Annual Industrial Stormwater Monitoring Report

Seattle-Tacoma International Airport

For the Period July 1, 2021 through June 30, 2022

September 29, 2022

Prepared by

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Port of Seattle

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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, 2021 through June 30, 2022. 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 all required sampling collection and reporting requirements in the NPDES permit for the 2021-2022 data collection period. 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-two (42) grab and forty-two (42) composite stormwater samples from 9 storm events were collected in the past year with results reported on quarterly Discharge Monitoring Reports (DMRs). There were five (5) instances of permit limit exceedances associated with 252 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 2021 Key Facts and Figures, SEA handled 498,741 metric tons of air cargo, and 36.2 million passengers. SEA is ranked the eleventh 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, 2022, 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 2021 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 Seattle-Tacoma International Airport Industrial Stormwater Discharge Monitoring Program* (QAPP) (Aspect Consulting, Inc. 2021). 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. with concurrent monitoring of the receiving water.

3.1.2 Field Quality Control Samples

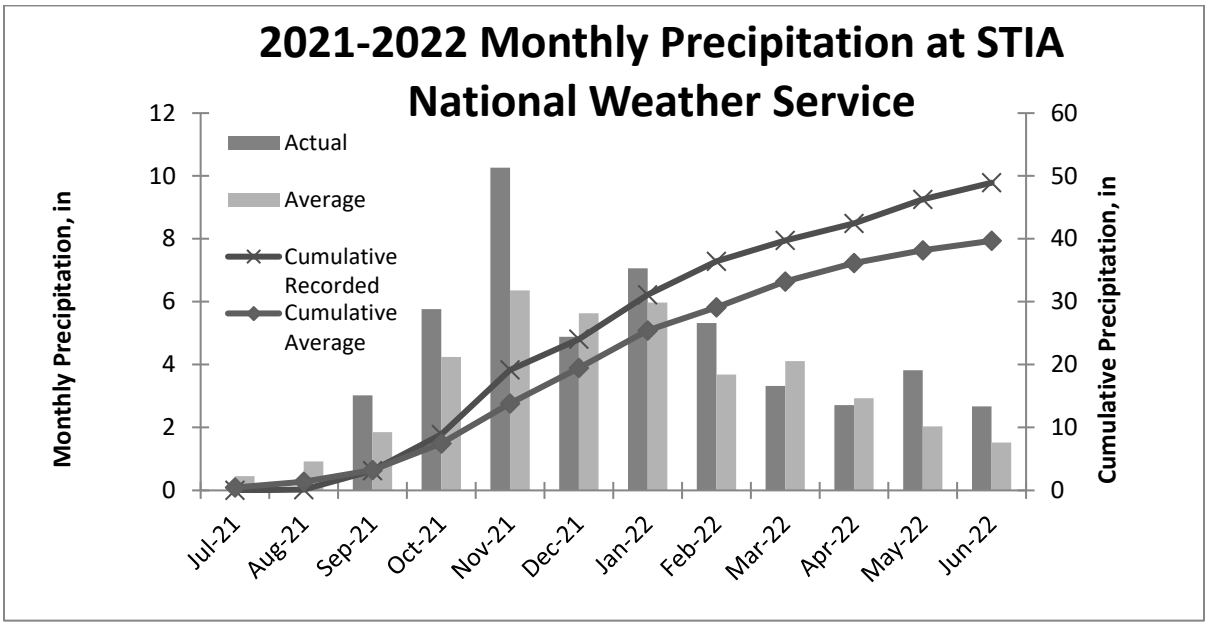
SEA routinely collects field duplicate and equipment blank samples during NPDES sampling events in accordance with the QAPP. **Appendix B** summarizes these results. The results reflect on the efficacy of the SEA's "clean" sampling methods developed for stormwater monitoring relative to metals (POS 1999).
Ten (10) Field Quality Control samples were collected in the 2021 – 2022 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 nine (9) precipitation events with precipitation ranging from 0.10 to 4.87 inches. Dry weather preceding these sampling events ranged from 12 hours (February 20, 2022) to 5.3 days (February 26, 2022). The tabular sample data in **Appendix A** includes storm event data such as precipitation depth, antecedent precipitation amounts, and length of antecedent dry period.

During the current permit's annual reporting schedule, 48.93 inches of precipitation fell at STIA; 9.24 inches greater than the historical (2002-2022) average of 39.69 inches and 11.06 inches greater than the previous monitoring year (37.87 inches). Monthly precipitation totals were below average druing January, February June, Septermber, and October; 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 42 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 7.1. 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 October 21, 2021 and April 29, 2022 measuring 6.1 and 6.4 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 November 3, 2021 (6.4 S.U.) and at the SDS4 site on October 21, 2021 (6.2 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. Source tracing and BMP effectiveness studies are underway on the S1 and SDD06A swale systems to inform on possible point sources and to assess opportunities for potential system improvements if issues are identified.

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 0.83 mg/L. The estimated median TPH concentration at all outfalls was 0.30 mg/L. However, the actual median TPH concentration may have been lower since TPH was only detected in 12 of the 42 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 2.2 NTU with a range from 0.1 NTU to 9.2 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/SDS1	9/17/2021	1.43	39.5	0.32	0	0	49.5	6.6	4.1	No Sheen	0.256	0.495	0.239
SDE4/SDS1	10/21/2021	0.66	8	0.21	0	0.29	32	6.1	2.3	No Sheen	< 0.1	< 0.3	< 0.2
SDE4/SDS1	11/1/2021	0.15	8	0.06	0	0	76	7	0.1	No Sheen	< 0.1	< 0.3	< 0.2
SDE4/SDS1	2/14/2022	0.1	13	0.05	0	0	90	6.6	5.3	No Sheen	0.477	0.778	0.301
SDE4/SDS1	2/26/2022	4.87	67	0.23	0	0.02	128	6.5	2.9	No Sheen	0.222	0.322	< 0.2
SDE4/SDS1	4/3/2022	0.82	32	0.11	0.02	0.05	42	7.5	3.2	No Sheen	0.182	0.282	< 0.2
SDE4/SDS1	4/29/2022	0.58	11.42	0.09	0	0.02	47.167	6.4	1.2	No Sheen	< 0.1	< 0.3	< 0.2
SDS3/5	9/17/2021	1.43	39.5	0.32	0	0	49.5	6.7	2.6	No Sheen	0.143	0.262	< 0.238
SDS3/5	11/3/2021	1.09	21	0.19	0.02	0.27	16	6.6	0.8	No Sheen	< 0.1	< 0.3	< 0.2
SDS3/5	2/20/2022	0.44	26	0.08	0.02	0.02	13	7.4	1.4	No Sheen	< 0.1	< 0.3	< 0.2
SDS3/5	4/3/2022	0.82	32	0.11	0.02	0.05	42	7	1	No Sheen	< 0.1	< 0.3	< 0.2
SDS4	9/17/2021	1.43	39.5	0.32	0	0	49.5	6.6	2.6	No Sheen	0.114	0.214	< 0.2
SDS4	10/21/2021	0.66	8	0.21	0	0.29	32	6.2	1.3	No Sheen	< 0.1	< 0.3	< 0.2
SDS4	2/20/2022	0.44	26	0.08	0.02	0.02	13	6.9	2	No Sheen	< 0.1	< 0.3	< 0.2
SDS4	4/3/2022	0.82	32	0.11	0.02	0.05	42	7.4	1.2	No Sheen	< 0.116	< 0.349	< 0.233
SDS6/7	9/17/2021	1.43	39.5	0.32	0	0	49.5	6.9	4.8	No Sheen	J 0.496	J 0.834	0.338
SDS6/7	10/21/2021	0.66	8	0.21	0	0.29	32	7.1	3.2	No Sheen	< 0.1	< 0.3	< 0.2
SDS6/7	2/20/2022	0.44	26	0.08	0.02	0.02	13	7.7	0.5	No Sheen	< 0.1	< 0.3	< 0.2
SDS6/7	4/29/2022	0.58	11.42	0.09	0	0.02	47.167	6.7	2.2	No Sheen	< 0.1	< 0.3	< 0.2
SDN1	11/3/2021	1.09	21	0.19	0.02	0.27	16	7.2	6.4	No Sheen	0.239	0.527	0.288
SDN1	2/14/2022	0.1	13	0.05	0	0	90	7.1	4.9	No Sheen	0.173	0.4	0.227
SDN1	4/3/2022	0.82	32	0.11	0.02	0.05	42	7.8	3.4	No Sheen	0.152	0.252	< 0.2
SDW2	11/3/2021	1.09	21	0.19	0.02	0.27	16	7.5	4.1	No Sheen	< 0.1	< 0.3	< 0.2
SDW2	2/14/2022	0.1	13	0.05	0	0	90	7.2	1.8	No Sheen	< 0.1	< 0.3	< 0.2
SDW2	2/20/2022	0.44	26	0.08	0.02	0.02	13	7.8	1.4	No Sheen	< 0.1	< 0.3	< 0.2
SDW2	4/3/2022	0.82	32	0.11	0.02	0.05	42	8.3	1.9	No Sheen	< 0.1	< 0.3	< 0.2
SDW1B	11/3/2021	1.09	21	0.19	0.02	0.27	16	7.1	6.1	No Sheen	< 0.1	< 0.3	< 0.2
SDW1B	2/20/2022	0.44	26	0.08	0.02	0.02	13	7.6	1.1	No Sheen	< 0.1	< 0.3	< 0.2
SDW1B	4/3/2022	0.82	32	0.11	0.02	0.05	42	7.8	2.3	No Sheen	< 0.1	< 0.3	< 0.2
SDW1A	10/21/2021	0.66	8	0.21	0	0.29	32	6.8	1.5	No Sheen	< 0.1	< 0.3	< 0.2
SDW1A	2/20/2022	0.44	26	0.08	0.02	0.02	13	7.4	2.2	No Sheen	< 0.1	< 0.3	< 0.2
SDW1A	4/3/2022	0.82	32	0.11	0.02	0.05	42	7.5	1.5	No Sheen	< 0.1	< 0.3	< 0.2
SDN3A	10/21/2021	0.66	8	0.21	0	0.29	32	6.9	0.9	No Sheen	< 0.1	< 0.3	< 0.2
SDN3A	2/20/2022	0.44	26	0.08	0.02	0.02	13	7.4	3.1	No Sheen	< 0.1	< 0.3	< 0.2
SDN3A	4/3/2022	0.82	32	0.11	0.02	0.05	42	7.6	1.3	No Sheen	< 0.1	< 0.3	< 0.2
SDN2/3/4	11/3/2021	1.09	21	0.19	0.02	0.27	16	7.7	6.7	No Sheen	0.14	0.24	< 0.2
SDN2/3/4	2/26/2022	4.87	67	0.23	0	0.02	128	7.7	0.1	No Sheen	< 0.1	< 0.3	< 0.2
SDN2/3/4	4/3/2022	0.82	32	0.11	0.02	0.05	42	7.9	2.3	No Sheen	< 0.1	< 0.3	< 0.2
SDD06A	9/17/2021	1.43	39.5	0.32	0	0	49.5	7.5	9.2	No Sheen	0.189	0.456	0.267
SDD06A	11/3/2021	1.09	21	0.19	0.02	0.27	16	6.4	1.1	No Sheen	< 0.1	< 0.3	< 0.2
SDD06A	2/20/2022	0.44	26	0.08	0.02	0.02	13	7.1	3	No Sheen	< 0.1	< 0.3	< 0.2
SDD06A	4/3/2022	0.82	32	0.11	0.02	0.05	42	7.5	1.2	No Sheen	< 0.116	< 0.349	< 0.233

3.1.5 Composite Sample Results and Discussion

For the 2021-2022 sampling period, the SEA collected a total of 42 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 39.0 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 was only 1 (1) permit limit exceedance for copper during the monitoring year.

The exceedance for copper occurred at the SDS3/5 outfall on September 17, 2021. The sample measured 39 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 6 µg/L to 67 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 ug/l	Zn Total ug/l
SDE4/SDS1	9/17/2021	1.43	39.5	0.32	0	0	49.5	23.1	66.6
SDE4/SDS1	10/21/2021	0.66	8	0.21	0	0.29	32	9.35	29
SDE4/SDS1	11/1/2021	0.15	8	0.06	0	0	76	7.87	18.6
SDE4/SDS1	2/14/2022	0.1	13	0.05	0	0	90	7.75	40.4
SDE4/SDS1	2/26/2022	4.87	67	0.23	0	0.02	128	10.7	55.2
SDE4/SDS1	4/3/2022	0.82	32	0.11	0.02	0.05	42	11.4	59.2
SDE4/SDS1	4/29/2022	0.58	11.42	0.09	0	0.02	47.167	11.1	63.5
SDS3/5	9/17/2021	1.43	39.5	0.32	0	0	49.5	39	15.2
SDS3/5	11/3/2021	1.09	21	0.19	0.02	0.27	16	19.3	10.4
SDS3/5	2/20/2022	0.44	26	0.08	0.02	0.02	13	9.16	12.1
SDS3/5	4/3/2022	0.82	32	0.11	0.02	0.05	42	10.9	17.6
SDS4	9/17/2021	1.43	39.5	0.32	0	0	49.5	18.7	< 6
SDS4	10/21/2021	0.66	8	0.21	0	0.29	32	15	< 6
SDS4	2/20/2022	0.44	26	0.08	0.02	0.02	13	3.47	< 6
SDS4	4/3/2022	0.82	32	0.11	0.02	0.05	42	6.23	28.1
SDS6/7	9/17/2021	1.43	39.5	0.32	0	0	49.5	16.1	J 34.6
SDS6/7	10/21/2021	0.66	8	0.21	0	0.29	32	10	< 6
SDS6/7	2/20/2022	0.44	26	0.08	0.02	0.02	13	6.11	< 6
SDS6/7	4/29/2022	0.58	11.42	0.09	0	0.02	47.167	6.14	6.28
SDN1	11/3/2021	1.09	21	0.19	0.02	0.27	16	10.8	66.9
SDN1	2/14/2022	0.1	13	0.05	0	0	90	9.23	44.1
SDN1	4/3/2022	0.82	32	0.11	0.02	0.05	42	9.59	50.1
SDW2	11/3/2021	1.09	21	0.19	0.02	0.27	16	6.08	26.2
SDW2	2/14/2022	0.1	13	0.05	0	0	90	3.32	< 6
SDW2	2/20/2022	0.44	26	0.08	0.02	0.02	13	3.1	< 6
SDW2	4/3/2022	0.82	32	0.11	0.02	0.05	42	3.6	9.62
SDW1B	11/3/2021	1.09	21	0.19	0.02	0.27	16	6.92	< 6
SDW1B	2/20/2022	0.44	26	0.08	0.02	0.02	13	2.39	< 6
SDW1B	4/3/2022	0.82	32	0.11	0.02	0.05	42	5.45	14.1
SDW1A	10/21/2021	0.66	8	0.21	0	0.29	32	4.72	< 6
SDW1A	2/20/2022	0.44	26	0.08	0.02	0.02	13	1.01	< 6
SDW1A	4/3/2022	0.82	32	0.11	0.02	0.05	42	2.08	< 6
SDN3A	10/21/2021	0.66	8	0.21	0	0.29	32	2.57	< 6
SDN3A	2/20/2022	0.44	26	0.08	0.02	0.02	13	< 0.5	< 6
SDN3A	4/3/2022	0.82	32	0.11	0.02	0.05	42	0.844	10
SDN2/3/4	11/3/2021	1.09	21	0.19	0.02	0.27	16	7.83	< 6
SDN2/3/4	2/26/2022	4.87	67	0.23	0	0.02	128	4.89	37.4
SDN2/3/4	4/3/2022	0.82	32	0.11	0.02	0.05	42	4.33	< 6
SDD06A	9/17/2021	1.43	39.5	0.32	0	0	49.5	12.6	24.6
SDD06A	11/3/2021	1.09	21	0.19	0.02	0.27	16	4.01	6.9
SDD06A	2/20/2022	0.44	26	0.08	0.02	0.02	13	5.24	20.8
SDD06A	4/3/2022	0.82	32	0.11	0.02	0.05	42	4.09	9.23

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 2021 and spring 2022.

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: Storm Drainage System Receiving Water In-Situ Toxicity Testing* (Aspect 2021).

For a full discussion on results of the sampling, please refer to *Rainbow Trout Early Life Stages In Situ Monitoring Testing, Fall 2021 and Spring 2022 Testing Events* (in production Nautilus, 2022).

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.

During the period covered by this report there was one primary project that impacted BMP's. The project in our SDE4 basin included a reboot of the cell phone waiting lot bioswale consisting of new soil and plants, along with some pervious concrete sidewalks.

5.0 SUMMARY AND CONCLUSIONS

During the reporting period from July 2021 to June 2022 the SEA fulfilled all requirements for outfall monitoring under the current NPDES permit. The Port collected a total of 42 grab samples and 42 composite stormwater samples during 9 storm events. Outfalls were sampled quarterly when discharges occurred from rain events that met the minimum rainfall criteria of 0.1 inch. There were five (5) instances of permit limit exceedances associated with 84 samples and 252 individual constituent analyses that were tested to meet the monitoring requirements of the NPDES permit.

To address the pH non-compliance, the Port is continuing a pH source tracing study in the SDE4 and SDD06A basins while also adding a source tracing study of the SDS1 basin. Results of these investigations will be used to assess possible implementation actions the Port can take to reduce future exceedances.

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

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APPENDIX A

TABULAR NPDES SAMPLE DATA SUMMARIES and STATISTICS

Port of Seattle

EMIS

Summary of Storms Sampled 9/17/2021 - 4/29/2022

StormDate	Depth, in.	Dur, hr	Max Int, in/hr	24hrant, in	48hrant, in	Dryant, hr	Dryant, Days	Load Factor	Event Type	Comment
4/29/2022	0.58	11.42	0.09	0	0.02	47.167	2.0	4.2	NPDES-Part II	JF to update w/ storm data
4/3/2022	0.82	32	0.11	0.02	0.05	42	1.8	4.6	NPDES-Part II	JF to update w/ storm data
2/26/2022	4.87	67	0.23	0	0.02	128	5.3	29.4	NPDES-Part II	JF to update w/ storm data
2/20/2022	0.44	26	0.08	0.02	0.02	13	0.5	1.0	NPDES-Part II	JF to update w/ storm data
2/14/2022	0.1	13	0.05	0	0	90	3.8	4.5	NPDES-Part II	JF to update w/ storm data
11/3/2021	1.09	21	0.19	0.02	0.27	16	0.7	3.0	NPDES-Part II	
11/1/2021	0.15	8	0.06	0	0	76	3.2	4.6	NPDES-Part II	
10/21/2021	0.66	8	0.21	0	0.29	32	1.3	6.7	NPDES-Part II	
9/17/2021	1.43	39.5	0.32	0	0	49.5	2.1	15.8	NPDES-Part II	
Count	9	9	9	9	9	9	9	9		
Median	0.66	21	0.11	0	0.02	47	2.0	4.6		
Average	1.13	25	0.15	0.01	0.07	55	2.3	8.2		

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

Port of Seattle
EMIS

NPDES Grab Statistics 7/1/2021 - 6/30/2022

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
All Outfalls	Count							42		42
	Max							0.039		0.067
	95th							0.019		0.063
	75th							0.011		0.029
	Median							0.007		0.010
	25th							0.004		0.006
	Min							0.001		0.006
	SD							0.005		0.021
	CV%							48%		54%
	#NonDetects							1		16
	%NonDetects							2%		38%
	#Trimmed							0		0
	%Trimmed							0%		0%
SDE4/SDS1 (002)	Count							7		7
	Max							0.023		0.067
	95th							0.020		0.066
	75th							0.011		0.061
	Median							0.011		0.055
	25th							0.009		0.035
	Min							0.008		0.019
	SD							0.005		0.018
	CV%							45%		39%
	#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 Grab Statistics 7/1/2021 - 6/30/2022

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
SDS3/5 (005)	Count							4		4
	Max							0.039		0.018
	95th							0.036		0.017
	75th							0.024		0.016
	Median							0.015		0.014
	25th							0.010		0.012
	Min							0.009		0.010
	SD							0.014		0.003
	CV%							70%		23%
	#NonDetects							0		0
	%NonDetects							0%		0%
	#Trimmed							0		0
	%Trimmed							0%		0%
SDS4 (009)	Count							4		4
	Max							0.019		0.028
	95th							0.018		0.025
	75th							0.016		0.012
	Median							0.011		0.006
	25th							0.006		0.006
	Min							0.003		0.006
	SD							0.007		0.011
	CV%							66%		96%
	#NonDetects							0		3
	%NonDetects							0%		75%
	#Trimmed							0		0
	%Trimmed							0%		0%

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

NPDES Grab Statistics 7/1/2021 - 6/30/2022

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
SDS6/7 (014)	Count							4		4
	Max							0.016		0.035
	95th							0.015		0.030
	75th							0.012		0.013
	Median							0.008		0.006
	25th							0.006		0.006
	Min							0.006		0.006
	SD							0.005		0.014
	CV%							49%		108%
	#NonDetects							0		2
	%NonDetects							0%		50%
	#Trimmed							0		0
	%Trimmed							0%		0%

SDN1 (006)	Count							3		3
	Max							0.011		0.067
	95th							0.011		0.065
	75th							0.010		0.058
	Median							0.010		0.050
	25th							0.009		0.047
	Min							0.009		0.044
	SD							0.001		0.012
	CV%							8%		22%
	#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 Grab Statistics 7/1/2021 - 6/30/2022

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
SDW2 (016)	Count							4		4
	Max							0.006		0.026
	95th							0.006		0.024
	75th							0.004		0.014
	Median							0.003		0.008
	25th							0.003		0.006
	Min							0.003		0.006
	SD							0.001		0.010
	CV%							34%		81%
	#NonDetects							0		2
	%NonDetects							0%		50%
	#Trimmed							0		0
	%Trimmed							0%		0%

SDW1B (017)	Count							3		3
	Max							0.007		0.014
	95th							0.007		0.013
	75th							0.006		0.010
	Median							0.005		0.006
	25th							0.004		0.006
	Min							0.002		0.006
	SD							0.002		0.005
	CV%							47%		54%
	#NonDetects							0		2
	%NonDetects							0%		67%
	#Trimmed							0		0
	%Trimmed							0%		0%

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

NPDES Grab Statistics 7/1/2021 - 6/30/2022

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
SDW1A (018)	Count							3		3
	Max							0.005		0.006
	95th							0.004		0.006
	75th							0.003		0.006
	Median							0.002		0.006
	25th							0.002		0.006
	Min							0.001		0.006
	SD							0.002		0.000
	CV%							73%		0%
	#NonDetects							0		3
	%NonDetects							0%		100%
	#Trimmed							0		0
	%Trimmed							0%		0%
SDN3A (019)	Count							3		3
	Max							0.003		0.010
	95th							0.002		0.010
	75th							0.002		0.008
	Median							0.001		0.006
	25th							0.001		0.006
	Min							0.001		0.006
	SD							0.001		0.002
	CV%							85%		31%
	#NonDetects							1		2
	%NonDetects							33%		67%
	#Trimmed							0		0
	%Trimmed							0%		0%

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

NPDES Grab Statistics 7/1/2021 - 6/30/2022

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
SDN2/3/4 (007)	Count							3		3
	Max							0.008		0.037
	95th							0.008		0.034
	75th							0.006		0.022
	Median							0.005		0.006
	25th							0.005		0.006
	Min							0.004		0.006
	SD							0.002		0.018
	CV%							33%		110%
	#NonDetects							0		2
	%NonDetects							0%		67%
	#Trimmed							0		0
	%Trimmed							0%		0%
SDD06A (020)	Count							4		4
	Max							0.013		0.025
	95th							0.012		0.024
	75th							0.007		0.022
	Median							0.005		0.015
	25th							0.004		0.009
	Min							0.004		0.007
	SD							0.004		0.009
	CV%							63%		56%
	#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 Grab Statistics 7/1/2021 - 6/30/2022

CONCENTRATION, mg/L

		TSS	Turb, NTU		E-Glycol	P-Glycol	Total Glycol	Cu	Pb	Zn
Landside (SDE4/SDS1, SDN1, SDD06A)	Count							14		14
	Max							0.023		0.067
	95th							0.016		0.067
	75th							0.011		0.058
	Median							0.009		0.042
	25th							0.008		0.022
	Min							0.004		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							28		28
	Max							0.039		0.037
	95th							0.019		0.032
	75th							0.009		0.013
	Median							0.006		0.006
	25th							0.003		0.006
	Min							0.001		0.006
	SD							0.008		0.009
	CV%							102%		81%
	#NonDetects							1		16
	%NonDetects							4%		57%
	#Trimmed							0		0
	%Trimmed							0%		0%

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

NPDES Grab Statistics 7/1/2021 - 6/30/2022

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
All Outfalls	Count	17	42	42	42	42	5
	Max	7.7		0.83	0.50	0.34	9.2
	95th	7.5		0.53	0.26	0.29	8
	75th	7.1		0.30	0.13	0.20	5
	Median	6.9		0.30	0.10	0.20	4.1
	25th	6.6		0.30	0.10	0.20	3
	Min	6.1		0.21	0.10	0.20	2.6
	SD	0.5		0.14	0.10	0.04	4
	CV%	8%		37%	57%	16%	54%
	#NonDetects	0	0	30	30	36	0
	%NonDetects	0%	0%	71%	71%	86%	0%
	#Trimmed	0	0	0	0	0	0
	%Trimmed	0%	0%	0%	0%	0%	0%
SDE4/SDS1 (002)	Count	3	7	7	7	7	1
	Max	7.0		0.78	0.48	0.30	4.1
	95th	7.0		0.69	0.41	0.28	4
	75th	6.8		0.41	0.24	0.22	4
	Median	6.6		0.30	0.18	0.20	4.1
	25th	6.3		0.30	0.10	0.20	4
	Min	6.1		0.28	0.10	0.20	4.1
	SD	0.5		0.18	0.14	0.04	0
	CV%	7%		46%	66%	18%	0%
	#NonDetects	0	0	3	3	5	0
	%NonDetects	0%	0%	43%	43%	71%	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 7/1/2021 - 6/30/2022

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
SDS3/5 (005)	Count	2	4	4	4	4	1
	Max	6.7		0.30	0.14	0.24	2.6
	95th	6.7		0.30	0.14	0.23	3
	75th	6.7		0.30	0.11	0.21	3
	Median	6.6		0.30	0.10	0.20	2.6
	25th	6.6		0.29	0.10	0.20	3
	Min	6.6		0.26	0.10	0.20	2.6
	SD	0.1		0.02	0.02	0.02	0
	CV%	1%		7%	19%	9%	0%
	#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	2	4	4	4	4	1
	Max	6.6		0.35	0.12	0.23	2.6
	95th	6.6		0.34	0.12	0.23	3
	75th	6.5		0.31	0.11	0.21	3
	Median	6.4		0.30	0.11	0.20	2.6
	25th	6.3		0.28	0.10	0.20	3
	Min	6.2		0.21	0.10	0.20	2.6
	SD	0.3		0.06	0.01	0.02	0
	CV%	4%		19%	8%	8%	0%
	#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.

NPDES Grab Statistics 7/1/2021 - 6/30/2022

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
SDS6/7 (014)	Count	2	4	4	4	4	1
	Max	7.1		0.83	0.50	0.34	4.8
	95th	7.1		0.75	0.44	0.32	5
	75th	7.1		0.43	0.20	0.23	5
	Median	7.0		0.30	0.10	0.20	4.8
	25th	6.9		0.30	0.10	0.20	5
	Min	6.9		0.30	0.10	0.20	4.8
	SD	0.1		0.27	0.20	0.07	0
	CV%	2%		62%	99%	29%	0%
	#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%
SDN1 (006)	Count	1	3	3	3	3	
	Max	7.2		0.53	0.24	0.29	
	95th	7.2		0.51	0.23	0.28	
	75th	7.2		0.46	0.21	0.26	
	Median	7.2		0.40	0.17	0.23	
	25th	7.2		0.33	0.16	0.21	
	Min	7.2		0.25	0.15	0.20	
	SD	0.0		0.14	0.05	0.05	
	CV%	0%		35%	24%	19%	
	#NonDetects	0	0	0	0	1	
	%NonDetects	0%	0%	0%	0%	33%	
	#Trimmed	0	0	0	0	0	
	%Trimmed	0%	0%	0%	0%	0%	

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

NPDES Grab Statistics 7/1/2021 - 6/30/2022

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
SDW2 (016)	Count	1	4	4	4	4	
	Max	7.5		0.30	0.10	0.20	
	95th	7.5		0.30	0.10	0.20	
	75th	7.5		0.30	0.10	0.20	
	Median	7.5		0.30	0.10	0.20	
	25th	7.5		0.30	0.10	0.20	
	Min	7.5		0.30	0.10	0.20	
	SD	0.0		0.00	0.00	0.00	
	CV%	0%		0%	0%	0%	
	#NonDetects	0	0	4	4	4	
	%NonDetects	0%	0%	100%	100%	100%	
	#Trimmed	0	0	0	0	0	
	%Trimmed	0%	0%	0%	0%	0%	
SDW1B (017)	Count	1	3	3	3	3	
	Max	7.1		0.30	0.10	0.20	
	95th	7.1		0.30	0.10	0.20	
	75th	7.1		0.30	0.10	0.20	
	Median	7.1		0.30	0.10	0.20	
	25th	7.1		0.30	0.10	0.20	
	Min	7.1		0.30	0.10	0.20	
	SD	0.0		0.00	0.00	0.00	
	CV%	0%		0%	0%	0%	
	#NonDetects	0	0	3	3	3	
	%NonDetects	0%	0%	100%	100%	100%	
	#Trimmed	0	0	0	0	0	
	%Trimmed	0%	0%	0%	0%	0%	

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

NPDES Grab Statistics 7/1/2021 - 6/30/2022

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
SDW1A (018)	Count	1	3	3	3	3	
	Max	6.8		0.30	0.10	0.20	
	95th	6.8		0.30	0.10	0.20	
	75th	6.8		0.30	0.10	0.20	
	Median	6.8		0.30	0.10	0.20	
	25th	6.8		0.30	0.10	0.20	
	Min	6.8		0.30	0.10	0.20	
	SD	0.0		0.00	0.00	0.00	
	CV%	0%		0%	0%	0%	
	#NonDetects	0	0	3	3	3	
	%NonDetects	0%	0%	100%	100%	100%	
	#Trimmed	0	0	0	0	0	
	%Trimmed	0%	0%	0%	0%	0%	
SDN3A (019)	Count	1	3	3	3	3	
	Max	6.9		0.30	0.10	0.20	
	95th	6.9		0.30	0.10	0.20	
	75th	6.9		0.30	0.10	0.20	
	Median	6.9		0.30	0.10	0.20	
	25th	6.9		0.30	0.10	0.20	
	Min	6.9		0.30	0.10	0.20	
	SD	0.0		0.00	0.00	0.00	
	CV%	0%		0%	0%	0%	
	#NonDetects	0	0	3	3	3	
	%NonDetects	0%	0%	100%	100%	100%	
	#Trimmed	0	0	0	0	0	
	%Trimmed	0%	0%	0%	0%	0%	

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

NPDES Grab Statistics 7/1/2021 - 6/30/2022

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
SDN2/3/4 (007)	Count	1	3	3	3	3	
	Max	7.7		0.30	0.14	0.20	
	95th	7.7		0.30	0.14	0.20	
	75th	7.7		0.30	0.12	0.20	
	Median	7.7		0.30	0.10	0.20	
	25th	7.7		0.27	0.10	0.20	
	Min	7.7		0.24	0.10	0.20	
	SD	0.0		0.03	0.02	0.00	
	CV%	0%		12%	20%	0%	
	#NonDetects	0	0	2	2	3	
	%NonDetects	0%	0%	67%	67%	100%	
	#Trimmed	0	0	0	0	0	
	%Trimmed	0%	0%	0%	0%	0%	
SDD06A (020)	Count	2	4	4	4	4	1
	Max	7.5		0.46	0.19	0.27	9.2
	95th	7.4		0.44	0.18	0.26	9
	75th	7.2		0.38	0.13	0.24	9
	Median	6.9		0.32	0.11	0.22	9.2
	25th	6.7		0.30	0.10	0.20	9
	Min	6.4		0.30	0.10	0.20	9.2
	SD	0.8		0.07	0.04	0.03	0
	CV%	11%		21%	34%	14%	0%
	#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 7/1/2021 - 6/30/2022

CONCENTRATION, mg/L

		pH	Sheen	TPH-Dx	TPH-D	TPH-MO	Turb
Landside (SDE4/SDS1, SDN1, SDD06A)	Count	6	14	14	14	14	2
	Max	7.5		0.78	0.48	0.30	9.2
	95th	7.4		0.61	0.33	0.29	9
	75th	7.2		0.44	0.21	0.24	8
	Median	6.8		0.31	0.16	0.20	6.65
	25th	6.4		0.30	0.10	0.20	5
	Min	6.1		0.25	0.10	0.20	4.1
	#NonDetects	0	0	6	6	9	0
	%NonDetects	0%	0%	43%	43%	64%	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	11	28	28	28	28	3
	Max	7.7		0.83	0.50	0.34	4.8
	95th	7.6		0.33	0.14	0.24	5
	75th	7.1		0.30	0.10	0.20	4
	Median	6.9		0.30	0.10	0.20	2.6
	25th	6.7		0.30	0.10	0.20	3
	Min	6.2		0.21	0.10	0.20	2.6
	SD	0.4		0.10	0.07	0.03	1
	CV%	6%		33%	63%	13%	38%
	#NonDetects	0	0	24	24	27	0
	%NonDetects	0%	0%	86%	86%	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 - 7/1/2021-6/30/2022

Outfall	Sample	Storm	depth	dur	maxint	ant24	ant48	dryant	Event Type	Sub Type	Comp Type	Type	Purpose	Grnd Deice
SDE4/SDS	SDE4/S1091721DUPG	9/17/2021	1.43	39.5	0.32	0	0	49.5	NPDES-Part II	first flush grab		FD	FldQC	No
SDE4/SDS	SDE4/S1091821DUPC	9/17/2021	1.43	39.5	0.32	0	0	49.5	NPDES-Part II	flow-wt comp	SMC	FD	FldQC	No
SDS3/5	SDS3/5091821DUPG	9/17/2021	1.43	39.5	0.32	0	0	49.5	NPDES-Part II	first flush grab		FD	FldQC	No
SDS3/5	SDS3/5091821DUPC	9/17/2021	1.43	39.5	0.32	0	0	49.5	NPDES-Part II	flow-wt comp	EMC	FD	FldQC	No
SDS4	SDS4091721DUPG	9/17/2021	1.43	39.5	0.32	0	0	49.5	NPDES-Part II	first flush grab		FD	FldQC	No
SDS4	SDS4091821DUPC	9/17/2021	1.43	39.5	0.32	0	0	49.5	NPDES-Part II	flow-wt comp	EMC	FD	FldQC	No
SDS6/7	SDS6/7091721DUPG	9/17/2021	1.43	39.5	0.32	0	0	49.5	NPDES-Part II	first flush grab		FD	FldQC	No
SDS6/7	SDS6/7091821DUPC	9/17/2021	1.43	39.5	0.32	0	0	49.5	NPDES-Part II	flow-wt comp	SMC	FD	FldQC	No
SDD06A	SDD06A091721DUPG	9/17/2021	1.43	39.5	0.32	0	0	49.5	NPDES-Part II	first flush grab		FD	FldQC	No
SDD06A	SDD06A091821DUPC	9/17/2021	1.43	39.5	0.32	0	0	49.5	NPDES-Part II	flow-wt comp	SMC	FD	FldQC	No

QC Samples Dups - 7/1/2021-6/30/2022

			Conventionals		Metals		TPH		
Outfall	Sample	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
SDE4/SDS	SDE4/S1091721DUPG		6.6	4.1			No Sheen	0.238	< 0.2
SDE4/SDS	SDE4/S1091821DUPC				0.0232	0.0658			
SDS3/5	SDS3/5091821DUPG		6.7	2.6			No Sheen	0.113	< 0.2
SDS3/5	SDS3/5091821DUPC				0.0391	0.0154			
SDS4	SDS4091721DUPG		6.6	2.6			No Sheen	0.107	< 0.2
SDS4	SDS4091821DUPC				0.0185	< 0.006			
SDS6/7	SDS6/7091721DUPG		6.9	4.8			No Sheen	J 0.372	0.226
SDS6/7	SDS6/7091821DUPC				0.0157	J 0.116			
SDD06A	SDD06A091721DUPG		7.5	9.2			No Sheen	0.14	0.201
SDD06A	SDD06A091821DUPC				0.0126	0.0249			

Selected Date Range; 7/1/2021-6/30/2022; Values Qualified as (<) are included as 1/2 the reported Detection Limit; Rejected Values not included.

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