San José-Santa Clara
Regional Wastewater Facility

2017
Annual Self-Monitoring Report

Reporting Period:
January 1 – December 31, 2017

San José-Santa Clara Regional Wastewater Facility
2017 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.

Editor-in-Chief	Jim Ervin
Managing Editor	Eric Dunlavey
Data Manager	Simret Yigzaw
Senior Producer	Ryan Mayfield
Field Coordinator	Bryan Frueh
Science Editor	Jessica Donald

Main Office:
408-635-6600
700 Los Esteros Road,
San Jose, CA 94135

On the Cover: Longfin smelt netted in Pond A21 on December 12th, 2017 by Dr. Jim Hobbs. Dr. Hobbs confirmed that Longfin spawning range extends to Lower South San Francisco Bay in 2017. See page 52 for details.

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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 2017, 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

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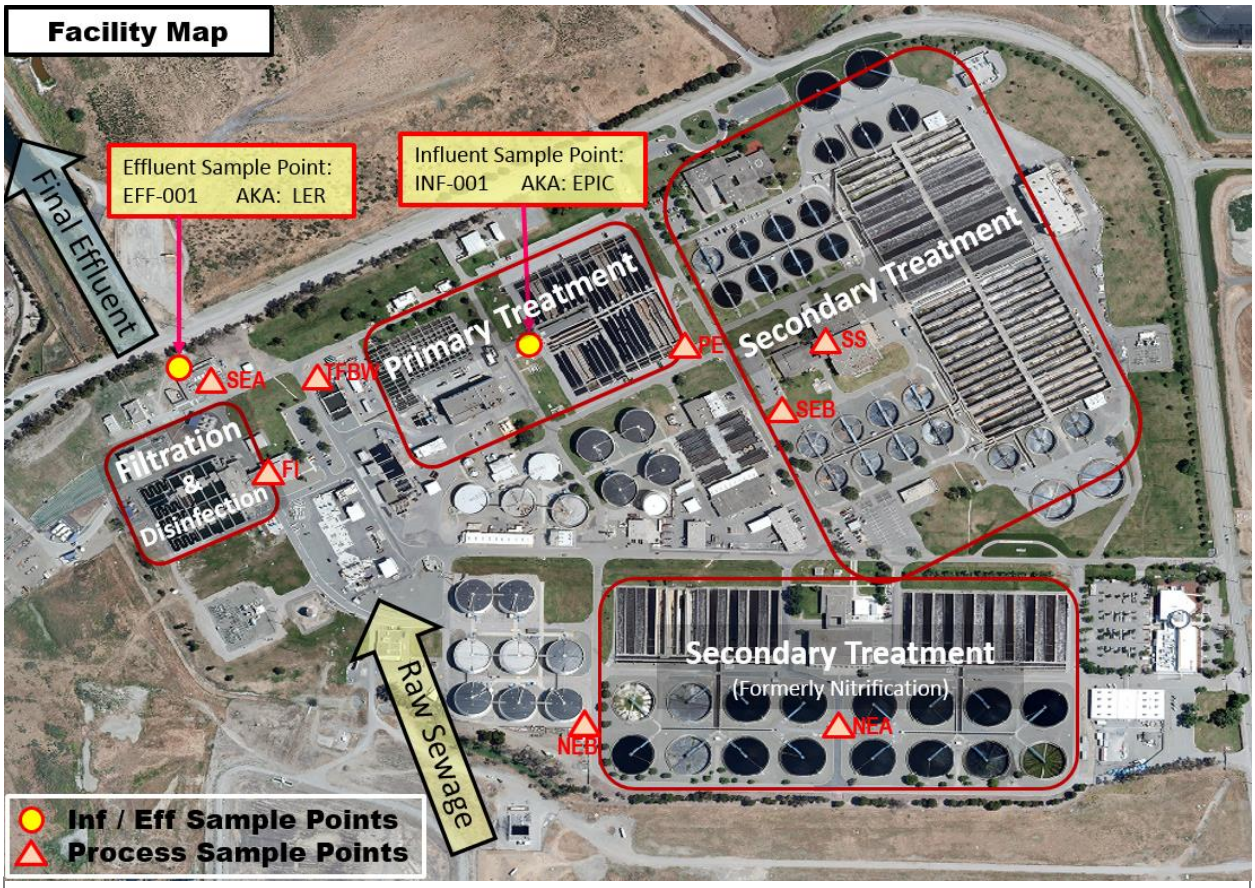
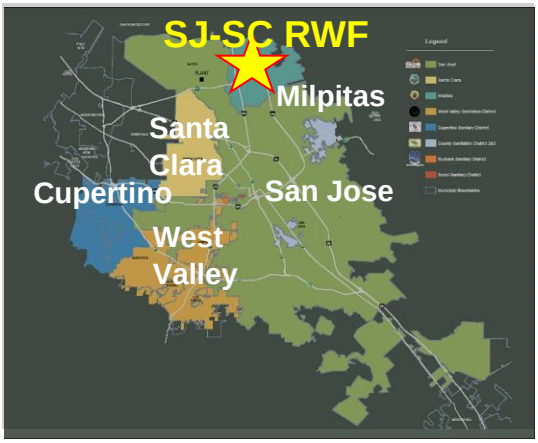


Water Pollution Control Plant: flow routing and influent and effluent sampling stations.
The wastewater treatment process consists of screening, grit removal, primary sedimentation, secondary (biological nutrient removal) treatment, secondary clarification, filtration, disinfection, and dechlorination.

Facility Storm Water Conveyance System

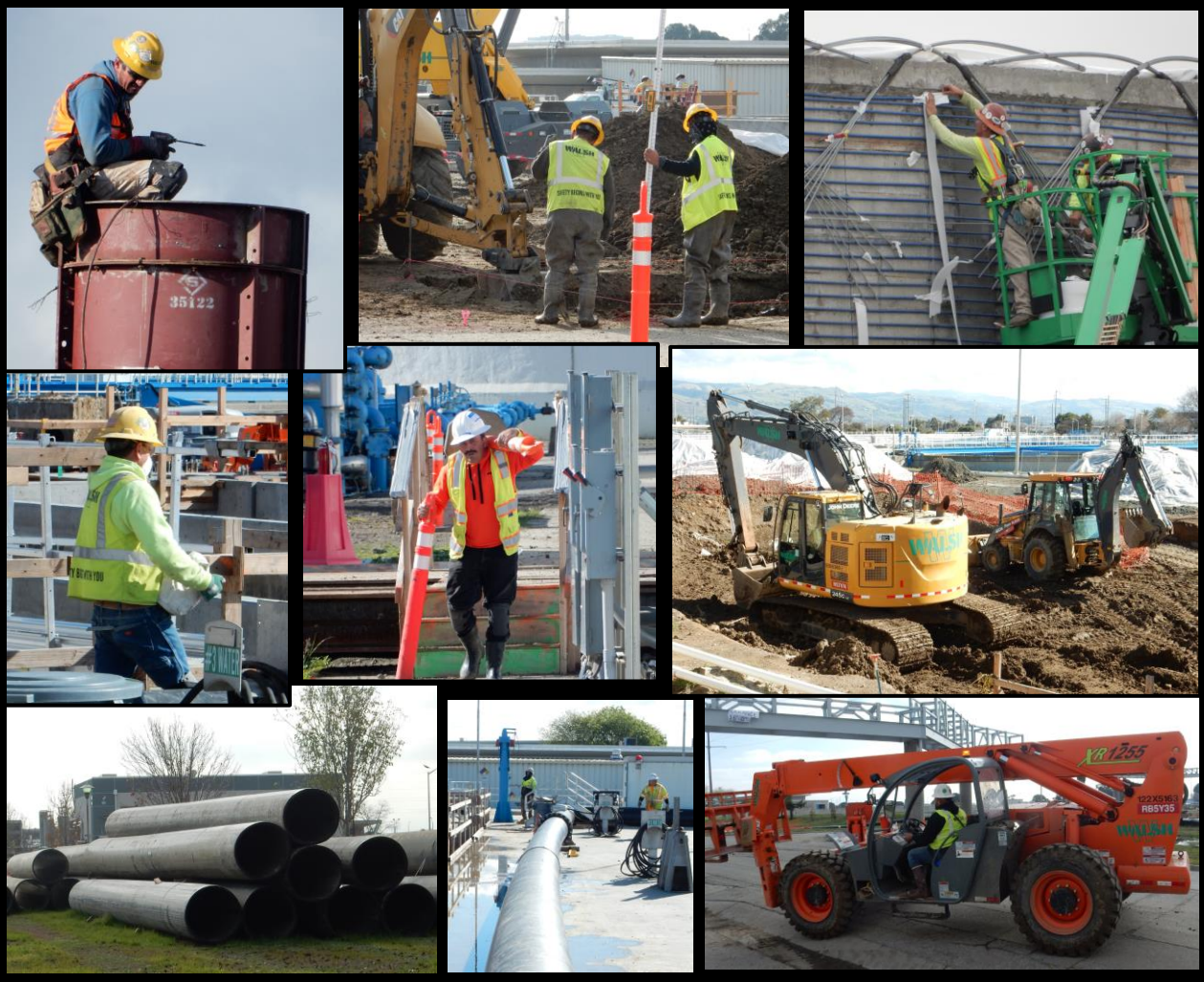
The treatment facility is designed to capture all spills and stormwater on site. 20 stormwater collection systems convey flows to 6 pump stations. Stormwater pump stations direct all captured water back to facility headworks for treatment. The stormwater catch basin system has capacity to contain at 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! ***Some say it's like rebuilding an airplane in flight.***



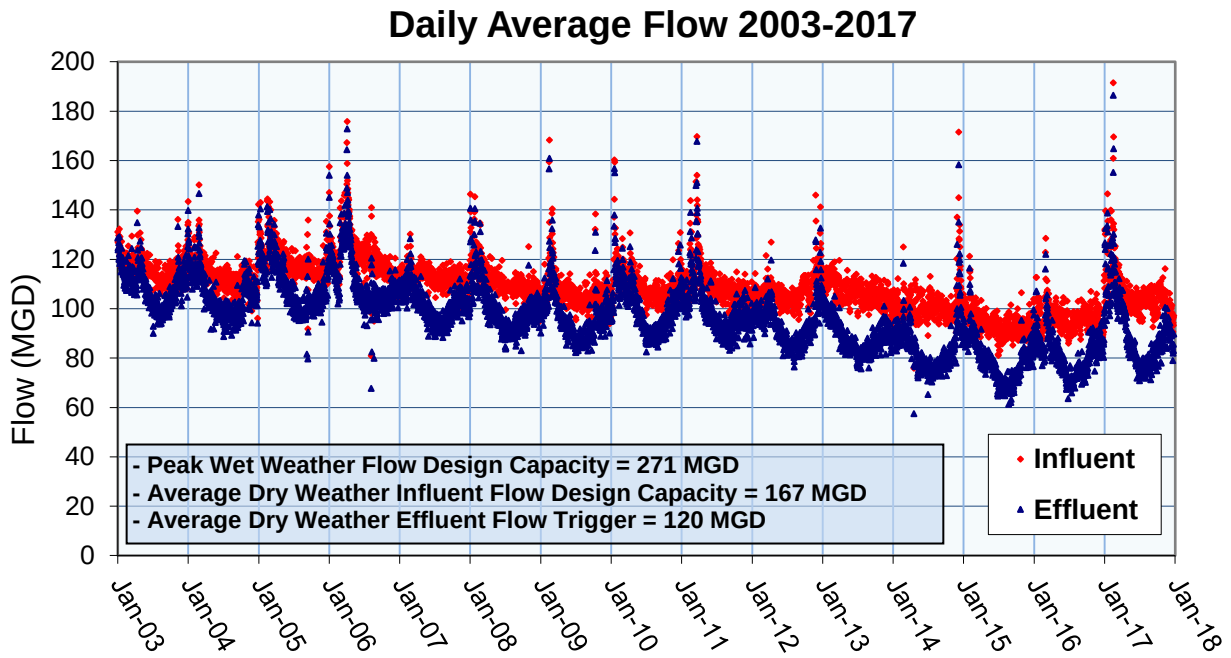
Year three of a 10-year, $1.4 billion rebuilding program: Treatment processes continue even as construction takes units off-line. Thanks to work of staff operators, mechanics, electricians & others, 2017 was the cleanest year ever!

a. Facility Flows

The peak average monthly effluent flow of 120.1 MGD occurred in February 2017. The peak daily flow for the year was 186.5 MGD on February 21.

- ***Average Dry Weather Influent Flow (ADWIF)*** *is the highest five-weekday period from June through October. The 2017 ADWIF was 107.3 MGD and occurred between 16 October and 20 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 2017, ADWEF was 77.8 MGD and occurred during the months of July to September.*

	Influent Flow	Effluent Flow (MGD) (Recent Years)			ADWIF Limit = 167 MGD ADWEF Trigger = 120 MGD	
	Average	Low	High	Average	ADWIF	ADWEF
2015	94.1	61.2	116.4	78.7	96.2	68.2
2016	96.1	63.5	122.2	81.4	101.1	73.0
2017	106.9	70.8	186.5	**91.3**	**107.3**	**77.8**



b. Biosolids and material

A lone FECON mulcher churning biosolids in a drying bed on 17 July, 2017.

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.

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 reach "pudding" 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
2015	3,532	53,405	87%	21%	50,002
2016	2,889	49,115	83%	24%	37,353
2017	**2,999**	**54,874**	**87%**	**20%**	**43,534**

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
2015	623	513	651
2016	551	753	635
2017	**390**	**429**	**516**

Concentrations in Biosolids (mg/kg)

	2015	2016	2017
Antimony	ND	ND	ND
Arsenic	6.3	7.5	7.0
Barium	410	420	450
Beryllium	ND	ND	0.9
Cadmium	1.5	1.1	1.0
Chromium	75	97	81
(Cr STLC)	1.1	0.95	1.3
Cobalt	14	12	14
Copper	430	440	360
(Cu STLC)	ND	ND	0.1
Lead	31	25	20
Mercury	1.4	0.94	0.4
Molybdenum	7.4	11	8.2
Nickel	72	77	82
Selenium	6.8	ND	3.4
Silver	7.6	6.3	4.4
Thallium	ND	ND	ND
Vanadium	63	67	61
Zinc	620	660	520
Cyanide	ND	2.4	1
DRO organics	640	910	840
ORO organics	2900	1600	1900

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 7.2 to 7.4 standard units (S.U.). Effluent Limits are 6.5 & 8.5 S.U.

Temperature: Effluent temperatures for 2017 ranged from 16.3 to 26.4^{o} C, averaging 21.1^{o} C.

Total Chlorine Residual: The Facility uses both continuous monitoring equipment and wet chemical analysis to monitor residual chlorine. In 2017, 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 1.0 to 2.2 Colony Forming Units (CFU) per 100 mL and averaged 1.5 CFU during 2017.

Oil & Grease: In 2017, Oil and Grease was not detected in quarterly monitoring. 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) or Detected Not Quantified (DNQ). Facility effluent limits are 5 mg/l (AMEL) and 10 mg/l (MDEL).

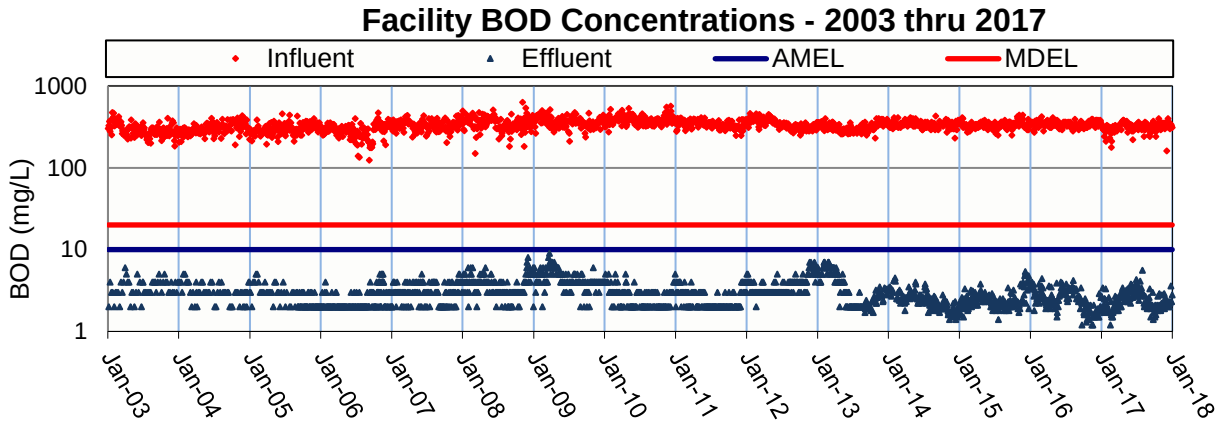
Dissolved Oxygen: Dissolved oxygen (DO) concentrations in effluent were above Bay Water Quality Objective of 5 mg/L throughout 2017. The 3-month rolling median value for DO percent saturation ranged from 80% to 84% in 2017.

DO Concentrations 2017				Min = 5.0 mg/L
	Low	High	Average	2016 Average
Effluent (mg/L)	6.5	8.5	7.3	7.1
Saturation (%)	73.7	93.5	82.2	80.9

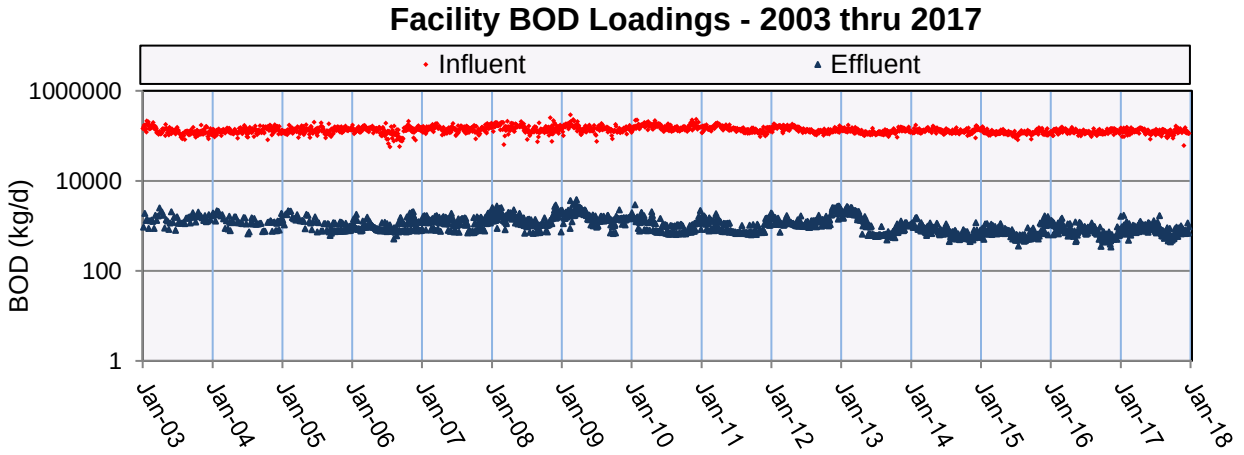
Biochemical Oxygen Demand (BOD): As defined by American Heritage Science Dictionary, Biochemical Oxygen Demand is: "The amount of oxygen required by aerobic microorganisms to decompose organic matter in a sample of water, such as one polluted by sewage. It is used as a measure of the degree of water 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**	
2015	**250**	**440**	**334**	**1**	**5**	**2**	**99%**
2016	**270**	**420**	**342**	**1**	**4**	**3**	*99%*
2017	**160**	**400**	**314**	**1**	**6**	**2**	***99%***

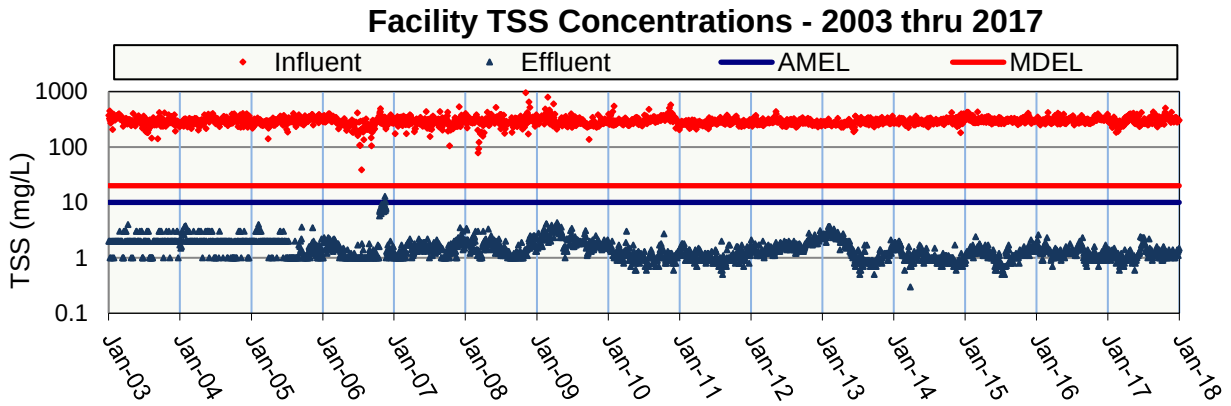


BOD Loadings 2017 (kg/d)					
	Annual Total	**Low**	**High**	**Average**	2016 Average
Influent	**46,039,885 (kg)**	**61,461**	**166,815**	**126,137**	124,676
Effluent	**306,247 (kg)**	**445**	**1736**	**839**	784

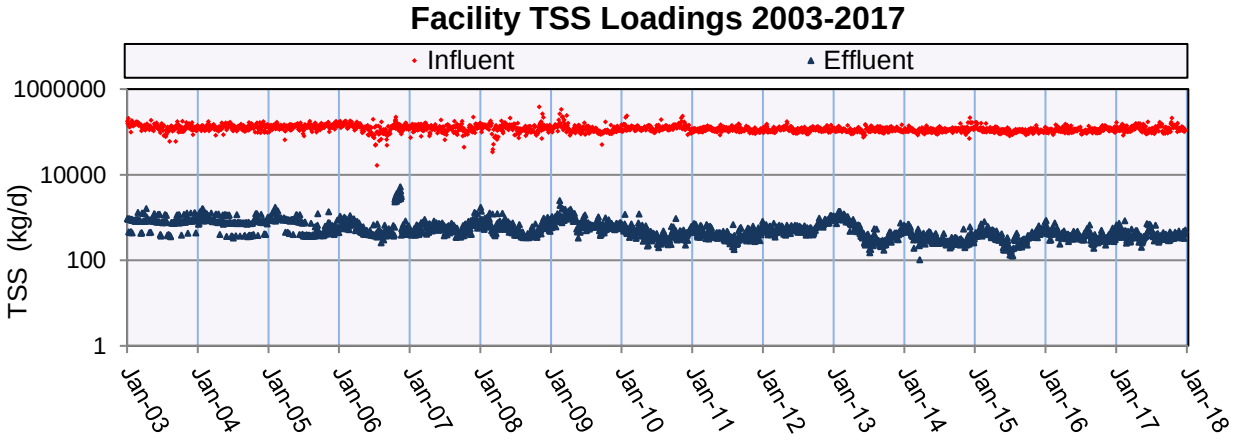


Total Suspended Solids (TSS): TSS is a measure of solid material suspended in water. Suspended solids settle out of the water column throughout the Facility treatment train: roughly half is removed in Primary settling tanks and another 40 to 45 percent is removed in Secondary/BNR clarifiers. Tertiary 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**	
2015	**253**	**428**	**307**	**1.0**	**2.0**	**1.0**	99.6%
2016	**249**	**417**	**310**	**1.0**	**3.0**	**1.0**	*99.6%*
2017	**185**	**507**	**305**	**1.0**	**2.0**	**1.0**	***99.6%***

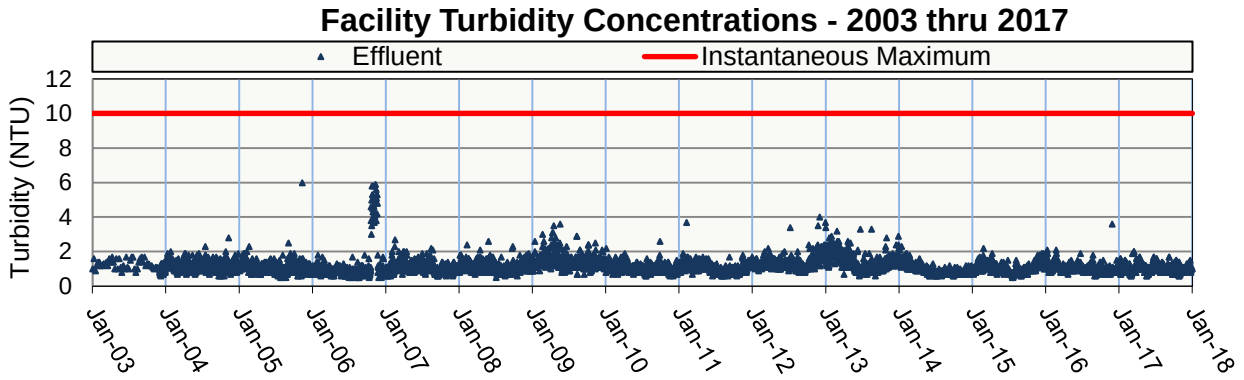


TSS Loadings 2017 (kg/d)					
	Annual Total	**Low**	**High**	**Average**	2016 Average
Influent	**44,749,502 (kg)**	**83,296**	**211,438**	**122,601**	112,994
Effluent	**146,857 (kg)**	**203**	**848**	**402**	392



Turbidity:

Turbidity 2017 (NTU)				High Limit = 10 NTU
Effluent	Low	High	Average	2016 Average
	0.6	2.0	1.0	1.1

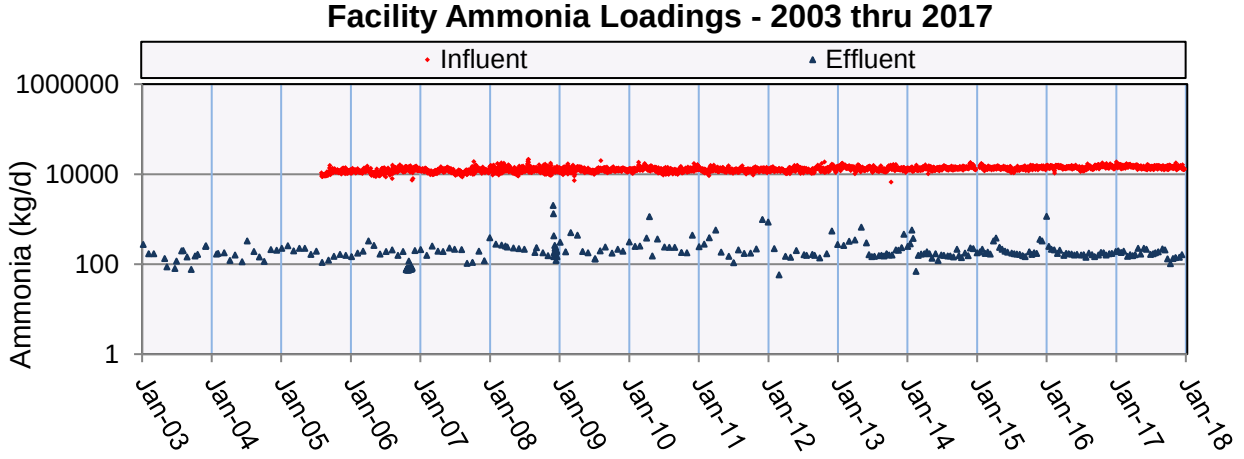


Total Ammonia: Practically all ammonia is removed. Chloramination process adds some back.

Ammonia N (mg/l)			AMEL = 3 MDEL = 8
Effluent	Low	High	Average
2015	0.5	1.3	0.7
2016	0.5	3.2*	0.7
2017	**0.3**	**0.7**	**0.5**

*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 2017 (kg/d)					
	Annual Total	Low	High	Average	2016 Average
Influent	5,322,488	12,396	18,707	14582	14,441
Effluent	63,915	102	227	175	217



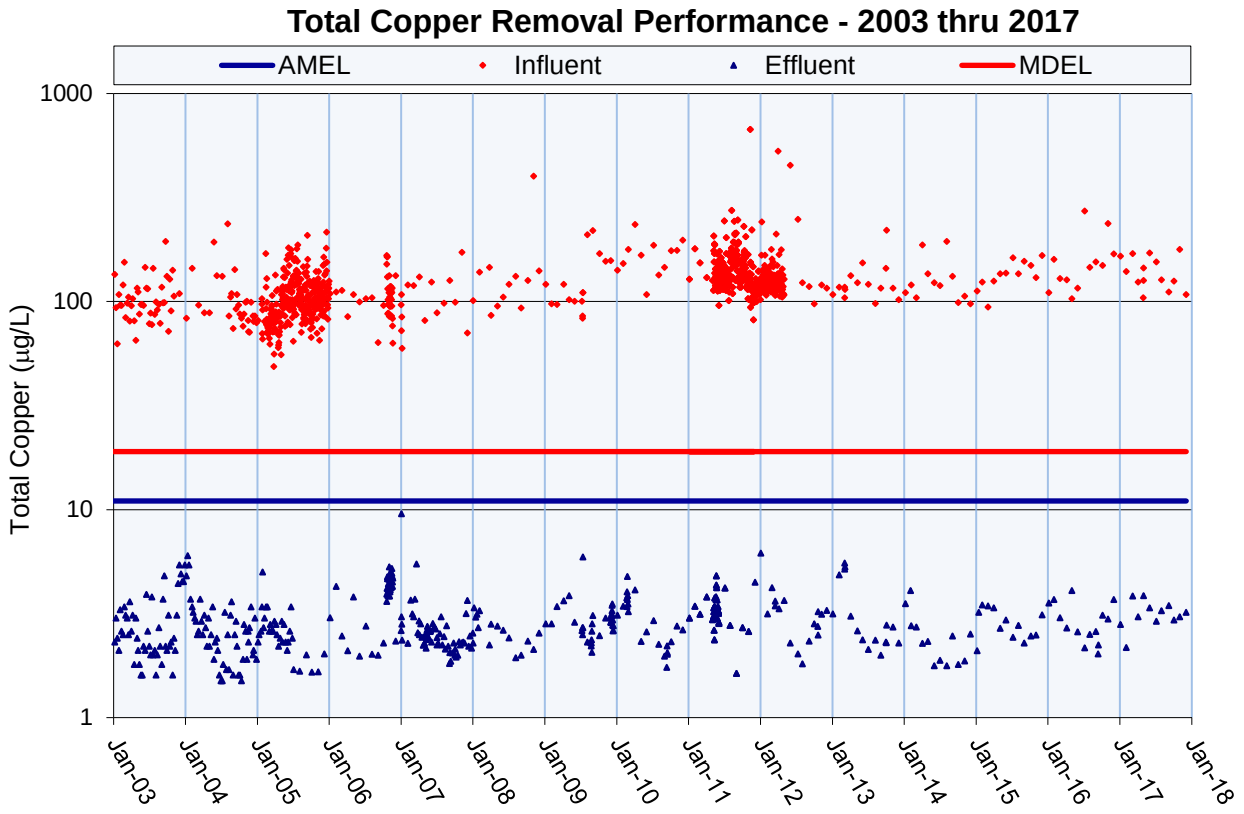
2) Priority Pollutants

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

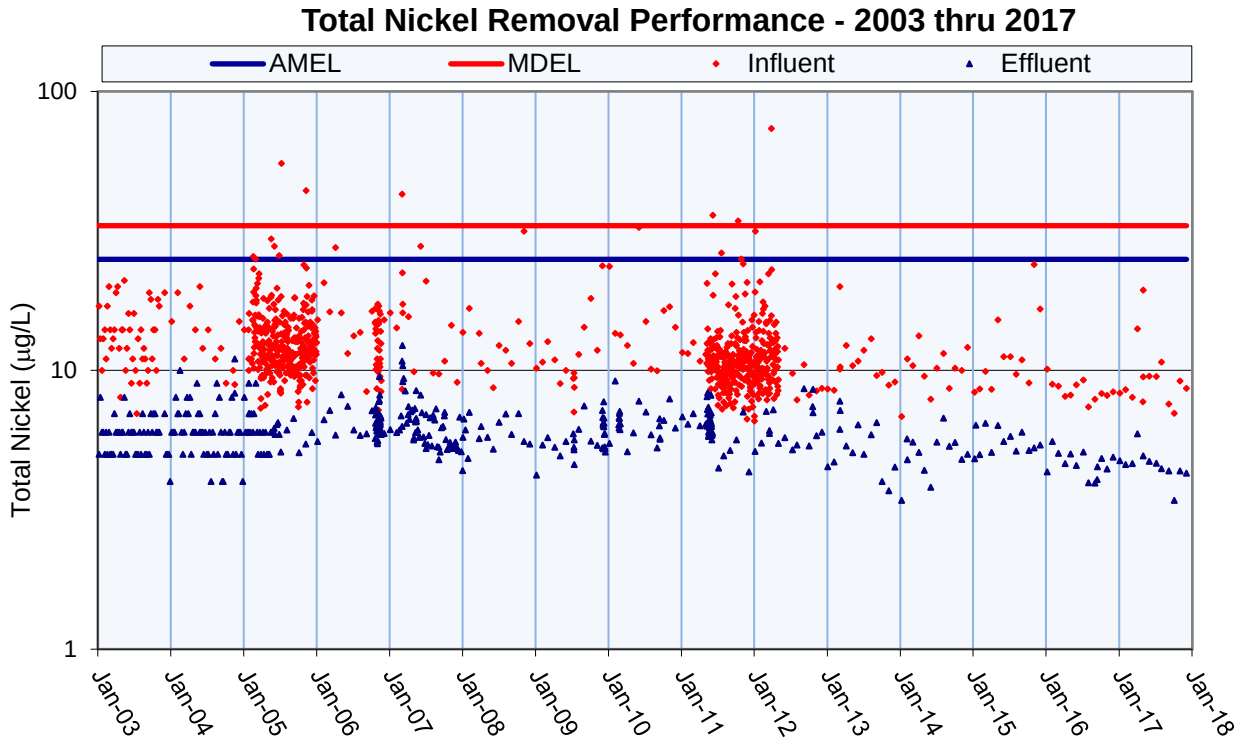
Copper:

Copper (ug/L)							AMEL = 11 ug/L MDEL = 19 ug/L
	Influent			Effluent			*Removal*
	Low	High	**Average**	Low	High	**Average**	
2015	**94**	**166**	**136**	**2.09**	**3.48**	**2.84**	*98%*
2016	**103**	**272**	**156**	**2.02**	**4.08**	**3.03**	*98%*
2017	**104**	**178**	**142**	**2.17**	**3.85**	**3.16**	***98%***



Nickel:

Nickel (ug/L)							AMEL = 25 ug/L MDEL = 33 ug/L
	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2015	8.36	24.00	11.94	4.82	6.47	5.57	*53%*
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%***

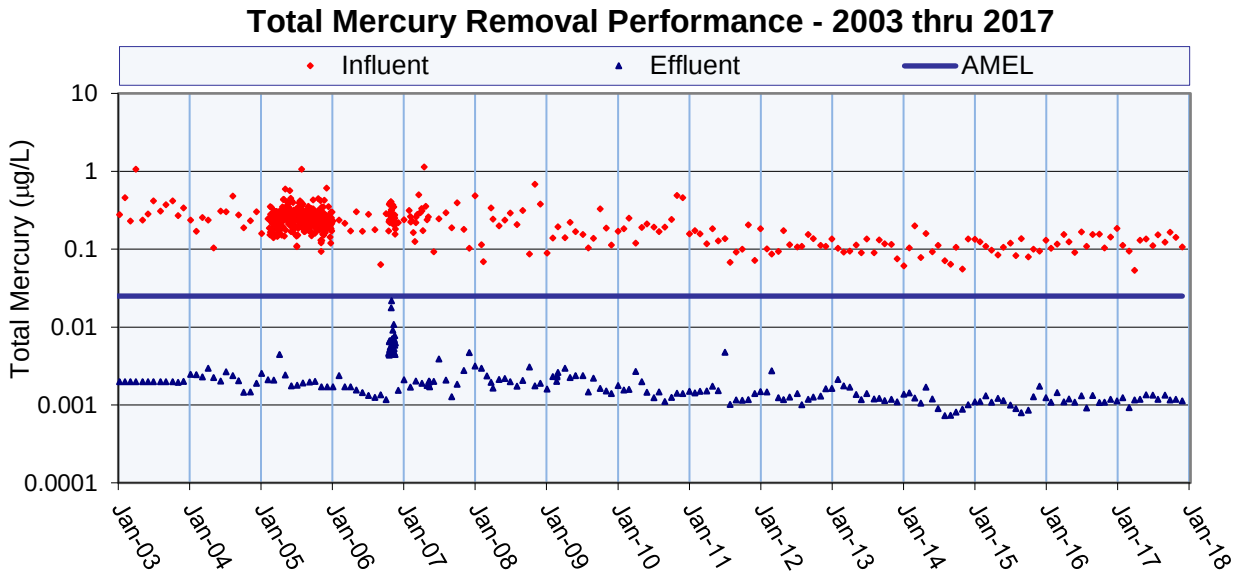


Cyanide: The Facility produces a small amount of cyanide from chloramination disinfection.

Cyanide (ug/L)							AMEL = 5.7 ug/L MDEL = 14 ug/L
	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2015	1.2(DNQ)	4.2	1.9	0.4(DNQ)	1.5(DNQ)	1.0	
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**	

Mercury:

Mercury (ug/L)						AMEL = 0.025 ug/L
	Influent			Effluent			Annual Load Kg/yr
	Low	High	Average	Low	High	Average	
2015	0.080	0.137	0.106	0.00080	0.00175	0.00113	*0.127*
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**	***0.137***



Individual effluent mercury concentrations, flows, and loads in 2017

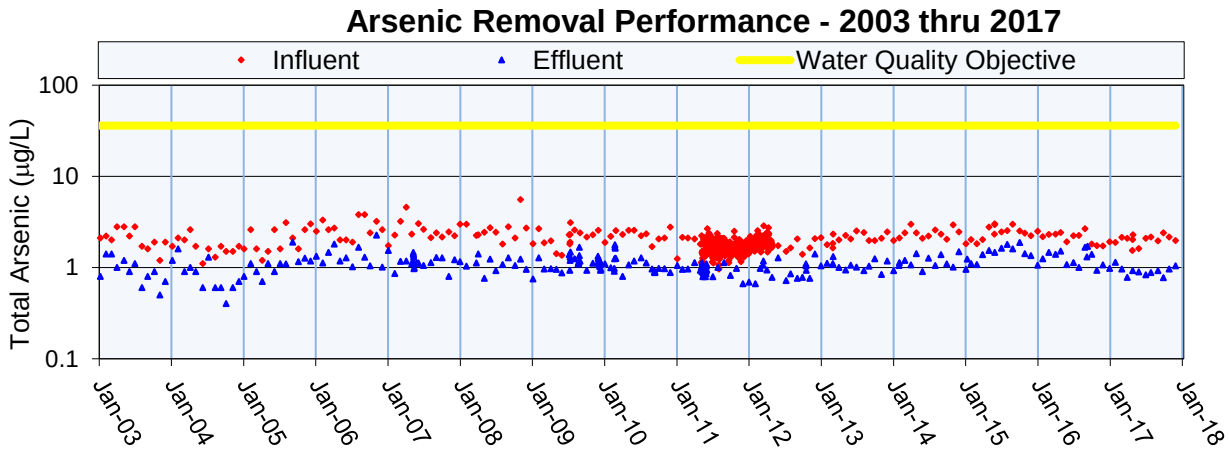
Sample Date	Mercury concentration (ug/L)	Effluent Flow (MGD)	Mercury Load (kg/day)
1/4/2017	0.00113	96.0	0.00041
2/2/2017	0.00124	97.1	0.00046
3/7/2017	0.00093	107.5	0.00038
4/3/2017	0.00116	99.2	0.00044
5/1/2017	0.00119	96.5	0.00044
6/1/2017	0.00135	82.1	0.00042
7/6/2017	0.00134	74.0	0.00038
8/1/2017	0.00118	73.2	0.00033
9/6/2017	0.00134	85.8	0.00044
10/3/2017	0.00116	84.6	0.00037
11/1/2017	0.00119	82.8	0.00037
12/4/2017	0.00113	92.8	0.00040

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

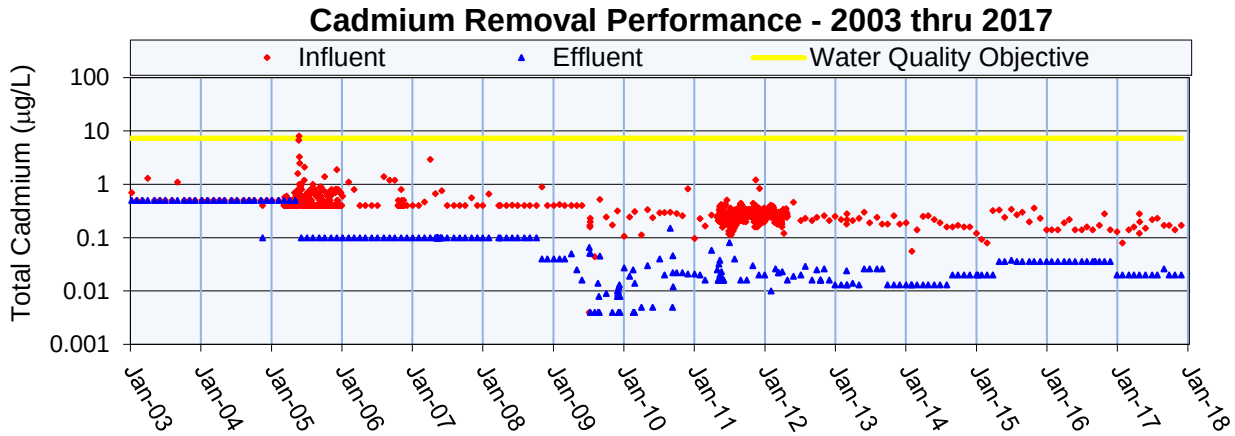
Arsenic:

Arsenic (ug/L)							WQO = 36 ug/L
	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2015	1.82	3.01	2.36	0.95	1.88	1.44	*39%*
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%***



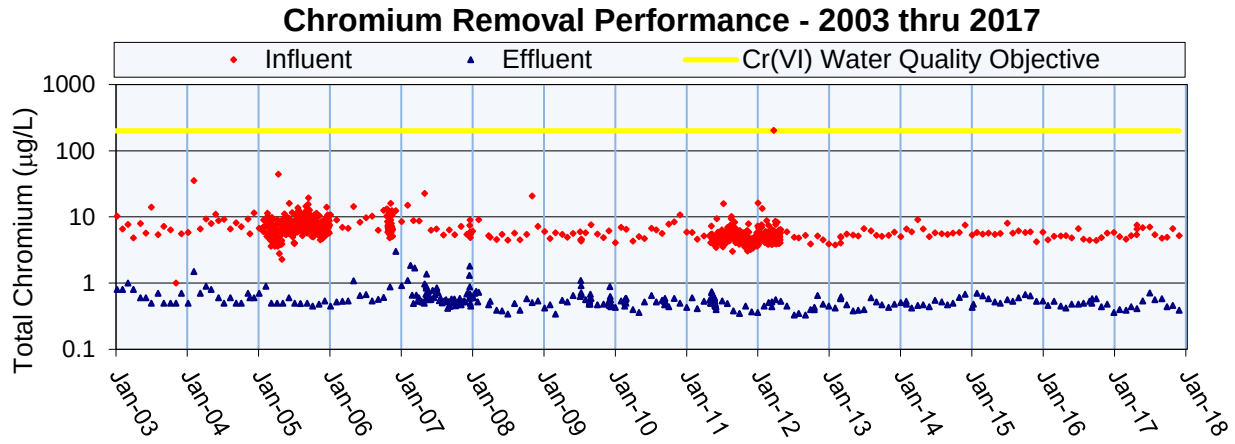
Cadmium:

Cadmium (ug/L)							WQO = 7.3 ug/L
	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2015	0.08(DNQ)	0.36	0.24	0.02(ND)	0.04(DNQ)	0.031	*87%*
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%***



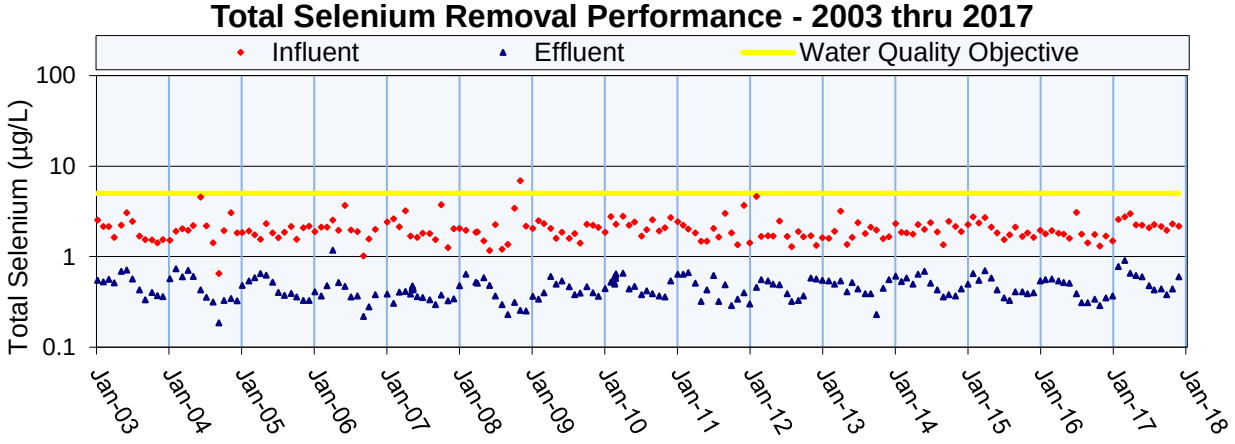
Total Chromium (substituted for Hexavalent Chromium): The 2014 NPDES Permit allows measurement of total chromium instead of hexavalent chromium in Facility Effluent.

Chromium (ug/L)							WQO = 180 ug/L
	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2015	4.24	8.03	5.79	0.43	0.70	0.58	*90%*
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%***



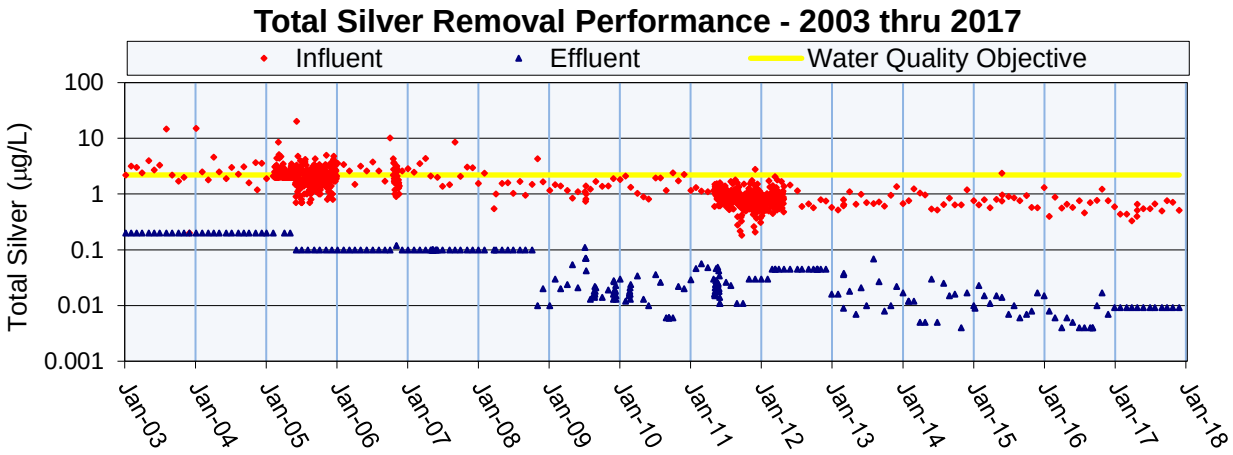
Selenium:

Selenium (ug/L)							WQO = 5 ug/L
	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2015	1.55	2.76	2.05	0.33	0.70	0.48	*77%*
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%***



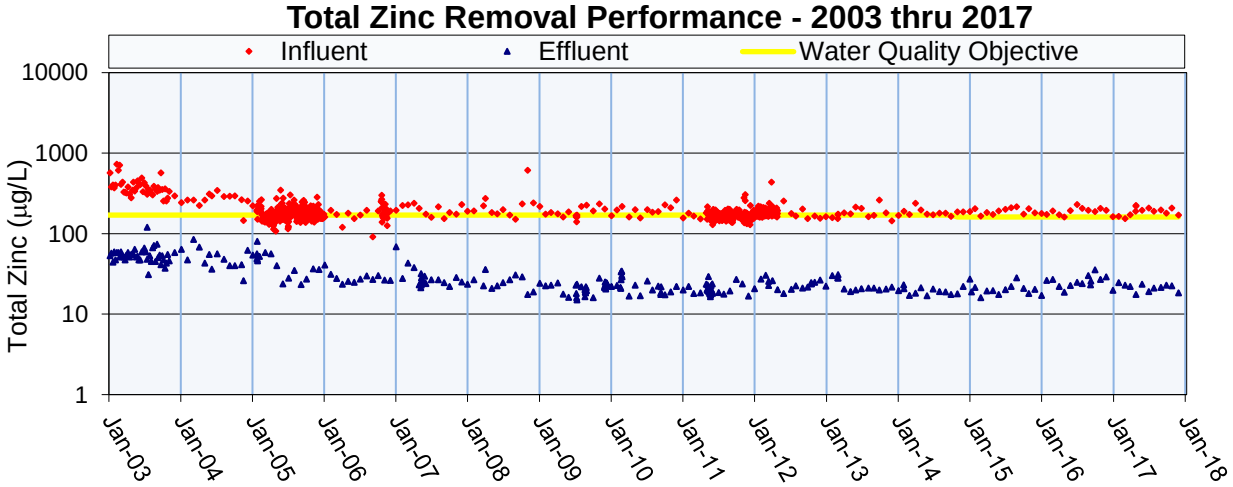
Silver:

Silver (ug/L)							WQO = 2.2 ug/L
	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2015	0.57	2.39	0.80	0.006 (ND)	0.023 (DNQ)	0.012	99%
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%***



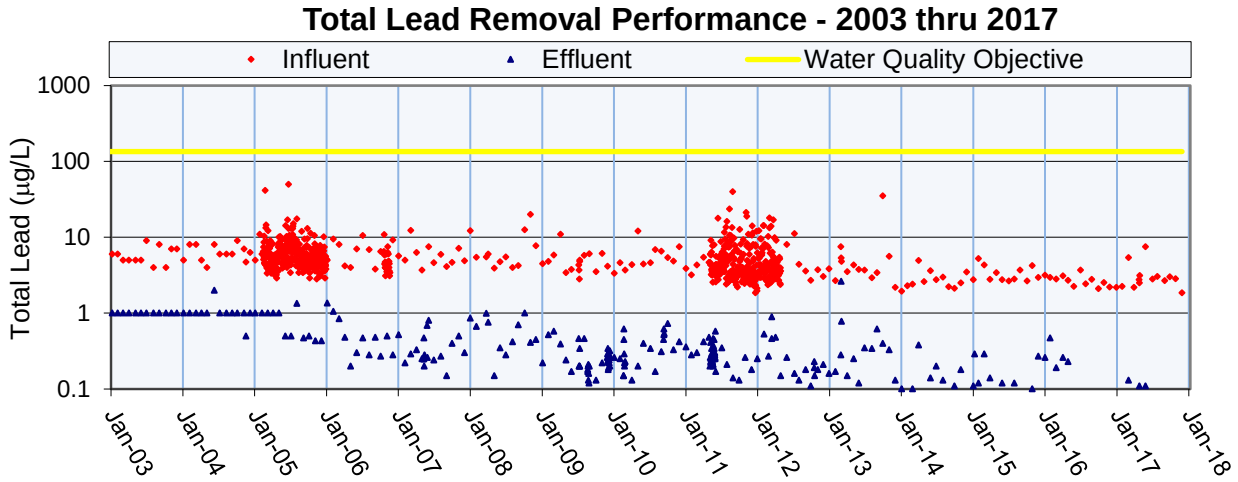
Zinc:

Zinc (ug/L)							WQO = 161 ug/L
	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2015	165	203	191	16.0	27.2	21.0	89%
2016	160	230	190	17.1	35.6	25.0	87%
2017	153	223	**179**	17.6	24.6	**21.3**	***88%***



Lead:

Lead (ug/L)							WQO = 135 ug/L
	Influent			Effluent			Removal
	Low	High	Average	Low	High	Average	
2015	2.64	5.24	3.35	0.08	0.29	0.14	*96%*
2016	2.10	3.68	2.72	0.06	0.47	0.16	*94%*
2017	1.86	7.51	**3.24**	0.06	0.13	**0.09**	***97%***



b) Other Metals

Antimony:

Antimony (ug/L)				WQO = 4300
	Effluent			Removal
	Low	High	Average	
2015	0.39	0.60	0.50	
2016	0.39	0.55	0.45	***NA***
2017	0.34	0.49	**0.41**	

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

Beryllium (ug/L)				WQO = NA
	Effluent			Removal
	Low	High	Average	
2015	0.020 (ND)	0.0270 (ND)	0.022	
2016	0.020 (ND)	0.0200 (ND)	0.020	***NA***
2017	0.0094(ND)	0.0094(ND)	**0.0094(ND)**	

Thallium:

Thallium (ug/L)				WQO = 6.3 (CTR)
	Effluent			Removal
	Low	High	Average	
2015	0.039 (ND)	0.55	0.095	
2016	0.056 (ND)	0.64	0.199	***NA***
2017	0.032(ND)	0.13	**0.042**	

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.

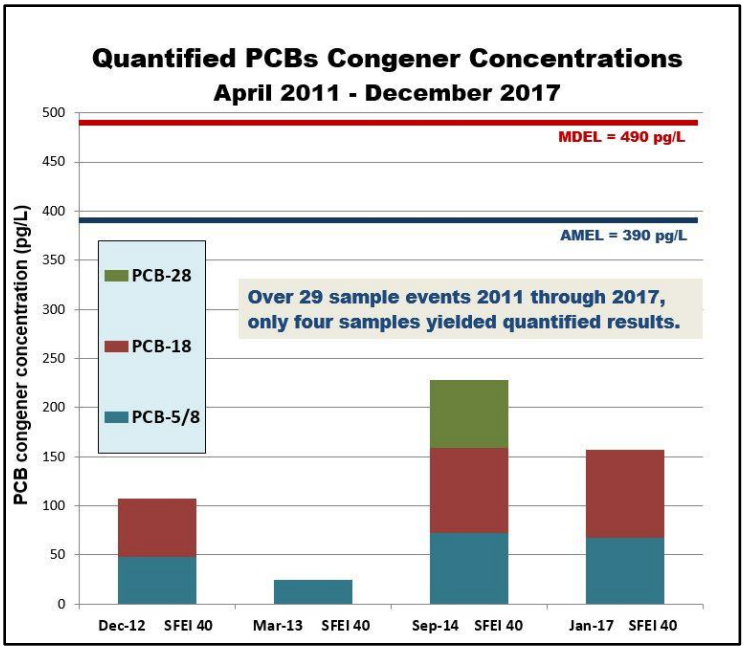
The Facility opted to reduce monitoring frequency and pay the AMR fee, so organic priority pollutants were last measured in February of 2016. Of 113 compounds analyzed, only three Volatile Organic Compounds (VOCs) were detected in Facility Effluent in 2016. The three detected VOCs were well below the 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 2017.

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 2017.



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 January, April, August, and October of 2017. PCBs congeners are reported as the sum of a subset of 40 congeners (SFEI 40) plus co-elutes. Since April 2011, only four of 29 sampling events have quantified any PCBs congeners.

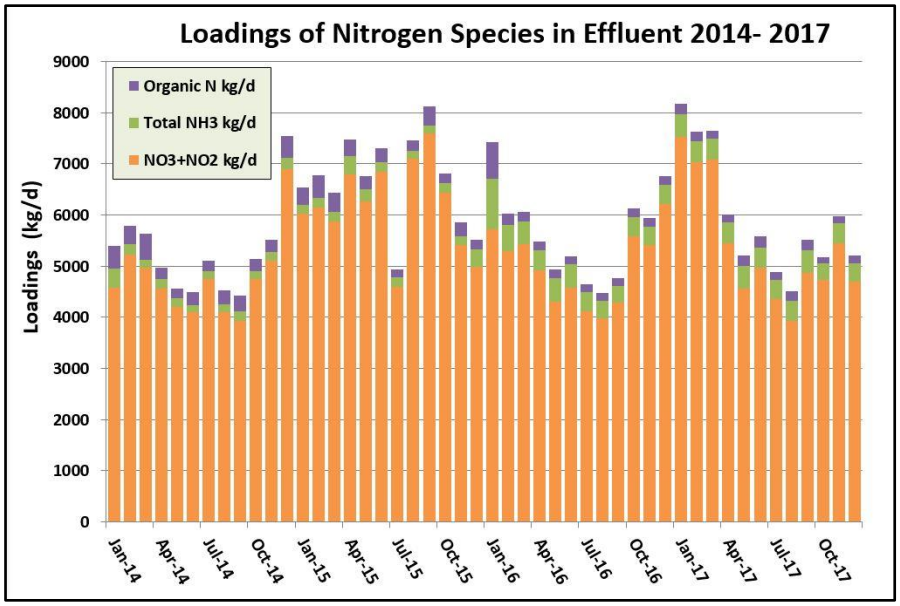
d) Nutrients

Effluent Nutrient Loadings in 2017. 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).

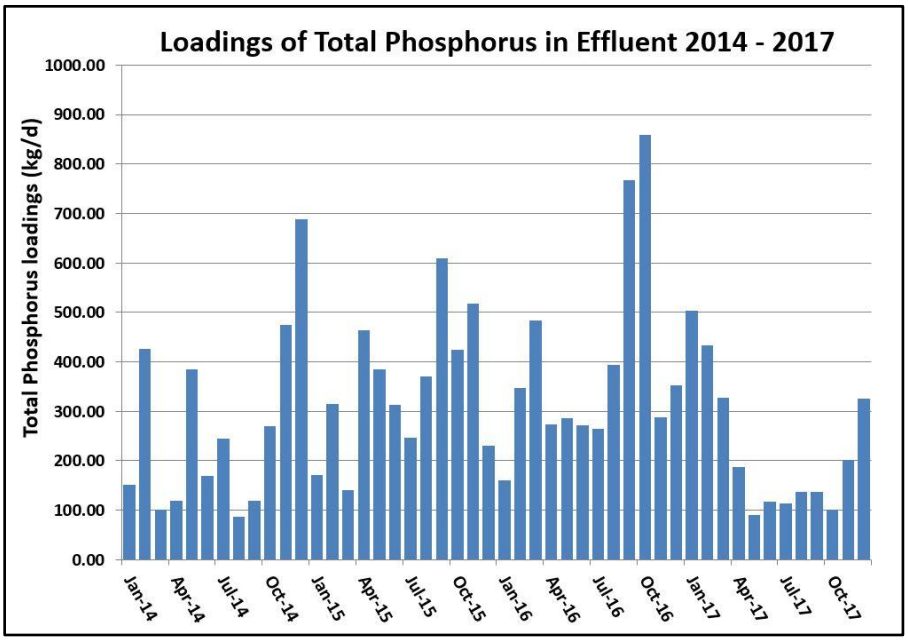
Nitrogen. Total Nitrogen (TN) is the sum of total ammonia (NH3), nitrate (NO3), nitrite (NO2), and organic nitrogen.

Discharged load of TN averaged 5786 kg/day in 2017. This was mostly as nitrate (NO3).

Based on previously measured influent loads of 23,000 kg/day in 2013, roughly 75% of total nitrogen is removed through treatment.



Phosphorus. Discharged load of Total Phosphorus (TP) averaged 223 kg/day in 2017. This compares to measured influent load of 3040 kg/day in 2013. Thus, the Facility removed roughly 93% of TP through treatment in 2017.



3) Whole Effluent Toxicity

Acute Toxicity: Larval rainbow trout are used to test acute toxicity of facility effluent quarterly. Four tests in 2017 resulted in 100% survival of rainbow trout. SJ-SC RWF has not failed an acute toxicity test in over 20 years. In fact, only 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.

Young Rainbow Trout

ACUTE TOXICITY TEST LARVAL TROUT		
ENDING DATE	EFFLUENT SURVIVAL	CONTROL SURVIVAL
01/26/13	100	100
02/28/13	100	100
03/22/13	100	100
04/19/13	100	100
05/17/13	100	100
06/28/13	100	100
07/26/13	100	100
08/23/13	100	100
09/22/13	97.8	100
10/19/13	100	97.8
11/16/13	100	100
12/13/13	100	97.8
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

Chronic Toxicity: Facility effluent is tested monthly for chronic toxicity using *Ceriodaphnia dubia* (water flea) reproduction and survival. In 2017, three test results were greater than one (1) chronic Toxicity Unit (TUc) in June, July, and September with TUc values of 26.3, 1.44, and 2.46 respectively.

CHRONIC TEST RESULTS-2017 (% EFFLUENT)							
START DATE	SURVIVAL		REPRODUCTION				
	NOEC	LOEC	NOEC	LOEC	IC_{25}	TUc	TST
1/13/2017	100	>100	100	>100	>100	<1	PASS
2/9/2017	100	>100	100	>100	>100	<1	PASS
3/9/2017	100	>100	100	>100	>100	<1	PASS
4/13/2017	100	>100	100	>100	>100	<1	PASS
5/11/2017	100	>100	100	>100	>100	<1	PASS
6/30/2017	**100**	**>100**	**<6.25**	**6.25**	**3.8**	**26.3**	**FAIL**
7/14/2017	100	>100	100	>100	>100	<1	PASS
7/22/2017	**100**	**>100**	**25**	**50**	**69.57**	**1.44**	**FAIL**
8/11/2017	100	>100	100	>100	>100	<1	PASS
8/17/2017	100	>100	100	>100	>100	<1	PASS
9/19/2017	**100**	**>100**	**25**	**50**	**40.64**	**2.46**	**FAIL**
10/3/2017	100	>100	100	>100	>100	<1	PASS
10/17/2017	100	>100	100	>100	>100	<1	PASS
11/2/2017	100	>100	100	>100	>100	<1	PASS
12/8/2017	100	>100	100	>100	>100	<1	PASS

- The June result of 26.3 TUc was unusually high and triggered accelerated monitoring (2 tests) in July. The second July test result was 1.44 TUc, which lead to another two tests in August. Both follow-up tests were less than one (1) TUc, which then de-triggered accelerated testing.
- A second single sample exceedance of 2.46 TUc in September triggered accelerated monitoring in October. Both subsequent test results were less than one (1) TUc, again de-triggering accelerated monitoring.
- The June test result was also unusual in showing a flat dose response: Ceriodaphnia reproduction showed similar inhibition at all test concentrations (100%, 50%, 25%, 12.5%, 6.25%). The effect did not increase with higher effluent concentrations.

Toxicity Identification Evaluation (TIE) trials, June thru August

RWF Laboratory Analyst performing chronic toxicity testing.

Pathogen Test. An archived effluent sample from June was filtered with a 0.2 µm nylon filter to remove pathogen interference. A 7-day follow-up test was conducted with 100% filtered and unfiltered effluent. Both filtered and unfiltered samples continued to show significant reproduction inhibition. This ruled out presence of pathogens as a cause of toxicity.

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

* Some tests were duplicate test events

Targeted Phase I TIE. The facility contracted Pacific EcoRisk Laboratory (PERL) to conduct a Targeted Phase I TIE. After confirming that baseline toxicity persisted, PERL Labs exposed toxic samples to three filtration treatments: 1 µm filtration, 1 µm filtration with C18 SPE, 1 µm filtration with Cation Exchange SPE. All three treatments fully removed survival toxicity and substantially reduced reproduction toxicity.
However, since magnitude of removal by each treatment was nearly identical, no class of toxicant could be discerned. PERL proposed three preliminary conclusions:

- Contaminant may have high affinity for surfaces of mixed sorptive capacity; likely organic, polar in nature, and is possibly charged – such a contaminant could be a partially deprotonated organic base.
- There may be more than one contaminant, such as a semi-volatile neutral organic and a cationic metal contributing almost equally to toxicity.
- Contaminant concentration may have overwhelmed SPE sorption/exchange capacity, resulting in contaminant breakthrough.

TOFMS investigation. The Facility contracted PERL Labs to conduct a Time of Flight Mass Spectrometry (TOFMS) evaluation of the June effluent sample. TOFMS analysis detected several hundred unidentified and identified organic contaminants. Further evaluation of the enormous number of detected compounds was deemed impractical.

Follow-Up of Targeted Phase I TIE. PERL Labs performed additional Targeted Phase I TIE tests in August. Sample treatment combinations of pH adjustments, 1 µm filtration, C18 SPE, cation exchange, and Florisil SPE were evaluated. By that time, baseline samples no longer showed survival toxicity and reproduction toxicity had diminished by 28%. After these follow-up treatments, only Florisil SPE completely removed toxicity. This may support the hypothesis that toxicity was caused by one or more organic polar contaminants.

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 Reach 1 funding, through FY18 USACE work plan, should occur in February. Construction should commence in summer 2018. 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 north and west sides of Facility biosolid lagoon areas.

Burrowing Owl Habitat. The 2017 breeding season was the fifth consecutive year of growth in owl population. In 2017 the number of breeding season adults was the highest recorded, with 34 adults observed (up from 20 in 2015, and 25 in 2016). The 17 nesting pairs compared to 12 pairs in 2016. However, only nine (9) adult pairs were successful in fledging 29 chicks for a 53% breeding success rate. In contrast, the breeding success rate was 100% in 2016, whereby all 12 nesting pairs produced 58 chicks.

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.

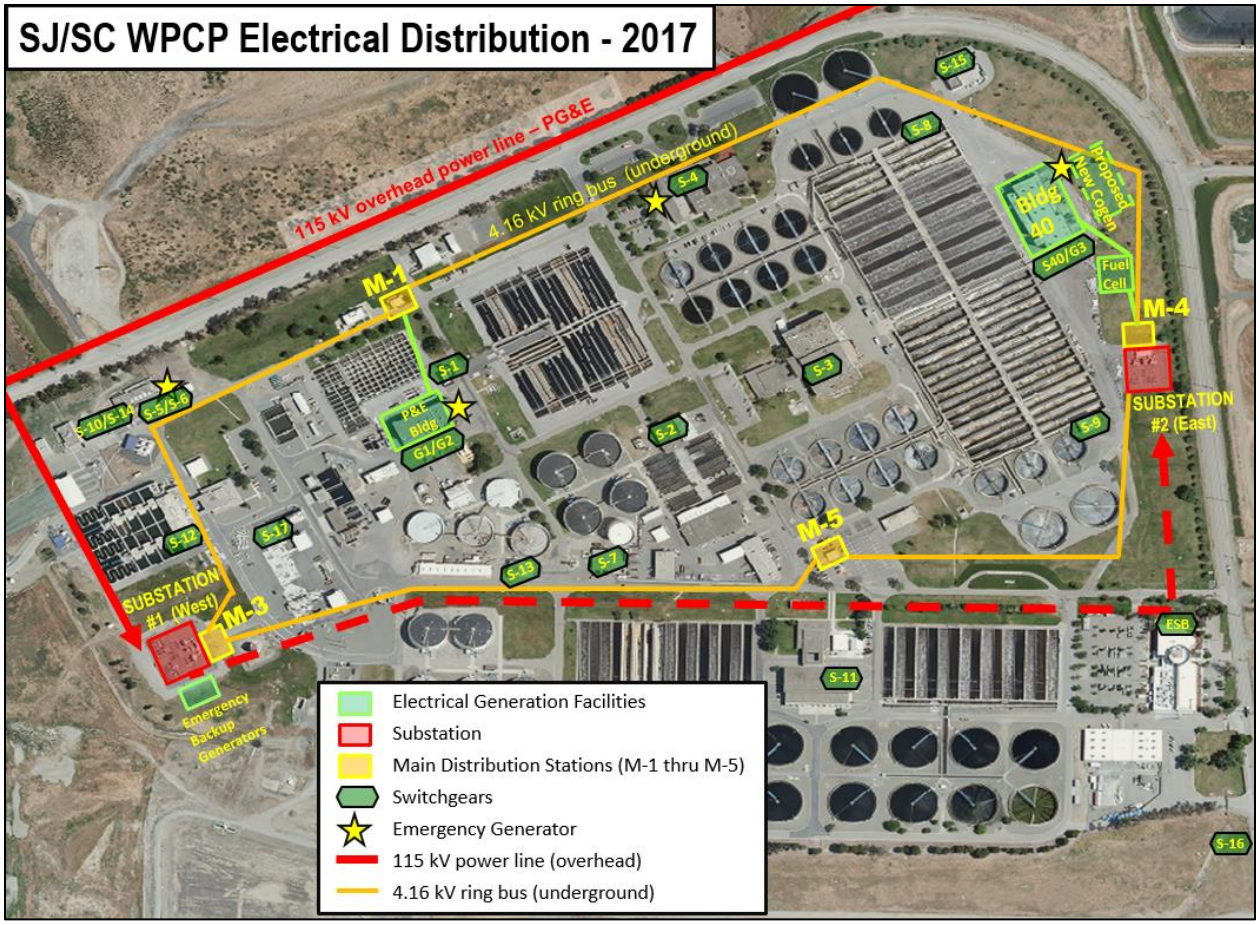
Engine-Driven Generators & Fuel Cell

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

- Four new 3 MW Emergency Backup Diesel Engines were certified in 2017 and are now standing by to assume electrical load in event that RWF power is lost or interrupted.
- Engine Generators, EG-1 and EG-3 are in service. A limited top end overhaul has begun on EG-1. Five of 12 cylinder heads have been rebuilt as of January 2018. Work is scheduled to be completed by summer of 2018.
- 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.
- Engines E-2 and E-5 were decommissioned in 2017. These large 60-year old engines and associated fuel and oil systems and tanks have been disconnected and drained. The equipment will remain on-site pending a larger project in 2020-21 to remove other remaining obsolete engine generators, cooper blowers, and gas compressors.
- The fuel cell is out of commission indefinitely.

Backup Emergency Generators & testing team - 16 March 2017.

Early in 2018, ground will be broken for construction of a new cogeneration building adjacent to "Building 40." The new building will house four new Caterpillar "CG 260-16" 3.5 MW engine generators. CG 260-16s will replace existing cogeneration units by late 2019. 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 will be delivered and installed at the RWF. 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. Blower N-5 was restored to full service in 2017 following repairs to an actuator and air discharge valve.

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

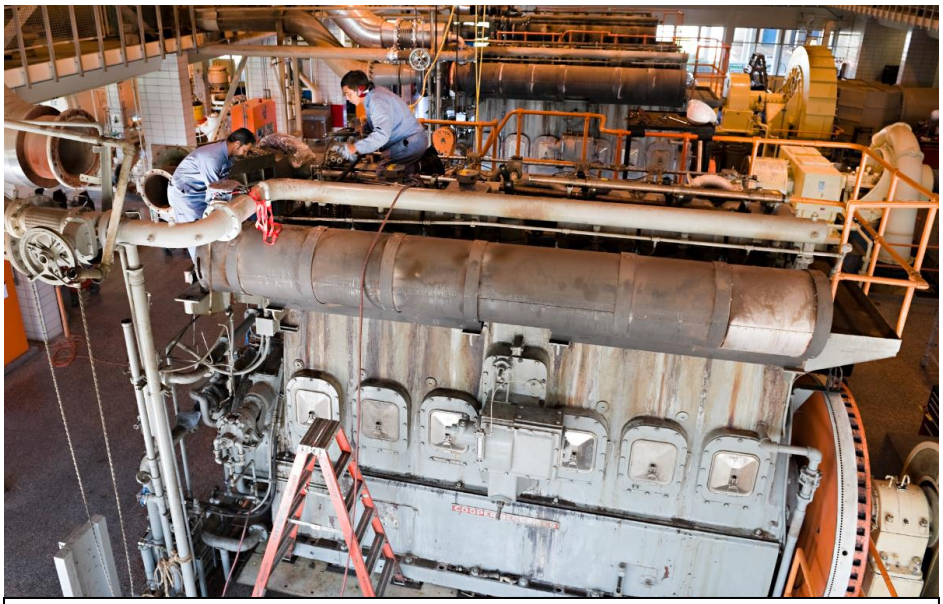
3 - *Building 40*

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 in 2017:

- Construction Enabling Improvements. This project includes a new multi-acre trailer hook-up, security entry, parking area, and lay yard area immediately south of the RWF. The project includes a dedicated turn-lane for increased construction activity over the next ten years. This project will be completed in early 2018.
- Plant Instrument Air System Upgrade. Contractor, Anderson Pacific, began construction of a new building adjacent to Secondary Blower Building that will house three new high-pressure air compressors. Upon completion, the air compressors will replace older units that provide high-pressure instrument air used to actuate valves and water level sensors.
- A fiber optic line was installed by contractor, Aegis ITS, Inc, from Highway 237 to a fiber optic patch panel at the facility Transmission Pump Station (TPS) building in January 2017. The new line replaces an older microwave system for direct electronic communications with City Hall.

New Instrument Air Compressor Building in 2017.

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

- Secondary Clarifier A4 - all metal fixtures and equipment.
- Secondary Remote RAS Pump entry sheds at northwest and southwest ends of secondary basin - metal piping, exterior, and A-side west valve stanchions.
- Secondary Aeration Area, west side basement - interiors and stairways.
- Secondary Clarifiers A & B 1-8 – piping between clarifiers.
- West Primary above-ground equipment and exposed raw sewage pipes.
- Storm Decant Pump Station in Residual Sludge Management Area operations yard.
- Exhaust stacks for EG2 and EG3 at Building 40 - sand-blasted and painted with high heat epoxy. Exhaust stack supports & frames were cleaned, primed & painted.
- Digester #9 - digester roof was recoated. Heat exchangers and all perimeter valves for digesters #9 and #12 were cleaned and painted.
- Remote digester tunnels and Digester 13 - expansion joints were replaced.
- Flow metering valve (54-inch) and touched up associated vault in TPS Building.

d) Condition Assessments and Studies

The following engineering studies and condition assessments were completed in 2017:

Flow Management Study. Stantec Consulting Services and RWF CIP staff completed this study in July 2017. The study evaluated projected wet weather flows out to years 2040 and 2050, current wet weather practices, facility limiting capacities, and alternative flow management alternatives.

- The study projects that RWF Average Daily Annual Flow (ADAF) of 142 MGD will be reached in year 2050.
- A Peak Hour Wet Weather Flow (PHWWF) factor of 2.0 times ADAF is recommended for facility processing capacity without need for excess flow storage.
- Extreme Peak Hour Wet Weather Flow (EPHWWF) is defined as infrequent events that exceed PHWWF. There have been six EPHWWF events since 1988. Four of the six events were 2.6 times ADAF, most recent being in February 2017.
- The bulk of the study evaluates major basins and pump stations in the RWF treatment train, flow bottlenecks, available water storage, and several strategies for managing extreme flows.

Aeration Tanks Rehabilitation Project, Condition Assessment and Alternatives Analysis. A final report was submitted by Brown and Caldwell in January 2018. This assessment evaluated BNR1 and BNR2 area structural integrity, pipelines, process mechanical equipment, electrical systems, and instrumentation and controls.

- The assessment concluded that most aeration infrastructure is in varying condition, not unexpected for its age.
- Most RAS and tank drain piping systems are recommended for rehabilitation, repair or replacement.
- Most valves, including all BNR-1 and BNR-2 tank effluent (ML), process air, cross-over valves, and tank drain (mud) valves/gates are recommended for replacement or refurbishment.
- For instrumentation, the report recommends replacement of liquid stream flow meters, dissolved oxygen probes, and valve actuators.
- Process air flow meters, temperature and pressure transmitters, and valve actuators are also recommended for replacement.

Nitrification Clarifier Rehabilitation Project, Alternatives Analysis Report. This report was provided by HDR, Inc. in June 2017 and encompasses evaluations performed by HDR and Kennedy/Jenks Consultants. The intent of this report was to review and confirm recommendations from the 'Nitrification Clarifiers Condition Assessment Final Report' prepared by AECOM in December 2011.

- This report concluded that clarifier mechanisms are well maintained but carbon steel components show corrosion and should be replaced.
- Concrete structures are in good condition with some repair and recoating recommended.
- Replacement of exposed electrical components, instrumentation, and RAS magnetic flowmeters is recommended.
- There is concern that clarifier mechanisms will not withstand sloshing forces from a major seismic event.

3) Operational Assessment

a) Headworks

Facility headworks include both a new 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.

Iron Salt Feed Station.

- An Iron Salt Feed Station at EBOS will be completed by contractor, Anderson Pacific, in early 2018. The station is in service as it undergoes final testing. The Iron Salt station is comprised of four ferric chloride ($FeCl_3$) tanks and a pump station for injecting $FeCl_3$ into raw sewage as it enters the facility. $FeCl_3$ binds with sulfides to help reduce odors and sulfide emissions from digesters and engines. A polymer injection station was also installed upstream of East Primary area to aid primary settling.
- A "Headworks Critical Improvements" project is underway. A second Duperon Flex Rake was installed late in 2017. A third Duperon is scheduled for installation early in 2018. These flex rakes replace existing bar screens in HW2 area.
- A new Alviso Force Main was completed in December 2017. This line connects the Alviso Spreckles Street pump station to the RWF EBOS and replaces the older Alviso line that was heavily degraded.
- A rebuilt climber rake was installed in Channel #1 Bars Screen of HW1 (old Headworks).

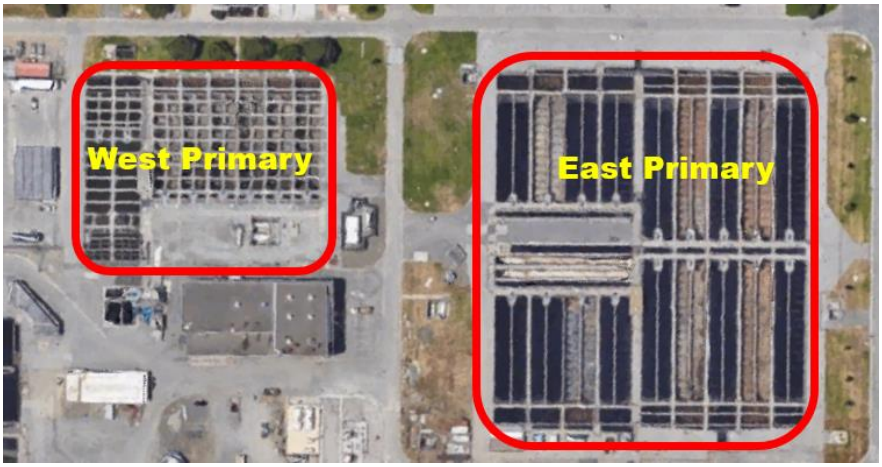
Duperon Flex Rakes.

A design-build project to construct a new headworks facility (Headworks 3 or HW3) to replace aging HW1 is in the bid and award phase. A design-builder should be selected by mid-2018. This new headworks will be located adjacent to current HW2.

b) Primary Clarifiers

West Primary. West Primary area was brought back to serviceable condition in anticipation of needed shutdowns in East Primary tanks over the next two years. This marks the first time in at least a decade that West Primary (part of the original 1956 infrastructure) has been in service.

East Primary. In March, while performing work for the Digester and Thickener Facilities Upgrade project, contractor Walsh Construction encountered major corrosion in a 78" Primary Effluent/Settled Sewage pipe that conveys primary effluent to secondary/BNR treatment. The discovery forced temporary partial shutdowns of the East Primary (southern) B-Side. Walsh Construction began preliminary initial repairs to the effluent pipe. Temporary above ground Primary Effluent piping to allow replacement of the failing 78" line will be installed as part of the Digester and Thickener Facilities Upgrade project. New 36-inch HDPE pipe was procured and staged on site in January 2018. Degraded in-ground pipe will be removed and replaced during the 2018 dry season.

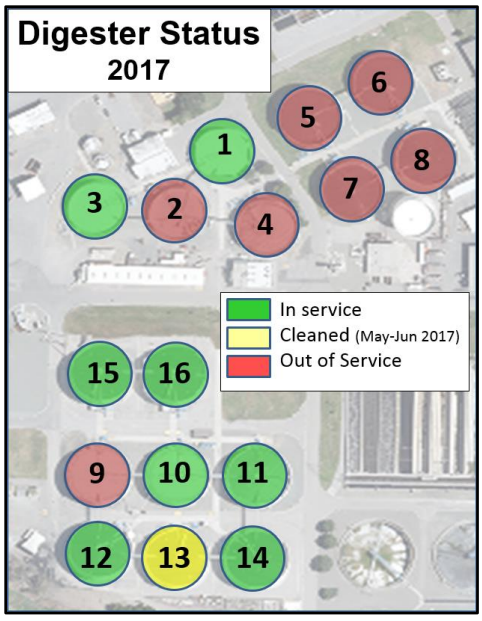


- All 40 influent valves in East Primary "A" and "B" tanks (west side) were fitted with new heavy-duty valve stems. The same work will be performed in 2018 for 40 valves in remaining "C" and "D" areas (east side) as part of a long-term project to replace corroded valve gear boxes and move them above ground.
- A 300 horsepower, 42-inch diameter, vertical pump and gear box was replaced from critical spares inventory at Primary Effluent Pump Station (PEPS) in #2 position. (PEPS is comprised of four pumps.) The removed pump will be refurbished and kept in inventory.

c) Digesters, Gas, & Sludge

Digester Status. Nine digesters are currently in service.

- Digesters 9 and 12 were cleaned, underwent valve replacement, and heat exchanger rebuild in early 2017. Digester 12 was restored to service, while Digester 9 remains out of service since October 2016 due to structural damage.
- Digester 13 was cleaned in mid-2017. During subsequent painting, severe corrosion was discovered in the digester roof. The unit was restored to service in October.
- Digesters 14, 15, and 16 are next slated for cleaning.
- 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

Digesters 5 thru 8 are undergoing conversion to thermophilic "Hot" operation.

- Caulking containing PCBs was identified during digester demolition. Under its TSCA authority, EPA approved a Phase 1 TSCA Application for remediation of soils contaminated with PCBs. Remediation is limited to soils adjacent to Digesters 5-8 and related tunnel areas to points where joints and adjacent tunnels connect. The City will be submitting a TSCA application to obtain approval to allow the City to address additional contaminated caulking and nearby substrate.
- Contractor, Walsh Construction, is rebuilding DAFT tanks 5-8 to new design. In 2017, all mechanical parts were removed from these tanks as repair and modifications began. The project encountered multiple unforeseen utility conflicts with piping that conveys water, natural gas, digester gas, storm drain and sanitary sewage. These and other unexpected discoveries may extend this project later than the planned September 2020 completion date.
- Temporary above-ground (essentially on-ground) digester gas piping has been installed to allow removal of methane piping systems from underground tunnels and is now in service. The new piping system will be used for at least two years 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 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.

New permanent above-ground piping racks: "The Monorail."

Digester Gas Compressor Upgrade project. Two new gas compressors passed final tests in 2017 and are now operational. These compressors replace three 40-year old units that compress digester methane gas that fuel engines at the RWF.

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. The two areas employ the same 4-stage BNR process and are run in parallel.

Secondary Area (BNR-1).

- Nine new 24-inch magnetic flow meters were installed in Secondary Area east end Primary Effluent feed lines in 2017. The meters replace older air-actuated Differential Pressure (DP-cell) V-cone flow meters. The additional 9 MAG meters combined with those installed in 2016 completes this upgrade project.
- Three clarifiers were refurbished in BNR-1 area in 2017: A4, B12, and B13. Drive and wiper systems were rebuilt. Tow-Bro arms were laser-leveled and balanced. Additionally, clarifier A4 was repainted.

Worker on a clarifier "Tow-Bro" arm.

Nitrification Area (BNR-2).

- Nitrification/BNR-2 A-side was shut down in summer 2017 to allow replacement of fine-bubble diffusers in all tanks, 1 thru 8. Shutdown afforded opportunity to install new 18-inch Bray air flow valves with pneumatic actuators and TZID valve positioners. (The same actuators and valve positioners were installed to control liquid flow in BNR-1 and BNR-2B areas.) All four BNR areas (BNR-1 A & B and BNR-2 A & B) have now been fitted with new valves, controllers, and positioners with this final installation.
- Similarly, new Kerz thermal mass air flow meters were installed in all 16 BNR-2A tanks in 2017. This same installation was was performed in the BNR-2B tanks in 2016.
- Clarifiers A-7, A-3 and B-6 are out of service due to degraded Return Activated Sludge (RAS) lines. Facility staff performed a series of shutdowns and removal of eight RAS pipe sections in 2017 to allow condition assessments that discovered this problem. Long-term repair options are being evaluated.

Secondary Area (BNR-1)

Below: Ongoing improvements to Secondary/BNR valves and meters and fine bubble diffuser maintenance is improving nitrogen control and removal. Incidents of ammonia and nitrite breakthrough have been greatly reduced since 2013. Overall discharged nitrogen concentrations are dropping back down to 2013 levels.

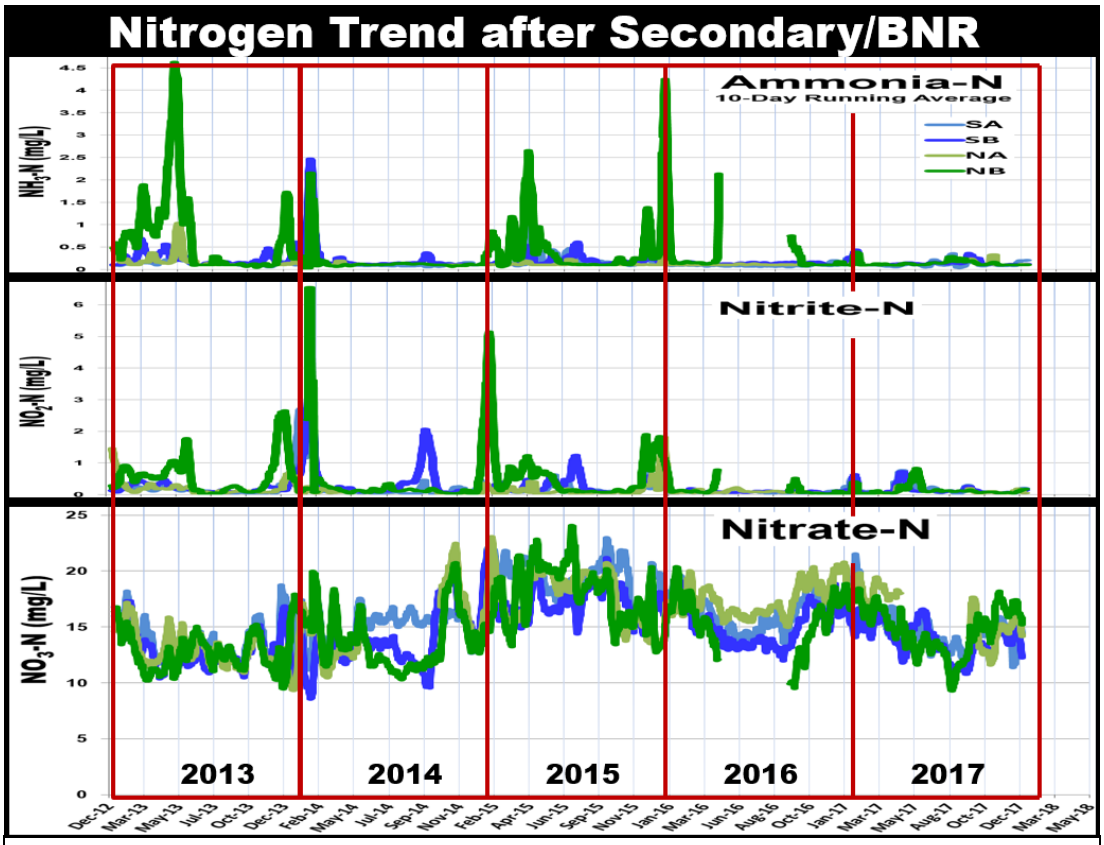


Chart developed by Dr. Rong Liu to track nitrogen oxidation and removal in each of four BNR process areas: Secondary (BNR-1) A & B, Nitrification (BNR-2) A & B.

e) Filtration & Disinfection

Filter media replacement. Filter bed A2 had media replaced with typical dual media – sand and anthracite. Filter bed A1 had media replaced with anthracite only (monomedia) as a pilot test to evaluate performance of monomedia on a gravel support bed. Thus far only filters A1 and A4 have been filled with anthracite monomedia. Performance testing of filter A4 demonstrated improved filter performance. Filter A1 has not yet been performance tested. However, fresh anthracite media continues to take many months to years to settle out to a typical run time of around 18 to 19 hours.

- Filter bed A4, outfitted with anthracite monomedia and steel orifice plates, mounted on drain tiles in 2015, continues to provide the longest run times and best performance of all 16 filter beds.
- A 400 horsepower, 24" diameter, vertical pump was installed from critical spares inventory to Treated Filter Backwash (TFBW) pump station #3 position. (TFBW pump station is comprised of 3 pumps.) The replaced pump will be refurbished and kept in critical spares inventory.

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.

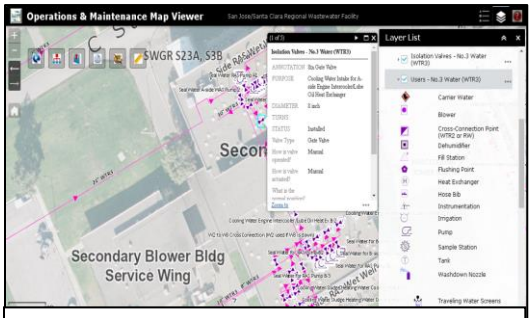
- Infor EAM tracks life cycle acquisition & maintenance cost of thousands of pieces of equipment and infrastructure (vertical & linear assets).
- Warehouse inventory items are cataloged and their usage is tracked.
- Non-inventory parts acquired through direct purchase by various shops are logged.
- Preventative maintenance is scheduled and tracked for equipment.
- Work orders and purchase orders are tracked and analyzed for labor and material costs and added to a work order history for future reference.

An upgrade to Infor EAM version 11.3 is planned for release to facility users in spring 2018. This version facilitates use of mobile devices and simplifies work order submission and tracking. Work is also under progress on a pilot to match CMMS tags with those of the facility Distributed Control System, to enable users to precisely locate assets for writing work orders.

Infor EAM (Enterprise Asset Management)	2015	2016	2017
Current software version	V.10.1.2	V.11 (Aug)	V.11.2
Assets tracked; vertical & linear	14,700	15,400	15,650
Warehouse inventory items cataloged & tracked	5,000	5,300	5,450
Non-inventory parts / direct purchase items logged	3,960	3,100	2,950
Preventative Maintenance items scheduled/recorded	2,000	3,100	3,200
Work Orders created & executed (regular/other)	3,050	3,400	3200/3300

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. Two new GIS Specialists were hired in 2017 to increase dedicated GIS staff to four.

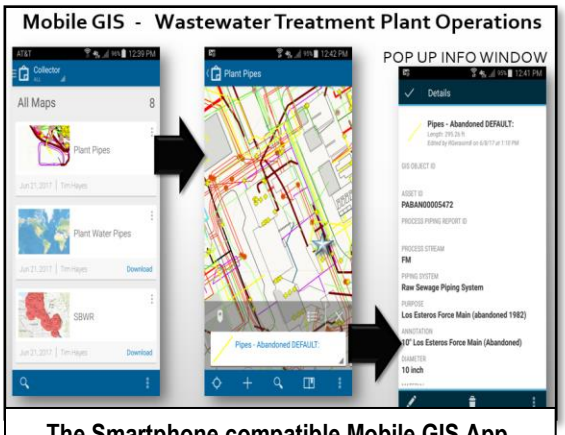
GIS Team recently added a “LineTrack” Electrical Detection Accessory to the existing Ground Penetrating Radar (GPR) System. The LineTrack accessory detects and identifies live underground electrical wires. https://www.geophysical.com/products/utilityscan-df Additional efforts are underway to map spare conduits and cables inside RWF Electrical Manholes using a 360-degree Pole Camera and GIS mapping.



A screenshot of the GIS WebMap App.

WebMap App. The GIS Team built the WebMap App in-house using ArcGIS Web AppBuilder, Developer Edition to allow staff to view RWF critical infrastructure, associated photos, and drawings from their desktops. The WebMap App reduces time needed to locate pipes and valves. In addition, posted photos and movies in the app have reduced the need for Confined Space Entry.

Mobile GIS App. GIS Team also deployed a mobile GIS app using “Collector” for ArcGIS. Facility staff and construction Inspectors can view interactive maps of critical infrastructure using a Smartphone in the field. This app is integrated with built-in smartphone GPS so staff can easily identify buried utilities and valves.



The Smartphone compatible Mobile GIS App.

Process Control Group.

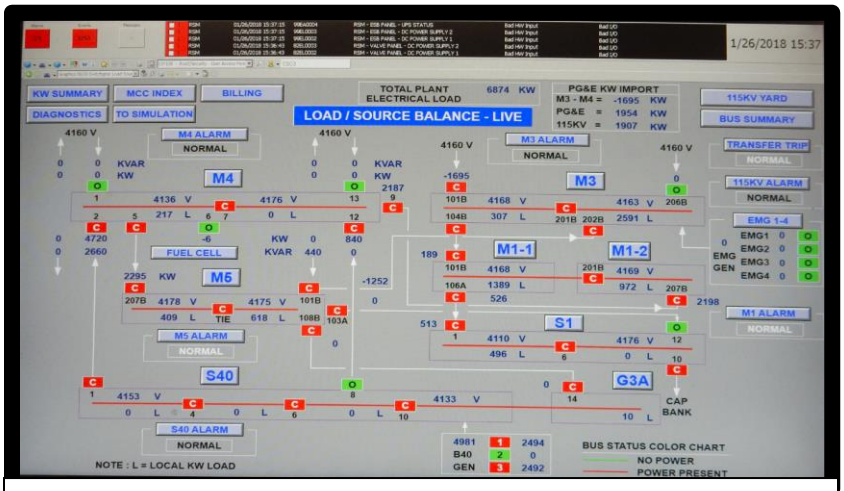
The Process Control team maintains automated systems and software that monitor and report thousands of process parameters throughout the facility.

Distributed Control System (DCS) Upgrade Project. This multi-year project is upgrading electronic hardware and software that collects data and remotely controls thousands of pieces of equipment around the facility.

DCS Phase II, rewiring of I/O hard-wire points was completed for instruments and controls in the Nitrification (BNR-2) area in 2017. The same work will be performed for the last remaining significant area, Secondary (BNR-1), in 2018.

New points are continually added and new graphics are integrated into the DCS system as new equipment comes on line. In 2017, system integration to the DCS was completed for the four new Emergency Backup Engines, two new Digester Gas Compressors and new Iron Salt and Polymer injection stations.

DCS Phase III, programming of new controllers to match existing programs and controllers, will begin in 2018. This final phase will replace old controllers and circuit boards with, smaller, smarter modules.



Live electrical load/source tracking display developed by Industrial Process Control Senior Specialists Steve Colby and Carlos Garcia.

5) Personnel

The Facility, under a 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 admin staffing totaled 214 positions of which 38 were vacant at end of 2017. One Wastewater Mechanical Maintenance Supervisor position was eliminated and 3 Wastewater Operator positions were added. A Senior Engineer position, supporting the Energy and Automation Division, was replaced by a Principal Engineer position.

Vacancies included: 2 Air Conditioning Mechanics, 1 Associate Engineering Tech, 1 Division Manager, 2 Engineering Techs, 2 Industrial Electricians, 2 Instrument Control Techs, 1 Office Specialist, 1 Principal Engineer, 1 Process and Systems Specialist, 1 Senior Engineer, 1 Senior Heavy Equipment Operator, 1 Warehouse worker, 4 Wastewater Attendants, 9 Wastewater Mechanics, 2 Wastewater Operations Superintendents, 1 Wastewater Operator, 4 Wastewater Operations Forepersons, and 2 Wastewater Senior Mechanics.

Operations Division: 72 positions responsible for daily control of treatment processes. A minimum of 8 personnel are on site at all times supervised by a Wastewater Operations Foreperson.

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 backed by at least 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.

In 2017, eight operator-in-training positions were filled. All passed the California State Water Resources Board Wastewater Operations Certification Grade two test and will be officially certified when on-the-job hours have been completed.

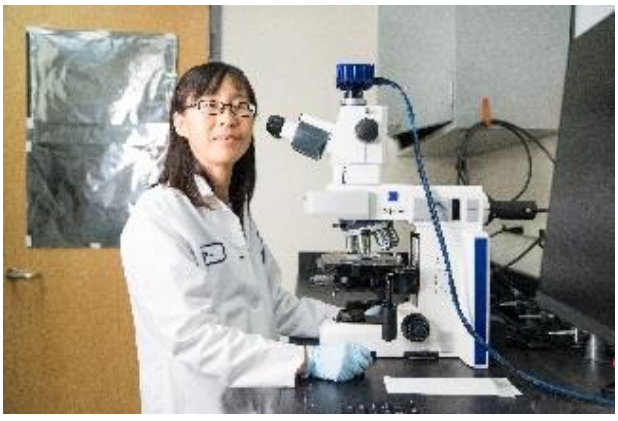
Facility Maintenance Division: 69 positions organized in three sections:

- 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: 59 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 project. 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: 15 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 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.

2018-2022 Capital Improvement Program (CIP). The 2018-2022 CIP provides funding of $1.51 billion, of which $238.1 million is allocated for 2017-2018. 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.

- $220 million: transfers from the City of San Jose Sewer Service and Use Charge Fund.
- $318.9 million in contributions from the City of Santa Clara and other agencies.
- $891.0 million commercial paper 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 2017-2018 Capital Budget at: http://ca-sanjose.civicplus.com/DocumentCenter/View/71793

Table below provides 2016-2017 actual CIP expenditures & encumbrances as of June 30, 2017.

2016-2017 Capital Improvement Program Year-end Expenditure Summary				
	Appn	Project	Expenditure on 6/30/2017	Current Encumbrances
1	401B	OWNER CONTROLLED INSURANCE PROGRAM	2,831,324	0
2	4127	DIGESTER & THICKENER FACILITIES UPGRADE	28,950,694	102,538,072
3	4332	EQUIPMENT REPLACEMENT	481,438	1,806
4	4341	PLANT ELECTRICAL RELIABILITY	31,196	53,122
5	5690	PLANT INFRASTRUCTURE IMPVT	346,671	1,956,485
6	5957	PUBLIC ART	20,051	108,000
7	6000	CITY-WIDE & PW CAP SUPPRT COST	507,043	0
8	6285	LAGOON & DRYING BED RETIREMENT	52,609	8,032
9	6313	CONSTRUCTION- ENABLING IMPROVEMENTS	2,700,013	1,082,138
10	6584	PAYMENT FOR CWFA TRUSTEE	5,000	0
11	6589	REVISED SBAP-SBWR EXTENSION	88,839	0
12	7074	NITRIFICATION CLARIFIER REHAB	1,376,348	26,620
13	7224	ADVNCD FACILITY CONTRL & METER REPLACEMENT	827,822	1,188,292
14	7226	E PRIMARY REHAB-SEISMIC & ODOR	5,785	39,882
15	7227	FILTER REHABILITATION	1,126,827	46,150
16	7230	IRON SALT FEED STATION	3,648,700	3,289,905
17	7364	SBWR MASTER PLAN	0	5,771
18	7394	T.P. DISTRIBUTD CONTROL SYSTEM	436,344	101,095
19	7395	URGENT & UNSCHEDULD T.P. REHAB	442	0
20	7396	YARD PIPING & ROAD IMPROVEMENTS	314,187	134,931
21	7448	HEADWORKS IMPROVEMENTS	860,422	2,136,807
22	7449	NEW HEADWORKS	1,737,485	936,191
23	7452	DIGESTED SLUDGE DEWATERING FACILITY	1,049,983	1,877,154
24	7453	COMB HEAT&PWR EQUIP REPR&RHAB	2,773,683	329,583
25	7454	ENERGY GENERATION IMPROVEMENTS	8,096,065	28,574,759
26	7456	PRELIMINARY ENGINEERING	515,513	104,862
27	7481	PROGRAM MANAGEMENT	6,878,848	1,823,432
28	7677	AERATION TANKS & BLOWER REHAB	2,177,598	5,742,808
29	7678	OUTFALL BRIDGE & LEVEE IMPROVEMENTS	65,363	82,622
30	7679	FACILITY WIDE WATER SYSTEM IMPROVEMENTS	474,501	621,184
31	7680	PLANT INSTRUMENT AIR SYSTEM UPGRADE	796,380	2,933,180
32	7681	SUPPORT BUILDING IMPROVEMENTS	336,312	218,445
33	7698	TUNNEL REHABILITATION	45,434	8,902
		TOTAL	69,558,920	155,970,229

Operating and Maintenance Budget.

San Jose-Santa Clara Regional Wastewater Facility

FY 2017-18 Operating & Maintenance Budget Summary

Budget Summary	2016-2017 Actual Expenses	2016-2017 Adopted Budget	2017-2018 Base Budget	2017-2018 Proposed Budget
Personal Services	$51,197,669	$54,770,465	$58,108,389	$56,877,511
Non-personal Services	25,386,138	29,379,019	29,470,519	33,233,019
Equipment	1,109,982	1,060,000	900,000	940,000
Inventory	390,878	400,000	400,000	400,000
Overhead	8,903,376	8,903,376	9,862,790	9,687,081
NCH Debt Service	1,118,437	1,118,437	1,175,345	1,175,345
Workers' Compensation	344,114	645,000	675,000	675,000
City Services	907,119	980,298	1,047,647	1,047,647
Total Operating Expenses	**89,357,713**	**97,256,595**	**101,639,690**	**104,035,603**

ESTIMATED COST DISTRIBUTION

2017-18 Estimated Total Gallons Treated (MG)	(1) Percent of Total Sewage Treated	City / District	2017-18 Proposed
25,219.388	64.161	City of San Jose	$66,750,283
4,991.335	14.415	City of Santa Clara	$14,996,732
30,210.723	**78.576**	**Sub-Total**	**$81,747,015**
3,552.188	9.271	West Valley Sanitation District	$9,645,141
1,928.236	5.179	Cupertino Sanitary District	$5,388,004
2,239.690	5.818	City of Milpitas	$6,052,791
347.435	0.927	Sanitation District # 2 - 3	$964,410
85.897	0.229	Burbank Sanitary District	$238,242
8,153.446	**21.424**	**Sub-Total**	**$22,288,588**
38,364.169	**100.000**	**TOTAL**	**$104,035,603**

(1) Composite of four parameters (flow, BOD, SS, ammonia). Source 2016-17 Revenue Program.

Regulatory fees and membership dues.

Major Permit Fees		Paid	Paid	Invoiced
Fees	**Agency**	**2015-16**	**2016-17**	**2017-18**
Permit: Annual NPDES Fee	State Water Resources Control Board	$519,351	$525,537	$525,537
Permit: Annual RMP Participation	Regional Monitoring Program – SFEI	$200,583	$234,752	$201,229
Permit: Alternate Monitoring Fee	Regional Monitoring Program – SFEI		$9,726*	$9,726
Permit: Annual Air Permit Fee	Bay Area Air Quality Management District	$82,417	$80,070	$83,307
Fee: Annual Cap and Trade	California Air Resources Board	$315,460	$303,692	$303,438
Related Membership Dues				
BACWA Annual Dues	Bay Area Clean Water Agencies	$267,636	$292,176	$294,086
WERF Research Dues	Water Environment Research Foundation	$46,184		
CASA Annual Dues	California Association of Sanitation Agencies	$18,720	$19,282	$19,282
Green Cities California Fund	Local Government Sustainable Energy	$4,200		

*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 2017, 653 SOP documents were filed in the SOP library.

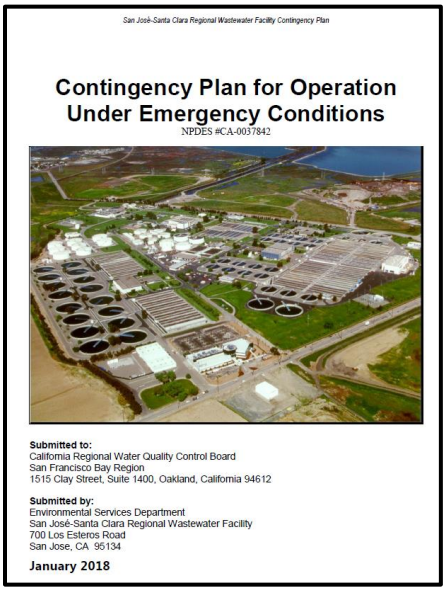
SOP Count by RWF Division	
RWF Division	**Number of SOPs**
Operations	412
Maintenance	149
Energy & Automation	51
Support & Administration	41
Total	653

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.” In late 2017, the plan was reviewed and updated to reflect personnel organization changes.


San José-Santa Clara Regional Wastewater Facility Contingency Plan

Contingency Plan for Operation Under Emergency Conditions

NPDES #CA-0037842

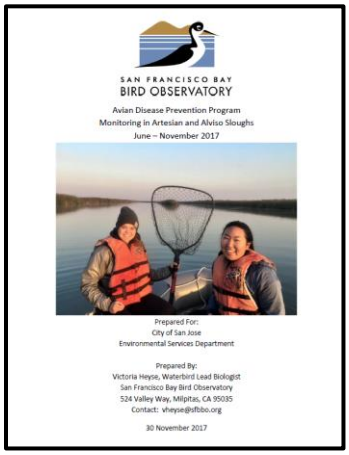
Submitted to:
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400, Oakland, California 94612

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


SAN FRANCISCO BAY
BIRD OBSERVATORY

Avian Disease Prevention Program
Monitoring in Artesian and Alviso Sloughs
June – November 2017

Prepared For:
City of San Jose
Environmental Services Department

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

30 November 2017

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 2017, no outbreaks of avian botulism were detected. Six dead, 5 sick, and 2 injured birds were found in the Artesian Slough – Lower Coyote Creek survey area over the six-month survey period from 5 June through 29 November. Additionally, 108 dead fish were found and collected. 103 of the fish were striped bass that most likely succumbed to heat stress in June through August.

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

b. South Bay Monitoring and Beneficial Uses.

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

1.4 WATER QUALITY CONTROL PLAN

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

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

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

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

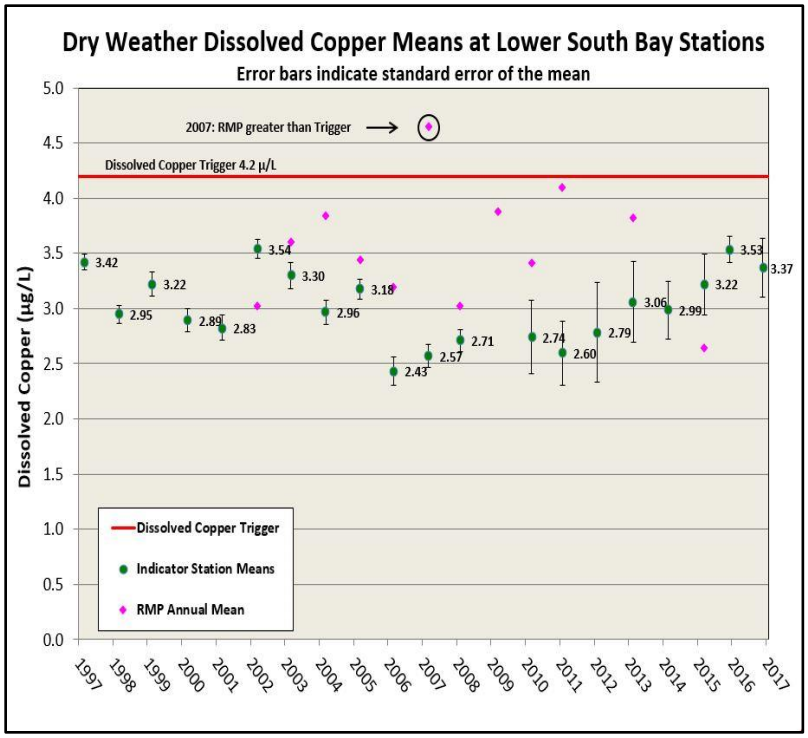
1. **Wildlife Habitat (WILD)**
2. **Fish Spawning (SPWN)**
3. **Warm Freshwater Habitat (WARM)**
4. **Cold Freshwater Habitat (COLD)**
5. **Fish Migration (MIGR)**
6. **Non-Contact Recreation (REC-1)**
7. **Contact Recreation (REC-2)**
8. **Commercial & Sport Fishing (COMM)**
9. **Rare & Endangered Species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

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

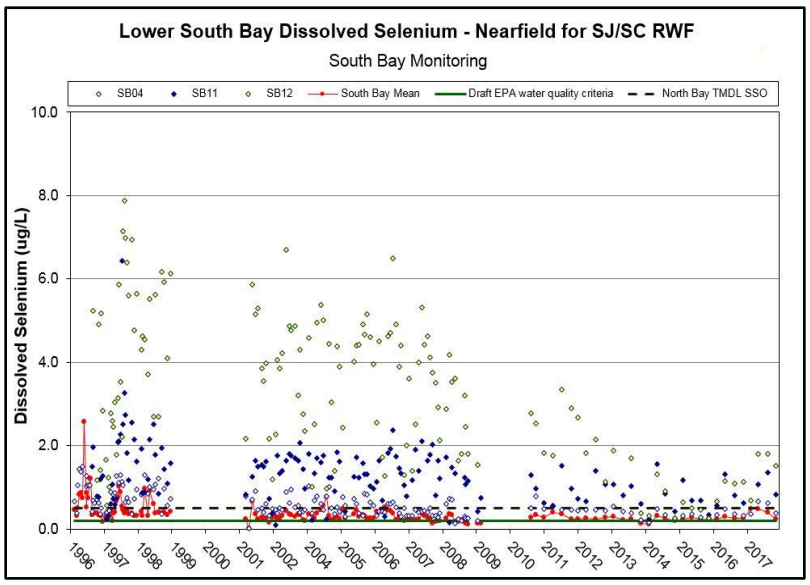
To demonstrate protection of beneficial uses, SJ-SC RWF has conducted water quality sampling at several stations in Lower South San Francisco Bay since 1965. Originally, only Dissolved Oxygen (DO), pH, temperature, and turbidity were monitored monthly. Ammonia, nitrate, nitrite, and phosphate were added 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 a 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 helped convince EPA to re-evaluate the draft criteria to consider a more common-sense approach to establishing selenium criteria.

Nutrient Monitoring. Since instituting a Biological Nutrient Removal (BNR) process in 1998, the Facility discharges practically no ammonia, and much lower concentrations of Total Nitrogen (TN) and Total Phosphorus (TP) than most other Bay Area facilities. However, nitrogen load, in the form of nitrate, is high owing to the large volume of treated water discharged.

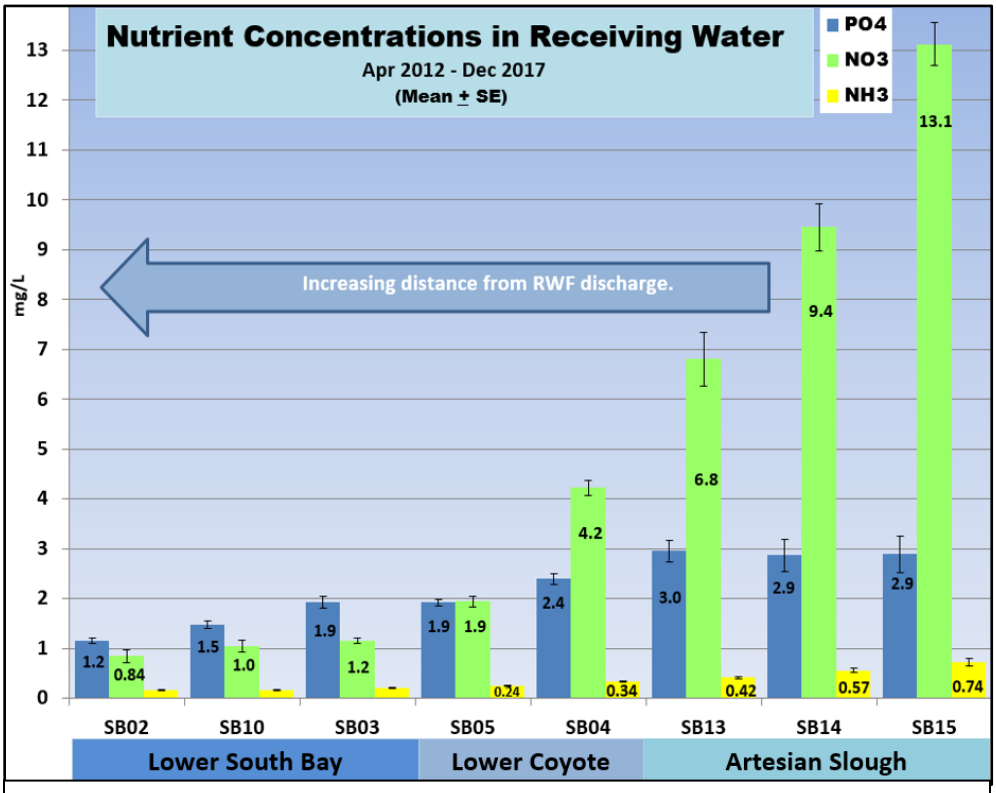
Jessica Donald and Ryan Mayfield collecting a nutrient sample at Mud Slough.

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.

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.

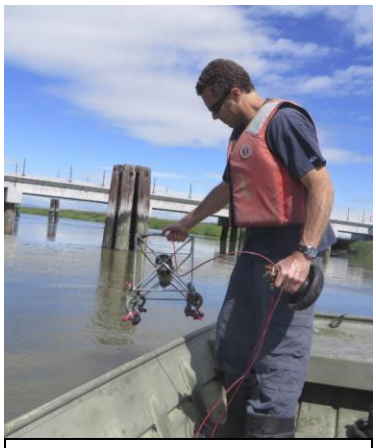


For better or worse, SJ-SC RWF discharges consistent concentrations of nitrate and phosphorus year-round. Concentrations drop steadily as water flows out to the Bay.

Where does the nitrogen go? –

1. physical parameters: Dissolved Oxygen, Temperature, Salinity

Dissolved Oxygen (DO) is consumed by living organisms in the aquatic environment. Dissolved inorganic nitrogen (ammonia or 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.



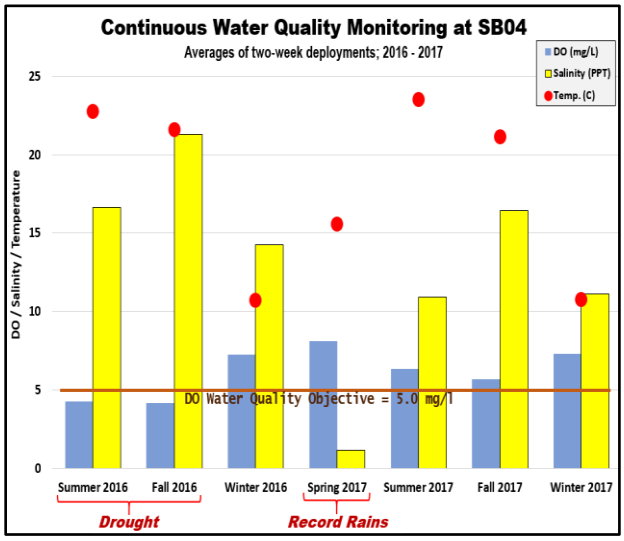
Bryan Frueh, deploying the Stonehenge sonde.

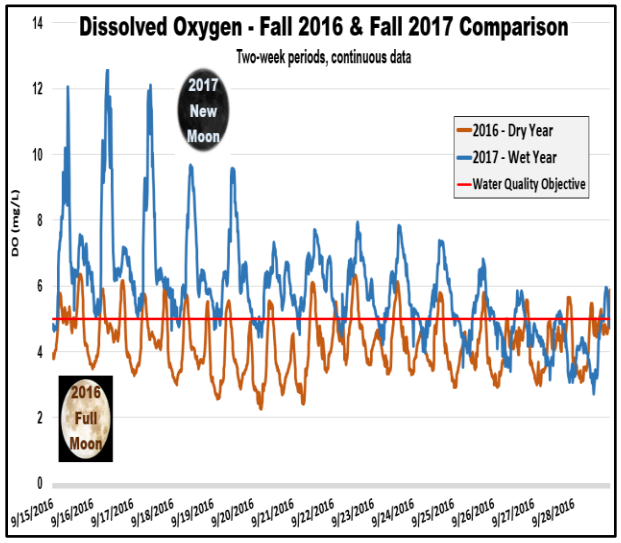
Project Stonehenge. To evaluate the DO issue, a YSI 6600 sonde was deployed at the Railroad Bridge in Coyote Creek for two-week periods during annual extreme tide and temperature events: winter and summer solstices (increased tidal range) and spring and fall equinoxes (reduced tidal range). The sonde collects DO, pH, Conductivity, and Temperature data, at 15-minute intervals.

Seven two-week long periods have been measured thus far. Warmer temperatures reduce oxygen solubility in water. In addition, warmth increases metabolic activity and respiration which consumes DO. Stonehenge data characterizes local estuarine conditions over dozens of tidal cycles during each seasonal event: DO drops as temperature rises in summer through fall; the reverse happens in winter through Spring. Stonehenge data is establishing boundaries around low DO concentration events in summer and fall warm periods.

Interestingly, this project began in mid-2016, an extreme drought year. Spring of 2017 commenced a very wet year. Freshwater flushing in spring 2017, and more water through the year, profoundly increased DO concentrations much later the following summer and fall.

September seasonal transition from summer to fall is typically the time when DO drops to its lowest point in the estuary. Reduction in sunlight and temperature drops cause reduction in phytoplankton photosynthesis. DO concentrations continue to rise with daily sunlight, but nightly drops become more pronounced. The right-side chart below illustrates continuous DO data from periods of low DO for both September 2016 and September 2017.





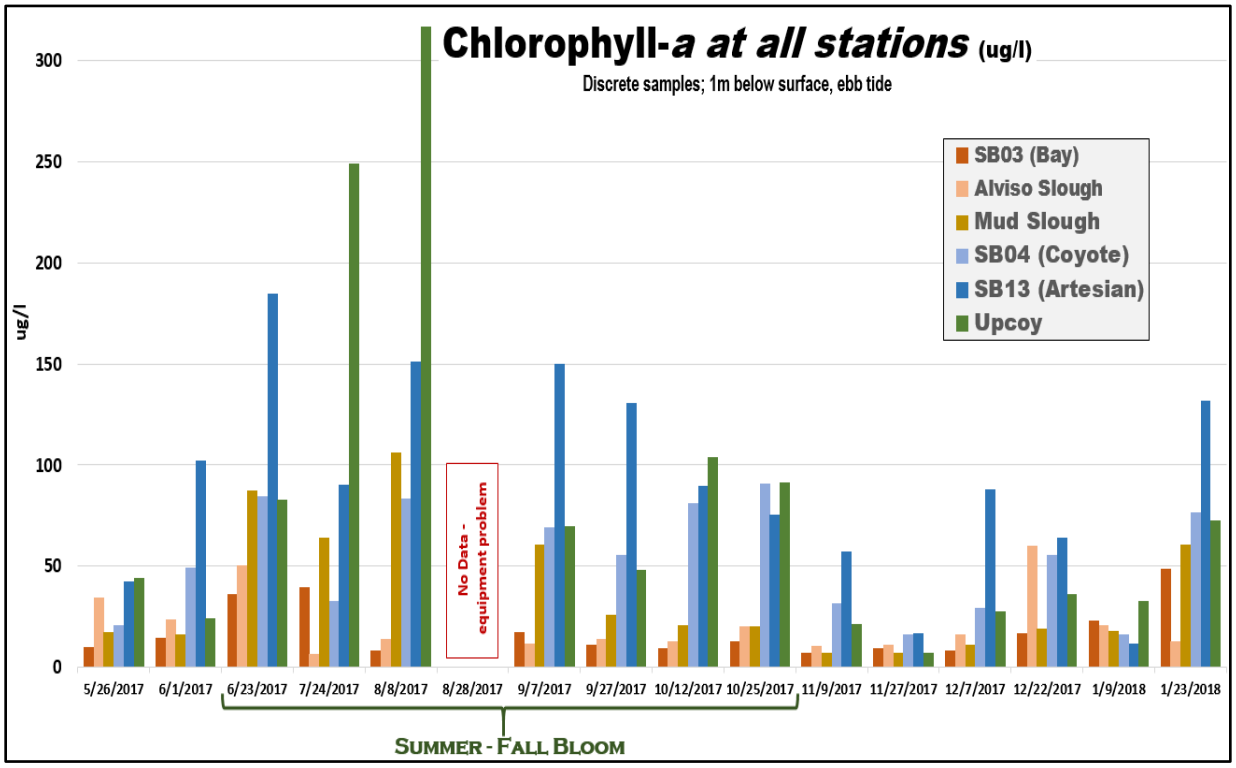
Where does the nitrogen go? –

2. biology.

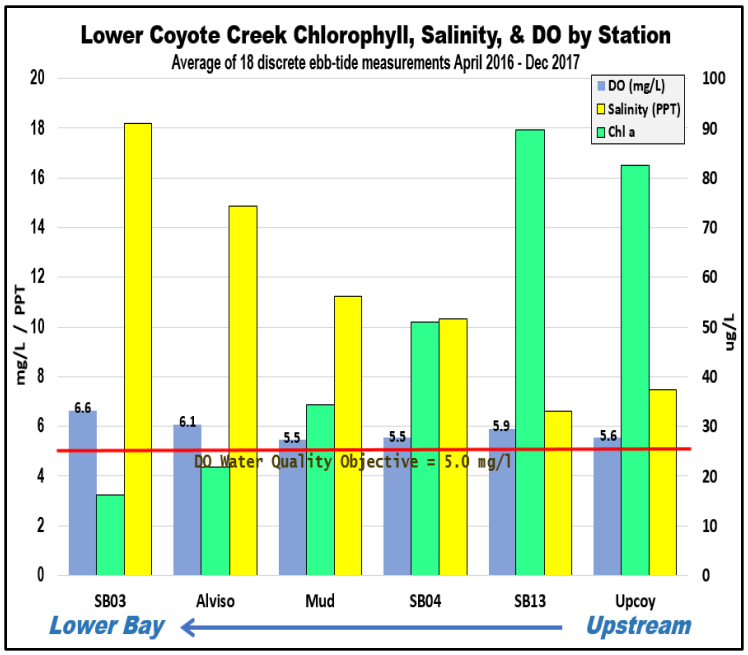
To investigate nutrient impacts, SJ-SC RWF staff began sampling water and sediment samples for biota at five stations along Lower Coyote Creek in 2016 and 2017.

A key feature of this area can be seen in the map of monitoring stations: **it is very green!** The greenness is not an illusion; the waters of this marsh and slough region harbor billions of microscopic single-celled algae called "phytoplankton." Like a grassy plain, the entire water-scape blooms and declines with the seasons. Phytoplankton, or "phytos" are primary producers and the first estuarine organisms expected to be stimulated by nitrogen. All living things feed directly or indirectly off these tiny plant cells. Like plants, phytoplankton cells contain chlorophyll that can be measured as a concentration to evaluate population density.

Chlorophyll. RWF staff began collecting chlorophyll samples in May 2017. This data quantifies the magnitude of phyto blooms in Lower Coyote Creek. Like many healthy estuarine systems, this region experiences a phyto bloom from late spring through late fall. However, chlorophyll density is extremely high. Chlorophyll concentrations in the range of 20 to 35 ug/l are generally considered strong bloom conditions. Here, average concentrations exceeded 80 ug/l from late June through August.



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, 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.

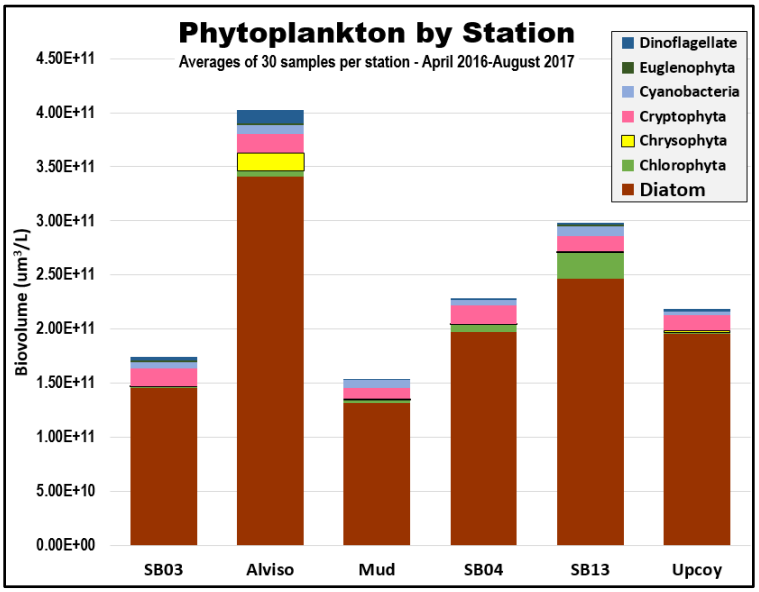


Ryan Mayfield using a Van Dorn sampler to collect a phytoplankton.

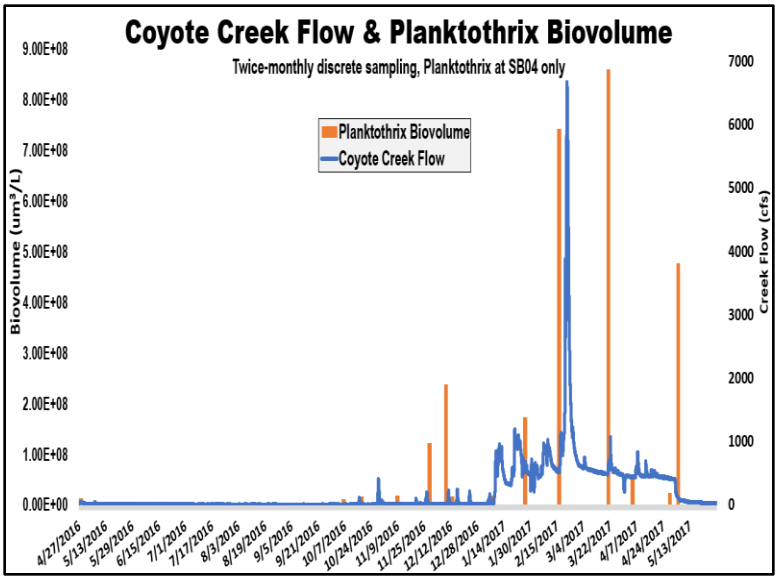
Phytoplankton Monitoring. A secondary concern for nitrogen is that too much of it could stimulate unwelcome phytoplankton, generically referred to as Harmful Algal Bloom (HAB) species.

RWF staff has provided water samples to 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.

Around the world, diatoms generally dominate salt water environments in terms of biovolume. The same was found in Lower Coyote Creek stations: overwhelming abundance of diatoms. Certain species of dinoflagellates or cyanobacteria HABs could be cause of concern, but these have been very rarely seen in over 4 years of sampling. One dinoflagellate "HAB" species, *Karenia mikimotoi*, was seen only once, and at low density.



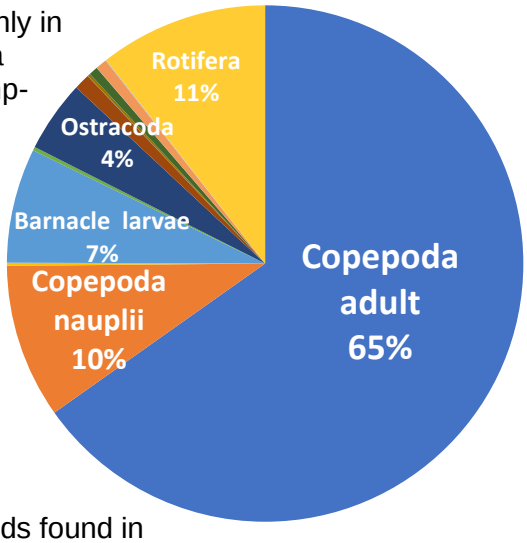
Another HAB species, cyanobacteria Planktothrix appeared at the Mud Slough station from late November 2016 until early May. The appearance coincided with freshwater flows during a wetter-than-normal winter. The graph at right shows Planktothrix densities compared with Coyote Creek flows.



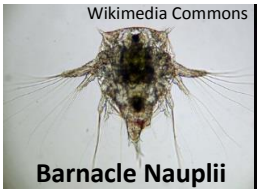
Even when Planktothrix abundance was high in Mud Slough, there were no signs of toxicity or biological disturbance associated with this bloom.

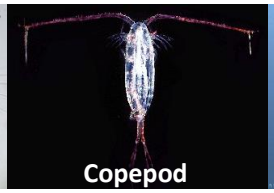
Zooplankton Monitoring. Zooplankton are tiny, often microscopic, animals that feed off phytoplankton. They are a vital food source for planktivorous (plankton eating) fish like anchovies, mullet, smelt and shad. Zooplankton include copepods, barnacle larvae, clam larvae (veligers), and small soft bodied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

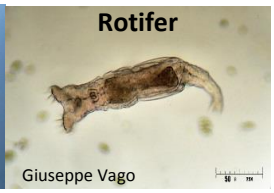
RWF staff began collecting zooplankton samples monthly in May 2016 using 250 um and 158 um nets attached to a tow sled. The larger mesh catches larval fish and shrimp-like species while smaller mesh captures very small zooplankton. Samples are preserved and sent to UC Davis for species identification.



Thus far, 65 zooplankton samples have been sorted. Initial results show average abundance of tiny animals vary greatly. Values ranged from 2,802 animals per cubic meter in March 2016 to a high of 58,631 in April 2017. The composition was heavily dominated by Calanoid copepods (65%), followed by Rotifers (11%), copepod nauplii (10%) and cirripedia (barnacle) nauplii. Calanoid copepods are a great food source for longfin smelt and northern anchovy. Copepods found in samples include *Eurytemora* sp., *Pseudodiaptomus marinus*, and *Oithona* sp. The copepod, *Pseudodiamptomus forbesi*, was found in April 2017 at SB13 and is considered an important part of endangered delta smelt and longfin smelt diets.







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).

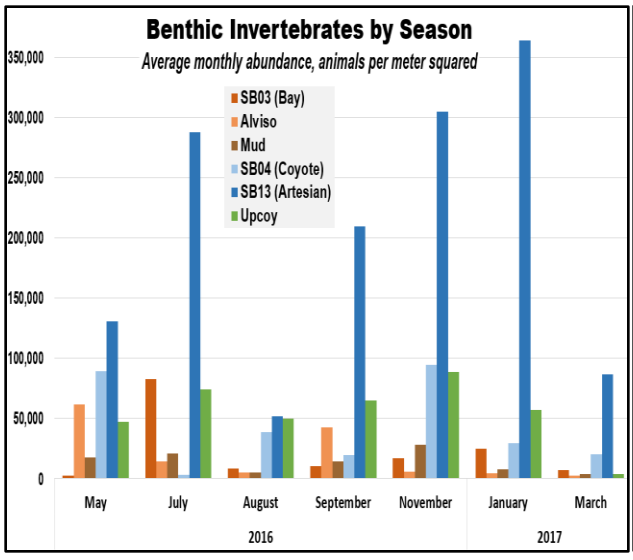
RWF staff began collecting bimonthly benthic samples at phytoplankton and zooplankton monitoring stations in May 2016. Benthic samples are collected using a Ponar grab sampler and delivered to USGS, Menlo Park laboratory, for taxonomic analysis. Forty-two samples have been processed. The remainder of 2017 samples are awaiting analysis by the USGS Lab.

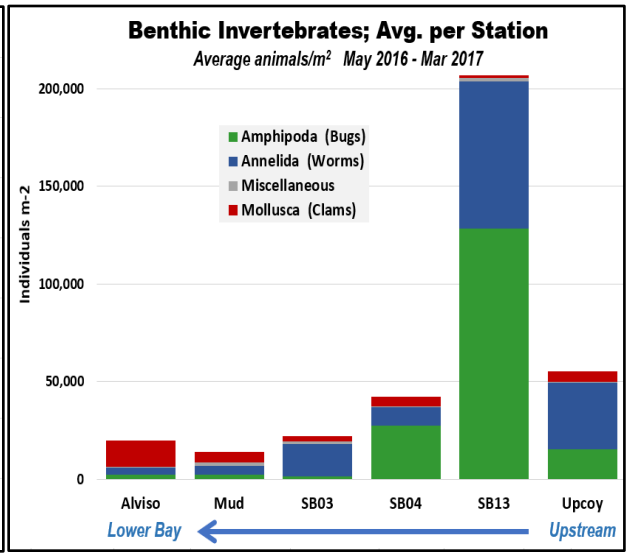
Results thus far show station SB13, at end of Artesian Slough, as having highest abundance of benthic organisms. The average number of animals was 205,012 per square meter! This is 15 times greater average density of organisms found at any other station. The lowest average benthic abundance was found at Mud Slough just a few miles downstream.

SB13 also has the greatest diversity of species with 30 different kinds of organisms found in that location. The most common species were annelid (worm) *Streblospio benedicti* and amphipod (bug) *Americorophium spinicorne*.

Benthic samples exhibit a great deal of variation. The extent to which localized spatial differences, water quality changes, or seasonal predation affect results is still not known.

Jessica Donald collecting a benthic sample using a Ponar grab device.





Fish Monitoring. Phytos, copepods, bugs, 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.

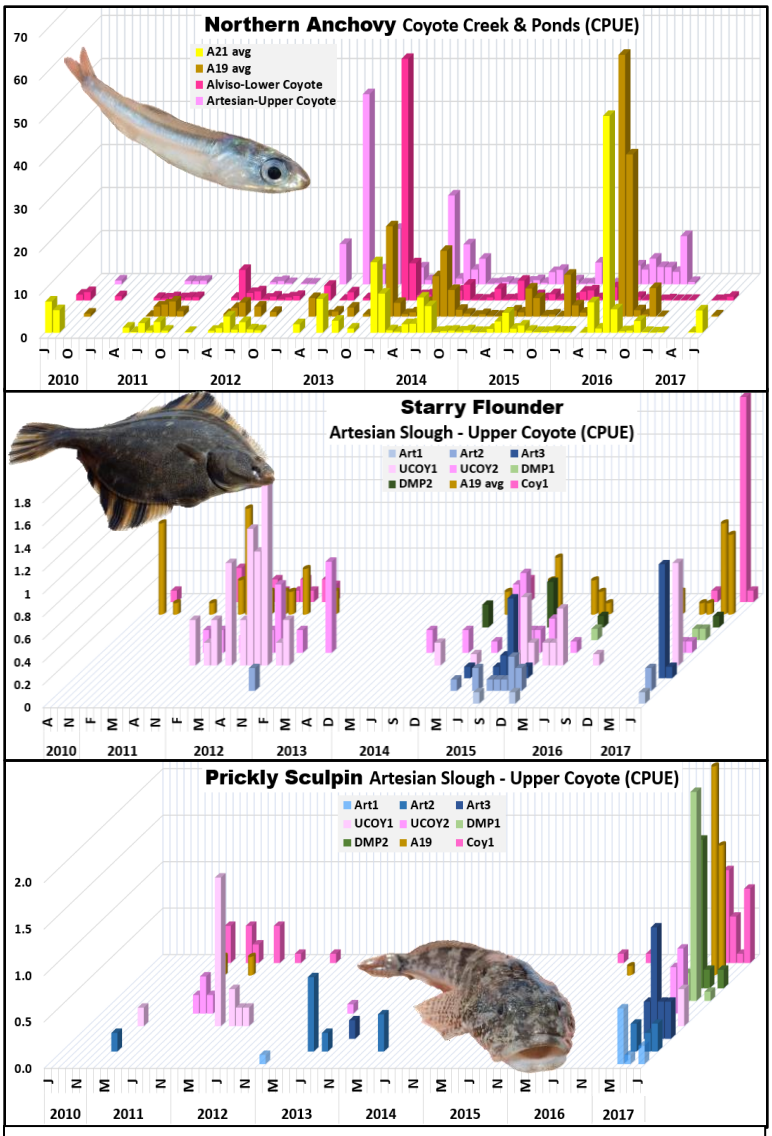
The fisheries team led by Dr. Jim Hobbs presented a poster at the 2017 State of the Estuary Conference documenting three years of fish trawl data from four marsh areas around the Bay. The poster, "Deep in the Shallows: Environmental Variability and Habitat Use by Native and Invasive Fishes …" by Arthur Barros, Levi Lewis, et al., concludes that Alviso Marsh and Lower Coyote Creek host the densest and most diverse fish populations found in San Francisco Bay.

Chart excerpt from Hobbs Lab poster, "Deep in the Shallows …". Of areas surveyed, Alviso Marsh areas around Lower Coyote Creek, have more fish.
http://hobbslab.com/wp-content/uploads/2017/10/SOE-poster.pdf

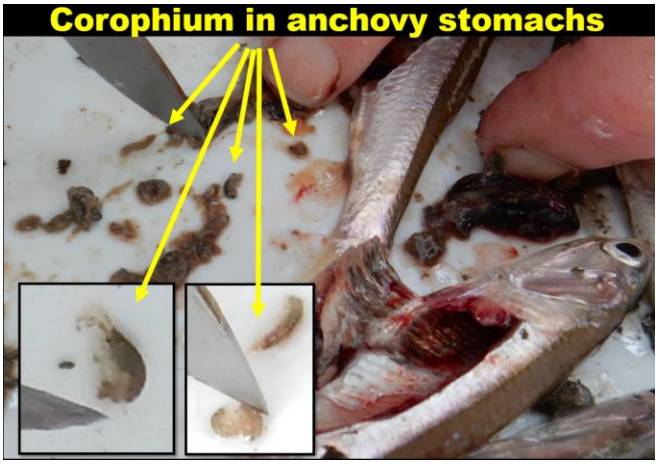
UC Davis researchers perform fishing trawls at 10 stations near SJ-SC RWF discharge and at an additional 10 stations further out in Coyote Creek, Alviso Slough and Lower South Bay for other agencies. (Stations shown here are color-keyed to match fish population charts on the following page.)

The UC Davis, Hobbs Labs 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. For example, fishing trawls since 2010 have tracked Northern Anchovies that arrive in huge numbers each summer to feed in warm shallow sloughs. The Hobbs team has found that anchovies are a summer-time-only fish in most years, but remain year-round, and even appear to spawn locally, during very dry drought years.

In contrast, fish that seek freshwater, like Starry Flounder and Prickly Sculpin, are present when creek flows provide enough freshwater for spawning. They may not be caught at all during very dry years. In this way, presence of an individual species reflects specific environmental events like the massive February freshwater flushing in 2017: Anchovies disappeared for a time, Starry Flounder and Prickly Sculpin showed up.



UC Davis trawling results 2010-2017 expressed as "Catch per Unit Effort" (CPUE). Note that typical summer-time anchovy catches are orders of magnitude greater than starry flounder or prickly sculpin.



Some of the highest numbers of Anchovies are netted at trawl station "Art 3" at the end of Artesian Slough. This is the same "SB03" station where benthic "bugs" (*Americorophium spinicorne*, among others) are found at the highest densities. And, in fact, the Hobbs team confirmed that Anchovy stomachs were full of corophium on warm, late-fall days.

After February rains, Lower Coyote Creek trawls began finding organisms characteristic of a freshwater lake!

In 2017, fishing trawls documented changes in local fish populations brought on by the huge rainwater pulse; the February Freshwater Flush of 2017. Local creek and Lower South Bay salinities plummeted to 1 part per thousand (ppt) or less for weeks. This concentration is essentially fresh water. During and after the Freshwater Flush, the Hobbs team netted several fish not seen in recent trawls: Sacramento Blackfish, Sacramento Sucker, Tule Perch, and others. Leopard Sharks were found dead from osmotic stress around South and Central Bay. Anchovy populations dropped to near zero. Three-spined Sticklebacks, American Shad and Threadfin Shad flourished. 2017 became a case-study of extreme climate induced changes affecting Bay fish.

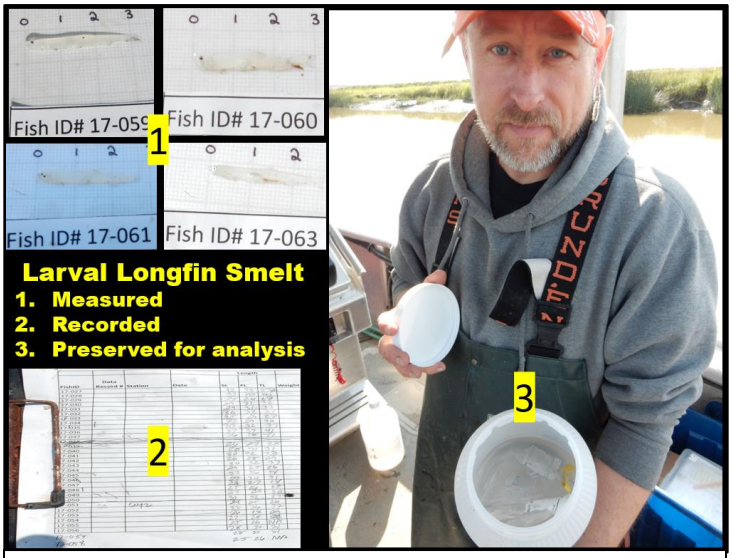
American & Threadfin Shad at Coy1 Station

Young Starry Flounder at Ucoy2

Longfins Spawn Here!

Early in 2017, UC Davis researchers finally found confirmation that Longfin Smelt spawn in Lower South Bay. Specifically, juvenile and larval, longfins were discovered in Artesian Slough, Lower Coyote Creek and especially in restored Pond A19 and Pond A21. These young fish were collected as part of both San Jose funded fish trawls and Calfornia Department of Water Resources (DWR) larval fish surveys. Local spawning of longfins in the Alviso Marsh complex has been long suspected but, until now, never confirmed.

Fish number one: one of the first juvenal longfins was discovered in Artesian Slough!



Dr. Jim Hobbs showing the steps of recording and preserving longfin specimens.

Longfin Smelt seek cool fresh water for spawning. It is likely that the 2017 freshwater flush played a major factor in inducing these fish to spawn in sufficient numbers for researchers to finally detect them.

The Hobbs team collects samples of young fish and eggs for detailed analysis back at UC Davis labs. 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.

Longfins spawned early in 2017 appear to have returned as adults by December 2018!

This adult female, full of eggs, was caught in Pond A19 on January 14th, 2018.

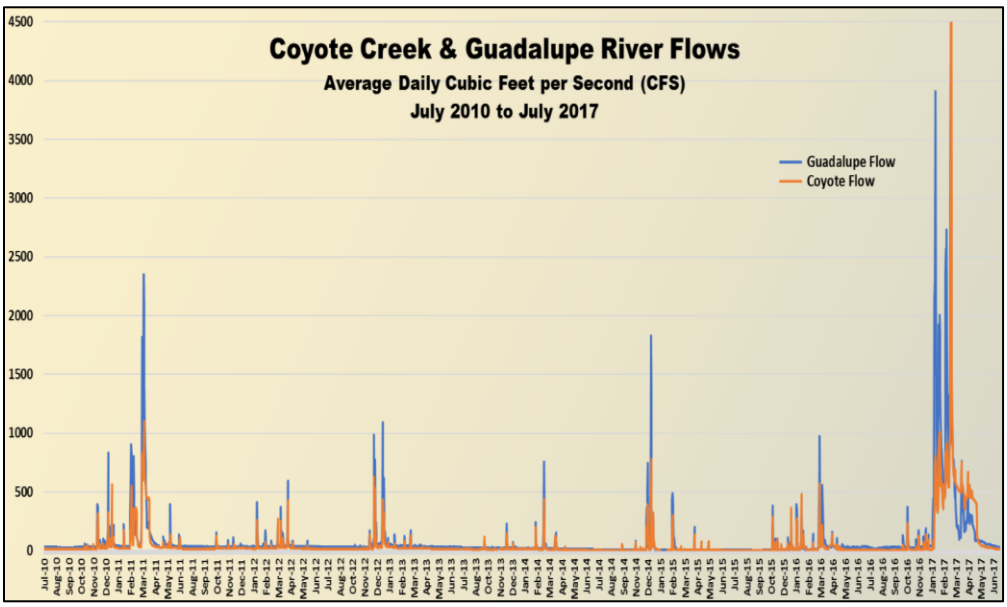
Summary of Environmental Monitoring costs. The table below summarizes annual costs in 2017 of supplies, analyses, purchase order and contract costs for nutrient and biological monitoring projects. In 2018, Chlorophyll and Phytoplankton sampling frequency will be reduced from bi-monthly to monthly.

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	2X/month	12,700
4	Phytoplankton sampling at 6 stations	BSA	2X/month	31,000
5	Zooplankton sampling at 6 stations	UC Davis	Monthly	14,400
6	Benthic monitoring at 6 stations	USGS	6X/year	11,330
7	Stonehenge DO monitoring at 1 station	In-house	Quarterly	1,700
8	Fish Assemblage monitoring	UC Davis	2X/quarter	89,000
	Total - 2017			207,786

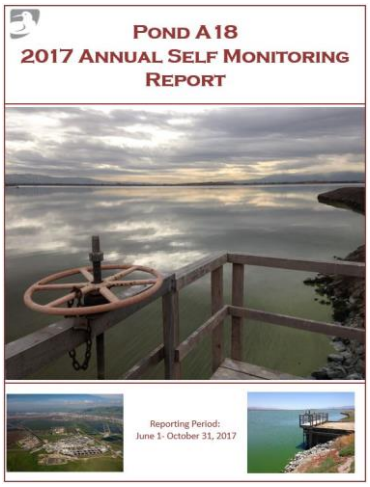
c. Other activities.

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 $12,775.

The graphic shows recent years of Coyote Creek and Guadalupe River flows. The freshwater flush of February 2017, which also corresponded with catastrophic flooding in parts of San Jose, also resulted in very fresh estuarine water that persisted through at least June. The huge freshwater pulse altered fish populations all the way through early 2018.



d. Pond A18 Monitoring

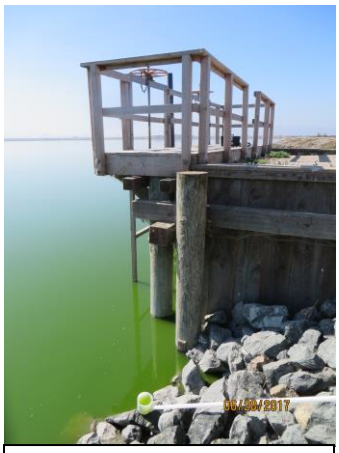


Pond A18 is a shallow, 856-acre former salt pond owned by City of San Jose. The pond circulates Bay water using two hydraulic control structures located at northern and southern ends of its western levee. Discharge of pond water is regulated by Waste Discharge Requirements (WDR) Order No. R2-2005-0003.

During dry season (June through October), the WDR requires continuous monitoring for DO, pH, temperature, and salinity in the pond and receiving water. Additional monitoring at three stations in Artesian Slough and Coyote Creek is conducted whenever pond dissolved oxygen concentration falls below WDR specified thresholds specified. Thirteen years of pond discharge monitoring have demonstrated no negative impacts to receiving water.

In January 2016 pond flows were reversed: Bay water is drawn in from southern hydraulic structure and discharged out from the north. This change reduces 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 high chlorophyll values, likely due to elevated nitrate concentrations entering the pond. During warm seasons, bright green water is conspicuous in Pond A18, but results in no detectable adverse environmental effects.

The City is awaiting issuance of USACE, BCDC, and Water Board permits to repair the eroding southern structure and stabilize adjacent levee embankments. Staff monitors structure and levee movement using photos and lath and whisker indicators. Weather and tide information is compiled and included in monitoring reports. Condition assessments are conducted biweekly and immediately following storms delivering greater than .75 inch of precipitation.



Green water near northern structure: Phytos at work.

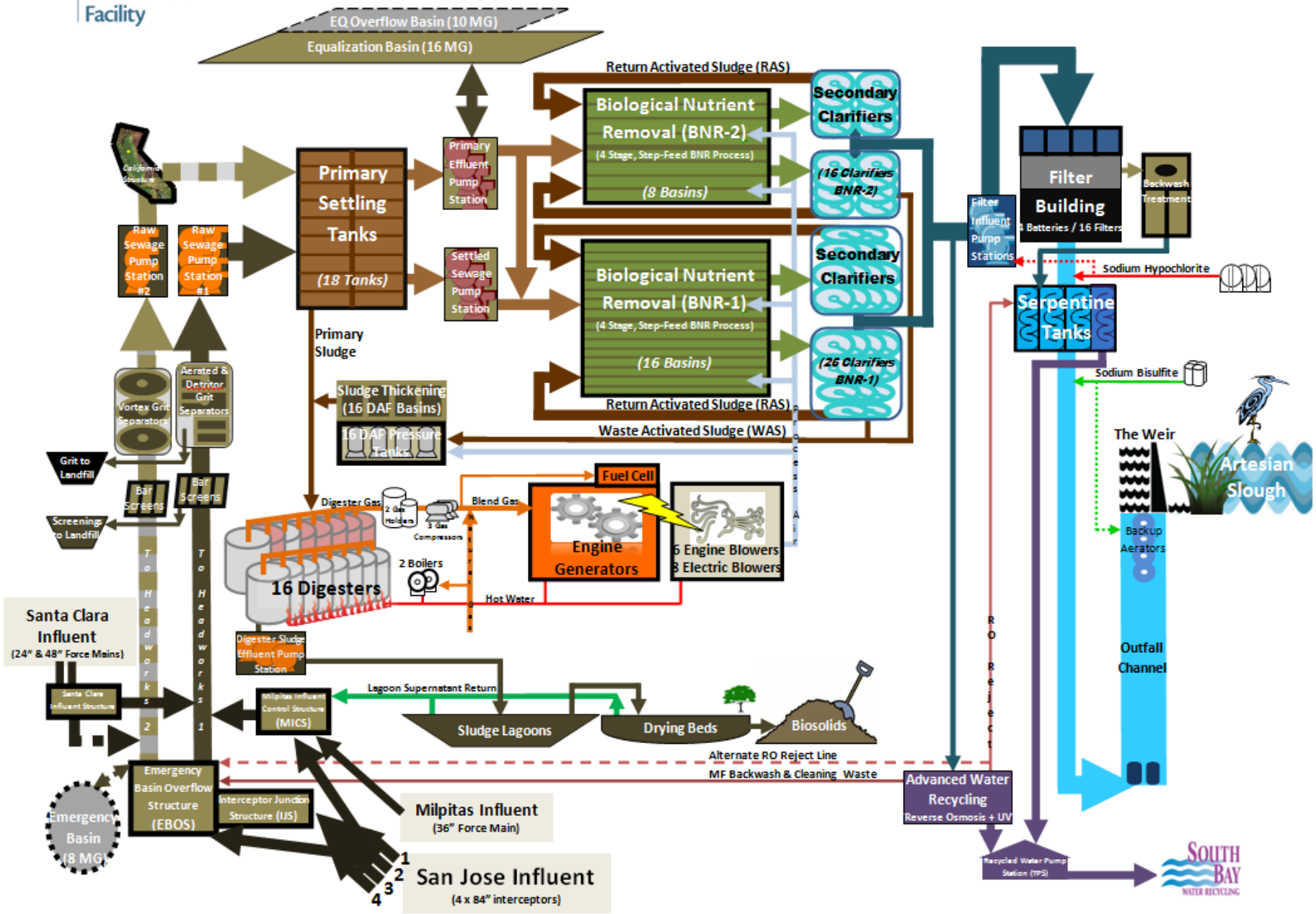
Bryan Frueh checks movement of southern structure.

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 Accreditation

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