San José-Santa Clara Regional Wastewater Facility

2019 Annual Self-Monitoring Report

San José-Santa Clara
Regional Wastewater Facility
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San José-Santa Clara Regional Wastewater Facility

2019 Self-Monitoring Annual Report

San José-Santa Clara Regional Wastewater Facility Annual Reports are posted on the City of San José website at:

http://www.sanjoseca.gov/regulatoryreports

This annual report summarizes the past year of facility effluent monitoring and provides summary data for the previous two years for comparison. Graphical tables also show flow and pollutant data back to January 2004 to capture the past 15 years of trends. Subsequent sections of this report summarize significant or interesting events impacting facility operations, maintenance, personnel, and finance. The final section discusses ongoing receiving water monitoring and special projects.

Reporting for the San José-Santa Clara Regional Wastewater Facility is managed by the Wastewater Compliance Team:

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On the Cover: Biosolids produced by the San Jose-Santa Clara Regional Wastewater Facility (RWF) ready to be hauled from one of the 20 drying beds used to solar dry the biosolids. The RWF biosolids meet Class-A standards through current digestion, lagoon stabilization, and solar drying processes. The RWF is evaluating future disposition options of the biosolids due to planned changes to its biosolids management practices consistent with the 2013 Plant Master Plan and 2015 Biosolids Transition Strategy. Recent regulations will also limit the volume of biosolids (considered organic material) that can be used as landfill alternate daily cover, which is the current biosolids disposition at RWF.

Table of Contents

List of Tables

List of Figures

Annual Self-Monitoring Report Background

NPDES Requirements

The Annual Self-Monitoring Report for the San José-Santa Clara Regional Wastewater Facility is required by NPDES Permit Number CA-0037842, Water Board Order Number R2-2014-0034.

In 2019, Facility maintained 100% compliance with all NPDES effluent limitations.

The facility continues to meet NPDES provision E-VI (permit page E-8) by participating in the San Francisco Bay Regional Monitoring Program (RMP) in collaboration with other BACWA agencies.

Annual status reports for various NPDES related programs and plans are summarized below:

General Annual Reporting for the NPDES Permit: Permit Provisions VI.C.2 - 5 require that the facility provide the following routine status reports:

a. Effluent Characterization Study – this analytical monitoring is reported via monthly & annual Facility Self-Monitoring Reports (SMRs)
b. Pollutant Minimization Program – annual Pollution Prevention (P2) program is reported to Regional Water Board by 28 February each year & posted on the City of San José website.
c. Pretreatment Program – annual & semi-annual pretreatment reports, submitted to Water Board by 28 February and 31 July respectively, are governed by NPDES Permit Attachment H, "Requirements for Pretreatment Annual Reports."
d. Sludge and Biosolids Management – Biosolids hauled off-site are reported to EPA, Region 9, in February each year in accordance with NPDES permit & 40 CFR part 503.
e. Collection System Management – Collection systems for Cities of San José & Santa Clara are managed & reported in accordance with NPDES Permit Attachment D & State Water Board Order No. WQ 2006-0003 DWQ, "General Collection System WDRs."
f. Avian Botulism Control Program – Provision VI.C.5.a: An Avian Botulism Control Program annual report is required by February 28 each year.

This SMR report, satisfying items "a." & "d." above, along with reports "b.", "c." & "f.", are posted on City of San José "Regulatory Reports" website:

https://www.sanjoseca.gov/regulatoryreports

The Collection System Management Annual Report (aka "Sewer System Management Plan," item "e.") is posted at this site:

https://www.sanjoseca.gov/your-government/departments/transportation/roads/sewers-storm-drains

Additional Annual SMR Report Requirements: Permit Attachment G, page G-11 outline required Facility Annual SMR reporting. In addition, Attachment G calls for the following plans and reports be reviewed annually and updated as necessary so as to remain useful and relevant to current practices:

a. Contingency Plan for Operations Under Emergency Conditions
b. Wastewater Facilities Status Report
c. O&M Manual

Facility Information

Facility Process Areas and Sampling Points

The wastewater treatment process consists of screening, grit removal, primary sedimentation, secondary (biological nutrient removal) treatment, secondary clarification, filtration, disinfection, and dechlorination. Figure 1, below, illustrates the facility treatment areas, flow routing, as well as the influent and effluent sample points.

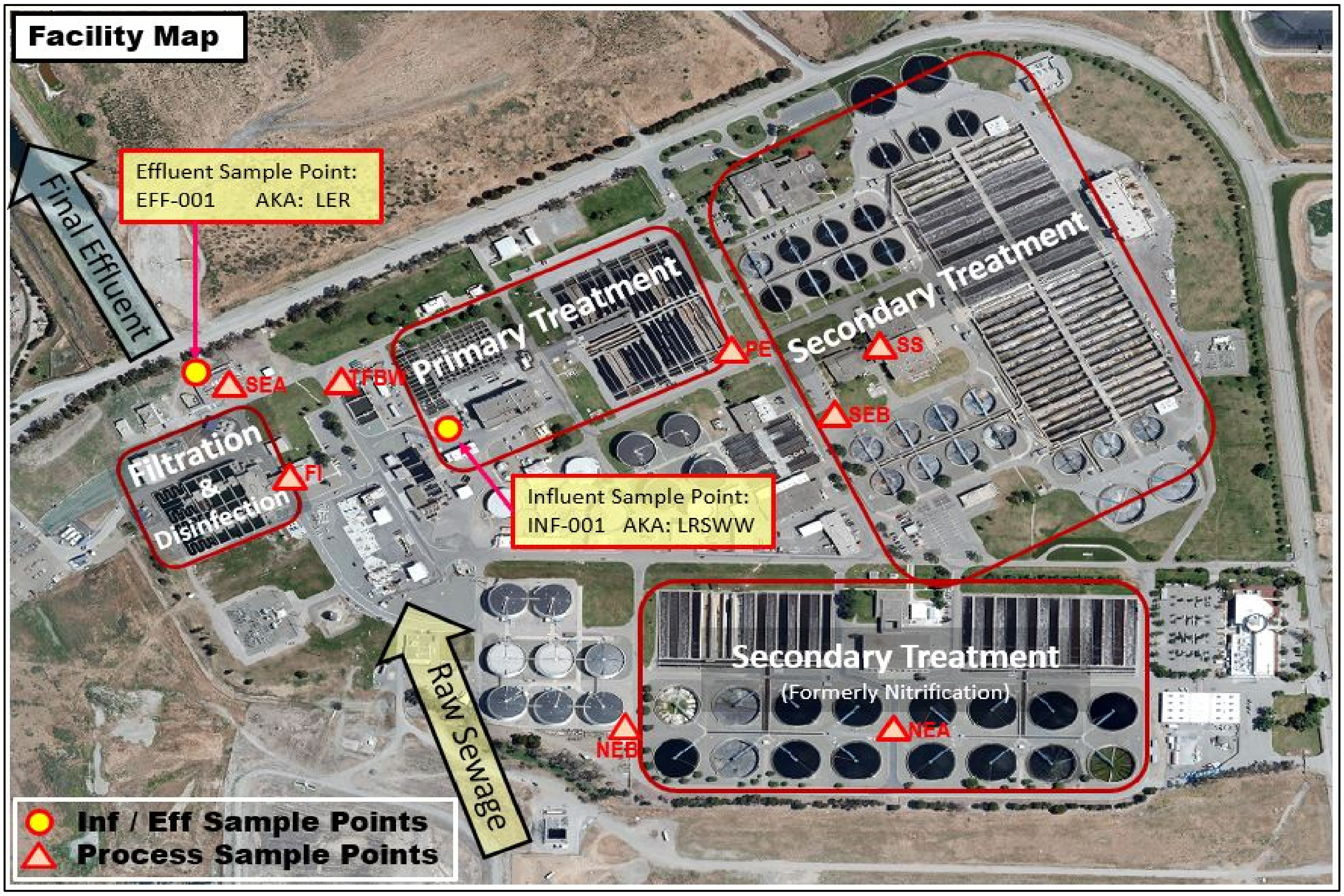


FIGURE 1 WATER POLLUTION CONTROL PLANT: STANDARD FLOW ROUTING AND INFLUENT AND EFFLUENT SAMPLING STATIONS

Facility Stormwater Conveyance System

The treatment facility is designed to capture all spills and stormwater on site. 20 stormwater collection systems convey flows to 6 pump stations (Figure 2). Stormwater pump stations direct all captured water back to facility headworks for treatment. The stormwater catch basin system has capacity to contain at least several hundred thousand gallons of spilled process waters if such an event occurs.

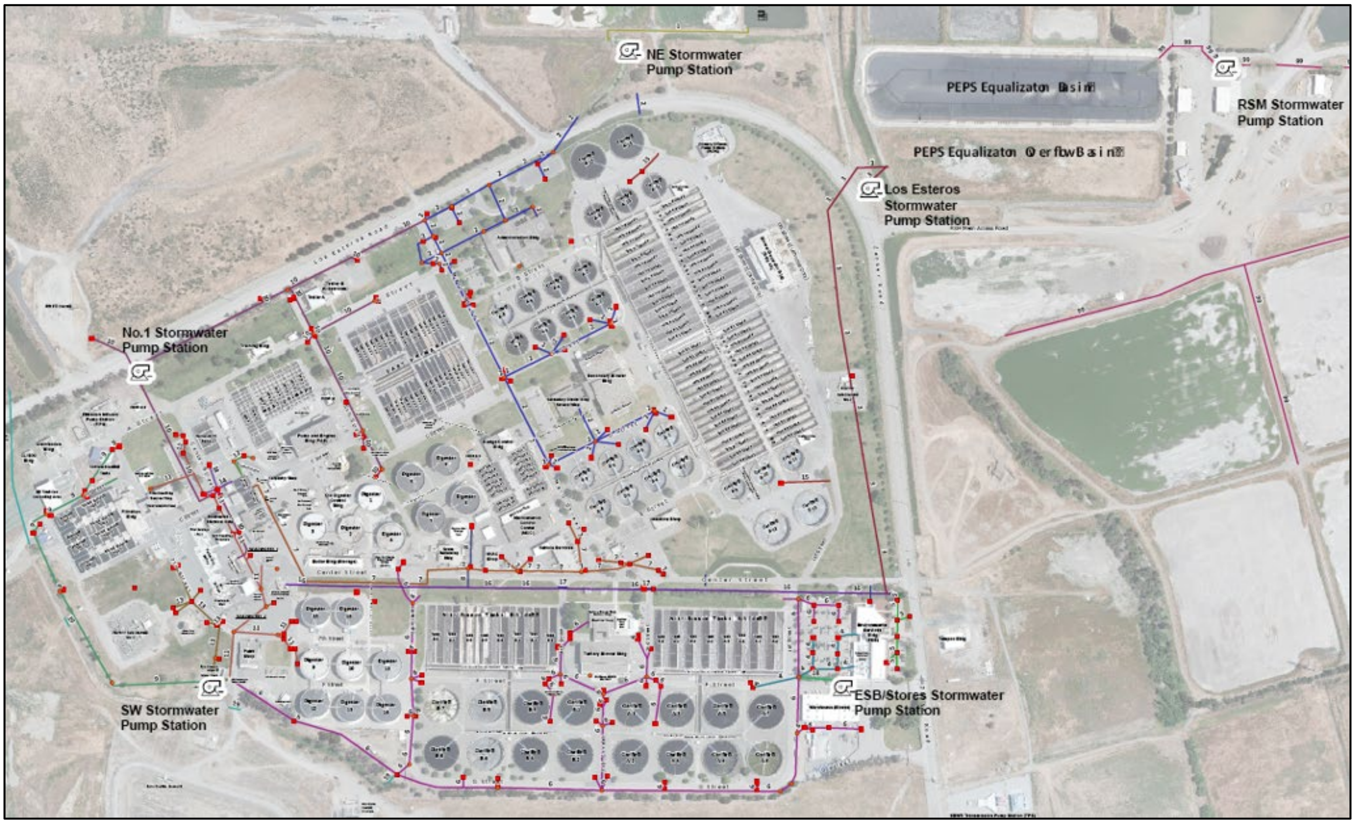


FIGURE 2 FACILITY STORMWATER CONVEYANCE SYSTEM MAP

Facility Service Area

The Facility receives wastewater from roughly 1.4 million residents and more than 17,000 commercial and industrial facilities. The City of San José manages the San José -Santa Clara Regional Wastewater Facility for the following Cities or agencies (Figure 3):

- San José,
- Santa Clara,
- Milpitas,
- Cupertino Sanitary District,
- County Sanitation Districts 2-3,
- Burbank Sanitary District, and
- West Valley Sanitation District (Campbell, Los Gatos, Monte Sereno, and Saratoga)

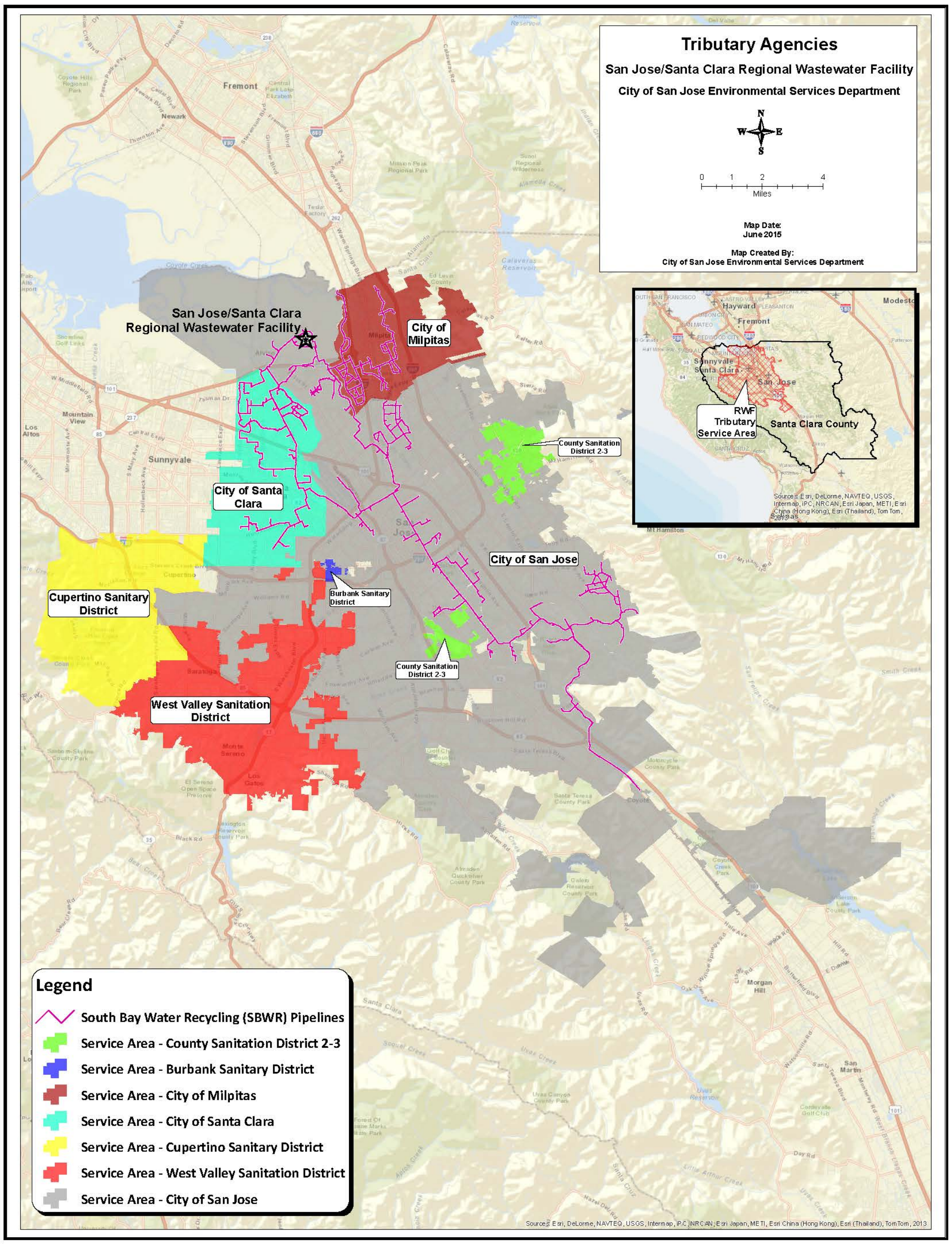


FIGURE 3 FACILITY LOCATION AND SERVICE AREA

1. Annual Reporting Requirements

Facility Flows

The peak average monthly effluent flow of 126.3 MGD occurred in February 2019. The peak daily flow for the year was 164.0 MGD on February 14.Table 1, below, summarizes influent and effluent flows for the last three years and Figure 4, below, illustrates daily average flows from 2004 through 2019.

Average Weather Influent Flow (ADWIF) is the highest five-weekday period from June through October. The 2019 ADWIF was 109.57 MGD and occurred between June 3 and June 7.

Average Dry Weather Effluent Flow (ADWEF) is the lowest average Effluent flow for any three consecutive months between the months of May and October. For 2019, ADWEF was 79.3 MGD and occurred during the months of July to September.

TABLE 1 SUMMARY OF INFLUENT AND EFFLUENT FLOWS 2017-2019

Year	Influent Flow	Effluent Flow			ADWIF Limit = 167 MGD ADWEF Trigger = 120 MGD	
	Average	Low	High	Average	ADWIF	ADWEF
2017	106.9	70.8	186.5	91.3	107.3	77.8
2018	105.5	72.7	122.4	87.6	110.3	79.4
2019	**108.6**	**69.6**	**164.0**	**93.2**	**109.6**	**79.3**

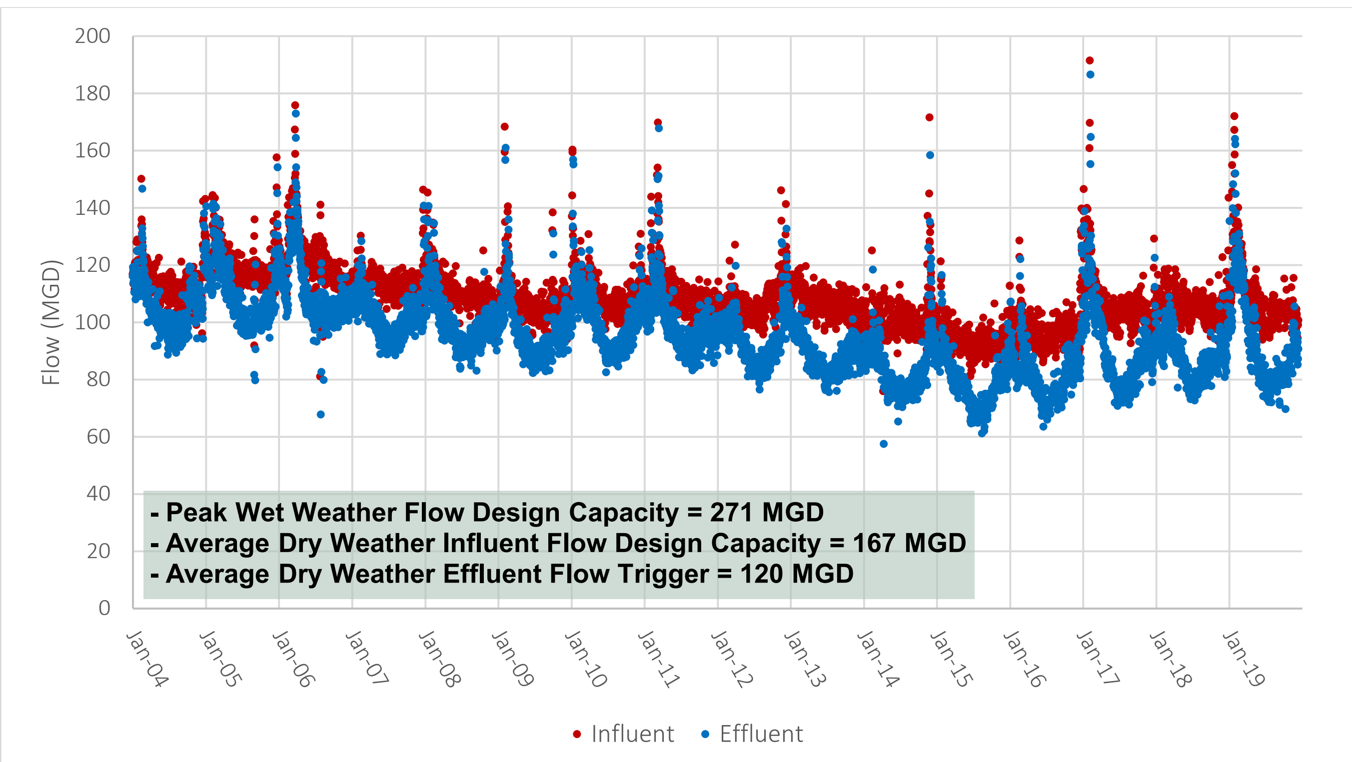


FIGURE 4 GRAPH OF DAILY AVERAGE FLOWS (MGD) 2004-2019

Biosolids and Material

Biosolids

Roughly one million gallons per day (1 MGD) of digester effluent is pumped to Residual Sludge Management (RSM) area sludge lagoons where the material stabilizes for 3 to 4 years. Floating dredges then pump biosolids to solar drying beds for one summer drying season. The facility has 4 Liquid Waste Technologies (LWT) dredges in inventory. Dredges typically have a 10-year operating life.

While drying, biosolids are churned using FECON FTX-600 Mulching Tractors and Caterpillar (CAT) bulldozers. FECON mulchers are most effective churning wet biosolids. Once biosolids have dried to a firmer consistency, the extra horsepower of a CAT D6 or D7 bulldozer is needed. Dried material is trucked to adjacent Newby Island Landfill where biosolids are used as Alternate Daily Cover (Figure 5).

FIGURE 5 BIOSOLIDS SOLAR-DRIED, PILED, AND READY FOR HAULING FOR USE AS ALTERNATE DAILY COVER

A project to replace open-air solar drying beds and lagoons with a new facility that will mechanically dewater all digested biosolids was scoped in 2018. Design began in October 2019 with 100% design projected for 2021.

TABLE 2 CONCENTRATIONS IN BIOSOLIDS (mg/kg)

	2017	2018	2019
Antimony	ND	ND	**ND**
Arsenic	7.0	7.0	**6.7**
Barium	450	320	**210**
Beryllium	0.9	ND	**0.57**
Cadmium	1.0	1.2	**1.8**
Chromium	81	76	**76**
(Cr STLC)	1.3	1.3	**0.97**
Cobalt	14	9.6	**12**
Copper	360	340	**370**
(Cu STLC)	0.1	0.2	**0.21**
Lead	20	24	**36**
Mercury	0.4	1.3	**0.89**
Molybdenum	8.2	7.3	**8.5**
Nickel	82	62	**66**
Selenium	3.4	4.4	**3.6**
Silver	4.4	4.7	**5.8**
Thallium	ND	ND	**ND**
Vanadium	61	54	**48**
Zinc	520	480	**600**
Cyanide	1	ND	**ND**
DR organics	840	200	**510**
OR organics	1900	430	**1000**

TABLE 3 BIOSOLIDS SUMMARY

Year	Truck Loads	Wet Tons	Total Solids	Volatile Solids	Dry Metric Tons-DMT
2017	2,999	54,874	87%	20%	43,534
2018	2,878	45,315	77%	22%	31,839
2019	3,287	53,872	81%	20%	39,521

Grit, Grease, and Screenings

Grit and screenings are collected near the headworks facility. Grease is floating material that accumulates in primary and secondary clarifiers. These materials are partially dewatered prior to being hauled to the local landfill. Table 4

TABLE 4 GRIT, GREASE, AND SCREENINGS (TONS) HAULED 2017-2019

Year	Grit	Grease	Screenings
2017	390	429	516
2018	550	367	517
2019	528	395	522

Effluent Monitoring

Facility NPDES Permit

Monitoring requirements from NPDES Permit Table 4 and monitoring frequency specified in Table E-3 of attachment E (Monitoring and Reporting Program) are summarized below in Table 5.

TABLE 5 EFFLUENT LIMITATIONS

	Average Monthly Effluent Limit (AMEL)	Maximum Daily Effluent Limit (MDEL)	Frequency
CBOD5 (BOD may be substituted)	10 mg/L	20 mg/L	Weekly
Total Suspended Solids (TSS)	10 mg/L	20 mg/L	Weekly
Oil and Grease	5 mg/L	10 mg/L	Quarterly
Total Ammonia, as N	3 mg/L	8 mg/L	Monthly
Copper	11 µg/L	19 µg/L	Monthly
Nickel	25 µg/L	33 µg/L	Monthly
Cyanide, Total	5.7 µg/L	13 µg/L	Monthly
Dioxin – TEQ	N/A	6.3 x 10-5 µg/L *(Interim)	2 x year
Indeno (1,2,3-cd) Pyrene	0.049 µg/L	0.098 µg/L	Quarterly
	Instantaneous Minimum	**Instantaneous Maximum**	**Frequency**
pH	6.5	8.5	Daily
Total Chlorine Residual	N/A	0.0 mg/L	Hourly
Turbidity	N/A	10 NTU	Weekly
Dissolved Oxygen	5.0 mg/L	N/A	Daily
	30 Day Geometric Mean		**Frequency**
Enterococcus Bacteria	35 CFU		5x per week

Mercury & PCBs Watershed Permit

Effluent limits below in Table 6 are established in the Mercury and PCBs Watershed Permit, Permit Number CA0038849, Order No. R2-2017-0041.

TABLE 6 EFFLUENT LIMITATIONS FOR MERCURY & PCBS

	AMEL µg/L	MDEL µg/L	Annual Mass	Frequency
Mercury	0.025	0.027	0.8 kg/yr	Monthly
PCBs	0.00039	0.00049	N/A	Quarterly

Nutrient Watershed Permit

Permit Number CA0038873, Order No. R2-2014-0014, required twice per month nutrient monitoring: Total Kjeldahl Nitrogen, Nitrate-Nitrite, Total Phosphorus, Soluble Reactive Phosphorus, Total Nitrogen - no limits are established.

On July 1, 2019 a new Nutrient Watershed Permit went into effect (Permit Number CA0038873, Order No. R2-2019-0017) requiring influent and effluent (Table 7) monitoring as detailed below – no limits are established.

TABLE 7 NUTRIENT WATERSHED PERMIT INFLUENT AND EFFLUENT MONITORING REQUIREMENTS

Parameter	Units	Influent Frequency	Effluent Frequency
Ammonia, Total	mg/L and kg/day as N	1x per quarter	2x per month
Total Kjeldahl Nitrogen	mg/L and kg/day as N	1x per quarter	Not required
Nitrate-Nitrite	mg/L and kg/day as N	1x per quarter	2x per month
Inorganic Nitrogen, Total (calculated)	mg/L and kg/day as N	Not required	2x per month
Phosphorus, Total	mg/L and kg/day as P	1x per quarter	2x per month

Annual average calculations for water quality constituents are determined from monthly average results except for constituents measured daily or multiple times per week

Non-detected values are substituted with corresponding Method Detection Level (MDL) values. Tables and Graphs also substitute the MDL for non-detected results.

a. Conventional Pollutants

The 2014 NPDES Permit established effluent limitations for Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS), BOD & TSS Percent Removal, Oil & Grease, pH, Total Chlorine Residual, Turbidity, Total Ammonia, and Enterococcus bacteria. Dissolved oxygen (DO) in the receiving water cannot fall below 5.0 mg/L due to effluent discharges. Loads for BOD, Ammonia, and TSS are calculated by multiplying each daily concentration by corresponding daily average flow.

Conventional pollutants with effluent limitations

pH

Effluent pH ranged from 6.9 to 7.5 standard units (S.U.) in 2019. Effluent Limits are 6.5 & 8.5 S.U.

Temperature

Effluent temperatures for 2019 ranged from 15.3 to 25.7^{o} C, averaging 20.9^{o} C.

Total Chlorine Residual

The Facility uses both continuous monitoring equipment and wet chemical analysis to monitor residual chlorine. In 2019, residual chlorine was not detected in final effluent at the outfall.

Enterococcus Bacteria

Facility effluent limit for Enterococcus is 35 colonies per 100 mL as a 30-day geometric mean. The 30-day geometric mean concentrations ranged from 2.7 to 6.2 Colony Forming Units (CFU) per 100 mL and averaged 4.6 CFU during 2019.

Oil & Grease

In 2019, Oil and Grease was not detected any of the four quarterly monitoring events. The ESD Lab Method Detection Limit (MDL) for Oil and Grease using Standard Method EPA 1664A was 1.4 – 1.7 mg/L in 2019 and the MDL is used as the reported value when all results are Non-Detect (ND). Facility effluent limits are 5 mg/L (AMEL) and 10 mg/L (MDEL).

Dissolved Oxygen

Dissolved oxygen (DO) concentrations in effluent were above Bay Water Quality Objective of 5 mg/L throughout 2019 (TABLE 8).

TABLE 8 DO CONCENTRATIONS 2019

	Low	High	Average	2018 Averages
Effluent (mg/l)	6.4	8.6	7.5	7.3
Saturation (%)	76.5	89.9	83.7	80.8

Conventional pollutants with effluent limits and load calculations

Biochemical Oxygen Demand (BOD)

As defined by American Heritage Science Dictionary, Biochemical Oxygen Demand is: "The amount of oxygen required by aerobic microorganisms to decompose organic matter in a sample of water, such as one polluted by sewage. It is used as a measure of the degree of water pollution."

The secondary aeration process (aka: Biological Nutrient Removal, BNR, Process) cultivates microbes that consume oxygen and organic material.

TABLE 9 BOD (mg/L) AMEL = 10 mg/L, MDEL = 20 mg/L

Year	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2017	160	400	314	1	6	2	99%
2018	270	460	340	2	5	3	99%
2019	**141**	**450**	**284**	**2**	**6**	**3**	**99%**

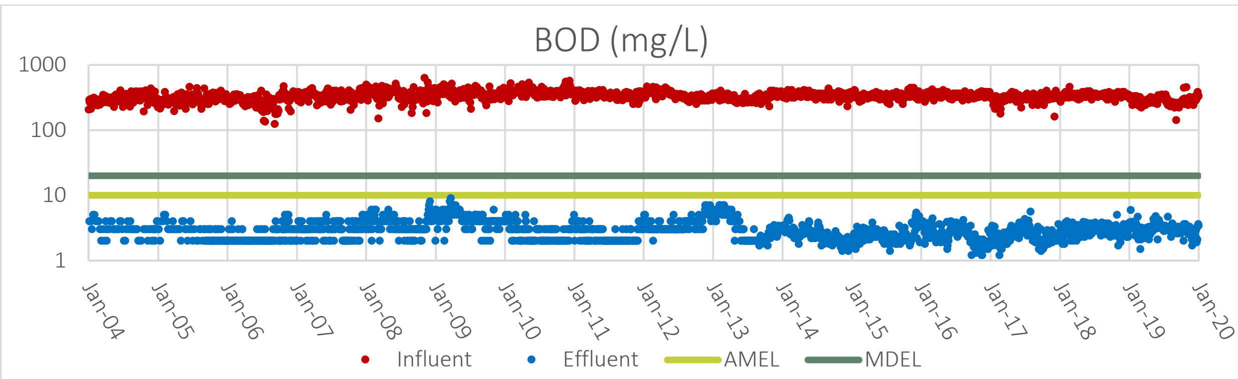


FIGURE 6 FACILITY BOD CONCENTRATIONS - 2004 THRU 2019

TABLE 10 BOD LOADINGS 2019 (kg/d)

	Annual Total	Low	High	Average	2018 Averages
Influent	42,813,057 (kg)	55,307	178,250	117,296	136,216
Effluent	355,514 (kg)	593	1,692	974	839

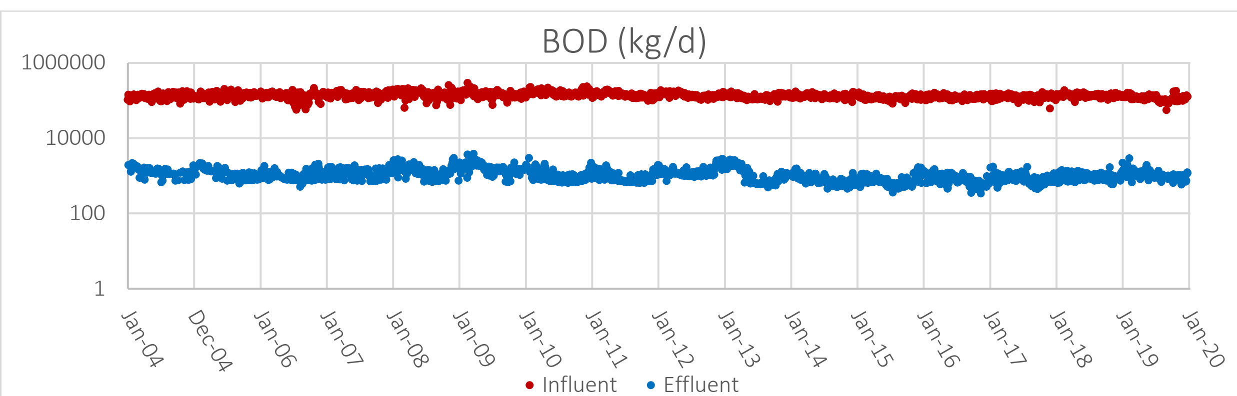


FIGURE 7 FACILITY BOD LOADINGS - 2004 THRU 2019

Total Suspended Solids (TSS)

TSS is a measure of solid material suspended in water. Suspended solids settle out of the water column throughout the Facility treatment train: roughly half is removed in Primary settling tanks and another 40 to 45 percent is removed secondary/BNR clarifiers. Tertiary filtration removes up to an addition 10 mg/L.

TABLE 11 TSS (mg/L) AMEL = 10 mg/L MDEL = 20 mg/L

Year	Influent			Effluent			
	Low	High	Average	Low	High	Average	Removal
2017	185	507	305	1.0	2.0	1.0	99.6%
2018	227	428	315	2.0	2.0	1.0	99.6%
2019	**123**	**506**	**314**	**1.0**	**3.0**	**1.0**	**99.6%**

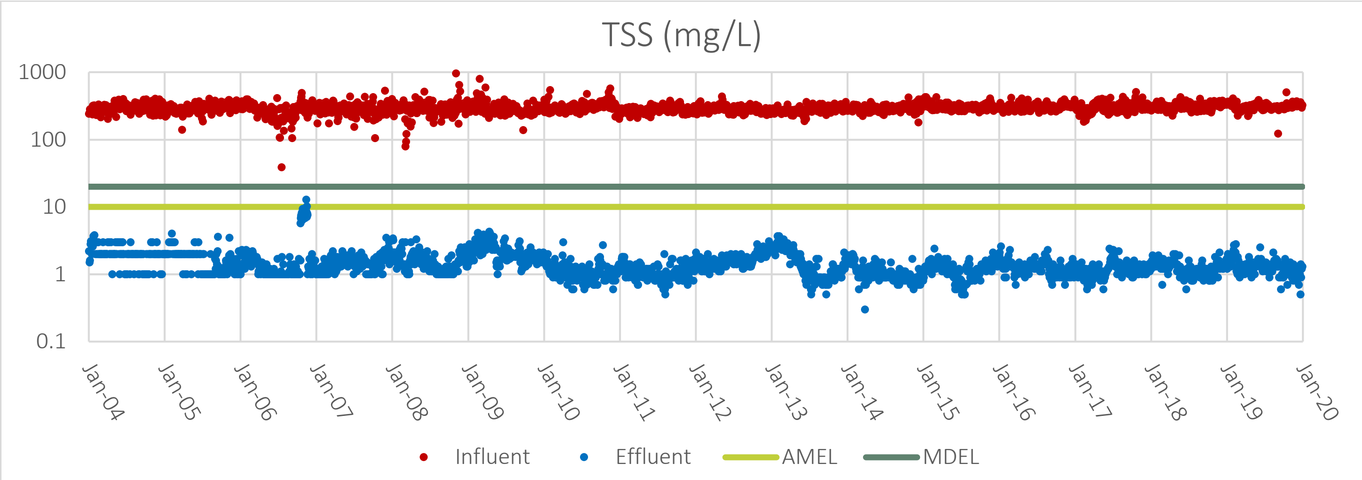


FIGURE 8 FACILITY TSS CONCENTRATIONS - 2004 THRU 2019

TABLE 12 TSS LOADINGS 2019 (kg/d)

	Annual Total	Low	High	Average	2018 Averages
Influent	47,352,279 (kg)	48,246	197,613	129,732	125,978
Effluent	173,750 (kg)	182	1,741	476	417

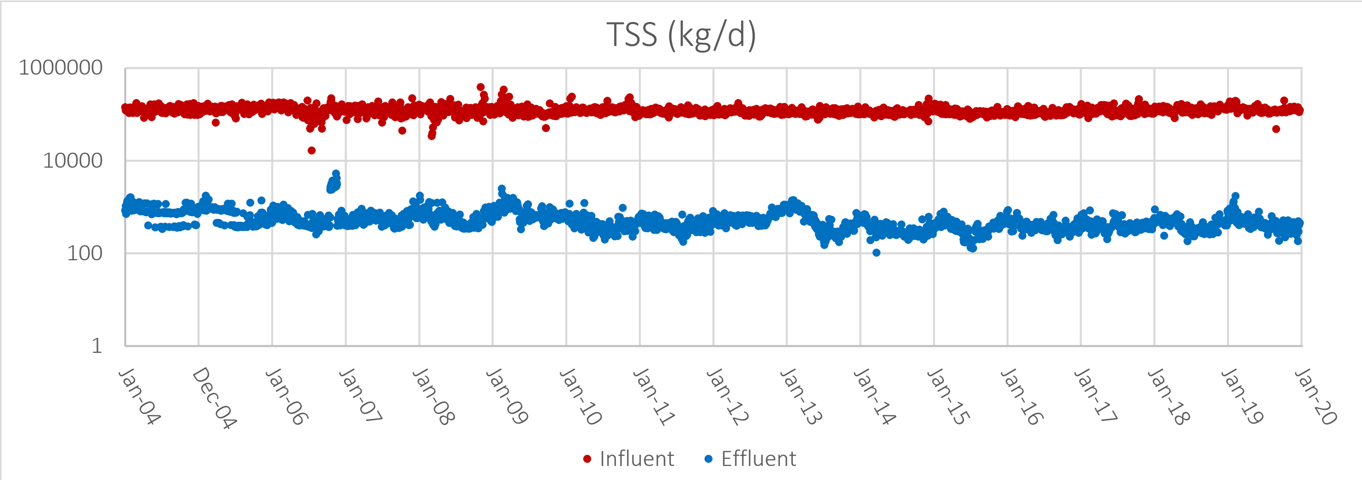


FIGURE 9 FACILITY TSS LOADINGS - 2004 THRU 2019

TABLE 13 TURBIDITY 2019 (NTU) HIGH LIMIT = 10 NTU

	Low	High	Average	2018 Average
Effluent	0.6	1.8	0.9	1.1

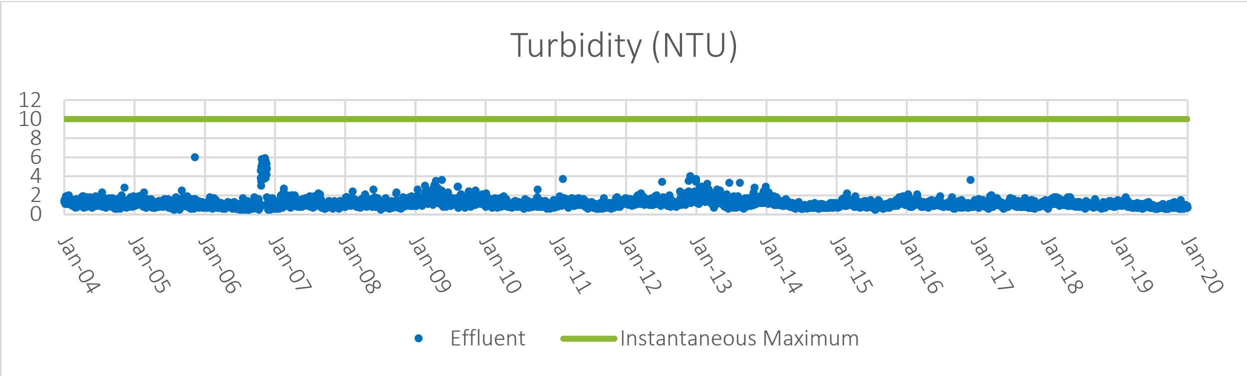


FIGURE 10 FACILITY TURBIDITY CONCENTRATIONS - 2004 THRU 2019

Total Ammonia

Practically all ammonia is removed. Chloramination process adds some back.

TABLE 14 AMMONIA N (mg/L) IN EFFLUENT AMEL = 3 mg/L MDEL = 8 mg/L

Year	Low	High	Average
2017	0.3	0.7	0.5
2018	0.5	1.3	0.6
2019	**0.4**	**1.1**	**0.6**

TABLE 15 AMMONIA LOADINGS 2019(kg/d)

	Annual Total	Low	High	Average	2018 Averages
Influent	4,894,403 kg	11,413	16,946	13,409	14,602
Effluent	79,315 kg	150	344	217	217

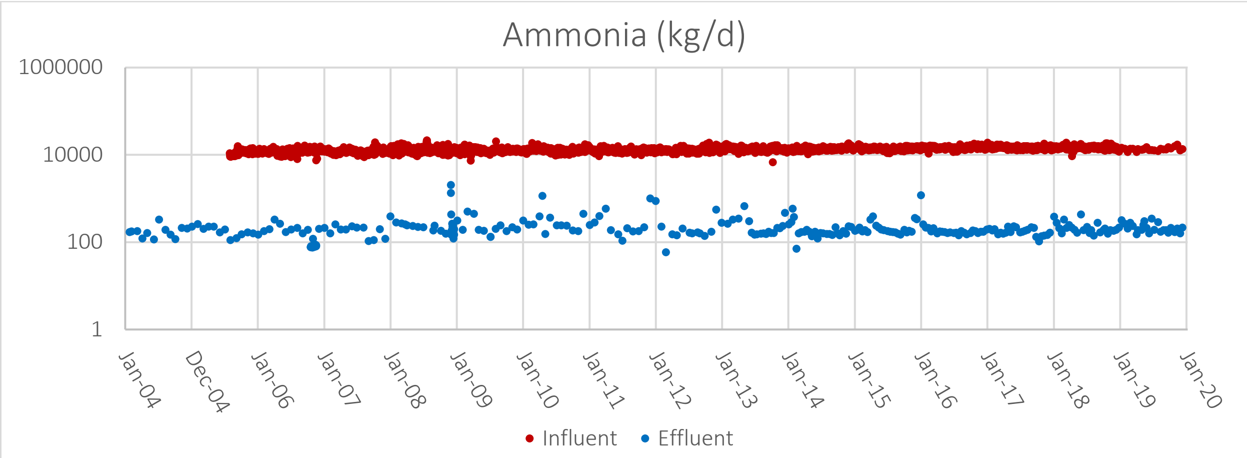


FIGURE 11 FACILITY AMMONIA LOADINGS - 2004 THRU 2019

b. Priority Pollutants

The Facility is required to perform twice per year monitoring of 126 priority pollutants listed in NPDES permit Table C of Attachment G. Most of these are organic compounds are never detected in effluent. The Facility has specific effluent limitations for 6 priority pollutants: Copper, Nickel, Cyanide, Dioxin, Indeno (1,2,3-cd) Pyrene, and Mercury. Ten additional metals and a few organic compounds from the priority pollutant list are typically detected at concentrations below applicable Water Quality Objectives.

Priority Pollutants with Effluent Limitations

The following tables summarize the past three years of influent and effluent water quality for the six priority pollutants for which the Facility has effluent limits. The charts represent the past 15 years of influent and effluent monitoring to display longer-term trends.

Copper

TABLE 16 COPPER (µg/L) AMEL = 11 µg/L MDEL 19 µg/L

Year	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2017	104	178	142	2.17	3.85	3.16	98%
2018	94	138	118	2.04	3.12	3.03	98%
2019	**58**	**94**	**81**	**2.11**	**2.82**	**2.36**	**97%**

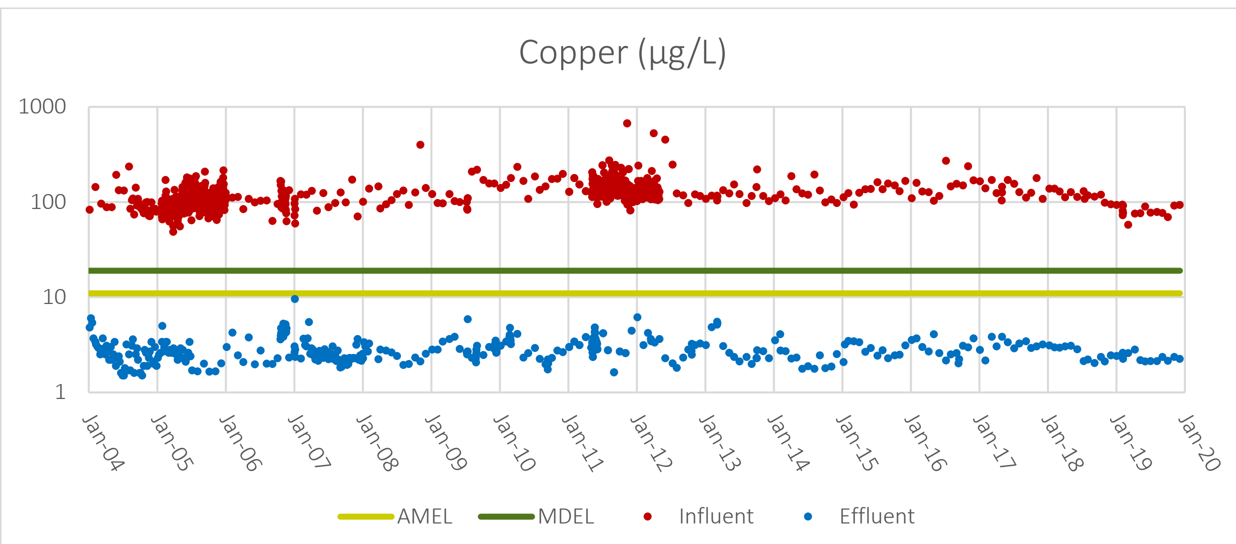


FIGURE 12 TOTAL COPPER (µg/L) REMOVAL PERFORMANCE - 2004 THRU 2019

Nickel

TABLE 17 NICKEL (µg/L) AMEL = 25 µg/L MDEL 33 µg/L

Year	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2017	7.01	19.40	9.36	3.42	5.92	4.59	51%
2018	6.55	19.30	9.11	3.84	6.29	4.69	49%
2019	**6.37**	**14.80**	**8.62**	**3.55**	**5.26**	**4.16**	**52%**

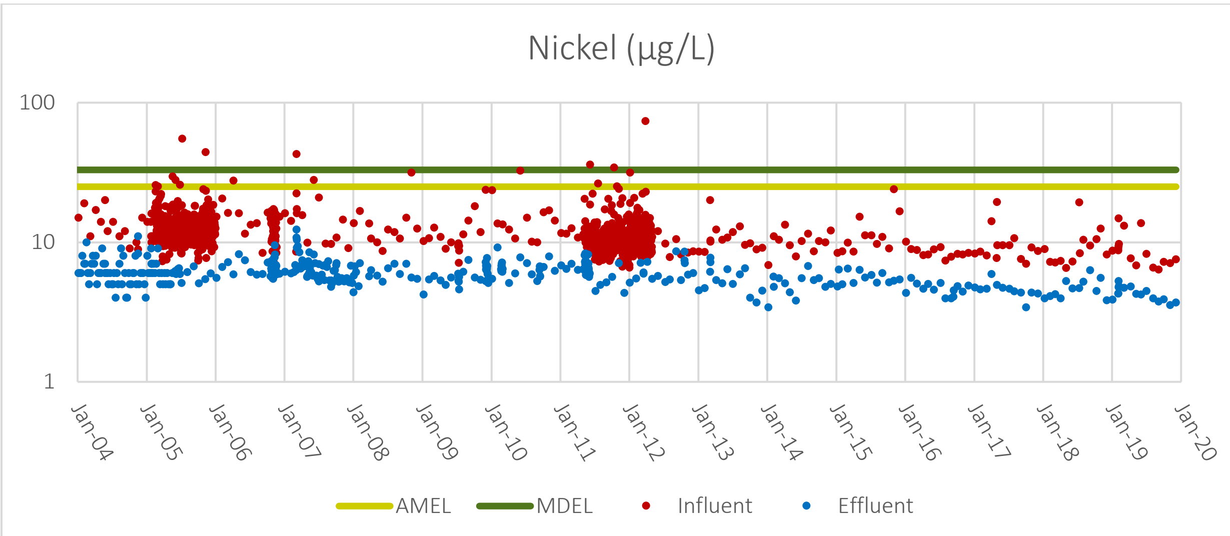


FIGURE 13 TOTAL NICKEL (µg/L) REMOVAL PERFORMANCE - 2004 THRU 2019

Cyanide

The Facility produces a small amount of cyanide from chloramination disinfection. Table 18 summarizes influent and effluent concentrations.

TABLE 18 CYANIDE (µg/L) AMEL = 5.7 µg/L MDEL 14 µg/L

Year	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2017	0.8(ND)	4.8	1.6	0.8(ND)	1.9(DNQ)	1.1	N/A
2018	0.9(ND)	1.8(DNQ)	1.6	0.9(ND)	1.3(DNQ)	1.0	N/A
2019	**0.9(ND)**	**2.0(DNQ)**	**1.1**	**0.9(ND)**	**2.0(DNQ)**	**1.0**	**N/A**

Mercury

TABLE 19 MERCURY (µg/L) AMEL = 0.025 µg/L

Year	Influent			Effluent			Annual Load
	Low	High	Average	Low	High	Average	kg/year
2017	0.054	0.185	0.126	0.00093	0.00135	0.00120	0.147
2018	0.058	0.134	0.099	0.00104	0.00195	0.00126	0.155
2019	**0.061**	**0.140**	**0.083**	**0.00094**	**0.00234**	**0.00128**	**0.170**

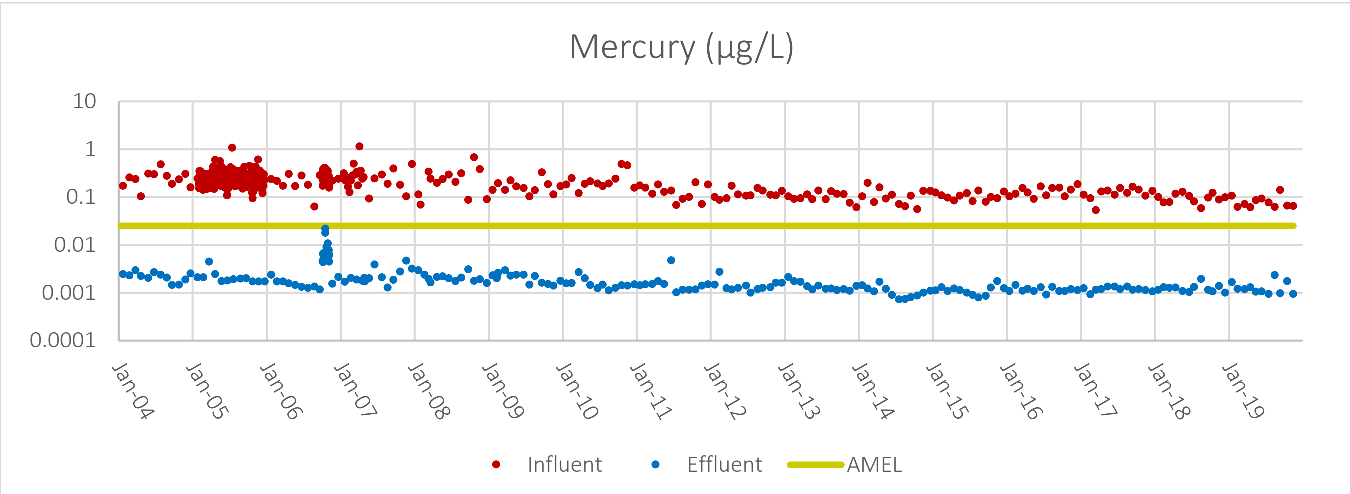


FIGURE 14 TOTAL MERCURY (µg/L) REMOVAL PERFORMANCE - 2004 THRU 2019

TABLE 20 MONTHLY MERCURY CONCENTRATIONS, FLOWS AND LOADS IN 2019

Sample Date	Mercury Concentration (µg/L)	Effluent Flow (MGD)	Mercury Load (kg/day)
1/3/2019	0.00100	88.45	0.000335
2/4/2019	0.00166	148.14	0.000932
3/5/2019	0.00120	119.06	0.000542
4/9/2019	0.00119	101.90	0.000460
5/8/2019	0.00130	91.11	0.000449
6/3/2019	0.00105	98.04	0.000390
7/2/2019	0.00106	83.27	0.000335
8/6/2019	0.00095	75.55	0.000272
9/4/2019	0.00234	78.92	0.000700
10/2/2019	0.00097	79.38	0.000292
11/5/2019	0.00175	79.67	0.000529
12/5/2019	0.00094	98.55	0.000351

Dioxin-TEQ

The 2014 NPDES Permit established an interim Effluent concentration limit for Dioxin-TEQ (toxic equivalence) of 6.3 x 10^{-5} µg/L and a monitoring frequency of twice per year. In 2016, an Alternate Monitoring and Reporting Permit (Order R2-2016-0008) revised monitoring frequency to once every five years. Dioxin has not been detected in final effluent.

Other priority pollutants

The following tables summarize the past three years of influent and effluent water quality for the priority pollutants for which the Facility does not have effluent limits. The charts represent the past 15 years of influent and effluent monitoring to display longer-term trends.

Arsenic

TABLE 21 ARSENIC (µg/L) WQO = 36 µg/L

Year	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2017	1.54	2.39	2.02	0.75	1.14	0.92	54%
2018	1.73	2.76	2.15	0.75	1.79	1.07	50%
2019	**1.60**	**2.40**	**1.88**	**0.79**	**1.31**	**0.97**	**48%**

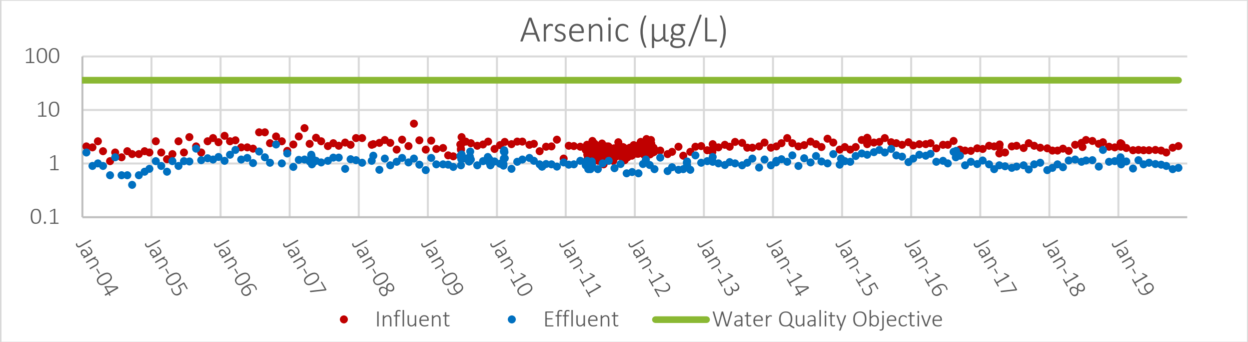


FIGURE 15 ARSENIC (µg/L) REMOVAL PERFORMANCE - 2004 THRU 2019

Cadmium

Table 22 summarizes influent and effluent levels as well as removal rates from the last three years. Figure 16 illustrates the removal trend from 2004 through 2019.

TABLE 22 CADMIUM (µg/L) WQO =7.3 µg/L

Year	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2017	0.08(ND)	0.28(DNQ)	0.17	0.02(ND)	0.03(DNQ)	0.021	88%
2018	0.12(ND)	0.43	0.20	0.03(ND)	0.03(DNQ)	0.03	85%
2019	**0.08(ND)**	**0.27**	**0.20**	**0.02(ND)**	**0.05(ND)**	**0.04(ND)**	**81%**

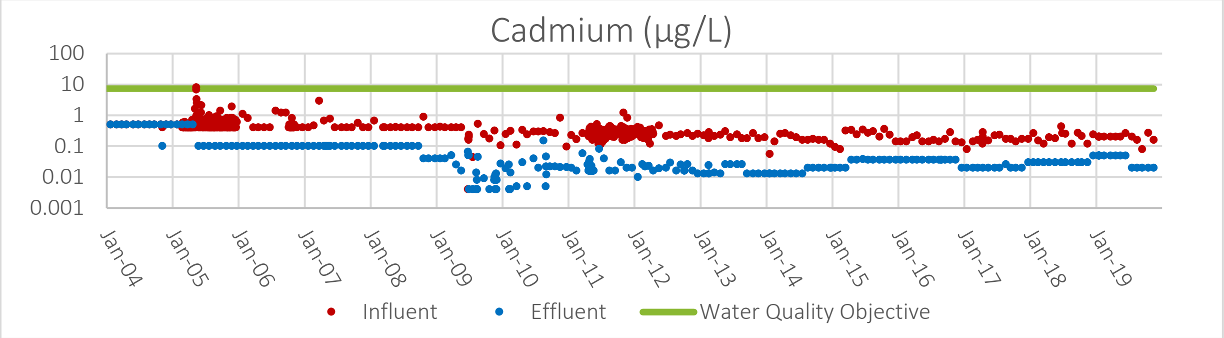


FIGURE 16 CADMIUM (µg/L) REMOVAL PERFORMANCE - 2004 THRU 2019

Chromium

The 2014 NPDES Permit allows measurement of total chromium instead of hexavalent chromium in Facility Effluent.

TABLE 23 CHROMIUM (µg/L) WQO = 180 µg/L

Year	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2017	4.61	7.52	5.73	0.36	0.71	0.47	92%
2018	4.80	8.88	6.52	0.37	0.55	0.44	93%
2019	**5.31**	**7.10**	**6.25**	**0.30(DNQ)**	**0.52**	**0.43**	**93%**

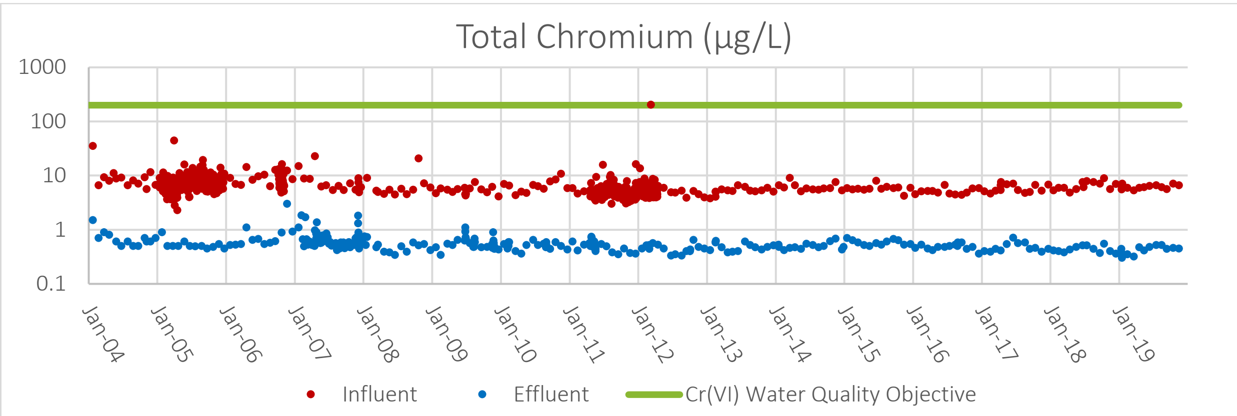


FIGURE 17 CHROMIUM REMOVAL PERFORMANCE - 2004 THRU 2019

Selenium

TABLE 24 SELENIUM (µg/L) WQO = 5 µg/L

Year	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2017	1.50	2.98	2.27	0.37	0.91	0.56	75%
2018	2.00	2.47	2.20	0.36	0.87	0.58	74%
2019	**1.73**	**4.41**	**2.25**	**0.35**	**1.17**	**0.61**	**73%**

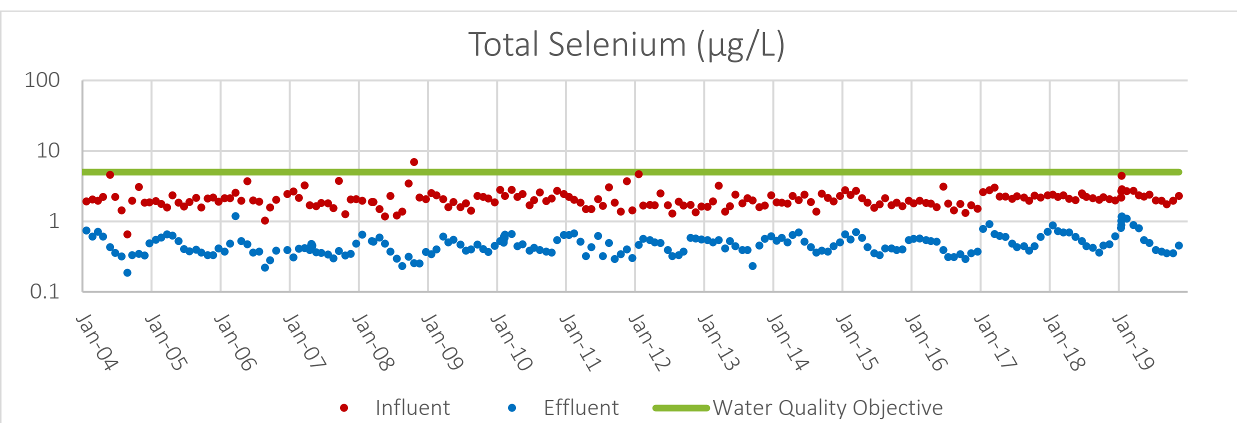


FIGURE 18 TOTAL SELENIUM REMOVAL PERFORMANCE - 2004 THRU 2019

Silver

TABLE 25 SILVER (µg/L) WQO = 2.2 µg/L

Year	Influent			Effluent			
	Low	High	Average	Low	High	Average	Removal
2017	0.33(DNQ)	0.76	0.56	0.0092(ND)	0.0092(ND)	0.009	98%
2018	0.29	0.75	0.51	0.032(ND)	0.032(ND)	0.032	94%
2019	**0.28**	**0.61**	**0.39**	**0.0037(ND)**	**0.042(DNQ)**	**0.026**	**93%**

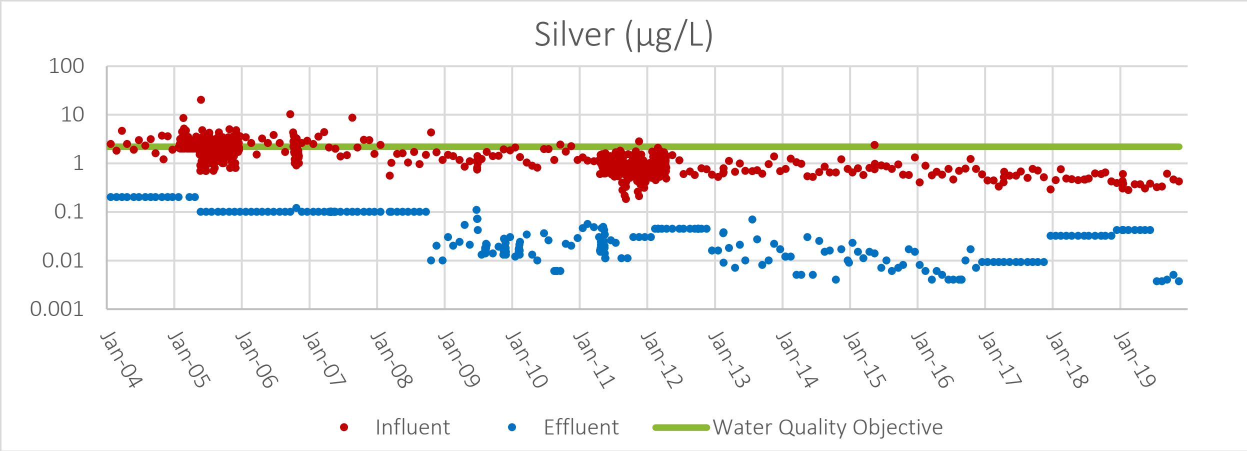


FIGURE 19 TOTAL SILVER REMOVAL PERFORMANCE - 2004 THRU 2019

Zinc

TABLE 26 ZINC (µg/L) WQO = 161 µg/L

Year	Influent			Effluent			
	Low	High	Average	Low	High	Average	Removal
2017	153	223	179	17.6	24.6	21.3	88%
2018	153	200	168	15.8	22.9	19.3	89%
2019	**114**	**181**	**150**	**14.0**	**20.2**	**17.3**	**88%**

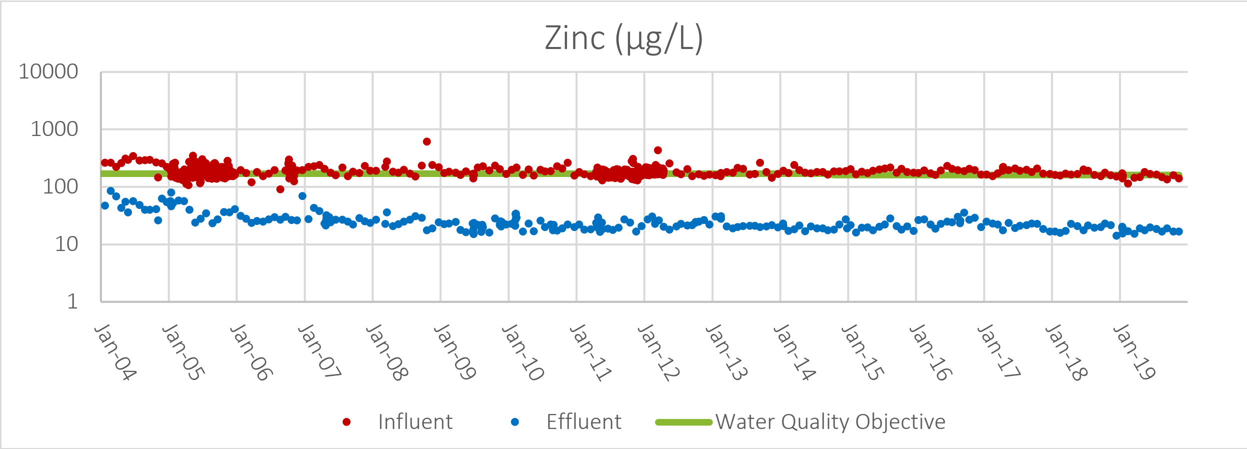


FIGURE 20 TOTAL ZINC REMOVAL PERFORMANCE - 2004 THRU 2019

Lead

TABLE 27 LEAD (µg/L) WQO = 135 µg/L

Year	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2017	1.86	7.51	3.24	0.06(DNQ)	0.13	0.09	97%
2018	1.71	4.23	2.46	0.05(DNQ)	0.15	0.07	97%
2019	**1.55**	**2.92**	**2.17**	**0.041(DNQ)**	**0.24**	**0.11**	**95%**

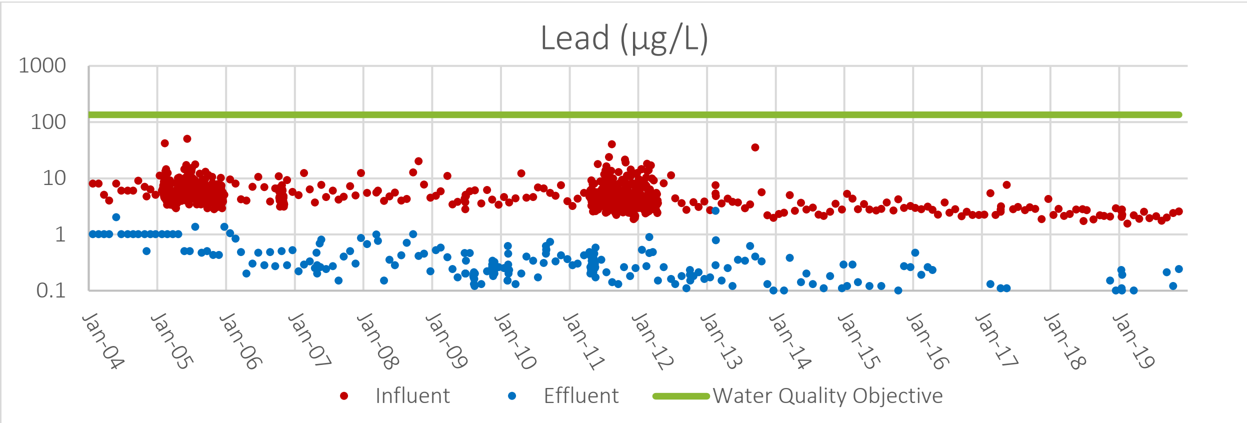


FIGURE 21 TOTAL LEAD REMOVAL PERFORMANCE - 2004 THRU 2019

Other metals

Concentrations for antimony, beryllium, and thallium for the last three years are presented below in Table 28, Table 29, and Table 30, respectively.

TABLE 28 ANTIMONY (µg/L) WQO = 4300

Year	Effluent			Removal
	Low	High	Average	
2017	0.34	0.49	0.14	N/A
2018	0.32	0.53	0.42	N/A
2019	**0.35**	**0.47**	**0.42**	**N/A**

TABLE 29 BERYLLIUM (µg/L) WQO = N/A

Year	Effluent			Removal
	Low	High	Average	
2017	0.0094(ND)	0.0094(ND)	0.0094(ND)	N/A
2018	0.0093(ND)	0.0093(ND)	0.0093(ND)	N/A
2019	**0.0064(ND)**	**0.0120(DNQ)**	**0.0065(ND)**	**N/A**

TABLE 30 THALLIUM (µg/L) WQO = 6.3 (CTR)

Year	Effluent			Removal
	Low	High	Average	
2017	0.032(ND)	0.13	0.042	N/A
2018	0.020(ND)	0.071(DNQ)	0.029	N/A
2019	**0.023(ND)**	**0.34**	**0.094**	**N/A**

Organic Priority Pollutants

The Facility's NPDES permit requires semi-annual monitoring of organic priority pollutants in effluent. This monitoring frequency was modified by Order R2-2016-0008, the *"Alternative Monitoring and Reporting Requirements (AMR) for Municipal Wastewater Dischargers for the Purposes of Adding Support to the San Francisco Bay Regional Monitoring Program (RMP),"* effective April 1, 2016. The AMR reduces monitoring frequency from twice-per-year to once every five years if discharger pays an additional RMP fee.

The Facility opted to reduce monitoring frequency and pay the AMR fee, so organic priority pollutants were last measured in February of 2016 (Table 31). Of 113 compounds analyzed, only three Volatile Organic Compounds (VOCs) were detected in Facility Effluent in 2016. The three detected VOCs were well below the most stringent water quality criteria (WQC) available.

TABLE 31 VOC CONCENTRATIONS IN 2016 ANALYSIS

Volatile Organic Compounds (µg/L)	February 2016	WQC
Chloroform	3.8	N/A
Dichlorobromomethane	1.2	46*
Toluene	0.45	200,000*

Indeno (1,2,3-cd) Pyrene

The facility has specific average monthly and maximum daily permit limits of 0.049 µg/L and 0.098 µg/L for this Polynuclear Aromatic Hydrocarbon (PAH). Accordingly, this is the only organic compound that must continue to be monitored quarterly regardless of the AMR. It was not detected in 2019.

Polychlorinated biphenyls (PCBs)

The Mercury and PCBs Watershed Permit, Permit #CA0038849, Order No. R2-2017-0041, requires twice per year monitoring of PCBs aroclors using USEPA method 608. Like organics monitoring requirements, frequency of aroclor monitoring was reduced to once every five years by the AMR. PCBs aroclors in effluent were not measured in 2019.

The Facility is also required to measure total PCBs by congener quarterly, using USEPA Proposed Method 1668c, for information only. Method 1668c data were collected in four times in 2019. PCBs congeners are reported as the sum of a subset of 40 congeners (SFEI 40) plus co-elutes. Since April 2011, only four of 33 sampling events have quantified any PCBs congeners (Figure 22).

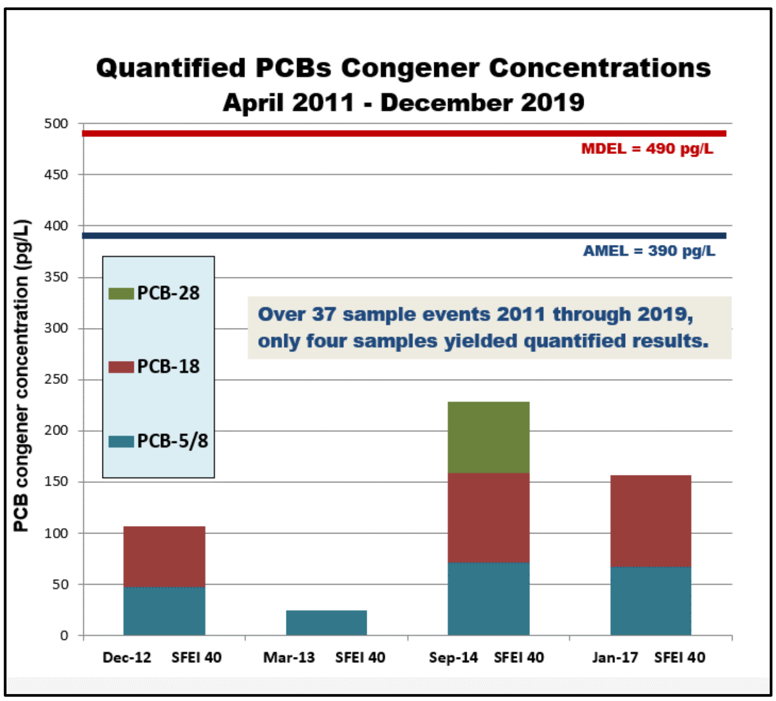


FIGURE 22 QUANTIFIED PCBS CONGENER CONCENTRATIONS 2011-2019

c. Nutrients

Effluent Nutrient Loadings in 2019

The Facility measures forms of nitrogen and phosphorus in effluent twice per month as required by the Nutrients Watershed Permit (NPDES No. CA 0038873, Order No. R2-2014-0014) from January through June, and as required by the reissued Nutrients Permit, Order No. R2-2019-0017 from July through December.

Nitrogen

Total Nitrogen (TN) is the sum of total ammonia (NH3), nitrate (NO3), nitrite (NO2), and organic nitrogen. Beginning in July, the Facility ceased measurements of organic nitrogen in effluent in response to changes in monitoring requirements in the new nutrients watershed permit. The new Permit emphasizes Total Inorganic Nitrogen (TIN), which is more biologically available. The reissued Permit also prioritizes dry season loadings of nitrogen and encourages dry season load reductions.

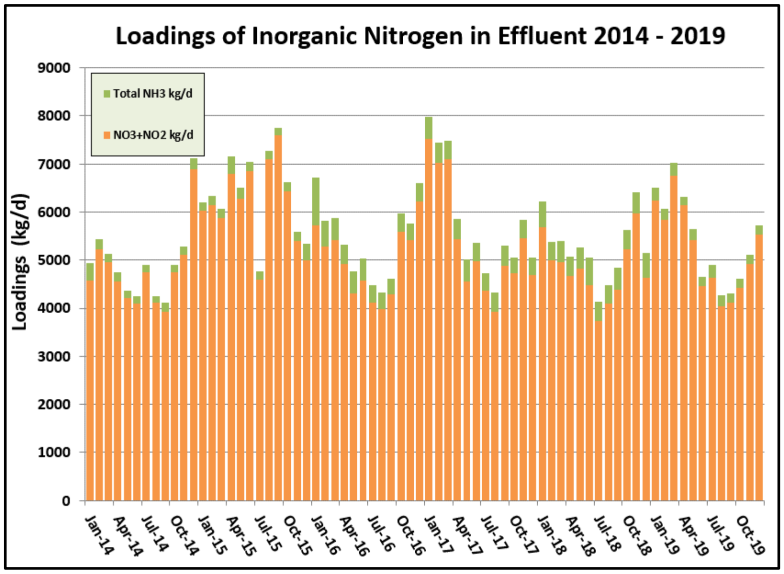


FIGURE 23 LOADINGS OF INORGANIC NITROGEN 2014-2019

Dry season discharged load of TIN averaged 4,742 kg/day in 2019. The discharged nitrogen was mostly as nitrate (NO3). Figure 23 illustrates loadings of inorganic nitrogen from 2014 through 2019.

Based on measured influent loads of 21,000 kg/day in 2019, in the dry season, roughly 78% of total nitrogen is removed through a combination of treatment (74%) and recycled water diversions (4%).

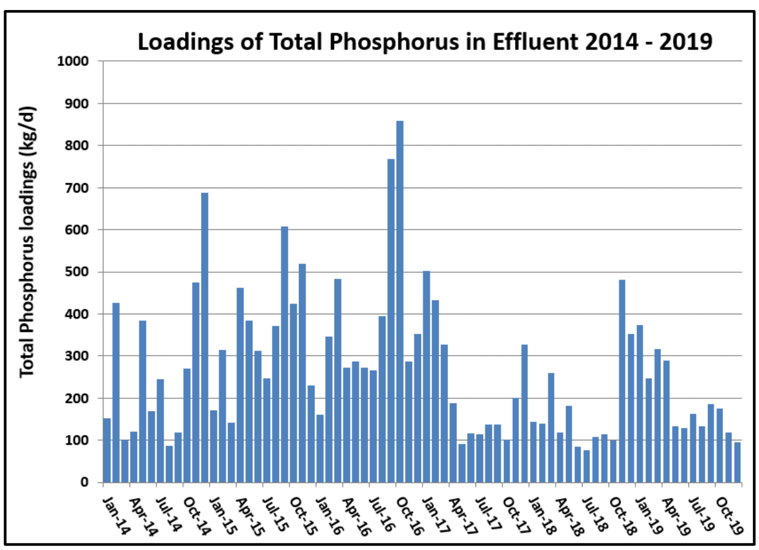


FIGURE 24 TOTAL PHOSPHORUS LOADINGS 2014-2019

Phosphorus

Discharged load of Total Phosphorus (TP) averaged 197 kg/day in 2019. Compared to typical measured influent loads of roughly 3000 kg/day entering the RWF in raw sewage, the Facility removed approximately 93% of TP through treatment in 2019.

d. Whole Effluent Toxicity

The Facility is required to measure for acute (lethality) and chronic (non-lethal) toxicity in its effluent using Whole Effluent Toxicity (WET) methods. These tests are conducted by the Facility's laboratory staff.

Acute Toxicity

Larval rainbow trout *(Oncorhynchus mykiss)* are used to evaluate acute toxicity of facility effluent quarterly using a 96-hour flow-through test conducted in accordance with EPA methods (Figure 25). Four tests in 2019 resulted in 100% survival of rainbow trout (Table 32). SJ-SC RWF has not failed an acute toxicity effluent test since its inception in 1987. The acute toxicity test requires: a 3-sample median result of not less than 90% survival and a single-sample maximum of not less than 70% survival.

FIGURE 25 AN ANALYST MEASURING WATER QUALITY DURING AN ACUTE TOXICITY TEST

TABLE 32 ACUTE TOXICITY TEST RESULTS 2014 THROUGH 2019

ACUTE TOXICITY TEST LARVAL TROUT		
ENDING DATE	EFFLUENT SURVIVAL	CONTROL SURVIVAL
01/17/14	100	100
02/14/14	100	100
03/21/14	100	100
04/25/14	100	100
05/23/14	100	100
06/27/14	100	100
07/25/14	100	100
08/29/14	100	100
09/26/14	100	100
10/24/14	100	100
11/21/14	100	93.3
01/31/15	100	100
04/24/15	100	100
07/24/15	100	100
10/23/15	100	100
02/12/16	100	100
04/22/16	100	100
09/20/16	100	100
10/11/16	100	100
01/28/17	100	100
04/28/17	100	100
08/20/17	100	100
10/06/17	100	100
01/26/18	100	100
05/25/18	100	100
07/23/18	100	100
11/09/18	100	100
02/17/19	100	100
05/24/19	100	100
09/01/19	100	100
12/06/19	100	100

Chronic Toxicity

The Facility has conducted monthly chronic toxicity testing using *Ceriodaphnia dubia* (water flea) evaluated for both reproduction and survival endpoints. The test has been conducted following EPA Methods since 1994. This year was uneventful with no toxicity detected in the Facility's effluent (Table 33). Chronic Toxicity Units (TUc) are calculated for each test by dividing the highest concentration of effluent tested (100%) by the test's IC25 value. The IC25 is the calculated concentration of RWF final effluent at which reproduction is reduced by 25% compared to test control animals. As defined in the RWF's NPDES Permit, accelerated monitoring is triggered if a 3-sample median value >1 TUc or a single sample result ≥2 TUc.

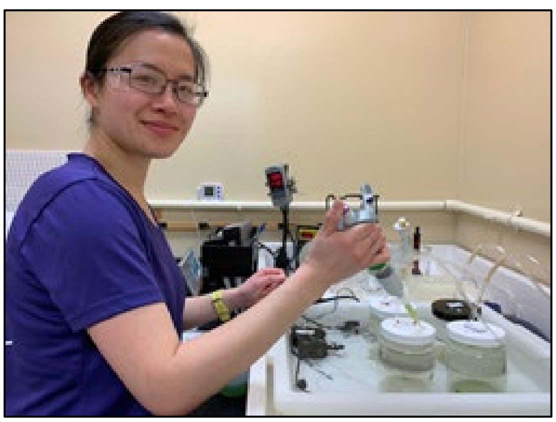


FIGURE 26 LABORATORY TECHNICIAN, AMY WONG FEEDING WATER FLEA CULTURES

Historically, the Facility has detected chronic toxicity in its final effluent on 42 occasions over a 26-year period with 25 of those occasions exhibiting very low magnitude (<2 TUc) and non-persistent toxicity. Furthermore, toxicity detections have been inconsistent, meaning the subsequent testing does not indicate ongoing toxicity in final effluent.

TABLE 33 CHRONIC TOXICITY TEST RESULTS FOR 2019

Start Date	Survival		Reproduction			TUc	TST
	NOEC	LOEC	NOEC	LOEC	IC25		
1/10/2019	100	>100	100	>100	>100	<1	PASS
2/7/2019	100	>100	100	>100	>100	<1	PASS
3/7/2019	100	>100	100	>100	>100	<1	PASS
4/12/2019	100	>100	100	>100	>100	<1	PASS
5/9/2019	100	>100	100	>100	>100	<1	PASS
6/6/2019	100	>100	100	>100	>100	<1	PASS
7/18/2019	100	>100	100	>100	>100	<1	PASS
8/8/2019	100	>100	100	>100	>100	<1	PASS
9/12/2019	100	>100	100	>100	>100	<1	PASS
10/4/2019	100	>100	100	>100	>100	<1	PASS
11/18/2019	100	>100	100	>100	>100	<1	PASS
12/12/2019	100	>100	100	>100	>100	<1	PASS

Low magnitude (<2 TUc) baseline toxicity is problematic when attempting to determine the cause of toxicity through a TIE as explained by EPA in their Guidance for Phase I TIE report. This is consistent with the inconclusive results of the Facility's previous TREs that were initiated following low level (<2.0 TUc) toxicity.

Planned Chronic Test Species Change

The Facility, in collaboration with a toxicology consultant, conducted a chronic toxicity species screening study of the Facility's effluent. The study began in December 2018 in coordination with the renewal of the NPDES Permit. Five taxonomically diverse species were tested using EPA approved methods over three phases and *Pimephales promelas* (fathead minnows) freshwater larvae (Figure 27) was determined to be the most sensitive species to the Facility's effluent. The proposal to change species from *Ceriodaphnia dubia* to *Pimephales promelas* was approved by the Regional Water Quality Control Board upon thorough evaluation of historical data and the species screening study.

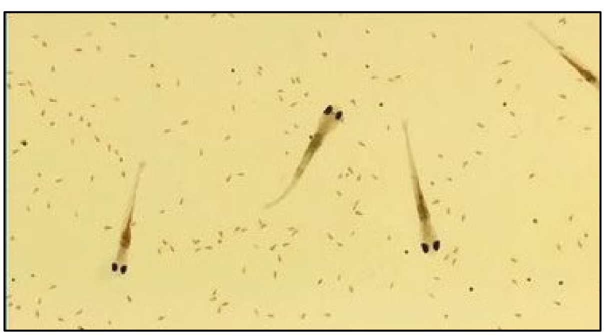


FIGURE 27 NEW TEST SPECIES: FATHEAD MINNOW LARVAE

TABLE 34 HISTORICAL CHRONIC TOXICITY TEST

Chronic Toxicity Result Summary			
Year	No. of Results		
	Reported	>1 but <2 TUc	>2 TUc
1994	12	0	0
1995	11	0	0
1996	13	1	1
1997	12	2	0
1998	12*	3	0
1999	14	0	2
2000	12	0	0
2001	12	0	0
2002	12	0	0
2003	12	0	0
2004	12	0	1
2005	12	0	1
2006	11	0	0
2007	13	0	1
2008	12	0	0
2009	14*	1	2
2010	19*	3	2
2011	14	2	1
2012	13	1	1
2013	14	4	3
2014	12	1	0
2015	13	3	0
2016	13	2	0
2017	15	1	2
2018	12	1	0
2019	12	0	0
* Some tests were duplicate test events			

Upon adoption, the new NPDES Permit will allow *Pimephales promelas* to serve as both the chronic and acute test species.

In anticipation of the upcoming changes, Facility staff has been training and is working towards Environmental Laboratory Accreditation Program (ELAP) accreditation for the new toxicity method.

2. Facility Annual Report Updates

The following annual update reports are submitted in accordance with NPDES Permit Attachment G.

a. Wastewater Facilities Status Report
b. Operations & Maintenance Manual (O&M Manual) Update
c. Contingency Plan for Operations Under Emergency Conditions

a. Wastewater Facility Status

NPDES Permit Attachment G requires annual update of Wastewater Facilities Status. This encompasses major wastewater facility operations or capital improvements over the past year. Activities that involve planning, assessing, and upgrading Facility assets are divided into six areas: 1) Property Management, 2) General Facility Status, 3) Operational Assessment, Infrastructure/Asset Management, Personnel, and Finance.

1) Facility Property Management

South Bay Shoreline Study

During the summer of 2019, pre-construction work activities on the flood control levee commenced. The US Army Corps of Engineers (USACE) completed truck hauling of levee import material to Pond A12 December 18, 2019. On December 5, 2019 the USACE advertised the Phase I Project Reaches 1, 2, and 3 for construction bidding and anticipate awarding in mid-January 2020, with the construction of Reach 1 (from Alviso Marina to the Union Pacific railroad) beginning in late January 2020. The Reach 1 right-of-way was acquired in September 2019 and the Santa Clara Valley Water District (project sponsor) anticipates full acquisition of Reach 2 and 3 right-of-ways by March 2020 with construction anticipated for Spring of 2020. City staff continues to coordinate with US Army Corps, California Coastal Commission, and Santa Clara Valley Water District on levee alignment and construction that will extend the levee across the RWF outfall and along the north and west sides of Facility biosolid lagoon areas. A project to design and construct a new final effluent pump station that will enable the RWF to continue to discharge final effluent even when the flood control levee is complete and closed was initiated by the CIP team in 2019.

Burrowing Owl Habitat

The western burrowing owl (Figure 28) population in the grasslands south of the RWF experienced challenging site conditions with heavy rains, flooding, and invasive weeds. Nonetheless, it continues to be the most successful burrowing owl colony in the Bay Area. In 2019, the Peak activity in 2019 occurred in June with 12 adults and 21 chicks, for a total of 33 owls. While number of individuals were lower than previous years, the reproductive success rate was higher with an average number of chicks per nest of 4.2 to 5.25 chicks per female. This is the largest mean brood size for successful nests recorded in the past five years according to the Santa Clara Valley Habitat Agency.

FIGURE 28 TWO BANDED ADULT BURROWING OWLS CAPTURED ON A MOTION ACTIVATED CAMERA "SHARING A SECRET."

Santa Clara Valley Audubon Society biologists and Santa Clara Valley Habitat Agency staff, who manage the RWF owl habitat, continued a supplemental feeding program for breeding pairs during the spring and summer. Their efforts boosted the nutrition for all owls and supported the owl population throughout the lower San Francisco Bay Conservation Area. The City continues to work with the Santa Clara Valley Habitat Agency and the Santa Clara Valley Audubon Society to manage and enhance the quality of the owl habitat under a 5-year management agreement by facilitating feeding support, protection, and repair of artificial burrows, and construction of new burrows. With this ongoing partnership, the burrowing owls' future at the RWF is looking bright!

2) General Facility Status

a) *Capital Improvement Program (CIP) Monthly Status Reports*

Monthly CIP status reports and many other CIP status update documents are available at this web address: https://sjenvironment.org/cip Status of key CIP projects are also summarized in the following sections of this report.

b) *Power*

Generators & Fuel Cell

Table 35 summarizes the RWF engine-driven generators and fuel cell. Three Engine Generators (EG-1, EG-2, and EG-3) and associated controls and switchgears were upgraded to work in tandem with the four new 3 MW emergency backup diesel generators in 2016 and 2017. Periodic "Black Start" tests are performed to demonstrate continued backup power reliability, keep staff familiar with backup power operating procedures, continue to test the new emergency generators, and tune existing engine generators to work seamlessly in event of power loss.

TABLE 35 SUMMARY OF ENGINE-DRIVEN GENERATORS & FUEL CELL

Engine-Driven Generators & Fuel Cell

Generator	Location	Year Built / Overhauled	Capacity (KW)	Operational Status
Emergency Backup (4)	West Side	2017	12,000	Standby
E-2	P&E Bldg.	1953/2002	800	Decommissioned in 2017
E-5	P&E Bldg.	1962/2008	1,750	Decommissioned in 2017
EG-1	Building 40	1994/2015	2,800	In Service
EG-2	Building 40	1983/2009	2,800	Standby
EG-3	Building 40	1983/2013	2,800	In Service
Fuel Cell	East Side	2012	700	Out of Commission

- The four 3 MW Emergency Backup Diesel Engines assume electrical load in the event that RWF power is lost or interrupted.
- Engine Generators, EG-1 and EG-3 are in service.
- EG-2 continues to available for use but is at "high hour" threshold. The unit is kept in standby until replacement by new cogeneration engines in 2020.

- New 3.5 MW units were witness tested in Germany in 2018 (Figure 29). The units will provide power to the facility along with heat needed for the digesters. The engines are designed to perform on low BTU, which will utilize all digester gas produced with a fifty percent blend of natural gas. The new control system will allow the Cat engines to work in tandem with the current engines.
- The fuel cell is out of commission indefinitely.

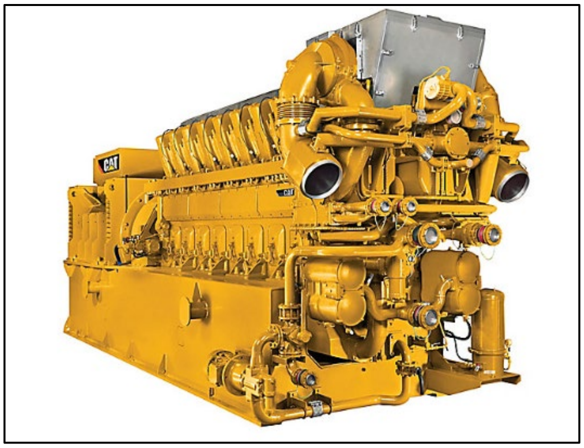


FIGURE 29 MANUFACTURER'S IMAGE OF ONE OF THE NEW 3.5 MW CG260-16 ENGINE GENERATORS

Construction of a new cogeneration building, adjacent to "Building 40" began in March 2018 and will house four new Caterpillar "CG 260-16" 3.5 MW engine generators (Figure 30). CG 260-16s are expected to fully replace existing cogeneration units by fall 2020. The new units are slightly smaller but more powerful with cleaner emissions than the 35 to 60-year old engines they will replace. After factory acceptance testing in Manheim, Germany in mid-2018, the four skid-mounted CG 260s were delivered in August and installed at the RWF (Figure 31). Beneficial use of the units is expected in September 2020 with final acceptance anticipated in January 2021.

FIGURE 31 A 330-TON CRANE PLACED EACH OF THE FOUR COGENERATION ENGINES ON ITS BASE

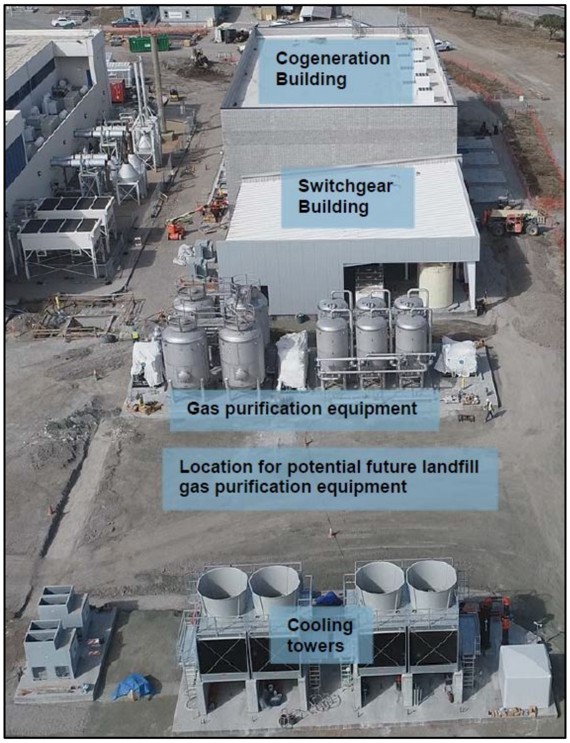


FIGURE 30 OCTOBER 2019: CONSTRUCTION OF THE NEW COGENERATION BUILDING

Blowers

Table 36 summarizes the on-site electric blowers.

Three large capacity electric Process Air Blowers (PABs) are located in Building 40. PAB-1 and PAB-3 are currently functional and reliable but run sparingly due to electrical cost. PAB-2 was taken out of service in 2019 as part of the blower upgrade project (Figure 32).

All Five "Tertiary Building Blowers" (TBBs), also known as nitrification area blowers, are operational.

All six engine-driven blowers in Secondary Blower Building (SBB) are operational. These blowers are also known as "Coopers," built by Cooper-Bessemer Corp).

FIGURE 32 BLOWER IMPROVEMENTS PROJECT PREPARING TO INSTALL A NEW ELECTRIC MOTOR TO IMPROVE THE AERATION SYSTEMS' RELIABILITY

TABLE 36 SUMMARY OF ELECTRIC BLOWERS

Electric Blowers			
3 - Building 40			
Blower	Capacity (BHP)	Start Date	Operational Status
PAB-1	4,000	1983	Standby
PAB-2	4,000	1983	Out-of-Service
PAB-3	4,000	1983	Standby
5 - Nitrification Building			
TBB N-1	2,250	1979	In Service
TBB N-2	2,250	1979	In Service
TBB N-3	2,250	1979	In Service
TBB N-4	2,250	1979	In Service
TBB N-5	2,250	1979	In Service
6 Engine-Driven Blowers *Secondary Blower Building*			
Blower	Capacity (BHP)	Startup Date	Operational Status
SBB A-1	2,345	1962/64	In Service
SBB A-2	2,345	1962/65	In Service
SBB A-3	2,345	1962/66	In Service
SBB B-1	1,855	1962/67	In Service
SBB B-2	1,855	1962/68	In Service
SBB B-3	1,855	1962/69	In Service

c) General Maintenance & Construction

Construction

Construction projects underway or completed in 2019 associated with Operational Areas are included in the Operational Assessment section. General construction projects that were performed or completed in 2019:

Environmental Services Building (ESB) Lab HVAC Ducting Replacement. Following a recommendation in the HVAC Improvements Project Condition Assessment completed in 2018, replacement of approximately 80 feet of corroded exhaust ducts in the ESB building was scoped and awarded to Kinetics Mechanical Service, Inc with construction beginning in November 2019. Five exhaust hoods and their support cabinets will also be replaced under this project, which is expected to be completed in 2020.

Electrical Distribution System Improvements. Electrical distribution throughout the Facility is delivered through a 4160 V Ring Bus System (Figure 33). Upgrades and improvements to the system have been ongoing and a CIP project to upgrade/replace Main Distribution station M4 and G3 and G4 Switchgears reached 100% design in 2019. The improvements will enhance load carrying capacity and strengthen the Ring Bus system.

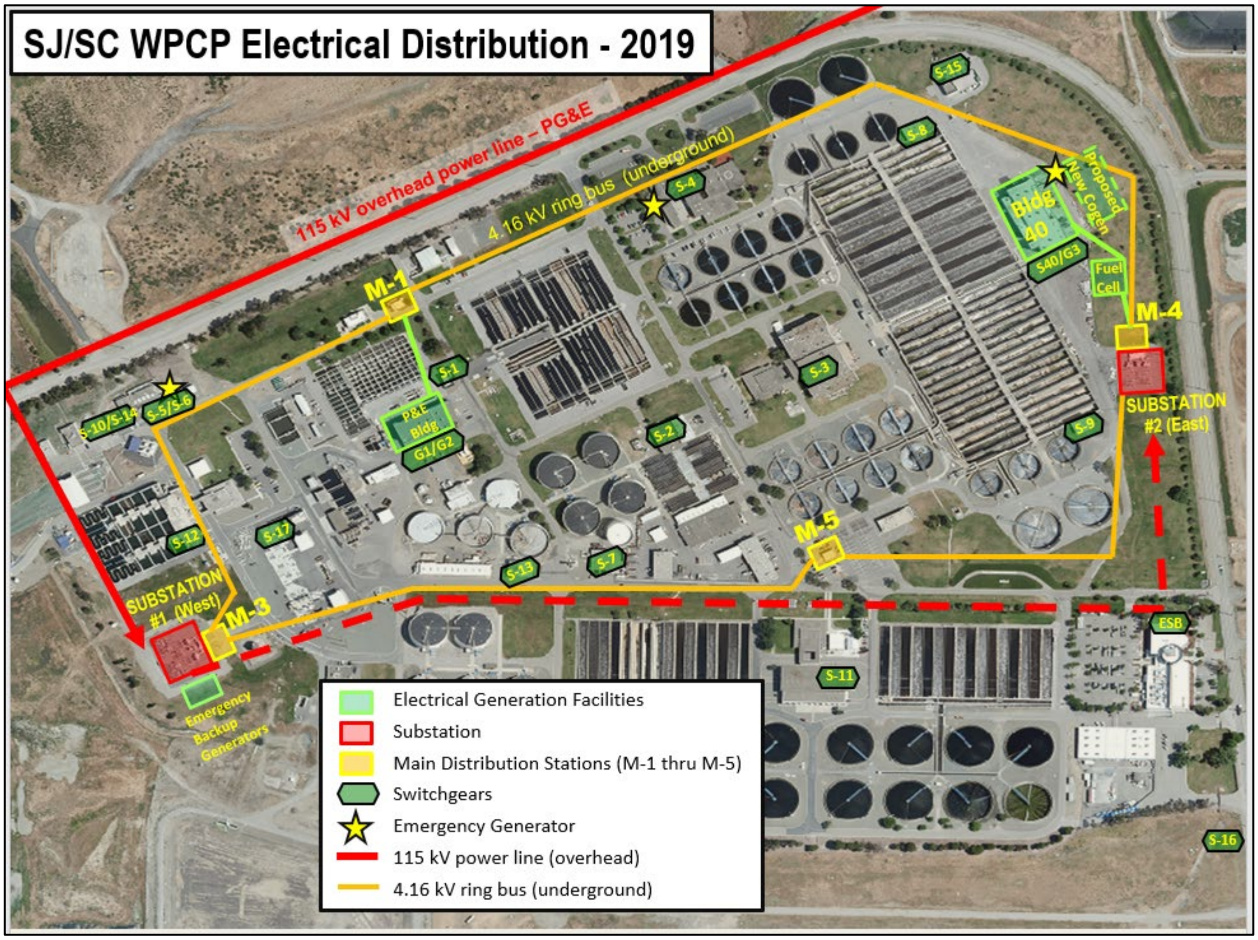


FIGURE 33 2019 ELECTRICAL DISTRIBUTION INCLUDING THE UNDERGROUND 4160 V RING BUS

c) Condition Assessments and Studies

The following studies, reports and condition assessments were completed or initiated in 2019:

Blower Improvements Project

The biological processes used to treat wastewater in the BNR-1 and BNR-2 require oxygen so microorganisms can perform treatment through respiration. The RWF has 14 blowers (6 engine-driven and 8 electric), that provide the oxygen for this process. The 14 blowers are between 36-57 years old. These aging blowers play a critical role in meeting discharge permit requirements for ammonia. The RWF performed a condition assessment that indicated the following:

- 10 of the 14 blowers should be upgraded.
- The 4 engine-driven blowers in the Secondary Blower Building will be decommissioned.
- Motors, instrumentation, and controls for the remaining 10 blowers need to be upgraded, but the blowers themselves still have a remaining service life of 30 years.
- Monterey Mechanical was awarded the construction contract in December 2018 and began construction in early 2019, with a project duration of 38 months and a construction cost estimate of $29.5M and an estimated overall cost of $52.3M.

- Process air flow meters, temperature and pressure transmitters, and valve actuators are also recommended for replacement.

Filter Rehabilitation Project

The RWF tertiary filtration process consists of 16 granular media filters and associated ancillary equipment. Many of the filtration process components (valves, electrical switchgear and control, filter media, piping, concrete) are nearing 40 years old and are in need of replacement or upgrade.

- Contractor Kennedy/Jenks completed a conceptual design report in January 2018 and submitted a 30% design report in July 2018.
- The construction cost estimate is approximately $31.6M
- The project will be delivered using the conventional design-bid-build approach and reached 60% design in 2019, with 100% design completion expected in early 2020.
- Award of construction contract is anticipated to be in fall 2020, with construction beginning November 2020. and beneficial use achieved in fall 2023.

Biosolids Future Disposition and Market Assessment Study

The Capital Improvement Program initiated a study to evaluate disposition options for the roughly 38,000 dry metric tons per year of biosolids that the RWF generates. Biosolids are currently sent to nearby Newby Island Landfill to be beneficially re-used as alternate daily cover (ADC), a disposition option that will be greatly restricted under future regulations (SB1383) when fully implemented. Furthermore, future biosolids processing via mechanical dewatering will result in a much wetter final product, further limiting the final biosolids use as ADC.

Contract Engineering firm Brown and Caldwell began the study in early 2019. A series of workshops, planning, and prioritizing study sessions were held to:

- Identify potential service providers for biosolids disposition other than ADC.
- Gather pricing and contract terms for the potential options.
- Recommend a procurement strategy.
- Produce an implementation plan that will help guide biosolids disposition decisions in the short, medium and long-term.

A draft report on the recommended procurement strategy and implementation plan was submitted to RWF in November 2019 and is expected to be finalized in early 2020.

3) Operational Assessment

a) Headworks

Facility headworks include both a newer headworks area (Headworks 2 or HW2) an old headworks area (HW1) and an upstream Emergency Basin Overflow Structure (EBOS) that receives flow from the main interceptor lines. Each headworks unit consists of bar screens and grit removal chambers to capture and remove screenings and grit material.

Figure 34 Iron salt feed station

An Iron Salt Feed Station at EBOS, after undergoing final testing in late 2018, was in service for 2019 (Figure 34). The Iron Salt station is comprised of four ferric chloride ($FeCl_3$) tanks and a pump station for injecting $FeCl_3$ into raw sewage as it enters the facility. $FeCl_3$ binds with sulfides to help reduce odors and sulfide emissions from digesters and engines.

A polymer injection station was also installed upstream of East Primary area to aid primary settling through chemically enhanced primary treatment (CEPT) by dosing 0.2 mg/L of polymer with the 10 mg/L ferric chloride. After undergoing demonstration testing in 2018, and relocation of the influent sampling point to a location upstream of the polymer injection location, the polymer was used for CEPT intermittently in 2019 to evaluate its effectiveness at enhanced solids and organics removal in east primary clarifiers.

New Headworks

A design-build project to construct a new headworks facility (Headworks 3 or HW3) to replace aging HW1 was awarded to CH2M Hill Engineers with Kiewit as the General Contractor in June 2018, and CDM Smith is serving as the Owner's Advisor. The project reached 60% design in 2019 following a comprehensive evaluation of cost, hydraulics, odor, O&M issues, environmental and social concerns, and selection of a new preferred site for the new HW3 that is near EBOS (Figure 35). Construction is expected to begin in Summer 2020. Estimated cost of HW3 is $150M with an estimated operational date of December 2022.

Figure 35 Proposed Site for New Headworks

b) Primary Clarifiers

West Primary

West Primary area (Figure 36) was brought back to serviceable condition in 2017 and has been used as needed during shutdowns of select East Primary tanks for necessary repairs. West Primary (part of the original 1956 facility) had been out of service for nearly a decade.

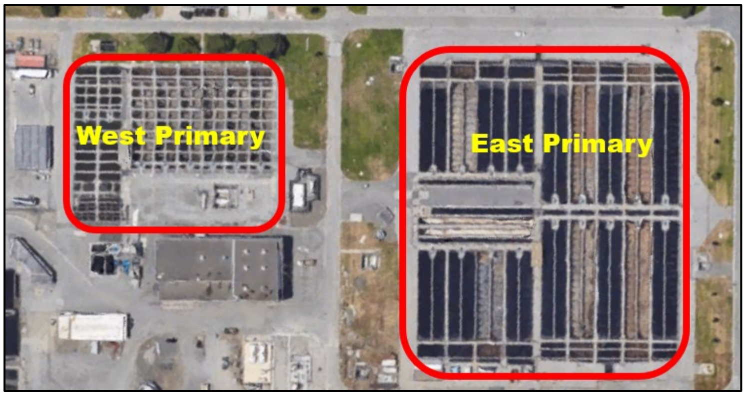


FIGURE 36 WEST AND EAST PRIMARY

East Primary

Following primary sedimentation in the primary clarifiers, primary effluent is piped from East Primary (Figure 36) to the secondary blower building (SBB) where it is then distributed to one of the four BNR process sections or to an equalization basin. Two settled sewage (SES) pipes, a 96-inch and a 87x136-inch, carry the primary effluent from East Primary to SBB. A project to evaluate these two pipes was initiated and scoped in 2018 and design of the plans to rehabilitate both pipes was completed in May 2019. The scope and design include:

- Rehabilitating the 96-inch SES pipe and performing concrete crown repair and epoxy coating for the 87x136-inch pipeline.
- Use existing re-route equipment that was used in the repair of the 78-inch primary effluent line in 2018 to re-route SES flows as work on the pipelines begins (Figure 37, Figure 38).
- Construction work on the SES rehabilitation project is anticipated to begin in Summer 2020 after all procurement for necessary equipment is in place.

FIGURE 37 SECTIONS OF 36-INCH HDPE PIPE, USED AS A TEMPORARY PIPING SYSTEM IN 2018 THAT WILL BE USED AGAIN FOR THE SES REHABILITATION PROJECT

FIGURE 38 TWO OF THE PUMPS UTILIZED IN THE TEMPORARY PIPING SYSTEM THAT WAS USED IN 2018 AND WILL BE USED AGAIN FOR THE SES REHABILITATION PROJECT.

In addition to the SES Rehabilitation Project, the Advanced Facility Control and Meter Replacement Project includes replacement of flow meters, valves, actuators, and sensors in East Primary as part of the design work for Phase 2. Phase 2 design work was completed in November 2019.

c) Digesters, Gas, & Sludge

Digester Status

Eight digesters are currently in service (Figure 39).

- Digesters 1, 3 and 16 were cleaned in 2019 and Digester 16 was restored to service upon completion.
- Digester 10 and 11 are in service and are the next digesters slated for cleaning in 2020.
- None of the Digesters are currently being cleaned and Digesters 9 – 16 are all in service as of December 2019.
- Digesters 2 & 4 suffer permanent structural degradation and will be eventually demolished.
- Digesters 5 thru 8 continue to be out of service pending rebuild as part of the Digester and Thickener Facilities Upgrade project.

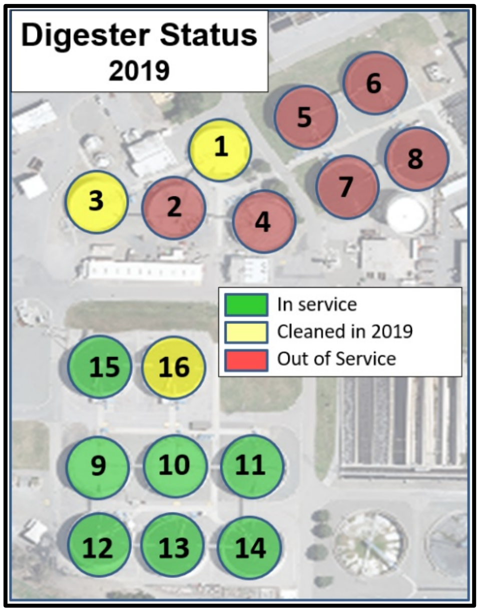


FIGURE 39 DIGESTER STATUS 2019

Digester and Thickener Facilities Upgrade Project

This project was initiated in 2016 and is currently at 85% completion (Figure 41). As part of this project, digesters 5 thru 8 will be converted to thermophilic digestion to allow Temperature-Phased Anaerobic Digestion (TPAD) in conjunction with the remaining mesophilic digesters, six DAFT tanks will be converted to operate as co-thickener units (primary and secondary sludges), a new primary sludge screening facility (Figure 40) will be constructed, along with two new electrical buildings, and external elevated gas piping and gas flare systems.

FIGURE 41 AERIAL IMAGE OF PROGRESS ON UPGRADES TO DIGESTERS 5 - 8

FIGURE 40 NEW SLUDGE SCREENING BUILDING NEARING COMPLETION

Highlights in 2019 include:

- Interior work on digesters 5 through 8 is nearly completed. Associated digester equipment, equipment pads and piping are still under construction.
- Permanent elevated, above-ground pipe racks nicknamed the "monorail" are nearly complete with all columns and foundations of the monorail complete (Figure 42).
- 5 in-service digesters (remote digesters) have been connected to the monorail piping and provide digester gas to the elevated pipes rather than tunnel pipes.

FIGURE 42 NEW PERMANENT ABOVE-GROUND PIPING RACKS: "THE MONORAIL" AT THE REMOTE DIGESTERS

- Caulking containing PCBs in the interior expansion joints of digesters and DAFT tanks was identified in 2017 during demolition. Under its TSCA authority, EPA fully approved a Phase 1 TSCA Application for remediation of soils contaminated with PCBs in February 2018 with a final risk-based approval application submitted in April 2018 that addressed possible contamination to both soils and adjacent concrete. Construction and demolition work have followed all remediation and testing conditions established in the EPA approval. All contaminated materials are being taken to Kettleman Hills Landfill in the Central Valley. Total cost for the PCBs soil cleanup has been $1.5M.

d) Biological Nutrient Removal (BNR)

The Biological Nutrient Removal (BNR) Process is carried out in two locations, historically referred to the "Secondary" and "Nitrification" areas, with each area having two batteries (A-side and B-side). The two areas employ the same 4-stage BNR process and are run in parallel.

Groundwater pressure relief valves (PRVs) are installed in all BNR aeration basins and clarifiers. These valves allow water from saturated soils around the subterranean concrete walls of the basins or clarifiers to enter empty basins if hydrostatic water pressure outside an emptied basin is sufficient to open the one-way PRV, preventing the basin from "floating" and experiencing

FIGURE 43 ALL FLAP VALVES GROUNDWATER PRESSURE RELIEF VALVES LIKE THE ONE IN BNR-1 (LEFT) WILL BE REPLACED WITH NEW STAINLESS STEEL VALVES (RIGHT)

significant structural damage. Replacement of the PRVs in BNR-2 clarifiers is included in the Nitrification Clarifiers Rehabilitation CIP projects described below. However, in April 2019, aging PRVs in the BNR-1 section (Figure 43) were observed and identified as assets needing replacement sooner than what would be achieved through the CIP program. In summer 2019, Facility Maintenance ordered and began replacing all PRVs in BNR-1 beginning with B-side on a rotating basis as basins were taken out of service. New Groundwater PRVs are stainless steel to replace the older cast-iron PRVs.

Secondary Area (BNR-1)

An Advanced Facility and Meter Control Replacement Project has been underway since 2016 when the RWF selected Black & Veatch as the design consultant to provide engineering services. The project will replace aging flow meters, valves, actuators, and sensors to ensure accurate and effective process control in the BNR process areas.

FIGURE 44 SECONDARY AREA (BNR-1)

- The Advanced Facility Meter Replacement Project is being implemented in two phases to align with planned maintenance shutdowns of the four BNR process areas.
- Phase 1 has been in the construction phase since July 2018 and will replace control equipment in the secondary (BNR-1, Figure 44) B-side batteries as well as the nitrification (BNR-2) B-side batteries and is expected to reach beneficial use by the end of 2020.
- Phase 2 will replace flow meters, valves and actuators, and sensors in the A-side batteries. Design work was completed in late 2019 and a contract is anticipated to be awarded by mid-2020.

Nitrification Area (BNR-2)

The RWF's 16 clarifiers (Figure 45) in the nitrification-BNR-2 section were constructed in the 1970s and 1980s. Following a previous series of shut-downs in the BNR-1 section to evaluate necessary repairs to degraded Return Activated Sludge (RAS) lines, a two-phase project to enhance the efficiency of the clarifiers and minimize unscheduled maintenance began. Engineering services contract was awarded to HDR Engineers and the project will follow the conventional design-bid-build approach. HDR completed 60% design for both phases in November 2018 with an estimated project cost of \$46M for Phase 1 and \$18M for Phase 2.

FIGURE 45 WORKER ON A CLARIFIER "TOW-BRO" ARM

- Phase 1 of the nitrification clarifiers rehabilitation project will replace clarifier mechanisms and appurtenances for 8 clarifiers, rehab up to 8 RAS pipelines, and install groundwater monitoring wells. Phase 1 will also replace drain valves, RAS valves, pressure relief valves, electrical and instrumentation control equipment for all 16 clarifiers in BNR-1. Design for phase 1 work was completed in April 2019 and construction is scheduled to start in January 2020.

- Phase 2 will follow completion of Phase 1 and will include rehabilitation of up to 8 of the remaining RAS pipelines and rehabilitation of the 8 remaining clarifiers. Phase 2 is at 60% design and is expected to reach detailed design in early 2022 following completion of phase 1.

Ongoing improvements to Secondary/BNR valves and meters and fine bubble diffuser maintenance has been steadily improving nitrogen control and removal. Incidents of ammonia and nitrite breakthrough have been greatly reduced since 2013. In 2019, BNR operations teams also began modifying aeration levels in the mixed liquor channels of BNR-2 (NA and NB in Figure below) to determine if additional denitrification could be achieved. Early results suggest additional nitrogen removal capabilities may exist without significant capital investments to basin and flow design (Figure 46).

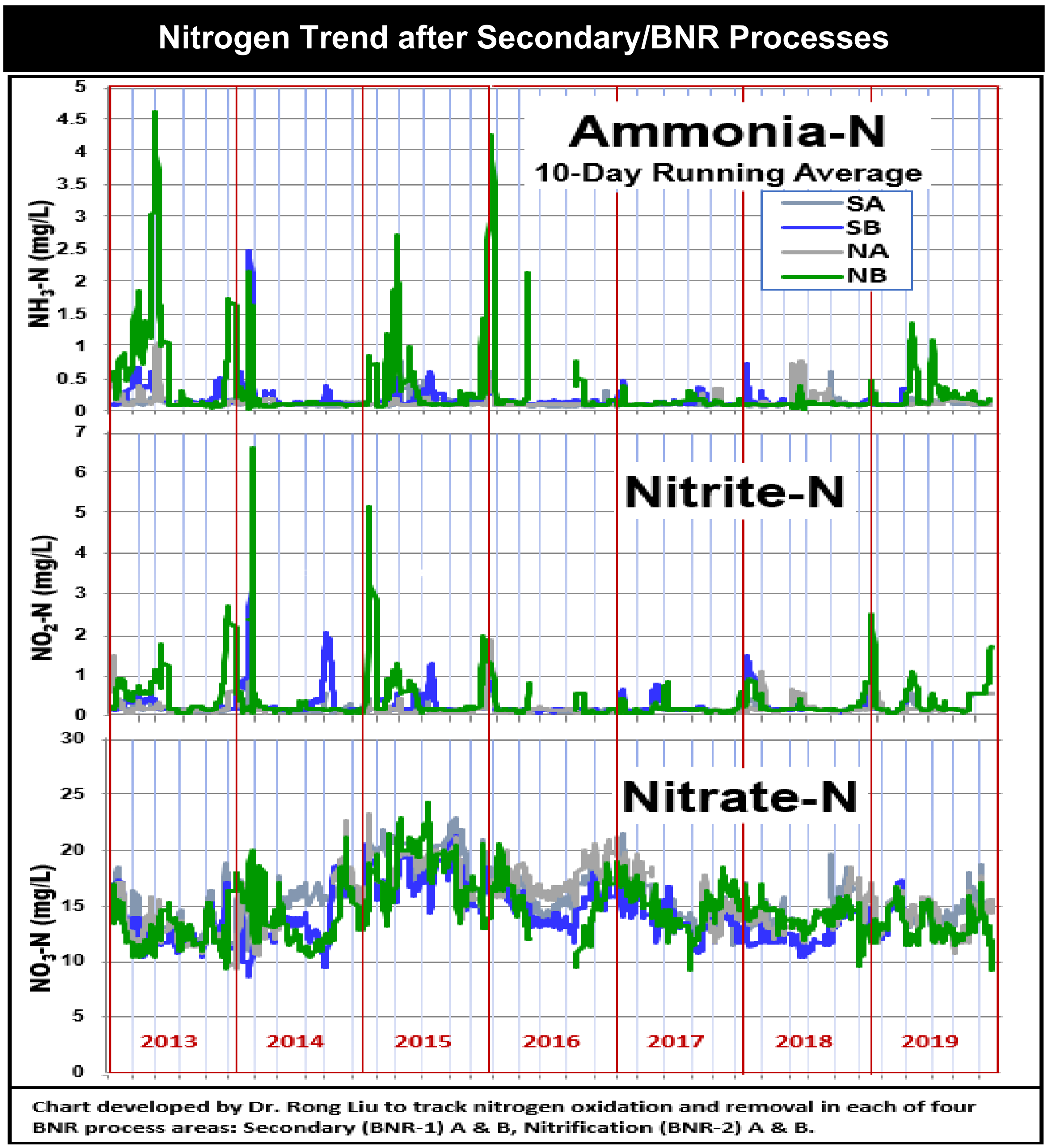


FIGURE 46 NITROGEN TRENDS AFTER SECONDARY/BNR PROCESSES

e) Filtration & Disinfection

The RWF tertiary filtration process consists of 16 granular media filters and associated ancillary equipment. The filtration process is one of the final treatment steps and is responsible for producing effluent that is in compliance with the RWF NPDES Permit and Title 22 requirements for recycled water.

Filter media replacement

As part of the condition assessment and pilot evaluations for the larger Filter Rehabilitation Project, a number of alternate media pilot testing projects have been conducted since 2015, including using monomedia (anthracite only) in filter bed A1.

- RWF Process Engineering Group completed a thorough evaluation of four different filter media configurations and included the use of air scour during filter backwash in their testing (Figure 47).
- Following extensive testing, the Process Engineering Group concluded that a filter media configuration of 34-inches of 1.4 – 1.5 mm anthracite mono media should be used in all 16 filters as part of the Filter Rehabilitation Project.
- In addition, the Process Engineering Group recommends that air scour should be installed in all 16 filters as part of the backwash process.

FIGURE 47 EVALUATION OF FOUR DIFFERENT FILTER MEDIA REPLACEMENT CONFIGURATIONS

Outfall Bridge, Levee, and Instrumentation Improvement Project

Following filtration, disinfection, and de-chlorination, the RWF final effluent is discharged to the outfall channel, which ends at the outfall weir bridge structure. The weir is the final point of regulatory compliance. Contractor AECOM provided a condition assessment report in June 2018 that evaluated the condition of the bridge, weir, monitoring instrumentation (including chlorine and flow meters), electrical components, and support buildings. In 2019, the final scope of the project was completed and includes:

- Replacing existing footbridge above the RWF outfall weir.
- Repair erosion scour along downstream edge of the outfall weir.
- Replace electrical transformer and water quality instrumentation at the outfall weir.
- Improve staff access to support buildings.
- Provide fiber optic system to support buildings and final effluent daylight station.
- Replace existing outfall pipe flow meters with new insertion-style flow meters that use doppler technology. New meters will greatly improve access to maintain and calibrate the flow meters (Figure 48).

Construction is anticipated to start in late 2020 with beneficial use forecasted for early 2022.

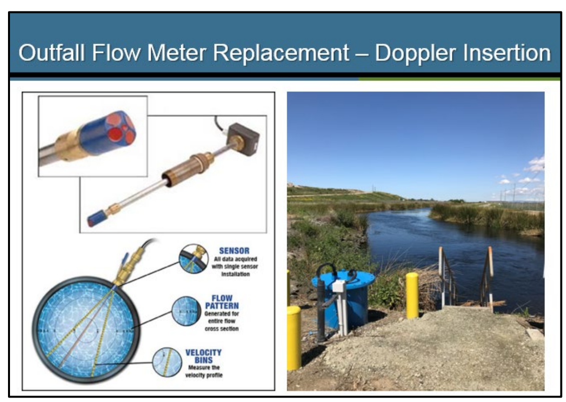


FIGURE 48 EXAMPLE OF DOPPLER INSERTION SENSOR TECHNOLOGY

4) Plant Infrastructure / Asset Management

Asset Management Support

The Asset Management Group oversees implementation of the Computerized Maintenance Management System (CMMS) and the Geographic Information System (GIS).

CMMS

The RWF has been using Infor Enterprise Asset Management (EAM) system as its CMMS system since July 2009.

- Infor EAM tracks life cycle acquisition & maintenance cost of thousands of pieces of equipment and infrastructure (vertical & linear assets) (Table 37).
- Warehouse inventory items are cataloged, and their usage is tracked.
- Non-inventory parts acquired through direct purchase by various shops are logged.
- Preventative maintenance is scheduled and tracked for appropriate equipment following manufacturer's recommendations.
- Work orders and purchase orders are tracked and analyzed for labor and material costs that are added to a work order history for future reference.
- The current Infor version 11.3 has been in use since April 2018 and has been well received by the end users. The group has been actively involved with preparations to integrate new equipment into the CMMS for new CIP projects coming online. This has been done through active engagement with the concerned process groups/shops and meetings with vendors/contractors.
- In 2019 the Iron Salt and Polymer Stations Project was completed, and the equipment is now part of the CMMS asset database. Similarly, after the new COGEN facility comes online, all its associated equipment will be integrated into the CMMS database.

TABLE 37 INFOR EAM TRACKING SUMMARY

Infor EAM (Enterprise Asset Management)	2017	2018	2019
Current Software version	V.11.2	V.11.3	V.11.3
Assets tracked; vertical and linear	15,650	15,061	16,543
Warehouse inventory items cataloged & tracked	5,450	5,153	5,162
Non-inventory parts/direct purchase items logged	2,950	3,122	3,328
Preventative Maintenance items scheduled/recorded	3,200	2,374	2,416
Work Orders created & executed (regular/other)	3,200/3300	3202/3283	3606/3373

GIS

The RWF Geographic Information Systems (GIS) group provides mapping, documentation, and field support for RWF operations, maintenance, electrical, and CIP/master planning groups. In addition, the GIS team runs the Subsurface Utility Damage Prevention Program.

The RWF GIS group continues to integrate technology into its workflow in the Facility's effort to provide increasingly accurate information to staff and consultants in a timely manner. With the recent acquisition of the Trimble TDC150 GNSS (Global Navigation Satellite System), staff will soon be capable of updating GIS data in a real time environment directly to the Enterprise Database while in the field with centimeter accuracy.

Data sharing has been a key concept within San Jose's GIS organizations and the RWF GIS group embraced a single Enterprise Database Architecture in 2019 (Figure 49). The group began integrating its key GIS data into the new Enterprise Database with the data owned and managed by the RWF GIS group with security, structure, and management executed by Public Works GIS group. This merging of resources ensures a secure robust database, reduces the creation of outdated data silos, and provides access to accurate and updated data to all users.

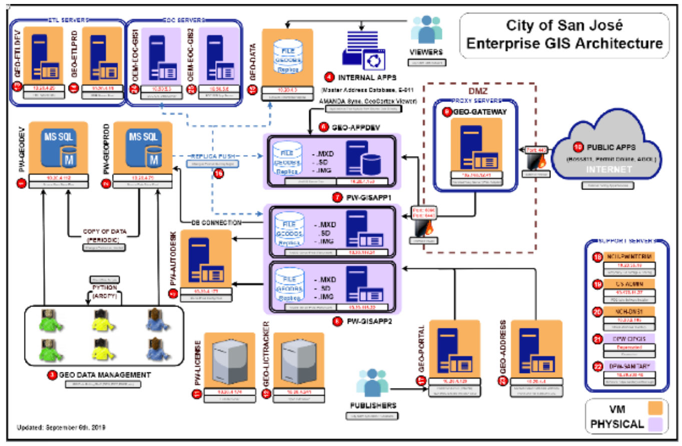


FIGURE 49 CITY OF SJ GIS ARCHITECTURE

Process Control Group

The RWF Process Control Systems (PCS) group oversees the administration, configuration, and maintenance of the Distributed Control System (DCS). The DCS is a collection of industrial computer controllers, networks, and input/output devices used to control, monitor, and report thousands of wastewater treatment processes and parameters throughout the facility.

The PCS group is actively engaged in the design/review process of most CIP projects. The role of the group is to verify that all equipment is correctly wired and networked into the DCS system and to guide or assist contractors with the creation of all code and graphics.

In addition, part of the 10-year CIP program includes a DCS upgrade project that is replacing the existing 25+ year old System Six DCS with a new Harmony DCS. Upgrades to the DCS system are being implemented through a phased, multi-year project with direction and leadership from the PCS team.

FIGURE 50 THE DCS WILL BE UPGRADE FROM SYSTEM SIX (LEFT) TO NEW HARMONY (RIGHT) CONTROLLERS

5) Personnel

The Facility, under direction of the Deputy Director of Wastewater Management, is supported by three principal divisions: Operations, Mechanical Maintenance, and Energy and Automation. Additional support is provided by Capital Improvement Program, Sustainability and Compliance Division, Environmental Laboratory, and an Asset Management group.

Facility operations, maintenance, energy, asset management and administrative staffing totaled 223 positions of which 38 were vacant at end of 2019. One groundsworker position was replaced by Maintenance Worker within the Maintenance department. Two industrial electrician and six wastewater operator positions were added in 19-20FY.

Vacancies included: 1 associate engineering technicians, 1 engineering technician, 3 industrial electricians, 2 instrument control technician, 2 maintenance workers, 1 painter, 1 senior air conditioning mechanic, 1 senior engineer technician, 1 senior painter, 4 wastewater attendants, 6 wastewater mechanics, 1 wastewater operations superintendent, 11 wastewater operators, 2 wastewater operations forepersons, and 1 wastewater senior mechanic.

Operations Division

80 positions are responsible for daily control of the treatment processes. A minimum of 8 personnel are on site at all times supervised by a wastewater operations foreperson, whose working title is shift foreperson.

In 2019, six state certified wastewater operators were hired, offset by 4 retirements and 3 separations.

Seven wastewater superintendents supervise seven functional areas: 1) computer room & shift forepersons; 2) training & scheduling; 3) primary & sludge control treatment; 4) biological nutrient removal treatment; 5) filtration & disinfection; 6) residual solid management; and 7) liaison for capital improvement projects. Superintendents are supported by 20 wastewater forepersons: 6 assigned to each treatment area, 6 to the computer room, 6 as Shift Forepersons, and 2 training forepersons. Wastewater superintendents and forepersons rotate through various assignments on about a two-year basis.

Facility Maintenance Division

67 positions are organized in three sections:

Mechanical Process Maintenance and CIP Support - repairs and maintains all mechanical equipment including, pumps, piping, rotating equipment, and structures, as well as provides design review and assistance in construction of various capital improvement projects.

Training, Scheduling, and Special Projects - administers and develops technical training for Wastewater Attendants Mechanics; researches and procures parts for mechanical equipment work orders; plans and schedules large maintenance projects.

Facilities and Maintenance - maintains all buildings on site, provides protective coatings for equipment and infrastructure, and is responsible for landscaping, warehouse, and bufferland management.

Energy and Automation Division

62 positions maintain electrical infrastructure, power generation, instrumentation, and process control systems. They are organized in four sections: Electrical & HVAC, Instrument Control, Power & Air, and Process Control. This Division also oversees Facility energy use and purchase of natural gas and electricity.

CIP Division

52 positions are responsible for design and construction of capital projects. CIP Division is comprised of 6 sections: Program Management, Power and Energy, Solids, Liquids, Facilities, and Process Engineering. Eleven positions are currently vacant. This Division is supported by co-located Public Works staff and consultant program management staff.

Environmental Compliance and Safety

16 positions. These personnel are comprised of environmental and regulatory analysts, scientists, and engineers who monitor, report, manage renewal of, and handle corrective action related to the National Pollutant Discharge Elimination System (NPDES) permit, air emissions permit, and health and safety regulations.

Environmental Laboratory

28 positions. Laboratory chemists, biologists, microbiologists, and laboratory technicians provide analytical support under California Environmental Laboratory Accreditation Program (ELAP), for Facility NPDES and Watershed Permits, and Pretreatment programs.

6) Finance

The Facility operates through a Joint Powers Agreement (JPA) titled "Agreement between San José and Santa Clara Respecting Sewage Treatment Plant" dated May 6, 1959. Under this "master agreement," the Facility is jointly owned by both cities and is administered and operated by City of San José. Through a series of additional "Master Agreements for Wastewater Treatment," five additional tributary collection systems hold rights to a share of SJ-SC RWF treatment capacity (Figure 51). In addition to cities of San José and Santa Clara, agreements cover: City of Milpitas, Cupertino Sanitary District, West Valley Sanitation District, County Sanitation District Nos. 2-3, and Burbank Sanitary District. Each agency retains sole ownership and responsibility of its own sanitary sewer collection system.

Each tributary agency prepares its revenue program annually. Rates are adopted by ordinance or resolution of the governing body of each Agency. Each Agency submits its revenue program to City of San José for review to determine conformity with State Water Board revenue program guidelines.

FIGURE 51 JPA CONTRIBUTING AGENCIES

Reserve Funds

The Wastewater Facility continues to maintain a Reserve for Equipment Replacement of $5.0 million according to its Master Agreement guideline, Clean Water Financing Authority (CWFA) Bond Covenants, and State Water Resources Control Board's Fund Loan Agreement policy.

2019-2023 Capital Improvement Program (CIP)

The 2020-2024 CIP provides funding of $1.39 billion, of which $399.3 million is allocated for 2019-2020. Revenues for the five-year CIP are derived from several sources: transfers from the City of San José Sewer Service and Use Charge (SSUC) Fund and Sewage Treatment Plant Connection Fee Fund; contributions from the City of Santa Clara and other tributary agencies; interest earnings; Calpine Metcalf Energy Center Facilities repayments; a federal grant from the US Bureau of Reclamation; and debt-financing proceeds.

- $252.3 million: transfers from the City of San José Sewer Service and Use Charge Fund.
- $314.8 million in contributions from the City of Santa Clara and other agencies.
- $753.3 million in wastewater revenue notes proceeds and bond proceeds. This element consists of short-term "bridge" financing until long-term bond funding is available.

A Plant Master Plan (PMP) was approved by City of San José and City of Santa Clara City Councils in November and December 2013. The PMP recommended more than 114 capital improvement projects to be implemented over a 30-year period at an investment level of roughly $2 billion.

Additional information can be found in the Water Pollution Control 2019-2020 Capital Budget at: https://www.sanjoseca.gov/home/showdocument?id=44950

Table 38 below provides 2018-2019 actual CIP expenditures & encumbrances as of June 30, 2019.

TABLE 38 CIP FISCAL YEAR-END EXPENDITURE

2018-2019 Capital Improvement Program Year-end Expenditure Summary				
	Appn	Project	Expenditure on 6/30/2019	Current Encumbrances
1	401B	OWNER CONTROLLED INSURANCE PROGRAM	1,345,886	0
2	402M	FLOOD PROTECTION	180,840	57,141
3	404V	STORMWATER IMPROVEMENTS	732,042	308,931
4	4127	DIGESTER & THICKENER FACILITIES UPGRADE	50,369,262	49,416,401
5	4332	EQUIPMENT REPLACEMENT	0	0
6	4341	PLANT ELECTRICAL RELIABILITY	704,465	88,455
7	5690	PLANT INFRASTRUCTURE IMPVT	1,233,486	285,961
8	5957	PUBLIC ART	189,137	223,342
9	6000	CITY-WIDE & PW CAP SUPPRT COST	626,415	0
11	6313	CONSTRUCTION- ENABLING IMPROVEMENTS	191,104	0
12	6584	PAYMENT FOR CWFA TRUSTEE	5,000	0
14	7074	NITRIFICATION CLARIFIER REHAB	2,148,108	388,638
15	7224	ADVNCD FACILITY CONTRL & METER REPLACEMENT	3,770,127	4,786,870
16	7226	E PRIMARY REHAB-SEISMIC & ODOR	0	0
17	7227	FILTER REHABILITATION	2,491,252	720,304
18	7230	IRON SALT FEED STATION	204,060	314,184
19	7394	T.P. DISTRIBUTD CONTROL SYSTEM	511,809	1,598,105
20	7395	URGENT & UNSCHEDULD T.P. REHAB	0	0
21	7396	YARD PIPING & ROAD IMPROVEMENTS	1,758,813	1,723,860
22	7448	HEADWORKS IMPROVEMENTS	973,303	462,036
23	7449	NEW HEADWORKS	4,687,500	2,437,394
24	7452	DIGESTED SLUDGE DEWATERING FACILITY	1,492,864	1,152,112
25	7453	COMB HEAT&PWR EQUIP REPR&RHAB	5,720	0
26	7454	ENERGY GENERATION IMPROVEMENTS	38,922,277	48,308,853
27	7456	PRELIMINARY ENGINEERING	270,223	674,737
28	7481	PROGRAM MANAGEMENT	6,189,481	2,288,980
29	7677	AERATION TANKS & BLOWER REHAB	2,300,257	36,612,674
30	7678	OUTFALL BRIDGE & LEVEE IMPROVEMENTS	526,098	379,633
31	7679	FACILITY WIDE WATER SYSTEM IMPROVEMENTS	305,400	905,715
32	7680	PLANT INSTRUMENT AIR SYSTEM UPGRADE	285,609	61,185
33	7681	SUPPORT BUILDING IMPROVEMENTS	1,154,628	654,924
34	7683	RECORD DRAWINGS	0	0
35	7698	TUNNEL REHABILITATION	4,539	0
		TOTAL	123,579,705	153,850,435

Operating and Maintenance Budget

ENVIRONMENTAL SERVICES DEPARTMENT

San Jose-Santa Clara Regional Wastewater Facility

FY 2019-20 Operating & Maintenance Budget Summary

Budget Summary	2018-2019 Actual Expenses	2018-2019 Adopted Budget	2019-2020 Base Budget	2019-2020 Adopted Budget
Personal Services	$55,313,312	$58,737,337	$60,951,905	$62,171,402
Non-personal Services	29,317,168	31,195,194	31,314,154	32,584,558
Equipment	493,968	906,000	906,000	906,000
Inventory	622,292	400,000	600,000	600,000
Overhead	11,919,978	13,466,283	12,459,172	12,459,172
NCH Debt Service	1,057,934	1,057,934	1,663,521	1,015,299
SCVWD- Adv. Water Treatment				1,000,000
SSUC Fund				2,266,575
Workers' Compensation	(434,389)	607,000	605,000	605,000
City Services	793,083	785,536	991,012	991,012
Total Operating Expenses	**$99,083,345**	**$107,155,284**	**$109,490,764**	**$114,599,018**

ESTIMATED COST DISTRIBUTION

2019-20 Estimated Total Gallons Treated (MG)	(1) Percent of Total Sewage Treated	City / District	2019-2020 Proposed
25,228.542	62.784	City of San Jose	$71,949,847
4,876.365	15.288	City of Santa Clara	$17,519,898
30,104.907	**78.072**	**Sub-Total**	**$89,469,745**
3,449.133	9.054	West Valley Sanitation District	$10,375,795
1,989.095	5.517	Cupertino Sanitary District	$6,322,428
2,253.310	6.196	City of Milpitas	$7,100,555
347.522	0.931	Sanitation District # 2 - 3	$1,066,917
86.180	0.230	Burbank Sanitary District	$263,578
8,125.240	**21.928**	**Sub-Total**	**$25,129,273**
38,230.147	**100.000**	**TOTAL**	**$114,599,018**

(1) Composite of four parameters (flow, BOD, SS, ammonia). Source 2018-19 Revenue Program.

Regulatory fees and membership dues

Major Permit Fees		Paid	Paid	Invoiced
Fees	**Agency**	**2017-18**	**2018-19**	**2019-20**
Permit: Annual NPDES Fee	State Water Resources Control Board	$525,537	$577,091	$653,081
Permit: Annual RMP Participation	Regional Monitoring Program – SFEI	$201,229	$210,819	$247,382
Permit: Alternate Monitoring Fee*	Regional Monitoring Program – SFEI	$9,726	$9,726	$9,726
Permit: Annual Air Permit Fee	Bay Area Air Quality Management District	$83,307	$70,198	$86,073
Fee: Annual Cap and Trade	California Air Resources Board	$303,438	$295,728	
Related Membership Dues				
BACWA Annual Dues	Bay Area Clean Water Agencies	$294,086	$296,034	$385,355
CASA Annual Dues	CA Association of Sanitation Agencies	$19,282	$20,053	$20,053

*A new "RMP Alternate Monitoring Fee" was established in 2016 that allows discharging agencies to elect to pay a supplemental fee in lieu of NPDES required quarterly and semiannual monitoring of EPA listed "Priority Pollutants."

b. O&M Manual Update

The RWF maintains an electronic Online Manual (OLM) and continuously updates Standard operating procedures (SOPs). Both the OLM and SOPs are accessible via the department intranet from any onsite networked computer. At the end of 2019, 679 documents were filed in the SOP library, which included SOPs and ancillary documents.

TABLE 39 2019 SOP COUNT BY RWF DIVISION

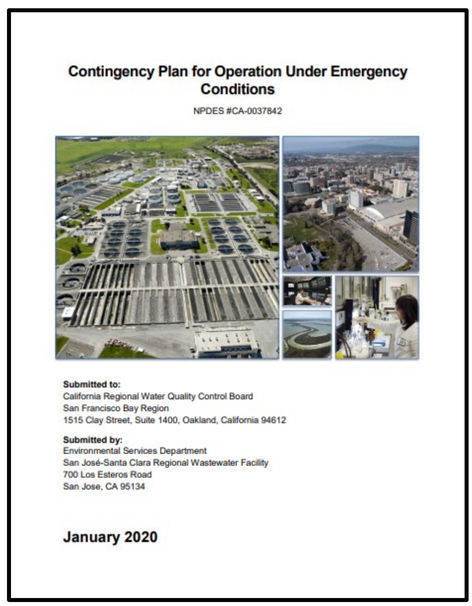
RWF Division	Number of SOPs
Operations	423
Maintenance	139
Energy & Automation	51
Support & Administration	66
Totals	***679***

Many SOPs are utilized by multiple divisions and workgroups. SOPs are cross-referenced so they appear in searches for all relevant groups. For example, Lock-Out Tag-Out (LOTO) SOPs appear under maintenance, operations, and energy.

- Operations includes process treatment areas, utility service, recycled water, and operations management SOPs.
- Maintenance includes all mechanical, paint shop, facilities and grounds keeping, and LOTO SOPs.
- Energy and Automation includes electrical, HVAC, instrumentation, and power & air SOPs.
- All other SOPs for general documentation, administration, asset management, regulatory compliance, safety, and security are under Support and Administration.

c. Contingency Plan Update

Since 1974, the facility has maintained a “Contingency Plan for Continued Operations Under Emergency Conditions.” The Plan was updated in January 2018 and was reviewed in early 2019 with no major revisions required. The Plan was reviewed again in December 2019 and revised in early January 2020 to reflect changes in personnel, plan holders, improve consistency between the Contingency Plan and other, internal emergency response plans, and include clarifying language on spill response. The Plan resides in SOP and Safety Libraries on the Facility’s network and hard copies are kept in key locations such as the Computer Room.


Contingency Plan for Operation Under Emergency Conditions

NPDES #CA-0037842

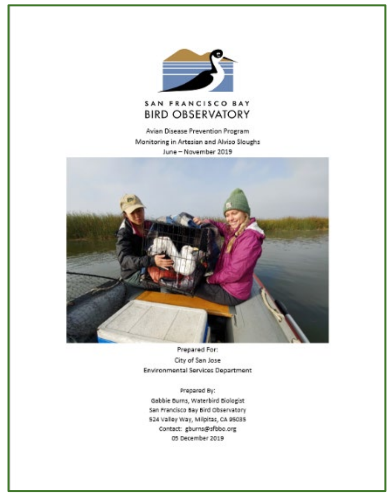
Submitted to:
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400, Oakland, California 94612

Submitted by:
Environmental Services Department
San José-Santa Clara Regional Wastewater Facility
700 Los Esteros Road
San Jose, CA 95134

January 2020

3. ENVIRONMENTAL MONITORING

a. Avian Botulism Monitoring


SAN FRANCISCO BAY
BIRD OBSERVATORY
Avian Disease Prevention Program
Monitoring in Artesian and Alviso Sloughs
June – November 2019
Prepared For:
City of San Jose
Environmental Services Department
Prepared By:
Gabbie Burns, Waterbird Biologist
San Francisco Bay Bird Observatory
524 Valley Way, Milpitas, CA 95035
Contact: gburns@sfbbo.org
05 December 2019

Since 1983, the Facility has contracted with San Francisco Bay Bird Observatory (SFBBO) to monitor for avian botulism outbreaks in the wastewater discharge vicinity from June through November.

In 2019, no outbreaks of avian botulism were detected. One injured and seven dead birds were found in the Artesian Slough – Lower Coyote Creek survey area over the six-month survey period from 3 June through 20 November. None of the sick birds were diagnosed with avian botulism. Additionally, ten dead fish were found and collected. Seven of the fish were striped bass.

The Avian Botulism Report is posted on the City's web site:

https://www.sanjoseca.gov/your-government/environment/regulatory-reports/-folder-71http://www.sanjoseca.gov/Archive.aspx?AMID=156&Type=&ADID

b. South Bay Monitoring and Beneficial Uses.

The SJ-SC RWF permit to discharge is designed to protect "Beneficial Uses" of Artesian Slough and Lower Coyote Creek. Beneficial Uses are designated by Regional Water Boards. Each Water Board is tasked to maintain a "Water Quality Control Plan" (AKA: Basin Plan) that, amongst other things, assigns Beneficial Uses to water bodies in the region.

1.4 WATER QUALITY CONTROL PLAN

By law, the Water Board is required to develop, adopt (after public hearing), and implement a Basin Plan for the Region. The Basin Plan is the master policy document that contains descriptions of the legal, technical, and programmatic bases of water quality regulation in the Region.

The plan must include:

- A statement of beneficial water uses that the Water Board will protect;
- The water quality objectives needed to protect the designated beneficial water uses; and
- The strategies and time schedules for achieving the water quality objectives.

http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/planningtmdls/basinplan/web/bp_ch1.shtml

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SJ-SC RWF NPDES permit (Order No. R2-2014-0034) identifies nine Basin Plan "Beneficial Uses" of Artesian Slough. These nine useful functions of water receiving treated wastewater must not be impaired or degraded. Beneficial Uses are listed in permit Table F-4 (page F-9 of the permit).

Nine beneficial uses of Artesian Slough

1. **Wildlife Habitat (WILD)**
2. **Fish Spawning (SPWN)**
3. **Warm Freshwater Habitat (WARM)**
4. **Cold Freshwater Habitat (COLD)**
5. **Fish Migration (MIGR)**
6. **Non-Contact Recreation (REC-1)**
7. **Contact Recreation (REC-2)**
8. **Commercial & Sport Fishing (COMM)**
9. **Rare & Endangered Species (RARE)**

SJ-SC RWF NPDES Permit, Order No. R2-2014-0034, Table F-4

To demonstrate protection of beneficial uses, SJ-SC RWF has conducted water quality sampling at several stations in Lower South San Francisco Bay since 1965. Originally, only Dissolved Oxygen (DO), pH, temperature, and turbidity were monitored monthly. Ammonia, nitrate, nitrite, and phosphate were added in 1975. Monitoring of certain metals was added in 1997. Two metals, copper and selenium, are monitored quarterly, in addition to DO, pH, temperature, turbidity and nutrients, although the 2019 monitoring plan was curtailed due to mechanical issues with the larger sampling vessel. This additional monitoring of Bay waters is not required under current NPDES permit. With the frequency of monitoring in the receiving waters, the beneficial uses REC-1 and REC-2 are routinely observed and documented (Figure 52).

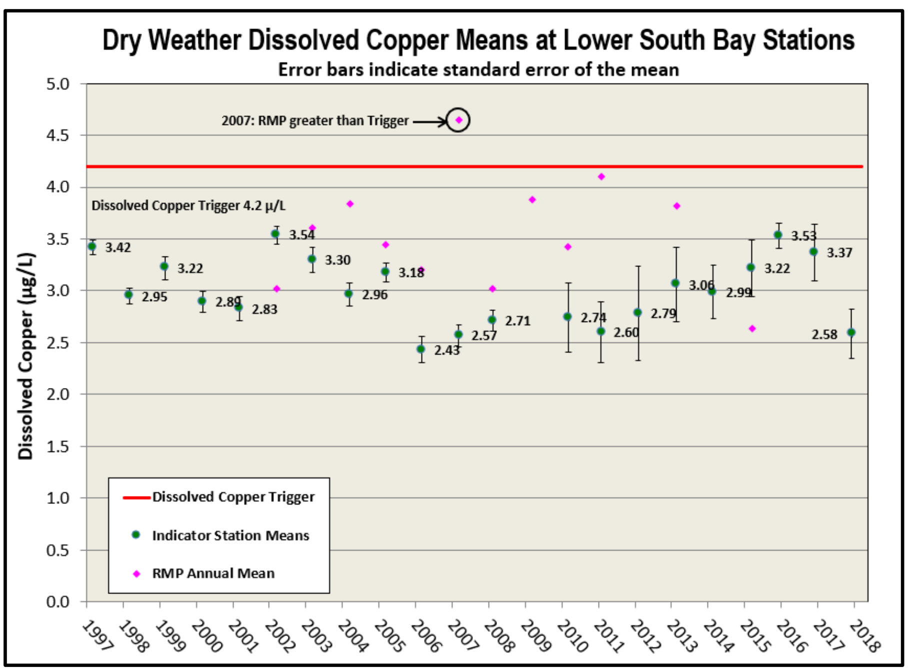
FIGURE 52 ANGLERS IN ALVISO SLOUGH: NOVEMBER 2019

Metals, nutrients, and water chemistry

Facility staff performs quarterly monitoring of Lower South San Francisco Bay receiving water by boat at 10 stations.

Copper Action Plan

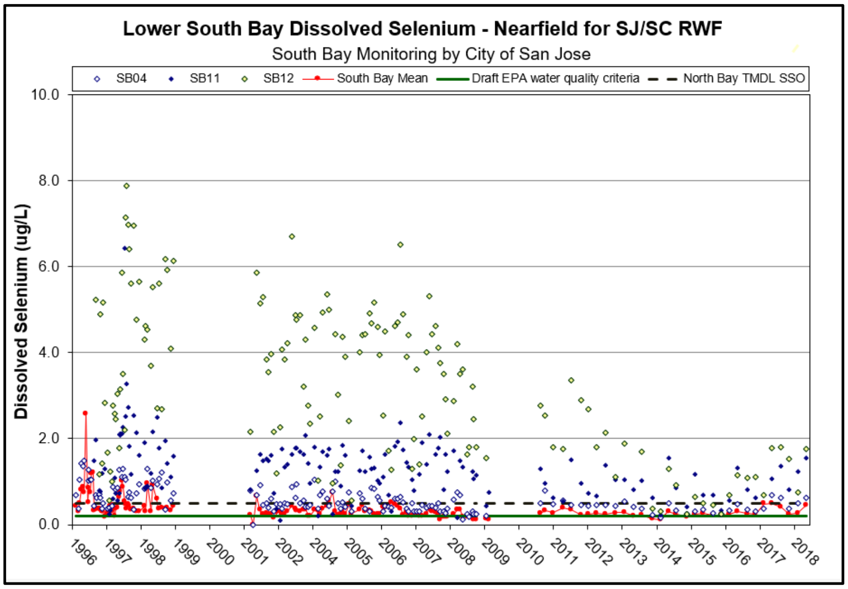
NPDES permits issued to the three Lower South Bay dischargers: SJ-SC RWF, City of Palo Alto, and City of Sunnyvale, include special provisions to "implement additional measures if … the three-year rolling mean copper concentration in South San Francisco Bay exceeds 4.2 µG/L …" The San Francisco Bay Regional Monitoring Program (RMP) collects water samples for metals only every other year. SJ-SC RWF dissolved copper data continues to demonstrate that concentrations are below the 4.2 µG/L threshold. Copper data generated by the SJ-SC RWF is shared and compared against RMP data at least annually. Copper monitoring did not occur in 2019 due to mechanical issues with sampling vessel the R/V Triplett.



Selenium

In 2016, EPA released draft criteria for selenium in San Francisco Bay that included individual criterion for water, fish, and bivalves. Fish are the most sensitive endpoint to selenium toxicity in the Bay. Water and bivalve criteria are derived from fish criteria based on North Bay food web modeling.

Decades of water column, bivalve, and fish tissue data collected in Lower South Bay indicate the proposed water column criterion are overly conservative and would result in unobtainable and unneeded permit limits for wastewater treatment plants.



SJ-SC RWF selenium data better informed the process leading to re-evaluation of the draft criteria in favor of a more common-sense, science-based approach to establishing selenium criteria. Selenium monitoring did not occur in 2019 due to mechanical issues with the sampling vessel the R/V Triplett.

Nutrient Monitoring

Because the RWF has fully nitrified since 1979, the facility discharges almost no ammonia. Since implementing the Biological Nutrient Removal (BNR) process in 1998, total nitrogen (TN) and total phosphorus (TP) concentrations are much lower than most other Bay Area facilities. However, nitrogen load, primarily in the form of nitrate, is high due to the large volume of treated water discharged that is sent to the RWF from the 1.5 million residents and 17,000 businesses in the service area.

EPA and Regional Water Board continue to be concerned that nitrogen loads typically grow with human population. In light of this concern, SJ-SC RWF started performing additional nutrient analysis of receiving water in 2012. This monitoring helps establish baseline conditions to better assess potential impacts on beneficial uses. The RWF discharges consistent nitrate and phosphorus

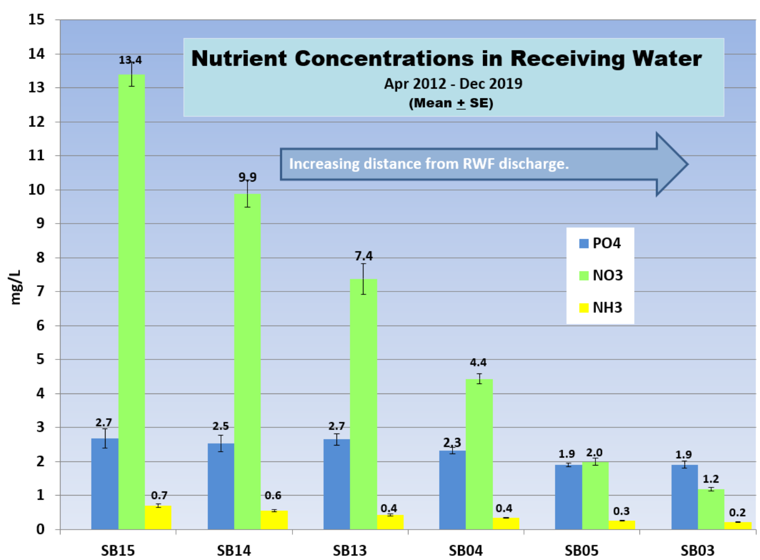


FIGURE 53 NITRATE, AMMONIA, AND PHOSPHORUS CONCENTRATIONS IN RECEIVING WATER

concentrations throughout the year. Concentrations in the receiving water decrease steadily as water flows out to the Bay (Figure 53).


California Water Boards
Gavin Newsom, Governor
Jared Blumenfeld, Secretary for Environmental Protection

San Francisco Bay Regional Water Quality Control Board

ORDER No. R2-2019-0017
NPDES No. CA0038873

WASTE DISCHARGE REQUIREMENTS FOR NUTRIENTS FROM MUNICIPAL WASTEWATER DISCHARGES TO SAN FRANCISCO BAY

The following dischargers are subject to waste discharge requirements (WDRs) set forth in this Order, for the purpose of regulating nutrient discharges to San Francisco Bay[1] and its contiguous bay segments:

San Francisco Bay Regional Water Board issued a region-wide watershed permit (Order No. R2-2014-0014) to address municipal wastewater discharges of nutrients in 2014 (Nutrient Permit). After five years of monitoring, load assessment, science development to determine impacts and future scenarios, and evaluations of nutrient reduction opportunities that came out of the first Nutrient Permit, the Water Board reissued a second Nutrient Permit in 2019 (Order No. R2-2019-0017). The new Permit incorporates many of the lessons learned and knowledge gleaned from the first Nutrient Permit. Among those lessons were that although nutrient loads to the Bay remain high and 62% of those loads are coming from municipal wastewater treatment plants, the science does not fully support the need for nutrient load caps at this time. The Fact Sheet (attachment F) of the second Nutrient Permit states:

> "Several years may be needed to determine an appropriate level of nutrient control and to identify management actions necessary to protect San Francisco Bay beneficial uses. This Order is the second phase of what the Regional Water Board expects to be a multi-permit effort."

The majority of SJ-SC RWF biological monitoring in Artesian Slough and Lower Coyote Creek, described in following sections, is aimed at generating data to show relationships between nutrient loads and biological response in local sloughs and salt ponds.

Physical Parameters: Dissolved Oxygen, Temperature, Salinity

Dissolved Oxygen

Dissolved Oxygen (DO) is consumed by living organisms in the aquatic environment. Dissolved inorganic nitrogen (ammonia, nitrite, and nitrate) in Facility effluent, can act as a fertilizer to stimulate excessive growth of algae (primary production). Primary production is essential for a healthy ecosystem and food web, but too much production can draw down DO concentrations to the point that fish and invertebrates suffocate. Nitrate concentrations flowing from Artesian Slough are known to be high. The question is, whether DO further downstream is adversely affected.


FIGURE 54 BRYAN FRUEH DEPLOYING A CONTINUOUS WATER QUALITY METER IN COYOTE CREEK

Continuous DO Monitoring.

Because DO fluctuates over relatively short durations, continuous DO data is useful for evaluating DO conditions.

During 2019, a YSI 6600 sonde was deployed for 30-day intervals on a bi-monthly basis at the Railroad Bridge in Coyote Creek (Figure 55). The sonde collects DO, pH, Conductivity, and Temperature data, at 15-minute intervals. This monitoring plan was an increase in the number (6) and duration (30 days) of deployments compared to 2017 when the continuous monitoring effort was piloted. The initial 2017 pilot effort was dubbed "Project Stonehenge" because 2-week deployments corresponded to seasonal equinoxes and solstices for 4 deployments per year. Repeated theft and vandalism of the deployed sonde in 2018 caused a number of setbacks and data loss. Data collection resumed in 2019 after RWF staff evaluated logistical and safety options before resuming continuous DO data collection. The partial year of data is still under QA/QC review.

Warmer temperatures reduce oxygen solubility in water and increase metabolic activity and respiration which consumes DO. Previous continuous DO data characterized local estuarine conditions over several tidal cycles during each seasonal event. DO drops as temperature rises in summer through fall; the reverse happens in winter through Spring. This data not only characterizes water quality in Lower Coyote Creek, but it can also serve as information into observed negative conditions such as fish kills, which rarely occur.

FIGURE 55 MAP OF MONITORING LOCATIONS FOR THE RWF'S LOWER SOUTH BAY AMBIENT MONITORING PROGRAM

Biological Monitoring

To investigate nutrient impacts, SJ-SC RWF staff began sampling water and sediment samples for biota along Artesian Slough and Lower Coyote Creek in 2016, 2017, 2018, and 2019 (Figure 55).

A healthy estuarine environment relies on phytoplankton, which are microscopic algae, that serve as the primary producers to fuel the rest of the estuarine food web. Like terrestrial plants, phytoplankton also need nitrogen to grow, so these primary producers are a direct indication of how much nitrogen in the system is being utilized for algal growth. Phytoplankton cells contain chlorophyll that can be measured as a concentration to evaluate population density or biomass.

Chlorophyll.

RWF staff began collecting monthly chlorophyll samples in May 2017, which are then measured by in-house staff at the ESD Laboratory. Laboratory staff use sample prep and analytical methodology that have been refined by the USGS Menlo Park Water Quality Monitoring Group. The USGS Lab also provided training and conducted an inter-lab comparison study that ensured the ESD Laboratory was generating chlorophyll-*a* data comparable to the that used in the rest of the Bay to assess condition. This data quantifies the magnitude of phytoplankton blooms in Lower Coyote Creek. Like many healthy estuarine systems, this region experiences a phytoplankton bloom in late spring and often in mid-fall. However, chlorophyll density can be extremely high. Chlorophyll concentrations in the range of 20 to 40 µg/L are generally considered bloom conditions. Here, concentrations have exceeded 80 µg/L during the spring bloom. Maximum concentration in 2019 was 76 µg/L in November at station SB14, which is mid-Artesian Slough (Figure 56).

January and March 2019 sampling runs had to be canceled due to mechanical issues with both sampling vessels.

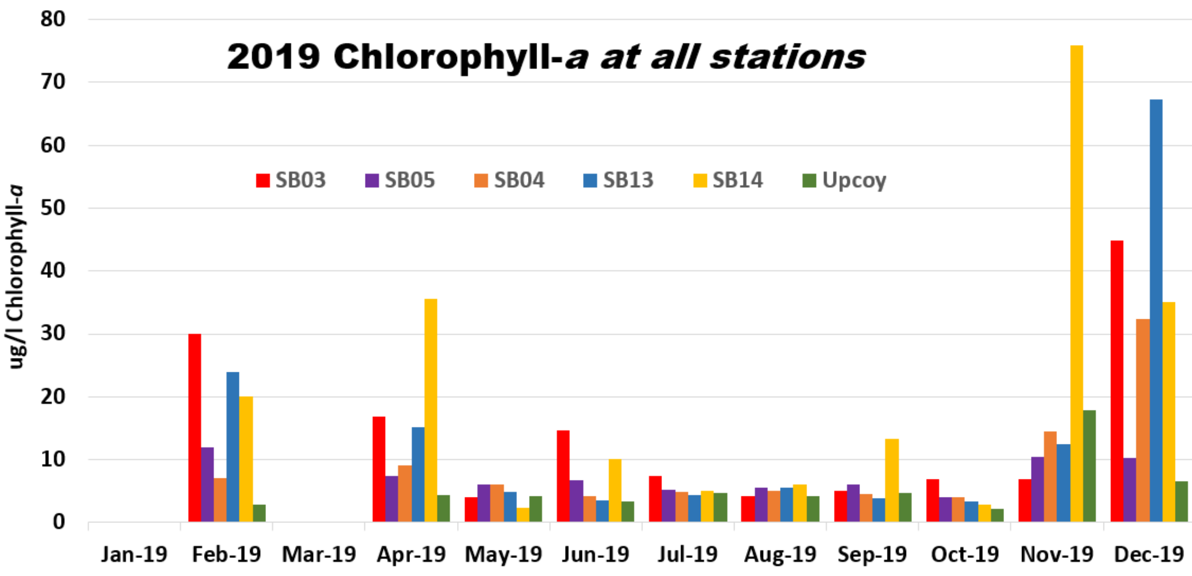


FIGURE 56 CHLOROPHYLL-*A* CONCENTRATIONS IN 2019

Average chlorophyll concentrations decline along a downstream gradient from Artesian Slough to the Bay. This supports the hypothesis that nitrate-rich effluent from the RWF may be fertilizing portions of Lower Coyote Creek. However, shallow marshes and sloughs also generally support high phytoplankton growth. The exact amount of RWF contribution is still uncertain. Even given the high chlorophyll concentrations during seasonal blooms, average DO is still above the threshold of concern, currently defined as a Water Quality Objective (WQO) of 5.0 mg/l, at all stations.

Phytoplankton Monitoring.

A secondary concern for nitrogen is that too much of it could stimulate undesirable phytoplankton, generically referred to as Harmful Algal Bloom (HAB) species.

RWF staff collect water samples that are analyzed by BSA Analytical Services for phytoplankton species enumeration. Samples are collected monthly at six stations using a Van Dorn sampler with samples taken at one-meter depth.

Diatoms generally dominate the biovolume of phytoplankton in most marine and estuarine systems. The same was found at the RWF monitoring locations: overwhelming abundance of diatoms (Figure 57). Certain species of dinoflagellates or cyanobacteria HABs, detected infrequently and in small

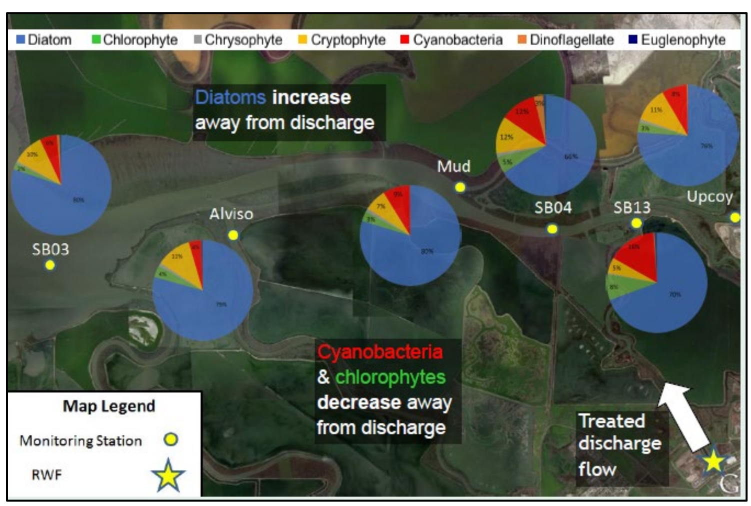


FIGURE 57 DISTRIBUTION OF PHYTOPLANKTON DIVISIONS IN STUDY AREA

amounts, could be cause for concern. However, these HABs have been very rarely seen in over 5 years of sampling.

At the State of the Estuary Conference in October 2019, RWF staff presented an analysis of phytoplankton species composition data that evaluated abiotic controls on localized phytoplankton community composition. The analysis, presented during the Conference poster session, found that physical parameters such as salinity, temperature, and light are important controls on phytoplankton species composition. Variations in nitrate concentrations seemed to explain some phytoplankton composition shifts at more Bay-ward stations (SB03, Alviso, and Mud). This relationship is the inverse of the nitrate concentration gradient with greater concentrations of nitrate closer to the Facility discharge.

Benthic Monitoring.

Benthic (bottom-dwelling) animals include organisms like clams, tube-dwelling amphipods and polychaete worms that live in, or on, surface sediments. Many Wastewater Treatment Facilities use measurements of benthic community composition, abundance and diversity to assess habitat condition near effluent discharge areas (e.g. San Francisco Public Utilities Commission, L.A. County Sanitation District, and Orange County Sanitation District).

FIGURE 58 PETITE PONAR SEDIMENT GRAB FOR BENTHIC SAMPLING

RWF staff began collecting bimonthly benthic samples at phytoplankton monitoring stations in May 2016. Benthic samples are collected using a Ponar grab sampler (Figure 58) and delivered to ICF contract lab for benthic taxonomy services.

In 2019, thirty-four samples were processed by ICF. Results of benthic monitoring to date, also presented during the poster session at the State of the Estuary Conference in October 2019, show that the lower salinity Artesian Slough stations have the highest abundance of benthic organisms. Station SB15, which is the closest to the RWF discharge, has by far the greatest abundance, and was dominated by crustaceans and oligocaetes. The species at these stations in general are opportunistic

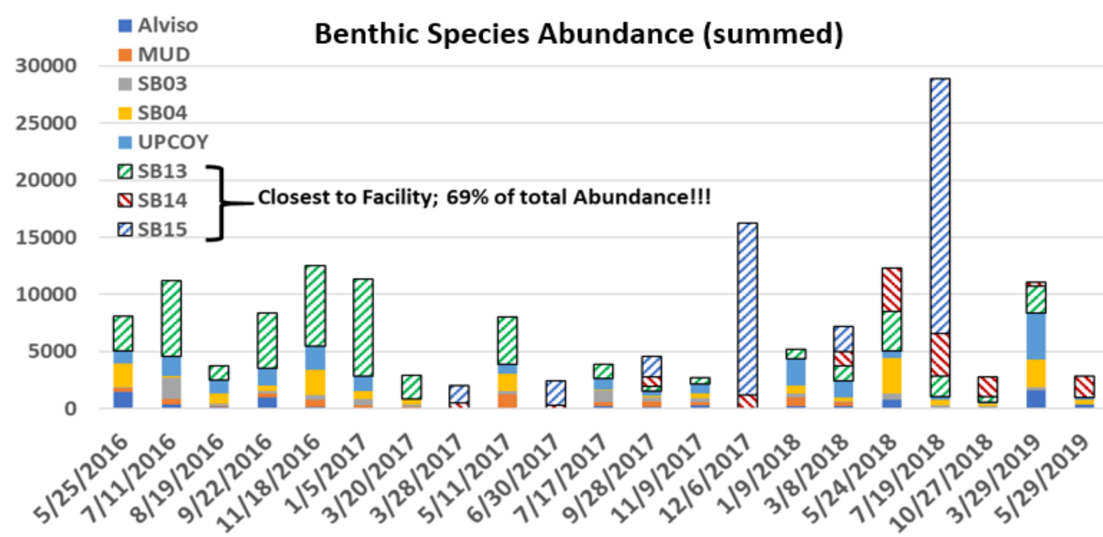


FIGURE 59 BENTHIC SPECIES ABUNDANCE DATA SINCE 2016

species tolerant of a wide range of environmental conditions. There is a general spatial trend of greater abundance closer to RWF discharge with the more distant stations in Alviso and SB03 having fewer overall benthic organisms. Station SB14, also in Artesian Slough, has the greatest species diversity with 17 major taxa represented.

Fish Monitoring.

Phytoplankton, benthos, and zooplankton (not measured in 2019) are critical indicators of ecosystem health, but fish populations directly measure attainment of seven of the nine beneficial uses for which the SJ-SC RWF is permitted to discharge. The SJ-SC RWF has contracted with UC Davis fisheries researchers to conduct fishing trawls at several stations downstream of the facility since 2015 (Figure 60). Formerly known as the Hobbs Lab, the UC Davis fisheries team re-named itself in 2019 and is now known as the Otolith Geochemistry and Fish Ecology Laboratory (Fish Ecology Team). The Fish Ecology Team is led by Dr. Levi Lewis.

FIGURE 60 FISH TRAWL LOCATIONS MONITORED BY UC DAVIS RESEARCHERS

The UC Davis Fish Ecology Team collects trawl catch data for over 30 fish species that reside in, and around, the Alviso Marsh complex immediately downstream of SJ-SC RWF discharge. The trawl events are routinely reported on via an online blog with posts relevant to the trawl monitoring under the title "Fish in the Bay." Blog posts and other updates on the team's activities can be found at:

http://www.hobbslab.com/news/

Community Structure of Fishes Report

In early 2019, the Fish Ecology Team submitted a final report documenting and characterizing the fish populations and water quality conditions in the Alviso Marsh study area since 2015. The Report presents a synthesis of trawl data in the Lower South Bay from 2011 through 2018 with similar levels of sampling effort occurring in years 2015 – 2018. Highlights from the report Include:

- Of the top 12 most abundant fish species in the study area, 7 (58%) were native and 5 (42%) invasive. The native Northern Anchovy dominated trawl catches followed by Yellowfin Gobies (invasive), and Threespine Sticklebacks (native).
- Northern Anchovies (Figure 61) were most abundant in warmer, higher salinity water but across a wide range of dissolved oxygen occurring in both the highest and lowest levels of dissolved oxygen in the study area.
- Threespine Sticklebacks and Mississippi Silversides were most abundant in low salinity, warmer water with low dissolved oxygen.
- Yellowfin and Arrow Gobies were most abundant in warmer, mid-salinity water with low dissolved oxygen.
- California Halibut, Shokihaze Gobies, American Shad, and English sole were abundant in cooler water with higher dissolved oxygen.

Figure 61 Northern Anchovies caught in the Lower South Bay during a Fish Ecology Lab trawl

These results suggest that some species (Sticklebacks, Silversides, Yellowfin Goby, Arrow Goby) exhibit tolerance to low dissolved oxygen (3 – 4 mg/L DO) with maximum catches at lower DO conditions. Other species (California Halibut, Striped Bass, English Sole, American Shad) had maximum catches at higher DO conditions, suggesting less tolerance to low DO conditions. Interestingly, the native Northern Anchovy was equally abundant at high and low DO conditions, suggesting either a broad tolerance range for this population of Anchovies or two separate populations representing different life histories or age classes. It is also worth noting that many of the fish species that are tolerant of lower DO conditions are prey to piscivorous species (Striped Bass, California Halibut) that are less tolerant of those conditions.

In general, while the Fish Ecology Team did measure low dissolved oxygen conditions (<3 mg/L) at times during this multi-year study. The episodes appeared to be ephemeral and occurred in the warmer summer months. The low dissolved oxygen conditions were also muted due to the mixing and flushing by large (>3-meter) semi-diurnal tides. The consistent discharge of ~80 MGD from the SJ-SC RWF in the summer months provides additional flushing with continuous fresh, high dissolved oxygen (~7 mg/L DO in effluent) inputs that could contribute to lessening the duration of these ephemeral events. Furthermore, the highest abundances of many native species in the study occurred during summer at the lowest observed dissolved oxygen concentrations, indicating these native species are not only tolerant, but may also potentially benefit from the low DO conditions

Figure 62 Black and brown-tailed native crangon shrimp caught in Lower South Bay

by using them as a refuge from predators. The Report concludes by comparing fish abundance and diversity in Lower South Bay to that of the North Bay, with fish communities in the South up to 20 times greater in abundance with greater diversity. This difference is attributed to higher production in the Lower South Bay, likely fueled in part by the Facility discharge, which supports an abundance of invertebrates and forage fish that, in turn, support vibrant bird and gamefish populations.

Fish Monitoring in 2019

The Fish Ecology Team from UC Davis has continued to conduct ongoing trawls in the Lower South Bay throughout all of 2019. This valuable ecological monitoring documents not only the health of the fish community by directly measuring abundance and diversity, but also includes concurrent water quality measurements and observations of other beneficial use attainment such as recreational fishing. In 2019, anchovies continued to be the most abundant fish species caught with 2,557 Northern Anchovies caught over the course of the year, which is an increase from the 2,254 caught in 2018. Native crangon shrimp (Figure 62), were also caught in large numbers with 32,663 captured in 2019. And the invasive yellowfin goby, which has consistently had annual catch counts greater than 1,000 since 2015, had a 2019 catch count of only 692. These are all trends or conditions we hope continue. An additional highlight was an approximately 4-foot long white sturgeon caught about a half-mile downstream of the SJ-SC RWF discharge point (Figure 63).

Figure 63 A 1.25-meter long white sturgeon caught in Artesian Slough on 10/6/2019

Longfin Smelt

An additional focus of the Fish Ecology Team is the Longfin Smelt, a state-listed threatened species. Longfins have been caught in the Lower South Bay in greater numbers than any other portion of the Bay in recent years. Longfin Smelt larvae, initially caught in Artesian Slough, confirmed that the threatened smelt not only occur, but also spawn in Lower South Bay. On February 12, 2018, a female longfin that had very recently discharged her eggs during spawning (referred to as a "spent" female) was captured just 350 feet downstream of the RWF discharge!

Figure 64 Giant (130 mm) longfin smelt caught in pond A21 during a December 2019 trawl

The Fish Ecology Team continued focused Longfin Smelt work from 2018 as part of Department of Water Resources (DWR) funded larval fish surveys. In November and December 2019, more frequent trawls targeting likely Longfin Smelt populations have been performed in order to collect Longfin Smelt Broodstock from the Alviso Marsh. These focused trawls will continue in January and February 2020. Initial results in 2019 were promising, including the largest Longfin Smelt captured on record by this team (Figure 64). However, the numbers so far from this winter (just 30 longfins caught in November and December 2019) are down considerably compared to the 226 caught over the same period in 2018. Perhaps January and February will provide a signifcant bump in the Longfin Smelt catch and the catch count for Water Year 19-20 will be closer to the 872 Longfin Smelt caught over the same four months in Water Year 18-19.

The Fish Ecology Team collects samples of young fish and eggs for detailed analysis back at UC Davis labs. Additional studies will reveal where young fish hatched, in what waters they reared, and what they have been eating. This important work helps determine management actions needed to save this State threatened species. Some Adult Longfin Smelt are also taken to the UC Davis Fish Conservation and Culture Lab where a project to develop effective culture methods for threatened Longfin Smelt is continuing.

Summary of Environmental Monitoring costs.

Table 40 below summarizes annual costs in 2019 of supplies, analyses, purchase order and contract costs for metals, nutrients, and biological ambient monitoring projects. Embedded into the monitoring costs for elements 1, 2, 3, and 7 are ongoing repair costs to the two vessels used to conduct this work. A new contract with UC Davis was executed in 2019 after expiration of the previous contract. The new contract term goes through September 2021 and funds 12 fish trawls (6x per year) at 20 stations, zooplankton sample analysis, and evaluation, synthesis and reporting of results. Semi-annual update reports are due in January and July of each year with a final report due in September 2021.

TABLE 40 2019 MONITORING COSTS FOR LOWER SOUTH BAY AMBIENT MONITORING PROGRAM

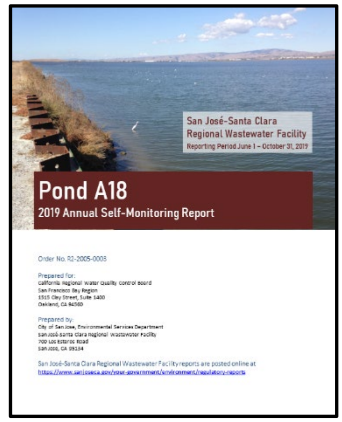
Chemical & Biological Monitoring in Artesian Slough & Bay				
	Monitoring Project	Analytical Lab	Freq.	Cost of supplies & analytical work
1	South Bay Monitoring at 7 stations: (Cu, Ni, Se, NH3, NO2, NO3, TKN, PO4, pH, Cond, DO)	In-house	Quarterly	$35,600
2	Nutrient Monitoring at 6 stations	In house	Monthly	$18,056
3	Chlorophyll monitoring at 6 stations	In-house	Monthly	$8,350
4	Phytoplankton sampling at 6 stations	BSA	Monthly	$14,430
5	Zooplankton sampling at 6 stations	UC Davis	6X/year	$14,400
6	Benthic monitoring at 6 stations	ICF	6X/year	$10,000
7	Continuous DO monitoring at 1 station	In-house	Quarterly	$3,700
8	Fish Assemblage monitoring	UC Davis	6X/year	$74,352
	Total – 2019			**$178,888**

c. Other activities.

Coyote Creek Stream Gage.

Since 1998, the City has co-funded, with Santa Clara Valley Water District (now Valleywater), a permanent stream gaging station on Coyote Creek, operated by United States Geological Survey. This gage provides data on year-round surface flows from the Coyote Creek watershed into the South Bay to better understand any pollutant loadings. The annual cost to the City is currently $13,150. Ongoing and consistent, long-term collection of tributary flows provides valuable information about baseline freshwater inputs and extreme freshwater flushes associated with storms.

d. Pond A18 Monitoring



Pond A18 is a shallow, 856-acre former salt pond owned by City of San José. The pond circulates Bay water using two hydraulic control structures located at northern and southern ends of its western levee. Discharge of pond water is regulated by Waste Discharge Requirements (WDR) Order No. R2-2005-0003.

During dry season (June through October), the WDR requires continuous monitoring for DO, pH, temperature, and salinity in the pond. Four receiving water stations in Artesian Slough and Coyote Creek are monitored once per month with additional monitoring conducted whenever pond dissolved oxygen concentration falls below WDR specified thresholds. Fourteen years of pond discharge monitoring have demonstrated no negative impacts to receiving water.

FIGURE 65 POND A18 "REVERSE FLOW"

The aging infrastructure of the pond's water control structures required improvements to the 14-year old structures and reinforcement of the adjacent levee. Beginning in January 2016 and into October 2018, pond flows were reversed compared to normal operations: Bay water was drawn in from southern hydraulic structure and discharged out from the north (Figure 65) to reduce stress on the aging southern structure and surrounding levee. Because southern structure is very close to SJ-SC RWF discharge, this configuration results in significantly higher nitrogen levels entering the pond, resulting in elevated chlorophyll values.

After securing several permits from USACE, BCDC, and Water Board in 2018, the City, with engineer and construction contractors, repaired and bolstered the southern levee and structure with improvements completed in October 2018. Following completion of the repairs, the pond was reverted back to its standard directional flow with the intake through the north and discharge from the south structures (Figure 66). The pond was operated in this standard flow configuration for the entirety of 2019. As a result, the pond water quality had more stable dissolved oxygen levels and lower chlorophyll-*a* levels compared to the most recent years when the pond was operated in "reverse flow" configuration.

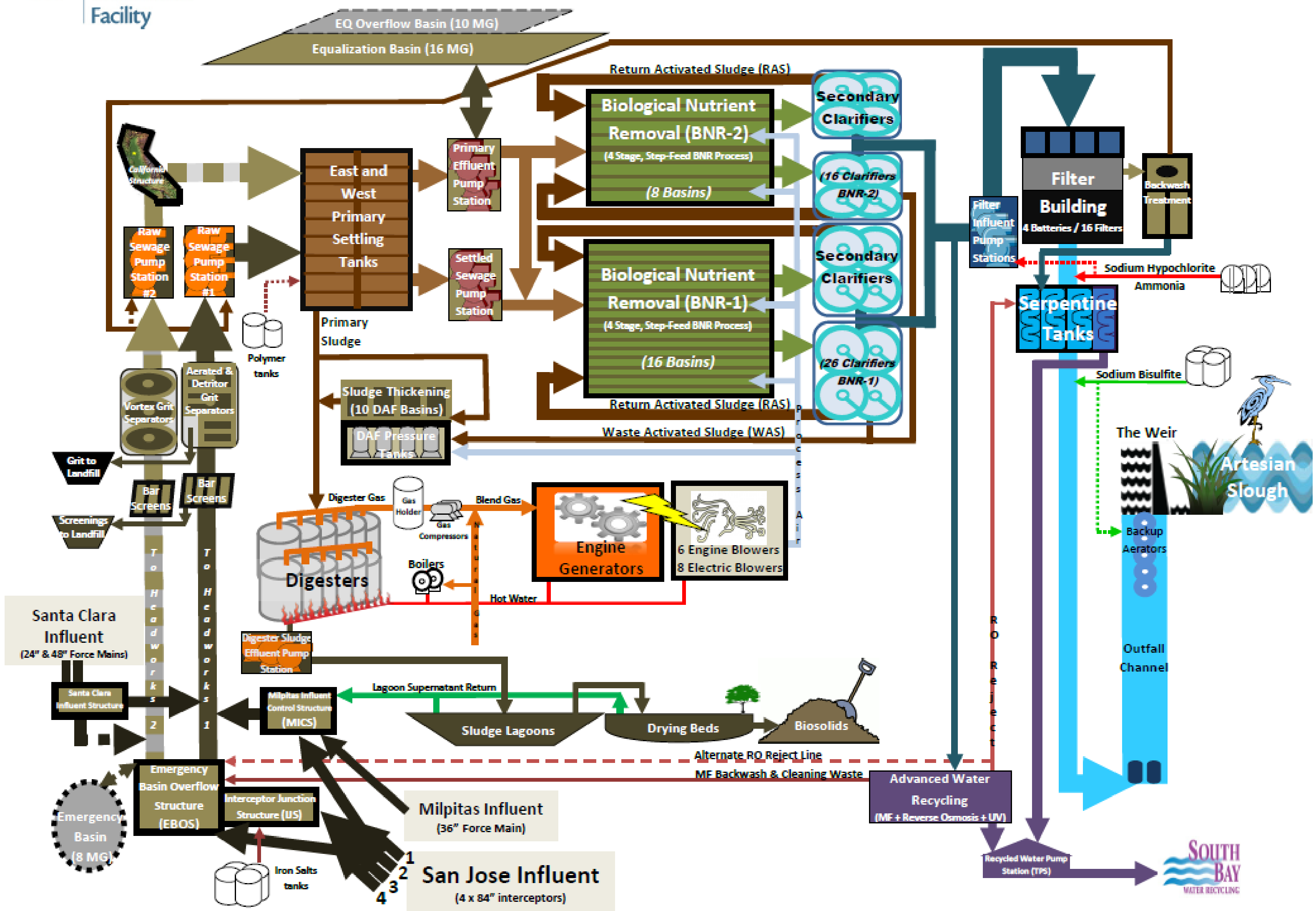
FIGURE 66 POND A18 "STANDARD FLOW" CONFIGURATION

Pond A18 Annual Reports are posted on City of San José web site at:
https://www.sanjoseca.gov/your-government/environment/regulatory-reports/-folder-70

San José-Santa Clara Regional Wastewater Facility

Revised: 9/2019

Process Schematic



ATTACHMENT A - Laboratory Accreditation

Accreditation covering all of 2019

CALIFORNIA
Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

THE GREAT SEAL OF THE STATE OF CALIFORNIA
EUREKA

CALIFORNIA STATE

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

CERTIFICATE OF ENVIRONMENTAL ACCREDITATION

Is hereby granted to

San Jose / Santa Clara WPCP Laboratory

Watershed Protection

4245 Zanker Road

San Jose, CA 95134

Scope of the certificate is limited to the
"Fields of Testing"
which accompany this Certificate.

Continued accredited status depends on successful completion of on-site inspection, proficiency testing studies, and payment of applicable fees.

This Certificate is granted in accordance with provisions of Section 100825, et seq. of the Health and Safety Code.

Certificate No.: **1313**

Expiration Date: **9/30/2020**

Effective Date: **10/1/2018**

Sacramento, California
subject to forfeiture or revocation

Christine Sotelo, Chief
Environmental Laboratory Accreditation Program