Annual Industrial Stormwater Monitoring Report

Seattle-Tacoma International Airport

For the Period July 1, 2015 through June 30, 2016

September 30, 2016

Prepared by

Aviation Environmental Programs

Port of Seattle

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EXECUTIVE SUMMARY

This Annual Industrial Stormwater Monitoring Report provides a summary of industrial monitoring results conducted pursuant to Part 2, Condition 2S1 of the National Pollutant Discharge Elimination System (NPDES) permit for the Port of Seattle's Seattle-Tacoma International Airport (STIA) NPDES Permit WA002465. Industrial stormwater discharges authorized under Part 2 of the permit include runoff associated with roads, runways, taxiways, airfield, rooftops, cargo operations, flight kitchens, and other areas associated with airport industrial activities, and excludes construction runoff and industrial wastewater discharges associated with ramp operations .

This report summarizes the results of stormwater sampling at outfalls listed in permit Condition 2S1 between July 1, 2015 and June 30, 2016 and satisfies the annual reporting requirement detailed in Part 2 Condition S2.G. Monitoring of construction activities, sanitary sewer discharges and the Industrial Wastewater System (IWS) are subject to other reporting requirements. Annual summaries of Part I IWS, Part I sanitary sewer monitoring results and Part 3 construction monitoring results are provided separately.

The STIA met all required sampling and reporting requirements in the NPDES permit for the 2015-2016 data collection period. A total of 53 grab and 51 composite stormwater samples from 12 storm events were collected in the past year with results reported on quarterly Discharge Monitoring Reports (DMRs).

There were four instances of permit limit exceedances associated with 261 individual constituent analyses. In addition to routine NPDES monitoring required by Condition 2S1, the STIA continued monitoring activities pursuant to other NPDES Part 2 permit conditions. These activities include sublethal and *in situ* toxicity sampling (Condition 2S8 and 2S9).

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1.0 INTRODUCTION

This Annual Report summarizes industrial stormwater monitoring results from the Seattle-Tacoma International Airport (STIA) as required by Part 2, Condition 2S1.G. of the Airport's NPDES permit. The Permit authorizes discharges from airport industrial activities. Airport industrial activity areas include roads, runways, taxiways, airfield, rooftops, cargo operations, flight kitchens, and other areas associated with airport industrial activities. The purpose of this Annual Report is to present the monitoring results from discharges to the Airport's stormwater drainage system (SDS) outfalls identified in Part 2 of the NPDES permit. This Annual Report does not address discharges to the Airport's Industrial Wastewater System (IWS) or construction-related stormwater discharges.

The report covers samples collected in the 12-month period of July 2015 through June 2016. Outfall sampling results summarized in this report include data previously submitted to Ecology in the NPDES permit Part 2 Discharge Monitoring Reports (DMRs), plus additional stormwater sample data such as that from quality assurance sampling and samples that were analyzed for additional parameters not required by the Permit. These additional monitoring data are presented in Appendix B of this report. Toxicity monitoring required by Part 2 of the NPDES permit also is summarized in this report.

This report is organized into four sections following the introduction. Section 2 describes background conditions at the Airport including descriptions of each drainage subbasin and outfall sampling location. Section 3 presents all of the discharge monitoring report (DMR) related grab sample and composite sample analytical data collected during the reporting period and the rainfall totals for the period. Section 4 provides a summary of the effluent limit compliance and BMP implementation during the monitoring period. A summary and conclusion are provided in Section 5.

2.0 BACKGROUND

2.1 Seattle-Tacoma International Airport Drainage

Located mid-way between the cities of Seattle and Tacoma, Washington, STIA was built in the 1940s and is owned and operated by the Port. According to the STIA's 2015 Airport Activity Report, STIA handled 381,408 aircraft operations, 322,636 metric tons of air cargo, and 42.3 million passengers. In 2014, the Airports Council International ranked STIA the thirteenth busiest United States passenger airport and the Federal Aviation Administration ranked STIA the twenty-second busiest airport in the U.S. for aircraft operations.

Stormwater drainage at STIA is separated into two different collection systems, the Industrial Wastewater System (IWS) and the Storm Drainage System (SDS). The IWS receives stormwater runoff from the ramp and other areas involved with aircraft servicing and maintenance, providing treatment before discharge to Puget Sound through a separate outfall. A total of 375 acres are diverted to the IWS.

The SDS drains over 1,200 acres. Half of this area is impervious and primarily associated with airport runways, taxiways, parking lots, roads and roof tops. The remainder is pervious which consists of landscaped or fallow open spaces and areas assocated with stormwater treatment best management practices (BMPs) such as runway filterstrips. About 25 percent of the area drained by the SDS flows to Miller Creek. This drainage area represents about 7 percent of Miller Creek's watershed. Approximately 71 percent of the total SDS area drains to the Northwest Ponds and Des Moines Creek, which represents about 21 percent of the creek's watershed.

2.2 STIA Storm Drainage Subbasins, Activities, and Outfall Descriptions

The Airport's SDS is segregated into separate stormwater subbasins that each drain to individual outfall locations. The NPDES permit lists a total of 13 outfalls in two categories: Existing & New Outfalls and Subbasins, and Future Outfalls to be activated as Part of the CDP Near-Term Project Development. As of June 30, 2015, 11 of the 13 outfalls are active and discharge stormwater related to industrial activity.

STIA stormwater subbasins are categorized according to their dominant activities: landside or airfield. These categories group subbasins together by similar land use and other characteristics. In general, passenger vehicle operations are absent from the airfield drainage subbasins while aircraft operations are absent from the landside subbasins. SDE4/S1 subbasin is an exception in that it includes both airfield and landside activities. Previous reports found that concentrations of TPH, TSS and other constituent concentrations were different for the landside and airfield categories (POS 1996a, 1997a.) Table 1, *STIA Subbasin Characteristics*, describes

each active subbasin, receiving water, activities within each subbasin, stormwater management BMPs, and total pervious and impervious surface areas. The physical location of the outfalls listed in Table 1 are shown on Figure 1 along with additional receiving water monitoring locations used for sublethal toxicity and *in situ* toxicity testing.

Table 1. STIA Subbasins Characteristics

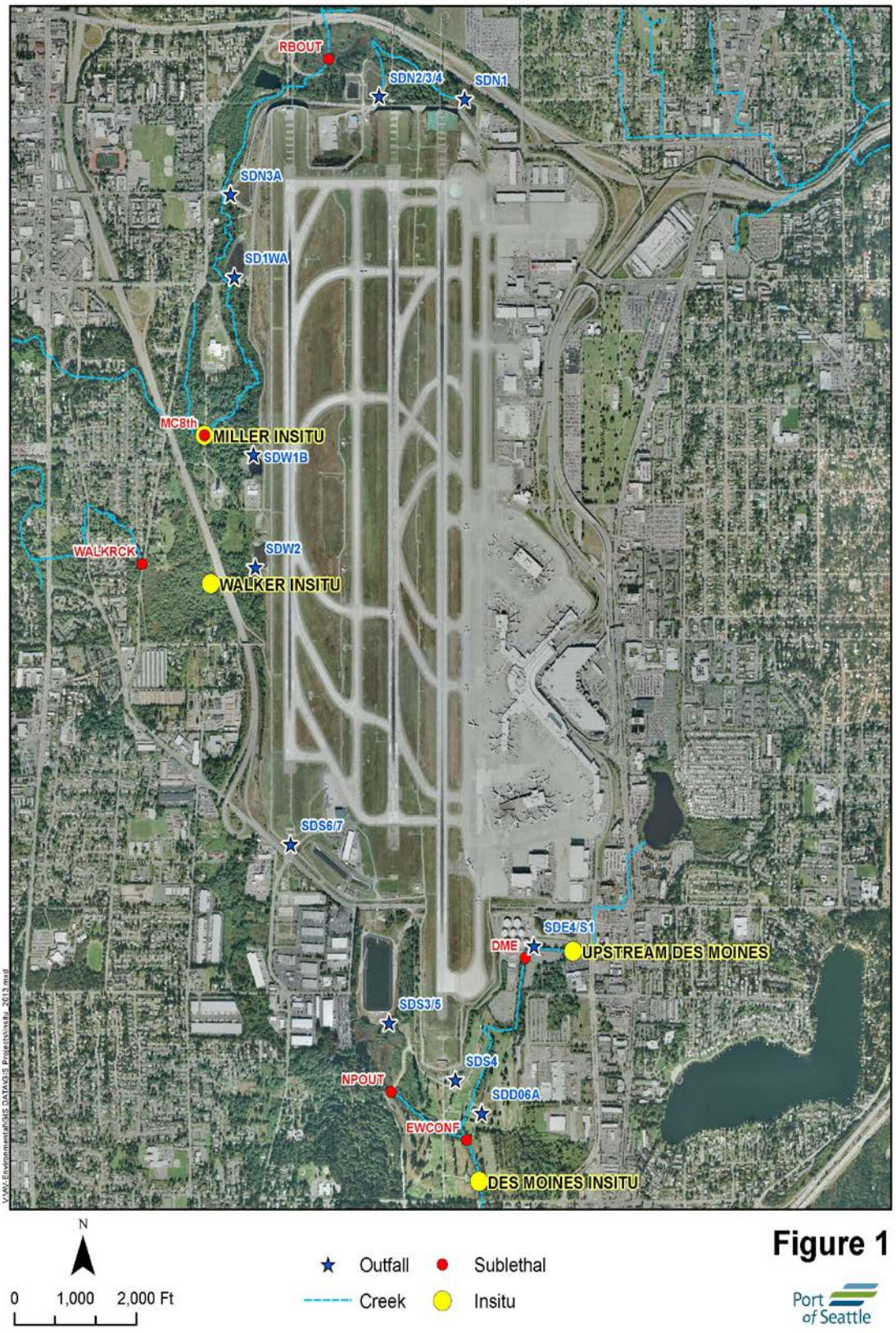
Outfall Name	Receiving Water	General Category	Industrial Activity	Non-Industrial Activity	Pervious Area[b] (acres)	Impervious Area[b] (acres)	Total Area[b, c] (acres)
SDE4/S1	Des Moines Creek (East Branch)	Landside	Limited portions of the airfield taxiways.	Public roads, vehicle parking areas, rooftops (terminal, hangar, cargo) and landscaped areas.	41.71	130.47	172.18
SDD-06A	Des Moines Creek (East Branch)	Landside	Loading docks, vehicle maintenance, vehicle washing, equipment parking and maintenance.	Public roads, vehicle parking areas, rooftops (terminal, hangar, cargo) and landscaped areas.	17.08	28.35	45.4
SDN1	Miller Creek via Lake Reba	Landside	Flight service kitchen.	Public roads, building rooftops and vehicle parking.	3.8	16.0	19.8
SDS3/5	NW Ponds and Des Moines Creek West	Airfield	Ground surface deicing/anti-icing, aircraft taxi, takeoff and landings.	Perimeter road, open areas and building rooftops.	212.44	244.98	457.42
SDS4	NW Ponds and Des Moines Creek West	Airfield	Ground surface deicing/anti-icing, aircraft taxi, takeoff and landings.	Runway infield and open areas.	41.6	24.8	66.4
SDS6/7	NW Ponds and Des Moines Creek West	Airfield	Ground surface deicing/anti-icing, aircraft taxi, takeoff and landings.	Access roads, runway infield and open areas.	63.94	45.94	109.88

Table 1. STIA Subbasins Characteristics

Outfall Name	Receiving Water	General Category	Industrial Activity	Non-Industrial Activity	Pervious Area[b] (acres)	Impervious Area[b] (acres)	Total Area[b, c] (acres)
SDN2/3/4[a]	Miller Creek via Lake Reba	Airfield	Ground surface deicing/anti-icing, aircraft taxi, takeoff and landings.	Perimeter road, access road, taxiway infield and open areas.	71.83	41.04	112.87
SDN3A	Miller Creek	Airfield	Ground surface deicing/anti-icing, aircraft taxi, takeoff and landings.	Perimeter road, runway infield and open areas.	22.9	8.62	31.5
SDW1A	Miller Creek	Airfield	Ground surface deicing/anti-icing, aircraft taxi, takeoff and landings.	Perimeter road, runway infield and open areas.	44.35	25.78	70.1
SDW1B	Miller Creek	Airfield	Ground surface deicing/anti-icing, aircraft taxi, takeoff and landings.	Perimeter road, runway infield and open areas.	59.7	25.0	84.7
SDW2	Walker Creek	Airfield	Ground surface deicing/anti-icing, aircraft taxi, takeoff and landings.	Perimeter road, runway infield and open areas.	27.04	10.5	37.51
Note:				**Total Area**	**606.39**	**601.48**	**1207.76**

a) The SDN2 runoff is pumped to IWS for all flows up to the 6 month /24-hour event. The SDN2 subbasin comprises approximately 46.5 acres, 36.6 of which are impervious. This area is included in acreages reported to the IWS.
b) Subbasin areas as described in the NPDES permit and updated annually in the STIAs Stormwater Pollution Prevention Plan.
c) Stormwater pond areas were not included in total acres. It is anticipated that ongoing changes resulting from planned construction will alter subbasin totals in the future.

Figure 1. Sampling Locations



3.0 SAMPLING RESULTS AND DISCUSSION

This section of the Annual Report summarizes the results of SDS outfall monitoring. All data summarized in this section has been reported to Ecology on quarterly DMRs and is included in Appendix A. Data generated from grab and composite samples are presented and discussed. These types of samples employ different protocols that represent different temporal periods of the particular stormwater discharge event and are therefore evaluated separately. Grab samples represent an instantaneous or short duration sampling period, while composites are collected over the storm event hydrograph to provide an event mean concentration (EMC).

In addition to the DMR data, this report summarizes other data collected at the outfalls listed in Part 2, 2S1 of the NPDES permit. These other data consist of field equipment blank samples, field duplicate samples, and other parameters collected during the monitoring period. These other data are presented in Appendix B. Section 3.2 of this report summarizes sublethal toxicity and *in situ* toxicity testing at receiving water sites downstream of STIA outfalls

3.1 Monitoring of Industrial Stormwater Discharges

3.1.1 Sampling Objectives and Procedures

Sampling protocols and locations have been selected to provide data consistent with the requirements of the NPDES permit and the representativeness criteria set forth in the *Quality Assurance Program Plan for Non-Construction Stormwater Runoff Monitoring* (QAPP) (Taylor Associates, Inc. 2011). The monitoring locations were selected to represent stormwater downstream of the last best management practice (BMP) within each subbasin.

The QAPP describes the criteria for sampling storm events and describes all relevant sampling, programming, and handling necessary to satisfy the monitoring requirements of the permit. Table 2 lists the current constituents measured or analyzed, methods used, and detection limits. The STIA reports results on DMRs from storms and samples that were considered representative according to criteria specified in the QAPP.

The STIA uses telemetry-based automatic samplers to collect a grab sample then a flow-weighted composite sample during rainstorms of 0.10 inches or greater that are preceded by less than 0.10 inch of rainfall in the previous 24 hours. These rainfall and antecedent sampling conditions are specified in the NPDES permit, Part 2, 2S2.B. Each grab or composite sample is analyzed for the constituents listed in Table 2 depending on sample type as specified in the NPDES permit.

Table 2. Constituents, Methods and Detection Limits

Constituent	Method	Detection limit (MDL)	Sample Type	Effluent Limits
pH	150.1[(1)]	0.01 S.U.	grab	6.5 – 8.5 S.U[4].
Oil & Grease - TPH (by GC)	NWTPH-Dx[(3)]	0.75 mg/l	grab	15 mg/L – no sheen
Turbidity	180.1[(1)]	0.05 NTU	grab	25 NTUs
Glycols, Ethylene, Propylene	GC FID[(2)]	10.0 mg/l	flow-wt comp.	NA
Total Recoverable Copper	200.8[(1)]	0.5 µg/l	flow-wt comp.	25.6 to 59.2 µg/l
Total Recoverable Zinc	200.8[(1)]	4.0 µg/l	flow-wt comp.	71.4 to 117 µg/l

1. Method refers to EPA-600/4-79-020 (U.S. EPA 1979).
2. Analyzed by Gas Chromatograph (GC), Flame Ionization Detector (FID). MDL is 10 mg/l each for propylene and ethylene glycols.
3. Method reports both a motor oil fraction and diesel fraction. TPH-Dx is the sum of these two fractions.
4. Approved limits for pH at stations SDN3A, SDW1A, SDW1B, SDW2 are 6.3 to 9.0 S.U.

3.1.2 Field Quality Control Samples

The STIA routinely collects field duplicate and equipment blank samples during NPDES sampling events in accordance with the QAPP. Appendix B summarizes these results. The results reflect on the efficacy of the STIA's "clean" sampling methods developed for stormwater monitoring relative to metals (POS 1999).

Four field blanks were collected in the 2015 – 2016 reporting period. Ethylene glycol and propylene glycol were non-detectable in all field blank samples. Zinc was detected in two field blank samples at 6 ug/L. There were no other anomalies associated with samples collected during these same storm events. Due to the low concentrations in the field blanks, the associated samples were not qualified and were considered representative of the discharge.

3.1.3 Permit Effluent Limits

The current NPDES permit (2016) specifies effluent limits for turbidity, pH, oil and grease, total copper, and total zinc at all outfalls (see Table 2). The major changes from the previous permit effluent limits are the removal of required lead testing, and a wider range of acceptable pH readings for outfalls SDN3A, SDW1A, SDW1B, and SDW2. Effluent limits for industrial stormwater first became effective during the previous permit on December 31, 2007. The site-specific study and subsequent derivation of site-specific water quality based effluent limits for copper and zinc are described in the 2009 NPDES Permit fact sheet. A 25 NTU effluent limit for turbidity was added in the April 1, 2009 permit as a replacement for an earlier TSS benchmark. The permit also specifies effluent limits for ammonia and nitrates/nitrites, however monitoring for these parameters is only required if urea is applied as an anti-icing agent. Urea was not used in the reporting year and has not been used at the Airport since 1996.

3.1.4 Storm Events Sampled

During the current permit's annual reporting schedule, 51.43 inches of rain fell at STIA, 12.76 inches more than the historical normal of 38.67 inches and 14 inches more than the past monitoring year (37.43 inches). Monthly rainfall totals were well below average in July, September, April and May. October 2015 through March 2016 all had more monthly rainfall than normal with August and December having approximately two times the monthly normal rainfall (Figure 2).

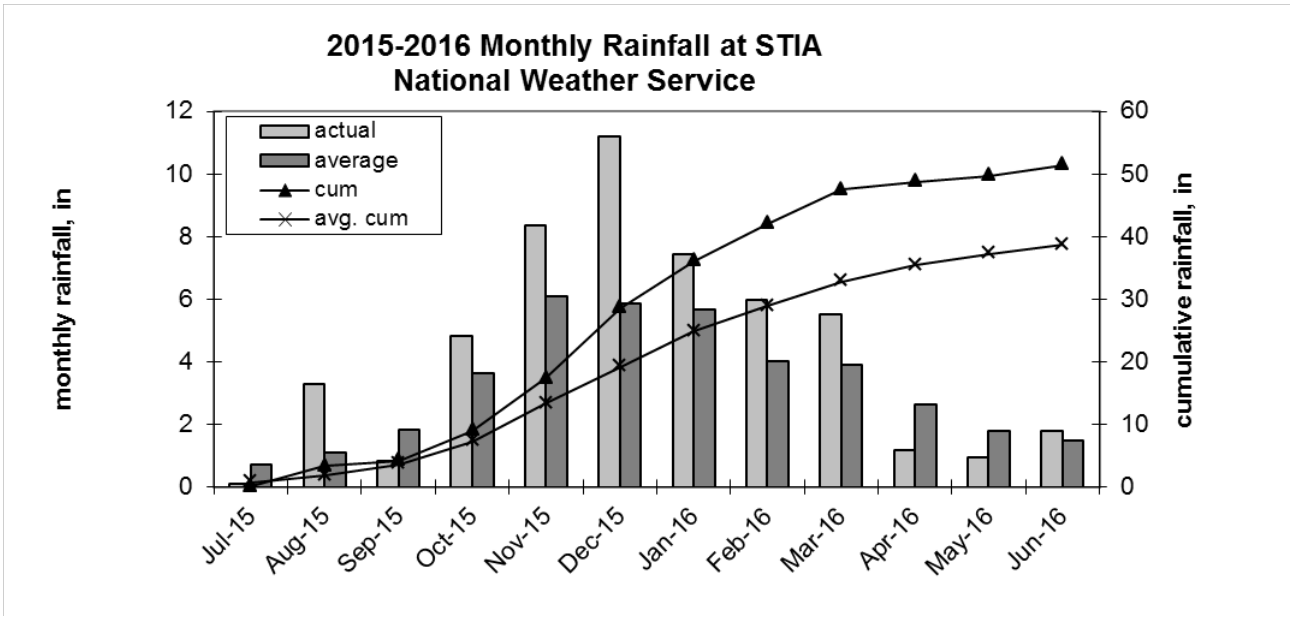


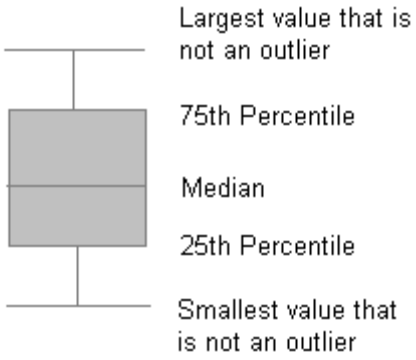
Figure 2. Rainfall Summary

In the 12 months ending June 30, 2016, the STIA sampled 12 rainfall events with rainfall ranging from 0.11 to 4.19 inches. Dry weather preceding these events ranged from 19 hours (August 29, 2015) to 8.6 days (April 12, 2016). The tabular sample data in Appendix A includes storm event data such as rainfall depth, antecedent rainfall, and length of antecedent dry period[1].

3.1.5 Data Presentation Methods

Outfall sampling results for the reporting period are summarized graphically in box plots that illustrate the central tendency, spread, and skew of the stormwater data (Figures 3 through 7). For low-censored data (i.e. non-detected values), a value of one half the detection limit was assumed for any calculation purposes (i.e. median, percentiles, etc.).

[1] The length of the dry antecedent period (the "dryant" data field in Appendix A) is the time, in hours, to the previous measurable (0.01") rainfall, which may or may not have actually produced runoff at a particular outfall.



The data set may include outliers and extreme values that represent unusual conditions or anomalies. Outliers are displayed on the box plots as circles and extreme values are shown as asterisks. With the exception of pH, permit effluent limits (where applicable) are indicated in a note below each graph, solid reference lines are used to indicate the upper and lower pH effluent limit. A flat horizontal line indicates the analyte was not detected during the reporting period.

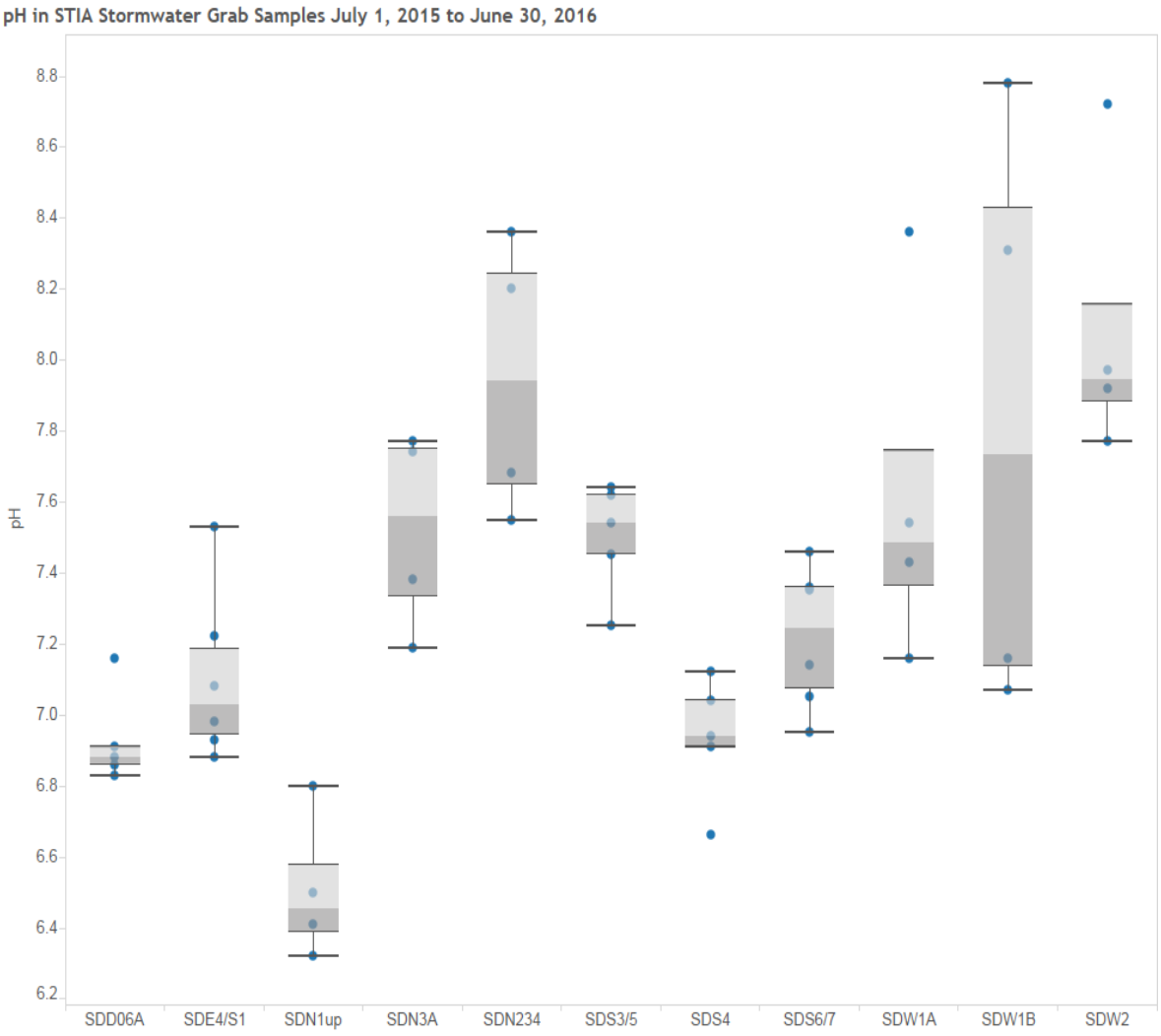
Appendix A tabulates and summarizes analytical results for each outfall for parameters required by the current permit, for the current annual reporting period July 1, 2015 through June 30, 2016. All data included in Appendix A has previously been provided to Ecology in quarterly DMRs and represents samples collected from those storms and sampling routines that met the criteria of the QAPP.

3.1.6 Grab Sample Results and Discussion

The following discussion includes results from 53 grab samples collected in the past year. Grab samples are analyzed for pH, TPH, and turbidity per current permit requirements, with tabular results and summary statistics contained in Appendix A.

3.1.6.1 pH

Figure 3 shows pH data for the current year. The median pH value from all outfalls was 7.22. Standard Units (S.U.) Sample results fell consistently within the effluent limit range of 6.5 to 8.5 (6.3-9.0 at SDN3A, SDW1A, SDW1B and SDW2) with the exception of two samples collected at outfall SDN-1. The two exceedances at the SDN-1 outfall were below the lower pH effluent limit range. A sample collected on November 12, 2015 had a pH reading of 6.32, and a sample collected on February 17, 2016 had a pH reading of 6.41. A field investigation was completed after each event, with no abnormal activity noted in the adjacent areas and basin. Subsequent monitoring indicated pH had returned to normal range. .

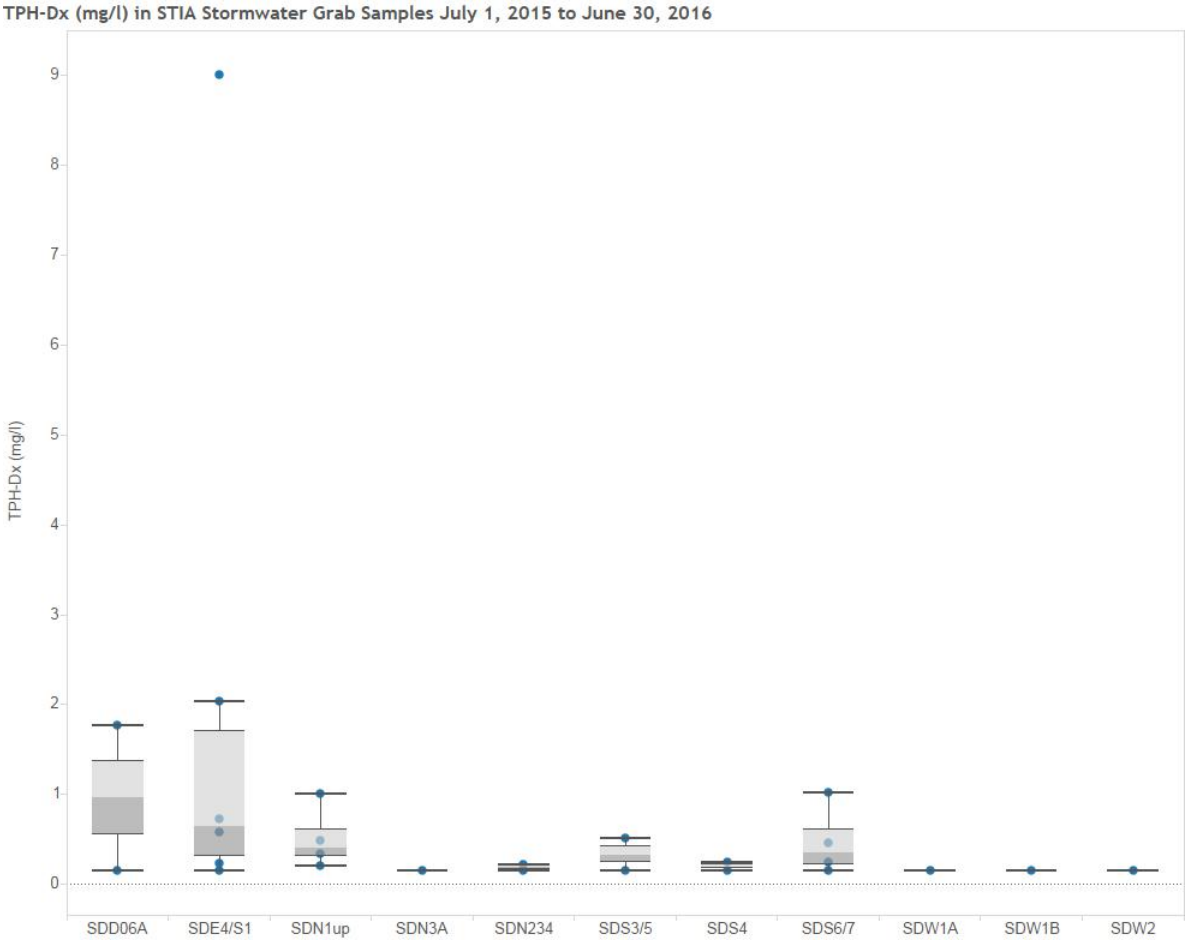


pH effluent limits: Stations SDE4/S1, SDD06A, SDN1, SDN2/3/4, SDS3/5, SDS6/7, SDS4 6.5 to 8.5. Stations SDN3A, SDW1A, SDW1B, SDW2 6.3 to 9.0

Figure 3. pH Results

3.1.6.2 Total Petroleum Hydrocarbons (TPH)

Figure 4 shows TPH data for the current reporting year. TPH ranged from less than 0.15 mg/L to 9.0 mg/L. The estimated median TPH concentration at all outfalls was 0.15 mg/L. However, the actual median TPH concentration may have been lower since TPH was only detected in 16 of the 53 samples. All sample results were well below the TPH effluent limit of 15 mg/L.



TPH Effluent Limit = 15 mg/L

Figure 4. TPH Results

3.1.6.3 Turbidity

Turbidity results for the current year are shown in Figure 5. The median turbidity for all outfalls was 1.99 NTU with a range from 0.5 NTU to 12.2 NTU. There were no permit limit exceedances for turbidity at any outfall during the monitoring period.

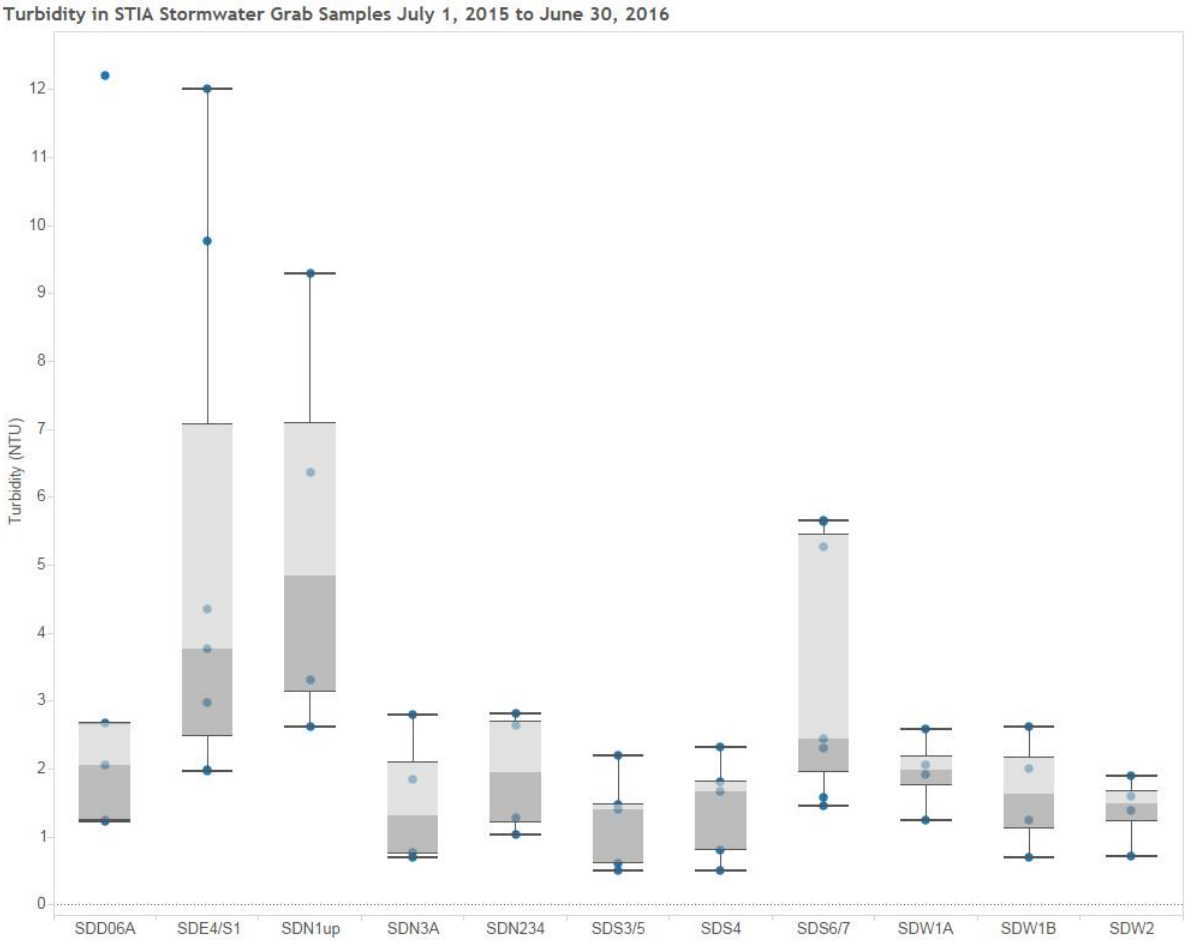


Figure 5. Turbidity Results

3.1.7 Composite Sample Results and Discussion

For the 2015-2016 sampling period, the STIA collected a total of 51 flow-weighted composite samples. Composite sample results are described separately from grab samples because grab samples represent an isolated segment of the storm event runoff. Composite sample results represent an average value or event-mean concentration (EMC) over a longer time period. All composite sample data contained within this report and on the DMRs met the representativeness criteria of the STIA's QAPP, which provides samples comparable with EPA methods (U.S. EPA 1992).

3.1.7.1 Glycols

The Federal Aviation Administration (FAA) authorizes specially formulated ethylene and propylene glycols for aircraft deicing and anti-icing. Port tenants perform all glycol application at STIA (applied by airlines or their ground service providers). To ensure public safety and comply with FAA regulations, aircraft pilots make the ultimate decision on whether to apply glycols or not. Monitoring for propylene and ethylene glycol is required by the NPDES permit during months when deicing and anti-icing is conducted. Glycol monitoring is required to assess track-out and sheer and drip from aircraft that are deiced within the IWS drainage area. No aircraft deicing occurs within the SDS.

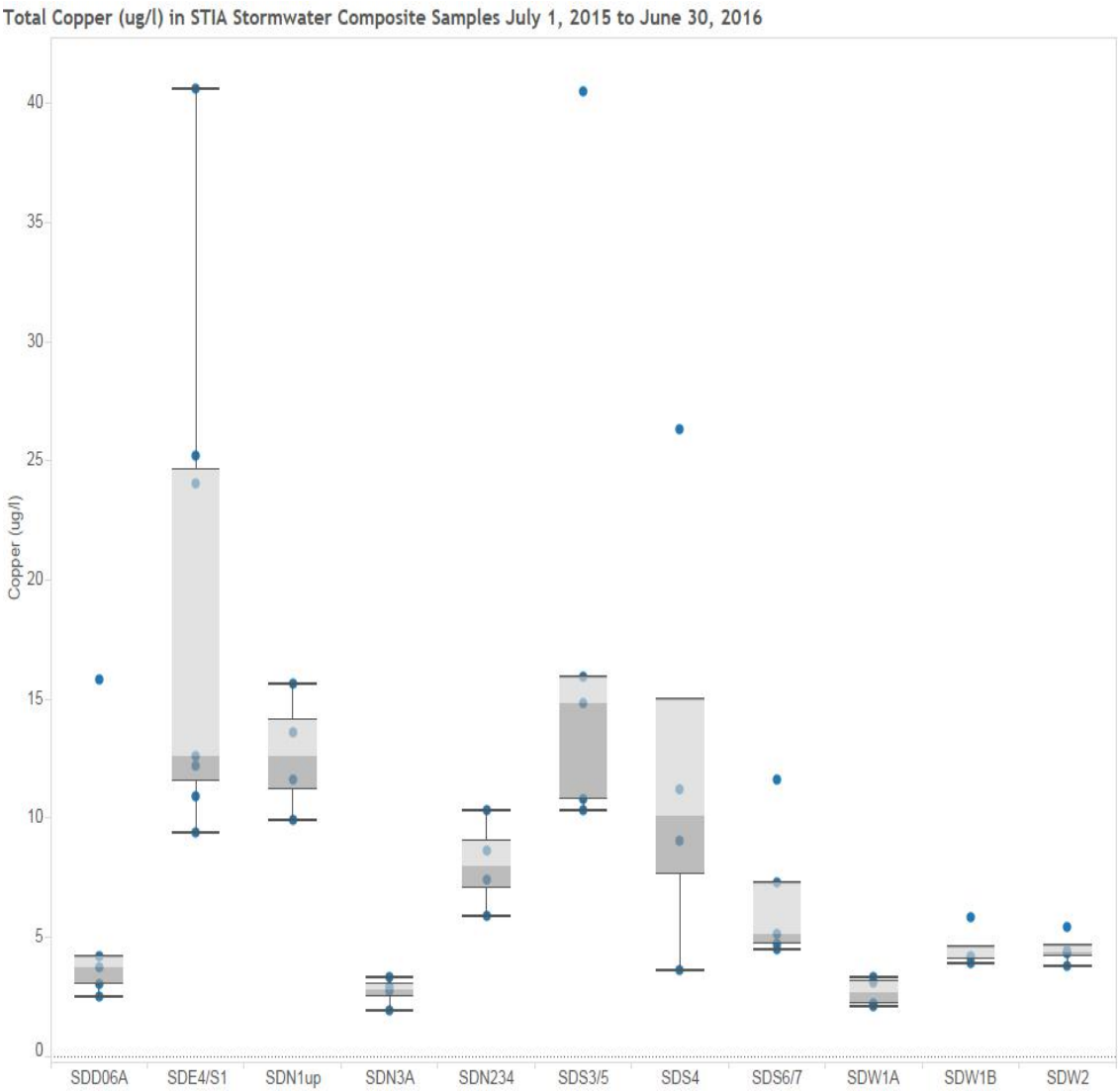
The length of the deicing season and the annual volume of aircraft deicing anti-icing fluid (ADAF) (glycol) applied are reported in the STIA's *2015-2016 Deicing/Anti-icing Fluids Usage Summary Report* (POS 2016). This report summarizes data provided by the airlines for the volumes of both ethylene and propylene glycol applied within the IWS. According to the *2015-2016 Deicing/Anti-icing Fluids Usage Summary Report*, airlines applied a total of 65,690 gallons of glycol during the months of October 2015-April 2016

Ethylene and propylene glycol were not detected in any of the 46 samples analyzed during deicing months in 2015 and 2016.

3.1.7.2 Copper

All data reported below are for total recoverable copper. The median copper concentration for all outfalls was 7.3 µg/L, with individual storm sample concentrations ranging from 1.9 µg/L to 40.6 µg/L (Figure 6). The permit effluent limit for copper at each outfall is variable based on a site-specific study and ranges from 26 µg/L to 59 µg/L depending on receiving water location.

There were two permit limit exceedances for copper at outfalls (SDE4/S1 and SDS3/5) during the monitoring period, both in association with the 8/14/2015 storm. The copper concentration at SDE4 was 40.6 as compared to the limit of 25.6. The elevated copper concentration at SDE4/S1 was likely due to a unusually long antecedent period and ongoing pond maintenance during the event meant flows were bypassing the pond and directly entering the treatment vault. The copper concentration at SDS3/5 was 40.5 as compared to the limit of 32.2. The exceedance at the SDS3/5 was also likely related to a combination of an unusually long antecedent dry period and possible construction related activity from the 16C/34C runway reconstruction.

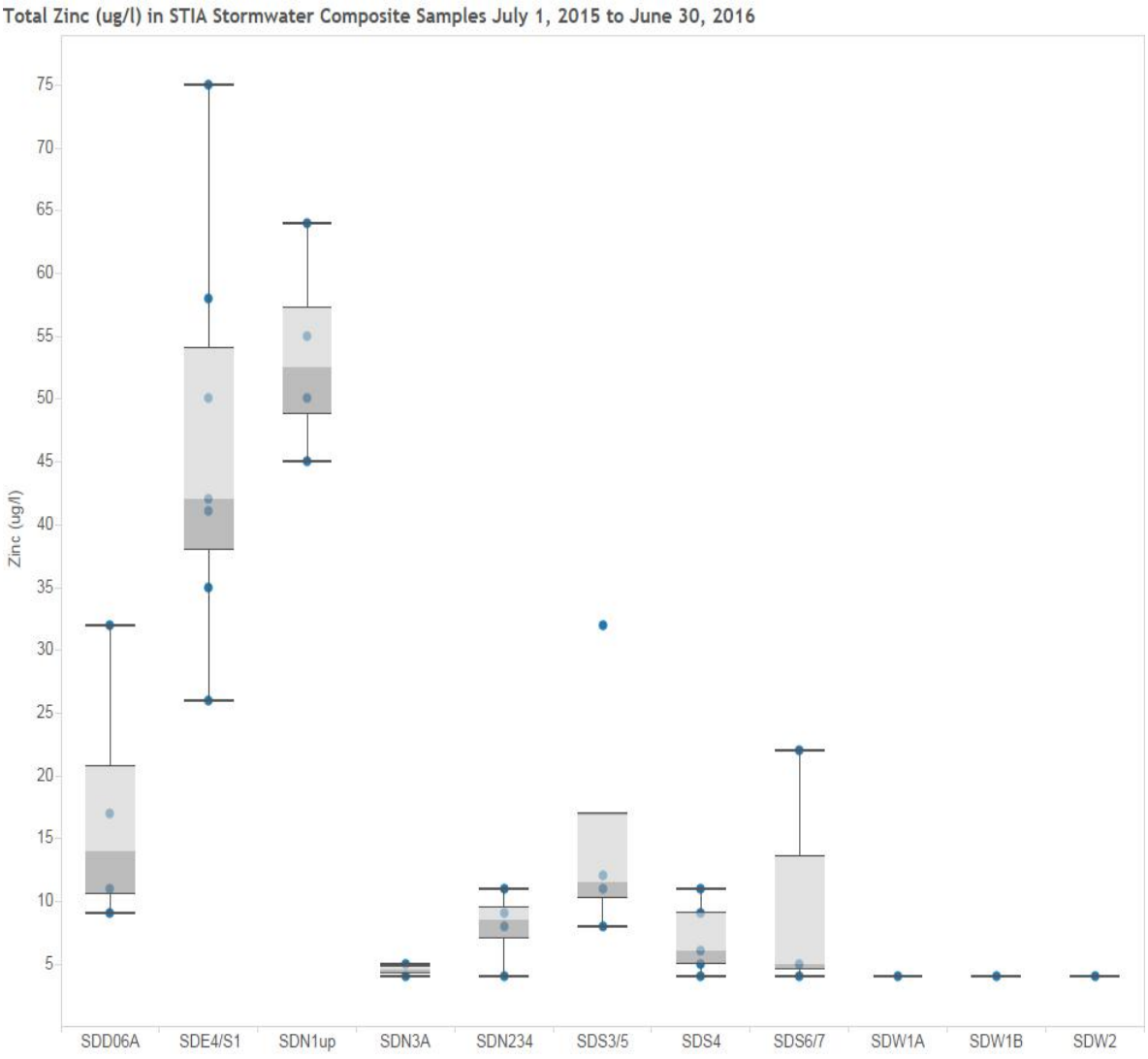


Effluent limits by outfall: 32.2 ug/l (SDS3/5, SDS4, SDS6/7), 28.5 ug/l (SDN1, SDN2/3/4), 25.6 ug/l (SDE4/S1, SDD06A), 59.2 ug/l (SDN3A, SDW1A, SDW1B), 47.9 ug/l (SDW2)

Figure 6. Copper Results

3.1.7.3 Zinc

All data reported are for total recoverable zinc. The median zinc concentration at all outfalls was 8 µg/L (Figure 7). Zinc concentrations ranged from not detected to 75 µg/L. There were no permit limit exceedances for zinc at any outfall during the monitoring period.



SDS4 effluent limit = 71.4 ug/l, all other outfalls 117 ug/l

Figure 7. Zinc Results

3.2 Toxicity Monitoring

The following section discusses stormwater monitoring data related to sublethal toxicity sampling as well as a description of an *in situ* monitoring program that was completed during fall season 2015 and spring season 2016.

3.2.1 Sublethal Toxicity Sampling

Part II. S8.A of the previous permit required sublethal toxicity testing on ambient samples from Miller Creek, Des Moines Creek, Walker Creek, Northwest Ponds, and Lake Reba biannually in the fall and spring during times of stormwater or snow melt runoff. If possible, another test is also required at stations receiving runoff from areas where deicing and anti-icing operations are occurring (winter event).

During the reporting period, samples were collected during fall of 2015 only as the permit expired and annual sublethal sampling is no longer required. Samples were not collected during a winter deicing event because the deicing activity during this time was in IWS draining locations. During the fall 2015 season, samples were collected from the East Branch of Des Moines Creek (DME), downstream of the confluence of the East and West Branch of Des Moines Creek (EWConf), the outlet of Northwest Ponds (NPOUT), the outlet of Lake Reba (RBOUT), Miller Creek at 8th Avenue (MC8TH) and the headwaters of Walker Creek (WLKR). The sublethal toxicity sampling locations are shown on Figure 1. There was no toxicity associated with any of the samples collected during the fall sampling event. The Fall 2015 Sublethal Toxicity Testing Report was submitted to Ecology on January 7, 2016 (Nautilus 2015).

In Situ Toxicity Monitoring

The in situ monitoring approach utilizes the early life stage (ELS) salmonid bioassay testing procedure using rainbow trout that can be applied in a laboratory or field (i.e., in situ) context. The test encompasses a number of developmental milestones (e.g., hatching, yolk-sac absorption, etc.), and provides a variety of biological endpoints, such as survival and growth, that can be used to assess water quality.

Results from the in situ bioassays and supporting analytical data are intended to provide an indication of attainment of receiving water quality standards and associated beneficial uses related to salmonid spawning and rearing. Initial Phase 1 testing conducted previously demonstrated that the RBT in situ ELS bioassay is an effective instream biological monitoring tool for assessing the potential effects of stormwater discharges on the receiving environment.

The sampling events conducted during this reporting period were completed under two versions of STIAs NPDES Permit No. WA0024651, which was reissued in January 1, 2016. The Fall 2015 event was conducted under Phase I of the In Situ

Monitoring Plan (i.e., Development and Demonstration), that was originally intended to last for one year (2010-2011) and include testing during the Spring and Fall seasons. However, this Phase was extended to allow for additional comparisons with the laboratory sublethal testing being conducted by the STIA at sites downstream of Port outfalls, as specified in Part II, Special Condition S8 of the NPDES permit. The laboratory sublethal toxicity testing is used for permit compliance purposes, and has been conducted concurrently with in situ deployments (when feasible) to facilitate validation of the in situ methodology. A comparison of the two methods was presented in the *Combined Acute, Sublethal, and In Situ Report* (Nautilus 2013).

The Spring 2016 event falls under the new Permit, WA0024651, Part 2. 2S9, and is now required to be conducted biannually in the fall and spring, corresponding to the spawning regimes of local salmonid species. Sampling was performed using the revised *Quality Assurance Program Plan: Seattle-Tacoma International Airport Receiving Water Sublethal Toxicity Testing* (Port of Seattle 2016). In addition to the locations used during Phase 1 testing, an additional site representing Walker Creek has been added to the sampling program (see Figure 1).

There were limited adverse effects observed at Miller Creek and Des Moines Creek at S 200th compared with controls in both testing events. Only length during the Fall 2015 event was significantly different ($p \leq 0.01$) with reductions in length of less than 5% relative to controls.

Notably, significant adverse effects were observed at the Upstream Des Moines Creek site during both testing events, with reduced hatching success, increased mortality and reduced growth. With the exception of the Spring 2015 testing event (Nautilus Environmental 2015), this site has consistently exhibited evidence of adverse effects, suggesting an ongoing pattern of impaired water quality.

The addition of Walker Creek in the Spring 2016 event went smoothly. The only adverse effect observed was on hatching success, which was significantly different but only a 10% effect relative to controls.

For a full discussion on results of the sampling, please refer to *Rainbow Trout Early Life Stages In Situ Monitoring Testing, Fall 2015 and Spring 2016 Testing Events* (Nautilus report in preparation).

4.0 BMP IMPLEMENTATION

The STIA has designed and constructed stormwater peak runoff rate and flow control BMPS to retrofit the entire airport. In addition to flow control BMPs, treatment BMPs are implemented to achieve stormwater effluent limits. Redeveloped areas are assessed for BMP requirements and implemented as necessary to meet NPDES permit requirements. During the design process, opportunities to implement LID technologies are explored.

During the 2015-2016 year, filter strips for the 16C/34C runway reconstruction project were replaced with extended compost amended filter strips where possible in order to include low impact development elements into the runway stormwater treatment system. BMPs in future Port subbasins SDD05A and SDD05B (south employee parking contractor laydown area) were improved by updating the SDD05B stormwater pond control structure and the construction of a new LID bioretention swale to treat flows from the SDD05B pond. These future subbasins/outfalls currently serve construction however LID BMPs elements were added in anticipation of future industrial activities in the subbasins. In addition to new BMPs, Port staff identified an illicit connection during a routine BMP inspection in the SDS1 subbasin in 2016. A project was initiated to correct drainage connection from SDS to IWS for areas where industrial activities occur. In addition to BMP upgrades or modifications, BMPs are maintained on scheduled frequency to ensure effluent limits are being met.

5.0 SUMMARY AND CONCLUSIONS

During the reporting period from July 2015 to June 2016 the STIA fulfilled requirements for outfall monitoring under the current NPDES permit by collecting a total of 53 grab samples and 51 composite stormwater samples during 12 storm events. Outfalls were sampled quarterly when discharges occurred from rain events that met the minimum rainfall criteria of 0.1 inch. There were only four instances of effluent limit exceedance associated with 261 constituents that were tested to meet the monitoring requirements of the NPDES permit. This high level of compliance is an indication that the stormwater BMPS and the overall stormwater management program are effective at mitigating impacts from Airport operations on the adjacent receiving waters.

6.0 REFERENCES

Cardno TEC, Inc. 2012. Interim Report – Stormwater pH Study for Seattle-Tacoma International Airport In Accordance with Agreed Order 8755. June 2012.

CH2MHILL 2008. Comprehensive Receiving Water and Stormwater Runoff Study. Port of Seattle, April 2008.

Nautilus Environmental, LLC. 2008a. Derivation of Site-Specific Water Quality Objectives and Effluent Limits for Copper in Stormwater, June 23, 2008.

Nautilus Environmental, LLC. 2008b. Derivation of Site-Specific Water Quality Objectives and Preliminary Effluent Limits for Zinc in Stormwater, June 23, 2008.

Nautilus Environmental, LLC. 2010. Port of Seattle- Seattle-Tacoma International Airport *In Situ* Monitoring Plan, Phase I, Development and Demonstration, September 2010.

Nautilus Environmental, LLC. 2011b. Port of Seattle- Seattle-Tacoma International Airport Rainbow Trout Early Life Stages *In Situ* Bioassay Monitoring, Phase 1: Development and Demonstration – Fall 2010 and Spring 2011 Monitoring, September 14, 2011.

Nautilus Environmental Inc. 2014. NPDES Sublethal Toxicity Testing: Seattle-Tacoma International Airport, Fall Event (October) 2014, December 2, 2014.

Nautilus Environmental Inc. 2015. NPDES Sublethal Toxicity Testing: Seattle-Tacoma International Airport, Spring Event (April/May) 2015, June 5, 2015.

Nautilus Environmental Inc. 2015b. Port of Seattle, Seattle-Tacoma International Airport, Rainbow Trout Early Life Stages In Situ Monitoring Testing, Phase I: Development and Demonstration – Fall 2014 and Spring 2015 Testing Events, August 2015.

POS 1999. Adapting Clean Sampling Techniques for POS NPDES Stormwater and other Stormwater Monitoring Project Needs. Scott Tobiason, Port of Seattle, Aviation Environmental Programs. Draft 6/5/99.

POS 2012a. Letter addressed to Ed Abbasi, WA Department of Ecology, dated May 9, 2012. RE: Storm Drainage System In Situ Monitoring Plan Update – Continue Phase I Testing, Seattle Tacoma International Airport, NPDES Permit WA-002465-1, Part II Special Condition S9.

POS 2015. Letter addressed to Jerry Shurvey, WA Department of Ecology, dated May 28, 2015. RE: 2013-2014 Deicing/Anti-icing Fluids Usage Summary Report Seattle Tacoma International Airport NPDES Permit WA-002465-1, Part I Special Condition S2.E.

POS 2015. Letter addressed to Jerry Shervey, WA Department of Ecology, dated June 3, 2015. RE: Agreed Order No. 8755: Request for Notice of Compliance Seattle -Tacoma International Airport NPDES Permit WA-002465-1.

POS 2016. Quality Assurance Program Plan: Seattle-Tacoma International Airport Receiving Water Sublethal Toxicity Testing, Port of Seattle, February 2016

Snoeyink and Jenkins, 1980. *Water Chemistry.* John Wiley and Sons, Inc. 1980.

Taylor Associates, Inc. 2008. Comprehensive Receiving Water and Runoff Study – Effects of Airport Ground Surface Deicing Biochemical Oxygen Demand on Receiving Water Dissolved Oxygen. Port of Seattle, April 2008.

Taylor Associates, Inc. 2011. Quality Assurance Program Plan for Non-Construction Stormwater Runoff Monitoring, Conducted Under Part II of the National Pollutant Discharge Elimination System Waste Discharge Permit, Port of Seattle, Seattle Tacoma International Airport, October 2011.

U.S. EPA 1979. Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-20, U.S. Environmental Protection Agency, Cincinnati, OH.

U.S. EPA 1992. NPDES Storm Water Sampling Guidance Document. U.S. EPA Office of Water. EPA 833-B-92-001. July 1992.

U.S. EPA 1993a. Stormwater discharges potentially addressed by Phase II of the NPDES program. Draft report to Congress. October 1993.

WDOE 2009. National Pollutant Discharge Elimination System permit No. WA-002465-1, effective April 1, 2009 by Washington Department of Ecology, Olympia, WA.

WDOE 2016. National Pollutant Discharge Elimination System permit No. WA0024651, effective Janauary 1, 2016 by Washington Department of Ecology, Olympia, WA.

WDOE 2012. Agreed Order Docket No. 8755.

APPENDIX A

TABULAR NPDES SAMPLE DATA SUMMARIES and STATISTICS

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Port of Seattle
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NPDES Composite Statistics 7/1/2015 - 6/30/2016

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
All Outfalls	Count				23	23		51	27	51
	Max				5	5		0.041	0.00320	0.075
	95th				5.0	5.0		0.026	0.00129	0.056
	75th				5.0	5.0		0.012	0.00040	0.024
	Median				5	5		0.007	0.00020	0.008
	25th				5.0	5.0		0.004	0.00010	0.002
	Min				5	5		0.002	0.00005	0.002
	SD				0.0	0.0		0.010	0.00100	0.020
	CV%				0%	0%		73%	123%	52%
	#NonDetects				23	23		0	4	16
	%NonDetects				100%	100%		0%	15%	31%
	#Trimmed				0	0		0	0	0
	%Trimmed				0%	0%		0%	0%	0%
SDE4/SDS1 (002)	Count				2	2		7	3	7
	Max				5	5		0.041	0.00320	0.075
	95th				5.0	5.0		0.036	0.00295	0.070
	75th				5.0	5.0		0.025	0.00195	0.054
	Median				5	5		0.013	0.00070	0.042
	25th				5.0	5.0		0.012	0.00070	0.038
	Min				5	5		0.009	0.00070	0.026
	SD				0.0	0.0		0.011	0.00144	0.016
	CV%				0%	0%		59%	94%	35%
	#NonDetects				2	2		0	0	0
	%NonDetects				100%	100%		0%	0%	0%
	#Trimmed				0	0		0	0	0
	%Trimmed				0%	0%		0%	0%	0%

Values qualified as non-detect (<) calculated at 1/2 the reported detection limit.

Port of Seattle
EMIS

NPDES Composite Statistics 7/1/2015 - 6/30/2016

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
SDS3/5 (005)	Count				2	2		5	3	5
	Max				5	5		0.041	0.00150	0.032
	95th				5.0	5.0		0.036	0.00139	0.028
	75th				5.0	5.0		0.016	0.00095	0.012
	Median				5	5		0.015	0.00040	0.012
	25th				5.0	5.0		0.011	0.00030	0.011
	Min				5	5		0.010	0.00020	0.008
	SD				0.0	0.0		0.013	0.00070	0.010
	CV%				0%	0%		68%	100%	64%
	#NonDetects				2	2		0	0	0
	%NonDetects				100%	100%		0%	0%	0%
	#Trimmed				0	0		0	0	0
	%Trimmed				0%	0%		0%	0%	0%
SDS4 (009)	Count				2	2		5	3	5
	Max				5	5		0.026	0.00040	0.011
	95th				5.0	5.0		0.023	0.00038	0.011
	75th				5.0	5.0		0.011	0.00030	0.009
	Median				5	5		0.011	0.00020	0.006
	25th				5.0	5.0		0.009	0.00020	0.005
	Min				5	5		0.004	0.00020	0.002
	SD				0.0	0.0		0.008	0.00012	0.004
	CV%				0%	0%		69%	43%	53%
	#NonDetects				2	2		0	0	1
	%NonDetects				100%	100%		0%	0%	20%
	#Trimmed				0	0		0	0	0
	%Trimmed				0%	0%		0%	0%	0%

Values qualified as non-detect (<) calculated at 1/2 the reported detection limit.

Port of Seattle
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NPDES Composite Statistics 7/1/2015 - 6/30/2016

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
SDS6/7 (014)	Count				3	3		5	3	5
	Max				5	5		0.012	0.00030	0.022
	95th				5.0	5.0		0.011	0.00029	0.019
	75th				5.0	5.0		0.007	0.00025	0.005
	Median				5	5		0.005	0.00020	0.004
	25th				5.0	5.0		0.005	0.00020	0.002
	Min				5	5		0.004	0.00020	0.002
	SD				0.0	0.0		0.003	0.00006	0.008
	CV%				0%	0%		45%	25%	121%
	#NonDetects				3	3		0	0	2
	%NonDetects				100%	100%		0%	0%	40%
	#Trimmed				0	0		0	0	0
	%Trimmed				0%	0%		0%	0%	0%
SDN1 (006)	Count				2	2		4	2	4
	Max				5	5		0.016	0.00080	0.064
	95th				5.0	5.0		0.015	0.00078	0.063
	75th				5.0	5.0		0.014	0.00070	0.057
	Median				5	5		0.013	0.00060	0.053
	25th				5.0	5.0		0.011	0.00050	0.049
	Min				5	5		0.010	0.00040	0.045
	SD				0.0	0.0		0.002	0.00028	0.008
	CV%				0%	0%		19%	47%	15%
	#NonDetects				2	2		0	0	0
	%NonDetects				100%	100%		0%	0%	0%
	#Trimmed				0	0		0	0	0
	%Trimmed				0%	0%		0%	0%	0%

Values qualified as non-detect (<) calculated at 1/2 the reported detection limit.

NPDES Composite Statistics 7/1/2015 - 6/30/2016

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
SDW2 (016)	Count				2	2		4	2	4
	Max				5	5		0.005	0.00010	0.004
	95th				5.0	5.0		0.005	0.00010	0.004
	75th				5.0	5.0		0.005	0.00009	0.002
	Median				5	5		0.004	0.00007	0.002
	25th				5.0	5.0		0.004	0.00006	0.002
	Min				5	5		0.004	0.00005	0.002
	SD				0.0	0.0		0.001	0.00004	0.001
	CV%				0%	0%		15%	47%	40%
	#NonDetects				2	2		0	1	3
	%NonDetects				100%	100%		0%	50%	75%
	#Trimmed				0	0		0	0	0
	%Trimmed				0%	0%		0%	0%	0%
SDW1B (017)	Count				2	2		4	2	4
	Max				5	5		0.006	0.00010	0.002
	95th				5.0	5.0		0.006	0.00010	0.002
	75th				5.0	5.0		0.005	0.00009	0.002
	Median				5	5		0.004	0.00007	0.002
	25th				5.0	5.0		0.004	0.00006	0.002
	Min				5	5		0.004	0.00005	0.002
	SD				0.0	0.0		0.001	0.00004	0.000
	CV%				0%	0%		19%	47%	0%
	#NonDetects				2	2		0	1	4
	%NonDetects				100%	100%		0%	50%	100%
	#Trimmed				0	0		0	0	0
	%Trimmed				0%	0%		0%	0%	0%

Values qualified as non-detect (<) calculated at 1/2 the reported detection limit.

NPDES Composite Statistics 7/1/2015 - 6/30/2016

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
SDW1A (018)	Count				2	2		4	2	4
	Max				5	5		0.003	0.00010	0.002
	95th				5.0	5.0		0.003	0.00010	0.002
	75th				5.0	5.0		0.003	0.00009	0.002
	Median				5	5		0.003	0.00007	0.002
	25th				5.0	5.0		0.002	0.00006	0.002
	Min				5	5		0.002	0.00005	0.002
	SD				0.0	0.0		0.001	0.00004	0.000
	CV%				0%	0%		23%	47%	0%
	#NonDetects				2	2		0	1	4
	%NonDetects				100%	100%		0%	50%	100%
	#Trimmed				0	0		0	0	0
	%Trimmed				0%	0%		0%	0%	0%
SDN3A (019)	Count				2	2		4	2	4
	Max				5	5		0.003	0.00010	0.005
	95th				5.0	5.0		0.003	0.00010	0.005
	75th				5.0	5.0		0.003	0.00009	0.004
	Median				5	5		0.003	0.00007	0.003
	25th				5.0	5.0		0.002	0.00006	0.002
	Min				5	5		0.002	0.00005	0.002
	SD				0.0	0.0		0.001	0.00004	0.002
	CV%				0%	0%		22%	47%	46%
	#NonDetects				2	2		0	1	2
	%NonDetects				100%	100%		0%	50%	50%
	#Trimmed				0	0		0	0	0
	%Trimmed				0%	0%		0%	0%	0%

Values qualified as non-detect (<) calculated at 1/2 the reported detection limit.

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NPDES Composite Statistics 7/1/2015 - 6/30/2016

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
SDN2/3/4 (007)	Count				2	2		4	2	4
	Max				5	5		0.010	0.00030	0.011
	95th				5.0	5.0		0.010	0.00029	0.011
	75th				5.0	5.0		0.009	0.00025	0.009
	Median				5	5		0.008	0.00020	0.009
	25th				5.0	5.0		0.007	0.00015	0.007
	Min				5	5		0.006	0.00010	0.004
	SD				0.0	0.0		0.002	0.00014	0.003
	CV%				0%	0%		23%	71%	37%
	#NonDetects				2	2		0	0	0
	%NonDetects				100%	100%		0%	0%	0%
	#Trimmed				0	0		0	0	0
	%Trimmed				0%	0%		0%	0%	0%

SDD06A (020)	Count				2	2		5	3	5
	Max				5	5		0.016	0.00040	0.032
	95th				5.0	5.0		0.013	0.00038	0.029
	75th				5.0	5.0		0.004	0.00030	0.017
	Median				5	5		0.004	0.00020	0.011
	25th				5.0	5.0		0.003	0.00015	0.011
	Min				5	5		0.002	0.00010	0.009
	SD				0.0	0.0		0.006	0.00015	0.009
	CV%				0%	0%		96%	65%	59%
	#NonDetects				2	2		0	0	0
	%NonDetects				100%	100%		0%	0%	0%
	#Trimmed				0	0		0	0	0
	%Trimmed				0%	0%		0%	0%	0%

Values qualified as non-detect (<) calculated at 1/2 the reported detection limit.

NPDES Composite Statistics 7/1/2015 - 6/30/2016

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
Landside (SDE4/SDS1, SDN1, SDD06A)	Count				6	6		16	8	16
	Max				5	5		0.041	0.00320	0.075
	95th				5.0	5.0		0.029	0.00236	0.067
	75th				5.0	5.0		0.016	0.00072	0.051
	Median				5	5		0.012	0.00055	0.042
	25th				5.0	5.0		0.008	0.00035	0.024
	Min				5	5		0.002	0.00010	0.009
	#NonDetects				6	6		0	0	0
	%NonDetects				100%	100%		0%	0%	0%
	#Trimmed				0	0		0	0	0
	%Trimmed				0%	0%		0%	0%	0%
Airfield (SDS3/5, SDS4, SDS6/7, SDW2, SDW1B, SDW1A, SDN3A, SDN2/3/4)	Count				17	17		35	19	35
	Max				5	5		0.041	0.00150	0.032
	95th				5.0	5.0		0.019	0.00051	0.015
	75th				5.0	5.0		0.010	0.00025	0.009
	Median				5	5		0.005	0.00020	0.004
	25th				5.0	5.0		0.004	0.00010	0.002
	Min				5	5		0.002	0.00005	0.002
	SD				0.0	0.0		0.008	0.00032	0.006
	CV%				0%	0%		96%	134%	104%
	#NonDetects				17	17		0	4	16
	%NonDetects				100%	100%		0%	21%	46%
	#Trimmed				0	0		0	0	0
	%Trimmed				0%	0%		0%	0%	0%

Values qualified as non-detect (<) calculated at 1/2 the reported detection limit.

Port of Seattle

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NPDES Composite Sample Data 7/1/2015 - 6/30/2016

SAMPLE DATA			STORM CHARACTERISTICS									CONCENTRATION, mg/L									
Seq	Outfall	Sample ID	Storm Date	Dpth in	Dur hr	MaxInt in/hr	24hrant in	48hrant in	Dryant hr	Type	Ground Deice?	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn		
1	SDE4/SDS1	SDE4/S1081415COMP	8/14/2015	1.01	8	0.36	0	0	49	EMC	No						0.041	0.003	0.075		
2	SDE4/SDS1	SDE4/S1111115COMP	11/10/2015	0.11	5	0.06	0	0.16	33	EMC	No			< 10	< 10		0.013	0.0007	0.035		
3	SDE4/SDS1	SDE4/S1120215COMP	12/1/2015	0.5	11	0.11	0	0.03	24.5	EMC	No			< 10	< 10		0.009	0.0007	0.026		
4	SDE4/SDS1	SDE4/S1021816COMP	2/17/2016	0.48	18	0.16	0	0.16	34	EMC	No						0.012		0.041		
5	SDE4/SDS1	SDE4/S1030216COMP	2/29/2016	0.98	29	0.11	0	0.8	24	SMC	No						0.011		0.042		
6	SDE4/SDS1	SDE4/S1051916COMP	5/19/2016	0.18	3.25	0.09	0	0	62	EMC	No						0.025		0.058		
7	SDE4/SDS1	SDE4/S1061816COMP	6/17/2016	0.17	10	0.06	0	0	65	EMC	No						0.024		0.05		
8	SDS3/5	SDS3/5081415COMP	8/14/2015	1.01	8	0.36	0	0	49	EMC	No						0.04	0.002	0.032		
9	SDS3/5	SDS3/5111315COMP	11/12/2015	4.19	65	0.2	0	0.09	39	SMC	No			< 10	< 10		0.016	0.0004	0.012		
10	SDS3/5	SDS3/5120215COMP	12/1/2015	0.5	11	0.11	0	0.03	24.5	EMC	No			< 10	< 10		0.01	0.0002	0.008		
11	SDS3/5	SDS3/5021816COMP	2/17/2016	0.48	18	0.16	0	0.16	34	EMC	No						0.011		0.011		
12	SDS3/5	SDS3/5041416COMP	4/14/2016	0.22	24	0.12	0	0.33	25	EMC	No						0.015		0.012		
13	SDS4	SDS4081415COMP	8/14/2015	1.01	8	0.36	0	0	49	SMC	No						0.026	0.0002	0.011		
14	SDS4	SDS4111815COMP	11/16/2015	0.94	25	0.12	0	1.59	31	EMC	No			< 10	< 10		0.011	0.0002	0.009		
15	SDS4	SDS4120215COMP	12/1/2015	0.5	11	0.11	0	0.03	24.5	EMC	No			< 10	< 10		0.011	0.0004	0.005		
16	SDS4	SDS4021816COMP	2/17/2016	0.48	18	0.16	0	0.16	34	EMC	No						0.009		0.006		
17	SDS4	SDS4041316COMP	4/12/2016	0.33	8	0.1	0	0	206	SMC	No						0.004		< 0.004		
18	SDS6/7	SDS6/7083015COMP	8/29/2015	1.51	35	0.35	0.02	0.02	19	SMC	No			< 10	< 10		0.012	0.0003	0.022		
19	SDS6/7	SDS6/7111315COMP	11/12/2015	4.19	65	0.2	0	0.09	39	SMC	No			< 10	< 10		0.005	0.0002	0.005		
20	SDS6/7	SDS6/7120215COMP	12/1/2015	0.5	11	0.11	0	0.03	24.5	EMC	No			< 10	< 10		0.004	0.0002	0.004		
21	SDS6/7	SDS6/7021816COMP	2/17/2016	0.48	18	0.16	0	0.16	34	EMC	No						0.005		< 0.004		
22	SDS6/7	SDS6/7041316COMP	4/12/2016	0.33	8	0.1	0	0	206	EMC	No						0.007		< 0.004		
23	SDN1	SDN1111315COMP	11/12/2015	4.19	65	0.2	0	0.09	39	SMC	No			< 10	< 10		0.016	0.0008	0.055		
24	SDN1	SDN1120215COMP	12/1/2015	0.5	11	0.11	0	0.03	24.5	EMC	No			< 10	< 10		0.012	0.0004	0.064		
25	SDN1	SDN1021816COMP	2/17/2016	0.48	18	0.16	0	0.16	34	EMC	No						0.01		0.05		
26	SDN1	SDN1041316COMP	4/12/2016	0.33	8	0.1	0	0	206	EMC	No						0.014		0.045		
27	SDW2	SDW2111315COMP	11/12/2015	4.19	65	0.2	0	0.09	39	SMC	No			< 10	< 10		0.005	0.0001	< 0.004		
28	SDW2	SDW2120215COMP	12/1/2015	0.5	11	0.11	0	0.03	24.5	EMC	No			< 10	< 10		0.004	< 0.0001	< 0.004		
29	SDW2	SDW2030216COMP	2/29/2016	0.98	29	0.11	0	0.8	24	SMC	No						0.004		0.004		
30	SDW2	SDW2041316COMP	4/12/2016	0.33	8	0.1	0	0	206	EMC	No						0.004		< 0.004		
31	SDW1B	SDW1B111815COMP	11/16/2015	0.94	25	0.12	0	1.59	31	SMC	No			< 10	< 10		0.004	0.0001	< 0.004		
32	SDW1B	SDW1B120215COMP	12/1/2015	0.5	11	0.11	0	0.03	24.5	EMC	No			< 10	< 10		0.004	< 0.0001	< 0.004		

R=Rejected Non-Representative Data - Refer to line comment for detail

L:\EMIS_SQL\Production\Surfacewater\SurfaceWater_SQL.mdb/rptSWNPDESComp

Port of Seattle

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NPDES Composite Sample Data 7/1/2015 - 6/30/2016

SAMPLE DATA			STORM CHARACTERISTICS									CONCENTRATION, mg/L									
Seq	Outfall	Sample ID	Storm Date	Dpth in	Dur hr	MaxInt in/hr	24hrant in	48hrant in	Dryant hr	Type	Ground Deice?	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn		
33	SDW1B	SDW1B021816COMP	2/17/2016	0.48	18	0.16	0	0.16	34	EMC	No						0.004		< 0.004		
34	SDW1B	SDW1B041316COMP	4/12/2016	0.33	8	0.1	0	0	206	EMC	No						0.006		< 0.004		
35	SDW1A	SDW1A111815COMP	11/16/2015	0.94	25	0.12	0	1.59	31	SMC	No			< 10	< 10		0.003	0.0001	< 0.004		
36	SDW1A	SDW1A120215COMP	12/1/2015	0.5	11	0.11	0	0.03	24.5	EMC	No			< 10	< 10		0.002	< 0.0001	< 0.004		
37	SDW1A	SDW1A021816COMP	2/17/2016	0.48	18	0.16	0	0.16	34	EMC	No						0.003		< 0.004		
38	SDW1A	SDW1A041316COMP	4/12/2016	0.33	8	0.1	0	0	206	EMC	No						0.002		< 0.004		
39	SDN3A	SDN3A111815COMP	11/16/2015	0.94	25	0.12	0	1.59	31	SMC	No			< 10	< 10		0.003	0.0001	0.004		
40	SDN3A	SDN3A120215COMP	12/1/2015	0.5	11	0.11	0	0.03	24.5	SMC	No			< 10	< 10		0.002	< 0.0001	< 0.004		
41	SDN3A	SDN3A021816COMP	2/17/2016	0.48	18	0.16	0	0.16	34	EMC	No						0.003		0.005		
42	SDN3A	SDN3A041316COMP	4/12/2016	0.33	8	0.1	0	0	206	EMC	No						0.003		< 0.004		
43	SDN2/3/4	SDN2/3/4111415COMP	11/12/2015	4.19	65	0.2	0	0.09	39	SMC	No			< 10	< 10		0.01	0.0003	0.011		
44	SDN2/3/4	SDN2/3/4120215COMP	12/1/2015	0.5	11	0.11	0	0.03	24.5	EMC	No			< 10	< 10		0.006	0.0001	0.008		
45	SDN2/3/4	SDN2/3/4021816COMP	2/17/2016	0.48	18	0.16	0	0.16	34	EMC	No						0.009		0.009		
46	SDN2/3/4	SDN2/3/4041516COMP	4/14/2016	0.22	24	0.12	0	0.33	25	EMC	No						0.007		0.004		
47	SDD06A	SDD06A081515COMP	8/14/2015	1.01	8	0.36	0	0	49	EMC	No						0.016	0.0004	0.032		
48	SDD06A	SDD06A111715COMP	11/16/2015	0.94	25	0.12	0	1.59	31	SMC	No			< 10	< 10		0.002	0.0002	0.017		
49	SDD06A	SDD06A120215COMP	12/1/2015	0.5	11	0.11	0	0.03	24.5	EMC	No			< 10	< 10		0.004	0.0001	0.011		
50	SDD06A	SDD06A021816COMP	2/17/2016	0.48	18	0.16	0	0.16	34	EMC	No						0.003		0.011		
51	SDD06A	SDDO6A041316COMP	4/12/2016	0.33	8	0.1	0	0	206	EMC	No						0.004		0.009		

R=Rejected Non-Representative Data - Refer to line comment for detail

NPDES Grab Statistics 7/1/2015 - 6/30/2016

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
All Outfalls	Count	53	53	53	53	53	53
	Max	8.8		9.00	2.40	6.60	12.2
	95th	8.4		1.32	0.82	0.49	9
	75th	7.6		0.23	0.13	0.10	3
	Median	7.2		0.15	0.05	0.10	1.99
	25th	6.9		0.15	0.05	0.10	1
	Min	6.3		0.15	0.05	0.10	0.5
	SD	0.3		2.19	0.64	1.60	4
	CV%	4%		203%	153%	243%	79%
	#NonDetects	0	0	37	37	43	0
	%NonDetects	0%	0%	70%	70%	81%	0%
	#Trimmed	0	0	0	0	0	0
	%Trimmed	0%	0%	0%	0%	0%	0%
SDE4/SDS1 (002)	Count	7	7	7	7	7	7
	Max	7.5		9.00	2.40	6.60	12
	95th	7.4		6.91	2.01	4.90	11
	75th	7.2		1.38	0.71	0.67	7
	Median	7.0		0.58	0.28	0.30	3.76
	25th	6.9		0.19	0.09	0.10	2
	Min	6.9		0.15	0.05	0.10	1.97
	SD	0.2		3.23	0.87	2.39	4
	CV%	3%		176%	140%	196%	76%
	#NonDetects	0	0	2	2	3	0
	%NonDetects	0%	0%	29%	29%	43%	0%
	#Trimmed	0	0	0	0	0	0
	%Trimmed	0%	0%	0%	0%	0%	0%

Values qualified as non-detect (<) calculated at 1/2 the reported detection limit.

NPDES Grab Statistics 7/1/2015 - 6/30/2016

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
SDS3/5 (005)	Count	5	5	5	5	5	5
	Max	7.6		0.51	0.30	0.21	2.2
	95th	7.6		0.44	0.25	0.19	2
	75th	7.6		0.15	0.05	0.10	1
	Median	7.5		0.15	0.05	0.10	1.4
	25th	7.4		0.15	0.05	0.10	1
	Min	7.3		0.15	0.05	0.10	0.51
	SD	0.2		0.16	0.11	0.05	1
	CV%	2%		73%	112%	40%	56%
	#NonDetects	0	0	4	4	4	0
	%NonDetects	0%	0%	80%	80%	80%	0%
	#Trimmed	0	0	0	0	0	0
	%Trimmed	0%	0%	0%	0%	0%	0%
SDS4 (009)	Count	5	5	5	5	5	5
	Max	7.1		0.24	0.14	0.10	2.32
	95th	7.1		0.22	0.12	0.10	2
	75th	7.0		0.15	0.05	0.10	2
	Median	6.9		0.15	0.05	0.10	1.67
	25th	6.9		0.15	0.05	0.10	1
	Min	6.7		0.15	0.05	0.10	0.5
	SD	0.2		0.04	0.04	0.00	1
	CV%	3%		24%	59%	0%	53%
	#NonDetects	0	0	4	4	5	0
	%NonDetects	0%	0%	80%	80%	100%	0%
	#Trimmed	0	0	0	0	0	0
	%Trimmed	0%	0%	0%	0%	0%	0%

Values qualified as non-detect (<) calculated at 1/2 the reported detection limit.

NPDES Grab Statistics 7/1/2015 - 6/30/2016

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
SDS6/7 (014)	Count	7	7	7	7	7	7
	Max	7.5		1.02	0.63	0.39	5.65
	95th	7.4		0.85	0.55	0.30	6
	75th	7.4		0.35	0.25	0.10	5
	Median	7.3		0.15	0.05	0.10	2.45
	25th	7.1		0.15	0.05	0.10	2
	Min	6.9		0.15	0.05	0.10	1.45
	SD	0.2		0.32	0.22	0.11	2
	CV%	3%		98%	118%	78%	56%
	#NonDetects	0	0	4	4	6	0
	%NonDetects	0%	0%	57%	57%	86%	0%
	#Trimmed	0	0	0	0	0	0
	%Trimmed	0%	0%	0%	0%	0%	0%
SDN1 (006)	Count	4	4	4	4	4	4
	Max	6.8		1.00	0.56	0.44	9.28
	95th	6.8		0.92	0.50	0.42	9
	75th	6.6		0.61	0.28	0.33	7
	Median	6.5		0.41	0.16	0.25	4.835
	25th	6.4		0.31	0.12	0.18	3
	Min	6.3		0.20	0.10	0.10	2.61
	SD	0.2		0.35	0.21	0.14	3
	CV%	3%		69%	87%	55%	57%
	#NonDetects	0	0	0	0	1	0
	%NonDetects	0%	0%	0%	0%	25%	0%
	#Trimmed	0	0	0	0	0	0
	%Trimmed	0%	0%	0%	0%	0%	0%

Values qualified as non-detect (<) calculated at 1/2 the reported detection limit.

NPDES Grab Statistics 7/1/2015 - 6/30/2016

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
SDW2 (016)	Count	4	4	4	4	4	4
	Max	8.7		0.15	0.05	0.10	1.89
	95th	8.6		0.15	0.05	0.10	2
	75th	8.2		0.15	0.05	0.10	2
	Median	7.9		0.15	0.05	0.10	1.495
	25th	7.9		0.15	0.05	0.10	1
	Min	7.8		0.15	0.05	0.10	0.72
	SD	0.4		0.00	0.00	0.00	0
	CV%	5%		0%	0%	0%	36%
	#NonDetects	0	0	4	4	4	0
	%NonDetects	0%	0%	100%	100%	100%	0%
	#Trimmed	0	0	0	0	0	0
	%Trimmed	0%	0%	0%	0%	0%	0%
SDW1B (017)	Count	4	4	4	4	4	4
	Max	8.8		0.15	0.05	0.10	2.62
	95th	8.7		0.15	0.05	0.10	3
	75th	8.4		0.15	0.05	0.10	2
	Median	7.7		0.15	0.05	0.10	1.63
	25th	7.1		0.15	0.05	0.10	1
	Min	7.1		0.15	0.05	0.10	0.7
	SD	0.8		0.00	0.00	0.00	1
	CV%	11%		0%	0%	0%	51%
	#NonDetects	0	0	4	4	4	0
	%NonDetects	0%	0%	100%	100%	100%	0%
	#Trimmed	0	0	0	0	0	0
	%Trimmed	0%	0%	0%	0%	0%	0%

Values qualified as non-detect (<) calculated at 1/2 the reported detection limit.

NPDES Grab Statistics 7/1/2015 - 6/30/2016

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
SDW1A (018)	Count	4	4	4	4	4	4
	Max	8.4		0.15	0.05	0.10	2.58
	95th	8.2		0.15	0.05	0.10	3
	75th	7.7		0.15	0.05	0.10	2
	Median	7.5		0.15	0.05	0.10	1.985
	25th	7.4		0.15	0.05	0.10	2
	Min	7.2		0.15	0.05	0.10	1.25
	SD	0.5		0.00	0.00	0.00	1
	CV%	7%		0%	0%	0%	28%
	#NonDetects	0	0	4	4	4	0
	%NonDetects	0%	0%	100%	100%	100%	0%
	#Trimmed	0	0	0	0	0	0
	%Trimmed	0%	0%	0%	0%	0%	0%
SDN3A (019)	Count	4	4	4	4	4	4
	Max	7.8		0.15	0.05	0.10	2.8
	95th	7.8		0.15	0.05	0.10	3
	75th	7.7		0.15	0.05	0.10	2
	Median	7.6		0.15	0.05	0.10	1.31
	25th	7.3		0.15	0.05	0.10	1
	Min	7.2		0.15	0.05	0.10	0.69
	SD	0.3		0.00	0.00	0.00	1
	CV%	4%		0%	0%	0%	65%
	#NonDetects	0	0	4	4	4	0
	%NonDetects	0%	0%	100%	100%	100%	0%
	#Trimmed	0	0	0	0	0	0
	%Trimmed	0%	0%	0%	0%	0%	0%

Values qualified as non-detect (<) calculated at 1/2 the reported detection limit.

NPDES Grab Statistics 7/1/2015 - 6/30/2016

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
SDN2/3/4 (007)	Count	4	4	4	4	4	4
	Max	8.4		0.22	0.12	0.10	2.81
	95th	8.3		0.21	0.11	0.10	3
	75th	8.2		0.17	0.07	0.10	3
	Median	7.9		0.15	0.05	0.10	1.955
	25th	7.6		0.15	0.05	0.10	1
	Min	7.6		0.15	0.05	0.10	1.03
	SD	0.4		0.04	0.04	0.00	1
	CV%	5%		21%	52%	0%	47%
	#NonDetects	0	0	3	3	4	0
	%NonDetects	0%	0%	75%	75%	100%	0%
	#Trimmed	0	0	0	0	0	0
	%Trimmed	0%	0%	0%	0%	0%	0%
SDD06A (020)	Count	5	5	5	5	5	5
	Max	7.2		1.77	1.20	0.57	12.2
	95th	7.1		1.45	0.97	0.48	10
	75th	6.9		0.15	0.05	0.10	3
	Median	6.9		0.15	0.05	0.10	2.05
	25th	6.9		0.15	0.05	0.10	1
	Min	6.8		0.15	0.05	0.10	1.22
	SD	0.1		0.72	0.51	0.21	5
	CV%	2%		153%	184%	108%	121%
	#NonDetects	0	0	4	4	4	0
	%NonDetects	0%	0%	80%	80%	80%	0%
	#Trimmed	0	0	0	0	0	0
	%Trimmed	0%	0%	0%	0%	0%	0%

Values qualified as non-detect (<) calculated at 1/2 the reported detection limit.

NPDES Grab Statistics 7/1/2015 - 6/30/2016

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
Landside (SDE4/SDS1, SDN1, SDD06A)	Count	16	16	16	16	16	16
	Max	7.5		9.00	2.40	6.60	12.2
	95th	7.3		3.77	1.50	2.35	12
	75th	7.0		0.79	0.38	0.41	7
	Median	6.9		0.28	0.13	0.16	3.14
	25th	6.8		0.15	0.05	0.10	2
	Min	6.3		0.15	0.05	0.10	1.22
	#NonDetects	0	0	6	6	8	0
	%NonDetects	0%	0%	38%	38%	50%	0%
	#Trimmed	0	0	0	0	0	0
	%Trimmed	0%	0%	0%	0%	0%	0%
Airfield (SDS3/5, SDS4, SDS6/7, SDW2, SDW1B, SDW1A, SDN3A, SDN2/3/4)	Count	37	37	37	37	37	37
	Max	8.8		1.02	0.63	0.39	5.65
	95th	8.4		0.47	0.31	0.12	5
	75th	7.8		0.15	0.05	0.10	2
	Median	7.4		0.15	0.05	0.10	1.67
	25th	7.2		0.15	0.05	0.10	1
	Min	6.7		0.15	0.05	0.10	0.5
	SD	0.5		0.16	0.11	0.05	1
	CV%	7%		80%	130%	46%	66%
	#NonDetects	0	0	31	31	35	0
	%NonDetects	0%	0%	84%	84%	95%	0%
	#Trimmed	0	0	0	0	0	0
	%Trimmed	0%	0%	0%	0%	0%	0%

Values qualified as non-detect (<) calculated at 1/2 the reported detection limit.

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NPDES Grab Sample Data 7/1/2015 - 6/30/2016

SAMPLE DATA			STORM CHARACTERISTICS								CONCENTRATION, mg/L							
Seq	Out fall	Sample ID	Storm Date	Dpth in	Dur hr	MaxInt in/hr	24hrant in	48hrant in	Dryant hr	Ground Deice?	pH	Sheen	TPH-Dx	TPH - D	TPH - MO	Turb		
1	SDE4/SDS1	SDE4/S1081415GRAB	8/14/2015	1.01	8	0.36	0	0	49	No	6.98	No Sheen	2.03	1.1	0.93	12.0		
2	SDE4/SDS1	SDE4/S1111115GRAB	11/10/2015	0.11	5	0.06	0	0.16	33	No	6.93	No Sheen	0.23	0.13	< 0.20	2.97		
3	SDE4/SDS1	SDE4/S1120115GRAB	12/1/2015	0.5	11	0.11	0	0.03	24.5	No	6.88	No Sheen	< 0.3	< 0.10	< 0.20	1.99		
4	SDE4/SDS1	SDE4/S1021716GRAB	2/17/2016	0.48	18	0.16	0	0.16	34	No	7.22	No Sheen	9	2.4	6.6	9.77		
5	SDE4/SDS1	SDE4/S1030116GRAB	2/29/2016	0.98	29	0.11	0	0.8	24	No	6.93	No Sheen	< 0.3	< 0.10	< 0.20	3.76		
6	SDE4/SDS1	SDE4/S1051916GRAB	5/19/2016	0.18	3.25	0.09	0	0	62	No	7.53	No Sheen	0.72	0.32	0.40	4.35		
7	SDE4/SDS1	SDE4/S1061716GRAB	6/17/2016	0.17	10	0.06	0	0	65	No	7.08	No Sheen	0.58	0.28	0.30	1.97		
8	SDS3/5	SDS3/5081415GRAB	8/14/2015	1.01	8	0.36	0	0	49	No	7.64	No Sheen	0.51	0.30	0.21	2.20		
9	SDS3/5	SDS3/5111215GRAB	11/12/2015	4.19	65	0.2	0	0.09	39	No	7.62	No Sheen	< 0.3	< 0.10	< 0.20	0.60		
10	SDS3/5	SDS3/5120115GRAB	12/1/2015	0.5	11	0.11	0	0.03	24.5	No	7.45	No Sheen	< 0.3	< 0.10	< 0.20	0.51		
11	SDS3/5	SDS3/5021716GRAB	2/17/2016	0.48	18	0.16	0	0.16	34	No	7.54	No Sheen	< 0.3	< 0.10	< 0.20	1.40		
12	SDS3/5	SDS3/5041416GRAB	4/14/2016	0.22	24	0.12	0	0.33	25	No	7.25	No Sheen	< 0.3	< 0.10	< 0.20	1.47		
13	SDS4	SDS4081415GRAB	8/14/2015	1.01	8	0.36	0	0	49	No	6.91	No Sheen	0.24	0.14	< 0.20	1.67		
14	SDS4	SDS4111715GRAB	11/16/2015	0.94	25	0.12	0	1.59	31	No	6.94	No Sheen	< 0.3	< 0.10	< 0.20	1.80		
15	SDS4	SDS4120115GRAB	12/1/2015	0.5	11	0.11	0	0.03	24.5	No	7.04	No Sheen	< 0.3	< 0.10	< 0.20	0.80		
16	SDS4	SDS4021716GRAB	2/17/2016	0.48	18	0.16	0	0.16	34	No	7.12	No Sheen	< 0.3	< 0.10	< 0.20	2.32		
17	SDS4	SDS4041216GRAB	4/12/2016	0.33	8	0.1	0	0	206	No	6.66	No Sheen	< 0.3	< 0.10	< 0.20	0.50		
18	SDS6/7	SDS6/7081415GRAB	8/14/2015	1.01	8	0.36	0	0	49	No	6.95	No Sheen	1.02	0.63	0.39	5.26		
19	SDS6/7	SDS6/7082915GRAB	8/29/2015	1.51	35	0.35	0.02	0.02	19	No	7.35	No Sheen	0.46	0.36	< 0.20	5.65		
20	SDS6/7	SDS6/7111115GRAB	11/10/2015	0.11	5	0.06	0	0.16	33	No	7.36	No Sheen	< 0.3	< 0.10	< 0.20	2.30		
21	SDS6/7	SDS6/7111215GRAB	11/12/2015	4.19	65	0.2	0	0.09	39	No	7.46	No Sheen	< 0.3	< 0.10	< 0.20	1.58		
22	SDS6/7	SDS6/7120115GRAB	12/1/2015	0.5	11	0.11	0	0.03	24.5	No	7.05	No Sheen	< 0.3	< 0.10	< 0.20	2.45		
23	SDS6/7	SDS6/7021716GRAB	2/17/2016	0.48	18	0.16	0	0.16	34	No	7.36	No Sheen	< 0.3	< 0.10	< 0.20	5.63		
24	SDS6/7	SDS6/7041216GRAB	4/12/2016	0.33	8	0.1	0	0	206	No	7.14	No Sheen	0.24	0.14	< 0.20	1.45		
25	SDN1	SDN11111215GRAB	11/12/2015	4.19	65	0.2	0	0.09	39	No	6.32	No Sheen	1	0.56	0.44	6.36		
26	SDN1	SDN1120115GRAB	12/1/2015	0.5	11	0.11	0	0.03	24.5	No	6.80	No Sheen	0.2	0.10	< 0.20	2.61		
27	SDN1	SDN1021716GRAB	2/17/2016	0.48	18	0.16	0	0.16	34	No	6.41	No Sheen	0.34	0.13	0.21	3.31		
28	SDN1	SDN1041216GRAB	4/12/2016	0.33	8	0.1	0	0	206	No	6.50	No Sheen	0.48	0.19	0.29	9.28		
29	SDW2	SDW2111215GRAB	11/12/2015	4.19	65	0.2	0	0.09	39	No	7.77	No Sheen	< 0.3	< 0.10	< 0.20	1.39		
30	SDW2	SDW2120115GRAB	12/1/2015	0.5	11	0.11	0	0.03	24.5	No	7.97	No Sheen	< 0.3	< 0.10	< 0.20	0.72		
31	SDW2	SDW2030116GRAB	2/29/2016	0.98	29	0.11	0	0.8	24	No	7.92	No Sheen	< 0.3	< 0.10	< 0.20	1.89		
32	SDW2	SDW2041216GRAB	4/12/2016	0.33	8	0.1	0	0	206	No	8.72	No Sheen	< 0.3	< 0.10	< 0.20	1.60		

R=Rejected Non-Representative Data - Refer to line comment for detail
L:\EMIS_SQL\Production\Surfacewater\SurfaceWater_SQL.mdb/rptSWNPDESGrabO

Port of Seattle
EMIS

NPDES Grab Sample Data 7/1/2015 - 6/30/2016

SAMPLE DATA			STORM CHARACTERISTICS								CONCENTRATION, mg/L							
Seq	Out fall	Sample ID	Storm Date	Dpth in	Dur hr	MaxInt in/hr	24hrant in	48hrant in	Dryant hr	Ground Deice?	pH	Sheen	TPH-Dx	TPH - D	TPH - MO	Turb		
33	SDW1B	SDW1B111715GRAB	11/16/2015	0.94	25	0.12	0	1.59	31	No	7.07	No Sheen	< 0.3	< 0.10	< 0.20	2.62		
34	SDW1B	SDW1B120115GRAB	12/1/2015	0.5	11	0.11	0	0.03	24.5	No	8.31	No Sheen	< 0.3	< 0.10	< 0.20	0.70		
35	SDW1B	SDW1B021716GRAB	2/17/2016	0.48	18	0.16	0	0.16	34	No	7.16	No Sheen	< 0.3	< 0.10	< 0.20	2.01		
36	SDW1B	SDW1B041216GRAB	4/12/2016	0.33	8	0.1	0	0	206	No	8.78	No Sheen	< 0.3	< 0.10	< 0.20	1.25		
37	SDW1A	SDW1A111715GRAB	11/16/2015	0.94	25	0.12	0	1.59	31	No	7.16	No Sheen	< 0.3	< 0.10	< 0.20	2.05		
38	SDW1A	SDW1A120115GRAB	12/1/2015	0.5	11	0.11	0	0.03	24.5	No	7.54	No Sheen	< 0.3	< 0.10	< 0.20	1.25		
39	SDW1A	SDW1A021716GRAB	2/17/2016	0.48	18	0.16	0	0.16	34	No	7.43	No Sheen	< 0.3	< 0.10	< 0.20	1.92		
40	SDW1A	SDW1A041216GRAB	4/12/2016	0.33	8	0.1	0	0	206	No	8.36	No Sheen	< 0.3	< 0.10	< 0.20	2.58		
41	SDN3A	SDN3A111715GRAB	11/16/2015	0.94	25	0.12	0	1.59	31	No	7.19	No Sheen	< 0.3	< 0.10	< 0.20	2.80		
42	SDN3A	SDN3A120115GRAB	12/1/2015	0.5	11	0.11	0	0.03	24.5	No	7.77	No Sheen	< 0.3	< 0.10	< 0.20	0.69		
43	SDN3A	SDN3A021716GRAB	2/17/2016	0.48	18	0.16	0	0.16	34	No	7.38	No Sheen	< 0.3	< 0.10	< 0.20	1.85		
44	SDN3A	SDN3A041216GRAB	4/12/2016	0.33	8	0.1	0	0	206	No	7.74	No Sheen	< 0.3	< 0.10	< 0.20	0.77		
45	SDN2/3/4	SDN2/3/4111315GRAB	11/12/2015	4.19	65	0.2	0	0.09	39	No	7.55	No Sheen	0.22	0.12	< 0.20	1.27		
46	SDN2/3/4	SDN2/3/4120115GRAB	12/1/2015	0.5	11	0.11	0	0.03	24.5	No	8.20	No Sheen	< 0.3	< 0.10	< 0.20	1.03		
47	SDN2/3/4	SDN2/3/4021716GRAB	2/17/2016	0.48	18	0.16	0	0.16	34	No	7.68	No Sheen	< 0.3	< 0.10	< 0.20	2.81		
48	SDN2/3/4	SDN2/3/4041416GRAB	4/14/2016	0.22	24	0.12	0	0.33	25	No	8.36	No Sheen	< 0.3	< 0.10	< 0.20	2.64		
49	SDD06A	SDD06A081415GRAB	8/14/2015	1.01	8	0.36	0	0	49	No	6.86	No Sheen	1.77	1.2	0.57	12.2		
50	SDD06A	SDD06A111715GRAB	11/16/2015	0.94	25	0.12	0	1.59	31	No	6.88	No Sheen	< 0.3	< 0.10	< 0.20	2.67		
51	SDD06A	SDD06A120115GRAB	12/1/2015	0.5	11	0.11	0	0.03	24.5	No	6.83	No Sheen	< 0.3	< 0.10	< 0.20	2.05		
52	SDD06A	SDD06A021716GRAB	2/17/2016	0.48	18	0.16	0	0.16	34	No	6.91	No Sheen	< 0.3	< 0.10	< 0.20	1.24		
53	SDD06A	SDDO6A041216GRAB	4/12/2016	0.33	8	0.1	0	0	206	No	7.16	No Sheen	< 0.3	< 0.10	< 0.20	1.22		

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APPENDIX B

OTHER SAMPLE DATA

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NPDES Other Parameters - 7/1/2015-6/30/2016

																Metals		
Outfall	Sample	Storm	depth	dur	maxint	ant24	ant48	dryant	Event Type	Sub Type	Type	Comp Type	Purpose	Grnd Deice	Comment	Cu Total mg/l	Pb Total mg/l	Zn Total mg/l
SDE4/SD9	SDE4/S1021816GRAB	2/17/2016	0.48	18	0.16	0	0.16	34	NPDES-Part II	first flush grab	GRAB		Other	No	N	0.0061	0.0005	0.025

QC Samples Blanks - 7/1/2015-6/30/2016

															Conventionals	Metals			Organics	
Outfall	Sample	Storm	depth	dur	maxint	ant24	ant48	dryant	Event Type	Sub Type	Type	Comp Type	Purpose	Grnd Deice	Comment	Turb NTU	Cu Total mg/l	Pb Total mg/l	Zn Total mg/l	E-glycol mg/l	P-glycol mg/l
SDN8	SDN8120315GRAB	12/1/2015	0.5	11	0.11	0	0.03	24.5	NPDES-Part II	first flush grab	EB		FldQC	No			< 0.00025	< 0.00005	0.006		
SDE4/SDS1	SDE4/S1081515BLNK	8/14/2015	1.01	8	0.36	0	0	49	NPDES-Part II	first flush grab	FB		FldQC	No			< 0.00025	< 0.00005	0.006		
SDE4/SDS1	SDE4/S1030216ERB	2/29/2016	0.98	29	0.11	0	0.8	24	NPDES-Part II	first flush grab	FB		FldQC	No		< 0.025	< 0.00025		< 0.002		
SDN2/3/4	SDN2/3/4120315BLNK	12/1/2015	0.5	11	0.11	0	0.03	24.5	NPDES-Part II	first flush grab	FB		FldQC	No			< 0.00025	< 0.00005	< 0.002	< 5	< 5

QC Samples Blanks - 7/1/2015-6/30/2016

		TPH			
Outfall	Sample	Sheen N/A	TPH-D mg/l	TPH-Dx mg/l	TPH-MO mg/l
SDN8	SDN8120315GRAB				
SDE4/SDS1	SDE4/S1081515BLNK	No Sheen	< 0.05	< 0.15	< 0.1
SDE4/SDS1	SDE4/S1030216ERB		< 0.05	< 0.15	< 0.1
SDN2/3/4	SDN2/3/4120315BLNK		< 0.05	< 0.15	< 0.1

QC Samples Dups - 7/1/2015-6/30/2016

															Conventionals		Metals			Organics	
Outfall	Sample	Storm	depth	dur	maxint	ant24	ant48	dryant	Event Type	Sub Type	Comp Type	Type	Purpose	Grnd Deice	Comment	ph pH Units	Turb NTU	Cu Total mg/l	Pb Total mg/l	Zn Total mg/l	E-glycol mg/l	
SDE4/SDS1	SDE4/S1081415DUPC	8/14/2015	1.01	8	0.36	0	0	49	NPDES-Part II	flow-wt comp	EMC	FD	FldQC	No				0.0374	0.0023	0.067		
SDW2	SDW2030116DUPG	2/29/2016	0.98	29	0.11	0	0.8	24	NPDES-Part II	first flush grab		FD	FldQC	No		7.91	1.84					
SDW2	SDW2030216DUPC	2/29/2016	0.98	29	0.11	0	0.8	24	NPDES-Part II	flow-wt comp	SMC	FD	FldQC	No				0.0045		0.006		
SDW1B	SDW1B041216DUPG	4/12/2016	0.33	8	0.1	0	0	206	NPDES-Part II	first flush grab		FD	FldQC	No		8.77	1.18					
SDW1B	SDW1B041316DUPC	4/12/2016	0.33	8	0.1	0	0	206	NPDES-Part II	flow-wt comp	EMC	FD	FldQC	No				0.0033		< 0.002		
SDN3A	SDN3A111715DUP	11/16/2015	0.94	25	0.12	0	1.59	31	NPDES-Part II	first flush grab		FD	FldQC	No		7.37	2.82					
SDN3A	SDN3A111815DUPC	11/16/2015	0.94	25	0.12	0	1.59	31	NPDES-Part II	flow-wt comp	SMC	FD	FldQC	No				0.0029	0.0001	0.004	< 5	<
SDN2/3/4	SDN2/3/4120115DUPG	12/1/2015	0.5	11	0.11	0	0.03	24.5	NPDES-Part II	first flush grab		FD	FldQC	No		8.38	1.04					
SDN2/3/4	SDN2/3/4120215DUPC	12/1/2015	0.5	11	0.11	0	0.03	24.5	NPDES-Part II	flow-wt comp	EMC	FD	FldQC	No				0.0059	0.0001	0.008	< 5	<

QC Samples Dups - 7/1/2015-6/30/2016

		;	TPH			
Outfall	Sample	P-glycol mg/l	Sheen N/A	TPH-D mg/l	TPH-Dx mg/l	TPH-MO mg/l
SDE4/SDS1	SDE4/S1081415DUPC		No Sheen			
SDW2	SDW2030116DUPG		No Sheen	< 0.05	< 0.15	< 0.1
SDW2	SDW2030216DUPC					
SDW1B	SDW1B041216DUPG		No Sheen	< 0.05	< 0.15	< 0.1
SDW1B	SDW1B041316DUPC					
SDN3A	SDN3A111715DUP		No Sheen	< 0.05	< 0.15	< 0.1
SDN3A	SDN3A111815DUPC	5				
SDN2/3/4	SDN2/3/4120115DUPG		No Sheen	< 0.05	< 0.15	< 0.1
SDN2/3/4	SDN2/3/4120215DUPC	5				