

Annual Industrial Waste System Stormwater Monitoring Report

Seattle-Tacoma International Airport

For the Period July 1, 2019 through June 30, 2020

September 29, 2020

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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 2019 through June 2020. 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 #7810-03. 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 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 all known, available and reasonable methods of prevention, control and treatment (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 three hundred and twenty-four (324) 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 187 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.

One hundred and sixty-eight (168) MG were processed and discharged through Outfall 001 to Puget Sound over 83 operating days. The average daily flow to Outfall 001 was 2.02 MG. There were no discharges in August 2019, September 2019 or March 2020. The maximum daily discharge was 4.43 MG on December 22, 2019. The maximum daily discharge limit of 18 MG was not exceeded.

Eighty-three (83) effluent samples were analyzed to characterize the daily discharge for BOD₅ concentration and loading. Concentrations of BOD₅ in IWTP effluent to Outfall 001 ranged from "non-detect" <= 1.5 milligrams per liter (mg/L) to 48.3 mg/L. Samples analyzed during the de-icing season (November - March) were well below their respective maximum daily mass limits. The maximum daily load of BOD₅ discharged was 1,467 pounds, which occurred on January 10, 2020 during the de-icing season. The average monthly BOD₅ load ranged from 38 pounds in June 2020 to 802 pounds in February 2020. The BOD₅ average monthly effluent concentration of 45 mg/L in the de-icing season and 25 mg/L in the non-de-icing season was not exceeded during this reporting period.

Twenty-five (25) effluent samples were analyzed for total suspended solids (TSS). TSS concentrations discharged to Outfall 001 ranged from “non-detect” \leq 5 mg/L to 36.0 mg/L. One TSS sample collected on June 1, 2020 was above the maximum daily effluent limit of 33 mg/L, Ecology was notified. The average monthly effluent TSS limit of 21 mg/L was not exceeded.

pH was continuously measured at the IWTP and instantaneous maximum and minimum results were recorded. The plant consistently operated within the permit-required pH range of 6.0 to 9.0. A minimum instantaneous pH of 6.2 and a maximum of 8.9 were measured during this reporting period.

Twenty-five (25) grab samples were analyzed for oil and grease. The maximum daily concentration was 17.35 mg/L taken on July 30, 2019. Average daily concentration was 3.15 mg/L. One Oil and Grease sample was above the maximum daily effluent limit of 15 mg/L, the results of this sample are being investigated; Ecology has been notified.

Acute and Chronic Toxicity tests were conducted during this reporting period. Results from toxicity tests were required in the final summer and winter of the year before permit renewal. Results have been reported to Ecology as part of the permit renewal process.

King County South Treatment Plant Discharges

The high concentration BOD₅-treated wastewater is 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.

One hundred and fifty-six (156) MG of flow was processed and routed to the KC STP due to elevated levels of BOD₅. Discharge to KC STP occurred on 121 days. There were no discharges to KC STP in May 2020. The maximum daily discharge of 2.57 MG occurred on December 19, 2019.

One hundred and twenty-one (121) effluent composite samples for water discharged to KC STP were analyzed for BOD₅. Concentrations of BOD₅ in effluent to KC STP ranged from 7.3 mg/L to 3,110 mg/L. The KC STP BOD₅ average concentration was 234.4 mg/L. A maximum daily load of 22,778 pounds was discharged on January 19, 2020. All samples met the KC STP maximum daily BOD₅ permit limit load of 60,000 pounds.

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 2019 Key Facts and Figures, STIA handled 453,549 metric tons of air cargo, and 51.8 million passengers. STIA is ranked the eighth-busiest U.S. passenger airport and has a regional impact of more than \$16.3 billion in business revenue, generating more than 172,000 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).

The current NPDES Permit (No. WA-0024651) became effective on January 1, 2016. This Annual Report focuses on the monitoring results from July 2019 through June 2020.

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 King County South Treatment Plant (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. Each drainage basin accounts for approximately half of the 375-acre IWS area. The IWS and storm drainage areas are depicted in Figure 1.

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 (BOD₅) runoff segregation, runoff storage, and the IWTP. These facilities along with additional information on all known, available, and reasonable methods of treatment determination (AKART) for IWS, an overview of aircraft de-icing and anti-icing operations of STIA, discharge characterization, stormwater pollution prevention, and the mixing zone study are described below.

The IWTP Improvements Project was completed in the summer of 2006, allowing for monitoring and segregation of IWS runoff based on BOD₅ concentrations. This project was initiated by the AKART determination for the IWS. "High BOD₅" effluent is defined as any water that could cause the IWTP to exceed the monthly daily average concentration or maximum daily load. Final Effluent Limitations are specified in S1.A of the permit. Treated wastewater containing high BOD₅ concentrations is conveyed to the KC STP, while treated wastewater with low BOD₅ concentrations is discharged to Puget Sound via the Midway Sewer District Outfall (Outfall 001). Start-up for this system occurred on November 6, 2006 and was fully implemented on January 1, 2007.

1.1.1 Collection and Segregation

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

Untreated industrial wastewater is stored in three lagoons. The primary purpose of Lagoons #1 and #2 is for collection of the “first flush” of high BOD₅ influent from the South Aviation and North Aviation areas, respectively. Although the primary purpose of Lagoon #3 is for collection of low BOD₅ runoff, high BOD₅ runoff during deicing 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 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 IWS treatment from various areas that formerly drained to the Airport’s stormwater drainage system (SDS).

1.1.3 Industrial Waste Treatment Plant

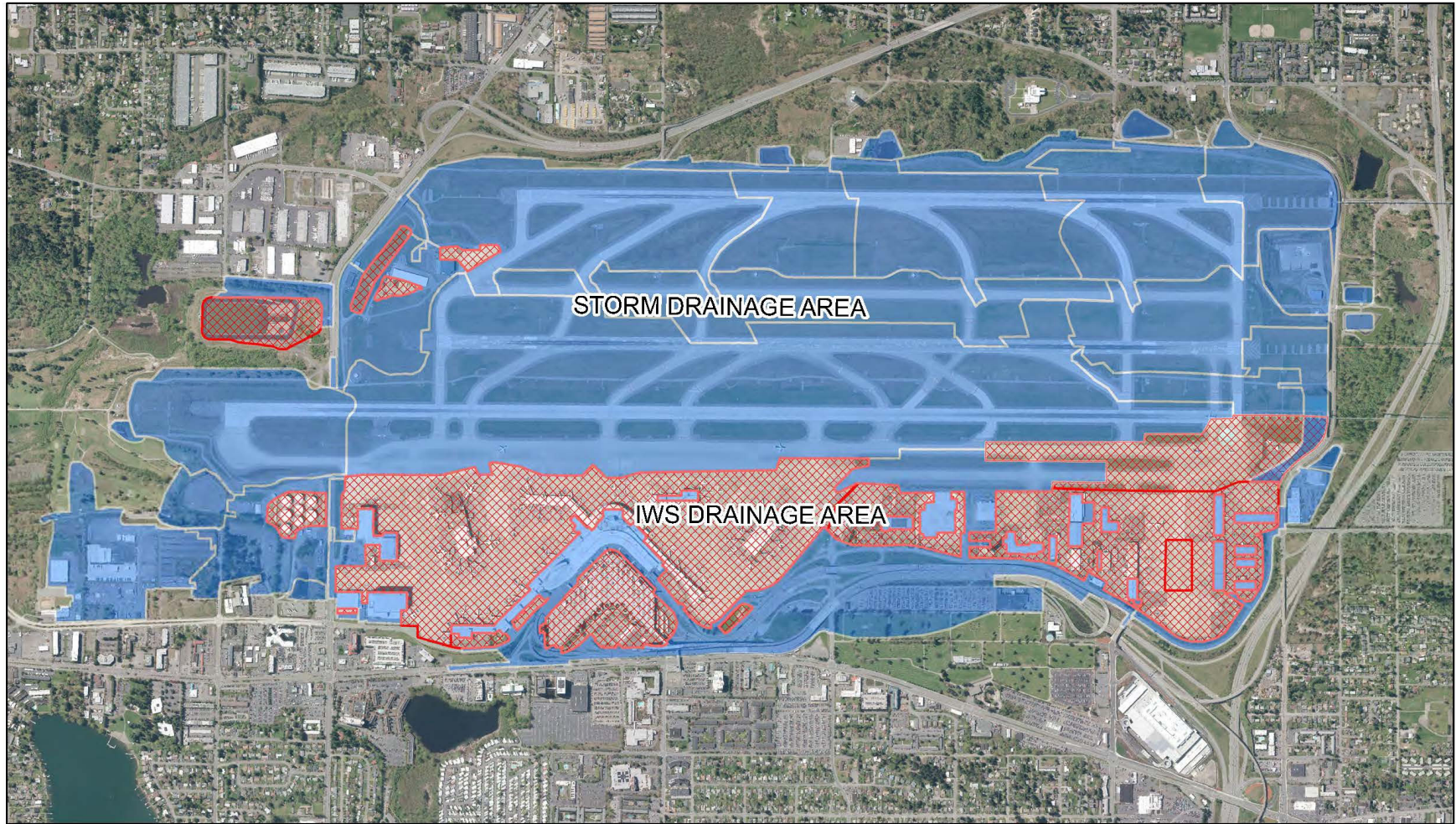
The IWTP is located at the southwestern end of the airport, south of Lagoons #1 and #2 and north of 188th Street, just west of the tunnel under the eastern-most airport runway known as 16 Left / 34 Right. The IWTP is designed to remove petroleum hydrocarbons and suspended solids using a dissolved air 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 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 stored in either of two underground wet wells located adjacent to the treatment plant. Treated water is discharged to Puget Sound from the low BOD₅ wet well and to the Valley View Sewer District from the high BOD₅ wet well. Discharges to the Valley View

Sewer District are conveyed to King County's Renton South Wastewater Treatment Plant (KC STP) 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 KC STP. However, the plant hydraulic capacities are effectively limited by either the mass-based effluent or flow limitations. The KC STP Permit limits discharges to the treatment plant to 1,600 GPM (2.3 MGD) and 60,000 pounds per day of BOD₅. 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 KC STP.



STIA FACILITY DRAINAGE

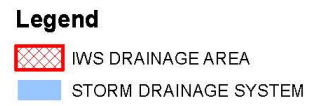
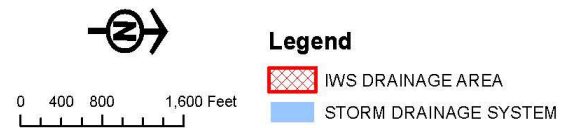


Figure 1. Vicinity Map for the POS Industrial Waste Treatment Plant at Sea-Tac International Airport

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 #7810-03

Program components include:

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

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

2.1 Influent and Effluent Measurements

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

2.2 Effluent Sampling

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

2.3 IWTP Analytes

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

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

2.4 Schedule

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

Table 1. Industrial Wastewater Treatment Plant Effluent Monitoring Requirements

Sample Collection	Reporting	Data	
		Review/Management	Data Reporting
Treatment System Operations			
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) Year 3 metals/cyanide, priority pollutants (one dry season and one wet season event) ^b	Laboratory report within 10 days of sample date.	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 Monthly metals/cyanide/TPH	Laboratory report within 10 days of sample date.	Data entry within 15 days of completing data review.	Monthly self-monitoring report by the 15th of the following month

^a Discharge to Puget Sound occur only when the BOD₅ 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 January 2018 through December 2018. 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. The renewed permit effective January 1, 2016 recalculated the BOD₅ mass load effluent limits based upon the treatment design flow. The 2016 permit renewal effluent limits are depicted 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	2,665 lbs/day
BOD ₅ April through October	25 mg/L	1,480 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 2019 through June 2020. Flow and BOD 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. 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 8 to 27 days. A total of 324 MG of IWS runoff was processed during the reporting period. This includes both discharges to Outfall 001 and KC STP. One hundred and sixty-eight (168) MG were discharged to Outfall 001 during the reporting period.

The maximum monthly flow to Outfall 001 was 52.7 MG in December 2019. During December 2019, Outfall 001 average daily flow was 3.29 MG and a maximum daily flow of 4.43 MG. The maximum monthly flow routed to the KC STP was 42.8 MG in January 2020. During January 2020, the KC STP outfall average daily flow was 1.78 MG and a maximum daily flow of 2.53 MG. Figure 2 depicts the monthly total flows from the IWTP to Outfall 001 and to KC STP.

Figure 2. IWTP Effluent Flow

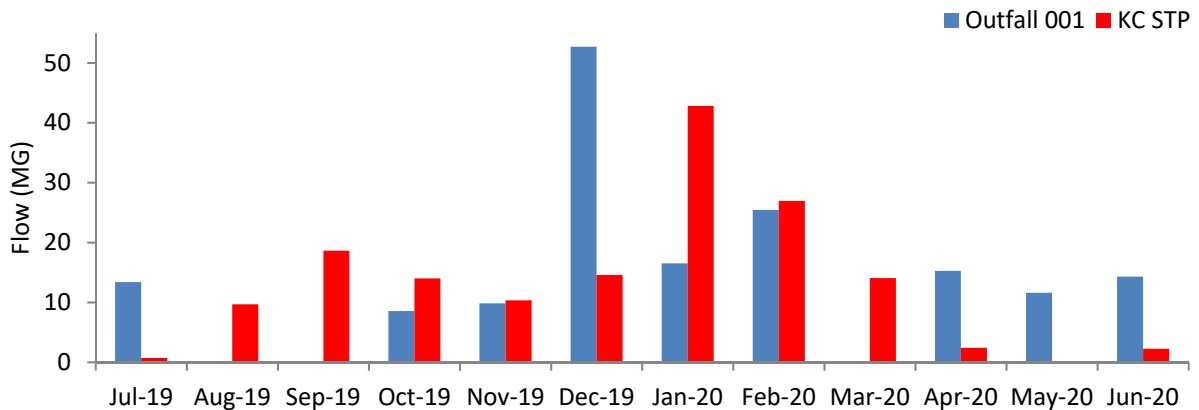


Figure 2. IWTP Effluent Flow

Table 3. Total Daily Effluent Flow Volume to Outfall 001

Date	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20
	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)	(MG)
1	1.119											1.265
2	1.610											1.297
3						1.458						1.260
4					4.134	1.928						1.170
5					2.924		1.448				0.570	1.213
6					2.771			1.016			1.152	
7							1.918	3.019				
8	1.172						2.768	3.024			0.941	
9	1.426						2.798	3.014				
10	1.526						4.270	3.0107				
11	1.612						0.690	3.017				
12	1.346							3.018			1.061	
13								2.786				
14						1.060		1.903			1.503	
15						0.968		1.629				
16												1.124
17												1.603
18												1.478
19											0.705	
20						2.109				3.538	1.168	
21						3.896				4.331	1.170	
22						4.426				0.164	0.862	
23	0.984			0.485		4.417				1.732		1.354
24	0.869			0.498		4.398						1.232
25	0.677					4.392						1.315
26						4.391						
27						4.389				0.784		
28						4.384				1.577	1.171	
29				1.715		4.378				1.584	1.298	
30	0.597			1.771		2.185				1.539		
31	0.447			4.073		3.928	2.625					
Monthly Volume (MG)	13.39	-	-	8.54	9.83	52.71	16.52	25.44	-	15.25	11.60	14.31
Num Days Operation	12	0	0	5	3	16	7	10	0	8	11	11
Avg Daily Flow (MGD)	1.12	-	-	1.71	3.28	3.29	2.36	2.54	-	1.91	1.05	1.30
Max Daily Flow (MGD)	1.61	-	-	4.07	4.13	4.43	4.27	3.02	-	4.33	1.50	1.60

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 (BOD₅)

Two hundred and four (204) effluent composite samples were analyzed for BOD₅, for discharges to both Outfall 001 and KC STP. Table 4 summarizes the BOD₅ concentration and load discharged to Outfall 001. Figures 3 through 6 depict various BOD₅ concentrations and loadings from Outfall 001 from this reporting period. Figure 7 and 8 describe BOD₅ concentrations and loading to the KC STP outfall.

BOD₅ Concentration

The average monthly BOD₅ concentration discharged to Outfall 001 ranged from 3.10 mg/L November 2019 to 37.03 mg/L in February 2020. The maximum daily concentration discharged to Outfall 001 was 48.3 mg/L on January 11, 2020.

The maximum daily concentration discharged to KC STP was 3,110 mg/L on January 14, 2020.

BOD₅ Loading

The average monthly BOD₅ load discharged to Outfall 001 ranged from 38 pounds in June 2020 to 802 pounds in February 2020. The maximum daily pounds per day discharged to Outfall 001 was 1,467 pounds. A total of 22,135 pounds of BOD₅ was discharged to Outfall 001 during this reporting period.

The maximum daily pounds per day discharged to KC STP was 22,778 pounds. A total of 299,444 pounds of BOD₅ was discharged to KC STP during this reporting period.

Table 4. Outfall 001 Biological Oxygen Demand Results

Date	Jul-19		Aug-19		Sep-19		Oct-19		Nov-19		Dec-19		Jan-20		Feb-20		Mar-20		Apr-20		May-20		Jun-20		
	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	7.3	68																					10.5	111	
2	10.8	145																						1.5	16
3											9.7	118												1.5	16
4									2.8	97	11.2	180												1.5	15
5									3.1	76			22.7	274							7.1	34	3.2	32	
6									3.4	79					39.4	334					7.0	67			
7													19.6	314	37.7	949									
8	9.4	92											24.3	561	37.1	936					5.1	40			
9	5.8	69											26.7	623	38.0	955									
10	11.2	143											41.2	1467	44.7	1122									
11	8.2	110											48.3	278	41.6	1047									
12	7.9	89													43.3	1090					4.6	41			
13															33.6	781									
14											24.2	214			28.4	451					10.1	127			
15											23.8	192			26.5	360									
16																							2.5	23	
17																							3.7	49	
18																							2.4	30	
19																					6.0	35			
20											17.8	313							11.9	351	5.8	56			
21											13.9	452							10.6	383	6.6	64			
22											13.6	502							8.3	11	7.2	52			
23	21.1	173					4.5	18			10.7	394						7.8	113				3.7	42	
24	15.9	115					3.6	15			17.3	635											5.9	61	
25	14.2	80									12.4	454											2.4	26	

BOD₅ Results Summary – Outfall 001

Figure 3. Outfall 001 Average Monthly BOD Concentration

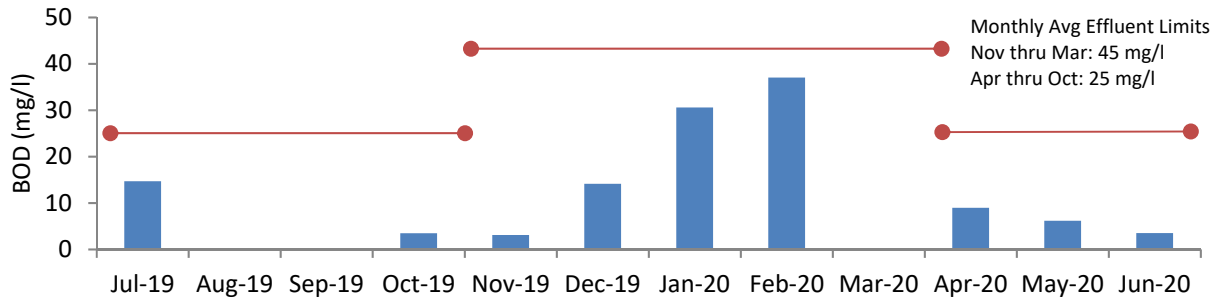


Figure 4. Outfall 001 Maximum Daily BOD Concentration

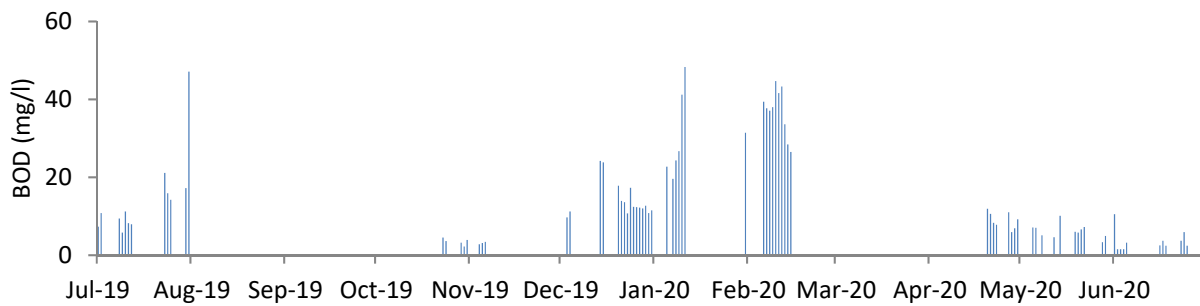


Figure 5. Outfall 001 Average Monthly BOD Load

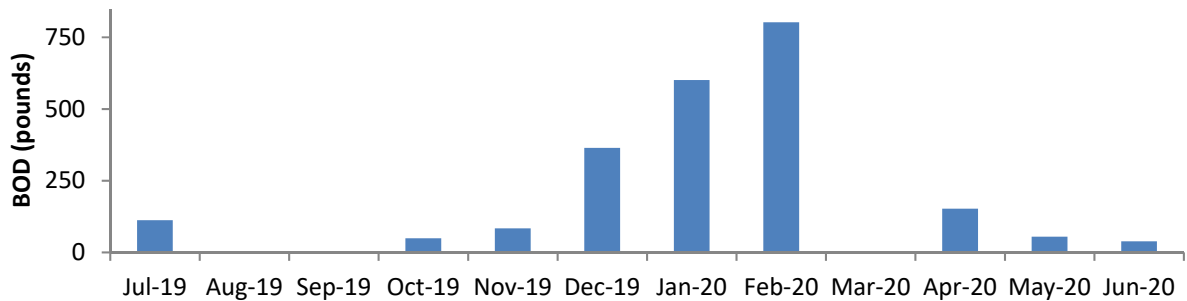
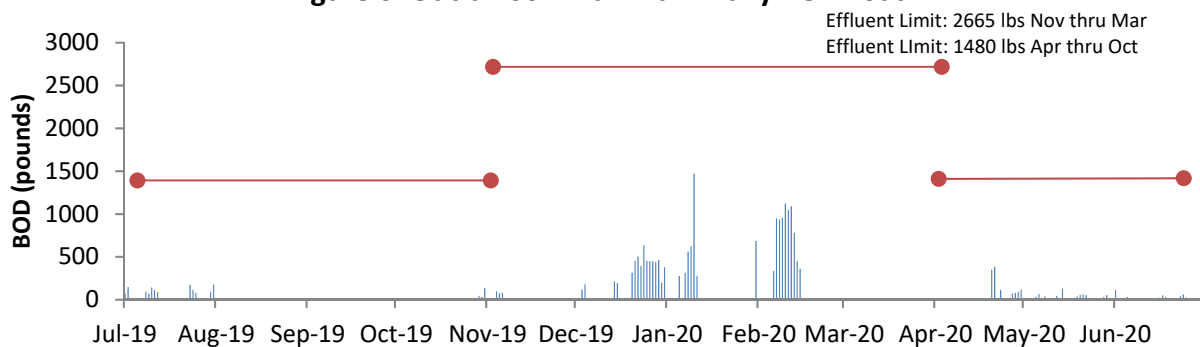


Figure 6. Outfall 001 Maximum Daily BOD Load



BOD Results Summary – KC STP Outfall

Figure 7. KC STP Maximum Daily BOD Concentration

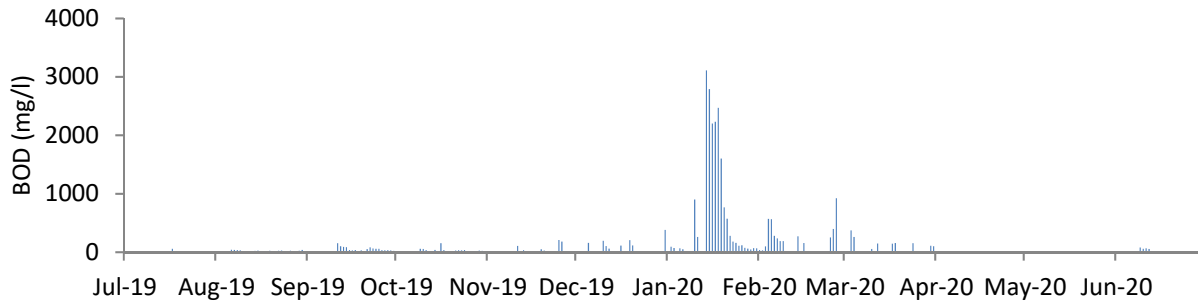
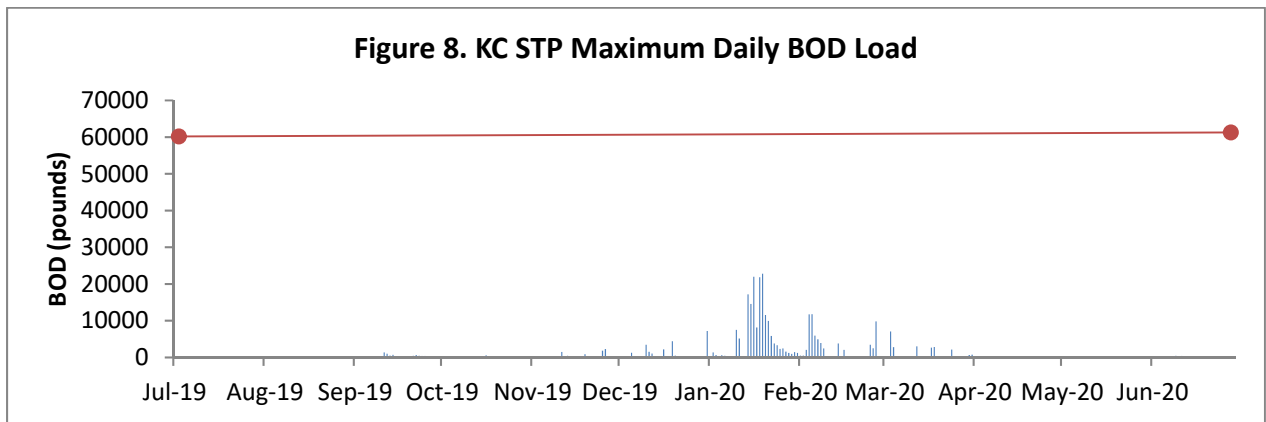


Figure 8. KC STP Maximum Daily BOD Load



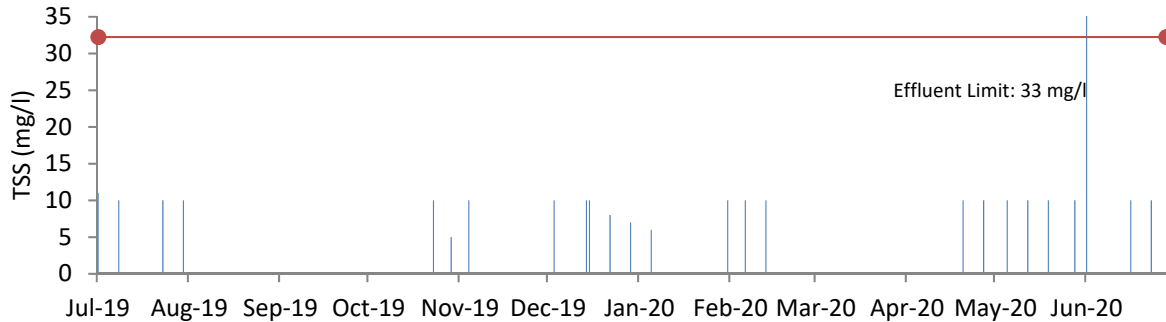
BOD₅ Mass Load Summary – AKART Implementation

Since AKART implementation, the IWTP has processed 10,354,091 pounds of BOD₅ from the 001 and KC STP outfalls. A total of 10,071,898 pounds of BOD₅ (97.3%) were segregated and sent to King County for treatment.

3.3.2 Total Suspended Solids (TSS)

A total of twenty-five (25) samples were analyzed from Outfall 001 for TSS by EPA Method 160.2. TSS analytical results for discharge to Outfall 001 ranged from “non-detect” ≤ 5 mg/L to 36.0 mg/L. One TSS sample was above the maximum daily effluent limit of 33 mg/L. The monthly average effluent limit of 21 mg/L was not exceeded. Figure 9 depicts the TSS values for this reporting period.

Figure 9. Maximum Daily Total Suspended Solids Concentration



3.3.3 Glycols

Ten (10) effluent composite sample were analyzed for propylene glycol using a modified technique of EPA Method 8015. There is no established effluent limit for glycol; however monthly reporting is required on DMR's from November through March. The daily concentration for propylene glycol discharged to Outfall 001 ranged from “non-detect” ≤ 5 mg/L to 30.3 mg/L.

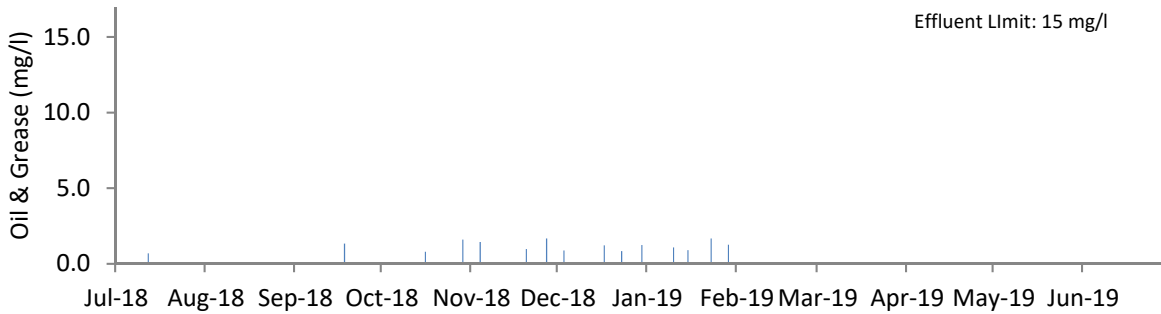
3.3.4 pH

Continuous pH metering is performed during discharge. The minimum instantaneous measurement was 6.2 on October 23 and 24, 2019 and the maximum measurement was 8.9 on June 25, 2020. All stormwater discharged to Outfall 001 was within the permitted range throughout the reporting period.

3.3.5 Oil and Grease

Twenty-five (25) grab samples of discharge to Outfall 001 were analyzed for oil and grease. 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 2019-2020 reporting period was 17.35 mg/L. Figure 10 depicts the Oil and Grease during this reporting period.

Figure 10. Maximum Daily 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 is required in the final summer and winter of the year before permit renewal. Toxicity testing was conducted on July 2nd, 2019 and this sample fulfills the “last summer prior to permit submittal” sample. The winter toxicity testing sample was conducted during the last reporting period. Results of toxicity testing 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 2019 through June 2020. Results of both NPDES permit-required monitoring were presented. Results were presented for flow, oil and grease, BOD₅, TSS, glycol, and pH. Results for analysis performed under compliance with King County Industrial Waste Discharge Permit have also been included with this report to provide comparison information for BOD₅ that has been removed from receiving waters because of the implementation of AKART.

The AKART system has been in place for 13.5 years. It is proving to be very effective in reducing discharge of pollutants to Puget Sound. For this reporting period, 299,444 pounds of BOD₅ out of the total processed 321,579 pounds (93.1 %) were segregated and sent to King County for treatment. Since the implementation of AKART on January 1, 2007, a total of 10,354,091 pounds of BOD₅ were processed through the IWTP and 10,071,898 pounds were segregated and sent to KC STP for treatment.

Effluent concentrations of BOD₅, TSS, oil and grease, and glycols to Outfall 001 have been significantly reduced via diversion to KC STP. The stormwater discharged to Outfall 001 met effluent limitations throughout the reporting period for BOD, glycols, and pH.

The BOD₅ discharges to Outfall 001 never exceeded 60% of the daily mass limit during de-icing season (November through March). The highest daily BOD₅ load occurred during the de-icing season at 1,467 pounds and the maximum daily effluent limit during that period is 2,665 pounds.

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/>; 2016 Airport Activity Report.

Washington State Department of Ecology. National Pollutant Discharge Elimination System Waste Discharge Permit WA-0024651, Port of Seattle. Effective Date: 1 January 2016.

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Appendix A: Outfall 001 Analytical Results

Appendix A. Outfall 001 Analytical Results

Date	Flow	BOD Concentration	BOD Mass	pH Min	pH Max	Propylene Glycol	TSS	Oil & Grease
	MGD	mg/l	pounds	S.U.	S.U.	mg/l	mg/l	mg/l
7/1/2019	1.12	7.3	68	7.5	8.2		11.00	0.93
7/2/2019	1.61	10.8	145	7.5	8.2			
7/8/2019	1.17	9.4	92	7.1	7.3		10.00	1.08
7/9/2019	1.43	5.8	69	7.3	7.6			
7/10/2019	1.53	11.2	143	7.0	7.4			
7/11/2019	1.61	8.2	110	7.1	7.4			
7/12/2019	1.35	7.9	89	7.1	7.6			
7/23/2019	0.98	21.1	173	6.9	7.0		10.00	2.90
7/24/2019	0.87	15.9	115	6.9	7.0			
7/25/2019	0.68	14.2	80	6.5	7.1			
7/30/2019	0.60	17.2	86	7.2	7.4		10.00	17.35
7/31/2019	0.45	47.1	176	7.2	7.3			
10/23/2019	0.49	4.5	18	6.2	6.5		10.00	1.48
10/24/2019	0.50	3.6	15	6.2	6.5			
10/29/2019	1.72	3.2	46	6.5	6.6		5.00	2.50
10/30/2019	1.77	2.2	32	6.5	6.6			
10/31/2019	4.07	3.9	132	6.5	6.7			
11/4/2019	4.13	2.8	97	6.6	6.8	5.0	10.00	4.25
11/5/2019	2.92	3.1	76	6.8	7.0			
11/6/2019	2.77	3.4	79	6.8	7.1			
12/3/2019	1.46	9.7	118	7.1	7.2	5.0	10.00	4.70
12/4/2019	1.93	11.2	180	7.2	7.3			
12/14/2019	1.06	24.2	214	6.9	7.1	13.0	10.00	5.61
12/15/2019	0.97	23.8	192	7.1	7.2	12.5	10.00	6.55
12/20/2019	2.11	17.8	313	6.3	7.2			
12/21/2019	3.90	13.9	452	6.6	6.7			
12/22/2019	4.43	13.6	502	6.6	6.6	5.0	8.00	4.71
12/23/2019	4.42	10.7	394	6.6	6.7			
12/24/2019	4.40	17.3	635	6.6	6.7			
12/25/2019	4.39	12.4	454	6.6	6.7			
12/26/2019	4.39	12.3	450	6.6	6.7			
12/27/2019	4.39	12.2	447	6.6	6.7			
12/28/2019	4.38	12.0	439	6.6	6.7			
12/29/2019	4.38	12.7	464	6.6	6.8	10.2	7.00	2.51
12/30/2019	2.19	10.8	197	6.7	6.8			

12/31/2019	3.93	11.5	377	6.6	6.9			
1/5/2020	1.45	22.7	274	6.9	7.2	13.4	6.00	5.21
1/7/2020	1.92	19.6	314	6.7	7.0			
1/8/2020	2.77	24.3	561	6.7	6.8			
1/9/2020	2.80	26.7	623	6.8	6.9			
1/10/2020	4.27	41.2	1467	6.8	7.0			
1/11/2020	0.69	48.3	278	6.9	6.9			
1/31/2020	2.63	31.4	688	6.5	6.7	30.3	10.00	3.67
2/6/2020	1.02	39.4	334	6.7	6.9	21.8	10.00	1.57
2/7/2020	3.02	37.7	949	6.6	7.3			
2/8/2020	3.02	37.1	936	6.8	7.0			
2/9/2020	3.01	38.0	955	6.8	7.1			
2/10/2020	3.01	44.7	1122	7.0	7.1			
2/11/2020	3.02	41.6	1047	7.0	7.1			
2/12/2020	3.02	43.3	1090	7.0	7.1			
2/13/2020	2.79	33.6	781	6.8	7.1	19.3	10.00	1.73
2/14/2020	1.90	28.4	451	6.8	7.0			
2/15/2020	1.63	26.5	360	6.7	7.2			
4/20/2020	3.54	11.9	351	7.2	7.5		10.00	1.00
4/21/2020	4.33	10.6	383	7.2	7.4			
4/22/2020	0.16	8.3	11	7.4	7.4			
4/23/2020	1.73	7.8	113	7.2	7.5			
4/27/2020	0.78	11.0	72	7.1	8.2		10.00	2.73
4/28/2020	1.58	5.9	78	7.0	7.1			
4/29/2020	1.58	6.9	91	7.0	7.7			
4/30/2020	1.54	9.2	118	7.4	7.6			
5/5/2020	0.57	7.1	34	7.2	7.4		10.00	2.06
5/6/2020	1.15	7.0	67	7.2	7.6			
5/8/2020	0.94	5.1	40	7.3	7.6			
5/12/2020	1.06	4.6	41	7.6	7.8		10.00	1.29
5/14/2020	1.50	10.1	127	7.4	7.6			
5/19/2020	0.71	6.0	35	6.9	7.1		10.00	1.27
5/20/2020	1.17	5.8	56	7.0	7.3			
5/21/2020	1.17	6.6	64	7.2	7.4			
5/22/2020	0.86	7.2	52	7.1	7.2			
5/28/2020	1.17	3.3	32	7.3	7.5		10.00	0.88
5/29/2020	1.30	4.9	53	7.3	7.5			
6/1/2020	1.27	10.5	111	6.8	6.9		36.00	1.40
6/2/2020	1.30	1.5	16	6.9	7.0			

6/3/2020	1.26	1.5	16	7.1	7.3			
6/4/2020	1.17	1.5	15	7.2	7.6			
6/5/2020	1.21	3.2	32	7.3	7.5			
6/16/2020	1.12	2.5	23	7.2	7.5		10.00	0.59
6/17/2020	1.60	3.7	49	7.3	7.6			
6/18/2020	1.48	2.4	30	7.4	7.8			
6/23/2020	1.35	3.7	42	8.2	8.8		10.00	0.72
6/24/2020	1.23	5.9	61	7.9	8.8			
6/25/2020	1.32	2.4	26	8.4	8.9			

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