

Annual Industrial Waste System Stormwater Monitoring Report

Seattle-Tacoma International Airport

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

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Executive Summary

This Annual Report summarizes the results of effluent monitoring at the Seattle-Tacoma International Airport (STIA) Industrial Waste Treatment Plant (IWTP) from July 1, 2021 through June 30, 2022. The IWTP discharges to the Puget Sound via Outfall 001 (Outfall 001) as defined in the Port of Seattle's (Port) National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit, WA0024651.

The IWTP also operates under the King County (KC) Waste Discharge Permit No. 7810-05. This permit allows the facility to discharge stormwater with higher concentrations of biochemical oxygen demand (BOD₅) to the King County South Treatment Plant (KC STP) for further treatment before ultimately discharging to the Puget Sound.

As of January 2007, STIA has operated under, final effluent limitations, which includes separate limits for BOD₅ from November through March and April through October. In addition, all known, available and reasonable methods of prevention, control, and treatment (AKART) system for segregating higher BOD₅ concentrations and routing them to the KC STP was finished in November 2006 with final implementation on January 1, 2007.

During the reporting period, a total of three hundred and fifty-two (352) million gallons (MG) of stormwater was processed in the IWTP and discharged to either Outfall 001 or KC STP. The IWTP operated on 172 days during the reporting period.

Outfall 001 Discharges

Outfall 001, as referred to in the Airport's NPDES Permit, is the Midway Sewer District's sewage treatment plant discharge point to the Puget Sound. The Midway Sewer District and Port have an operating agreement for joint use of the Midway Sewer District's outfall (Outfall 001). The Port monitors and reports all discharges to Ecology in accordance with Part 1 Special Conditions S1 and S2 of the STIA NPDES permit.

One hundred and fifty-nine (159) MG of stormwater was processed and discharged through Outfall 001 to Puget Sound over 75 days during the reporting period. The daily average flow to Outfall 001 was 2.12 MG. There were no discharges to Outfall 001 in December 2021, January 2022, or May 2022. The daily maximum discharge limit to Outfall 001 is 18 MG. During the reporting period, the maximum daily discharge to Outfall 001 was 4.36 MG and occurred on November 16, 2021.

Seventy-five (75) samples were collected from Outfall 001 effluent to characterize the daily discharge for BOD₅ concentration and to calculate BOD₅ mass-loading. Concentrations of BOD₅ discharged to Outfall 001 ranged from 1.2 milligrams per liter (mg/L) to 43.9 mg/L. The BOD₅ monthly average effluent concentration of 45 mg/L in the de-icing season (November - March) and 25 mg/L in the non-de-icing season (April - October) was not exceeded. All samples collected were well below their respective daily maximum BOD₅ mass-loading limits. The monthly average BOD₅ mass-load ranged from 30 pounds in August 2021 to 723 pounds in February 2022. The daily maximum BOD₅ mass-load discharged to Outfall 001 was 920 pounds and occurred during the de-icing season on November 28, 2021.

Twenty-four (24) samples were collected from Outfall 001 effluent and analyzed for total suspended solids (TSS). TSS concentrations discharged to Outfall 001 ranged from 4.0 mg/L to 26.0 mg/L. All TSS samples were below the daily maximum effluent limit of 33 mg/L. In August 2021, the average TSS concentration was equal to the monthly average effluent limit of 21 mg/L. The average TSS concentration was below the monthly average effluent limit for all other months.

pH was continuously measured at the IWTP and instantaneous maximum and minimum results were recorded. The plant consistently operated within the NPDES permit-required pH range of 6.0 to 9.0. A minimum instantaneous pH of 6.9 and a maximum of 8.7 were measured during this reporting period.

Twenty-four (24) samples were collected from Outfall 001 effluent and analyzed for oil and grease. Over the reporting period, the maximum concentration of oil and grease was 2.75 mg/L and the daily average concentration was 1.00 mg/L. All Oil and Grease samples were well below the daily maximum effluent limit of 15 mg/L.

King County South Treatment Plant Discharges

High concentration BOD₅-treated wastewater is separated and discharged to the Valley View Sewer District and then conveyed to the KC STP where the wastewater undergoes secondary treatment prior to discharging to the Puget Sound. All sample parameters were reported in accordance with Condition S4 of the King County Waste Discharge Permit.

One hundred and ninety-three (193) MG of industrial stormwater was separated, processed, and routed to the KC STP due to elevated levels of BOD₅. Discharge to KC STP occurred on 102 days over the reporting period. The IWTP did not discharge to KC STP during the month of July 2021, August 2021, September 2021, or February 2022. The daily maximum discharge limit of 2.76 MG was temporarily increased to 4 MGD in coordination with King County only for the month of January 2022. The January increase in daily discharge was used for testing a “ramp-up” scenario as an alternative approach to IWTP operations with upcoming reduced BOD₅ effluent limits effective in October 2022. The daily maximum discharge of 3.92 MG occurred on January 30, 2022. The instantaneous maximum discharge rate or peak flow limit of 1,965 GPM was also temporarily increased in January to 2,828 GPM. The peak flow discharged to KC STP over the reporting period was 2,767 GPM and it occurred on January 20, 2022. All discharges outside of the testing scenarios in January met permit parameters for daily maximum flow, instantaneous flow rate, and peak flow limitations.

One hundred and two (102) samples were collected from KC STP effluent and analyzed for BOD₅. Sample concentrations of BOD₅ ranged from 3.9 mg/L to 2,790 mg/L. The KC STP BOD₅ average concentration was 447 mg/L. All KC STP effluent samples collected during the reporting period met the daily maximum BOD₅ mass-load of 60,000 pounds and the daily maximum hourly load of 2,500 lbs/hr. The daily maximum BOD₅ mass-load was 34,802 pounds and it occurred on two days both January 18 and January 19, 2022. The hourly maximum BOD₅ mass-load was 1,450 lbs/hr. The hourly maximum BOD₅ mass-load also occurred on two days both January 18 and January 19, 2022. During the month of January 2022 BOD₅ effluent limits were reduced for Maximum Daily Loading from 60,000 lbs/day to 45,000 lbs/day. During this testing scenario period a new Average Monthly BOD₅ effluent limit of 27,500 lbs/day was in place. The new reduced BOD₅ effluent limits were met for all parameters.

Section 1: Introduction

Located midway between the cities of Seattle and Tacoma, Washington, the Seattle-Tacoma International Airport (STIA) was built in the 1940s and is owned and operated by the Port of Seattle (Port). According to the Port's SEA Airport Statistics, in 2021 STIA handled 498,741 metric tons of air cargo, and 36.2 million passengers. STIA is ranked in the top ten busiest U.S. passenger airport and has a regional impact of more than \$22.5 billion in business revenue, generating more than 151,400 jobs.

The Port is required by the National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit Part I, Special Condition S2.F, to submit an Annual IWS Stormwater Monitoring Report for the STIA, Industrial Waste Treatment Plant (IWTP). The annual report is a compilation of data submitted monthly to the Washington State Department of Ecology (Ecology) in the Discharge Monitoring Reports (DMRs). Data collected to characterize effluent discharged to King County South Treatment Plant (KC STP) is included in this report for comparison.

The NPDES Permit (No. WA0024651) became effective on January 1, 2016 and was valid through August 31, 2021. The amended NPDES Permit (same permit number) is effective as of September 1, 2021 through August 31, 2026. This Annual IWS Stormwater Monitoring Report summarizes the discharge monitoring results from July 2021 through June 2022.

1.1 Industrial Waste System

The primary function of the Port's Industrial Wastewater System (IWS) at STIA is to collect, segregate, treat, and discharge effluent generated from aircraft fueling and maintenance areas in compliance with the Port's NPDES permit (No. WA0024651) and the King County South Treatment Plant (KC STP) waste discharge permit (No. 7810-05).

The STIA IWS collects industrial stormwater from two drainage basins: The North and South Service Basins. The IWS and storm drainage areas are depicted in Figure 1. The IWS North Service Basin includes portions of the airport area between Taxiways A and B and Air Cargo Road, as well as the Weyerhaeuser area on the southern side of the airfield. The IWS South Basin includes the Fuel Farm and Passenger Gate Ramp areas, as well as aircraft hangers. The North drainage basin accounts for approximately 130-acres and the South drainage basins accounts for approximately 242-acres.

The IWS manages stormwater associated with industrial activities from airline and maintenance operations as well as wastewater from other airport-related operations. These contaminants of concern consist primarily of spilled fuel, detergents, lubricants, and de-icing and anti-icing fluids. The system includes collection and conveyance facilities, high biochemical oxygen demand (BOD₅) runoff segregation, runoff storage, and the IWTP. These facilities along with additional information on all known, available, and reasonable methods of treatment determination (AKART) for IWS, an overview of aircraft de-icing and anti-icing operations of STIA, discharge characterization, stormwater pollution prevention, and the mixing zone study are described below.

The IWTP Improvements Project was completed in the summer of 2006, allowing for monitoring and segregation of IWS runoff based on BOD₅ concentrations. This project was initiated by the AKART determination for the IWS. "High BOD₅" effluent is defined as any water that could cause the IWTP to exceed the monthly daily average concentration or maximum daily load. Final Effluent Limitations are specified in S1.A of the permit. Treated wastewater containing high BOD₅

concentrations is conveyed to the KC STP, while treated wastewater with low BOD₅ concentrations is discharged to Puget Sound via the Midway Sewer District Outfall (Outfall 001). Start-up for this system occurred on November 6, 2006 and was fully implemented on January 1, 2007.

1.1.1 Collection and Segregation

The IWS collects stormwater from flush gutters and catch basins. These structures collect spilled fluids, which are then conveyed to the IWS storage lagoons during precipitation events. Prior to entering the storage lagoons, the wastewater is automatically analyzed, and flow is directed to specific lagoons based upon BOD₅ concentration.

Untreated industrial stormwater is stored in three lagoons. The primary purpose of Lagoons #1 and #2 is for collection of the “first flush” of high BOD₅ influent from the South Aviation and North Aviation areas, respectively. The primary purpose of Lagoon #3 is for collection of low BOD₅ runoff, however, high BOD₅ runoff during deicing periods may also be stored in Lagoon #3 when Lagoons #1 and #2 reach full capacity. Prior to treatment, the stormwater flows from Lagoons #1 and #2 through mechanical screening devices, which are sized to remove large debris.

Water stored in Lagoons #1 and #2 drain by gravity to the IWTP. Water is pumped from Lagoon #3 to the IWTP. Some settling of solids occurs in the lagoons. The lagoons are typically cleaned every other year pending summer weather conditions. Lagoon sediments are analyzed and disposed of as necessary. Detailed descriptions of the IWS storage lagoons and the IWTP process are provided in earlier Engineering Reports and the Fact Sheet of the NPDES permit for STIA.

1.1.2 Conveyance

The IWS conveyance system includes approximately 35 miles of piping, 1,200 manholes and catch basins, two below-grade vaults in the parking garage, and 11 pump stations. These facilities are maintained on a regular basis as described in the Port’s Stormwater Pollution Prevention Plan (SWPPP) and the Inspection, Maintenance, and Operation Procedures Manual. Each pump station functions as a key structural source control best management practice (BMP) by diverting runoff to the IWTP from various areas that formerly drained to the Airport’s stormwater drainage system (SDS).

1.1.3 Industrial Waste Treatment Plant

The IWTP is located at the southwestern end of the airport, south of Lagoons #1 and #2 and north of 188th Street, just west of the tunnel under the eastern-most airport runway known as 16 Left / 34 Right. The IWTP is designed to remove petroleum hydrocarbons and suspended solids using a dissolved air flotation (DAF) process.

The facility consists of six treatment trains each with flash mix, flocculation, and DAF tanks. The DAF process begins with the addition of coagulation chemicals to the influent water in a flash mix chamber, followed by gentle mixing in a flocculation tank to coagulate suspended solids and oil droplets. The water then flows by gravity to the DAF units. Air bubbles released in the DAF units float the floc particles. Flight scrapers push the float over a scum beach. The skimmed float flows out of the IWTP building in a floor trench to a sludge sump at the eastern side of the IWTP building. The DAF float is collected in the sludge sump and pumped to two decant tanks located east of the IWTP building. The float separates the process-water into water and sludge phases. The

water layer is decanted and returned to the IWS lagoons. The decant tanks are cleaned annually. Sludges are analyzed and disposed of as necessary.

Treated industrial wastewater is directed in either of two underground wet wells located adjacent to the treatment plant. Treated water flows into each wet well from the top of the structure and is discharged through a valve near the bottom of the wet well designated as the high BOD₅ wet well or near the surface of the wet well designated low BOD₅ wet well. Treated water is discharged to Puget Sound from the low BOD₅ wet well and to the Valley View Sewer District (VVSD) from the high BOD₅ wet well. Discharges to the VVSD are conveyed to the King County South Wastewater Treatment Plant (KC STP) where they undergo secondary treatment before being discharged to Puget Sound. A schematic diagram of the treatment system is presented in Figure 2.

The IWS AKART pump station and pipeline can discharge up to 2,990 GPM (4.3 MGD) to the KC STP. However, the plant hydraulic capacities are effectively limited by either the mass-based effluent or flow limitations. The KC STP Permit mass-based effluent limits allow a maximum BOD₅ hourly load of 2,500 lbs/hr and a daily maximum load of 60,000 lbs/day. The KC STP Permit limits discharges up to 1,915 GPM for 15-minutes within a 24-hour period, a peak instantaneous flow of 1,965 GPM, and a daily maximum discharge volume of 2.76 MG. In January 2022 the daily maximum discharge volume limit was temporarily increased in coordination with King County to 4.0 MGD with a peak instantaneous flow of 2,828 GPM in anticipation of reduced effluent limits in October 2022. The KS STP permit reserves King County's and Valley View Sewer District's authority to request that discharges to their system stop as necessary to prevent hydraulic overloading of the sewer conveyance systems or the KC STP.

Figure 1. Vicinity Map for the POS IWTP at STIA

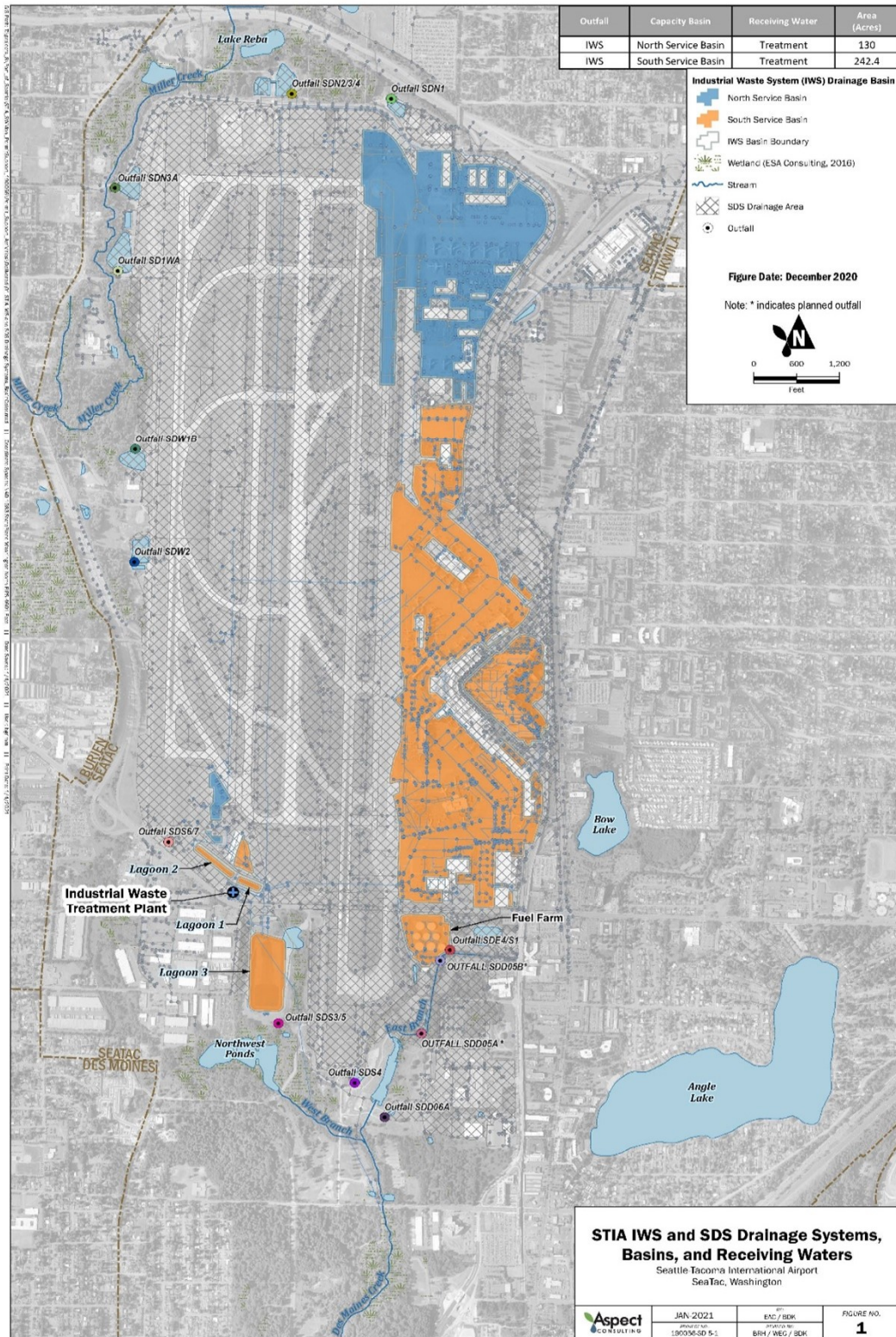
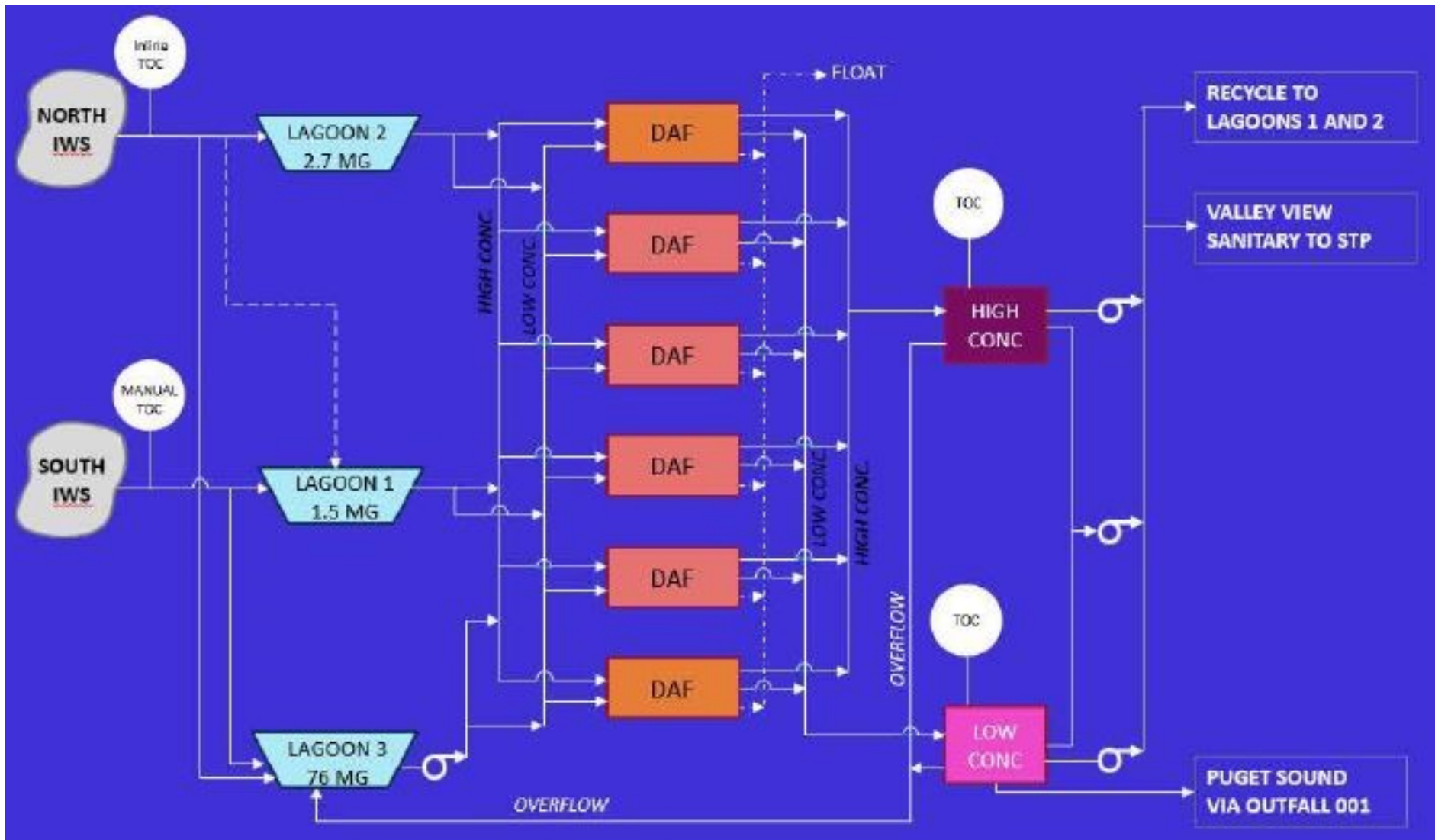


Figure 2. Schematic Diagram of the Port's IWTP at STIA.



Section 2: Sampling Objectives, Locations and Methods

The goal of this monitoring program is to characterize the flow and water quality of effluent from the IWTP for compliance with the following permits:

- NPDES Permit No. WA0024651, Part I, Special Condition S1.A and S2.A
- King County Waste Discharge Permit No. 7810-05

Program components include:

- Continuous monitoring of effluent discharge rates to operate the treatment plant in accordance with permit requirements
- Continuous monitoring of water quality of the effluent for selected parameters using in-line meters to ensure permit compliance
- Collection and analysis of effluent samples in accordance with permit requirements
- Quality control measures to obtain reliable and consistent data
- Report data in accordance with permit requirements

This section provides an overview of the monitoring requirements for discharges to Puget Sound and the Valley View Sewer District. A complete description of the monitoring program is contained in the Quality Assurance Program Plan, Seattle Tacoma International Airport Industrial Waste Treatment Plant Discharge Monitoring Program, September 2011, Amended January 2021.

2.1 Influent and Effluent Measurements

Daily grab samples of influent are analyzed for turbidity and pH. In-line meters are used to continuously monitor flow, pH, and TOC of the IWTP effluent. These data are used for IWTP operations to determine where to store influent, how to treat influent, and where to discharge effluent. In addition, effluent flow data are used to quantify discharge volumes and constituent loads for compliance with permit requirements.

2.2 Effluent Sampling

Composite and grab sampling techniques are used to collect effluent samples on a daily, weekly, quarterly, or permit-cycle frequency depending on the parameter, as required by the discharge permits. The collected samples are analyzed for pH, turbidity, and total residual chlorine by the sampling personnel, and for the remaining water quality parameters by contract laboratories.

2.3 IWTP Analytes

All sampling and analytical methods used to meet the monitoring requirements follow the Guidelines Establishing Test Procedures for the Analysis of Pollutants contained in 40 CFR Part 136 and the *Standard Methods for the Examination of Water and Wastewater*. A summary of sample parameters and associated sampling frequency and type is provided in Table 1.

Samples were submitted with chains-of-custody for analysis at Ecology-accredited laboratories: Amtest Laboratories of Kirkland, WA; Analytical Resources Inc., of Seattle, WA; and Edge Analytical, Inc. of Burlington, WA. All samples were analyzed by methods defined in Part I, Special Condition S2 and Appendix A of the permit.

2.4 Schedule

Methods and procedures are implemented in compliance with Part I Condition S2 (Monitoring Requirements) and S3 (Reporting and Record Keeping Requirements) of the Airport’s NPDES permit. Sampling for this program occurs at a varied frequency depending on the discharge location and analytical parameter. Data reporting for this program occurs monthly in accordance with the permit requirements. The schedule for sample collection, laboratory analysis, data review and management, and data reporting is summarized in Table 1.

Table 1. Industrial Wastewater Treatment Plant Effluent Monitoring Requirements

Sample Collection	Reporting	Data	
		Review/Management	Data Reporting
Treatment System Operations			
Influent: Daily, turbidity/pH Effluent: Continuous, flow/pH/TOC Daily, TOC	Daily shift logs completed on each monitoring date.	Shift log review within 1 day of monitoring. Effluent data entered into POS operator spreadsheet within 1 day of monitoring.	Effluent flow and pH data are reported for permit compliance as specified below.
Ecology NPDES Permit for Discharge to Outfall 001 ^a			
Effluent: Continuous, flow/pH Daily, BOD ₅ Weekly ^b , TSS/TPH Weekly ^b , propylene glycol (Nov.- March only) Year 3, priority pollutants (one dry season and one wet season event) ^c	Laboratory report within 10 days of sample date.	Data entry within 15 days of receiving Level 2A Data Review	Monthly discharge monitoring report (DMR) by the 28th of the following month. Priority pollutant reports submitted 180 days prior to permit expiration. Annual summary report by October 1 following each permit year (July through June).
King County Waste Discharge Permit for Discharge to KC STP			
Effluent: Continuous, flow/pH Daily, BOD ₅ /TSS Monthly, metals/TPH	Laboratory report within 10 days of sample date.	Data entry within 15 days of receiving Level 2A Data Review.	Monthly self-monitoring report by the 15th of the following month

^a Discharge to Outfall 001 may occur only when the BOD₅ concentration and mass loading limits specified in Table 2 are met. Discharge must be to the KC STP if these conditions are not met.

^b One week is defined as Sunday to Saturday.

^c Year 3 of the NPDES permit is January 2024 through December 2024. Dry season is April through October and wet season is November through March.

2.5 NPDES Permit Final Effluent Limits

Final Effluent Limits (excerpted from the NPDES Permit No. WA0024651) are summarized in Table 2.

Table 2. Effluent Limitations for Discharges to Outfall 001

Parameter	Average Monthly ^a	Maximum Daily ^b
Flow ^c	Report – MGD	Report – MGD
Oil and Grease ^d	8 mg/L	15 mg/L
BOD ₅ November through March	45 mg/L	Report – mg/L 2,665 lbs/day
BOD ₅ April through October	25 mg/L	Report – mg/L 1,480 lbs/day
Total Suspended Solids	21 mg/L	33 mg/L
pH ^e	Daily minimum is equal to or greater than 6, the daily maximum is less than 9	

^a The average monthly effluent limitations are based on the arithmetic mean of the samples taken during the month.

^b The maximum daily effluent limit is defined as the highest allowable daily discharge. The daily discharge means the discharge of a pollutant measured during a calendar day. For pollutants with limits expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For other units of measurement, the daily discharge is the average measurement of the pollutant over the day.

^c The daily maximum flow is based on the Port's agreement with Midway Sewer District. Based on this agreement the combined flow from the IWS and Midway Sewer District must not exceed 90% of the capacity of the outfall, which is 18 MGD.

^d Oil and grease analyzed by the NWTPH-Dx method as an approved alternative

^e Indicates range of permitted values. When pH is continuously monitored, excursions between 5.0 and 6.0 or 9.0 and 10.0 shall not be considered violations provided no single excursion exceeds 60 minutes in length and total excursions do not exceed 7 hours and 30 minutes per month. Any excursions below 5.0 and above 10.0 are violations. The instantaneous maximum and minimum pH shall be reported monthly.

2.6 KC STP Final Effluent Limits

Final Effluent Limits (excerpted from the King County Waste Discharge Permit No. 7810-5) are summarized in Table 3.

Table 3. Effluent Limitations for Discharges to the KC STP.

Parameter	Daily Average Concentration (mg/L)	Instantaneous Maximum Concentration (mg/L)	Maximum Daily Loading ^a (lbs/day)
Total Suspended Solids	NA	NA	NA
Arsenic, Total	1.0	4.0	0.27
Cadmium, Total	0.5	0.6	0.17
Chromium, Total	2.75	5.0	1.2
Copper, Total	3.0	8.0	6.89
Lead, Total	2.0	4.0	1.2
Mercury	0.1	0.2	0.06
Nickel, Total	2.5	5.0	2.49
Silver, Total	1.0	3.0	0.44
Zinc, Total	5.0	10.0	12.31
Cyanide Amenable	2.0	3.0	NA
Non-polar FOG ^b	100	NA	NA

BOD ₅ ^e	Daily Maximum Hourly Load ^d (lbs/hr)	Maximum Daily Loading ^e (lbs/day)	Average Monthly Loading ^f (lbs/day)
July 2021 – Dec 2021 Feb 2022 – July 2022	2,500	60,000	--
Jan 2022	2,500	45,000	27,500

pH ^g	Daily Minimum	Instantaneous Minimum	Maximum
	≥5.5	5.0	≤12.0

Flow	Maximum Instantaneous Discharge Rate	Maximum Daily Discharge Volume
July 2021 – Dec 2021 Feb 2022 – July 2022 ^h	1,965 GPM	2.76 MG
Jan 2022 ⁱ	2,828 GPM	4.0 MG

- ^a The daily maximum load equals the daily average concentration in mg/L, multiplied by the flow in million gallons per day, multiplied by 8.34.
- ^b Analyzed by the NWTPH-Dx method as an approved alternative to nonpolar fats, oils, and grease.
- ^c In case of anomaly during analysis, the Port may report BOD₅ concentration based on TOC using a KCIW approved statistical procedure. The Port must indicate the use of the TOC in lieu of BOD₅ on self-monitoring reports.
- ^d The daily maximum hourly load is the daily maximum load (lbs/day) divided by the number of hours of discharge in any given day. To avoid exceeding the daily maximum hourly load, the Port could use the TOC analyzer to monitor the discharge.
- ^e The maximum daily effluent limit is defined as the highest allowable daily discharge. The daily discharge means the discharge of a pollutant measured during a calendar day. For pollutants with limits expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For other units of measurement, the daily discharge is the average measurement of the pollutant over the day.
- ^f The average monthly effluent loading limit is based on the arithmetic mean of the samples taken during the calendar month.
- ^g The instantaneous minimum pH limit is violated whenever any single grab sample or any instantaneous recording is less than pH 5. The daily minimum pH limit is violated whenever any continuous recording of 15 minutes or longer remains below pH 5.5 or when each pH value of four consecutive grab samples collected at 15-minute intervals or longer within a 24-hour period remains below pH 5.5. Discharges greater than pH 12 are prohibited unless the Port obtains verbal or written approval from King County prior to discharge.
- ^h The instantaneous maximum flow rate limit is violated whenever any instantaneous recording is greater than 1,965gpm. The daily maximum flow rate is violated whenever any continuous recording of 15 minutes or longer remains above 1,915 gpm within a 24-hour period.
- ⁱ The instantaneous maximum flow rate limit is violated whenever any instantaneous recording is greater than 2,828gpm. The daily maximum flow rate is violated whenever any continuous recording of 15 minutes or longer remains above 2,778 gpm within a 24-hour period.

Section 3: Results

3.1 General

This report presents the results of IWTP effluent monitoring program for discharges to Puget Sound under the Airport's NPDES Permit No. WA0024651 and to the KC STP Permit No. 7810-05 for the period of July 2021 through June 2022.

3.2 Effluent Flow

The amount of water processed in the IWTP is a function of runoff volumes, lagoon inventories, and operations schedules. A total of three hundred and fifty-two (352) MG of stormwater runoff was processed during the reporting period, this includes both discharges to Outfall 001 and KC STP. Figure 3 depicts the monthly total effluent volume discharged to Outfall 001 and to KC STP from the IWTP.

Figure 3. IWTP Total Monthly Effluent Flow

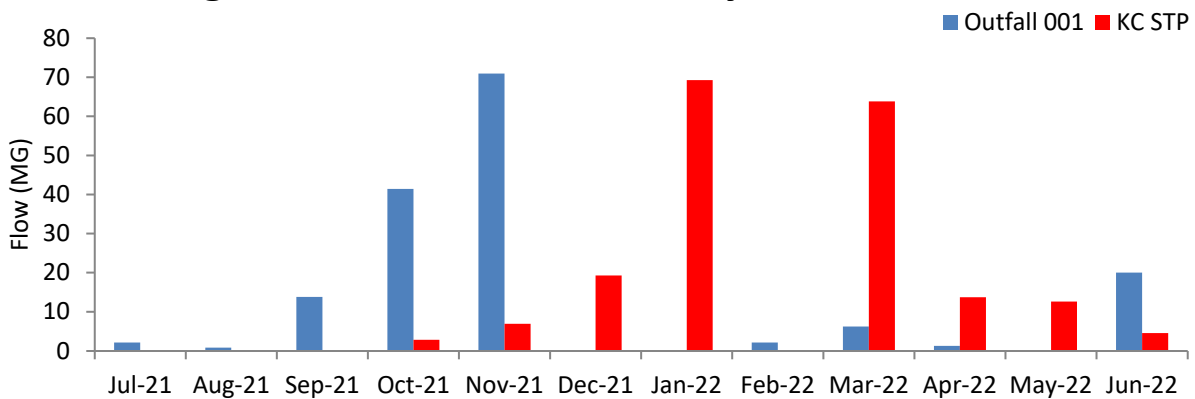


Table 4 depicts the Total Daily Effluent Volume discharged to Outfall 001, as well as the calculated total volume, average, and maximum flows per month. One hundred and fifty-nine (159) MG of stormwater were discharged to Outfall 001 during the reporting period. The monthly maximum flow to Outfall 001 was 71 MG in November 2021. The daily maximum flow to Outfall 001 was 4.36 MG and occurred on November 16, 2021. The IWTP discharged to Outfall 001, 75 days during the reporting period with a daily average flow of 2.12 MG when operating.

Table 5 depicts the Total Daily Effluent Volume discharged to KC STP, as well as the calculated total volume, average, and maximum flows per month. One hundred and ninety-three (193) MG of industrial stormwater were discharged to KC STP during the reporting period. The monthly maximum flow routed to the KC STP was 69.28 MG in January 2022. The daily maximum flow to KC STP was 3.92 MG and occurred on January 30, 2022. The instantaneous maximum discharge rate to the KC STP was 2,767 GPM and occurred on January 20, 2022. The IWTP discharged to KC STP, 102 days during the reporting period with an average daily flow of 1.89 MG when operating.

Table 4. Total Daily Effluent Flow Volume to Outfall 001

Date	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22
	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)
1				1.425	2.889				1.25			
2				2.839	2.154							
3				2.471								
4				1.281	1.877							
5		0.065		0.597	2.943					1.257		
6					2.497							
7				1.442	2.854							
8					2.946							1.138
9					2.944							1.584
10		0.776			3.453							1.337
11				1.203	3.312							
12				1.16	4.045							
13	0.534			1.221								1.164
14	0.67				3.372							
15					4.053							1.619
16					4.36				2.163			1.594
17					4.335							1.33
18					4.353							
19					2.04							
20												
21			1.582									1.387
22			0.884		2.792							1.353
23			1.567	2.872					2.222			1.33
24				2.872								
25			1.766	2.016	2.789							
26			1.769	1.877	2.857							
27	0.928		1.425	2.388								1.412
28			1.576	2.742	4.242			2.114				1.581
29			1.601	4.357	3.423							1.595
30			1.608	4.343	0.398							1.592
31				4.329					0.609			
Monthly Volume (MG)	2.13	0.84	13.78	41.44	70.93	-	-	2.11	6.24	1.26	-	20.02
Num Days Operation	3	2	9	18	23	0	0	1	4	1	0	14
Avg Daily Flow (MGD)	0.71	0.42	1.53	2.30	3.08	-	-	2.11	1.56	1.26	-	1.43
Max Daily Flow (MGD)	0.93	0.78	1.77	4.36	4.36	-	-	2.11	2.22	1.26	-	1.62

Table 5. Total Daily Effluent Flow Volume to KC STP

Date	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22
	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)
1									2.54			0.946
2									2.602			0.971
3							0.626		2.607		0.754	0.781
4							0.628		2.607		0.677	
5							0.729		2.606	2.538		
6						1.658	1.444		2.605	2.55		0.865
7						2.51	2.09		2.602			0.966
8						2.508	2.341		2.598			
9							1.691		2.599		0.584	
10							1.988		2.6		0.948	
11						2.521	2.163		2.6		0.872	
12						2.458	2.352		2.599	0.921	0.927	
13							2.551		2.492	0.903	0.654	
14				0.924			2.182		2.601	0.97		
15						2.497	2.528		2.614	0.79		
16						1.618	2.49		2.618		0.853	
17							2.529		2.595		0.888	
18							2.529		2.591		0.944	
19				0.483			2.529		2.598	0.951	0.945	
20				0.89		2.381	2.706		2.597	0.975	0.795	
21				0.519		1.123	2.821		2.612	0.986		
22							2.804		2.613			
23					2.479		2.788		2.616			
24					2.342		2.788		2.461			
25							2.718				0.947	
26							2.75			0.906	0.862	
27					2.08		2.75			0.988		
28							3.78			0.248		
29							3.868					
30							3.916					
31							2.198		1.656		0.96	
Monthly Volume (MG)	-	-	-	2.82	6.90	19.27	69.28	-	63.83	13.73	12.61	4.53
Num Days Operation	0	0	0	4	3	9	29	0	25	12	15	5
Avg Daily Flow (MGD)	-	-	-	0.70	2.30	2.14	2.39	-	2.55	1.14	0.84	0.91
Max Daily Flow (MGD)	-	-	-	0.92	2.48	2.52	3.92	-	2.62	2.55	0.96	0.97

3.3 Effluent Quality

Analytical results for all permit-required monitoring samples from Outfall 001 are reported in Appendix A. Results are discussed in the following sections. Line charts and graphs are presented for the parameters sampled daily, weekly, and monthly. In the provided graphical plots and tables for discharges to Outfall 001, concentrations of non-detected analytes are presented as:

- For reporting single values:
 - Method detection limit (for values reported below detection) is presented with a less than (<) sign in tables.
- For reporting average concentrations:
 - Half the detection value (for values reported below detection) is used if the laboratory detected the parameter in another sample for the monthly reporting period.
 - Zero (for values reported below detection) is used if the laboratory did not detect the parameter in another sample for the monthly reporting period.
- For reporting mass-loading:
 - Half the method detection limit (for values reported below detection) is used to calculate mass-loading of parameters. Mass is presented with a less than (<) sign in tables.

Analytical results for all permit-required monitoring samples from KC STP are reported in Appendix B. Results are discussed in the following sections. Line charts and graphs are presented for the parameters sampled daily, weekly, and monthly. In the provided graphical plots and tables for discharge to KC STP, concentrations of non-detected analytes are presented as:

- For reporting single values:
 - Method detection limit (for values reported below detection) is presented with a less than (<) sign in tables.
- For reporting average concentrations:
 - Method detection limit (for values reported below detection) is used to calculate average concentrations.
- For reporting mass-loading:
 - Half the method detection limit (for values reported below detection) is used to calculate mass-loading of parameters. Mass is presented with a less than (<) sign in tables.

3.3.1 Biochemical Oxygen Demand (BOD₅)

One hundred and seventy-seven (177) effluent samples were analyzed for BOD₅, for discharges to both Outfall 001 and KC STP. Table 6 summarizes the BOD₅ sample concentrations and mass-loading discharged to Outfall 001. Table 7 summarizes the BOD₅ sample concentrations and mass-loading discharged to KC STP. Figures 4 and 5 depict monthly average BOD₅ concentrations and daily maximum BOD₅ mass-loadings from Outfall 001 during this reporting period. Figures 6 and 7 depict monthly average BOD₅ sample concentrations and daily maximum BOD₅ mass-loading to the KC STP outfall.

BOD₅ Concentration

The monthly average BOD₅ concentration discharged to Outfall 001 ranged from 4.46 mg/L in June 2022 to 41.0 mg/L in February 2022. The daily maximum concentration discharged to Outfall 001 was 43.9 mg/L on March 1, 2022. All BOD₅ samples collected from discharges to Outfall 001, during this reporting period, were below NPDES permit limits.

The daily maximum concentration discharged to KC STP over the reporting period was 2,790 mg/L on January 5, 2022. There are no concentration limits to BOD₅ for discharges to KC STP.

BOD₅ Mass-Loading

The BOD₅ monthly average mass-load discharged to Outfall 001 ranged from 30 pounds in August 2021 to 723 pounds in February 2022. The daily maximum BOD₅ mass-load discharged to Outfall 001 was 920 pounds on November 28, 2021. A total of 13,726 pounds of BOD₅ was discharged to Outfall 001 during this reporting period. All BOD₅ mass-loading in discharges to Outfall 001, during this reporting period, were below NPDES permit limits.

The daily maximum pounds of BOD₅ discharged to KC STP was 34,802 pounds which occurred on two days both January 18 and 19, 2022. The daily maximum hourly BOD₅ load to KC STP was 1,450 pounds on two days both January 18 and 19, 2022. A total of 785,556 pounds of BOD₅ was discharged to KC STP during this reporting period. All BOD₅ mass-loading per month, per day, and per hour to KC STP, during this reporting period, were below King County Waste Discharge Permit limits.

Table 6. Outfall 001 Biological Oxygen Demand Results

Date	Jul-21		Aug-21		Sep-21		Oct-21		Nov-21		Dec-21		Jan-22		Feb-22		Mar-22		Apr-22		May-22		Jun-22	
	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day
1							4.4	52	1.2	29							43.9	458						
2							4.2	99	6.5	117														
3							4.9	101																
4							4.3	46	5.6	88														
5			14.2	8			6.5	32	4.3	106									8.7	91				
6									11.5	239														
7							9.0	108	9.7	231														
8									8.4	206													4.1	39
9									4.3	106													4.3	57
10			8.2	53					8.2	236													4.1	46
11							4.2	42	14.8	409														
12							5.5	53	8.4	283														
13	6.1	27					5.6	57															3.5	34
14	6.2	35							5.7	160														
15									4.7	159													3.4	46
16									4.7	171							32.7	590					3.7	49
17									4.2	152													5.9	65
18									5.7	207														
19									9.6	163														
20																								
21					3.7	49																	4.2	49
22					3.9	29			15.4	359													7.1	80
23					4.4	58	17.4	417									35.6	660					4.4	49
24							15.9	381																
25					9.6*	141*	7.8	131	39.5	919														
26					4.4	65	7.2	113	32.9	784														
27	17.8	138			6.5	77	8.1	161															4.7	55

Date	Jul-21		Aug-21		Sep-21		Oct-21		Nov-21		Dec-21		Jan-22		Feb-22		Mar-22		Apr-22		May-22		Jun-22	
	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day
28					5.4	71	15.6	357	26	920					41.0	723							5	66
29					4.8	64	3.4	124	29.8	851													3.9	52
30					5.2	70	1.7	62	43.1	143													4.1	54
31							1.8	65									27.8	141						
Monthly BOD ₅ Mass-Load	138		53		141		417		920		-		-		723		660		91		-		80	
Operating Days per Month	3		2		9		18		23		0		0		1		4		1		0		14	
Monthly Average	10.0	67	11.2	30	5.3	134	7.1	133	13.2	306	-	-	-	-	41.0	723	35	462	8.7	91	-	-	4.5	53
Monthly Maximum per Day	17.8	200	14.2	61	9.6	623	17.4	2,401	43.1	7,037	-	-	-	-	41	723	43.9	1,849	8.7	91	-	-	7.1	741

* A Hold-Time exceedance occurred due to excessive heat in the laboratory. An Ecology approved regression analysis of TOC/BOD₅ samples was performed.

Table 7. KC STP Biological Oxygen Demand Results

Date	Jul-21		Aug-21		Sep-21		Oct-21		Nov-21		Dec-21		Jan-22		Feb-22		Mar-22		Apr-22		May-22		Jun-22	
	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day
1																	343	7266					6.9	54
2																	317	6879					6.7	54
3													2040	10651			230	5001					7.1	46
4													2400	12570			244*	5303*						
5													2790	16963			234	5086	50.2	1063				
6											315	4356	1740	20955			249	5410	59.3	1261			3.9	28
7											490	10257	933	16263			203	4405					5.5	44
8											306	6401	955	18645			253	5482						
9													1850	26090			229	4964						
10													1420	23543			225	4879						
11											253	5319	1520	27420			253	5486						

Date	Jul-21		Aug-21		Sep-21		Oct-21		Nov-21		Dec-21		Jan-22		Feb-22		Mar-22		Apr-22		May-22		Jun-22		
	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	Conc mg/L	Mass-Load lbs/day	
12											230	4715	1160	22754			256	5549	94.4	725	14.8	114			
13													1080	22977			278	5778	84.9	639	16.0	87			
14													1750	31846			244	5293	77.1	624					
15												333	6935	1180	24879			225	4905	237	1561				
16												357	4817	1100	22843			202	4410			15.0	107		
17													1480	31216			201	4350			13.9	103			
18													1650	34802			225	4862			11.9	94			
19							90.9	366					1650	34802			187	4052	218	1729	13.5	106			
20							69.3	514				320	6354	595	13428			236	5112	170	1382	11.0	73		
21							31.4	136				559	5235	493*	11608*			201	4379	167	1373				
22													680	15902			163	3552							
23									174.0	3597			690	16044			147	3207							
24									186.0	3633			654	15207			148	3038							
25													644	14598							9.9	78			
26													628	14403					141	1065	10.1	73			
27									79.6	1381			617	14151					113	931					
28													606	19104					159	329					
29													652	21033											
30													621	20282											
31													551	10101			115	1588			7.6	61			
Monthly BOD ₅ Mass-Load	-	-	-	-	-	-	2,411	603	8,611	2,870	351	6,043	1,177	20,175	-	-	120,235	4,809	12,683	131	1,057	1,918	128	227	
Operating Days per Month	0	0	0	0	0	0	4	4	3	3	9	9	29	29	0	0	25	25	12	12	15	15	5	5	
Monthly Average	-	-	-	-	-	-	93	603	147	2,870	351	6,043	1,177	20,175	-	-	224	4,809	131	1,057	19	128	6	45	
Monthly Maximum per Day	-	-	-	-	-	-	181	1,395	186	3,633	559	10,257	2,790	34,801	-	-	343	7,266	237	1,729	49.4	291	7.1	54	

* A Hold-Time exceedance occurred due to excessive heat in the laboratory. An Ecology approved regression analysis of TOC/BOD₅ samples was performed.

BOD₅ Results Summary – Outfall 001

Figure 4. Outfall 001 Monthly Average BOD₅ Concentration

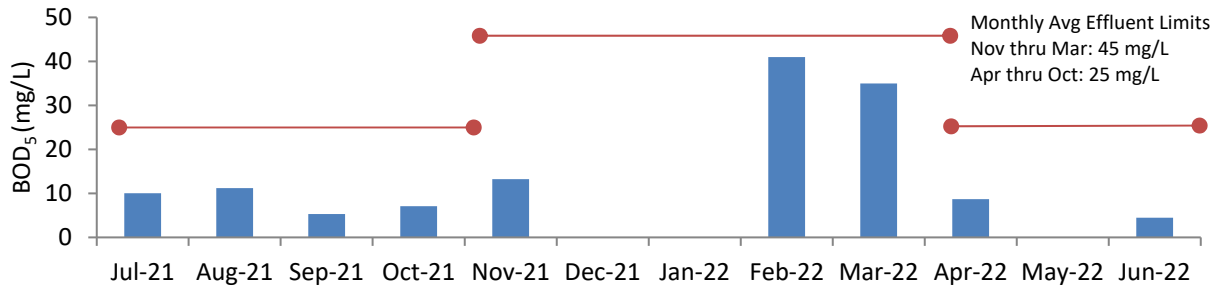
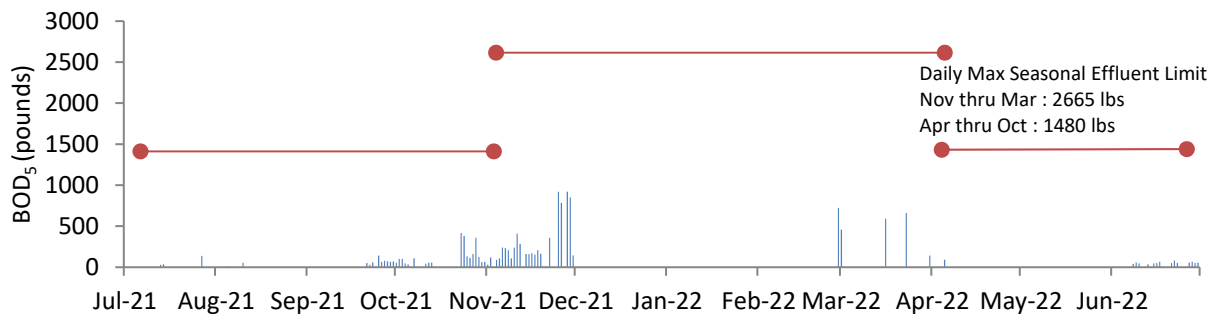


Figure 5. Outfall 001 Daily Maximum BOD₅ Mass-Load



BOD₅ Results Summary – KC STP Outfall

Figure 6. KC STP Daily Maximum BOD₅ Concentration

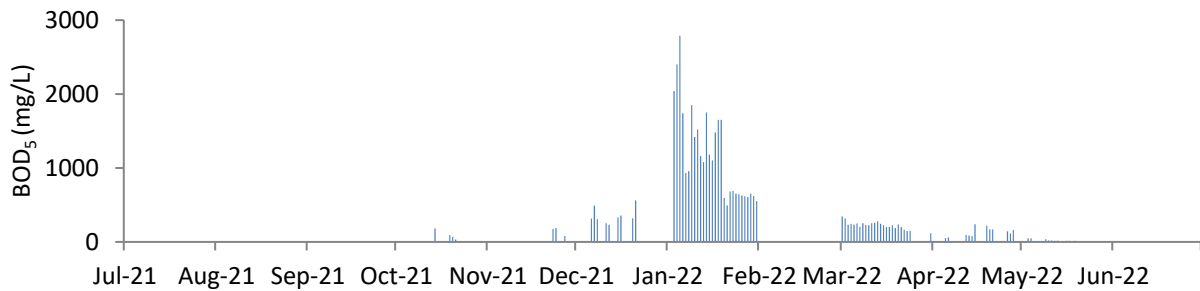
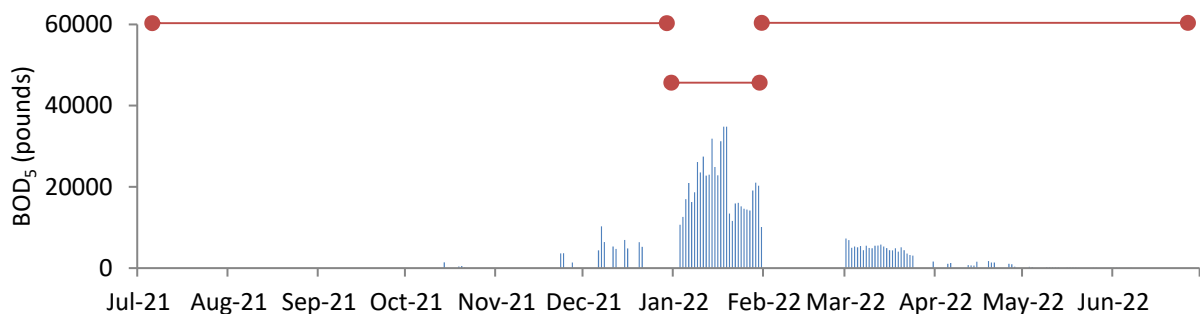


Figure 7. KC STP Daily Maximum BOD₅ Mass-Load



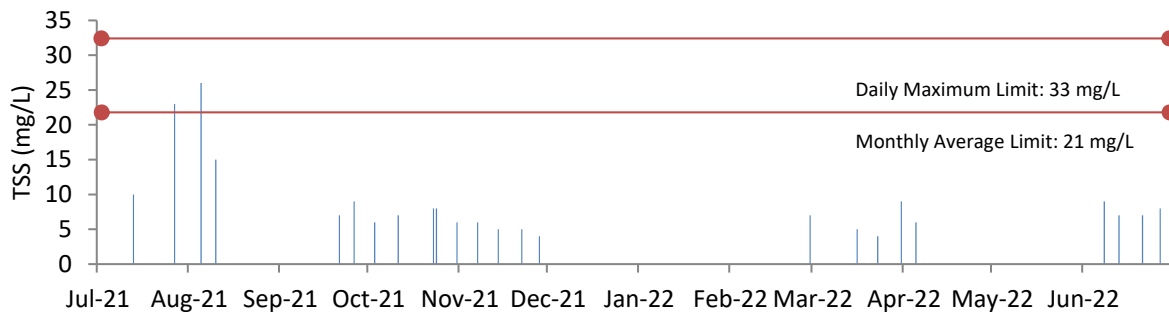
BOD₅ Mass-Load Summary – AKART Implementation

Since AKART implementation, the IWTP has processed 11,850,676 pounds of BOD₅ and discharged to Outfall 001 and KC STP. A total of 11,534,318 pounds of BOD₅ (97.3%) were segregated and sent to King County for treatment.

3.3.2 Total Suspended Solids (TSS)

A total of twenty-four (24) samples were collected from Outfall 001 for TSS analysis. TSS results for discharges to Outfall 001 ranged from 4.0 mg/L to 26.0 mg/L. All TSS samples were below the NPDES daily maximum effluent limit of 33 mg/L and the monthly average effluent limit of 21 mg/L. Figure 8 depicts the Outfall 001 Daily Maximum TSS concentrations for the reporting period.

Figure 8 . Outfall 001 Daily Maximum TSS Concentration



3.3.3 Glycols

Eight (8) effluent samples were collected from discharges to Outfall 001 and analyzed for propylene-glycol using a modified technique of EPA Method 8015. There is no established effluent limit for glycol; however monthly reporting is required on DMR's during the de-icing season from November through March. The daily concentration for propylene-glycol discharged to Outfall 001 during the reporting period ranged from non-detect to 19.3 mg/L.

3.3.4 pH

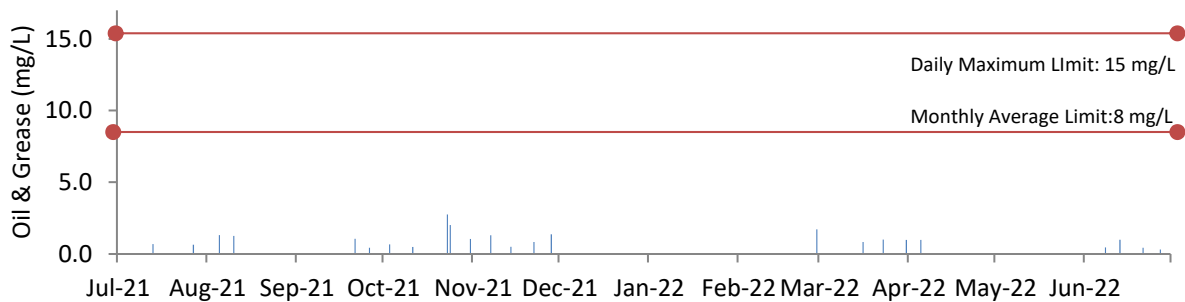
Continuous pH metering is performed during discharge Outfall 001. For Outfall 001 discharges the minimum instantaneous pH measurement was 6.9 and the maximum pH measurement was 8.7. All stormwater discharged to Outfall 001 was within the NPDES permitted range throughout the reporting period.

Continuous pH metering is performed during discharge to KC STP. For KC STP discharges the minimum instantaneous pH measurement was 5.4, recorded on May 3, 2022. On May 3rd the IWTP's continuous probe malfunctioned causing erroneous results. The malfunctioning probe was replaced on May 4th and King County was notified of potential non-compliance. During probe replacement, grab samples were collected and analyzed for pH with a minimum result of 6.7. The maximum pH measurement recorded during the reporting period was 8.6. All other stormwater discharged to KC STP throughout the reporting period was within the King County Waste Discharge permit range.

3.3.5 Oil and Grease

Twenty-four (24) samples were collected and submitted for oil and grease analysis of discharge to Outfall 001. The oil and grease samples were analyzed by method NW-TPH-Dx which has a lower detection limit and more accurately characterizes potential contaminants related to jet fuel. The daily maximum concentration collected of oil and grease, during the 2021-2022 reporting period, was 2.75 mg/L. As noted in Figure 9, all Oil and Grease samples were well below the daily maximum effluent limit of 15 mg/L and the monthly average effluent limit of 8 mg/l.

Figure 9. Outfall 001 Daily Maximum Oil & Grease Concentration



3.3.6 Priority Pollutants

Priority pollutant sampling was not conducted during this reporting period. Results of past reporting periods have been reported to Ecology as part of the permit renewal process.

3.3.7 Toxicity Testing

Acute and Chronic toxicity testing was not conducted during this reporting period. Results of past reporting periods have been reported to Ecology as part of the permit renewal process.

Section 4: Conclusions

This report summarized results of effluent sampling at the STIA IWTP from July 2021 through June 2022. Results of permit required monitoring were presented for both NPDES Permit (No. WA0024651) and King County Waste Discharge Permit (No. 7810-05). Results were presented for flow, BOD₅, TSS, propylene-glycol, pH, and oil and grease.

The AKART system has been in place for 15.5 years. It is proving to be very effective in reducing discharge of pollutants to Puget Sound. For this reporting period, 785,556 pounds of BOD₅ out of the total processed 799,281 pounds (98.3%) were segregated and sent to King County for treatment. Since the implementation of AKART on January 1, 2007, a total of 11,850,676 pounds of BOD₅ were processed through the IWTP and 11,534,318 pounds were segregated and sent to KC STP for treatment.

Stormwater pollutants to Outfall 001 have been significantly reduced via diversion to KC STP. The stormwater discharged to Outfall 001 met NPDES effluent limitations throughout the reporting period for all parameters measured.

The stormwater discharged to KC STP met King County Waste Discharge Permit effluent limitations throughout the reporting period for all parameters measured.

Section 5: References

Kennedy/Jenks Consultants. April 2012. Port of Seattle Seattle-Tacoma International Airport Industrial Waste System Waste Water Treatment Plant Operation & Maintenance Manual.

Aspect Consulting. January 2021. Quality Assurance Program Plan, Seattle Tacoma International Airport, Industrial Waste Treatment Plant Discharge Monitoring Program.

Port of Seattle; Sea-Tac Airport Website; <https://www.portseattle.org/page/airport-statistics>; 2021 Airport Activity Report.

Washington State Department of Ecology. National Pollutant Discharge Elimination System Waste Discharge Permit WA-0024651, Port of Seattle. Effective Date: 1 January 2016. Amended: September 1, 2021 through August 31, 2026

King County Waste Discharge Permit No. 7810-04, Port of Seattle. Effective Date: 21 July 2016 through July 20, 2021.

King County Waste Discharge Permit No. 7810-05, Port of Seattle. Effective Date: 21 July 2021 through July 20, 2026.

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Appendix A: Outfall 001 Analytical Results

Appendix A. Outfall 001 Analytical Results

Date	Flow	BOD ₅	BOD ₅	pH Min	pH Max	Propylene-Glycol	TSS	NWTPH-Dx
	MGD	mg/L	pounds	S.U.	S.U.	mg/L	mg/L	mg/L
7/13/2021	0.53	6.1	27	7.6	8.1		10.00	0.69
7/14/2021	0.67	6.2	35	7.6	7.9			
7/27/2021	0.93	17.8	138	8.1	8.6		23.00	0.64
8/5/2021	0.07	14.2	8	7.9	8.0		26.00	1.31
8/10/2021	0.78	8.2	53	7.4	7.6		15.00	1.26
9/21/2021	1.58	3.7	49	7.2	7.3		7.00	1.05
9/22/2021	0.88	3.9	29	7.2	7.3			
9/23/2021	1.57	4.4	58	7.3	7.5			
9/25/2021	1.77	9.6 ^d	141 ^d	7.3	7.8			
9/26/2021	1.77	4.4	65	7.5	7.8		9.00 ^d	0.42
9/27/2021	1.43	6.5	77	7.4	7.6			
9/28/2021	1.58	5.4	71	7.4	7.5			
9/29/2021	1.60	4.8	64	7.4	7.6			
9/30/2021	1.61	5.2	70	7.3	7.5			
10/1/2021	1.43	4.4	52	7.3	7.5			
10/2/2021	2.84	4.2	99	7.4	7.9			
10/3/2021	2.47	4.9	101	7.6	8.4		6.00	0.67
10/4/2021	1.28	4.3	46	7.3	7.8			
10/5/2021	0.60	6.5	32	7.4	7.6			
10/7/2021	1.44	9.0	108	7.2	7.3			
10/11/2021	1.20	4.2	42	7.3	7.4		7.00	0.49
10/12/2021	1.16	5.5	53	7.2	7.3			
10/13/2021	1.22	5.6	57	7.2	7.3			
10/23/2021	2.87	17.4	417	7.2	7.3		8.00	2.75
10/24/2021	2.87	15.9	381	7.2	7.2		8.00	2.02
10/25/2021	2.02	7.8	131	7.1	7.2			
10/26/2021	1.88	7.2	113	7.2	7.3			
10/27/2021	2.39	8.1	161	7.0	7.2			
10/28/2021	2.74	15.6	357	6.9	7.4			
10/29/2021	4.36	3.4	124	6.9	7.1			
10/30/2021	4.34	1.7	62	7.0	7.2			
10/31/2021	4.33	1.8	65	7.1	7.2	<10.0 ^a	6.00	1.04
11/1/2021	2.89	1.2	29	7.1	7.3			
11/2/2021	2.15	6.5	117	7.2	7.3			
11/4/2021	1.88	5.6	88	7.1	7.2			

Date	Flow	BOD ₅	BOD ₅	pH Min	pH Max	Propylene-Glycol	TSS	NWTPH-Dx
	MGD	mg/L	pounds	S.U.	S.U.	mg/L	mg/L	mg/L
11/5/2021	2.94	4.3	106	7.1	7.2			
11/6/2021	2.50	11.5	239	7.1	7.3			
11/7/2021	2.85	9.7	231	7.1	7.2	<5.0°	6.00	1.30
11/8/2021	2.95	8.4	206	7.1	7.4			
11/9/2021	2.94	4.3	106	7.1	7.2			
11/10/2021	3.45	8.2	236	7.1	7.2			
11/11/2021	3.31	14.8	409	7.1	7.3			
11/12/2021	4.05	8.4	283	7.1	7.2			
11/14/2021	3.37	5.7	160	7.0	7.1	<5.0°	5.00	0.50
11/15/2021	4.05	4.7	159	7.0	7.1			
11/16/2021	4.36	4.7	171	7.0	7.1			
11/17/2021	4.34	4.2	152	7.0	7.1			
11/18/2021	4.35	5.7	207	7.1	7.2			
11/19/2021	2.04	9.6	163	7.1	7.2			
11/22/2021	2.79	15.4	359	7.2	7.3	<5.0°	5.00	0.83
11/25/2021	2.79	39.5	919	7.3	7.4			
11/26/2021	2.86	32.9	784	7.3	7.4			
11/28/2021	4.24	26.0	920	7.2	7.4	19.3	4.00	1.37
11/29/2021	3.42	29.8	851	7.3	7.5			
11/30/2021	0.40	43.1	143	7.4	7.5			
2/28/2022	2.11	41.0	723	7.4	7.4	15.6	7.00	1.71
3/1/2022	1.25	43.9	458	7.4	7.5			
3/16/2022	2.16	32.7	590	7.6	7.7	15.4	5.00	0.83
3/23/2022	2.22	35.6	660	7.6	7.8	18.3	4.00	1.00
3/31/2022	0.61	27.8	141	7.6	7.7	<5.0°	9.00	0.97
4/5/2022	1.26	8.7	91	7.5	7.5		6.00	0.97
6/8/2022	1.14	4.1	39	7.7	7.8		9.00	0.45
6/9/2022	1.58	4.3	57	7.9	7.9			
6/10/2022	1.34	4.1	46	7.8	7.9			
6/13/2022	1.16	3.5	34	7.7	8.0		7.00	0.99
6/15/2022	1.62	3.4	46	7.5	8.1			
6/16/2022	1.59	3.7	49	8.0	8.3			
6/17/2022	1.33	5.9	65	8.0	8.2			
6/21/2022	1.39	4.2	49	7.8	8.1		7.00	0.43
6/22/2022	1.35	7.1	80	8.0	8.5			
6/23/2022	1.33	4.4	49	8.0	8.5			
6/27/2022	1.41	4.7	55	7.7	8.3		8.00	0.31

Date	Flow	BOD ₅	BOD ₅	pH Min	pH Max	Propylene-Glycol	TSS	NWTPH-Dx
	MGD	mg/L	pounds	S.U.	S.U.	mg/L	mg/L	mg/L
6/28/2022	1.58	5.0	66	7.9	8.6			
6/29/2022	1.60	3.9	52	8.1	8.7			
6/30/2022	1.59	4.1	54	8.4	8.7			

^a Method detection limit (for values reported below detection) is used if only a single sample was taken during the monthly reporting period and is presented with a less than (<) sign.

^b Zero (for values reported below detection) is used if the laboratory did not detect the parameter in another sample for the monthly reporting period.

^c Half the detection value (for values reported below detection) is used if the laboratory detected the parameter in another sample for the monthly reporting period and is presented with a less than (<) sign.

^d A Hold-Time exceedance occurred due to excessive heat in the laboratory. An Ecology approved regression analysis of TOC/BOD₅ samples was performed.

Appendix B: KC STP Analytical Results

Appendix B. KC STP Analytical Results

Date	Flow	BOD ₅	BOD ₅	pH Min	pH Max	TSS	NWTPH-Dx
	MGD	mg/L	lbs/day	S.U.	S.U.	mg/L	mg/L
10/14/2021	0.92	181.0	1395	7.2	7.3	10.00	2.01
10/19/2021	0.48	90.9	366	7.4	7.4	7.00	
10/20/2021	0.89	69.3	514	7.3	7.4	8.00	
10/21/2021	0.52	31.4	136	7.2	7.3	10.00	
11/23/2021	2.48	174.0	3597	7.0	7.4	11.00	2.51
11/24/2021	2.34	186.0	3633	7.2	7.3	9.00	
11/27/2021	2.08	79.6	1381	7.0	7.3	9.00	
12/6/2021	1.66	315.0	4356	7.3	7.4	6.00	1.54
12/7/2021	2.51	490.0	10257	7.3	7.5	7.00	
12/8/2021	2.51	306.0	6401	7.4	7.5	8.00	
12/11/2021	2.52	253.0	5319	7.2	7.6	9.00	
12/12/2021	2.46	230.0	4715	7.1	7.4	8.00	
12/15/2021	2.50	333.0	6935	7.0	7.2	8.00	
12/16/2021	1.62	357.0	4817	7.1	7.1	8.00	
12/20/2021	2.38	320.0	6354	7.1	7.1	6.00	
12/21/2021	1.12	559.0	5235	6.8	7.0	6.00	
1/3/2022	0.63	2040.0	10651	6.9	7.0	12.00	4.02
1/4/2022	0.63	2400.0	12570	6.9	7.1	13.00	
1/5/2022	0.73	2790.0	16963	7.0	7.0	14.00	
1/6/2022	1.44	1740.0	20955	6.9	7.1	14.00	
1/7/2022	2.09	933.0	16263	6.8	7.0	8.00	
1/8/2022	2.34	955.0	18645	6.8	7.0	6.00	
1/9/2022	1.69	1850.0	26090	6.9	7.2	8.00	
1/10/2022	1.99	1420.0	23543	6.9	7.1	5.00	
1/11/2022	2.16	1520.0	27420	6.8	7.5	5.00	
1/12/2022	2.35	1160.0	22754	6.8	7.0	6.00	
1/13/2022	2.55	1080.0	22977	6.8	7.0	5.00	
1/14/2022	2.18	1750.0	31846	6.8	7.1	5.00	
1/15/2022	2.53	1180.0	24879	6.8	6.9	5.00	
1/16/2022	2.49	1100.0	22843	6.8	6.9	5.00	
1/17/2022	2.53	1480.0	31216	6.8	7.0	4.00	
1/18/2022	2.53	1650.0	34802	6.8	6.9	5.00	
1/19/2022	2.53	1650.0	34802	6.7	6.9	4.00	
1/20/2022	2.71	595.0	13428	6.5	7.0	4.00	
1/21/2022	2.82	493.4 ^d	11608 ^d	6.7	7.0	2.00	

Date	Flow	BOD ₅	BOD ₅	pH Min	pH Max	TSS	NWTPH-Dx
	MGD	mg/L	lbs/day	S.U.	S.U.	mg/L	mg/L
1/22/2022	2.80	680.0	15902	6.7	7.0	2.00	
1/23/2022	2.79	690.0	16044	6.7	6.7	2.00	
1/24/2022	2.79	654.0	15207	6.6	7.0	2.00	
1/25/2022	2.72	644.0	14598	6.7	6.7	2.00	
1/26/2022	2.75	628.0	14403	6.7	6.7	2.00	
1/27/2022	2.75	617.0	14151	6.6	7.0	2.00	
1/28/2022	3.78	606.0	19104	6.6	6.7	3.00	
1/29/2022	3.87	652.0	21033	6.5	6.9	3.00	
1/30/2022	3.92	621.0	20282	6.4	6.9	3.00	
1/31/2022	2.20	551.0	10101	6.4	6.9	4.00	
3/1/2022	2.54	343.0	7266	6.6	6.8	16.00	3.22
3/2/2022	2.60	317.0	6879	6.6	6.6	10.00	
3/3/2022	2.61	230.0	5001	6.6	6.7	10.00	
3/4/2022	2.61	243.9 ^d	5303 ^d	6.6	6.7	9.00	
3/5/2022	2.61	234.0	5086	6.6	6.7	8.00	
3/6/2022	2.61	249.0	5410	6.6	6.7	9.00	
3/7/2022	2.60	203.0	4405	6.6	7.0	9.00	
3/8/2022	2.60	253.0	5482	6.6	7.0	10.00	
3/9/2022	2.60	229.0	4964	6.6	7.0	9.00	
3/10/2022	2.60	225.0	4879	6.6	7.0	9.00	
3/11/2022	2.60	253.0	5486	6.6	7.0	10.00	
3/12/2022	2.60	256.0	5549	6.6	7.0	10.00	
3/13/2022	2.49	278.0	5778	6.6	6.9	10.00	
3/14/2022	2.60	244.0	5293	6.6	7.0	11.00	
3/15/2022	2.61	225.0	4905	6.7	6.8	10.00	
3/16/2022	2.62	202.0	4410	6.6	7.0	11.00	
3/17/2022	2.60	201.0	4350	6.7	6.7	10.00	
3/18/2022	2.59	225.0	4862	6.7	6.9	9.00	
3/19/2022	2.60	187.0	4052	6.7	6.7	14.00	
3/20/2022	2.60	236.0	5112	6.7	6.9	10.00	
3/21/2022	2.61	201.0	4379	6.7	7.0	10.00	
3/22/2022	2.61	163.0	3552	6.7	7.0	10.00	
3/23/2022	2.62	147.0	3207	6.7	7.0	10.00	
3/24/2022	2.46	148.0	3038	6.7	7.3	12.00	
3/31/2022	1.66	115.0	1588	6.6	7.0	15.00	
4/5/2022	2.54	50.2	1063	7.1	7.3	14.00	2.96
4/6/2022	2.55	59.3	1261	7.1	7.3	14.00	

Date	Flow	BOD ₅	BOD ₅	pH Min	pH Max	TSS	NWTPH-Dx
	MGD	mg/L	lbs/day	S.U.	S.U.	mg/L	mg/L
4/12/2022	0.92	94.40	725	7.0	7.2	11.00	
4/13/2022	0.90	84.90	639	7.1	7.3	10.00	
4/14/2022	0.97	77.10	624	7.1	7.3	15.00	
4/15/2022	0.79	237.00	1561	6.6	7.2	17.00	
4/19/2022	0.95	218.00	1729	7.0	7.1	13.00	
4/20/2022	0.98	170.00	1382	6.8	7.0	14.00	
4/21/2022	0.99	167.00	1373	6.9	7.0	10.00	
4/26/2022	0.91	141.00	1065	6.7	7.0	16.00	
4/27/2022	0.99	113.00	931	6.8	7.0	16.00	
4/28/2022	0.25	159.00	329	6.9	7.0	21.00	
5/3/2022	0.75	46.20	291	5.4	8.1	16.00	1.99
5/4/2022	0.68	49.40	279	5.8	6.1	11.00	
5/9/2022	0.58	34.90	170	7.3	8.0	10.00	
5/10/2022	0.95	18.60	147	7.5	8.6	8.00	
5/11/2022	0.87	18.70	136	7.4	8.6	11.00	
5/12/2022	0.93	14.80	114	7.3	8.6	8.00	
5/13/2022	0.65	16.00	87	7.5	7.6	7.00	
5/16/2022	0.85	15.00	107	7.3	7.5	7.00	
5/17/2022	0.89	13.90	103	7.3	7.6	6.00	
5/18/2022	0.94	11.90	94	7.3	7.5	7.00	
5/19/2022	0.95	13.50	106	7.4	7.6	6.00	
5/20/2022	0.80	11.00	73	7.5	8.0	7.00	
5/25/2022	0.95	9.90	78	7.2	8.6	7.00	
5/26/2022	0.86	10.10	73	7.6	8.6	7.00	
5/31/2022	0.96	7.60	61	7.2	7.6	6.00	
6/1/2022	0.95	6.90	54	7.4	7.6	5.00	0.70
6/2/2022	0.97	6.70	54	7.3	7.8	8.00	
6/3/2022	0.78	7.10	46	7.5	7.7	5.00	
6/6/2022	0.87	3.90	28	7.3	7.5	7.00	
6/7/2022	0.97	5.50	44	7.3	7.6	9.00	

^a Method detection limit (for values reported below detection) is used if only a single sample was taken during the monthly reporting period and is presented with a less than (<) sign.

^b Zero (for values reported below detection) is used if the laboratory did not detect the parameter in another sample for the monthly reporting period.

^c Half the detection value (for values reported below detection) is used if the laboratory detected the parameter in another sample for the monthly reporting period and is presented with a less than (<) sign.

^d A Hold-Time exceedance occurred due to excessive heat in the laboratory. An Ecology approved regression analysis of TOC/BOD₅ samples was performed.

Date	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Silver	Zinc
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
10/14/2021	0.0015	0.0014	0.0012	0.0126	0.0009	0.0011	< 0.0002 ^a	0.0300
11/23/2021	0.0009	0.0002	0.0010	0.0081	0.0007	0.0009	< 0.0002 ^a	0.0431
12/6/2021	0.0010	0.0002	0.0011	0.0071	0.0004	0.0010	< 0.0002 ^a	0.0332
1/3/2022	0.0013	0.0006	0.0017	0.0134	0.0013	0.0015	< 0.0002 ^a	0.0843
3/1/2022	0.0009	0.0005	0.0008	0.0092	0.0008	0.0016	< 0.0002 ^a	0.0850
4/5/2022	0.0013	0.0003	< 0.0005 ^a	0.0109	0.0007	0.0017	< 0.0002 ^a	0.0495
5/3/2022	0.0013	0.0001	0.0009	0.0084	0.0007	0.0014	< 0.0002 ^a	0.0314
6/1/2022	0.0008	< 0.0001 ^a	< 0.0005 ^a	0.0038	0.0001	0.0008	< 0.0002 ^a	0.0178

Date	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Silver	Zinc
	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
10/14/2021	0.0113	0.0106	0.0089	0.0971	0.0071	0.0082	< 0.0008 ^b	0.2312
11/23/2021	0.0188	0.0045	0.0209	0.1677	0.0139	0.0181	< 0.0021 ^b	0.8911
12/6/2021	0.0132	0.0023	0.0152	0.0986	0.0058	0.0136	< 0.0014 ^b	0.4591
1/3/2022	0.0067	0.0031	0.0087	0.0700	0.0067	0.0077	< 0.0005 ^b	0.4401
3/1/2022	0.0183	0.0099	0.0179	0.1945	0.0172	1.8006	< 0.0021 ^b	0.0042
4/5/2022	0.0265	0.0055	< 0.0005 ^b	0.2307	0.0155	0.0364	< 0.0021 ^b	1.0478
5/3/2022	0.0081	0.0009	0.0055	0.0531	0.0044	0.0087	< 0.0006 ^b	0.1975
6/1/2022	0.0067	< 0.0004 ^b	< 0.0020 ^b	0.0299	0.0010	0.0066	< 0.0008 ^b	0.1404

^a Method detection limit (for values reported below detection) is used and is presented with a less than (<) sign.

^b Half the detection value (for values reported below detection) is used to calculate mass-loading and is presented with a less than (<) sign.

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