Annual Industrial Waste System Stormwater Monitoring Report

Seattle-Tacoma International Airport

For the Period July 1, 2022 through June 30, 2023

September 29, 2023

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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 2022 through June 2023. The IWTP discharges to 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, WA-0024651.

The IWTP also operates under King County (KC) Waste Discharge Permit #7810-05. This permit allows the facility to discharge stormwater with higher concentrations of biochemical oxygen demand (BOD_5) to the King County South Treatment Plant (KC STP) for further treatment before ultimately discharging to Puget Sound.

Starting in January 2007, STIA operated under the new effluent limitations, which included separate limits for BOD_5 for November through March and April through October. In addition, the all known, available and reasonable methods of prevention, control and treatment (AKART) system for segregating higher BOD_5 concentrations and routing them to the KC STP was finished and started up in November 2006 with final implementation on January 1, 2007. On October 1, 2022, the permit effluent limits were adjusted to allow for increased daily maximum discharge volume through the system under reduced BOD_5 daily maximum and monthly average mass-loading limits.

During the reporting period, a total of two hundred and forty-nine (249) million gallons (MG) of stormwater was processed in the IWTP and discharged to either the Outfall 001 or KC STP. The IWTP operated for 184 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 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.

Forty-two (42) MG of stormwater was processed and discharged through Outfall 001 to Puget Sound over a total of 26 days during the reporting period. The daily average flow to Outfall 001 was 1.62 MG. There were no discharges in August 2022, September 2022, December 2022, February 2023, March 2023, April 2023, May 2023, or June 2023. The daily maximum discharge limit to Outfall 001 is 18 MG. During the reporting period, the daily maximum discharge to Outfall 001 was 4.34 MG and occurred on October 20, 2022.

Twenty-six (26) samples were collected from Outfall 001 effluent to characterize the daily discharge for BOD_5 concentration and to calculate BOD_5 mass-loading. Concentrations of BOD_5 discharged to Outfall 001 ranged from 2.2 milligrams per liter (mg/L) to 679.0 mg/L. The maximum concentration of 679.0 mg/L occurred during a brief discharge on January 17, 2023 when the electronic valve malfunctioned at the treatment plant. This discharge caused an NPDES permit limit exceedance for monthly average BOD_5 concentrations in January 2023. The Port notified the

Department of Ecology on January 17, 2023 via email of the incident. Outside of that discharge event, the maximum concentration of BOD_5 was 22.5 mg/L. All other samples were below the BOD_5 concentration permit limits. All samples taken throughout the reporting period were well below their respective daily maximum BOD_5 mass-loading limits. The daily maximum mass-load of BOD_5 discharged to Outfall 001 was 611 pounds on November 8, 2022. The monthly average BOD_5 mass-loading ranged from 2 pounds in January 2023 to 308 pounds in November 2022.

Eight (8) 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 8.0 mg/L. All TSS samples were below the monthly average effluent limit of 21 mg/L. All TSS samples were below the daily maximum effluent limit of 33 mg/L.

pH was continuously measured at the IWTP, and instantaneous maximum and minimum results were recorded. The plant operated within the permit-required pH range of 6.0 to 9.0. A minimum instantaneous pH of 6.5 and a maximum of 9.2 were measured during this reporting period. The maximum pH of 9.2 was above the 9.0 permit limit for a period of 10 minutes, because the high pH discharge occurred for less than 1 hour, it does not exceed permit benchmarks.

Eight (8) 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 9.08 mg/L with a daily average concentration of 1.73 mg/L. The monthly average oil and grease concentration limit was exceeded during the month of January 2023. This exceedance occurred during the previously mentioned brief discharge on January 17, 2023. All other monthly average oil and grease concentrations were below the limit of 8 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 BOD_5 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 Puget Sound. All sample parameters were reported in accordance with Condition S4 of the King County Waste Discharge Permit #7810-05.

Two hundred and seven (207) MG of industrial stormwater was separated, processed, and routed to the KC STP due to elevated levels of BOD_5. Discharge to KC STP occurred on 160 days over the reporting period. The IWTP did not discharge to KC STP during the months of July 2022 or September 2022. The daily maximum discharge permit limit was increased on October 1, 2022 from 2.76 MG to 4.0 MG. The daily maximum discharge of 3.25 MG occurred on January 12, 2023. The maximum instantaneous flow rate permit limit was increased on October 1, 2022 from 1,965 GPM to 2,883 GPM. On August 2, 2022, the maximum instantaneous flow rate exceeded the permitted limit for approximately 2 minutes at a rate of 1,985 GPM. King County was notified of this incident on August 3, 2022 via email and followed up with a permit violation report on August 11, 2022. The daily maximum flow rate permit limit was also increased on October 1, 2022 from 1,915 GPM to 2,778 GPM. The peak flow discharged to KC STP over the reporting period was 2,561 GPM and it occurred on January 15, 2023. With the exception of the maximum instantaneous flow rate exceedance on August 2, 2022, all other flow discharge limits were met for the duration of the reporting period.

One hundred and sixty (160) composite samples were collected from KC STP effluent and analyzed for BOD_5. During the reporting period, sample concentrations of BOD_5 ranged from 5.6 mg/L to 3,260 mg/L. The KC STP BOD_5 daily average concentration was 1,168 mg/L during the reporting period. The daily maximum BOD_5 mass-loading limit was decreased on October 1, 2022 from 60,000 lbs/day to 45,000 lbs/day. The daily maximum BOD_5 mass-load discharged to KC STP was 38,209 pounds and it occurred on December 5, 2022. A new monthly average BOD_5 mass-loading limit was instituted on October 1, 2022 at 27,500 lbs/day. The maximum monthly average mass-load of 19,034 lbs/day occurred during the month of December 2022. During the reporting period, all samples met the KC STP BOD_5 permit limits for mass-loading.

There was one other violation of the King County Waste Discharge permit on February 11, 2023 when the instantaneous pH dropped below the permitted limit of 5.5 to 5.4 for a period of 26 minutes. King County was notified of this incident on February 14, 2023.

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 2022, STIA handled 456,289 metric tons of air cargo, and 45.9 million passengers. STIA is ranked the twelfth-busiest U.S. commercial 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 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 current NPDES Permit (No. WA-0024651) became effective on September 1, 2021 and will expire on August 31, 2026. This Annual IWS Stormwater Monitoring Report summarizes the discharge monitoring results from July 1, 2022 through June 30, 2023.

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 wastewater 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 basin 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 (BOD_5) 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 BOD_5 concentrations. This project was initiated by the AKART determination for the IWS. "High BOD_5" effluent is defined as any water that could cause the IWTP to exceed the daily or monthly average concentration or daily maximum load. Final

Effluent Limitations are specified in S1.A of the permit. Treated wastewater containing high BOD_5 concentrations is conveyed to the KC STP, while treated wastewater with low BOD_5 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 BOD_5 concentration.

Untreated industrial wastewater is stored in three lagoons. The primary purpose of Lagoons #1 and #2 is for collection of the "first flush" of high BOD_5 influent from the South Aviation and North Aviation areas, respectively. Although the primary purpose of Lagoon #3 is for collection of low BOD_5 runoff, high BOD_5 runoff during de-icing periods may also be stored in Lagoon #3 when Lagoons #1 and #2 reach full capacity. Prior to treatment, the wastewater flows from Lagoons #1 and #2 through mechanical screening devices, which are sized to remove large objects.

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 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 BOD_5 wet well or near the surface of the wet well designated low as the low BOD_5 wet well. Treated water is discharged to Puget Sound from the low BOD_5 wet well and to the Valley View Sewer District (VVSD) from the high BOD_5 wet well. Discharges to the VVSD are conveyed to King County South Wastewater Treatment Plant (KC STP) where they undergo secondary treatment before being discharged to Puget Sound. A schematic 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's mass-based effluent limits allow a maximum BOD_5 hourly load of 2,500 lbs/hr. As of October 1, 2022, the BOD_5 daily maximum mass-loading limit has been reduced and a new monthly average mass-loading limit has been set to 27,500 lbs/day. The daily maximum load of 60,000 lbs/day was reduced to 45,000 lbs/day. The KC STP permit discharge limits have been increased as of October 1, 2023 from 1,915 GPM for 15-minutes within a 24-hour period to 2,883 GPM for 15-minutes within a 24-hour period, a peak instantaneous flow was raised from 1,965 GPM to 2,778 GPM, and the daily maximum discharge volume was raised from 2.76 MG to 4.0 MG. In addition, the KC STP permit reserves King County and VVSD'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

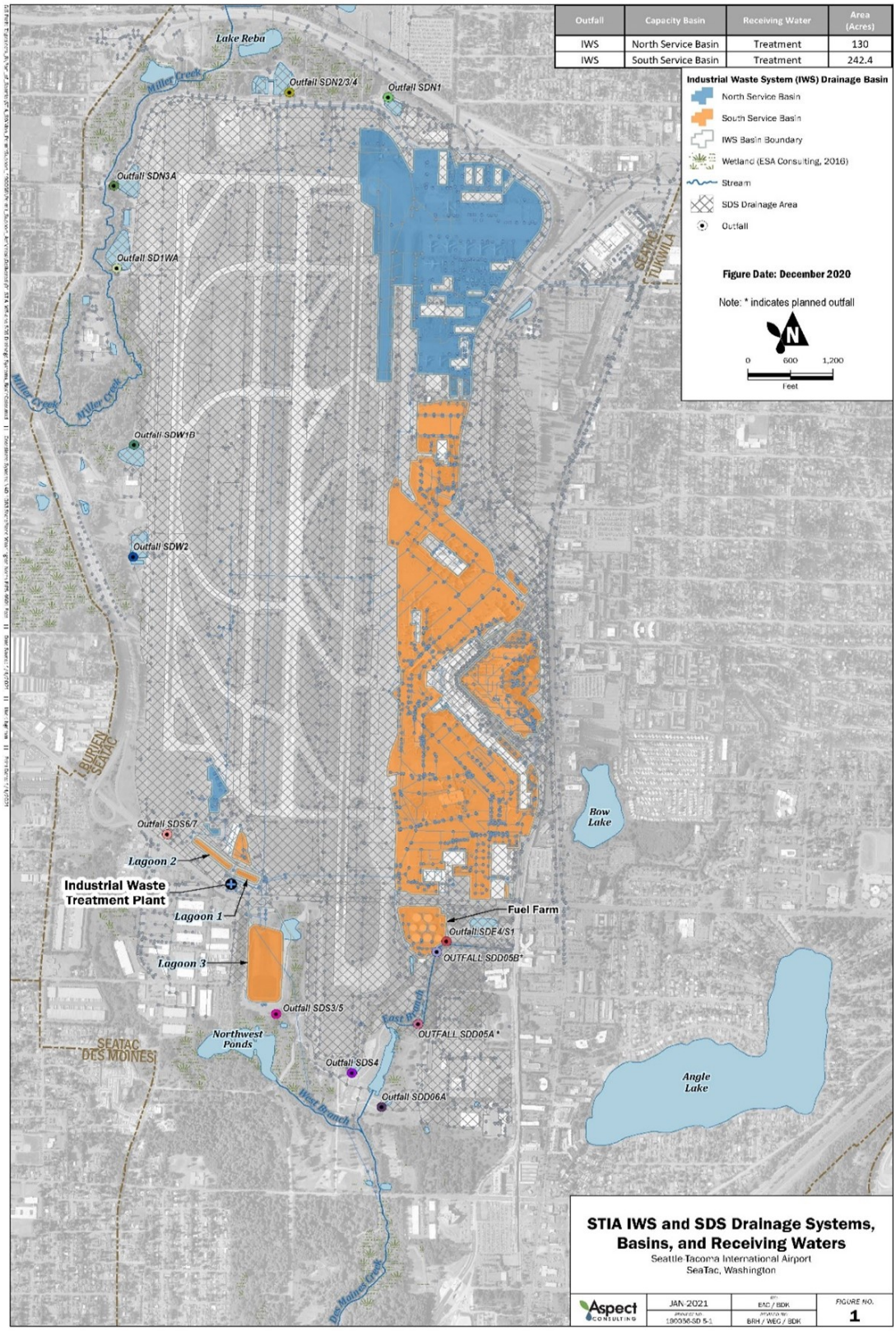
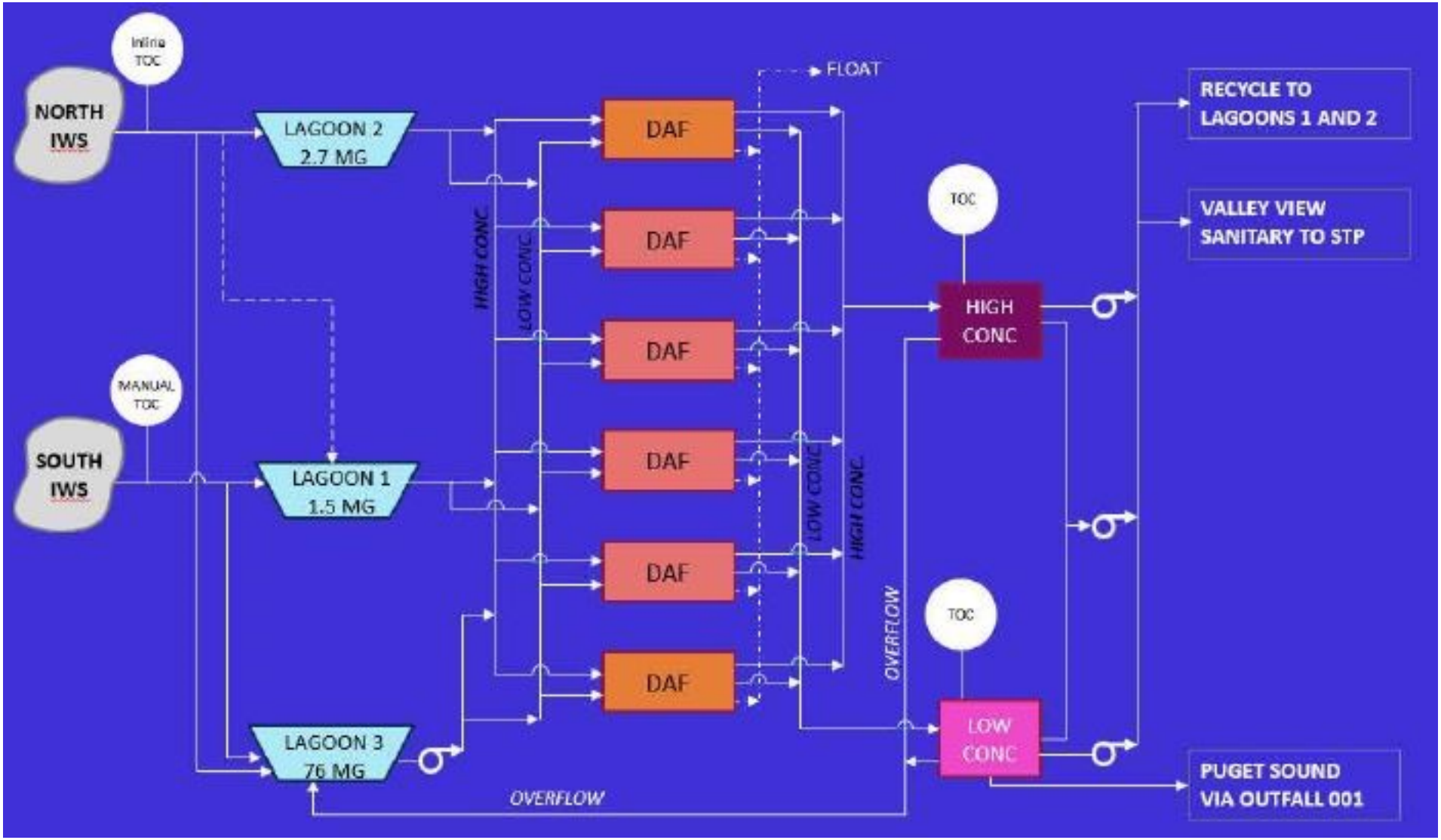


Figure 2. Schematic Diagram of the Port's IWTP at STIA



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. WA-0024651, Part I, Special Condition S1.A and S2.A
- King County Waste Discharge Permit #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, REV 3.0 October 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. IWTP 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 within 45 days of the monitoring period. 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 BOD_5 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 from April through October and wet season is from 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 Permit Final Effluent Limits

Final Effluent Limits (excerpted from the King County Waste Discharge Permit #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)	Daily Maximum 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 [c]	Daily Maximum Hourly Load [d] (lbs/hr)	Daily Maximum Loading [e] (lbs/day)	Average Monthly Loading [f] (lbs/day)
July '21 – Sep 30, '22	2,500	60,000	--
Oct 1, '22 – July '26	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 '21 – Sep 30, '22[h]	1,965 GPM	2.76 MG
Oct 1, '22 – July '26[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 BOD_5 concentration based on TOC using a KCIW approved statistical procedure. The Port must indicate the use of the TOC in lieu of BOD_5 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 1,965 GPM. 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 2,828 GPM. 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 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 2022 through June 2023. Flow and BOD_5 related results are summarized in this report for samples collected under the King County Waste Discharge permit to provide a complete overview of all discharges from the IWTP.

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 two hundred and forty-nine (249) 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

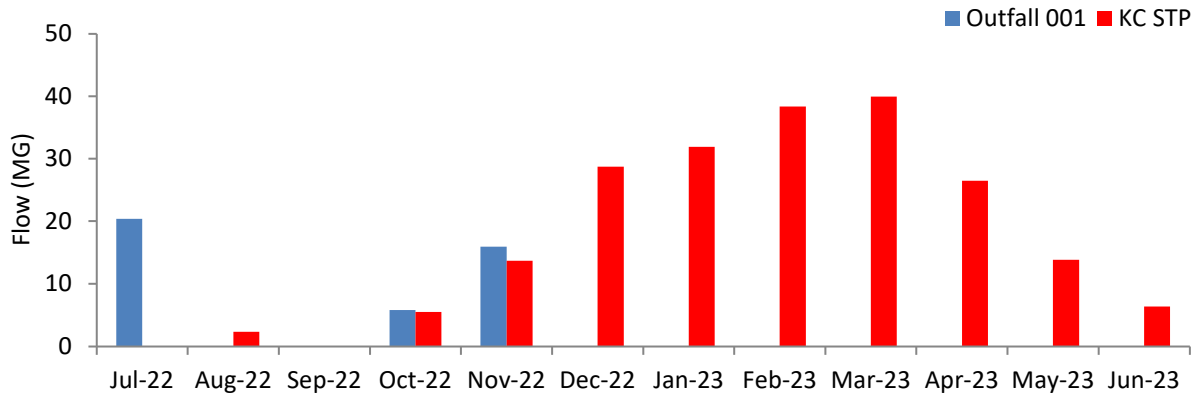


Table 4 depicts the Total Daily Effluent Volume discharged to Outfall 001, as well as the calculated total volume, average, and maximum flows per month. Forty-two (42) MG of stormwater were discharged to Outfall 001 during the reporting period. The monthly maximum flow to Outfall 001 was 20 MG in July 2022. The daily maximum flow to Outfall 001 was 4.34 MG and occurred on October 20, 2022. The IWTP discharged to Outfall 001 on 26 days during the reporting period with a daily average flow of 1.62 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. Two hundred and seven (207) MG of industrial stormwater were discharged to KC STP during the reporting period. The monthly maximum flow routed to the KC STP was 39.95 MG in March 2023. The daily maximum flow to KC STP was 3.25 MG and occurred on January 12, 2023.

The permitted instantaneous maximum discharge rate to the KC STP was raised on October 1, 2023. Before October 1, 2022 the instantaneous maximum flow rate limit was violated whenever any instantaneous recording was greater than 1,965 GPM. The daily maximum flow rate was violated whenever any continuous recording of 15 minutes or longer remained above 1,915 GPM

within a 24-hour period. After October 1, 2022 the instantaneous maximum flow rate limit is violated whenever any instantaneous recording is greater than 2,828 GPM. 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. **Figure 4** depicts the instantaneous maximum discharge rate to the KC STP. On August 2, 2022, around 2:02 pm the instantaneous flow rate exceeded the permitted limit for approximately 2 minutes at a rate of 1,985 GPM. The instantaneous maximum flow rate, over the reporting period, was 2,561 GPM and occurred on January 15, 2023. The IWTP discharged to KC STP, 160 days during the reporting period with an average daily flow of 1.29 MG when operating.

Figure 4. KC STP Instantaneous Maximum Flow Rate

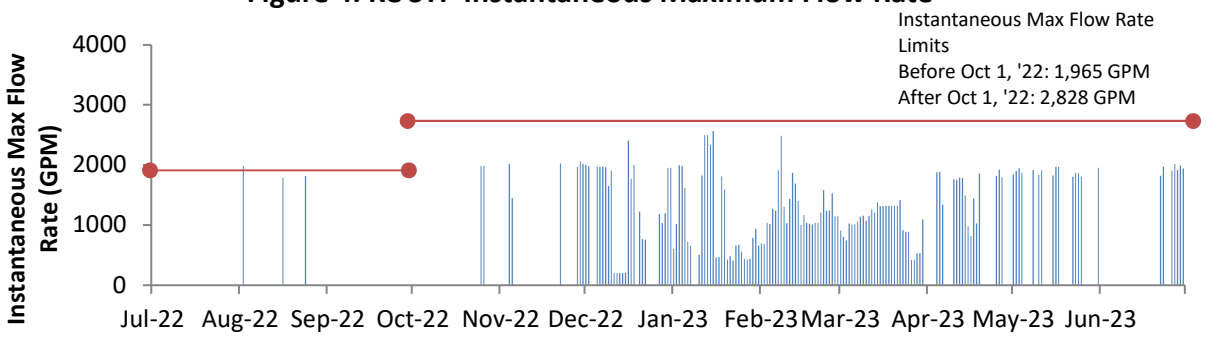


Table 4. Total Daily Effluent Flow Volume to Outfall 001

Date	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23
	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)
1	1.323				2.905							
2					2.885							
3					2.749							
4												
5	1.462				1.217							
6	1.592											
7	1.591				2.896							
8	0.680				3.254							
9												
10												
11	0.577											
12												
13	0.703											
14	1.450											
15	1.308											
16												
17							0.0003					
18	1.331											
19	1.590											
20	1.585			4.339								
21	1.133											
22	0.786											
23												
24												
25	0.836											
26	1.437											
27	0.996											
28												
29												
30												
31				1.45								
Monthly Volume (MG)	20.38	-	-	5.79	15.91	-	0.0003	-	-	-	-	-
Num Days Operation	17	0	0	2	6	0	1	0	0	0	0	0
Daily Avg Flow (MGD)	1.20	-	-	2.90	2.65	-	0.0003	-	-	-	-	-
Daily Max Flow (MGD)	1.59	-	-	4.34	3.25	-	0.0003	-	-	-	-	-

Table 5. Total Daily Effluent Flow Volume to KC STP

Date	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23
	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)
1						2.717	0.864	0.860	1.003		0.939	
2		0.596				1.375	0.864	0.861	0.927		0.983	
3							1.373	1.047	1.026		0.931	
4					2.445		1.943	1.171	1.197	2.610	0.932	
5					0.713	2.424	0.680	1.706	1.307	2.235		
6						1.922	0.761	1.092	1.301	1.746		
7						1.738	0.239	1.804	1.364			
8						1.946		2.574	1.059		0.989	
9						1.945		1.149	1.464			
10						0.989	0.245	1.221	1.445	1.561	0.914	
11						0.287	1.896	1.224	1.573	2.507	0.875	
12						0.288	3.248	1.195	1.672	2.547		
13						0.288	1.619	2.004	1.679	2.354		
14						0.288	1.998	1.139	1.714	1.83		
15						0.288	2.77	1.079	1.874	1.224	0.936	
16		0.883				2.194	0.572	1.082	1.880	0.960	1.005	
17						2.060	0.592	1.286	1.88	1.601	1.023	
18						0.349	1.882	1.334	1.883	1.255		
19							1.989	1.194	1.883	1.295		
20						0.823	0.499	1.274	1.886			
21						1.05	0.601	1.313	1.886			
22					2.697	1.045	0.529	1.520	1.511		0.944	0.896
23							0.815	1.788	1.147		0.968	0.799
24		0.835					0.823	1.491	1.266		0.966	
25				2.693			0.551	1.318	0.818	0.901	0.746	
26				2.787			0.566	1.543	0.585	0.972		0.861
27						0.474	0.533	1.573	0.587	0.863		1.051
28					2.309	0.526	0.579	1.499	0.701			0.886
29					2.776	0.761	0.995		0.746			1.055
30					2.736	2.121	1.187		0.681			0.808
31						0.828	0.703				0.698	
Monthly Volume (MG)	-	2.31	-	5.48	13.68	28.73	31.92	38.34	39.95	26.46	13.85	6.36
Num Days Operation	0	3	0	2	6	24	29	28	30	16	15	7
Avg Daily Flow (MGD)	-	0.77	-	2.74	2.28	1.20	1.10	1.37	1.33	1.65	0.92	0.91
Max Daily Flow (MGD)	-	0.88	-	2.79	2.78	2.72	3.25	2.57	1.89	2.61	1.02	1.06

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 (BOD_5)

One hundred and eighty-six (186) effluent samples were analyzed for BOD_5, for discharges to both Outfall 001 and KC STP. **Table 6** summarizes the BOD_5 sample concentrations and mass-loading discharged to Outfall 001. **Table 7** summarizes the BOD_5 sample concentrations and

mass-loading discharged to KC STP. **Figure 5** depicts monthly average BOD_5 concentrations to Outfall 001. **Figure 6** depict daily maximum BOD_5 mass-loadings from Outfall 001 during this reporting period. **Figures 7, 8**, and **9** depict hourly maximum, daily maximum, and monthly average BOD_5 mass-loading to the KC STP outfall.

BOD_5 Concentration

The monthly average BOD_5 concentration discharged to Outfall 001 ranged from 3.92 mg/L in July 2022 to 679.0 mg/L in January 2023. The daily maximum concentration discharged to Outfall 001 was 679.0 mg/L on January 17, 2023. This maximum concentration of 679.0 mg/L occurred during a brief accidental discharge. This discharge event lasted approximately 1.5 hours and a total of 0.0003 MG was released. During this event a total of 2 pounds of BOD_5 was discharged to Outfall 001. This discharge event caused an exceedance for monthly average BOD_5 concentrations in January 2023, it was the only discharge that occurred that month. Outside of that discharge event the maximum concentration of BOD_5 was 22.5 mg/L. All other BOD_5 samples collected from discharges to Outfall 001, during this reporting period were below permit limits.

The daily maximum concentration discharged to KC STP over the reporting period was 3,260 mg/L on December 27, 2022. There are no concentration limits to BOD_5 for discharges to KC STP.

BOD_5 Mass-Loading

The BOD_5 monthly average mass-load discharged to Outfall 001 ranged from 2 pounds in January 2023 to 308 pounds in November 2022. The daily maximum BOD_5 mass-load discharged to Outfall 001 was 611 pounds on November 8, 2022. A total of 2,774 pounds of BOD_5 was discharged to Outfall 001 during this reporting period. All BOD_5 mass-loading in discharges to Outfall 001, during this reporting period were below NPDES permit limits.

The daily maximum pounds of BOD_5 discharged to KC STP was 38,209 pounds which occurred on December 05, 2022. A total of 1,858,069 pounds of BOD_5 was discharged to KC STP during this reporting period. All BOD_5 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-22		Aug-22		Sep-22		Oct-22		Nov-22		Dec-22		Jan-23		Feb-23		Mar-23		Apr-23		May-23		Jun-23	
	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	4.2	46							8.7	211														
2									11.0	265														
3									10.4	238														
4																								
5	3.4	41							18.6	189														
6	2.2	29																						
7	3.5	46							13.9	336														
8	3.4	19							22.5	611														
9																								
10																								
11	3.2	15																						
12																								
13	3.2	19																						
14	4.4	53																						
15	5.3	58																						
16																								
17													679	2										
18	3.3	37																						
19	2.9	38																						
20	3.5	46					3.7	134																
21	5.3	50																						
22	5.0	33																						
23																								
24																								
25	3.6	25																						

Date	Jul-22		Aug-22		Sep-22		Oct-22		Nov-22		Dec-22		Jan-23		Feb-23		Mar-23		Apr-23		May-23		Jun-23	
	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
26	4.1	49																						
27	6.1	51																						
28																								
29																								
30																								
31							10.9	132																
Monthly BOD_5 Mass-Load	657		-		-		266		1849		-		2		-		-		-		-		-	
Operating Days per Month	17		0		0		2		6		0		1		0		0		0		0		0	
Monthly Average	3.9	39	-	-	-	-	7.3	133	14.2	308	-	-	679	2	-	-	-	-	-	-	-	-	-	-
Monthly Maximum per Day	6.1	58	-	-	-	-	10.9	134	22.5	611	-	-	679	2	-	-	-	-	-	-	-	-	-	-

Table 7. KC STP Biological Oxygen Demand Results

Date	Jul-22		Aug-22		Sep-22		Oct-22		Nov-22		Dec-22		Jan-23		Feb-23		Mar-23		Apr-23		May-23		Jun-23	
	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											1020	23113	2207*	15903*	1760	12623	1820	15224			61.0	478		
2			20.2	100							779	8933	2170	15636	1820	13069	2450	18941			56.1	460		
3													1100	12596	1830	15980	2330	19937			53.0	412		
4									126	2569			791	12818	1830	17872	1980	19766	414*	9007*	48.8	379		
5									51.1*	304*	1890	38209	2290	12987	1200	17074	1810	19730	413	7698				
6											2120	33982	2270	14407	1680	15300	1750	18988	412	5999				
7											2310	33483	2174*	4333	888	13360	1600	18201						
8											2273*	36885*			611	13116	1720	15191			43.8	361		
9											2256*	36589*			1520	14566	1890	23076						
10											2206.6	18201	1890	3862	1950	19857	1870	22536	69.0	900	25.6	195		

Date	Jul-22		Aug-22		Sep-22		Oct-22		Nov-22		Dec-22		Jan-23		Feb-23		Mar-23		Apr-23		May-23		Jun-23	
	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
11											1320	3160	680	10753	1700	17354	2220	29124	67.0	1401	24.8	181		
12											1560	3747	344	9318	1680	16743	1840	25658	80.0	1689				
13											1070	2570	709	9573	940	15711	1490	20864	71.0	1392				
14											970	2330	581	9681	1740	16529	1410	20156	69.0	1055				
15											819	1967	383	8848	1980	17818	1310	20474	68.0	696	12.3	96		
16			5.7	42							1950	35681	1892*	9026*	2000	18048	1480	23205	75.0	601	19.9	167		
17											1490	25599	1630	8048	2170	23274	1470	23048	87.0	1159	12.7	108		
18											1640	4773	597*	9372*	1940	21584	1500	23556	101	1057				
19													614	10185	1930	19219	1440	22614	105	1134				
20											3220	22102	1710	7116	2000	21250	1710	26897						
21											3140	27497	1830	9173	1900	20806	2020	31773						
22									193	4341	3200	27889	1820	8030	1860	23579	1234*	15551*			28.6*	225*	16.0	120
23													1290	8768	1580	23561	1300	12436			12.3	99	16.3	109
24			5.6	39									1260	8648	1840	22880	1380	14571			13.1	106		
25							44.1	990					1750	8042	1530	16818	1203*	8207*	101	759	12.5	78		
26							28.0	651					1890	8922	1610	20718	1185*	5781*	69.0	557			15.0	108
27											3260	12887	1920	8535	1800	23614	1250	6119	76.0	548			36.0*	316*
28									125	2407	2490	10923	1740	8402	1970	24628	1210	7074					36.3*	268*
29									82.5	1910	2450	15550	1000	8298			1020	6346					19.1	168
30									376	8580	894*	15821*	896	8870			1110	6304					17.3	117
31											2162*	14928*	1800	10553							19.2	112		
Monthly BOD_5 Mass-Load	-		181		-		1,641		20,111		456,818		280,703		516,950		541,351		35,652		3,457		1,204	
Operating Days per Month	0		3		0		2		6		24		29		28		30		16		15		7	
Monthly Average	-	-	10.5	60	-	-	36.1	821	158.9	3352	1937.0	19034	1421.6	9679	1687.8	18463	1600.1	18045	142.3	2228	29.6	230	22.3	172
Monthly Maximum per Day	-	-	20.2	100	-	-	44.1	990	376	8580	3260.0	38209	2290.0	15903	2170.0	24628	2450.0	31773	413.8	9007	61	478	36.3	316

* A Hold-Time exceedance occurred. An Ecology approved regression analysis of TOC/BOD_5 samples was performed.

BOD_5 Results Summary – Outfall 001

Figure 5. Outfall 001 Monthly Average BOD_5 Concentration

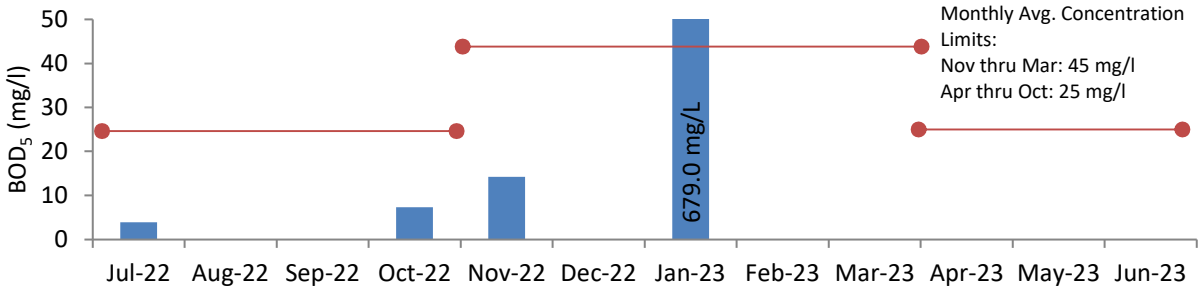
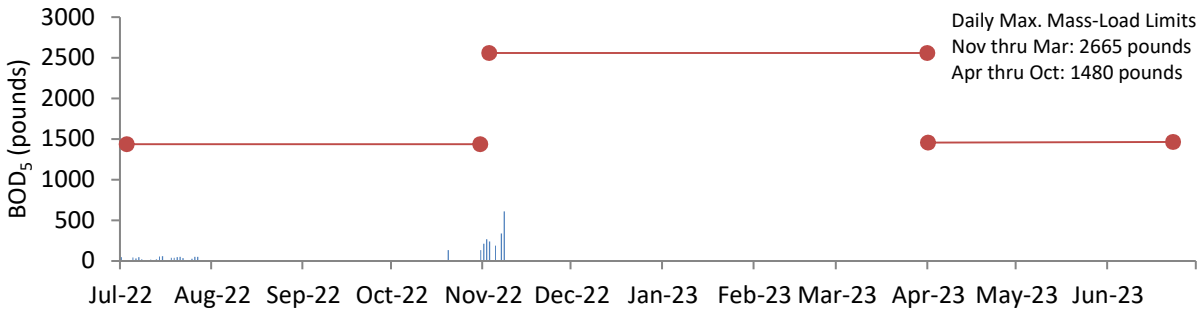


Figure 6. Outfall 001 Daily Maximum BOD_5 Mass-Load



BOD_5 Results Summary – KC STP Outfall

Figure 7. KC STP Daily Maximum Hourly BOD_5 Mass-Load

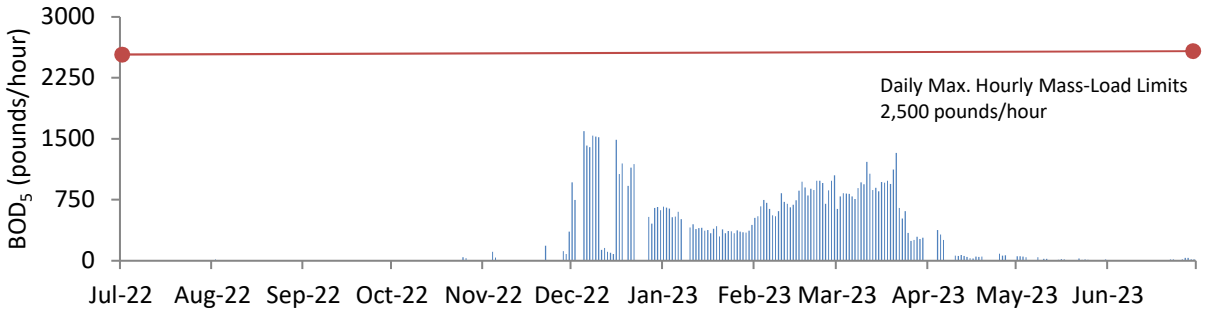


Figure 8. KC STP Daily Maximum BOD_5 Mass-Load

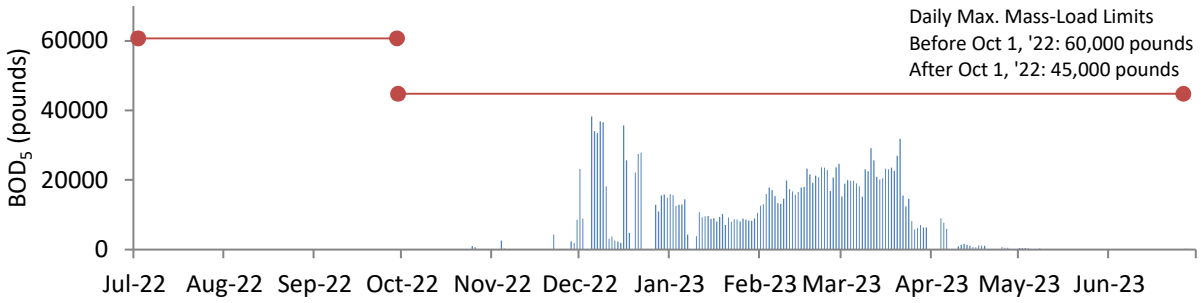
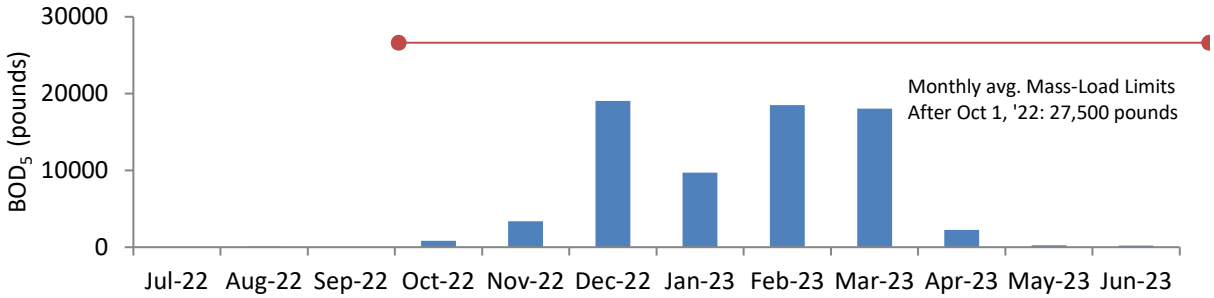


Figure 9. KC STP Monthly Average BOD_5 Mass-Load



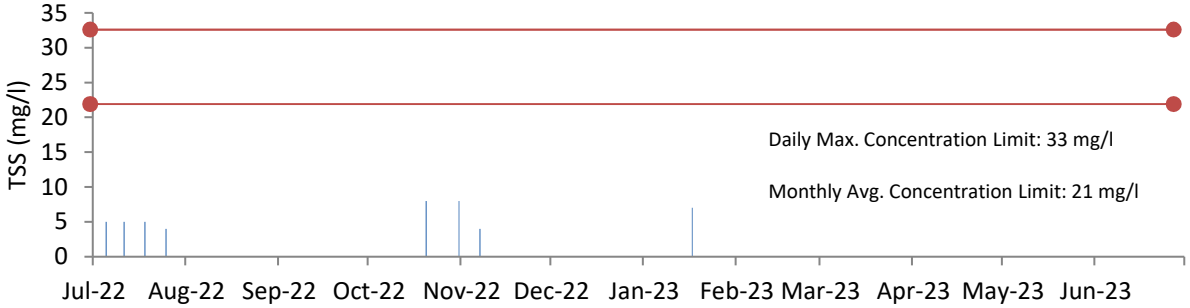
BOD_5 Mass Load Summary – AKART Implementation

Since AKART implementation, the IWTP has processed 13,711,519 pounds of BOD_5 from the 001 and KC STP outfalls. A total of 13,392,387 pounds of BOD_5 (97.7%) were segregated and sent to King County for treatment.

3.3.2 Total Suspended Solids (TSS)

A total of eight (8) samples were collected from Outfall 001 for TSS analysis. TSS results for discharges to Outfall 001 ranged from 4.0 mg/L to 8.0 mg/L. All TSS samples were well below the daily maximum effluent limit of 33 mg/L and the monthly average effluent limit of 21 mg/L. **Figure 10** depicts the Outfall 001 Daily Maximum TSS concentrations for the reporting period.

Figure 10 . Outfall 001 Daily Maximum TSS Concentration



3.3.3 Glycols

Three (3) 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 propylene-glycol; however monthly reporting is required on DMR's from November through March. The daily concentration for propylene-glycol discharged to Outfall 001 during the reporting period ranged from non-detect to 469.0 mg/L.

3.3.4 pH

Continuous pH metering is performed during discharge to Outfall 001. For Outfall 001 discharges, the minimum instantaneous pH measurement was 6.5 and the maximum pH measurement was 9.2. The maximum pH of 9.2 was only above the 9.0 permit limit for a period of 10-minutes, because the high pH discharge occurred for less than 1 hour; it therefore does not exceed permitted benchmarks. All

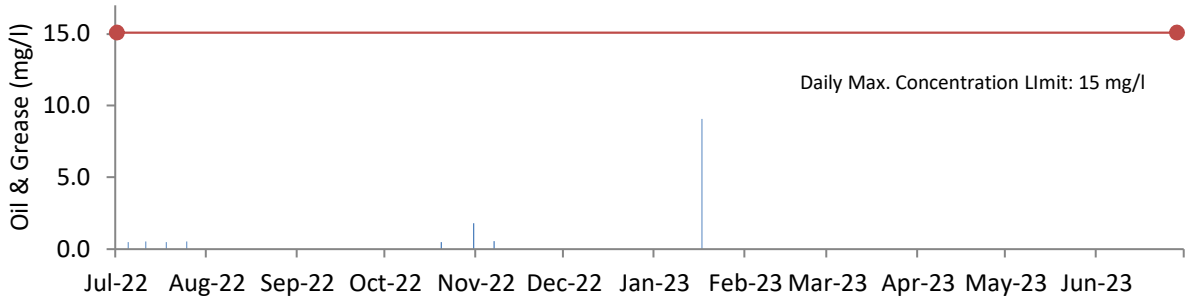
stormwater discharged to Outfall 001 was within the NPDES permitted range throughout the reporting period.

Continuous pH metering is performed during discharge to KC STP. For KC STP, the minimum instantaneous measurement was 5.4, recorded on February 11, 2023. The minimum pH of 5.4 was below the 5.5 limit for a period of 26 minutes. At 9:58 AM, the caustic soda used to treat pH froze inside the pump head, which resulted in a drop in pH. The issue was corrected immediately, and pH was restored to 5.5 by 10:24 AM. The discharge rate was 900 GPM during this period which equates to a total of 23,400 gallons of discharged water that were affected by this low pH. The maximum pH measurement over the reporting period was 9.4. 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

Eight (8) 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 maximum concentration during the 2022-2023 reporting period was 9.08 mg/L. As noted in **Figure 11**, all Oil and Grease samples were well below the daily maximum effluent limit of 15 mg/L but exceeded the monthly average during the brief period of discharge during January 2023.

Figure 11. 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 1, 2022 through June 30, 2023. Results of permit required monitoring were presented for both NPDES Permit (No. WA00224651) and King County Waste Discharge Permit (No. 7810-05). Results were presented for flow, BOD_5, TSS, propylene-glycol, pH, and oil and grease.

The AKART system has been in place for 16.5 years. It is proving to be very effective in reducing discharge of pollutants to Puget Sound. For this reporting period, 1,858,069 pounds of BOD_5 out of the total processed 1,860,843 pounds (99.9 %) were segregated and sent to King County for treatment. Since the implementation of AKART on January 1, 2007, a total of 13,711,519 pounds of BOD_5 were processed through the IWTP and 13,392,387 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 except for one oil and grease sample which occurred during the brief discharge in January 2023.

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 Wastewater Treatment Plant Operation & Maintenance Manual.

Aspect Consulting. October 2021. Quality Assurance Program Plan, Seattle Tacoma International Airport, Industrial Waste Treatment Plant Discharge Monitoring Program REV 3.0.

Port of Seattle; Sea-Tac Airport Website; http://www.portseattle.org/seatac/; 2022 Airport Activity Report.

Washington State Department of Ecology. National Pollutant Discharge Elimination System Waste Discharge Permit WA-0024651, Port of Seattle. Effective Date: September 1, 2021.

King County Industrial Waste Program. King County Waste Discharge Permit 7810-05, Port of Seattle IWS. Effective Date: July 21, 2021.

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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
7/1/2022	1.32	4.2	46	8.3	8.6			
7/5/2022	1.46	3.4	41	8.1	8.9		5	0.47
7/6/2022	1.59	2.2	29	8.4	8.8			
7/7/2022	1.59	3.5	46	8.3	9.0			
7/8/2022	0.68	3.4	19	8.6	9.0			
7/11/2022	0.58	3.2	15	7.2	9.2		5	0.51
7/13/2022	0.70	3.2	19	7.8	8.8			
7/14/2022	1.45	4.4	53	8.5	8.8			
7/15/2022	1.31	5.3	58	7.9	8.5			
7/18/2022	1.33	3.3	37	7.4	8.3		5	0.47
7/19/2022	1.59	2.9	38	7.7	8.5			
7/20/2022	1.59	3.5	46	7.1	8.3			
7/21/2022	1.13	5.3	50	7.4	8.1			
7/22/2022	0.79	5.0	33	7.3	7.5			
7/25/2022	0.84	3.6	25	7.1	8.7		4	0.53
7/26/2022	1.44	4.1	49	8.3	9.0			
7/27/2022	1.00	6.1	51	8.2	8.6			
10/20/2022	4.34	3.7	134	7.7	7.8		8	0.47
10/31/2022	1.45	10.9	132	6.7	6.8	<10 [a]	8	1.79
11/1/2022	2.91	8.7	211	6.6	6.7			
11/2/2022	2.89	11.0	265	6.6	6.7			
11/3/2022	2.75	10.4	238	6.6	6.9			
11/5/2022	1.22	18.6	189	6.7	7.0			
11/7/2022	2.90	13.9	336	6.5	6.7	<10 [a]	4	0.55
11/8/2022	3.25	22.5	611	6.7	7.0			
1/17/2023	0.0003	679.0	2	6.8	7.3	469	7	9.08

[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.

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
8/2/2022	0.60	20.2	100	7.2	8.0	39	5.03
8/16/2022	0.88	5.7	42	7.9	8.2	12	
8/24/2022	0.84	5.6	39	8.2	8.6	8	
10/25/2022	2.69	44.1	990	7.1	8.6	10	1.95
10/26/2022	2.79	28.0	651	7.2	7.2	12	
11/4/2022	2.45	126.0	2569	7.0	7.3	13	1.27
11/5/2022	0.71	51.1 [d]	304 [d]	7.0	7.3	9	
11/22/2022	2.70	193.0	4341	6.5	7.9	10	
11/28/2022	2.31	125.0	2407	6.7	7.1	6	
11/29/2022	2.78	82.5	1910	6.7	8.0	5	
11/30/2022	2.74	376.0	8580	6.6	8.0	6	
12/1/2022	2.72	1020.0	23113	6.6	6.7	13	5.12
12/2/2022	1.38	779.0	8933	6.7	6.7	11	
12/5/2022	2.42	1890.0	38209	6.9	7.2	8	
12/6/2022	1.92	2120.0	33982	7.0	7.1	9	
12/7/2022	1.74	2310.0	33483	7.0	7.1	9	
12/8/2022	1.95	2272.7 [d]	36885 [d]	7.0	7.1	9	
12/9/2022	1.95	2255.6 [d]	36589 [d]	7.0	7.1	8	
12/10/2022	0.99	2206.6 [d]	18201 [d]	7.0	7.1	10	
12/11/2022	0.29	1320.0	3160	6.3	6.8	7	
12/12/2022	0.29	1560.0	3747	6.7	6.8	7	
12/13/2022	0.29	1070.0	2570	6.3	6.7	11	
12/14/2022	0.29	970.0	2330	6.6	6.7	20	
12/15/2022	0.29	819.0	1967	6.5	6.5	14	
12/16/2022	2.19	1950.0	35681	6.6	6.8	7	
12/17/2022	2.06	1490.0	25599	6.7	6.7	7	
12/18/2022	0.35	1640.0	4773	6.6	6.9	7	
12/20/2022	0.82	3220.0	22102	6.6	6.9	10	
12/21/2022	1.05	3140.0	27497	6.9	7.0	8	
12/22/2022	1.05	3200.0	27889	6.9	7.1	9	
12/27/2022	0.47	3260.0	12887	6.3	7.1	20	
12/28/2022	0.53	2490.0	10923	6.7	7.1	9	
12/29/2022	0.76	2450.0	15550	6.6	6.7	10	
12/30/2022	2.12	894.4 [d]	15821 [d]	6.5	6.7	13	
12/31/2022	0.83	2161.7 [d]	14928 [d]	6.5	6.7	8	

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
1/1/2023	0.86	2206.6 [d]	15903 [d]	6.6	6.7	8	3.11
1/2/2023	0.86	2170.0 [d]	15636 [d]	6.4	6.7	6	
1/3/2023	1.37	1100.0	12596	6.6	6.9	7	
1/4/2023	1.94	791.0	12818	6.9	7.0	8	
1/5/2023	0.68	2290.0	12987	6.6	7.0	5	
1/6/2023	0.76	2270.0	14407	6.6	6.8	5	
1/7/2023	0.24	2173.6 [d]	4333 [d]	6.6	6.8	5	
1/10/2023	0.25	1890.0	3862	6.6	6.7	8	
1/11/2023	1.90	680.0	10753	6.6	7.0	9	
1/12/2023	3.25	344.0	9318	6.9	7.0	10	
1/13/2023	1.62	709.0	9573	6.6	7.0	10	
1/14/2023	2.00	581.0	9681	6.5	6.7	8	
1/15/2023	2.77	383.0	8848	6.5	7.0	10	
1/16/2023	0.57	1891.8 [d]	9026 [d]	6.6	6.6	8	
1/17/2023	0.59	1630.0	8048	6.5	7.0	8	
1/18/2023	1.88	597.0 [d]	9372 [d]	6.5	7.0	10	
1/19/2023	1.99	614.0	10185	6.5	6.7	8	
1/20/2023	0.50	1710.0	7116	6.6	6.7	7	
1/21/2023	0.60	1830.0	9173	6.6	6.8	8	
1/22/2023	0.53	1820.0	8030	6.6	6.7	10	
1/23/2023	0.82	1290.0	8768	6.6	6.7	11	
1/24/2023	0.82	1260.0	8648	6.6	6.8	13	
1/25/2023	0.55	1750.0	8042	6.5	6.8	9	
1/26/2023	0.57	1890.0	8922	6.6	6.8	8	
1/27/2023	0.53	1920.0	8535	6.7	6.8	8	
1/28/2023	0.58	1740.0	8402	6.6	6.7	10	
1/29/2023	1.00	1000.0	8298	6.6	6.8	13	
1/30/2023	1.19	896.0	8870	6.3	6.9	11	
1/31/2023	0.70	1800.0	10553	6.5	6.6	<5 [c]	
2/1/2023	0.86	1760.0	12623	6.4	6.5	9	2.93
2/2/2023	0.86	1820.0	13069	6.4	6.5	<5 [c]	
2/3/2023	1.05	1830.0	15980	6.2	6.4	<5 [c]	
2/4/2023	1.17	1830.0	17872	6.2	6.7	12	
2/5/2023	1.71	1200.0	17074	6.1	6.8	18	
2/6/2023	1.09	1680.0	15300	5.9	6.7	11	
2/7/2023	1.80	888.0	13360	5.9	6.5	14	
2/8/2023	2.57	611.0	13116	6.1	6.5	10	

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
2/9/2023	1.15	1520.0	14566	5.6	6.3	10	
2/10/2023	1.22	1950.0	19857	5.5	6.1	11	
2/11/2023	1.22	1700.0	17354	5.4	6.4	13	
2/12/2023	1.20	1680.0	16743	5.7	6.5	11	
2/13/2023	2.00	940.0	15711	5.7	6.5	12	
2/14/2023	1.14	1740.0	16529	5.7	6.4	12	
2/15/2023	1.08	1980.0	17818	5.8	6.2	15	
2/16/2023	1.08	2000.0	18048	5.5	6.1	12	
2/17/2023	1.29	2170.0	23274	5.6	6.4	15	
2/18/2023	1.33	1940.0	21584	5.8	6.3	13	
2/19/2023	1.19	1930.0	19219	5.7	7.5	14	
2/20/2023	1.27	2000.0	21250	5.7	5.9	14	
2/21/2023	1.31	1900.0	20806	5.8	5.9	14	
2/22/2023	1.52	1860.0	23579	5.8	6.1	<0.5 [c]	
2/23/2023	1.79	1580.0	23561	5.9	6.0	16	
2/24/2023	1.49	1840.0	22880	5.8	6.0	18	
2/25/2023	1.32	1530.0	16818	5.8	6.1	11	
2/26/2023	1.54	1610.0	20718	5.6	6.0	13	
2/27/2023	1.57	1800.0	23614	5.8	6.1	17	
2/28/2023	1.50	1970.0	24628	5.7	6.1	14	
3/1/2023	1.00	1820.0	15224	5.6	6.1	16	5.18 [a]
3/2/2023	0.93	2450.0	18941	5.8	6.0	21	
3/3/2023	1.03	2330.0	19937	5.8	6.2	18	
3/4/2023	1.20	1980.0	19766	5.8	6.1	17	
3/5/2023	1.31	1810.0	19730	5.8	6.2	17	
3/6/2023	1.30	1750.0	18988	5.8	6.0	17	
3/7/2023	1.36	1600.0	18201	5.8	6.0	17	
3/8/2023	1.06	1720.0	15191	5.8	6.0	13	
3/9/2023	1.46	1890.0	23076	5.8	6.0	21	
3/10/2023	1.45	1870.0	22536	5.9	6.0	20	
3/11/2023	1.57	2220.0	29124	5.8	5.9	18	
3/12/2023	1.67	1840.0	25658	5.7	6.2	17	
3/13/2023	1.68	1490.0	20864	5.8	6.0	18	
3/14/2023	1.71	1410.0	20156	5.9	6.0	17	
3/15/2023	1.87	1310.0	20474	5.9	6.0	15	
3/16/2023	1.88	1480.0	23205	5.7	6.0	12	
3/17/2023	1.88	1470.0	23048	5.7	5.9	13	

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
3/18/2023	1.88	1500.0	23556	5.7	6.1	15	
3/19/2023	1.88	1440.0	22614	5.7	5.9	13	
3/20/2023	1.89	1710.0	26897	5.7	6.1	11	
3/21/2023	1.89	2020.0	31773	5.7	6.2	13	
3/22/2023	1.51	1234.0 [d]	15551 [d]	5.8	6.3	12	
3/23/2023	1.15	1300.0	12436	5.8	6.1	16	
3/24/2023	1.27	1380.0	14571	5.8	6.2	13	
3/25/2023	0.82	1203.0 [d]	8207 [d]	5.8	6.2	14	
3/26/2023	0.59	1185.0 [d]	5781 [d]	5.8	6.1	17	
3/27/2023	0.59	1250.0	6119	5.8	6.2	14	
3/28/2023	0.70	1210.0	7074	5.8	6.2	15	
3/29/2023	0.75	1020.0	6346	5.8	6.2	14	
3/30/2023	0.68	1110.0	6304	5.6	9.4	16	
4/4/2023	2.61	413.8 [d]	9007 [d]	6.5	6.7	26	5.60
4/5/2023	2.24	413.0	7698	6.5	7.0	24	
4/6/2023	1.75	412.0	5999	6.7	7.0	25	
4/10/2023	1.56	69.0	900	6.8	7.0	11	
4/11/2023	2.51	67.0	1401	6.8	7.0	9	
4/12/2023	2.55	80.0	1689	6.8	7.0	9	
4/13/2023	2.35	71.0	1392	6.8	7.0	10	
4/14/2023	1.83	69.0	1055	6.9	7.1	9	
4/15/2023	1.22	68.0	696	7.0	7.1	8	
4/16/2023	0.96	75.0	601	7.0	7.2	13	
4/17/2023	1.60	87.0	1159	6.9	7.2	10	
4/18/2023	1.26	101.0	1057	7.1	7.3	10	
4/19/2023	1.30	105.0	1134	7.1	7.3	11	
4/25/2023	0.90	101.0	759	6.9	8.0	14	
4/26/2023	0.97	69.0	557	6.6	6.8	14	
4/27/2023	0.86	76.0	548	6.6	6.8	11	
5/1/2023	0.94	61.0	478	6.2	6.8	9	3.85
5/2/2023	0.98	56.1	460	6.7	6.8	10	
5/3/2023	0.93	53.0	412	6.7	7.1	12	
5/4/2023	0.93	48.8	379	6.7	7.1	12	
5/8/2023	0.99	43.8	361	6.7	7.1	11	
5/10/2023	0.91	25.6	195	7.0	7.1	20	
5/11/2023	0.88	24.8	181	7.0	7.2	13	
5/15/2023	0.94	12.3	96	6.8	7.2	10	

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
5/16/2023	1.01	19.9	167	7.1	7.2	11	
5/17/2023	1.02	12.7	108	7.0	7.3	11	
5/22/2023	0.94	28.6 [d]	225 [d]	7.1	7.9	6	
5/23/2023	0.97	12.3	99	7.6	8.3	5	
5/24/2023	0.97	13.1	106	7.8	8.4	6	
5/25/2023	0.75	12.5	78	7.7	8.4	9	
5/31/2023	0.70	19.2	112	7.1	9.0	9	
6/22/2023	0.90	16.0	291	6.9	7.4	18	3.96
6/23/2023	0.80	16.3	266	7.1	7.3	18	
6/26/2023	0.86	15.0	280	6.7	7.6	14	
6/27/2023	1.05	36.0 [d]	330 [d]	7.0	8.0	14	
6/28/2023	0.89	36.3 [d]	336 [d]	7.3	8.5	11	
6/29/2023	1.06	19.1	406	7.5	8.9	13	
6/30/2023	0.81	17.3	203	7.9	8.7	16	

[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 and an Ecology approved regression analysis of TOC/BOD_5 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
2-Aug-22	0.0066	0.0003	0.0021	0.0311	0.0039	0.0047	<0.0004 [a]	0.0637
25-Oct-22	0.0022	0.0002	0.0011	0.0172	0.0014	0.0024	<0.0004 [a]	0.0508
4-Nov-22	0.0014	0.0003	0.0022	0.0166	0.0019	0.0015	<0.0004 [a]	0.0548
1-Dec-22	0.0008	0.0003	0.0016	0.0112	0.0008	<0.0010 [a]	<0.0004 [a]	0.0486
1-Jan-23	0.0012	0.0003	0.0020	0.0073	0.0006	0.0014	<0.0004 [a]	0.0636
1-Feb-23	0.0014	0.0003	0.0014	0.0064	0.0005	0.0020	<0.0004 [a]	0.1080
1-Mar-23	0.0014	0.0003	0.0018	0.0080	0.0007	0.0028	<0.0004 [a]	0.1640
4-Apr-23	0.0015	0.0005	0.0017	0.0164	0.0017	0.0032	<0.0004 [a]	0.1100
1-May-23	0.0012	0.0002	<0.0010 [a]	0.0083	0.0007	0.0020	<0.0004 [a]	0.0375
22-Jun-23	0.0020	<0.0002 [a]	0.0013	0.0126	0.0009	0.0024	<0.0004 [a]	0.0369

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
2-Aug-22	0.0329	0.0017	0.0105	0.1546	0.0196	0.0234	0.0010 [b]	0.3166
25-Oct-22	0.0487	0.0040	0.0240	0.3863	0.0323	0.0530	0.0045 [b]	1.1409
4-Nov-22	0.0290	0.0066	0.0445	0.3385	0.0394	0.0308	0.0041 [b]	1.1174
1-Dec-22	0.0171	0.0068	0.0367	0.2538	0.0174	0.0113 [b]	0.0045 [b]	1.1013
1-Jan-23	0.0084	0.0024	0.0143	0.0523	0.0045	0.0101	0.0007 [b]	0.4583
1-Feb-23	0.0099	0.0021	0.0098	0.0456	0.0034	0.0144	0.0014 [b]	0.7746
1-Mar-23	0.0118	0.0028	0.0149	0.0668	0.0055	0.0230	0.0017 [b]	1.3719
4-Apr-23	0.0327	0.0117	0.0379	0.3570	0.0370	0.0697	0.0044 [b]	2.3944
1-May-23	0.0095	0.0018	0.0039 [b]	0.0648	0.0056	0.0160	0.0016 [b]	0.2937
22-Jun-23	0.0148	0.0007 [b]	0.0096	0.0942	0.0067	0.0180	0.0015 [b]	0.2757

[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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