Annual Industrial Stormwater Monitoring Report

Seattle-Tacoma International Airport

For the Period July 1, 2016 through June 30, 2017

September 29, 2017

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, 2016 and June 30, 2017 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 2016-2017 data collection period. A total of 45 grab and 41 composite stormwater samples from 11 storm events were collected in the past year with results reported on quarterly Discharge Monitoring Reports (DMRs).

There were three instances of permit limit exceedances associated with 280 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. This activity included *in situ* toxicity sampling (Condition 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 2016 through June 2017. 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 Port's 2016 Airport Activity Report, STIA handled 412,170 aircraft operations, 366,000 metric tons of air cargo, and 45.7 million passengers. In 2016, the Airports Council International ranked STIA the nineth 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 during future development. As of June 30, 2017, 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

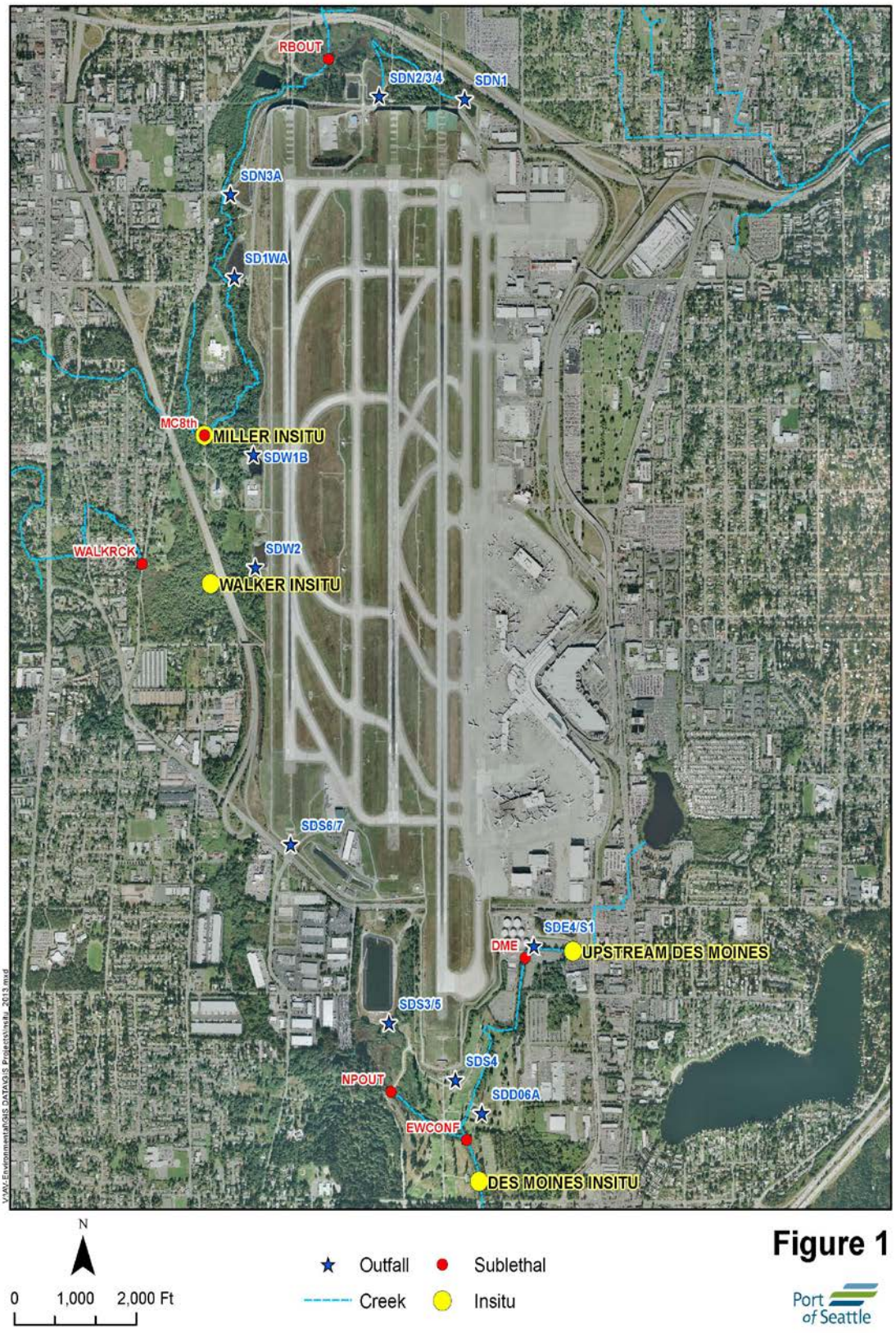
Table 1. STIA Subbasins Characteristics

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.

NOTE: Data within this table is currently in process of verification and update to be completed by the next reporting period.

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 *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[3].
Oil & Grease - TPH (by GC)	NWTPH-Dx[(2)]	0.75 mg/l	grab	15 mg/L – no sheen
Turbidity	180.1[(1)]	0.05 NTU	grab	25 NTUs
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. Method reports both a motor oil fraction and diesel fraction. TPH-Dx is the sum of these two fractions.
3. 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).

Seven Field Quality Control samples were collected in the 2016 – 2017 reporting period There were no anomalies associated with samples collected during these same storm events.

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.

3.1.3 Storm Events Sampled

During the current permit's annual reporting schedule, 48.25 inches of rain fell at STIA, 9.98 inches more than the historical normal of 38.27 inches and 3.18 inches less than the past monitoring year (51.43 inches). Monthly rainfall totals were well

below average in August, September, December and January. October, February and March all had more monthly rainfall than normal with October and February having over two times the monthly normal rainfall (Figure 2).

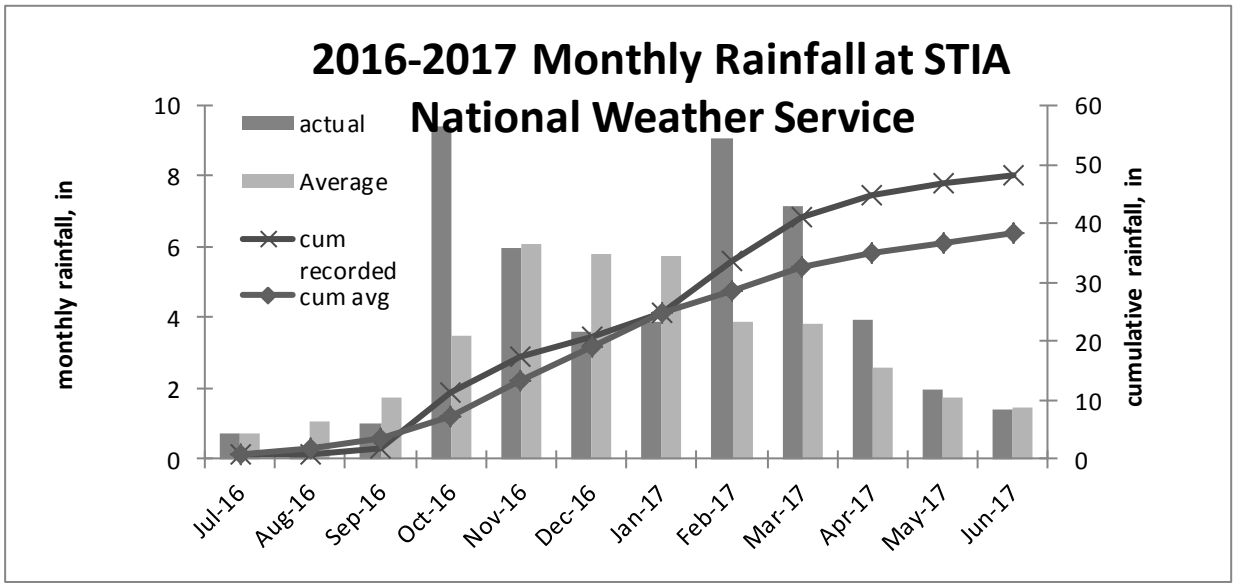


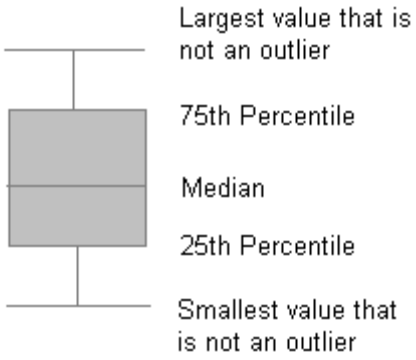
Figure 2. Rainfall Summary

In the 12 months ending June 30, 2016, the STIA sampled 11 rainfall events with rainfall ranging from 0.13 to 2.2 inches. Dry weather preceding these events ranged from 14 hours (March 3, 2017) to 4.8 days (August 2, 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].

3.1.4 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.

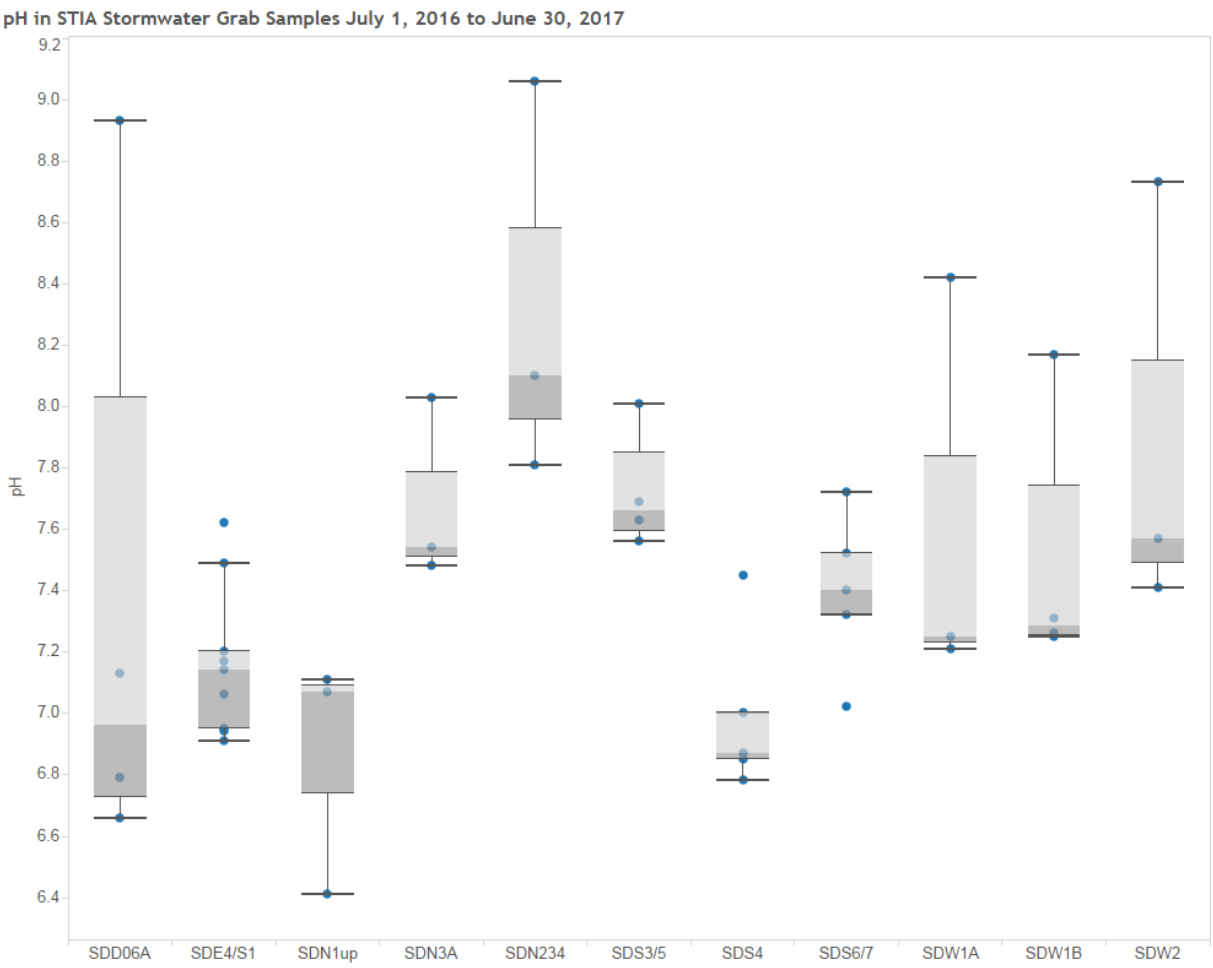
Appendix A tabulates and summarizes analytical results for each outfall for parameters required by the current permit, for the current annual reporting period July 1, 2016 through June 30, 2017. All data included in Appendix A has previously been provided to Ecology in quarterly DMRs and represents samples collected from those storms and sampling routines that met the criteria of the QAPP.

3.1.5 Grab Sample Results and Discussion

The following discussion includes results from 45 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.

3.1.5.1 pH

Figure 3 shows pH data for the current year. The median pH value from all outfalls was 7.3. 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 three samples. The September 6, 2016 sample for SDD06A and the April 4, 2017 sample for SDN2/3/4 were both above the permit effluent limit, 8.93 and 9.03 respectfully. The October 19, 2016 SDN1 sample was below the lower permit effluent limit at 6.41. Construction site monitoring of the receiving water for the SDN1 station, Lake Reba, recorded a pH measurement of 7.56 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. .

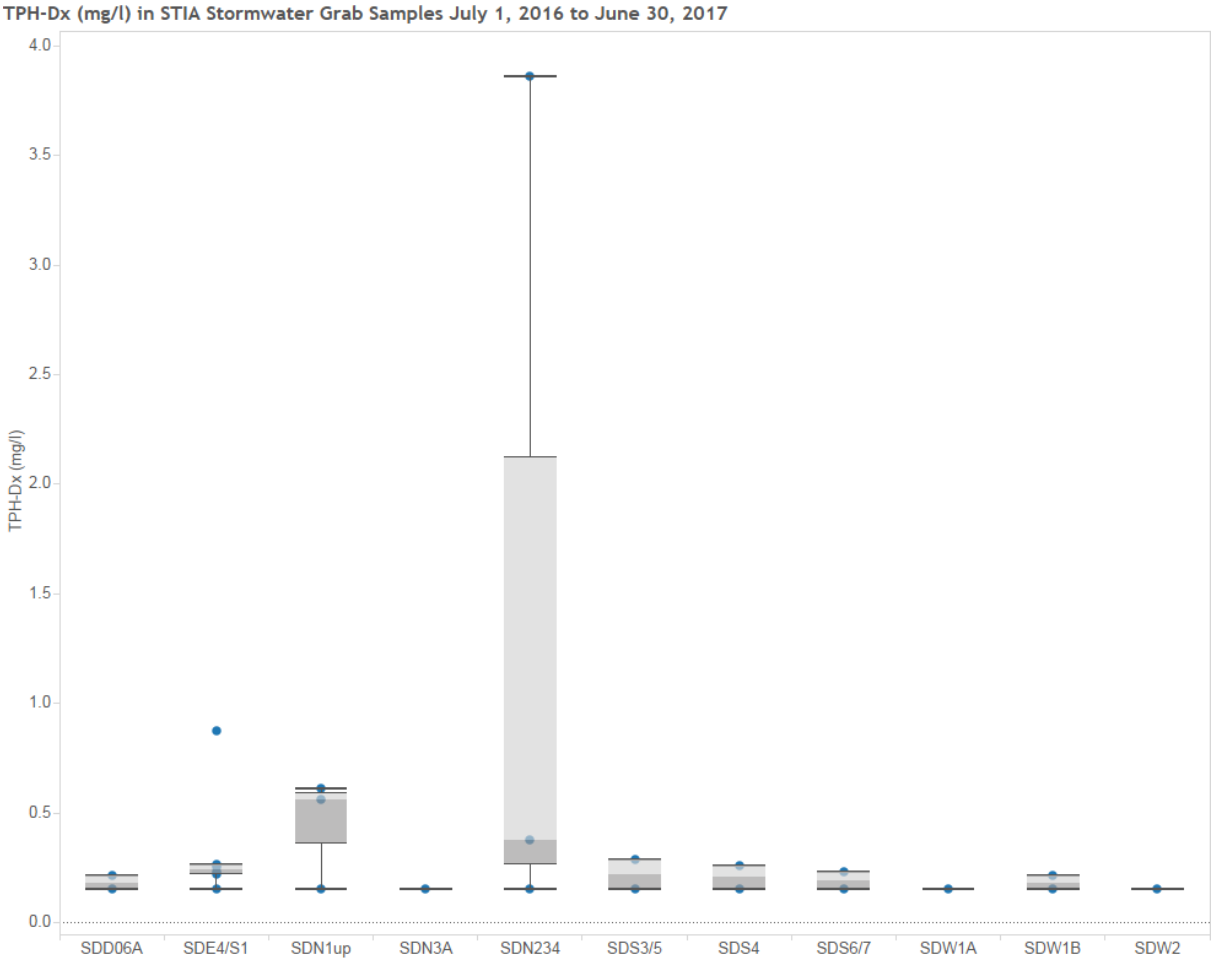


pH effluent limits: Stations SDE4/S1, SDD06A, SDN1, SDN2/3/4, SDS3/5, SDS6/7, SDS4 6.5 to 8.5.
Stations SDN3A, SDW1A, SDW1B, SDW2 6.3 to 9.0

Figure 3. pH Results

3.1.5.2 Total Petroleum Hydrocarbons (TPH)

Figure 4 shows TPH data for the current reporting year. TPH ranged from less than 0.15 mg/L to 3.86 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 9 of the 41 samples. All sample results were well below the TPH effluent limit of 15 mg/L.

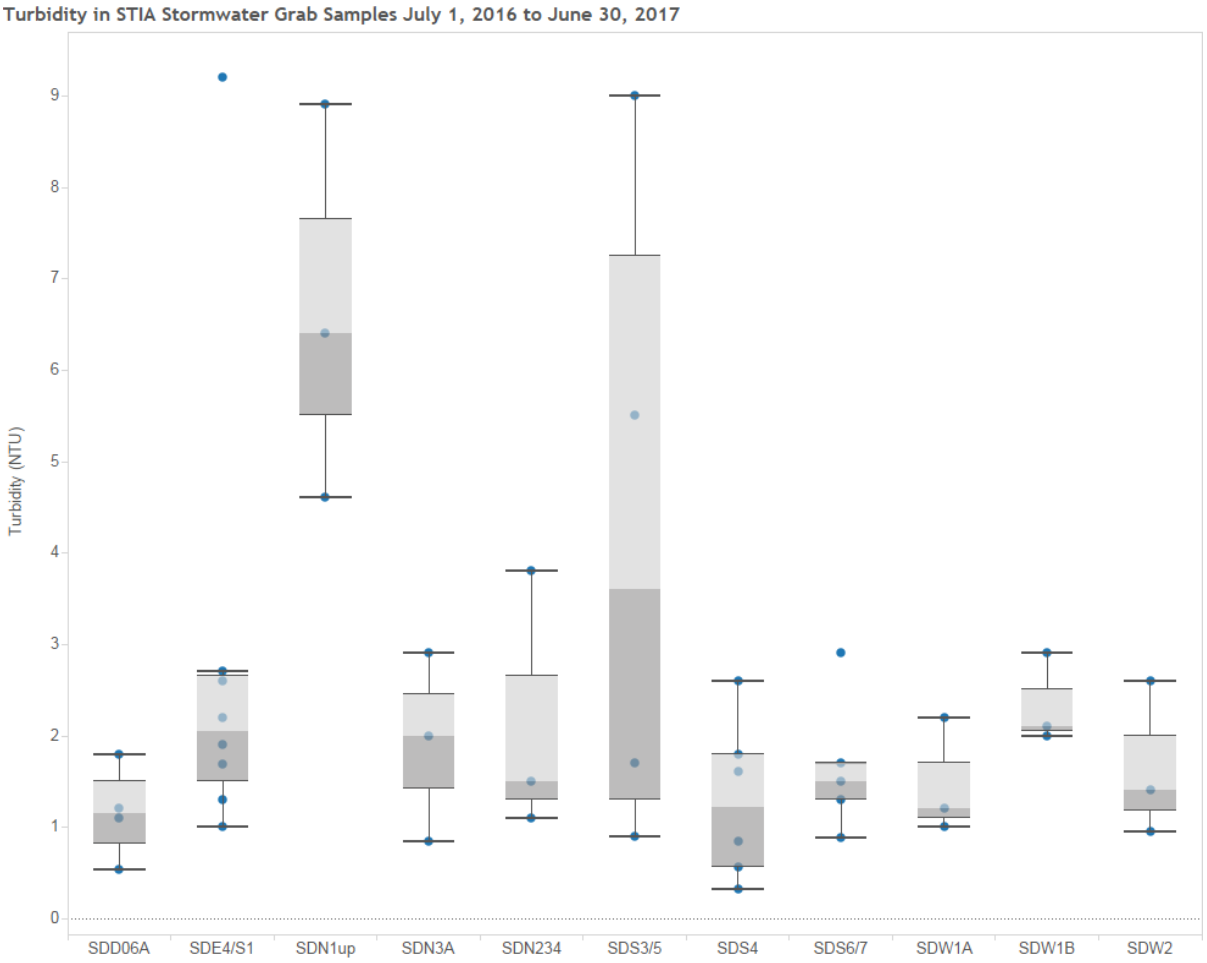


TPH Effluent Limit = 15 mg/L

Figure 4. TPH Results

3.1.5.3 Turbidity

Turbidity results for the current year are shown in Figure 5. The median turbidity for all outfalls was 1.8 NTU with a range from 0.32 NTU to 9.2 NTU. There were no permit limit exceedances for turbidity at any outfall during the monitoring period.



Turbidity Effluent Limit = 25 NTU

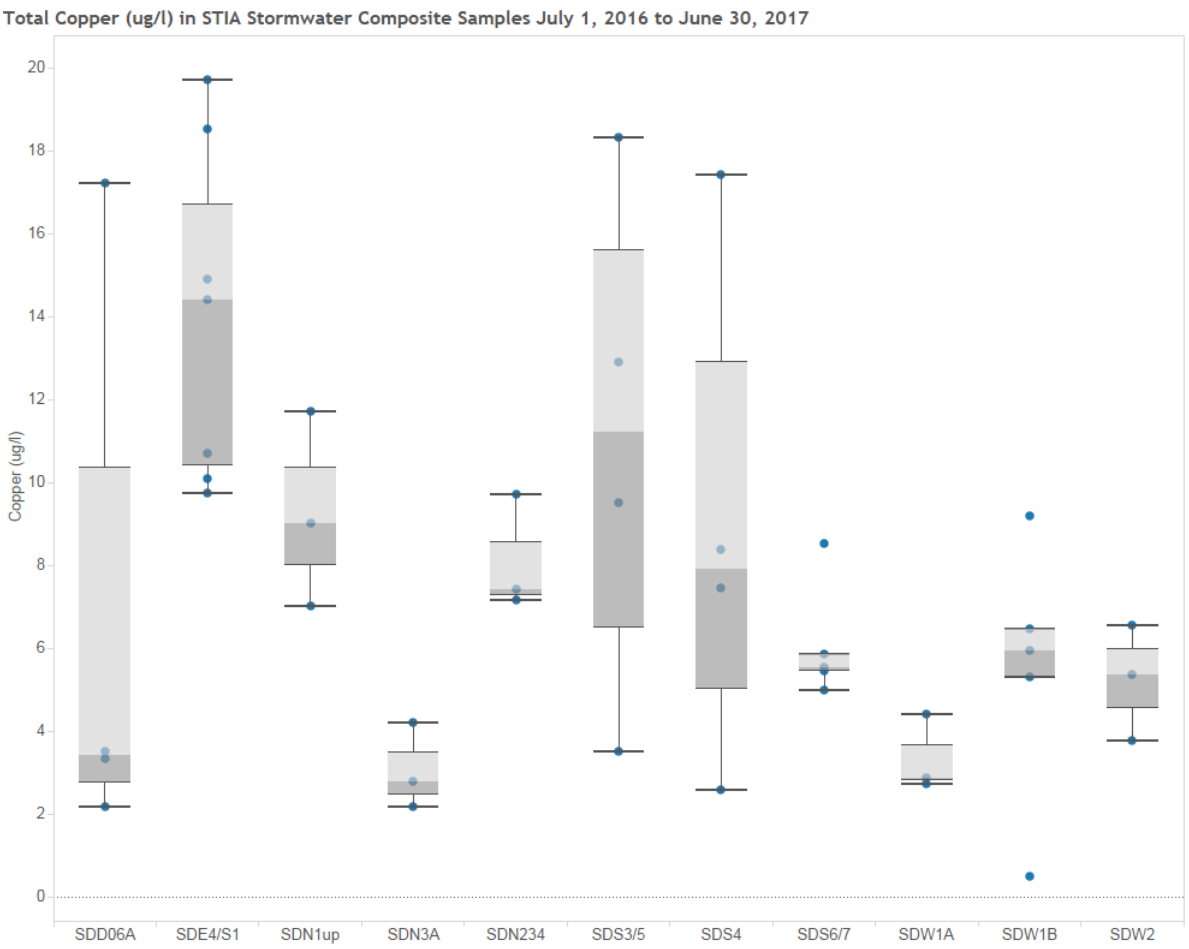
Figure 5. Turbidity Results

3.1.6 Composite Sample Results and Discussion

For the 2016-2017 sampling period, the STIA collected a total of 41 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 a flow-weighted average value 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).

3.1.6.1 Copper

All data reported below are for total recoverable copper. The median copper concentration for all outfalls was 7.0 µg/L, with individual storm sample concentrations ranging from 2.0 µg/L to 20 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 no permit limit exceedances for copper at during the monitoring year.

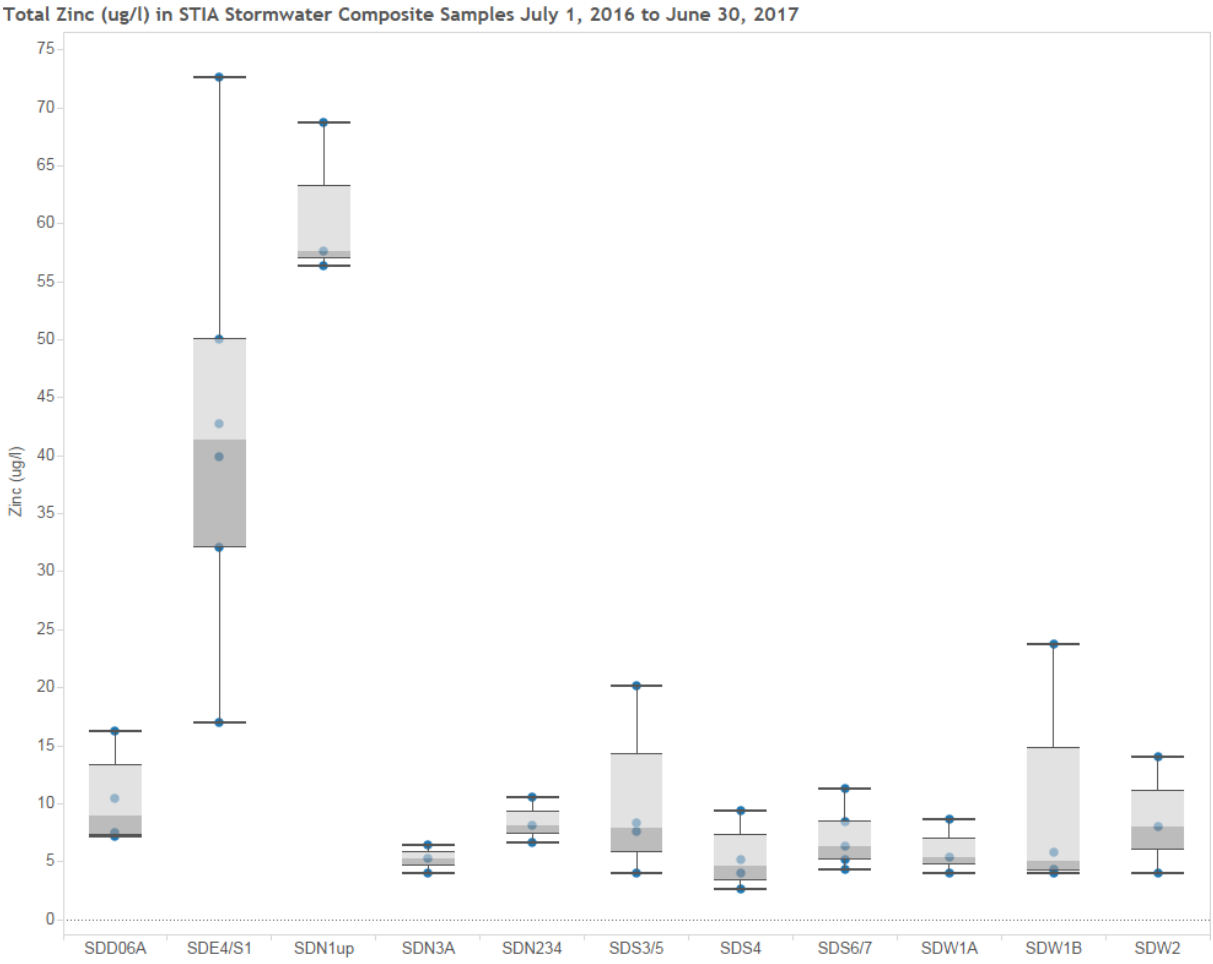


Effluent limits by outfall: 32.2 ug/l (SDS3/5, SDS4, SDS6/7), 28.5 ug/l (SDN1, SDN2/3/4), 25.6 ug/l (SDE4/S1, SDD06A), 59.2 ug/l (SDN3A, SDW1A, SDW1B), 47.9 ug/l (SDW2)

Figure 6. Copper Results

3.1.6.2 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 73 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 the *in situ* monitoring program that was completed during fall season 2016 and spring season 2017.

3.2.1 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 the Port's Permit, WA0024651, Part 2. 2S9, and are 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).

There were generally no adverse effects observed ($p > 0.01$) at Miller Creek and Walker Creek compared with controls in both testing events. There were also no adverse effects observed at Des Moines Creek at 200th during the Fall 2016 event, but reduced hatching success and survival were observed in Spring 2017.

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. Adverse effects were also observed at Des Moines Creek at 200th during the Spring 2017 deployment, with significant reduction in hatching success and survival compared to the control. Although the severity of effects observed at Des Moines Creek at 200th was greater than observed at the upstream Des Moines Creek site, it is possible that the downstream effects could be related at least in part to inputs originating upstream of STIA.

For a full discussion on results of the sampling, please refer to *Rainbow Trout Early Life Stages In Situ Monitoring Testing, Fall 2016 and Spring 2017 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 2016-2017 year the major BMP related work involved completion of tasks begun in early summer of 2016. These efforts were outlined in the 2015-16 report as they were substantially completed then. The 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 (Summer 2016 completion). 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 (August 2016 completion). These future subbasins/outfalls currently serve construction however LID BMPs elements were added in anticipation of future industrial activities in the subbasins. BMPs are maintained on scheduled frequency to ensure effluent limits are being met.

5.0 SUMMARY AND CONCLUSIONS

During the reporting period from July 2016 to June 2017 the STIA fulfilled requirements for outfall monitoring under the current NPDES permit by collecting a total of 45 grab samples and 41 composite stormwater samples during 11 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 three instances of effluent limit exceedance associated with the 86 samples and 280 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.

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APPENDIX A

TABULAR NPDES SAMPLE DATA SUMMARIES and STATISTICS

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Port of Seattle
EMIS

NPDES Grab Statistics 7/1/2016 - 6/30/2017

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
All Outfalls	Count	45	45	45	45	45	45
	Max	9.1		3.86	2.54	1.32	9.2
	95th	8.7		0.60	0.27	0.39	8
	75th	7.6		0.21	0.11	0.10	3
	Median	7.3		0.15	0.05	0.10	1.8
	25th	7.0		0.15	0.05	0.10	1
	Min	6.4		0.15	0.05	0.10	0.32
	SD	0.6		0.22	0.10	0.13	3
	CV%	8%		80%	86%	80%	87%
	#NonDetects	0	0	32	32	41	0
	%NonDetects	0%	0%	71%	71%	91%	0%
	#Trimmed	0	0	0	0	0	0
	%Trimmed	0%	0%	0%	0%	0%	0%
SDE4/SDS1 (002)	Count	8	8	8	8	8	8
	Max	7.6		0.87	0.41	0.47	9.2
	95th	7.5		0.66	0.32	0.34	7
	75th	7.2		0.23	0.14	0.10	3
	Median	7.0		0.18	0.08	0.10	2.05
	25th	6.9		0.15	0.05	0.10	2
	Min	6.9		0.15	0.05	0.10	1.3
	SD	0.2		0.25	0.12	0.13	3
	CV%	3%		91%	96%	89%	88%
	#NonDetects	0	0	4	4	7	0
	%NonDetects	0%	0%	50%	50%	88%	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 7/1/2016 - 6/30/2017

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
SDS3/5 (005)	Count	4	4	4	4	4	4
	Max	8.0		0.28	0.18	0.10	9
	95th	8.0		0.26	0.16	0.10	8
	75th	7.8		0.18	0.08	0.10	6
	Median	7.7		0.15	0.05	0.10	3.6
	25th	7.6		0.15	0.05	0.10	2
	Min	7.6		0.15	0.05	0.10	0.9
	SD	0.2		0.07	0.07	0.00	4
	CV%	3%		37%	80%	0%	87%
	#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%
SDS4 (009)	Count	6	6	6	6	6	6
	Max	7.4		0.26	0.16	0.10	2.6
	95th	7.3		0.23	0.13	0.10	2
	75th	7.0		0.15	0.05	0.10	2
	Median	6.9		0.15	0.05	0.10	1.225
	25th	6.9		0.15	0.05	0.10	1
	Min	6.8		0.15	0.05	0.10	0.32
	SD	0.2		0.04	0.04	0.00	1
	CV%	4%		26%	65%	0%	67%
	#NonDetects	0	0	5	5	6	0
	%NonDetects	0%	0%	83%	83%	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 7/1/2016 - 6/30/2017

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
SDS6/7 (014)	Count	5	5	5	5	5	5
	Max	7.7		0.23	0.13	0.10	2.9
	95th	7.7		0.21	0.11	0.10	3
	75th	7.5		0.15	0.05	0.10	2
	Median	7.4		0.15	0.05	0.10	1.5
	25th	7.3		0.15	0.05	0.10	1
	Min	7.0		0.15	0.05	0.10	0.88
	SD	0.3		0.04	0.04	0.00	1
	CV%	3%		21%	54%	0%	46%
	#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%
SDN1 (006)	Count	3	3	3	3	3	3
	Max	7.1		0.61	0.24	0.41	8.9
	95th	7.1		0.60	0.23	0.40	9
	75th	7.1		0.58	0.22	0.37	8
	Median	7.1		0.56	0.20	0.32	6.4
	25th	6.7		0.36	0.12	0.21	6
	Min	6.4		0.15	0.05	0.10	4.6
	SD	0.4		0.25	0.10	0.16	2
	CV%	6%		57%	61%	58%	33%
	#NonDetects	0	0	1	1	1	0
	%NonDetects	0%	0%	33%	33%	33%	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 7/1/2016 - 6/30/2017

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
SDW2 (016)	Count	3	3	3	3	3	3
	Max	8.7		0.15	0.05	0.10	2.6
	95th	8.6		0.15	0.05	0.10	2
	75th	8.1		0.15	0.05	0.10	2
	Median	7.6		0.15	0.05	0.10	1.4
	25th	7.5		0.15	0.05	0.10	1
	Min	7.4		0.15	0.05	0.10	0.95
	SD	0.7		0.00	0.00	0.00	1
	CV%	9%		0%	0%	0%	52%
	#NonDetects	0	0	3	3	3	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	3	3	3	3	3	3
	Max	8.2		0.21	0.11	0.10	2.9
	95th	8.1		0.21	0.11	0.10	3
	75th	7.7		0.18	0.08	0.10	3
	Median	7.3		0.15	0.05	0.10	2.1
	25th	7.3		0.15	0.05	0.10	2
	Min	7.3		0.15	0.05	0.10	2
	SD	0.5		0.04	0.04	0.00	0
	CV%	7%		21%	51%	0%	21%
	#NonDetects	0	0	2	2	3	0
	%NonDetects	0%	0%	67%	67%	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 7/1/2016 - 6/30/2017

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
SDW1A (018)	Count	3	3	3	3	3	3
	Max	8.4		0.15	0.05	0.10	2.2
	95th	8.3		0.15	0.05	0.10	2
	75th	7.8		0.15	0.05	0.10	2
	Median	7.3		0.15	0.05	0.10	1.2
	25th	7.2		0.15	0.05	0.10	1
	Min	7.2		0.15	0.05	0.10	1
	SD	0.7		0.00	0.00	0.00	1
	CV%	9%		0%	0%	0%	44%
	#NonDetects	0	0	3	3	3	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	3	3	3	3	3	3
	Max	8.0		0.15	0.05	0.10	2.9
	95th	8.0		0.15	0.05	0.10	3
	75th	7.8		0.15	0.05	0.10	2
	Median	7.5		0.15	0.05	0.10	2
	25th	7.5		0.15	0.05	0.10	1
	Min	7.5		0.15	0.05	0.10	0.84
	SD	0.3		0.00	0.00	0.00	1
	CV%	4%		0%	0%	0%	54%
	#NonDetects	0	0	3	3	3	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 7/1/2016 - 6/30/2017

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
SDN2/3/4 (007)	Count	3	3	3	3	3	3
	Max	9.1		3.86	2.54	1.32	3.8
	95th	9.0		3.51	2.31	1.20	4
	75th	8.6		2.12	1.41	0.71	3
	Median	8.1		0.37	0.27	0.10	1.5
	25th	8.0		0.26	0.16	0.10	1
	Min	7.8		0.15	0.05	0.10	1.1
	SD	0.7		2.08	1.38	0.70	1
	CV%	8%		142%	144%	139%	68%
	#NonDetects	0	0	1	1	2	0
	%NonDetects	0%	0%	33%	33%	67%	0%
	#Trimmed	0	0	0	0	0	0
	%Trimmed	0%	0%	0%	0%	0%	0%
SDD06A (020)	Count	4	4	4	4	4	4
	Max	8.9		0.21	0.11	0.10	1.8
	95th	8.7		0.20	0.10	0.10	2
	75th	7.6		0.17	0.06	0.10	1
	Median	7.0		0.15	0.05	0.10	1.15
	25th	6.8		0.15	0.05	0.10	1
	Min	6.7		0.15	0.05	0.10	0.54
	SD	1.1		0.03	0.03	0.00	1
	CV%	14%		18%	46%	0%	44%
	#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%

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

Port of Seattle
EMIS

NPDES Grab Statistics 7/1/2016 - 6/30/2017

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
Landside (SDE4/SDS1, SDN1, SDD06A)	Count	15	15	15	15	15	15
	Max	8.9		0.87	0.41	0.47	9.2
	95th	8.0		0.69	0.29	0.43	9
	75th	7.2		0.24	0.14	0.10	4
	Median	7.1		0.15	0.05	0.10	1.9
	25th	6.9		0.15	0.05	0.10	1
	Min	6.4		0.15	0.05	0.10	0.54
	#NonDetects	0	0	8	8	12	0
	%NonDetects	0%	0%	53%	53%	80%	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	30	30	30	30	30	30
	Max	9.1		3.86	2.54	1.32	9
	95th	8.6		0.33	0.23	0.10	5
	75th	7.8		0.15	0.05	0.10	3
	Median	7.5		0.15	0.05	0.10	1.65
	25th	7.3		0.15	0.05	0.10	1
	Min	6.8		0.15	0.05	0.10	0.32
	SD	0.5		0.68	0.45	0.22	2
	CV%	7%		230%	296%	158%	82%
	#NonDetects	0	0	24	24	29	0
	%NonDetects	0%	0%	80%	80%	97%	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.

Port of Seattle
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NPDES Grab Sample Data 7/1/2016 - 6/30/2017

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/S1080216GRAB	8/2/2016	0.13	7	0.08	0	0	116	No	7.62	No Sheen	0.25	0.15	< 0.20	1.69		
2	SDE4/SDS1	SDE4/S1101916GRAB	10/19/2016	1.35	17	0.3	0	0.13	36	No	H 6.95	No Sheen	< 0.3	< 0.100	< 0.200	2.7		
3	SDE4/SDS1	SDE4/S1102616GRAB	10/26/2016	1.35	19	0.26	0.01	0.08	22	No	H 6.94	No Sheen	< 0.3	< 0.100	< 0.200	1.9		
4	SDE4/SDS1	SDE4/S1021417GRAB	2/14/2017	2.2	34.25	0.2	0	0	24.5	No	H 7.06	No Sheen	< 0.3	< 0.100	< 0.200	2.6		
5	SDE4/SDS1	SDE4/S1030317GRAB	3/3/2017	0.35	17	0.11	0.07	0.07	14	No	H 6.95	No Sheen	0.874	0.405	0.469	9.2		
6	SDE4/SDS1	SDE4/S1040417GRAB	4/4/2017	0.57	22	0.06	0	0.05	47	No	H 7.17	No Sheen	0.23	0.130	< 0.200	1.9		
7	SDE4/SDS1	SDE4/S1041017GRAB	4/10/2017	0.34	19	0.11	0	0	39	No	H 6.91	No Sheen	< 0.3	< 0.100	< 0.200	1.3		
8	SDE4/SDS1	SDE4/S1041717GRAB	4/17/2017	0.44	27	0.11	0	0	69	No	H 7.20	No Sheen	0.215	0.115	< 0.200	2.2		
9	SDS3/5	SDS3/5080216GRAB	8/2/2016	0.13	7	0.08	0	0	116	No	8.01	No Sheen	< 0.3	< 0.10	< 0.20	0.90		
10	SDS3/5	SDS3/5101916GRAB	10/19/2016	1.35	17	0.3	0	0.13	36	No	H 7.56	No Sheen	< 0.3	< 0.100	< 0.200	9.0		
11	SDS3/5	SDS3/5021417GRAB	2/14/2017	2.2	34.25	0.2	0	0	24.5	No	H 7.63	No Sheen	0.284	0.184	< 0.200	5.5		
12	SDS3/5	SDS3/5040417GRAB	4/4/2017	0.57	22	0.06	0	0.05	47	No	H 7.69	No Sheen	< 0.3	< 0.100	< 0.200	1.7		
13	SDS4	SDS4090116GRAB	9/1/2016	0.23	15	0.1	0	0.01	23	No	7.45	No Sheen	< 0.3	< 0.100	< 0.200	2.6		
14	SDS4	SDS4090616GRAB	9/6/2016	0.41	6	0.12	0	0	86	No	H 6.85	No Sheen	< 0.3	< 0.100	< 0.200	0.85		
15	SDS4	SDS4102016GRAB	10/19/2016	1.35	17	0.3	0	0.13	36	No	H 6.87	No Sheen	0.259	0.159	< 0.200	1.8		
16	SDS4	SDS4021417GRAB	2/14/2017	2.2	34.25	0.2	0	0	24.5	No	H 6.78	No Sheen	< 0.3	< 0.100	< 0.200	1.6		
17	SDS4	SDS4030317GRAB	3/3/2017	0.35	17	0.11	0.07	0.07	14	No	H 7.00	No Sheen	< 0.3	< 0.100	< 0.200	0.56		
18	SDS4	SDS4041017GRAB	4/10/2017	0.34	19	0.11	0	0	39	No	H 6.87	No Sheen	< 0.3	< 0.100	< 0.200	0.32		
19	SDS6/7	SDS6/7090616GRAB	9/6/2016	0.41	6	0.12	0	0	86	No	H 7.02	No Sheen	0.229	0.129	< 0.200	1.5		
20	SDS6/7	SDS6/7101916GRAB	10/19/2016	1.35	17	0.3	0	0.13	36	No	H 7.32	No Sheen	< 0.3	< 0.100	< 0.200	1.3		
21	SDS6/7	SDS6/7030317GRAB	3/3/2017	0.35	17	0.11	0.07	0.07	14	No	H 7.40	No Sheen	< 0.3	< 0.100	< 0.200	0.88		
22	SDS6/7	SDS6/7040417GRAB	4/4/2017	0.57	22	0.06	0	0.05	47	No	H 7.72	No Sheen	< 0.3	< 0.100	< 0.200	1.7		
23	SDS6/7	SDS6/7041017GRAB	4/10/2017	0.34	19	0.11	0	0	39	No	H 7.52	No Sheen	< 0.3	< 0.100	< 0.200	2.9		
24	SDN1	SDN1101916GRAB	10/19/2016	1.35	17	0.3	0	0.13	36	No	H 6.41	No Sheen	< 0.3	< 0.100	< 0.200	6.4		
25	SDN1	SDN1021417GRAB	2/14/2017	2.2	34.25	0.2	0	0	24.5	No	H 7.07	No Sheen	0.609	0.199	0.410	8.9		
26	SDN1	SDN1040417GRAB	4/4/2017	0.57	22	0.06	0	0.05	47	No	H 7.11	No Sheen	0.561	0.238	0.323	4.6		
27	SDW2	SDW2102016GRAB	10/26/2016	1.35	19	0.26	0.01	0.08	22	No	H 7.57	No Sheen	< 0.3	< 0.100	< 0.200	0.95		
28	SDW2	SDW2021517GRAB	2/14/2017	2.2	34.25	0.2	0	0	24.5	No	H 7.41	No Sheen	< 0.3	< 0.100	< 0.200	2.6		
29	SDW2	SDW2040517GRAB	4/4/2017	0.57	22	0.06	0	0.05	47	No	H 8.73	No Sheen	< 0.3	< 0.100	< 0.200	1.4		
30	SDW1B	SDW1B102616GRAB	10/26/2016	1.35	19	0.26	0.01	0.08	22	No	H 7.25	No Sheen	< 0.3	< 0.100	< 0.200	2.0		
31	SDW1B	SDW1B021417GRAB	2/14/2017	2.2	34.25	0.2	0	0	24.5	No	H 7.26	No Sheen	< 0.3	< 0.100	< 0.200	2.9		
32	SDW1B	SDW1B040417GRAB	4/4/2017	0.57	22	0.06	0	0.05	47	No	H 8.17	No Sheen	0.212	0.112	< 0.200	2.1		

R=Rejected Non-Representative Data - Refer to line comment for detail
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Port of Seattle
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NPDES Grab Sample Data 7/1/2016 - 6/30/2017

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	SDW1A	SDW1A102016GRAB	10/19/2016	1.35	17	0.3	0	0.13	36	No	H 7.25	No Sheen	< 0.3	< 0.100	< 0.200	1.2		
34	SDW1A	SDW1A021417GRAB	2/14/2017	2.2	34.25	0.2	0	0	24.5	No	H 7.21	No Sheen	< 0.3	< 0.100	< 0.200	2.2		
35	SDW1A	SDW1A042317GRAB	4/23/2017	0.48	20	0.14	0.09	0.09	15	No	H 8.42	No Sheen	< 0.3	< 0.100	< 0.200	1.0		
36	SDN3A	SDN3A102016GRAB	10/19/2016	1.35	17	0.3	0	0.13	36	No	H 7.48	No Sheen	< 0.3	< 0.100	< 0.200	2.0		
37	SDN3A	SDN3A021517GRAB	2/14/2017	2.2	34.25	0.2	0	0	24.5	No	H 7.54	No Sheen	< 0.3	< 0.100	< 0.200	2.9		
38	SDN3A	SDN3A040517GRAB	4/4/2017	0.57	22	0.06	0	0.05	47	No	H 8.03	No Sheen	< 0.3	< 0.100	< 0.200	0.84		
39	SDN2/3/4	SDN2/3/4102016GRAB	10/19/2016	1.35	17	0.3	0	0.13	36	No	H 8.10	No Sheen	3.86	2.54	1.32	1.5		
40	SDN2/3/4	SDN2/3/4021417GRAB	2/14/2017	2.2	34.25	0.2	0	0	24.5	No	H 7.81	No Sheen	0.374	0.274	< 0.200	3.8		
41	SDN2/3/4	SDN2/3/4040417GRAB	4/4/2017	0.57	22	0.06	0	0.05	47	No	H 9.06	No Sheen	< 0.3	< 0.100	< 0.200	1.1		
42	SDD06A	SDD06A090616GRAB	9/6/2016	0.41	6	0.12	0	0	86	No	H 8.93	No Sheen	0.21	0.110	< 0.200	1.1		
43	SDD06A	SDD06A102016GRAB	10/19/2016	1.35	17	0.3	0	0.13	36	No	H 7.13	No Sheen	< 0.3	< 0.100	< 0.200	0.54		
44	SDD06A	SDD06A021517GRAB	2/14/2017	2.2	34.25	0.2	0	0	24.5	No	H 6.66	No Sheen	< 0.3	< 0.100	< 0.200	1.8		
45	SDD06A	SDD06A040517GRAB	4/4/2017	0.57	22	0.06	0	0.05	47	No	H 6.79	No Sheen	< 0.3	< 0.100	< 0.200	1.2		

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

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NPDES Composite Statistics 7/1/2016 - 6/30/2017

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
All Outfalls	Count							41		41
	Max							0.020		0.073
	95th							0.018		0.058
	75th							0.010		0.017
	Median							0.007		0.008
	25th							0.004		0.005
	Min							0.002		0.002
	SD							0.006		0.023
	CV%							52%		62%
	#NonDetects							0		6
	%NonDetects							0%		15%
	#Trimmed							0		0
	%Trimmed							0%		0%
SDE4/SDS1 (002)	Count							7		7
	Max							0.020		0.073
	95th							0.019		0.066
	75th							0.017		0.046
	Median							0.014		0.040
	25th							0.010		0.032
	Min							0.010		0.017
	SD							0.004		0.017
	CV%							29%		43%
	#NonDetects							0		0
	%NonDetects							0%		0%
	#Trimmed							0		0
	%Trimmed							0%		0%

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

NPDES Composite Statistics 7/1/2016 - 6/30/2017

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
SDS3/5 (005)	Count							4		4
	Max							0.018		0.020
	95th							0.017		0.018
	75th							0.014		0.011
	Median							0.011		0.008
	25th							0.008		0.006
	Min							0.004		0.002
	SD							0.006		0.008
	CV%							56%		80%
	#NonDetects							0		1
	%NonDetects							0%		25%
	#Trimmed							0		0
	%Trimmed							0%		0%
SDS4 (009)	Count							4		4
	Max							0.017		0.009
	95th							0.016		0.009
	75th							0.011		0.006
	Median							0.008		0.004
	25th							0.006		0.002
	Min							0.003		0.002
	SD							0.006		0.003
	CV%							69%		70%
	#NonDetects							0		1
	%NonDetects							0%		25%
	#Trimmed							0		0
	%Trimmed							0%		0%

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

NPDES Composite Statistics 7/1/2016 - 6/30/2017

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
SDS6/7 (014)	Count							4		4
	Max							0.009		0.011
	95th							0.008		0.011
	75th							0.006		0.008
	Median							0.005		0.006
	25th							0.005		0.005
	Min							0.005		0.004
	SD							0.002		0.003
	CV%							26%		47%
	#NonDetects							0		0
	%NonDetects							0%		0%
	#Trimmed							0		0
	%Trimmed							0%		0%
SDN1 (006)	Count							3		3
	Max							0.012		0.069
	95th							0.011		0.068
	75th							0.010		0.063
	Median							0.009		0.058
	25th							0.008		0.057
	Min							0.007		0.056
	SD							0.002		0.007
	CV%							25%		11%
	#NonDetects							0		0
	%NonDetects							0%		0%
	#Trimmed							0		0
	%Trimmed							0%		0%

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

NPDES Composite Statistics 7/1/2016 - 6/30/2017

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
SDW2 (016)	Count							3		3
	Max							0.007		0.014
	95th							0.006		0.013
	75th							0.006		0.011
	Median							0.005		0.008
	25th							0.005		0.005
	Min							0.004		0.002
	SD							0.001		0.006
	CV%							27%		75%
	#NonDetects							0		1
	%NonDetects							0%		33%
	#Trimmed							0		0
	%Trimmed							0%		0%
SDW1B (017)	Count							3		3
	Max							0.009		0.006
	95th							0.009		0.006
	75th							0.008		0.005
	Median							0.006		0.004
	25th							0.006		0.003
	Min							0.005		0.002
	SD							0.002		0.002
	CV%							31%		47%
	#NonDetects							0		1
	%NonDetects							0%		33%
	#Trimmed							0		0
	%Trimmed							0%		0%

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

NPDES Composite Statistics 7/1/2016 - 6/30/2017

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
SDW1A (018)	Count							3		3
	Max							0.004		0.009
	95th							0.004		0.008
	75th							0.004		0.007
	Median							0.003		0.005
	25th							0.003		0.004
	Min							0.003		0.002
	SD							0.001		0.003
	CV%							28%		62%
	#NonDetects							0		1
	%NonDetects							0%		33%
	#Trimmed							0		0
	%Trimmed							0%		0%
SDN3A (019)	Count							3		3
	Max							0.004		0.006
	95th							0.004		0.006
	75th							0.003		0.006
	Median							0.003		0.005
	25th							0.002		0.004
	Min							0.002		0.002
	SD							0.001		0.002
	CV%							34%		50%
	#NonDetects							0		1
	%NonDetects							0%		33%
	#Trimmed							0		0
	%Trimmed							0%		0%

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

NPDES Composite Statistics 7/1/2016 - 6/30/2017

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
SDN2/3/4 (007)	Count							3		3
	Max							0.010		0.010
	95th							0.009		0.010
	75th							0.009		0.009
	Median							0.007		0.008
	25th							0.007		0.007
	Min							0.007		0.007
	SD							0.001		0.002
	CV%							17%		23%
	#NonDetects							0		0
	%NonDetects							0%		0%
	#Trimmed							0		0
	%Trimmed							0%		0%
SDD06A (020)	Count							4		4
	Max							0.017		0.016
	95th							0.015		0.015
	75th							0.007		0.012
	Median							0.003		0.009
	25th							0.003		0.007
	Min							0.002		0.007
	SD							0.007		0.004
	CV%							109%		41%
	#NonDetects							0		0
	%NonDetects							0%		0%
	#Trimmed							0		0
	%Trimmed							0%		0%

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

NPDES Composite Statistics 7/1/2016 - 6/30/2017

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
Landside (SDE4/SDS1, SDN1, SDD06A)	Count							14		14
	Max							0.020		0.073
	95th							0.019		0.070
	75th							0.015		0.055
	Median							0.010		0.036
	25th							0.008		0.016
	Min							0.002		0.007
	#NonDetects							0		0
	%NonDetects							0%		0%
	#Trimmed							0		0
	%Trimmed							0%		0%
Airfield (SDS3/5, SDS4, SDS6/7, SDW2, SDW1B, SDW1A, SDN3A, SDN2/3/4)	Count							27		27
	Max							0.018		0.020
	95th							0.016		0.013
	75th							0.008		0.008
	Median							0.006		0.006
	25th							0.004		0.003
	Min							0.002		0.002
	SD							0.004		0.004
	CV%							60%		65%
	#NonDetects							0		6
	%NonDetects							0%		22%
	#Trimmed							0		0
	%Trimmed							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 7/1/2016 - 6/30/2017

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/S1080316COMP	8/2/2016	0.13	7	0.08	0	0	116	EMC	No						0.018		0.017		
2	SDE4/SDS1	SDE4/S1102016COMP	10/19/2016	1.35	17	0.3	0	0.13	36	EMC	No						0.011		0.032		
3	SDE4/SDS1	SDE4/S1102716COMP	10/26/2016	1.35	19	0.26	0.01	0.08	22	EMC	No						0.01		0.05		
4	SDE4/SDS1	SDE4/S1021517COMP	2/14/2017	2.2	34.3	0.2	0	0	24.5	SMC	No						0.01		0.032		
5	SDE4/SDS1	SDE4/S1030417COMP	3/3/2017	0.35	17	0.11	0.07	0.07	14	EMC	No						0.02		0.073		
6	SDE4/SDS1	SDE4/S1041017COMP	4/10/2017	0.34	19	0.11	0	0	39	SMC	No						0.014		0.043		
7	SDE4/SDS1	SDE4/S1041817COMP	4/17/2017	0.44	27	0.11	0	0	69	SMC	No						0.015		0.04		
8	SDS3/5	SDS3/5080216COMP	8/2/2016	0.13	7	0.08	0	0	116	SMC	No						0.004		< 0.004		
9	SDS3/5	SDS3/5102016COMP	10/19/2016	1.35	17	0.3	0	0.13	36	EMC	No						0.018		0.008		
10	SDS3/5	SDS3/5021517COMP	2/14/2017	2.2	34.3	0.2	0	0	24.5	SMC	No						0.013		0.008		
11	SDS3/5	SDS3/5040517COMP	4/4/2017	0.57	22	0.06	0	0.05	47	EMC	No						0.01		0.02		
12	SDS4	SDS4090616COMP	9/6/2016	0.41	6	0.12	0	0	86	EMC	No						0.008		J 0.003		
13	SDS4	SDS4102016COMP	10/19/2016	1.35	17	0.3	0	0.13	36	EMC	No						0.017		0.009		
14	SDS4	SDS4030417COMP	3/3/2017	0.35	17	0.11	0.07	0.07	14	EMC	No						0.007		0.005		
15	SDS4	SDS4041017COMP	4/10/2017	0.34	19	0.11	0	0	39	SMC	No						0.003		< 0.004		
16	SDS6/7	SDS6/7090616COMP	9/6/2016	0.41	6	0.12	0	0	86	EMC	No						0.009		0.011		
17	SDS6/7	SDS6/7102016COMP	10/19/2016	1.35	17	0.3	0	0.13	36	EMC	No						0.006		0.004		
18	SDS6/7	SDS6/7030417COMP	3/3/2017	0.35	17	0.11	0.07	0.07	14	EMC	No						0.005		0.005		
19	SDS6/7	SDS6/7041017COMP	4/10/2017	0.34	19	0.11	0	0	39	SMC	No						0.005		0.006		
20	SDN1	SDN1102016COMP	10/19/2016	1.35	17	0.3	0	0.13	36	EMC	No						0.012		0.058		
21	SDN1	SDN1021517COMP	2/14/2017	2.2	34.3	0.2	0	0	24.5	SMC	No						0.009		0.069		
22	SDN1	SDN1040517COMP	4/4/2017	0.57	22	0.06	0	0.05	47	EMC	No						0.007		0.056		
23	SDW2	SDW2102116COMP	10/19/2016	1.35	17	0.3	0	0.13	36	EMC	No						0.007		0.008		
24	SDW2	SDW2021617COMP	2/14/2017	2.2	34.3	0.2	0	0	24.5	SMC	No						0.005		0.014		
25	SDW2	SDW2040517COMP	4/4/2017	0.57	22	0.06	0	0.05	47	SMC	No						0.004		< 0.004		
26	SDW1B	SDW1B102716COMP	10/26/2016	1.35	19	0.26	0.01	0.08	22	EMC	No						0.009		< 0.004		
27	SDW1B	SDW1B021517COMP	2/14/2017	2.2	34.3	0.2	0	0	24.5	SMC	No						0.005		0.006		
28	SDW1B	SDW1B040517COMP	4/4/2017	0.57	22	0.06	0	0.05	47	SMC	No						0.006		0.004		
29	SDW1A	SDW1A102116COMP	10/19/2016	1.35	17	0.3	0	0.13	36	EMC	No						0.004		< 0.004		
30	SDW1A	SDW1A021517COMP	2/14/2017	2.2	34.3	0.2	0	0	24.5	SMC	No						0.003		0.009		
31	SDW1A	SDW1A042417COMP	4/23/2017	0.48	20	0.14	0.09	0.09	15	EMC	No						0.003		0.005		
32	SDN3A	SDN3A102116COMP	10/19/2016	1.35	17	0.3	0	0.13	36	EMC	No						0.004		0.005		

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

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NPDES Composite Sample Data 7/1/2016 - 6/30/2017

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	SDN3A	SDN3A021617COMP	2/14/2017	2.2	34.3	0.2	0	0	24.5	SMC	No						0.003		0.006		
34	SDN3A	SDN3A040617COMP	4/4/2017	0.57	22	0.06	0	0.05	47	SMC	No						0.002		< 0.004		
35	SDN2/3/4	SDN2/3/4102116COMP	10/19/2016	1.35	17	0.3	0	0.13	36	EMC	No						0.01		0.01		
36	SDN2/3/4	SDN2/3/4021517COMP	2/14/2017	2.2	34.3	0.2	0	0	24.5	SMC	No						0.007		0.007		
37	SDN2/3/4	SDN2/3/4040517COMP	4/4/2017	0.57	22	0.06	0	0.05	47	SMC	No						0.007		0.008		
38	SDD06A	SDD06A090616COMP	9/6/2016	0.41	6	0.12	0	0	86	EMC	No						0.017		0.016		
39	SDD06A	SDD06A102116COMP	10/19/2016	1.35	17	0.3	0	0.13	36	EMC	No						0.004		0.01		
40	SDD06A	SDD06A021517COMP	2/14/2017	2.2	34.3	0.2	0	0	24.5	SMC	No						0.002		0.007		
41	SDD06A	SDD06A040517COMP	4/4/2017	0.57	22	0.06	0	0.05	47	SMC	No						0.003		0.007		

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

APPENDIX B

OTHER SAMPLE DATA

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QC Samples Dups - 7/1/2016-6/30/2017

																Conventionals		Metals		TPH			
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	Zn Total mg/l	Sheen N/A	TPH-D mg/l	TPH-Dx mg/l	TPH-MO mg/l
SDE4/SDS	SDE4/S1040417DUPG	4/4/2017	0.57	22	0.06	0	0.05	47	NPDES-Part II	first flush grab		FD	FldQC	No		H 7.49	1.9			No Sheen	0.162	0.262	< 0.1
SDE4/SDS	SDE4/S1041017DUPG	4/10/2017	0.34	19	0.11	0	0	39	NPDES-Part II	first flush grab		FD	FldQC	No		H 7.14	1			No Sheen	< 0.05	< 0.15	< 0.1
SDS6/7	SDS6/7030417DUPC	3/3/2017	0.35	17	0.11	0.07	0.07	14	NPDES-Part II	flow-wt comp	EMC	FD	FldQC	No				0.00587	0.00837				
SDW1B	SDW1B102616DUPG	10/26/2016	1.35	19	0.26	0.01	0.08	22	NPDES-Part II	first flush grab		FD	FldQC	No		H 7.31	2.1			No Sheen	< 0.05	< 0.15	< 0.1
SDW1B	SDW1B102716DUPC	10/26/2016	1.35	19	0.26	0.01	0.08	22	NPDES-Part II	time-comp	EMC	FD	FldQC	No				0.00648	0.0237				

Selected Date Range; 7/1/2016-6/30/2017; Values Qualified as (<) are included as 1/2 the reported Detection Limit; Rejected Values not included.

QC Samples Blanks - 7/1/2016-6/30/2017

																Metals		TPH
Outfall	Sample	Storm	depth	dur	maxint	ant24	ant48	dryant	Event Type	Sub Type	Type	Comp Type	Purpose	Grnd Deice	Comment	Cu Total mg/l	Zn Total mg/l	Sheen N/A
SDN8	SDN8102716GRAB	10/26/2016	1.35	19	0.26	0.01	0.08	22	NPDES-Part II	first flush grab	FB		FldQC	No		< 0.00025	< 0.002	No Sheen
SDW1B	SDW1B102716BLNK	10/26/2016	1.35	19	0.26	0.01	0.08	22	NPDES-Part II	flow-wt comp	FB		FldQC	No		< 0.00025	< 0.002	

Selected Date Range; 7/1/2016-6/30/2017; Values Qualified as (<) are included as 1/2 the reported Detection Limit; Rejected Values not included.