboratory analyses. Stormwater monitoring and sampling at NBF was conducted in general accordance with the SAP (Landau Associates 2012a), which includes a Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP).

In late 2011, Boeing started a transition in laboratory contracting from Analytical Resources, Inc. (ARI) located in Tukwila, Washington, to Eurofins Lancaster Laboratories (LLI) located in Lancaster, Pennsylvania, both of which are EPA-approved and Ecology-certified labs. Selected split sampling was conducted in anticipation of the laboratory transition. However, due to logistical constraints, it was ultimately decided in early 2012 that NBF stormwater samples would continue to be sent to ARI. Therefore, all sampling results used in this annual evaluation are from ARI.

2.1 SAMPLING OBJECTIVES

As described in the SAP, the objectives of the field sampling were to gather data to:

- Monitor stormwater discharges for comparison with the LTST interim goals
- Evaluate the design assumptions for and performance of the LTST facility
- Confirm that the interim goals are reasonably conservative and descriptive of site conditions, including the appropriateness of treating non-detect PCBs concentrations in water as zero when calculating the annual average PCB concentration
- Accurately characterize the offsite stream from the King County North Lateral re-route in order to evaluate this load contribution to the LSIV and the LTST system
- Evaluate individual lateral storm drain inputs, and monitor the effects of future source control actions
- Characterize solids for disposal
- Evaluate the performance of the Media Bed Pilot Study (MBPS).

2.2 SAMPLING LOCATIONS

Stormwater and solids samples were collected at NBF at the following locations shown on Figures 4, 5, and 6:

- **Lift Station (LS431) – Compliance Monitoring Point**. The point of compliance for the LTST interim goals is identified in the SAP as just downstream of the King County lift station pumps. This point is also downstream of the LTST system effluent discharge. Sampling at this location consisted of collecting flow-weighted whole water samples for laboratory analysis. In addition, continuous flow monitoring was conducted at LS431, to quantify the amount of stormwater discharged.
- **LTST System Influent and Effluent**. To monitor the performance of the LTST facility, whole water samples of the treatment facility influent and effluent, and filtered solids samples from the treatment facility influent and effluent, were collected for laboratory analysis. The influent to the LTST facility from MH130A (the North Lateral) was sampled independently from the influent to the LTST facility from the LSIV (all other laterals). When the King County pumps operate and bypass of the LTST CESF system occurs, untreated stormwater

from LSIV is what is discharged to Slip 4. LSIV samples provide characterization of bypass stormwater[1] as well as data on the influent to the CESF system.

- **LTST Weir Tanks, Storage Tanks, and Sand Filters.** Samples of solids retained in the backflush settling tank were collected to determine appropriate disposal options for the solids. Periodic cleanout of the backflush settling tank was required during the first year of operation. No solids were removed from the inlet weir tank, the storage tanks, or the sand filters during the first year of operation, and no samples were collected from these locations.
- **Sediment Traps.** To continue to evaluate individual lateral storm drain inputs, Boeing continued the sediment trap monitoring program that began in 2005, with the modifications described in the SAP to account for changes in flow due to the stormwater re-route. This consisted of collecting solids from sediment traps at locations SL4-T1, SL4-T2, SL4-T3, SL4-T4, SL4-T5, SL4-T4A, and SL4-T5A(2). This monitoring program is overseen by Ecology.
- **Re-routed North Lateral Storm Drain Bypass Pipe from King County (KCBYP).** In order to determine if the re-routed stormwater from King County was contributing to an inability of the LTST system to meet the EPA interim goals, flow-weighted water samples were taken from a manhole along the King County bypass re-route. Flow monitoring was conducted at the new wet well [SL4-T5A(2)].
- **MBPS.** To evaluate the performance of the MBPS, whole water grab samples were collected from the system influent and effluents for laboratory analysis. Results from the MBPS were presented in a memorandum to EPA, *Media Bed Pilot Study – Final Report* (Geosyntec 2012).

The storm drain system, sampling locations LS431 and KCBYP, sediment trap locations, and the MBPS location are shown on Figure 5. Figure 6 shows a more close-up plan view of the LTST system and the locations of the water sample ports and filtered solids housings for the LTST system influent (both MH130A and LSIV) and effluent.

2.3 LIFT STATION (LS431)

Sampling at LS431 consisted of collecting flow-weighted composite whole water samples from stormwater at the monitoring POC. The POC is in the King County lift station effluent vault (LS431 discharge outlet structure), at a point just downstream of the location at which the CESF effluent is discharged into that structure. Storm drain discharges here represent 94 percent of the NBF onsite drainage area. The remaining 6 percent of the area is primarily used for employee parking and is known to have relatively lower PCB solids concentrations (Landau Associates 2011c). LS431 is also the farthest downstream location in the storm drain system not impacted by tidal flushing. Figures 5 and 6 show POC, LS431.

---

[1] Collecting samples of LSIV water that is conveyed to the treatment system is an indirect method of sampling water that bypasses the treatment system. However, during precipitation events where bypass of the treatment system occurs, stormwater enters the LSIV at high, turbulent flow rates from three very large pipes. Both the King County pumps and the LTST LSIV pump have intake structures located near the bottom of the vault. Water within the LSIV is well-mixed during these events, which is supported by visual observation through the grate at ground level. Therefore, LSIV samples are reasonably representative of bypass stormwater.

2.3.1 SAMPLING FREQUENCY

Stormwater samples were collected monthly from LS431. These twelve sampling events took place over multiple days in order to obtain representative samples of water discharged to Slip 4 during a wide variety of precipitation conditions. Setup took place and sampling commenced on the first Monday of the month. If the week of the month that included the first Monday also included a holiday, sampling instead took place the following week. Volume intervals for flow-weighted composite whole water sampling were calculated based on weather forecasts for the period starting Monday and continuing through the following Thursday, a 3-day period. Actual precipitation varied from the predicted amount used to calculate the volume interval, and sample collection sometimes occurred before Thursday due to earlier than anticipated filling of the 5-gallon glass carboy. Similarly, sometimes sample collection occurred after Thursday due to drier than anticipated conditions. Samples were not collected earlier than the Thursday following setup, unless the sample carboy was filled prior to that time due to heavier than expected stormwater flow conditions.

In addition, to ensure that at least some monitoring of LS431 discharge took place during LTST system bypass conditions, five storm events were sampled. Requirements for these five events were precipitation of 0.5 inches or greater in the sampling event (24 hours or less), and indication that bypass of the LTST system occurred during the sampling event. Two additional storm events of less than 0.5 inches of precipitation were conducted; the results are included in this report. Bypass of the treatment system occurred during six of the seven storm sampling events (no bypass occurred for the storm event starting October 12, 2012).

A matrix of sampling events, including the type of event, sample dates, precipitation data, and sampling location is provided in Table 1.

2.3.2 SAMPLING AND DATA COLLECTION METHODS

Flow-weighted composite samples of the stormwater at LS431 were collected using an ISCO 6712 automated sampler with a jumbo base holding a 5-gallon laboratory-cleaned glass carboy. Equal volume aliquots [500 milliliters (mL)] were collected more frequently at high flow rates and less frequently at low flow rates. The volume interval between aliquots for each sampling event was calculated using the anticipated volume of stormwater runoff and base flow[2] for the period to be sampled. A regression line was made using flow data at LS431 from past storm events and was continually updated with the most recent data, to estimate runoff for an upcoming sampling event based on the inches of predicted rainfall. During periods of dry weather, flow data collected at LS431 provided an estimation of base flow rates, which change seasonally.

---

[2] For this project, base flow is defined as water that enters the NBF storm drain system, but is not a direct result of precipitation. Base flow primarily includes infiltrating groundwater, but may also contain small contributions from other sources (e.g., fire fighting-related water, offsite sources of landscape irrigation water, or possible offsite illicit sources of wash water to storm drains). Base flow rates are measured at LS431 during periods of zero precipitation. The rate fluctuates seasonally due to changes in groundwater elevation.

Flow measurements were taken with a Marsh-McBirney FLO-DAR® Radar Area/Velocity Sensor mounted above the flow at the entrance to the 48-inch LS431 outlet pipe, downstream of the CESF effluent discharge. The sensor was installed so that it is oriented in the center of the flow in the pipe. Flow was measured continuously at 1-minute intervals. Data from the sensor was collected and logged by a Hach FL900 Series Flow Logger, and the ISCO autosampler was programmed to collect aliquots of stormwater based on the predetermined volume interval programmed into the flow logger.

The stormwater collected for laboratory analysis is drawn from a point at the entrance to the 48-inch LS431 outlet pipe, downstream of the King County lift station pumps and the LTST system discharge. A peristaltic pump (attached to the autosampler) and a Teflon®-lined suction line are used to collect water from this location. The intake of the suction line is connected to a stainless-steel strainer to remove any large debris. The strainer is attached to an aluminum plate bolted to the floor of the outlet pipe entrance.

The sampling carboy was kept on ice for the entire sampling event. Within 24 hours after the sampling event concluded (i.e., the time the last aliquot was collected), the carboy was retrieved, capped with a Teflon®-lined cap, and submitted to the laboratory for the analyses required. Using a churn splitter or similar device, laboratory staff distributed proper volumes of homogenized stormwater to bottles for preservation or immediate analysis.

Precipitation was tracked through the Seattle Boeing Field-King County International Airport rain gauge (identified as "KBFI") at: http://www.wrh.noaa.gov/mesowest/getobext.php?wfo=sew&sid=KBFI&num=48&raw=0&dbn=m. The KBFI rain gauge data was recorded to determine how much precipitation fell during sampling periods, as well as how much precipitation fell during the 2011-2012 season.

2.3.3 LABORATORY ANALYSES

Whole water samples were analyzed for PCBs using EPA Method 8082, for TSS using Standard Method (SM) 2540D, and for particle size distribution (PSD) using the Ecology TAPE Method. To provide information for the remedial investigation being conducted by Ecology at NBF and the GTSP, samples were analyzed for total and dissolved metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) using EPA Methods 200.8 and 7470; semivolatile organic compounds (SVOCs) using EPA Method 8270D, and polycyclic aromatic hydrocarbons (PAHs) using EPA Selected Ion Monitoring (SIM) Method 8270D. To provide data for compliance monitoring for the National Pollutant Discharge Elimination System (NPDES) stormwater permit at NBF, samples were analyzed for turbidity using EPA Method 180.1 and pH (starting December 8, 2011) using EPA Method 150.1. Because of LTST operational challenges by dissolved iron and iron-related bacteria growth (e.g., precipitation in monitoring instrumentation and additional sludge volume accumulation in the backflush tank) that are associated with groundwater infiltration into the storm drain lines, samples have been analyzed for total and dissolved iron and manganese starting December 28, 2011 using EPA Method 6010.

2.4 LONG-TERM STORMWATER TREATMENT SYSTEM SAMPLING

Sampling at the LTST facility consisted of collecting whole water grab samples of the treatment facility effluent and influent from the MH130A line, composite water samples of the stormwater from the LSIV influent line, and samples of the solids entrained in the influent (both MH130A and LSIV) and effluent.

2.4.1 SAMPLING FREQUENCY

Whole water samples and filtered solids samples (for PCBs only, see below for metals and PSD) were collected from the treatment facility influent and effluent on a twice monthly basis in November and December 2011, and then monthly from January through October 2012. In addition, storm event samples collected for LTST performance monitoring were collected concurrent with LS431 storm event discharge compliance sampling.

Because a filter bag cannot be analyzed for other parameters when it is analyzed for PCBs (the entire bag and its contents are extracted for analysis), additional sampling events are required for filtered solids sampling for metals and PSD. This was done on a monthly basis, and was only done for MH130A and LSIV locations, as STST filtered solids samples and one LTST filtered solids sample in November 2011 showed that the effluent filter bags do not collect enough solids to remove for the metals and PSD analyses.

A matrix of sampling events, including the type of event, sample dates, precipitation data, and sampling location is provided in Table 1.

2.4.2 SAMPLING AND DATA COLLECTION METHODS – WHOLE WATER

Whole water grab samples were collected directly into laboratory bottles from sample ports on the MH130A influent line and the effluent line of the treatment system. To monitor the LTST system performance under a variety of conditions, efforts were taken to collect whole water grab samples from the MH130A influent and the effluent during both precipitation conditions and during base flow conditions. Reasonable efforts were made to sample at various times during a precipitation event (i.e., at the beginning of a storm and toward the end of a storm) and during various intensities of storms. Samples were collected in laboratory-supplied sample bottles after allowing water to purge from the sampling ports for a minimum of 20 seconds prior to collection of a sample.

Composite whole water samples were collected from the LSIV influent line. Sampling duration generally matched that of LS431. Methodology for LSIV sample collection evolved over the reporting period in order to better meet the goal of collecting samples representative of LSIV stormwater during heavier rainfall conditions during periods of LTST system bypass. In November and December 2011, the LSIV whole water composite samples were generated from equal volume grab samples collected on a fixed time interval (every 12 hours during a routine monthly event, and every 6 hours during a storm event), providing time-weighted composites consisting of bypass and non-bypass flows. Starting January 2012, LSIV whole water samples were collected as a flow-weighted composite consisting of bypass and non-bypass flows, using an ISCO 6712 automated sampler similar to the one described in Section 2.3.2, with the Teflon®-lined tube attached to the LSIV sample port. The LSIV ISCO sampler was triggered from the flow logger used at LS431, as no reasonably feasible method of triggering sample collection based on flow rates into or out of the LSIV was identified. Although LS431 flow includes treated water and bypass water, triggering LSIV samples based on the LS431 flow logger still results in more aliquots being taken during higher flow rates (e.g., during bypass conditions) and less aliquots being taken during lower flow rates (e.g., discharge of treated stormwater only).

Starting in late March 2012, equipment was installed so that the LSIV ISCO only collected aliquots during periods of bypass of the CESF system. An ISCO model 1640 Liquid Level Actuator, which uses a conductivity switch, was placed in the lift station outlet structure (near where the LS431 Flo-Dar sensor is located) so that the probe tip is underwater only when one or more King County pumps are on. This allowed the LSIV *In Situ* Chemical Oxidation (ISCO) sampling program to be suspended unless the LTST system was being bypassed. As fewer aliquots were taken by the LSIV ISCO as compared to the LS431 ISCO due to the additional trigger criterion, the volume of each LSIV aliquot was increased from 500 mL to 1,000 mL (the maximum allowed by the ISCO) in late March 2012, so there was a better chance of collecting enough volume for laboratory analysis when only a small number of aliquots are taken.

After installation, multiple operational difficulties with the Liquid Level Actuator were observed, some of which affected sampling events. The actuator baffle was trapping air around the probe tip and disabling the LSIV autosampler program (March 31 to April 1, 2012 storm event and June monthly event), and iron bacterial growth on the probe tip was enabling the LSIV autosampler program (May 2012 monthly event). These issues were resolved with improved operating procedures. Also, in November 2012 a rodent chewed through the actuator cable, and in December 2012 the probe tip malfunctioned due to damage. Since then, the actuator cord has been enclosed in conduit, and a spare probe tip is kept onsite in case of malfunction.

2.4.3 Sampling and Data Collection Methods – Filtered Solids

To collect solids samples from the treatment facility influent and effluent, filtration systems were installed on each influent pipeline (MH130A and LSIV) and on the effluent pipeline. These locations are shown on Figure 6. A portion of each of the three streams passes through a filter bag where solids are captured. Each filter system consists of a FSI model CBFP-11 carbon steel filter housing. A flow totalizer downstream of each filter measures the total volume of stormwater flowing through the filter bag. Filter bags used were 16-inch-long, 7-inch-diameter, 1 micron (μm) nominal particle size rated polypropylene felt filter bags with a Polyloc® seal (to prevent bypass).

The amount of filtration time for each filter bag to be analyzed for PCBs generally matched the duration of the LS431 water sampling (up to 24 hours for storm events, approximately 3 days for routine monthly events). Filtration time for filter bags to be analyzed for metals and PSD varied, in an attempt to collect as much mass of solids as possible to be able to run the analyses. Only clean, new filters were used. For bags being submitted for PCBs analysis, filter bags were pre-weighed and numbered at the laboratory. After successful completion of filtration, the filter bag was removed, placed in a clean Ziploc bag, sealed, labeled, and transported to the laboratory. Readings from the flow totalizers were collected at the start and end of filtration for each sampling event.

2.4.4 Laboratory Analyses

Whole water samples were analyzed for PCBs using EPA Method 8082, for TSS using Standard Method (SM) 2540D, and for PSD using the Ecology TAPE Method. To provide information on the effectiveness of the LTST system at removing metals, samples were analyzed for total and dissolved metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) using EPA Methods 200.8 and 7470 starting on December 8, 2011. For one event on December 21, 2011, samples were analyzed for SVOCs using EPA Method 8270D and PAHs using EPA SIM Method 8270D as part of a split sampling event, to provide comparison data between laboratories (ARI and LLI). Samples were analyzed for turbidity (except the effluent which is continuously analyzed for turbidity by Clear Water) using EPA Method 180.1 and pH (starting December 8, 2011) using EPA Method 150.1. Samples were analyzed for total and dissolved iron and manganese starting December 20, 2011 using EPA Method 6010.

Filtered solids samples collected from the LTST facility influent and effluent were analyzed for PCBs by EPA Method 8082, for metals by EPA Methods 6010/6020 and 7471, and for PSD by Puget Sound Estuary Program (PSEP)-PS. With EPA approval, PSD analysis was discontinued after June 15, 2012, as the data set already obtained was adequate. For the PCBs analyses, new filters were weighed and numbered prior to sample collection, so that each sample was matched to a unique, clean-filter weight. The used filter was dried, weighed, and processed by the laboratory. For each filter, the entire filter (not including the hard plastic ring, but including whatever material was collected) was extracted and the analytical results presented in units of total μg of PCBs. Knowing the full weight of the used dried filter (including collected material) and the pre-filtration weight, the estimated mass of PCBs per mass of total solids was calculated. For metals and PSD analyses, solids were scraped from the used filter bags for analysis.

2.5 WEIR AND STORAGE TANK MONITORING AND SAMPLING

The solids levels in the inlet weir tank, each storage tank, and the backflush settling tank were inspected at least once per month. Monitoring of the thickness of accumulated solids was performed with a Sludge Judge® inserted from the top of the tank to the tank floor. The device collects a solids sample that can be retrieved and visually inspected. The thickness of accumulated solids in the sampler was observed and recorded. Three or more readings, spread approximately equally along the length of the tank, were averaged and used to determine if the solids level was deep enough to require tank cleanout. The solids in the inlet weir tank and the three storage tanks were never deep enough to warrant sampling, cleaning, and disposal. Solids from the backflush settling tank were sampled on February 2, 2012 and September 18, 2012.

Sampling of backflush tank solids, tank cleanout, and disposal of the sludge was conducted in general accordance with the SAP. As the sampling data was used for waste characterization purposes only, it is not included in this report.

2.6 SEDIMENT TRAPS

The sediment trap monitoring program that began in 2005 at the NBF site, and is overseen by Ecology, was continued during operation of the LTST facility to evaluate stormwater quality from the individual NBF lateral storm drains prior to combining at the LSIV and treatment at the LTST facility. Sediment trap sampling locations are shown on Figure 5. Solids were collected by sediment traps at locations SL4-T1, SL4-T2, SL4-T3, SL4-T4, SL4-T5, and SL4-T4A. Locations SL4-T2A and SL4-T3A are monitored separately by the City, and analytical data for these locations are not presented in this report. At location SL4-T5A(2), a sediment trap is not used; instead, solids are collected from the bottom of the wet well, which collects solids behind a permanent weir.

2.6.1 Sampling Frequency

The established frequency for sediment trap sampling is annually, currently once per year in the spring. Sediment trap samples were most recently collected on April 24, 2012, and sediment trap bottles were redeployed the same day for collection in spring 2013.

2.6.2 Sampling Methods

Each sediment trap [with the exception of SL4-T5A(2)] consists of two stainless-steel brackets and housings that each holds a Teflon® sample container. Once the containers are securely placed on the bracket, the container lids are removed and placed in a plastic sealable bag and labeled with the sample location. After the desired sample duration has elapsed, the lids are placed back on the containers and the containers removed. The solids in SL4-T5A(2) were collected from the bottom of the compartment of the wet well behind the weir using a new, clean, laboratory-supplied glass soil sampling jar affixed to the end of a decontaminated telescoping sampling pole. Water was decanted from the jar, to the extent possible, and the solids from each "pass" were combined and homogenized in a clean stainless-steel bowl using a clean stainless-steel spoon, and placed into a separate sample jar.

2.6.3 LABORATORY ANALYSES

Sediment trap solids samples were analyzed for PCBs using EPA Method 8082; SVOCs using Puget Sound Dredged Disposal Analysis (PSDDA) SW8270D; total metals (arsenic, copper, lead, mercury, and zinc) using EPA Methods 6010 and 7471; diesel-range and motor oil-range petroleum hydrocarbons using Ecology Method NWTPH-Dx; TOC using the method Plumb (1981), and PSD using PSEP-PS. Depending on the quantity of solids collected, the laboratory might not have been able to analyze all parameters, in which case, the analysis of parameters was prioritized in the order listed above.

2.7 RE-ROUTED KING COUNTY STORMWATER

In order to determine if the re-routed stormwater from King County was contributing to an inability of the LTST system to meet the EPA interim goals, flow rate monitoring was performed and flow-weighted whole water samples were collected from this re-routed storm drain line. Continuous flow rate monitoring took place at the new wet well near the LTST, as discussed in the Completion Report (Landau Associates 2012b), using a weir and pressure transducer. The wet well is not in an appropriate location to stage sampling equipment; to conduct flow-weighted whole water composite sampling, an ISCO 6712 automated sampler was used at an upstream location, shown on Figure 5 as KCBYP.

2.7.1 SAMPLING FREQUENCY

To compare data from King County re-routed stormwater to the overall stormwater discharge at LS431, whole water composite sampling was conducted at KCBYP concurrent with LS431 sampling for seven of the routine monthly sampling events and two of the storm events.

A matrix of sampling events, including the type of event, sample dates, precipitation data, and sampling location is provided in Table 1.

2.7.2 SAMPLING AND DATA COLLECTION METHODS

Flow-weighted composite samples of the stormwater at KCBYP were collected using an ISCO 6712 automated sampler holding a 5-gallon laboratory-cleaned glass carboy. Equal volume aliquots (500 mL) were collected more frequently at high flow rates and less frequently at low flow rates. The volume interval between aliquots for each sampling event was calculated using the anticipated volume of stormwater runoff for the period to be sampled. To estimate runoff for an upcoming sampling event based on the inches of predicted rainfall, a regression line was initially made using flow data from previous sampling at the MH178 location, and then was replaced and updated with the most recent data from sampling events at KCBYP. All KCBYP samples were flow-weighted composites with the exception of the March 7, 2012 sampling event, during which the autosampler collected only 1 aliquot.

An ISCO Model 750 Area Velocity Flow Module and an ISCO low profile area/velocity flow sensor were used to take flow measurements to trigger flow-weighted sample collection. The sensor was installed so that it was oriented in the center of the flow in the pipe. Flow was measured at 1-minute intervals during sampling events. The ISCO autosampler was programmed to collect aliquots of stormwater based on the predetermined volume interval programmed into the flow logger.

A peristaltic pump (attached to the autosampler) and a Teflon®-lined suction line were used to collect water from the upstream 24-inch pipe at the KCBYP manhole. The intake of the suction line is connected to a stainless-steel strainer to remove any large debris, which was attached to an expanding scissors ring with a diameter matching the outlet pipe dimensions. The ISCO low profile area/velocity flow sensor was attached to the same scissors ring. The scissors ring was placed at least one pipe diameter (24 inches) upstream in the pipe. The flow sensor faced upstream and was oriented at the bottom of the pipe. The strainer faced upstream and was situated so that the intake screen was near, but not touching, the surface of the pipe to avoid excess sediment accumulation. The strainer was positioned near the bottom of the pipe so that it was completely underwater during stormwater discharge. The sensor cable and suction tubing were capped and coiled for storage in the manhole in between sample events.

The sampling carboy was kept on ice for the entire sampling event. Within 24 hours after the sampling event concluded (i.e., the time the last aliquot was collected), the carboy was retrieved, capped with a Teflon®-lined cap, and submitted to the laboratory for the analyses required. Using a churn splitter or similar device, laboratory staff distributed proper volumes of homogenized stormwater to bottles for preservation or immediate analysis.

Precipitation was tracked through the Seattle Boeing Field-King County International Airport rain gauge (identified as "KBFI") at: http://www.wrh.noaa.gov/mesowest/getobext.php?wfo=sew&sid=KBFI&num=48&raw=0&dbn=m. The KBFI rain gauge data was recorded to determine how much precipitation fell during sampling periods.

2.7.3 Laboratory Analyses

Whole water samples were analyzed for PCBs using EPA Method 8082, for TSS using Standard Method (SM) 2540D, and for PSD using the Ecology TAPE Method. To provide information for the remedial investigation being conducted by Ecology at NBF and the GTSP, samples were analyzed for total and dissolved metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) using EPA Methods 200.8 and 7470. For two storm events on November 17 and 22, 2011, samples were also analyzed for SVOCs using EPA Method 8270D, and PAHs using EPA SIM Method 8270D. In addition, samples were analyzed for turbidity using EPA Method 180.1 and pH (starting December 28, 2011) using EPA Method 150.1 in order to collect additional information required for General Industrial Permit stormwater reporting. Samples were analyzed for total and dissolved iron and manganese starting

December 28, 2011 using EPA Method 6010. Due to insufficient sample volume on December 5, 2011 and March 7, 2012, only PCBs were analyzed for these events.

3.0 MONITORING RESULTS

The results from monitoring of the NBF storm drain system and LTST performance evaluation have been provided to EPA on a monthly basis as part of the monthly progress reports. These monitoring results are provided in this section. The results from the MBPS, filtered solids, and the sediment traps are also discussed.

3.1 LS431 AND LTST PERFORMANCE ANALYTICAL RESULTS

Laboratory analytical results are provided in Tables 2 through 9. Whole water results are provided in Table 2 for the LS431 point of compliance, Table 3 for KCBYP, Table 4 for MH130A, Table 5 for LSIV, and Table 6 for CESF system treated effluent. Filtered solids results are provided in Table 7 for MH130A, Table 8 for LSIV, and Table 9 for treated effluent.

3.1.1 PCBs IN WHOLE WATER

All water samples of the LTST CESF system effluent have been non-detect for PCBs. Concentrations of total PCBs at the influent to the CESF system have ranged from non-detect (at a reporting limit of 0.010 µg/L) to 1.1 µg/L at MH130A, and from non-detect (at a reporting limit of 0.010 µg/L) to 0.017 µg/L at LSIV. PCBs at the POC, LS431, have been non-detect except for the November 22 – 23, 2011 storm event, which indicated a concentration of total PCBs of 0.025 µg/L. The majority of PCB detections in water samples have been Aroclor 1254, with Aroclor 1260 also being detected in two of the MH130A samples. Other Aroclors were not detected in whole water samples.

3.1.2 TSS AND PSD IN WHOLE WATER

TSS in water samples from the LTST CESF system effluent ranged from non-detect [at a reporting limit of 1.0 milligrams per liter (mg/L)] to 10.4 mg/L. At the influent to the CESF system, TSS in water samples ranged from 3.0 to 53.2 mg/L at MH130A, and from 7.7 to 56.4 mg/L at LSIV. At LS431, TSS in water samples ranged from non-detect (at a reporting limit of 1.0 mg/L) to 110 mg/L. The 110 mg/L TSS result was from the storm event on November 22-23, 2011, and coincides with the only PCB detection at LS431 during the reporting period. The next highest TSS concentration at LS431 was 16.6 mg/L.

PSD data from water samples were highly variable throughout the reporting period at all sampling locations. The CESF effluent data indicate that a significant percentage of very small particulate (below 3.9 µm) can pass through the CESF treatment system, as was expected. However, particles of this size are not expected to settle in Slip 4 (Jones et. al. 2011). PSD data also appear to suggest that 7 of 19 effluent samples contained a majority (based on mass) of particulate greater than 250 µm, a size range that the CESF system was expected to remove. However, in every whole water effluent sample analyzed (Table 6), the TSS concentration given by the PSD analysis (when all particle size groupings are added together) was significantly higher than the direct TSS concentration measured using EPA Method 160.2. That difference in TSS concentration between the two analytical methods was especially pronounced in samples where PSD results indicated a majority of the particulates were greater than 250 µm. It is believed that low TSS concentration in CESF treated effluent may contribute to imprecise PSD analysis in these samples, which limits the ability to draw conclusions from this data set.

3.1.3 SVOCs in Whole Water

At LS431, SVOCs in water (other than PAHs) were non-detect during the reporting period for all constituents except for phenol (two detections with a maximum concentration of 1.8 µg/L) and bis(2-Ethylhexyl)phthalate (three detections with a maximum concentration of 2.5 µg/L). Due to the lower reporting limits used, PAHs were more frequently detected at LS431. Data indicate a correlation between amount of precipitation (and corresponding percentage of treatment system bypass) during the sampling event and detections of PAHs. The monthly events with little to no precipitation (and little to no CESF system bypass) had fewer detected constituents and generally lower PAH concentrations. As high molecular weight compounds with generally low solubility, similar to PCBs, PAHs in stormwater are known to be associated with the suspended solids rather than being present in a dissolved form. Therefore, it is not unexpected that the data suggest that the CESF treatment system is effective at reducing concentration of PAHs.

3.1.4 Metals in Whole Water

High concentrations of iron and manganese were routinely detected in LTST CESF system influent, effluent, and LS431 water samples, consistent with the observation of base flow due to groundwater infiltration into the storm drain system and consistent with the observation of iron bacterial growth in many elements of the LTST system and storm drain system.

Of the other metals analyzed for, arsenic, cadmium, chromium, copper, lead, nickel, and zinc were detected at various concentrations at MH130A, LSIV, LS431, and the CESF effluent (except for cadmium, which was not detected in the effluent). Mercury was not detected at any sampling location in the reporting period.

Data indicate the CESF system decreased metals concentrations in stormwater. For total arsenic in water samples, concentrations at the CESF system influent ranged from 0.7 to 5.3 µg/L at MH130A and from 0.7 to 1.8 µg/L at LSIV, while concentrations at the CESF system effluent ranged from 0.2 to 1.2 µg/L. For total cadmium in water samples, concentrations at the CESF system influent ranged from non-detect (at a reporting limit of 0.1 µg/L) to 0.8 µg/L at MH130A and from non-detect (at a reporting limit of 0.1 µg/L) to 0.7 µg/L at LSIV, while concentrations at the CESF system effluent were all non-detect (at a reporting limit of 0.1 µg/L). For total chromium in water samples, concentrations at the CESF system influent ranged from non-detect (at a reporting limit of 0.5 µg/L) to 4.8 µg/L at MH130A and from 0.9 to 3.6 µg/L at LSIV, while concentrations at the CESF system effluent ranged from non-detect (at a reporting limit of 0.5 to 1.0 µg/L) to 0.8 µg/L. For total copper in water samples, concentrations at the CESF system influent ranged from 1.6 to 10.0 µg/L at MH130A and from 1.2 to 11.4 µg/L at LSIV, while concentrations at the CESF system effluent ranged from non-detect (at a reporting limit of 0.5 µg/L) to 4.3µg/L. For total lead in water samples, concentrations at the CESF system influent ranged from 0.2 to 12.9 µg/L at MH130A and from 0.2 to 26.1 µg/L at LSIV, while concentrations at the CESF system effluent ranged from non-detect (at a reporting limit of 0.1 µg/L) to 18.6 µg/L. For total nickel in water samples, concentrations at the CESF system influent ranged from 0.9 to 2.4 µg/L at MH130A and from 1.0 to 4.1 µg/L at LSIV, while concentrations at the CESF system effluent ranged from non-detect (at a reporting limit of 0.5 µg/L) to 1.3 µg/L. For total zinc in water samples, concentrations at the CESF system influent ranged from 18 to 141 µg/L at MH130A and from 8 to 87 µg/L at LSIV, while concentrations at the CESF system effluent ranged from non-detect (at a reporting limit of 4 µg/L) to 31 µg/L.

As a point of comparison for the metals concentrations, the metals listed above (except nickel and chromium) have a benchmark value established in the Industrial Stormwater General Permit applicable to various industry categories. All of the CESF effluent samples at NBF were well below the listed benchmark values for those metals.

3.1.5 PCBs in Filtered Solids

Calculated concentrations of PCBs in filtered solids (using filter bag weights and mass of solids collected) ranged from 0.39 to 11.66 mg/kg at MH130A, from 0.01 to 2.37 mg/kg at LSIV, and from 0.29 to 4.50 mg/kg at the CESF effluent. Calculated concentrations of PCBs in filtered solids (using flow totalizer data) ranged from 0.005 to 0.145 µg/L at MH130A, from less than 0.001 to 0.014 µg/L at LSIV, and from less than 0.0001 to 0.0023 µg/L at the CESF effluent.

3.2 SUMMARY OF FLOW MEASUREMENTS AND PRECIPITATION DATA

During the period from November 1, 2011 through October 31, 2012, approximately 176 million gallons of water were treated and discharged by the CESF system. Flow rate measurements collected by the Flo-Dar sensor and Hach flow logger at the lift station discharge (LS431) indicated that 257 million gallons of stormwater were discharged from the lift station to Slip 4 in the same period. This volume includes both treated water and any water discharged by King County pumps that bypasses treatment. Therefore, an estimated 68 percent of stormwater flowing to the lift station was treated by the LTST system.

Accordingly, 82 million gallons of stormwater bypassed treatment at the LTST system and was directly discharged to Slip 4. Periods of bypass of the treatment system can be determined from the flow data collected at LS431, as evidenced by a sharp increase in flow rate of discharge when a King County pump turns on and a sharp decrease in flow rate of discharge when a King County pump turns off. A summary of the 2011-2012 LTST sampling events and information on the times and durations of bypass during each event is included in Table 10.

The vast majority of LTST system bypass occurs with just one of the four King County pumps on. From November 2011 through October 2012, the Flo-Dar data indicate there have been 12 short periods of bypass where two King County pumps were on, for a total of 251 minutes for the year. The flow data indicate no more than two King County pumps were ever on simultaneously in this time period. The Flo-Dar meter was not calibrated for more than 1 KC pump on, so the accuracy of the data for this brief amount of time has not been confirmed. However, due to the low frequency and short duration of these occurrences, any error in flow data is deemed to be negligible when considering volumes for the entire year.

During the one-year period from November 2011 through October 2012, approximately 37 inches of precipitation was measured at the Boeing Field weather station (identified as KBFI), 13.9 million gallons flowed through the Re-Routed King County North Lateral storm drain line, 9.30 million gallons were pumped directly from MH130A to the LTST system, and 1.15 million gallons bypassed the MH130A pump (by overtopping the adjacent MH130B weir) and flowed to the LSIV. Therefore, approximately 89 percent of stormwater at MH130A was captured and pumped directly to the treatment system (with an additional portion of the volume bypassed picked up for treatment at the LSIV). This annual percent capture at MH130A is slightly under the design average long-term capture of 91 percent. Given that stormwater discharge from NBF was well within PCB interim goals, it is unlikely to be necessary to increase pump capacity at MH130A. However, the MH130A pump system will be evaluated to see if flow rate improvements can be made in the second year of operation.

Raw flow data collected at one-minute intervals of discharge at LS431, at 15-minute intervals for CESF discharge, and at 30-second intervals at the King County re-route wet well weir and MH130B weir, are not presented in this report due to the large number of readings collected, but are available in electronic form upon EPA or Ecology's request. Precipitation totals and stormwater flow volumes by month are listed in Table 11.

3.3 MEDIA BED PILOT STUDY RESULTS

A pilot test of stormwater treatment was conducted at NBF to test passive stormwater treatment using two media beds with different media blends of rhyolite sand, zeolite, and either granular activated carbon (GAC) or walnut shell. The testing was conducted between November 2011 and March 2012. Testing indicated the ability of media beds to reduce TSS and PCB concentrations. However, clogging of both the media beds due to growth of iron-oxidizing bacteria significantly limited the stormwater flow rate through the media. The testing procedures and results were documented in a memorandum provided to EPA (Geosyntec 2012). Based on the results of LTST performance, the FWAAC calculation (Appendix A), and the MBPS, there are no current plans to implement media bed treatment at NBF.

3.4 SEDIMENT TRAP SAMPLING RESULTS

Sediment trap samples were most recently collected on April 24, 2012. Sediment trap sample analytical results for total PCBs for this most recent sampling event and for previous sediment trap sampling events are provided in Table 12.

Evaluation of the trends in PCB concentrations at each of the sampling locations was somewhat inconclusive because of the periodic instances when not enough solids had accumulated in the traps to allow the laboratory to present the PCB result on a dry weight basis, but rather the concentrations were presented "as received". It was also not possible to draw firm conclusions about reductions in PCB mass loading following source control activities using only sediment trap solids PCB concentration data on their own. Therefore, we have also requested that the laboratory record the total mass of solids collected in the sediment traps for the past few sediment trap sampling events. Examining both sets of data together revealed apparent reductions in the PCB mass deposition rates at sediment trap locations SL4-T5 and SL4-T1, which are likely attributable to both STST and LTST system operations, as well as to the PCB source control activities that occurred prior to and during the most recent annual sediment trap sampling period.

4.0 EVALUATION OF LTST PERFORMANCE

This section provides an evaluation of the NBF LTST monitoring results for the period of November 2011 through October 2012. The first year of LTST monitoring and subsequent evaluation of the collected data has prompted recommendations for minor modifications to the existing SAP for the stormwater monitoring program for the November 2012 through October 2013 monitoring year. The modifications are presented in an addendum to the existing SAP, included in this report in Appendix B.

4.1 LTST SYSTEM AND POINT OF COMPLIANCE

Results from the first year of LTST system operation confirm the ability of the LTST system to meet the interim goals as described in Section 1.4.2. At the point of compliance (LS431), all flow-weighted composite whole water samples were below the marine chronic water quality criterion interim goal of 0.030 µg/L PCBs. All twelve of the routine 3-day monthly event composite samples and six out of seven composite storm event samples at LS431 were non-detect for PCBs, with only one storm event sample measuring a concentration of 0.025 µg/L PCBs. It should be noted that the one detection came during the largest storm event, which consisted of 1.99 inches of precipitation during the sampling period. This is not unexpected because more untreated stormwater will bypass the treatment system and be discharged during intense storm events.

The FWAAC has been calculated for comparison to the 0.018 µg/L alternative interim goal. A memorandum describing the FWAAC evaluation and providing the associated calculations was prepared by Geosyntec and the Panel and is included in Appendix A. For the first year of LTST system operation, the FWAAC for PCBs was calculated as 0.0011 µg/L using only Flo-Dar flow rate data for both treated and untreated stormwater, and as 0.0013 µg/L using CESF system in-line pipe flow meter data. Both calculations are well below the alternative interim goal of 0.018 µg/L PCBs.

Although not explicitly part of the LTST design or part of the SAP, it is worth noting that NBF is also covered under the Ecology Industrial Stormwater General Permit (ISGP). Since the LTST system has been in place, LS431 is also the designated sampling point for ISGP compliance. All LTST effluent and LS431 sampling results have met the benchmark values for ISGP monitoring parameters (e.g., turbidity, pH, copper, zinc).

LTST flow monitoring indicates that the LTST system treated approximately 176 million gallons, which is 68 percent of measured stormwater volume discharged from the lift station to Slip 4 during the first year of LTST system operation. That treatment percentage is well above the original design basis of 59 percent stormwater volume capture (Geosyntec Consultants and Landau Associates 2011). This indicates the capacity of the treatment system is appropriate.

A calculation by Geosyntec of the stormwater treatment volume (see Table 1 of Appendix A) shows a larger volume of 197 million gallons of stormwater was treated based on interpretation of LS431 Flo-Dar data, compared to the 176 million gallon volume observed based on CESF system flow meters. Additionally, Table 2 of Appendix A shows slightly different total volumes were used for the two calculations of the FWAAC. For the calculation of the FWAAC using CESF system flow meter data, the volume of total discharge was calculated substituting CESF system flow meter data in place of Flo-Dar data for total flow in August and September 2012, because 100 percent of stormwater was treated in those months. This substitution is also reflected in Table 11. The full-pipe flow meters of the CESF system are considered to be more accurate than the Flo-Dar open channel flow meter readings and summation of the data showing flows of 1,500 gpm or less. We plan to continue to use the CESF system flow meters for tracking of volume of stormwater treated, and to substitute CESF system flow meter data for Flo-Dar data for future months where 100 percent of stormwater is treated. We also plan to conduct a Flo-Dar flow meter annual calibration in first quarter of 2013.

As listed in Appendix A, the FWAAC at the influent of the LTST (prior to CESF treatment) over the first year of LTST operation was calculated to be 0.0097 µg/L and the FWAAC at the LS431 POC was calculated to be 0.0011 µg/L (or 0.0013 µg/L if the CESF system flow meter readings are used for treated stormwater volume). Given that approximately 257.84 million gallons of stormwater were discharged from LS431 to Slip 4 during this time period, the PCB loading to the LTST system is estimated to have been approximately 9.47 grams and the PCB loading to Slip 4 (after treatment by the CESF system) is estimated to have been 1.07 grams. This calculated PCB loading to Slip 4 is expected to be biased slightly low due to the fact that non-detect values are treated as zero. However, as noted in Section 4.3.1, the zero assumption is more accurate than assuming a detection of PCBs at ½ the reporting limit for non-detect events. An alternative FWAAC calculation is provided in Appendix A, using both LSIV and effluent filtered solids data rather than zero for the non-detect whole water concentrations. As listed in Appendix A, the alternative FWAAC for PCBs using filtered solids data was calculated to be 0.0030 µg/L. Using this calculation, the estimated PCB loading to Slip 4 is 2.93 grams. Therefore, PCB loading to Slip 4 is likely to be in the range of 1 to 3 grams per year.

The post-treatment PCB mass loading to Slip 4 was initially estimated to be an average of 10.64 grams per year (Geosyntec 2011a). The calculated value for the first year of LTST operation of 1 to 3 grams per year corresponds to a PCB loading to Slip 4 that is significantly less than initially estimated.

4.2 RE-ROUTED KING COUNTY STORMWATER

A main reason for the re-route of the offsite portion of the North Lateral storm drain line as part of the LTST construction was to improve percentage of the stormwater flow at MH130A that can be captured for treatment. However, another reason for the re-route was to be able to divert offsite King County North Lateral stormwater directly to Slip 4, if necessary to reduce the flow rate of stormwater to the LTST system in order to attain the PCB interim goals for NBF stormwater discharge.

The 13.93 million gallons of re-routed King County North Lateral stormwater that were conveyed to the LSIV represents just over 5 percent of the total annual discharge at LS431. PCBs were detected in the King County Stormwater, but at relatively low concentrations: the maximum concentration was 0.015 µg/L during the December 2011 monthly sampling event. PCBs were non-detect for five out of seven monthly events and two out of four storm events. One event was conducted during a period of 0.00 inches precipitation, and all other events had at least 0.01 inches of precipitation during the sampling period. As listed in Table 1 and the associated footnotes, the precipitation amounts (in inches) for the seven KCBYP monthly sampling periods were 0.00, 0.12, 0.07, 0.06, 0.29, 0.01, and 0.46 inches. There does not appear to be a correlation between precipitation amounts and PCB concentration. The lack of PCB measurements at this location at or above a concentration of 0.018 µg/L, combined with the success of the LTST system in meeting interim goals, indicates that diverting the re-routed King County North Lateral stormwater around the LTST system (directly to Slip 4) is not necessary at this time. As noted in the Expert Panel memorandum (Appendix A), the FWAAC at the influent of the LTST was calculated to be 0.0097 µg/L for PCBs. Therefore, treating a portion of the water from the King County North Lateral Line in the LTST appears to have added benefits compared to rerouting the water directly to Slip 4 without treatment.

4.3 VALIDITY OF ASSUMPTIONS

The alternative solids interim goal of a FWAAC for total PCBs in water of 0.018 µg/L at the LS431 POC was developed using certain estimates and assumptions (Jones et. al. 2011). It is worth comparing actual measured results from the first year of LTST system operation to values assumed in that evaluation.

4.3.1 NON-DETECT RESULTS

Because the laboratory analytical reporting limit for PCB Aroclors is currently 0.010 µg/L, and the alternative interim goal is a FWAAC of 0.018 µg/L for PCBs, it was decided to use zero for non-detect PCB results when calculating the FWAAC (Jones et. al. 2011). The reason is that using the reporting limit, or even half the value of the reporting limit, could result in a calculation that gives a false exceedance of the alternative solids interim goal. To demonstrate the validity of using zero for non-detect PCB results, filtered solids analytical results from treatment system effluent were evaluated to calculate apparent PCB concentrations in water for each event where data were available, as follows:

$$\frac{Mass\ of\ PCBs\ in\ filtered\ solids\ (\mu g)}{Volume\ of\ stormwater\ filtered\ (L)} = Concentration\ of\ PCBs\ in\ stormwater\ \left(\frac{\mu g}{L}\right)$$

The results of this evaluation are provided in Table 9. Calculated PCB concentrations ranged from less than 0.001 µg/L to a maximum of 0.002 µg/L for the 17 monthly and storm event samples collected of treatment system effluent. The mean calculated PCB concentration of the 17 samples was 0.0007 µg/L. Comparing that result to the laboratory reporting limit for PCBs in whole water of 0.010 µg/L indicates that using zero for non-detect results is more appropriate than using the reporting limit, 0.010 µg/L, or even half of the reporting limit, 0.005 µg/L.

The above calculation can also be performed using the effluent whole water TSS measurements and the mass of filtered solids rather than the volume of stormwater filtered for the filter sample. This analysis yields a similar result of a calculated PCB concentration near 0.001 µg/L. However, that calculation is complicated by the fact that 9 of the 17 whole water measurements of treated effluent were below the TSS analytical reporting limit of 1.0 mg/L, and so it is unclear whether it would be appropriate to use half the value of the reporting limit or some other value for those non-detect results.

To assess the effect of using zero for non-detect results on the FWAAC, an alternative calculation of the FWAAC was performed using both LSIV and effluent filtered solids data rather than zero for the non-detect whole water concentrations, as presented in Appendix A. As listed in Appendix A, the FWAAC for PCBs using filtered solids data was calculated to be 0.0030 µg/L, which is still well below the interim goal of 0.018 µg/L.

4.3.2 Other Assumptions Used to Calculate the Alternative Interim Goal

Based on hydrologic modeling, a total volume for annual stormwater discharge from the lift station to Slip 4 of 352 million gallons was estimated (Geosyntec Consultants 2011a). The measured annual discharge of 257 million gallons of stormwater in the first year was 73 percent of the expected average volume, despite measured precipitation of 37.22 inches, which was 3 percent more than the historical annual average precipitation for the site vicinity of approximately 36 inches. It is not clear why the hydrologic model was less than the measured runoff volume. However, the measured discharge volume indicates that the original estimate of average annual runoff volume appears to have been a conservative estimate.

The annual average percentage of stormwater that was estimated to be treated was 59 percent. The measured volume of stormwater treated was 167 million gallons, corresponding to 68 percent of the volume discharged to Slip 4. Therefore, the assumption of average percentage of stormwater that will be treated appears to have been a conservative assumption and suggests that the 0.018 µg/L PCB FWAAC would not need to be adjusted downward based on the actual measurements.

The average TSS concentration at the LSIV was estimated to be 27 mg/L, compared to the measured average LSIV TSS concentration of 23.3 mg/L. The average CESF system effluent TSS concentration was estimated to be approximately 0.5 mg/L based on the performance of the STST system. The measured average TSS concentration in LTST system treated effluent was 2.4 mg/L. This higher than expected TSS in the treated effluent is believed to be the result of the higher concentration of iron solids generated by the greater proportion of infiltrating groundwater to the LTST system compared to the STST stormwater source at MH130A. Overall, the measured TSS results at LSIV and system effluent suggest a similar solids mass loading to Slip 4 compared to what was originally estimated, again suggesting that no adjustment to the 0.018 µg/L PCB FWAAC evaluation process would need to be made.

5.0 USE OF THIS REPORT

This report has been prepared for the exclusive use of The Boeing Company and applicable regulatory agencies for performance evaluation of a long-term stormwater treatment facility for removal of PCBs from stormwater in the storm drain system at NBF. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

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

LANDAU ASSOCIATES, INC.

Martin Valeri, E.I.T.
Senior Staff Engineer

Joseph A. Kalmar, P.E.
Principal

JAK/MCV/tam

6.0 REFERENCES

AMEC Geomatrix. 2011. *Slip 4 Salinity Monitoring Data Report, North Boeing Field, Seattle/Tukwila, Washington*. Submitted to The Boeing Company. June.

EPA. 2012. Letter: *EPA Approval of Final Memorandum, Amended Monitoring Approach Recommendations for North Boeing Field Long-Term Stormwater Treatment System, North Boeing Field, Seattle, Washington, prepared for The Boeing Company by Geosyntec Consultants and NBF Stormwater Expert Panel, dated January 10, 2012, ASAOC for Removal Action, CERCLA-10-2010-0242.* From Karen Keeley, Project Manager, U.S. Environmental Protection Agency, to Carl Bach, Project Manager, The Boeing Company. January 19.

EPA. 2011. Letter: *EPA Approval of Slip 4 Salinity Monitoring Data Report, North Boeing Field, Seattle, Washington, prepared for The Boeing Company by AMEC Geomatrix, Inc., dated June 2011; ASAOC for Removal Action, CERCLA-10-2010-0242.* From Karen Keeley, Project Manager, U.S. Environmental Protection Agency, Region 10, to Brian Anderson, The Boeing Company. June 20.

EPA. 2010. Memorandum: *Action Memorandum for the Time-Critical Removal Action at North Boeing Field near the Slip 4 Early Action Area of the Lower Duwamish Waterway Superfund Site, Seattle, King County, Washington.* From Karen Keeley, Remedial Project Manager, U.S. Environmental Protection Agency, Region 10, to Daniel D. Opalski, Director, Office of Environmental Cleanup. September 23.

EPA and Boeing. 2010. *Administrative Settlement Agreement and Order on Consent for Removal Action, North Boeing Field and the Slip 4 Early Action Area of the Lower Duwamish Waterway Superfund Site, Seattle, Washington*. U.S. Environmental Protection Agency Region 10 Docket No. CERCLA-10-2010-0242. September 29.

Geosyntec Consultants. 2012. Memorandum: *Media Bed Pilot Study – Final Report*. May 16.

Geosyntec Consultants. 2011a. *Final Removal Action Work Plan: Long-Term Stormwater Treatment Addendum. North Boeing Field*. March 3.

Geosyntec Consultants. 2011b. *Final Removal Action Work Plan: Long-Term Stormwater Treatment, North Boeing Field*. January 26.

Geosyntec Consultants. 2011c. *AKART Analysis Report for North Boeing Field Long-Term Stormwater Treatment*. February 9.

Geosyntec and Landau Associates. 2011. *Final Pre-Design Technical Memorandum: Long-Term Stormwater Treatment*. North Boeing Field. April 6.

Jones, J., M. Stenstrom, R. Pitt, and Geosyntec Consultants. 2012. Memorandum: *Amended Monitoring Approach Recommendations for North Boeing Field Long-Term Stormwater Treatment System.* From Jon Jones, Michael Stenstrom, and Robert Pitt, NBF Stormwater Expert Panel; jointly with Geosyntec Consultants, to Karen Keeley, U.S.EPA. January 10.

Jones, J., Stenstrom, M., Pitt, R., and Geosyntec Consultants. 2011. Memorandum: *Alternative Interim Goal Recommendations for Protection of Slip 4 Sediment Recontamination.* December 12.

Landau Associates 2012a. S*ampling and Analysis Plan, Long-Term Stormwater Treatment, North Boeing Field, Seattle, Washington*. Prepared for The Boeing Company. March 21.

Landau Associates. 2012b. *Removal Action/Stormwater Treatment Completion Report, North Boeing Field, Seattle, Washington*. Prepared for The Boeing Company. March 23.

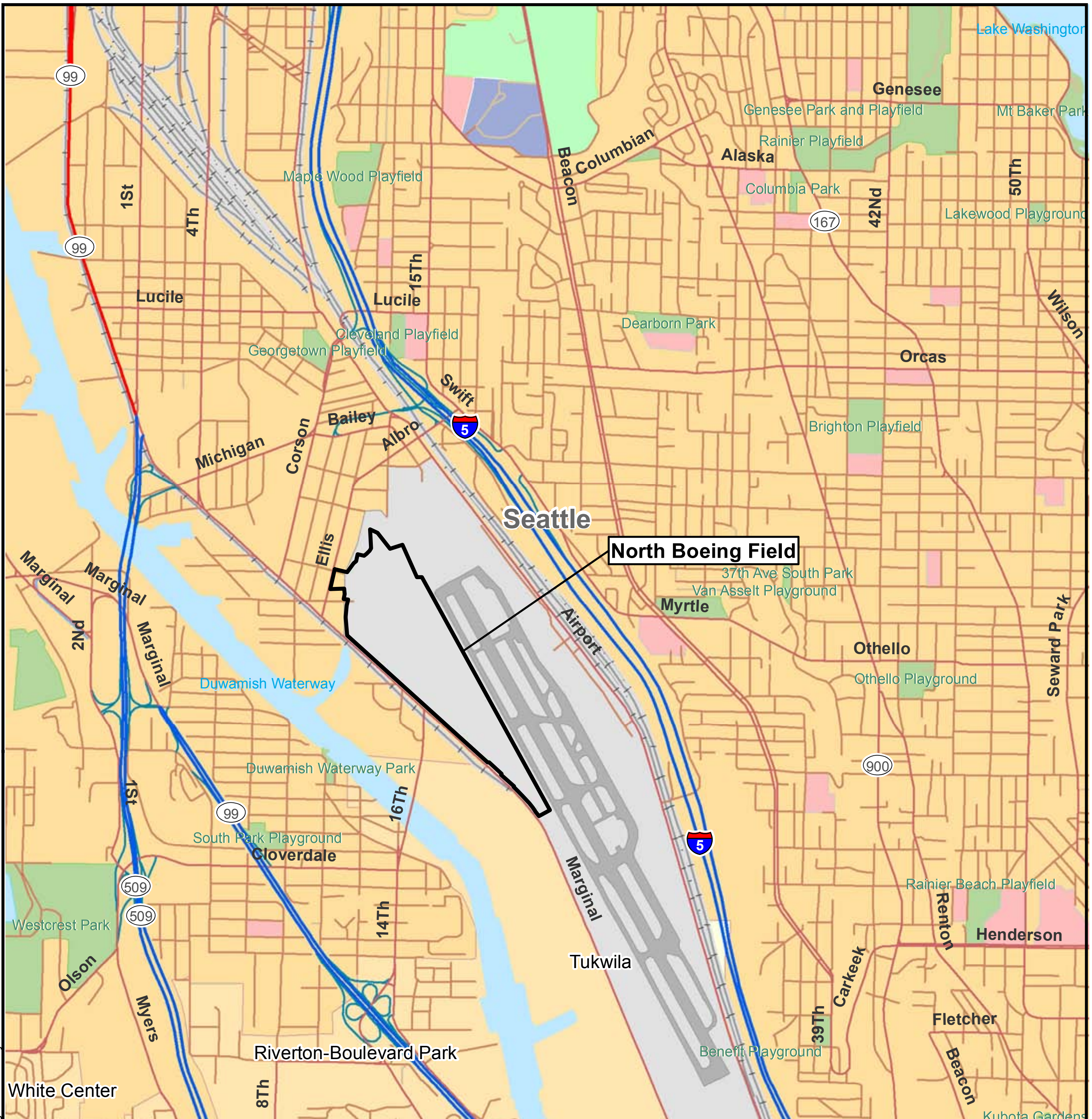
Landau Associates. 2011a. *Removal Action Work Plan, Short-Term Stormwater Treatment, North Boeing Field, Seattle, Washington*. Prepared for The Boeing Company. January 7.

Landau Associates. 2011b. *Technical Memorandum: November 2011 Progress Report, North Boeing Field Stormwater Treatment, Lower Duwamish Waterway Superfund Site, EPA Docket No. CERCLA-10-2010-0242*. From Kristi Hendrickson and Joseph Kalmar, Landau Associates, to Karen Keeley, U.S. Environmental Protection Agency. December 5.

Landau Associates. 2011c. *100% Design Report, Long-Term Stormwater Treatment, North Boeing Field, Seattle, Washington*. Prepared for The Boeing Company. June 24.

Landau Associates. 2010. *Proposed Design, Short-Term Stormwater Treatment Facility, North Boeing Field, Seattle, Washington*. Prepared for The Boeing Company. July 15.

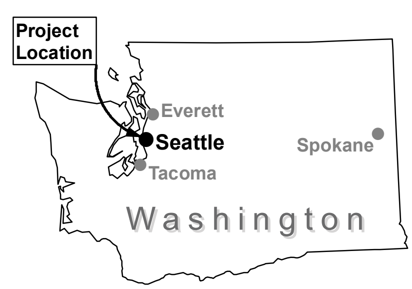
SAIC. 2011. *North Boeing Field/Georgetown Steam Plant Site Remedial Investigation/ Feasibility Study: Assessment of Infiltration and Inflow to North Boeing Field Storm Drain System*. Prepared for the Washington State Department of Ecology. Science Applications International Corporation. February.



N

0 0.5 1

Miles

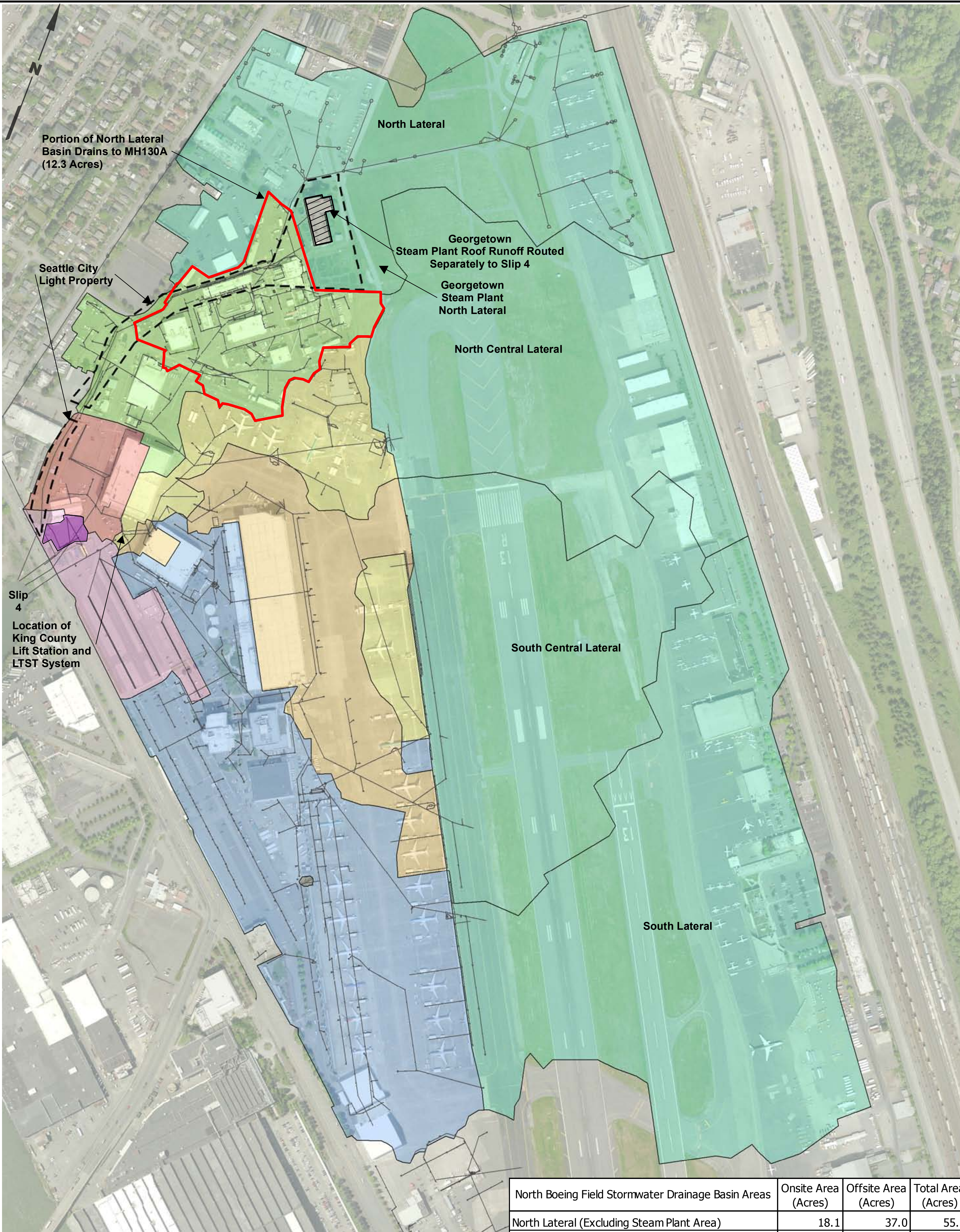


Data Source: ESRI 2008

Landau Associates

North Boeing Field Seattle, Washington	**Vicinity Map**	Figure 1

Y:\Projects\025082\MapDocs\3111\Completion Report\Figure 1 Vicinity.mxd 2/27/2012



North Boeing Field Stormwater Drainage Basin Areas	Onsite Area (Acres)	Offsite Area (Acres)	Total Area (Acres)
North Lateral (Excluding Steam Plant Area)	18.1	37.0	55.1
North Lateral Steam Plant Only - No Roof	0.0	4.1	4.1
North-Central Lateral	14.7	42.6	57.3
South-Central Lateral	21.9	42.7	64.6
South Lateral	46.3	64.3	110.6
Bldg 3-380 Area	4.6	0.0	4.6
Re-Routed to Combine with 3-380 Drainage Area	0.5	0.0	0.5
Total Drainage Area to Lift Station (LS431)	106.1	190.7	296.8
Parking Lot Area (Downstream of KC Lift Station)	6.8	0.0	6.8
Sanitary Sewer <0.1 Acres			

Legend

- MH130 Drainage Basin
- Off-site
- Drainage to Sanitary Sewer
- Building 3-380 Area
- North-Central Lateral
- North Lateral
- Parking Lot Area (Downstream of King County Lift Station, LS431)
- South-Central Lateral
- South Lateral
- Area Re-Routed to Combine with 3-380 Drainage Area

0 450 900

Scale in Feet

Data Source: Aerial - SAIC 2009; Conveyance System - The Boeing Company (On-site) and SAIC 2009 (Off-site); Basin Boundaries - The Boeing Company (On-site), SAIC 2009 (Off-site) Figure 2-1 "Storm Drain Lines in the Vicinity of NBF-GTSP Site", and City of Seattle Map "Lower Duwamish Waterway Areas Draining to Slip 4"

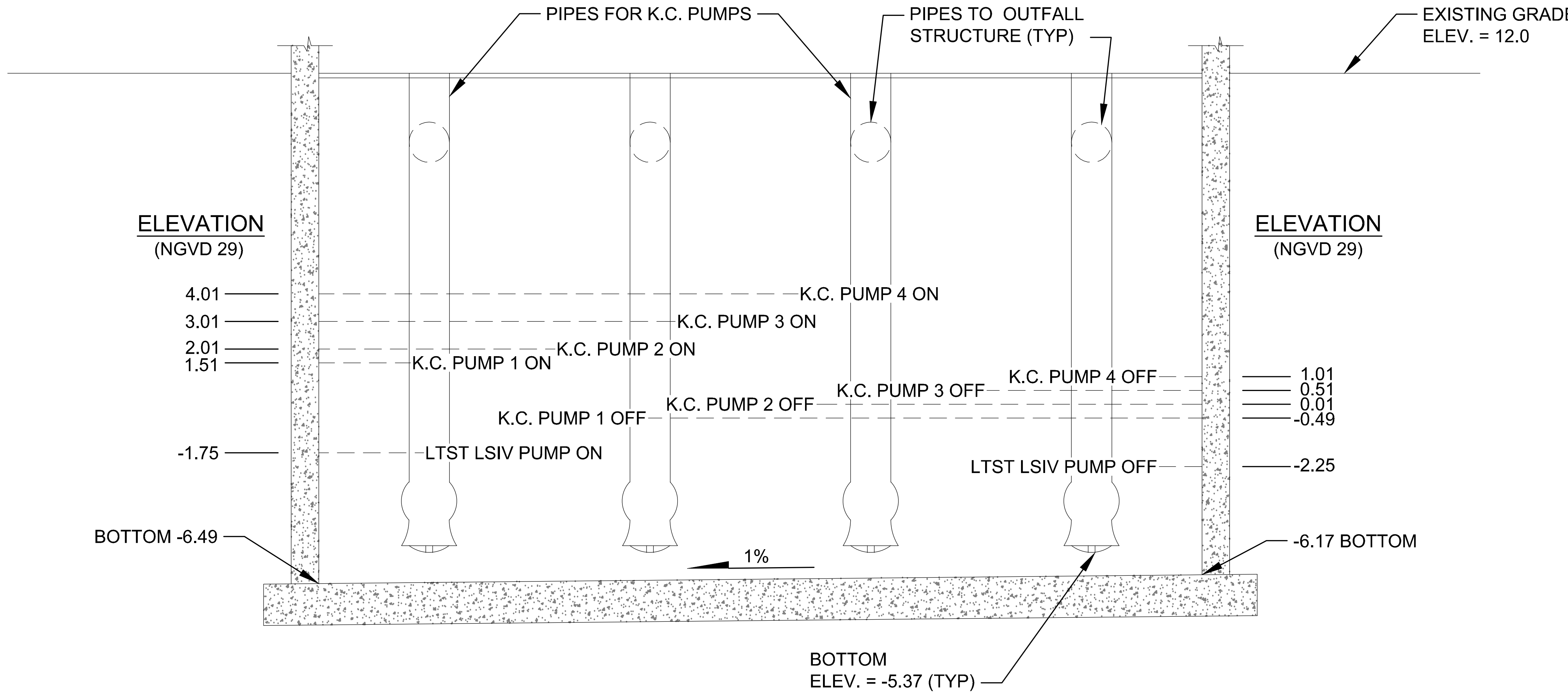
Note
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

LANDAU ASSOCIATES

North Boeing Field
Seattle, Washington

North Boeing Field Stormwater Drainage Basins

Figure
2



Notes

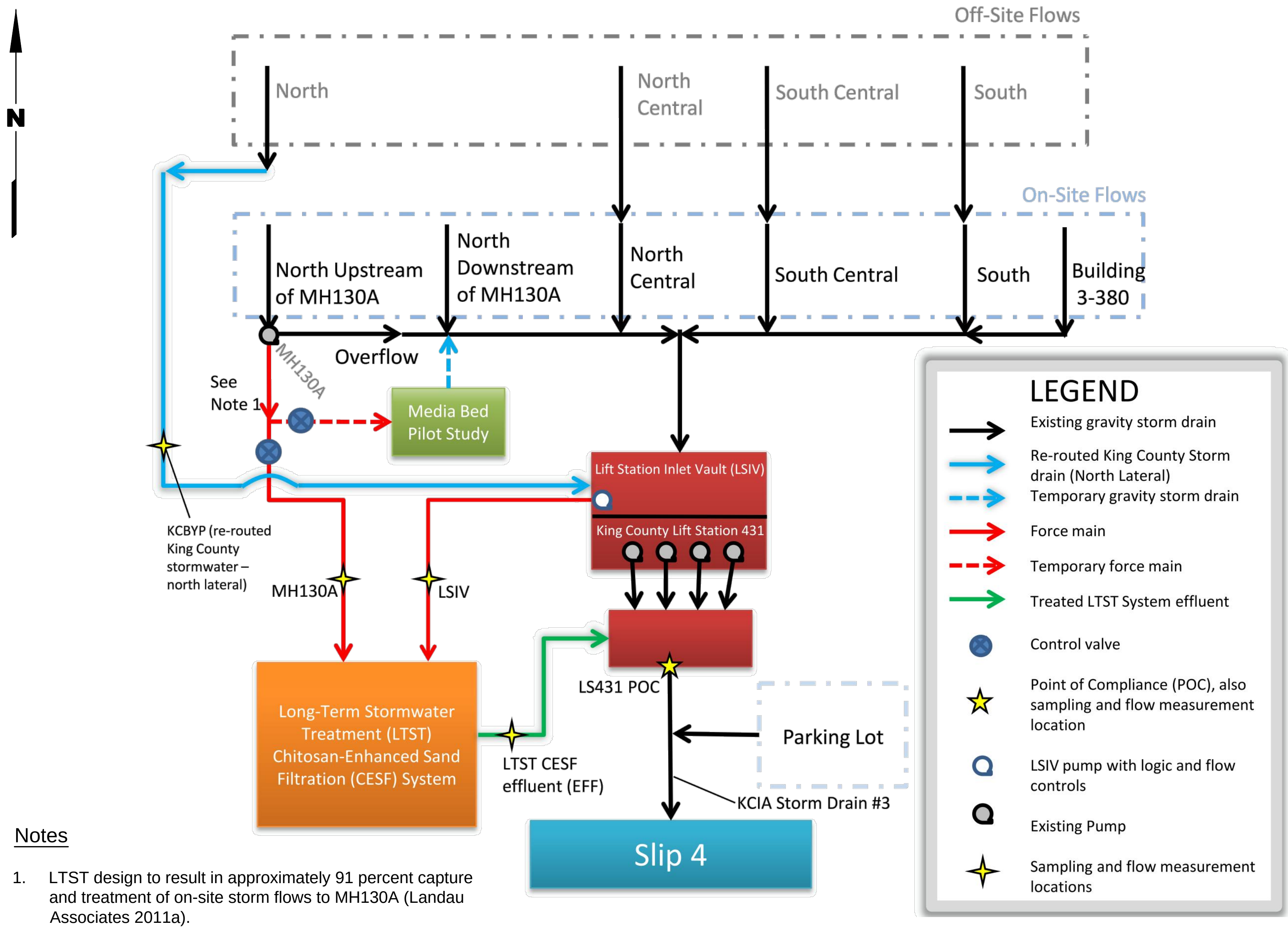
1. K.C. = King County
2. LTST LSIV pump is on a VFD. The pump on setting at elevation -1.75 triggers a flow rate of approximately 500 gpm. Flow rate is increased with rising water level, up to max LTST system capacity at approximate elevation 0.67.
3. On/Off settings as of February 2013. Settings may be adjusted to optimize treatment system operation.

0 5 10
Scale in Feet

SOURCE: 1944 AS-BUILT DRAWING PUMPING PLANT NO. 2 PROVIDED BY KING COUNTY

North Boeing Field Seattle, Washington	**LSIV Section Showing Pump On/Off Settings**	Figure 3

LANDAU ASSOCIATES



Notes

1. LTST design to result in approximately 91 percent capture and treatment of on-site storm flows to MH130A (Landau Associates 2011a).

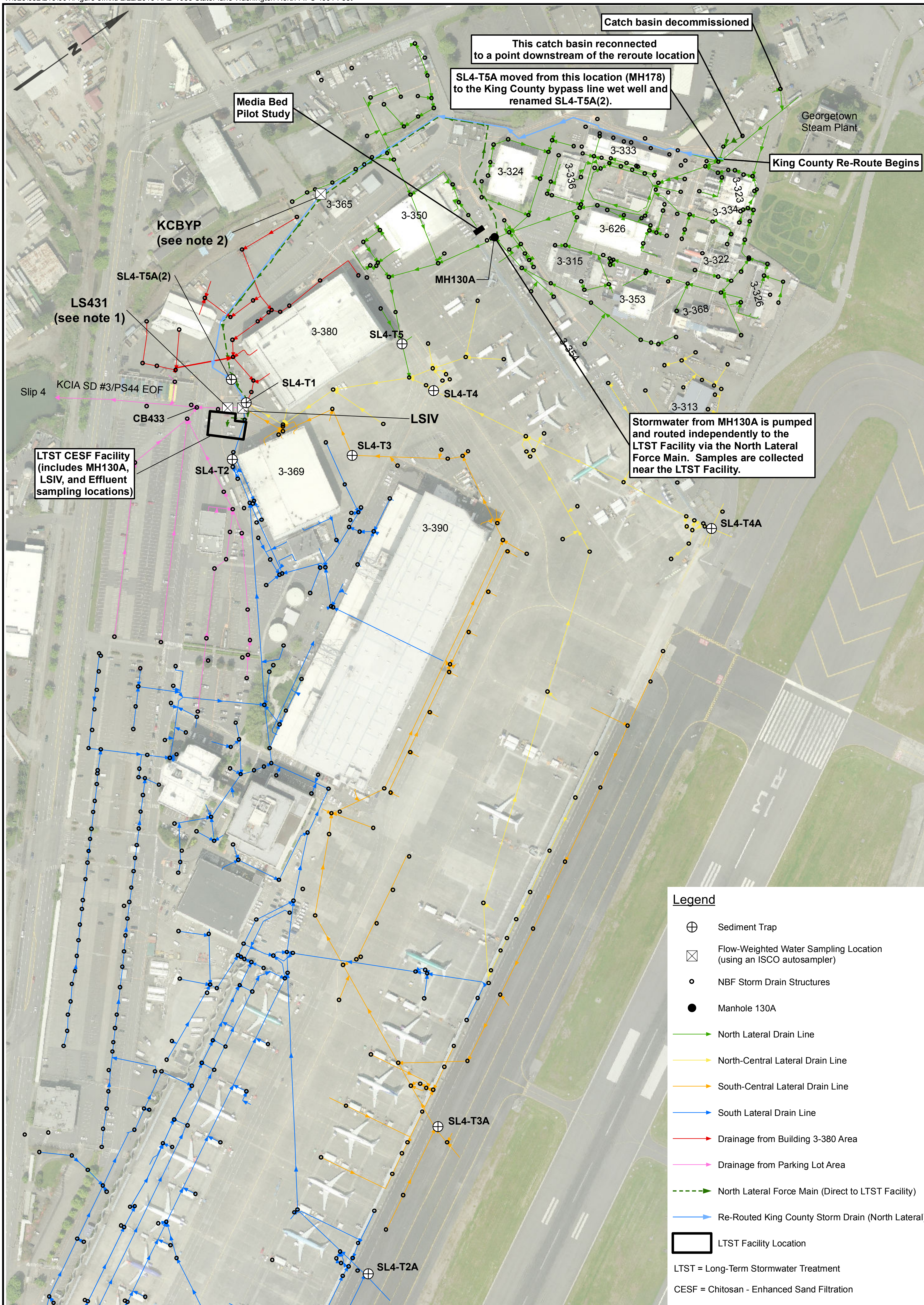
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Source: Adapted from Figure 1 (Jones et. al 2012)

LANDAU ASSOCIATES

North Boeing Field Seattle, Washington	**Schematic Diagram of LTST System Components**	Figure 4

V:\025\082\213\004\Figure 5.mxd 2/22/2013 NAD 1983 StatePlane Washington North FIPS 4601 Feet



Notes:

1. LS431 is the Point of Compliance (POC).
2. KCBYP is the sampling location for re-routed King County stormwater - north lateral.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 250 500

Scale in Feet

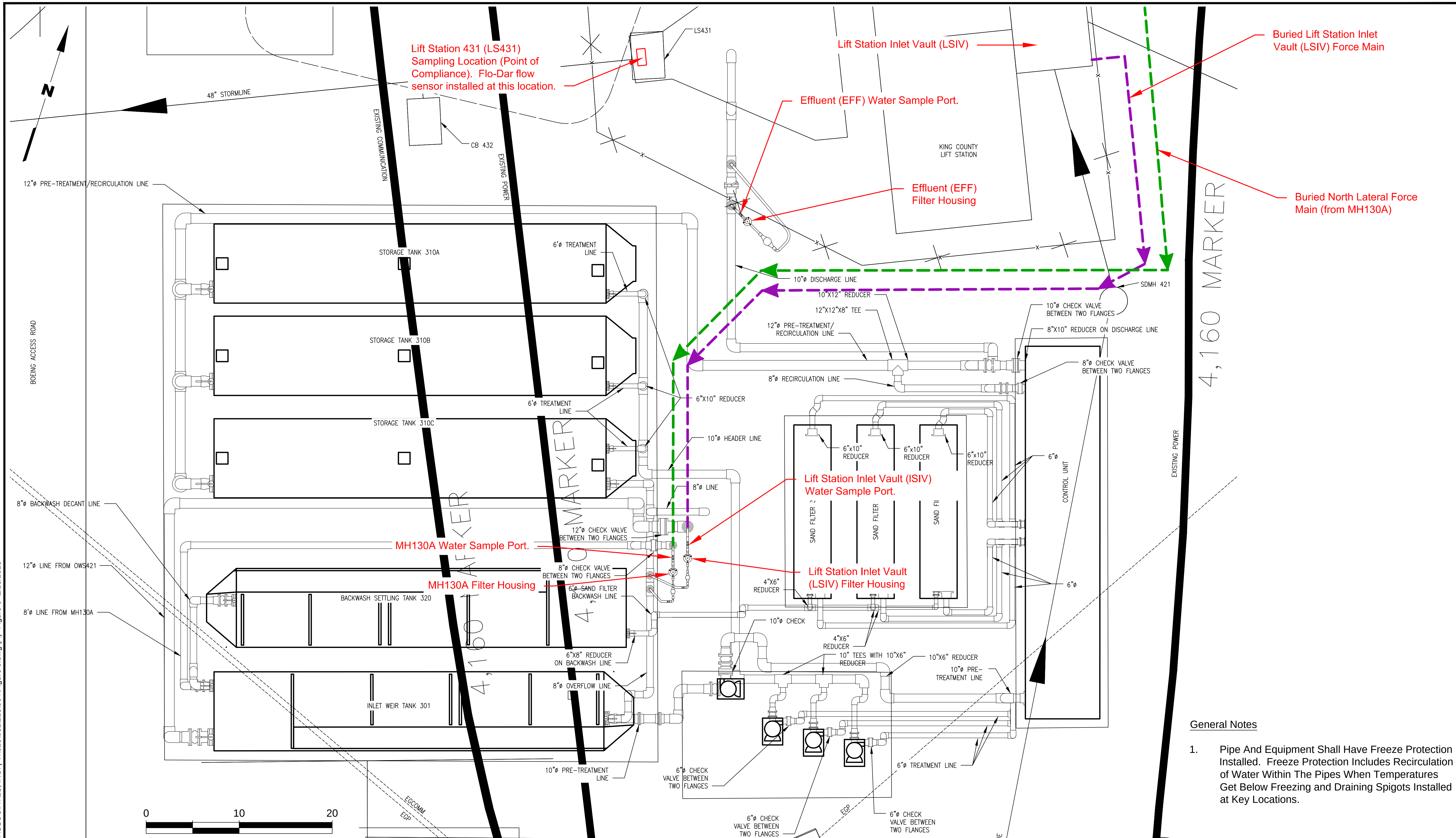
Storm Drain System Data Source: SAIC

LANDAU ASSOCIATES

North Boeing Field
Seattle, Washington

Storm Drain System and LTST Sampling Locations

Figure 5



General Notes

1. Pipe And Equipment Shall Have Freeze Protection Installed. Freeze Protection Includes Recirculation of Water Within The Pipes When Temperatures Get Below Freezing and Draining Spigots Installed at Key Locations.

Source: Boeing Treatment System Piping Layout Plan M502 Record Drawing Dated 12/08/11

Note

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

LANDAU ASSOCIATES

North Boeing Field Seattle, Washington	LTST Sampling Locations	Figure 6

TABLE 1
SUMMARY OF LTST 2011-2012 LTST STORMWATER SAMPLING EVENTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Event	Begin Date	End Date	Precipitation (inches) (a)	LS431 Whole Water	LSIV Whole Water	LSIV Filtered Solids	MH130A Whole Water	MH130A Filtered Solids	Effluent Whole Water	Effluent Filtered Solids	KCBYP Whole Water
November Monthly	11/8/2011	11/11/2011	0.00	✓	✓ (b)	✓	✓	✓	✓	✓	
December Monthly	12/5/2011	12/8/2011	0.00	✓	✓ (b)	✓	✓	✓	✓	✓	✓
January Monthly	1/9/2012	1/12/2012	0.23 (c)	✓	✓ (d)	✓	✓	✓	✓	✓	✓
February Monthly	2/6/2012	2/9/2012	0.10 (e)	✓	✓ (d)	✓	✓	✓	✓	✓	✓
March Monthly	3/5/2012	3/8/2012	0.06	✓	✓ (d)	✓	✓	✓	✓	✓	✓
April Monthly	4/2/2012	4/5/2012	0.29	✓	(f)	✓	✓	✓	✓	✓	✓
May Monthly	5/7/2012	5/10/2012	0.01	✓	✓ (d)	✓	✓	✓	✓	✓	✓
June Monthly	6/4/2012	6/7/2012	0.87 (g)	✓	✓ (d)	✓	✓	✓	✓	✓	✓
July Monthly	7/9/2012	7/11/2012	0.00	✓	(f)	✓	✓	✓	✓	✓	
August Monthly	8/6/2012	8/9/2012	0.00	✓	(f)	✓	✓	✓	✓	✓	
September Monthly	9/10/2012	9/13/2012	0.01	✓	(f)	✓	✓	✓	✓	(h)	
October Monthly	10/1/2012	10/4/2012	0.00	✓	(f)	✓	✓	✓	✓	✓	
Storm	11/16/2011	11/17/2011	0.38	✓	✓ (b)	✓	✓	✓	✓	✓	✓
	11/22/2011	11/23/2011	1.99 (i)	✓	✓ (b)	✓	✓	✓	✓	✓	✓
	12/27/2011	12/28/2011	0.86	✓	✓ (b)	✓	✓	✓	✓	✓	✓
	1/20/2012	1/21/2012	0.85 (j)	✓	✓ (d)	✓	✓	✓	✓	✓	✓
	3/12/2012	3/13/2012	0.76	✓	✓ (d)	✓	✓	✓	✓	✓	
	3/31/2012	4/1/2012	0.50	✓	(k)	✓	✓	✓	✓	✓	
	10/12/2012	10/13/2012	0.08	✓ (l)	(f)						
Interim (m)	11/11/2011	11/16/2011	0.38			✓		✓		✓ (n)	
	12/8/2011	12/15/2011	0.07			✓		✓			
	12/20/2011	12/21/2011	0.00		✓ (b)	✓	✓		✓		
	1/21/2012	1/26/2012	1.24			✓		✓			
	2/9/2012	2/17/2012	0.71			✓		✓			
	2/23/2012	2/29/2012	0.73			✓		✓			
	3/8/2012	3/12/2012	1.01			✓		✓			
	3/19/2012	3/23/2012	0.35			✓		✓			
	4/6/2012	4/11/2012	0.00 / 0.08 (o)			✓		✓			
	4/20/2012	4/27/2012	0.78			(p)		✓			
	5/18/2012	5/25/2012	0.73			(p)		✓			
	6/7/2012	6/15/2012	0.23			(p)		✓			
	7/11/2012	7/19/2012	0.00			(p)		✓			
	8/9/2012	8/16/2012	0.00			(p)		✓			
	9/13/2012	9/20/2012	0.00			(p)		✓			
	10/4/2012	10/9/2012	0.00			(p)		✓			

✓ = sample collected

[shaded] = sample not required

(a) Precipitation amounts listed for the monthly and storm events are for the LS431 sample collection period. Amounts sometimes differed for LSIV, MH130A, Effluent, or KCBYP locations. See the appropriate footnote for precipitation amounts in those cases.

(b) LSIV sample was a time-weighted composite.

(c) During the January monthly event, precipitation during the KCBYP sampling was 0.12 inches (less than at LS431) due to unexpected rainfall and earlier than anticipated filling of the sample carboy.

(d) LSIV sample was a flow-weighted composite.

(e) During the February monthly event, precipitation during the LSIV, MH130A, and EFF filtered solids sampling was 0.16 inches (greater than at LS431), and precipitation during the KCBYP sampling was 0.07 inches (less than at LS431), due to unexpected rainfall and earlier than anticipated filling of the LS431 and KCBYP sample carboys.

(f) No LSIV sample was collected because no bypass of the treatment system occurred and the LSIV ISCO was never enabled.

(g) During the June monthly event, precipitation during LSIV water sampling was 0.48 inches (less than at LS431) due to a problem with the liquid level actuator at the start of the sample period. Precipitation during the LSIV, MH130A, and EFF filtered solids sampling was 0.94 inches (greater than at LS431) and precipitation during the KCBYP sampling was 0.46 inches (less than at LS431), due to unexpected rainfall and earlier than anticipated filling of the LS431 and KCBYP sample carboys.

(h) An Effluent filtered solids valve was left closed during the September monthly event and no sample was collected. A sample was collected for PCB analysis during the 9/13/2012 - 9/20/2012 interim event instead, but the extraction vial broke at the laboratory so the sample could not be analyzed.

(i) During the 11/22/2011 - 11/23/2011 storm event, the valves for the MH130A and EFF filtered solids samples were left open for 30 hours (instead of 24) due to a miscommunication, and precipitation during the event was 2.46 inches (greater than at LS431). Precipitation during the KCBYP sampling was 1.48 inches (less than at LS431) due to unexpected runoff volume and earlier than anticipated filling of the KCBYP sample carboy.

(j) During the 1/20/2012 - 1/21/2012 storm event, precipitation during the KCBYP sampling was 0.73 inches (less than at LS431) due to a slightly later start time.

(k) No LSIV sample was collected due to difficulties with operation of the liquid level actuator.

(l) As part of compliance monitoring with the NPDES stormwater permit at NBF, LS431 was sampled during the "first fall flush". The sample period lasted less than 12 hours from the start of discharge.

(m) Interim sampling events were conducted to collect filtered solids samples for metals and PSD analysis, as the filter bags for PCB analysis can only be analyzed for PCBs. One exception is the 12/20/2011 - 12/21/2011 event, which was conducted because twice monthly LTST sampling (LSIV, MH130A, and Effluent water) was required in 2011, and also to collect split samples for laboratory comparison. PSD analysis of filtered solids was discontinued after the 6/7/2012 to 6/15/2012 sampling event.

(n) One Effluent filter bag was collected and submitted to the laboratory for metals and PSD analysis, but the laboratory could not scrape enough solids from the bag for the analysis, and no further effluent filter bags were collected for metals or PSD.

(o) During the 4/6/2012 - 4/11/2012 interim sampling event, precipitation during the LSIV filtered solids sampling was 0.00 inches and precipitation during the MH130A filtered solids sampling was 0.08 inches. During dry conditions, sometimes there would not be enough material in the bag to analyze for metals and PSD. In this case, two consecutive MH130A bags were collected in an attempt to filter out the required mass of solids, and this added an extra day of filtration to the MH130A sample period, which accounts for the precipitation difference from the LSIV bag.

(p) A second parallel filter housing was installed at the LSIV filtered solids sampling location in December 2011 to allow for split sample collection for laboratory comparison. After split sampling was no longer being conducted, the LSIV filter bags for metals and PSD analysis were collected during the monthly events, eliminating the need for LSIV filtered solids sampling during interim events.

TABLE 2
LS431 WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W
Laboratory Data ID	TW50A/TW50F/TW54A	TX90A/TX90D/TX91A	TY96A/TY96D/TY98A	UA56A/UA56D/UA57A	UC78A/UC78D/UC80A	UE10A/UE10D/UE11A	UE68A/UE68D/UE73A	UH75A/UH75F/UH76A	UL49A/UL49D/UL50A
Sample Collection Date	11/11/2011	11/17/2011	11/23/2011	12/08/2011	12/28/2011	1/12/2012	1/21/2012	02/08/2012	03/08/2012
Sample Type	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite
Event Type	Monthly	Storm	Storm	Monthly	Storm	Monthly	Storm	Monthly	Monthly
PCBs (µg/L)									
Method SW8082									
Aroclor 1016	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	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	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	0.010 U	0.010 U	**0.025**	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Aroclor 1260	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 1221	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	0.010 U	0.010 U	0.010 U	0.030 U	0.010 U	0.012 U	0.010 U	0.010 U	0.010 U
Aroclor 1262	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 (a)	ND	ND	**0.025**	ND	ND	ND	ND	ND	ND
SEMIVOLATILES (µg/L)									
Method SW8270D									
Phenol	**1.8**	**1.5**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bis-(2-Chloroethyl) Ether	NA	NA	NA	NA	NA	1.0 U	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA	1.0 U	NA	NA	NA
1,3-Dichlorobenzene	NA	1.0 U	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Benzyl Alcohol	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Methylphenol	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2,2'-Oxybis(1-Chloropropane)	NA	NA	NA	NA	NA	1.0 U	NA	NA	NA
4-Methylphenol	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
N-Nitroso-Di-N-Propylamine	NA	NA	NA	NA	NA	1.0 U	NA	NA	NA
Hexachloroethane	NA	1.0 U	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U
Nitrobenzene	NA	NA	NA	NA	NA	1.0 U	NA	NA	NA
Isophorone	NA	NA	NA	NA	NA	1.0 U	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA	5.0 U	NA	NA	NA
2,4-Dimethylphenol	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Benzoic Acid	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
bis(2-Chloroethoxy) Methane	NA	NA	NA	NA	NA	1.0 U	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	NA	NA	5.0 U	NA	NA	NA
1,2,4-Trichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Naphthalene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-Chloroaniline	NA	NA	NA	NA	NA	5.0 U	NA	NA	NA
Hexachlorobutadiene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	5.0 U	NA	NA	NA
2-Methylnaphthalene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	5.0 U	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	NA	NA	NA	5.0 U	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	NA	NA	5.0 U	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	1.0 U	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA	5.0 U	NA	NA	NA
Dimethylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Acenaphthylene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
3-Nitroaniline	NA	NA	NA	NA	NA	5.0 U	NA	NA	NA
Acenaphthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2,4-Dinitrophenol	NA	NA	NA	NA	NA	10 U	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA	5.0 U	NA	NA	NA
Dibenzofuran	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2,6-Dinitrotoluene	NA	NA	NA	NA	NA	5.0 U	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	5.0 U	NA	NA	NA
Diethylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

TABLE 2
LS431 WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W
Laboratory Data ID	TW50A/TW50F/TW54A	TX90A/TX90D/TX91A	TY96A/TY96D/TY98A	UA56A/UA56D/UA57A	UC78A/UC78D/UC80A	UE10A/UE10D/UE11A	UE68A/UE68D/UE73A	UH75A/UH75F/UH76A	UL49A/UL49D/UL50A
Sample Collection Date	11/11/2011	11/17/2011	11/23/2011	12/08/2011	12/28/2011	1/12/2012	1/21/2012	02/08/2012	03/08/2012
Sample Type	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite
Event Type	Monthly	Storm	Storm	Monthly	Storm	Monthly	Storm	Monthly	Monthly
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	1.0 U	NA	NA	NA
Fluorene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-Nitroaniline	NA	NA	NA	NA	NA	5.0 U	NA	NA	NA
4,6-Dinitro-2-Methylphenol	NA	NA	NA	NA	NA	10 U	NA	NA	NA
N-Nitrosodiphenylamine	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	1.0 U	NA	NA	NA
Hexachlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Pentachlorophenol	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Phenanthrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbazole	NA	NA	NA	NA	NA	1.0 U	NA	NA	NA
Anthracene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Di-n-Butylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Pyrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Butylbenzylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
3,3'-Dichlorobenzidine	NA	NA	NA	NA	NA	5.0 U	NA	NA	NA
Benzo(a)anthracene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate	1.0 U	1.0 U	**1.0**	1.0 U	**2.3**	1.0 U	1.0 U	1.0 U	1.0 U
Chrysene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Di-n-Octyl phthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(a)pyrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Indeno(1,2,3-cd)pyrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibenz(a,h)anthracene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(g,h,i)perylene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1-Methylnaphthalene	NA	1.0 U	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U
Total Benzofluoranthenes	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
PAHs (µg/L)									
Method SW8270D-SIM									
Naphthalene	**0.022**	**0.032**	**0.044**	**0.018** U	**0.021**	**0.012**	**0.080**	0.021 U	**0.012**
2-Methylnaphthalene	**0.011**	**0.038**	**0.025**	0.010 U	**0.013**	**0.0099** J	**0.10**	**0.014**	0.010 U
1-Methylnaphthalene	0.010 U	**0.028**	**0.016**	0.010 U	**0.0091** J	**0.0070** J	**0.075**	**0.011**	0.010 U
Acenaphthylene	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	**0.010**	0.010 U	0.010 U
Acenaphthene	**0.087**	**0.030**	**0.0088** J	**0.092**	**0.015**	**0.041**	**0.013**	**0.088**	**0.045**
Fluorene	0.010 U	**0.010**	**0.0093** J	0.010 U	**0.0068** J	0.010 U	**0.019**	0.010 U	0.010 U
Phenanthrene	0.010 U	**0.032**	**0.094**	**0.010**	**0.081**	**0.014** J	**0.078**	**0.022**	**0.018**
Anthracene	0.010 U	0.010 U	**0.013**	0.010 U	**0.0096** J	0.010 U	**0.0070** J	0.010 U	0.010 U
Fluoranthene	0.012 U	**0.056** B	**0.28** B	0.010 U	**0.24**	**0.032**	**0.17**	**0.041**	**0.041**
Pyrene	0.010 U	**0.029**	**0.19**	0.010 U	**0.18**	**0.019**	**0.12**	**0.038** J	**0.024**
Benzo(a)anthracene	0.010 U	0.010 U	**0.057**	0.010 U	**0.043**	0.010 U	**0.026**	0.010 U	0.010 U
Chrysene	0.010 U	**0.020**	**0.17** B	0.010 U	**0.14**	**0.011**	**0.11**	**0.019**	**0.017**
Benzo(a)pyrene	0.010 U	0.010 U	**0.10**	0.010 U	**0.072**	0.010 U	**0.048**	0.010 U	0.010 U
Indeno(1,2,3-cd)pyrene	0.010 U	0.010 U	**0.10**	0.010 U	**0.070**	0.010 U	**0.048**	0.010 U	0.010 U
Dibenz(a,h)anthracene	0.010 U	0.010 U	**0.035**	0.010 U	**0.020**	0.010 U	**0.014**	0.010 U	0.010 U
Benzo(g,h,i)perylene	0.010 U	0.010 U	**0.12**	0.010 U	**0.086**	0.010 U	**0.068**	**0.010**	0.010 U
Dibenzofuran	0.010 U	0.010 U	**0.0067** J	0.010 U	**0.0063** J	0.010 U	**0.010**	0.010 U	0.010 U
Total Benzofluoranthenes	0.020 U	**0.029**	**0.30**	0.020 U	**0.23**	**0.011** J	**0.17**	**0.028**	**0.022**
CPAH TEQ	NA	**0.0031**	**0.151**	ND	**0.110**	**0.001**	**0.075**	**0.003**	**0.002**
TOTAL METALS (µg/L)									
Method EPA200.8/6010B,C/7470A									
Arsenic	**0.6**	**0.5**	**0.7**	**0.8**	**0.7**	**0.7**	**0.5**	**0.8**	**0.7**
Cadmium	0.1 U	0.1 U	**0.6**	0.1 U	**0.2**	0.1 U	**0.3**	0.1 U	0.1 U
Chromium	0.5 U	0.5 U	**1.7**	0.5 U	**1.2**	1 U	**1.1**	1 U	1 U

TABLE 2
LS431 WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W
Laboratory Data ID	TW50A/TW50F/TW54A	TX90A/TX90D/TX91A	TY96A/TY96D/TY98A	UA56A/UA56D/UA57A	UC78A/UC78D/UC80A	UE10A/UE10D/UE11A	UE68A/UE68D/UE73A	UH75A/UH75F/UH76A	UL49A/UL49D/UL50A
Sample Collection Date	11/11/2011	11/17/2011	11/23/2011	12/08/2011	12/28/2011	1/12/2012	1/21/2012	02/08/2012	03/08/2012
Sample Type	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite
Event Type	Monthly	Storm	Storm	Monthly	Storm	Monthly	Storm	Monthly	Monthly
Copper	0.5 U	**1.8**	**5.1**	**0.6**	**4.3**	**1.2**	**4.0**	**0.8**	**1.1**
Iron	NA	NA	NA	**760**	**3890**	**2480**	**1970**	**2110**	**2230**
Lead	0.1 U	**0.5**	**4.9**	**0.3**	**2.5**	**0.2**	**1.9**	**0.4**	**0.2**
Manganese	NA	NA	NA	**833**	**132**	**593**	**84**	**639**	**540**
Mercury	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	**0.5**	**0.6**	**1.2**	**1.3**	**1.1**	**1.4**	**2.4**	**1.4**	**1.8**
Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	**7**	**20**	**48**	**8**	**38**	**16**	**50**	**7**	**9**
DISSOLVED METALS (µg/L)									
Method EPA200.8/6010C									
Arsenic	**0.6**	**0.4**	**0.3**	**0.8**	**0.3**	**0.5**	**0.2**	**0.6**	**0.4**
Cadmium	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.2**	0.1 U	0.1 U
Chromium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U
Copper	0.5 U	**1.3**	**1.4**	**0.8**	**1.3**	**0.9**	**1.3**	**1.0**	**0.7**
Iron	NA	NA	NA	NA	**150**	**170**	**220**	50 U	**360**
Lead	0.1 U	0.1 U	**0.2**	0.1 U	**0.2**	0.1 U	**0.2**	0.1 U	0.1 U
Manganese	NA	NA	NA	NA	**90**	**552**	**76**	**621**	**509**
Nickel	**0.6**	**0.6**	**0.5**	**1.2**	**0.7**	**1.3**	**1.8**	**1.3**	**1.8**
Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	**7**	**16**	**21**	**6**	**17**	**13**	**37**	**8**	4 U
DISSOLVED METALS (ng/L)									
Method SW7470A									
Mercury	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U
CONVENTIONALS									
pH (SU; EPA 150.1)	NA	NA	NA	**7.05**	**6.40**	**7.06**	**6.78**	**7.17**	**7.35**
Total Suspended Solids (mg/L; EPA 160.2; SM2540D)	1.0 U	**3.4**	**110**	**1.4**	**16.6**	**6.2**	**6.1**	**5.8**	**6.4**
Turbidity (NTU; EPA 180.1)	**1.33** J	**4.30**	**6.60**	**2.00**	**29.0**	**14.6**	**14.4**	**7.80**	**8.00**
PARTICLE/GRAIN SIZE (mg/L)									
Method ASTM-D3977C									
Sediment Conc. > 500 um	0.01 U	**0.1**	**62.1**	0.01 U	**1.3**	**1.8**	**0.4**	**5.1**	**0.9**
Sediment Conc. 500 to 250 um	**0.4**	**1.1**	**33.9**	0.01 U	**2.3**	**1.5**	**0.4**	**0.7**	**0.4**
Sediment Conc. 250 to 125 um	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sediment Conc. 125 to 62.5 um	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sediment Conc. 62.5 to 3.9 um	0.01 U	0.01 U	**16.0**	0.01 U	**11.8**	0.01 U	**7.1**	0.01 U	0.01 U
Sediment Conc. 3.9 to 1 um	**0.3**	**2.0**	**4.0**	**0.9**	**2.4**	**4.9**	**1.4**	**3.3**	**0.3**
Sediment Conc. < 1 um	**0.3**	**2.3**	**2.2**	**1.9**	**1.0**	**13.4**	**1.2**	**2.4**	**0.4**
PRECIPITATION (b)									
Amount During Test (inches)	0.0	0.38	1.99	0.0	0.86	0.23	0.85	0.10	0.06

TABLE 2
LS431 WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W
Laboratory Data ID	UM18A/UM18C/UM19A	UO82A/UO82D/UO83A	UP29A/UP29E/UP30A	UU03A/UU03F/UU04A	UX69A/UX69C/UX70A	VB89A/VB89D/VB90A	VF37A/VF37D/VF38A	VJ50A/VJ50G/VJ52A	VL90A/VL90D/VL91A	VN17A/VN17B/VN18A
Sample Collection Date	03/13/2012	04/01/2012	04/05/2012	5/10/2012	6/7/2012	7/11/2012	8/9/2012	9/13/2012	10/4/2012	10/13/2012
Sample Type	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite
Event Type	Storm	Storm	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Storm
PCBs (μg/L)										
Method SW8082										
Aroclor 1016	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.012 U	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	0.010 U	0.010 U	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	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Aroclor 1254	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 1260	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 1221	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	0.010 U	0.015 U	0.010 U	0.018 U	0.015 U	0.010 U	0.020 U	0.010 U	0.010 U	0.015 U
Aroclor 1262	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 (a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SEMIVOLATILES (μg/L)										
Method SW8270D										
Phenol	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bis-(2-Chloroethyl) Ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	1.0 U	NA	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Benzyl Alcohol	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	2.0 U	2.0 UJ	2.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Methylphenol	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2,2'-Oxybis(1-Chloropropane)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U
N-Nitroso-Di-N-Propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.0 U	NA	NA	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U
Nitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isophorone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	3.0 U	3.0 U	3.0 U
Benzoic Acid	10 U	10 U	10 U	10 U	10 U	10 U	10 U	20 U	20 U	20 U
bis(2-Chloroethoxy) Methane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Naphthalene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-Chloroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	3.0 U	3.0 U	3.0 U
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dimethylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Acenaphthylene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
3-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2,4-Dinitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

TABLE 2
LS431 WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W
Laboratory Data ID	UM18A/UM18C/UM19A	UO82A/UO82D/UO83A	UP29A/UP29E/UP30A	UU03A/UU03F/UU04A	UX69A/UX69C/UX70A	VB89A/VB89D/VB90A	VF37A/VF37D/VF38A	VJ50A/VJ50G/VJ52A	VL90A/VL90D/VL91A	VN17A/VN17B/VN18A
Sample Collection Date	03/13/2012	04/01/2012	04/05/2012	5/10/2012	6/7/2012	7/11/2012	8/9/2012	9/13/2012	10/4/2012	10/13/2012
Sample Type	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite
Event Type	Storm	Storm	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Storm
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Pentachlorophenol	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10 U	10 U	10 U
Phenanthrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbazole	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Di-n-Butylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Pyrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Butylbenzylphthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
3,3'-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
bis(2-Ethylhexyl)phthalate	1.0 U	1.0 U	1.0 U	**2.5**	1.0 U	1.0 U	1.0 U	3.0 U	3.0 U	3.0 U
Chrysene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Di-n-Octyl phthalate	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(a)pyrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Indeno(1,2,3-cd)pyrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibenz(a,h)anthracene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(g,h,i)perylene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U
1-Methylnaphthalene	1.0 U	NA	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Total Benzofluoranthenes	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	5.0 U	5.0 U
PAHs (µg/L)										
Method SW8270D-SIM										
Naphthalene	**0.014**	**0.010**	**0.012**	**0.035**	**0.011**	0.011 U	**0.010**	0.010 U	0.010 U	0.010 U
2-Methylnaphthalene	**0.014**	**0.010**	**0.010**	**0.0080** J	**0.011**	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
1-Methylnaphthalene	**0.012**	**0.012**	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Acenaphthylene	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
Acenaphthene	**0.011**	**0.016**	**0.043**	**0.054**	**0.035**	**0.066**	**0.090**	**0.080**	**0.10**	**0.081**
Fluorene	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
Phenanthrene	**0.031**	**0.026**	**0.011**	**0.0088** J	**0.040**	0.010 U	**0.010**	0.010 U	0.010 U	**0.014**
Anthracene	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
Fluoranthene	**0.078**	**0.073**	**0.014**	**0.020**	**0.093**	**0.013**	**0.012**	0.010 U	0.010 U	**0.010**
Pyrene	**0.048**	**0.046**	0.010 U	**0.016**	**0.044**	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Benzo(a)anthracene	**0.0093** J	**0.016**	0.010 U	0.010 U	**0.012**	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Chrysene	**0.043**	**0.036**	0.010 U	**0.0089** J	**0.049**	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Benzo(a)pyrene	**0.015**	**0.020**	0.010 U	0.010 U	**0.018**	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Indeno(1,2,3-cd)pyrene	**0.012**	**0.021**	0.010 U	0.010 U	**0.022** J	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Dibenz(a,h)anthracene	0.010 U	0.010 U	0.010 UJ	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Benzo(g,h,i)perylene	**0.013**	**0.025**	0.010 U	0.010 U	**0.025**	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Dibenzofuran	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 Benzofluoranthenes	**0.062**	**0.056**	0.020 U	0.020 U	**0.069**	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
CPAH TEQ	**0.0238**	**0.030**	ND	**0.0001**	**0.029**	ND	ND	ND	ND	ND
TOTAL METALS (µg/L)										
Method EPA200.8/6010B,C/7470A										
Arsenic	**0.4**	**0.4**	**0.5**	**0.8**	**0.7**	**0.7**	**0.7**	**0.9**	**0.6**	**1.0**
Cadmium	0.1 U	0.1 U	0.1 U	0.1 U	**0.1**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Chromium	0.5 U	0.5 U	0.5 U	0.5 U	**0.6**	1 U	0.5 U	1 U	0.5 U	**0.6**

TABLE 2
LS431 WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W	LS431-W
Laboratory Data ID	UM18A/UM18C/UM19A	UO82A/UO82D/UO83A	UP29A/UP29E/UP30A	UU03A/UU03F/UU04A	UX69A/UX69C/UX70A	VB89A/VB89D/VB90A	VF37A/VF37D/VF38A	VJ50A/VJ50G/VJ52A	VL90A/VL90D/VL91A	VN17A/VN17B/VN18A
Sample Collection Date	03/13/2012	04/01/2012	04/05/2012	5/10/2012	6/7/2012	7/11/2012	8/9/2012	9/13/2012	10/4/2012	10/13/2012
Sample Type	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite
Event Type	Storm	Storm	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Storm
Copper	1.9	1.7	1.1	0.6	2.7	0.5 U	0.5 U	1.0	0.5 U	4.2
Iron	860	1090	890	1890	2690	1320	1850	2490	1260	2180
Lead	0.6	0.5	0.1 U	0.1 U	0.7	0.1 U	0.1 U	0.1 U	0.1	0.5
Manganese	69	178	482	752	344	660	779	960	872	606
Mercury	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	0.8	1.2	1.9 J	2.1	1.2	0.7	1.2	1.1	0.8	1.6
Silver	NA	0.2 U	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	24	24	11	8	19	6	4	4	4 U	9
DISSOLVED METALS (µg/L)										
Method EPA200.8/6010C										
Arsenic	0.3	0.3	0.4	0.6	0.5	0.5	0.5	0.6	0.5	0.9
Cadmium	0.1	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Chromium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U
Copper	1.1	1.1	0.9	0.5 U	2.0	0.5 U	0.5 U	0.8	0.5 U	3.6
Iron	230	190	50 U	100	230	120	60	60	190	690
Lead	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.3
Manganese	65	163	472	703	295	622	749	870	855	568
Nickel	0.9	1.2	1.7	2.0	1.1	0.7	0.6	1.0	0.8	1.5
Silver	NA	0.2 U	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	17	19	9	5	14	4 U	4	4 U	4 U	6
DISSOLVED METALS (ng/L)										
Method SW7470A										
Mercury	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U
CONVENTIONALS										
pH (SU; EPA 150.1)	6.41	6.94	7.03	7.20	7.33	7.14	7.21	7.31	7.59	7.06
Total Suspended Solids (mg/L; EPA 160.2; SM2540D)	4.4	6.8	1.9	8.4	15.9	3.2	6.0	7.0	5.8	4.7
Turbidity (NTU; EPA 180.1)	4.20	3.60	5.00	7.30	14.1	8.50	8.20	15.0	6.20	8.40
PARTICLE/GRAIN SIZE (mg/L)										
Method ASTM-D3977C										
Sediment Conc. > 500 um	0.5	3.5	7.6	0.9	0.59	3.14	0.42	4.77	3.99	0.60
Sediment Conc. 500 to 250 um	1.4	1.3	8.9	1.5	2.85	3.66	0.53	0.20	0.53	0.60
Sediment Conc. 250 to 125 um	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sediment Conc. 125 to 62.5 um	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sediment Conc. 62.5 to 3.9 um	0.01 U	4.7	1.7	0.01 U	9.95	0.01 U	5.27	0.01 U	2.74	0.01 U
Sediment Conc. 3.9 to 1 um	1.2	0.4	0.5	4.2	1.42	0.70	1.32	2.61	0.80	2.19
Sediment Conc. < 1 um	2.7	0.01 U	0.3	4.8	0.33	2.70	0.93	12.12	0.39	5.10
PRECIPITATION (b)										
Amount During Test (inches)	0.76	0.50	0.29	0.01	0.87	0.00	0.00	0.01	0.00	0.08

TABLE 2
LS431 WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

NA = Not Analyzed.

ND = Not Detected.

Bold = Detected compound.

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.

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

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

a) Total PCBs is the sum of detected aroclors or, if no aroclors are detected, is reported as non-detect (ND).

(b) Precipitation data is from the NOAA Quality Controlled Local Climatological Data for Station 24234/BFI - SEATTLE: BOEING FIELD/KING COUNTY INTERNATIONAL AIRPORT.

TABLE 3
RE-ROUTED KING COUNTY STORMWATER WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	KCBYP-W	KCBYP-W	KCBYP-W	KCBYP-W	KCBYP-W	KCBYP-W	KCBYP-W	KCBYP-W	KCBYP-W
Laboratory Data ID	TX90B/TX90E/TX91B	TY96B/TY96E/TY98B	UA56B	UC78B/UC78E/UC80B	UD94A/UD94D/UD95A	UE68C/UE68F/UE73C	UH75C/UH75H/UH76C	UL49C	UP29B/UP29F/UP30B
Sample Collection Date	11/17/2011	11/22/2011	12/05/2011	12/28/2011	1/9/2012	1/21/2012	02/08/2012	03/07/2012	04/05/2012
Sample Type	Flow-weighted composite	Flow-weighted composite	Grab	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Grab	Flow-weighted composite
Event Type	Storm	Storm	Monthly	Storm	Monthly	Storm	Monthly	Monthly	Monthly
PCBs (µg/L)									
Method SW8082									
Aroclor 1016	0.010 U	0.010 U	0.011 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Aroclor 1242	0.010 U	0.010 U	0.011 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Aroclor 1248	0.010 U	0.010 U	0.011 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Aroclor 1254	0.010 U	**0.011**	**0.015**	**0.012**	**0.010**	0.010 U	0.010 U	0.010 U	0.010 U
Aroclor 1260	0.010 U	0.010 U	0.011 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Aroclor 1221	0.010 U	0.010 U	0.011 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Aroclor 1232	0.010 U	0.010 U	0.011 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Aroclor 1262	0.010 U	0.010 U	0.011 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Total PCBs (a)	ND	**0.011**	**0.015**	**0.012**	**0.010**	ND	ND	ND	ND
SEMIVOLATILES (µg/L)									
Method SW8270D									
Phenol	**5.4**	2.0 U	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Benzyl Alcohol	5.0 U	10 U	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Benzoic Acid	10 U	20 U	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Naphthalene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Dimethylphthalate	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Fluorene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	5.0 U	10 U	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Anthracene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Di-n-Butylphthalate	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Pyrene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	**1.0**	**2.6**	NA	NA	NA	NA	NA	NA	NA
Chrysene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Di-n-Octyl phthalate	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
1-Methylnaphthalene	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA
Total Benzofluoranthenes	1.0 U	2.0 U	NA	NA	NA	NA	NA	NA	NA

TABLE 3
RE-ROUTED KING COUNTY STORMWATER WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	KCBYP-W	KCBYP-W	KCBYP-W	KCBYP-W	KCBYP-W	KCBYP-W	KCBYP-W	KCBYP-W	KCBYP-W
Laboratory Data ID	TX90B/TX90E/TX91B	TY96B/TY96E/TY98B	UA56B	UC78B/UC78E/UC80B	UD94A/UD94D/UD95A	UE68C/UE68F/UE73C	UH75C/UH75H/UH76C	UL49C	UP29B/UP29F/UP30B
Sample Collection Date	11/17/2011	11/22/2011	12/05/2011	12/28/2011	1/9/2012	1/21/2012	02/08/2012	03/07/2012	04/05/2012
Sample Type	Flow-weighted composite	Flow-weighted composite	Grab	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Grab	Flow-weighted composite
Event Type	Storm	Storm	Monthly	Storm	Monthly	Storm	Monthly	Monthly	Monthly
PAHs (µg/L)									
Method SW8270D-SIM									
Naphthalene	0.037	0.033	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	0.022	0.018	NA	NA	NA	NA	NA	NA	NA
1-Methylnaphthalene	0.013	0.012	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	0.010 U	0.010 U	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	0.010 U	0.0057 J	NA	NA	NA	NA	NA	NA	NA
Fluorene	0.011	0.013	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	0.13	0.18	NA	NA	NA	NA	NA	NA	NA
Anthracene	0.016	0.026	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	0.35 B	0.55 B	NA	NA	NA	NA	NA	NA	NA
Pyrene	0.21	0.34	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	0.049	0.092	NA	NA	NA	NA	NA	NA	NA
Chrysene	0.16	0.26 B	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	0.099	0.16	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0.096	0.17	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	0.032	0.058	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	0.11	0.19	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	0.012	0.012	NA	NA	NA	NA	NA	NA	NA
Total Benzofluoranthenes	0.28	0.46	NA	NA	NA	NA	NA	NA	NA
CPAH TEQ	0.146	0.241	NA	NA	NA	NA	NA	NA	NA
TOTAL METALS (µg/L)									
Method EPA200.8/SW6010B/7470A									
Arsenic	1.0	0.7	NA	1.3	1.2	0.4	1.0	NA	1.3
Cadmium	0.3	0.4	NA	0.6	0.5	0.2	0.2	NA	0.4
Chromium	1.6	1.8	NA	3.6	1.6	1.0	0.5 U	NA	1.0
Copper	14.8	12.9	NA	22.7	12.8	11.0	6.5	NA	10.2
Iron	NA	NA	NA	2810	1880	790	2130	NA	2670
Lead	6.8	11.5	NA	18.1	6.4	3.8	1.4	NA	3.4
Manganese	NA	NA	NA	56	55	17	62	NA	56
Mercury	0.1 U	0.1 U	NA	0.1 U	0.1 U	0.1 U	0.1 U	NA	0.1 U
Nickel	2.0	1.6	NA	4.3	4.0	3.2	3.2	NA	2.7
Zinc	73	58	NA	83	58	58	34	NA	45
DISSOLVED METALS (µg/L)									
Method EPA200.8/SW6010B									
Arsenic	0.7	0.3	NA	0.3	0.5	0.2	0.5	NA	0.4
Cadmium	0.2	0.1	NA	0.1	0.3	0.2	0.1	NA	0.2
Chromium	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	0.5 U	NA	0.5 U
Copper	7.3	2.3	NA	2.5	5.7	3.9	4.2	NA	6.2
Iron	NA	NA	NA	50 U	310	50 U	170	NA	170
Lead	0.6	0.2	NA	0.2	0.5	0.1 U	0.2	NA	0.3
Manganese	NA	NA	NA	4	45	4	63	NA	38
Nickel	1.0	0.5 U	NA	1.2	2.9	2.4	2.9	NA	2.0
Zinc	49	28	NA	32	39	42	26	NA	36
DISSOLVED METALS (ng/L)									
Method SW7470A									
Mercury	20.0 U	20.0 U	NA	20.0 U	20.0 U	20.0 U	20.0 U	NA	20.0 U
CONVENTIONALS									
pH (SU; EPA 150.1)	NA	NA	NA	6.44	6.57	6.65	6.93	NA	6.98
Total Suspended Solids (mg/L; SM2540D)	21.4	50.2 J	NA	44.4	20.4	12.9	6.9	NA	13.5
Turbidity (NTU; EPA 180.1)	19.0	9.20	NA	16.1	16.1	11.0	17.6	NA	19.5

TABLE 3
RE-ROUTED KING COUNTY STORMWATER WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	KCBYP-W	KCBYP-W	KCBYP-W	KCBYP-W	KCBYP-W	KCBYP-W	KCBYP-W	KCBYP-W	KCBYP-W
Laboratory Data ID	TX90B/TX90E/TX91B	TY96B/TY96E/TY98B	UA56B	UC78B/UC78E/UC80B	UD94A/UD94D/UD95A	UE68C/UE68F/UE73C	UH75C/UH75H/UH76C	UL49C	UP29B/UP29F/UP30B
Sample Collection Date	11/17/2011	11/22/2011	12/05/2011	12/28/2011	1/9/2012	1/21/2012	02/08/2012	03/07/2012	04/05/2012
Sample Type	Flow-weighted composite	Flow-weighted composite	Grab	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Grab	Flow-weighted composite
Event Type	Storm	Storm	Monthly	Storm	Monthly	Storm	Monthly	Monthly	Monthly
PARTICLE/GRAIN SIZE (mg/L)									
Method ASTM-D3977C									
Sediment Conc. > 500 um	**0.7**	**9.5**	NA	**29.4**	**0.5**	**1.5**	**0.5**	NA	**13.2**
Sediment Conc. 500 to 250 um	**0.7**	**7.7**	NA	**7.3**	**0.5**	**0.8**	**0.9**	NA	**12.8**
Sediment Conc. 250 to 125 um	0.01 U	0.01 U	NA	0.01 U	0.01 U	0.01 U	0.01 U	NA	0.01 U
Sediment Conc. 125 to 62.5 um	0.01 U	0.01 U	NA	0.01 U	0.01 U	0.01 U	0.01 U	NA	0.01 U
Sediment Conc. 62.5 to 3.9 um	**17.4**	**45.4**	NA	**36.4**	**15.6**	**11.5**	0.01 U	NA	**14.1**
Sediment Conc. 3.9 to 1 um	**4.2**	**5.7**	NA	**6.6**	**4.1**	**2.0**	**2.4**	NA	**2.5**
Sediment Conc. < 1 um	**3.0**	**3.3**	NA	**3.5**	**2.2**	**1.5**	**4.7**	NA	**1.1**
PRECIPITATION (b)									
Amount During Test (inches)	0.38	1.48	0.0	0.86	0.12	0.73	0.07	0.06	0.29

TABLE 3
RE-ROUTED KING COUNTY STORMWATER WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	KCBYP-W	KCBYP-W
Laboratory Data ID	UU03C/UU03H/UU04C	UX30A/UX30D/UX31A
Sample Collection Date	5/9/2012	6/5/2012
Sample Type	Flow-weighted composite	Flow-weighted composite
Event Type	Monthly	Monthly
PCBs (µg/L)		
Method SW8082		
Aroclor 1016	0.010 U	0.010 U
Aroclor 1242	0.010 U	0.010 U
Aroclor 1248	0.010 U	0.010 U
Aroclor 1254	0.010 U	0.010 U
Aroclor 1260	0.010 U	0.010 U
Aroclor 1221	0.010 U	0.010 U
Aroclor 1232	0.010 U	0.010 U
Aroclor 1262	0.010 U	0.010 U
Total PCBs (a)	ND	ND
SEMIVOLATILES (µg/L)		
Method SW8270D		
Phenol	NA	NA
1,3-Dichlorobenzene	NA	NA
1,4-Dichlorobenzene	NA	NA
Benzyl Alcohol	NA	NA
1,2-Dichlorobenzene	NA	NA
2-Methylphenol	NA	NA
4-Methylphenol	NA	NA
Hexachloroethane	NA	NA
2,4-Dimethylphenol	NA	NA
Benzoic Acid	NA	NA
1,2,4-Trichlorobenzene	NA	NA
Naphthalene	NA	NA
Hexachlorobutadiene	NA	NA
2-Methylnaphthalene	NA	NA
Dimethylphthalate	NA	NA
Acenaphthylene	NA	NA
Acenaphthene	NA	NA
Dibenzofuran	NA	NA
Diethylphthalate	NA	NA
Fluorene	NA	NA
N-Nitrosodiphenylamine	NA	NA
Hexachlorobenzene	NA	NA
Pentachlorophenol	NA	NA
Phenanthrene	NA	NA
Anthracene	NA	NA
Di-n-Butylphthalate	NA	NA
Fluoranthene	NA	NA
Pyrene	NA	NA
Butylbenzylphthalate	NA	NA
Benzo(a)anthracene	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA
Chrysene	NA	NA
Di-n-Octyl phthalate	NA	NA
Benzo(a)pyrene	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA
Dibenz(a,h)anthracene	NA	NA
Benzo(g,h,i)perylene	NA	NA
1-Methylnaphthalene	NA	NA
Total Benzofluoranthenes	NA	NA

TABLE 3
RE-ROUTED KING COUNTY STORMWATER WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	KCBYP-W	KCBYP-W
Laboratory Data ID	UU03C/UU03H/UU04C	UX30A/UX30D/UX31A
Sample Collection Date	5/9/2012	6/5/2012
Sample Type	Flow-weighted composite	Flow-weighted composite
Event Type	Monthly	Monthly
PAHs (µg/L)		
Method SW8270D-SIM		
Naphthalene	NA	NA
2-Methylnaphthalene	NA	NA
1-Methylnaphthalene	NA	NA
Acenaphthylene	NA	NA
Acenaphthene	NA	NA
Fluorene	NA	NA
Phenanthrene	NA	NA
Anthracene	NA	NA
Fluoranthene	NA	NA
Pyrene	NA	NA
Benzo(a)anthracene	NA	NA
Chrysene	NA	NA
Benzo(a)pyrene	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA
Dibenz(a,h)anthracene	NA	NA
Benzo(g,h,i)perylene	NA	NA
Dibenzofuran	NA	NA
Total Benzofluoranthenes	NA	NA
CPAH TEQ	NA	NA
TOTAL METALS (µg/L)		
Method EPA200.8/SW6010B/7470A		
Arsenic	**1.0**	**0.8**
Cadmium	0.1 U	**0.4**
Chromium	0.5 U	**1.0**
Copper	**3.9**	**15.2**
Iron	**2610**	**1440**
Lead	**1.5**	**5.3**
Manganese	**81**	**29**
Mercury	0.1 U	0.1 U
Nickel	**1.6**	**2.0**
Zinc	**13**	**77**
DISSOLVED METALS (µg/L)		
Method EPA200.8/SW6010B		
Arsenic	**0.5**	**0.4**
Cadmium	0.1 U	**0.3**
Chromium	0.5 U	0.5 U
Copper	**2.3**	**8.2**
Iron	**270**	**100**
Lead	**0.1**	**0.4**
Manganese	**76**	**18**
Nickel	**1.5**	**1.4**
Zinc	**9**	**60**
DISSOLVED METALS (ng/L)		
Method SW7470A		
Mercury	20.0 U	20.0 U
CONVENTIONALS		
pH (SU; EPA 150.1)	**6.85**	**6.68**
Total Suspended Solids (mg/L; SM2540D)	**10.2**	**14.7**
Turbidity (NTU; EPA 180.1)	**11.8**	**12.2**

TABLE 3
RE-ROUTED KING COUNTY STORMWATER WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	KCBYP-W	KCBYP-W
Laboratory Data ID	UU03C/UU03H/UU04C	UX30A/UX30D/UX31A
Sample Collection Date	5/9/2012	6/5/2012
Sample Type	Flow-weighted composite	Flow-weighted composite
Event Type	Monthly	Monthly
PARTICLE/GRAIN SIZE (mg/L)		
Method ASTM-D3977C		
Sediment Conc. > 500 um	**5.3**	**0.21**
Sediment Conc. 500 to 250 um	**5.6**	**0.54**
Sediment Conc. 250 to 125 um	0.01 U	0.01 U
Sediment Conc. 125 to 62.5 um	0.01 U	0.01 U
Sediment Conc. 62.5 to 3.9 um	**7.0**	**13.36**
Sediment Conc. 3.9 to 1 um	**1.0**	**1.29**
Sediment Conc. < 1 um	**0.7**	**1.05**
PRECIPITATION (b)		
Amount During Test (inches)	0.00	0.46

NA = Not Analyzed.
ND = Not Detected
Bold = Detected compound.
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.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U = Indicates the compound was undetected at the reported concentration.

a) Total PCBs is the sum of detected aroclors or, if no aroclors are detected, is reported as non-detect (ND).
(b) Precipitation data is from the NOAA Quality Controlled Local Climatological Data for Station 24234/BFI - SEATTLE: BOEING FIELD/KING COUNTY INTERNATIONAL AIRPORT.

TABLE 4
MH130A WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A
Laboratory Data ID	TW17B	TX51B	TY77B	TZ89A	UC19B/UC19E/UC20B	UC67A/UC67C/UC68A	UD94B/UD94E/UD95B	UE63A/UE63C/UE64A	UH75D/UH75I/UH76D	UK69A/UK69C/UK70A	UL81A/UL81C/UL82A
Sample Date	11/08/2011	11/16/2011	11/22/2011	12/5/2011	12/21/2011	12/27/2011	1/10/2012	1/20/2012	02/09/2012	03/05/2012	03/12/2012
Sample Type	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Event Type	Monthly	Storm	Storm	Monthly	2nd Monthly	Storm	Monthly	Storm	Monthly	Monthly	Storm
PCBs (µg/L)											
Method SW8082											
Aroclor 1016	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	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	0.010 U	0.10 U	0.010 U	0.050 U	0.20 U	0.075 U	0.10 U	0.050 U	0.15 U	0.045 U	0.10 U
Aroclor 1254	0.010 U	**0.088**	0.010 U	**0.046**	**0.063**	**0.090** J	**0.069**	**0.059**	**0.12**	**0.044**	**0.048**
Aroclor 1260	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	**0.023** J	0.010 U	**0.021**	0.010 U	0.010 U	0.010 U
Aroclor 1221	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	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 1262	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 (a)	ND	**0.088**	ND	**0.046**	**0.063**	**0.113** J	**0.069**	**0.08**	**0.12**	**0.044**	**0.048**
SEMIVOLATILES (µg/L)											
Method SW8270D											
Phenol	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Benzyl Alcohol	NA	NA	NA	NA	5.0 U	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Benzoic Acid	NA	NA	NA	NA	10 U	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Dimethylphthalate	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	5.0 U	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Di-n-Butylphthalate	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Di-n-Octyl phthalate	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
1-Methylnaphthalene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA
Total Benzofluoranthenes	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA	NA

TABLE 4
MH130A WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A
Laboratory Data ID	TW17B	TX51B	TY77B	TZ89A	UC19B/UC19E/UC20B	UC67A/UC67C/UC68A	UD94B/UD94E/UD95B	UE63A/UE63C/UE64A	UH75D/UH75I/UH76D	UK69A/UK69C/UK70A	UL81A/UL81C/UL82A
Sample Date	11/08/2011	11/16/2011	11/22/2011	12/5/2011	12/21/2011	12/27/2011	1/10/2012	1/20/2012	02/09/2012	03/05/2012	03/12/2012
Sample Type	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Event Type	Monthly	Storm	Storm	Monthly	2nd Monthly	Storm	Monthly	Storm	Monthly	Monthly	Storm
PAHs (µg/L)											
Method SW8270D-SIM											
Naphthalene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA	NA
1-Methylnaphthalene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	0.024	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	0.011	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	0.014	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA	NA
Total Benzofluoranthenes	NA	NA	NA	NA	0.020 U	NA	NA	NA	NA	NA	NA
CPAH TEQ	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA
TOTAL METALS (µg/L)											
Method EPA200.8/6010B,C/7470A											
Arsenic	NA	NA	NA	NA	1.2	1.1	0.8	0.9	1.1	0.7	1.1
Cadmium	NA	NA	NA	NA	0.2	0.5	0.4	0.8	0.2	0.3	0.3
Chromium	NA	NA	NA	NA	0.5 U	2.2	0.7	4.8	0.5	1.4	1 U
Copper	NA	NA	NA	NA	2.9	8.7	6.1	10.0	4.7	5.2	2.7
Iron	NA	NA	NA	NA	6180	3770	1360	3070	3700	1820	4440
Lead	NA	NA	NA	NA	6.8	6.5	1.4	12.9	0.7	3.4	0.2
Manganese	NA	NA	NA	NA	366	45	76	60	210	59	380
Mercury	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	NA	NA	NA	NA	2.2	1.7	1.6	2.4	1.3	1.1	1.0
Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	52	127	81	141	34	89	71
DISSOLVED METALS (µg/L)											
Method EPA200.8/6010B,C											
Arsenic	NA	NA	NA	NA	0.6	0.3	0.5	0.2	0.6	0.3	0.8
Cadmium	NA	NA	NA	NA	0.1 U	0.1	0.3	0.3	0.1	0.1	0.2
Chromium	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U
Copper	NA	NA	NA	NA	0.9	2.4	2.6	2.0	2.2	1.8	1.2
Iron	NA	NA	NA	NA	100	50 U	160	50 U	90	230	2480
Lead	NA	NA	NA	NA	0.3	0.1 U	0.2	0.2	0.1 U	0.1	0.1 U
Manganese	NA	NA	NA	NA	380	7	77	19	205	49	363
Nickel	NA	NA	NA	NA	1.3	0.6	1.4	0.6	1.1	0.6	0.8
Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	37	73	66	74	33	64	61
DISSOLVED METALS (ng/L)											
Method SW7470A											
Mercury	NA	NA	NA	NA	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U

TABLE 4
MH130A WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A
Laboratory Data ID	TW17B	TX51B	TY77B	TZ89A	UC19B/UC19E/UC20B	UC67A/UC67C/UC68A	UD94B/UD94E/UD95B	UE63A/UE63C/UE64A	UH75D/UH75I/UH76D	UK69A/UK69C/UK70A	UL81A/UL81C/UL82A
Sample Date	11/08/2011	11/16/2011	11/22/2011	12/5/2011	12/21/2011	12/27/2011	1/10/2012	1/20/2012	02/09/2012	03/05/2012	03/12/2012
Sample Type	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Event Type	Monthly	Storm	Storm	Monthly	2nd Monthly	Storm	Monthly	Storm	Monthly	Monthly	Storm
CONVENTIONALS											
pH (SU; EPA 150.1)	NA	NA	NA	NA	**6.65**	**6.55**	**6.54**	**6.52**	**6.72**	**6.59**	**6.79**
Total Suspended Solids (mg/L; EPA 160.2; SM2540D)	**13.2** J	**13.2**	**10.4**	**28.0**	**17.3**	**23.8**	**5.4**	**38.4**	**7.6**	**12.3**	**11.8**
Turbidity (NTU; EPA 180.1)	**78.0**	**26.0**	**13.6**	NA	**64.6**	**21.0**	**11.6**	**37.0**	**22.0**	**13.5**	**33.0**
PARTICLE/GRAIN SIZE (mg/L)											
Method ASTM-D3977C											
Sediment Conc. > 500 um	**0.6**	**0.6**	0.01 U	**0.4**	**1.7**	**2.3**	**0.4**	**0.5**	**6.6**	**6.0**	**5.1**
Sediment Conc. 500 to 250 um	**0.4**	**2.4**	0.01 U	**1.3**	**1.3**	**2.3**	**0.1**	**1.4**	**0.7**	**4.6**	**6.8**
Sediment Conc. 250 to 125 um	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sediment Conc. 125 to 62.5 um	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sediment Conc. 62.5 to 3.9 um	**4.2**	**11.8**	0.01 U	**25.2**	**10.6**	**20.8**	0.01 U	**41.4**	0.01 U	**7.8**	**5.4**
Sediment Conc. 3.9 to 1 um	**7.1**	**4.1**	**2.9**	**6.5**	**3.0**	**4.6**	**3.5**	**4.8**	**1.9**	**1.9**	**1.2**
Sediment Conc. < 1 um	**6.3**	**2.7**	**5.8**	**3.1**	**1.8**	**2.1**	**9.6**	**4.4**	**6.7**	**1.0**	**1.3**
Previous 1 Hour Precip. (inches) (b)	0.0	0.0	0.0	0.0	0.0	0.04	0.0	0.09	0.03	0.0	0.01
Previous 12 Hours Precip. (inches) (b)	0.0	0.0	0.7	0.0	0.0	0.17	0.23	0.27	0.03	0.36	0.02

TABLE 4
MH130A WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A
Laboratory Data ID	UO82B/UO82E/UO83B	UP29C/UP29G/UP30C	UU03D/UU03I/UU04D	UX30B/UX30E/UX31B	VB89B/VB89E/VB90B	VF37B/VF37E/VF38B	VJ50B/VJ50H/VJ52B	VL90B/VL90E/VL91B
Sample Date	03/31/2012	04/05/2012	5/10/2012	6/5/2012	7/11/2012	8/9/2012	9/13/2012	10/4/2012
Sample Type	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Event Type	Storm	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly
PCBs (µg/L)								
Method SW8082								
Aroclor 1016	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.050 U	0.010 U
Aroclor 1242	0.10 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.050 U	0.010 U
Aroclor 1248	0.010 U	0.15 U	0.15 U	0.15 U	0.30 U	0.15 U	0.30 U	0.075 U
Aroclor 1254	**0.030**	**0.20**	**0.10**	**0.12**	**0.081**	**0.098**	**1.1** J	**0.081**
Aroclor 1260	0.010 U	0.018 U	0.010 U	0.012 U	0.010 U	0.010 U	0.10 U	0.010 U
Aroclor 1221	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.050 U	0.010 U
Aroclor 1232	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.050 U	0.010 U
Aroclor 1262	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.050 U	0.010 U
Total PCBs (a)	**0.030**	**0.20**	**0.10**	**0.12**	**0.081**	**0.098**	**1.1** J	**0.081**
SEMIVOLATILES (µg/L)								
Method SW8270D								
Phenol	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA
Benzyl Alcohol	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	NA	NA	NA	NA
Benzoic Acid	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA
Dimethylphthalate	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-Butylphthalate	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-Octyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA
1-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA
Total Benzofluoranthenes	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 4
MH130A WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A
Laboratory Data ID	UO82B/UO82E/UO83B	UP29C/UP29G/UP30C	UU03D/UU03I/UU04D	UX30B/UX30E/UX31B	VB89B/VB89E/VB90B	VF37B/VF37E/VF38B	VJ50B/VJ50H/VJ52B	VL90B/VL90E/VL91B
Sample Date	03/31/2012	04/05/2012	5/10/2012	6/5/2012	7/11/2012	8/9/2012	9/13/2012	10/4/2012
Sample Type	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Event Type	Storm	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly
PAHs (µg/L)								
Method SW8270D-SIM								
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA
1-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA
Total Benzofluoranthenes	NA	NA	NA	NA	NA	NA	NA	NA
CPAH TEQ	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL METALS (µg/L)								
Method EPA200.8/6010B,C/7470A								
Arsenic	**0.7**	**1.8**	**4.6**	**1.1**	**3.4**	**2.8**	**2.4**	**5.3**
Cadmium	**0.4**	**0.5**	**0.3**	**0.4**	**0.2**	0.1 U	**0.2**	**0.2**
Chromium	0.5 U	**1.6**	**1.1**	**1.0**	1 U	1 U	0.5 U	**0.8**
Copper	**3.4**	**8.1**	**5.5**	**5.8**	**4.3**	**1.6**	**2.0**	**4.2**
Iron	**1370**	**5140**	**21900**	**2710**	**14100**	**11300**	**6140**	**19300**
Lead	**0.5**	**3.1**	**3.0**	**1.9**	**1.9**	**0.7**	**0.4**	**1.3**
Manganese	**91**	**146**	**548**	**76**	**497**	**492**	**326**	**203**
Mercury	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	**1.1**	**2.0**	**1.9**	**1.2**	**2.3**	**1.1**	**0.9**	**1.6**
Silver	0.2 U	NA	NA	NA	NA	NA	NA	NA
Zinc	**126**	**124**	**48**	**97**	**30**	**25**	**18**	**40**
DISSOLVED METALS (µg/L)								
Method EPA200.8/6010B,C								
Arsenic	**0.4**	**0.6**	**0.8**	**0.6**	**0.9**	**0.8**	**1.2**	**0.4**
Cadmium	**0.4**	**0.2**	0.1 U	**0.2**	0.1 U	0.1 U	0.1 U	0.1 U
Chromium	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Copper	**2.0**	**3.0**	**0.8**	**3.0**	**0.9**	**0.5**	**1.1**	**1.5**
Iron	**260**	**250**	50 U	**410**	50 U	50 U	50 U	50 U
Lead	0.1 U	**0.1**	0.1 U	**0.2**	0.1 U	0.1 U	0.1 U	0.1 U
Manganese	**74**	**128**	**518**	**70**	**445**	**436**	**303**	**23**
Nickel	**1.0**	**1.3**	**1.2**	**0.8**	**1.6**	**1.0**	**0.8**	**1.3**
Silver	0.2 U	NA	NA	NA	NA	NA	NA	NA
Zinc	**120**	**98**	**11**	**81**	**7**	**10**	**9**	**5**
DISSOLVED METALS (ng/L)								
Method SW7470A								
Mercury	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U

TABLE 4
MH130A WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A	LTST-W-MH130A
Laboratory Data ID	UO82B/UO82E/UO83B	UP29C/UP29G/UP30C	UU03D/UU03I/UU04D	UX30B/UX30E/UX31B	VB89B/VB89E/VB90B	VF37B/VF37E/VF38B	VJ50B/VJ50H/VJ52B	VL90B/VL90E/VL91B
Sample Date	03/31/2012	04/05/2012	5/10/2012	6/5/2012	7/11/2012	8/9/2012	9/13/2012	10/4/2012
Sample Type	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Event Type	Storm	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly
CONVENTIONALS								
pH (SU; EPA 150.1)	**6.62**	**6.81**	**6.64**	**6.74**	**6.86**	**6.84**	**6.81**	**7.11**
Total Suspended Solids (mg/L; EPA 160.2; SM2540D)	**3.0**	**17.1**	**28.8**	**6.6**	**32.0**	**32.0**	**12.9**	**53.2**
Turbidity (NTU; EPA 180.1)	**6.80**	**37.0**	**42.0**	**9.40**	**82.5**	**74.0**	**16.0**	**130**
PARTICLE/GRAIN SIZE (mg/L)								
Method ASTM-D3977C								
Sediment Conc. > 500 um	**5.8**	**11.8**	**9.8**	**0.99**	**5.13**	**1.48**	**2.26**	**1.60**
Sediment Conc. 500 to 250 um	**7.6**	**9.7**	**3.0**	**1.18**	**2.76**	**2.53**	**2.47**	**2.30**
Sediment Conc. 250 to 125 um	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sediment Conc. 125 to 62.5 um	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sediment Conc. 62.5 to 3.9 um	0.01 U	**14.4**	**23.8**	**9.73**	**25.36**	**17.04**	**16.85**	**35.12**
Sediment Conc. 3.9 to 1 um	**1.3**	**4.1**	**3.9**	**0.65**	**6.66**	**6.33**	**4.05**	**9.68**
Sediment Conc. < 1 um	**2.3**	**1.3**	**2.1**	**0.77**	**2.85**	**2.89**	**1.70**	**2.70**
Previous 1 Hour Precip. (inches) (b)	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0
Previous 12 Hours Precip. (inches) (b)	0.43	0.12	0.0	0.44	0.0	0.0	0.0	0.0

NA = Not Analyzed

Bold = Detected compound.
U = Indicates the compound was not detected at the reported concentration.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

a) Total PCBs is the sum of detected aroclors or, if no aroclors are detected, is reported as non-detect (ND).
(b) Precipitation data is from the NOAA Quality Controlled Local Climatological Data for Station 24234/BFI - SEATTLE: BOEING FIELD/KING COUNTY INTERNATIONAL AIRPORT.

TABLE 5
LSIV WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV	LSTS-W-LSIV
Laboratory Data ID	TW50B	TX90C	TY96C	UA56C	UC19C/UC19F/UC20C	UC78C/UC78F/UC80C	UE10B/UE10C/UE11B	UE68B/UE68E/UE73B	UH75B/UH75G/UH76B
Sample Date	11/11/2011	11/17/2011	11/23/2011	12/08/2011	12/21/2011	12/28/2011	1/12/2012	1/21/2012	02/08/2012
Sample Type	Time-weighted composite	Time-weighted composite	Time-weighted composite	Time-weighted composite	Time-weighted composite	Time-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite
Event Type	Monthly	Storm	Storm	Monthly	2nd Monthly	Storm	Monthly	Storm	Monthly
PCBs (µg/L)									
Method SW8082									
Aroclor 1016	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	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	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	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	**0.016**	0.010 U
Aroclor 1260	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 1221	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	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 1262	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 (a)	ND	ND	ND	ND	ND	ND	ND	**0.016**	ND
SEMIVOLATILES (µg/L)									
Method SW8270D									
Phenol	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Benzyl Alcohol	NA	NA	NA	NA	5.0 U	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Benzoic Acid	NA	NA	NA	NA	10 U	NA	NA	NA	NA
1,2,4-Trichlorobenzene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Dimethylphthalate	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
N-Nitrosodiphenylamine	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	5.0 U	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Di-n-Butylphthalate	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	**1.6**	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Di-n-Octyl phthalate	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
1-Methylnaphthalene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA
Total Benzofluoranthenes	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA

TABLE 5
LSIV WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV	LSTS-W-LSIV
Laboratory Data ID	TW50B	TX90C	TY96C	UA56C	UC19C/UC19F/UC20C	UC78C/UC78F/UC80C	UE10B/UE10C/UE11B	UE68B/UE68E/UE73B	UH75B/UH75G/UH76B
Sample Date	11/11/2011	11/17/2011	11/23/2011	12/08/2011	12/21/2011	12/28/2011	1/12/2012	1/21/2012	02/08/2012
Sample Type	Time-weighted composite	Time-weighted composite	Time-weighted composite	Time-weighted composite	Time-weighted composite	Time-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite
Event Type	Monthly	Storm	Storm	Monthly	2nd Monthly	Storm	Monthly	Storm	Monthly
PAHs (µg/L)									
Method SW8270D-SIM									
Naphthalene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA
1-Methylnaphthalene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	**0.19**	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	**0.028**	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	**0.042**	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	**0.031**	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	**0.029**	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	**0.014**	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	**0.013**	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	**0.016**	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA
Total Benzofluoranthenes	NA	NA	NA	NA	**0.046**	NA	NA	NA	NA
CPAH TEQ	NA	NA	NA	NA	**0.020**	NA	NA	NA	NA
TOTAL METALS (µg/L)									
Method EPA200.8/6010B/7470A									
Arsenic	NA	NA	NA	**1.2**	**1.4**	**0.9**	**1.0**	**1.6**	**1.2**
Cadmium	NA	NA	NA	0.1 U	0.1 U	**0.3**	**0.2**	**0.7**	**0.1**
Chromium	NA	NA	NA	**1.0**	**2**	**1.6**	1 U	**3.6**	1 U
Copper	NA	NA	NA	**1.2**	**3.7**	**8.8**	**3.6**	**11.4**	**2.1**
Iron	NA	NA	NA	**10,200**	**14300**	**5860**	**9010**	**14800**	**8330**
Lead	NA	NA	NA	**0.2**	**1.5**	**26.1**	**1.2**	**8.0**	**0.5**
Manganese	NA	NA	NA	**898**	**999**	**221**	**502**	**187**	**739**
Mercury	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	NA	NA	NA	**1.0**	**1.2**	**1.4**	**1.3**	**3.5**	**1.4**
Zinc	NA	NA	NA	**8**	**15**	**52**	**34**	**87**	**18**
DISSOLVED METALS (µg/L)									
Method EPA200.8/SW6010B									
Arsenic	NA	NA	NA	NA	**0.9**	**0.4**	**0.5**	**0.2**	**0.6**
Cadmium	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	**0.1**	0.1 U
Chromium	NA	NA	NA	NA	**0.5**	0.5 U	1 U	0.5 U	0.5 U
Copper	NA	NA	NA	NA	0.5 U	**1.8**	**1.7**	**2.2**	**0.9**
Iron	NA	NA	NA	NA	**4260**	**620**	**1030**	**190**	**680**
Lead	NA	NA	NA	NA	**0.2**	**1.5**	**0.2**	**0.2**	0.1 U
Manganese	NA	NA	NA	NA	**936**	**130**	**440**	**98**	**693**
Nickel	NA	NA	NA	NA	**0.8**	0.5 U	**1.0**	**1.3**	**1.3**
Zinc	NA	NA	NA	NA	**5**	**19**	**14**	**27**	**9**
DISSOLVED METALS (ng/L)									
Method SW7470A									
Mercury	NA	NA	NA	NA	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U
CONVENTIONALS									
pH (SU; EPA 150.1)	NA	NA	NA	**7.06**	**6.66**	**6.39**	**6.98**	**6.68**	**7.08**
Total Suspended Solids (mg/L; EPA 160.2; SM2540D)	**16.7**	**9.4**	**7.7**	**20.3**	**19.4**	**23.4**	**21.1**	**35.9**	**17.5**
Turbidity (NTU; EPA 180.1)	**80.0**	**38.2**	**9.30**	**76.0**	**61.2**	**20.0**	**66.0**	**37.0**	**66.0**

TABLE 5
LSIV WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV	LSTS-W-LSIV
Laboratory Data ID	TW50B	TX90C	TY96C	UA56C	UC19C/UC19F/UC20C	UC78C/UC78F/UC80C	UE10B/UE10C/UE11B	UE68B/UE68E/UE73B	UH75B/UH75G/UH76B
Sample Date	11/11/2011	11/17/2011	11/23/2011	12/08/2011	12/21/2011	12/28/2011	1/12/2012	1/21/2012	02/08/2012
Sample Type	Time-weighted composite	Time-weighted composite	Time-weighted composite	Time-weighted composite	Time-weighted composite	Time-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite
Event Type	Monthly	Storm	Storm	Monthly	2nd Monthly	Storm	Monthly	Storm	Monthly
PARTICLE/GRAIN SIZE (mg/L)									
Method ASTM-D3977C									
Sediment Conc. > 500 um	0.01 U	**0.1**	**0.6**	**0.1**	**1.0**	**1.3**	**0.7**	**22.7**	**2.1**
Sediment Conc. 500 to 250 um	**2.0**	**0.2**	**1.0**	**0.6**	**1.0**	**3.6**	**3.5**	**8.6**	**1.3**
Sediment Conc. 250 to 125 um	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sediment Conc. 125 to 62.5 um	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sediment Conc. 62.5 to 3.9 um	**15.1**	**6.7**	**11.2**	**14.4**	**12.7**	**14.5**	**13.6**	**51.7**	0.01 U
Sediment Conc. 3.9 to 1 um	**8.3**	**3.6**	**2.2**	**8.0**	**4.7**	**3.0**	**5.2**	**6.3**	**4.4**
Sediment Conc. < 1 um	**8.8**	**3.5**	**1.2**	**6.7**	**3.4**	**1.3**	**4.0**	**4.3**	**17.8**
PRECIPITATION (b)									
Amount During Test (inches)	0.0	0.38	1.99	0.0	0.0	0.86	0.23	0.85	0.10

TABLE 5
LSIV WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV
Laboratory Data ID	UL49B/UL49E/UL50B	UM18B/UM18D/UM19B	UU03B/UU03G/UU04B	UX69B/UX69D/UX70B
Sample Date	03/08/2012	03/13/2012	5/10/2012	6/7/2012
Sample Type	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite, bypass only
Event Type	Monthly	Storm	Monthly	Monthly
PCBs (µg/L)				
Method SW8082				
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	**0.017**
Aroclor 1260	0.010 U	0.010 U	0.010 U	0.010 U
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
Aroclor 1262	0.010 U	0.010 U	0.010 U	0.010 U
Total PCBs (a)	ND	ND	ND	**0.017**
SEMIVOLATILES (µg/L)				
Method SW8270D				
Phenol	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA
Benzyl Alcohol	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA
Benzoic Acid	NA	NA	NA	NA
1,2,4-Trichlorobenzene	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA
Dimethylphthalate	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA
N-Nitrosodiphenylamine	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA
Di-n-Butylphthalate	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA
Di-n-Octyl phthalate	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA
1-Methylnaphthalene	NA	NA	NA	NA
Total Benzofluoranthenes	NA	NA	NA	NA

TABLE 5
LSIV WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV
Laboratory Data ID	UL49B/UL49E/UL50B	UM18B/UM18D/UM19B	UU03B/UU03G/UU04B	UX69B/UX69D/UX70B
Sample Date	03/08/2012	03/13/2012	5/10/2012	6/7/2012
Sample Type	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite, bypass only
Event Type	Monthly	Storm	Monthly	Monthly
PAHs (µg/L)				
Method SW8270D-SIM				
Naphthalene	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA
1-Methylnaphthalene	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA
Total Benzofluoranthenes	NA	NA	NA	NA
CPAH TEQ	NA	NA	NA	NA
TOTAL METALS (µg/L)				
Method EPA200.8/6010B/7470A				
Arsenic	**1.0**	**0.7**	**1.5**	**1.8**
Cadmium	**0.1**	**0.2**	0.1 U	**0.4**
Chromium	1 U	**0.9**	**1.0**	**3.6**
Copper	**2.6**	**3.7**	**1.9**	**8.9**
Iron	**8520**	**3490**	**14400**	**14200**
Lead	**0.9**	**1.5**	**0.4**	**3.2**
Manganese	**549**	**110**	**813**	**216**
Mercury	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	**4.1**	**1.1**	**1.8**	**1.4**
Zinc	**21**	**27**	**9**	**56**
DISSOLVED METALS (µg/L)				
Method EPA200.8/SW6010B				
Arsenic	**0.4**	**0.4**	**0.6**	**0.4**
Cadmium	0.1 U	0.1 U	0.1 U	0.1 U
Chromium	0.5 U	0.5 U	0.5 U	**0.5**
Copper	**1.1**	**1.5**	**0.5**	**2.8**
Iron	**670**	**460**	**830**	**350**
Lead	0.1 U	**0.1**	0.1 U	**0.2**
Manganese	**484**	**93**	**730**	**83**
Nickel	**3.5**	**0.7**	**1.4**	**0.6**
Zinc	**8**	**15**	4 U	**11**
DISSOLVED METALS (ng/L)				
Method SW7470A				
Mercury	20.0 U	20.0 U	20.0 U	20.0 U
CONVENTIONALS				
pH (SU; EPA 150.1)	**7.13**	**6.47**	**6.99**	**7.20**
Total Suspended Solids (mg/L; EPA 160.2; SM2540D)	**26.6**	**14.2**	**34.5**	**56.4** J
Turbidity (NTU; EPA 180.1)	**52.0**	**14.0**	**76.0**	**50.5**

TABLE 5
LSIV WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV	LTST-W-LSIV
Laboratory Data ID	UL49B/UL49E/UL50B	UM18B/UM18D/UM19B	UU03B/UU03G/UU04B	UX69B/UX69D/UX70B
Sample Date	03/08/2012	03/13/2012	5/10/2012	6/7/2012
Sample Type	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite	Flow-weighted composite, bypass only
Event Type	Monthly	Storm	Monthly	Monthly
PARTICLE/GRAIN SIZE (mg/L)				
Method ASTM-D3977C				
Sediment Conc. > 500 um	**4.1**	**3.0**	**5.9**	**26.88**
Sediment Conc. 500 to 250 um	**2.0**	**2.3**	**3.3**	**13.69**
Sediment Conc. 250 to 125 um	0.01 U	0.01 U	0.01 U	0.01 U
Sediment Conc. 125 to 62.5 um	0.01 U	0.01 U	0.01 U	0.01 U
Sediment Conc. 62.5 to 3.9 um	**14.2**	**10.3**	**19.9**	**30.53**
Sediment Conc. 3.9 to 1 um	**3.3**	**1.6**	**6.1**	**3.80**
Sediment Conc. < 1 um	**3.8**	**1.0**	**3.0**	**1.18**
PRECIPITATION (b)				
Amount During Test (inches)	0.06	0.76	0.01	0.48

NA = Not Analyzed.
ND = Not Detected.
Bold = Detected compound.
U = Indicates the compound was not detected at the reported concentration.

a) Total PCBs is the sum of detected aroclors or, if no aroclors are detected, is reported as non-detect (ND).
(b) Precipitation data is from the NOAA Quality Controlled Local Climatological Data for Station 24234/BFI - SEATTLE: BOEING FIELD/KING COUNTY INTERNATIONAL AIRPORT.

TABLE 6
EFFLUENT WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF
Laboratory Data ID	TW17A	TX51A	TY77A	TZ89B	UC19A/UC19D/UC20A	UC67B/UC67D/UC68B	UD94C/UD94F/UD95C	UE63B/UE63D/UE64B	UH75E/UH75J/UH76E	UK69B/UK69D/UK70B
Sample Date	11/08/2011	11/16/2011	11/22/2011	12/5/2011	12/20/2011	12/27/2011	1/10/2012	1/20/2012	02/09/2012	03/05/2012
Sample Type	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Event Type	Monthly	Storm	Storm	Monthly	2nd Monthly	Storm	Monthly	Storm	Monthly	Monthly
PCBs (µg/L)										
Method SW8082										
Aroclor 1016	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	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	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.012 U	0.010 U
Aroclor 1254	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 1260	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 1221	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	0.010 U	0.010 U	0.010 U	0.019 U	0.010 U	0.010 U	0.015 U	0.010 U	0.010 U	0.010 U
Aroclor 1262	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 (a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SEMIVOLATILES (µg/L)										
Method SW8270D										
Phenol	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Benzyl Alcohol	NA	NA	NA	NA	5.0 U	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Benzoic Acid	NA	NA	NA	NA	10 U	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Dimethylphthalate	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	5.0 U	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Di-n-Butylphthalate	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Di-n-Octyl phthalate	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
1-Methylnaphthalene	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA
Total Benzofluoranthenes	NA	NA	NA	NA	1.0 U	NA	NA	NA	NA	NA

TABLE 6
EFFLUENT WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF
Laboratory Data ID	TW17A	TX51A	TY77A	TZ89B	UC19A/UC19D/UC20A	UC67B/UC67D/UC68B	UD94C/UD94F/UD95C	UE63B/UE63D/UE64B	UH75E/UH75J/UH76E	UK69B/UK69D/UK70B
Sample Date	11/08/2011	11/16/2011	11/22/2011	12/5/2011	12/20/2011	12/27/2011	1/10/2012	1/20/2012	02/09/2012	03/05/2012
Sample Type	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Event Type	Monthly	Storm	Storm	Monthly	2nd Monthly	Storm	Monthly	Storm	Monthly	Monthly
PAHs (µg/L)										
Method SW8270D-SIM										
Naphthalene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA
1-Methylnaphthalene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	**0.15**	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	**0.023**	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	**0.032**	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	**0.021**	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	0.010 U	NA	NA	NA	NA	NA
Total Benzofluoranthenes	NA	NA	NA	NA	0.020 U	NA	NA	NA	NA	NA
CPAH TEQ	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA
TOTAL METALS (µg/L)										
Method EPA200.8/6010B,C/7470A										
Arsenic	NA	NA	NA	NA	**1.0**	**0.4**	**0.4**	**0.4**	**0.8**	**0.2**
Cadmium	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Chromium	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	**0.8**	0.5 U	0.5 U
Copper	NA	NA	NA	NA	0.5 U	**4.3**	**2.8**	**1.9**	**1.5**	**0.7**
Iron	NA	NA	NA	NA	**2950**	**1000**	**290**	**930**	**3080**	**210**
Lead	NA	NA	NA	NA	**0.8**	**18.6**	**0.2**	**0.6**	0.1 U	0.1 U
Manganese	NA	NA	NA	NA	**787**	**112**	**379**	**140**	**493**	**30**
Mercury	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	NA	NA	NA	NA	**1.0**	**0.6**	**0.7**	**0.8**	**1.3**	0.5 U
Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	**8**	**18**	**31**	**29**	**8**	**6**
DISSOLVED METALS (µg/L)										
Method EPA200.8/6010B,C										
Arsenic	NA	NA	NA	NA	**0.9**	**0.3**	**0.4**	**0.3**	**0.5**	**0.2**
Cadmium	NA	NA	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Chromium	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	**0.6**	0.5 U	0.5 U
Copper	NA	NA	NA	NA	0.5 U	**1.5**	**0.9**	**1.0**	**1.3**	**0.6**
Iron	NA	NA	NA	NA	**2690**	50 U	**150**	**70**	**130**	50 U
Lead	NA	NA	NA	NA	**0.6**	**1.7**	**0.1**	0.1 U	0.1 U	0.1 U
Manganese	NA	NA	NA	NA	**790**	**94**	**370**	**130**	**386**	**30**
Nickel	NA	NA	NA	NA	**0.8**	0.5 U	**0.7**	**0.8**	**1.4**	0.5 U
Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	**7**	**13**	**24**	**23**	**9**	**6**
DISSOLVED METALS (ng/L)										
Method SW7470A										
Mercury	NA	NA	NA	NA	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U

TABLE 6
EFFLUENT WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF
Laboratory Data ID	TW17A	TX51A	TY77A	TZ89B	UC19A/UC19D/UC20A	UC67B/UC67D/UC68B	UD94C/UD94F/UD95C	UE63B/UE63D/UE64B	UH75E/UH75J/UH76E	UK69B/UK69D/UK70B
Sample Date	11/08/2011	11/16/2011	11/22/2011	12/5/2011	12/20/2011	12/27/2011	1/10/2012	1/20/2012	02/09/2012	03/05/2012
Sample Type	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Event Type	Monthly	Storm	Storm	Monthly	2nd Monthly	Storm	Monthly	Storm	Monthly	Monthly
CONVENTIONALS										
pH (SU; EPA 150.1)	NA	NA	NA	NA	**6.63**	**6.63**	**6.54**	**6.58**	**6.74**	**6.79**
Total Suspended Solids (mg/L; EPA 160.2; SM2540D)	1.0 U	**10.4**	1.0 U	1.1 U	**6.6**	**2.2**	1.0 U	**1.2**	1.0 U	**1.5**
Turbidity (NTU; EPA 180.1)	NA	NA	NA	NA	**6.70**	NA	NA	NA	NA	NA
PARTICLE/GRAIN SIZE (mg/L)										
Method ASTM-D3977C										
Sediment Conc. > 500 um	0.01 U	**0.2**	0.01 U	**0.4**	**0.7**	**1.8**	0.01 U	0.01 U	**0.4**	**4.7**
Sediment Conc. 500 to 250 um	0.01 U	**0.2**	0.01 U	**0.3**	**0.9**	**3.0**	0.01 U	**0.7**	**0.6**	**5.1**
Sediment Conc. 250 to 125 um	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sediment Conc. 125 to 62.5 um	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sediment Conc. 62.5 to 3.9 um	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**1.40**	0.01 U	0.01 U	0.01 U	0.01 U
Sediment Conc. 3.9 to 1 um	**0.7**	**8.3**	**0.9**	**0.8**	**2.4**	**0.2**	**0.4**	**1.4**	**4.7**	0.01 U
Sediment Conc. < 1 um	**0.3**	**9.8**	**4.5**	**0.3**	**5.1**	**0.1**	**0.4**	**2.0**	**4.3**	0.01 U
Previous 1 Hour Precip. (inches) (b)	0.0	0.0	0.01	0.0	0.0	0.04	0.0	0.09	0.03	0.0
Previous 12 Hours Precip. (inches) (b)	0.0	0.0	0.7	0.0	0.0	0.17	0.23	0.27	0.03	0.36

TABLE 6
EFFLUENT WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF
Laboratory Data ID	UL81B/UL81D/UL82B	UO82C/UO82F/UO83C	UP29D/UP29H/UP30D	UU03E/UU03J/UU04E	UX30C/UX30F/UX31C	VB89C/VB89F/VB90C	VF37C/VF37F/VF38C	VJ50C/VJ50I/VJ52C	VL90C/VL90F/VL91C
Sample Date	03/12/2012	03/31/2012	04/05/2012	5/10/2012	6/5/2012	7/11/2012	8/9/2012	9/13/2012	10/4/2012
Sample Type	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Event Type	Storm	Storm	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly
PCBs (µg/L)									
Method SW8082									
Aroclor 1016	0.012 U	0.010 U	0.012 U	0.010 U	0.010 U	0.015 U	0.010 U	0.012 U	0.010 U
Aroclor 1242	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	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	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 1260	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 1221	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	0.010 U	0.020 U	0.010 U	0.020 U	0.015 U	0.010 U	0.025 U	0.010 U	0.010 U
Aroclor 1262	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 (a)	ND	ND	ND	ND	ND	ND	ND	ND	ND
SEMIVOLATILES (µg/L)									
Method SW8270D									
Phenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzyl Alcohol	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzoic Acid	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dimethylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-Butylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-Octyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA
1-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Benzofluoranthenes	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 6
EFFLUENT WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF
Laboratory Data ID	UL81B/UL81D/UL82B	UO82C/UO82F/UO83C	UP29D/UP29H/UP30D	UU03E/UU03J/UU04E	UX30C/UX30F/UX31C	VB89C/VB89F/VB90C	VF37C/VF37F/VF38C	VJ50C/VJ50I/VJ52C	VL90C/VL90F/VL91C
Sample Date	03/12/2012	03/31/2012	04/05/2012	5/10/2012	6/5/2012	7/11/2012	8/9/2012	9/13/2012	10/4/2012
Sample Type	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Event Type	Storm	Storm	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly
PAHs (µg/L)									
Method SW8270D-SIM									
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA
1-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Benzofluoranthenes	NA	NA	NA	NA	NA	NA	NA	NA	NA
CPAH TEQ	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL METALS (µg/L)									
Method EPA200.8/6010B,C/7470A									
Arsenic	**0.7**	**0.3**	**0.5**	**0.8**	**0.4**	**0.7**	**0.7**	**1.2**	**0.6**
Cadmium	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Chromium	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	0.5 U	**0.5**
Copper	**0.7**	**1.0**	**1.3**	0.5 U	**1.7**	0.5 U	0.5 U	**0.7**	0.5 U
Iron	**2500**	**210**	**400**	**1740**	**170**	**700**	**1110**	**8130**	**690**
Lead	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.1**	0.1 U
Manganese	**866**	**73**	**265**	**798**	**40**	**870**	**781**	**1120**	**958**
Mercury	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	**0.7**	**0.6**	**0.7**	**0.8**	**0.6**	**1.2**	**0.9**	**1.0**	**0.9**
Silver	NA	0.2 U	NA	NA	NA	NA	NA	NA	NA
Zinc	**19**	**27**	**16**	**7**	**14**	**6**	4 U	4 U	4 U
DISSOLVED METALS (µg/L)									
Method EPA200.8/6010B,C									
Arsenic	**0.6**	**0.2**	**0.4**	**0.7**	**0.3**	**0.7**	**0.6**	**0.7**	**0.6**
Cadmium	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Chromium	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Copper	**0.6**	**0.8**	**1.1**	0.5 U	**1.4**	0.5 U	0.5 U	**0.6**	0.5 U
Iron	**480**	50 U	**90**	**650**	50 U	**310**	**290**	**260**	**160**
Lead	**0.1**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Manganese	**814**	**72**	**258**	**760**	**38**	**876**	**798**	**1050**	**928**
Nickel	**0.7**	**0.6**	**1.2**	**0.7**	**0.5**	**1.2**	**1.0**	**1.0**	**0.9**
Silver	NA	0.2 U	NA	NA	NA	NA	NA	NA	NA
Zinc	**17**	**26**	**15**	**7**	**13**	**5**	4 U	4 U	4 U
DISSOLVED METALS (ng/L)									
Method SW7470A									
Mercury	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U

TABLE 6
EFFLUENT WHOLE WATER SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF	LTST-W-EFF
Laboratory Data ID	UL81B/UL81D/UL82B	UO82C/UO82F/UO83C	UP29D/UP29H/UP30D	UU03E/UU03J/UU04E	UX30C/UX30F/UX31C	VB89C/VB89F/VB90C	VF37C/VF37F/VF38C	VJ50C/VJ50I/VJ52C	VL90C/VL90F/VL91C
Sample Date	03/12/2012	03/31/2012	04/05/2012	5/10/2012	6/5/2012	7/11/2012	8/9/2012	9/13/2012	10/4/2012
Sample Type	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Event Type	Storm	Storm	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly
CONVENTIONALS									
pH (SU; EPA 150.1)	**6.91**	**6.56**	**6.72**	**6.77**	**6.77**	6.93	**6.86**	**6.74**	**7.01**
Total Suspended Solids (mg/L; EPA 160.2; SM2540D)	**3.3**	1.0 U	**1.8**	**1.3**	1.0 U	1.0 U	1.0 U	**8.2**	**5.1**
Turbidity (NTU; EPA 180.1)	NA	NA	NA	NA	NA	NA	NA	NA	NA
PARTICLE/GRAIN SIZE (mg/L)									
Method ASTM-D3977C									
Sediment Conc. > 500 um	**5.4**	**5.3**	**7.1**	**0.4**	**2.68**	**4.72**	0.01 U	0.01 U	0.01 U
Sediment Conc. 500 to 250 um	**6.1**	**7.5**	**6.2**	**0.5**	**3.78**	**3.44**	**0.32**	0.01 U	**0.73**
Sediment Conc. 250 to 125 um	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sediment Conc. 125 to 62.5 um	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sediment Conc. 62.5 to 3.9 um	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**1.13**	0.01 U	0.01 U
Sediment Conc. 3.9 to 1 um	**1.1**	**0.6**	0.01 U	**4.0**	**0.22**	**0.18**	**0.27**	**8.77**	**0.25**
Sediment Conc. < 1 um	**1.7**	**0.8**	**0.5**	**2.8**	**1.25**	**0.62**	**0.42**	**18.14**	**16.25**
Previous 1 Hour Precip. (inches) (b)	0.01	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0
Previous 12 Hours Precip. (inches) (b)	0.02	0.43	0.12	0.0	0.44	0.0	0.0	0.0	0.0

NA = Not Analyzed.
ND = Not Detected.
Bold = Detected compound.
U = Indicates the compound was not detected at the reported concentration.

a) Total PCBs is the sum of detected aroclors or, if no aroclors are detected, is reported as non-detect (ND).
(b) Precipitation data is from the NOAA Quality Controlled Local Climatological Data for Station 24234/BFI - SEATTLE: BOEING FIELD/KING COUNTY INTERNATIONAL AIRPORT.

TABLE 7
MH130A FILTERED SOLIDS SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A
Laboratory Data ID	TW50D	TX25B	TX90G	TY96G	UA56F	UB55B	UC78I	UE10F	UE68G	UF88A	UH75K	UI57A	UK14D	UL49H	UL81E	UM18E
Filtration Start Date	11/8/2011	11/11/2011	11/16/2011	11/22/2011	12/5/2011	12/08/2011	12/27/2012	1/9/2012	1/20/2012	1/21/2012	2/6/2012	2/9/2012	2/23/2012	3/5/2012	3/8/2012	3/12/2012
Filtration End Date	11/11/2011	11/16/2011	11/17/2011	11/23/2011	12/08/2011	12/15/2011	12/28/2011	1/12/2012	1/21/2012	1/26/2012	2/9/2012	2/17/2012	2/29/2012	3/8/2012	3/12/2012	3/13/2012
Event Type	Monthly	Interim	Storm	Storm	Monthly	Interim	Storm	Monthly	Storm	Interim	Monthly	Interim	Interim	Monthly	Interim	Storm
Measured Mass in Filter																
Aroclor 1016 (µg)	0.5 UJ	NA	2.5 U	0.5 U	10 U	NA	1.0 U	2.0 U	5.0 U	NA	5.0 U	NA	NA	2.0 U	NA	2.5 U
Aroclor 1242 (µg)	0.5 UJ	NA	2.5 U	0.5 U	10 U	NA	1.0 U	2.0 U	5.0 U	NA	5.0 U	NA	NA	2.0 U	NA	2.5 U
Aroclor 1248 (µg)	5.0 UJ	NA	15 U	**6.0**	30 U	NA	25 U	50 U	62 U	NA	**100**	NA	NA	60 U	NA	50 U
Aroclor 1254 (µg)	**6.0** J	NA	**17**	**10**	**27**	NA	**35**	**59**	**63**	NA	**89**	NA	NA	**68**	NA	**64**
Aroclor 1260 (µg)	0.8 UJ	NA	2.5 U	**8.0**	10 U	NA	**13**	5.0 U	**12**	NA	5.0 U	NA	NA	**12**	NA	**14**
Aroclor 1221 (µg)	0.5 UJ	NA	2.5 U	0.5 U	10 U	NA	1.0 U	2.0 U	5.0 U	NA	5.0 U	NA	NA	2.0 U	NA	2.5 U
Aroclor 1232 (µg)	0.5 UJ	NA	2.5 U	0.5 U	10 U	NA	1.0 U	2.0 U	5.0 U	NA	5.0 U	NA	NA	2.0 U	NA	2.5 U
Aroclor 1262 (µg)	0.5 UJ	NA	2.5 U	0.5 U	10 U	NA	1.0 U	2.0 U	5.0 U	NA	5.0 U	NA	NA	2.0 U	NA	2.5 U
Total PCBs (a) (µg)	**6.0** J	NA	**17**	**24.0**	**27**	NA	**48**	**59**	**75**	NA	**189**	NA	NA	**80**	NA	**78**
Mass of Filtered Solids:																
Bag Number	76	NA	94	105	74	NA	95	96	104	NA	135	NA	NA	145	NA	150
Filter Micron Rating (µm)	1	NA	1	1	1	NA	1	1	1	NA	1	NA	NA	1	NA	1
Unused Filter Bag (grams)	142.57	NA	138.63	140.33	138.76	NA	149.81	137.46	143.94	NA	149.50	NA	NA	157.86	NA	149.10
Dried Filter Bag with Filtered Solids (grams)	157.9	NA	148.22	153.38	176.64	NA	171.06	153.17	171.19	NA	165.71	NA	NA	175.71	NA	167.40
Total Solids Filtered, Dry Weight (grams)	15.33	NA	9.59	13.05	37.88	NA	21.25	15.71	27.25	NA	16.21	NA	NA	17.85	NA	18.30
Calculated Concentration of Total PCBs in Filtered Solids, Dry Weight (mg/kg)	**0.39**	NA	**1.77**	**1.84**	**0.71**	NA	**2.26**	**3.76**	**2.75**	NA	**11.66**	NA	NA	**4.48**	NA	**4.26**
Volume of Stormwater Filtered:																
Flow Totalizer at Start of Filtration (gallons)	1,010,105	NA	1,010,775	1,011,514	1,012,698	NA	1,012,981	1,013,670	1,013,962	NA	1,016,921	NA	NA	1,018,042	NA	1,018,681
Flow Totalizer at Sample Collection (gallons)	1,010,394	NA	1,011,104	1,012,698	1,012,839	NA	1,013,670	1,013,962	1,014,442	NA	1,017,377	NA	NA	1,018,469	NA	1,019,809
Volume of Stormwater Filtered (gallons)	289	NA	329	1,184	142	NA	689	291	480	NA	457	NA	NA	426	NA	1,127
Calculated Concentration of Total PCBs in Whole Water using flow totalizer data, (µg/L)	**0.005**	NA	**0.014**	**0.005**	**0.050**	NA	**0.018**	**0.054**	**0.041**	NA	**0.109**	NA	NA	**0.050**	NA	**0.018**
TOTAL METALS (mg/kg)																
Method EPA200.8/6010B.C/7470A/7471A																
Arsenic	NA	30 U	NA	NA	NA	120 U	NA	NA	NA	NA	NA	80 U	NA	NA	90 U	NA
Cadmium	NA	**8**	NA	NA	NA	**6**	NA	NA	NA	NA	NA	**8**	NA	NA	**11**	NA
Chromium	NA	**63**	NA	NA	NA	**20**	NA	NA	NA	NA	NA	**62**	NA	NA	**52**	NA
Copper	NA	**124**	NA	NA	NA	**38**	NA	NA	NA	NA	NA	**183**	NA	NA	**190**	NA
Iron	NA	NA	NA	NA	NA	**370,000**	NA	NA	NA	NA	NA	**259,000**	NA	NA	**311000**	NA
Lead	NA	**130**	NA	NA	NA	50 U	NA	NA	NA	NA	NA	**90**	NA	NA	**90**	NA
Manganese	NA	NA	NA	NA	NA	**761**	NA	NA	NA	NA	NA	**537**	NA	NA	**658**	NA
Mercury	NA	**0.9**	NA	NA	NA	**0.2**	NA	NA	NA	NA	NA	**0.9**	NA	NA	**0.7**	NA
Nickel	NA	**20**	NA	NA	NA	20 U	NA	NA	NA	NA	NA	**40**	NA	NA	**20**	NA
Zinc	NA	**1140**	NA	NA	NA	**490**	NA	NA	NA	NA	NA	**920**	NA	NA	**1830**	NA

TABLE 7
MH130A FILTERED SOLIDS SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

		LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A
	Laboratory Data ID	TW50D	TX25B	TX90G	TY96G	UA56F	UB55B	UC78I	UE10F	UE68G	UF88A	UH75K	UI57A	UK14D	UL49H	UL81E	UM18E
	Filtration Start Date	11/8/2011	11/11/2011	11/16/2011	11/22/2011	12/5/2011	12/08/2011	12/27/2012	1/9/2012	1/20/2012	1/21/2012	2/6/2012	2/9/2012	2/23/2012	3/5/2012	3/8/2012	3/12/2012
	Filtration End Date	11/11/2011	11/16/2011	11/17/2011	11/23/2011	12/08/2011	12/15/2011	12/28/2011	1/12/2012	1/21/2012	1/26/2012	2/9/2012	2/17/2012	2/29/2012	3/8/2012	3/12/2012	3/13/2012
	Event Type	Monthly	Interim	Storm	Storm	Monthly	Interim	Storm	Monthly	Storm	Interim	Monthly	Interim	Interim	Monthly	Interim	Storm
PARTICLE/GRAIN SIZE (percent)																	
Method PSEP-PS																	
Particle/Grain Size, Phi Scale >-1	(2,000 microns)	NA	2.7	NA	NA	NA	0.1	NA	NA	NA	0.3	NA	NA	0.1 U	NA	NA	NA
Particle/Grain Size, Phi Scale -1 to 0	(2,000-1,000 microns)	NA	8.5	NA	NA	NA	6.1	NA	NA	NA	13.8	NA	NA	10.1	NA	NA	NA
Particle/Grain Size, Phi Scale 0 to 1	(1,000-500 microns)	NA	2.1	NA	NA	NA	3.0	NA	NA	NA	7.1	NA	NA	5.7	NA	NA	NA
Particle/Grain Size, Phi Scale 1 to 2	(500-250 microns)	NA	1.1	NA	NA	NA	1.0	NA	NA	NA	8.5	NA	NA	4.3	NA	NA	NA
Particle/Grain Size, Phi Scale 2 to 3	(250-125 microns)	NA	0.8	NA	NA	NA	0.5	NA	NA	NA	6.0	NA	NA	3.7	NA	NA	NA
Particle/Grain Size, Phi Scale 3 to 4	(125-62 microns)	NA	1.1	NA	NA	NA	0.2	NA	NA	NA	4.2	NA	NA	4.7	NA	NA	NA
Particle/Grain Size, Phi Scale 4 to 5	(62.5-31.0 microns)	NA	30.9	NA	NA	NA	18.0	NA	NA	NA	5.0	NA	NA	50.5	NA	NA	NA
Particle/Grain Size, Phi Scale 5 to 6	(31.0-15.6 microns)	NA	18.1	NA	NA	NA	21.3	NA	NA	NA	30.1	NA	NA	6.1	NA	NA	NA
Particle/Grain Size, Phi Scale 6 to 7	(15.6-7.8 microns)	NA	8.4	NA	NA	NA	13.2	NA	NA	NA	7.0	NA	NA	4.1	NA	NA	NA
Particle/Grain Size, Phi Scale 7 to 8	(7.8-3.9 microns)	NA	8.9	NA	NA	NA	11.2	NA	NA	NA	8.3	NA	NA	4.7	NA	NA	NA
Particle/Grain Size, Phi Scale 8 to 9	(3.9-2.0 microns)	NA	6.6	NA	NA	NA	5.6	NA	NA	NA	4.1	NA	NA	2.7	NA	NA	NA
Particle/Grain Size, Phi Scale 9 to 10	(2.0-1.0 microns)	NA	6.7	NA	NA	NA	14.3	NA	NA	NA	1.8	NA	NA	1.9	NA	NA	NA
Particle/Grain Size, Phi Scale <10	(<1.0 micron)	NA	4.2	NA	NA	NA	5.5	NA	NA	NA	3.8	NA	NA	1.7	NA	NA	NA
Particle/Grain Size, Fines (Silt/Clay)	(<62 microns)	NA	83.8	NA	NA	NA	89.1	NA	NA	NA	60.0	NA	NA	71.5	NA	NA	NA
PRECIPITATION (b)																	
Amount During Test (inches)		0.0	0.38	0.38	2.46	0.0	0.07	0.91	0.23	0.85	1.24	0.16	0.71	0.73	0.06	1.01	0.76

TABLE 7
MH130A FILTERED SOLIDS SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A
Laboratory Data ID	UN75A	UO82H	UP34B	UQ03B	US05A	UU03M	UW21A	UX77C	UZ02A	VB89I	VC63A	VF37I	VF92A	VJ50F	VK18B	VL90I	VM55A
Filtration Start Date	3/19/2012	3/31/2012	4/2/2012	4/6/2012	4/20/2012	5/7/2012	5/18/2012	6/4/2012	6/7/2012	7/9/2012	7/11/2012	8/6/2012	8/9/2012	9/10/2012	9/13/2012	10/1/2012	10/4/2012
Filtration End Date	3/23/2012	4/1/2012	4/5/2012	4/11/2012	4/27/2012	5/10/2012	5/25/2012	6/7/2012	6/15/2012	7/11/2012	7/19/2012	8/9/2012	8/16/2012	9/13/2012	9/20/2012	10/4/2012	10/9/2012
Event Type	Interim	Storm	Monthly	Interim	Interim	Monthly	Interim	Monthly	Interim	Monthly	Interim	Monthly	Interim	Monthly	Interim	Monthly	Interim
Measured Mass in Filter																	
Aroclor 1016 (µg)	NA	5.0 U	0.5 U	NA	NA	5.0 U	NA	4.0 U	NA	1.0 U	NA	1.0 U	NA	5.0 U	NA	1.0 U	NA
Aroclor 1242 (µg)	NA	5.0 U	0.5 U	NA	NA	5.0 U	NA	4.0 U	NA	1.0 U	NA	1.0 U	NA	5.0 U	NA	1.0 U	NA
Aroclor 1248 (µg)	NA	100 U	12 U	NA	NA	47 U	NA	100 U	NA	50 U	NA	100 U	NA	38 U	NA	15 U	NA
Aroclor 1254 (µg)	NA	**110**	**15**	NA	NA	**49**	NA	**120**	NA	**31**	NA	**86**	NA	**56**	NA	**26**	NA
Aroclor 1260 (µg)	NA	12 U	1.2 U	NA	NA	**5.2**	NA	10 U	NA	2.5 U	NA	6.2 U	NA	5.0 U	NA	2.2 U	NA
Aroclor 1221 (µg)	NA	5.0 U	0.5 U	NA	NA	5.0 U	NA	4.0 U	NA	1.0 U	NA	1.0 U	NA	5.0 U	NA	1.0 U	NA
Aroclor 1232 (µg)	NA	5.0 U	0.5 U	NA	NA	5.0 U	NA	4.0 U	NA	1.0 U	NA	1.0 U	NA	5.0 U	NA	1.0 U	NA
Aroclor 1262 (µg)	NA	5.0 U	0.5 U	NA	NA	5.0 U	NA	4.0 U	NA	1.0 U	NA	1.0 U	NA	5.0 U	NA	1.0 U	NA
Total PCBs (a) (µg)	NA	**110**	**15**	NA	NA	**54.2**	NA	**120**	NA	**31**	NA	**86**	NA	**56**	NA	**26**	NA
Mass of Filtered Solids:																	
Bag Number	NA	118	134	NA	NA	117	NA	146	NA	152	NA	140	NA	155	NA	163	NA
Filter Micron Rating (µm)	NA	1	1	NA	NA	1	NA	1	NA	1	NA	1	NA	1	NA	1	NA
Unused Filter Bag (grams)	NA	149.93	152.14	NA	NA	159.11	NA	155.02	NA	156.81	NA	153.94	NA	143.76	NA	137.46	NA
Dried Filter Bag with Filtered Solids (grams)	NA	167.25	173.81	NA	NA	179.41	NA	190.91	NA	175.35	NA	175.23	NA	151.99	NA	146.54	NA
Total Solids Filtered, Dry Weight (grams)	NA	17.32	21.67	NA	NA	20.30	NA	35.89	NA	18.54	NA	21.29	NA	8.23	NA	9.08	NA
Calculated Concentration of Total PCBs in Filtered Solids, Dry Weight (mg/kg)	NA	**6.35**	**0.69**	NA	NA	**2.67**	NA	**3.34**	NA	**1.67**	NA	**4.04**	NA	**6.80**	NA	**2.86**	NA
Volume of Stormwater Filtered:																	
Flow Totalizer at Start of Filtration (gallons)	NA	1,020,723	1,021,709	NA	NA	1,023,772	NA	1,024,550	NA	1,025,496	NA	1,025,919	NA	1,026,296	NA	1,026,598	NA
Flow Totalizer at Sample Collection (gallons)	NA	1,021,708	1,022,314	NA	NA	1,024,046	NA	1,024,884	NA	1,025,659	NA	1,026,076	NA	1,026,422	NA	1,026,664	NA
Volume of Stormwater Filtered (gallons)	NA	985	606	NA	NA	274	NA	335	NA	163	NA	157	NA	126	NA	66	NA
Calculated Concentration of Total PCBs in Whole Water using flow totalizer data, (µg/L)	NA	**0.029**	**0.007**	NA	NA	**0.052**	NA	**0.095**	NA	**0.050**	NA	**0.145**	NA	**0.117**	NA	**0.104**	NA
TOTAL METALS (mg/kg)																	
Method EPA200.8/6010B.C/7470A/7471A																	
Arsenic	NA	NA	NA	80 U	NA	NA	100 U	NA	60 U	NA	130 U	NA	60 U	NA	120 U	NA	120 U
Cadmium	NA	NA	NA	**4**	NA	NA	**9**	NA	**13**	NA	5 U	NA	**6**	NA	**5**	NA	**17**
Chromium	NA	NA	NA	**30**	NA	NA	**60**	NA	**63**	NA	**50**	NA	**59**	NA	10 U	NA	**30**
Copper	NA	NA	NA	**128**	NA	NA	**133**	NA	**151**	NA	**96**	NA	**141**	NA	**52**	NA	**117**
Iron	NA	NA	NA	**357,000**	NA	NA	**273,000**	NA	**248,000**	NA	**338,000**	NA	**226,000**	NA	**393,000**	NA	**411000**
Lead	NA	NA	NA	**50**	NA	NA	**80**	NA	**110**	NA	**60**	NA	**150**	NA	50 U	NA	**90**
Manganese	NA	NA	NA	**551**	NA	NA	**854**	NA	**616**	NA	**698**	NA	**660** J	NA	**1730**	NA	**5070**
Mercury	NA	NA	NA	**1.0** J	NA	NA	**10.8**	NA	**5.4**	NA	**0.8**	NA	**1.20** J	NA	**1.0**	NA	**1.5**
Nickel	NA	NA	NA	20 U	NA	NA	**30**	NA	**30**	NA	**30**	NA	**40**	NA	20 U	NA	20 U
Zinc	NA	NA	NA	**580**	NA	NA	**1420**	NA	**1350**	NA	**620**	NA	**980**	NA	**580**	NA	**2930**

TABLE 7
MH130A FILTERED SOLIDS SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

		LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A	LTST-F-MH130A
Laboratory Data ID		UN75A	UO82H	UP34B	UQ03B	US05A	UU03M	UW21A	UX77C	UZ02A	VB89I	VC63A	VF37I	VF92A	VJ50F	VK18B	VL90I	VM55A
Filtration Start Date		3/19/2012	3/31/2012	4/2/2012	4/6/2012	4/20/2012	5/7/2012	5/18/2012	6/4/2012	6/7/2012	7/9/2012	7/11/2012	8/6/2012	8/9/2012	9/10/2012	9/13/2012	10/1/2012	10/4/2012
Filtration End Date		3/23/2012	4/1/2012	4/5/2012	4/11/2012	4/27/2012	5/10/2012	5/25/2012	6/7/2012	6/15/2012	7/11/2012	7/19/2012	8/9/2012	8/16/2012	9/13/2012	9/20/2012	10/4/2012	10/9/2012
Event Type		Interim	Storm	Monthly	Interim	Interim	Monthly	Interim	Monthly	Interim	Monthly	Interim	Monthly	Interim	Monthly	Interim	Monthly	Interim
PARTICLE/GRAIN SIZE (percent)																		
Method PSEP-PS																		
Particle/Grain Size, Phi Scale >-1	(2,000 microns)	9.2	NA	NA	NA	0.1 U	NA	0.1 U	NA	0.3	NA	0.1 U	NA	NA	NA	NA	NA	NA
Particle/Grain Size, Phi Scale -1 to 0	(2,000-1,000 microns)	13.0	NA	NA	NA	7.5	NA	1.0	NA	2.6	NA	2.5	NA	NA	NA	NA	NA	NA
Particle/Grain Size, Phi Scale 0 to 1	(1,000-500 microns)	3.7	NA	NA	NA	7.2	NA	4.0	NA	3.6	NA	3.3	NA	NA	NA	NA	NA	NA
Particle/Grain Size, Phi Scale 1 to 2	(500-250 microns)	3.0	NA	NA	NA	6.5	NA	5.2	NA	6.0	NA	3.6	NA	NA	NA	NA	NA	NA
Particle/Grain Size, Phi Scale 2 to 3	(250-125 microns)	2.5	NA	NA	NA	7.2	NA	6.7	NA	9.1	NA	4.8	NA	NA	NA	NA	NA	NA
Particle/Grain Size, Phi Scale 3 to 4	(125-62 microns)	2.2	NA	NA	NA	7.2	NA	9.4	NA	9.6	NA	5.8	NA	NA	NA	NA	NA	NA
Particle/Grain Size, Phi Scale 4 to 5	(62.5-31.0 microns)	38.0	NA	NA	NA	43.2	NA	15.2	NA	48.3	NA	8.0	NA	NA	NA	NA	NA	NA
Particle/Grain Size, Phi Scale 5 to 6	(31.0-15.6 microns)	6.1	NA	NA	NA	3.3	NA	42.6	NA	6.3	NA	15.3	NA	NA	NA	NA	NA	NA
Particle/Grain Size, Phi Scale 6 to 7	(15.6-7.8 microns)	4.7	NA	NA	NA	3.0	NA	2.2	NA	4.3	NA	7.4	NA	NA	NA	NA	NA	NA
Particle/Grain Size, Phi Scale 7 to 8	(7.8-3.9 microns)	6.5	NA	NA	NA	4.7	NA	4.5	NA	5.1	NA	13.2	NA	NA	NA	NA	NA	NA
Particle/Grain Size, Phi Scale 8 to 9	(3.9-2.0 microns)	3.1	NA	NA	NA	4.1	NA	3.2	NA	2.7	NA	10.5	NA	NA	NA	NA	NA	NA
Particle/Grain Size, Phi Scale 9 to 10	(2.0-1.0 microns)	2.1	NA	NA	NA	3.5	NA	3.5	NA	0.2	NA	16.9	NA	NA	NA	NA	NA	NA
Particle/Grain Size, Phi Scale <10	(<1.0 micron)	6.0	NA	NA	NA	2.7	NA	2.5	NA	1.9	NA	9.0	NA	NA	NA	NA	NA	NA
Particle/Grain Size, Fines (Silt/Clay)	(<62 microns)	66.4	NA	NA	NA	64.5	NA	73.7	NA	68.7	NA	80.1	NA	NA	NA	NA	NA	NA
PRECIPITATION (b)																		
Amount During Test (inches)		0.35	0.50	0.29	0.08	0.78	0.01	0.73	0.94	0.23	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00

NA = Not Analyzed
Bold = Detected compound.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U = Indicates the compound was not detected at the reported concentration.
UJ = The analyte was not detected in the sample; the reported sample reporting limit is an estimate.

a) Total PCBs is the sum of detected aroclors or, if no aroclors are detected, is reported as non-detect (ND).
(b) Precipitation data is from the NOAA Quality Controlled Local Climatological Data for Station 24234/BFI - SEATTLE: BOEING FIELD/KING COUNTY INTERNATIONAL AIRPORT.

TABLE 8
LSIV FILTERED SOLIDS SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV
Laboratory Data ID	TW50C	TX25A	TX90F	TY96F	UA56E	UB55A	UC19G	UC78G	UE10G	UE68H	UF88B	UH75L	UI57B	UK14E
Filtration Start Date	11/8/2011	11/11/2011	11/16/2011	11/22/2011	12/5/2011	12/08/2011	12/20/2011	12/27/2011	1/9/2012	1/20/2012	1/21/2012	2/6/2012	2/9/2012	2/23/2012
Filtration End Date	11/11/11	11/16/11	11/17/2011	11/23/2011	12/08/2011	12/15/2011	12/21/2011	12/28/2011	1/12/2012	1/21/2012	1/26/2012	2/9/2012	2/17/2012	2/29/2012
Event Type	Monthly	Interim	Storm	Storm	Monthly	Interim	2nd Monthly	Storm	Monthly	Storm	Interim	Monthly	Interim	Interim
Measured Mass in Filter														
Aroclor 1016 (µg)	0.5 U	NA	0.5 U	0.5 U	0.5 UJ	NA	0.5 UJ	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	NA
Aroclor 1242 (µg)	0.5 U	NA	0.5 U	0.5 U	0.6 UJ	NA	0.5 UJ	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	NA
Aroclor 1248 (µg)	1.8 U	NA	**0.9**	**3.2**	0.5 UJ	NA	0.5 UJ	**0.5**	**1.1**	**2.6**	NA	**1.5**	NA	NA
Aroclor 1254 (µg)	**2.4**	NA	**1.9**	**6.4**	0.5 UJ	NA	0.5 UJ	**1.1**	**1.5**	**6.7**	NA	**1.9**	NA	NA
Aroclor 1260 (µg)	0.5 U	NA	**1.0**	**7.1**	0.5 UJ	NA	0.5 UJ	**0.7**	**0.6**	**5.9**	NA	0.5 U	NA	NA
Aroclor 1221 (µg)	0.5 U	NA	0.5 U	0.5 U	0.5 UJ	NA	0.5 UJ	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	NA
Aroclor 1232 (µg)	0.5 U	NA	0.5 U	0.5 U	0.5 UJ	NA	0.5 UJ	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	NA
Aroclor 1262 (µg)	0.5 U	NA	0.5 U	0.5 U	0.5 UJ	NA	0.5 UJ	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	NA
Total PCBs (a) (µg)	**2.4**	NA	**3.8**	**16.7**	0.5 UJ	NA	0.5 UJ	**2.3**	**3.2**	**15.2**	NA	**3.4**	NA	NA
Mass of Filtered Solids:														
Bag Number	89	NA	85	115	71	NA	107	106	99	131	NA	119	NA	NA
Filter Micron Rating (µm)	1	NA	1	1	1	NA	1	1	1	1	NA	1	NA	NA
Unused Filter Bag (grams)	140.87	NA	126.30	141.42	146.52	NA	131.19	135.85	144.15	161.18	NA	152.85	NA	NA
Dried Filter Bag with Filtered Solids (grams)	164.16	NA	138.69	160.17	170.66	NA	180.20	146.66	159.96	194.35	NA	176.59	NA	NA
Total Solids Filtered, Dry Weight (grams)	23.29	NA	12.39	18.75	24.14	NA	49.01	10.81	15.81	33.17	NA	23.74	NA	NA
Calculated Concentration of Total PCBs in Filtered Solids, Dry Weight (mg/kg)	**0.10**	NA	**0.31**	**0.89**	0.02 UJ	NA	0.01 UJ	**0.21**	**0.20**	**0.46**	NA	**0.14**	NA	NA
Volume of Stormwater Filtered:														
Flow Totalizer at Start of Filtration (gallons)	29,485	NA	29,732	30,178	31,021	NA	31,454	31,530	31,591	31,688	NA	34,765	NA	NA
Flow Totalizer at Sample Collection (gallons)	29,631	NA	29,921	31,021	31,112	NA	31,530	31,592	31,687	31,986	NA	35,049	NA	NA
Volume of Stormwater Filtered (gallons)	146	NA	189	843	91	NA	76	62	97	299	NA	284	NA	NA
Calculated Concentration of Total PCBs in Whole Water using flow totalizer data, (µg/L)	**0.004**	NA	**0.005**	**0.005**	0.001 U	NA	0.002 U	**0.010**	**0.009**	**0.013**	NA	**0.003**	NA	NA
TOTAL METALS (mg/kg)														
Method EPA200.8/6010B,C/7470A														
Arsenic	NA	80 U	NA	NA	NA	110 U	NA	NA	NA	NA	NA	NA	110 U	NA
Cadmium	NA	**4**	NA	NA	NA	4 U	NA	NA	NA	NA	NA	NA	**7**	NA
Chromium	NA	**52** J	NA	NA	NA	**20**	NA	NA	NA	NA	NA	NA	**40**	NA
Copper	NA	**116** J	NA	NA	NA	**22**	NA	NA	NA	NA	NA	NA	**92**	NA
Iron	NA	NA	NA	NA	NA	**354,000**	NA	NA	NA	NA	NA	NA	**335,000**	NA
Lead	NA	**90**	NA	NA	NA	40 U	NA	NA	NA	NA	NA	NA	40 U	NA
Manganese	NA	NA	NA	NA	NA	**1970**	NA	NA	NA	NA	NA	NA	**1250**	NA
Mercury	NA	0.1 U	NA	NA	NA	0.2 U	NA	NA	NA	NA	NA	NA	0.2 U	NA
Nickel	NA	**20** J	NA	NA	NA	20 U	NA	NA	NA	NA	NA	NA	**30**	NA
Zinc	NA	**630** J	NA	NA	NA	**160**	NA	NA	NA	NA	NA	NA	**630**	NA

TABLE 8
LSIV FILTERED SOLIDS SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

	Sample Location ID	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV
	Laboratory Data ID	TW50C	TX25A	TX90F	TY96F	UA56E	UB55A	UC19G	UC78G	UE10G	UE68H	UF88B	UH75L	UI57B	UK14E
	Filtration Start Date	11/8/2011	11/11/2011	11/16/2011	11/22/2011	12/5/2011	12/08/2011	12/20/2011	12/27/2011	1/9/2012	1/20/2012	1/21/2012	2/6/2012	2/9/2012	2/23/2012
	Filtration End Date	11/11/11	11/16/11	11/17/2011	11/23/2011	12/08/2011	12/15/2011	12/21/2011	12/28/2011	1/12/2012	1/21/2012	1/26/2012	2/9/2012	2/17/2012	2/29/2012
	Event Type	Monthly	Interim	Storm	Storm	Monthly	Interim	2nd Monthly	Storm	Monthly	Storm	Interim	Monthly	Interim	Interim
PARTICLE/GRAIN SIZE (percent)															
Method PSEP-PS															
Particle/Grain Size, Phi Scale >-1	(2,000 microns)	NA	7.8	NA	NA	NA	0.1 U	NA	NA	NA	NA	0.1	NA	NA	0.1
Particle/Grain Size, Phi Scale -1 to 0	(2,000-1,000 microns)	NA	7.2	NA	NA	NA	14.3	NA	NA	NA	NA	7.6	NA	NA	18.8
Particle/Grain Size, Phi Scale 0 to 1	(1,000-500 microns)	NA	2.3	NA	NA	NA	3.2	NA	NA	NA	NA	8.7	NA	NA	6.5
Particle/Grain Size, Phi Scale 1 to 2	(500-250 microns)	NA	1.1	NA	NA	NA	1.8	NA	NA	NA	NA	15.7	NA	NA	4.6
Particle/Grain Size, Phi Scale 2 to 3	(250-125 microns)	NA	1.0	NA	NA	NA	1.2	NA	NA	NA	NA	15.1	NA	NA	3.6
Particle/Grain Size, Phi Scale 3 to 4	(125-62 microns)	NA	0.9	NA	NA	NA	0.9	NA	NA	NA	NA	7.0	NA	NA	3.1
Particle/Grain Size, Phi Scale 4 to 5	(62.5-31.0 microns)	NA	34.7	NA	NA	NA	15.7	NA	NA	NA	NA	30.4	NA	NA	15.0
Particle/Grain Size, Phi Scale 5 to 6	(31.0-15.6 microns)	NA	15.1	NA	NA	NA	1.7	NA	NA	NA	NA	5.6	NA	NA	12.8
Particle/Grain Size, Phi Scale 6 to 7	(15.6-7.8 microns)	NA	4.3	NA	NA	NA	9.2	NA	NA	NA	NA	1.2	NA	NA	3.0
Particle/Grain Size, Phi Scale 7 to 8	(7.8-3.9 microns)	NA	7.5	NA	NA	NA	12.6	NA	NA	NA	NA	2.0	NA	NA	5.6
Particle/Grain Size, Phi Scale 8 to 9	(3.9-2.0 microns)	NA	4.4	NA	NA	NA	9.7	NA	NA	NA	NA	1.6	NA	NA	7.2
Particle/Grain Size, Phi Scale 9 to 10	(2.0-1.0 microns)	NA	5.4	NA	NA	NA	8.7	NA	NA	NA	NA	4.4	NA	NA	5.9
Particle/Grain Size, Phi Scale <10	(<1.0 micron)	NA	8.4	NA	NA	NA	20.9	NA	NA	NA	NA	0.7	NA	NA	13.8
Particle/Grain Size, Fines (Silt/Clay)	(<62 microns)	NA	79.7	NA	NA	NA	78.6	NA	NA	NA	NA	45.9	NA	NA	63.4
PRECIPITATION (c)															
Amount During Test (inches)		0.0	0.38	0.38	1.99	0.0	0.07	0.0	0.91	0.23	0.85	1.24	0.16	0.71	0.73

TABLE 8
LSIV FILTERED SOLIDS SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV
Laboratory Data ID	UL49G	UL81F	UM18F	UN75B	UO82G	UP34C	UP34D	UQ03A	UU03K	UX77A/UX77B	VB89G/VB89H	VF37G/VF37H	VJ50D/VJ50E	VL90G/VL90H
Filtration Start Date	3/5/2012	3/8/2012	3/12/2012	3/19/2012	3/31/2012	4/2/2012	4/2/2012	4/6/2012	5/7/2012	6/4/2012	7/9/2012	8/6/2012	9/10/2012	10/1/2012
Filtration End Date	3/8/2012	3/12/2012	3/13/2012	3/23/2012	4/1/2012	4/5/2012	4/5/2012	4/10/2012	5/10/2012	6/7/2012	7/11/2012	8/9/2012	9/13/2012	10/4/2012
Event Type	Monthly	Interim	Storm	Interim	Storm	Monthly	Monthly	Interim	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly
Measured Mass in Filter														
Aroclor 1016 (µg)	0.5 U	NA	0.5 U	NA	0.5 U	1.0 U	NA	NA	0.1 U	0.5 U	0.1 U	0.1 U	0.1 U	0.1 U
Aroclor 1242 (µg)	0.5 U	NA	0.5 U	NA	0.5 U	1.0 U	NA	NA	0.1 U	0.5 U	0.1 U	0.1 U	0.1 U	0.1 U
Aroclor 1248 (µg)	3.8 U	NA	**3.8**	NA	6.2 U	50 U	NA	NA	**0.9**	5.0 U	1.5 U	1.5 U	1.0 U	0.5 U
Aroclor 1254 (µg)	**7.5**	NA	**7.2**	NA	**13**	**48**	NA	NA	**1.6**	**5.7**	**1.3**	**1.5**	**1.1**	**0.8**
Aroclor 1260 (µg)	**5.7**	NA	**2.6**	NA	**3.2**	4.0 U	NA	NA	**0.5**	**2.9**	**0.3**	**0.3**	**0.6**	**0.3**
Aroclor 1221 (µg)	0.5 U	NA	0.5 U	NA	0.5 U	1.0 U	NA	NA	0.1 U	0.5 U	0.1 U	0.1 U	0.1 U	0.1 U
Aroclor 1232 (µg)	0.5 U	NA	0.5 U	NA	0.5 U	1.0 U	NA	NA	0.1 U	0.5 U	0.1 U	0.1 U	0.1 U	0.1 U
Aroclor 1262 (µg)	0.5 U	NA	0.5 U	NA	0.5 U	1.0 U	NA	NA	0.1 U	0.5 U	0.1 U	0.1 U	0.1 U	0.1 U
Total PCBs (a) (µg)	**13.2**	NA	**13.6**	NA	**16.2**	**48**	NA	NA	**3**	**8.6**	**1.6**	**1.8**	**1.7**	**1.1**
Mass of Filtered Solids:														
Bag Number	143	NA	141	NA	147	139	NA	NA	149	130	136	138	161	158
Filter Micron Rating (µm)	1	NA	1	NA	1	1	NA	NA	1	1	1	1	1	1
Unused Filter Bag (grams)	156.04	NA	152.98	NA	158.56	154.60	NA	NA	156.88	154.73	155.52	146.98	136.93	141.36
Dried Filter Bag with Filtered Solids (grams)	186.21	NA	171.18	NA	190.29	174.87	NA	NA	159.29	185.71	183.45	185.15	172.14	178.87
Total Solids Filtered, Dry Weight (grams)	30.17	NA	18.20	NA	31.73	20.27	NA	NA	2.41	30.98	27.93	38.17	35.21	37.51
Calculated Concentration of Total PCBs in Filtered Solids, Dry Weight (mg/kg)	**0.44**	NA	**0.75**	NA	**0.51**	**2.37**	NA	NA	**1.24**	**0.28**	**0.06**	**0.05**	**0.05**	**0.03**
Volume of Stormwater Filtered:														
Flow Totalizer at Start of Filtration (gallons)	3,663	NA	36,209	NA	6,166	8,068	NA	NA	9,194	39,171	40,092	39,894	39,374	39,596
Flow Totalizer at Sample Collection (gallons)	3,987	NA	37,097	NA	8,068	8,952	NA	NA	9,332	39,573	40,340	39,374	39,596	39,736
Volume of Stormwater Filtered (gallons)	324	NA	889	NA	1,902	884	NA	NA	138	402	248	(b)	222	140
Calculated Concentration of Total PCBs in Whole Water using flow totalizer data, (µg/L)	**0.011**	NA	**0.004**	NA	**0.002**	**0.014**	NA	NA	**0.006**	**0.006**	**0.002**	(b)	**0.002**	**0.002**
TOTAL METALS (mg/kg)														
Method EPA200.8/6010B,C/7470A														
Arsenic	NA	90 U	NA	NA	NA	NA	90 U	NA	80 U	90 U	80 U	110 U	80 U	90 U
Cadmium	NA	**6**	NA	NA	NA	NA	4 U	NA	3 U	**7**	3 U	4 U	**5**	4 U
Chromium	NA	**46**	NA	NA	NA	NA	**42**	NA	**24**	**42**	**26**	**20**	**26**	**23**
Copper	NA	**98**	NA	NA	NA	NA	**79**	NA	**29**	**92**	**33**	**22**	**30**	**52**
Iron	NA	**325000**	NA	NA	NA	NA	**319,000**	NA	**368,000**	**251,000**	**323,000**	**297,000**	**313000**	**357000**
Lead	NA	40 U	NA	NA	NA	NA	40 U	NA	30 U	50	30 U	40 U	30 U	40 U
Manganese	NA	**1630**	NA	NA	NA	NA	**1210**	NA	**1850**	**1480**	**2010**	**1780**	**2000**	**2880**
Mercury	NA	0.2 U	NA	NA	NA	NA	**0.2**	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	NA	**30**	NA	NA	NA	NA	20 U	NA	20 U	20	20 U	20 U	20 U	20 U
Zinc	NA	**770**	NA	NA	NA	NA	**420**	NA	**110**	**760**	**120**	**90**	**210**	**100**

TABLE 8
LSIV FILTERED SOLIDS SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID		LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV	LTST-F-LSIV
Laboratory Data ID		UL49G	UL81F	UM18F	UN75B	UO82G	UP34C	UP34D	UQ03A	UU03K	UX77A/UX77B	VB89G/VB89H	VF37G/VF37H	VJ50D/VJ50E	VL90G/VL90H
Filtration Start Date		3/5/2012	3/8/2012	3/12/2012	3/19/2012	3/31/2012	4/2/2012	4/2/2012	4/6/2012	5/7/2012	6/4/2012	7/9/2012	8/6/2012	9/10/2012	10/1/2012
Filtration End Date		3/8/2012	3/12/2012	3/13/2012	3/23/2012	4/1/2012	4/5/2012	4/5/2012	4/10/2012	5/10/2012	6/7/2012	7/11/2012	8/9/2012	9/13/2012	10/4/2012
Event Type		Monthly	Interim	Storm	Interim	Storm	Monthly	Monthly	Interim	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly
PARTICLE/GRAIN SIZE (percent)															
Method PSEP-PS															
Particle/Grain Size, Phi Scale >-1	(2,000 microns)	NA	NA	NA	0.1 U	NA	NA	NA	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA
Particle/Grain Size, Phi Scale -1 to 0	(2,000-1,000 microns)	NA	NA	NA	7.3	NA	NA	NA	7.8	1.3	10.9	NA	NA	NA	NA
Particle/Grain Size, Phi Scale 0 to 1	(1,000-500 microns)	NA	NA	NA	5.5	NA	NA	NA	2.7	1.5	9.1	NA	NA	NA	NA
Particle/Grain Size, Phi Scale 1 to 2	(500-250 microns)	NA	NA	NA	5.0	NA	NA	NA	3.2	1.1	6.0	NA	NA	NA	NA
Particle/Grain Size, Phi Scale 2 to 3	(250-125 microns)	NA	NA	NA	4.2	NA	NA	NA	2.6	0.9	6.0	NA	NA	NA	NA
Particle/Grain Size, Phi Scale 3 to 4	(125-62 microns)	NA	NA	NA	4.3	NA	NA	NA	2.2	1.0	6.8	NA	NA	NA	NA
Particle/Grain Size, Phi Scale 4 to 5	(62.5-31.0 microns)	NA	NA	NA	12.7	NA	NA	NA	16.7	2.2	13.4	NA	NA	NA	NA
Particle/Grain Size, Phi Scale 5 to 6	(31.0-15.6 microns)	NA	NA	NA	16.1	NA	NA	NA	17.4	20.7	13.2	NA	NA	NA	NA
Particle/Grain Size, Phi Scale 6 to 7	(15.6-7.8 microns)	NA	NA	NA	4.9	NA	NA	NA	9.2	20.9	6.1	NA	NA	NA	NA
Particle/Grain Size, Phi Scale 7 to 8	(7.8-3.9 microns)	NA	NA	NA	8.4	NA	NA	NA	12.8	24.5	8.7	NA	NA	NA	NA
Particle/Grain Size, Phi Scale 8 to 9	(3.9-2.0 microns)	NA	NA	NA	7.2	NA	NA	NA	7.5	10.2	3.4	NA	NA	NA	NA
Particle/Grain Size, Phi Scale 9 to 10	(2.0-1.0 microns)	NA	NA	NA	13.6	NA	NA	NA	9.7	8.4	6.8	NA	NA	NA	NA
Particle/Grain Size, Phi Scale <10	(<1.0 micron)	NA	NA	NA	10.7	NA	NA	NA	8.0	7.1	9.6	NA	NA	NA	NA
Particle/Grain Size, Fines (Silt/Clay)	(<62 microns)	NA	NA	NA	73.6	NA	NA	NA	81.4	94.2	61.2	NA	NA	NA	NA
PRECIPITATION (c)															
Amount During Test (inches)		0.06	1.01	0.76	0.35	0.50	0.29	0.29	0.00	0.01	0.94	0.00	0.00	0.01	0.00

NA = Not Analyzed
Bold = Detected compound.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U = Indicates the compound was not detected at the reported concentration.
UJ = The analyte was not detected in the sample; the reported sample reporting limit is an estimate.

(a) Total PCBs is the sum of detected aroclors or, if no aroclors are detected, is the largest reporting limit.
(b) It has been observed that system vibration has intermittently caused the flow meter totalizer to move in reverse. The 8/9/2012 reading was 39,374 gallons (lower than the previous reading).
Therefore, the flow volume and whole water concentration of PCBs could not be determined.
(c) Precipitation data is from the NOAA Quality Controlled Local Climatological Data for Station 24234/BFI - SEATTLE: BOEING FIELD/KING COUNTY INTERNATIONAL AIRPORT.

TABLE 9
EFFLUENT FILTERED SOLIDS SAMPLING ANALYTICAL RESULTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Sample Location ID	LTST-F-EFF	LTST-F-EFF	LTST-F-EFF	LTST-F-EFF	LTST-F-EFF	LTST-F-EFF	LTST-F-EFF	LTST-F-EFF	LTST-F-EFF	LTST-F-EFF	LTST-F-EFF	LTST-F-EFF	LTST-F-EFF	LTST-F-EFF	LTST-F-EFF	LTST-F-EFF	LTST-F-EFF
Laboratory Data ID	TW50E	TX90H	TY96H	UA56G	UC78K	UE10E	UE68I	UH75M	UL49F	UM18G	UO82I	UP34A	UU03N	UX77D	VB89J	VF37J	VL90J
Filtration Start Date	11/8/2011	11/16/2011	11/22/2011	12/5/2011	12/27/2011	1/9/2012	1/20/2012	2/6/2012	3/5/12	3/12/2012	3/31/2012	4/2/2012	5/7/2012	6/4/2012	7/9/2012	8/6/2012	10/1/12
Filtration End Date	11/11/2011	11/17/2011	11/23/2011	12/08/2011	12/28/2011	1/12/2012	1/21/2012	2/9/2012	3/8/2012	3/13/2012	4/1/2012	4/5/2012	5/10/2012	6/7/2012	7/11/2012	8/9/2012	10/4/2012
Event Type	Monthly	Storm	Storm	Monthly	Storm	Monthly	Storm	Monthly	Monthly	Storm	Storm	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly
Measured Mass in Filter																	
Aroclor 1016 (µg)	0.5 U	0.5 U	0.1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	1.0 U	0.5 U	0.5 U	0.5 U
Aroclor 1242 (µg)	0.5 U	0.5 U	0.1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	1.0 U	0.5 U	0.5 U	0.5 U
Aroclor 1248 (µg)	1.0 U	**1.3**	**1.3**	1.2 U	2.0 U	15 U	6.2 U	**9.6**	15 U	7.5 U	62 U	7.5 U	5.6 U	15 U	10 U	12 U	1.2 U
Aroclor 1254 (µg)	**0.9**	**2.1**	**2.2**	**1.3**	**2.4**	**12**	**7.6**	**8.2**	**18**	**6.9**	**82**	**8.4**	**7.0**	**13**	**7.9**	**11**	**1.4**
Aroclor 1260 (µg)	0.5 U	**0.6**	**1.4** P	0.5 U	**0.9**	1.2 U	**2.7**	1.0 U	**3.5**	**2.0**	10 U	0.8 U	**0.7** P	1.5 U	0.5 U	1.0 U	0.5 U
Aroclor 1221 (µg)	0.5 U	0.5 U	0.1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	1.0 U	0.5 U	0.5 U	0.5 U
Aroclor 1232 (µg)	0.5 U	0.5 U	0.1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	1.0 U	0.5 U	0.5 U	0.5 U
Aroclor 1262 (µg)	0.5 U	0.5 U	0.1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.0 U	0.5 U	0.5 U	1.0 U	0.5 U	0.5 U	0.5 U
Total PCBs (a) (µg)	**0.9**	**4**	**4.9** P	**1.3**	**3.3**	**12**	**10.3**	**17.8**	**21.5**	**8.9**	**82**	**8.4**	**7.7**	**13**	**7.9**	**11**	**1.4**
Mass of Filtered Solids:																	
Bag Number	88	81	79	93	92	75	151	144	148	128	121	123	132	122	120	142	167
Filter Micron Rating (µm)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Unused Filter Bag (grams)	126.48	131.11	132.90	138.64	132.09	152.04	151.56	157.27	152.48	158.60	159.76	155.99	152.12	153.52	155.61	156.94	141.95
Dried Filter Bag with Filtered Solids (grams)	126.31	144.78	140.60	133.23	142.17	165.33	169.18	175.81	171.54	178.25	177.98	180.68	170.35	170.31	171.26	177.54	143.39
Total Solids Filtered, Dry Weight (grams)	N/A (b)	13.67	7.70	N/A (b)	10.08	13.29	17.62	18.54	19.06	19.65	18.22	24.69	18.23	16.79	15.65	20.60	1.44
Calculated Concentration of Total PCBs in Filtered Solids, Dry Weight (mg/kg)	N/A (b)	**0.29**	**0.64**	N/A (b)	**0.33**	**0.90**	**0.58**	**0.96**	**1.13**	**0.45**	**4.50**	**0.34**	**0.42**	**0.77**	**0.50**	**0.53**	**0.97**
Volume of Stormwater Filtered:																	
Flow Totalizer at Start of Filtration (gallons)	8,997	20,446	36,069	48,298	52,436	59,481	63,494	67,914	70,731	76,764	81,002	90,276	95,759	99,927	102,867	107,127	113,620
Flow Totalizer at Sample Collection (gallons)	9,375	36,068	48,297	52,429	59,475	63,491	67,912	70,732	76,765	81,045	90,275	95,759	99,924	102,867	107,130	111,402	113,906
Volume of Stormwater Filtered (gallons)	378	15,622	12,228	4,132	7,039	4,009	4,418	2,818	6,033	4,280	9,273	5,483	4,165	2,940	4,263	4,275	286
Calculated Concentration of Total PCBs in Whole Water using flow totalizer data, (µg/L)	**0.0006**	**0.0001**	**0.0001** P	**0.0001**	**0.0001**	**0.0008**	**0.0006**	**0.0017**	**0.0009**	**0.0005**	**0.0023**	**0.0004**	**0.0005**	**0.0012**	**0.0005**	**0.0007**	**0.0013**
PRECIPITATION (c)																	
Amount During Test (inches)	0.0	0.38	2.46	0.0	0.91	0.23	0.85	0.16	0.06	0.76	0.50	0.29	0.01	0.94	0.00	0.00	0.00

NA = Not Analyzed.
Bold = Detected compound.
P = The analyte was detected on both chromatographic columns but the quantified values differ by 40% RPD with no obvious chromatographic interference. The higher of the two values is reported by the laboratory.
U = Indicates the compound was not detected at the reported concentration.

(a) Total PCBs is the sum of detected aroclors or, if no aroclors are detected, is the largest reporting limit.
(b) Because the filter bag mass was weighed as less after filtration than before filtration, the amount of solids filtered or PCB concentration cannot be estimated.
(c) Precipitation data is from the NOAA Quality Controlled Local Climatological Data for Station 24234/BFI - SEATTLE: BOEING FIELD/KING COUNTY INTERNATIONAL AIRPORT.

TABLE 10
BYPASS DURING 2011-2012 SAMPLING EVENTS
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Event	Event Begin Date	Event End Date	Precipitation during LS431 Sampling Period (in)	Approximate Start of Bypass	Approximate End of Bypass	Comments
November Monthly	11/8/2011	11/11/2011	0.00	NA	NA	No bypass occurred during sampling event.
December Monthly	12/5/2011	12/8/2011	0.00	NA	NA	No bypass occurred during sampling event.
January Monthly	1/9/2012	1/12/2012	0.23	1/9/12 21:05	1/9/12 21:19	
February Monthly	2/6/2012	2/9/2012	0.10	NA	NA	No bypass occurred during sampling event.
March Monthly	3/5/2012	3/8/2012	0.06	3/5/12 8:50	3/5/12 9:02	
				3/5/12 9:58	3/5/12 10:13	
April Monthly	4/2/2012	4/5/2012	0.29	NA	NA	No bypass occurred during sampling event.
May Monthly	5/7/2012	5/10/2012	0.01	NA	NA	No bypass occurred during sampling event.
June Monthly	6/4/2012	6/7/2012	0.87	6/5/12 4:38	6/5/12 5:01	
				6/5/12 5:53	6/5/12 6:09	
				6/7/12 7:21	6/7/12 7:44	
				6/7/12 8:24	6/7/12 8:46	
				6/7/12 10:30	6/7/12 10:48	
July Monthly	7/9/2012	7/11/2012	0.00	NA	NA	No bypass occurred during sampling event.
August Monthly	8/6/2012	8/9/2012	0.00	NA	NA	No bypass occurred during sampling event.
September Monthly	9/10/2012	9/13/2012	0.01	NA	NA	No bypass occurred during sampling event.
October Monthly	10/1/2012	10/4/2012	0.00	NA	NA	No bypass occurred during sampling event.
Storm Events	11/16/2011	11/17/2011	0.38	11/16/11 16:08	11/16/11 16:23	
	11/22/2011	11/23/2011	1.99	11/22/11 4:09	11/22/11 4:36	
				11/22/11 4:55	11/22/11 7:16	
				11/22/11 7:39	11/22/11 8:03	
				11/22/11 8:31	11/22/11 8:45	
				11/22/11 10:41	11/22/11 10:49	
				11/22/11 13:36	11/22/11 13:50	
				11/22/11 14:13	11/22/11 14:41	
				11/22/11 14:56	11/22/11 16:28	
				11/22/11 16:48	11/22/11 18:54	
				11/22/11 19:07	11/22/11 19:40	
				11/22/11 20:19	11/22/11 20:30	
				11/22/11 20:59	11/22/11 21:51	
				11/22/11 22:10	11/22/11 22:24	
				11/22/11 23:43	11/22/11 23:55	
				11/23/11 0:29	11/23/11 0:48	
				11/23/11 1:10	11/23/11 1:28	
				11/23/11 1:59	11/23/11 2:15	
				11/23/11 2:35	11/23/11 3:02	
				11/23/11 3:18	11/23/11 3:43	
				11/23/11 4:01	11/23/11 6:27	
				11/23/11 7:06	11/23/11 7:16	
	12/27/2011	12/28/2011	0.86	12/27/11 17:44	12/27/11 17:59	
				12/27/11 18:21	12/27/11 18:50	
				12/27/11 19:06	12/27/11 19:28	
				12/27/11 19:55	12/27/11 20:13	
				12/27/11 20:34	12/27/11 21:03	
				12/27/11 21:16	12/27/11 21:45	
				12/27/11 22:16	12/27/11 22:42	
				12/27/11 22:59	12/27/11 23:14	
				12/28/11 15:32	12/28/11 15:49	
				12/28/11 16:13	12/28/11 16:38	
	1/20/2012	1/21/2012	0.85	1/20/12 14:39	1/20/12 14:54	
				1/20/12 15:23	1/20/12 15:38	
				1/20/12 16:09	1/20/12 16:24	
				1/20/12 17:09	1/20/12 17:23	
				1/20/12 19:52	1/20/12 20:03	
				1/20/12 21:55	1/20/12 22:05	
				1/20/12 22:32	1/20/12 22:51	
				1/20/12 23:18	1/20/12 23:35	
				1/21/12 0:11	1/21/12 0:26	
				1/21/12 1:05	1/21/12 1:20	
				1/21/12 2:01	1/21/12 2:16	
				1/21/12 3:23	1/21/12 3:37	
				1/21/12 4:05	1/21/12 4:26	
				1/21/12 4:59	1/21/12 5:14	
				1/21/12 5:53	1/21/12 6:08	
				1/21/12 7:04	1/21/12 7:15	
				1/21/12 8:36	1/21/12 8:47	
				1/21/12 10:18	1/21/12 10:30	
				1/21/12 11:30	11/21/12 11:44	
	3/12/2012	3/13/2012	0.76	3/12/12 15:44	3/12/12 16:06	
				3/12/12 16:26	3/12/12 17:26	
				3/12/12 17:46	3/12/12 18:11	
				3/12/12 18:54	3/12/12 19:12	
				3/12/12 20:09	3/12/12 20:25	
				3/12/12 21:41	3/12/12 21:58	
				3/13/12 1:17	3/13/12 1:31	
	3/31/2012	4/1/2012	0.50	3/31/12 6:12	3/31/12 6:43	
				3/31/12 7:14	3/31/12 7:37	
				3/31/12 8:03	3/31/12 8:27	
	10/12/2012	10/13/2012	0.08	NA	NA	No bypass occurred during sampling event.

TABLE 11
MONTHLY PRECIPITATION AND FLOW VOLUMES
LONG-TERM STORMWATER TREATMENT SYSTEM
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Data Source:	KBFI Gauge	Flo-Dar data from LS431	CESF Effluent Data from Clear Water	Calculated	Transducer Data from KC Re-Route Wet Well	Transducer Data from MH130B Weir
	Precipitation (in)	Stormwater Discharge (Mgal)	Stormwater Treated (Mgal)	% Stormwater Treated	King County Re-Route Stormwater (Mgal)	MH130A Stormwater Flowing to LSIV (Mgal)
November 2011	5.54	29.49	17.44	59%	1.68	0.08
December 2011	1.81	16.36	10.19	62%	0.58	0
January 2012	5.61	33.51	23.43	70%	1.70	0
February 2012	3.05	24.75	15.94	64%	1.20	0.94
March 2012	7.15	44.74	28.09	63%	2.40	0.027
April 2012	2.00	20.76	16.49	79%	0.89	0
May 2012	2.59	19.16	15.35	80%	0.53	0.072
June 2012	2.60	17.49	14.16	81%	1.20	0
July 2012	0.73	12.30	9.35	76%	0.70	0
August 2012	0.00	6.75 (a)	6.75	100%	0.60	0
September 2012	0.05	5.10 (a)	5.10	100%	0.45	0
October 2012	6.09	27.45	13.94	51%	2.00	0.04
Yearly Total	**37.22**	**257.84**	**176.23**	**68%**	**13.93**	**1.15**

Note:

(a) There was little to no precip in August or September 2012, and no bypass of the LTST system occurred. The Flo-Dar data indicated 7.39 Mgal (August) and 5.89 Mgal (September) were discharged. However, as 100% of the water was treated, we substituted Clear Water's data for these months.

TABLE 12
SEDIMENT TRAP ANALYTICAL DATA
NORTH BOEING FIELD

SPU Sample ID:		**SL4-T1**	SL4-T1	SL4-T1	SL4-T1	SL4-T1	SL4-T1	SL4-T1	SL4-T1	SL4-T1	SL4-T1	SL4-T1	SL4-T1	SL4-T1	**SL4-T2**	SL4-T2	SL4-T2
Boeing Manhole No.:	MH100	MH422	MH422	MH422	MH422	MH422	MH422	MH422	MH422	MH422	MH422	MH422	MH422	MH422	MH356	MH356	MH356
Lab ID:	HS89A	IK38A	JE01B	KA63E	KK75A/KL08A	KY79C	LV54A	MN63B	NI22A	OC25C	OU11B	QS17A	SQ45A	UR61B	IK38F	JE01A	KA63D
Sample Type:	Grab	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap
Date Deployed:		3/7/2005	8/11/2005	3/16/2006	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009	11/12/2010	4/5/2011	3/7/2005	8/11/2005	3/16/2006
Date Collected:	2/16/2005	8/11/2005	3/16/2006	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009	4/8/2010	4/5/2011	04/24/2012	8/11/2005	3/16/2006	10/11/2006
TOTAL METALS (mg/kg-dry)																	
(Method 6000-7000 series)																	
Arsenic	20	11	10	30	9	20	6	19	10	9 U	NA	15	NA	10 U	NA	NA	50 U
Copper	102	83.6	110	325	133 J	123	79.3	80.1	142	168	NA	140	NA	97.5	NA	NA	276
Lead	142	140	97 J	216	159	227	84	90	190	215	NA	309	NA	117	NA	NA	300
Mercury	0.2	1.10	0.93 J	8.3	3.65	2.66	1.16 J	0.43	2.64	0.33	NA	0.36	NA	0.15	NA	NA	0.6
Zinc	411	368	435	1,140	382	474	313	717	563	518	NA	554	NA	487	NA	NA	1,560
NWTPH-Dx (mg/kg)																	
Diesel-Range Hydrocarbons	40	230	490	NA	350	710	NA	300	99 U	71	NA	100	NA	100	NA	NA	NA
Motor Oil-Range Hydrocarbons	190	970	1,800	NA	930	3,500	NA	1,100	470	450	NA	720	NA	460	NA	NA	NA
PCBs (µg/kg)																	
(PSDDA PCB SW8082)																	
Aroclor 1016	95 U	29 U	6,200 U	21,000 U	51,000 U	87,000 U	4,700 U	3,100 U	740 U	2,200 U	250 U	160 U	390 U	96 U	21 U	210 U	300 U
Aroclor 1242	95 U	29 U	6,200 U	21,000 U	51,000 U	87,000 U	4,700 U	3,100 U	740 U	2,200 U	250 U	160 U	390 U	96 U	21 U	210 U	230 U
Aroclor 1248	95 U	29 U	41,000	110,000 U	100,000 U	240,000	12,000	3,100 U	3,700 U	4,400 U	380 U	1,600 U	970 U	110	21 U	210 U	300 U
Aroclor 1254	1,600	10,000	55,000	110,000	260,000	180,000	9,800	7,600	10,000	19,000	680	3,400	3,400	350	500 P	890	760
Aroclor 1260	380 P	1,200 U	11,000	21,000 U	51,000 U	87,000 U	4,700 U	3,100 U	990 U	2,200 U	250 U	550	690	160	340	570	470
Aroclor 1221	95 U	29 U	6,200 U	21,000 U	26,000 U	87,000 U	4,700 U	3,100 U	740 U	2,200 U	250 U	160 U	390 U	96 U	21 U	210 U	75 U
Aroclor 1232	95 U	29 U	6,200 U	21,000 U	51,000 U	87,000 U	4,700 U	3,100 U	740 U	2,200 U	250 U	160 U	390 U	96 U	21 U	210 U	380 U
Aroclor 1262	NA	NA	NA	NA	NA	NA	NA	NA	740 U	NA	NA	NA	NA	96 U	NA	NA	NA
Aroclor 1268	NA	NA	NA	NA	NA	NA	NA	NA	740 U	NA	NA	NA	NA	NA	NA	NA	NA
Total PCBs	1,980	10,000	107,000	110,000	260,000	420,000	21,800 *	7,600	10,000 *	19,000 *	680 *	3,950	4,090	620	840	1460	1230
SEMIVOLATILES (µg/kg-dry)																	
(PSDDA SVOCS SW8270D)																	
Phenol	59 U	100 U	340 U	260	79 U	480 U	87 UJ	160 U	200 U	82 U	330 U	200 U	NA	130	NA	1,300 U	NA
Bis-(2-Chloroethyl) Ether	59 U	100 U	340 U	NA	NA	NA	87 UJ	NA	NA	82 U	NA	NA	NA	NA	NA	1,300 U	NA
2-Chlorophenol	59 U	100 U	340 U	NA	NA	NA	87 UJ	NA	NA	82 U	NA	NA	NA	NA	NA	1,300 U	NA
1,3-Dichlorobenzene	59 U	100 U	340 U	240 U	79 U	480 U	87 UJ	160 U	200 U	82 U	330 U	200 U	NA	98 U	NA	1,300 U	NA
1,4-Dichlorobenzene	59 U	100 U	340 U	240 U	79 U	480 U	87 UJ	160 U	200 U	82 U	330 U	200 U	NA	98 U	NA	1,300 U	NA
Benzyl Alcohol	59 U	100 U	340 U	240 U	79 U	480 U	87 UJ	160 U	200 U	200	330 U	200 U	NA	83 J	NA	1,300 U	NA
1,2-Dichlorobenzene	59 U	100 U	340 U	240 U	79 U	480 U	87 UJ	160 U	200 U	82 U	330 U	200 U	NA	98 U	NA	1,300 U	NA
2-Methylphenol	59 U	100 U	340 U	240 U	79 U	480 U	87 UJ	160 U	200 U	82 U	330 U	200 U	NA	98 U	NA	1,300 U	NA
2,2'-Oxybis(1-Chloropropane)	59 U	100 U	340 U	NA	NA	NA	87 UJ	NA	NA	82 U	NA	NA	NA	NA	NA	1,300 U	NA
4-Methylphenol	59 U	100 U	340 U	420	170	480 U	87 UJ	160 U	200 U	82 U	330 U	200 U	NA	220	NA	1,300 U	NA
N-Nitroso-Di-N-Propylamine	300 U	510 U	1,700 U	NA	NA	NA	430 UJ	NA	NA	410 U	NA	NA	NA	NA	NA	6,600 U	NA
Hexachloroethane	59 U	100 U	340 U	240 U	79 U	480 U	87 UJ	160 U	200 U	82 U	330 U	200 U	NA	98 U	NA	1,300 U	NA
Nitrobenzene	59 U	100 U	340 U	NA	NA	NA	87 UJ	NA	NA	82 U	NA	NA	NA	NA	NA	1,300 U	NA
Isophorone	59 U	100 U	340 U	NA	NA	NA	87 UJ	NA	NA	82 U	NA	NA	NA	NA	NA	1,300 U	NA
2-Nitrophenol	300 U	510 U	1,700 U	NA	NA	NA	430 UJ	NA	NA	410 U	NA	NA	NA	NA	NA	6,600 U	NA
2,4-Dimethylphenol	59 U	100 U	340 U	240 U	210	480 U	87 UJ	160 U	200 U	82 U	330 U	200 U	NA	200 U	NA	1,300 U	NA
Benzoic Acid	590 U	1,000 U	3,400 U	2,400 U	790 U	4,800 U	870 UJ	1,600 U	2,000 U	2,600	3,300 U	2,000 U	NA	2,000 UJ	NA	13,000 U	NA
bis(2-Chloroethoxy) Methane	59 U	100 U	340 U	NA	NA	NA	87 UJ	NA	NA	82 U	NA	NA	NA	NA	NA	1,300 U	NA
2,4-Dichlorophenol	300 U	510 U	1,700 U	NA	NA	NA	430 UJ	NA	NA	410 U	NA	NA	NA	NA	NA	6,600 U	NA
1,2,4-Trichlorobenzene	59 U	100 U	340 U	240 U	79 U	480 U	87 UJ	160 U	200 U	82 U	330 U	200 U	NA	98 U	NA	1,300 U	NA
Naphthalene	59 U	100 U	340 U	240 U	79 U	480 U	87 UJ	160 U	200 U	82 U	330 U	200 U	NA	160	NA	1,300 U	NA
4-Chloroaniline	300 U	510 U	1,700 U	NA	NA	NA	430 UJ	NA	NA	410 U	NA	NA	NA	NA	NA	6,600 U	NA
Hexachlorobutadiene	59 U	100 U	340 U	240 U	79 U	480 U	87 UJ	160 U	200 U	82 U	330 U	200 U	NA	490 U	NA	1,300 U	NA
4-Chloro-3-methylphenol	300 U	510 U	1,700 U	NA	NA	NA	430 UJ	NA	NA	410 U	NA	NA	NA	NA	NA	6,600 U	NA
2-Methylnaphthalene	59 U	120	340 U	240 U	79 U	480 U	87 UJ	160 U	200 U	82 U	330 U	200 U	NA	200	NA	1,300 U	NA
Hexachlorocyclopentadiene	300 U	510 U	1,700 U	NA	NA	NA	430 UJ	NA	NA	410 U	NA	NA	NA	NA	NA	6,600 U	NA
2,4,6-Trichlorophenol	300 U	510 U	1,700 U	NA	NA	NA	430 UJ	NA	NA	410 U	NA	NA	NA	NA	NA	6,600 U	NA
2,4,5-Trichlorophenol	300 U	510 U	1,700 U	NA	NA	NA	430 UJ	NA	NA	410 U	NA	NA	NA	NA	NA	6,600 U	NA
2-Chloronaphthalene	59 U	100 U	340 U	NA	NA	NA	87 UJ	NA	NA	82 U	NA	NA	NA	NA	NA	1,300 U	NA
2-Nitroaniline	300 U	510 U	1,700 U	NA	NA	NA	430 UJ	NA	NA	410 U	NA	NA	NA	NA	NA	6,600 U	NA
Dimethylphthalate	59 U	100 U	340 U	240 U	79 U	480 U	87 UJ	160 U	200 U	82 U	330 U	200 U	NA	98 U	NA	1,300 U	NA
Acenaphthylene	59 U	100 U	340 U	240 U	79 U	480 U	87 UJ	160 U	200 U	82 U	330 U	200 U	NA	98 U	NA	1,300 U	NA
3-Nitroaniline	300 U	510 U	1,700 U	NA	NA	NA	430 UJ	NA	NA	410 U	NA	NA	NA	NA	NA	6,600 U	NA
Acenaphthene	59 U	210	340 U	240 U	90	480 U	87 UJ	370	200 U	82 U	330 U	200 J	NA	360	NA	1,300 U	NA

TABLE 12
SEDIMENT TRAP ANALYTICAL DATA
NORTH BOEING FIELD

SPU Sample ID:		**SL4-T1**	SL4-T1	SL4-T1	SL4-T1	SL4-T1	SL4-T1	SL4-T1	SL4-T1	SL4-T1	SL4-T1	SL4-T1	SL4-T1	SL4-T1	**SL4-T2**	SL4-T2	SL4-T2
Boeing Manhole No.:	MH100	MH422	MH422	MH422	MH422	MH422	MH422	MH422	MH422	MH422	MH422	MH422	MH422	MH422	MH356	MH356	MH356
Lab ID:	HS89A	IK38A	JE01B	KA63E	KK75A/KL08A	KY79C	LV54A	MN63B	NI22A	OC25C	OU11B	QS17A	SQ45A	UR61B	IK38F	JE01A	KA63D
Sample Type:	Grab	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap
Date Deployed:		3/7/2005	8/11/2005	3/16/2006	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009	11/12/2010	4/5/2011	3/7/2005	8/11/2005	3/16/2006
Date Collected:	2/16/2005	8/11/2005	3/16/2006	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009	4/8/2010	4/5/2011	04/24/2012	8/11/2005	3/16/2006	10/11/2006
2,4-Dinitrophenol	590 U	1,000 U	3,400 U	NA	NA	NA	870 UJ	NA	NA	820 U	NA	NA	NA	NA	NA	13,000 U	NA
4-Nitrophenol	300 U	510 U	1,700 U	NA	NA	NA	430 UJ	NA	NA	410 U	NA	NA	NA	NA	NA	6,600 U	NA
Dibenzofuran	59 U	150	340 U	240 U	79 U	480 U	87 UJ	260	200 U	82 U	330 U	240	NA	330	NA	1,300 U	NA
2,6-Dinitrotoluene	300 U	510 U	1,700 U	NA	NA	NA	430 UJ	NA	NA	410 U	NA	NA	NA	NA	NA	6,600 U	NA
2,4-Dinitrotoluene	300 U	510 U	1,700 U	NA	NA	NA	430 UJ	NA	NA	410 U	NA	NA	NA	NA	NA	6,600 U	NA
Diethylphthalate	59 U	100 U	340 U	240 U	79 U	480 U	87 UJ	160 U	200 U	82 U	330 U	200 U	NA	240 U	NA	1,300 U	NA
4-Chlorophenyl-phenylether	59 U	100 U	340 U	NA	NA	NA	87 UJ	NA	NA	82 U	NA	NA	NA	NA	NA	1,300 U	NA
Fluorene	59 U	190	340 U	240 U	130	480 U	87 UJ	490	200 U	82 U	330 U	260	NA	420	NA	1,300 U	NA
4-Nitroaniline	300 U	510 U	1,700 U	NA	NA	NA	430 UJ	NA	NA	410 U	NA	NA	NA	NA	NA	6,600 U	NA
4,6-Dinitro-2-Methylphenol	590 U	1,000 U	3,400 U	NA	NA	NA	870 UJ	NA	NA	820 U	NA	NA	NA	NA	NA	13,000 U	NA
N-Nitrosodiphenylamine	59 U	100 U	340 U	240 U	79 U	480 U	87 UJ	160 U	200 U	82 U	330 U	200 U	NA	98 U	NA	1,300 U	NA
4-Bromophenyl-phenylether	59 U	100 U	340 U	NA	NA	NA	87 UJ	NA	NA	82 U	NA	NA	NA	NA	NA	1,300 U	NA
Hexachlorobenzene	59 U	100 U	340 U	240 U	79 U	480 U	87 UJ	160 U	200 U	82 U	330 U	200 U	NA	98 U	NA	1,300 U	NA
Pentachlorophenol	300 U	510 U	1,700 U	1,200 U	400 U	2,400 U	430 UJ	770 U	1,000 U	410 U	1,700 U	1,000 U	NA	980 UJ	NA	6,600 U	NA
Phenanthrene	250	2,800	2,500	2,900	1,200	2,700	950 J	4,300	2,000	770	1,100	4,000	NA	5,200	NA	15,000	NA
Carbazole	110	390	480	NA	NA	NA	240 J	NA	NA	210	NA	NA	NA	NA	NA	3,600	NA
Anthracene	140	360	380	290	220	480 U	120 J	510	200 U	85	330 U	560	NA	330	NA	1,700	NA
Di-n-Butylphthalate	59 U	130	360	240 U	250 U	480 U	220 J	200	200 U	82 U	330 U	6,900	NA	120	NA	1,300 U	NA
Fluoranthene	880	4,100	6,600	7,700	2,400	5,800	2,200 J	5,600	3,400	1,900	2,500	9,900	NA	7,000	NA	45,000	NA
Pyrene	810	3,000	3,400	4,700	2,100	3,900	1,700 J	3,800	2,600	1,200	1,900	5,400	NA	5,700	NA	23,000	NA
Butylbenzylphthalate	86	120	340 U	1,200	79 U	480 U	390 J	430	480	100	240 J	330	NA	370 J	NA	1,600	NA
3,3'-Dichlorobenzidine	300 U	510 U	1,700 U	NA	NA	NA	430 UJ	NA	NA	410 U	NA	NA	NA	NA	NA	6,600 U	NA
Benzo(a)anthracene	380	1,400	1,800	1,600	1,100	1,900	570 J	1,600	860	540	820	3,100	NA	1,700	NA	11,000	NA
bis(2-Ethylhexyl)phthalate	2,000	2,400	2,600	10,000	1,200	9,800	2,900 J	2,200	1,700	2,300	7,300	7,400	NA	4,400	NA	34,000	NA
Chrysene	620	1,900	2,700	4,300	1,600	3,000	1,200 J	2,500	1,600	970	1,500	5,100	NA	3,300	NA	23,000	NA
Di-n-Octyl phthalate	71	440	1,000	1,500	240	2,700	980 J	470	550	440	1,900	1,900	NA	790	NA	9,800	NA
Benzo(b)fluoranthene	760	2,400	2,400	3,200	1,700	3,600	1,600 J	2,500	1,600	840	1,400	4,300	NA	NA	NA	26,000	NA
Benzo(k)fluoranthene	460	1,300	2,300	4,100	1,600	3,400	1,100 J	1,800	1,100	920	1,500	4,300	NA	NA	NA	17,000	NA
Total Benzofluoranthenes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5,500	NA	NA	NA
Benzo(a)pyrene	480	1,700	2,000	2,800	1,400	2,600	830 J	1,900	1,100	760	1,300	4,600	NA	2,200	NA	15,000	NA
Indeno(1,2,3-cd)pyrene	180	810	930	2,000	530	1,300	300 J	1,200	940	560	1,000	3,100	NA	1,900	NA	9,200	NA
Dibenz(a,h)anthracene	59 U	260	340 U	700	120	480 U	87 UJ	490	230	200	340	1,300	NA	650	NA	2,100	NA
Benzo(g,h,i)perylene	200	720	890	2,000	530	1,300	120 J	1,300	1,100	600	1,200	3,600	NA	2,100	NA	9,000	NA
1-Methylnaphthalene	NA	NA	NA	NA	NA	NA	87 U	160 U	200 U	82 U	330 U	200 U	NA	120	NA	NA	NA
CONVENTIONAL PARAMETERS (%)																	
Total Solids (EPA 160.3) (%)	38.80	72.80 J	71.30 J	37.60	75.00	NA	NA	67.70	NA	49.60	NA	59.50	59.50	50.70	NA	NA	8.93
Total Organic Carbon (Plumb, 1981) (%)	6.60	4.29	7.86	NA	3.45	NA	NA	3.83	NA	3.98	NA	5.65	4.64	3.10	NA	NA	NA
WEIGHT OF SOLIDS COLLECTED (g)										58.34	16.85	102.50		58.43			
Reported as Dry Wt		P,S,T,M	P,S,T,M	P,S,M	P,S,T,M	P,S,T,M		P,S,T,M	M	M		P,S,T,M	P	P,S,T,M	P	P,S	P,S,M
Reported as As Received							P,S,M		P,S,T	P,S,T	P,S						
Not Analyzed Due to Low Sample Volume				T			T				T,M		S,T,M		S,T,M	T,M	T

P=PCBs
S=SVOCs
T=TPH
M=Metals

TABLE 12
SEDIMENT TRAP ANALYTICAL DATA
NORTH BOEING FIELD

SPU Sample ID:	SL4-T2	SL4-T2	SL4-T2	SL4-T2	SL4-T2	SL4-T2	SL4-T2	SL4-T2	SL4-T2	SL4-T2	**SL4-T3**	SL4-T3	SL4-T3	SL4-T3	SL4-T3	SL4-T3	SL4-T3
Boeing Manhole No.:	MH356	MH356	MH356	MH356	MH356	MH356	MH356	MH356	MH356	MH356	MH364	MH364	MH364	MH364	MH364	MH364	MH364
Lab ID:	KK75B	KY79D	LV54B	MN63A	NI22B	OC25A	OU11A	QS17B	SQ45B	UR61C	IK38G	JE01C	KA63A	KK75C/KL08B	KY79E	LV54C	MN63D
Sample Type:	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap
Date Deployed:	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009	11/12/2010	4/5/2011	3/7/2005	8/11/2005	3/16/2006	10/11/2006	1/8/2007	5/14/2007	10/29/2007
Date Collected:	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009	4/8/2010	4/5/2011	04/24/2012	8/11/2005	3/16/2006	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008
TOTAL METALS (mg/kg-dry)																	
(Method 6000-7000 series)																	
Arsenic	NA	NA	5 U	NA	NA	NA	NA	NA	NA	20 U	NA	30 U	100 U	10 U	NA	5 U	NA
Copper	NA	NA	40.9	NA	NA	NA	NA	NA	NA	249	NA	99	106	72.2	NA	4.3	NA
Lead	NA	NA	43	NA	NA	NA	NA	NA	NA	272	NA	120	100	97	NA	4	NA
Mercury	NA	NA	0.08	NA	NA	NA	NA	NA	NA	0.42	NA	0.3	0.7 U	0.09 U	NA	0.03 U	NA
Zinc	NA	NA	222	NA	NA	NA	NA	NA	NA	1,470	NA	448	660	293	NA	30	NA
NWTPH-Dx (mg/kg)																	
Diesel-Range Hydrocarbons	NA	NA	NA	NA	NA	NA	NA	NA	NA	770	NA	320	NA	NA	NA	NA	NA
Motor Oil-Range Hydrocarbons	NA	NA	NA	NA	NA	NA	NA	NA	NA	2,800	NA	1,200	NA	NA	NA	NA	NA
PCBs (µg/kg)																	
(PSDDA PCB SW8082)																	
Aroclor 1016	27 U	19 U	35 U	13 U	24 U	9.9 U	34 U	79 U	26 U	340 U	20 U	160 U	78 U	49 U	(a)	34 U	10 U
Aroclor 1242	27 U	19 U	35 U	13 U	24 U	9.9 U	34 U	79 U	26 U	340 U	20 U	160 U	78 U	49 U	(a)	34 U	10 U
Aroclor 1248	13 U	19 U	35 U	19 U	24 U	9.9 U	34 U	120 U	100 U	340 U	20 U	270 U	160 U	120 U	(a)	34 U	20 U
Aroclor 1254	180	70	90	47	24	10	48	260	370	400	1,400	1,300	480	430	(a)	34 U	65
Aroclor 1260	130	58	43	38	24 U	9.9 U	34 U	200	310	350	380 U	510	150	140	(a)	34 U	25
Aroclor 1221	13 U	19 U	35 U	13 U	24 U	9.9 U	34 U	79 U	26 U	340 U	20 U	160 U	39 U	49 U	(a)	34 U	10 U
Aroclor 1232	13 U	19 U	35 U	13 U	24 U	9.9 U	34 U	79 U	26 U	340 U	20 U	310 U	160 U	49 U	(a)	34 U	10 U
Aroclor 1262	NA	NA	NA	NA	24 U	NA	NA	NA	NA	340 U	NA	NA	NA	NA	NA	NA	NA
Aroclor 1268	NA	NA	NA	NA	24 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total PCBs	310	128	133 *	85 *	24 *	10 *	48 *	460	680	750	1,400	1810	630	570	(a)	34 * U	90 *
SEMIVOLATILES (µg/kg-dry)																	
(PSDDA SVOCS SW8270D)																	
Phenol	NA	NA	NA	NA	NA	88 U	NA	470 U	NA	730	NA	530 U	NA	480 U	NA	NA	59 U
Bis-(2-Chloroethyl) Ether	NA	NA	NA	NA	NA	88 U	NA	NA	NA	NA	NA	530 U	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA	88 U	NA	NA	NA	NA	NA	530 U	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	88 U	NA	470 U	NA	280 U	NA	530 U	NA	480 U	NA	NA	59 U
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	88 U	NA	470 U	NA	280 U	NA	530 U	NA	480 U	NA	NA	59 U
Benzyl Alcohol	NA	NA	NA	NA	NA	88 U	NA	470 U	NA	280 U	NA	530 U	NA	480 U	NA	NA	59 U
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	88 U	NA	470 U	NA	280 U	NA	530 U	NA	480 U	NA	NA	59 U
2-Methylphenol	NA	NA	NA	NA	NA	88 U	NA	470 U	NA	280 U	NA	530 U	NA	480 U	NA	NA	59 U
2,2'-Oxybis(1-Chloropropane)	NA	NA	NA	NA	NA	88 U	NA	NA	NA	NA	NA	530 U	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	88 U	NA	470 U	NA	2,100	NA	530 U	NA	480 U	NA	NA	59 U
N-Nitroso-Di-N-Propylamine	NA	NA	NA	NA	NA	440 U	NA	NA	NA	NA	NA	2,700 U	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA	88 U	NA	470 U	NA	280 U	NA	530 U	NA	480 U	NA	NA	59 U
Nitrobenzene	NA	NA	NA	NA	NA	88 U	NA	NA	NA	NA	NA	530 U	NA	NA	NA	NA	NA
Isophorone	NA	NA	NA	NA	NA	88 U	NA	NA	NA	NA	NA	530 U	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA	440 U	NA	NA	NA	NA	NA	2,700 U	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	NA	88 U	NA	470 U	NA	550 U	NA	530 U	NA	480 U	NA	NA	59 U
Benzoic Acid	NA	NA	NA	NA	NA	880 U	NA	4,700 U	NA	5,500 U	NA	5,300 U	NA	4,800 U	NA	NA	590 U
bis(2-Chloroethoxy) Methane	NA	NA	NA	NA	NA	88 U	NA	NA	NA	NA	NA	530 U	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	NA	NA	440 U	NA	NA	NA	NA	NA	2,700 U	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	88 U	NA	470 U	NA	280 U	NA	530 U	NA	480 U	NA	NA	59 U
Naphthalene	NA	NA	NA	NA	NA	88 U	NA	470 U	NA	290	NA	530 U	NA	480 U	NA	NA	59 U
4-Chloroaniline	NA	NA	NA	NA	NA	440 U	NA	NA	NA	NA	NA	2,700 U	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA	88 U	NA	470 U	NA	1,400 U	NA	530 U	NA	480 U	NA	NA	59 U
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	440 U	NA	NA	NA	NA	NA	2,700 U	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	88 U	NA	470 U	NA	220 J	NA	530 U	NA	480 U	NA	NA	59 U
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	440 U	NA	NA	NA	NA	NA	2,700 U	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	NA	NA	NA	440 U	NA	NA	NA	NA	NA	2,700 U	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	NA	NA	440 U	NA	NA	NA	NA	NA	2,700 U	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	88 U	NA	NA	NA	NA	NA	530 U	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA	440 U	NA	NA	NA	NA	NA	2,700 U	NA	NA	NA	NA	NA
Dimethylphthalate	NA	NA	NA	NA	NA	88 U	NA	470 U	NA	280 U	NA	530 U	NA	480 U	NA	NA	59 U
Acenaphthylene	NA	NA	NA	NA	NA	88 U	NA	470 U	NA	280 U	NA	530 U	NA	480 U	NA	NA	59 U
3-Nitroaniline	NA	NA	NA	NA	NA	440 U	NA	NA	NA	NA	NA	2,700 U	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	88 U	NA	430 J	NA	480	NA	530 U	NA	480 U	NA	NA	59 U

TABLE 12
SEDIMENT TRAP ANALYTICAL DATA
NORTH BOEING FIELD

SPU Sample ID:	SL4-T2	SL4-T2	SL4-T2	SL4-T2	SL4-T2	SL4-T2	SL4-T2	SL4-T2	SL4-T2	SL4-T2	**SL4-T3**	SL4-T3	SL4-T3	SL4-T3	SL4-T3	SL4-T3	SL4-T3
Boeing Manhole No.:	MH356	MH356	MH356	MH356	MH356	MH356	MH356	MH356	MH356	MH356	MH364	MH364	MH364	MH364	MH364	MH364	MH364
Lab ID:	KK75B	KY79D	LV54B	MN63A	NI22B	OC25A	OU11A	QS17B	SQ45B	UR61C	IK38G	JE01C	KA63A	KK75C/KL08B	KY79E	LV54C	MN63D
Sample Type:	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap
Date Deployed:	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009	11/12/2010	4/5/2011	3/7/2005	8/11/2005	3/16/2006	10/11/2006	1/8/2007	5/14/2007	10/29/2007
Date Collected:	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009	4/8/2010	4/5/2011	04/24/2012	8/11/2005	3/16/2006	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008
2,4-Dinitrophenol	NA	NA	NA	NA	NA	880 U	NA	NA	NA	NA	NA	5,300 U	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA	440 U	NA	NA	NA	NA	NA	2,700 U	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	88 U	NA	430 J	NA	440	NA	530 U	NA	480 U	NA	NA	59 U
2,6-Dinitrotoluene	NA	NA	NA	NA	NA	440 U	NA	NA	NA	NA	NA	2,700 U	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	440 U	NA	NA	NA	NA	NA	2,700 U	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	NA	100 U	NA	470 U	NA	690 U	NA	530 U	NA	480 U	NA	NA	59 U
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	88 U	NA	NA	NA	NA	NA	530 U	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	88 U	NA	570	NA	480	NA	530 U	NA	480 U	NA	NA	59 U
4-Nitroaniline	NA	NA	NA	NA	NA	440 U	NA	NA	NA	NA	NA	2,700 U	NA	NA	NA	NA	NA
4,6-Dinitro-2-Methylphenol	NA	NA	NA	NA	NA	880 U	NA	NA	NA	NA	NA	5,300 U	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine	NA	NA	NA	NA	NA	88 U	NA	470 U	NA	280 U	NA	530 U	NA	480 U	NA	NA	59 U
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	88 U	NA	NA	NA	NA	NA	530 U	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA	88 U	NA	470 U	NA	280 U	NA	530 U	NA	480 U	NA	NA	59 U
Pentachlorophenol	NA	NA	NA	NA	NA	440 U	NA	2,300 U	NA	2,800 UJ	NA	2,700 U	NA	2,400 U	NA	NA	300 U
Phenanthrene	NA	NA	NA	NA	NA	390	NA	11,000	NA	11,000	NA	1,800	NA	2,000	NA	NA	300
Carbazole	NA	NA	NA	NA	NA	100	NA	NA	NA	NA	NA	530 U	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	88 U	NA	1,300	NA	1,100	NA	530 U	NA	480 U	NA	NA	63
Di-n-Butylphthalate	NA	NA	NA	NA	NA	88 U	NA	1,600	NA	460	NA	530 U	NA	480 U	NA	NA	59 U
Fluoranthene	NA	NA	NA	NA	NA	1,100	NA	28,000	NA	26,000	NA	4,800	NA	4,700	NA	NA	690
Pyrene	NA	NA	NA	NA	NA	810	NA	15,000	NA	19,000	NA	2,700	NA	2,900	NA	NA	480
Butylbenzylphthalate	NA	NA	NA	NA	NA	88 U	NA	530	NA	1,000 J	NA	530 U	NA	480 U	NA	NA	59 U
3,3'-Dichlorobenzidine	NA	NA	NA	NA	NA	440 U	NA	NA	NA	NA	NA	2,700 U	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	330	NA	7,200	NA	7,700	NA	1,200	NA	1,300	NA	NA	210
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	NA	1,500	NA	19,000	NA	37,000	NA	4,800	NA	3,600	NA	NA	490
Chrysene	NA	NA	NA	NA	NA	850	NA	16,000	NA	19,000	NA	2,600	NA	2,600	NA	NA	390
Di-n-Octyl phthalate	NA	NA	NA	NA	NA	280	NA	27,000	NA	8,300	NA	23,000	NA	11,000	NA	NA	1,600
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	820	NA	13,000	NA	NA	NA	2,600	NA	3,000	NA	NA	500
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	860	NA	13,000	NA	NA	NA	1,700	NA	1,700	NA	NA	240
Total Benzofluoranthenes	NA	NA	NA	NA	NA	NA	NA	NA	NA	34,000	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	520	NA	12,000	NA	12,000	NA	1,500	NA	1,900	NA	NA	310
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	530	NA	8,500	NA	12,000	NA	930	NA	1,400	NA	NA	220
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	88 U	NA	3,500	NA	4,700	NA	530 U	NA	480 U	NA	NA	60
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	600	NA	9,400	NA	13,000	NA	950	NA	1,500	NA	NA	220
1-Methylnaphthalene	NA	NA	NA	NA	NA	88 U	NA	470 U	NA	280 U	NA	NA	NA	NA	NA	NA	59 U
CONVENTIONAL PARAMETERS (%)																	
Total Solids (EPA 160.3) (%)	NA	NA	NA	NA	NA	NA	NA	25.00	28.10	27.60	NA	13.40 J	4.93	40.80	NA	NA	NA
Total Organic Carbon (Plumb, 1981) (%)	NA	NA	NA	NA	NA	NA	NA	NA	16.1	17.7	NA	5.80	NA	2.38	NA	NA	NA
WEIGHT OF SOLIDS COLLECTED (g)						39.34	8.05	65.70		107.66							
Reported as Dry Wt	P,S	P						P,S	P	P,S,T,M	P	P,S,T,M	P,M	P,S,M	P		
Reported as As Received			P,M	P	P	P,S	P									P,M	P,S
Not Analyzed Due to Low Sample Volume	T,M	S,T,M	S,T	S,T,M	S,T,M	T,M	S,T,M	T,M	S,T,M		S,T,M		S,T	T	S,T,M	S,T	T,M

P=PCBs
S=SVOCs
T=TPH
M=Metals

TABLE 12
SEDIMENT TRAP ANALYTICAL DATA
NORTH BOEING FIELD

SPU Sample ID:	SL4-T3	SL4-T3	SL4-T3	SL4-T3	SL4-T3	SL4-T3	**SL4-T4**	SL4-T4	SL4-T4	SL4-T4	SL4-T4	SL4-T4	SL4-T4	SL4-T4	SL4-T4	SL4-T4	SL4-T4
Boeing Manhole No.:	MH364	MH364	MH364	MH364	MH364	MH364	MH221A	MH221A	MH221A	MH221A	MH221A	MH221A	MH221A	MH221A	MH221A	MH221A	MH221A
Lab ID:	NI22D	OC25B	OU11D	QS17C	SQ45C	UR61D	HS89B	IK38B	JE01D	KA63B	KK75D/KL08C	KY79F	LV54D	MN63E	NI22E	OC25E	OU11E
Sample Type:	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Grab	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap
Date Deployed:	3/18/2008	7/30/2008	12/3/2008	4/6/2009	11/12/2010	4/5/2011		3/8/2005	8/11/2005	3/16/2006	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008
Date Collected:	7/30/2008	12/3/2008	4/6/2009	4/8/2010	4/5/2011	04/24/2012	2/16/2005	8/11/2005	3/16/2006	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009
TOTAL METALS (mg/kg-dry)																	
(Method 6000-7000 series)																	
Arsenic	NA	NA	NA	NA	NA	70 U	12	NA	20	70	10	NA	50	18	NA	NA	5.0 U
Copper	NA	NA	NA	NA	NA	110	38.5	NA	134	271	125	NA	329	85.8	NA	NA	61.4
Lead	NA	NA	NA	NA	NA	90	50	NA	190	330	175	NA	288	115	NA	NA	83
Mercury	NA	NA	NA	NA	NA	0.1	0.09	NA	0.4	0.6	0.4	NA	0.5	0.21	NA	NA	0.11
Zinc	NA	NA	NA	NA	NA	640	332	NA	733	2,460	828	NA	1,990	1,080	NA	NA	317
NWTPH-Dx (mg/kg)																	
Diesel-Range Hydrocarbons	NA	NA	NA	NA	NA	150	120	NA	580	NA	1,200	NA	NA	100	NA	NA	1,300
Motor Oil-Range Hydrocarbons	NA	NA	NA	NA	NA	540	210	NA	1,800	NA	1,300	NA	NA	420	NA	NA	3,400
PCBs (µg/kg)																	
(PSDDA PCB SW8082)																	
Aroclor 1016	13 U	10 U	21 U	110 U	20 U	270 U	120 U	9.8 U	95 U	94 U	96 U	160 U	45 U	75 U	30 U	50 U	82 U
Aroclor 1242	13 U	10 U	21 U	110 U	20 U	270 U	120 U	9.8 U	95 U	120 U	96 U	160 U	45 U	75 U	30 U	50 U	82 U
Aroclor 1248	13 U	10 U	21 U	110 U	99 U	270 U	120 U	9.8 U	100 U	140 U	96 U	160 U	45 U	75 U	200 U	50 U	82 U
Aroclor 1254	32	26	28	250	370	420	960	1,900 P	750	580	1,000	790	1,200	240	510 J	100	160
Aroclor 1260	13 U	10 U	21 U	110 U	180	280	530	850	340	360	700	800	680	200	270 J	140	180
Aroclor 1221	13 U	10 U	21 U	110 U	20 U	270 U	120 U	9.8 U	95 U	23 U	96 U	160 U	45 U	75 U	30 U	50 U	82 U
Aroclor 1232	13 U	10 U	21 U	110 U	20 U	270 U	120 U	9.8 U	95 U	94 U	96 U	160 U	45 U	75 U	30 U	50 U	82 U
Aroclor 1262	13 U	NA	NA	NA	NA	270 U	NA	NA	NA	NA	NA	NA	NA	NA	30 U	NA	NA
Aroclor 1268	13 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	30 U	NA	NA
Total PCBs	32 *	26 *	28 *	250	550	700	1490	2750	1090	940	1700	1590	1,880	440 *	780 * J	240 *	340 *
SEMIVOLATILES (µg/kg-dry)																	
(PSDDA SVOCS SW8270D)																	
Phenol	NA	82 U	NA	180 U	NA	620	58 U	220	550 U	NA	280 U	NA	NA	98 U	470 U	260 U	390
Bis-(2-Chloroethyl) Ether	NA	82 U	NA	NA	NA	NA	58 U	210 U	550 U	NA	NA	NA	NA	NA	NA	260 U	NA
2-Chlorophenol	NA	82 U	NA	NA	NA	NA	58 U	210 U	550 U	NA	NA	NA	NA	NA	NA	260 U	NA
1,3-Dichlorobenzene	NA	82 U	NA	180 U	NA	250 U	58 U	210 U	550 U	NA	280 U	NA	NA	98 U	470 U	260 U	370 U
1,4-Dichlorobenzene	NA	82 U	NA	180 U	NA	250 U	58 U	210 U	550 U	NA	280 U	NA	NA	98 U	470 U	260 U	370 U
Benzyl Alcohol	NA	82 U	NA	180 U	NA	250 U	58 U	210 U	550 U	NA	280 U	NA	NA	98 U	470 U	260 U	370 U
1,2-Dichlorobenzene	NA	82 U	NA	180 U	NA	250 U	58 U	210 U	550 U	NA	280 U	NA	NA	98 U	470 U	260 U	370 U
2-Methylphenol	NA	82 U	NA	180 U	NA	250 U	58 U	240	550 U	NA	280 U	NA	NA	98 U	470 U	260 U	370 U
2,2'-Oxybis(1-Chloropropane)	NA	82 U	NA	NA	NA	NA	58 U	210 U	550 U	NA	NA	NA	NA	NA	NA	260 U	NA
4-Methylphenol	NA	82 U	NA	180 U	NA	6,000	58 U	210 U	550 U	NA	280 U	NA	NA	98 U	470 U	260 U	520
N-Nitroso-Di-N-Propylamine	NA	410 U	NA	NA	NA	NA	290 U	1,000 U	2800 U	NA	NA	NA	NA	NA	NA	1,300 U	NA
Hexachloroethane	NA	82 U	NA	180 U	NA	250 U	58 U	210 U	550 U	NA	280 U	NA	NA	98 U	470 U	260 U	370 U
Nitrobenzene	NA	82 U	NA	NA	NA	NA	58 U	210 U	550 U	NA	NA	NA	NA	NA	NA	260 U	NA
Isophorone	NA	82 U	NA	NA	NA	NA	58 U	210 U	550 U	NA	NA	NA	NA	NA	NA	260 U	NA
2-Nitrophenol	NA	410 U	NA	NA	NA	NA	290 U	1,000 U	2,800 U	NA	NA	NA	NA	NA	NA	1,300 U	NA
2,4-Dimethylphenol	NA	82 U	NA	180 U	NA	500 U	58 U	210 U	550 U	NA	280 U	NA	NA	98 U	470 U	260 U	370 U
Benzoic Acid	NA	820 U	NA	1,800 U	NA	5,000 U	580 U	2,100 U	5,500 U	NA	2,800 U	NA	NA	980 U	4,700 U	2,600 U	3,400 J
bis(2-Chloroethoxy) Methane	NA	82 U	NA	NA	NA	NA	58 U	210 U	550 U	NA	NA	NA	NA	NA	NA	260 U	NA
2,4-Dichlorophenol	NA	410 U	NA	NA	NA	NA	290 U	1,000 U	2,800 U	NA	NA	NA	NA	NA	NA	1,300 U	NA
1,2,4-Trichlorobenzene	NA	82 U	NA	180 U	NA	250 U	58 U	210 U	550 U	NA	280 U	NA	NA	98 U	470 U	260 U	370 U
Naphthalene	NA	82 U	NA	180 U	NA	250 U	58 U	670	550 U	NA	280 U	NA	NA	98 U	470 U	260 U	370 U
4-Chloroaniline	NA	410 U	NA	NA	NA	NA	290 U	1,000 U	2,800 U	NA	NA	NA	NA	NA	NA	1,300 U	NA
Hexachlorobutadiene	NA	82 U	NA	180 U	NA	1,200 U	58 U	210 U	550 U	NA	280 U	NA	NA	98 U	470 U	260 U	370 U
4-Chloro-3-methylphenol	NA	410 U	NA	NA	NA	NA	290 U	1,000 U	2,800 U	NA	NA	NA	NA	NA	NA	1,300 U	NA
2-Methylnaphthalene	NA	82 U	NA	180 U	NA	250 U	58 U	4,000	550 U	NA	280 U	NA	NA	98 U	470 U	260 U	370 U
Hexachlorocyclopentadiene	NA	410 U	NA	NA	NA	NA	290 U	1,000 U	2,800 U	NA	NA	NA	NA	NA	NA	1,300 U	NA
2,4,6-Trichlorophenol	NA	410 U	NA	NA	NA	NA	290 U	1,000 U	2,800 U	NA	NA	NA	NA	NA	NA	1,300 U	NA
2,4,5-Trichlorophenol	NA	410 U	NA	NA	NA	NA	290 U	1,000 U	2,800 U	NA	NA	NA	NA	NA	NA	1,300 U	NA
2-Chloronaphthalene	NA	82 U	NA	NA	NA	NA	58 U	210 U	550 U	NA	NA	NA	NA	NA	NA	260 U	NA
2-Nitroaniline	NA	410 U	NA	NA	NA	NA	290 U	1,000 U	2,800 U	NA	NA	NA	NA	NA	NA	1,300 U	NA
Dimethylphthalate	NA	82 U	NA	180 U	NA	250 U	58 U	210 U	550 U	NA	280 U	NA	NA	98 U	470 U	260 U	370 U
Acenaphthylene	NA	82 U	NA	180 U	NA	250 U	58 U	210 U	550 U	NA	280 U	NA	NA	98 U	470 U	260 U	370 U
3-Nitroaniline	NA	410 U	NA	NA	NA	NA	290 U	1,000 U	2,800 U	NA	NA	NA	NA	NA	NA	1,300 U	NA
Acenaphthene	NA	82 U	NA	180 U	NA	250 U	58 U	1,300	550 U	NA	280 U	NA	NA	98 U	470 U	260 U	370 U

TABLE 12
SEDIMENT TRAP ANALYTICAL DATA
NORTH BOEING FIELD

SPU Sample ID:	SL4-T3	SL4-T3	SL4-T3	SL4-T3	SL4-T3	SL4-T3	**SL4-T4**	SL4-T4	SL4-T4	SL4-T4	SL4-T4	SL4-T4	SL4-T4	SL4-T4	SL4-T4	SL4-T4	SL4-T4
Boeing Manhole No.:	MH364	MH364	MH364	MH364	MH364	MH364	MH221A	MH221A	MH221A	MH221A	MH221A	MH221A	MH221A	MH221A	MH221A	MH221A	MH221A
Lab ID:	NI22D	OC25B	OU11D	QS17C	SQ45C	UR61D	HS89B	IK38B	JE01D	KA63B	KK75D/KL08C	KY79F	LV54D	MN63E	NI22E	OC25E	OU11E
Sample Type:	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Grab	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap
Date Deployed:	3/18/2008	7/30/2008	12/3/2008	4/6/2009	11/12/2010	4/5/2011		3/8/2005	8/11/2005	3/16/2006	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008
Date Collected:	7/30/2008	12/3/2008	4/6/2009	4/8/2010	4/5/2011	04/24/2012	2/16/2005	8/11/2005	3/16/2006	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009
2,4-Dinitrophenol	NA	820 U	NA	NA	NA	NA	580 U	2,100 U	5,500 U	NA	NA	NA	NA	NA	NA	2,600 U	NA
4-Nitrophenol	NA	410 U	NA	NA	NA	NA	290 U	1,000 U	2,800 U	NA	NA	NA	NA	NA	NA	1,300 U	NA
Dibenzofuran	NA	82 U	NA	180 U	NA	250 U	58 U	740	550 U	NA	280 U	NA	NA	98 U	470 U	260 U	370 U
2,6-Dinitrotoluene	NA	410 U	NA	NA	NA	NA	290 U	1,000 U	2,800 U	NA	NA	NA	NA	NA	NA	1,300 U	NA
2,4-Dinitrotoluene	NA	410 U	NA	NA	NA	NA	290 U	1,000 U	2,800 U	NA	NA	NA	NA	NA	NA	1,300 U	NA
Diethylphthalate	NA	82 U	NA	180 U	NA	620 U	58 U	210 U	550 U	NA	280 U	NA	NA	98 U	470 U	260 U	370 U
4-Chlorophenyl-phenylether	NA	82 U	NA	NA	NA	NA	58 U	210 U	550 U	NA	NA	NA	NA	NA	NA	260 U	NA
Fluorene	NA	82 U	NA	180 U	NA	250 U	73	1,000	550 U	NA	340	NA	NA	98 U	470 U	260 U	370 U
4-Nitroaniline	NA	410 U	NA	NA	NA	NA	290 U	1,000 U	2,800 U	NA	NA	NA	NA	NA	NA	1,300 U	NA
4,6-Dinitro-2-Methylphenol	NA	820 U	NA	NA	NA	NA	580 U	2,100 U	5,500 U	NA	NA	NA	NA	NA	NA	2,600 U	NA
N-Nitrosodiphenylamine	NA	82 U	NA	180 U	NA	250 U	58 U	210 U	550 U	NA	280 U	NA	NA	98 U	470 U	260 U	370 U
4-Bromophenyl-phenylether	NA	82 U	NA	NA	NA	NA	58 U	210 U	550 U	NA	NA	NA	NA	NA	NA	260 U	NA
Hexachlorobenzene	NA	82 U	NA	180 U	NA	250 U	58 U	210 U	550 U	NA	280 U	NA	NA	98 U	470 U	260 U	370 U
Pentachlorophenol	NA	410 U	NA	910 U	NA	2,500 UJ	290 U	1,000 U	2,800 U	NA	1,400 U	NA	NA	490 U	2,300 U	1,300 U	1,900 U
Phenanthrene	NA	82 U	NA	760	NA	1,200	300	8,600	2,800	NA	4,100	NA	NA	560	820	2,800	1,800
Carbazole	NA	82 U	NA	NA	NA	NA	58 U	1,000	570	NA	NA	NA	NA	NA	NA	390	NA
Anthracene	NA	82 U	NA	180 U	NA	250 U	71	1,500	550 U	NA	500	NA	NA	98 U	470 U	260 U	370 U
Di-n-Butylphthalate	NA	82 U	NA	660	NA	170 J	58 U	260	550 U	NA	340	NA	NA	98 U	470 U	260 U	370 U
Fluoranthene	NA	100	NA	1,800	NA	2,500	920	8,900	6,100	NA	8,700	NA	NA	1,300	1,900	3,800	4,200
Pyrene	NA	90	NA	1,100	NA	2,100	870	6,800	3,500	NA	5,600	NA	NA	860	1,400	2,500	2,600
Butylbenzylphthalate	NA	82 U	NA	180 U	NA	170 J	58 U	210 U	550 U	NA	440	NA	NA	98 U	470 U	260 U	370 U
3,3'-Dichlorobenzidine	NA	410 U	NA	NA	NA	NA	290 U	1,000 U	2,800 U	NA	NA	NA	NA	NA	NA	1,300 U	NA
Benzo(a)anthracene	NA	82 U	NA	440	NA	670	280	3,000	1,600	NA	2,300	NA	NA	340	470 U	550	700
bis(2-Ethylhexyl)phthalate	NA	340	NA	4,000	NA	5,700	760	6,000	7,400	NA	9,000	NA	NA	2,300	2,800	5,500	19,000
Chrysene	NA	84	NA	1,100	NA	1,900	490	4,100	3,100	NA	4,400	NA	NA	770	1,100	1,800	2,600
Di-n-Octyl phthalate	NA	2,000	NA	20,000	NA	17,000	120	3,700	6,900	NA	11,000	NA	NA	2,400	3,300	3,600	22,000
Benzo(b)fluoranthene	NA	82 U	NA	810	NA	NA	710	4,600	2,800	NA	5,200	NA	NA	1,000	1,400	1,100	2,200
Benzo(k)fluoranthene	NA	82 U	NA	810	NA	NA	400	2,600	2,200	NA	4,400	NA	NA	570	910	1,600	2,200
Total Benzofluoranthenes	NA	NA	NA	NA	NA	3,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	82 U	NA	670	NA	1,100	400	3,400	2,000	NA	3,300	NA	NA	600	830	920	1,500
Indeno(1,2,3-cd)pyrene	NA	82 U	NA	480	NA	1,000	260	1,900	1,000	NA	1,400	NA	NA	450	830	730	1,400
Dibenz(a,h)anthracene	NA	82 U	NA	180 J	NA	360	58 U	730	550 U	NA	280 U	NA	NA	200	470 U	260 U	410
Benzo(g,h,i)perylene	NA	82 U	NA	550	NA	1,100	230	1,600	990	NA	1,400	NA	NA	470	960	810	1,600
1-Methylnaphthalene	NA	82 U	NA	180 U	NA	250 U	NA	NA	NA	NA	NA	NA	NA	98 U	470 U	260 U	370 U
CONVENTIONAL PARAMETERS (%)																	
Total Solids (EPA 160.3) (%)	NA	NA	NA	17.50	31.90	18.00	75.70	NA	41.60 J	16.2	42.30	NA	NA	50.40	NA	NA	NA
Total Organic Carbon (Plumb, 1981) (%)	NA	NA	NA	NA	3.14	7.67	1.00	NA	5.41	NA	4.34	NA	NA	4.38	NA	NA	NA
WEIGHT OF SOLIDS COLLECTED (g)		36.91	15.02	92.90		97.64										36.00	35.14
Reported as Dry Wt				P,S	P	P,S,T,M		P,S	P,S,T,M	P,M	P,S,T,M	P	P,M	M			
Reported as As Received	P	P,S	P											P,S,T	P,S	P,S	P,S,T,M
Not Analyzed Due to Low Sample Volume	S,T,M	T,M	S,T,M	T,M	S,T,M			T,M		S,T		S,T,M	S,T		T,M	T,M	

P=PCBs
S=SVOCs
T=TPH
M=Metals

TABLE 12
SEDIMENT TRAP ANALYTICAL DATA
NORTH BOEING FIELD

SPU Sample ID:	SL4-T4	SL4-T4	SL4-T4	**SL4-T4A**	SL4-T4A	SL4-T4A	SL4-T4A	SL4-T4A	SL4-T4A	SL4-T4A	SL4-T4A	SL4-T4A	SL4-T4A	SL4-T4A	SL4-T4A	SL4-T4A	SL4-T4A
Boeing Manhole No.:	MH221A	MH221A	MH221A	MH229A	MH229A	MH229A	MH229A	MH229A	MH229A	MH229A	MH229A	MH229A	MH229A	MH229A	MH229A	MH229A	MH229A
Lab ID:	QS17D	SQ45D	UR61F	HS89D	IK38D	JE01F	KA63G	KK75E/KL08D	KY79G	LV54E	MN63G	NI22G	OC25G	OU11G	QS17F	SQ45G	UR61G
Sample Type:	Sed. Trap	Sed. Trap	Sed. Trap	Grab	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap
Date Deployed:	4/6/2009	11/12/2010	4/5/2011		3/8/2005	8/11/2005	3/16/2006	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009	11/12/2010	4/5/2011
Date Collected:	4/8/2010	4/5/2011	04/24/2012	2/16/2005	8/11/2005	3/16/2006	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009	4/8/2010	4/5/2011	04/24/2012
TOTAL METALS (mg/kg-dry)																	
(Method 6000-7000 series)																	
Arsenic	30	NA	30	30	16	13	20	12	NA	6	NA	NA	NA	NA	14	NA	20
Copper	334	NA	408	85.5	94.3	75.2	262	76.0	NA	61.0	NA	NA	NA	NA	248 J	NA	419
Lead	382	NA	399	155	144	116	414	121	NA	77	NA	NA	NA	NA	376 J	NA	506
Mercury	0.37	NA	0.47	0.07	0.19	0.10	0.3	0.09	NA	0.07	NA	NA	NA	NA	0.23	NA	0.34
Zinc	1,880	NA	1,920	1,130	460	337	1,220	433	NA	309	NA	NA	NA	NA	551	NA	1,430
NWTPH-Dx (mg/kg)																	
Diesel-Range Hydrocarbons	380	NA	540	200	100	180	NA	140	NA	NA	NA	NA	NA	NA	210	NA	250
Motor Oil-Range Hydrocarbons	1,900	NA	1,700	1,100	410	1,100	NA	600	NA	NA	NA	NA	NA	NA	1,400	NA	1,200
PCBs (µg/kg)																	
(PSDDA PCB SW8082)																	
Aroclor 1016	70 U	28 U	400 U	140 U	9.8 U	9.9 U	81 U	9.8 U	(a)	11 U	10 U	15 U	11 U	10 U	53 U	22 U	46 U
Aroclor 1242	70 U	28 U	400 U	140 U	9.8 U	9.9 U	81 U	9.8 U	(a)	11 U	10 U	15 U	11 U	10 U	53 U	22 U	46 U
Aroclor 1248	210 U	110 U	400 U	140 U	9.8 U	9.9 U	81 U	9.8 U	(a)	22	10 U	15 U	11 U	10 U	270 U	22 U	46 U
Aroclor 1254	640	430	690	3,700	290 P	39	83	41	(a)	49	16	28	11 U	10 U	510	67	100
Aroclor 1260	430	340	690	1,900	160	75	160	62	(a)	28	26	30	11 U	10 U	170	87	160
Aroclor 1221	70 U	28 U	400 U	140 U	9.8 U	9.9 U	81 U	9.8 U	(a)	11 U	10 U	15 U	11 U	10 U	53 U	22 U	46 U
Aroclor 1232	70 U	28 U	400 U	140 U	9.8 U	9.9 U	81 U	9.8 U	(a)	11 U	10 U	15 U	11 U	10 U	53 U	28 U	46 U
Aroclor 1262	NA	NA	400 U	NA	NA	NA	NA	NA	NA	NA	NA	15 U	NA	NA	NA	NA	46 U
Aroclor 1268	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	15 U	NA	NA	NA	NA	NA
Total PCBs	1070	770	1380	5600	450	114	243	103	(a)	99 *	42 *	58 *	11 * U	10 * U	680	154	260
SEMIVOLATILES (µg/kg-dry)																	
(PSDDA SVOCS SW8270D)																	
Phenol	390 U	NA	470	220 U	160 U	600 U	NA	160 U	NA	NA	61 U	530 U	NA	500 U	250 U	NA	340 J
Bis-(2-Chloroethyl) Ether	NA	NA	NA	220 U	160 U	600 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	220 U	160 U	600 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	390 U	NA	450 U	220 U	160 U	600 U	NA	160 U	NA	NA	61 U	530 U	NA	500 U	250 U	NA	480 U
1,4-Dichlorobenzene	390 U	NA	450 U	220 U	160 U	600 U	NA	160 U	NA	NA	61 U	530 U	NA	500 U	250 U	NA	480 U
Benzyl Alcohol	390 U	NA	450	220 U	160 U	600 U	NA	160 U	NA	NA	61 U	530 U	NA	500 U	250 U	NA	480 U
1,2-Dichlorobenzene	390 U	NA	450 U	220 U	160 U	600 U	NA	160 U	NA	NA	61 U	530 U	NA	500 U	250 U	NA	480 U
2-Methylphenol	390 U	NA	450 U	220 U	160 U	600 U	NA	160 U	NA	NA	61 U	530 U	NA	500 U	250 U	NA	480 U
2,2'-Oxybis(1-Chloropropane)	NA	NA	NA	220 U	160 U	600 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	390 U	NA	450 J	220 U	160 U	600 U	NA	160 U	NA	NA	61 U	530 U	NA	380 J	270	NA	1,200
N-Nitroso-Di-N-Propylamine	NA	NA	NA	1,100 U	790 U	3,000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	390 U	NA	450 U	220 U	160 U	600 U	NA	160 U	NA	NA	61 U	530 U	NA	500 U	250 U	NA	480 U
Nitrobenzene	NA	NA	NA	220 U	160 U	600 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isophorone	NA	NA	NA	220 U	160 U	600 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	1,100 U	790 U	3,000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	390 U	NA	900 U	220 U	160 U	600 U	NA	160 U	NA	NA	61 U	530 U	NA	500 U	250 U	NA	960 U
Benzoic Acid	3,900 U	NA	9,000 UJ	2,200 U	1,600 U	6,000 U	NA	1,600 U	NA	NA	610 U	5,300 U	NA	5,000 U	2,500 U	NA	9,600 UJ
bis(2-Chloroethoxy) Methane	NA	NA	NA	220 U	160 U	600 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	1,100 U	790 U	3,000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	390 U	NA	450 U	220 U	160 U	600 U	NA	160 U	NA	NA	61 U	530 U	NA	500 U	250 U	NA	480 U
Naphthalene	390 U	NA	450 U	220 U	160 U	600 U	NA	160 U	NA	NA	61 U	530 U	NA	500 U	250 U	NA	480 U
4-Chloroaniline	NA	NA	NA	1,100 U	790 U	3,000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	390 U	NA	2,200 U	220 U	160 U	600 U	NA	160 U	NA	NA	61 U	530 U	NA	500 U	250 U	NA	2,400 U
4-Chloro-3-methylphenol	NA	NA	NA	1,100 U	790 U	3,000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	390 U	NA	450 U	660	160 U	600 U	NA	160 U	NA	NA	61 U	530 U	NA	500 U	250 U	NA	480 U
Hexachlorocyclopentadiene	NA	NA	NA	1,100 U	790 U	3,000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	NA	1,100 U	790 U	3,000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	1,100 U	790 U	3,000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	220 U	160 U	600 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	1,100 U	790 U	3,000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dimethylphthalate	390 U	NA	450 U	220 U	160 U	600 U	NA	160 U	NA	NA	61 U	530 U	NA	500 U	250 U	NA	480 U
Acenaphthylene	390 U	NA	450 U	220 U	160 U	600 U	NA	160 U	NA	NA	61 U	530 U	NA	500 U	250 U	NA	480 U
3-Nitroaniline	NA	NA	NA	1,100 U	790 U	3,000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	390 U	NA	450 U	930	160 U	600 U	NA	160 U	NA	NA	61 U	530 U	NA	500 U	170 J	NA	480 U

TABLE 12
SEDIMENT TRAP ANALYTICAL DATA
NORTH BOEING FIELD

SPU Sample ID:	SL4-T4	SL4-T4	SL4-T4	**SL4-T4A**	SL4-T4A	SL4-T4A	SL4-T4A	SL4-T4A	SL4-T4A	SL4-T4A	SL4-T4A	SL4-T4A	SL4-T4A	SL4-T4A	SL4-T4A	SL4-T4A	SL4-T4A
Boeing Manhole No.:	MH221A	MH221A	MH221A	MH229A	MH229A	MH229A	MH229A	MH229A	MH229A	MH229A	MH229A	MH229A	MH229A	MH229A	MH229A	MH229A	MH229A
Lab ID:	QS17D	SQ45D	UR61F	HS89D	IK38D	JE01F	KA63G	KK75E/KL08D	KY79G	LV54E	MN63G	NI22G	OC25G	OU11G	QS17F	SQ45G	UR61G
Sample Type:	Sed. Trap	Sed. Trap	Sed. Trap	Grab	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap
Date Deployed:	4/6/2009	11/12/2010	4/5/2011		3/8/2005	8/11/2005	3/16/2006	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009	11/12/2010	4/5/2011
Date Collected:	4/8/2010	4/5/2011	04/24/2012	2/16/2005	8/11/2005	3/16/2006	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009	4/8/2010	4/5/2011	04/24/2012
2,4-Dinitrophenol	NA	NA	NA	2,200 U	1,600 U	6,000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	1,100 U	790 U	3,000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	390 U	NA	290 J	560	160 U	600 U	NA	160 U	NA	NA	61 U	530 U	NA	500 U	200 J	NA	340 J
2,6-Dinitrotoluene	NA	NA	NA	1,100 U	790 U	3,000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	1,100 U	790 U	3,000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	390 U	NA	1,100 U	220 U	160 U	600 U	NA	160 U	NA	NA	61 U	530 U	NA	500 U	250 U	NA	1,200 U
4-Chlorophenyl-phenylether	NA	NA	NA	220 U	160 U	600 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	240 J	NA	270 J	1,100	160 U	600 U	NA	160 U	NA	NA	61 U	530 U	NA	500 U	260	NA	260 J
4-Nitroaniline	NA	NA	NA	1,100 U	790 U	3,000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-Methylphenol	NA	NA	NA	2,200 U	1,600 U	6,000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine	390 U	NA	450 U	220 U	160 U	600 U	NA	160 U	NA	NA	61 U	530 U	NA	500 U	250 U	NA	480 U
4-Bromophenyl-phenylether	NA	NA	NA	220 U	160 U	600 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	390 U	NA	450 U	220 U	160 U	600 U	NA	160 U	NA	NA	61 U	530 U	NA	500 U	250 U	NA	480 U
Pentachlorophenol	2,000 U	NA	4,500 UJ	1,100 U	790 U	3,000 U	NA	810 U	NA	NA	300 U	2,600 U	NA	2,500 U	1,300 U	NA	4,800 UJ
Phenanthrene	4,300	NA	5,700	8,900	1,700	1,600	NA	1,400	NA	NA	800	1,000	NA	2,300	4,900	NA	6,900
Carbazole	NA	NA	NA	1,500	370	600 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	420	NA	450	1,200	180	600 U	NA	210	NA	NA	120	530 U	NA	500 U	680	NA	650
Di-n-Butylphthalate	890	NA	810	220 U	350	600 U	NA	240	NA	NA	130	530 U	NA	420 J	320	NA	1,400
Fluoranthene	11,000	NA	12,000	11,000	3,100	4,200	NA	3,200	NA	NA	1,800	2,500	NA	4,800	13,000	NA	15,000
Pyrene	5,200	NA	10,000	7,600	2,100	2,400	NA	2,300	NA	NA	1,200	2,000	NA	3,900	7,100	NA	12,000
Butylbenzylphthalate	320 J	NA	490 J	220 U	160 U	600 U	NA	220	NA	NA	76	530 U	NA	500 U	630	NA	570 J
3,3'-Dichlorobenzidine	NA	NA	NA	1,100 U	790 U	3,000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	2,300	NA	2,600	3,000	860	1,000	NA	920	NA	NA	460	630	NA	1,100	3,900	NA	3,500
bis(2-Ethylhexyl)phthalate	18,000	NA	30,000	2,200	2,600	2,600	NA	3,700	NA	NA	1,400	1,700	NA	2,500	6,000	NA	8,100
Chrysene	6,200	NA	8,300	4,200	1,700	2,500	NA	2,000	NA	NA	1,100	1,600	NA	3,300	6,500	NA	9,700
Di-n-Octyl phthalate	22,000	NA	38,000	240	4,300	9,600	NA	7,200	NA	NA	2,600	5,900	NA	16,000	1,200	NA	30,000
Benzo(b)fluoranthene	4,900	NA	NA	5,400	2,100	2,500	NA	2,300	NA	NA	1,200	2,000	NA	2,600	5,500	NA	NA
Benzo(k)fluoranthene	4,900	NA	NA	3,600	1,300	1,900	NA	2,500	NA	NA	1,000	1,400	NA	3,500	5,500	NA	NA
Total Benzofluoranthenes	NA	NA	14,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	18,000
Benzo(a)pyrene	4,200	NA	5,000	3,400	1,400	1,600	NA	1,500	NA	NA	730	1,200	NA	2,100	5,700	NA	6,500
Indeno(1,2,3-cd)pyrene	2,800	NA	4,900	1,500	780	960	NA	670	NA	NA	560	1,200	NA	2,100	2,800	NA	6,300
Dibenz(a,h)anthracene	1,000	NA	1,700	220 U	160 U	600 U	NA	160 U	NA	NA	220	530 U	NA	320 J	1,200	NA	2,300
Benzo(g,h,i)perylene	3,000	NA	5,600	1,300	710	900	NA	690	NA	NA	590	1,200	NA	2,300	2,900	NA	7,000
1-Methylnaphthalene	390 U	NA	450 U	NA	NA	NA	NA	NA	NA	NA	61 U	530 U	NA	500 U	250 U	NA	480 U
CONVENTIONAL PARAMETERS (%)																	
Total Solids (EPA 160.3) (%)	28.10	29.60	24.50	66.60	47.30 J	NA	27.8	50.50	NA	NA	NA	NA	NA	NA	62.10	31.90	21.70
Total Organic Carbon (Plumb, 1981) (%)	12.1	19.3	17.6	3.88	5.35	NA	NA	4.06	NA	NA	NA	NA	NA	NA	9.17	10.6	17.6
WEIGHT OF SOLIDS COLLECTED (g)	128.20		86.55										52.42	32.17	951.80		71.82
Reported as Dry Wt	P,S,T,M	P	P,S,T,M		P,S,T,M	P,S,T,M	P,M	P,S,T,M	P						P,S,T,M	P	P,S,T,M
Reported as As Received										P,M	P,S	P,S	P	P,S			
Not Analyzed Due to Low Sample Volume		S,T,M					S,T		S,T,M	S,T	T,M	T,M	S,T,M	T,M		S,T,M	

P=PCBs
S=SVOCs
T=TPH
M=Metals

TABLE 12
SEDIMENT TRAP ANALYTICAL DATA
NORTH BOEING FIELD

SPU Sample ID:	**SL4-T5**	SL4-T5	SL4-T5	SL4-T5	SL4-T5	SL4-T5	SL4-T5	SL4-T5	SL4-T5	SL4-T5	SL4-T5	SL4-T5	SL4-T5	SL4-T5	**SL4-T5A**	SL4-T5A	SL4-T5A
Boeing Manhole No.:	MH363	MH363	MH363	MH363	MH363	MH363	MH363	MH363	MH363	MH363	MH363	MH363	MH363	MH363	MH178	MH178	MH178
Lab ID:	HS89C	IK38C	JE01E	KA63C	KK75F/KL08E	KY79B	LV54F	MN63C	NI22C	OC25D	OU11C	QS17E	SQ45E	UR61E	IK38E	JE01G	KA63F
Sample Type:	Grab	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap
Date Deployed:		3/7/2005	8/11/2005	3/16/2006	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009	11/12/2010	4/5/2011	3/8/2005	8/11/2005	3/16/2006
Date Collected:	2/16/2005	8/11/2005	3/16/2006	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009	4/8/2010	4/5/2011	04/24/2012	8/11/2005	3/16/2006	10/11/2006
TOTAL METALS (mg/kg-dry)																	
(Method 6000-7000 series)																	
Arsenic	8	21	20 U	40 U	10	40 U	40 U	10	20	20	20	15	20	10	14	20	20
Copper	45.1	148	297	640	140	251	366	257	328	556	764	287	560	173	113	541	818
Lead	110	109	184	310	102	210	240	186	199	273	275	277	151	149	962	233	381
Mercury	0.7	1.12	2.02	2.9	5.11	1.8	4.4	1.07	0.6 J	1.0	0.7	0.34	0.85	0.40	0.86	0.27	0.4
Zinc	272	553	717	1,370	428	751	1,120	611	933	1,510	1280	705	670	1,040	220	597	945
NWTPH-Dx (mg/kg)																	
Diesel-Range Hydrocarbons	47	390	1,200	1,200	840	580	460	1,500	220	120 J	3,900	340	470	250	160	1,400	660
Motor Oil-Range Hydrocarbons	190	1,400	4,800	5,900	3,100	3,500	2900	6,900	1,100	710 J	12,000	1,800	1,400	720	570	7,500	4,800
PCBs (µg/kg)																	
(PSDDA PCB SW8082)																	
Aroclor 1016	950 U	49 U	7,600 U	55,000 U	66,000 U	11,000 U	650 U	4,600 U	250 U	510 U	1,100 U	94 U	400 U	240 U	9.6 U	100 U	100 U
Aroclor 1242	950 U	49 U	7,600 U	55,000 U	66,000 U	11,000 U	650 U	4,600 U	250 U	510 U	1,100 U	94 U	400 U	240 U	9.6 U	100 U	100 U
Aroclor 1248	1,900 U	49 U	48,000	660,000 U	130,000 U	90,000	25,000	7,000 U	1,700 U	1,000 U	1,600 U	940 U	1,200 U	850	9.6 U	100 U	100 U
Aroclor 1254	7,000	24,000	54,000	800,000	200,000	93,000	37,000	16,000	4,200 J	3,100	2,100	2,200	3,000	2,000	72	320	430
Aroclor 1260	950 U	2,400 U	12,000	130,000 U	66,000 U	23,000 U	650 U	4,600 U	500 U	510 U	1,100 U	350	610	720	34	330	170
Aroclor 1221	480 U	49 U	7,600 U	55,000 U	66,000 U	11,000 U	650 U	4,600 U	250 U	510 U	1,100 U	94 U	400 U	240 U	9.6 U	100 U	100 U
Aroclor 1232	1,400 U	49 U	7,600 U	55,000 U	130,000 U	11,000 U	650 U	4,600 U	250 U	510 U	1,100 U	94 U	400 U	240 U	9.6 U	100 U	100 U
Aroclor 1262	NA	NA	NA	NA	NA	NA	NA	NA	250 U	NA	NA	NA	NA	240 U	NA	NA	NA
Aroclor 1268	NA	NA	NA	NA	NA	NA	NA	NA	250 U	NA	NA	NA	NA	NA	NA	NA	NA
Total PCBs	7,000	24,000	114,000	800,000	200,000	183,000	62,000	16,000	4,200 * J	3,100	2,100	2,550	3,610	3,570	106	650	600
SEMIVOLATILES (µg/kg-dry)																	
(PSDDA SVOCS SW8270D)																	
Phenol	59 U	130 U	1,200 U	300	330	860	120 UJ	450 U	270 U	230 U	1,900	250 U	270 U	360	110 U	680 U	380 U
Bis-(2-Chloroethyl) Ether	59 U	130 U	1,200 U	NA	NA	NA	120 UJ	NA	NA	230 U	NA	NA	NA	NA	110 U	680 U	NA
2-Chlorophenol	59 U	130 U	1,200 U	NA	NA	NA	120 UJ	NA	NA	230 U	NA	NA	NA	NA	110 U	680 U	NA
1,3-Dichlorobenzene	59 U	130 U	1,200 U	260 U	220 U	420 U	120 UJ	450 U	270 U	230 U	470 U	250 U	270 U	240 U	110 U	680 U	380 U
1,4-Dichlorobenzene	59 U	130 U	1,200 U	260 U	220 U	420 U	120 UJ	450 U	270 U	230 U	470 U	250 U	270 U	240 U	110 U	680 U	380 U
Benzyl Alcohol	59 U	130 U	1,200 U	260 U	220 U	420 U	120 UJ	450 U	270 U	230 U	470 U	250 U	1,400 U	190 J	110 U	680 U	380 U
1,2-Dichlorobenzene	59 U	130 U	1,200 U	260 U	220 U	420 U	120 UJ	450 U	270 U	230 U	470 U	250 U	270 U	240 U	110 U	680 U	380 U
2-Methylphenol	59 U	130 U	1,200 U	260 U	220 U	420 U	120 UJ	450 U	270 U	230 U	470 U	250 U	270 U	240 U	110 U	680 U	380 U
2,2'-Oxybis(1-Chloropropane)	59 U	130 U	1,200 U	NA	NA	NA	120 UJ	NA	NA	230 U	NA	NA	NA	NA	110 U	680 U	NA
4-Methylphenol	59 U	360	1,200 U	590	4,600	8,100	280 J	760	2,400	340	11,000	660	720	1,900	410	830	530
N-Nitroso-Di-N-Propylamine	290 U	660 U	5,800 U	NA	NA	NA	600 UJ	NA	NA	1,200 U	NA	NA	NA	NA	560 U	3,400 U	NA
Hexachloroethane	59 U	130 U	1,200 U	260 U	220 U	420 U	120 UJ	450 U	270 U	230 U	470 U	250 U	270 U	240 U	110 U	680 U	380 U
Nitrobenzene	59 U	130 U	1,200 U	NA	NA	NA	120 UJ	NA	NA	230 U	NA	NA	NA	NA	110 U	680 U	NA
Isophorone	59 U	130 U	1,200 U	NA	NA	NA	120 UJ	NA	NA	230 U	NA	NA	NA	NA	110 U	680 U	NA
2-Nitrophenol	290 U	660 U	5,800 U	NA	NA	NA	600 UJ	NA	NA	1,200 U	NA	NA	NA	NA	560 U	3,400 U	NA
2,4-Dimethylphenol	59 U	130 U	1,200 U	260 U	440	420 U	120 UJ	450 U	270 U	230 U	470 U	250 U	270 U	480 U	110 U	680 U	380 U
Benzoic Acid	590 U	1,300 U	12,000 U	2,600 U	2,200 U	4,200 U	1,200 UJ	4,500 U	2,700 U	2,300 U	3,500 J	2,500 U	780 J	4,800 UJ	1,100 U	6,800 U	3,800 U
bis(2-Chloroethoxy) Methane	59 U	130 U	1,200 U	NA	NA	NA	120 UJ	NA	NA	230 U	NA	NA	NA	NA	110 U	680 U	NA
2,4-Dichlorophenol	290 U	660 U	5,800 U	NA	NA	NA	600 UJ	NA	NA	1,200 U	NA	NA	NA	NA	560 U	3,400 U	NA
1,2,4-Trichlorobenzene	59 U	130 U	1,200 U	260 U	220 U	420 U	120 UJ	450 U	270 U	230 U	470 U	250 U	270 U	240 U	110 U	680 U	380 U
Naphthalene	59 U	130 U	1,200 U	260 U	220 U	420 U	120 UJ	450 U	270 U	230 U	470 U	250 U	270 U	240 U	110 U	680 U	380 U
4-Chloroaniline	290 U	660 U	5,800 U	NA	NA	NA	600 UJ	NA	NA	1,200 U	NA	NA	NA	NA	560 U	3,400 U	NA
Hexachlorobutadiene	59 U	130 U	1,200 U	260 U	220 U	420 U	120 UJ	450 U	270 U	230 U	470 U	250 U	270 U	1,200 U	110 U	680 U	380 U
4-Chloro-3-methylphenol	290 U	660 U	5,800 U	NA	NA	NA	600 UJ	NA	NA	1,200 U	NA	NA	NA	NA	560 U	3,400 U	NA
2-Methylnaphthalene	59 U	130 U	1,200 U	260 U	220 U	420 U	120 UJ	650	270 U	230 U	270 J	250 U	270 U	240 U	110 U	680 U	380 U
Hexachlorocyclopentadiene	290 U	660 U	5,800 U	NA	NA	NA	600 UJ	NA	NA	1,200 U	NA	NA	NA	NA	560 U	3,400 U	NA
2,4,6-Trichlorophenol	290 U	660 U	5,800 U	NA	NA	NA	600 UJ	NA	NA	1,200 U	NA	NA	NA	NA	560 U	3,400 U	NA
2,4,5-Trichlorophenol	290 U	660 U	5,800 U	NA	NA	NA	600 UJ	NA	NA	1,200 U	NA	NA	NA	NA	560 U	3,400 U	NA
2-Chloronaphthalene	59 U	130 U	1,200 U	NA	NA	NA	120 UJ	NA	NA	230 U	NA	NA	NA	NA	110 U	680 U	NA
2-Nitroaniline	290 U	660 U	5,800 U	NA	NA	NA	600 UJ	NA	NA	1,200 U	NA	NA	NA	NA	560 U	3,400 U	NA
Dimethylphthalate	59 U	130 U	1,200 U	260 U	220 U	420 U	120 UJ	450 U	270 U	230 U	470 U	250 U	270 U	240 U	110 U	680 U	380 U
Acenaphthylene	59 U	130 U	1,200 U	260 U	220 U	NA	120 UJ	450 U	270 U	230 U	470 U	250 U	270 U	240 U	110 U	680 U	380 U
3-Nitroaniline	290 U	660 U	5,800 U	NA	NA	420 U	600 UJ	NA	NA	1,200 U	NA	NA	NA	NA	560 U	3,400 U	NA
Acenaphthene	59 U	130 U	1,200 U	260 U	220 U	420 U	120 UJ	1,100	270 U	230 U	470 U	140 J	270 U	240 U	110 U	680 U	380 U

TABLE 12
SEDIMENT TRAP ANALYTICAL DATA
NORTH BOEING FIELD

SPU Sample ID:	**SL4-T5**	SL4-T5	SL4-T5	SL4-T5	SL4-T5	SL4-T5	SL4-T5	SL4-T5	SL4-T5	SL4-T5	SL4-T5	SL4-T5	SL4-T5	SL4-T5	**SL4-T5A**	SL4-T5A	SL4-T5A
Boeing Manhole No.:	MH363	MH363	MH363	MH363	MH363	MH363	MH363	MH363	MH363	MH363	MH363	MH363	MH363	MH363	MH178	MH178	MH178
Lab ID:	HS89C	IK38C	JE01E	KA63C	KK75F/KL08E	KY79B	LV54F	MN63C	NI22C	OC25D	OU11C	QS17E	SQ45E	UR61E	IK38E	JE01G	KA63F
Sample Type:	Grab	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap
Date Deployed:		3/7/2005	8/11/2005	3/16/2006	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009	11/12/2010	4/5/2011	3/8/2005	8/11/2005	3/16/2006
Date Collected:	2/16/2005	8/11/2005	3/16/2006	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009	4/8/2010	4/5/2011	04/24/2012	8/11/2005	3/16/2006	10/11/2006
2,4-Dinitrophenol	590 U	1,300 U	12,000 U	NA	NA	NA	1,200 UJ	NA	NA	2,300 U	NA	NA	NA	NA	1,100 U	6,800 U	NA
4-Nitrophenol	290 U	660 U	5,800 U	NA	NA	NA	600 UJ	NA	NA	1,200 U	NA	NA	NA	NA	560 U	3,400 U	NA
Dibenzofuran	59 U	130 U	1,200 U	260 U	220 U	420 U	120 UJ	600	270 U	230 U	470 U	200 J	270 U	240 U	110 U	680 U	380 U
2,6-Dinitrotoluene	290 U	660 U	5,800 U	NA	NA	NA	600 UJ	NA	NA	1,200 U	NA	NA	NA	NA	560 U	3,400 U	NA
2,4-Dinitrotoluene	290 U	660 U	5,800 U	NA	NA	NA	600 UJ	NA	NA	1,200 U	NA	NA	NA	NA	560 U	3,400 U	NA
Diethylphthalate	59 U	130 U	1,200 U	260 U	220 U	420 U	120 UJ	450 U	270 U	230 U	470 U	250 U	270 UJ	590 U	110 U	680 U	380 U
4-Chlorophenyl-phenylether	59 U	130 U	1,200 U	NA	NA	NA	120 UJ	NA	NA	230 U	NA	NA	NA	NA	110 U	680 U	NA
Fluorene	59 U	130 U	1,200 U	260 U	220 U	420 U	120 UJ	1,300	270 U	230 U	470 U	250	270 U	240 U	110 U	680 U	380 U
4-Nitroaniline	290 U	660 U	5,800 U	NA	NA	NA	600 UJ	NA	NA	1,200 U	NA	NA	NA	NA	560 U	3,400 U	NA
4,6-Dinitro-2-Methylphenol	590 U	1,300 U	12,000 U	NA	NA	NA	1,200 UJ	NA	NA	2,300 U	NA	NA	NA	NA	1,100 U	6,800 U	NA
N-Nitrosodiphenylamine	59 U	130 U	1,200 U	260 U	220 U	420 U	120 UJ	450 U	270 U	230 U	470 U	250 U	270 U	240 U	110 U	680 U	380 U
4-Bromophenyl-phenylether	59 U	130 U	1,200 U	NA	NA	NA	120 UJ	NA	NA	230 U	NA	NA	NA	NA	110 U	680 U	NA
Hexachlorobenzene	59 U	130 U	1,200 U	260 U	220 U	420 U	120 UJ	450 U	270 U	230 U	470 U	250 U	270 U	240 U	110 U	680 U	380 U
Pentachlorophenol	290 U	660 U	5,800 U	1,300 U	1,100 U	2,100 U	600 UJ	2,200 U	1,400 U	1,200 U	2,400 U	1,200 U	1,400 U	2,400 UJ	560 U	3,400 U	1,900 U
Phenanthrene	260	1,600	3,700	2,400	1,800	1,600	840 J	9,200	780	1,400	2,600	4,200	950	830	1,300	4,600	2,900
Carbazole	68	310	1,200 U	NA	NA	NA	180 J	NA	NA	410	NA	NA	NA	NA	260	1,400	NA
Anthracene	59 U	210	1,200 U	260 U	270	420 U	120 UJ	1,800	270 U	230 U	250 J	540	100 J	240 U	150	680 U	380 U
Di-n-Butylphthalate	59 U	130 U	1,200 U	360	450 U	420 U	160 J	470	270 U	230 U	470 U	1,200	920	310	150	680 U	730
Fluoranthene	750	2,900	9,700	6,500	3,700	3,900	2,200 J	14,000	1,800	3,700	5,800	10,000	2,400	1,400	2,400	13,000	6,900
Pyrene	660	2,000	5,100	4,100	3,400	1,800	1,100 J	9,900	1,400	2,300	4,200	5,500	1,300	1,200	1,700	6,000	5,200
Butylbenzylphthalate	59 U	140	1,200 U	440	230	420 U	690 J	1,200	370	860	1,300	280 J	270 U	550 J	110 U	680 U	580
3,3'-Dichlorobenzidine	290 U	660 U	5,800 U	NA	NA	NA	600 UJ	NA	NA	1,200 U	NA	NA	NA	NA	560 U	3,400 U	NA
Benzo(a)anthracene	280	940	2,500	1,300	1,400	1,100	440 J	4,000	420	900	1,500	2,800	600	460	840	3,200	2,000
bis(2-Ethylhexyl)phthalate	500	2,700	8,300	19,000	7,300	15,000	8,000 J	13,000	6,100	5,900	34,000	10,000	2,100	9,000	1,800	10,000	10,000
Chrysene	400	1,400	4,300	3,700	2,700	2,100	1,200 J	7,000	1,100	2,100	3,700	5,500	1,200	970	1,200	6,300	4,400
Di-n-Octyl phthalate	69	1,200	5,500	7,200	2,300	8,800	4,400 J	4,400	2,300	1,600	11,000	2,500	270 U	1,300	220	2,500	4,800
Benzo(b)fluoranthene	450	1,700	4,500	3,100	3,000	2,700	1,200 J	6,600	810	1,400	2,700	4,400	NA	NA	1,600	7,400	4,200
Benzo(k)fluoranthene	310	970	2,900	3,000	2,900	2,400	1,400 J	4,400	1,100	2,000	3,700	4,400	NA	NA	800	4,300	3,500
Total Benzofluoranthenes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2,000	1,300	NA	NA	NA
Benzo(a)pyrene	300	1,200	3,000	2,300	2,200	1,700	390 J	5,400	690	1,400	2,200	4,500	860	510	1,100	4,500	3,000
Indeno(1,2,3-cd)pyrene	180	680	1,600	1,400	840	1,100	170 J	3,300	600	1,100	2,000	2,700	740	430	520	2,200	2,000
Dibenz(a,h)anthracene	59 U	130 U	1,200 U	480	220 U	420 U	120 UJ	1,500	270 U	390	380 J	1,100	310	240 U	110 U	680 U	640
Benzo(g,h,i)perylene	170	600	1,500	1,500	870	1,100	120 UJ	3,400	690	1,200	2,200	3,000	850	530	450	2,100	2,000
1-Methylnaphthalene	NA	NA	NA	NA	NA	NA	120 UJ	470	270 U	230 U	470 U	250 U	270 U	240 U	NA	NA	NA
CONVENTIONAL PARAMETERS (%)																	
Total Solids (EPA 160.3) (%)	79.90	NA	54.60 J	28.80	62.70	27.10	27.10	45.00	34.20	33.50	26.40	52.90	45.60	39.60	NA	50.80 J	39.20
Total Organic Carbon (Plumb, 1981) (%)	0.76	NA	7.59	11.0	4.76	8.76	9.95	11.4	NA	13.1	14.6	9.84	7.46	4.46	NA	7.62	7.68
WEIGHT OF SOLIDS COLLECTED (g)										146.87	151.94	794.20		134.85			
Reported as Dry Wt		P,S,T,M	P,S,T,M	P,S,T,M	P,S,T,M	P,S,T,M	P,S,T,M	P,S,T,M	M	P,S,T,M	P,S,T,M	P,S,T,M	P,S,T,M	P,S,T,M	P,S,T,M	P,S,T,M	P,S,T,M
Reported as As Received									P,S,T								
Not Analyzed Due to Low Sample Volume																	

P=PCBs
S=SVOCs
T=TPH
M=Metals

TABLE 12
SEDIMENT TRAP ANALYTICAL DATA
NORTH BOEING FIELD

SPU Sample ID:	SL4-T5A	SL4-T5A	SL4-T5A	SL4-T5A	SL4-T5A	SL4-T5A	SL4-T5A	SL4-T5A	SL4-T5A	SL4-T5A	SL4-T5A(2) (b)
Boeing Manhole No.:	MH178	MH178	MH178	MH178	MH178	MH178	MH178	MH178	MH178	MH178	KC wet well (b)
Lab ID:	KK75G/KL08F	KY79A	LV54G	MN63F	NI22F	OC25F	OU11F	QS17G	SQ45F	TV18A	UR61A
Sample Type:	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Grab (b)
Date Deployed:	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009	11/12/2010	4/5/2011	NA (b)
Date Collected:	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009	4/8/2010	4/5/2011	11/3/2011	04/24/2012
TOTAL METALS (mg/kg-dry)											
(Method 6000-7000 series)											
Arsenic	7 U	20	20	7 U	10	20	10 U	20	14	20	30 U
Copper	103	227	359	76.9	206	316 J	759	248	144	196	283
Lead	100	194	486	92	172	687 J	257	342	716 J	227 J	270
Mercury	0.15	0.38	0.4	0.14	0.21	0.58 J	0.42	0.31	0.21 J	0.31 J	0.2
Zinc	209	464	781	201	374	691	1000	1,380	356	555	790 J
NWTPH-Dx (mg/kg)											
Diesel-Range Hydrocarbons	340	770	240	86	160	230 J	1,600	400	190	530	480
Motor Oil-Range Hydrocarbons	1,600	6,800	2,300	760	900	1,600 J	5,800	1,600	1,500	2,600	1,900
PCBs (µg/kg)											
(PSDDA PCB SW8082)											
Aroclor 1016	70 U	47 U	30 U	19 U	15 U	49 U	68 U	67 U	20 U	48 U	48 U
Aroclor 1242	70 U	47 U	30 U	19 U	15 U	49 U	68 U	67 U	20 U	48 U	48 U
Aroclor 1248	70 U	47 U	120 U	19 U	75 U	49 U	68 U	200 U	58 U	97 U	58 U
Aroclor 1254	86	240	490	85	160	190 J	130	270	240	260	260
Aroclor 1260	70 U	150	180	36	48	120 J	68 U	170	92	110	150
Aroclor 1221	70 U	47 U	30 U	19 U	15 U	49 U	68 U	67 U	20 U	48 U	48 U
Aroclor 1232	70 U	47 U	30 U	19 U	15 U	49 U	68 U	67 U	20 U	48 U	48 U
Aroclor 1262	NA	NA	NA	NA	15 U	NA	NA	NA	NA	NA	48 U
Aroclor 1268	NA	NA	NA	NA	15 U	NA	NA	NA	NA	NA	NA
Total PCBs	86	390	670	121	208 *	310	130	440	332	370	410
SEMIVOLATILES (µg/kg-dry)											
(PSDDA SVOCS SW8270D)											
Phenol	180	1,100	560 UJ	160 U	290 U	230 U	640	360 U	320 U	1,300 U	1,100
Bis-(2-Chloroethyl) Ether	NA	NA	560 UJ	NA	NA	230 U	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	560 UJ	NA	NA	230 U	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	170 U	370 U	560 UJ	160 U	290 U	230 U	250 U	360 U	320 U	1,300 U	300 U
1,4-Dichlorobenzene	170 U	370 U	560 UJ	160 U	290 U	230 U	250 U	360 U	320 U	1,300 U	300 U
Benzyl Alcohol	170 U	370 U	560 UJ	160 U	290 U	230 U	250 U	360 U	1,600 U	1,300 U	300 U
1,2-Dichlorobenzene	170 U	370 U	560 UJ	160 U	290 U	230 U	250 U	360 U	320 U	1,300 U	300 U
2-Methylphenol	170 U	370 U	560 UJ	160 U	290 U	230 U	250 U	360 U	320 U	1,300 U	300 U
2,2'-Oxybis(1-Chloropropane)	NA	NA	560 UJ	NA	NA	230 U	NA	NA	NA	NA	NA
4-Methylphenol	2,000	9,400	1,600 J	160 U	310	1,300	12,000	360 U	1,000	5,100	15,000
N-Nitroso-Di-N-Propylamine	NA	NA	2,800 UJ	NA	NA	1,200 U	NA	NA	NA	NA	NA
Hexachloroethane	170 U	370 U	560 UJ	160 U	290 U	230 U	250 U	360 U	320 U	1,300 U	300 U
Nitrobenzene	NA	NA	560 UJ	NA	NA	230 U	NA	NA	NA	NA	NA
Isophorone	NA	NA	560 UJ	NA	NA	230 U	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	2,800 UJ	NA	NA	1,200 U	NA	NA	NA	NA	NA
2,4-Dimethylphenol	170 U	370 U	560 UJ	160 U	290 U	230 U	250 U	360 U	320 U	2,600 U	590 U
Benzoic Acid	1,700 U	3,700 U	5,600 UJ	1,600 U	2,900 U	2,300 U	2,500 U	3,600 U	390 J	26,000 UJ	5,900 U
bis(2-Chloroethoxy) Methane	NA	NA	560 UJ	NA	NA	230 U	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	2,800 UJ	NA	NA	1,200 U	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	170 U	370 U	560 UJ	160 U	290 U	230 U	250 U	360 U	320 U	1,300 U	300 U
Naphthalene	170 U	370 U	560 UJ	160 U	290 U	230 U	250 U	360 U	320 U	1,300 U	300 U
4-Chloroaniline	NA	NA	2,800 UJ	NA	NA	1,200 U	NA	NA	NA	NA	NA
Hexachlorobutadiene	170 U	370 U	560 UJ	160 U	290 U	230 U	250 U	360 U	320 U	6,400 U	1,500 U
4-Chloro-3-methylphenol	NA	NA	2,800 UJ	NA	NA	1,200 U	NA	NA	NA	NA	NA
2-Methylnaphthalene	170 U	370 U	560 UJ	160 U	290 U	230 U	160 J	360 U	320 U	1,300 U	300 U
Hexachlorocyclopentadiene	NA	NA	2,800 UJ	NA	NA	1,200 U	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	2,800 UJ	NA	NA	1,200 U	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	2,800 UJ	NA	NA	1,200 U	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	560 UJ	NA	NA	230 U	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	2,800 UJ	NA	NA	1,200 U	NA	NA	NA	NA	NA
Dimethylphthalate	170 U	370 U	560 UJ	160 U	290 U	230 U	250 U	360 U	320 U	1,300 U	300 U
Acenaphthylene	170 U	NA	560 UJ	160 U	290 U	230 U	250 U	360 U	320 U	1,300 U	300 U
3-Nitroaniline	NA	370 U	2,800 UJ	NA	NA	1,200 U	NA	NA	NA	NA	NA
Acenaphthene	170 U	370 U	560 UJ	160 U	290 U	230 U	150 J	350 J	320 U	1,300 U	300 U

TABLE 12
SEDIMENT TRAP ANALYTICAL DATA
NORTH BOEING FIELD

SPU Sample ID:	SL4-T5A	SL4-T5A	SL4-T5A	SL4-T5A	SL4-T5A	SL4-T5A	SL4-T5A	SL4-T5A	SL4-T5A	SL4-T5A	SL4-T5A(2) (b)
Boeing Manhole No.:	MH178	MH178	MH178	MH178	MH178	MH178	MH178	MH178	MH178	MH178	KC wet well (b)
Lab ID:	KK75G/KL08F	KY79A	LV54G	MN63F	NI22F	OC25F	OU11F	QS17G	SQ45F	TV18A	UR61A
Sample Type:	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Sed. Trap	Grab (b)
Date Deployed:	10/11/2006	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009	11/12/2010	4/5/2011	NA (b)
Date Collected:	1/8/2007	5/14/2007	10/29/2007	3/18/2008	7/30/2008	12/3/2008	4/6/2009	4/8/2010	4/5/2011	11/3/2011	04/24/2012
2,4-Dinitrophenol	NA	NA	5,600 UJ	NA	NA	2,300 U	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	2,800 UJ	NA	NA	1,200 U	NA	NA	NA	NA	NA
Dibenzofuran	170 U	370 U	560 UJ	160 U	290 U	230 U	200 J	280 J	320 U	1,300 U	180 J
2,6-Dinitrotoluene	NA	NA	2,800 UJ	NA	NA	1,200 U	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	2,800 UJ	NA	NA	1,200 U	NA	NA	NA	NA	NA
Diethylphthalate	170 U	370 U	560 UJ	160 U	290 U	230 U	250 U	360 U	320 UJ	3,200 U	740 U
4-Chlorophenyl-phenylether	NA	NA	560 UJ	NA	NA	230 U	NA	NA	NA	NA	NA
Fluorene	170 U	370 U	560 UJ	160 U	290 U	230	190 J	400	320 U	1,300 U	160 J
4-Nitroaniline	NA	NA	2,800 UJ	NA	NA	1,200 U	NA	NA	NA	NA	NA
4,6-Dinitro-2-Methylphenol	NA	NA	5,600 UJ	NA	NA	2,300 U	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine	170 U	370 U	560 UJ	160 U	290 U	230 U	250 U	360 U	320 U	1,300 U	300 U
4-Bromophenyl-phenylether	NA	NA	560 UJ	NA	NA	230 U	NA	NA	NA	NA	NA
Hexachlorobenzene	170 U	370 U	560 UJ	160 U	290 U	230 U	250 U	360 U	320 U	1,300 U	300 U
Pentachlorophenol	840 U	1,800 U	2,800 UJ	820 U	1,400 U	1,200 U	1,300 U	1,800 U	1,600 U	13,000 UJ	3,000 UJ
Phenanthrene	2,200	2,100	2,300 J	1,300	1,700	3,800	3,500	7,800	1700	2,400	3,700
Carbazole	NA	NA	570 J	NA	NA	1,100	NA	NA	NA	NA	NA
Anthracene	320	370 U	560 UJ	200	290 U	480	360	830	220 J	1,300 U	340
Di-n-Butylphthalate	170 U	370 U	560 UJ	160 U	290 U	230 U	250 U	800	320 U	1,300 U	300
Fluoranthene	5,000	5,600	5,800 J	3,100	4,100	9,500	8,100	20,000	4,800	5,000	9,800
Pyrene	3,800	2,700	3000 J	2,000	3,200	5,500	5,800	11,000	2,500	3,700	6,300
Butylbenzylphthalate	170 U	370 U	560 UJ	160 U	320	370	240 J	300 J	320 U	1,300 U	650 J
3,3'-Dichlorobenzidine	NA	NA	2,800 UJ	NA	NA	1,200 U	NA	NA	NA	NA	NA
Benzo(a)anthracene	1,700	1,400	1,500 J	950	1,200	2,700	2,200	5,200	1,200	1,400	2,200
bis(2-Ethylhexyl)phthalate	3,800	13,000	13,000 J	990	5,800	9,800	24,000	16,000	2,000	9,000	23,000
Chrysene	2,700	2,800	3,100 J	1,400	2,300	4,700	5,000	12,000	2,300	3,200	5,400
Di-n-Octyl phthalate	1,300	3,700	2,800 J	180	530	3,500	2,000	16,000	320 U	1,300 U	3,600
Benzo(b)fluoranthene	3,600	4,100	4,100 J	1,900	2,700	4,600	4,300	9,900	NA	NA	NA
Benzo(k)fluoranthene	3,100	2,600	2,800 J	1,000	1,800	4,400	5,200	9,900	NA	NA	NA
Total Benzofluoranthenes	NA	NA	NA	NA	NA	NA	NA	NA	4,000	5,500	9,800
Benzo(a)pyrene	2,300	2,200	1,200 J	1,300	1,900	4,000	3,500	8,400	1,700	2,200	3,700
Indeno(1,2,3-cd)pyrene	1,000	1,200	560 UJ	810	1,400	2,400	2,400	4,700	1,400	2,200	3,300
Dibenz(a,h)anthracene	220	370 U	560 UJ	290	300	890	630	2,000	610	710 J	1,400
Benzo(g,h,i)perylene	1,000	1,200	560 UJ	850	1,500	2,500	2,200	4,600	1,500	2,200	3,900
1-Methylnaphthalene	NA	NA	560 UJ	160 U	290 U	230 U	250 U	360 U	320 U	1,300 U	300 U
CONVENTIONAL PARAMETERS (%)											
Total Solids (EPA 160.3) (%)	69.90	45.40	40.20	74.40	40.70	49.80	41.70	29.50	54.90	35.70	13.7
Total Organic Carbon (Plumb, 1981) (%)	4.88 J	8.87	11.8	3.56	NA	13.2	14.9	12.8	10.7	8.98	16.0
WEIGHT OF SOLIDS COLLECTED (g)						399.40	164.48	117.60			
Reported as Dry Wt	P,S,T,M	P,S,T,M	P,S,T,M	P,S,T,M	M	P,S,T,M	P,S,T,M	P,S,T,M	P,S,T,M	P,S,T,M	P,S,T,M
Reported as As Received					P,S,T						
Not Analyzed Due to Low Sample Volume											

P=PCBs
S=SVOCs
T=TPH
M=Metals

U = Indicates the compound was not detected at the given reporting limit.
UJ = Indicates the compound was not detected; the given reporting limit is an estimate.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
P = Indicates the analyte was detected on both chromatographic columns, but the quantified values differ by ≥40% RPD with no obvious chromatographic interference.
NA = Not analyzed.
(a) These samples were cross-contaminated during laboratory analysis. Due to limited sample volume, re-extraction and re-analysis could not be performed. As a result, measured PCB concentrations for these two samples are erroneous and are not shown.
(b) Location SL4-T5A was moved from MH178 to the King County bypass line wet well (installed in October 2011) and renamed SL4-T5A(2). SL4-T5A(2) does not have a bracket and Teflon container like the other sediment trap locations; SL4-T5A(2) is sampled by collecting solids from the bottom of the wet well, which collects solids behind a permanent weir. The line was put into service in October 2011, and solids have been accumulating behind the weir since that time.

Note:
The samples listed in this table were collected in coordination with Seattle Public Utilities (SPU). The 2/16/05 samples are grab samples of solids collected from the base of the manhole or catch basin. With the exception of the 2/16/05 grab samples, these sediment trap samples represent a composite of the sediment collected in the sediment trap bottles between the deployment and collection dates.

APPENDIX A

Memorandum: Annual FWAAC Results and Recommendations for LTST

Memorandum

Date: 4 March 2013

To: Karen Keeley, USEPA

Copies to: Lori Blair, Carl Bach, and Brian Anderson, The Boeing Company; Jim Fitzpatrick, Black & Veatch; and Joe Kalmar, Landau Associates

From: Jon Jones, Michael Stenstrom, and Robert Pitt, NBF Stormwater Expert Panel; jointly with Geosyntec Consultants

Subject: Year 1 Monitoring (November 1, 2011 through October 31, 2012) and Flow-Weighted Average Annual Concentration (FWAAC) Results and Recommendations for North Boeing Field (NBF) Long-Term Stormwater Treatment (LTST) System

---

INTRODUCTION

To prevent sediment recontamination due to PCBs in Slip 4, a Long-Term Stormwater Treatment (LTST) system was installed at the North Boeing Field (NBF) site. The NBF Stormwater Expert Panel (Panel), along with Geosyntec Consultants, established a loading-based yearly average Interim Goal (IG) for the LTST system of 0.018 μg/L total PCBs for stormwater discharging to Slip 4 (NBF Stormwater Expert Panel and Geosyntec, 2011).

After determining that the previous IG of 100 μg total PCBs per kg solids (100 ppb) (SAIC, 2010) was not capable of accounting for changes in the NBF storm drain mass solids loading to Slip 4, a static mass balance analysis approach was proposed. This revised mass balance approach uses water quality and flow data from a number of monitoring points in the NBF storm drain system to yield a Flow-Weighted Average Annual Concentration (FWAAC) of PCBs in the water discharging to Slip 4. The FWAAC calculation methodology is described in detail in the "Amended Monitoring Approach Recommendations for North Boeing Field Long-Term Stormwater Treatment System" memo (Geosyntec, 2012).

A monitoring approach was proposed to collected data for the FWAAC and was ultimately incorporated into the NBF LTST Sampling and Analysis Plan (SAP) (Landau Associates, 2011) and the Revised Final SAP (Landau Associates, 2012a). Water quality sampling and flow measurement locations were proposed at the Lift Station Inlet Vault (LSIV), the Chitosan-Enhanced Sand Filtration (CESF) system effluent, the North Lateral re-route influent to the Lift Station, and at the Lift Station (LS431) Point of Compliance (POC), as shown in Figure 1.

As described in the SAP, the objectives of the field sampling were to gather data to:

1. Assess the LTST system for compliance with the proposed FWAAC IG;

2. Confirm that the data used and the assumptions made to arrive at the proposed FWAAC IG were reasonably conservative and descriptive of site conditions;

3. Confirm that treating non-detect (ND) results as zero (0) concentration values is appropriate; and

4. Accurately characterize the off-site stream from the King County North Lateral Re-route in order to evaluate this load contribution to the Lift Station and LTST system.

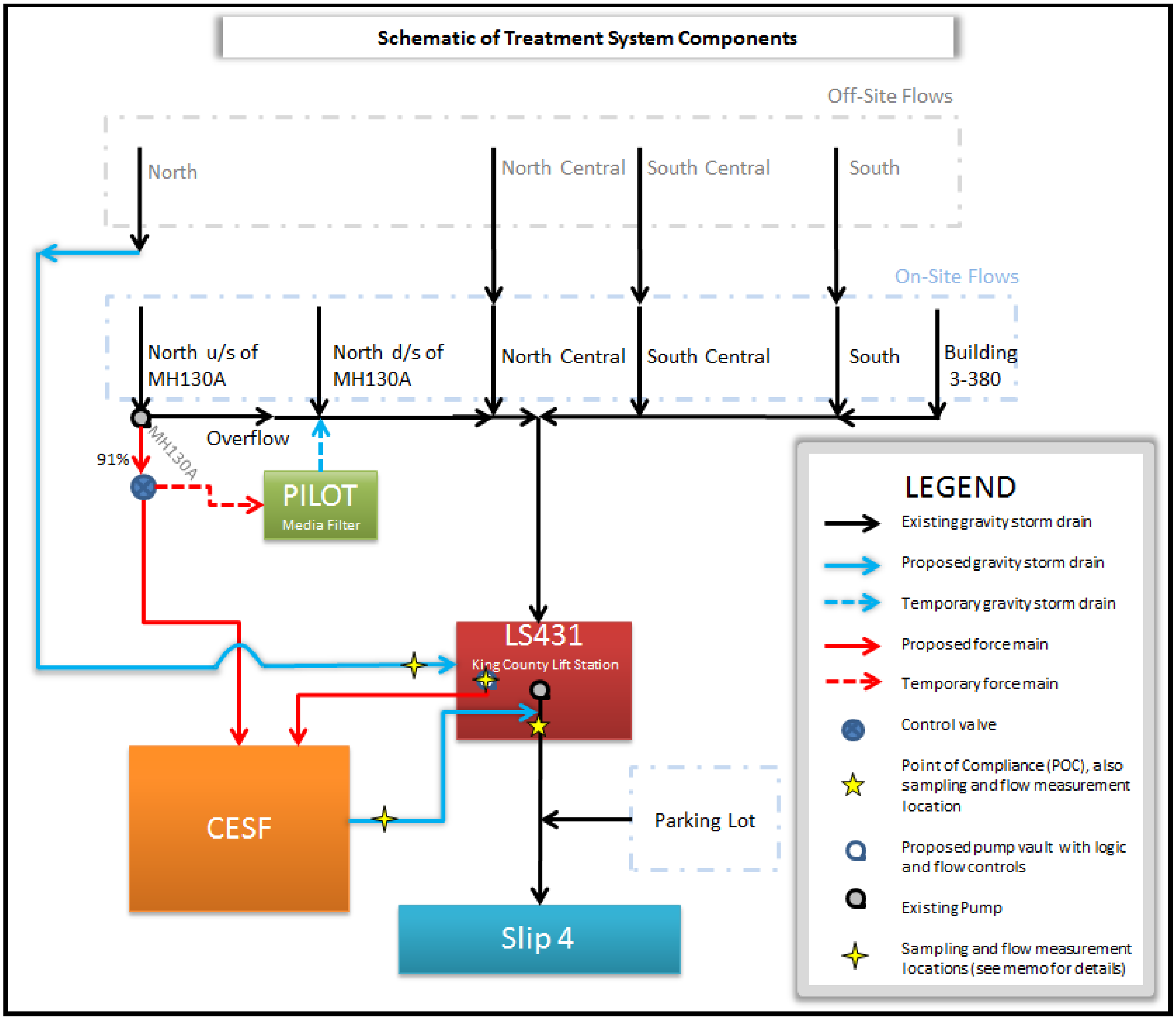


Figure 1. Schematic of flows to Slip 4 taken from Remedial Action Work Plan (RAWP) Addendum (Geosyntec, 2011)

PURPOSE AND ORGANIZATION

The purpose of this memo is to address the four objectives described above using the first year of data collected (November 2011 to October 2012) at NBF, and describe all assumptions made in order to completely perform these tasks.

The assumptions, data, and calculations are presented first, followed by discussion and recommendations.

MOST SENSITIVE ASSUMPTIONS

The following represent the most sensitive assumptions used in the calculations required to obtain the ‘Year 1 Calculated’ results in Table 1:

- The flow was assumed to be treated if under 1,500 gpm and during large events, the flow under 1,500 gpm was assumed to be treated and the excess over 1,500 gpm was assumed to be untreated, resulting in a blend of fully treated low flow volumes and untreated excess flows during large storms;
- Testing the ND assumption required filtered solids data for each sampled site. Because LS431 filtered solids data were not available, the storm sampled load for this site was calculated as follows:

  $Storm\ Sampled\ Load =$
  $(baseflow\ x\ Effluent\ PCB\ Conc.) + (overflow\ x\ LSIV\ PCB\ Conc.)$; and

- Since Effluent PCB samples and LSIV PCB samples were taken one day apart, the date of the LSIV sample was assumed for both to perform the calculation for the storm sampled load.

YEAR 1 DATA AND FWAAC CALCULATIONS

Using flow data at the LS431 discharge and whole water quality sampling[1] results (assuming ND results are zero), the FWAAC for total PCBs in water being discharged to Slip 4 was calculated to be 0.0011 µg/L. Filtered solids and total suspended solids (TSS) data were not used in lieu of ND whole water results because of the potential error in this method. Using filtered solids data along with TSS data to determine the concentration of PCBs is dependent on the effectiveness of solids capture and is ultimately a calculation rather than a measurement. Because of this uncertainty, these results were not used in the calculation for compliance with the IG, but were used to verify the assumption that ND results can be treated as zero. If the ND results are

[1] Whole water quality samples’ refers to either grab or composite water samples, including all particulate or dissolved fractions contained therein.

replaced with concentrations calculated from filtered solids and TSS data in the FWAAC calculation the result is a FWAAC = 0.0030 μg/L. These calculations are described in more detail below.

Table 1 compares the results from performed calculations with predicted and observed values of precipitation, total discharge, and total treated stormwater.

Table 1: Predicted, Observed, and Calculated Values

	Long Term Predicted[1]	Year 1 Observed[2]	Year 1 Calculated[3]
Precipitation (inches)	36	37.22	N/A
Total Discharge to Slip 4 (million gallons)[4]	352	258	N/A
Total Treated Stormwater (million gallons)	N/A	176	197
% Stormwater Treated	59%	68%	76%

Notes:
1. Long term predicted data values reflect the expected performance of the LTST system based on Geosyntec's modeling and design (Geosyntec, 2011).
2. Year 1 observed values are taken from the Landau Associates October 2012 Monthly progress report, which includes treated flow monitoring data recorded by the CESF system from November 2011 to October 2012 (Landau Associates, 2012b).
3. Year 1 calculated values are the result of calculations performed by Geosyntec using LS431 flow meter data provided by Landau Associates between November 2011 and October 2012.
4. Total Discharge to Slip 4 includes stormwater (liquids and dissolved particles) in the form of base flow, storm event runoff, snow melt runoff and drainage, as well as all solids that enter the storm drainage system.

To calculate the FWAAC using whole water samples, recorded flow and water quality data from the Landau Associates monthly progress reports (Landau Associates, 2012b) were collected and synthesized to develop the total flow volumes and average total PCB concentrations for Year 1. The discrepancy between Year 1 observed 'total treated stormwater' and Year 1 calculated 'total treated stormwater' shown in Table 1 is due to the use of two different sources of flow data. The observed total treated results come from the Landau Associates progress reports, which rely on field measurements from their subcontractor, Clear Water (CW), at the effluent of the CESF (reported in 15 minute increments). The calculated total treated results rely on evaluating the portion of the Flo Dar data, provided by Landau Associates for total flow at the LS431 POC, that is below 1,500 gpm (the capacity of the CESF). The CW data are not provided in a format consistent with the FWAAC methodology; however, an approximate calculation using this data will be performed for consistency. The results using both data sources are shown in Table 2 and explained further below.

Table 2: Year 1 PCB Loading Calculation Parameters using Whole Water Samples[2]

	Average Total PCB Concentrations [Range] (µg/L)	Flow Volume (million Liters) [Flo Dar data]	Flow Volume (million Liters) [CW data][3]	Load (g) [Flo Dar data]	Load (g) [CW data]
Baseflow	0 [0]	650	667	0	0
Storm Sampled	0.0036 [0-0.025]	37	37	0.42	0.42
Storm Treated	0 [0]	80	0	0	0
Storm Untreated	0.0032 [0-0.016]	210	272	0.67	0.87
Total	-	980	976	1.1	1.3

To better illustrate the flow allocation as shown in Table 2, Figure 2 displays recorded flow at the LS431 POC from a period of time in December 2011 with the appropriate flow designations shaded. The legend also explains how the concentrations were used with each flow designation and the discussion to follow explains this relationship in greater detail.

---

[2] Providing all data used in the FWAAC calculation is not possible within this memorandum because the full calculation requires analyzing the data for sampled loads during individual time steps. Therefore, this table represents a summary of the final totals and averages that resulted from the full calculation.

[3] The CW data do not distribute the treated stormwater between baseflow and storm treated flow. Because the average concentration of baseflow and the average concentration of storm treated flow are both zero, the proportions will not affect the total loading. Therefore, the total treated volume is assumed to be baseflow and the storm treated flow is assumed to be zero.

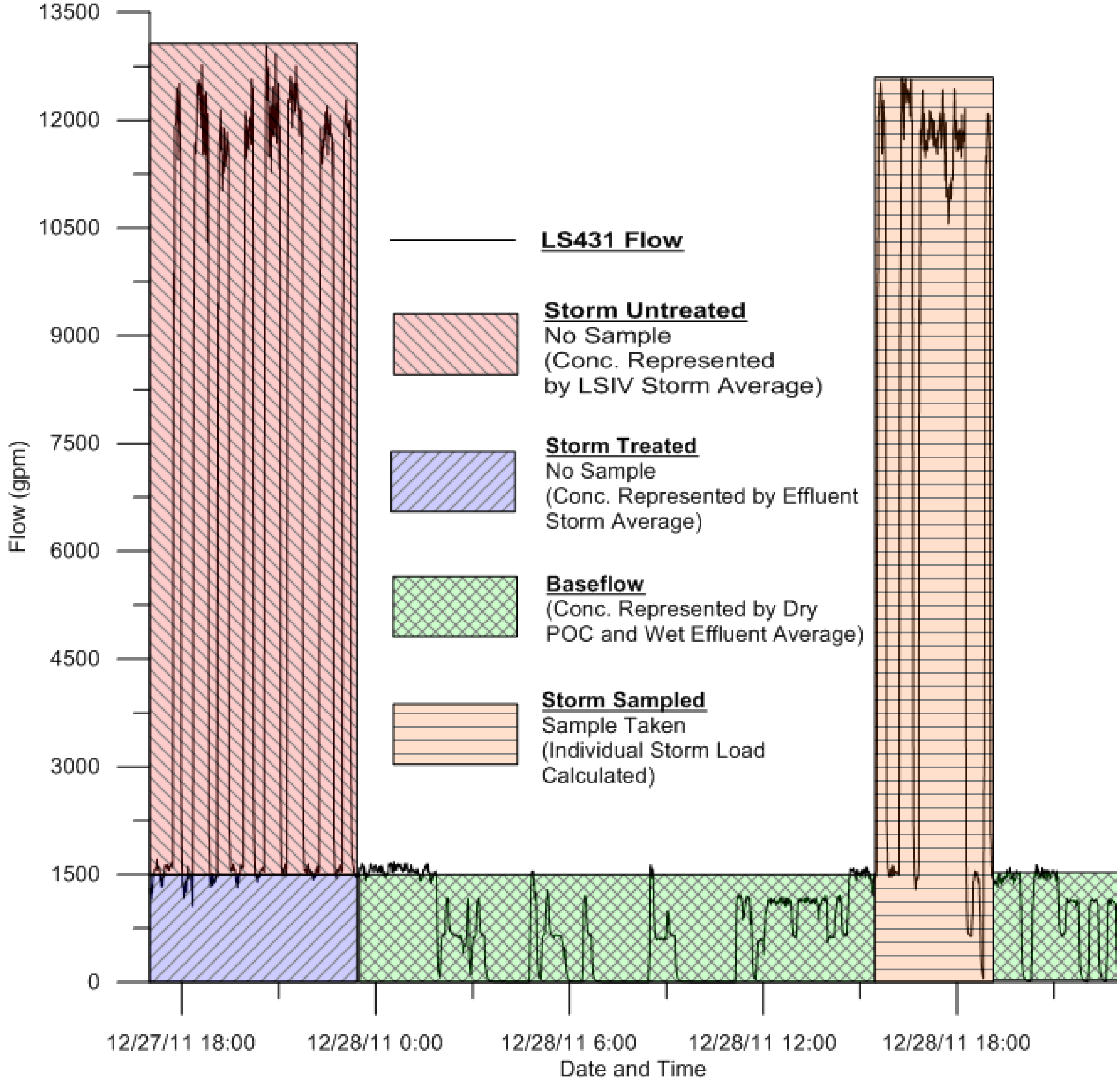


Figure 2. Observed Flow at the LS431 POC with Flow Designations for the FWAAC

- **Baseflow.** The baseflow average total PCB concentration was calculated by averaging the water quality sampling results from the POC during dry weather, or, during wet weather events, from the CESF effluent. The baseflow flow volumes were calculated by summing the recorded flow data that were less than or equal to 1,500 gpm (the capacity of the CESF system) in the absence of effluent flow measurements with comparable time steps.

- **Storm Sampled.** The storm sampled average total PCB concentration was calculated by averaging the water quality sampling results at the POC during wet weather events. The storm sampled flow volumes were calculated by summing the total value of all recorded flow data that exceeded 1,500 gpm and coincided with a water quality sampling event. During such an event, the entire volume (above and below 1,500 gpm) were used in the summation.

- **Storm Treated.** The storm treated average total PCB concentration was calculated by averaging the water quality sampling results at the CESF effluent during wet weather events. The storm treated flow volumes were calculated by summing 1,500 gpm (the capacity of the CESF system) of each recorded flow during a wet weather event in which a water quality sample was not taken (i.e. 1,500 gpm from each flow measurement during an un-sampled storm was summed throughout Year 1).

- **Storm Untreated**: The storm untreated average total PCB concentration was calculated by averaging the water quality sampling results at the LSIV during wet weather. The storm untreated flow volumes were calculated by summing the flow in excess of 1,500 gpm of each recorded flow during a wet weather event in which a water quality sample was not taken (i.e. the portion of flow that exceeded 1,500 gpm from each flow measurement during an un-sampled storm was summed throughout Year 1).

The Year 1 loads were calculated by multiplying the Year 1 average total PCB concentrations by the Year 1 flow volumes (including appropriate unit conversion) for baseflow, storm treated, and storm untreated loads separately. The storm sampled load was calculated as the sum of the individual loads from each recorded event throughout Year 1 (determined by multiplying the individual event flow volume by the concentration). The total Year 1 PCB load from the site shown in Table 2 was calculated to be 1.1 grams using Flo Dar data, which is equal to 0.0024 pounds, and 1.3 grams using CW data, which is equal to 0.0029 pounds.

The previously described FWAAC calculation methodology was used to verify the ND as zero assumption using total PCB filtered solids data to calculate the concentration of total PCBs in water rather than using the whole water data.. In order to perform this comparison, the ratio of total PCB filtered solids mass to total solids mass was multiplied by the TSS concentration for each water quality sampling event. The concentrations calculated using total PCB filtered solids data and the resulting loads using these concentrations are shown in Table 3.

Table 3: PCB Loading Calculation Parameters using Filtered Solids Data

	Year 1 Average Total PCB Concentrations (µg/L)	Year 1 Load (g)
Baseflow	1.3E-03	0.83
Storm Sampled	3.6E-03	0.24
Storm Treated	1.8E-03	0.15
Storm Untreated	8.3E-03	1.74
Total	-	3.0

The loads in Table 3 were calculated using the same methodology previously described; multiplying average concentration by total flow volume, except for the storm sampled load that relies on the summation of individual event loads. The volumes used to calculate the loads using PCB filtered solids are the same as those used in the whole water calculation (Table 2). The total Year 1 PCB load from the site shown in Table 3 was calculated, using filtered solids and TSS data, to be 3.0 grams, which is equal to 0.0066 pounds.

For both scenarios (using whole water samples and filtered solids), the FWAAC was calculated by dividing the sum of all Year 1 loads by the sum of all Year 1 flow volumes. These results are presented in Table 4.

Table 4: FWAAC Results

	Interim Goal	Discharge to Slip 4 (Assuming ND = 0) [Flo Dar data]	Discharge to Slip 4 (Assuming ND = 0) [CW data]	Discharge to Slip 4 (Using Filtered Solids Data for ND Whole Water Results)
FWAAC (total PCBs)	0.018 µg/L	0.0011 µg/L	0.0013 µg/L	0.0030 µg/L

DISCUSSION AND RECOMMENDATIONS

To summarize the results of Year 1 monitoring, the four key tasks resulting from this monitoring effort outlined in the introduction are discussed below.

Task #1: Assess the LTST system for compliance with the proposed FWAAC IG

Using the assumption that ND results signify a PCB concentration of zero, the calculated FWAAC at the POC over the year being analyzed (November 2011 to October 2012) is 0.0011 μg/L total PCBs using Flo Dar data and 0.0013 μg/L total PCBs using CW data, which are both below the IG of 0.018 μg/L total PCBs. The FWAAC at the influent of the LTST (0.0097 μg/L total PCBs) is 8.7 times greater than the treated effluent which demonstrates the effectiveness of the LTST system at removing PCBs from stormwater.

Task #2: Confirm that the data used and the assumptions made to arrive at the proposed FWAAC IG were reasonably conservative and descriptive of site conditions

- **Observed vs. predicted discharge.** In Table 1, the total annual observed discharge to Slip 4 (258 million gallons) was less than the predicted value (352 million gallons). This signifies that the assumptions used to set the IG were conservative. The total discharged flow will continue to be monitored and the benefit of re-calibrating the Storm Water Management Model (SWMM) will be re-evaluated after an additional year of monitoring.

- **Observed vs. predicted treatment rate.** Table 1 also shows that the observed and calculated percent stormwater treated (68% and 76%, respectively) are higher than the predicted value (59%). If only 59% of the stormwater had been treated, the resulting FWAAC would be higher than the Year 1 calculated value (0.0011 μg/L total PCBs), but would still expected to be below the FWAAC IG (0.018 μg/L total PCBs).

- **Flow data corrections.** Landau Associates performed calibrations of the flow monitoring equipment (Flo-Dar flow sensor) at the discharge location to Slip 4. However, due to the wide variation in flow rates, the final calibration was performed based on lower flows and a correction factor was incorporated for higher flows. This difficulty in calibration most likely explains the variation between predicted, observed, and calculated total treated stormwater flows and the total discharge to Slip 4, because each of these results are dependent on flow measurements. Since the flow monitoring equipment has been calibrated to the maximum accuracy possible, recalibration is not recommended. However, the need for new calibration will be re-evaluated after an additional year of monitoring.

- **Additional Assumptions.** While the results suggest that the assumptions made to arrive at the proposed FWAAC IG were reasonably conservative and descriptive of site conditions, additional assumptions, such as the assumption that bedload solids constitute a very small percentage of the total transported solids mass in the storm drain system, cannot be verified at this time.

Task #3: Confirm that treating ND values as zero is appropriate

The calculated FWAAC using filtered solids data in conjunction with TSS data to represent ND whole water samples (0.0030 μg/L total PCBs) is higher than the FWAAC calculated assuming ND results are zero (0.0011 μg/L total PCBs). However, the difference between these two estimates is small compared to the established IG (0.018 μg/L total PCBs), and therefore this assumption is assumed to be adequate. This assumption will continue to be monitored throughout the following year.

Task #4: Accurately characterize the off-site stream from the King County North Lateral Re-route in order to evaluate this load contribution to the Lift Station and LTST system.

Based on monitoring results, the total Year 1 volume from the King County North Lateral Re-route was 13.9 million gallons and the FWAAC of this flow was calculated to be 0.0044 μg/L total PCBs (3.9 times larger than the calculated FWAAC of PCBs discharging to Slip 4 after treatment). Sufficient data were collected to characterize this off-site stream flow and this site will continue to be monitored throughout the following year.

CONCLUSION

The monitoring carried out in Year 1 (November 2011 to October 2012) at the NBF was successful in obtaining data to perform the four key tasks previously discussed. The LTST system effluent PCB loading is in compliance with the IG of 0.018 μg/L total PCBs if calculated by assuming ND results are zero as well as when using filtered solids data for whole water ND results. While variations in the total stormwater treated and total stormwater discharged to Slip 4 exist, they are not substantial enough to expect that the FWAAC is exceeding the IG. Therefore, recalibration of the SWMM model or the flow monitoring equipment is not recommended at this time. These discrepancies will be re-evaluated after an additional year of monitoring is performed.

REFERENCES

Geosyntec Consultants, 2012. *Amended Monitoring Approach Recommendations for North Boeing Field Long-Term Stormwater Treatment System (10 January 2012).*

Geosyntec Consultants, 2011. *Addendum to Removal Action Work Plan: Long-Term Stormwater Treatment (26 January 2011)*. March.

Landau Associates, 2012a. March 21, 2012 is the final revised SAP.

Landau Associates, 2012b. *October 2012 Progress Report North Boeing Field Stormwater Treatment Lower Duwamish Waterway Superfund Site EPA Docket No. CERCLA-10-2010-0242 (5 November 2012).*

Landau Associates, 2011. *Sampling and Analysis Plan, Long-Term Stormwater Treatment, North Boeing Field, Seattle, Washington*. June.

NBF Stormwater Expert Panel and Geosyntec, 2011. *Alternative Interim Goal Recommendations for Protection of Slip 4 Sediment Recontamination*. October.

SAIC, 2010. *North Boeing Field/Georgetown Steam Plant Site Remedial Investigation/ Feasibility Study – Slip 4 Sediment Recontamination Modeling Report.* September.

* * * * *

APPENDIX B

Sampling and Analysis Plan Addendum, 2013-2014, Long-Term Stormwater Treatment

Sampling and Analysis Plan Addendum
2012 - 2013
Long-Term Stormwater Treatment
North Boeing Field
Seattle, Washington

March 4, 2013

Prepared for

The Boeing Company
Seattle, Washington

Landau Associates
130 2nd Avenue South
Edmonds, WA 98020
(425) 778-0907

TABLE OF CONTENTS

FIGURES

TABLES

ATTACHMENTS

LIST OF ABBREVIATIONS AND ACRONYMS

µg/L	Micrograms per Liter
ARI	Analytical Resources, Inc.
Boeing	The Boeing Company
CESF	Chitosan-Enhanced Sand Filtration
EAA	Early Action Area
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
FS	Feasibility Study
FWAAC	Flow-Weighted Average Annual Concentration
gpm	Gallons per Minute
GTSP	Georgetown Steam Plant
KCBYP	Re-routed North Lateral Storm Drain Pipe from King County
LDW	Lower Duwamish Waterway
LOD	Limit of Detection
LSIV	Lift Station Inlet Vault
LTST	Long-Term Stormwater Treatment
MBPS	Media Bed Pilot Study
NBF	North Boeing Field
NPDES	National Pollutant Discharge Elimination System
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
POC	Point of Compliance
PSD	Particle Size Distribution
QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
RL	Reporting Limit
SAP	Sampling and Analysis Plan
SIM	Selected Ion Monitoring
SVOCs	Semivolatile Organic Compounds
TOC	Total Organic Carbon
TSS	Total Suspended Solids

1.0 INTRODUCTION

This document presents modifications to the stormwater monitoring program for operation of the long-term stormwater treatment (LTST) system at the North Boeing Field (NBF) site in Seattle, Washington (Figure 1), beginning 2013. This document is to be used as an addendum to the existing sampling and analysis plan (SAP; Landau Associates 2012) for monitoring the second year of LTST operation, from November 1, 2012 to October 31, 2013. The LTST system, which consists primarily of a chitosan-enhanced sand filtration (CESF) system to remove total suspended solids (TSS) and associated polychlorinated biphenyls (PCBs) from stormwater, was installed as part of a removal action conducted by The Boeing Company (Boeing) at NBF to control contaminant discharges from the NBF site to the Slip 4 Early Action Area (EAA) of the Lower Duwamish Waterway (LDW) Superfund Site.

The primary purpose of the NBF stormwater monitoring program is to determine if the LTST system is meeting the following interim goals at the point of compliance (POC):

- Water discharged to Slip 4 must be below the Aquatic Life – Marine/Chronic water quality standard of 0.030 micrograms per liter (μg/L) total PCBs.
- A flow-weighted average annual concentration (FWAAC) for total PCBs in water of 0.018 μg/L.

The latter is referred to as the alternative interim goal, which was approved by the U.S. Environmental Protection Agency (EPA) in place of an interim goal for solids (EPA 2011). Another goal of the monitoring program is to collect data to support the NBF – Georgetown Steam Plant (GTSP) Remedial Investigation (RI)/Feasibility Study (FS) being conducted by the Washington State Department of Ecology (Ecology). The following samples are being collected in support of the Ecology RI/FS:

- Whole water at LS431, MH130A, the Lift Station Inlet Vault (LSIV), and the CESF effluent for analysis of semivolatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), and metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc)
- Filtered solids at MH130A, LSIV, and the CESF effluent for PAHs, and at MH130A and LSIV for analysis of metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc).

The first year of monitoring was performed between November 1, 2011 and October 31, 2012. The modifications to the SAP presented in this document are a result of evaluations of data and methodologies from the first year of LTST operation and monitoring, and considering additional monitoring requested by Ecology for their NBF –GTSP RI/FS. This document does not restate information in the existing SAP, but describes changes for the 2012-2013 monitoring program. The existing SAP and this SAP addendum are to be used when conducting LTST monitoring activities at NBF.

2.0 FIELD SAMPLING PLAN

Changes to the monitoring program from the 2011-2012 year are described in the sections below. Aspects of the monitoring program that are not discussed in this Field Sampling Plan will remain as they are described in the existing SAP (Landau Associates 2012). Similar to the previous year, sampling will take place from November (2012) through October (2013), and Boeing will present modifications to the stormwater monitoring program to EPA for 2013-2014 after the 2012-2013 monitoring is complete and the data have been evaluated.

As described in the annual LTST performance evaluation report, to which this document is an appendix, Boeing decided in early 2012 that, due to logistical difficulties, Eurofins Lancaster Laboratories, located in Lancaster, Pennsylvania, would not be used for LTST related stormwater sample analysis for this project. It is planned that all laboratory analysis described in the SAP and this SAP addendum will be conducted by Analytical Resources, Inc (ARI), located in Tukwila, Washington.

As requested by Ecology (Ecology 2012), Boeing will request that ARI report whole water PCB concentrations down to the ARI Limit of Detection (LOD) of 0.005 µg/L, which is ½ the target Reporting Limit (RL), starting in January 2013. Any data reported below the target RL (0.010 µg/L) is approximate and will be J-flagged. Quality control criteria for PCBs analysis in aqueous samples at ARI are included as Attachment 1.

A revised sampling and analysis summary is presented in Table 1. Revised analytical methods and target reporting limits are presented in Table 2. Revised information on sample containers, preservatives, and holding time requirements is presented in Table 3.

2.1 SAMPLING LOCATIONS

Samples will continue to be collected from the lift station (LS431) monitoring POC; the LTST system influent [MH130A and lift station inlet vault (LSIV)] and effluent; the LTST weir tanks, storage tanks, and sand filters, as necessary; and the sediment traps. The Media Bed Pilot Study (MBPS) and associated sampling was completed in March 2012, the equipment was removed from the site later that year, and there are no plans to continue with additional media bed testing. NBF stormwater-related sampling locations are shown on Figures 2 and 3.

2.2 LIFT STATION (LS431) SAMPLING

Ecology (2012) has requested filtered solids sampling at LS431 for PCBs, metals, and PAHs. At this location, downstream of both the LTST effluent and of the King County pumps that bypass the LTST system, flow occurs in one of two ways – 1) treated flow only with a flow rate of up to approximately 1,500 gallons per minute (gpm), depths of water between 2 and 8 inches, and very little entrained solids, and 2) bypass conditions with a flow rate of 9,000 gpm or greater, at depths of water of 19 inches or greater, with a higher concentration of entrained solids. Devising a working filtration system that would produce representative flow-weighted samples given these flow conditions is not reasonably feasible.

A second point is that the stormwater flow at LS431 is composed of stormwater flow from only two locations, King County pumps at the lift station (from LSIV) and treated CESF effluent, and from both of which we collect filter bag solids samples. Flow data from the CESF system and LS431 as well as the laboratory data from filtered solids at the LSIV and CESF effluent locations (see Section 2.3 below for proposed filtered solids sampling for PAHs) can be used to calculate representative flow-weighted contaminant loadings for PCBs and PAHs at LS431. In addition, an assessment of the discharge of particulate metals at LS431 can be determined using laboratory data for total and dissolved metals in whole water at LS431, LSIV, and the CESF effluent location. Due to the factors described above, we do not propose to collect filtered solids samples at LS431.

To provide data for compliance monitoring for the National Pollutant Discharge Elimination System (NPDES) stormwater permit at NBF (covered under Ecology's Industrial Stormwater General Permit, No. WAR000226), LS431 samples will be analyzed for turbidity using EPA Method 180.1, and quarterly for pH using a field meter. LS431 samples will also be analyzed for pH in the laboratory using EPA Method 150.1. A visual observation of the LS431 stormwater sample for oil sheen will also be made, in accordance with permit conditions. Total copper and total zinc are the other parameters that must be analyzed in stormwater samples and compared to benchmark values on a quarterly basis in order to meet the permit conditions, and those two metals are already included as part of the routine metals sampling established in the LTST SAP.

Because of LTST operational challenges by dissolved iron and iron-related bacteria growth (e.g., precipitation in monitoring instrumentation and additional sludge volume accumulation in the backflush tank) that are associated with groundwater infiltration into the storm drain lines, LS431 samples will also be analyzed for total and dissolved iron and manganese using EPA Method 6010 (in addition to the metals analysis currently conducted).

2.3 LONG-TERM STORMWATER TREATMENT SYSTEM SAMPLING

There are a number of planned changes to monitoring at the LTST system for 2012-2013, which are discussed in the following sections.

2.3.1 MH130A WHOLE WATER

To provide requested data for the RI being conducted by Ecology at NBF and the GTSP, whole water samples from MH130A will be collected and analyzed for SVOCs by EPA Method 8270D and PAHs using EPA Selected Ion Monitoring (SIM) Method 8270D. Sampling for SVOCs and PAHs in whole water will be conducted during the period of filtered solids sampling for PAHs (discussed in

Section 2.3.2) and will be conducted during alternating (i.e., every other) routine monthly sampling events and alternating storm events starting in February 2013. Ecology has also requested TSS analysis, which is already included in the existing sampling plan and will continue to be conducted during each monthly event and storm event.

MH130A whole water samples will be analyzed for turbidity using EPA Method 180.1, for pH using EPA Method 150.1, and for total and dissolved iron and manganese using EPA Method 6010 (in addition to the metals analysis currently conducted).

2.3.2 MH130A Filtered Solids

Filtered solids samples will no longer be analyzed for particle size distribution (PSD). This change was made in June 2012 and approved by EPA.

To provide requested data for the RI being conducted by Ecology at NBF and the GTSP, filter bag samples from MH130A will be collected and analyzed for PAHs using EPA Method 8270D. A second filter housing, in parallel with the existing housing, will be installed at the MH130A location by January 31, 2013. The existing filter housing will continue to be used to collect filtered solids samples for PCB analysis. After installation of the second filter housing, filtered solids samples from the second MH130A housing will be analyzed for metals or PAHs on an alternating basis during the routine monthly events. Similarly, filtered solids samples from the second filter housing at MH130A will be collected during storm monitoring events and will be analyzed for metals or PAHs on an alternating basis. Whole water sampling for TSS, SVOCs, and PAHs will be conducted during the period of filtered solids sampling for PAHs.

Similar to the procedure for analysis of filter bag samples for PCBs, filters for PAH analysis will be weighed and numbered prior to sample collection so that each sample can be matched to a unique, clean-filter weight. The used filter will be dried, weighed, and processed by the laboratory. For each filter, the entire filter (not including the hard plastic ring, but including whatever material was collected) will be extracted and the analytical results presented in units of total μg of PAHs. Knowing the full weight of the used dried filter (including collected material) and the pre-filtration weight, the estimated mass of PAHs per mass of total solids can be calculated.

MH130A filtered solids samples will be analyzed for iron and manganese using EPA Method 6010 (in addition to the metals analysis currently conducted).

2.3.3 LSIV Whole Water

For LSIV water samples, because the ISCO autosampler is enabled by the liquid level actuator only when the CESF system is being bypassed, some monthly sampling events are likely to result in no collection of a LSIV sample. This occurred for multiple monthly sampling events during the 2011-2012 sampling year. Although a goal of LSIV stormwater sampling is to collect a sample that is representative of water that bypasses the CESF system, another goal is to have adequate LTST system influent water quality data in order to compare to the treated effluent water quality and be able to assess CESF system treatment performance. Therefore, if it is not possible to collect a flow-weighted LSIV sample during a sampling event due to insufficient bypass occurring, then a grab sample of LSIV water will be collected and submitted to the laboratory. A tee and additional sampling port valve will be installed at the LSIV sample location so that LSIV sample water can be directed to either the ISCO or out of the new sample port for a grab sample. Logistically, the new sampling procedure will likely mean waiting until the end of a monthly event to determine if a flow-weighted sample of bypass water can be collected, prior to collecting a LSIV grab sample.

To provide requested data for the RI being conducted by Ecology at NBF and the GTSP, all routine monthly and storm event whole water samples from LSIV will be analyzed for SVOCs by EPA Method 8270D and PAHs using EPA SIM Method 8270D starting in January 2013. Ecology has also requested TSS analysis, which is already included in the existing sampling plan and will continue to be conducted during each monthly event and storm event.

LSIV whole water samples will be analyzed for turbidity using EPA Method 180.1, for pH using EPA Method 150.1, and for total and dissolved iron and manganese using EPA Method 6010 (in addition to the metals analysis currently conducted).

2.3.4 LSIV Filtered Solids

Filtered solids samples will no longer be analyzed for PSD. This change was made in June 2012 and approved by EPA.

To provide requested data for the RI being conducted by Ecology at NBF and the GTSP, filter bag samples from LSIV will be collected and analyzed for PAHs using EPA Method 8270D. There are already two filter housings in parallel at the LSIV sampling location. One of the housings will continue to be used to collect filtered solids samples for PCB analysis. Starting in January 2013, filtered solids samples from the second LSIV housing will be analyzed for metals or PAHs on an alternating basis during the routine monthly events. Similarly, filtered solids samples from the second filter housing at LSIV will be collected during storm monitoring events and will be analyzed for metals or PAHs on an alternating basis. Filtered solids sampling for PAHs will be conducted concurrently with whole water sampling for TSS, SVOCs, and PAHs.

Similar to the procedure for analysis of PCBs, filters for PAH analysis will be weighed and numbered prior to sample collection so that each sample can be matched to a unique, clean-filter weight. The used filter will be dried, weighed, and processed by the laboratory. For each filter, the entire filter (not including the hard plastic ring, but including whatever material was collected) will be extracted and the analytical results presented in units of total µg of PAHs. Knowing the full weight of the used dried filter (including collected material) and the pre-filtration weight, the estimated mass of PAHs per mass of total solids can be calculated.

MH130A filtered solids samples will be analyzed for iron and manganese using EPA Method 6010 (in addition to the metals analysis currently conducted).

2.3.5 Effluent Whole Water

To provide requested data for the RI being conducted by Ecology at NBF and the GTSP, whole water samples from the LTST system effluent will be collected and analyzed for SVOCs by EPA Method 8270D and PAHs using EPA SIM Method 8270D. Sampling for SVOCs and PAHs will be conducted during the period of filtered solids sampling for PAHs (discussed in Section 2.3.6). Ecology requested that 3 whole water effluent samples be analyzed for these parameters, and these 3 samples will be collected during one routine monthly sampling event and two storm events in 2013. Ecology has also requested TSS analysis of whole water effluent, which is already included in the existing sampling plan and will continue to be conducted during each monthly event and storm event.

EFF whole water samples will be analyzed for pH using EPA Method 150.1 and for total and dissolved iron and manganese using EPA Method 6010 (in addition to the metals analysis currently conducted).

2.3.6 Effluent Filtered Solids

To provide information for the RI being conducted by Ecology at NBF and the GTSP, filter bag samples from the LTST effluent will be collected and analyzed for PAHs using EPA Method 8270D. A second filter housing, in parallel with the existing housing, will be installed at the LTST effluent location by January 31, 2013. The existing filter housing will continue to be used to collect filtered solids samples for PCB analysis. After installation of the second filter housing, filtered solids samples from the second LTST effluent housing will be analyzed for PAHs during one of the routine monthly events, and two of the storm events. Whole water sampling for TSS, SVOCs, and PAHs will be conducted during the period of filtered solids sampling for PAHs.

It was demonstrated during the first year of LTST monitoring that filtered solids sampling for metals at the LTST effluent location cannot be performed following the same planned procedure as at the LSIV and MH130A locations, because the filter does not collect a sufficient mass of solids that can be scraped from the bag to provide the needed mass for laboratory analysis. Whole bag extraction, similar to what the laboratory does for PCB analysis in filtered solids (and described below for PAH analysis), is not possible in any form at ARI that would produce reliable, representative data for metals. Therefore, we do not propose to collect filtered solids samples for metals at this location. We maintain that whole water laboratory data for total and dissolved metals, which we will continue to monitor, provides more accurate data for metals in the LTST effluent.

Similar to the procedure for analysis of PCBs, filters for PAH analysis will be weighed and numbered prior to sample collection so that each sample can be matched to a unique, clean-filter weight. The used filter will be dried, weighed, and processed by the laboratory. For each filter, the entire filter (not including the hard plastic ring, but including whatever material was collected) will be extracted and the analytical results presented in units of total μg of PAHs. Knowing the full weight of the used dried filter (including collected material) and the pre-filtration weight, the estimated mass of PAHs per mass of total solids can be calculated.

2.4 SEDIMENT TRAPS

The applicable method for measuring total organic carbon (TOC) in solids has changed from Plumb 1981 to EPA Method 9060.

2.5 WEIR TANK, STORAGE TANK, AND SANDFILTER MEDIA SAMPLING

When monitoring for depth of sludge in the weir and storage tanks, the existing SAP indicates that when the solids level at the bottom of the tank is greater than 12 inches for the inlet weir tank or storage tanks, or 24 inches for the backflush settling tank, the solids will be sampled for waste characterization and solids will be cleaned out from the tank. An allowance was made to modify these solids depths that trigger cleanout and, during the first year of operation, it was determined that a deeper blanket of solids could accumulate without negative effects to treatment system operation or performance. A deeper sludge blanket can also promote sludge thickening and limit the volume of water that needs to be removed and processed. Therefore, the solids levels will be allowed to reach up to 3 feet for the inlet weir tank and storage tanks and 5 feet for the backflush settling tank prior to cleanout.

Sampling of the solids from the weir tanks and storage tanks and of the sandfilter media does not need to take place each time solids are to be disposed. Previous analytical results from the solids can be used to properly profile the waste if no significant difference in water quality is expected. Sampling and analysis of solids for waste characterization will occur if requested by the disposal facility or as necessary for Boeing to maintain sufficient waste profile information.

For sample collection of weir and storage tank solids, the existing SAP states that a new clean sample jar is to be affixed to the sample pole at each new location. However, the grab samples of solids from a tank are combined and homogenized, so the use of separate clean jars is unnecessary. One new clean sample jar for multiple grabs (in a discrete tank for a discrete sampling event) is sufficient.

2.6 RE-ROUTED KING COUNTY STORMWATER

Ecology has requested additional sampling of the re-routed King County north lateral stormwater (KCBYP), including filtered solids for PCBs, PAHs, and metals with concurrent whole water sampling for TSS and SVOCs.

The offsite stormwater from the north lateral was rerouted to allow improved capture and preferential treatment of onsite stormwater that drains to MH130A. However, the KCBYP line connects into the LSIV just the same as other NBF storm drain laterals (north central, south central, and south laterals, plus the onsite portion of the north lateral), and this stormwater continues to be treated at the LTST system. There are no current plans to bypass this stormwater from treatment. Therefore, this stormwater is no different than the other sources of stormwater to LSIV, and there seems to be no useful reason to perform additional sampling at KCBYP beyond the sampling that will continue to be performed at LSIV.

The KCBYP has already been extensively monitored, including seven routine monthly sampling events and four storm sampling events in the past year. Whole water sampling at this location in the past year included analysis for PCBs, SVOCs, PAHs, total metals, dissolved metals, TSS, and particle size distribution. In addition, there continues to be a sediment trap monitoring point for the KCBYP line, location SL4-T5A(2), where solids sample collection will continue to be performed and that includes analysis for PCBs, SVOCs, PAHs, and metals on an annual basis. Therefore, no additional whole water or filtered solids sampling is planned for KCBYP during the 2012-2013 monitoring year.

3.0 QUALITY ASSURANCE PROJECT PLAN

The Quality Assurance Project Plan (QAPP) portion of the existing SAP (Landau Associates 2012) was reviewed to determine whether there were any additional items that needed to be revised or updated, especially related to the request that ARI report whole water PCB concentrations down to the ARI LOD of 0.005 µg/L. No revisions to the QAPP were deemed necessary. Future data validation reports will include a reference to this final SAP addendum.

4.0 DATA ANALYSIS AND REPORTING

Based on steady operation and performance of the LTST system during the first year of LTST operation and monitoring, and considering that the flow-weighted average annual concentration (FWAAC) for PCBs at LS431 was well below the established criterion of 0.018 µg/L (calculated to be 0.0011 µg/L), detailed progress reports with stormwater analytical data tables and data validation reports will be provided to EPA quarterly instead of monthly during the 2012-2013 monitoring year. Brief (approximately one page) progress reports will be provided to EPA for the months in which a quarterly report is not submitted. EPA approved this modification on January 8, 2013. Quarterly and monthly reports will be submitted on the 5th day of the following month (or the first subsequent work day if the 5th day of the month falls on a weekend or holiday).

An annual LTST performance evaluation report will be prepared for the 2012-2013 LTST monitoring year. A draft version of this report will be submitted by Boeing to EPA by December 5, 2013 for review. It is anticipated that, if the LTST system continues to perform well and stormwater discharge to Slip 4 continues to meet applicable water quality criteria for PCBs in the second year of system operation, the number of sampling events will be reduced for the third year of LTST monitoring. EPA may request a meeting to discuss the results presented in the annual performance evaluation and any recommended modifications to the stormwater monitoring program for 2014. A final version of the annual LTST performance evaluation report will be submitted by Boeing to EPA within 14 working days following receipt of written comments from EPA.

A schedule of report submittals for the 2012-2013 monitoring year is included as Table 4.

* * * * * * *

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

LANDAU ASSOCIATES, INC.

Martin Valeri, E.I.T.
Senior Staff Engineer

Joseph A. Kalmar, P.E.
Principal

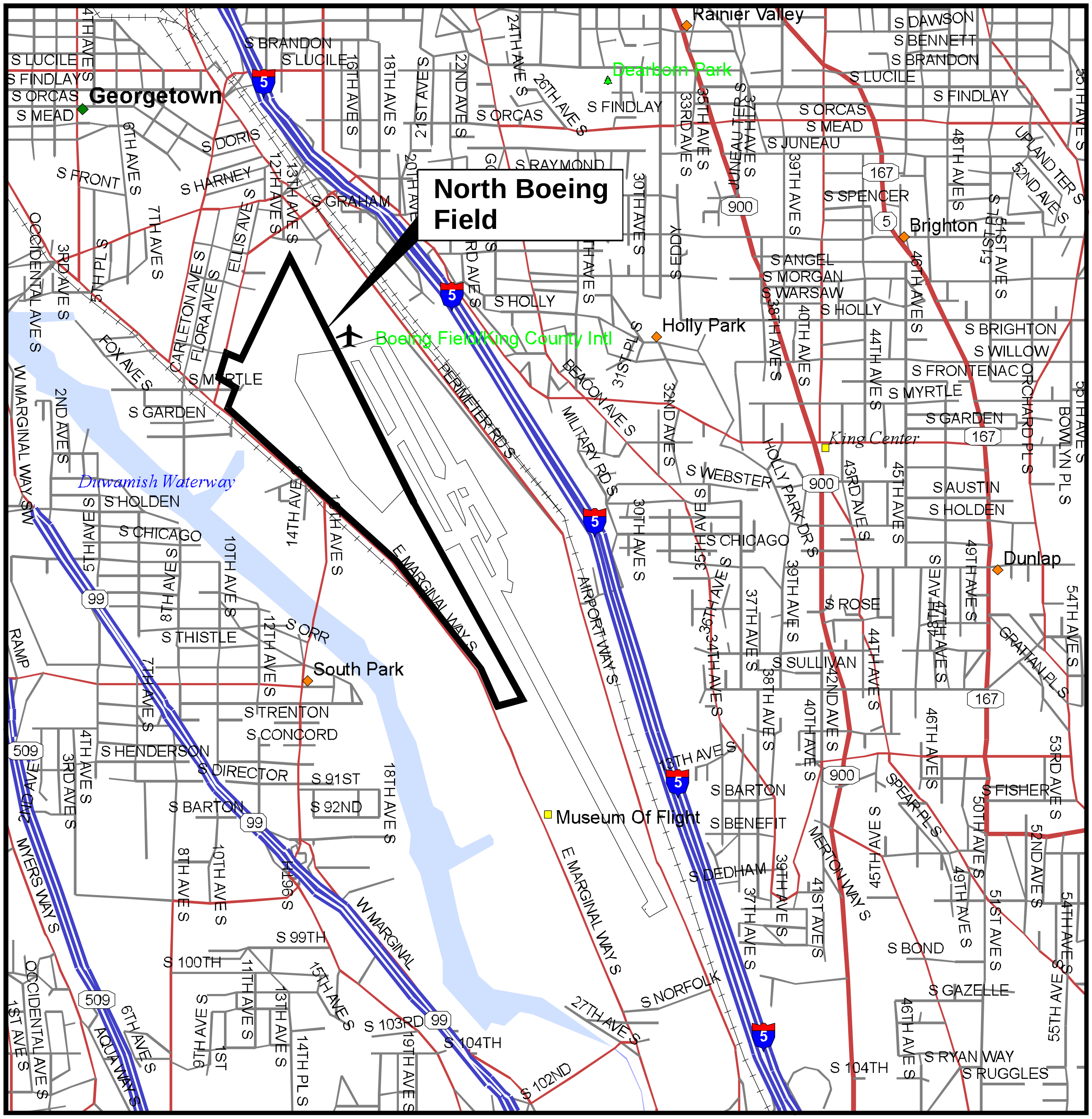
JAK/MCV/tam

5.0 REFERENCES

Ecology. 2012. *Additional Stormwater Sampling Requested by Ecology – 11/30/2012*. November 30.

EPA. 2011. Letter: *EPA Approval of Technical Memorandum, Alternative Interim Goal Recommendations for Protection of Slip 4 Sediment Recontamination, North Boeing Field, Seattle, Washington, prepared for The Boeing Company by Geosyntec Consultants and NBF Stormwater Expert Panel, dated December 12, 2011, ASAOC for Removal Action, CERCLA-10-2010-0242*. From Karen Keeley, Project Manager, U.S. Environmental Protection Agency, to Carl Bach, Project Manager, The Boeing Company. December 15.

Landau Associates 2012. S*ampling and Analysis Plan, Long-Term Stormwater Treatment, North Boeing Field, Seattle, Washington*. Prepared for The Boeing Company. March 21.



Map from DeLorme Street Atlas USA, 2002

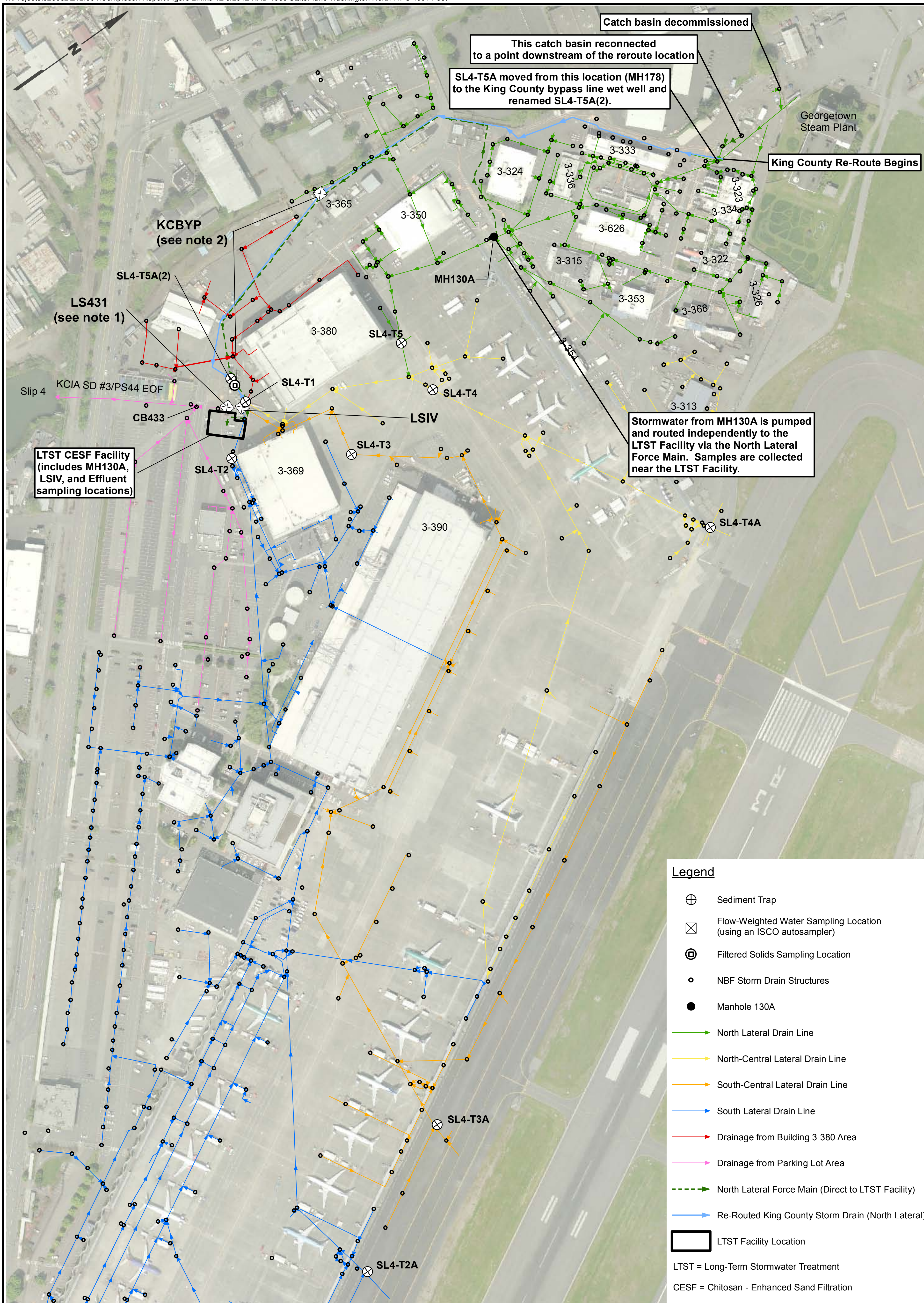
0 ½ 1
Scale in Miles

Flume Realignment| V:\025\082\089\SD Structure & Surface Solids Investigation\Figure 1.cdr 8/29/2009

LANDAU ASSOCIATES

North Boeing Field Seattle, Washington	**Vicinity Map**	Figure 1

Y:\Projects\025082\212.004\Completion Report\Figure 2.mxd 12/5/2012 NAD 1983 StatePlane Washington North FIPS 4601 Feet



Notes:

1. LS431 is the Point of Compliance (POC).
2. KCBYP refers to the sampling locations for rerouted King County stormwater - north lateral.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 250 500

Scale in Feet

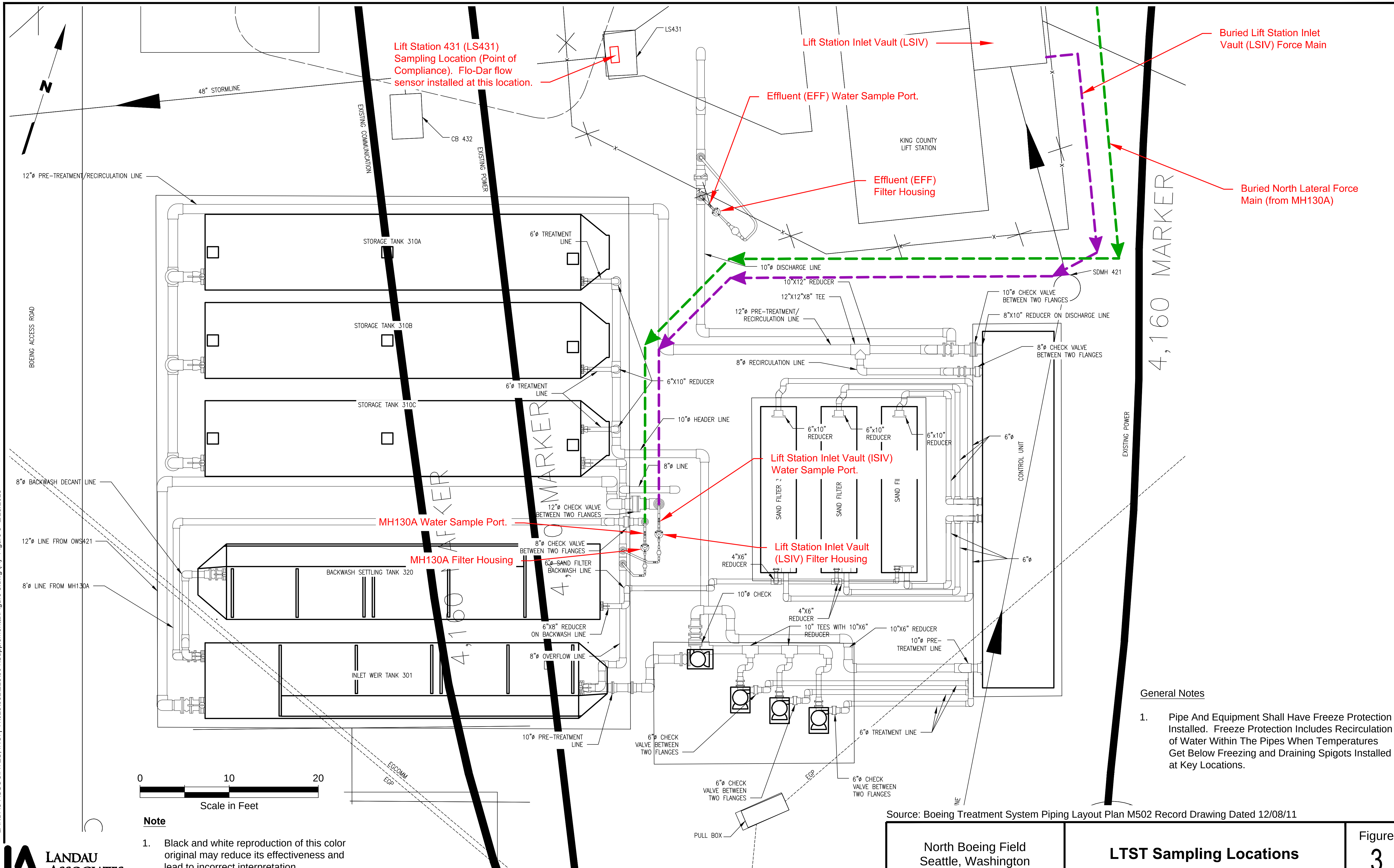
Storm Drain System Data Source: SAIC

Landau Associates

North Boeing Field
Seattle, Washington

Storm Drain System and LTST Sampling Locations

Figure 2



Note

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

General Notes

1. Pipe And Equipment Shall Have Freeze Protection Installed. Freeze Protection Includes Recirculation of Water Within The Pipes When Temperatures Get Below Freezing and Draining Spigots Installed at Key Locations.

Source: Boeing Treatment System Piping Layout Plan M502 Record Drawing Dated 12/08/11

North Boeing Field Seattle, Washington	**LTST Sampling Locations**	Figure 3

LANDAU ASSOCIATES

TABLE 1
REVISED LONG-TERM REMOVAL ACTION SAMPLING AND ANALYSIS SUMMARY
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Location	Sample Type	Sample Media	Frequency (a)	Parameters	Analytical Methods
Lift Station (LS431) (Compliance Monitoring Point)	Whole Water (flow-weighted composite)	Stormwater (b)	Monthly routine sampling through December 2013; Five additional 24-hour storm events of ≥0.5 inch precipitation, November 1, 2012 - October 31, 2013	PCBs	EPA Method 8082
				TSS	SM 2540D
				PSD	Ecology TAPE 2008 Appendix F/ASTM D3977, Method C (c)
				Total/Dissolved Metals (d,e)	EPA Methods 200.8; 7470 for Hg; 6010 for Fe, Mn
				SVOCs (d)	EPA Method 8270D
				PAHs (d)	EPA SIM Method 8270D
				Turbidity	EPA Method 180.1
				pH	EPA Method 150.1 / meter
Long-Term Stormwater Treatment System	Whole Water Influent from Lift Station Inlet Vault: Flow-weighted composite of treatment system bypass (preferred) or grab (if insufficient bypass occurs for flow-weighted sample collection).	Stormwater (b)	Monthly (f) through December 2013; Five additional 24-hour storm events (f) of ≥0.5 inch precipitation, November 1, 2012 - October 31, 2013	PCBs	EPA Method 8082
				TSS	SM 2540D
				PSD	Ecology TAPE 2008 Appendix F/ASTM D3977, Method C (c)
				Total/Dissolved Metals (d,e)	EPA Methods 200.8; 7470 for Hg; 6010 for Fe, Mn
				Turbidity	EPA Method 180.1
				pH	EPA Method 150.1
			Monthly (f) January - December 2013; Three 24-hour storm events (f) of ≥0.5 inch precipitation, January 1, 2013 - October 31, 2013	SVOCs (d)	EPA Method 8270D
				PAHs (d)	EPA SIM Method 8270D
	Whole Water Influent from MH130A (grab)		Monthly (f) through December 2013; Five additional 24-hour storm events (f) of ≥0.5 inch precipitation, November 1, 2012 - October 31, 2013	PCBs	EPA Method 8082
				TSS	SM 2540D
				PSD	Ecology TAPE 2008 Appendix F/ASTM D3977, Method C (c)
				Total/Dissolved Metals (e)	EPA Methods 200.8; 7470 for Hg; 6010 for Fe, Mn
				Turbidity	EPA Method 180.1
				pH	EPA Method 150.1
			Alternating months (f) February - December 2013; Alternating 24-hour storm events (f) of ≥0.5 inch precipitation, February 1, 2013 - October 31, 2013	SVOCs	EPA Method 8270D
				PAHs	EPA SIM Method 8270D
	Whole Water Effluent (grab)		Monthly (f) through December 2013; Five additional 24-hour storm events (f) of ≥0.5 inch precipitation, November 1, 2012 - October 31, 2013	PCBs	EPA Method 8082
				TSS	SM 2540D
				PSD	Ecology TAPE 2008 Appendix F/ASTM D3977, Method C (c)
				Total/Dissolved Metals (e)	EPA Methods 200.8; 7470 for Hg; 6010 for Fe, Mn
				pH	EPA Method 150.1
			Alternating months (f) February - December 2013; Alternating 24-hour storm events (f) of ≥0.5 inch precipitation, February 1, 2013 - October 31, 2013	SVOCs	EPA Method 8270D
				PAHs	EPA SIM Method 8270D
	Whole Water Effluent (grab) (g)		Twice monthly (h)	Residual Chitosan	Ecology approved procedure (i)
	Filtered Solids Influent from Lift Station Inlet Vault	Stormwater Solids	Monthly (f) through December 2013; Five additional 24-hr storm events (f) of ≥0.5 inch precipitation, November 1, 2012 - October 31, 2013	PCBs	EPA Method 8082
			Alternating months (f) January - December 2013; Alternating 24-hour storm events (f) of ≥0.5 inch precipitation, January 1, 2013 - October 31, 2013	Metals (e, j)	EPA Methods 6010; 7471 for Hg
				PAHs	EPA Method 8270D

TABLE 1
REVISED LONG-TERM REMOVAL ACTION SAMPLING AND ANALYSIS SUMMARY
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Location	Sample Type	Sample Media	Frequency (a)	Parameters	Analytical Methods
Long-Term Stormwater Treatment System (continued)	Filtered Solids Influent from MH130A	Stormwater Solids (continued)	Monthly (f) through December 2013; Five additional 24-hr storm events (f) of ≥0.5 inch precipitation, November 1, 2012 - October 31, 2013	PCBs	EPA Method 8082
			Alternating months (f) February - December 2013; Alternating 24-hour storm events (f) of ≥0.5 inch precipitation, February 1, 2013 - October 31, 2013	Metals (e, j)	EPA Methods 6010; 7471 for Hg
				PAHs	EPA Method 8270D
	Filtered Solids Effluent		Monthly (f) through December 2013; Five additional 24-hr storm events (f) of ≥0.5 inch precipitation, November 1, 2012 - October 31, 2013	PCBs	EPA Method 8082
			One monthly event (f); Two 24-hour storm events (f) of ≥0.5 inch precipitation, February 1, 2013 - October 31, 2013	PAHs	EPA Method 8270D
Sediment Traps [SL4-T1, SL4-T2, SL4-T3, SL4-T4, SL4-T4A, SL4-T5, SL4-T5A(2) (k)] (SL4-T5A moved from MH178 to King County bypass line wet well)	Annual Composite, Homogenized	Stormwater Solids	Annually (l)	PCBs	PSDDA Method 8082
				SVOCs	PSDDA SVOCS SW8270D
				Total Metals	Method 6000-7000
				NWTPH-Dx	NWTPH-Dx (with acid silica gel cleanup)
				Total Organic Carbon	EPA Method 9060
				Percent Total Solids	EPA 160.3 (modified for solids)
				PSD	PSEP-PS (m)
Weir and Storage Tanks, Sand Filter Media	Composite from 3 or More Grab Samples from Tank or Filter Vessel (grab locations to result in both horizontal and vertical compositing)	Settled Solids	As Needed (n)	PCBs	EPA Method 8082
				SVOCs	EPA Method 8270D
				Metals	TCLP and/or Method 6000-7000
				Petroleum Hydrocarbons	NWTPH-Dx and NWTPH-Gx

PCBs = polycholorinated biphenyls
TSS = total suspended solids
PSD = particle size distribution
TOC = total organic carbon
SIM = selected ion monitoring
PAHs = polycyclic aromatic hydrocarbons
SVOCs = semivolatile organic compounds
TCLP = toxicity characteristic leaching procedure
LTST = long-term stormwater treatment
STST = short-term stormwater treatment
CESF = chitosan-enhanced sand filtration
PSDDA = Puget Sound Dredged Disposal Analysis
PSEP = Puget Sound Estuary Protocols
O&M = operation and maintenance
TAPE = Technology Assessment Protocol
Ecology = Washington State Department of Ecology
EPA = U.S. Environmental Protection Agency
NBF = North Boeing Field
GTSP = Georgetown Steam Plant

(a) Monitoring plan beginning November 2012. All sampling and analysis will be performed by Boeing/Landau Associates and Boeing's contract laboratory, unless otherwise noted. Sampling frequency for all analyses is to be determined for sampling starting January 2014. Boeing will propose to EPA a sampling frequency and sampling parameters based on the results from the November 2012 - October 2013 sampling events.
(b) Stormwater is defined as all liquids, including any particles dissolved therein, in the form of base flow, storm water runoff, snow melt runoff, and drainage, as well as all solids which enter the storm drain system.
(c) Size ranges (in µm) for PSD analysis of water samples are <1, 1-3.9, 3.9-62.5, 62.5-125, 125-250, 250-500, and >500.
(d) If sufficient volume is available, LS431 whole water samples will be analyzed for total and dissolved metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc), SVOCs, and PAHs to support Ecology's NBF-GTSP remedial investigation activities.
(e) Metals list for water and filtered solids samples is arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, and zinc.
(f) LTST system influent/effluent sampling eventd will be performed concurrent with lift station (LS431) sampling events.
(g) Whole water effluent grab samples for Residual Chitosan testing will be collected from the treatment facility effluent sample port by Clear Water Compliance Services.
(h) Residual chitosan was never detected in twice monthly effluent samples from the LTST facility in the first year of monitoring, or in weekly effluent samples from the STST facility. There is extremely low probability of chitosan being able to pass through the sand filters.
(i) Per CESF system O&M Manual, Ecology approves procedures for residual chitosan testing for each chitosan distributor. Testing will be conducted in accordance with distributor's approved procedures.
(j) When sufficient volume is available, LTST filtered solids samples will be analyzed for metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) to support Ecology's NBF-GTSP remedial investigation activities.
(k) Location SL4-T5A(2) does not have a bracket and Teflon container like other sediment trap locations; SL4-T5A(2) shall be sampled by collecting solids from the bottom of the wet well, which collects solids behind a permanent weir.
(l) Depending on the quantity of solids collected in the sediment traps, the laboratory may not be able to analyze all parameters. Laboratory will weigh and report total mass of solids collected per sample location. Analysis of parameters will be prioritized in the order listed. Sediment trap sampling will continue indefinitely until such time that additional data collection is no longer needed to support source control efforts.
(m) Particle size distribution for sediment trap solids samples will be conducted using Puget Sound Estuary Protocols (PSEP) method. When low volumes of sample are collected, particle size distribution will be accomplished using sedigraph for material less than 62.5 µm.
(n) The thickness of accumulated solids (sludge) in the weir tanks will be checked at least once per month to determine if solids should be removed. Prior to solids removal, a composite sample of the solids will be collected and analyzed for waste characterization purposes. Composite sampling may also be done for used sand filter media prior to disposal. Waste characterization may not be necessary if appropriate prior waste characterization data is available, but would be necessary if contaminant concentrations in the LTST influent change significantly. Sampling and analysis for waste characterization will occur if requested by the disposal facility.

TABLE 2
REVISED ANALYTICAL METHODS AND TARGET REPORTING LIMITS
LONG-TERM STORMWATER TREATMENT SAMPLING
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Analyte	Analytical Method (a)	Target Reporting Limits (b)			
		Water	Filtered Solids	Unfiltered Solids	
				Sediment Traps	Residual Solids
		ARI RL (c)	ARI RL (c)	ARI RL (c)	ARI RL (c)
PCBs					
Aroclor 1016	EPA Method 8082 (d)	0.01 µg/L	0.5 µg	10 µg/kg	33 µg/kg
Aroclor 1221	EPA Method 8082 (d)	0.01 µg/L	0.5 µg	10 µg/kg	33 µg/kg
Aroclor 1232	EPA Method 8082 (d)	0.01 µg/L	0.5 µg	10 µg/kg	33 µg/kg
Aroclor 1242	EPA Method 8082 (d)	0.01 µg/L	0.5 µg	10 µg/kg	33 µg/kg
Aroclor 1248	EPA Method 8082 (d)	0.01 µg/L	0.5 µg	10 µg/kg	33 µg/kg
Aroclor 1254	EPA Method 8082 (d)	0.01 µg/L	0.5 µg	10 µg/kg	33 µg/kg
Aroclor 1260	EPA Method 8082 (d)	0.01 µg/L	0.5 µg	10 µg/kg	33 µg/kg
Aroclor 1262	EPA Method 8082 (d)	0.01 µg/L	0.5 µg	--	--
CONVENTIONALS					
Dissolved Organic Carbon	SM 5310B / SM 5310C	0.6 mg/L	--	--	--
pH	EPA Method 150.1	0.01 SU	--	--	--
Total Organic Carbon	EPA Method 9060	--	--	0.02 percent	--
Total Suspended Solids	SM 2540	1 mg/L	--	--	--
Turbidity	EPA Method 180.1	0.05 NTU	--	--	--
PARTICLE SIZE DISTRIBUTION					
Particle Size Distribution	PSEP-PS/Ecology TAPE 2008 Appendix F/ASTM D3977, Method C	--	--	--	--
TOTAL PETROLEUM HYDROCARBONS					
Diesel-Range	NWTPH-Dx (e,f)	--	--	5.0 mg/kg	5.0 mg/kg
Gasoline-Range	NWTPH-Gx (e)	--	--	--	5.0 mg/kg
Motor Oil-Range	NWTPH-Dx (e,f)	--	--	10.0 mg/kg	10.0 mg/kg
METALS					
Arsenic	EPA Method 200.8/6010	0.5 µg/L	5.0 mg/kg	5.0 mg/kg	5.0 mg/kg
Barium	EPA Method 200.8/6010	--	--	--	0.3 mg/kg
Cadmium	EPA Method 200.8/6010	0.1 µg/L	0.2 mg/kg	--	0.2 mg/kg
Chromium	EPA Method 200.8/6010	0.5 µg/L	0.5 mg/kg	--	0.5 mg/kg
Copper	EPA Method 200.8/6010	0.5 µg/L	0.2 mg/kg	0.2 mg/kg	--
Iron	EPA Method 6010	50 µg/L	5.0 mg/kg	--	--
Lead	EPA Method 200.8/6010	0.1 µg/L	2.0 mg/kg	2.0 mg/kg	2.0 mg/kg
Manganese	EPA Method 6010	1 µg/L	0.1 mg/kg	--	--
Mercury (total)	EPA Method 7470/7471	0.1 µg/L	0.025 mg/kg	0.025 mg/kg	0.025 mg/kg
Mercury (dissovled)	EPA Method 7470/7471	0.02 µg/L	--	--	--
Nickel	EPA Method 200.8/6010	0.5 µg/L	1.0 mg/kg	--	--
Selenium	EPA Method 200.8/6010	--	--	--	5.0 mg/kg
Silver	EPA Method 200.8/6010	--	--	--	0.3 mg/kg
Zinc	EPA Method 200.8/6010	4.0 µg/L	1.0 mg/kg	1.0 mg/kg	--
TCLP METALS					
Arsenic	EPA Method 1311/6010	--	--	--	0.2 mg/L
Barium	EPA Method 1311/6010	--	--	--	0.2 mg/L
Cadmium	EPA Method 1311/6010	--	--	--	0.01 mg/L
Chromium	EPA Method 1311/6010	--	--	--	0.02 mg/L
Lead	EPA Method 1311/6010	--	--	--	0.1 mg/L
Mercury	EPA Method 1311/7471	--	--	--	0.0002 mg/L
Selenium	EPA Method 1311/6010	--	--	--	0.2 mg/L
Silver	EPA Method 1311/6010	--	--	--	0.02 mg/L
SEMIVOLATILES					
Phenol	SW 8270D (g)	1.0 µg/L	--	20 µg/kg	67 µg/kg
Bis-(2-Chloroethyl) Ether	SW 8270D	--	--	--	67 µg/kg
2-Chlorophenol	SW 8270D	--	--	--	67 µg/kg
1,3-Dichlorobenzene	SW 8270D (g)	--	--	20 µg/kg	67 µg/kg
1,4-Dichlorobenzene	SW 8270D (g)	1.0 µg/L	--	20 µg/kg	67 µg/kg
Benzyl Alcohol	SW 8270D (g)	5.0 µg/L	--	20 µg/kg	330 µg/kg
1,2-Dichlorobenzene	SW 8270D (g)	1.0 µg/L	--	20 µg/kg	67 µg/kg
2-Methylphenol	SW 8270D (g)	1.0 µg/L	--	20 µg/kg	67 µg/kg
2,2'-Oxybis(1-Chloropropane)	SW 8270D	--	--	--	67 µg/kg
4-Methylphenol	SW 8270D (g)	1.0 µg/L	--	20 µg/kg	67 µg/kg
N-Nitroso-Di-N-Propylamine	SW 8270D	--	--	--	67 µg/kg
Hexachloroethane	SW 8270D (g)	--	--	20 µg/kg	67 µg/kg
Nitrobenzene	SW 8270D	--	--	--	67 µg/kg
Isophorone	SW 8270D	--	--	--	67 µg/kg
2-Nitrophenol	SW 8270D	--	--	--	67 µg/kg
2,4-Dimethylphenol	SW 8270D (g)	1.0 µg/L	--	20 µg/kg	67 µg/kg
Benzoic Acid	SW 8270D (g)	10.0 µg/L	--	100 µg/kg	670 µg/kg
bis(2-Chloroethoxy) Methane	SW 8270D	--	--	--	67 µg/kg
2,4-Dichlorophenol	SW 8270D	--	--	--	330 µg/kg

TABLE 2
REVISED ANALYTICAL METHODS AND TARGET REPORTING LIMITS
LONG-TERM STORMWATER TREATMENT SAMPLING
NORTH BOEING FIELD - SEATTLE, WASHINGTON

		Target Reporting Limits (b)			
		Water	Filtered Solids	Unfiltered Solids	
	Analytical			Sediment Traps	Residual Solids
Analyte	Method (a)	ARI RL (c)	ARI RL (c)	ARI RL (c)	ARI RL (c)
SEMIVOLATILES (continued)			--		
1,2,4-Trichlorobenzene	SW 8270D (g)	1.0 µg/L	--	100 µg/kg	67 µg/kg
Naphthalene	SW 8270D (g,h)	0.01 µg/L	1.5 µg	20 µg/kg	67 µg/kg
4-Chloroaniline	SW 8270D	--	--	--	330 µg/kg
Hexachlorobutadiene	SW 8270D (g)	1.0 µg/L	--	20 µg/kg	67 µg/kg
4-Chloro-3-methylphenol	SW 8270D	--	--	--	330 µg/kg
1-Methylnaphthalene	SW 8270D (g)	--	1.5 µg	20 µg/kg	67 µg/kg
2-Methylnaphthalene	SW 8270D (g,h)	0.01 µg/L	1.5 µg	100 µg/kg	67 µg/kg
Hexachlorocyclopentadiene	SW 8270D	--	--	--	330 µg/kg
2,4,6-Trichlorophenol	SW 8270D	--	--	--	330 µg/kg
2,4,5-Trichlorophenol	SW 8270D	--	--	--	330 µg/kg
2-Chloronaphthalene	SW 8270D	--	--	--	67 µg/kg
2-Nitroaniline	SW 8270D	--	--	--	330 µg/kg
Dimethylphthalate	SW 8270D (g)	1.0 µg/L	--	100 µg/kg	67 µg/kg
Acenaphthylene	SW 8270D (g,h)	0.01 µg/L	1.5 µg	20 µg/kg	67 µg/kg
3-Nitroaniline	SW 8270D	--	--	--	330 µg/kg
Acenaphthene	SW 8270D (g,h)	0.01 µg/L	1.5 µg	100 µg/kg	67 µg/kg
2,4-Dinitrophenol	SW 8270D	--	--	--	670 µg/kg
4-Nitrophenol	SW 8270D	--	--	--	330 µg/kg
Dibenzofuran	SW 8270D (g,h)	0.01 µg/L	1.5 µg	100 µg/kg	67 µg/kg
2,6-Dinitrotoluene	SW 8270D	--	--	--	330 µg/kg
2,4-Dinitrotoluene	SW 8270D	--	--	--	330 µg/kg
Diethylphthalate	SW 8270D (g)	1.0 µg/L	--	100 µg/kg	67 µg/kg
4-Chlorophenyl-phenylether	SW 8270D	--	--	--	67 µg/kg
Fluorene	SW 8270D (g,h)	0.01 µg/L	1.5 µg	20 µg/kg	67 µg/kg
4-Nitroaniline	SW 8270D	--	--	--	330 µg/kg
4,6-Dinitro-2-Methylphenol	SW 8270D	--	--	--	670 µg/kg
N-Nitrosodiphenylamine	SW 8270D (g)	1.0 µg/L	--	20 µg/kg	67 µg/kg
4-Bromophenyl-phenylether	SW 8270D	--	--	--	67 µg/kg
Hexachlorobenzene	SW 8270D (g)	1.0 µg/L	--	20 µg/kg	67 µg/kg
Pentachlorophenol	SW 8270D (g)	5.0 µg/L	--	20 µg/kg	330 µg/kg
Phenanthrene	SW 8270D (g,h)	0.01 µg/L	1.5 µg	20 µg/kg	67 µg/kg
Carbazole	SW 8270D	--	--	--	67 µg/kg
Anthracene	SW 8270D (g,h)	0.01 µg/L	1.5 µg	20 µg/kg	67 µg/kg
Di-n-Butylphthalate	SW 8270D (g)	1.0 µg/L	--	20 µg/kg	67 µg/kg
Fluoranthene	SW 8270D (g,h)	0.01 µg/L	1.5 µg	20 µg/kg	67 µg/kg
Pyrene	SW 8270D (g,h)	0.01 µg/L	1.5 µg	100 µg/kg	67 µg/kg
Butylbenzylphthalate	SW 8270D (g)	1.0 µg/L	--	20 µg/kg	67 µg/kg
3,3'-Dichlorobenzidine	SW 8270D	--	--	--	330 µg/kg
Benzo(a)anthracene	SW 8270D (g,h)	0.01 µg/L	1.5 µg	20 µg/kg	67 µg/kg
bis(2-Ethylhexyl)phthalate	SW 8270D (g)	1.0 µg/L	--	20 µg/kg	67 µg/kg
Chrysene	SW 8270D (g,h)	0.01 µg/L	1.5 µg	20 µg/kg	67 µg/kg
Total benzofluoranthenes	SW 8270D (g,h)	0.02 µg/L	1.5 µg	20 µg/kg	67 µg/kg
Benzo(b)fluoranthene	SW 8270D (g,h)	--	1.5 µg	--	--
Benzo(k)fluoranthene	SW 8270D (g,h)	--	1.5 µg	--	--
Di-n-Octyl phthalate	SW 8270D (g)	1.0 µg/L	--	20 µg/kg	67 µg/kg
Benzo(a)pyrene	SW 8270D (g,h)	0.01 µg/L	1.5 µg	20 µg/kg	67 µg/kg
Indeno(1,2,3-cd)pyrene	SW 8270D (g,h)	0.01 µg/L	1.5 µg	20 µg/kg	67 µg/kg
Dibenz(a,h)anthracene	SW 8270D (g,h)	0.01 µg/L	1.5 µg	20 µg/kg	67 µg/kg
Benzo(g,h,i)perylene	SW 8270D (g,h)	0.01 µg/L	1.5 µg	20 µg/kg	67 µg/kg

ARI = Analytical Resources, Inc.
LOD = Limit of Detection
NTU = Nephelometric Turbidity Units
RL = Reporting Limit
SM = Standard Method
SU = Standard Units

(a) Analytical methods are from SW-846 (EPA 1986) and updates unless otherwise noted.
(b) Reporting limits goals are based on current laboratory data. Instances may arise where high sample concentrations, nonhomogeneity of samples, total solids (percent of sample that is solids), or matrix interferences, preclude achieving the desired reporting limits.
(c) ARI reporting will be based on the lowest standard on the calibration curve. ARI will report whole water PCB concentrations down to the Limit of Detection (LOD) of 0.005 µg/L (½ the target RL), and any data below the target RL of 0.010 µg/L will be J-flagged.
(d) Sediment trap solids will be analyzed by PSDDA Method 8082.
(e) Methods NWTPH-Dx and NWTPH-Gx as described in *Analytical Methods for Petroleum Hydrocarbons,* Washington State Department of Ecology, Publication ECY97-602, June 1997 (Ecology 1997)
(f) For NWTPH-Dx analyses, an acid silica gel cleanup will be performed for sediment trap solids, but not for residual solids.
(g) Sediment trap samples will be analyzed by PSDDA Method 8270D.
(h) Water samples will be analyzed by SW 8270D Selective Ion Monitoring (SIM).

TABLE 3
REVISED SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIME REQUIREMENTS
LONG-TERM STORMWATER TREATMENT SAMPLING
NORTH BOEING FIELD - SEATTLE, WASHINGTON

	Analytical	LS431 and LTST LSIV Whole Water Composite Samples				LTST Facility Whole Water MH130A/LSIV/Effluent Grab Samples				LTST Facility Influent/Effluent Filtered Solids			
Analyte	Method	Volume Required	Container	Preservation	Holding Time	Volume Required	Container	Preservation	Holding Time	Volume Required	Container	Preservation	Holding Time
PCBs	EPA 8082/ PSDAA 8082	2L	5-gallon glass carboy	Store cool at 6^{o}C	7 days to extraction, 40 days to analysis	2L	Two 1L Amber Glass	Store cool at 6^{o}C	7 days to extraction, 40 days to analysis	N/A (2)	Filter Bag	Store cool at 6^{o}C	14 days to extraction, 40 days to analysis
TSS	SM 2540 D-97	1L		Store cool at 6^{o}C	7 days	1L	1L HDPE	Store cool at 6^{o}C	7 Days	--	--	--	--
Total and Dissolved Metals	EPA 200.8	1L		Store cool at 6°C, Nitric Acid in lab	6 months (28 days for Hg) after filtering for dissolved metals and preservation in lab	1L	Two 500 mL Polyethylene	Store cool at 6^{o}C, Nitric Acid in field (Total) and lab (Dissolved)	6 months (28 days for Hg) after collection (total) or after filtering for dissolved metals and preservation in lab (dissolved)	--	--	--	--
Total and Dissolved Mercury	EPA 7470									--	--	--	--
Total and Dissolved Iron and Manganese	EPA 6010									--	--	--	--
Particle Size Distribution	Ecology TAPE 2008 Appendix F / ASTM D3977, Method C	1L		Store cool at 6^{o}C	7 days	1L	1L Polyethylene	Store cool at 6^{o}C	7 days	--	--	--	--
	PSEP-PS	--	--	--	--	--	--	--	--	--	--	--	--
SVOCs	EPA 8270D / PSDDA SW8270D	1L	5-gallon glass carboy	Store cool at 6^{o}C	7 days to extraction, 40 days to analysis	1L	Two 500 mL Amber Glass	Store cool at 6^{o}C	7 days	--	--	--	--
PAHs	EPA 8270D SIM / EPA 8270D	1L		Store cool at 6^{o}C	7 days to extraction, 40 days to analysis	1L	Two 500 mL Amber Glass	Store cool at 6^{o}C	7 days	N/A (2)	Filter Bag	Store cool at 6^{o}C	14 days
Turbidity	EPA 180.1	500 mL		Store cool at 6^{o}C	48 hours	500 mL	500mL HDPE	Store cool at 6^{o}C	48 hours	--	--	--	--
pH	EPA 150.1 / meter			Store cool at 6^{o}C	Analyze immediately upon receipt in the laboratory			Store cool at 6^{o}C	Analyze immediately upon receipt in the laboratory	--	--	--	--
Diesel-range and motor-oil range petroleum hydrocarbons	NWTPH-Dx	--	--	--	--	--	--	--	--	--	--	--	--
Gasoline-Range Petroleum Hydrocarbons	NWTPH-Gx	--	--	--	--	--	--	--	--	--	--	--	--
Metals	EPA 6010	--	--	--	--	--	--	--	--	4 oz.	Filter Bag	Store cool at 6^{o}C	6 months
Mercury	EPA 7471	--	--	--	--	--	--	--	--		Filter Bag	Store cool at 6^{o}C	28 days
Total Organic Carbon	EPA Method 9060	--	--	--	--	--	--	--	--	--	--	--	--
TCLP Metals	EPA 6010/7470	--	--	--	--	--	--	--	--	--	--	--	--

PCBs = polychlorinated biphenyls
TSS = total suspended solids
SVOCs = semivolatile organic compounds
PAHs = polycyclic aromatic hydrocarbons
Hg = mercury
LTST - Long-Term Stormwater Treatment

AG = amber glass boston round bottle
HDPE = High Density Polypropylene
WMG = wide mouth glass jar
WMGS = wide mouth glass jar with septa lid
oz. = ounce
C = Centrigrade

PSDDA = Puget Sound Dredged Disposal Analysis
PSEP = Puget Sound Estuary Protocols
Ecology = Washington State Department of Ecoolgy
EPA = U.S. Environmental Protection Agency
TCLP = Toxicity Characteristic Leachate Procedure
N/A = not applicable

Notes:

1. No headspace.
2. The entire filter bag (filter material and collected material) is analyzed, regardless of the volume of solids collected in the bag.
3. Amount of settled solids collected in Teflon bottle is not anticipated to meet required sample volumes. Laboratory will pre-screen samples and cut back on volumes required based on pre-screens. Analysis is prioritized due to limited volume.

TABLE 3
REVISED SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIME REQUIREMENTS
LONG-TERM STORMWATER TREATMENT SAMPLING
NORTH BOEING FIELD - SEATTLE, WASHINGTON

Analyte	Analytical Method	Sediment Traps				Weir Tank, Backflush Tank, and Sand Filtration Units Residual Solids			
		Volume Required	Container	Preservation	Holding Time	Volume Required	Container	Preservation	Holding Time
PCBs	EPA 8082/ PSDAA 8082	8 oz. (3)	Teflon Bottle or WMG	Store cool at 6^{o}C	14 days to extraction, 40 days to analysis	8 oz.	8 oz. WMG	Store cool at 6^{o}C	14 days to extraction, 40 days to analysis
TSS	SM 2540 D-97	--	--	--	--	--	--	--	--
Total and Dissolved Metals	EPA 200.8	--	--	--	--	--	--	--	--
Total and Dissolved Mercury	EPA 7470	--	--	--	--	--	--	--	--
Total and Dissolved Iron and Manganese	EPA 6010	--	--	--	--	--	--	--	--
Particle Size Distribution	Ecology TAPE 2008 Appendix F / ASTM D3977, Method C	--	--	--	--	--	--	--	--
	PSEP-PS	8 oz. (3)	Teflon Bottle or WMG	Store cool at 6^{o}C	7 days	--	--	--	--
SVOCs	EPA 8270D / PSDDA SW8270D	8 oz. (3)	Teflon Bottle or WMG	Store cool at 6^{o}C	14 days	8 oz.	8 oz. WMG	Store cool at 6^{o}C	14 days
PAHs	EPA 8270D SIM / EPA 8270D	--	--	--	--	--	--	--	--
Turbidity	EPA 180.1	--	--	--	--	--	--	--	--
pH	EPA 150.1 / meter	--	--	--	--	--	--	--	--
Diesel-range and motor-oil range petroleum hydrocarbons	NWTPH-Dx	8 oz. (3)	Teflon Bottle or WMG	Store cool at 6^{o}C	14 days to extraction, 40 days to analysis	8 oz.	8 oz. WMG	Store cool at 6^{o}C	14 days to extraction, 40 days to analysis
Gasoline-Range Petroleum Hydrocarbons	NWTPH-Gx	--	--	--	--	2 oz.	2 oz. WMGS (1)	Store cool at 6^{o}C	14 days to extraction, 40 days to analysis
Metals	EPA 6010	4 oz. (3)	Teflon Bottle or WMG	Store cool at 6^{o}C	6 months	--	--	--	--
Mercury	EPA 7471		Teflon Bottle or WMG	Store cool at 6^{o}C	28 days	--	--	--	--
Total Organic Carbon	EPA Method 9060	4 oz. (3)	Teflon Bottle or WMG	Store cool at 4^{o}C	14 days to extraction, 40 days to analysis	--	--	--	--
TCLP Metals	EPA 6010/7470	--	--	--	--	8 oz	8 oz. WMG	Store cool at 6^{o}C	28/180 days to TCLP extraction, 28/180 days to analysis (Hg/all other metals)

PCBs = polychlorinated biphenyls
TSS = total suspended solids
SVOCs = semivolatile organic compounds
PAHs = polycyclic aromatic hydrocarbons
Hg = mercury
LTST - Long-Term Stormwater Treatment

AG = amber glass boston round bottle
HDPE = High Density Polypropylene
WMG = wide mouth glass jar
WMGS = wide mouth glass jar with septa lid
oz. = ounce
C = Centrigrade

PSDDA = Puget Sound Dredged Disposal Analysis
PSEP = Puget Sound Estuary Protocols
Ecology = Washington State Department of Ecoolgy
EPA = U.S. Environmental Protection Agency
TCLP = Toxicity Characteristic Leachate Procedure
N/A = not applicable

Notes:

1. No headspace.
2. The entire filter bag (filter material and collected material) is analyzed, regardless of the volume of solids collected in the bag.
3. Amount of settled solids collected in Teflon bottle is not anticipated to meet required sample volumes. Laboratory will pre-screen samples and cut back on volumes required based on pre-screens. Analysis is prioritized due to limited volume.

TABLE 4
2013 REPORT SUBMITTAL SCHEDULE
LONG-TERM STORMWATER TREATMENT
NORTH BOEING FIELD, SEATTLE, WASHINGTON

Report	Due Date (submittal to EPA)
January 2013 Monthly Progress Report	February 5, 2013
February 2013 Monthly Progress Report	March 5, 2013
1st Quarter 2013 Progress Report	April 5, 2013
April 2013 Monthly Progress Report	May 6, 2013
May 2013 Monthly Progress Report	June 5, 2013
2nd Quarter 2013 Progress Report	July 5, 2013
July 2013 Monthly Progress Report	August 5, 2013
August 2013 Monthly Progress Report	September 5, 2013
3rd Quarter 2013 Progress Report	October 7, 2013
October 2013 Monthly Progress Report	November 5, 2013
Annual LTST Performance Evaluation Report (draft)	December 5, 2013
November 2013 Monthly Progress Report	December 5, 2013
4th Quarter 2013 Progress Report	January 6, 2014
Annual LTST Performance Evaluation Report (final)	14 working days following receipt of written comments from EPA

ATTACHMENT 1

Quality Control Criteria for Analysis of Aqueous and Tissue Samples for Aroclors (Polychlorinated Biphenyls – PCB) EPA Method 8082B

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Quality Control Criteria for Analysis of Aqueous and Tissue Samples for Aroclors (Polychlorinated Biphenyls – PCB) EPA Method 8082B

Analysis Code	Extraction	DL[1]	LOD[1]	LOQ[1]	Analyte	Spike Recovery Control Limits (%) [2,3]			RPD[4]
						LCS	MB/LCS Surrogate	Sample Surrogate	
Aqueous Samples (Separatory Funnel Extraction – EPA Method 3510C)									
PCBWSI 01-3018F	500 to 5 mL	0.130 µg/L	0.5 µg/L	1 µg/L	Aroclor 1016	45 – 121	--	--	≤ 40
		0.147 µg/L	0.5 µg/L	1 µg/L	Aroclor 1260	54 – 129	--	--	
		--	--	--	TCMX	--	40 – 118	38 – 118	
		--	--	--	DCBP	--	41 – 111	29 – 118	
PCBWSM 02-3021F	500 to 1 mL	0.0175 µg/L	0.05 µg/L	0.1 µg/L	Aroclor 1016	36 – **100**	--	--	≤ 40
		0.0174 µg/L	0.05 µg/L	0.1 µg/L	Aroclor 1260	41 – 113	--	--	
		--	--	--	TCMX	--	29 – **100**	25 – **100**	
		--	--	--	DCBP	--	39 – 116	**10** – 128	
PCBWLS	1000 to 0.5 mL[5]	0.00248 µg/L	0.005 µg/L	0.01 µg/L	Aroclor 1016	44 – 117	--	--	≤ 40
		0.00276 µg/L	0.005 µg/L	0.01 µg/L	Aroclor 1260	46 – 131	--	--	
		--	--	--	TCMX	--	31 – **100**	21 – **100**	
		--	--	--	DCBP	--	32 – 108	19 – 111	
TCLP Extract (Separatory Funnel Extraction – EPA Method 3510C)									
PCBWST	100 to 10 mL	0.130 µg/L [8]	5 µg/L	10 µg/L	Aroclor 1016	30 – 160	--	--	≤ 40
		0.147 µg/L [8]	5 µg/L	10 µg/L	Aroclor 1260	30 – 160	--	--	
		--	--	--	TCMX	--	30 – 160	30 – 160	
		--	--	--	DCBP	--	30 – 160	30 – 160	
Tissue Samples (Tissuemizer / Blender Extraction – EPA Method 3550C Modified) – Concentrations in µg/kg as received (wet weight)									
PCBUZI 09-3029F	10 g to 5 mL	2.92 µg/kg [6]	25 µg/kg	50 µg/kg	Aroclor 1016	30 – 160			≤ 40
		3.91 µg/kg [6]	25 µg/kg	50 µg/kg	Aroclor 1260	30 – 160			
		--	--	--	TCMX		30 – 160	30 – 160	
		--	--	--	DCBP		30 – 160	30 – 160	
PCBUZM 10-3027F	25 g to 5 mL	2.37 µg/kg [7]	10 µg/kg	20 µg/kg	Aroclor 1016	30 – 160			≤ 40
		1.06 µg/kg [7]	10 µg/kg	20 µg/kg	Aroclor 1260	30 – 160			
		--	--	--	TCMX		30 – 160	30 – 160	
		--	--	--	DCBP		30 – 160	30 – 160	
PCBUZL 11-3030F	25 g to 1 mL	2.37 [7] µg/kg	2 µg/kg	4 µg/kg	Aroclor 1016	30 – 160			≤ 40
		1.06 [7] µg/kg	2 µg/kg	4 µg/kg	Aroclor 1260	30 – 160			
		--	--	--	TCMX		30 – 160	30 – 160	
		--	--	--	DCBP		30 – 160	30 – 160	

(1) Detection Limit (DL), Limit of Detection (LOD) & Limit of Quantitation (LOQ) are defined in ARI SOP 1018S.
(2) Highlighted control limits (**bold font**) are adjusted from the calculated values to reflect that ARI does not use control limits < 10 for the lower limit or < 100 for the upper limit.
(3) 30 – 160 are default limits used when there is insufficient data to calculate historic control limits
(4) Acceptance criteria for the relative percent difference (RPD) between analytes in replicate analyzes. If C_O and C_D are the concentrations of the original and duplicate respectively then

$$RPD = \frac{|C_O - C_D|}{\frac{C_O + C_D}{2}} x100$$

(5) Low level extraction solvent is hexane instead of Methylene Chloride.
(6) LOD Study SM10
(7) MDL Study QZ25
(8) Based on PCBWSI until sufficient TCLP data is collected to calculate LOD.