Annual Industrial Stormwater Monitoring Report

Seattle-Tacoma International Airport

For the Period July 1, 2020 through June 30, 2021

September 30, 2021

Prepared by

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Port of Seattle

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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1.0 INTRODUCTION

The Port of Seattle (Port) National Pollutant Discharge Elimination System (NPDES) permit WA0024651 is broken down into three sections: Part 1: Industrial Wastewater, Part 2: Industrial Stormwater and Part 3: Construction Stormwater. NPDES Permit Part 2 Special Condition 2S1.G requires an annual summary of industrial stormwater monitoring results. The twelve-month period is defined as July 1, 2020 through June 30, 2021. This report provides a summary of industrial monitoring and permit compliance results for the SDS outfalls identified in Part 2 of the NPDES permit during this period.

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 as required by Part 2 of the NPDES permit is discussed but results will be contained in separate report submittals.

The Port met almost all required sampling collection and reporting requirements in the NPDES permit for the 2020-2021 data collection period. One 3rd quarter of 2020 sample was missed at the SDN234 station when a valve was incorrectly opened. Stormwater samples are collected from eleven (11) outfalls which discharge to five (5) different receiving waters; Lake Reba, Miller Creek, Walker Creek, Northwest Ponds, and Des Moines Creek. A total of forty-one (41) grab and forty-one (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 six (6) instances of permit limit exceedances associated with 246 individual constituent analyses.

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 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 best management practices (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, The Seattle-Tacoma International Airport (SEA) was built in the 1940s and is owned and operated by the Port. According to the Port's 2019 Key Facts and Figures, SEA handled 453,549 metric tons of air cargo, and 58.1 million passengers. SEA is ranked in the top ten busiest U.S. passenger airports and has a regional impact of more than $22.5 billion in business revenue, generating more than 151,400 jobs.

Stormwater drainage at SEA 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. Approximately 480 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 associated with stormwater treatment best management practices (BMPs) such as runway filter strips. 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 SEA 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 thirteen (13) outfalls in two categories: Existing & New Outfalls and Subbasins, and Future Outfalls to be activated during future development. As of June 30, 2021, eleven (11) of the thirteen (13) outfalls are active and discharge stormwater related to industrial activity.

SEA 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 total petroleum (TPH), total suspended solids (TSS) and other constituent concentrations were different for the landside and airfield categories (POS 1996a, 1997a.) **Table 1**, *SEA 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.

2.3 Permit Effluent Limits

The 2016 NPDES permit specifies effluent limits for turbidity, pH, oil and grease, total copper, and total zinc (see **Table 2**). The major changes from the previous permit effluent limits are the removal of lead analysis and an adjusted pH range for outfalls SDN3A, SDW1A, SDW1B, and SDW2. The pH range for these listed outfalls was widened to 6.3-9.0 with concurrent receiving water monitoring after a study showed discharge within this range would not cause a violation of water quality standards in the receiving water. Lead was removed from the sampling effort for this permit based on Port studies that identified lead exceedances as extremely unlikely.

Effluent limits for industrial stormwater became effective several permits ago 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 2016 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 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 applied in this reporting year and has not been utilized at the Airport since 1996.

Table 1. SEA 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.	41.5	138.1	179.6
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.	18.2	27.2	45.3
SDN1	Miller Creek via Lake Reba	Landside	Flight service kitchen.	Public roads, building rooftops and vehicle parking.	3.8	14.9	18.6
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.	206.3	250.6	456.8

Table 1. SEA 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)
SDS4	NW Ponds and Des Moines Creek West	Airfield	Ground surface deicing/anti-icing, aircraft taxi, takeoff and landings.	Runway infield and open areas.	40.5	25.9	66.3
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.	68.9	48.2	117.1
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.	68.3	44.6	112.9
SDN3A	Miller Creek	Airfield	Ground surface deicing/anti-icing, aircraft taxi, takeoff and landings.	Perimeter road, runway infield and open areas.	23.1	8.1	31.2
SDW1A	Miller Creek	Airfield	Ground surface deicing/anti-icing, aircraft taxi, takeoff and landings.	Perimeter road, runway infield and open areas.	44.1	26.0	70.1

Table 1. SEA 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)
SDW1B	Miller Creek	Airfield	Ground surface deicing/anti-icing, aircraft taxi, takeoff and landings.	Perimeter road, runway infield and open areas.	59.5	25.0	84.5
SDW2	Walker Creek	Airfield	Ground surface deicing/anti-icing, aircraft taxi, takeoff and landings.	Perimeter road, runway infield and open areas.	30.9	10.8	41.7
Note:				**Total Area**	**584.9**	**639.3**	**1224.1**

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 SEAs Stormwater Pollution Prevention Plan. Based on 2018 GIS analysis completed by Aspect consulting predominantly using a 2017 aerial.
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 *in situ* toxicity testing at receiving water sites downstream of SEA 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) (Aspect Consulting, Inc. 2018. The monitoring locations were selected to represent stormwater downstream of the last (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 SEA reports results on DMRs from storms and samples that were considered representative according to criteria specified in the QAPP.

SEA uses telemetry-based automatic samplers to collect a grab sample followed by 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** based 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 1983 and updates).
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.

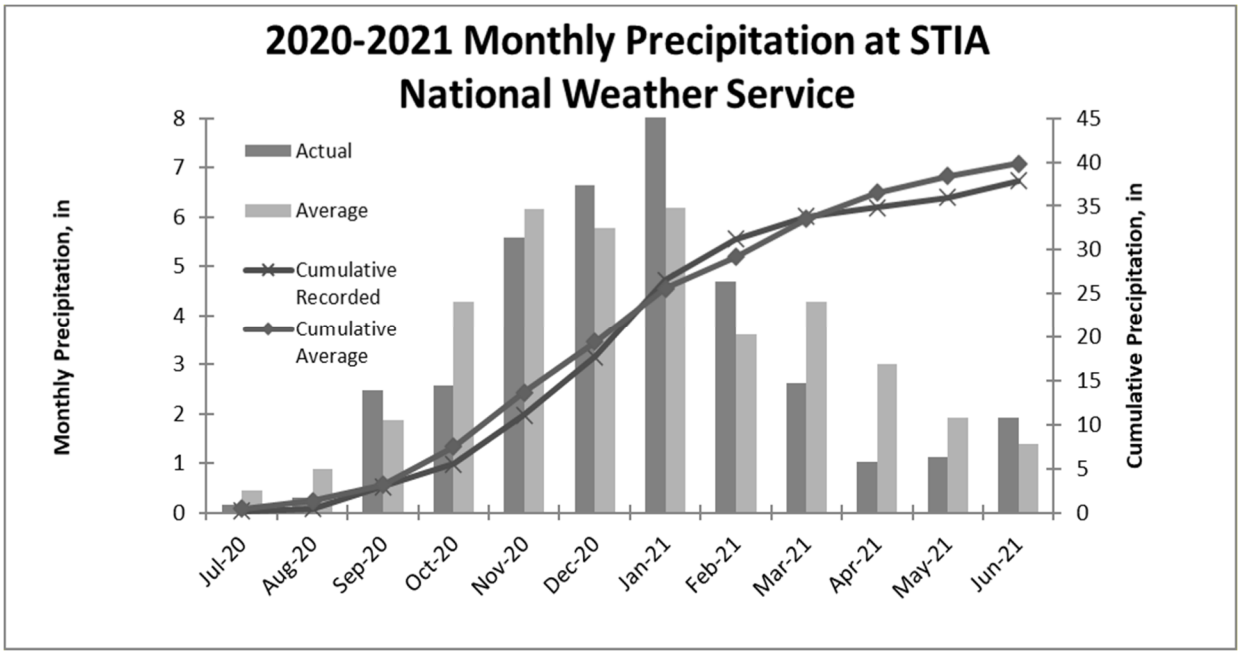
3.1.2 Field Quality Control Samples

SEA 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 SEA's "clean" sampling methods developed for stormwater monitoring relative to metals (POS 1999).
Seven (7) Field Quality Control samples were collected in the 2020 – 2021 reporting period. There were no anomalies associated with samples collected during these same storm events.

3.1.3 Storm Events and Precipitation

During this reporting period, SEA sampled eleven (11) precipitation events with precipitation ranging from 0.16 to 1.96 inches. Dry weather preceding these sampling events ranged from 14 hours (January 30, 2021) to 14 days (April 24, 2021). The tabular sample data in **Appendix A** includes storm event data such as precipitation depth, antecedent precipitation amounts, and length of antecedent dry period.
Over the course of this annual reporting schedule, 37.78 inches of precipitation fell at STIA; 2.03 inches less than the historical (2002-2021) average of 39.81 inches and 4.78 inches less than the previous monitoring year (42.56 inches). Monthly precipitation totals were below average during July, August, October, November, March, April, and May; all other months observed were above average (**Figure 2**).

Figure 2. Precipitation Summary



3.1.4 Grab Sample Results and Discussion

The following discussion includes results from 41 grab samples collected in the past year. Grab samples are analyzed for pH, TPH, and turbidity per current permit requirements. Tabular results are presented at the end of this section and summary statistics are contained in **Appendix A**.

3.1.4.1 pH

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 S.U. (6.3-9.0 at SDN3A, SDW1A, SDW1B and SDW2) with the exception of four (4) samples.

Two (2) of the depressed pH samples occurred at SDE4/S1. These results occurred on November 12, 2020 and March 4, 2021 measuring 6.18 and 6.1 S.U. respectively. Site inspections did not identify any operations or conditions that would result in depressed pH stormwater runoff.

The two (2) remaining pH exceedances occurred at the SDD06A site on September 23, 2020 (6.31 S.U.) and January 30, 2021 (6.4 S.U.). The rain events that led to the low pH measurements were likely highly acidic storm events. There were no unusual activities that may have generated the low pH.

In an effort to better understand potential pH sources SEA is sampling the storm event rainfall pH. A study is underway on the SDD06A swale system to improve flow splitting and to assess the performance of the system.

3.1.4.2 Total Petroleum Hydrocarbons (TPH)

Total Petroleum Hydrocarbons is determined by Washington State Department of Ecology (WDOE) method NWTPH-Dx; the summation of the diesel and motor oil range TPH quantified by this method resembles the concentration of oil & grease. TPH ranged from less than 0.15 mg/L to 1.63 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 10 of the 41 samples. All sample results were well below the TPH effluent limit of 15 mg/L.

3.1.4.3 Turbidity

The median turbidity for all outfalls was 1.53 NTU with a range from 0.23 NTU to 21.6 NTU. There were no permit limit exceedances for turbidity at any outfalls during the monitoring period.

Table 3. Grab Sample Data

Outfall	Storm	depth	dur	maxint	ant24	ant48	dryant		ph pH Units	Turb NTU	Sheen N/A		TPH-D mg/l		TPH-Dx mg/l		TPH-MO mg/l
SDE4/SDS	8/20/2020	0.16	22	0.08	0	0	293	H	7.52	5.12	No Sheen		0.468		1.198		0.73
SDE4/SDS	11/3/2020	0.99	25.5	0.2	0	0	97.25	H	6.91	1.53	No Sheen	<	0.1		0.279		0.229
SDE4/SDS	11/12/2020	0.82	28.75	0.14	0	0.03	47.25	H	6.18	1.75	No Sheen	<	0.1	<	0.3	<	0.2
SDE4/SDS	2/21/2021	0.64	18	0.12	0.01	0.02	22	H	6.83	2.13	No Sheen	<	0.1	<	0.3	<	0.2
SDE4/SDS	3/4/2021	0.3	7	0.07	0	0.01	46	H	6.08	1.15	No Sheen	<	0.1	<	0.3	<	0.2
SDE4/SDS	4/7/2021	0.31	5	0.17	0	0	79		7.48	9.97	No Sheen		0.267		1.247		0.98
SDE4/SDS	4/24/2021	0.69	32	0.08	0	0	335		7.52	21.6	No Sheen		1.14		1.632		0.492
SDS3/5	9/18/2020	0.24	16	0.12	0	0	84	H	6.51	4.61	No Sheen		0.362		0.817		0.455
SDS3/5	11/3/2020	0.99	25.5	0.2	0	0	97.25	H	6.99	0.309	No Sheen	<	0.1	<	0.3	<	0.2
SDS3/5	1/30/2021	1.96	86	0.16	0.09	0.11	15.5	H	7.35	0.442	No Sheen	<	0.1	<	0.3	<	0.2
SDS3/5	4/7/2021	0.31	5	0.17	0	0	79		7.52	0.32	No Sheen	<	0.1	<	0.3	<	0.2
SDS4	8/20/2020	0.16	22	0.08	0	0	293	H	7.62	0.83	No Sheen	<	0.1	<	0.3	<	0.2
SDS4	11/3/2020	0.99	25.5	0.2	0	0	97.25	H	6.99	0.228	No Sheen	<	0.1	<	0.3	<	0.2
SDS4	2/21/2021	0.64	18	0.12	0.01	0.02	22	H	6.96	3.65	No Sheen	<	0.1	<	0.3	<	0.2
SDS4	4/7/2021	0.31	5	0.17	0	0	79		7.05	0.86	No Sheen	<	0.1	<	0.3	<	0.2
SDS6/7	8/20/2020	0.16	22	0.08	0	0	293	H	7.61	1.16	No Sheen		0.128		0.228	<	0.2
SDS6/7	11/3/2020	0.99	25.5	0.2	0	0	97.25	H	7.32	2.57	No Sheen	<	0.1	<	0.3	<	0.2
SDS6/7	1/30/2021	1.96	86	0.16	0.09	0.11	15.5	H	7.4	3.34	No Sheen	<	0.1	<	0.3	<	0.2
SDS6/7	4/7/2021	0.31	5	0.17	0	0	79		7.57	1.4	No Sheen	<	0.1	<	0.3	<	0.2
SDN1	11/3/2020	0.99	25.5	0.2	0	0	97.25	H	6.81	2.08	No Sheen		0.209		0.49		0.281
SDN1	1/30/2021	1.96	86	0.16	0.09	0.11	15.5	H	6.73	2.19	No Sheen		0.126		0.226	<	0.2
SDN1	5/3/2021	0.29	15.75	0.1	0	0	55		6.87	1.2	No Sheen		0.138		0.238	<	0.2
SDW2	11/3/2020	0.99	25.5	0.2	0	0	97.25	H	7.69	1.11	No Sheen	<	0.1	<	0.3	<	0.2
SDW2	1/30/2021	1.96	86	0.16	0.09	0.11	15.5	H	8.08	0.663	No Sheen	<	0.1	<	0.3	<	0.2
SDW2	4/7/2021	0.31	5	0.17	0	0	79		8.2	1.33	No Sheen	<	0.1	<	0.3	<	0.2
SDW1B	11/3/2020	0.99	25.5	0.2	0	0	97.25	H	7.62	1.85	No Sheen	<	0.1	<	0.3	<	0.2
SDW1B	1/30/2021	1.96	86	0.16	0.09	0.11	15.5	H	7.51	1.53	No Sheen	<	0.1	<	0.3	<	0.2
SDW1B	4/24/2021	0.69	32	0.08	0	0	335		7.5	1	No Sheen	<	0.1	<	0.3	<	0.2
SDW1A	11/3/2020	0.99	25.5	0.2	0	0	97.25	H	7.16	0.362	No Sheen	<	0.1	<	0.3	<	0.2
SDW1A	1/30/2021	1.96	86	0.16	0.09	0.11	15.5	H	7.42	2.15	No Sheen	<	0.1	<	0.3	<	0.2
SDW1A	4/7/2021	0.31	5	0.17	0	0	79		7.19	0.71	No Sheen	<	0.1	<	0.3	<	0.2
SDN3A	11/3/2020	0.99	25.5	0.2	0	0	97.25	H	7.04	0.273	No Sheen	<	0.1	<	0.3	<	0.2
SDN3A	2/21/2021	0.64	18	0.12	0.01	0.02	22	H	7.08	2.21	No Sheen	<	0.1	<	0.3	<	0.2
SDN3A	4/24/2021	0.69	32	0.08	0	0	335		7.5	1.2	No Sheen	<	0.1	<	0.3	<	0.2
SDN2/3/4	11/3/2020	0.99	25.5	0.2	0	0	97.25	H	6.79	0.51	No Sheen	<	0.1	<	0.3	<	0.2
SDN2/3/4	1/30/2021	1.96	86	0.16	0.09	0.11	15.5	H	7.67	1.8	No Sheen	<	0.1	<	0.3	<	0.2
SDN2/3/4	4/7/2021	0.31	5	0.17	0	0	79		7.38	2.42	No Sheen	<	0.1	<	0.3	<	0.2
SDD06A	9/23/2020	1.1	32	0.11	0.09	0.09	14	H	6.31	2.81	No Sheen		0.156		0.419		0.263
SDD06A	11/3/2020	0.99	25.5	0.2	0	0	97.25	H	6.92	0.625	No Sheen	<	0.1	<	0.3	<	0.2
SDD06A	1/30/2021	1.96	86	0.16	0.09	0.11	15.5	H	6.37	2.32	No Sheen	<	0.1	<	0.3	<	0.2
SDD06A	4/7/2021	0.31	5	0.17	0	0	79		7.4	1.7	No Sheen	<	0.1	<	0.3	<	0.2

3.1.5 Composite Sample Results and Discussion

For the 2020-2021 sampling period, the SEA 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 SEA's QAPP, which provides samples comparable with EPA methods (U.S. EPA 1992). Tabular results are presented at the end of this section and summary statistics are contained in **Appendix A**.

3.1.5.1 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 1.0 µg/L to 35.0 µg/L. 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 (2) permit limit exceedances for copper during the monitoring year.

Both exceedances for copper occurred in the 3rd quarter of 2020. On August 20, 2020 the sample at SDE4 measured 32.2 µg/l and on September 18, 2020 the SDD06A sample measured 35.4 µg/l

3.1.5.2 Zinc

All data reported are for total recoverable zinc. The median zinc concentration at all outfalls was 10 µg/L .Zinc concentrations ranged from 2 µg/L to 79 µg/L. There were no permit limit exceedances for zinc during the monitoring period.

Table 4. Composite Sample Data

Outfall	Storm	depth	dur	maxint	ant24	ant48	dryant	Cu Total mg/l		Zn Total mg/l
SDE4/SDS1	8/20/2020	0.16	22	0.08	0	0	293	0.0322		0.079
SDE4/SDS1	11/3/2020	0.99	25.5	0.2	0	0	97.25	0.00969		0.0406
SDE4/SDS1	11/12/2020	0.82	28.75	0.14	0	0.03	47.25	0.00694		0.0369
SDE4/SDS1	2/21/2021	0.64	18	0.12	0.01	0.02	22	0.00798		0.0428
SDE4/SDS1	3/4/2021	0.3	7	0.07	0	0.01	46	0.00975		0.0584
SDE4/SDS1	4/7/2021	0.31	5	0.17	0	0	79	0.0101		0.0399
SDE4/SDS1	4/24/2021	0.69	32	0.08	0	0	335	0.0009		0.00764
SDS3/5	9/18/2020	0.24	16	0.12	0	0	84	0.0354		0.0452
SDS3/5	11/3/2020	0.99	25.5	0.2	0	0	97.25	0.0198		0.0129
SDS3/5	1/30/2021	1.96	86	0.16	0.09	0.11	15.5	0.00988		0.00875
SDS3/5	4/7/2021	0.31	5	0.17	0	0	79	0.00948		0.00779
SDS4	8/20/2020	0.16	22	0.08	0	0	293	0.00406		0.00505
SDS4	11/3/2020	0.99	25.5	0.2	0	0	97.25	0.0114		0.00401
SDS4	2/21/2021	0.64	18	0.12	0.01	0.02	22	0.00777		0.0221
SDS4	4/7/2021	0.31	5	0.17	0	0	79	0.00443		0.00697
SDS6/7	8/20/2020	0.16	22	0.08	0	0	293	0.00824		0.0213
SDS6/7	11/3/2020	0.99	25.5	0.2	0	0	97.25	0.0104	<	0.002
SDS6/7	1/30/2021	1.96	86	0.16	0.09	0.11	15.5	0.00407	<	0.002
SDS6/7	4/7/2021	0.31	5	0.17	0	0	79	0.00457	<	0.002
SDN1	11/3/2020	0.99	25.5	0.2	0	0	97.25	0.0105		0.0431
SDN1	1/30/2021	1.96	86	0.16	0.09	0.11	15.5	0.00493		0.0403
SDN1	5/3/2021	0.29	15.75	0.1	0	0	55	0.00889		0.0218
SDW2	11/3/2020	0.99	25.5	0.2	0	0	97.25	0.00309		0.00477
SDW2	1/30/2021	1.96	86	0.16	0.09	0.11	15.5	0.00284	<	0.002
SDW2	4/7/2021	0.31	5	0.17	0	0	79	0.00195		0.0106
SDW1B	11/3/2020	0.99	25.5	0.2	0	0	97.25	0.00783		0.0105
SDW1B	1/30/2021	1.96	86	0.16	0.09	0.11	15.5	0.00358	<	0.002
SDW1B	4/24/2021	0.69	32	0.08	0	0	335	0.0171		0.0396
SDW1A	11/3/2020	0.99	25.5	0.2	0	0	97.25	0.00407		0.00656
SDW1A	1/30/2021	1.96	86	0.16	0.09	0.11	15.5	0.00211	<	0.002
SDW1A	4/7/2021	0.31	5	0.17	0	0	79	0.00119	<	0.002
SDN3A	11/3/2020	0.99	25.5	0.2	0	0	97.25	0.00178		0.00972
SDN3A	2/21/2021	0.64	18	0.12	0.01	0.02	22	0.00167		0.0135
SDN3A	4/24/2021	0.69	32	0.08	0	0	335	0.00235		0.00523
SDN2/3/4	11/3/2020	0.99	25.5	0.2	0	0	97.25	0.0111		0.0111
SDN2/3/4	1/30/2021	1.96	86	0.16	0.09	0.11	15.5	0.00571	<	0.002
SDN2/3/4	4/7/2021	0.31	5	0.17	0	0	79	0.00819		0.00424
SDD06A	9/23/2020	1.1	32	0.11	0.09	0.09	14	0.0102		0.0217
SDD06A	11/3/2020	0.99	25.5	0.2	0	0	97.25	0.00577		0.00822
SDD06A	1/30/2021	1.96	86	0.16	0.09	0.11	15.5	0.0029		0.00702
SDD06A	4/7/2021	0.31	5	0.17	0	0	79	0.00385		0.0115

3.2 In Situ Toxicity Monitoring

The following sections discusses stormwater monitoring data related to the *in situ* monitoring program that was completed during fall 2020 and spring 2021.

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).

For a full discussion on results of the sampling, please refer to *Rainbow Trout Early Life Stages In Situ Monitoring Testing, Fall 2020 and Spring 2021 Testing Events* (Nautilus, 2021).

4.0 BMP Implementation

SEA 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.

After conducting source tracing efforts the Port determined to activate the North Expressway Relocation Filter Vault. This vault was installed in 2006 however there was not additional need for water quality treatment in this drainage area of the SDE4 subbasin. The vault was cleaned and retrofitted for installation of 23 metals Rx filter cartridges. The Taxiway A/B remote deicing pad was activated, with a valve to adjust the drainage between IWS and SDS3.

5.0 SUMMARY AND CONCLUSIONS

During the reporting period from July 2020 to June 2021 the SEA fulfilled all but one requirement for outfall monitoring under the current NPDES permit. The Port collected a total of 41 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 six (6) instances of permit limit exceedances associated with 82 samples and 246 individual constituent analyses that were tested to meet the monitoring requirements of the NPDES permit.

To address the pH non-compliance, the Port is implementing a pH source tracing study in the SDE4 and SDD06A basins. Results of these investigations will be used to assess possible implementation actions the Port can take to reduce future exceedances. The sampling plans were provided to the Department of Ecology on September 23, 2021

This high level of compliance is an indication that the stormwater BMP's and ongoing process of continual improvement for the overall stormwater management program are effective at mitigating impacts from Airport operations on the adjacent receiving waters.

6.0 REFERENCES

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APPENDIX A

TABULAR NPDES SAMPLE DATA SUMMARIES and STATISTICS

Port of Seattle

EMIS

Summary of Storms Sampled 8/20/2020 - 5/3/2021

StormDate	Depth, in.	Dur, hr	Max Int, in/hr	24hrant, in	48hrant, in	Dryant, hr	Dryant, Days	Load Factor	Event Type	Comment
5/3/2021	0.29	15.75	0.1	0	0	55	2.3	5.5	NPDES-Part II	
4/24/2021	0.69	32	0.08	0	0	335	14.0	26.8	NPDES-Part II	
4/7/2021	0.31	5	0.17	0	0	79	3.3	13.4	NPDES-Part II	
3/4/2021	0.3	7	0.07	0	0.01	46	1.9	3.2	NPDES-Part II	
2/21/2021	0.64	18	0.12	0.01	0.02	22	0.9	2.6	NPDES-Part II	
1/30/2021	1.96	86	0.16	0.09	0.11	15.5	0.6	2.5	NPDES-Part II	
11/12/2020	0.82	28.75	0.14	0	0.03	47.25	2.0	6.6	NPDES-Part II	update with storm data
11/3/2020	0.99	25.5	0.2	0	0	97.25	4.1	19.5	NPDES-Part II	update with storm data
9/23/2020	1.1	32	0.11	0.09	0.09	14	0.6	1.5	NPDES-Part II	
9/18/2020	0.24	16	0.12	0	0	84	3.5	10.1	NPDES-Part II	
8/20/2020	0.16	22	0.08	0	0	293	12.2	23.4	NPDES-Part II	
Count	11	11	11	11	11	11	11	11		
Median	0.64	22	0.12	0	0	55	2.3	6.6		
Average	0.68	26	0.12	0.02	0.02	99	4.1	10.5		

load factor = maxint (in/hr)*dryant(hrs)

Event Type defined in Procedure Manual for Stormwater Monitoring

"dur" = rainfuall duration in hours

"24hrant" and "48hrant" is the total rainfall in the 24 and 48 hours preceding the event respectively

"dryant" is the duration of the antecedent dry period to the last measurable (0.01 in.) rainfall

Port of Seattle
EMIS

NPDES Composite Statistics 7/1/2020 - 6/30/2021

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
All Outfalls	Count							41		41
	Max							0.035		0.079
	95th							0.020		0.045
	75th							0.010		0.022
	Median							0.007		0.010
	25th							0.004		0.005
	Min							0.001		0.002
	SD							0.007		0.021
	CV%							83%		64%
	#NonDetects							0		8
	%NonDetects							0%		20%
	#Trimmed							0		0
	%Trimmed							0%		0%
SDE4/SDS1 (002)	Count							7		7
	Max							0.032		0.079
	95th							0.026		0.073
	75th							0.010		0.051
	Median							0.010		0.041
	25th							0.007		0.038
	Min							0.001		0.008
	SD							0.010		0.022
	CV%							89%		50%
	#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 7/1/2020 - 6/30/2021

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
SDS3/5 (005)	Count							4		4
	Max							0.035		0.045
	95th							0.033		0.040
	75th							0.024		0.021
	Median							0.015		0.011
	25th							0.010		0.009
	Min							0.009		0.008
	SD							0.012		0.018
	CV%							65%		96%
	#NonDetects							0		0
	%NonDetects							0%		0%
	#Trimmed							0		0
	%Trimmed							0%		0%

SDS4 (009)	Count							4		4
	Max							0.011		0.022
	95th							0.011		0.020
	75th							0.009		0.011
	Median							0.006		0.006
	25th							0.004		0.005
	Min							0.004		0.004
	SD							0.003		0.008
	CV%							50%		89%
	#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 7/1/2020 - 6/30/2021

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
SDS6/7 (014)	Count							4		4
	Max							0.010		0.021
	95th							0.010		0.018
	75th							0.009		0.007
	Median							0.006		0.002
	25th							0.004		0.002
	Min							0.004		0.002
	SD							0.003		0.010
	CV%							44%		141%
	#NonDetects							0		3
	%NonDetects							0%		75%
	#Trimmed							0		0
	%Trimmed							0%		0%

SDN1 (006)	Count							3		3
	Max							0.010		0.043
	95th							0.010		0.043
	75th							0.010		0.042
	Median							0.009		0.040
	25th							0.007		0.031
	Min							0.005		0.022
	SD							0.003		0.012
	CV%							35%		33%
	#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 7/1/2020 - 6/30/2021

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
SDW2 (016)	Count							3		3
	Max							0.003		0.011
	95th							0.003		0.010
	75th							0.003		0.008
	Median							0.003		0.005
	25th							0.002		0.003
	Min							0.002		0.002
	SD							0.001		0.004
	CV%							23%		76%
	#NonDetects							0		1
	%NonDetects							0%		33%
	#Trimmed							0		0
	%Trimmed							0%		0%

SDW1B (017)	Count							3		3
	Max							0.017		0.040
	95th							0.016		0.037
	75th							0.012		0.025
	Median							0.008		0.010
	25th							0.006		0.006
	Min							0.004		0.002
	SD							0.007		0.020
	CV%							73%		114%
	#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 7/1/2020 - 6/30/2021

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
SDW1A (018)	Count							3		3
	Max							0.004		0.007
	95th							0.004		0.006
	75th							0.003		0.004
	Median							0.002		0.002
	25th							0.002		0.002
	Min							0.001		0.002
	SD							0.001		0.003
	CV%							60%		75%
	#NonDetects							0		2
	%NonDetects							0%		67%
	#Trimmed							0		0
	%Trimmed							0%		0%

SDN3A (019)	Count							3		3
	Max							0.002		0.014
	95th							0.002		0.013
	75th							0.002		0.012
	Median							0.002		0.010
	25th							0.002		0.007
	Min							0.002		0.005
	SD							0.000		0.004
	CV%							19%		44%
	#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 7/1/2020 - 6/30/2021

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
SDN2/3/4 (007)	Count							3		3
	Max							0.011		0.011
	95th							0.011		0.010
	75th							0.010		0.008
	Median							0.008		0.004
	25th							0.007		0.003
	Min							0.006		0.002
	SD							0.003		0.005
	CV%							32%		82%
	#NonDetects							0		1
	%NonDetects							0%		33%
	#Trimmed							0		0
	%Trimmed							0%		0%
SDD06A (020)	Count							4		4
	Max							0.010		0.022
	95th							0.010		0.020
	75th							0.007		0.014
	Median							0.005		0.010
	25th							0.004		0.008
	Min							0.003		0.007
	SD							0.003		0.007
	CV%							57%		55%
	#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 7/1/2020 - 6/30/2021

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
Landside (SDE4/SDS1, SDN1, SDD06A)	Count							14		14
	Max							0.032		0.079
	95th							0.018		0.066
	75th							0.010		0.042
	Median							0.008		0.038
	25th							0.005		0.014
	Min							0.001		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							0.035		0.045
	95th							0.019		0.034
	75th							0.010		0.011
	Median							0.005		0.007
	25th							0.003		0.002
	Min							0.001		0.002
	SD							0.007		0.011
	CV%							96%		111%
	#NonDetects							0		8
	%NonDetects							0%		30%
	#Trimmed							0		0
	%Trimmed							0%		0%

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

Port of Seattle
EMIS

NPDES Grab Statistics 7/1/2020 - 6/30/2021

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
All Outfalls	Count	41	41	41	41	41	41
	Max	8.2		1.63	1.14	0.98	21.6
	95th	7.7		1.20	0.36	0.49	5
	75th	7.5		0.15	0.05	0.10	2
	Median	7.3		0.15	0.05	0.10	1.53
	25th	6.9		0.15	0.05	0.10	1
	Min	6.1		0.15	0.05	0.10	0.228
	SD	0.5		0.50	0.29	0.28	6
	CV%	7%		106%	145%	103%	139%
	#NonDetects	0	0	31	32	34	0
	%NonDetects	0%	0%	76%	78%	83%	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		1.63	1.14	0.98	21.6
	95th	7.5		1.52	0.94	0.90	18
	75th	7.5		1.22	0.37	0.61	8
	Median	6.9		0.28	0.05	0.23	2.13
	25th	6.5		0.15	0.05	0.10	2
	Min	6.1		0.15	0.05	0.10	1.15
	SD	0.6		0.65	0.41	0.35	7
	CV%	9%		94%	137%	91%	121%
	#NonDetects	0	0	3	4	3	0
	%NonDetects	0%	0%	43%	57%	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 7/1/2020 - 6/30/2021

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
SDS3/5 (005)	Count	4	4	4	4	4	4
	Max	7.5		0.82	0.36	0.46	4.61
	95th	7.5		0.72	0.32	0.40	4
	75th	7.4		0.32	0.13	0.19	1
	Median	7.2		0.15	0.05	0.10	0.381
	25th	6.9		0.15	0.05	0.10	0
	Min	6.5		0.15	0.05	0.10	0.309
	SD	0.4		0.33	0.16	0.18	2
	CV%	6%		105%	122%	94%	150%
	#NonDetects	0	0	3	3	3	0
	%NonDetects	0%	0%	75%	75%	75%	0%
	#Trimmed	0	0	0	0	0	0
	%Trimmed	0%	0%	0%	0%	0%	0%
SDS4 (009)	Count	4	4	4	4	4	4
	Max	7.6		0.15	0.05	0.10	3.65
	95th	7.5		0.15	0.05	0.10	3
	75th	7.2		0.15	0.05	0.10	2
	Median	7.0		0.15	0.05	0.10	0.845
	25th	7.0		0.15	0.05	0.10	1
	Min	7.0		0.15	0.05	0.10	0.228
	SD	0.3		0.00	0.00	0.00	2
	CV%	4%		0%	0%	0%	110%
	#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 7/1/2020 - 6/30/2021

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
SDS6/7 (014)	Count	4	4	4	4	4	4
	Max	7.6		0.23	0.13	0.10	3.34
	95th	7.6		0.22	0.12	0.10	3
	75th	7.6		0.17	0.07	0.10	3
	Median	7.5		0.15	0.05	0.10	1.985
	25th	7.4		0.15	0.05	0.10	1
	Min	7.3		0.15	0.05	0.10	1.16
	SD	0.1		0.04	0.04	0.00	1
	CV%	2%		23%	56%	0%	48%
	#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%
SDN1 (006)	Count	3	3	3	3	3	3
	Max	6.9		0.49	0.21	0.28	2.19
	95th	6.9		0.46	0.20	0.26	2
	75th	6.8		0.36	0.17	0.19	2
	Median	6.8		0.24	0.14	0.10	2.08
	25th	6.8		0.23	0.13	0.10	2
	Min	6.7		0.23	0.13	0.10	1.2
	SD	0.1		0.15	0.04	0.10	1
	CV%	1%		47%	28%	65%	30%
	#NonDetects	0	0	0	0	2	0
	%NonDetects	0%	0%	0%	0%	67%	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 7/1/2020 - 6/30/2021

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
SDW2 (016)	Count	3	3	3	3	3	3
	Max	8.2		0.15	0.05	0.10	1.33
	95th	8.2		0.15	0.05	0.10	1
	75th	8.1		0.15	0.05	0.10	1
	Median	8.1		0.15	0.05	0.10	1.11
	25th	7.9		0.15	0.05	0.10	1
	Min	7.7		0.15	0.05	0.10	0.663
	SD	0.3		0.00	0.00	0.00	0
	CV%	3%		0%	0%	0%	33%
	#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	7.6		0.15	0.05	0.10	1.85
	95th	7.6		0.15	0.05	0.10	2
	75th	7.6		0.15	0.05	0.10	2
	Median	7.5		0.15	0.05	0.10	1.53
	25th	7.5		0.15	0.05	0.10	1
	Min	7.5		0.15	0.05	0.10	1
	SD	0.1		0.00	0.00	0.00	0
	CV%	1%		0%	0%	0%	29%
	#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 7/1/2020 - 6/30/2021

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
SDW1A (018)	Count	3	3	3	3	3	3
	Max	7.4		0.15	0.05	0.10	2.15
	95th	7.4		0.15	0.05	0.10	2
	75th	7.3		0.15	0.05	0.10	1
	Median	7.2		0.15	0.05	0.10	0.71
	25th	7.2		0.15	0.05	0.10	1
	Min	7.2		0.15	0.05	0.10	0.362
	SD	0.1		0.00	0.00	0.00	1
	CV%	2%		0%	0%	0%	88%
	#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	7.5		0.15	0.05	0.10	2.21
	95th	7.5		0.15	0.05	0.10	2
	75th	7.3		0.15	0.05	0.10	2
	Median	7.1		0.15	0.05	0.10	1.2
	25th	7.1		0.15	0.05	0.10	1
	Min	7.0		0.15	0.05	0.10	0.273
	SD	0.3		0.00	0.00	0.00	1
	CV%	4%		0%	0%	0%	79%
	#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 7/1/2020 - 6/30/2021

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
SDN2/3/4 (007)	Count	3	3	3	3	3	3
	Max	7.7		0.15	0.05	0.10	2.42
	95th	7.6		0.15	0.05	0.10	2
	75th	7.5		0.15	0.05	0.10	2
	Median	7.4		0.15	0.05	0.10	1.8
	25th	7.1		0.15	0.05	0.10	1
	Min	6.8		0.15	0.05	0.10	0.51
	SD	0.4		0.00	0.00	0.00	1
	CV%	6%		0%	0%	0%	62%
	#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%
SDD06A (020)	Count	4	4	4	4	4	4
	Max	7.4		0.42	0.16	0.26	2.81
	95th	7.3		0.38	0.14	0.24	3
	75th	7.0		0.22	0.08	0.14	2
	Median	6.6		0.15	0.05	0.10	2.01
	25th	6.4		0.15	0.05	0.10	1
	Min	6.3		0.15	0.05	0.10	0.625
	SD	0.5		0.13	0.05	0.08	1
	CV%	8%		62%	69%	58%	51%
	#NonDetects	0	0	3	3	3	0
	%NonDetects	0%	0%	75%	75%	75%	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 7/1/2020 - 6/30/2021

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
Landside (SDE4/SDS1, SDN1, SDD06A)	Count	14	14	14	14	14	14
	Max	7.5		1.63	1.14	0.98	21.6
	95th	7.5		1.38	0.70	0.82	14
	75th	7.3		0.47	0.20	0.28	3
	Median	6.8		0.23	0.09	0.10	2.105
	25th	6.5		0.15	0.05	0.10	2
	Min	6.1		0.15	0.05	0.10	0.625
	#NonDetects	0	0	6	7	8	0
	%NonDetects	0%	0%	43%	50%	57%	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	27	27	27	27	27	27
	Max	8.2		0.82	0.36	0.46	4.61
	95th	8.0		0.20	0.10	0.10	4
	75th	7.6		0.15	0.05	0.10	2
	Median	7.4		0.15	0.05	0.10	1.16
	25th	7.1		0.15	0.05	0.10	1
	Min	6.5		0.15	0.05	0.10	0.228
	SD	0.4		0.13	0.06	0.07	1
	CV%	5%		72%	95%	60%	78%
	#NonDetects	0	0	25	25	26	0
	%NonDetects	0%	0%	93%	93%	96%	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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APPENDIX B

Quality Control Samples

QC Samples Dups - 7/1/2020-6/30/2021

																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-MO mg/l
SDN1	SDN1013021DUPG	1/30/2021	1.96	86	0.16	0.09	0.11	15.5	NPDES-Part II	first flush grab		FD	FldQC	No		H 6.15	2.65			No Sheen	0.103	< 0.1
SDN1	SDN1013121DUPC	1/30/2021	1.96	86	0.16	0.09	0.11	15.5	NPDES-Part II	flow-wt comp	SMC	FD	FldQC	No				0.00609	0.0535			
SDN2/3/	SDN2/3/4013121DUPC	1/30/2021	1.96	86	0.16	0.09	0.11	15.5	NPDES-Part II	first flush grab		FD	FldQC	No		H 7.72	1.78			No Sheen	< 0.05	< 0.1
SDN2/3/	SDN2/3/4020121DUPC	1/30/2021	1.96	86	0.16	0.09	0.11	15.5	NPDES-Part II	flow-wt comp	SMC	FD	FldQC	No				0.00561	< 0.002			

xref_primary_site	outfall	sample_name	sample_type_code	storm_stormdate	EventID	sample_sub_type_desc	event_type_desc	composite_yn	composite_desc	ground_deice_YN	purp_desc	comment	std_anl_method_name	chemical_name	lab_flag	result_value	reporting_detection_limit	result_unit	dilution_factor	project_code	reportable_result	npdes_reporting_yn	sample_date_time	sys_loc_code	total_or_dissolved
STORM	SDS3/5	SDS3/5110420BLNK	EB	11/3/2020 0:00	Storm20201103	discreet series	NPDES-Part II	FALSE		FALSE	NPDES - II		E200.8	Copper	U	0.500	0.500	ug/L	1	Storm	Yes	TRUE	11/4/2020 13:21	A_STO99	T
STORM	SDS3/5	SDS3/5110420BLNK	EB	11/3/2020 0:00	Storm20201103	discreet series	NPDES-Part II	FALSE		FALSE	NPDES - II		E200.8	Zinc	U	4.00	4.00	ug/L	1	Storm	Yes	TRUE	11/4/2020 13:21	A_STO99	T
Storm	SDS4	SDS411042OBLNK	EB	11/3/2020 0:00	Storm20201103	discreet series	NPDES-Part II	FALSE		FALSE	NPDES - II		E200.8	Copper	U	0.500	0.500	ug/L	1	Storm	Yes	TRUE	11/4/2020 13:04	A_STO42	T
Storm	SDS4	SDS411042OBLNK	EB	11/3/2020 0:00	Storm20201103	discreet series	NPDES-Part II	FALSE		FALSE	NPDES - II		E200.8	Zinc	U	4.00	4.00	ug/L	1	Storm	Yes	TRUE	11/4/2020 13:04	A_STO42	T
storm	SDD06A	SDD06A110420BLNK	EB	11/3/2020 0:00	Storm20201103	discreet series	NPDES-Part II	FALSE		FALSE	NPDES - II		E200.8	Copper	U	0.500	0.500	ug/L	1	Storm	Yes	TRUE	11/4/2020 13:43	A_STO134	T
storm	SDD06A	SDD06A110420BLNK	EB	11/3/2020 0:00	Storm20201103	discreet series	NPDES-Part II	FALSE		FALSE	NPDES - II		E200.8	Zinc	U	4.00	4.00	ug/L	1	Storm	Yes	TRUE	11/4/2020 13:43	A_STO134	T

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