Annual Industrial Waste System Stormwater Monitoring Report

Seattle-Tacoma International Airport

For the Period July 1, 2014 through June 30, 2015

September 25, 2015

Prepared by

Aviation Environmental Programs

Port of Seattle

Table of Contents

List of Tables

List of Figures

Appendix

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 2014 through June 2015. The IWTP discharges to Puget Sound via Outfall 001 (Outfall 001) as defined in the Port of Seattle's (Port's) National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit, WA-002465-1.

The IWTP also operates under a King County (KC) Waste Discharge Permit # 7810-02. This permit allows the facility to discharge stormwater with higher concentrations of biochemical oxygen demand (BOD) to the King County South Treatment Plant (KC STP) for further treatment before ultimately discharging to the Puget Sound.

Starting in January 2007, STIA operated under the new, final effluent limitations, which included separate limits for BOD for November through March and April through October. In addition, the AKART system for segregating higher BOD concentrations and routing them to the KC STP was finished and started up in November 2006 with final implementation on January 1, 2007.

A total of 284 million gallons (MG) of flow was processed in the IWTP and discharged to either the Outfall 001 or KC STP during the reporting period. The IWTP operated on 181 days during the reporting period.

Outfall 001 Discharges

Outfall 001, as referred to in the Airport's NPDES Permit, is the Midway Sewer Districts 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. The Port monitors and reports all discharges to Ecology in accordance with Part 1 S1 of the STIA NPDES permit.

Two hundred and nineteen (219) MG were processed and discharged through Outfall 001 to the Puget Sound over 139 days. The average daily flow to outfall 001 was 1.58 MG. There were no discharges in July 2014 and April 2015. The maximum daily discharge was 4.86 MG on March 18, 2015.

One hundred and thirty nine (139) effluent samples were collected to characterize the daily discharge for BOD_5 concentration and loading. Concentrations of BOD_5 in IWTP effluent to Outfall 001 ranged from 2.00 to 85.00 milligrams per liter (mg/l). The maximum daily load of BOD_5 that was discharged was 1,000 pounds which occurred during the deicing season. The maximum daily load of BOD_5 discharged during the non-deicing season was 185 pounds. Both were well below their respective maximum daily mass limits. The average monthly BOD_5 load ranged from 18 pounds in August 2014 to 416 pounds in March 2014.

Forty-one (41) effluent samples were analyzed for total suspended solids (TSS). TSS concentrations discharged to Outfall 001 ranged from 1 mg/L to 17.3 mg/l. All TSS samples were below the maximum daily effluent limit. The average monthly effluent limit of 21 mg/l was met.

pH was continuously measured at the IWTP and instantaneous maximum and minimum results were recorded. The plant consistently operated within the permits required pH range of 6.0 to 9.0 with a minimum instantaneous pH of 6.1 and the maximum of 9.0.

Forty-one (41) grab samples were analyzed for oil and grease. The maximum concentration was 2.5 mg/l. Average daily concentration was 1.08 mg/l. All Oil and Grease samples were well below the maximum daily effluent limit of 15 mg/l.

King County South Treatment Plant Discharges

The high concentration BOD treated wastewater discharges 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.

Sixty-five (65) MG of flow was processed and routed to the KC STP due to elevated levels of BOD. Discharge to KC STP occurred on 52 days. There were no discharges in the months of July 2014, August 2014, October 2014, and June 2015. The maximum daily discharge was 2.23 MG on November 22, 2014.

Fifty-two (52) effluent composite samples for water discharged to KC STP were analyzed for BOD. Concentrations of BOD in effluent to KC STP ranged from 24 to 4,600 mg/l. The KC STP BOD average concentration was 559 mg/l. The maximum daily load of 52,542 pounds BOD was discharged to KC STP on December 4, 2014.

Section 1: Introduction

Located mid-way between the cities of Seattle and Tacoma, Washington, STIA was built in the 1940s and is owned and operated by the Port. According to the Port's 2014 Airport Activity Report STIA handled 340,478 aircraft operations, 327,270 metric tons of air cargo, and 37.4 million passengers. In 2013, the Airports Council International ranked STIA the fifteenth busiest United States passenger airport and the Federal Aviation Administration ranked STIA the twenty-second busiest airport in the U.S. for aircraft operations.

The Port is required by the NPDES Waste Discharge Permit Part I, Special Condition S2.F, to submit an annual monitoring report for the STIA IWTP. The Annual Report is a compilation of data submitted monthly to Washington State Department of Ecology (Ecology) in the Discharge Monitoring Reports (DMRs).

The current NPDES Permit (No. WA-002465-1) became effective on April 1, 2009. The Annual Report summarizes effluent monitoring results from July to the following June. This Annual Report focuses on the monitoring results from July 2014 through June 2015.

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 and the KC STP waste discharge permits.

The STIA IWS collects industrial wastewater from two drainage basins: the North Service Basin and the South Service Basin. 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 (See Figure 1). Each drainage basin accounts for approximately half of the 375 acre IWS area.

The IWS manages stormwater associated with industrial activities from airline and maintenance operations as well as wastewater from other airport related operations. These contaminants consist primarily of spilled fuel, de-icing and anti-icing fluids, detergents, and lubricants. The system includes collection and conveyance facilities, high biochemical oxygen demand (BOD) 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 deicing 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 IWS runoff based on BOD concentrations. This project was initiated by the AKART determination for the IWS. "High BOD" effluent is defined as any water that could cause the IWTP to exceed the average daily or average maximum monthly Final Effluent Limitations specified in S1.B of the permit. Treated wastewater containing high BOD concentrations is conveyed to the KC STP at Renton, while treated wastewater with low BOD concentrations is discharged to the Puget Sound via the Midway Sewer District Outfall (Outfall 001). Start-up for this system occurred on November 6, 2006 and was fully implemented January 1, 2007.

1.1.1 Collection and Segregation

The Industrial Waste System (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 concentration.

Untreated industrial wastewater is stored in either of three lagoons. The primary purpose of Lagoons #1 and #2 is for collection of the "first flush" of high BOD influent from the South Aviation and North Aviation areas, respectively. Although the primary purpose of Lagoon #3 is for collection of low BOD runoff, high BOD runoff during de-icing periods may also be stored in Lagoon #3 when Lagoon #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 cleaned annually. 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, 1200 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 BMP by diverting runoff to IWS treatment 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 is allowed to separate 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 stored in either of two underground wet wells located adjacent to the treatment plant. Treated water is discharged to Puget Sound from the low BOD wet well

and to the Valley View Sewer District from the high BOD wet well. Discharges to the Valley View Sewer District are conveyed to the South Wastewater Treatment Plant where they undergo secondary treatment before being discharged to Puget Sound.

The IWTP AKART pump station and pipeline are capable of discharging up to 2,990 gpm (4.3 mgd) to the King County's Renton Wastewater Treatment Plant. However, these plant hydraulic capacities are effectively limited by either the mass-based effluent or flow limitations. The KC STP Permit limits discharges to the Renton Wastewater Treatment Plant to 1,600 gpm (2.3 mgd) and 60,000 pounds per day of BOD. In addition the 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 Renton plant.

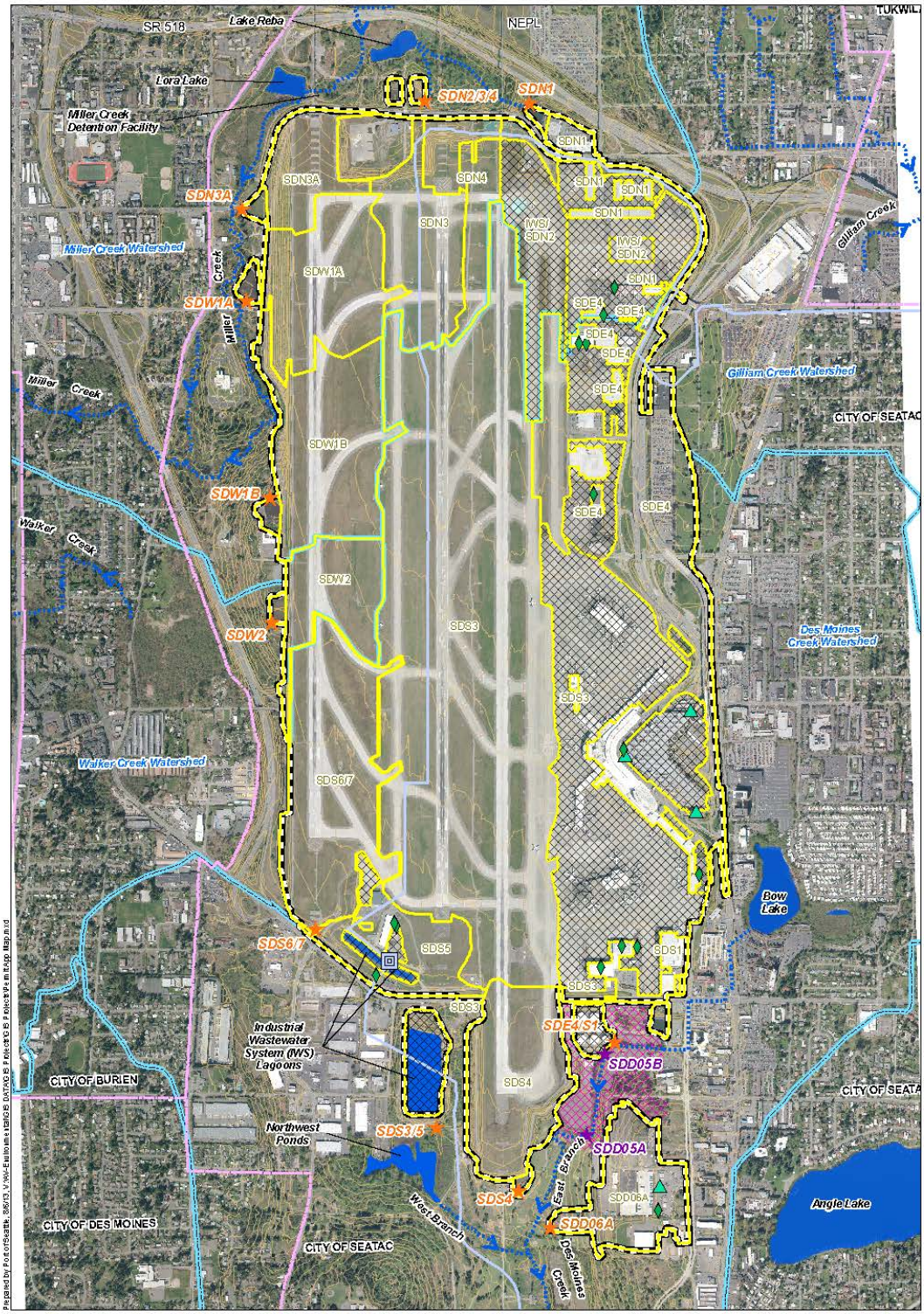


Figure 1. Vicinity Location Map

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-002465-1, Part I, Condition S2.A.1
- King County Waste Discharge Permit 7810-02

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 montitoring program is contained in the Quality Assurance Program Plan, Seattle Tacoma International Airport Industrial Waste Treatment Plant Discharge Monitoring Program, September 2011.

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 and turbidity by the IWTP operator, and for the remaining water quality parameters by a contract laboratory.

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 laboratory, Amtest Laboratories of Kirkland, Washington and Analytical Resources Inc., of Seattle, WA. All samples were analyzed by methods defined in Part I, Special Condition S2 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 on a monthly basis 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			
Continuous flow/pH/TOC	Daily shift logs completed on each monitoring date.	Shift log review within 1 day of monitoring. Data entered into POS 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 Puget Sound [a]			
Continuous flow/pH Daily BOD Weekly TSS/TPH Weekly glycols (Nov.-March only) Quarterly metals/cyanide Year 3 priority pollutants (one dry season and one wet season event) [b]	Laboratory report within 10 days of sample date.	Data review procedures are under development Data entry within 15 days of completing 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 Valley View Sewer District			
Continuous flow/pH Daily BOD/TSS Quarterly metals/ cyanide/TPH	Laboratory report within 10 days of sample date.	Data review procedures are under development. Data entry within 15 days of completing data review.	Monthly self-monitoring report by the 15th of the following month. Quarterly self-monitoring report by January 15, April 15, July 15, and October 15.

[a] Discharge to Puget Sound may occur only when the BOD concentration and mass loading limits specified in Table 1 are met. Discharge must be to the Valley View Sewer District if these conditions are not met.

[b] Year 3 of the NPDES permit is July 2011 through June 2012. 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 Permit) are summarized in Table 2.

Table 2. Effluent Limitations: Port of Seattle, IWTP Effluent, Puget Sound Outfall

Parameter	Average Monthly[a]	Maximum Daily[b]
Flow[c]	Report	Report
Oil and Grease	8 mg/l	15 mg/l
BOD_5 November through March	45 mg/l, 500 lbs/day	Report, 3,115 lbs/day
BOD_5 April through October	25 mg/l, 130 lbs/day	Report, 1,340 lbs/day
TSS	21 mg/l	33 mg/l
pH[d]	pH 6 to 9	
Toxicity Testing	As defined in Permit Sections S3.A and S4.A	

Notes:

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

(b) The maximum daily effluent limitation 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 limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged 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) 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.

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 and to the KC STP for the period of July 2014 through June 2015. Flow and BOD related results are summarized in this report for samples collected under the King County Waste Discharge permit in order 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. Table 3 depicts the total daily effluent volume, number of days of operation, and the maximum daily flow discharged to Outfall 001 from the IWTP during plant operations. Days of operation and effluent discharge for each month ranged from 0 to 22 days. A total of 284 MG of IWS runoff was processed during the reporting period. This includes both discharges to Outfall 001 and KC STP. Two hundred and nineteen (219) MGs were discharged to Outfall 001 during the reporting period.

The maximum monthly flow to Outfall 001 was 43.6 MG in October 2014. During October 2014, Outfall 001 average daily flow was 1.41 MG and a maximum daily flow of 3.51 MG. The maximum monthly flow routed to the KC STP was 22.9 MG in December 2014. During December 2014, the KC STP outfall average daily flow was 0.74 MG and a maximum daily flow of 2.22 MG. Figure 2 depicts the monthly total flows from the IWTP to Outfall 001 and to KC STP.

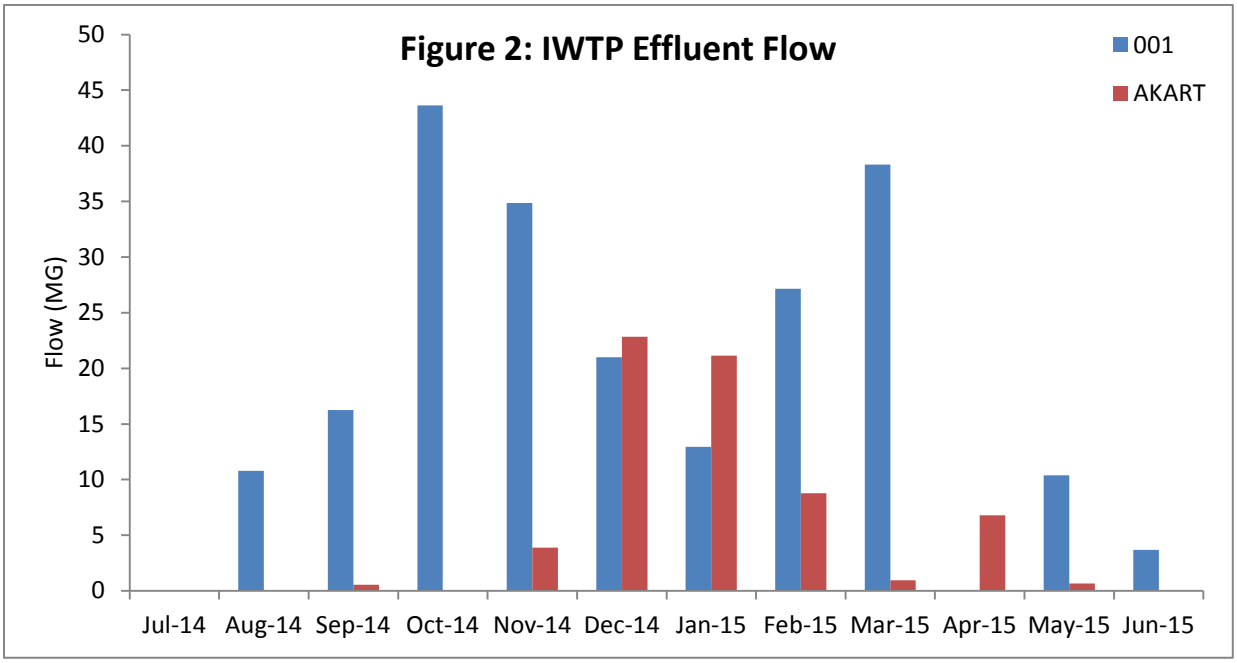


Table 3: Total Daily Effluent Flow Volume to Outfall 001

Date	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15
	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)
1	--	--	--	1.31	4.38	1.27	--	--	0.28	--	--	--
2	--	--	--	1.24	4.18	1.40	0.84	--	--	--	--	--
3	--	--	1.04	--	3.10	1.33	--	--	--	--	--	1.15
4	--	0.44	1.06	--	0.84	--	--	--	1.29	--	--	0.25
5	--	0.80	1.01	--	1.43	--	--	--	1.31	--	0.75	0.25
6	--	0.79	--	1.23	1.20	--	--	--	1.90	--	--	--
7	--	0.82	--	1.24	1.19	1.15	0.83	4.56	--	--	--	--
8	--	--	1.11	1.31	--	1.46	2.00	3.58	--	--	--	--
9	--	--	1.01	0.57	--	0.70	1.27	3.29	--	--	--	--
10	--	--	1.07	1.02	--	--	--	3.11	1.47	--	--	--
11	--	--	0.93	--	2.24	--	--	3.31	--	--	0.69	--
12	--	0.69	--	--	2.05	--	--	3.78	--	--	0.85	--
13	--	--	--	--	1.31	--	--	1.01	--	--	0.89	--
14	--	0.70	--	--	--	--	--	--	0.91	--	0.89	--
15	--	--	0.74	1.43	--	--	--	--	2.42	--	--	--
16	--	--	--	1.43	--	1.15	--	--	4.64	--	--	--
17	--	--	0.80	1.18	--	1.31	--	--	4.72	--	--	--
18	--	0.75	--	--	--	1.32	--	0.80	4.86	--	0.83	--
19	--	0.77	0.89	--	--	--	--	0.82	4.71	--	1.08	--
20	--	0.66	--	2.52	0.62	--	--	--	--	--	1.08	--
21	--	1.21	--	3.00	0.79	--	--	--	--	--	0.95	--
22	--	0.94	--	3.38	--	2.25	2.73	--	--	--	--	--
23	--	--	0.74	3.51	--	2.56	1.50	--	--	--	--	--
24	--	--	1.53	3.35	1.41	--	0	0.40	--	--	--	0.71
25	--	1.15	1.49	3.49	1.51	0.00	1.48	0.40	1.90	--	--	0.90
26	--	1.07	--	3.51	2.01	3.17	1.91	--	1.81	--	--	0.44
27	--	--	--	2.23	1.71	0.00	0	1.28	1.66	--	0.75	--
28	--	--	--	1.12	2.02	0.00	0	0.83	1.34	--	1.64	--
29	--	--	1.50	2.22	1.85	0.00	0.38	--	2.32	--	--	--
30	--	--	1.34	2.17	1.04	1.03	0	--	--	--	--	--
31	--	--	--	1.18	--	0.91	0	--	0.79	--	--	--
Total Monthly Volume (MG)	--	10.79	16.26	43.64	34.86	21.01	12.94	27.15	38.32	--	10.40	3.70
Num Days Operation	--	13	15	22	19	18	14	13	17	--	11	6
Ave Daily Flow (MGD)	--	0.83	1.08	1.98	1.83	1.17	0.92	2.09	2.25	--	0.95	0.62
Max Daily Flow (MGD)	--	1.21	1.53	3.51	4.375	3.167	2.727	4.56	4.864	--	1.635	1.148

3.3 Effluent Quality

Analytical results for all permit-required monitoring samples are reported in Appendix A. Data results are discussed in the following sections. Line charts and graphs are presented for the parameters sampled daily and weekly. In the provided graphical plots, concentrations of non-detected analytes are presented as one-half the laboratory practical quantitation limit.

3.3.1 Biochemical Oxygen Demand (BOD_5)

One hundred and ninety-one (191) effluent composite samples were analyzed for BOD for discharges to both Outfall 001 and KC STP. Table 4 summarizes the BOD_5 concentration and load discharged to Outfall 001. Figures 3 through 6 depict various BOD concentrations and loadings from Outfall 001 from this reporting period. Figure 7 and 8 describe BOD concentrations and loading to the KC STP outfall.

BOD Concentration

The average monthly BOD concentration discharged to Outfall 001 ranged from 2.71 mg/L in August 2014 to 33.29 mg/L in Decmeber 2014. The maximum daily concentration discharged to Outfall 001 was 85.0 mg/l on November 24, 2014.

The maximum daily concentration discharged to KC STP was 4,600.0 mg/l on December 3, 2014.

BOD Loading

The average monthly BOD pounds discharged to Outfall 001 ranged from 18 pounds in August 2014 to 416 pounds in March 2015. The maximum daily pounds per day discharged to was 1,000 pounds during the deicing season. A total of 29,258 pounds of BOD was discharged during this reporting period.

The maximum daily pounds per day discharged to KC STP was 52,542 pounds. A total of 260,380 pounds of BOD was discharged to KC STP during this reporting period.

Table 4. Outfall 001 Biological Oxygen Demand Results

	July		August		September		October		November		December		January		February		March		April		May		June	
Date	Conc mg/L	Load lb/day	Conc mg/L	Load lb/day	Conc mg/L	Load lb/day	Conc mg/L	Load lb/day	Conc mg/L	Load lb/day	Conc mg/L	Load lb/day	Conc mg/L	Load lb/day	Conc mg/L	Load lb/day	Conc mg/L	Load lb/day	Conc mg/L	Load lb/day	Conc mg/L	Load lb/day	Conc mg/L	Load lb/day
1	--	--	--	--	--	--	6.0	66	4.3	157	38.0	403	--	--	--	--	19.8	47	--	--	--	--	--	--
2	--	--	--	--	--	--	5.4	56	3.3	115	41.0	478	17.0	119	--	--	--	--	--	--	--	--	--	--
3	--	--	--	--	6.2	54	--	--	7.1	183	34.0	377	--	--	--	--	--	--	--	--	--	--	19.3	185
4	--	--	4.0	15	5.9	52	--	--	7.2	50	--	--	--	--	--	--	29.4	316	--	--	--	--	13.2	28
5	--	--	2.0	13	4.0	34	--	--	5.5	66	--	--	--	--	--	--	30.6	334	--	--	5.00	31	15.7	33
6	--	--	4.1	27	--	--	2.5	26	8.4	84	--	--	--	--	--	--	30.2	478	--	--	--	--	--	--
7	--	--	3.1	21	--	--	2.6	27	7.0	70	36.0	346	29.0	202	14.0	532	--	--	--	--	--	--	--	--
8	--	--	--	--	4.9	45	3.5	38	--	--	35.0	428	29.0	483	14.0	418	--	--	--	--	--	--	--	--
9	--	--	--	--	5.0	42	3.6	17	--	--	45.0	264	26.0	276	14.0	384	--	--	--	--	--	--	--	--
10	--	--	--	--	5.6	50	3.5	30	--	--	--	--	--	--	17.0	440	35.8	437	--	--	--	--	--	--
11	--	--	--	--	5.3	41	--	--	9.3	174	--	--	--	--	15.0	414	--	--	--	--	3.30	19	--	--
12	--	--	2.8	16	--	--	--	--	8.1	139	--	--	--	--	13.0	410	--	--	--	--	4.10	29	--	--
13	--	--	--	--	--	--	--	--	7.7	84	--	--	--	--	12.0	101	--	--	--	--	4.20	31	--	--
14	--	--	2.0	12	--	--	--	--	--	--	--	--	--	--	--	--	20.5	156	--	--	4.40	33	--	--
15	--	--	--	--	7.4	46	11.0	131	--	--	--	--	--	--	--	--	23.4	473	--	--	--	--	--	--
16	--	--	--	--	--	--	10.0	119	--	--	52.0	497	--	--	--	--	9.7	376	--	--	--	--	--	--
17	--	--	--	--	4.2	28	11.0	108	--	--	38.0	416	--	--	--	--	9.4	370	--	--	--	--	--	--
18	--	--	4.4	28	--	--	--	--	--	--	46.0	508	--	--	31.9	212	10.9	442	--	--	6.90	48	--	--
19	--	--	2.0	13	23.0	171	--	--	--	--	--	--	--	--	31.8	216	10.0	393	--	--	6.10	55	--	--
20	--	--	2.0	11	--	--	6.8	143	21.0	109	--	--	--	--	--	--	--	--	--	--	3.10	28	--	--
21	--	--	2.0	20	--	--	5.9	148	20.0	132	--	--	--	--	--	--	--	--	--	--	3.30	26	--	--
22	--	--	2.0	16	--	--	4.7	132	--	--	27.0	506	24.0	546	--	--	--	--	--	--	--	--	--	--
23	--	--	--	--	6.6	41	6.0	176	--	--	22.0	471	24.0	300	--	--	--	--	--	--	--	--	--	--
24	--	--	--	--	6.5	83	4.2	117	85.0	1000	--	--	--	--	83.0	278	--	--	--	--	--	--	6.6	39
25	--	--	2.3	22	5.8	72	2.2	64	62.0	780	--	--	20.0	246	67.5	225	48.8	772	--	--	--	--	6.3	47
26	--	--	2.5	22	--	--	5.1	149	44.0	738	20.0	529	18.0	287	--	--	41.3	624	--	--	--	--	8.1	30
27	--	--	--	--	--	--	2.0	37	41.0	585	--	--	--	--	18.9	202	33.3	461	--	--	7.00	44	--	--
28	--	--	--	--	--	--	6.9	64	39.0	657	--	--	--	--	60.4	416	29.3	326	--	--	7.50	102	--	--
29	--	--	--	--	9.2	115	5.1	94	30.0	463	--	--	12.0	38	--	--	26.3	508	--	--	--	--	--	--
30	--	--	--	--	8.9	100	8.2	149	41.0	356	18.0	155	--	--	--	--	--	--	--	--	--	--	--	--
31	--	--	--	--	--	--	11.0	108	--	--	14.0	106	--	--	--	--	84.9	557	--	--	--	--	--	--
Total Monthly		-		236		974		1,999		5,942		5,484		2,497		4,249		7,070		-		446		361
Num Days Operation		0		13		15		22		19		14		9		13		17		0		11		6
Ave Monthly			2.71	18	7.23	65	5.78	91	23.73	313	33.29	392	22.11	277	30.19	327	29.04	416			4.99	41	11.53	60
Max Daily	0.00	0	4.40	28	23.00	171	11.00	176	85.00	1000	52.00	529	29.00	546	83.00	532	84.90	772	0.00	0	7.50	102	19.30	185

BOD Results Summary – Outfall 001

Figure 3: Outfall 001 Average Monthly BOD Concentration

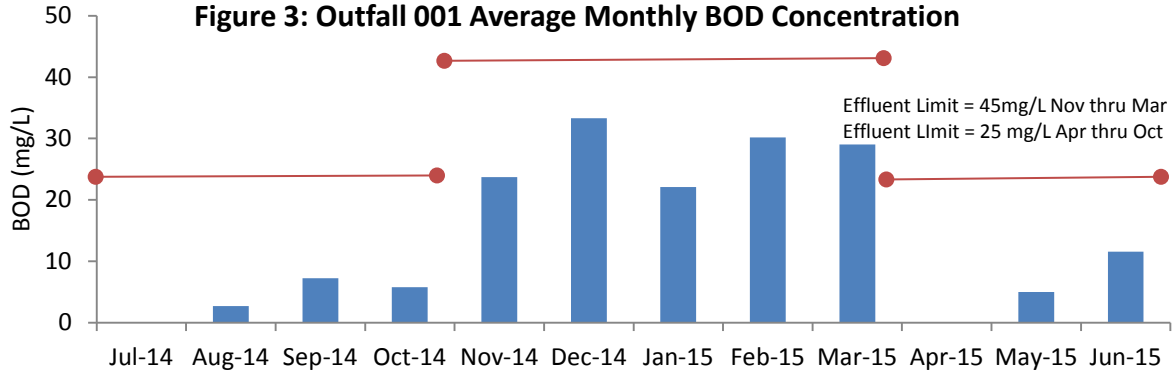


Figure 4: Outfall 001 Maximum Daily Concentration

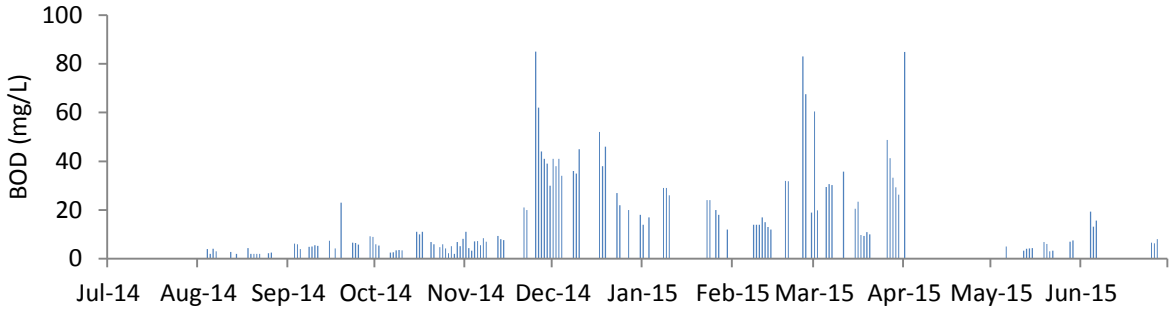


Figure 5: Outfall 001 BOD Average Monthly Load

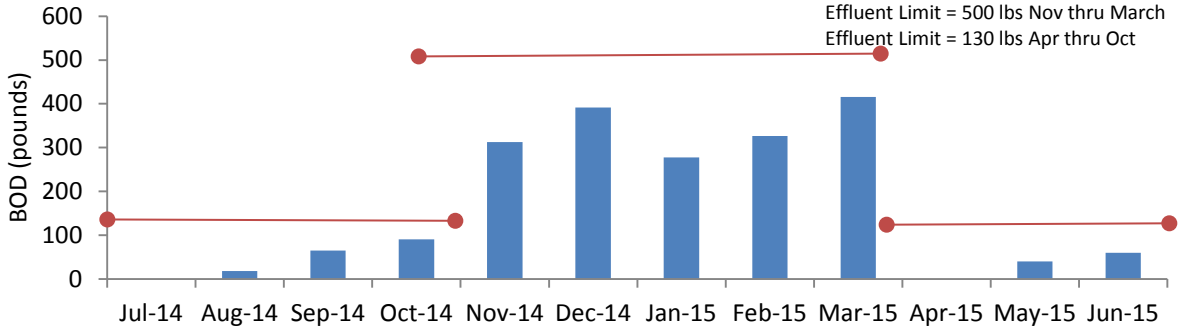
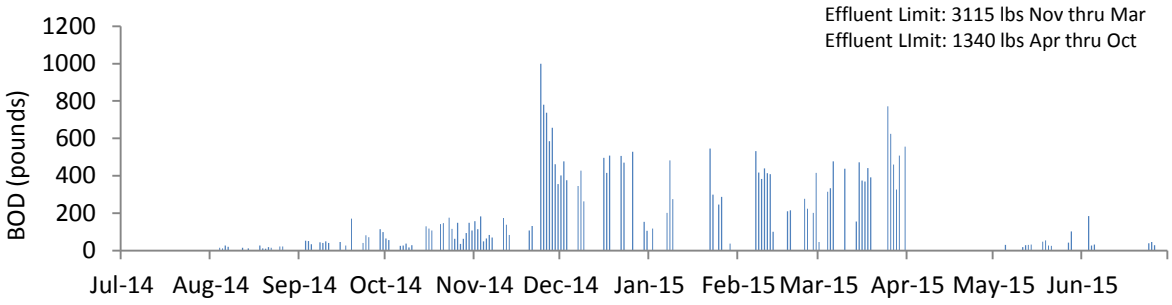


Figure 6: Outfall 001 BOD Maximum Daily Load



BOD Results Summary – KC STP Outfall

Figure 7: KC STP Maximum Daily BOD Concentration

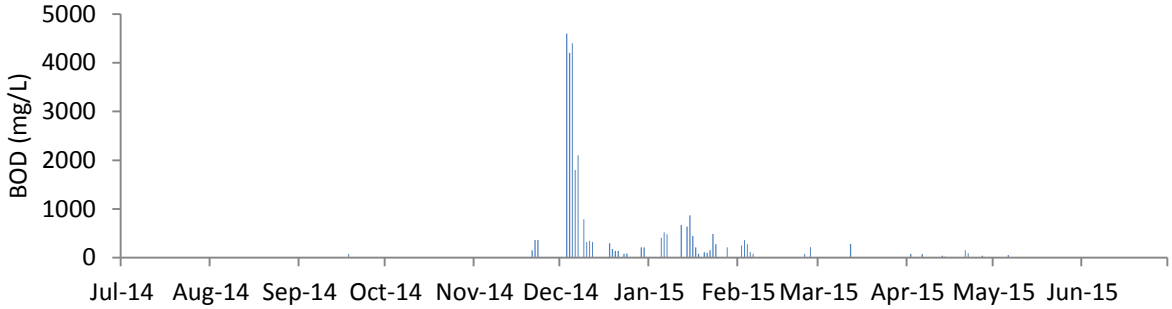
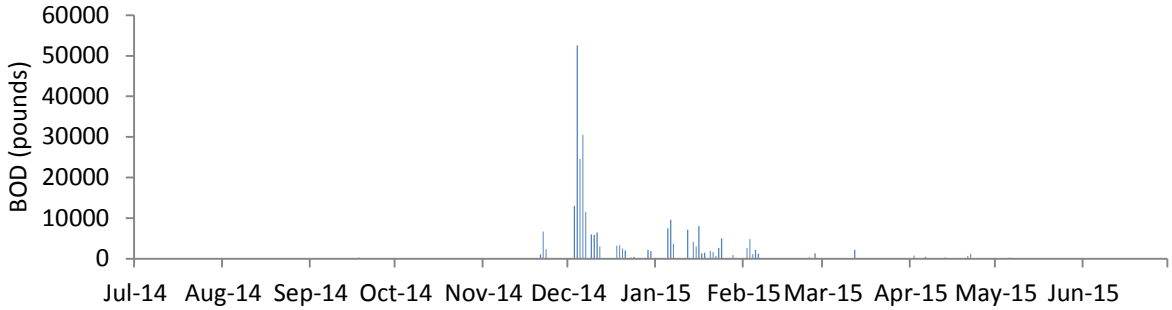


Figure 8: KC STP Maximum Daily BOD Load



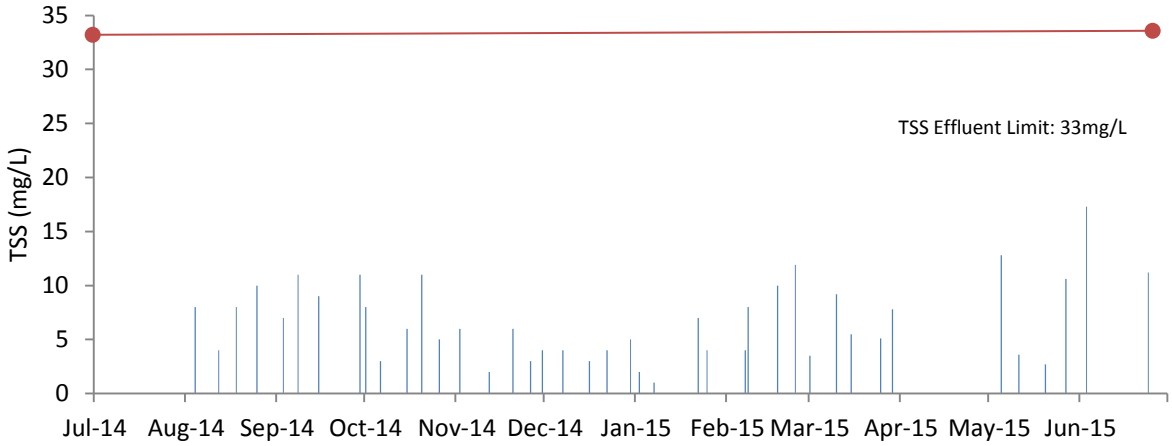
BOD Mass Load Summary – AKART Implementation

The IWTP has processed 7,501,361 pounds of BOD from the 001 and KC STP outfalls. A total of 7.338,925 pounds of BOD (97.8 %) were segregated and sent to King County for treatment.

3.3.2 Total Suspended Solids (TSS)

A total of FORTY-ONE (41) samples were collected from the IWTP for TSS by EPA Method 160.2. TSS analytical results for discharge to Outfall 001 ranged from 1.0 mg/l to 17.3 mg/l. All TSS samples were well below the maximum daily effluent limit of 33 mg/L. The monthly average effluent limit of 21 mg/l was met. Figure 9, depicts the TSS values for this reporting period.

Figure 9: Maximum Daily Total Suspended Solids Concentration



3.3.3 Glycols

Sixteen (16) effluent composite sample was collected and analyzed for propylene and ethylene 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. The daily concentration for propylene glycol discharged to Outfall 001 ranged from non-detect to 47.0 mg/l. The daily concentration for ethylene glycol was non-detect.

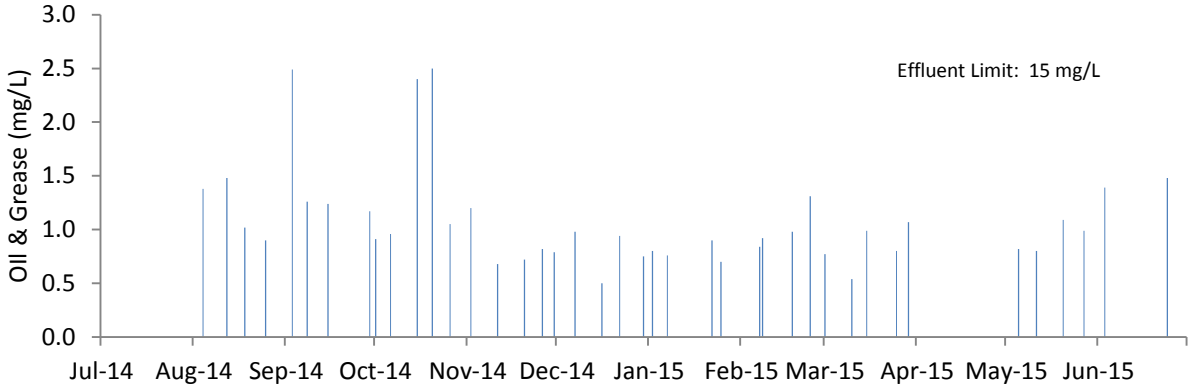
3.3.4 pH

Continuous pH metering is performed during discharge. The minimum instantaneous measurement was 6.1 and the maximum measurement was 9.0. All stormwater discharged to Outfall 001 was within the permitted range throughout the reporting period.

3.3.5 Oil and Grease

Forty-one (41) grab samples of discharge to Outfall 001 were collected daily and submitted for oil and grease analysis. The oil and grease was 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 2014-2015 reporting period was 2.50 mg/l. As noted in Figure 10, all Oil and Grease samples were well below the maximum daily effluent limit of 15 mg/l.

Figure 10: Maximum Daily Oil & Grease Concentration



3.3.6 Heavy Metals

Four (4) samples were collected quarterly for metals in discharges to Outfall 001. Table 6 depicts the sampling parameter and maximum concentration.

Table 6. Heavy Metal Sampling and Maximum Concentration to Outfall 001

Parameter	Maximum Concentration (ug/l)
Arsenic	2.86
Cadmium	0.95
Chromium	2.50
Copper	20.00
Cyanide	<5.0
Lead	0.65
Mercury	<0.02
Nickel	0.89
Selenium	0.28
Silver	0.31
Zinc	27.3

3.3.7 Priority Pollutants

Priority pollutant sampling was not required during this report period. Priority pollutant sampling is conducted during the wet season and dry season during year three of the permit.

3.3.8 Toxicity Testing

Acute and chronic toxicity sampling was not required during this report period. Toxicity sampling frequency occurss during the wet season and dry season during year three of the permit.

Section 4: Conclusions

This report summarized results of effluent sampling at the STIA IWTP from July 2014 through June 2015. Results of both NPDES permit-required monitoring were presented. Results were presented for flow, oil and grease, BOD_5, TSS, COD, glycol, pH, and specified metals. Results for analysis performed under compliance with King County Industrial Pretreatment Permit have also been included with this report to provide comparison information for the amount of BOD that has been removed from receiving waters as a result of the implementation of AKART.

The AKART system has been in place for 8.5 years. It is proving to be very effective in reducing discharge of pollutants to Puget Sound. For this reporting period, 260,380 pounds of BOD out of the total processed 289,638 pounds (89.9%) were segregated and sent to King County for treatment. Since the official implementation of AKART on January 1, 2007, a total of 7,501,361 pounds of BOD were processed through the IWTP and 7,338,925 pounds were segregated and sent to KC STP for treatment.

Effluent concentrations of BOD, TSS, and glycols to Outall 001 have been significantly reduced, and the stormwater discharged to Outfall 001 met all effluent limitations throughout the reporting period.

The BOD effluent was consistently below the daily maximum limits for mass. Discharges never exceeded 32% of the daily mass limit (November through March). IWTP discharges did approach the monthly average BOD limit.

This year was one of the warmest years on recent record. For this reason, deicing volumes were lower than normal, resulting in record low volumes being needed to be discharged to AKART.

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.

Herrera. September 2011. Quality Assurance Program Plan, Seattle Tacoma International Airport, Industrial Waste Treatment Plant Discharge Monitoring Program.

Port of Seattle; Sea-Tac Airport Website; http://www.portseattle.org/seatac/; 2013 Airport Activity Report.

Washington State Department of Ecology. National Pollutant Discharge Elimination System Waste Discharge Permit WA-002465-1, Port of Seattle. Effective Date: 1 April 2009.

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Appendix A: Outfall 001 Analytical Results

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Appendix A: Outfall 001 Analytical Results

Date	Flow	BOD	BOD	pH	pH	Prop. Glycol	Ethyl. Glycol	TSS	Oil & Grease	Arsenic	Cadmium	Chromium	Copper	Lead	Zinc	Cyanide	Mercury	Nickel	Selenium	Silver
	MGD	mg/L	pounds	min	max	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
8/4/14	0.44	4.0	15	7.0	8.0			8.0	1.38	2.85	0.26	<2.5	20.0	0.65	27.3	<5.0	<0.02	2.73	<0.25	<0.05
8/5/14	0.80	2.0	13	7.4	7.8															
8/6/14	0.79	4.1	27	7.3	7.4															
8/7/14	0.82	3.1	21	7.1	7.3															
8/12/14	0.69	2.8	16	7.1	7.3			4.0	1.48											
8/14/14	0.70	2.0	12	6.4	6.5															
8/18/14	0.75	4.4	28	6.5	6.7			8.0	1.02											
8/19/14	0.77	2.0	13	6.7	7.2															
8/20/14	0.66	2.0	11	6.8	7.1															
8/21/14	1.21	2.0	20	6.9	7.1															
8/22/14	0.94	2.0	16	6.9	7.1															
8/25/14	1.15	2.3	22	6.8	7.4			10.0	0.90											
8/26/14	1.07	2.5	22	7.1	7.4															
9/3/14	1.04	6.2	54	6.8	7.1			7.0	2.49											
9/4/14	1.06	5.9	52	6.8	7.0															
9/5/14	1.01	4.0	34	6.7	6.9															
9/8/14	1.11	4.9	45	6.6	7.1			11.0	1.26											
9/9/14	1.01	5.0	42	6.9	7.1															
9/10/14	1.07	5.6	50	6.9	7.0															
9/11/14	0.93	5.3	41	6.9	7.0															
9/15/14	0.74	7.4	46	6.9	7.5			9.0	1.24											
9/17/14	0.80	4.2	28	7.0	7.6															
9/19/14	0.89	23.0	171	7.1	7.3															
9/23/14	0.74	6.6	41	8.0	8.3															
9/24/14	1.53	6.5	83	6.2	6.5															
9/25/14	1.49	5.8	72	6.2	6.4															
9/29/14	1.50	9.2	115	6.2	6.2			11.0	1.17											

Appendix A: Outfall 001 Analytical Results

9/30/14	1.34	8.9	100	6.2	6.3															
10/1/14	1.31	6.0	66	6.2	6.3			8.0	0.91	1.4	0.16	2.5	9.0	0.44	22.0	<5.0	<0.02	1.1	<.25	<.05
10/2/14	1.24	5.4	56	6.3	6.4															
10/6/14	1.23	2.5	26	6.4	6.6			3.0	0.96											
10/7/14	1.24	2.6	27	6.5	6.6															
10/8/14	1.31	3.5	38	6.6	6.8															
10/9/14	0.57	3.6	17	6.8	6.9															
10/10/14	1.02	3.5	30	6.8	7.3															
10/15/14	1.43	11.0	131	6.7	6.9			6.0	2.40											
10/16/14	1.43	10.0	119	6.6	6.7															
10/17/14	1.18	11.0	108	6.6	6.7															
10/20/14	2.52	6.8	143	6.6	6.8			11.0	2.50											
10/21/14	3.00	5.9	148	6.2	6.6															
10/22/14	3.38	4.7	132	6.6	6.7															
10/23/14	3.51	6.0	176	6.6	6.7															
10/24/14	3.35	4.2	117	6.6	6.7															
10/25/14	3.49	2.2	64	6.6	6.7															
10/26/14	3.51	5.1	149	6.6	6.8			5.0	1.05											
10/27/14	2.23	2.0	37	6.7	6.9															
10/28/14	1.12	6.9	64	6.8	7.0															
10/29/14	2.22	5.1	94	6.7	7.0															
10/30/14	2.17	8.2	149	6.8	7.1															
10/31/14	1.18	11.0	108	6.7	6.9															
11/1/14	4.38	4.3	157	6.6	6.8															
11/2/14	4.18	3.3	115	6.3	6.5	10.00	10.00	6.0	1.20											
11/3/14	3.10	7.1	183	6.4	6.7															
11/4/14	0.84	7.2	50	6.5	7.0															
11/5/14	1.43	5.5	66	6.9	7.0															
11/6/14	1.20	8.4	84	6.9	7.5															

Appendix A: Outfall 001 Analytical Results

11/7/14	1.19	7.0	70	6.8	7.0														
11/11/14	2.24	9.3	174	6.7	7.4				0.68										
11/12/14	2.05	8.1	139	6.7	7.6	10.00	10.00	2.0											
11/13/14	1.31	7.7	84	7.5	7.6														
11/20/14	0.62	21.0	109	6.9	7.1	10.00	10.00	6.0	0.72										
11/21/14	0.79	20.0	132	7.0	7.1														
11/24/14	1.41	85.0	1000	6.5	6.6														
11/25/14	1.51	62.0	780	6.2	9.0														
11/26/14	2.01	44.0	738	6.6	6.8	29.00	10.00	3.0	0.82										
11/27/14	1.71	41.0	585	6.1	6.9														
11/28/14	2.02	39.0	657	6.4	6.9														
11/29/14	1.85	30.0	463	6.5	6.7														
11/30/14	1.04	41.0	356	6.7	6.8	31.20	10.00	4.0	0.79										
12/1/14	1.27	38.0	403	6.7	6.8														
12/2/14	1.40	41.0	478	6.8	6.9														
12/3/14	1.33	34.0	377	6.8	6.9														
12/7/14	1.15	36.0	346	6.6	6.9		10.00	4.0	0.98										
12/8/14	1.46	35.0	428	6.7	6.8														
12/9/14	0.70	45.0	264	6.7	6.8														
12/16/14	1.15	52.0	497	6.1	6.7	32.50	10.00	3.0	0.50										
12/17/14	1.31	38.0	416	6.6	6.7														
12/18/14	1.32	46.0	508	6.8	6.9														
12/22/14	2.25	27.0	506	6.6	6.8	10.00	10.00	4.0	0.94										
12/23/14	2.56	22.0	471	6.6	6.7														
12/26/14	3.17	20.0	529	6.5	6.8														
12/30/14	1.03	18.0	155	6.7	6.9	<10	<10	5.0	0.75										
12/31/14	0.91	14.0	106	6.8	6.9														
1/2/15	0.841	17.00	119	6.80	7.00	<10	<10	2.0	0.80	0.45	0.95	<2.5	5.00	0.22	21.40	12.00	<0.05	0.48	0.28	0.31
1/7/15	0.834	29.00	202	6.80	6.90	<10	<10	1.0	0.76										

Appendix A: Outfall 001 Analytical Results

1/8/15	1.995	29.00	483	6.70	6.90															
1/9/15	1.272	26.00	276	6.80	7.00															
1/22/15	2.727	24.00	546	6.50	6.70	<10	<10	7.0	0.90											
1/23/15	1.5	24.00	300	6.60	6.80															
1/25/15	1.476	20.00	246	6.60	6.90	<10	<10	4.0	0.70											
1/26/15	1.914	18.00	287	6.70	6.90															
1/29/15	0.38	12.00	38	6.60	6.90															
2/7/15	4.56	14.00	532	6.40	6.60	10.00	10.00	4.0	0.84											
2/8/15	3.584	14.00	418	6.40	6.60	10.00	10.00	8.0	0.92											
2/9/15	3.285	14.00	384	6.50	6.70															
2/10/15	3.106	17.00	440	6.60	6.70															
2/11/15	3.31	15.00	414	6.60	6.80															
2/12/15	3.779	13.00	410	6.60	6.80															
2/13/15	1.009	12.00	101	6.60	6.80															
2/18/15	0.795	31.90	212	7.00	7.20	20.00	10.00	10.0	0.98											
2/19/15	0.816	31.80	216	7.00	7.10															
2/24/15	0.401	83.00	278	6.90	7.10	47.00	10.00	11.9	1.31											
2/25/15	0.4	67.50	225	6.60	6.80															
2/27/15	1.283	18.90	202	6.30	6.60															
2/28/15	0.826	60.40	416	6.30	6.90															
3/1/15	0.282	19.80	47	6.50	6.60	15.00	<10	3.5	0.77											
3/4/15	1.288	29.40	316	6.70	7.00															
3/5/15	1.31	30.60	334	6.70	6.90															
3/6/15	1.896	30.20	478	6.70	6.90															
3/10/15	1.465	35.80	437	7.00	8.30	21.00	<10	9.2	0.54											
3/14/15	0.911	20.50	156	6.60	7.10															
3/15/15	2.422	23.40	473	6.50	6.60	10.00	<10	5.5	0.99											
3/16/15	4.642	9.70	376	6.40	6.70															
3/17/15	4.724	9.40	370	6.40	6.60															

Appendix A: Outfall 001 Analytical Results

3/18/15	4.864	10.90	442	6.40	6.60															
3/19/15	4.707	10.00	393	6.40	6.60															
3/25/15	1.897	48.80	772	6.70	7.00	25.00	<10	5.1	0.80											
3/26/15	1.813	41.30	624	6.70	6.90															
3/27/15	1.66	33.30	461	6.50	6.90															
3/28/15	1.336	29.30	326	6.70	6.90															
3/29/15	2.318	26.30	508	6.80	7.00	16.00	<10	7.8	1.07											
3/31/15	0.786	84.90	557	7.10	7.20															
5/5/15	0.746	5.00	31	6.90	7.10			12.8	0.82	1.20	0.10	<0.5	10.90	0.60	21.0	<5.0	<0.1	1.40	<0.5	<0.2
5/11/15	0.693	3.30	19	7.40	8.40			3.6	0.80											
5/12/15	0.853	4.10	29	8.00	8.40															
5/13/15	0.891	4.20	31	7.40	8.50															
5/14/15	0.891	4.40	33	7.30	7.60															
5/18/15	0.832	6.90	48	7.00	8.60															
5/19/15	1.083	6.10	55	8.00	8.90															
5/20/15	1.081	3.10	28	8.40	8.80			2.7	1.09											
5/21/15	0.945	3.30	26	8.30	8.90															
5/27/15	0.749	7.00	44	8.00	8.90			10.6	0.99											
5/28/15	1.635	7.50	102	8.00	8.90															
6/3/15	1.148	19.30	185	6.70	7.20			17.3	1.39											
6/4/15	0.25	13.20	28	7.00	7.10															
6/5/15	0.251	15.70	33	6.90	7.10															
6/24/15	0.713	6.60	39	7.50	7.90			11.2	1.48											
6/25/15	0.895	6.30	47	7.30	8.20															
6/26/15	0.444	8.10	30	7.20	7.70															