San José-Santa Clara
Regional Wastewater Facility

2018
Annual Self-Monitoring Report

Reporting Period:
January 1 – December 31, 2018

San José-Santa Clara Regional Wastewater Facility
2018 Annual Self-Monitoring Report

San José-Santa Clara Regional Wastewater Facility Annual Reports are posted on the City of San Jose website at: http://www.sanjoseca.gov/Archive.aspx?AMID=161&Type=&ADID=

San José-Santa Clara Regional Wastewater Facility

This annual report summarizes the past year of facility effluent monitoring. Graphical tables also show flow and pollutant data back to January 2003 when data began to be stored in the current Laboratory Information Management System (LIMS). 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.

Report by Wastewater Compliance Team

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On the Cover from top: Artesian slough from the final compliance point at the outfall weir bridge where the RWF discharge enters the Bay. Inset top: Four threatened longfin smelt netted in Artesian Slough by Dr. Jim Hobbs. Longfin spawned in Lower South San Francisco Bay, including Artesian Slough, in 2017 and 2018. Bottom: A rendering of the future cogeneration building that will provide 12.5MW of energy from digester gas and other sources. Construction of the new facility began in 2018. Inset bottom: Key RWF Maintenance and Energy & Automation personnel at the cogeneration building groundbreaking ceremony on March 1, 2018.

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1. ANNUAL SELF MONITORING REPORT

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 2018, Facility maintained 100% compliance with all NPDES effluent limitations.**
- **The Facility continues to meet NPDES permit 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:

1. General Annual Reporting for the NPDES Permit:

Permit Provisions VI.C.2 - 5 require that the facility provide the following routine status reports:

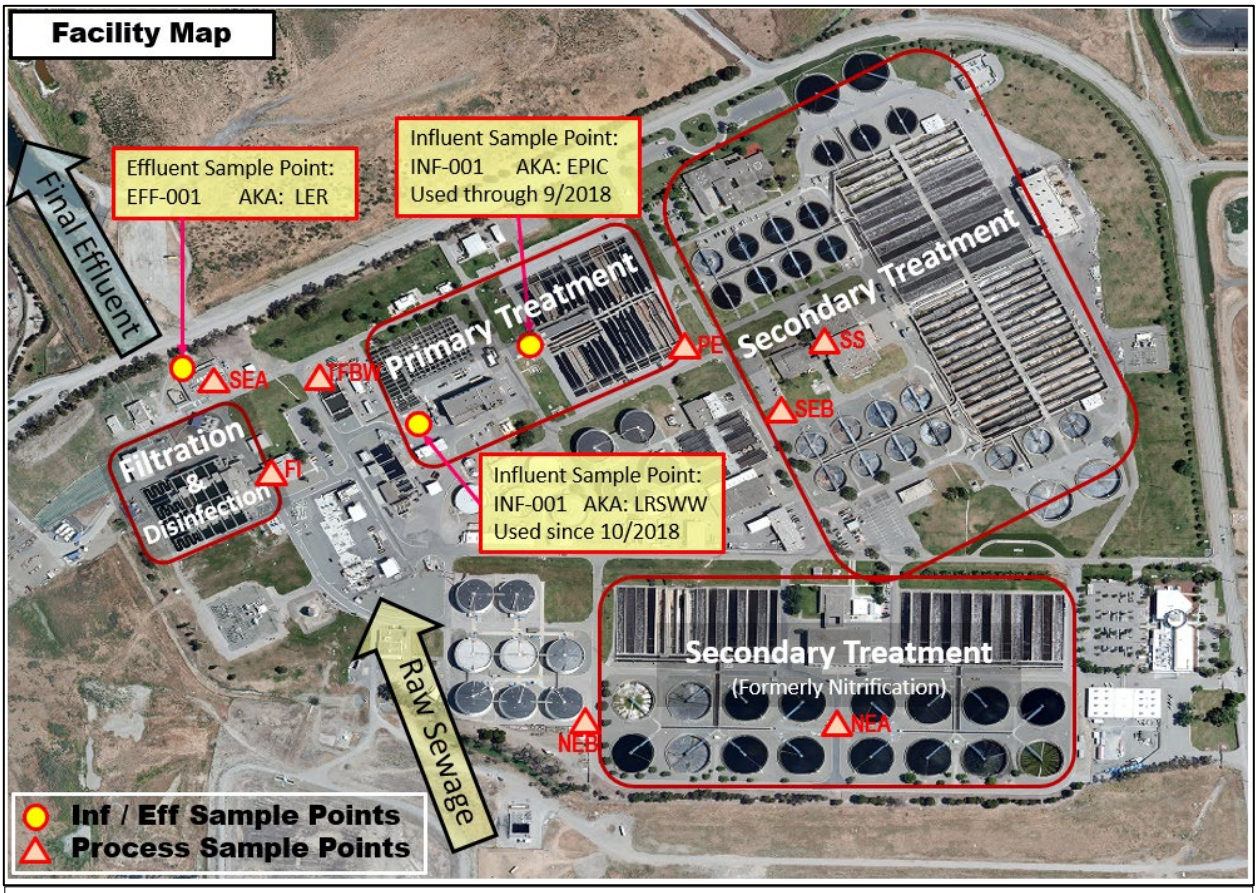
a. **Effluent Characterization Study** – this analytical monitoring is reported via monthly & annual Facility Self-Monitoring Reports (SMRs)
b. **Pollutant Minimization Program** – annual Pollution Prevention (P2) program is reported to Regional Water Board by 28 February each year & posted on the City of San Jose 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 Jose & 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 Jose "Regulatory Reports" website: http://www.sanjoseca.gov/index.aspx?NID=815.
The Collection System Management Annual Report (item "e") is posted at this site:
http://www.sanjoseca.gov/DocumentCenter/Home/View/7

2. Additional Annual SMR Report Requirements:

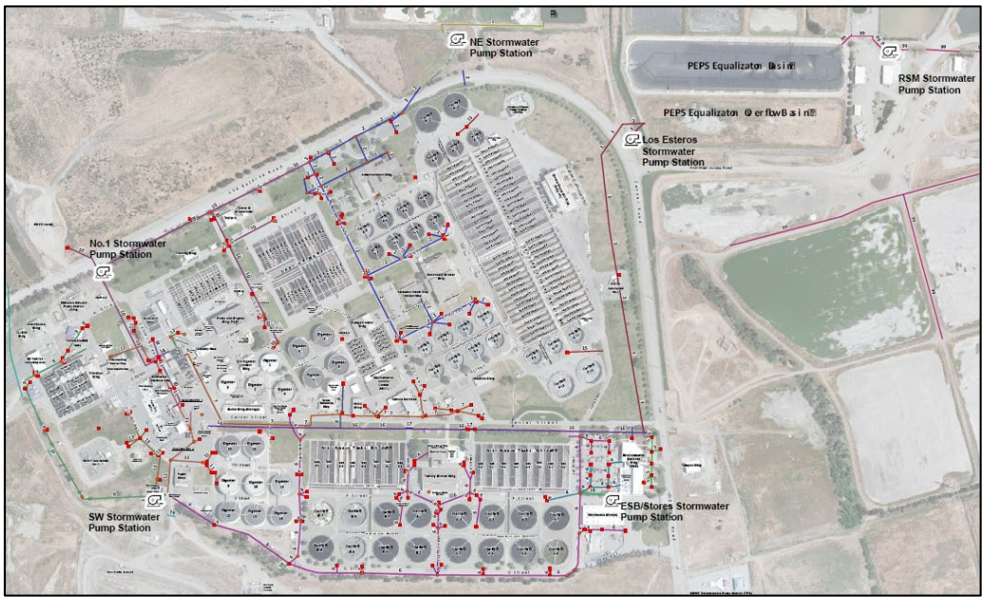
Permit Attachment G, pages G-17 thru G-18 require outline Facility Annual SMR reporting. In addition, Attachment G calls for the following plans and reports be updated annually:

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



Water Pollution Control Plant: flow routing and influent and effluent sampling stations.
The wastewater treatment process consists of screening, grit removal, primary sedimentation, secondary (biological nutrient removal) treatment, secondary clarification, filtration, disinfection, and dechlorination.

Facility Storm Water Conveyance System

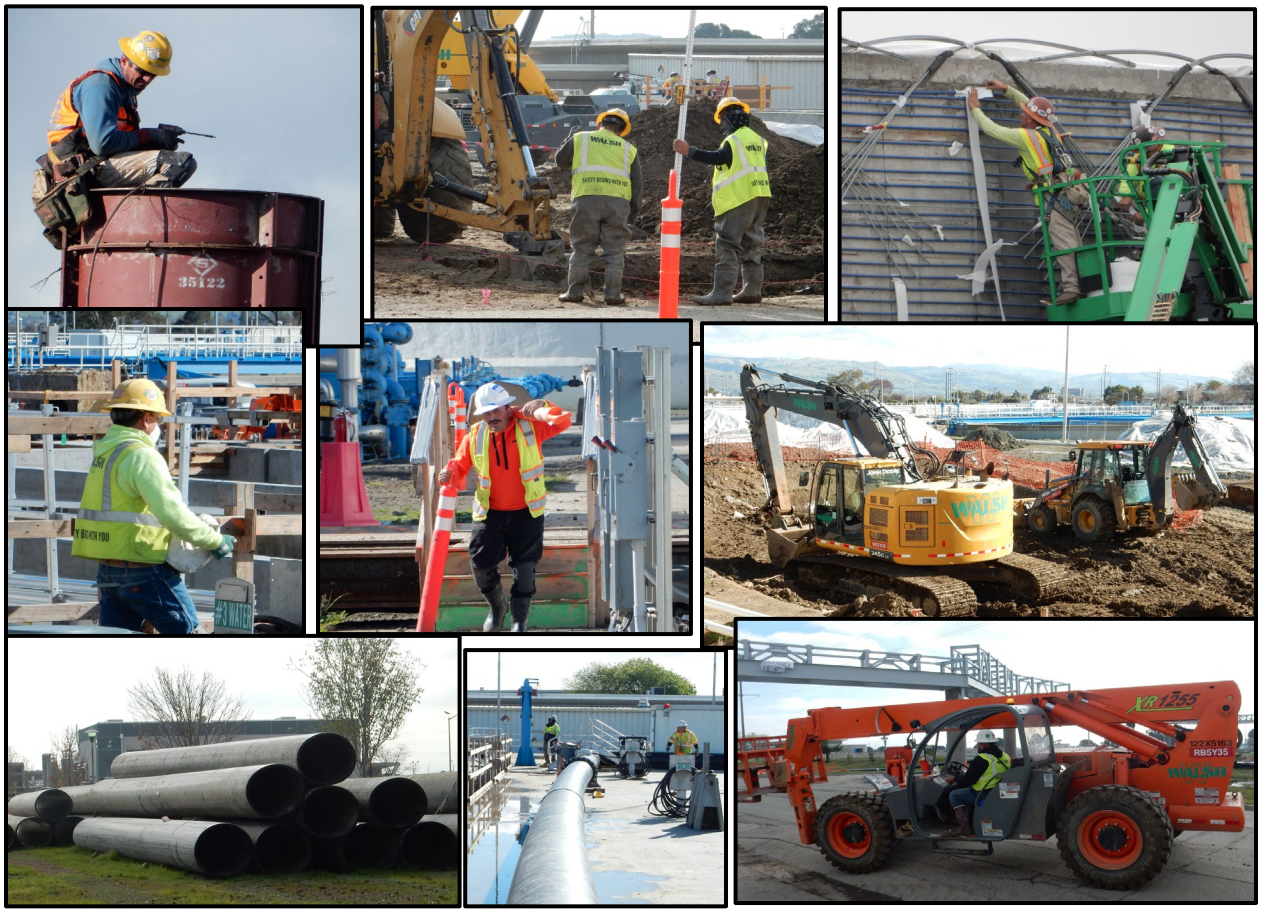


The treatment facility is designed to capture all spills and stormwater on site. 20 stormwater collection systems convey flows to 6 pump stations. Stormwater pump stations direct all captured water back to facility headworks for treatment. The stormwater catch basin system has capacity to contain at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

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 Jose manages the San José -Santa Clara Regional Wastewater Facility for the following Cities or agencies:

- 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)

Under Construction! ***Not unlike rebuilding an airplane in flight.***



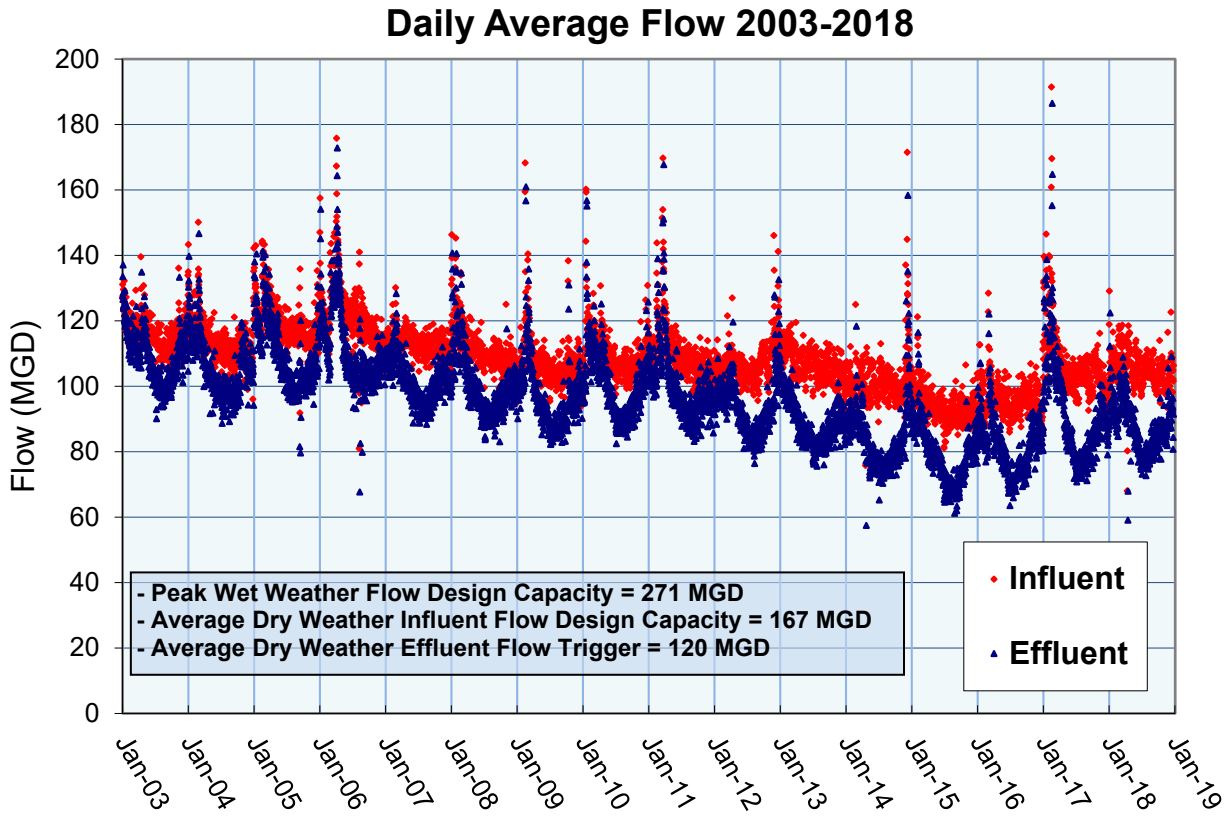
Year four of a 10-year, $1.4 billion rebuilding program: Wastewater treatment continues even as units are taken off-line for construction. Excellent and dedicated operators, mechanics, electricians & others maintained 100% Compliance in 2018!

a. Facility Flows

The peak average monthly effluent flow of 98.0 MGD occurred in March 2018. The peak daily flow for the year was 122.4 MGD on January 9.

- ***Average Dry Weather Influent Flow (ADWIF)*** *is the highest five-weekday period from June through October. The 2018 ADWIF was 110.3 MGD and occurred between 4 June and 8 October.*
- ***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 2018, ADWEF was 79.4 MGD and occurred during the months of June to August.*

	Influent Flow	Effluent Flow (MGD) (Recent Years)			ADWIF Limit = 167 MGD ADWEF Trigger = 120 MGD	
	Average	Low	High	Average	ADWIF	ADWEF
2016	96.1	63.5	122.2	81.4	101.1	68.2
2017	106.9	70.8	186.5	91.3	107.3	77.8
2018	105.4	72.7	122.4	**87.6**	**110.3**	**79.4**



b. Biosolids and material

Roughly one million gallons per day (1 MGD) of digester effluent is pumped to Residual Sludge Management (RSM) area sludge lagoons where the material consolidates for 3 to 4 years. Floating dredges pump consolidated 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 and two are due for replacement.

RSM Wastewater Attendant, Michael Shuck samples dried biosolids for chemical analysis.

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.

Biosolids Hauled

	Truck Loads	Wet Tons	Total Solids	Volatile Solids	Dry Metric Tons-DMT
2016	2,889	49,115	83%	24%	37,353
2017	2,999	54,874	87%	20%	43,534
2018	**2,878**	**45,315**	**77%**	**22%**	**31,839**

Plans to replace open-air solar drying beds and lagoons with a new facility that will mechanically dewater all digested biosolids are underway. In December 2017, a request for qualifications was advertised with a total construction estimate of $65M.

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.

Grit, Grease, & Screenings Hauled (Tons)

	Grit	Grease	Screenings
2016	551	753	635
2017	390	429	516
2018	**550**	**367**	**517**

Concentrations in Biosolids (mg/kg)

	2016	2017	2018
Antimony	ND	ND	**ND**
Arsenic	7.5	7.0	**7**
Barium	420	450	**320**
Beryllium	ND	0.9	**ND**
Cadmium	1.1	1.0	**1.2**
Chromium	97	81	**76**
(Cr STLC)	0.95	1.3	**1.3**
Cobalt	12	14	**9.6**
Copper	440	360	**340**
(Cu STLC)	ND	0.1	**0.2**
Lead	25	20	**24**
Mercury	0.94	0.4	**1.3**
Molybdenum	11	8.2	**7.3**
Nickel	77	82	**62**
Selenium	ND	3.4	**4.4**
Silver	6.3	4.4	**4.7**
Thallium	ND	ND	**ND**
Vanadium	67	61	**54**
Zinc	660	520	**480**
Cyanide	2.4	1	**ND**
DRO organics	910	840	**200**
ORO organics	1600	1900	**430**

c. Effluent Monitoring

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:

Effluent Limitations (From NPDES permit Table 4)			
	Average Monthly Effluent Limit (AMEL)	Maximum Daily Effluent Limit (MDEL)	Frequency
$CBOD_5$ (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 ug/l	19 ug/l	Monthly
Nickel	25 ug/l	33 ug/l	Monthly
Cyanide, Total	5.7 ug/l	13 ug/l	Monthly
Dioxin – TEQ	N/A	6.3×10^{-5} ug/l *(Interim)	2 x year
Indeno (1,2,3-cd) Pyrene	0.049 ug/l	0.098 ug/l	Quarterly
	Instantaneous Minimum	Instantaneous Max	
pH	6.5	8.5	Daily
Total Chlorine Residual	N/A	0.0 mg/l	Hourly
Turbidity	N/A	10 NTU	Daily
Dissolved Oxygen	5.0 mg/l	N/A	Daily
	30-day geometric mean		
Enterococcus Bacteria	35 CFU		5 x Week

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

Effluent Limitations for Mercury & PCBs (Mercury & PCBs, Tables 5A & 5b)				
	AMEL ug/l	MDEL ug/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 # CA0038873, Order No. R2-2014-0014, requires twice per month nutrient monitoring: Total Kjeldahl Nitrogen, Nitrate-Nitrite, Total Phosphorus, Soluble Reactive Phosphorus, Total Nitrogen (Calculated) - no limits are established.

- *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.*

1) 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.

pH: Effluent pH ranged from 6.9 to 7.6 standard units (S.U.). Effluent Limits are 6.5 & 8.5 S.U.

Temperature: Effluent temperatures for 2018 ranged from 16.6 to 25.0° C, averaging 20.9° C.

Total Chlorine Residual: The Facility uses both continuous monitoring equipment and wet chemical analysis to monitor residual chlorine. In 2018, 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 1.4 to 5.1 Colony Forming Units (CFU) per 100 mL and averaged 2.3 CFU during 2018.

Oil & Grease: In 2018, Oil and Grease was not detected in three of four quarterly monitoring events. The April 2018 sample result was Detected Not Quantified (DNQ) with an estimated value of 1.5 mg/L. The Method Detection Limit (MDL) for Oil and Grease using Standard Method EPA 1664A is 1.1 mg/L and is used as reported value when all results are Non-Detect (ND). Facility effluent limits are 5 mg/L (AMEL) and 10 mg/L (MDEL).

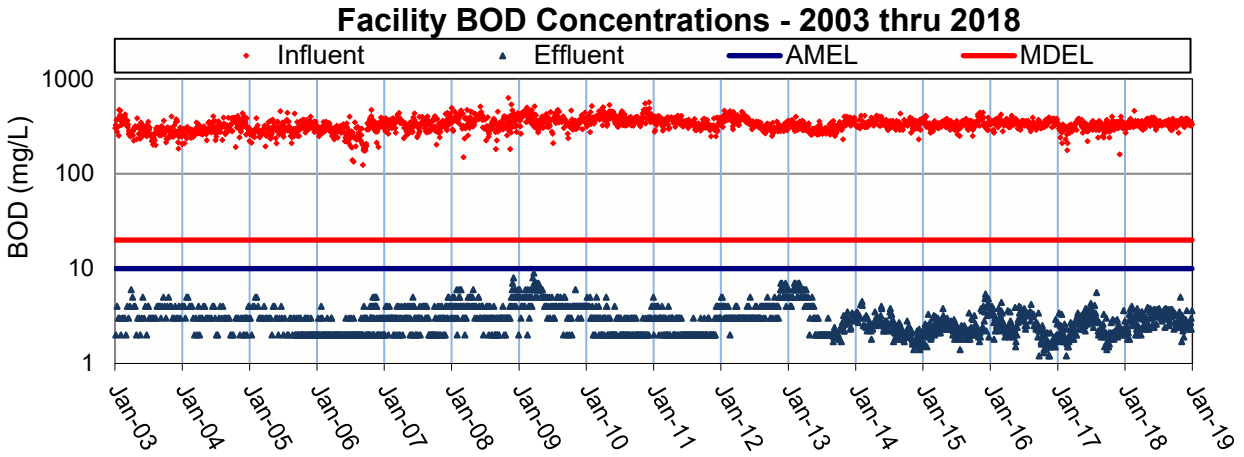
Dissolved Oxygen: Dissolved oxygen (DO) concentrations in effluent were above Bay Water Quality Objective of 5 mg/L throughout 2018. The 3-month rolling median value for DO percent saturation ranged from 80% to 81% in 2018.

DO Concentrations 2018				Min = 5.0 mg/L
	Low	High	Average	2017 Average
Effluent (mg/L)	6.3	8.1	7.3	7.3
Saturation (%)	73.0	88.4	80.8	82.2

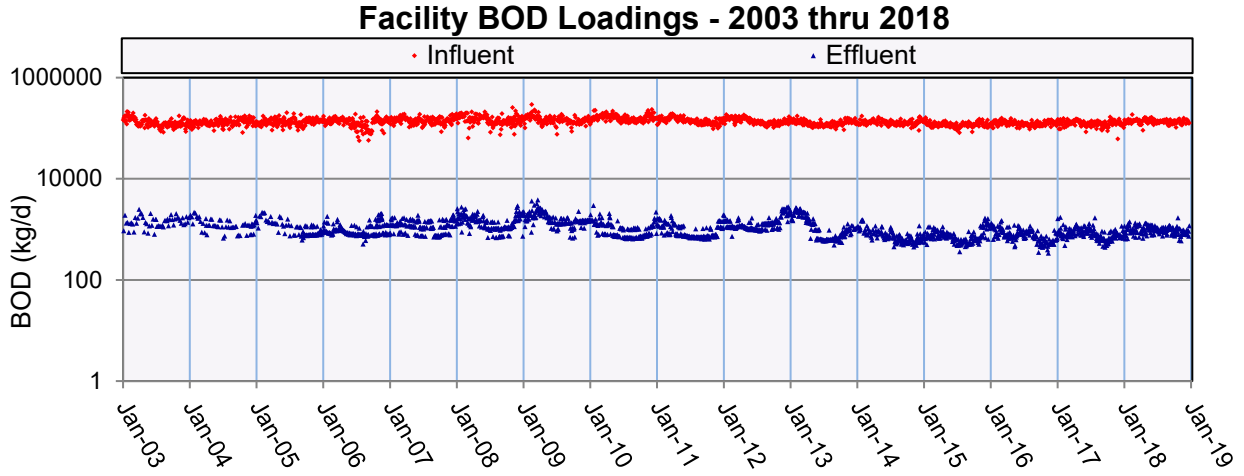
Biochemical Oxygen Demand (BOD): As defined by American Heritage Science Dictionary, Biochemical Oxygen Demand is: "The amount of oxygen required by aerobic microorganisms to decompose organic matter in a sample of water, such as one polluted by sewage. It is used as a measure of the degree of water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

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

BOD (mg/L)							AMEL = 10 mg/L MDEL = 20 mg/L
	Influent			Effluent			*Removal*
	Low	High	**Average**	Low	High	**Average**	
2016	**270**	**420**	**342**	**1**	**4**	**3**	**99%**
2017	**160**	**400**	**314**	**1**	**6**	**2**	*99%*
2018	**270**	**460**	**340**	**2**	**5**	**3**	***99%***

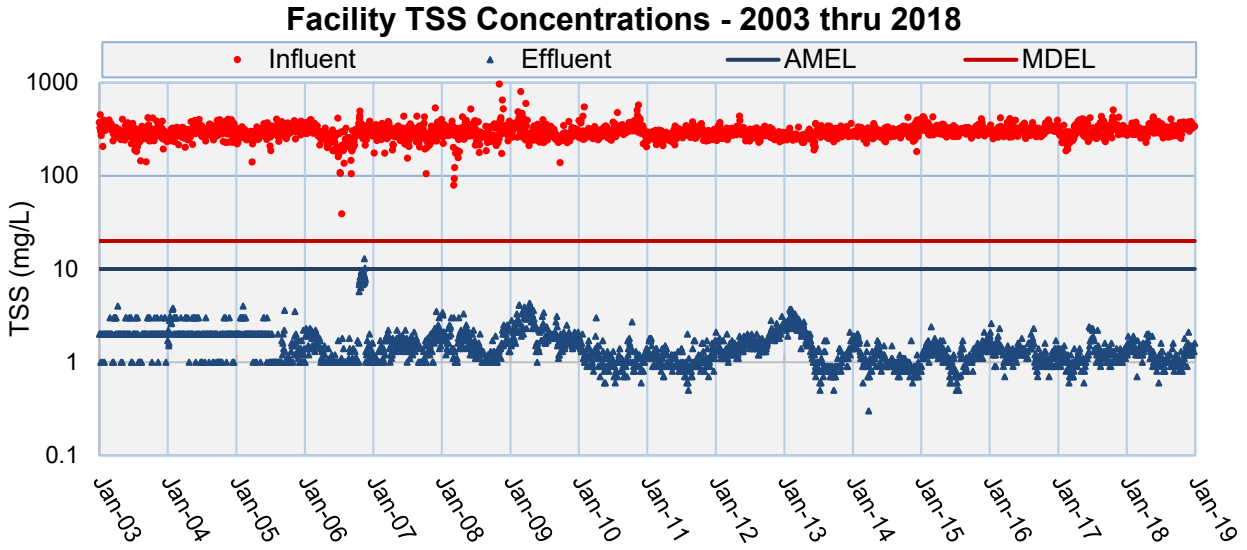


BOD Loadings 2018 (kg/d)					
	Annual Total	**Low**	**High**	**Average**	2017 Average
Influent	**49,718,689 (kg)**	**91,289**	**185,961**	**136,216**	126,137
Effluent	**355,514 (kg)**	**593**	**1,692**	**974**	839

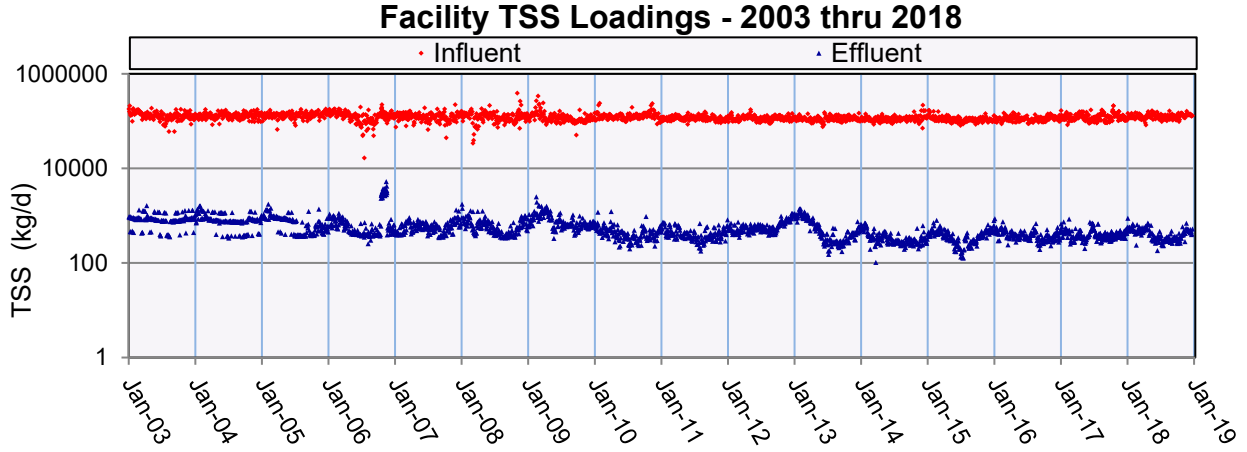


Total Suspended Solids (TSS): TSS is a measure of solid material suspended in water. Suspended solids settle out of the water column throughout the Facility treatment train: roughly half is removed in Primary settling tanks and another 40 to 45 percent is removed in Secondary/BNR clarifiers. Tertiary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

TSS (mg/L)						AMEL = 10 mg/L MDEL = 20 mg/L	
	Influent			Effluent			*Removal*
	Low	High	**Average**	Low	High	**Average**	
2016	**249**	**417**	**310**	**1.0**	**3.0**	**1.0**	99.6%
2017	**185**	**507**	**305**	**1.0**	**2.0**	**1.0**	*99.6%*
2018	**227**	**428**	**315**	**1.0**	**2.0**	**1.0**	***99.6%***

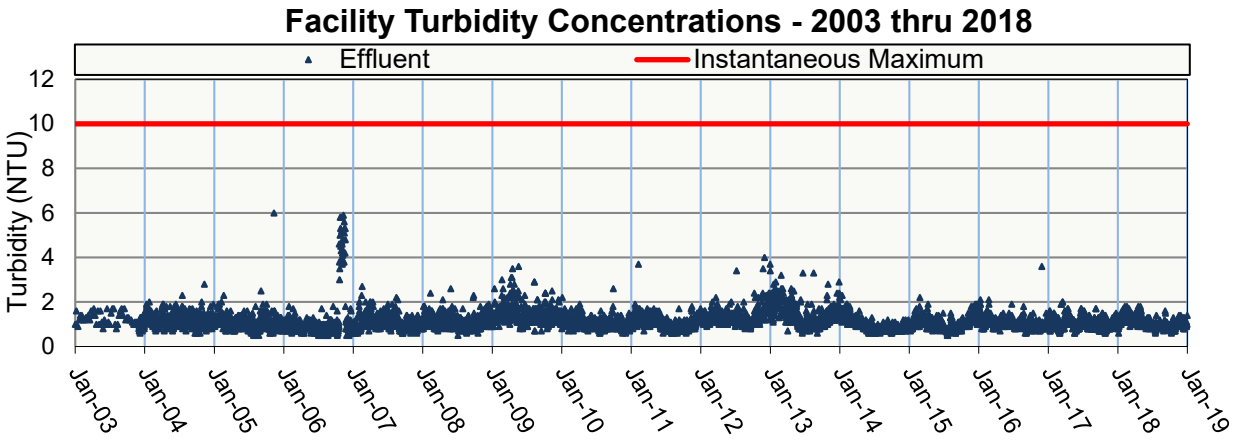


TSS Loadings 2018 (kg/d)					
	Annual Total	**Low**	**High**	**Average**	2017 Average
Influent	**45,981,797 (kg)**	**82,769**	**166,213**	**125,978**	122,601
Effluent	**152,036 (kg)**	**182**	**882**	**417**	402



Turbidity:

Turbidity 2018 (NTU)				High Limit = 10 NTU
Effluent	Low	High	Average	2017 Average
	0.6	1.8	1.1	1.0

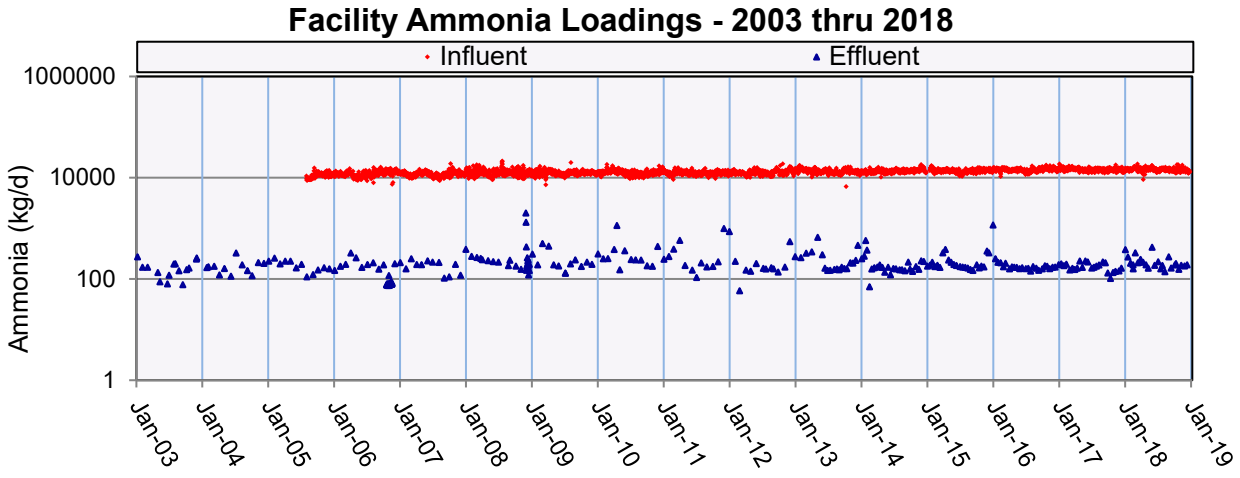


Total Ammonia: Practically all ammonia is removed. Chloramination process adds some back.

Ammonia N (mg/l)			AMEL = 3 MDEL = 8
Effluent	Low	High	Average
2016	0.5	3.2*	0.7
2017	0.3	0.7	0.5
2018	**0.5**	**1.3**	**0.6**

*A single value measured on 1/6/16 was 3.2 mg/L, which is above the 3.0 mg/L AMEL. When averaged with the second monthly ammonia effluent compliance sample, monthly average was 1.9 mg/L, which is below AMEL.

Ammonia Loadings 2018 (kg/d)					
	Annual Total	Low	High	Average	2016 Average
Influent	5,329,686	9,258	18,788	14,602	14,582
Effluent	79,264	139	424	217	175



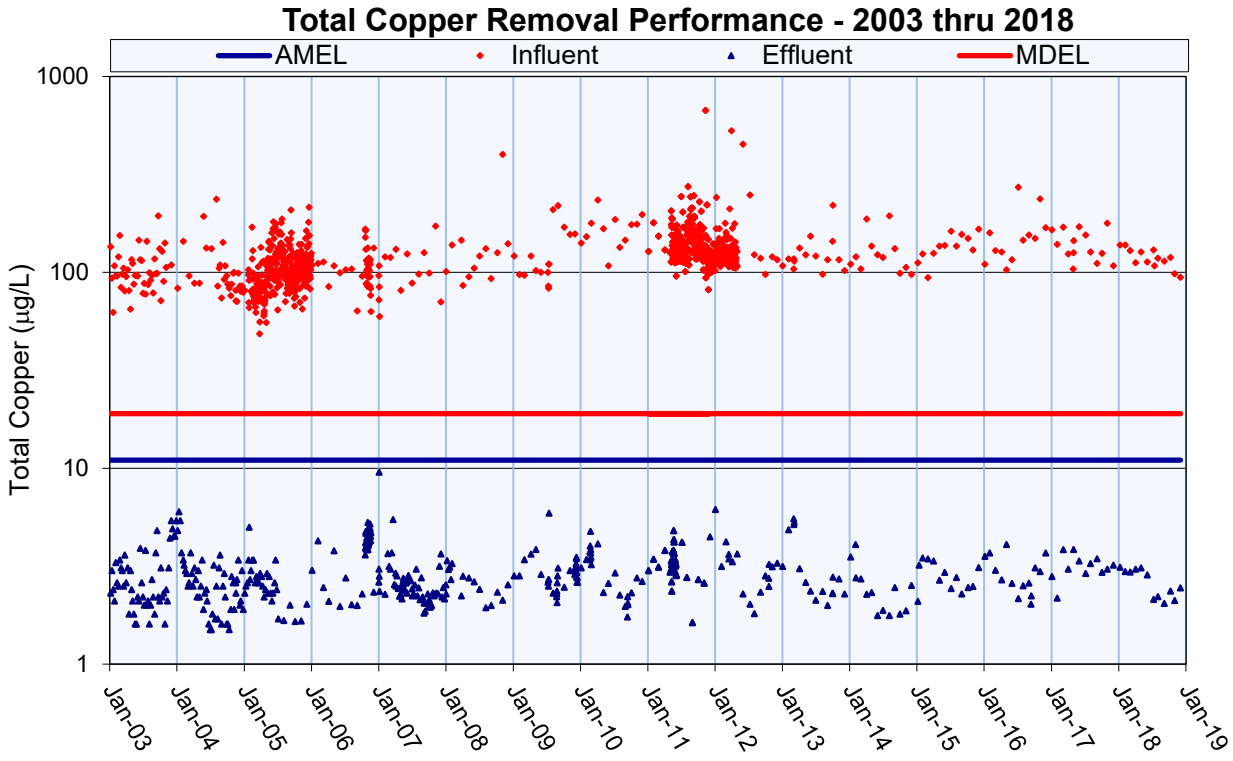
2) Priority Pollutants

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.

a) Priority Pollutants with Effluent Limitations

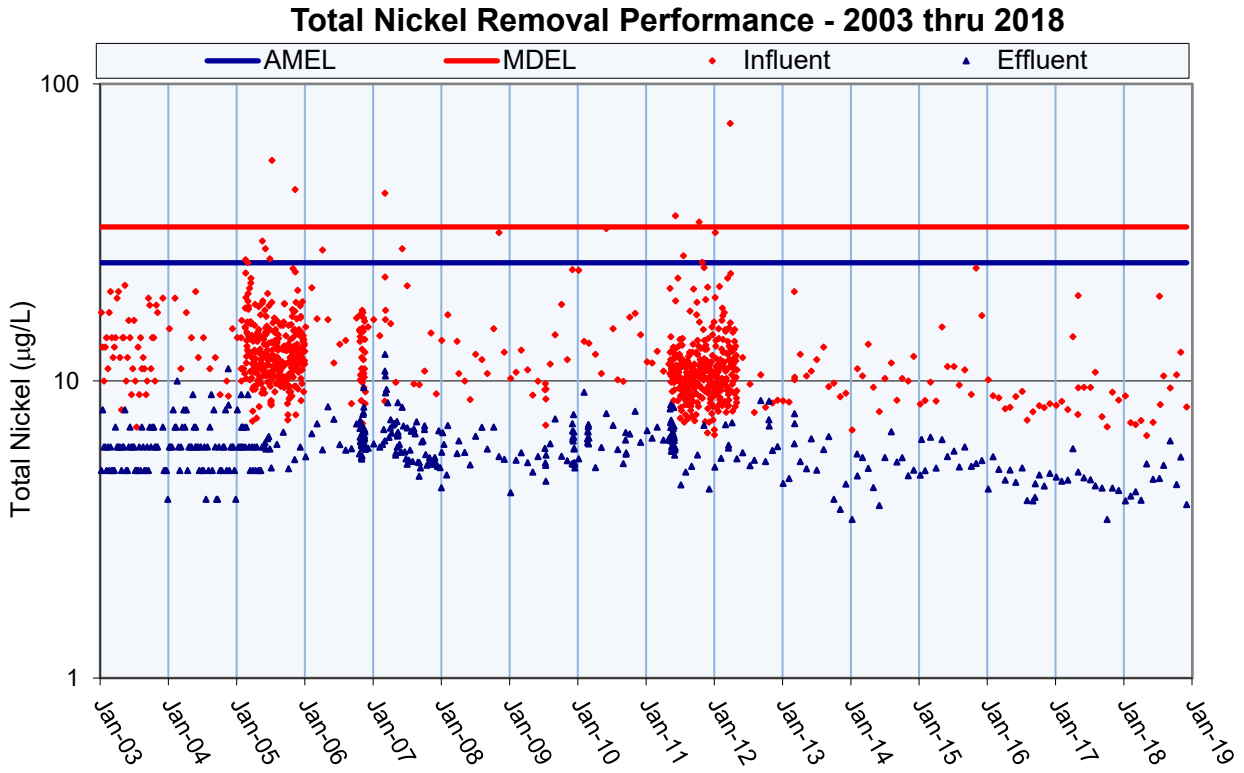
Copper:

Copper (ug/L)						AMEL = 11 ug/L MDEL = 19 ug/L	
	Influent			Effluent			*Removal*
	Low	High	**Average**	Low	High	**Average**	
2016	**103**	**272**	**156**	**2.02**	**4.08**	**3.03**	*98%*
2017	**104**	**178**	**142**	**2.17**	**3.85**	**3.16**	*98%*
2018	**94**	**138**	**118**	**2.04**	**3.12**	**2.61**	***98%***



Nickel:

Nickel (ug/L)							AMEL = 25 ug/L MDEL = 33 ug/L
	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2016	7.39	10.10	8.52	3.95	5.56	4.71	*45%*
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%***

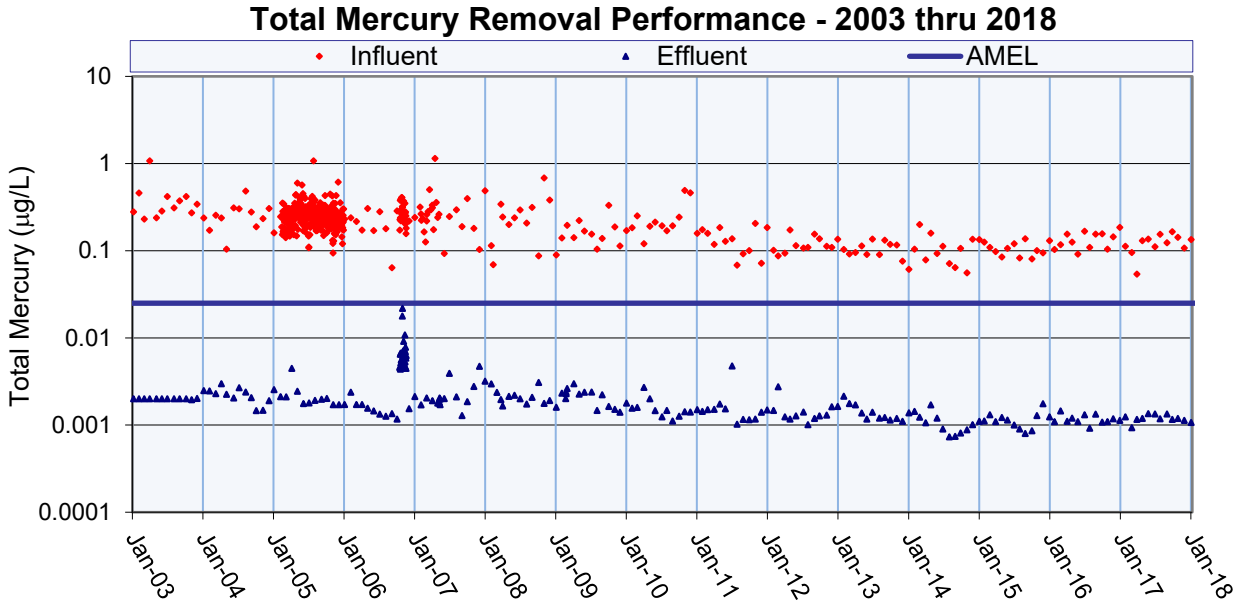


Cyanide: The Facility produces a small amount of cyanide from chloramination disinfection.

Cyanide (ug/L)							AMEL = 5.7 ug/L MDEL = 14 ug/L
	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2016	0.8(ND)	2.2(DNQ)	1.6	0.8(ND)	1.2(DNQ)	1.0	*NA*
2017	0.8(ND)	4.8	**1.6**	0.8(ND)	1.9(DNQ)	**1.1**	
2018	0.9(ND)	1.6(DNQ)	**1.1**	0.9(ND)	1.3(DNQ)	**1.0**	

Mercury:

Mercury (ug/L)						AMEL = 0.025 ug/L
	Influent			Effluent			Annual Load
	Low	High	Average	Low	High	Average	Kg/yr
2016	0.091	0.167	0.122	0.00092	0.00145	0.00117	0.131
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***



Individual effluent mercury concentrations, flows, and loads in 2018

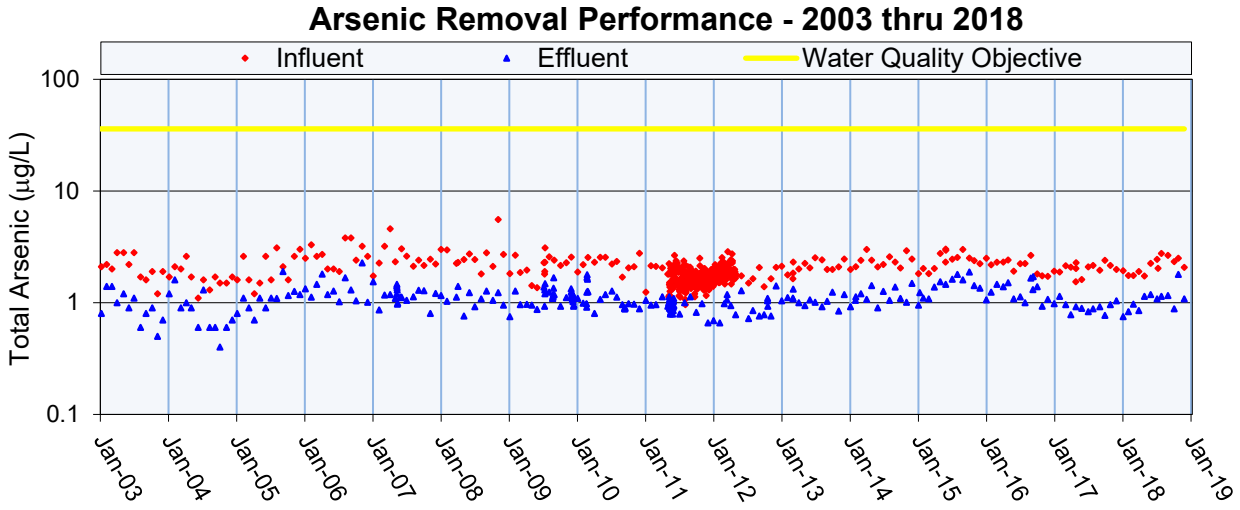
Sample Date	Mercury concentration (ug/L)	Effluent Flow (MGD)	Mercury Load (kg/day)
1/9/2018	0.00107	122.4	0.00050
2/6/2018	0.00115	93.4	0.00041
3/5/2018	0.00130	103.1	0.00051
4/3/2018	0.00126	89.2	0.00043
5/3/2018	0.00128	90.0	0.00044
6/6/2018	0.00108	87.5	0.00036
7/10/2018	0.00104	77.2	0.00030
8/2/2018	0.00133	77.8	0.00039
9/6/2018	0.00195	78.0	0.00058
10/10/2018	0.00115	84.5	0.00037
11/1/2018	0.00107	83.9	0.00034
12/3/2018	0.00139	92.1	0.00049

Dioxin-TEQ: The 2014 NPDES Permit established an interim Effluent concentration limit for Dioxin-TEQ (toxic equivalence) of 6.3 x 10^{-5} ug/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.

Priority Pollutant Metals

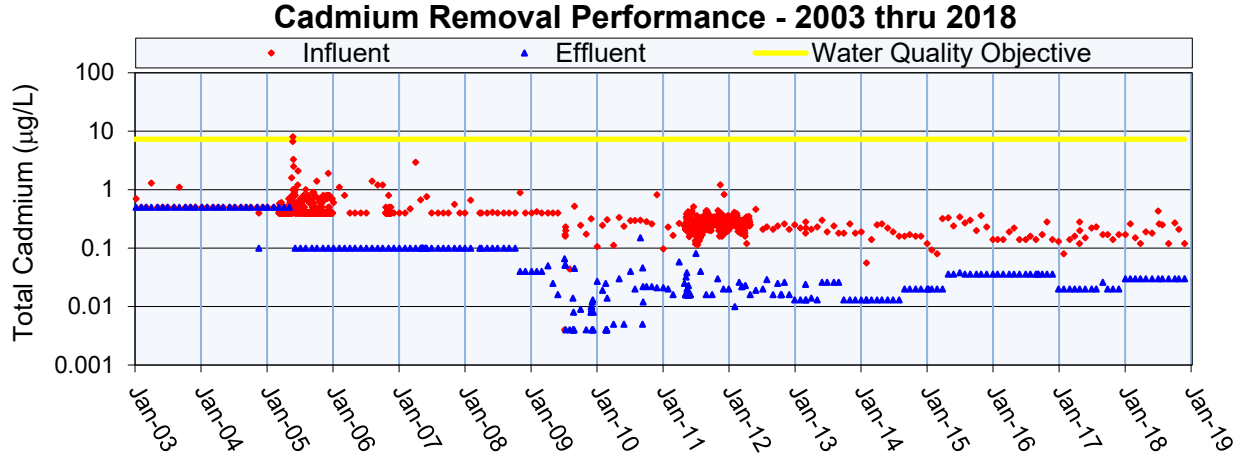
Arsenic:

Arsenic (ug/L)							WQO = 36 ug/L
	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2016	1.72	2.65	2.17	0.93	1.71	1.24	*43%*
2017	1.54	2.39	2.02	0.77	1.14	0.92	*54%*
2018	1.73	2.76	**2.15**	0.75	1.79	**1.07**	***50%***



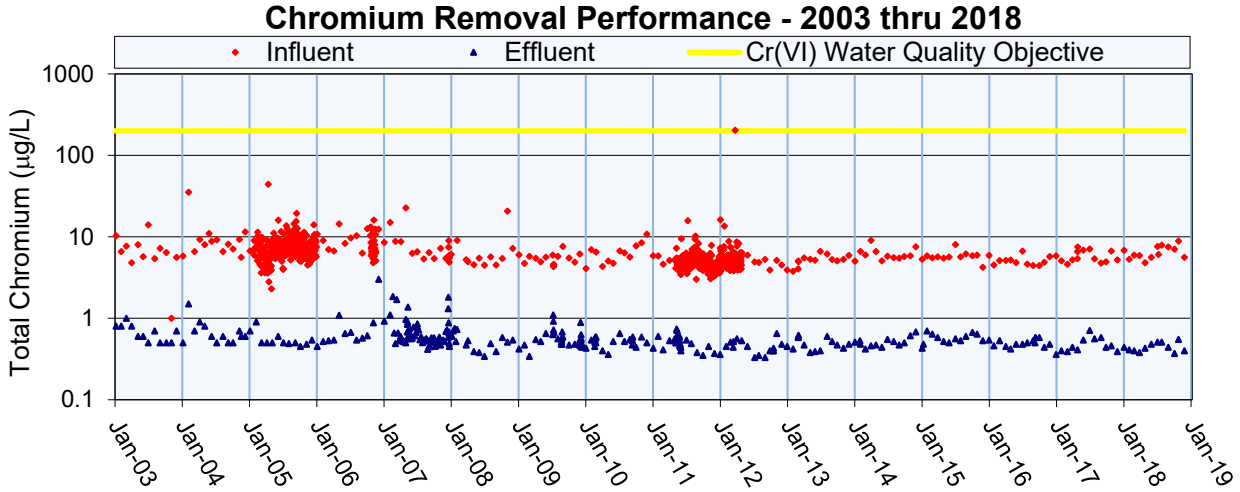
Cadmium:

Cadmium (ug/L)							WQO = 7.3 ug/L
	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2016	0.14(ND)	0.28(DNQ)	0.17	0.04(ND)	0.04(ND)	0.031	*78%*
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(ND)	**0.03**	***85%***



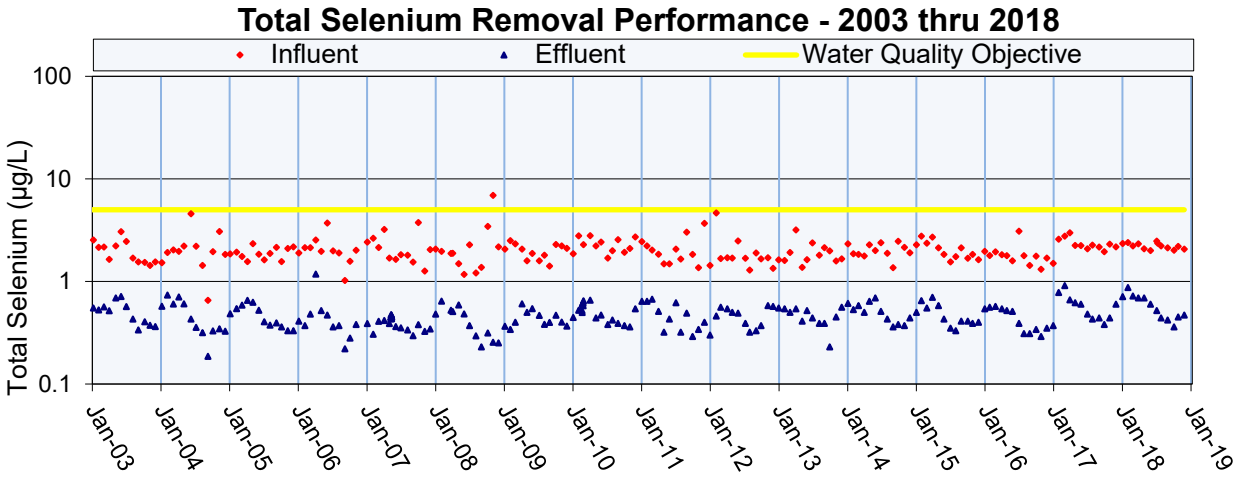
Total Chromium (substituted for Hexavalent Chromium): The 2014 NPDES Permit allows measurement of total chromium instead of hexavalent chromium in Facility Effluent.

Chromium (ug/L)							WQO = 180 ug/L
	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2016	4.42	6.68	5.12	0.42	0.58	0.49	90%
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%***



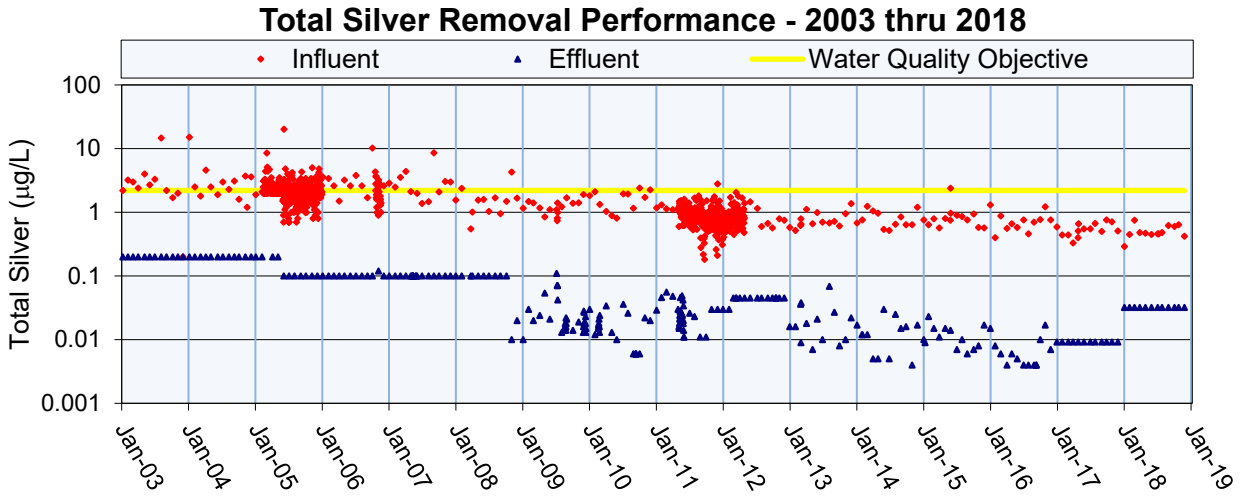
Selenium:

Selenium (ug/L)							WQO = 5 ug/L
	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2016	1.31	3.08	1.83	0.29	0.57	0.44	76%
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%***



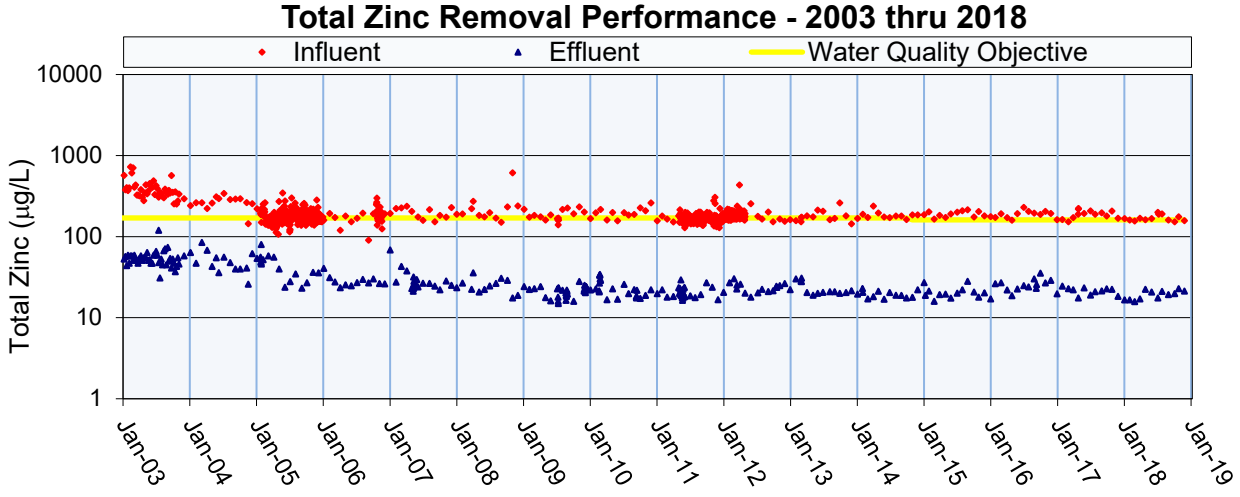
Silver:

Silver (ug/L)							WQO = 2.2 ug/L
	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2016	0.40	1.31	0.76	0.004(ND)	0.017(DNQ)	0.008	99%
2017	0.33(DNQ)	0.76	0.56	0.0092(ND)	0.0092(ND)	0.009	98%
2018	0.29(DNQ)	0.75	**0.51**	0.032(ND)	0.032(ND)	**0.032**	***94%***



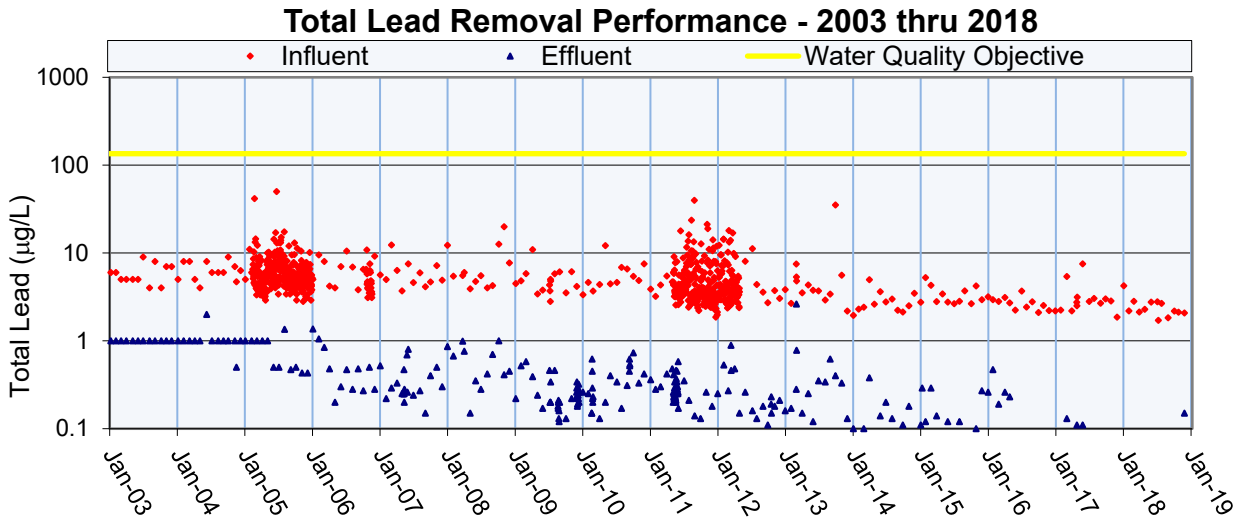
Zinc:

Zinc (ug/L)							WQO = 161 ug/L
	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2016	160	230	190	17.1	35.6	25.0	87%
2017	153	223	179	17.6	24.6	21.3	88%
2018	153	200	**168**	15.8	22.9	**19.3**	***89%***



Lead:

Lead (ug/L)							WQO = 135 ug/L
	Influent			Effluent			
	Low	High	Average	Low	High	Average	*Removal*
2016	2.10	3.68	2.72	0.06(DNQ)	0.47	0.16	*94%*
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%***



b) Other Metals

Antimony:

Antimony (ug/L)				WQO = 4300
	Effluent			
	Low	High	Average	*Removal*
2016	0.39	0.55	0.45	
2017	0.34	0.49	0.41	***NA***
2018	0.32	0.53	**0.42**	

Beryllium: Literature suggests chronic toxicity of beryllium may be as low as 5.3 ug/L.

Beryllium (ug/L)				WQO = NA
	Effluent			
	Low	High	Average	*Removal*
2016	0.020(ND)	0.0200(ND)	0.020	
2017	0.0094(ND)	0.0094(ND)	0.0094(ND)	***NA***
2018	0.0093(ND)	0.0093(ND)	**0.0093(ND)**	

Thallium:

Thallium (ug/L)				WQO = 6.3 (CTR)
	Effluent			
	Low	High	Average	*Removal*
2016	0.056 (ND)	0.64	0.199	
2017	0.032(ND)	0.13	0.042	***NA***
2018	0.020(ND)	0.071(DNQ)	**0.029**	

c) Organics

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.

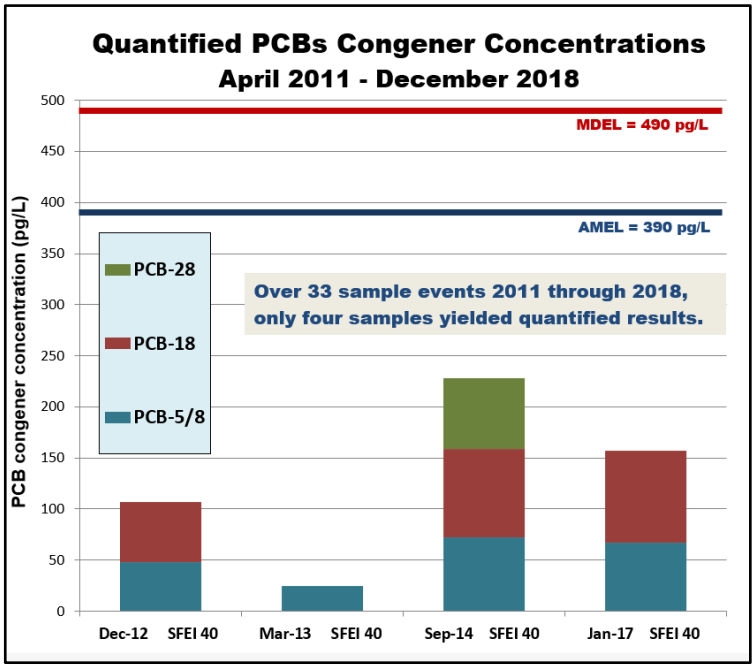
The Facility opted to reduce monitoring frequency and pay the AMR fee, so organic priority pollutants were last measured in February of 2016. Of 113 compounds analyzed, only three Volatile Organic Compounds (VOCs) were detected in Facility Effluent in 2016. The three detected VOCs were well below the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

Volatile Organic Compounds (ug/L)	February 2016	WQC
Chloroform	3.8	NA
Dichlorobromomethane	1.2	46*
Toluene	0.45 (DNQ)	200,000*

*Both Dichlorobromomethane and Toluene are based on human health criteria for consumption of organisms.

Indeno (1,2,3-cd) Pyrene. The facility has specific average monthly and maximum daily permit limits of 0.049 ug/l and 0.098 ug/l for this Polynuclear Aromatic Hydrocarbon (PAH). Accordingly, this is the only exotic organic compound that must continue to be monitored quarterly regardless of the AMR. It was not detected in 2018.

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 2018.



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 2018. 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.

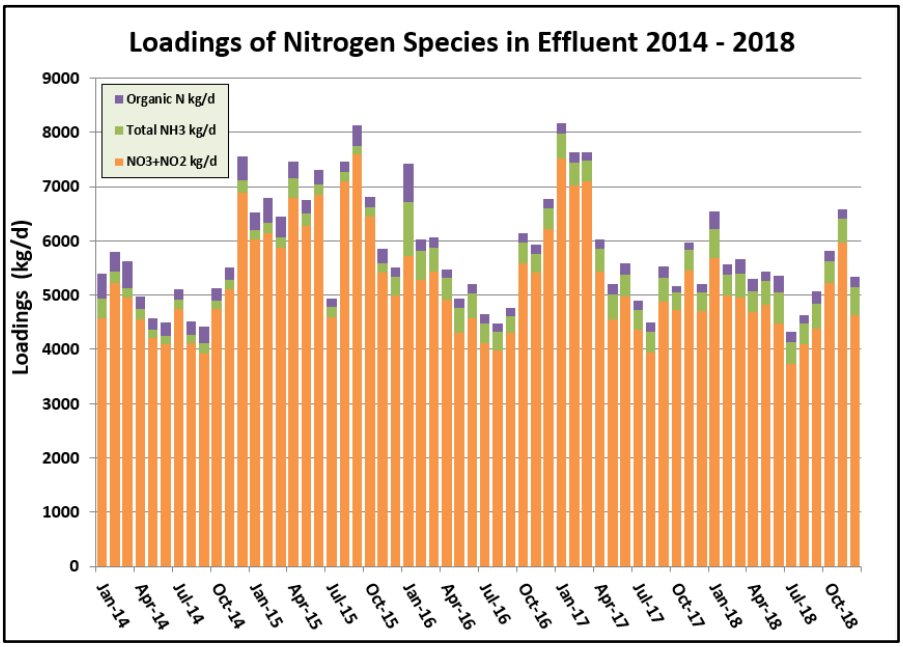
d) Nutrients

Effluent Nutrient Loadings in 2018. 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).

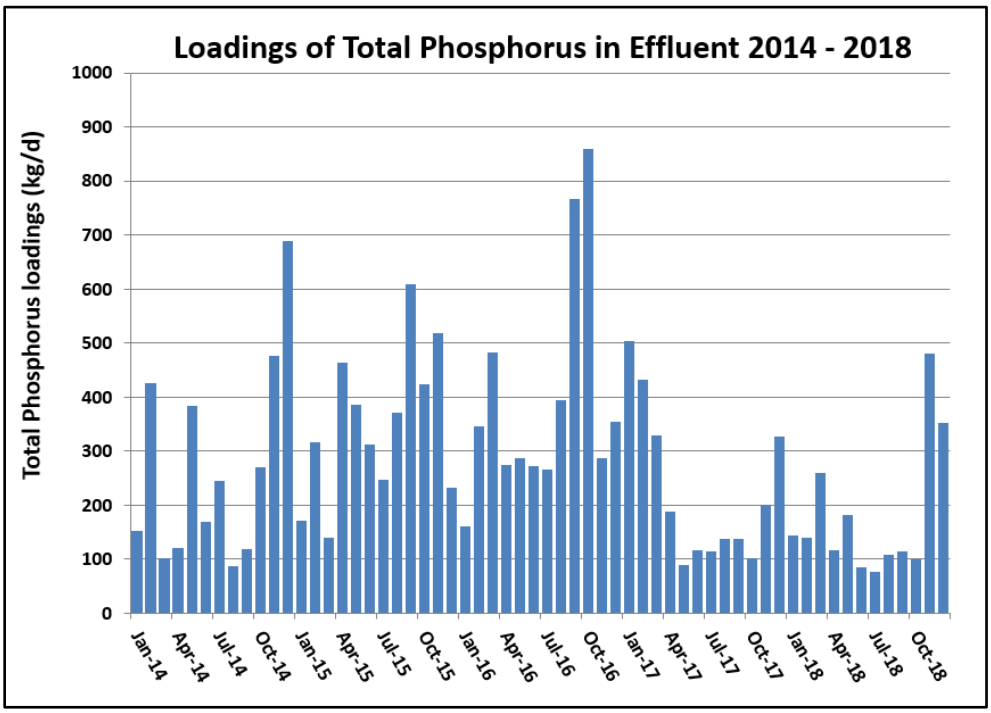
Nitrogen. Total Nitrogen (TN) is the sum of total ammonia (NH3), nitrate (NO3), nitrite (NO2), and organic nitrogen.

Discharged load of TN averaged 5,258 kg/day in 2018. This was mostly as nitrate (NO3).

Based on previously measured influent loads of 23,000 kg/day in 2013, roughly 77% of total nitrogen is removed through treatment.

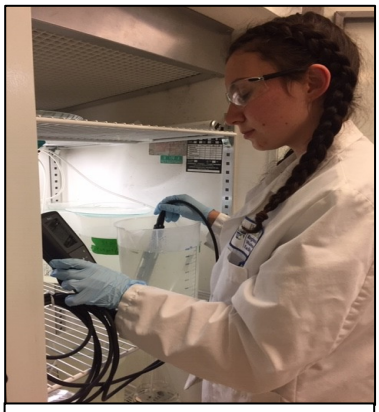


Phosphorus. Discharged load of Total Phosphorus (TP) averaged 180 kg/day in 2018. Compared to the measured influent load of 3040 kg/day from 2013, the Facility removed roughly 94% of TP through treatment in 2018.



3) Whole Effluent Toxicity

Acute Toxicity: Larval rainbow trout are used to test acute toxicity of facility effluent quarterly using a 96-hour flow-through test conducted in accordance with EPA methods. Four tests in 2018 resulted in 100% survival of rainbow trout. SJ-SC RWF has not failed an acute toxicity effluent test in 25 years. In fact, not a single test fish has died in the last five years of testing! 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.



Toxicology Technician, Meredith Klashman, evaluates water quality of test water.

Young Rainbow Trout

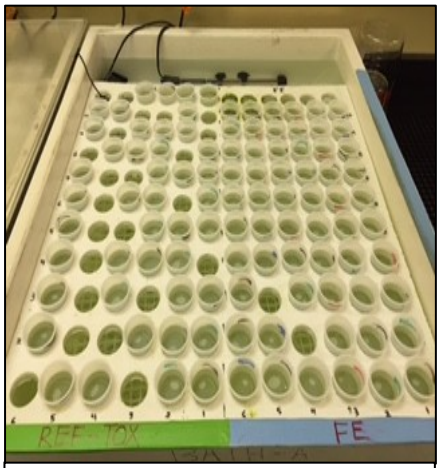
ACUTE TOXICITY TEST
LARVAL TROUT

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

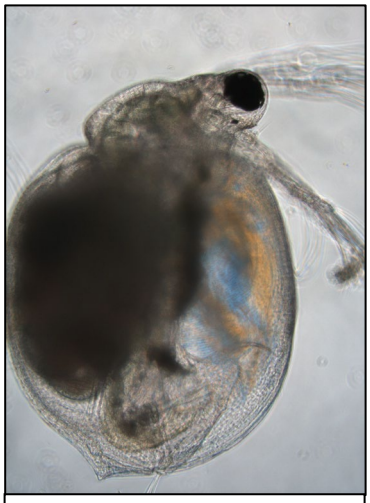
Chronic Toxicity: Facility effluent is tested monthly for chronic toxicity using *Ceriodaphnia dubia* (water flea) evaluated for the reproduction and survival endpoints. In 2018, only a single instance of chronic toxicity with a TUc greater than 1 occurred. While the August 2018 test resulted in a 1.86 TUc for reproduction, the two subsequent chronic tests were below 1 TUc, resulting in a 3-sample median of <1 TUc for all of 2018.

CHRONIC TEST RESULTS - 2018 (% EFFLUENT)

START DATE	SURVIVAL		REPRODUCTION				
	NOEC	LOEC	NOEC	LOEC	IC_{25}	TUc	TST
1/18/2018	100	>100	100	>100	>100	<1	PASS
2/21/2018	100	>100	100	>100	>100	<1	PASS
3/19/2018	100	>100	100	>100	>100	<1	PASS
4/12/2018	100	>100	100	>100	>100	<1	PASS
5/10/2018	100	>100	100	>100	>100	<1	PASS
6/14/2018	100	>100	100	>100	>100	<1	PASS
7/12/2018	100	>100	100	>100	>100	<1	PASS
8/9/2018	**50**	**100**	**12.5**	**25**	**53.84**	**1.86**	**FAIL**
9/24/2018	100	>100	100	>100	>100	<1	PASS
10/18/2018	100	>100	100	>100	>100	<1	PASS
11/2/2018	100	>100	100	>100	>100	<1	PASS
12/10/2018	100	>100	100	>100	>100	<1	PASS



Chronic Toxicity test board



Ceriodaphnia dubia

Chronic toxicity testing using Ceriodaphnia dubia has been performed since the inception of the Facility's chronic toxicity characterization in 1994. Chronic Toxicity Units (TUc) are calculated for each test by dividing the highest concentration of effluent tested (100%) by the test 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.

Toxicology Technician, Alex Brewster, performing a 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

* Some tests were duplicate test events

Since 1994, the RWF has detected chronic toxicity in its final effluent on 42 occasions over a 25-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.

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.

The Facility will continue its aggressive approach to determine the cause(s) and source(s) of the toxicant(s) responsible for chronic toxicity in future.

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. US Army Corps of Engineers (USACE) attained Water Board certification to commence construction of the first segment of South Bay Shoreline Levee in December 2017. BCDC issued a Consistency Determination on January 18, 2018. Appropriation of federal funding for the entire project, through the FY18 USACE supplemental budget, occurred in August 2018. Construction on Reach 1 should commence in summer 2019. The first levee segment runs from Town of Alviso north to southwest corner of Pond A16, terminating at the UPRR tracks. City staff continues to coordinate with US Army Corps, California Coastal Commission, and Santa Clara Valley Water District on levee alignment and future phases of construction that will extend the levee across the RWF outfall and along the north and west sides of Facility biosolid lagoon areas.

Burrowing Owl Habitat. The western burrowing owl population in the grasslands south of the San José-Santa Clara Regional Wastewater Facility continues to be the most successful burrowing owl colony in the Bay Area. In 2018, the peak of activity happened in June with 18 adults and 22 chicks, for a total of 41 owls. Although this number is lower than previous years, the reproductive success rate was higher, and the population remains robust.

Two banded adult burrowing owls captured on a motion activated camera "sharing a secret."

A feeding study was conducted by the Santa Clara Valley Audubon Society this year to evaluate the effect of supplemental feeding survival rates of chicks. Our 201-acre owl habitat was among the sites in this study. Although the results weren't statistically significant, the observed differences were meaningful. Fed nests produced twice as many chicks that weighed more than those from unfed nests. The feeding study also improved the success rate at nearby sites like Moffett Field, where number of chicks doubled compared to counts in 2017. 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.

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: http://sjenvironment.org/cip Status of key CIP projects are also summarized in the following sections of this report.

b) Power

Generators & 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. A series of "Black Start" tests were performed between February and April to test the new emergency generators and tune existing engine generators to work seamlessly in event of power loss.

Engine-Driven Generators & Fuel Cell

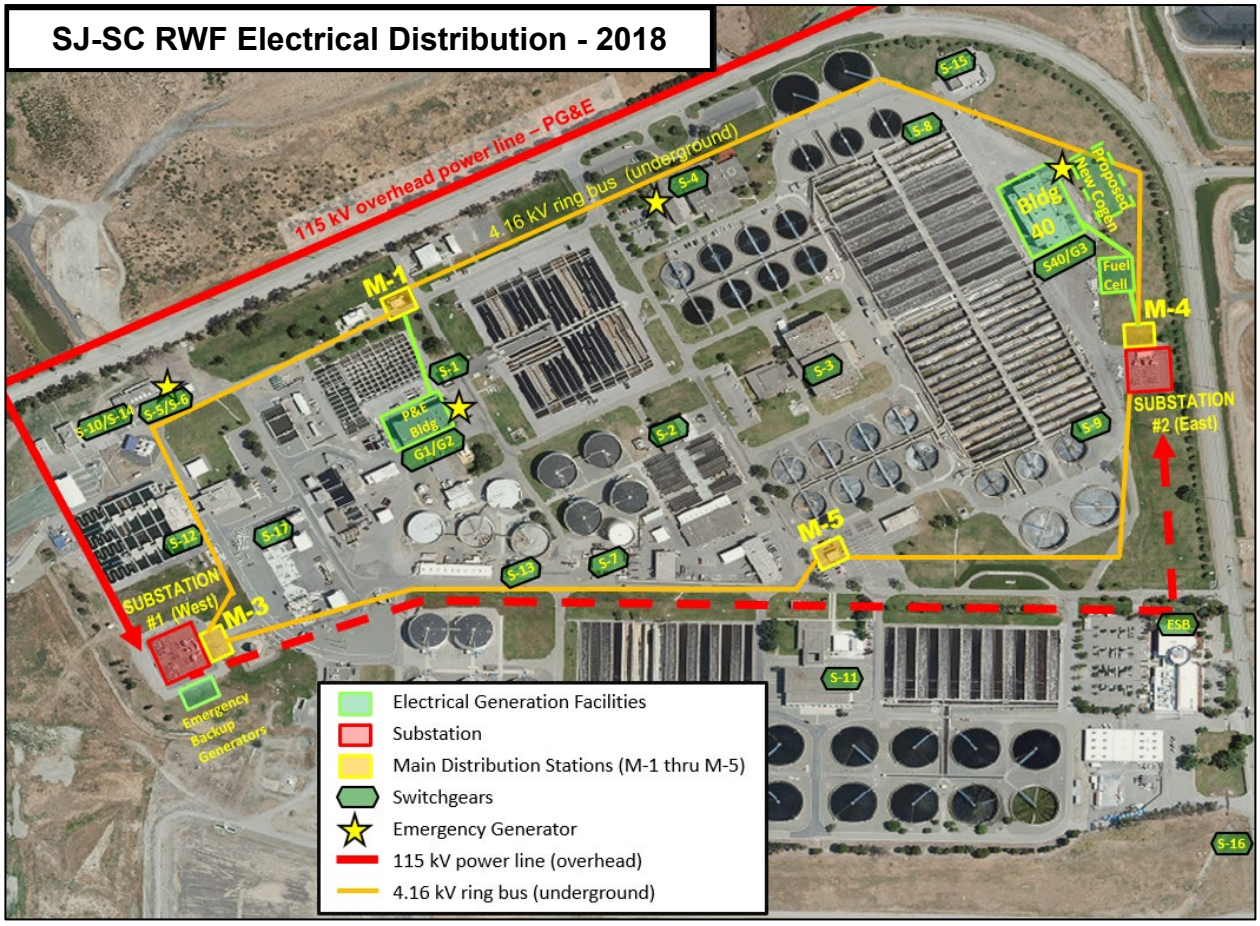
Generator	Location	Year Built / Overhauled	Capacity (KW)	Operational Status
Emergency Backup (4)	West Side	2017	12,000	Standby
E-2	P&E Bldg.	1953/2002	800	Decommissioned in 2017
E-5	P&E Bldg.	1962/2008	1,750	Decommissioned in 2017
EG-1	Building 40	1994/2015	2,800	In Service
EG-2	Building 40	1983/2009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

- With the four 3 MW Emergency Backup Diesel Engines certified and in service, they will assume electrical load in 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 2019.
- New 3.5 MW units were witness tested in Germany in 2018. 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.

Energy and Automation Division Manager, Ron Nickels, and Power and Air Supervisor Phil Hamilton next to a new 3.5MW CG260-16 engine generator.

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. CG 260-16s are scheduled to fully replace existing cogeneration units by spring 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 in November 2018. Commissioning of the new units is expected to be completed in November 2019.

A brochure from Caterpillar describes the new cogen units:
http://s7d2.scene7.com/is/content/Caterpillar/LEBE0018-01



Blowers. Three large capacity electric Process Air Blowers (PABs) are located in Building 40. These are currently functional and reliable but run sparingly due to electrical cost.

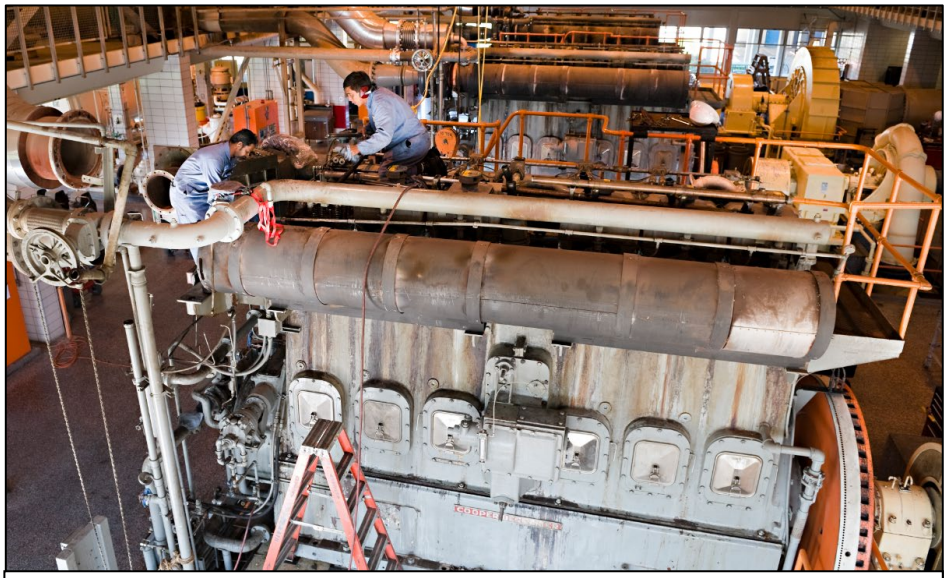
All five "Tertiary Building Blowers" (TBBs), also known as nitrification area blowers, are operational.

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

Process Air Blowers, PAB-1 thru PAB-3.

Electric Blowers			
3 - *Building 40*			
Blower	Capacity (BHP)	Start Date	Operational Status
PAB-1	4,000	1983	Standby
PAB-2	4,000	1983	Standby
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



Cooper engine-driven blower SBB B-1 being serviced in 2014.

©Robert Dawson. Photo courtesy of City of San José Public Art Collection

c) General Maintenance & Construction

Construction. General construction projects performed or completed in 2018:

- **Construction Enabling Improvements.** This project includes a new multi-acre trailer hook-up, dedicated construction security entry, contractor employee parking area, and lay yard area immediately south of the RWF. The project includes a dedicated turn-lane to accommodate the increased construction activity expected over the next ten years. This project reached beneficial use in August 2018.
- **Plant Instrument Air System Upgrade**. This project constructed a new building adjacent to Secondary Blower Building to house three new high-pressure air compressors. The new compressors replace older units and provide high-pressure instrument air used to actuate valves and water level sensors. The project reached beneficial use in November 2018.
- **Headworks Critical Improvements.** This project addressed critical needs including replacing two existing climber screens at Headworks 2 with multi-rake screens, replacing two slide gate stems and actuators at the Emergency Basin Overflow Structure (EBOS), and adding disconnect switches for control power at Headworks 2, enabling slide gate actuators to be locally isolated. The project reached beneficial use in August 2018.

New Instrument Air Compressor Building.

Painting. The following buildings and major equipment were cleaned, primed & painted.

- Secondary Basement Tunnel, West – piping, valves and support in approximately 65% of the tunnel.
- Secondary Remote RAS pump room tunnels – piping, valves, and support.
- Secondary Clarifiers A6 and A8 – cleaned, prepped, primed and coated all metal items.
- Rag Bin Canopy in HW1 – using epoxy primer and polyurethane finish.
- Life ring boxes – cleaned, prepped, primed, painted and labeled throughout RWF.
- Trailer D stairs and wheelchair access ramp to all entrances, interior walls and ceiling of the Paint Shop, and support panels for Construction Enabling Trailers.
- West Primary Basement floor drain grates.
- Traffic marking – repainted and marked curbs throughout RWF.
- Building 40 Roof Equipment – all equipment on east side roof mezzanine.
- Expansion Joints repair – Digester 14, Secondary A-side mixed liquor channel
- Concrete repair - stairs at SBB service wing, replaced electrical vault in East and West Primary, repaired Nitrification B-side tunnel leaks, capped P&E Building abandoned raw sewage line

d) Condition Assessments and Studies

The following studies, reports and condition assessments were completed in 2018:

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 35-56 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 blowers in the Secondary Blower Building should 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.
- The design consultant, Brown & Caldwell completed design in May 2018.
- Monterey Mechanical was awarded the construction contract in December 2018 and will begin construction in early 2019, with a project duration of 38 months and a construction cost estimate of $29.5M.
- Process air flow meters, temperature and pressure transmitters, and valve actuators are also recommended for replacement.

Filter Rehabilitation Project Conceptual Design Report. 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 (30% design) is approximately $28M
- The project will be delivered using the conventional design-bid-build approach with 60% design scheduled for spring 2019, and 100% design by fall 2019.
- Award of construction contract is anticipated to be in summer 2020, with construction beginning fall 2020 and beneficial use achieved in spring 2023.

Fire Life Safety Upgrades Project, Condition Assessment. A final condition assessment report was completed by contractor Kennedy/Jenks in July 2018. The assessment focused on 32 existing support buildings and evaluated the general level of life safety and fire protection in each building. A list of short and long-term recommendations for corrections includes improvements to fire alarm and monitoring systems, signage, and fire suppression systems.

HVAC Improvements Project, Condition Assessment. A final condition assessment report was completed by contractor Kennedy/Jenks in August 2018. The assessment included occupancy and use analysis, and condition/performance assessment of heating, ventilation, and air conditioning (HVAC) systems in 18 existing support buildings. The report provides recommendations for replacing undersized or aging units, redundancy systems, improved duct layouts, and installation of environmentally friendly air handling units.

Yard Piping and Roadway Improvements Project, Condition Assessment. A condition assessment was performed in summer 2018 by contractor Black & Veatch, with a final condition assessment report in January 2019. The project has evaluated all process yard piping from 24 inches to 96 inches and the report provides recommendations for prioritizing repair or rehabilitation of all assessed pipes based upon a condition rating, priority score, and a range of expected service life.

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.

- An Iron Salt Feed Station at EBOS was completed by contractor, Anderson Pacific, in early 2018. The station is in service and underwent final testing in 2018. 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.

Iron Salt Feed Station.

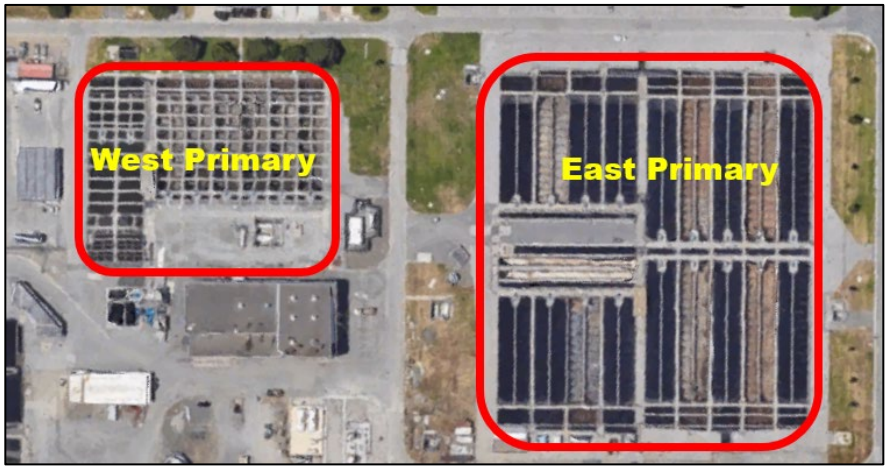
- A polymer injection station was also installed upstream of East Primary area to aid primary settling through chemically enhanced primary treatment (CEPT) by dosing 0.2 mg/L of polymer with the 10 mg/L ferric chloride. The polymer injection station underwent demonstration testing in early 2018 using an alternate temporary injection point that was downstream of the raw sewage composite sample point. The originally designed injection point, if used, would have resulted in polymer in the raw sewage composite sample.
- The influent compliance sampling point was relocated from the East Primary Influent Channel (EPIC) further upstream to the Large Raw Sewage Wet Well (LRSWW). The change in sampling location was necessary to enable the injection and mixing of polymer downstream of the influent sample point. The sampling location change was approved by the San Francisco Bay Regional Water Quality Control Board in October 2018 following parallel testing from March through August 2018 that demonstrated comparable results from both composite sample locations.
- A "Headworks Critical Improvements" project was completed in November 2018. In addition to other equipment replacements completed in previous years, in 2018, the project replaced two existing climber screens in Headworks 2 with Duperon Flex Rake, which are multi-flex rakes.

Duperon Flex Rakes.

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. After a comprehensive evaluation of cost, hydraulics, odor, O&M issues, environmental and social concerns, the project team selected a preferred site for the new HW3 that is near EBOS. A basis of design draft report is due in early 2019. Estimated cost of HW3 is $165M with a completion date of December 2022.

b) Primary Clarifiers

West Primary. West Primary area 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.



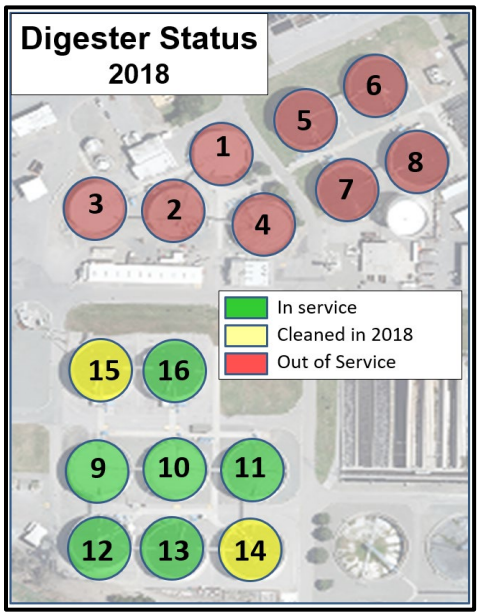
East Primary. In late 2016, while performing work for the Digester and Thickener Facilities Upgrade project, contractor Walsh Construction encountered major corrosion in a 78" pipe that conveys primary effluent (PE) to the secondary/BNR operational areas. Hydrogen sulfide gas caused corrosion to the top of the concrete pipe and rebar.

- The discovery has forced temporary partial shutdowns of the East Primary (southern) B-Side while a temporary piping system was installed to carry the flow (up to 100 MGD) normally conveyed through the non-redundant 78" pipe from east primary to the secondary aeration tanks.
- Following 18 months of meticulous planning and re-design, the temporary, above ground piping system was fully operational and the 78" PE pipe was taken out of service in May 2018 and repairs to the damaged pipe began.
- All repairs were performed during the 2018 dry season and construction work on all elements was completed, on schedule in October 2018.

Sections of 36-inch HDPE pipe, installed and used as a temporary piping system while the 78" PE line was out of service for repair.

Two of the pumps utilized in the temporary piping system while the 78" PE line was out of service for repair.

c) Digesters, Gas, & Sludge



Digester Status. Eight digesters are currently in service.

- Digesters 14 and 15 were cleaned in 2018 and restored to service upon completion.
- Digesters 9 and 13 were cleaned in mid-2017 and restored to service in August 2018 after roof replacement on digester 9, and roof repair on digester 13.
- Digester 16 is in service and is the next digester slated for cleaning.
- Digesters 1 and 3 are currently being cleaned.
- 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.

Digester and Thickener Facilities Upgrade Project

This project was initiated in 2016 and is currently at 55% completion. As part of this project, digesters 5 thru 8 will be converted to Temperature-Phased Anaerobic Digestion (TPAD), six DAFT tanks will be converted to operate as co-thickener units (primary and secondary sludges), a new primary sludge screening facility will be constructed, along with two new electrical buildings, and external elevated gas piping and gas flare systems. Highlights in 2018 include:

- New interior foundations and support columns for the concrete roofs were completed. Old post-tensioning cables were removed and replaced. Gas mixing systems were installed in the interior of the four digester tanks and exterior foundations for all digesters are at 50% completion.
- 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.
- Contractor, Walsh Construction, completed all structural modifications to six DAFT tanks in 2018 to enable co-thickening of primary and waste activated sludges. Tanks have been re-coated and installation of new mechanical mechanisms is underway. Repair and modifications of these tanks included removal of old equipment such as pressurization tanks, and associated piping. New piping was installed in 2018 and new pressurized tanks and piping work will be installed and completed in 2019.

- Temporary above-ground digester gas piping was installed in 2017 to allow removal of methane piping systems from underground tunnels and has been in service during all of 2018. The new piping system will be used at least through 2019 until a truly above-ground system, is completed. The digester gas bypass work was delayed approximately six months due to BAAQMD digester gas venting restrictions.

Temporary digester gas above-ground (on-ground) piping

- Permanent above-ground piping racks nicknamed “The Monorail,” are being installed. The new racks will provide mounting for digester gas, fuel, and compressed air piping networks. A total of 79 concrete footings and columns and most segments of the steel pipe rack were installed in 2018.

New permanent above-ground piping racks: “The Monorail.”

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.

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.

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 was awarded to the General Contractor Overaa in 2018 and will replace control equipment in the secondary (BNR-1) B-side batteries as well as the nitrification (BNR-2) B-side batteries.
- Phase 2 will replace the A-side batteries and is scheduled to go out to bid October 2019.

Nitrification Area (BNR-2).

- The RWF's 16 clarifiers 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 construction cost of $43M for Phase 1 and $24M for Phase 2.

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.
- 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.

Below: 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.

Nitrogen Trend after Secondary/BNR Processes

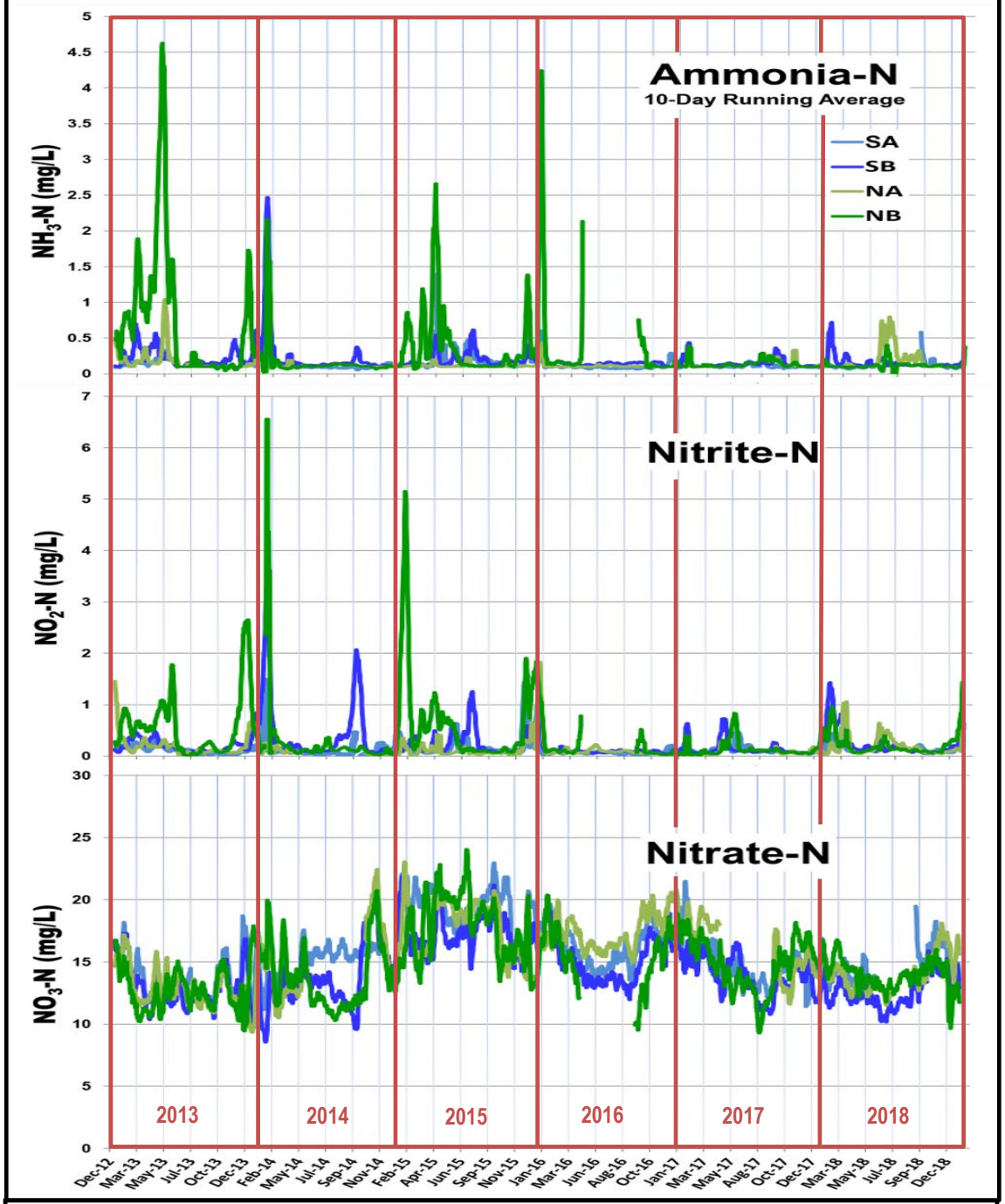


Chart developed by Dr. Rong Liu to track nitrogen oxidation and removal in each of four BNR process areas: Secondary (BNR-1) A & B, Nitrification (BNR-2) A & B.

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 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.

- Oct. 2018 - Filter media column testing began to determine if a new filter media specification should be used in future filter rebuilds. The testing is ongoing and has been underway for about 3 months in coordination with RWF Process Engineering Group.

Filtration general repairs and maintenance.

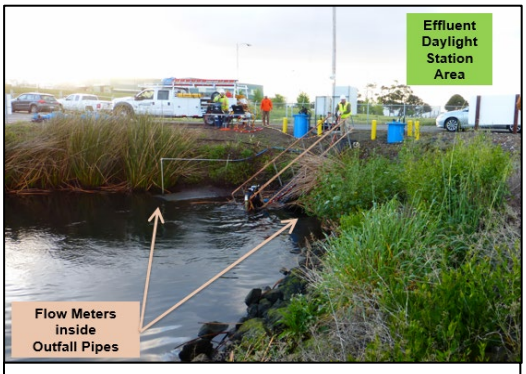
- July 2018 – The filter backwash basin and flocculators were drained and clean of grit/old media in July 2018. This is a maintenance effort performed about once every 3 years.
- B Battery backwash flow control valve was repaired in summer 2018. The valve was broken for approximately 2 weeks, which limited effectiveness of B side backwashes.

Disinfection general repairs and maintenance.

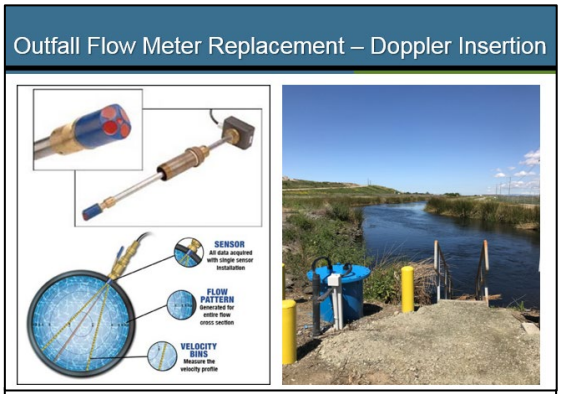
- Process Water used for washdown and other non-potable water uses onsite was shut down for valve repairs in April 2018. During this shutdown, RWF utilized backup recycled water, which limits the amount of equipment that can be in service at the same time.

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.

- Divers entered the final effluent pipes and outfall channel in April 2018 as part of the condition assessment of RWF infrastructure. The purpose was to evaluate final effluent flow meters condition and the condition of the outfall weir, both of which will be replaced, repaired and upgraded as part of the Outfall levee and bridge project.
- New insertion-style flow meters that use doppler technology will replace the current final effluent flow meters. Current meters require an effluent flow shut down so a specialized diver can enter the pipe to perform maintenance. The replacement flow meters will remove the need for specialized divers.



Current flow meters require specialized divers to access the sensors.



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).
- 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 equipment.
- 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.

Infor EAM (Enterprise Asset Management)	2016	2017	2018
Current Software version	V.11	V.11.2	V.11.3
Assets tracked; vertical and linear	15,400	15,650	15,061
Warehouse inventory items cataloged & tracked	5,300	5,450	5,153
Non-inventory parts/direct purchase items logged	3,100	2,950	3,122
Preventative Maintenance items scheduled/recorded	3,100	3,200	2,374
Work Orders created & executed (regular/other)	3,400	3200/3300	3302/3283

The system was upgraded to Infor version 11.3 in April of this year. Due to the added features and user friendliness, it has been well received by Facility staff. Equipment in two process areas at the RWF have already been ID-matched with the Distributed Control System (DCS) to facilitate user ease in locating the CMMS equipment through DCS tags on the graphic display. Work is in progress to match the CMMS/DCS tags for the remaining process areas.

GIS. GIS staff provides mapping and documentation 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 Geographic Information Services (GIS) Team has added new capabilities to locate buried utilities using the latest Ground Penetrating Radar (GPR) technology. The recent addition of the 350MHz Digital HyperStacking Antenna from GSSI, Inc. allows the team to gain ever greater accuracy in the location and identification of RWF buried utilities. With HyperStacking technology the team can now see buried utilities where they were not able to be seen before. The GIS Team also completed an intensive 2-day training regimen on how to use this technology.

350MHz Digital HyperStacking™ Ground Penetrating Radar Antenna

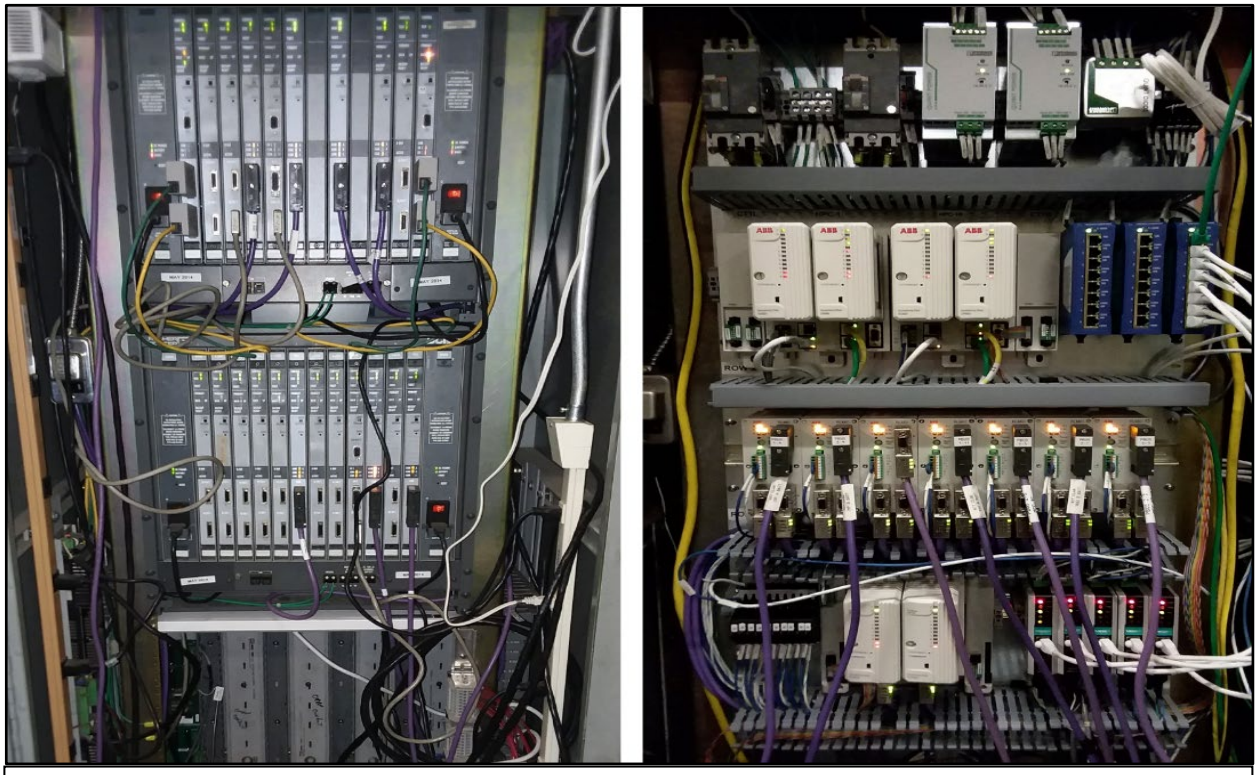
Process Control Group.

The RWF Process Control Systems 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.

Capital Improvement Program Projects. 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. PCS is currently assisting the Nitrification Rehab, Digesters Rehab, Blowers Improvements, Co-Gen, Fire-Life-Safety, Meter Replacement, M4 Replacement G3/G3A Replacement projects amongst others.

DCS Upgrade Project. The DCS upgrade project is replacing the existing 25+ year old System Six DCS with a new Harmony DCS through a phased, multi-year project. A significant milestone was reached during 2018 with the completion of a Pilot Project which replaced one of the existing controllers in the Nitrification Area with a new Harmony controller.

Additionally, in preparation for the conversion, all wiring and cabinetry for all Plant-wide instrumentation is being replaced and the PCS group, in cooperation with Instrument and Electrical Shops, is currently rewiring the Secondary Process area. To-date, over 7,000 signals out of 8,000 have been rewired and reconfigured.



Left: Old System Six controller in Nitrification. **Right: New Harmony controller in Nitrification.**

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 215 positions of which 27 were vacant at end of 2018. One senior office specialist position in the administrative group was replaced by a senior engineering technician position in the asset management group. In the maintenance group, a division manager position was replaced by a wastewater facility operations manager position.

Vacancies included: 2 associate engineering technicians, 1 industrial process control senior specialist, 1 industrial electrician, 1 instrument control technician, 1 principle office specialist, 1 industrial process control specialist, 6 wastewater attendants, 5 wastewater mechanics, 2 wastewater operators, 4 wastewater operations forepersons, and 3 wastewater senior mechanics.

Operations Division: 74 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 2018, eight 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.

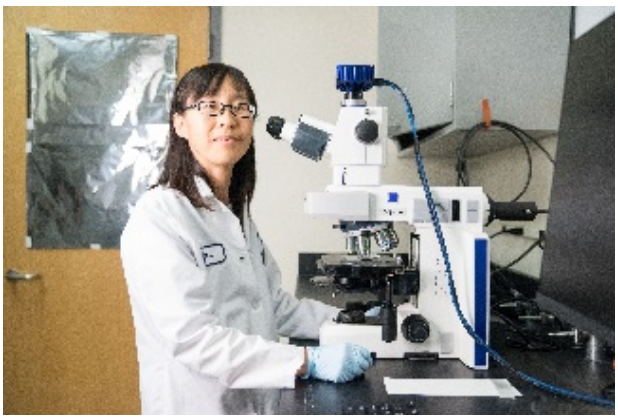
Facility Maintenance Division: 67 positions organized in three sections:

- 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, bufferland management.

Energy and Automation Division: 60 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: 51 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. Eight 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 who monitor, report, 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 personnel. 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 Jose 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 Jose. 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. In addition to cities of San Jose 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 Jose for review to determine conformity with State Water Board revenue program guidelines.

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 2019-2023 CIP provides funding of $1.38 billion, of which $174.7 million is allocated for 2018-2019. Revenues for the five-year CIP are derived from several sources: transfers from the City of San Jose 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.

- $214.9 million: transfers from the City of San Jose Sewer Service and Use Charge Fund.
- $317.3 million in contributions from the City of Santa Clara and other agencies.
- $753.3 million 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 Jose 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 2018-2019 Capital Budget at: http://ca-sanjose.civicplus.com/DocumentCenter/View/79822

Table below provides 2017-2018 actual CIP expenditures & encumbrances as of June 30, 2018.

2017-2018 Capital Improvement Program Year-end Expenditure Summary				
	Appn	Project	Expenditure on 6/30/2018	Current Encumbrances
1	401B	OWNER CONTROLLED INSURANCE PROGRAM	272,915	0
2	402M	FLOOD PROTECTION	37,829	18,732
3	404V	STORMWATER IMPROVEMENTS	125,604	755,317
4	4127	DIGESTER & THICKENER FACILITIES UPGRADE	48,392,418	97,592,675
5	4332	EQUIPMENT REPLACEMENT	0	0
6	4341	PLANT ELECTRICAL RELIABILITY	108,810	711,304
7	5690	PLANT INFRASTRUCTURE IMPVT	669,588	1,349,422
8	5957	PUBLIC ART	58,468	383,000
9	6000	CITY-WIDE & PW CAP SUPPRT COST	566,394	0
10	6285	LAGOON & DRYING BED RETIREMENT	0	1,564
11	6313	CONSTRUCTION- ENABLING IMPROVEMENTS	931,785	499,287
12	6584	PAYMENT FOR CWFA TRUSTEE	5,000	0
13	6589	REVISED SBAP-SBWR EXTENSION	0	0
14	7074	NITRIFICATION CLARIFIER REHAB	1,175,875	1,949,975
15	7224	ADVNCD FACILITY CONTRL & METER REPLACEMENT	941,926	7,993,783
16	7226	E PRIMARY REHAB-SEISMIC & ODOR	286	212
17	7227	FILTER REHABILITATION	1,080,049	353,106
18	7230	IRON SALT FEED STATION	2,921,689	510,797
19	7394	T.P. DISTRIBUTD CONTROL SYSTEM	344,966	278,600
20	7395	URGENT & UNSCHEDULD T.P. REHAB	0	0
21	7396	YARD PIPING & ROAD IMPROVEMENTS	289,893	2,226,369
22	7448	HEADWORKS IMPROVEMENTS	2,213,026	1,023,865
23	7449	NEW HEADWORKS	1,254,471	4,876,103
24	7452	DIGESTED SLUDGE DEWATERING FACILITY	1,428,495	2,034,466
25	7453	COMB HEAT&PWR EQUIP REPR&RHAB	234,151	88,844
26	7454	ENERGY GENERATION IMPROVEMENTS	13,665,329	84,366,878
27	7456	PRELIMINARY ENGINEERING	28,738	176,614
28	7481	PROGRAM MANAGEMENT	5,332,056	3,055,297
29	7677	AERATION TANKS & BLOWER REHAB	6,558,407	692,341
30	7678	OUTFALL BRIDGE & LEVEE IMPROVEMENTS	120,183	741,037
31	7679	FACILITY WIDE WATER SYSTEM IMPROVEMENTS	572,012	172,244
32	7680	PLANT INSTRUMENT AIR SYSTEM UPGRADE	2,867,548	377,864
33	7681	SUPPORT BUILDING IMPROVEMENTS	604,838	1,410,408
34	7683	RECORD DRAWINGS	0	0
35	7698	TUNNEL REHABILITATION	76,319	15,309
		TOTAL	92,879,068	213,655,411

Operating and Maintenance Budget.

San Jose-Santa Clara Regional Wastewater Facility

FY 2018-19 Operating & Maintenance Budget Summary

Budget Summary	2017-2018 Actual Expenses	2017-2018 Adopted Budget	2018-2019 Base Budget	2018-2019 Adopted Budget
Personal Services	$53,911,273	$57,036,603	$58,513,458	$58,737,337
Non-personal Services	27,140,641	33,233,019	30,695,194	31,195,194
Equipment	557,785	940,000	906,000	906,000
Inventory	541,602	400,000	400,000	400,000
Overhead	9,687,081	9,687,081	13,466,283	13,466,283
NCH Debt Service	1,175,345	1,175,143	1,057,934	1,057,934
Workers' Compensation	536,619	675,000	607,000	607,000
City Services	983,835	1,050,457	782,744	785,536
Total Operating Expenses	**$94,534,181**	**$104,197,303**	**$106,428,613**	**$107,155,284**

ESTIMATED COST DISTRIBUTION

2018-19 Estimated Total Gallons Treated (MG)	(1) Percent of Total Sewage Treated	City / District	2018-2019 Proposed
24,891.434	63.437	City of San Jose	$67,976,098
5,077.619	15.196	City of Santa Clara	$16,283,317
29,969.053	**78.633**	**Sub-Total**	**$84,259,415**
3,428.330	9.075	West Valley Sanitation District	$9,724,342
1,911.097	5.471	Cupertino Sanitary District	$5,862,466
2,058.490	5.659	City of Milpitas	$6,063,918
345.079	0.931	Sanitation District # 2 - 3	$997,616
86.089	0.231	Burbank Sanitary District	$247,529
7,829.085	**21.367**	**Sub-Total**	**$22,895,871**
37,798.138	**100.000**	**TOTAL**	**$107,155,286**

(1) Composite of four parameters (flow, BOD, SS, ammonia). Source 2017-18 Revenue Program.

Regulatory fees and membership dues.

Major Permit Fees		Paid	Paid	Invoiced
Fees	**Agency**	**2016-17**	**2017-18**	**2018-19**
Permit: Annual NPDES Fee	State Water Resources Control Board	$525,537	$525,537	$577,091
Permit: Annual RMP Participation	Regional Monitoring Program – SFEI	$234,752	$201,229	$210,819
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	$80,070	$83,307	$70,198
Fee: Annual Cap and Trade	California Air Resources Board	$303,692	$303,438	$295,728
Related Membership Dues				
BACWA Annual Dues	Bay Area Clean Water Agencies	$292,176	$294,086	$296,034
WERF Research Dues	Water Environment Research Foundation			
CASA Annual Dues	California Association of Sanitation Agencies	$19,282	$19,282	$19,282
Green Cities California Fund	Local Government Sustainable Energy			

*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. At the end of 2018, 678 documents were filed in the SOP library, which included SOPs and ancillary documents.

SOP Count by RWF Division	
RWF Division	**Number of SOPs**
Operations	430
Maintenance	147
Energy & Automation	45
Support & Administration	41
Ancillary	15
Totals	**678**

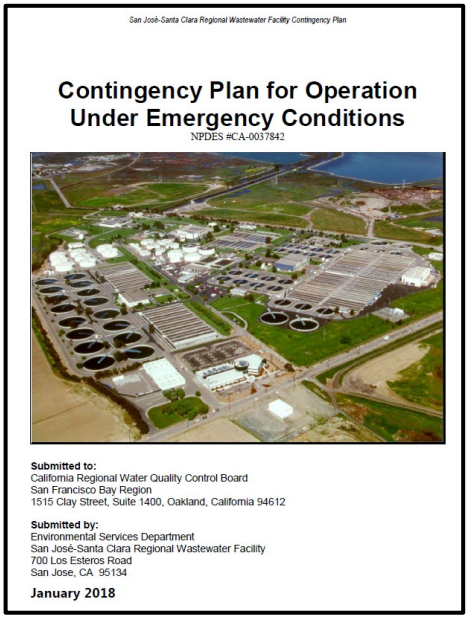
Completion of the Iron Salts and Polymer CIP Project generated 23 new procedures that were added during 2018. In addition, 4 SOPs were added for the Disinfection and Filtration process areas, as well as one for Sludge Control.

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 is undergoing review and revision that is expected to be finalized in early 2019.


San José-Santa Clara Regional Wastewater Facility Contingency Plan

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 2018

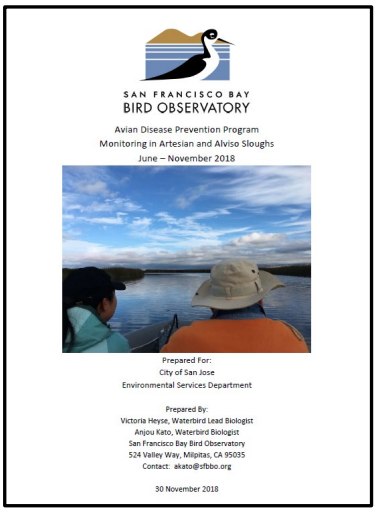
3. ENVIRONMENTAL MONITORING

a. Avian Botulism Monitoring

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 2018, no outbreaks of avian botulism were detected. Ten dead, 8 sick, and 2 injured birds were found in the Artesian Slough – Lower Coyote Creek survey area over the six-month survey period from 7 June through 27 November. None of the sick birds were diagnosed with avian botulism. Additionally, 18 dead fish were found and collected. Seventeen of the fish were striped bass.

The Avian Botulism Report is posted on the City's web site: http://www.sanjoseca.gov/Archive.aspx?AMID=156&Type=&ADID


SAN FRANCISCO BAY
BIRD OBSERVATORY

Avian Disease Prevention Program
Monitoring in Artesian and Alviso Sloughs
June – November 2018

Prepared For:
City of San Jose
Environmental Services Department

Prepared By:
Victoria Heyse, Waterbird Lead Biologist
Anjou Kato, Waterbird Biologist
San Francisco Bay Bird Observatory
524 Valley Way, Milpitas, CA 95035
Contact: akato@sfbbo.org

30 November 2018

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

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

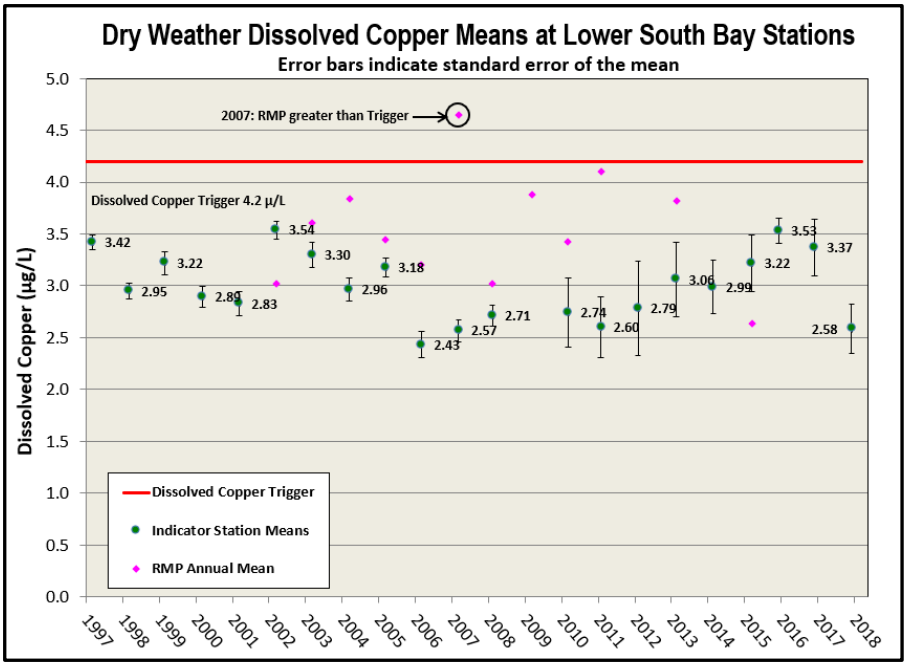
1. **Wildlife Habitat (WILD)**
2. **Fish Spawning (SPWN)**
3. **Warm Freshwater Habitat (WARM)**
4. **Cold Freshwater Habitat (COLD)**
5. **Fish Migration (MIGR)**
6. **Non-Contact Recreation (REC-1)**
7. **Contact Recreation (REC-2)**
8. **Commercial & Sport Fishing (COMM)**
9. **Rare & Endangered Species (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. Currently, two metals, copper and selenium, continue to be monitored quarterly, in addition to DO, pH, temperature, turbidity and nutrients. This additional monitoring of Bay waters is not required under current NPDES permit.

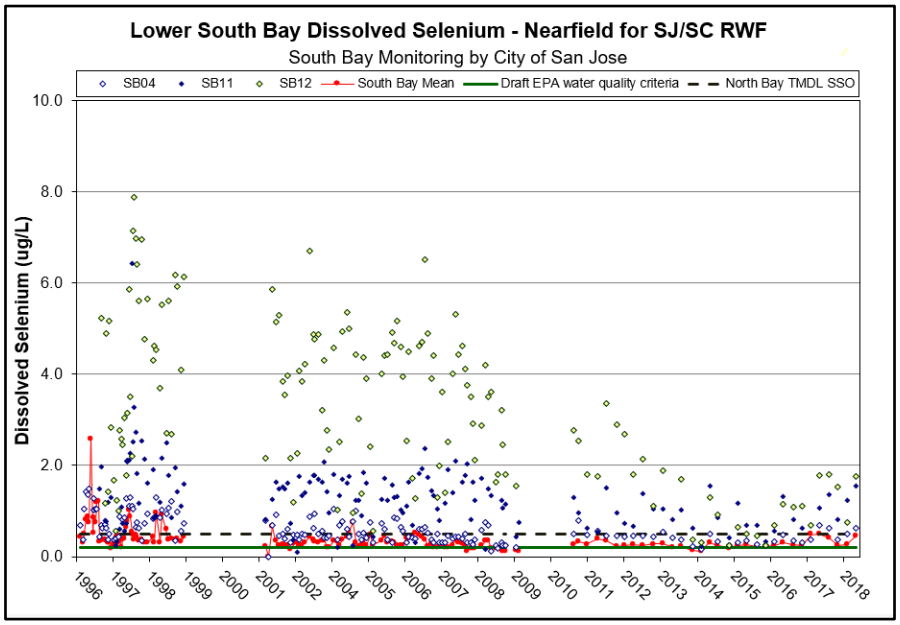
Metals, nutrients, and water chemistry. Facility staff performs quarterly monitoring of Lower South San Francisco Bay receiving water by boat at 10 stations.

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 ug/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 ug/l threshold. Copper data generated by the SJ-SC RWF is shared and compared against RMP data at least annually.



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.

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.

EPA and Regional Water Board continue to be concerned that nitrogen loads tend to 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.

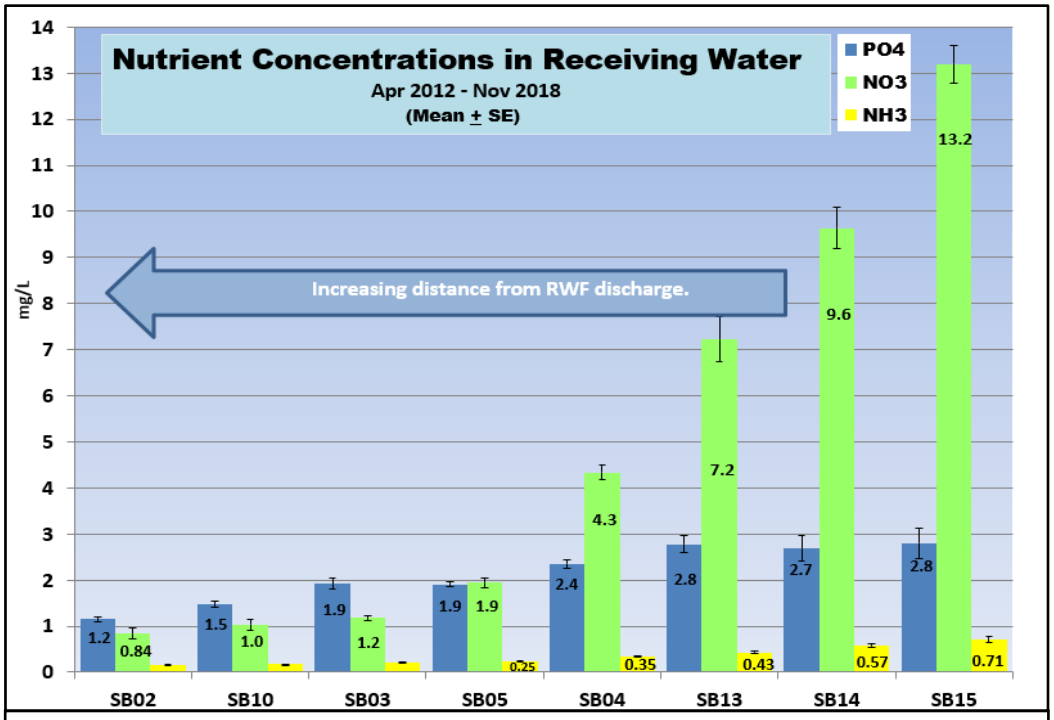
Jessica Donald and Ryan Mayfield collecting a nutrient sample.

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. The permit Fact Sheet (attachment F) states:

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

The bulk 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.

1. Physical Parameters: Dissolved Oxygen, Temperature, Salinity



SJ-SC RWF discharges consistent concentrations of nitrate and phosphorus year-round. Concentrations decrease steadily as water flows out to the Bay.

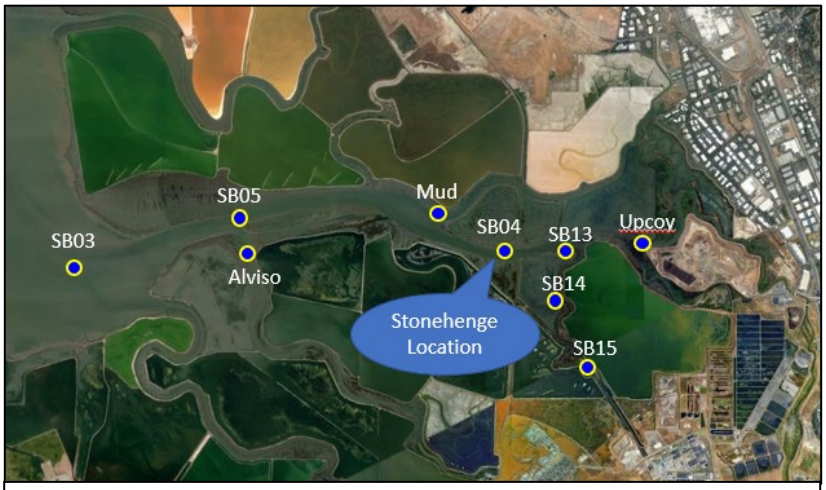
Dissolved Oxygen (DO) is consumed by living organisms in the aquatic environment. Dissolved inorganic nitrogen (ammonia, nitrite, and nitrate) in Facility effluent, can act as a fertilizer to stimulate excessive growth of algae (primary production). Too much production can draw down DO concentrations 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.

Bryan Frueh, deploying the continuous monitoring sonde.

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

During 2018, a YSI 6600 sonde was deployed for 30-day intervals on a bi-monthly basis at the Railroad Bridge in Coyote Creek (see map below). 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. Unfortunately, repeated theft and vandalism of the deployed sonde in 2018 caused a number of setbacks and data loss. Data collection is on hold while RWF staff evaluate logistical and safety options before resuming continuous DO data collection.

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 an information into observed negative conditions such as fish kills, which rarely occur.

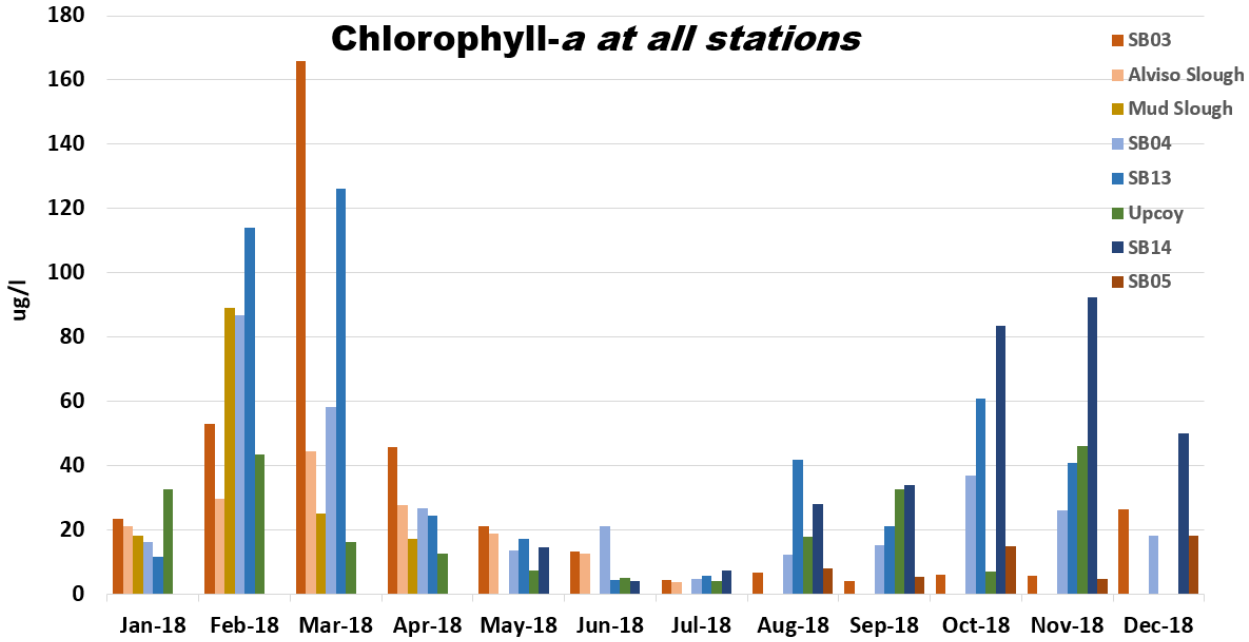


Map of Monitoring Locations

2. Biology.

To investigate nutrient impacts, SJ-SC RWF staff began sampling water and sediment samples for biota at five stations along Lower Coyote Creek in 2016, 2017, and 2018.

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. 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 ug/l are generally considered bloom conditions. Here, average concentrations can exceed 80 ug/l during the spring bloom.

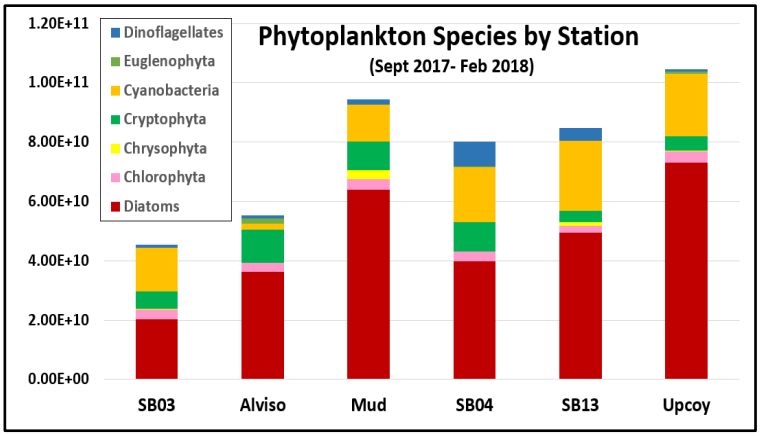
Average chlorophyll concentrations decline along a downstream gradient from Artesian Slough to the Bay. This supports the hypothesis that nitrate-rich effluent from the RWF may be fertilizing portions of Lower Coyote Creek. However, shallow marshes and sloughs also generally support high phytoplankton growth. The exact amount of RWF contribution is still uncertain. Even given the high chlorophyll concentrations during season 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.

Ryan Mayfield using a Van Dorn sampler to collect a phytoplankton.

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 has collected water samples that are analyzed by BSA Analytical Services for phytoplankton species enumeration since 2013. In April 2016, sample collection method was changed to make use of 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. Certain species of dinoflagellates or cyanobacteria HABs, detected infrequently and in small amounts could be cause of concern. However, these HABs have been very rarely seen in over 5 years of sampling.

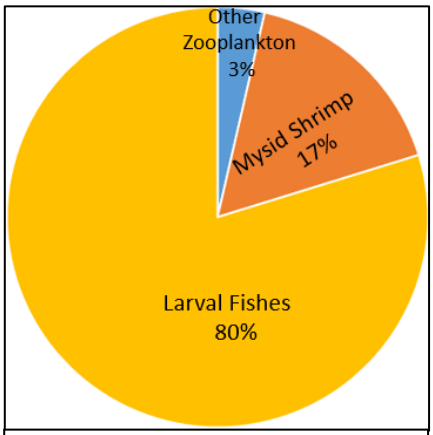


In 2018, one HAB species, the cyanobacteria Microsystis, was observed for the first time by this monitoring program. Under the right conditions, this species can produce toxins that can harm aquatic life. It is a freshwater species, so its presence in the estuarine and marine environment is unusual and generally corresponds to wet years. While Microsystis was detected, no dead fish or wildlife were observed during RWF field monitoring.

Zooplankton Monitoring. Zooplankton are tiny, often microscopic, animals that feed off phytoplankton. They are a vital food source for planktivorous (plankton eating) fish like anchovies, mullet, smelt and shad. Zooplankton include copepods, barnacle larvae, clam larvae (veligers), and small soft bodied rotifers. An additional indicator of phytoplankton (and estuarine) health is whether an abundant, healthy, and diverse population of zooplankton is supported.

RWF staff began collecting zooplankton samples monthly in May 2016 using two different nets attached to a tow sled. The larger mesh catches larval fish and shrimp-like species while smaller mesh captures very small zooplankton. Samples are preserved and sent to UC Davis for species identification.

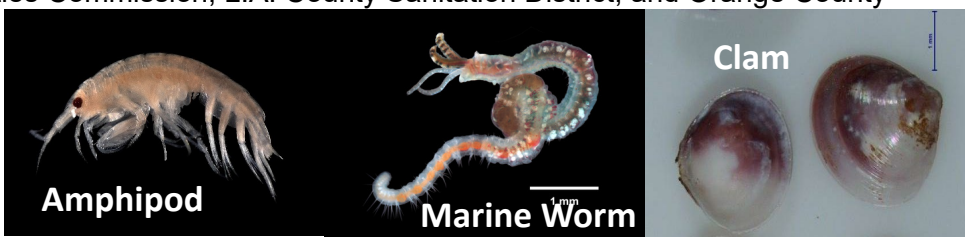
For 2018, only 18 samples have been sorted at this time due to budget constraints. Initial results show the catch is dominated by larval fishes (mostly yellowfin goby). Unlike 2017, no longfin smelt larvae were found in the samples that were processed.



Percentage of zooplankton groups captured during net tows in 2018.

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).

RWF staff began collecting bimonthly benthic samples at phytoplankton and zooplankton

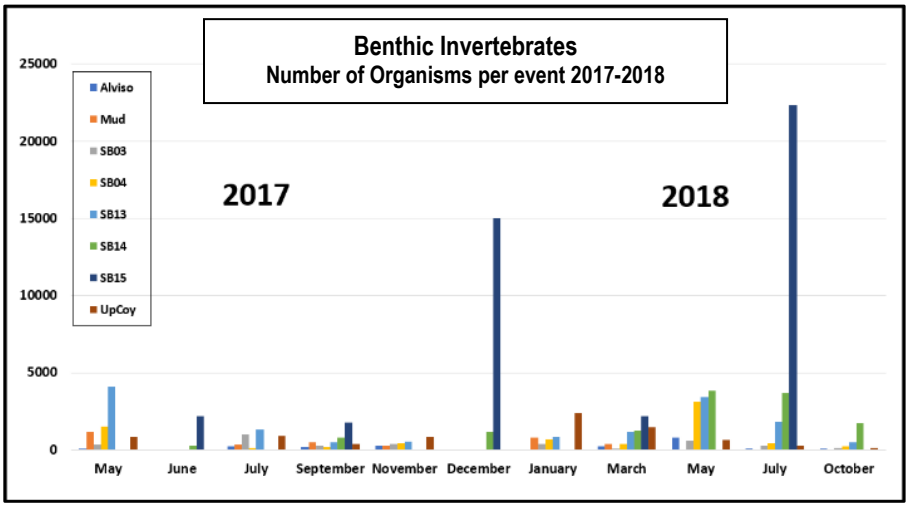


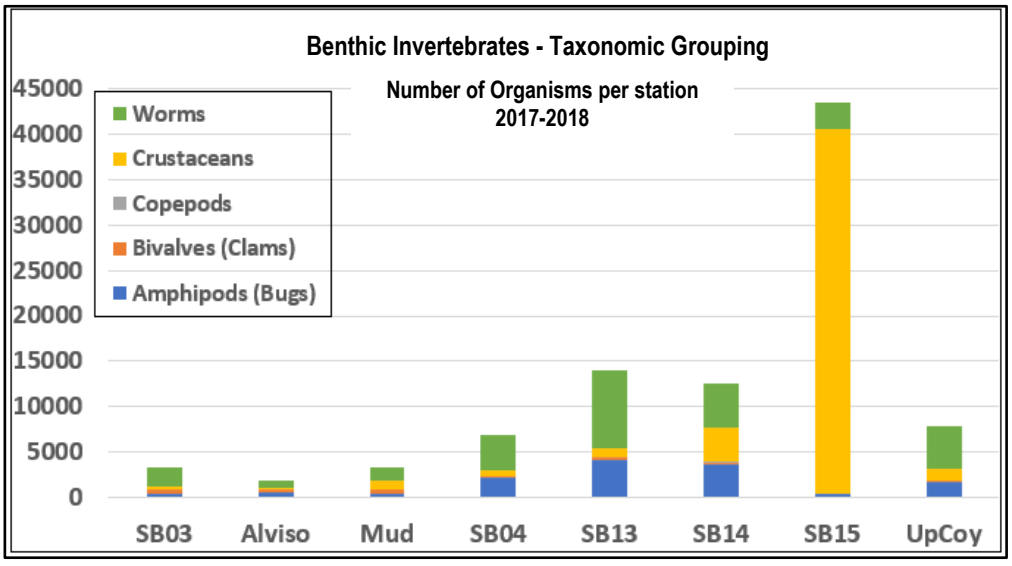
monitoring stations in May 2016. Benthic samples are collected using a Ponar grab sampler and delivered to a contract laboratory for taxonomic analysis. During 2018, the City changed labs from USGS, Menlo Park to ICF for benthic taxonomy services. Also, one station was dropped from benthic monitoring (Mud) and two were added (SB14 and SB15, both in Artesian Slough).

Sixty-two samples were processed, including some collected in 2017 that were not in last year's report. The remainder of the 2018 samples are awaiting analysis at the ICF Lab.

Ponar sediment grab used to collect benthic samples.

Results show that the Artesian Slough stations have the highest abundance of benthic organisms, with SB15, which is the closest to the RWF discharge, having by far the greatest abundance, and was dominated by crustaceans. 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, had the greatest species diversity with 17 major taxa represented. The most common species were two crustaceans, *Podocopida sp.*, and *Cyprideis sp.*, both of which are ostracods or tiny seed shrimp.





Fish Monitoring. Phytoplankton, zooplankton, and worms 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 UC Davis fisheries researchers to conduct fishing trawls at several stations downstream of the facility since 2015. The UC Davis fisheries team, known as the Hobbs Lab, is led by Dr. Jim Hobbs.

UC Davis researchers perform fishing trawls at 10 stations near SJ-SC RWF discharge and at an additional 10 stations further out in Coyote Creek, Alviso Slough and Lower South Bay for other agencies.

Hobbs Lab 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 Hobbs Lab will submit a final report in early 2019 that documents and characterizes the fish populations and water quality conditions in the Alviso Marsh study area since 2015 and will describe how Alviso Marsh conditions and populations compare to those elsewhere in San Francisco Bay.

Longfins Spawn in Lower South Bay!

Longfin smelt, a state-listed threatened species, were caught in 2017 by UC Davis researchers. Longfin smelt larvae, initially caught in Artesian Slough, confirmed that the threatened smelt 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!

Longfin smelt caught in Artesian Slough on November 11, 2018.

Map indicating where 151 longfin smelt were caught during a single weekend of trawling in Alviso Marsh, December 2018.

In 2018, in addition to the trawling conducted by the Hobbs Lab described above, the crew continued a focused monitoring effort on longfin smelt in the Lower South Bay and other regions of San Francisco Bay. The work was funded in part by San Jose as a component of the trawling work, and also as part of the California Department of Water Resources (DWR) funded larval fish surveys. The 2018 news was even better than the 2017 news with 272 adult longfin and 1,024 larvae caught by UC Davis researchers! The vast majority of adult and larval longfins have been caught in the Lower South Bay Alviso Marsh Complex, upstream and downstream of Artesian Slough.

The Hobbs 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. In late 2018, Dr. Hobbs also took approximately 150 adults to the UC Davis Fish Conservation and Culture Lab where a project to develop effective culture methods for threatened longfin smelt is underway.

Summary of Environmental Monitoring costs. The table below summarizes annual costs in 2018 of supplies, analyses, purchase order and contract costs for metals, nutrients, and biological ambient monitoring projects. Following evaluation of temporal and spatial trends coupled with revisiting the overall purpose and questions the monitoring is focused on answering, sampling frequencies were modified in 2018. Sampling frequencies for Chlorophyll and Phytoplankton were reduced from bi-monthly to monthly. Zooplankton sampling was also reduced from monthly to once every two months.

Chemical & Biological Monitoring in Artesian Slough & Bay

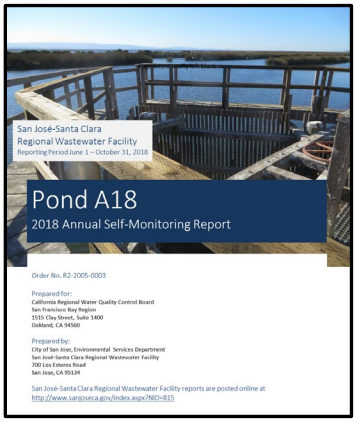
	Monitoring Project	Analytical Lab	Freq.	Cost of supplies & analytical work
1	South Bay Monitoring at 7 stations: (Cu, Ni, Se, NH3, NO2, NO3, TKN, PO4, pH, Cond, DO)	In-house	Quarterly	$31,600
2	Nutrient Monitoring at 6 stations	In house	Monthly	$16,056
3	Chlorophyll monitoring at 6 stations	In-house	Monthly	$6,350
4	Phytoplankton sampling at 6 stations	BSA	Monthly	$13,650
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	$1,700
8	Fish Assemblage monitoring	UC Davis	2X/quarter	$89,000
	Total - 2018			$182,756

c. Other activities.

Coyote Creek Stream Gage. Since 1998, the City has co-funded, with Santa Clara Valley Water District, 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 $12,645. 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 Jose. 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. Thirteen years of pond discharge monitoring have demonstrated no negative impacts to receiving water.

Pond A18 southern intake configuration with northern discharge and monitoring stations.

Pond A18 northern intake configuration with southern discharge and monitoring stations.

In January 2016 pond flows were reversed: Bay water was drawn in from southern hydraulic structure and discharged out from the north 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.

During 2018, the City secured several final permits from USACE, BCDC, and Water Board, plus had consultations with, and plan approval from USFWS, NMFS, and CA Dept of Fish and Wildlife on an engineering design and plan to repair and bolster the southern levee and structure. Construction began in August 2018 and repairs were completed in late September 2018. In October 2018, the pond was reverted back to its standard directional flow with the intake through the north and discharge from the south structures.

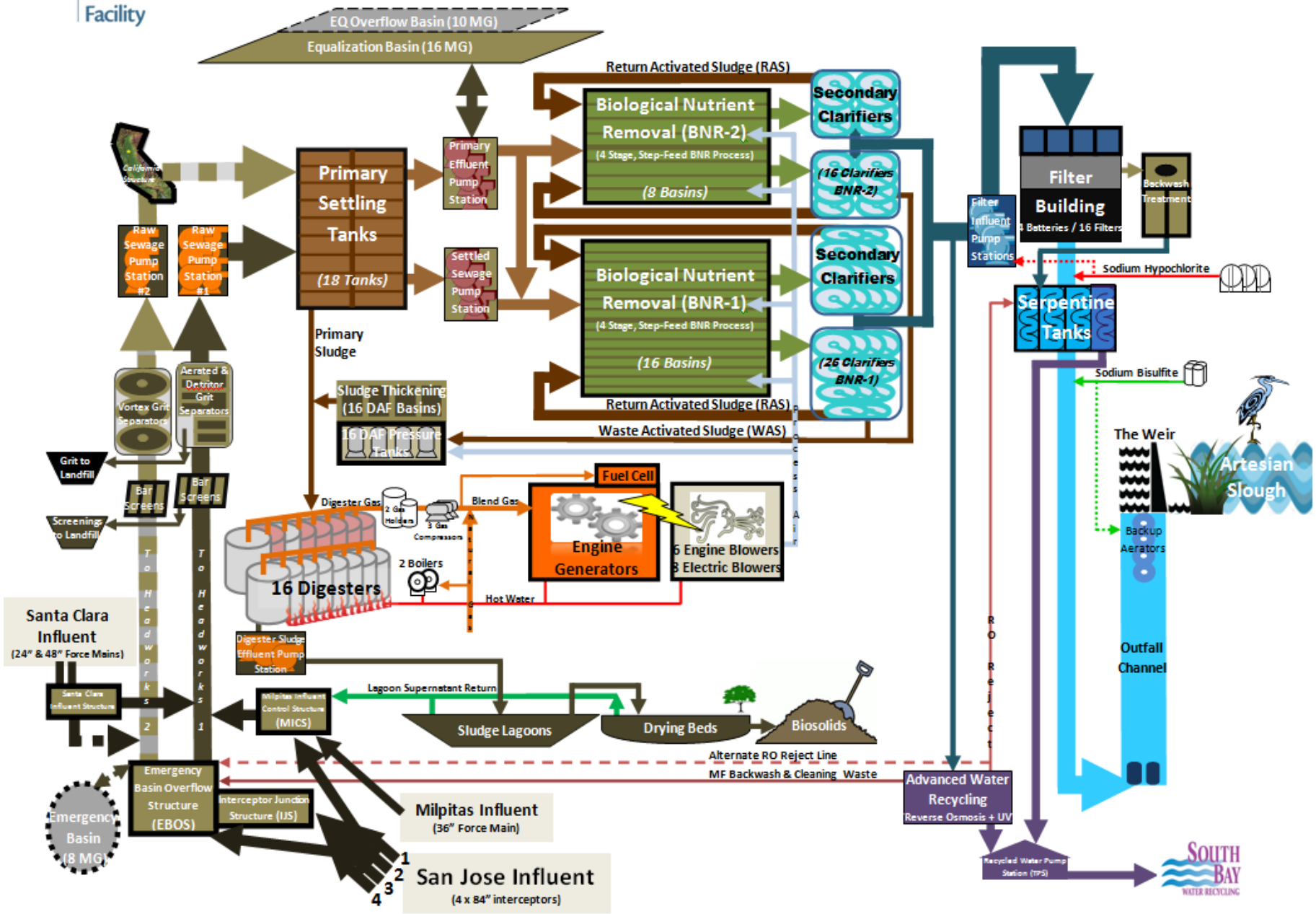
Levee was reinforced with sheet piles and horizontal whalers to prevent erosion and shifting.

Pond A18 Annual Reports are posted on City of San Jose web site at:
http://www.sjenvironment.org/Archive.aspx?AMID=155&Type=&ADID=

San José-Santa Clara Regional Wastewater Facility

Process Schematic

Revised: 2/2014



ATTACHMENT A - Laboratory Accreditations

Accreditations covering all of 2018

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

CALIFORNIA STATE

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

CERTIFICATE OF ENVIRONMENTAL ACCREDITATION

Is hereby granted to

San Jose / Santa Clara WPCP Laboratory

ESD

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: **9/30/2018**

Effective Date: **10/1/2016**

Sacramento, California
subject to forfeiture or revocation

Christine Sotelo, Chief
Environmental Laboratory Accreditation Program

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

Interim

CALIFORNIA STATE

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

CERTIFICATE OF ENVIRONMENTAL ACCREDITATION

Is hereby granted to

San Jose Santa Clara WPCP Laboratory

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: **9/30/2019**

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

Sacramento, California
subject to forfeiture or revocation

Christine Sotelo, Chief
Environmental Laboratory Accreditation Program

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