City of Sunnyvale | Environmental Services Department



Water Pollution Control Plant

Plant Compliance

Annual NPDES Report
R2-2014-0035

Sunnyvale

2019

2019 ANNUAL NPDES REPORT

City of Sunnyvale

Prepared for:

Mr. Michael Montgomery

California Regional Water Quality Control Board

San Francisco Bay Region

1515 Clay Street, Suite #1400

Oakland, CA 94612

Prepared by:

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Environmental Services Department

Regulatory Programs Division

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January 31, 2020

Sunnyvale

January 31, 2020

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Mr. Michael Montgomery
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite #1400
Oakland, CA 94612

Attn: NPDES Division

Re: 2019 Annual Self-Monitoring Report, City of Sunnyvale Water Pollution Control Plant

The attached 2019 Annual Self-Monitoring Report is submitted in accordance with the requirements of Order No. R2-2014-0035 for the City of Sunnyvale Water Pollution Control Plant.

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have any questions, please contact me at (408) 730-7788.

Sincerely,

Steve Hogg
WPCP Division Manager

Attachment: 2019 Annual NPDES Report

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. INTRODUCTION

1.0. BACKGROUND

The 2019 Annual National Pollutant Discharge Elimination System (NPDES) Report for the City of Sunnyvale (City) Water Pollution Control Plant (WPCP) is prepared in accordance with NPDES Permit Number CA0037621, San Francisco Bay Regional Water Quality Control Board (RWQCB) Order R2-2014-0035. This report summarizes the discharge monitoring results from the January 1 to December 31, 2019 reporting period and has been divided into six chapters to address the requirements contained in Section V.C.1.f of Attachment G, as well as Provisions VI.C.2 (Effluent Characterization Study and Report) and VI.C.4.b (Sludge and Biosolids Management) of the Order.

San Francisco Bay Mercury and PCBs Watershed Permit

The City is also subject to Waste Discharge Requirements of the Mercury and PCB Watershed Permit No. CA0038849, made effective January 1, 2013, and revised on January 1, 2018 under Order No. R2-2017-0041. This permit's annual reporting requirements may be met either in the Annual NPDES Report or through participation in a group report submitted by the Bay Area Clean Water Agencies (BACWA). The City chose to meet these reporting requirements in the 2019 Annual NPDES Report with the reporting summarized in **Chapter II, Section 2.1.4** and **Section 2.1.5**.

San Francisco Bay Nutrients Watershed Permit

The City is also subject to Waste Discharge Requirements of the Nutrient Watershed Permit No. CA0038873, made effective July 1, 2014 and revised on July 1, 2019 under Order No. R2-2019-0017. The City provides its nutrient information in a separate annual report or states that it is participating in a group report submitted by BACWA by October 30 of each year. The City has elected to participate in the 2019 Group Annual Report that will be prepared and submitted by BACWA by February 1, 2020. Nutrient data are also reported electronically in the California Integrated Water Quality System (CIWQS) via monthly Self-Monitoring Reports (SMRs).

Alternate Monitoring Program Permit

The City is also subject to the Alternate Monitoring Program Order No. R2-2016-0008, which was made effective by the RWQCB on April 1, 2016. The permit establishes alternative monitoring requirements for municipal wastewater discharges subject to RWQCB Permit No. CA0038849. Participating wastewater treatment facilities can reduce their effluent monitoring costs for most organic priority pollutants and chronic toxicity species rescreening. In exchange for the reduced monitoring requirements, facilities make supplemental payments to the Regional Monitoring Program (RMP) for regional studies to inform management decisions about water quality in the San Francisco Bay.

2.0. FACILITY DESCRIPTION

The City owns and operates the Donald M. Sommers WPCP, located at 1444 Borregas Avenue, Sunnyvale, CA 94088 (**Figure 1**). The WPCP is one of 37 Publicly Owned Treatment Works (POTWs) that discharge to the San Francisco Bay. Located in the Lower South Bay subembayment, the WPCP is considered a shallow

Figure 1: WPCP Site Location Map

water discharger and is therefore subject to more stringent treatment standards as compared to its deep-water discharge cohorts (**Figure 2**).

Figure 2: POTWs located in the Bay Area

The WPCP was originally constructed in 1956. Over the years, the City has periodically increased treatment capacity as Sunnyvale's population has grown to 155,567 (2019) and has incorporated new technologies in wastewater treatment processes to improve effluent water quality. Residential, commercial, and industrial wastewater collected from the surrounding service areas, including Rancho Rinconada and Moffett Field, enters the WPCP via 295 miles of gravity sewer mains and interceptors. Wastewater is subsequently treated to tertiary standards before being discharged to Moffett Channel, tributary to South San Francisco Bay via Guadalupe Slough. The average dry weather flow design capacity of the WPCP is 29.5 million gallons per day (MGD), which also corresponds to the facility's permitted capacity. Peak wet weather design capacity of the WPCP is 40 MGD. Over the past 10 years, the highest recorded daily dry weather inflow was 16.5 MGD, which occurred on June 15, 2009, and the highest wet weather inflow was 28.4 MGD on December 11, 2014.

2.1. Wastewater Treatment Processes

The WPCP is comprised of four distinct process areas, which include 1) Preliminary and Primary Treatment Facilities; 2) Secondary Treatment Facilities; 3) Tertiary Treatment Facilities; 4) and Solids Processing Facilities. Wastewater entering the WPCP is treated using a combination of physical, biological, and chemical processes to remove pollutants according to the process flow diagram shown in **Figure 3**. More detailed Liquids and Solids Process Flow Diagrams are presented in **Attachment A**.

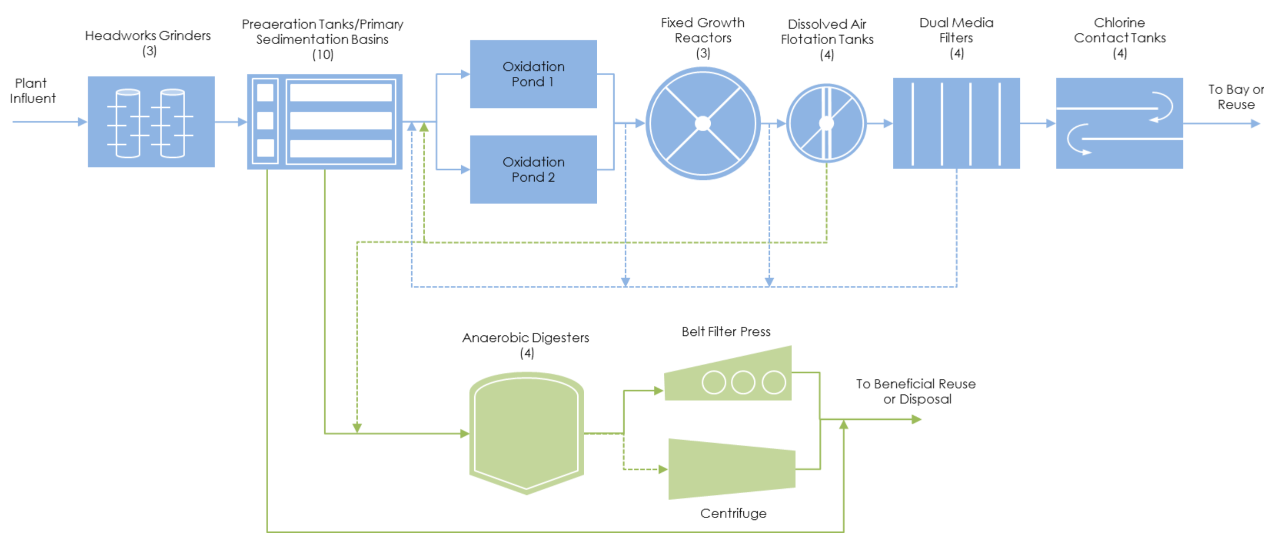


Figure 3: WPCP Process Flow Diagram. Blue corresponds to liquid and green to solids flows

Figure 4: Aerial photo of the various WPCP treatment processes and outfall

The City is in the process of implementing a 20-year Capital Improvement Program (CIP) known as the *Sunnyvale Cleanwater Program* (SCWP) that will repair or replace the majority of WPCP facilities to address rehabilitation and repair, as well as anticipated treatment needs. Individual CIP projects are referenced throughout the report and are described in more detail in **Chapter IV.**

2.1.1. Preliminary and Primary Treatment

The Preliminary and Primary Treatment Facilities were originally constructed in 1956 to provide influent screening/grinding, raw sewage pumping and metering, preaerated grit removal, and primary sedimentation. The facilities were expanded several times, most recently in 1984 with the construction of the tenth sedimentation basin, grit handling equipment, and the Auxiliary Pump Station (APS).

Figure 5: Preaeration Tanks and Primary Sedimentation Basins

Wastewater from the sanitary sewer collection system initially enters the Headworks 30 feet below grade where Channel Monsters® grind large debris prior to pumping the raw sewage into the Preaeration Tanks and subsequent Primary Sedimentation Basins (Error! Reference source not found.). Service air is injected into wastewater in the P reaeration Basins in order to discourage septic conditions and odors, and to remove grit (typically inorganic, heavy solids such as sand, gravel, coffee grounds, etc.) that could otherwise damage downstream pumping equipment and accumulate inside anaerobic digesters. Aerated wastewater then flows into the Primary Sedimentation Basins, where the velocity is slowed to allow suspended solids to either rise to the surface (floatable solids/scum) or settle to the bottom of the basins (settable solids/sludge). Floatable solids are skimmed off the surface water, while settled solids are removed from the bottom of the basins and pumped to anaerobic digesters for further treatment. Refer to **Section 2.1.4** for additional information on solids handling. The clarified wastewater (primary effluent) from each basin is collected by launders and conveyed into a pipeline that leads to the Oxidation Ponds where it undergoes secondary treatment. During dry weather conditions (May-October), only five of the ten Preaeration Tanks/Sedimentation Basins are operated on any given day.

If the Headworks is unable to handle the incoming wastewater flow due to mechanical failure or excessive flows, the APS is placed in service to convey wastewater from the collection system into the preaeration tanks and primary sedimentation basins. The APS consists of a vertical bar screen to remove large floatable and suspended debris and an electric motor-driven centrifugal submersible pump to convey the wastewater. Screenings are hand separated and disposed.

Construction of new Primary Treatment Facilities, including a new Headworks and influent pump station, is currently underway with a projected completion year of 2021 (**Chapter IV, Section 3.0**). This project will also address Title V air regulatory requirements associated with phasing-out three combustion engines that power the influent pumps in favor of electric motor-driven pumps. In 2018, the City completed work on an Emergency Flow Management Project that provides a 1 MW trailer-mounted backup diesel generator to replace the 80 kw natural gas generator, which was limited in application. The new generator can be used to power specific areas of the WPCP that experience power outages, including the Headworks and Primary Treatment Facility to ensure movement of wastewater into the Oxidation Ponds until power is restored (**Chapter III, Section 9.0**). As a part of the new primary package, a 2 MW diesel generator is being installed to power new and future facilities as part of the contingency plan in the event of a power loss.

2.1.2. Secondary Treatment

Primary effluent undergoes secondary (biological) treatment through the use of two Oxidation Ponds with a combined surface area of 440 acres (**Figure 6**). The Oxidation Ponds were constructed in their present form in 1968, and were originally designed to treat high BOD (biochemical oxygen demand) loadings during the summer canning season. BOD loadings were greatly reduced with the departure of the canneries in 1983, and the original surface aerators (2,500 hp of total surface aeration capacity) were replaced by seven smaller (15 hp) aerators located in the distribution and return channels to supplement aeration provided by microalgae and atmospheric diffusion.

Primary effluent discharged into the Oxidation Ponds is mixed by recirculating pond effluent back into the distribution channel, which in effect creates a single large pond. Ammonia and organic material are readily degraded by aerobic and anaerobic bacteria[1] through processes of nitrification and denitrification that happen simultaneously in the ponds. The average detention time of the Oxidation Ponds is 30-45 days and is dependent on flows, operating depth, and other factors.

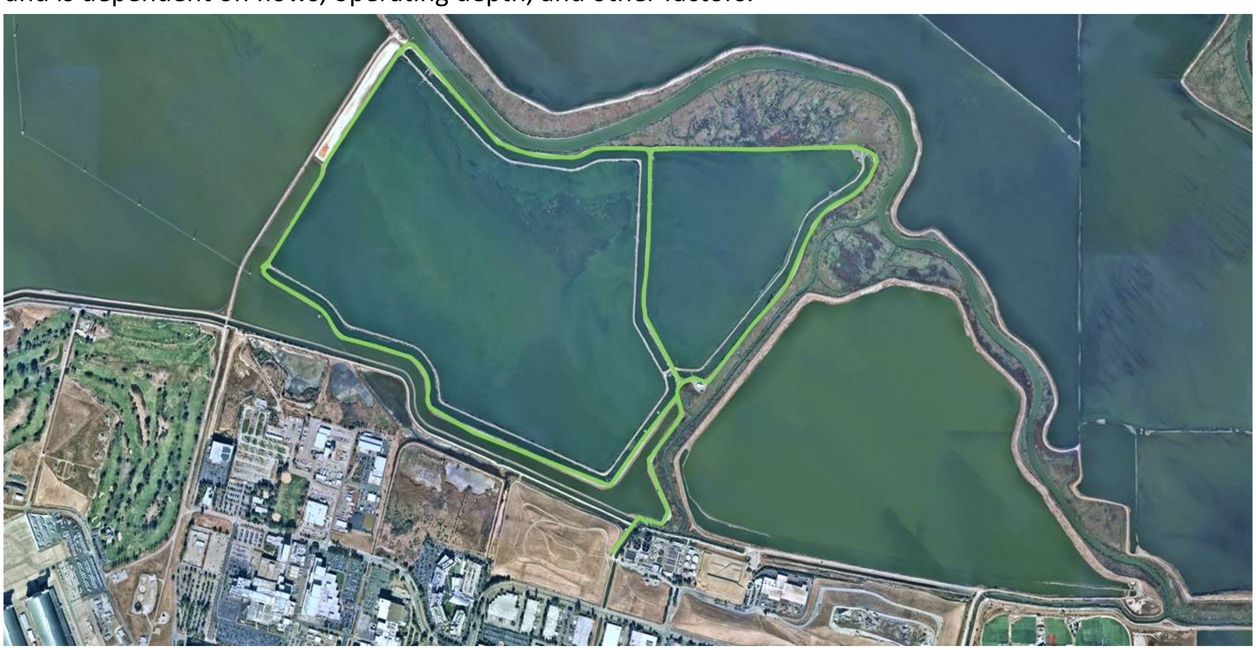


Figure 6: Aerial photo of the Oxidation Ponds (highlighted in green)

[1] Ammonia removal in the Oxidation Ponds is subject to seasonal variability, with the highest removal rates observed in the warmer summer months and the lowest in the colder winter months, BOD removal is less susceptible to the same seasonal fluctuations.

The City implements a pond dredging program that began in 2012 to remove solids that have accumulated in the Oxidation Ponds from Primary Effluent and various process return flows including flocculated solids and filter back wash, thereby recovering lost volume and improving overall treatment efficacy. Solids removed from this project are processed on-site before being hauled off-site as Class B biosolids. Refer to **Section 2.1.4** of this Chapter for more information on solids handling. The City is embarking on a long-term maintenance program to address erosion along the levees which delineate the Oxidation Ponds and are essential to their continued performance (**Chapter IV, Section 12.0**).

Figure 8: Fixed Growth Reactor distributing wastewater over plastic growth media

Following treatment in the Oxidation Ponds, effluent is then conveyed to Fixed Growth Reactors (FGRs), commonly known as trickling filters, which provide additional nitrification of residual ammonia. The FGRs are comprised of plastic cross-flow media (**Figure 8**) on which a film of microorganisms (biofilm) attach and readily convert ammonia (NH_3) in wastewater to nitrate (NO_3^-). During the colder winter months, the nitrification efficacy of the Oxidation Ponds is reduced (or stops altogether), and the FGRs provide the majority of nitrification needed to meet ammonia discharge limits (**Chapter II, Section 1.4**).

Figure 7: Algae being skimmed off the surface of wastewater in a Dissolved Air Flotation Tank

FGR effluent flows by gravity to the Dissolved Air Flotation Tanks (DAFTs), where compressed air and polymer are introduced to coagulate and flocculate biological solids (algae and bacteria) generated during treatment in the Oxidation Ponds and FGRs (**Figure 7**). Flocs rise to the water surface and are skimmed into troughs which return material to the Oxidation Ponds. The City completed improvements to the DAFTs in 2015 and 2017 which consisted of concrete repair and rehabilitation to extend their useful life by at least 10 years. Upgrades to the recycled water facility (**Section 2.2**) in 2017 converted one of the four DAFTs to be flexibly operated as a dedicated clarifier for continuous recycled water production or Bay discharge.

2.1.3. Tertiary Treatment

The Tertiary Treatment Facilities were originally constructed in 1978 and then expanded in 1984 to provide additional treatment of Oxidation Pond effluent. Additional improvements were also made in the 1990s to allow for the production of recycled water. As a final polishing step, clarified effluent from the DAFTs is conveyed to the Dual Media Filters (DMFs), which provide additional removal of remaining algae and particulate matter via gravity filtration through anthracite (top, coarse layer) and sand (bottom, fine layer) (**Figure 9**). The filters are routinely backwashed to remove accumulated solids, with the backwash water being returned to the Oxidation Ponds. Repairs were made in 2013 and 2016, which consisted of replacement of filter media and nozzles, repair of the underdrain system, and corrosion protection to extend the useful life of the DMFs.

Figure 9: Dual Media Filters treating wastewater

Effluent from the DMFs is disinfected with liquid sodium hypochlorite (formerly, chlorine gas) for at least one hour in a series of Chlorine Contact Tanks (CCTs) prior to dechlorination with sodium bisulfite, and discharged to Moffett Channel, tributary to the San Francisco Bay via Guadalupe Slough (**Figure 10**). A portion of the filtered wastewater undergoes additional treatment in dedicated CCTs to meet the requirements for disinfected tertiary recycled water as specified in Title 22 of the California Code of Regulations Section 2.4. Furthermore, a portion of the disinfected wastewater is partially dechlorinated and redistributed throughout the WPCP as process water for filter backwashing, engine cooling, and other internal purposes.

In 2018, the City completed a project to improve its disinfection and recycled water production facilities (**Chapter IV, Section 8.0**), which includes replacement of gaseous chlorine with liquid sodium hypochlorite as well as other mechanical, electrical, and instrumentation and control improvements (**Chapter IV, Section 6.0**). The City also added a second sodium bisulfite dosing location to provide additional flexibility and reliability to meet final effluent residual chlorine discharge limits (**Chapter IV, Section 7.0**).

Figure 10: Wastewater being disinfected in the Chlorine Contact Tanks prior to discharge into Moffett Channel

2.1.4. *Solids Processing*

Solids Processing	
Disposal Type	Tonnage (Dry Tons)
Land Application	1,505
Compost	---
Monofill	---
Landfill	295
Annual Total	1,800

Solids removed during primary treatment are fed into primary anaerobic digesters and detained for approximately 35 to 40 days at a temperature of 96 to 103 °F. Primary digestion is typically followed by additional treatment in a secondary digester for 12 to 15 days. Within the digesters, anaerobic bacteria breakdown organic matter and produce Biogas, a mixture of methane, carbon dioxide, and hydrogen sulfide gases in addition to stabilized nutrient rich biosolids and water.

A portion of the biogas produced in the anaerobic digesters powers the three main influent engines. Each engine drives a dedicated centrifugal pump that lifts wastewater into the Headworks from the sanitary sewer collection system in addition to driving blowers that aerate the Preaeration Tanks. Exhaust heat recovered from the main influent engines and jacket water from the PGF engines is captured and used to maintain a near constant temperature in the digesters. The remainder of the biogas is blended with landfill gas (LFG) from the adjacent closed landfill and air-blended natural gas. This gas mixture is utilized by two engine generators that comprise the Power Generation Facility (PGF). On average, the PGF produces 1.2 megawatts (MW) of power, which provides the majority of power used by the WPCP and offsets its purchases from PG&E and Silicon Valley Clean Energy.

Historically, biosolids were conditioned with polymer and dewatered on gravity drainage tiles to 15-20% solids and then solar dried to approximately 25-30% solids prior to disposal. In contrast, biosolids generated from the Oxidation Ponds[2] were later mechanically dewatered to a similar consistency by a contractor (Synagro, Inc.) using a centrifuge in the same general area as the dewatering tiles. In 2016, the WPCP moved its solids handling location and changed the operation to accommodate construction of the new Primary Treatment Facilities (**Chapter IV, Section 10.0**), which are being placed in the same area as the former drainage tiles. Currently, all biosolids are mechanically dewatered by Synagro using either a belt filter press or centrifuge. Filtrate and centrate are returned to the Oxidation Ponds for additional treatment. A solids process flow diagram is included in **Attachment A**.

Biosolids produced at the WPCP undergo a series of analytical tests prior to being hauled off-site to ensure they are in compliance with regulations set forth in 40 CFR Part 503. Biosolids are typically disposed of through a combination of land application, which includes agricultural application and compost, and surface disposal in a landfill. The location of the disposal site varies depending on availability and the composition of the solids. In a typical year, the majority of biosolids produced at the WPCP are land applied to agricultural

[2] The Oxidation Ponds essentially act as a low-temperature anaerobic digester to degrade and stabilize organic solids remaining in the primary effluent wastewater.

fields, with a much smaller portion being sent to surface disposal or for further treatment off-site in order to meet Class A requirements for resale as compost. The City also has the option of disposing of biosolids in the Sunnyvale Biosolids Monofill (SBM). Historically, the SBM has been used for surface disposal of biosolids produced when an anaerobic digester is cleaned-out though it also has other approved uses. The frequency at which a digester is cleaned-out can vary depending on the feed rate and composition of the raw sludge, but on average occurs every 3 to 4 years.

During the 2019 reporting period, the WPCP produced 1,800 dry tons of biosolids. Of the total, 1,294 dry tons were dredged from the Oxidation Ponds and 506 dry tons were removed from the anaerobic digesters. The vast majority of the biosolids produced (1,505 dry tons) were land applied in Sacramento county. The remaining 295 dry tons were sent to landfills in Merced and Solano counties for disposal or use as alternative cover. For additional information on biosolids management at the WPCP, refer to the *Biosolids Management Annual Report* for 2019, scheduled for submittal by February 19, 2020, per Provision VI.C.4.b of Order No. R2-2014-0035.

2.2. Recycled Water Production

The WPCP historically operated in two different treatment modes: 1) San Francisco Bay discharge, or 2) recycled water production. In late 2017, the WPCP completed an improvement project that allows for the simultaneous production and distribution of recycled water and discharge to San Francisco Bay (**Chapter IV, Section 8.0**), alongside improvements to its chlorination (**Chapter IV, Section 6.0**) and dechlorination (**Chapter IV, Section 7.0**) systems. Under the new configuration, a portion of the FGR effluent is sent to a dedicated DAFT, a pair of DMFs, and CCTs for further treatment in order to meet the requirements for disinfected tertiary recycled water as specified in CCR Title 22 and in accordance with the water reclamation requirements in Regional Water Board Order No. 94-069. The polymer dose, chlorine dose, and chlorine contact time are adjusted accordingly to meet the more stringent requirements. As a final production step, recycled water is partially dechlorinated with sodium bisulfite prior to entering the distribution system. Refer to the process flow diagram in **Attachment A** for more detail.

Recycled Water

Flow Type	Volume (MG)
Recycled Water Produced *WPCP*	105
Potable Water Added *WPCP*	18
Potable Water Added *San Lucar Facility*	183
Total Delivered	***306***

Recycled water is distributed in “purple pipes” throughout the service area for irrigation of private and public landscapes, parks, and golf courses for use in decorative ponds and for other approved uses. Typically around 8% of the daily wastewater flow is been diverted for recycled water. In addition, disinfected secondary recycled water (No. 3 Water) is partially dechlorinated and reused internally for filter backwashing, engine cooling, and other purposes. Use of No. 3 Water is relatively constant throughout the year with an average annual use around 250-300 MG.

During the 2019 reporting period, the WPCP produced a total of 105 MG of recycled water and delivered 306 MG to the recycled water system. The difference represents potable water additions made at the WPCP or the off-site San Lucar Facility to satisfy total system demand (**Figure 11**). In 2019, recycled water production was lower than previous years due to operation and maintenance constraints. For additional information on recycled water production at the WPCP, refer to the *Recycled Water Annual Report* for 2019, scheduled for submittal to the RWQCB by March 15, 2020, as well as submittal on Geotracker by April 30, 2020 per the requirement of Section IX.D. of Attachment E.

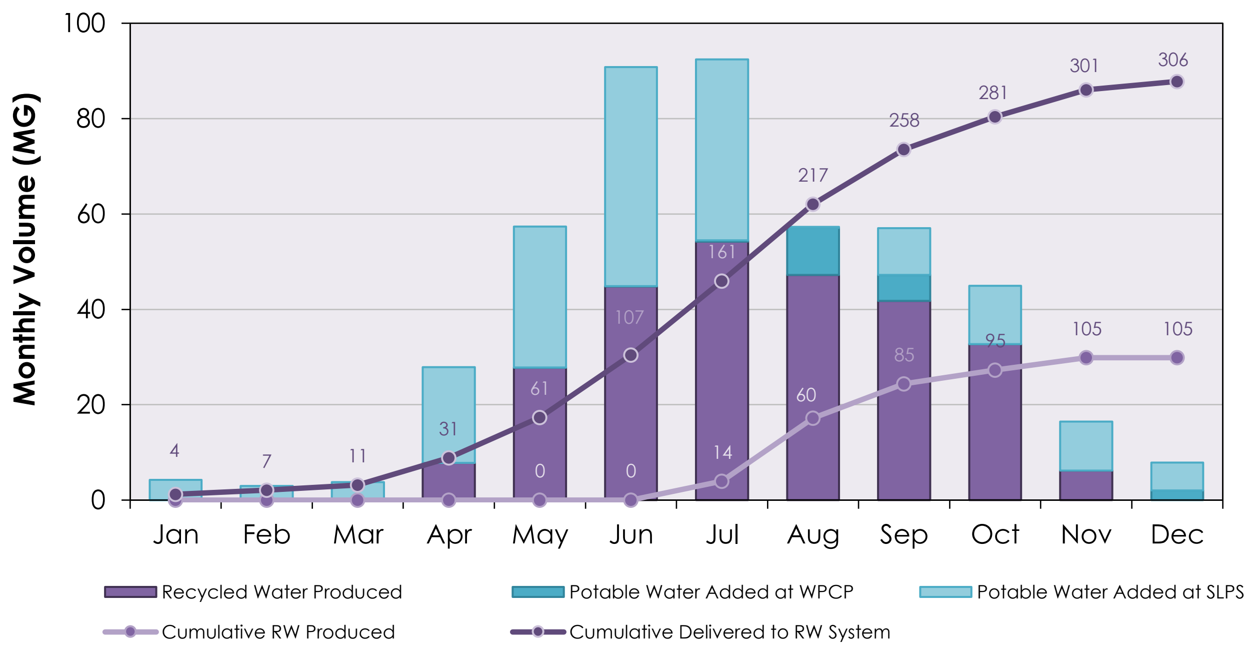


Figure 11: Recycled Water Production and Distribution in 2019. The difference between production and delivered represents potable water added at either the WCP or the San Lucar Facility

2.3. WPCP Laboratory

The WPCP operates an on-site laboratory that analyzes samples for monitoring treatment process and permit compliance, industrial pretreatment samples collected from industrial facilities that discharge to the sanitary sewer system, and City drinking water samples to monitor for compliance with drinking water regulatory standards. A list of the Laboratory's approved analyses and the current environmental certification is included in **Attachment B**.

The laboratory utilizes a Laboratory Information Management System (LIMS), implemented in January 2017, to effectively manage data from different analysis/instruments and generate lab reports. LIMS has greatly improved data entry efficiency and integrity through its automation features. As part of the WPCP rebuild effort, design of the Cleanwater Center continues, which includes new Administration, Laboratory, and Maintenance facilities within one building. Construction on the Cleanwater Center is expected to begin in 2022 and be completed in 2024 (**Chapter IV, Section 4.0**).

2.4. Stormwater Management

All stormwater collected from within the WPCP, as well as from storm inlets on Carl Road just outside WPCP boundaries and the Sunnyvale biosolids monofill, is directed to the Headworks. Therefore, coverage under the statewide permit for discharges of stormwater associated with industrial activities (NPDES General Permit No. CAS000001) is not required.

2.5. Facility Condition Assessment and Ongoing Plant Rehabilitation

Due to the overall age of facilities at the WPCP, critical elements of the existing treatment processes need to be rehabilitated or replaced to maintain permit compliance and keep them operational until they are fully replaced with the final build-out (2035±). In 2019, the WPCP continued progress on the Facilities Rehabilitation project following the findings and recommendations from the Condition Assessment performed in 2017. Refer to **Chapter IV, Section 2.0** for additional information on the project.

II. Plant Performance and Compliance

1.0. PLANT PERFORMANCE

The WPCP continues to maintain a high level of performance as discussed herein. Permit Compliance is discussed in **Section 2.0** of this Chapter.

1.1. WPCP Wastewater Flows

The WPCP is designed and permitted for a daily average dry weather effluent flow of 29.5 MGD, and has a peak wet weather flow design capacity of 40.0 MGD. Average daily influent and effluent flow rates are shown in **Figure 12A**. The annual average influent and effluent flow rates for this reporting period were 13.5 and 11.4 MGD, respectively (**Figure 12B**). Annual average dry weather flows (May 1-Sept 30) were approximately 12.8 MGD for influent and 9.1 MGD for effluent. Annual average wet weather flows (Oct 1-Apr 30) were approximately 14.0 MGD for influent and 13.2 MGD for effluent.

WPCP Flow Rates

Flow Type (MGD)	Influent	Effluent
Average Daily	13.5	11.4
Average Dry Weather	12.8	9.1
Average Wet Weather	14.0	13.2
Peak-Hourly Max	34.0	---
Instantaneous Max	34.9	---
Total Treated (MG)	4,929	---

Overall, the WPCP treated 4,929 MG of influent wastewater during this reporting period at an average rate of 13.5 MGD. A maximum daily average flow rate of 24.6 MGD occurred on February 14, 2019. While significantly higher than in 2018, the peak flow is consistent with historical wet season data. The WPCP experienced an influent peak hourly flow rate of 34.0 MGD and an instantaneous flow rate of 34.9 MGD.

Daily influent flow rates reveal a slight increase from the previous two years (2017-2018), which is mainly attributed to a high amount of precipitation, a reduction in drought restrictions, and an increase in population. In **Figure 12B,** the daily flows and precipitation are captured on an annual average basis. As shown, annual average influent flows show an increase in 2019 when compared to data from the previous five years suggesting that influent flows are rebounding post-drought restrictions. The City experienced a significant growth in population over the last year (1.0%) continuing a trend of 1% or more growth in each of the last four years (**Figure 12C**). Potable water use remained consistent during the 2019 reporting period (**Figure 13**) as compared with 2017 and 2018. The influent flow rates observed during the 2014 through 2016 reporting periods were some of the lowest on record, despite an approximate 1.6% population increase and a large daily net workforce influx of approximately 20,000 (15%) non-resident workers during

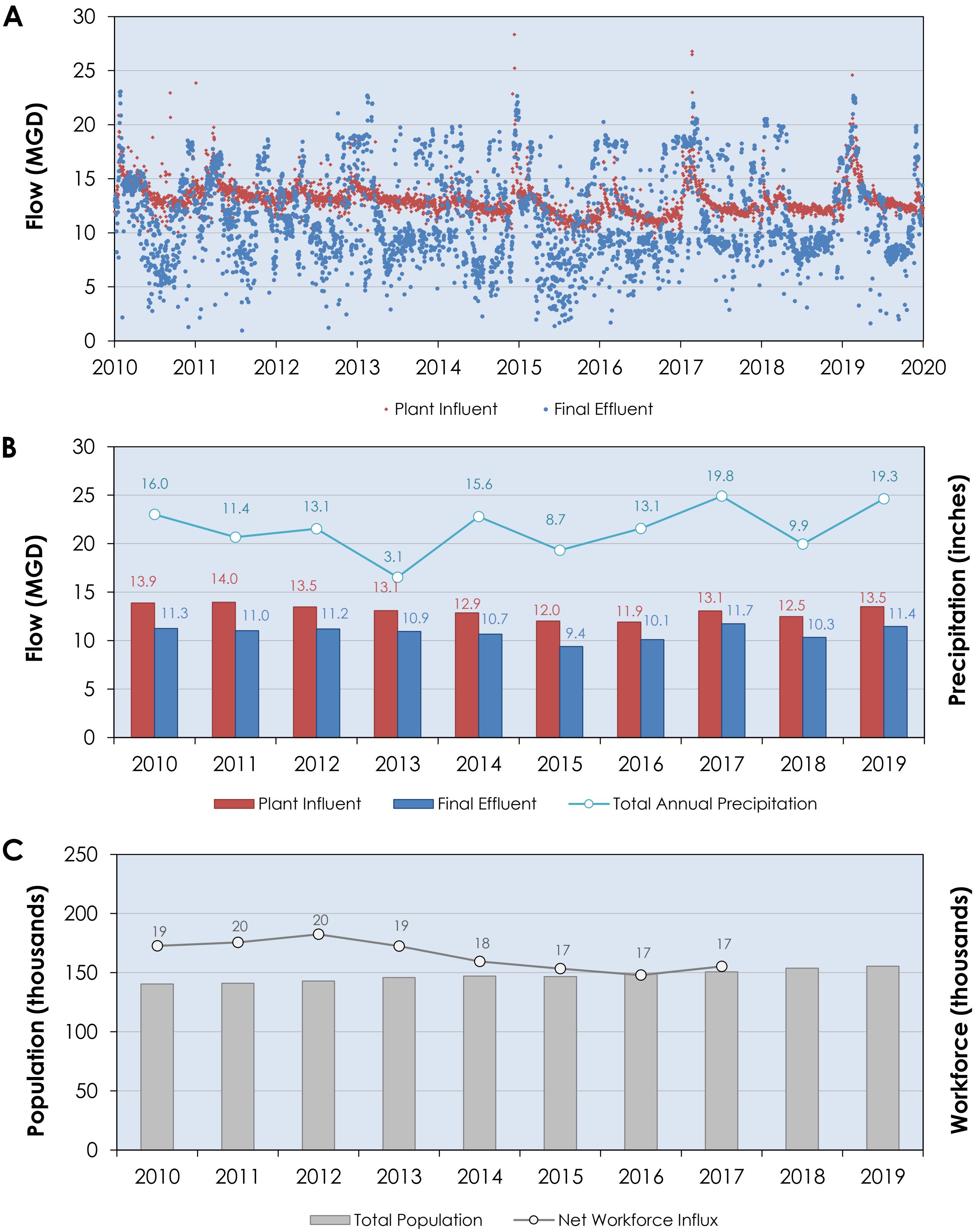


Figure 12: WPCP Wastewater Flow Rate Trends from 2010-2019. A) Daily and B) Annual Average Influent and Effluent Wastewater Flows through the WPCP from 2010-2019. C) Total Population and Net Workforce Influx (thousands) in Sunnyvale from 2010-2019 (net workforce influx data not yet available for 2018-2019)

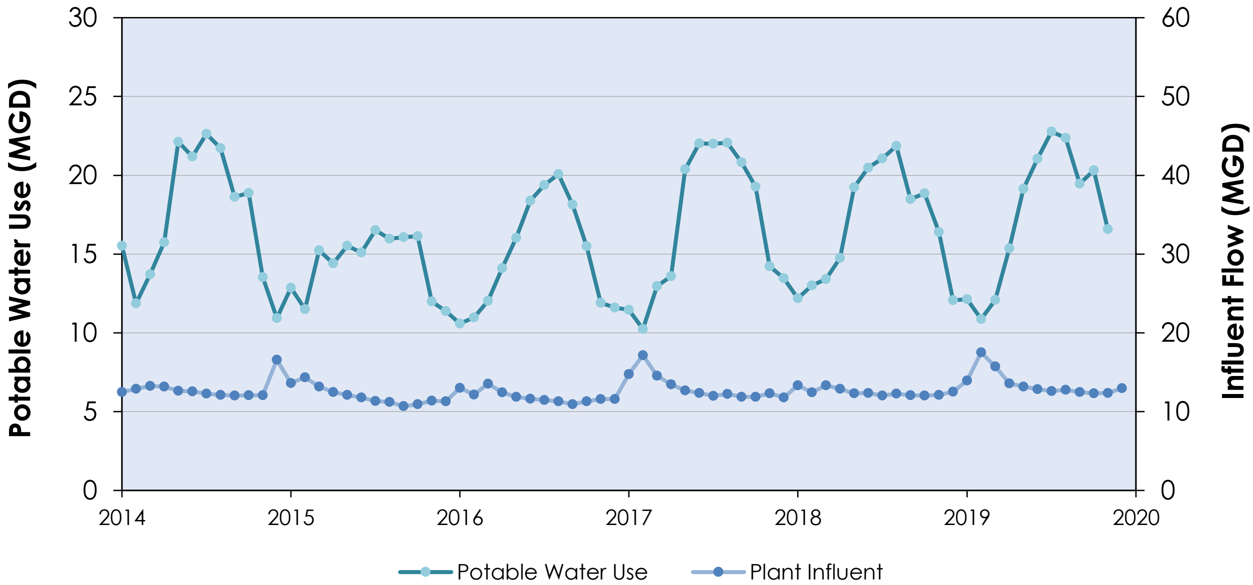


Figure 13: Monthly Average Citywide Potable Water Use and WPCP Influent Flows from 2014-2019

those respective reporting periods (**Figure 12C**)[3]. The significant decrease in flow during that time was the result of reductions in water use in response to the drought and State mandated restrictions.[4] By the end of 2018, the City had achieved a total annual reduction of 15%, as compared with 2013, which met the minimum reduction goal of 15% set by the Stage 1 Water Reduction Target.

Daily effluent flow rates mimicked the seasonal pattern observed over the ten-year period presented in **Figure 12A** and ranged from 2.0 to 22.7 MGD in 2019. The large variation and difference between influent and effluent flow rates is primarily attributed to the storage capacity of, and evaporation (estimated at 1-2 MGD on average) from, the Oxidation Ponds, as well as recycled water production.[5] Historically, effluent flows have been highly variable throughout the year as compared with influent flows due in large part to the production of recycled water, a process which had been discontinuous with SF Bay discharge. Following the completion of the Continuous Recycled Water Production Facility project and the resumption of recycled water production in April 2018 as described in **Section 2.2** of the previous Chapter,

[3] Calculated as an annual average from U.S. Census Bureau data available from 2002-2017 (https://onthemap.ces.census.gov/). Daily workforce influx data unavailable for 2018-2019 and assumed to be at least the same as previous years.

[4] On April 1, 2015, Governor Brown signed an executive order imposing additional drought restrictions and directed the State Water Board to impose restrictions to achieve a statewide 25% reduction in potable urban water usage through February 28, 2016, and later extended through October 2016, as compared with 2013 levels. In response to this executive order, on May 12, 2015, the Sunnyvale City Council adopted a resolution declaring a 30% water reduction target through June 30, 2016, and instituted measures in pursuit of that goal (City of Sunnyvale - Drought and Water Conservation). On June 30, 2016, the City Council set a Stage 1 Water Reduction Target of 15% through June 30, 2017. The 15% target was not renewed as of June 30, 2017.

[5] Effluent flow rates below approximately 8 MGD correspond to the WPCP's Flow Management Strategy and tertiary shutdowns. Daily effluent flow rates can reach 0 MGD (zero discharge) during extended shutdowns, in which case the influent flow is held in the Oxidation Ponds until the tertiary process is restored. The storage capacity of the Oxidation Ponds is estimated at >550 MG and their use for temporary storage can have a large impact on the difference between daily influent and effluent flow rates. Zero discharge days are used to calculate average effluent flow rates but have been omitted from reporting the range of effluent flows.

effluent flow rates were more consistent. The resultant 105 MG of recycled water produced during the 2019 reporting period is less than a typical production year due to operation and maintenance constraints.

Annual average effluent flow rates shown in **Figure 12B** have remained relatively consistent across the same time period with the exception of 2015 and 2016, which showed marked decreases from previous years. This is primarily attributed to an increase in recycled water production as well as a decrease in influent flows during those reporting periods in response to drought conditions. In comparison, 2017 and 2019 annual average effluent flows were higher due to a lack of recycled water production coupled with higher influent flow rates and precipitation.

Average monthly flow rates during this reporting period are shown in **Figure 14**. A comparison between influent and effluent monthly average flow rates reveals the seasonal effects of recycled water production and evaporation from the Oxidation Ponds. During summer months (May-August), when recycled water

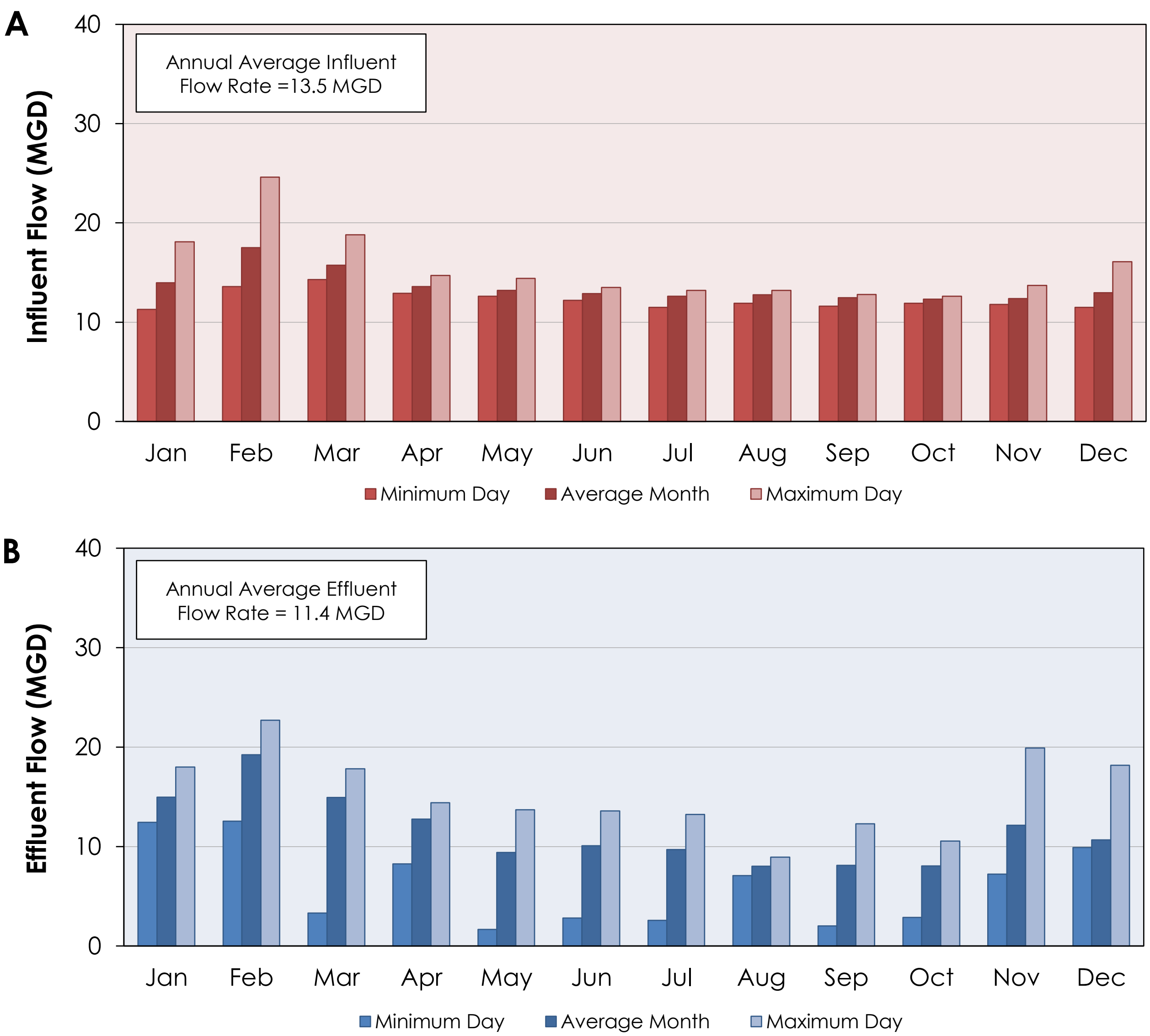


Figure 14: Monthly and Annual Average A) Influent and B) Effluent Wastewater Flow Rates through the WPCP during 2019

production and evaporation rates are highest, influent monthly average flow rates are significantly higher than the corresponding effluent flow rate. The opposite is true during the fall and winter months (September-January), where recycled water production and evaporation rates are generally at their lowest and precipitation rates are at their highest. Exceptional precipitation during late-2018 and early-2019 caused an increase of influent flow rates (**Figure 14A**) and contributed to the rise in volume of rain water in the Oxidation Ponds. The excess volume stored in the Oxidation Ponds is discharged at higher rates over a longer period of time to maintain an appropriate operating level consistent with the WPCP's Flow Management Strategy described below. This strategy coupled with the absence of recycled water production in the early shoulder months (January-April) resulted in the higher final effluent depicted in **Figure 14B**.

The Oxidation Ponds have an available storage capacity of 50 to 100 MG, depending on the pond depth. This storage capacity forms the cornerstone of the WPCP's Flow Management Strategy, which allows Operations staff to maintain water elevation for optimal treatment and required storage; operate the Tertiary Treatment Facilities at a constant flow rate (flow equalization); and maintain flexibility to repair and rehabilitate aging Tertiary Treatment Facilities.

1.2. Carbonaceous Biochemical Oxygen Demand

Carbonaceous biochemical oxygen demand (CBOD) measures organic content in wastewater and is used by the RWQCB as one of the parameters for evaluating and regulating WPCP performance.

CBOD

Type	Limit	Performance
% Removal:	85%	98%
Daily (MDEL):	20 mg/L	2.4 – 9.8 mg/L
Monthly (AMEL):	10 mg/L	3.7 – 7.0 mg/L

Figure 15 summarizes CBOD concentration data and removal performance from 2015 to 2019. Influent and effluent CBOD samples are collected as flow-weighted composites over a 24-hour period. During the 2019 reporting period, influent CBOD concentrations more closely mirror 2017 concentrations compared to 2018 with an annual average concentration around 232 mg/L.

As shown in **Figure 15A** and **Figure 15B**, effluent daily composite and average monthly effluent CBOD concentrations remained below their respective permit limits during the reporting period. The percent removal of CBOD, as measured by the difference in influent and effluent concentrations, remained well above the minimum removal rate of 85% with an average of 98% (**Figure 15C**). Effluent concentrations demonstrated a general trend of lower removal during the colder months and higher removal during the warmer months. Metabolic activity in the secondary treatment processes declines during the colder months, resulting in higher CBOD concentrations as compared with the summer months.

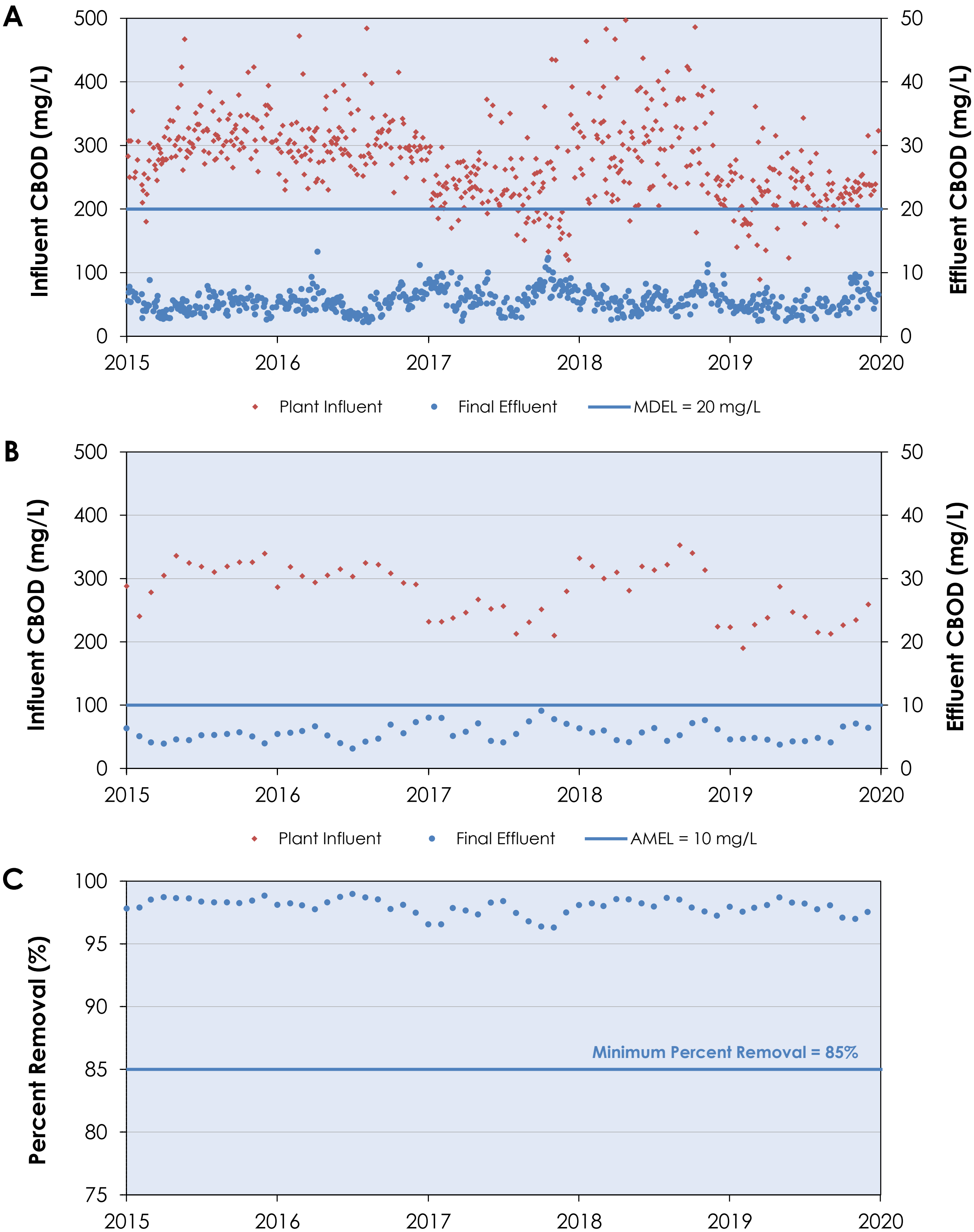
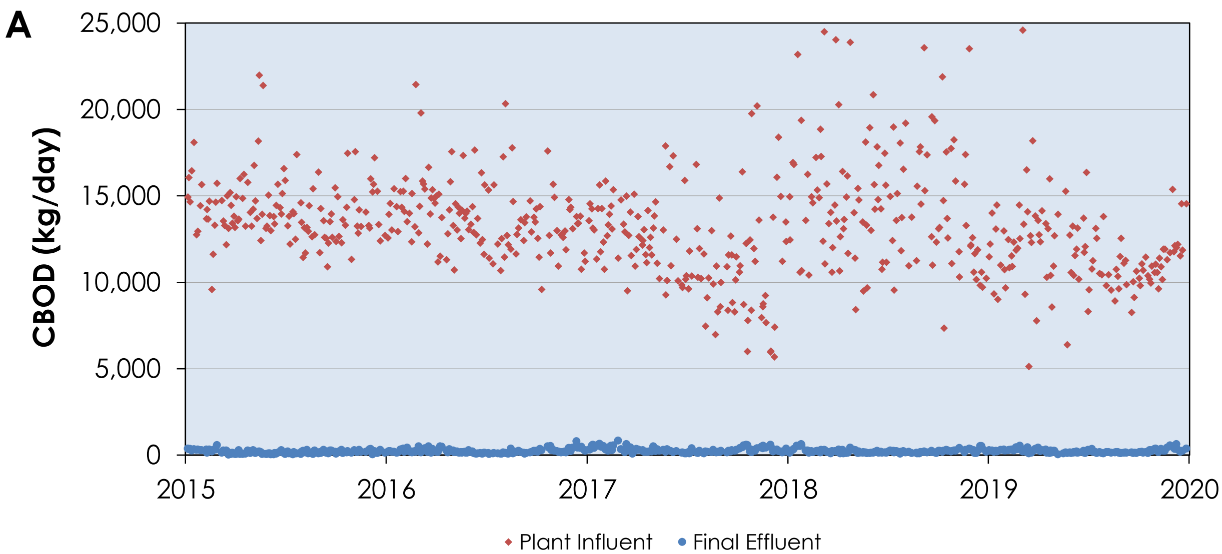


Figure 15: CBOD Trends through the WPCP from 2015-2019. A) Daily and B) Average Monthly Influent and Effluent CBOD (mg/L) through the WPCP from 2015-2019. C) Average Monthly Effluent Percent Removal of CBOD from 2015-2019

Influent CBOD data show significant variability throughout 2018. In mid-2019 it was identified that rag accumulation on the composite sampler intake line was a contributing factor to CBOD data variability and the influent sampling point was modified. Data variability subsequently reduced and remained more consistent for the remainder of the 2019 reporting period. Effluent data collected during the 2019 reporting period indicate a high level of performance at the WPCP both prior to and after the influent sampling point adjustment.

Figure 16 summarizes daily and annual influent and effluent CBOD loading rates as measured in kilograms per day (kg/day) and kilograms per year (kg/yr) from 2015 to 2019. Influent CBOD loading rates have returned to a trend more related to those seen prior to 2018. This is also reflected in the influent CBOD concentration data trend shown in **Figure 15**. Effluent CBOD loading rates decreased slightly as compared with 2018, but within a similar range seen over the past five years.



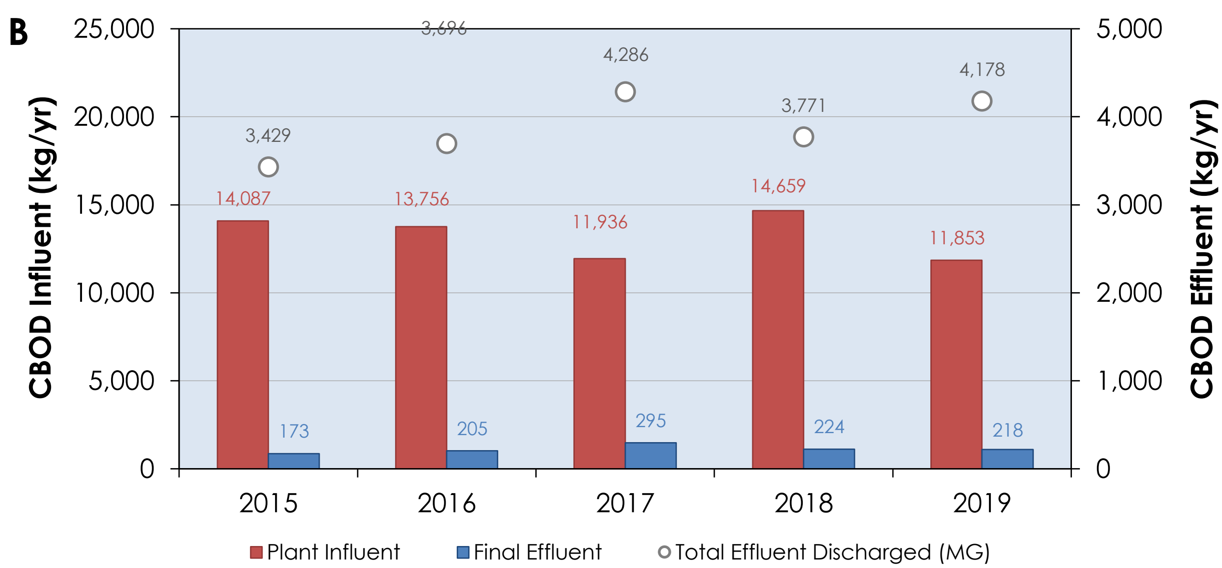


Figure 16: Average A) Daily and B) Annual CBOD Loading Rates and Total Effluent Discharged from 2015-2019

1.3. Total Suspended Solids

TSS		
Type	Limit	Performance
% Removal:	85%	96%
Daily (MDEL):	30 mg/L	4.5 – 20.7 mg/L
Monthly (AMEL):	20 mg/L	6.6 – 13.9mg/L

Total suspended solids (TSS) is a measure of the suspended solids content of wastewater that will not pass through a standard laboratory glass fiber filter. Similar to CBOD, TSS is used by the RWQCB for evaluating and regulating the WPCP's performance.

Figure 17 summarizes TSS concentration data and removal performance from 2015 to 2019. Monthly average Influent TSS showed a steady decline from around 339 mg/L in February to around 261 mg/L in June, which is a typical pattern observed in most years as it coincides with some of the heaviest rainfall experienced by the region that can contribute to scouring of accumulated sediment within the collection system. The spike gradually subsides as the rainy season gives way to the drier summer months and flows decrease. Occasionally, a second spike will appear toward the end of the summer months (August-September). This can be attributed to enhanced water conservation efforts coupled with a steady increase in population (**Figure 12C**). Influent TSS data generally showed a lower degree of variability this reporting period compared to 2018. The modification of the influent sampler intake line to reduce inorganic debris accumulation likely contributed to the reduction in TSS variability in 2019.

As shown in **Figure 17A** and **Figure 17B**, effluent daily and average monthly TSS concentrations remained below their respective permit limits. The percent removal of TSS, as measured by the difference in influent and effluent concentrations, remained well above the minimum removal rate of 85%, with an average of 96% over the reporting period (**Figure 17C**), indicating a high level of performance. Effluent TSS concentration data from 2015 to 2019 show a relatively consistent seasonal trend with higher concentrations measured in the colder months as compared with the warmer months. The dominant species of algae within the Oxidation Ponds typically undergoes a seasonal shift between summer and winter. In the summer months, colonial algal species (i.e. Scenedesmus) dominate and are readily removed by the DAFTs and DMFs; whereas, single cell algal species (i.e. Chlorella) dominate during the winter months and are more challenging to remove. Operations staff typically respond by adjusting polymer and chlorine dosing in the DAFTs and CCTs to provide a strong buffer around daily and monthly permit limits. This is especially true during the production of recycled water since the CCR Title 22 turbidity limits are more stringent than those specified in the NPDES permit. Operations staff also perform more frequent backwashing of the DMFs to ensure filter efficiency during the summer.

Figure 18 summarizes daily and annual influent and effluent TSS loading rates as measured in kilograms per day (kg/day) and kilograms per year (kg/yr) from 2015 to 2019. Influent loading rates showed an overall downward trend, mirroring the influent TSS concentration data trend shown in **Figure 17.** In contrast, effluent loading rates showed a slight increase compared to previous years. A combination of increased flow rates and a decrease in recycled water production likely contributed to higher effluent loading rates in 2019.

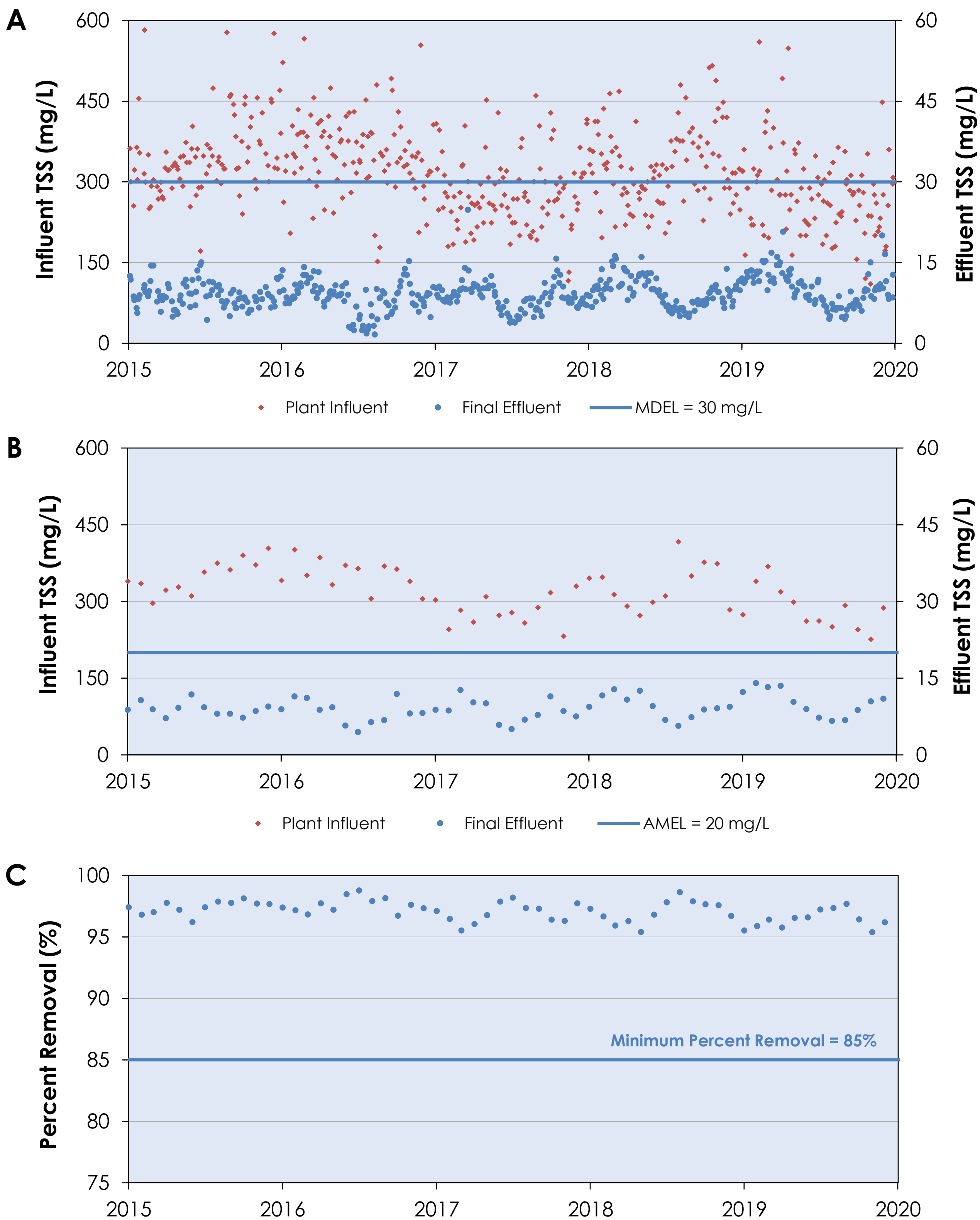


Figure 17: TSS Trends through the WPCP from 2015-2019. A) Daily and B) Average Monthly Influent and Effluent TSS (mg/L) through the WPCP from 2015-2019. C) Average Monthly Effluent Percent Removal of TSS from 2015-2019

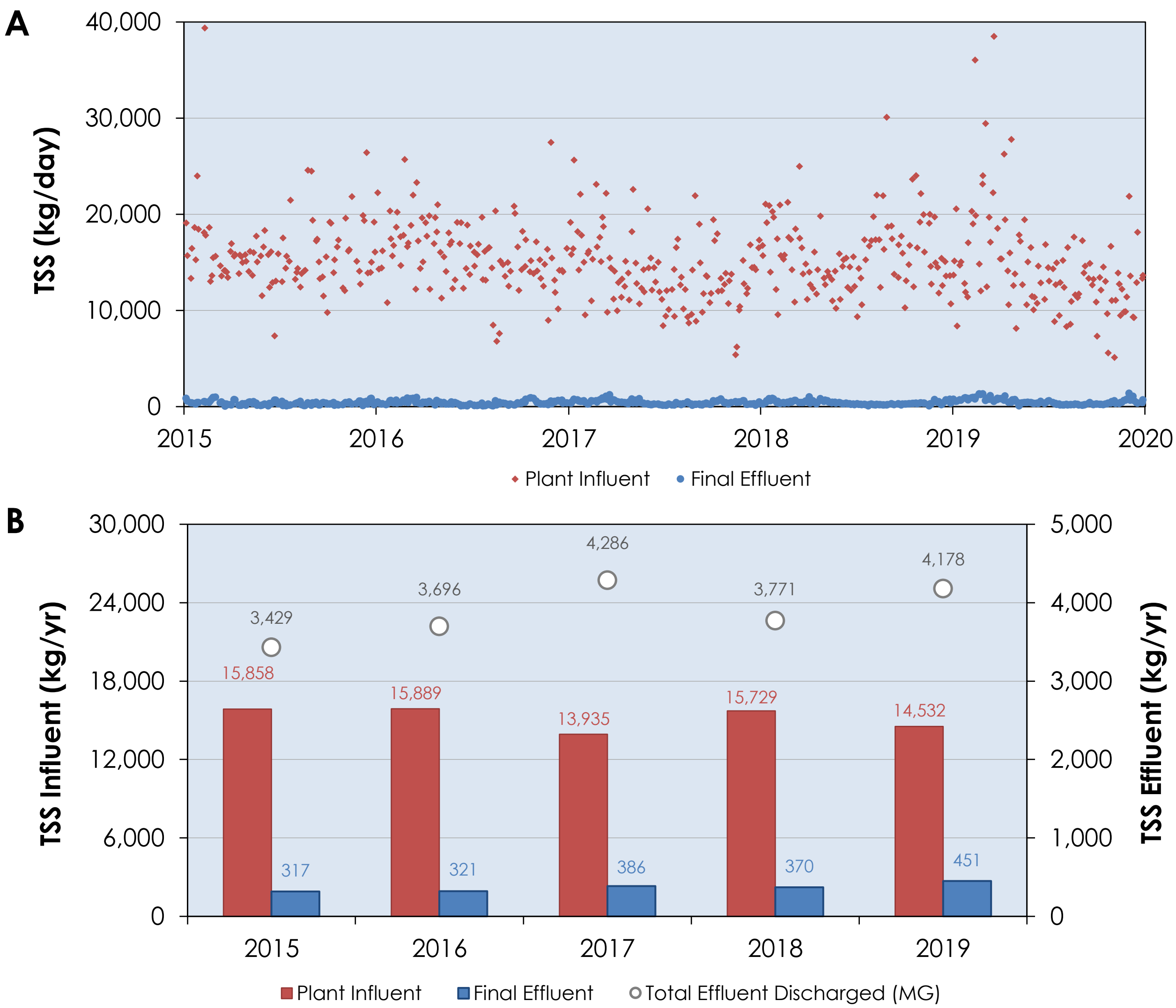


Figure 18: Average A) Daily and B) Annual TSS Loading Rates and Total Effluent Discharged from 2015-2019

1.4. Total Ammonia

Ammonia removal occurs in both the Oxidation Ponds and the FGRs. In the Oxidation Ponds, ammonia removal is achieved through biological nitrification as well as uptake by algae and as a result it is highly susceptible to seasonal fluctuations. Lower removal rates occur during the fall/winter (October-May) when ambient temperatures are low and daytime is shorter; whereas, higher removal rates occur during the summer (June-September)

Ammonia

Type	Limit	Performance
Daily (MDEL):	26 mg/L (Oct-May) 5 mg/L (Jun-Sept)	0.07 – 17.3 mg/L 0.07 – 3.43 mg/L
Monthly (AMEL):	18 mg/L (Oct-May) 2 mg/L (Jun-Sept)	0.2 – 10.4 mg/L 0.1 – 0.7 mg/L

when ambient temperatures are high and daytime is longer. Consequently, nitrification in the FGRs is the primary process of ammonia removal between October and May as they show less influence from ambient weather conditions. A small additional increment of ammonia removal occurs in the filters, so concentrations in the final effluent are slightly lower that in the FGR effluent. The WPCP's NPDES permit includes seasonal performance limits for ammonia that reflect the variability in the performance of the two processes.

1.4.1. Data Review

Figure 19 summarizes ammonia concentration data and removal performance trends. **Figure 19A** depicts removal performance of the Oxidation Ponds and FGRs during the 2019 reporting period. Seasonal removal trends are clearly visible, with the Oxidation Ponds demonstrating ammonia removal from March to October, and the FGRs removing the majority of the ammonia during the remainder of the year. The seasonal increase in effluent ammonia from the Oxidation Ponds is typical and attributed to low ambient temperatures throughout the majority of January and February as well as November through December 2019. As described in more detail in the *Strategies to Enhance Performance* section below, the WPCP only performed a single snail control event in May 2019 without significantly compromising FGR performance.

As shown in **Figure 19B** and **Figure 19C**, daily and average monthly effluent ammonia in 2019 remained below their respective seasonal permit limits. Influent ammonia concentrations, have begun to return to a similar pattern as seen in 2015 through 2017. A record 10-year daily max of 58.4 mg/L was measured on December 27, 2016, (**Figure 19B**) although there were increased ammonia readings, no such spikes were detected in 2019.

Figure 20 summarizes average daily (kg/day) and annual (kg/yr) influent and effluent ammonia loading rates from 2015 to 2019. Influent loading rates showed an upward trend during 2015 through 2016 and although they had leveled-off in 2018, the influent ammonia concentration data trend shows a return to previous increased loading rates. Effluent ammonia loading rates are variable with the higher values generally occurring during the winter season and lower values generally occurring during the summer season, reflecting the seasonal nature of the Oxidation Ponds and FGRs performance. Similar to TSS, effluent ammonia loading rates increased in 2019 as compared with 2018, possibly due to limited recycled water production and the operation efficiency of the Oxidation Ponds and FGRs. Additional information pertaining to ammonia and other nutrient trends is presented in **Section 1.5** of this Chapter and is available in the *2019 Nutrient Watershed Permit Annual Report* submitted by BACWA.

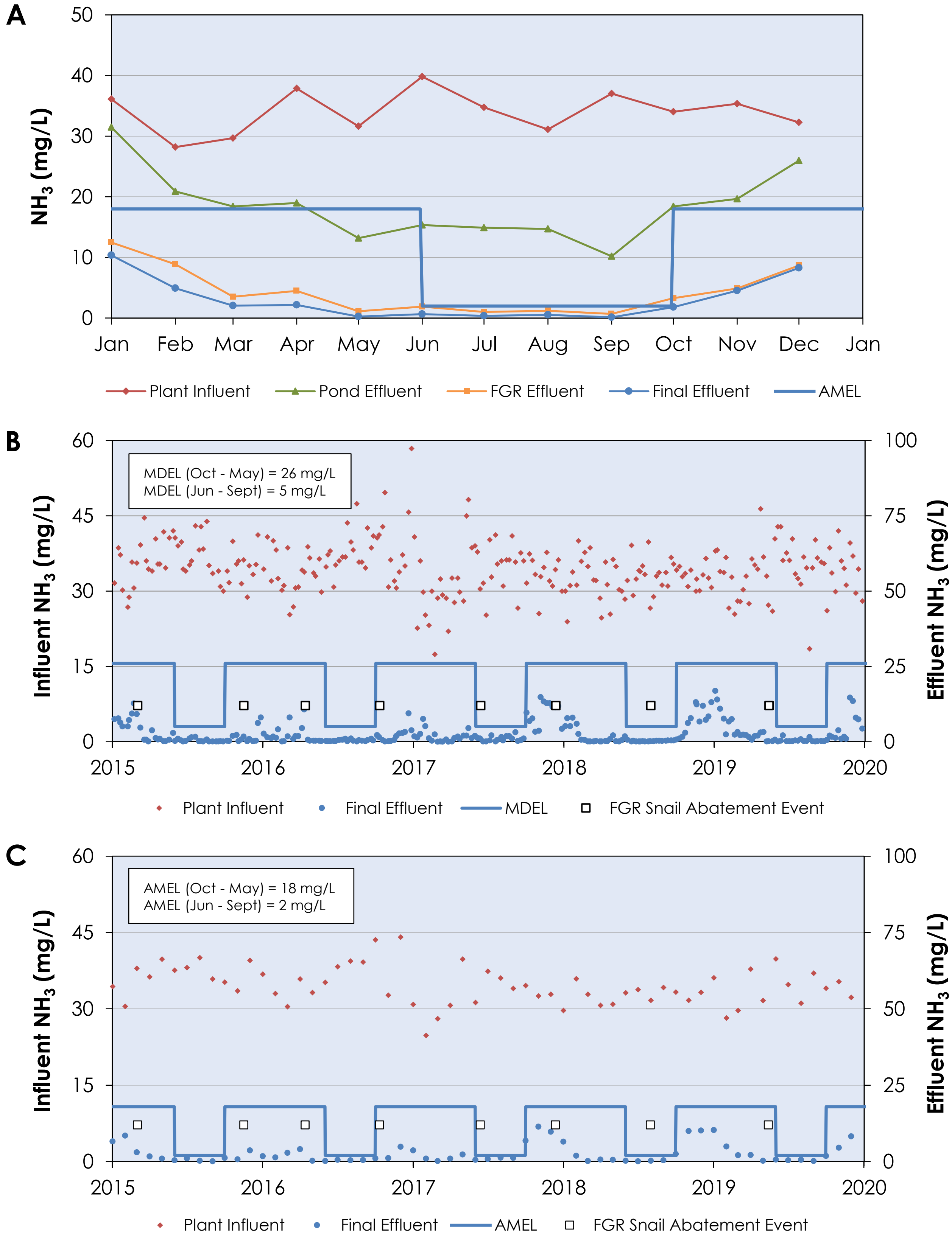


Figure 19: Ammonia Trends at the WPCP from 2015-2019. A) Monthly Average Total Ammonia from Pond, FGR, and Final Effluent during 2019. B) Daily and C) Monthly Average Influent and Effluent Total Ammonia from 2015-2019.

Figure 20: Average A) Daily and B) Annual Ammonia Loading Rates and Total Effluent Discharged from 2015-2019

1.4.2. Performance Optimization Strategies

Oxidation Pond Dredging

Ammonia removal in the Oxidation Ponds is highly variable and seasonal in nature. Although variability in weather patterns plays a significant role, the loss of volume due to solids deposition over time has likely impacted performance by reducing the "working" capacity of the Oxidation Ponds. In addition to acting as a low-temperature anaerobic digester to stabilize solids, the Oxidation Ponds promote ammonia removal by direct assimilation into photosynthetic algae cells as well as bacterial nitrification. As such, maintaining a sufficient water column and working volume is a performance essential and one of the only control variables for an open system of this type.

There are numerous entry routes for solids, including algae growth within the Oxidation Ponds, float (flocculated solids) skimmed from the DAFTs, DMF backwash water, solids handling wash water, digester supernatant, and carryover and emergency bypass from the Primary Treatment process. Consequently, the City began a long-term dredging project in 2012 to restore capacity to the Oxidation Ponds (**Chapter IV, Section 10.0**). Dredging continued during this reporting period, but was restricted to the wet weather season to avoid generating ammonia in excess of the FGRs' processing capacity. A total of 1,294 dry tons of biosolids were removed from the Oxidation Ponds in 2019, a majority of which were re-used for agricultural land application.

Snail Control Program

Trickling filters, such as the FGRs, are prone to declining ammonia removal performance because of snail predation on nitrifying bacteria that inhabit the plastic growth media. As a result, the City periodically performs snail treatment throughout the year. During a treatment event, the FGRs are placed into recirculation mode and effluent from the Oxidation Ponds is dosed with ammonium sulfate (approx. 8-9 tons at 40% solution) and sodium hydroxide (approx. 7 tons at 25% solution) in a batch process. The rise in pH from the sodium hydroxide effectively converts the ammonium sulfate to ammonia, which is toxic to the snails but beneficial to nitrifying bacteria up to a certain point. Snail shells and other solids are collected in the FGR distribution structure and wasted to the oxidation ponds, which help contribute a carbonate source to facilitate secondary treatment and act as a beneficial reuse to the pond ecosystem.

One snail control event was performed during this reporting period on May 14, 2019 and is depicted on **Figure 19B** and **Figure 19C**. Typically, a second control event occurs in October or early November during the seasonal shift and subsequent decline in Oxidation Pond performance. However, due to operating efficiency within the Oxidation Ponds and FGRs, a second control event was deemed unnecessary for this reporting period. Effluent total ammonia is well below the permit limit as shown in **Figure 19B** and **Figure 19C**. The WPCP plans to continue performing these control events as long as the FGRs are required to provide nitrification.

1.5. Nutrient Summary

In addition to the current NPDES permit, the City is also subject to Waste Discharge Requirements of the Nutrient Watershed Permit issued by the RWQCB. During the reporting period the City was under NPDES Permit No. CA0038873, Order No. R2-2014-0014 through June 30, 2019 until Order No. R2-2019-0017 became effective July 1, 2019. The purpose of the Nutrient Watershed Permit is to track and evaluate Bay Area POTWs' treatment performance, fund nutrient monitoring programs, support load response modeling, and conduct treatment plant optimization and upgrade studies for nutrient removal. Information pertaining to the Nutrient Watershed Permit is prepared in a separate annual report by BACWA and also reported electronically in CIWQS. The following summary is provided as an additional indicator of plant performance and in support of the trends presented in previous Sections.

Prior to the issuance of Order R2-2014-0014, the WPCP collected nutrient data from 2012-2014 in response to a 13267 letter received from the RWQCB in March 2012. During this two-year period, samples were collected at different intervals for both influent (twice annually) and effluent (twice-per-month) and analyzed for the common forms of nitrogen (**Figure 21**) and phosphorus (**Figure 22**) to provide a complete nutrient profile. Consequently, there are periods where influent data for both nitrogen and phosphorous are sparse. Influent monitoring frequencies were voluntarily increased by the City in 2015 and then again in 2017 to provide a more complete dataset for the design of the new treatment facilities under the City's Master Plan.

The issuance of Order No. R2-2019-0017 shifted the focus of the previous order from monitoring effluent total nitrogen (TN) to total inorganic nitrogen (TIN) as well as implementing influent monitoring of several parameters including total phosphorus (TP). Since nitrogen is the growth-limiting nutrient for phytoplankton in San Francisco Bay, a planning level target (PLT) was established in the new order for TIN, which is the bioavailable form of nitrogen. Only dry season discharge data are used to calculate the planning level target because it more accurately defines the current performance of treatment when accounting for variability in nutrient discharges. The establishment of the planning level target was determined by adding a 15% growth buffer to the maximum dry season average effluent TIN load between May 1, 2014 and September 30, 2017. The maximum dry season average for the City was determined to be 630 kg/day and has become the baseline for nitrogen loads.

Nitrogen

Total Inorganic Nitrogen (TIN) is the measure of the total concentration of ammonia and nitrate and nitrite (NOx). Total nitrogen (TN) is a measure of TIN and the organic fraction of nitrogen (Org-N). Influent total nitrogen consists primarily of ammonia and organic species Org-N, with the contribution from NOx being negligible. On average, as illustrated in **Figure 21A**[6], Org-N comprises 40% of influent nitrogen with ammonia making up the remaining 60%. Effluent wastewater differs, as nitrification occurs in the Oxidation Ponds and FGRs, resulting in ammonia being largely oxidized to NOx. In this case, nitrate (NO_3) is the dominant form of oxidized nitrogen in the effluent, averaging 98% of NOx or 85% of TIN. Effluent TIN is subject to seasonal variability for reasons discussed below.

Total Inorganic Nitrogen

Annual Total Effluent Load	**342 tons**
% Removal	**42%**

Annual Average Dry Weather Nitrogen

Effluent Loading Performance	**553 kg/day**
Planning Level Target (PLT)	**730 kg/day**

[6] TN is the summation of ammonia, NOx, and Org-N. NOx contribution is negligible in influent wastewater and had been previously verified at the WPCP between 2012-2014 as part of monitoring conducted under the 13267 letter.

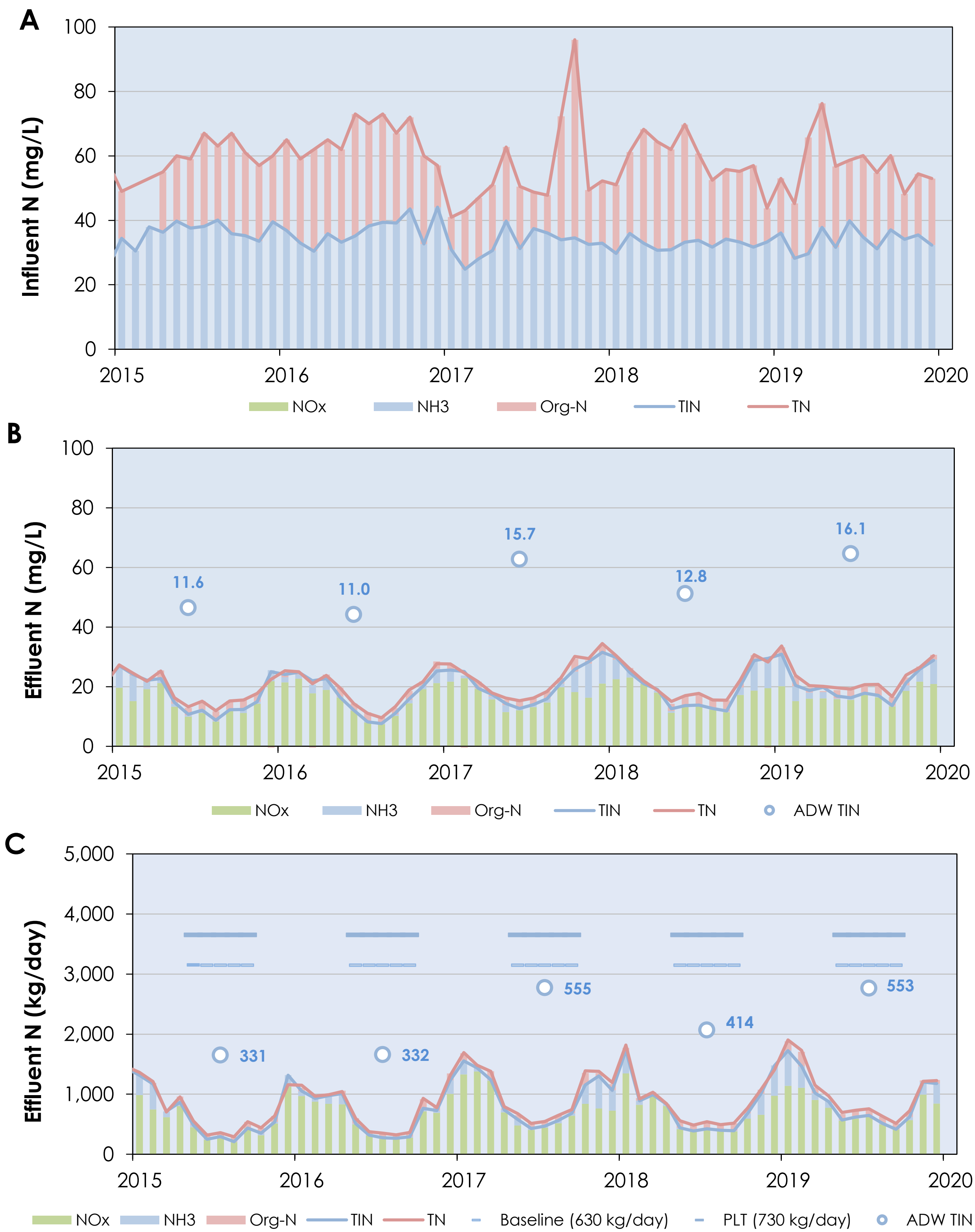


Figure 21: Nitrogen Trends at the WPCP from 2015-2019. A) Monthly Average Influent Nitrogen Concentrations. B) Speciated Monthly Average Effluent Nitrogen Concentrations and C) Effluent Nitrogen Loading Rates with ADW TIN and PLT

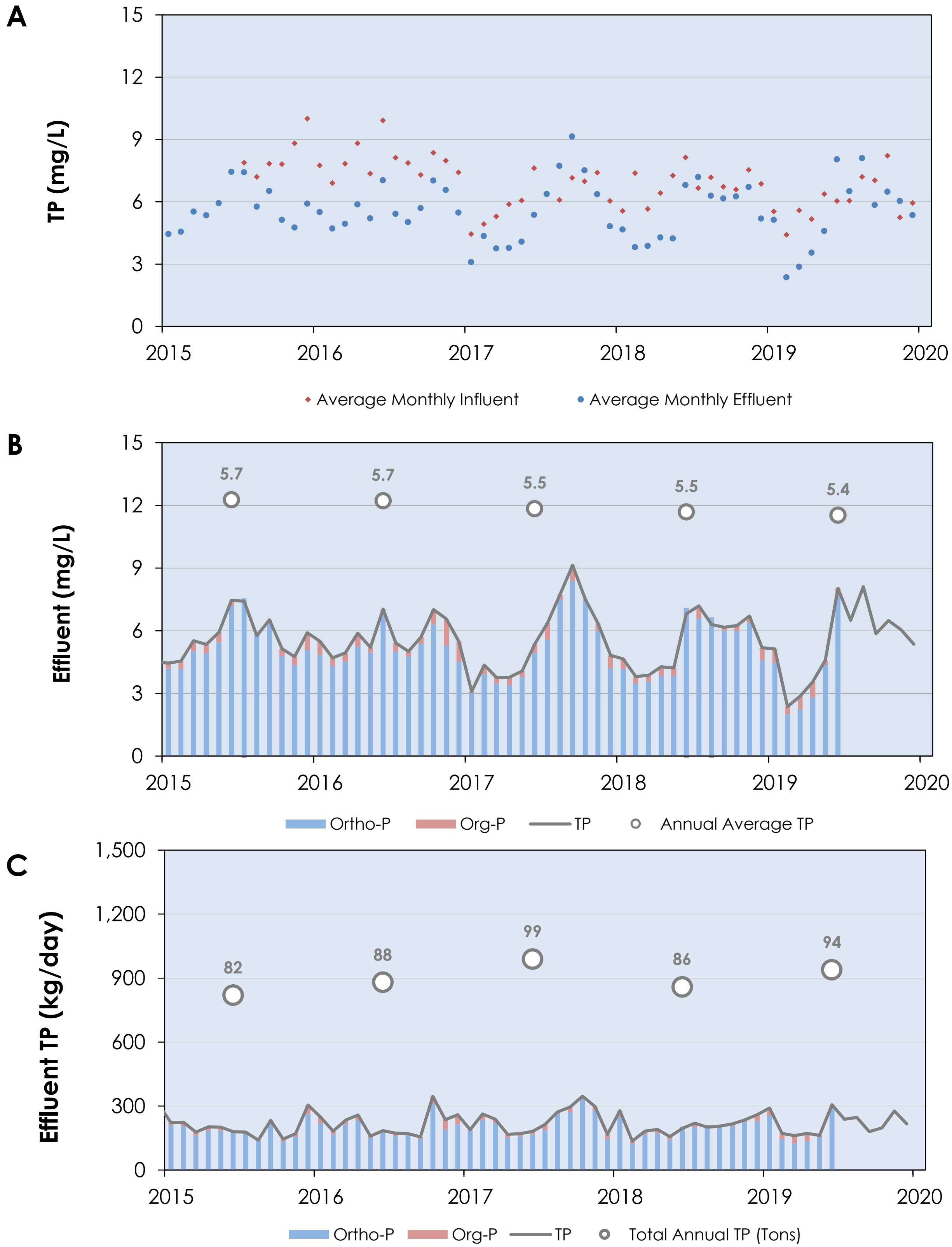


Figure 22: Phosphorous Trends at the WPCP from 2015-2018. A) Monthly Average Influent and Effluent TP Concentrations. B) Speciated Monthly Average Effluent Phosphorous Concentrations and C) Loading Rates with Annual Total TP Loads

Figure 21A shows average monthly influent nitrogen concentrations collected as flow-weighted composite samples over a 24-hour period. In the current order, influent Total Kjeldahl Nitrogen (TKN) monitoring was retained and is considered equivalent to influent TN. Monthly average Influent TKN concentrations in 2019 ranged from 45 to 76 mg/L with an annual average of 58 mg/L. In general, influent TKN concentrations exhibited seasonal variation with higher concentrations in the summer and lower concentrations in the winter. These fluctuations correspond inversely with influent flow patterns. Between March and April of 2019, influent TKN concentrations were consistently high, reaching a maximum of 100 mg/L. A similar trend was observed between June and July 2018 as well as September and October 2017, with a maximum concentration of 120 mg/L. Ammonia influent concentrations during both time periods remained relatively consistent, as did CBOD and TSS, indicating a large Org-N driver behind the measured results. A primary source of Org-N are proteins that can be released when organic matter starts to break-down and before ammonification occurs. Despite these periodic Org-N spikes, effluent TN concentrations were consistent with previous years, indicating a high degree of removal performance.

Monthly average effluent TIN and TN concentrations are separated into the dominant forms of nitrogen (NOx, ammonia, and Org-N) in **Figure 21B**. The seasonal influence on nitrification at the WPCP becomes more apparent at this scale, with influent ammonia concentrations converting to NOx in the warmer summer months under more kinetically favorable biological conditions and then remaining more dominant in the colder winter months. Signs of denitrification are also apparent in the summer months, as decreases in ammonia are not fully offset by increases in NOx, thereby driving down TIN concentrations. Though not shown graphically in this report, the majority of denitrification occurs in the Oxidation Ponds during the summer months. Given that the FGRs and DAFTs promote aerobic conditions through mechanical turbulence and the introduction of dissolved air, some denitrification is likely occurring in the DMFs where the anaerobic conditions necessary for denitrification can develop. Effluent TIN concentrations during the 2019 reporting period appeared to be slightly elevated as compared with the previous year, with an annual average of 20 mg/L. Effluent TIN concentrations during the beginning of the reporting period were slightly higher than in previous years due to higher ammonia concentrations resulting from reduced Oxidation Pond and FGR performance. A snail treatment event performed in spring 2019 resulted in improved FGR performance.

Average monthly effluent nitrogen loading rates shown in **Figure 21C** and depict seasonal nitrification/denitrification variations experienced at the WPCP similar to those shown in **Figure 21B**. The loading rates are also influenced by nutrient diversion through recycled water production primarily in the summer months. Consequently, the loading rate curve displays peaks in the winter months when demand for recycled water is low and biological activity (nitrification/denitrification) slows, and troughs in the summer months when recycled water production and biological activity are high. TIN removal efficiency, as measured by the difference between annual average influent and effluent concentrations, remained high during the 2019 reporting period at approximately 42%.

Figure 21C also shows the annual average dry weather (ADW) effluent TIN load in relation to the current performance as well as the PLT. Effluent ADW TIN loadings from 2017 to 2019 were higher than observed in previous years primarily as a result of low recycled water production coupled with a reduction in nitrification/denitrification rates in the Oxidation Ponds. Nevertheless, the calculated effluent ADW loads during the 2019 reporting period remained below the PLT.

Phosphorous

Total Phosphorous	
Annual Average Effluent	**5.4 mg/L**
Annual Total Effluent Load	**94 Tons**
% Removal	**12%**

Average monthly influent and effluent total phosphorous (TP) concentrations are shown in **Figure 22A**. The WPCP began voluntarily analyzing for influent TP during 2015 to complement TN data and support nutrient discussions with a more complete dataset. Since then, influent TP concentrations have been relatively consistent with slightly higher concentrations observed during 2015 and 2016, as compared with 2017-2019. Effluent concentrations indicate relatively consistent concentrations that are less influenced by seasonal variation as compared to nitrogen. The approximate 12% reduction in TP between influent and effluent levels observed during this reporting period is consistent with previous years and reflective of incidental removal of phosphorus at various stages throughout the treatment process.

Figure 22B shows monthly averages ranging from 2.4 to 8.1 mg/L and the annual average of 5.4 mg/L effluent TP concentrations. **Figure 22B** shows effluent TP concentrations separated into the dominant forms of orthophosphate (Ortho-P) and organic phosphorous (Org-P). Ortho-P, also known as dissolved reactive phosphorous, represents the form of phosphorous that is readily available for biological growth and comprises the largest fraction of effluent TP, whereas Org-P represents a much smaller fraction. Analysis of the various forms of phosphorus began in 2013 and ended in July 2019 when Order No. R2-2019-0017 became effective and shifted the focus solely to TP. During the 2019 reporting period, TP concentration showed peak concentrations in warmer months complimented by lower concentrations during the colder months. This trend has become more consistent since 2017 and is more closely aligned with influent concentrations than in historical data.

Average phosphorous loading rates and annual total TP loads are shown in **Figure 22C**. Overall, average TP loading rates have remained fairly consistent since 2013. The annual total TP has increased since 2018, but remains lower than the 99 tons of TP seen in 2017 with approximately 94 tons of TP being discharged to the SF Bay during the 2019 reporting period.

1.6. Plant Performance Summary

The WPCP maintained pollutant removal efficiency during the 2019 reporting period. As shown in **Figure 23**, between 2014 and 2016, both CBOD and TSS influent concentrations began increasing concurrently with decreases in potable water use and influent flow as a result of the drought. Both influent and effluent flow rates during the drought also reached record annual average lows of 11.9 MGD and 10.1 MGD. Potable water use rebounded in 2017 alongside influent flow rates, likely due to moderate drought relief from the increased precipitation and removal of state mandated restrictions. Since then, influent CBOD and TSS concentrations have decreased to historical levels with the exception of 2018. Beginning in 2015,

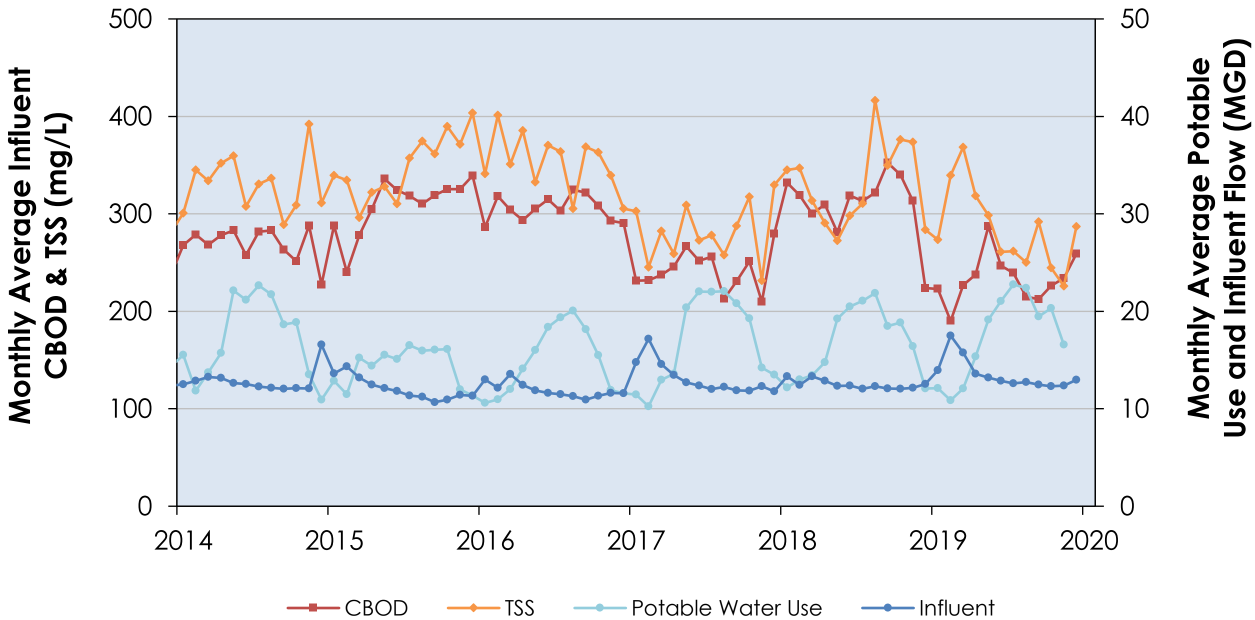


Figure 23: Monthly Average CBOD and TSS Influent Concentrations, Citywide Potable Water Use, and WPCP Influent Flows from 2014-2019

there was a noticeable increase in influent CBOD concentrations and data variability that carried through 2016. In 2017, WPCP staff adjusted the maintenance frequency and protocol for the influent composite sampler, as well as the sample collection schedule. The adjustments were made to mitigate the potential dislodging of accumulated organic matter from tubing walls and to avoid capturing return flows (digester supernatant and drainage from sedimentation basins), both of which could influence sample results and favor data scatter. Following these adjustments, data variability was somewhat reduced. In 2018, a larger degree of variability was observed and the WPCP began investigating possible causes. In June 2019, the influent composite sampler intake tubing was modified to reduce inorganic debris accumulation on the exterior of the tubing, resulting in a reduction in data variability.

Increases in effluent loading rates are primarily attributed to a reduction in recycled water production in 2019, the interplay between an upsurge in population (1.0%) coupled with a large daily net workforce influx of non-resident workers, and patterns of precipitation and potable water use. Having only performed a single snail control event in 2019, the operating efficiency observed in the Oxidation Ponds appears to have contributed to lower ammonia loads than observed in recent years. The WPCP maintained a high TIN load removal rate around 49%.

2.0. PERMIT COMPLIANCE

All required monitoring data were reported electronically to CIWQS via monthly SMRs. Per Attachment G, Provision V.C.1.h.3 of the permit, such reporting removes the requirement for tabular and graphical summaries of monitoring data in this annual report. However, the City has prepared the following tabular and graphical summaries for internal use, and has included them here for informational purposes.

2.1. Effluent Limitations

Table 1 summarizes effluent compliance sampling conducted during 2019, including regulatory limits, the range of sample results, and the number of samples collected and exceedances. During the 2019 reporting period the WPCP experienced one exceedance of effluent limitations, an on-hour total chlorine residual exceedance.

2.1.1. Constituent Removal

Figure 24 through **Figure 28** show constituent removal and any applicable corresponding effluent limitation (MDEL, AMEL) or applicable water quality objective (WQO) values. WQOs are numerical standards established in the California Toxics Rule or other governing documents and are distinct from effluent limitations even though they form the basis for effluent limitations, if required. WQOs are designed to protect water quality, aquatic life, and human health in the receiving water and carry no immediate regulatory action. Therefore, WQOs presented in the following figures, which are taken from the current NPDES permit, are included solely for informational purposes.[7] During the reporting period, one effluent sample result exceeded the silver WQO. The sample result of 4.5 µg/L was above the silver 2.2 µg/L water quality objective and was reported in the November monthly SMR. The silver concentration in the Plant Influent sample collected on the same day was 0.29 µg/L. Process samples including Primary Effluent and Pond Effluent collected on the same day were 0.24 and 0.09 (DNQ) µg/L. A review of historic data revealed that the 4.5 µg/L silver measured in the Plant Effluent was the highest concentration observed in the last five years indicating that the high silver result may have been an invalid result. Plant Effluent silver levels were mostly non detects (NDs) in the last five years ranging from 0.06 (ND) to 0.33 µg/L. The November silver sample result was determined to be unique and efforts to determine the cause of the spike were inconclusive. Elevated influent and effluent results were observed in September – November for chromium and nickel (**Figure 24**), but remained below the MDEL or WQO for the respective metals. December results for chromium and nickel returned to normally observed levels. An investigation into the possible causes of the elevated results is ongoing.

In addition, per Section VI.C.2.a of the current NPDES permit Fact Sheet, the results from the 2014 and 2015 priority pollutant monitoring have been included in **Attachment C** and are discussed further in

[7] The WQO listed in the chart for total chromium is the limit for chromium (VI) and is conservatively applied to effluent total chromium.

Table 1: Effluent Monitoring Sample Results for Standard Parameters in 2019

Parameter Class	Parameter	Parameter Limit Type	Parameter Limit	2019 Final Effluent Min	2019 Final Effluent Avg	2019 Final Effluent Max	Number of Samples[1] / Exceedance
Standard	**CBOD**	MDEL (mg/L)	20	2.4	5.0	9.8	113 / 0
		AMEL (mg/L)	10	3.7	5.0	7.0	12 / 0
		Percent Removal (%)	85	97	98	99	12 / 0
	TSS	MDEL (mg/L)	30	4.5	10.4	20.7	102 / 0
		AMEL (mg/L)	20	6.6	10.4	13.9	12 / 0
		Percent Removal (%)	85	95	96	98	12 / 0
	Ammonia (as N)	MDEL [Oct-May] (mg/L)	26	0.08	4.4	16.9	35 / 0
		AMEL [Oct-May] (mg/L)	18	0.2	4.3	10.3	8 / 0
		MDEL [Jun-Sept] (mg/L)	5	0.07	0.4	2.07	18 / 0
		AMEL [Jun-Sept] (mg/L)	2	0.1	0.4	0.6	4 / 0
	Oil & Grease	MDEL (mg/L)	10	<1.5	<1.5	1.5	4 / 0
		AMEL (mg/L)	5	<1.5	<1.5	1.5	4 / 0
	Turbidity	MDEL (NTU)	10	3.2	7.3	9.0	52 / 0
	pH[1]	Max / Min	8.5 / 6.5	6.7	7.2	7.5	352 / 0
	Chlorine Residual[1]	IMEL (mg/L)	0	0	0.1	2.3	352 / 1
	Enterococci	Geo Mean (month) (MPN/100mL)	35	1.2	2.1	3.1	12 / 0
Toxicity	**Acute Toxicity**	90th% (% Survival)	70	100	100	100	4 / 0
		Moving Median (% Survival)	90	100	100	100	4 / 0
Organics	**Cyanide**	MDEL (ug/L)	17	2.1	2.2	3.4	12 / 0
		AMEL (ug/L)	7.5	2.1	2.2	3.4	12 / 0
	Dioxin TEQ[2]	AMEL (ug/L)	1.4×10^{-8}	---	---	---	--- / ---
		MDEL (ug/L)	2.8×10^{-8}	---	---	---	--- / ---
	Bis (2-Ethylhexyl) Phthalate	MDEL (mg/L)	12	<0.5	<0.5	<0.5	4 / 0
		AMEL (mg/L)	5.9	<0.5	<0.5	<0.5	4 / 0
Metals	**Copper**	MDEL (ug/L)	19	1.6	2.8	3.5	12 / 0
		AMEL (ug/L)	10	1.6	2.8	3.5	12 / 0
	Mercury	AWEL (ug/L)	0.027	0.00091	0.0013	0.0021	12 / 0
		AMEL (ug/L)	0.025	0.00091	0.0013	0.0021	12 / 0
		AAEL (kg/yr)	0.120	---	---	0.017	1 / 0
	Nickel	MDEL (ug/L)	35	2.6	7.1	17.4	12 / 0
		AMEL (ug/L)	24	2.6	7.1	17.4	12 / 0

Legend:
1: Sample collection required only during active discharge – sample count below 365 indicates periods of zero discharge to SF Bay
2: Sampling conducted for Dioxin TEQ once every permit cycle (RWQCB Order R2-2016-0008. Requirements were satisfied in March 2016.
AAEL: Average annual effluent limit
AMEL: Average monthly effluent limit
AWEL: Average weekly effluent limit
IMEL: Instantaneous maximum effluent limit
MDEL: Maximum daily effluent limit
MPN: Most probable number
J: Analyte detected, but not quantifiable
ND: Analyte was "not-detected" above the laboratory method detection limit
NTU: Nephelometric turbidity unit
<#: Analytical results less than the laboratory detection limit
---: Indicates that data are not available or applicable

Chapter VI, Section 1.0. No priority pollutant data other than the parameters listed above were collected in 2019 as the City elected to divert the analytical costs associated with priority pollutant monitoring to supplement the Regional Monitoring Program under the *Alternate Monitoring and Reporting Requirements for Municipal Wastewater Discharges* Order No. R2-2016-0008. With the exception of the parameters above, the WPCP will not collect additional priority pollutant data until the next permit reissuance, as data collected in 2015 satisfies the once-per-permit-cycle requirement established in Provision VI.C.1 of the Order.

Figure 27 shows data from common physical parameters collected as grab samples at the WPCP, of which only turbidity (**Figure 27A**) and pH (**Figure 27B**) have effluent limits. Influent and effluent temperature data (**Figure 27C**) are relevant for evaluating trends in biological treatment performance and are included in this report for informational purposes only. The variability in turbidity data shown in **Figure 27A** from 2015 through 2016 is the result of recycled water production at the WPCP, when recycled water was produced separately from SF Bay discharge. Under that configuration, DAFTs and DMFs were operated to produce a lower turbidity (2 NTU as compared to the 10 NTU limit for NPDES discharge) effluent, and the filtered water from the DMFs subjected to additional treatment in the CCTs in order to meet the more stringent Title 22 requirements for tertiary disinfected wastewater. During the transition from recycled water production to NPDES discharge, 2 NTU effluent would be discharged to SF Bay. The completion of the Continuous Recycled Water Production Facility project in April 2018 has facilitated the WPCP's ability to simultaneously discharge to SF Bay and produce recycled water, which has reduced the variability in effluent turbidity since the treatment processes are now independent. As discussed in **Chapter II, Section 2.2**, recycled water production was lower in 2019 than previous years due to operation and maintenance constraints.

Effluent pH values occasionally approach the lower discharge limit of 6.5 as shown in **Figure 27B**. The depression in pH was historically attributed to the use of chlorine gas (which depresses pH) for disinfection, coupled with the more stringent Title 22 water quality requirements associated with recycled water production, which required higher chlorine doses. Disinfection for recycled water production is now separate from disinfection for Bay discharge, and sodium hypochlorite (which does not depress pH) is now used rather than chlorine gas. Seasonal variations in effluent pH still occur with lower pH observed in the cooler winter months, but pH levels are not expected to approach the lower pH limit to the degree that occurred in the past.

Influent and effluent temperatures at the WPCP vary seasonally but follow the same general pattern (**Figure 27C**). The significant difference between the influent and effluent temperatures is the result of the long residence time in the Oxidation Ponds. On average, primary effluent is held in the Oxidation Ponds for 30-45 days. In contrast, wastewater passes through primary treatment and reaches secondary treatment in the Oxidation Ponds within 1-2 hours on average. As a result, the wastewater undergoing secondary treatment is heavily influenced by ambient temperatures and carried through to the final effluent.

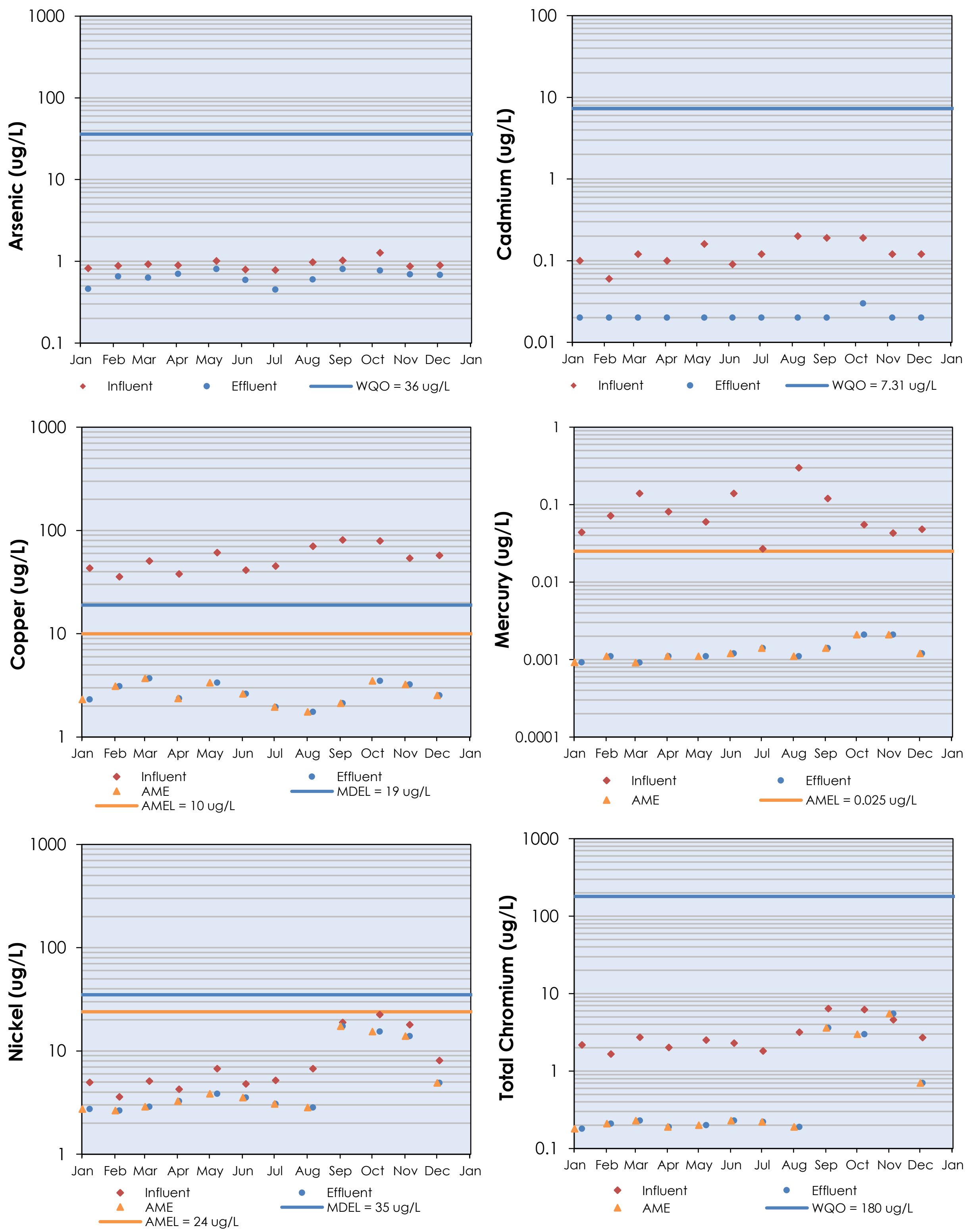


Figure 24: Concentrations of Common Metal Pollutants at the WPCP during 2019. WQO on Total Chromium chart is for WQO for Chromium (III).

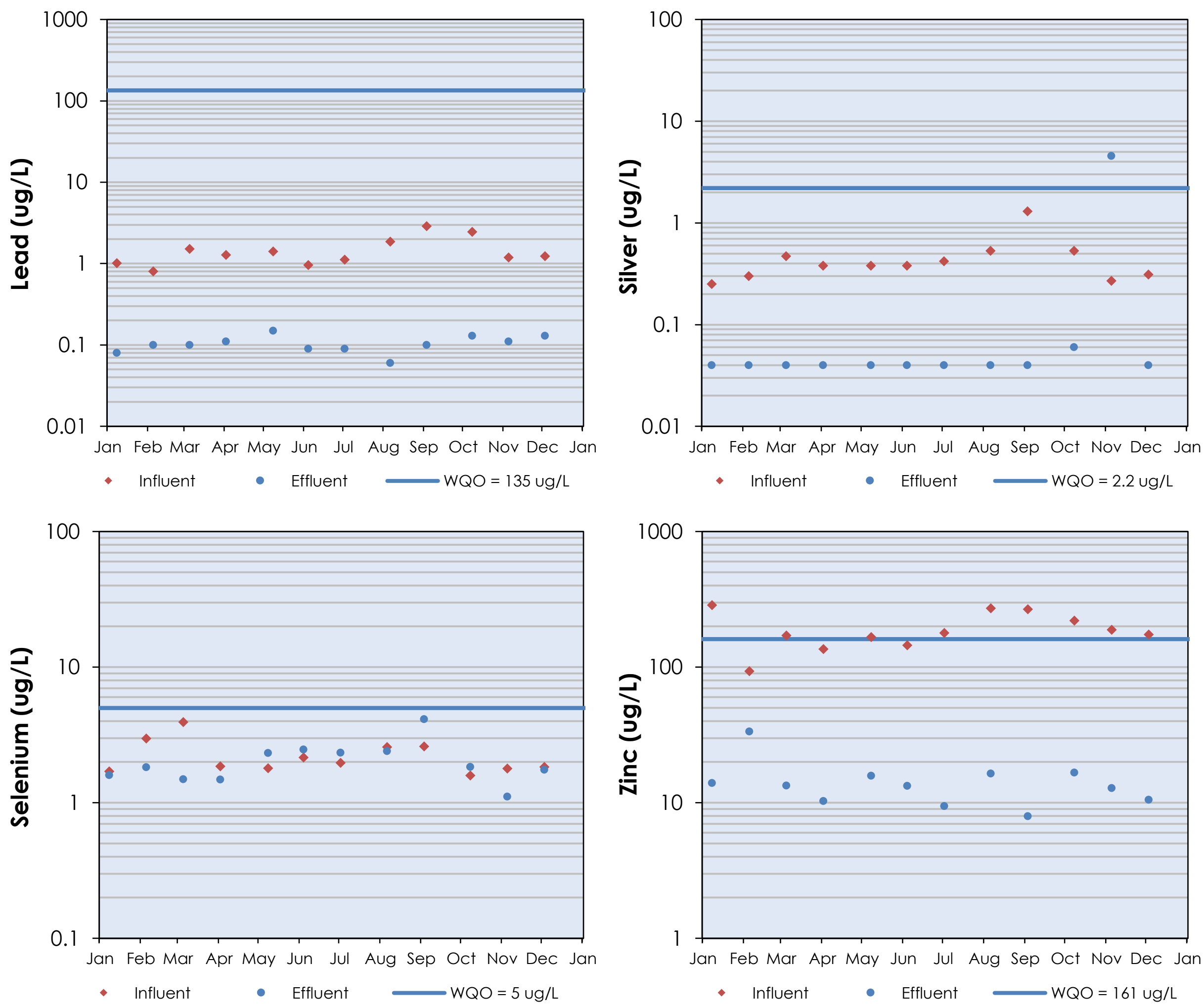


Figure 25: Concentrations of Common Metal Pollutants at the WPCP during 2019

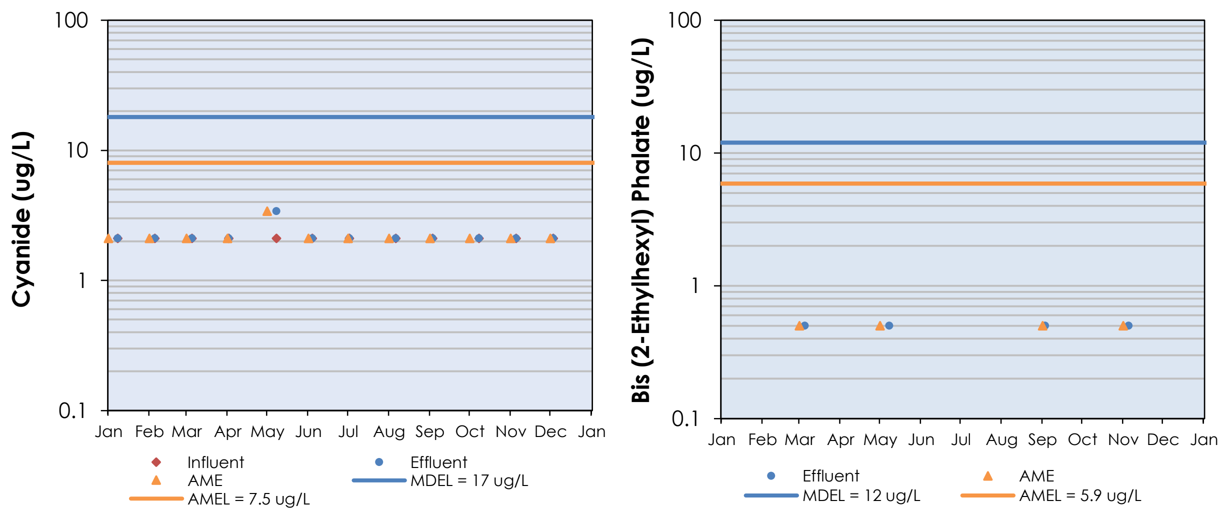


Figure 26: Concentrations of Common Organic Pollutants at the WPCP during 2019

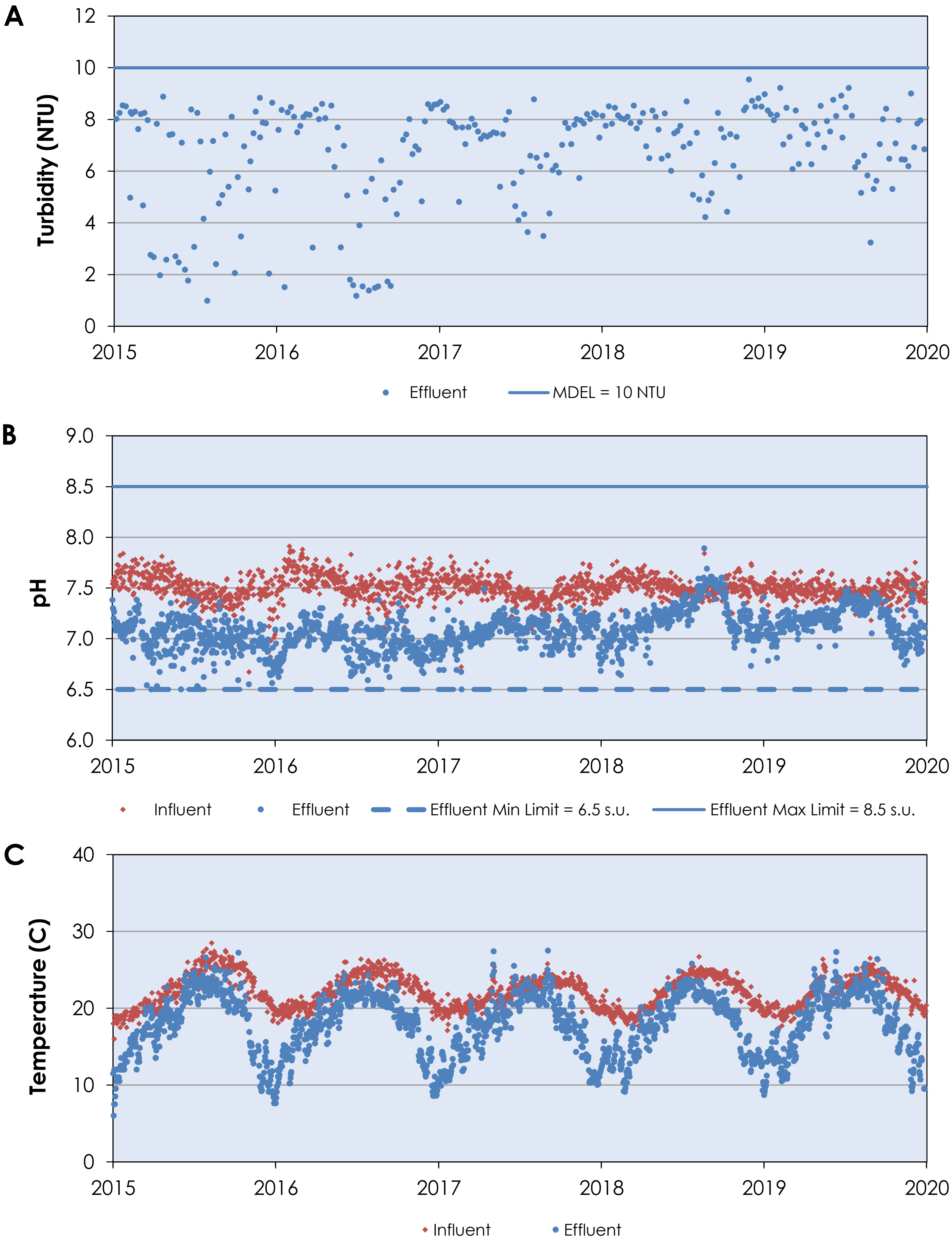


Figure 27: Common Physical Parameters at the WPCP from 2015-2019

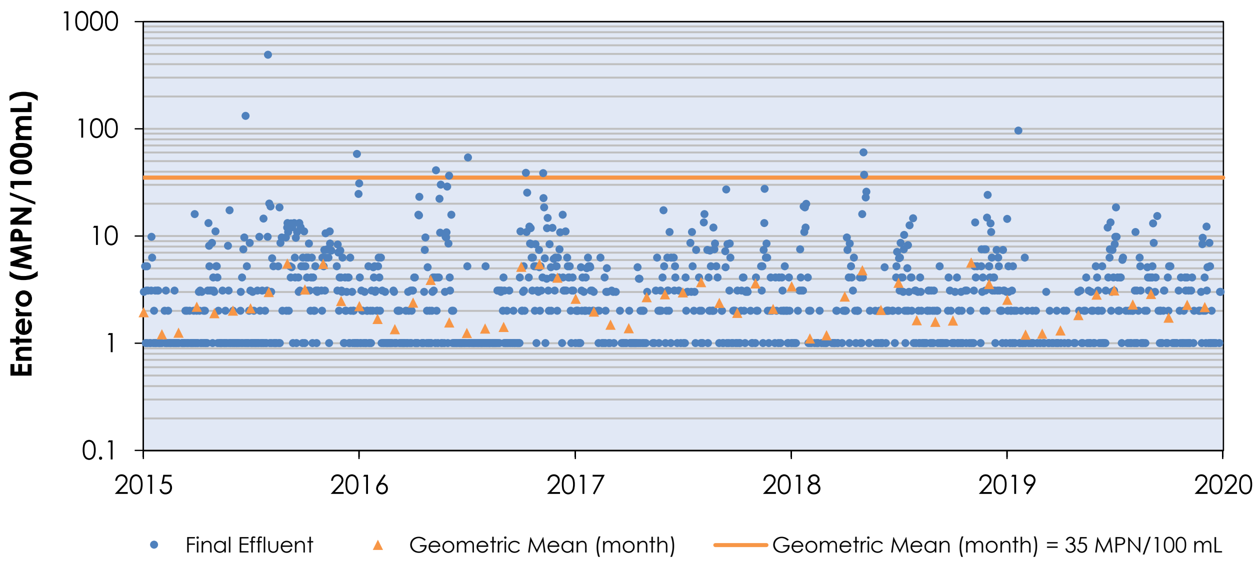


Figure 28: Effluent Enterococcus Measurements at the WPCP from 2015-2019

2.1.2. Chronic Toxicity Effluent Triggers

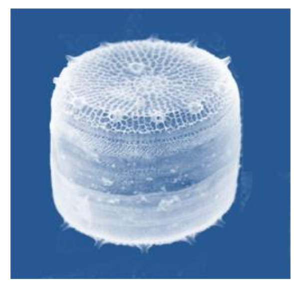


Figure 29: *Thalassiosira pseudonana*

Under the current NPDES permit, the Plant is required to conduct monthly chronic toxicity testing of its effluent discharge using the marine alga (diatom), *Thalassiosira pseudonana* (**Figure 29**). This species was selected as the most sensitive species based on a chronic toxicity screening testing conducted during the 2014 permit renewal process. The chronic toxicity test is conducted by the City's contract laboratory, Pacific Ecorisk Laboratory (PERL). The test is performed over a four-day period with growth measured at the endpoint.

Provision V.B.3.b. in Attachment E of the current NPDES permit contains effluent triggers if the single test maximum exceeds 2.0 TUc or the three-sample median exceeds 1.0 TUc based on the IC_{25}[8]. If either condition is triggered, the City must implement an accelerated monitoring schedule for chronic toxicity testing of twice-per-month and submit an event-specific Toxicity Reduction Evaluation (TRE) Workplan to the RWQCB within 30 days of detecting toxicity. The City may only return to routine (monthly) monitoring of chronic toxicity if results from the accelerated monitoring fail to confirm toxicity and do not exceed the permit triggers described above. However, the City must implement the TRE Workplan if the accelerated monitoring confirms toxicity and initiate investigative corrective actions until toxicity results are shown to be below trigger levels or as directed by the Executive Officer.

Following the adoption of the current NPDES permit, the City developed a Generic TRE Workplan, which includes a six-tiered approach for evaluating and responding to chronic toxicity events. The basic approach is to start simple at Tier 1 (accelerated monitoring) and Tier 2 (process optimization, examination of operational practices and process chemical use) to identify potential causes or sources of toxicity before

[8] IC stands for inhibition concentration. IC_{25} is the statistical calculation of the effluent concentration which causes a 25% reduction in growth or reproduction of test organisms.

moving on to more complex and costly laboratory investigations or potential operational or physical modifications. The workplan further requires the implementation of a Toxicity Identification Evaluation (TIE) upon exceedance of a trigger value of 1.25 toxicity units (TUc) based on EC_{50} or IC_{50}[9] values.

During the 2019 reporting period, the single sample maximum of 2 TUc and three-sample median of 1 TUc were not exceeded in any given month (**Table 2**). Toxicity was detected at very low levels in the months of January and October at 1.1 and 1.4 TUc, respectively, but did not exceed the permit triggers.

Table 2: Summary of Chronic Toxicity Testing Results for WPCP Effluent during 2019

Test #	Sample Date	Growth TU_c	3-Sample Median (Growth TU_c)
1	1/9/2019	1.1	<1.0
2	2/6/2019	<1.0	<1.0
3	3/6/2019	<1.0	<1.0
4	4/3/2019	<1.0	<1.0
5	5/23/2019	<1.0	<1.0
6	6/5/2019	<1.0	<1.0
7	7/24/2019	<1.0	<1.0
8	8/21/2019	<1.0	<1.0
9	9/4/2019	<1.0	<1.0
10	10/23/2019	1.4	<1.0
11	11/6/2019	<1.0	<1.0
12	12/4/2019	<1.0	<1.0

2.1.3. Effluent Residual Chlorine

During the 2019 reporting period, the WPCP experienced one "on-hour" residual chlorine excursion reported electronically in CIWQS as a violation of the IMEL. On November 20, 2019, during maintenance work on the tertiary side of the facility, a loss in power to a network switch caused the cessation of the SBS dosing pumps as well as partial loss of tertiary instrumentation signals. In response, operations ceased effluent discharge until communication with tertiary instrumentation was restored and system functionality was confirmed. During the incident, approximately 397,188 gallons of chlorinated final effluent with an estimated average chlorine residual of 2.33 ppm was discharged, which resulted in an estimated total of 7.7 lbs. of chlorine. A more detailed account of this event is documented in the 5-Day Written Report submitted to the RWQCB on November 26, 2019, as required by Attachment G, Section V.E.2.b of the WPCP's NPDES permit.

[9] EC_{50} is the concentration which results in 50% of the maximal response. IC_{50} is the concentration which results in a 50% reduction in growth or growth rate.

2.1.4. Mercury Effluent Limitations and Trigger

The WPCP continues to be an active member of BACWA and participates in the annual submittal of water quality data pertaining to mercury discharge. In accordance with the Mercury and PCBs Watershed Permit, effluent mercury concentrations are measured monthly for regulatory compliance. During the reporting period, effluent mercury concentrations remained below the average monthly trigger (0.011 ug/L) and limit (0.025 ug/L). The total annual effluent mercury loading of 0.020 kg/yr, is well below the permit limit of 0.12 kg/yr (**Figure 30**).

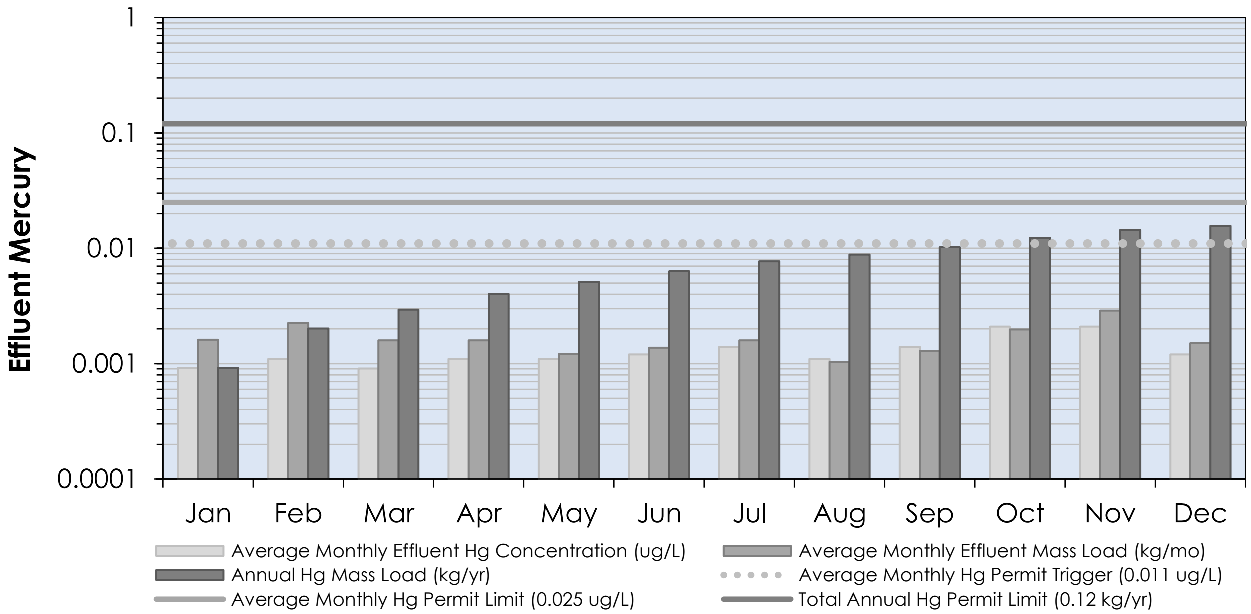


Figure 30: Effluent Mercury Concentrations and Loading Rates during 2019

2.1.5. PCB Effluent Limitations

In accordance with the Mercury and PCBs Watershed Permit, the WPCP is also required to measure and report total PCBs as congeners semi-annually using EPA Proposed Method 1668c. Results from this method are provided to the RWQCB for informational purposes and are used to verify assumptions and evaluate the need to refine wasteload allocations. The requirement for monitoring of PCBs as Aroclors for compliance with effluent limitations was reduced to once per permit cycle by the *Alternate Monitoring and Reporting Requirements for Municipal Wastewater Discharges* Order No. R2-2016-0008. PCBs as Aroclor data submitted in 2015 satisfies the once-per-permit-cycle requirement established in Provision VI.C.1 of the Order.

2.2. Unauthorized Discharge

The WPCP experienced one unauthorized discharge[10] on December 15, 2019, wherein flocculated solids from the DAFTs was discharged to Moffett Channel when a pipe conveying the solids to the Oxidation Ponds ruptured unexpectedly at a segment that crosses over the channel. The WPCP responded by closing the valve to the pipeline and diverting the solids through a different pipeline out to the Oxidation Ponds. The City believes that the age of the pipe and the high frequency of inundation by brackish water are primary contributing factors to the breakage. The WPCP completed the notifications to various agencies as required by Section V.E.2 of Attachment G. A more detailed account of this event is documented in the 5-Day Written Report submitted to the RWQCB on December 20, 2019.

2.3. NPDES Compliance Evaluation Inspection

On June 21, 2019, representatives from the RWQCB performed the annual NPDES Compliance Evaluation Inspection (CEI) at the WPCP. A report of their inspection findings was transmitted to the WPCP on December 27, 2019. Section X of the CEI report listed the following findings that did not require corrective action from the WPCP:

- Updates on the various capital improvement projects, impacted processes, and steps taken to mitigate impacts should be provided to the Water Board on an ongoing basis.
- The Water Board recognizes that substantial reductions to visible algae in the filter beads and chlorination tanks have occurred since the last inspection.

2.4. Avian Botulism Control Program

In accordance with Provision VI.C.5.A of the current NPDES permit, the City submits an annual *Avian Botulism Control Program Report* by February 28 for the preceding year. The program consists of monitoring for the occurrence of avian botulism and the collection of sick or dead birds and other dead vertebrates found along Guadalupe Slough, Moffett Channel, and the Oxidation Ponds and levees. Controls to limit the outbreak and spread of this disease consist primarily of the collection and proper disposal of sick and dead birds. The San Francisco Bay Bird Observatory was contracted by the City to locate and collect sick birds and dead vertebrates from June through November of 2019 when the potential for outbreak is the highest. WPCP Operations and Laboratory staff also conduct weekly surveys throughout the year around the Oxidation Ponds and collect sick, injured, or dead birds and mammals. No cases of avian botulism were identified during the 2019 reporting period.

[10] California Code of Regulations, Title 23, Section 2250(b), defines an unauthorized discharge to be a discharge, not regulated by waste discharge requirements, of treated, partially treated, or untreated wastewater resulting from the intentional or unintentional diversion of wastewater from a collection, treatment or disposal system.

III. Facility Reports

1.0. OPERATION AND MAINTENANCE MANUAL

The WPCP's Operation and Maintenance (O&M) Manual is maintained in both electronic and hard copy formats. The electronic version is located on the WPCP's network at J:\ESD\WPCP\General\Operations\O&M Manual. The Manual's Table of Contents listings are hyperlinked to individual sections. Hard copy versions of the Manual are maintained in the Operations Manager's office, Maintenance Manager's office, Seniors' Operations office, Training Room, and Tertiary Control Room.

The following sections of the O&M Manual were revised or updated during 2019 and have been added to both the electronic and hard copy versions, except as indicated:

Chapter I *WPCP Overview*	This chapter was revised to reflect changes in staffing and Operator certification levels, plus additional updating of the text to reflect changes in 2019.
Chapter II *Electrical One-lines*	Revisions to Figures II-1 (Plant Overview), Figure II-6A and II-6B (Motor Control Center B), and Fig II-22 (Recycled Water Sump - Panel 600).
Chapter III-8 *Fixed Growth Reactors*	Minor revisions/updating. Updated electronic copy only.
Chapter III-10 *Dual Media Filters*	Additional revisions to text and figures related to continuous recycled water production.
Chapter III-11 *Chlorination/Dechlorination*	Additional revisions to text and figures related to continuous recycled water production. Although the revisions are still under review by WPCP Operations staff, the revised chapter has been added to the manual.
Chapter III-17 *Sodium Hypochlorite Storage and Feed System*	Additional revisions to text and figures related to continuous recycled water production.
Chapter III-18 *Sodium Bisulfite Storage and Feed System*	Additional revisions to text and figures related to continuous recycled water production.
Chapter III-23 *Recycled Water Production*	Major revisions to reflect changes related to continuous recycled water production. The draft version is under review by WPCP Operations staff.

The WPCP's Electronic O&M Manual (EOMM) project is intended to replace the existing O&M document with an intuitive, centralized interface that provides ready access to all relevant O&M Materials, including content from the current O&M Manual, SOPs, record drawings, equipment information/manuals, in a completely electronic format. The EOMM project was formally chartered in January 2018 with support from the City's IT Department. Activities during 2019 included development of an overall site navigational structure, a pilot page for the Anaerobic Digestion chapter, incorporation of the remainder of existing chapters, and pilot pages for content from the new Headworks and Primary Treatment Facilities project O&M manual submittals. To provide a simple interface for WPCP staff, the project team compiled all of this content using the Atlassian Confluence collaboration software, with the underlying data residing on the City's SharePoint site. The current schedule calls for the system to "go live" in two phases: Phase 1 will include the existing process areas, and will go live in February 2020; Phase 2 will include new Headworks and Primary Treatment Facilities process areas and is estimated to go live in July 2020. Future facilities that are part of the SCWP will be integrated as they are completed. The EOMM transition will continue during 2020 and all future updating of the O&M Manual chapters will be done in the EOMM application only.

In addition to the WPCP O&M Manual, the WPCP maintains an Operator in Training (OIT) Manual. This manual includes 32 "Ops Tasks" that address specific tasks in a highly detailed manner. New Operators must demonstrate proficiency in each Ops Task before being allowed to perform the task independently. These Ops Tasks are reviewed annually and updated as needed. No substantial updates were made to the Ops Tasks during the 2019 reporting period. Ops Tasks are kept on the WPCP network at J:\ESD\WPCP\General\Operations\OPS Training\OIT Manual\OIT Manual Updated.

The WPCP also maintains a series of Standard Operating Procedures (SOPs), which contain detailed instructions for certain operational and administrative tasks. Updating of SOPs is an ongoing process. In addition, every Operator is required to perform an annual review of every SOP. This process is tracked by support staff. These reviews feed into the annual SOP updating process. Electronic versions of the WPCP SOPs are kept at J:\ESD\WPCP\WPCPData\SOPs\SOP - signed PDF. The following is a list of SOPs that were updated, created, or deleted during this reporting period:

SOPs Updated

- SOP #2020I: Evacuation & Emergency Preparation of the Sunnyvale Water Pollution Control Plant
- SOP #3045C: Solids Process Monitoring and Removal Procedures
- SOP #1023E: Used Oil, Oily Waste & Oil Filter Accumulation, Labeling and Recycling
- SOP #4004F: Lock Out, Tag Out Procedures

SOPs Created

- SOP #2006A: Hazardous Material and Waste Management
- SOP #3039A: Recycled Water Truck Program

2.0. PLANT MAINTENANCE PROGRAM

During the 2019 reporting period, the Plant Maintenance Program utilized the new Enterprise Asset Management System (EAMS) implemented in 2018. The EAMS provides the functions of a computerized maintenance system (CMMS) including; work order generation/tracking and other maintenance data management functions, plus advanced features for asset tracking and life-cycle management, predictive and condition-based maintenance, materials and supplies purchasing, and other features (**Chapter IV, Section 11.0**). Maintenance and Operations staff can use iPad handheld tablets with the Infor EAM Mobile app to interface with the Asset Management System. The tablets provide a field interface to work orders for corrective maintenance (CM) and preventative maintenance (PM) procedures, preventative operations procedures (POPs)[11], equipment information (via a bar-code reader) and expedited data entry for work orders and other maintenance/process control measurements.

The Operations and Maintenance staff continues to review and develop the Preventative Maintenance program to provide improved reporting on asset condition and work history. The WPCP places a strong emphasis on preventative maintenance as a means to achieve high mechanical reliability. Staff members from both Operations and Maintenance sections perform preventative maintenance functions. There are currently 3,434 pieces of equipment identified in the Infor EAM equipment database. The system has improved the efficiency of the WPCP's Maintenance Program and contributes to WPCP reliability through more timely access to maintenance information and work order status, better inventory control, and will have the ability to use advanced features such as predictive maintenance as the system is populated. PM, CM, and POP counts are reduced from previous years due to the new Infor EAM software's ability to group similar tasks into a single Work Order. This simplification allows the same work to be completed with reduced data entry requirements. As shown in **Table 3**, the WPCP maintained a high level of efficiency by completing the vast majority of work orders issued in 2019. The remaining work orders that were not completed will be carried over into 2020 for completion.

Table 3: Tabulation of 2019 Work Orders Issued and Completed

2019	**PM** (Maintenance)	**CM** (Maintenance)	**POP** (Operations)
Completed	923	857	5,990
Released/On Hold/Waiting for Parts	50	148	95
Total Work Orders	***973***	***1005***	***6,085***
% Completed	***95%***	***85%***	***98%***

Notes:
PM: Preventative Maintenance; CM: Corrective Maintenance; POP: Preventative Operations Procedures

During the 2019 reporting period, the WPCP generated approximately 1,978 corrective and preventative maintenance related work orders, of which 1,780 were completed in the same year (90%). In addition, the WPCP completed 5,990 POPs of the 6,085 that were generated. The remaining work orders will be carried over into 2020 and completed according to schedule.

The WPCP also uses an on-line system (D-A Lube) for tracking results from laboratory analysis of lubricating oil removed from WPCP equipment under the preventative maintenance program. D-A Lube provides rapid reporting of analytical results, and flags high contaminant levels and other conditions that may indicate mechanical problems (e.g. excessive wear, presence of moisture, etc.). Some of the more significant maintenance and upgrades to WPCP equipment in 2019 included:

[11] POPs are preventative maintenance efforts executed specifically by Operations staff.

- Plant electrical switchgear testing
- Digester 3 coating project
- Top End overhaul of the #1 Power Generator Unit
- Rehabilitation of #3 and #4 Filtered Water Pumps
- Piping modifications of Digester 1 and Digester 2 mix pump and gas piping.
- Overhaul of the #3 Main Influent Pump Engine

3.0. WASTEWATER FACILITIES REVIEW AND EVALUATION

Provision VI.C.4.a requires that the City regularly review and evaluate its wastewater facilities and operational practices to ensure that the wastewater collection, treatment, and disposal facilities are adequately staffed, supervised, financed, operated, maintained, repaired, and upgraded as necessary, in order to provide adequate and reliable transport, treatment, and disposal of all wastewater from both existing and planned future wastewater sources under the City's service responsibilities.

The responsibility to conduct reviews of the WPCP, to develop goals, objectives and priorities, to formulate rules and procedures, and to maintain budgetary control are explicitly listed as duties of the ESD Division Managers (WPCP, Water and Sewer Services, Solid Waste Programs, and Regulatory Programs), and of section managers within these Divisions. In some cases, assistance for the review and evaluation process is provided through special studies conducted by outside consultants, such as the WPCP's Master Planning and Condition Assessment efforts. These efforts are described elsewhere in this annual report. The Environmental Management Chapter of the City's General Plan also plays a role by establishing long-term goals and policies, and providing action statements designed to ensure their implementation. For the sewer system, metrics used to assess the effectiveness of collection system operations are described in the City's Sewer System Management Plan, which is audited on a biennial basis. Results of the current evaluation are summarized below, in other sections of this annual report, and in other regulatory and planning documents. The City believes that current staff allocation and supervision are sufficient to perform its mission and meet the requirements listed above.

Facility Upgrades

Numerous WPCP upgrade projects, as well as the City's current Master Plan for the WPCP rebuild are currently in progress as described in **Section IV**.

Financing

The WPCP and associated collection system are financed by revenues generated from fees collected from users of the sanitary sewer system. Sewer rates are evaluated periodically by a financial consultant to determine if revenues are sufficient to support current and future operations and maintenance, equipment replacement, and planned capital improvements. Utility rates are typically adjusted by the City Council each fiscal year to keep revenues and expenditures in balance. The Council adopted new utility rates effective on July 1, 2019, approving an overall 4% increase in the sewer service rate for Fiscal Year 2019-2020. The actual rate increases vary by customer class and reflect needed improvements to the City's aging infrastructure and increases in operating and regulatory compliance costs. This translates into a monthly increase of $1.97 ($51.33 per month total) for an average single-family residence and 1.37 ($35.54 per month total) for multi-family residences.

Capital and operating budgets are projected over a 20-year horizon and are updated on an alternating biennial cycle. The current capital budget projections include funding for major WPCP reconstruction and/or rehabilitation projects, which were ongoing in 2019. City budgets also provide for ongoing rehabilitation of the sewer system.

Staffing and Supervision

The WPCP is operated and maintained by the WPCP Division of ESD, with offices at the WPCP. Staffing is as follows:

Division Managers	The WPCP Division Manager is responsible for the overall operation and maintenance of the WPCP. The Regulatory Programs Division Manager supports the WPCP Division on regulatory issues, and has responsibility for the Laboratory, Pretreatment Program, and Compliance Programs, which also operate at the WPCP. Both Managers report to the ESD Director.
WPCP Managers	The WPCP Operations Manager (who also serves as the Chief Plant Operator) and WPCP Maintenance Manager report to the WPCP Division Manager. The Lab Manager reports to the Regulatory Programs Division Manager.
Operations Staff	25 full-time Operators, including two Principal Operators, four Senior Operators, and 19 Operators. In addition, there is one Utility Worker and one WPCP Control Systems Integrator.
Maintenance Staff	One Senior Mechanic, eight Mechanics, and one Senior Storekeeper.
Laboratory Staff	Two Senior Environmental Chemists, three Chemists, and three Lab/Field Technicians.
Pretreatment/Compliance Inspection Staff	One Senior Inspector, five Environmental Compliance Inspectors, and two Lab/Field Technicians.
Compliance and Technical Support Staff	Three Environmental Engineering Coordinators.

Operations

WPCP operations are performed by a highly skilled group of State Water Resources Control Board-certified Wastewater Operators organized into five shifts (Days I, Days II, Graves I, Graves II and a training shift). Five Operators are on duty at all times, including at least one Senior or Principal Operator (both the Senior and Principal Operators are shift supervisors as defined by the SWRCB). The WPCP places major emphasis on training new and existing Operators to develop and maintain a high level of skill. The Operator in Training (OIT) Program provides both mentoring and rigorous training in all areas of WPCP operations. The WPCP Operation & Maintenance (O&M) Manual and OIT Training Manual are key elements of the OIT Program. In addition to demonstrating an understanding of the concepts and practices in the O&M Manual, OITs must also be familiar with all applicable Standard Operating Procedures (SOPs) and be trained by veteran operators and then signed off by a shift supervisor in 32 task specific SOPs before being allowed to perform those tasks independently. All OITs work with other highly trained veteran operators that provide direct supervision as defined by the SWRCB. Safety training is an ongoing and mandatory process for all Operators, and numerous elective training and career advancement opportunities are also provided. Operators perform all routine WPCP operational tasks, special assignments, and are responsible for POPs, as described under the Plant Maintenance Program (**Section 2.0**). Operators receive ongoing support from the WPCP Chief Plant Operator, Division Manager, Support Services staff, and outside consultants.

Maintenance

WPCP maintenance is performed by a skilled crew of eight journey level Maintenance Mechanics under the supervision of one Senior Mechanic with the direction of the WPCP Maintenance Manager. Maintenance staff is responsible for the corrective maintenance and major preventive maintenance tasks, with certain specialty maintenance functions (such as PGF engine overhauls) performed by outside contractors. Maintenance staff has mandatory training requirements in addition to opportunities for elective trainings. The Maintenance section currently uses the Infor EAM CMMS, as described under the Plant Maintenance Program.

ESD Water and Sewer Systems Division and WPCP Maintenance staff work collaboratively to maintain the wastewater and storm water sewer systems. The Division also utilizes outside contractors for specialty services, and receives engineering and regulatory support from other City work units and engineering consultants.

Collection System

The sanitary sewer collection system is operated and maintained by the ESD Water and Sewer Systems Division, whose offices are located at the City's Corporation Yard. WPCP and Water and Sewer services are supported by administrative staff at the WPCP and Corporation Yard, the ESD Director, the ESD Regulatory Programs Division, the Department of Public Works Engineering Division (providing engineering support for CIP projects), and staff from other City Departments. The City also has contracts with various consultant firms for technical and regulatory support, planning studies, engineering design for CIP projects, and other needs. Staffing is as follows (wastewater-related positions only):

Division Managers	The Water and Sewer Systems Division Manager is responsible for the overall operation and maintenance of the potable water distribution, sanitary sewer and storm water collection systems, and shares responsibility with the WPCP Division Manager for the production of recycled water. The Division Manager reports to the ESD Director.
Managers	The Wastewater Operations Manager reports to the Water and Sewer Systems Division Manager.
Operations and Maintenance Staff	13 full-time workers, including a Wastewater Collections Supervisor, two Wastewater Collections Crew Leaders, three Senior Wastewater Collections Workers, and seven Maintenance Worker I/II.

Shared Technical Support and Maintenance Staff	A number of positions in the Water Program and at the WPCP provide shared support services to the Wastewater Collections program. These include: one Senior Mechanic, eight Mechanics, and one Senior Storekeeper who are shared between the WPCP and the Wastewater Operations program. In addition, one Senior Civil Engineer, one Water Distribution Supervisor, one Water Distribution Crew Leader, one Senior Water Distribution Worker, and two water distribution Workers are shared between the Water Program and Wastewater Operations program.

A series of prioritized CIP projects have been developed for the sewer system in addition to allocating funding annually for ongoing emergency or incidental sewer repair and rehabilitation. In 2018, the City completed construction of the 2016-2017 Sanitary Sewer Main Replacement Phase 4 project, and the Baylands Storm Pump Station No. 2 Rehabilitation Project. In addition, the City solicited bids for the Storm Pump Station No. 1 upgrade project which is addressing the immediate needs identified in a previous condition assessment project. The project includes includes seismic upgrades, the replacement of discharge piping and inlet grating to protect wet wells, and completed the design of the Lawrence Sanitary Sewer Trunk Main Rehabilitation Phase 1 project.

In 2019, the City began design of the 2019-2020 Sanitary Sewer Main Replacement project. As a part of the project, the City will solicit bids for the Lawrence Sanitary Sewer Trunk Main Rehabilitation Phase 1 project, and complete the Sanitary Sewer Siphon Cleaning Phase I Project. In addition, the City will begin a project to upgrade and expand its sanitary sewer hydraulic model. The City manages its own construction crews and performs point repairs regularly, as well as manhole and lateral repairs.

4.0. CONTINGENCY PLAN

On December 1, 1999, the WPCP submitted a revised Contingency Plan pursuant to Provision 10 of NPDES Order 98-053 and RWQCB Resolution 74-10. Since that time, the Plan has been updated annually, and was reprinted in 2005, 2007, 2012, and 2013.

Several projects at the WPCP have impacted contingency operations as discussed below. These include the Emergency Flow Management Project. The Headworks and Primary Treatment Facilities Project will also impact the Contingency Plan with the implementation of a new 2 MW backup emergency generator and is scheduled for completion in 2021.

Emergency Flow Management Project

In 2014, the City embarked on an analysis to evaluate options for conveying raw wastewater around the WPCP's Primary Treatment Facility in the event of an emergency where some or all of the facility is disabled. In addition, the WPCP evaluated alternative means of conveying primary effluent to the Oxidation Ponds in the event of a failure of the existing primary effluent pipeline. The results from the evaluation are documented in the Emergency Flow Management Evaluation Report, which was finalized in January 2016. Key findings from the report were also summarized in the 2015 Annual NPDES Report.

Based on the report's findings and recommendations, the WPCP addressed a potential failure of the primary effluent pipeline under the WPCP Primary Treatment Facility reconstruction project. This project is ongoing and will provide two key infrastructure components once completed: 1) a new primary effluent junction structure and 2) a new pipeline to divert primary effluent to the tertiary drainage line, providing an alternative means for primary effluent to reach the Oxidation Ponds. The new diversion pipeline will act as a permanent backup means of routing primary effluent to the Oxidation Ponds.

The City also procured a 1 MW trailer-mounted backup diesel generator that can be used to power specific areas of the plant that experience power outages, or to operate the Headworks and Primary Treatment Facilities, with primary effluent stored in the Oxidation Ponds until power is restored. The project includes equipment needed to connect the mobile generator to the electrical distribution system at various locations throughout the WPCP. This project was completed in June 2018, and a new chapter was added to the WPCP's O&M Manual (**Chapter IV, Section 9.0**).

The above projects will impact the description of preventative measures found in *Section 4: Spill Prevention Plan of the Contingency Plan*, specifically *Table 1: Possible Sources of Treatment Plant Spills and Bypasses*, which summarizes all potential major spills, their possible cause, consequences of the spill and preventative measures.

Headworks and Primary Treatment Facilities Project

This massive construction project will address concerns related to the reliability of the primary effluent pipeline by providing an alternative means of directing primary effluent to the Oxidations Ponds for emergency purposes. The Primary Treatment Facilities Project will enhance overall treatment reliability through new influent pumping facilities, use of influent screens, a new electrical distribution system (initially for the primary facilities and later to be expanded to the entire plant), and a permanently installed 2 MW back-up power system that will be able to service all the WPCP's loads. The latter will have a significant and positive impact on the current emergency power provisions described in Sections 2.1, 2.2, and 3.7 of the Contingency Plan. The project has been split into three packages, the first of which was completed in 2017 and the second of which is currently under construction with an expected completion date in mid to late 2020. Refer to **Chapter IV, Section 3.0** for more information.

Updating the Contingency Plan

This status report will be appended to the Contingency Plan and will serve as the 2019 update. In 2020, the WPCP will incorporate a major update to the Contingency Plan, including additional detailed information regarding new and upcoming facilities.

5.0. SPILL PREVENTION CONTROL AND COUNTERMEASURE

In 2010, a new section was added to the Contingency Plan to specifically address the Spill Prevention Plan requirements of NPDES Permit Attachment G. The Spill Prevention Control and Countermeasure (SPCC) Plan is documented in Section 4 of the Contingency Plan and has not changed. In addition, The SPCC Plan also addresses spill response for non-wastewater spills at the WPCP.

IV. SUNNYVALE CAPITAL IMPROVEMENT PROGRAM

1.0. OVERVIEW

The original components of the WPCP were completed in 1956 and many are still in service to this date. Most of the other major components of the WPCP were completed over the subsequent 15-20 years. Based on a 2006 Asset Condition Assessment Report, the City began implementing several rehabilitation projects and developed a long-term Strategic Infrastructure Plan to serve as a road map for the physical improvements and process enhancements needed to maintain a high level of treatment and to meet current and expected regulatory requirements and stewardship objectives. To help implement the Strategic Infrastructure Plan, in 2013, the City secured the professional services of an engineering design team of consultants to develop a Capital Improvement Program (CIP) and comprehensive Master Plan, which included the "basis of design" development for the various process areas to be rebuilt and a Programmatic Environmental Impact Report.

The City Council approved the WPCP's Master Plan and PEIR in August 2016, thereby authorizing the City to begin implementing the design and construction of the various components necessary to complete the massive 20-year reconstruction project, also known as the *Sunnyvale Cleanwater Program* (SCWP). With an estimated cost of approximately $596 million[12], the SCWP will replace the WPCP's aging infrastructure and operation. **Table 4** lists current major projects within the CIP, including several from the SCWP. Key projects currently underway are highlighted in the table and presented in Fact Sheets in the preceding sections[13]. During fiscal year 2018-2019, the City expended approximately $43.5 million on select CIP projects, including those under the SCWP.

Figure 31: View of WPCP looking east

[12] Budgeted amount for Phases 1-3 of the Master Plan. Phases 4-5 are not included.
[13] CIP information gathered from the *Adopted Budget and Resource Allocation Plan for the City of Sunnyvale Fiscal Year 2019-2020, Volume II – Project Budget*.

Table 4: Summary of CIP Projects, Estimated Costs and Completion Dates

CIP Project Name	Estimated Project Life Total Cost	Status	Estimated Completion Date	Treatment Process Improvements					
				Headworks	Primary	Secondary	Tertiary	Solids Handling	PGF
Primary Treatment Facilities Design and Construction	$ 122,185,617	A	2021	X	X				
Condition Assessment and Existing Plant Rehabilitation	$ 63,622,561	A	2023			X	X		
Administration, Laboratory, and Maintenance Building	$ 44,382,418	A	2024	X	X	X	X	X	X
Caribbean Drive Parking and Bay Trail Access Enhancements	$ 1,671,273	A	2020				X		
Hypochlorite Conversion, Dechlorination Improvements, and Continuous Recycled Water Production Facilities	$ 7,261,210	C	2018				X		
Emergency Flow Management	$ 2,883,000	C	2018		X				
Biosolids Processing	$ 30,970,058	A	2026			X		X	
Asset Management Program	$450,000	C	2018	X	X	X	X	X	X
Oxidation Pond Levee Rehabilitation	$ 9,319,929	A	2028			X			
Electronic O&M Manual	$ 514,080	A	2020	X	X	X	X	X	X
Solids/Dewatering Repairs	$ 175,000	A	2020					X	
SCWP Program Management	$ 63,214,020	A	2029	X	X	X	X	X	X
SCWP Construction Management	$ 35,360,001	A	2029	X	X				
Waste Gas Burner Replacement	$ 4,031,134	A	2029						X
Primary Process Repairs	$ 562,441	A	2021		X				
Secondary Process Repairs	$ 744,809	A	2024			X			
Tertiary Process Repairs	$ 2,259,169	A	2022				X		
PGF Repairs	$2,450,000	A	2026						X
Support Facilities Repairs	$ 1,315,372	A	2025	X	X	X	X	X	X
CIP Total	***$ 393,372,092***								

Notes:

1) Rows highlighted indicate key projects presented in Fact Sheets in the following section.

2) Status Legend: A = Active, C =Completed

2.0. FACILITY CONDITION ASSESSMENT & PLANT REHABILITATION

SUNNYVALE
CLEANWATER
PROGRAM

PROJECT TITLE
Facility Condition Assessment

CONTRACTOR
AECOM

START DATE
May 2017

PROJECT STATUS

Condition Assessment
Completed
Nov 2017

Facilities Rehabilitation
In Progress

Sunnyvale

Condition Assessment and Existing Plant Rehabilitation

WHAT IS IT?

Under the Condition Assessment project, the contractor performed physical assessments of critical equipment and structures within the secondary and tertiary process areas of the WPCP. Their findings and recommendations are being used to refine the scope for facility rehabilitation project, which will ensure the plant facilities remain functional until Stage 2 of the Secondary treatment facilities are complete or through 2035.

Contractor assessing an Air Floatation Tank

WHY?

Due to the age of overall facilities at the WPCP, critical elements of the existing treatment processes need to be rehabilitated or replaced to maintain permit compliance and keep them operational until they are fully replaced with the final build-out of all the conventional activated sludge (CAS) facilities (2035±). Furthermore, the WPCP's Master Plan identified more than 30 capital improvement projects, of which a detailed condition assessment was needed to further quantify existing conditions prior to implementing facilities rehabilitation projects.

PROJECT AREAS

3.0. PRIMARY TREATMENT FACILITIES DESIGN AND CONSTRUCTION

SUNNYVALE
CLEANWATER
PROGRAM

PROJECT TITLE

Primary Treatment Facilities Design and Construction

DESIGN FIRM

Carollo Engineers

CONSTRUCTION FIRMS

Anderson Pacific (P1)
OVERAA (P2)

START DATE

July 2016

PROJECT STATUS

Package 1
Completed
October 2017

Package 2
In Progress

Sunnyvale

Primary Treatment Facilities

WHAT IS IT?

The Primary Treatment Facilities project includes the phased design and construction of new headworks, primary sedimentation tanks, influent pump station, grit removal facilities, and associated electrical, mechanical, and control systems. Along with the use of modern sedimentation tank design for solids removal, the new facilities will improve protection of downstream processes and of biosolids quality through use of influent screens and high efficiency grit basins.

Construction of new Primary Facilities

WHY?

The oldest of the Primary Sedimentation Basins were part of the original plant built in 1955. The concrete in these tanks is eroding and exposing the reinforced steel inside the structures. In addition, the tanks were built before the current, more stringent seismic requirements were put in place, leaving the current structures vulnerable to earthquake damage. The WPCP Strategic Infrastructure Plan (2010) recommended full replacement and relocation of primary treatment, influent pumping and headworks, grit removal, and power distribution facilities, to the former dewatering and drying area east of the existing primary sedimentation basin area.

4.0. ADMINISTRATION, LABORATORY, AND MAINTENANCE BUILDING

SUNNYVALE
CLEANWATER
PROGRAM

PROJECT TITLE
Administration, Laboratory, and Maintenance Building

DESIGN FIRM
MWA Architects

CONSTRUCTION FIRM
TBD

START DATE
September 2017

PROJECT STATUS
In Progress

Sunnyvale

Administration, Laboratory, and Maintenance Building

WHAT IS IT?

The new Administration, Laboratory, and Maintenance Building will provide a much needed facility update to the WPCP. As currently envisioned, the new building will accommodate various groups from within the WPCP and Regulatory Programs Divisions that are presently spread across different facilities and provide a common space to foster collaboration. The design of the building was awarded in September 2017 to MWA Architects and budgeted to meet LEED Gold 2009 standards. The building itself will be located at the intersection of Borregas Ave. and Carl Rd, and a new parking area will be provided for staff and visitor use on the old Household Hazardous Waste Site. As such, public access to the parking spaces at the end of Carl Road will be permanently restricted once construction begins. A separate project (*Caribbean Drive Parking and Trail Enhancements Project*) will provide replacement parking spaces along Caribbean

WHY?

The City is engaged in the Sunnyvale Clean Water Program to renovate the existing WPCP in order to reliably treat and dispose of municipal sewage over the next 30 or more years. The current Administration Building is outdated and in the path of the new floodwall. Construction of a new Administration, Laboratory, and Maintenance Building will not only provide a much needed facility update, but will also provide additional office space for City staff that are currently spread across various facilities.

5.0. CARIBBEAN DRIVE PARKING AND BAY TRAIL ACCESS ENHANCEMENTS

SUNNYVALE
CLEANWATER
PROGRAM

PROJECT TITLE
Caribbean Drive Parking and Bay Trail Access Enhancements

DESIGN FIRM
Mark Thomas

CONSTRUCTION FIRM
Redgwick Construction

START DATE
March 2017

PROJECT STATUS
In Progress

Sunnyvale

Caribbean Drive Parking

WHAT IS IT?

Since 2010, the City has maintained a parking lot and trailhead at the end of Carl Road that provides public access to the San Francisco Bay Trail. The City will be shifting the parking spaces and trail access point from their current position to Caribbean Drive. The work associated with this project includes converting a portion of one lane of west-bound travel on Caribbean Drive to 18 parking parallel parking spaces; installing curbside bioretention cells between the parking spaces to treat stormwater; a new multi-use trail; and striping modifications for transitioning from three lanes to two and back to three lanes.

Partial Area of Bay Trail Levee Enhancements

WHY?

The City is looking to enhance the entrance of the Bay Trail by relocating it to Caribbean Drive for several reasons. Currently, there is no opportunity for expanding the public parking to meet the demands of increased Bay Trail use. Furthermore, the current access point is located in an area heavily trafficked with regular Plant deliveries. Lastly, the construction related to the Sunnyvale Clean Water Program as well as future changes with Plant site layout will increase the congestion.

PROJECT AREAS

6.0. HYPOCHLORITE CONVERSION

SUNNYVALE
CAPITAL IMPROVEMENT
PROGRAM

PROJECT TITLE
Sodium Hypochlorite Conversion

CONTRACTOR
Anderson Pacific

START DATE
May/July 2015

PROJECT STATUS
Completed
May 2018

Sunnyvale

Sodium Hypochlorite Conversion

WHAT IS IT?

This project entails the design and construction of a liquid chlorine (sodium hypochlorite) disinfection system to replace the existing gaseous chlorine system. The project also includes upgrades to the SCADA system that is used to monitor and control disinfection and other tertiary processes. The Hypochlorite Conversion project was a component of a larger project that also upgrades the existing dechlorination system and modifies the current process for recycled water production.

New Sodium Hypochlorite Tank Farm

WHY?

The purpose of this project is to replace the chlorine gas currently being utilized for final effluent and recycled water disinfection with a safer, more manageable chemical: liquid, sodium hypochlorite. Chlorine gas is extremely hazardous and most POTWs have transitioned away from its use for effluent disinfection. The will included the installation of storage tanks, chemical feed pumps, yard piping, injection equipment, and an upgraded Supervisory Control and Data Acquisition (SCADA) system.

7.0. DECHLORINATION IMPROVEMENTS

SUNNYVALE
CAPITAL IMPROVEMENT
PROGRAM

PROJECT TITLE

Dechlorination System Improvements

CONTRACTOR

Anderson Pacific

START DATE

May/June 2015

PROJECT STATUS

Completed

May 2018

Dechlorination Improvements

WHAT IS IT?

New Sodium Bisulfite (SBS) Dosing Point

This project provides for the design and construction to improve the dichlorination process of final effluent and recycled water. This project will install an additional sodium bisulfite (SBS) injection point upstream to give the control system more time to respond to changes in SBS demand. The will included the installation of chemical feed pumps, yard piping, and injection equipment. The City is also upgrading the SCADA system that controls dechlorination and other tertiary processes and replacing core hardware. Existing control programming is being replicated in the new system, and new programing is being developed to incorporate the new SBS injection units into the dechlorination control strategy.

WHY?

The purpose of this project is to address the limited time for control system response due to the distance between the final dechlorination injection point and the discharge compliance point. Historically, there has been very little time for control system response, which has necessitated the use of additional anticipatory controls and control overrides to ensure compliance with discharge requirements.

PROJECT AREAS

Sunnyvale

8.0. CONTINUOUS RECYCLED WATER PRODUCTION AND PIPELINE EXTENSION

SUNNYVALE
CAPITAL IMPROVEMENT
PROGRAM

PROJECT TITLE

Continuous Recycled Water Production and Wolfe Road Pipeline

CONTRACTOR

Anderson Pacific

START DATE

May 2015

PROJECT STATUS

Completed

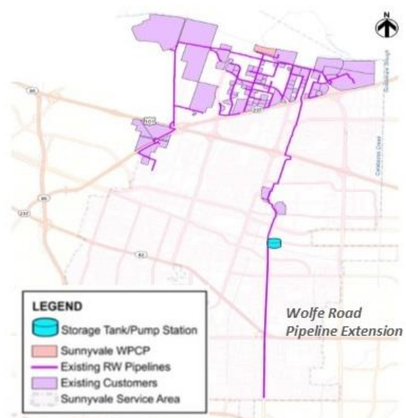
May 2018

Sunnyvale

Continuous Recycled Water Production Facilities and Wolfe Road Pipeline

WHAT IS IT?

The project includes design and construction improvements that will allow for continuous production of recycled water in parallel with discharge of treated effluent to San Francisco Bay. The project is intended to alleviate current and future drought impacts by offsetting the use of potable water in the recycled water distribution system, which is a practice utilized when customer demand exceeds production. The project also includes a new pumping station and 13,300 linear foot extension of the Wolfe Road pipeline to the new Apple Campus 2 in Cupertino under a partnership with the Santa Clara Valley Water District.



Recycled Water Service Area

WHY?

The purpose of this project is to increase recycled water production and distribution capacity, and process reliability while reducing chemical and operating costs. Furthermore, the project sets the stage for a future potable reuse project involving groundwater recharge through an additional extension of the Wolfe Road pipeline to SCVWD recharge ponds.

PROJECT AREAS

9.0. EMERGENCY FLOW MANAGEMENT

SUNNYVALE
CAPITAL IMPROVEMENT
PROGRAM

PROJECT TITLE
Emergency Flow Management

CONTRACTOR
Anderson Pacific

START DATE
February 2016

PROJECT STATUS
Completed
June 2018

Sunnyvale

Emergency Flow Management

WHAT IS IT?

The WPCP experiences area-specific power outages, as well as plant-wide power outages that create challenging situations due to the absence of redundant centralized power distribution and back-up system. The Emergency Flow Management project will install a 1 MW trailer-mounted back-up diesel generator that can service various locations of the WPCP. The emergency generator will provide standby power for existing facilities, including the Primary Influent Pump Station, Auxiliary Pump Station and other essential Tertiary treatment equipment. Although the generator will have the ability to connect to all loads powered through the distribution system, due to size constraints it will not be capable of powering all loads simultaneously. However, through selective load shedding and other operational measures, it will be possible to maintain full treatment when operating on emergency power.

WHY?

Currently, the power generating engines are not configured to provide stand-alone power to various critical wastewater process systems. The generator will provide standby emergency power to ensure continued operation of the WPCP in the event of a power outage.

PROJECT AREAS

10.0. OXIDATION POND AND DIGESTER DEWATERING

SUNNYVALE
CAPITAL IMPROVEMENT PROGRAM

PROJECT TITLE
Biosolids Processing

CONTRACTOR
Synagro

START DATE
January 2014

PROJECT STATUS
In progress

Sunnyvale

Solids Dewatering

WHAT IS IT?

The Synagro Dewatering project was initiated in 2009 to address the accumulation of solids in the Oxidation Ponds through dredging and dewatering with a centrifuge prior to hauling off-site for beneficial reuse. No solids had been removed since the ponds were converted for use as a secondary treatment process in the late 1960s. In late February, 2015, Synagro's processing work site was relocated to the north side of the Primary Sedimentation Basins to make way for the new Primary Treatment Facilities. In addition to pond solids, Synagro began dewatering digester solids on a belt filter press following their relocation. Previously, digester solids were dewatered by Operations staff in a system that used slotted dewatering tiles to drain excess water before moving them to a solar drying tarmac. The new configuration will likely continue until the new dewatering facility is constructed.

New Synagro Dewatering Area

WHY?

According to a 2006 study, solids carried over from various stages in the WPCP's treatment process have accumulated to an estimated 35-45% of pond volume, resulting in a decline in treatment capacity and efficacy.

PROJECT AREAS

11.0. ASSET MANAGEMENT PROGRAM

SUNNYVALE
CAPITAL IMPROVEMENT
PROGRAM

PROJECT TITLE

Asset Management Program

CONTRACTOR

The Arcanum Group

START DATE

May 2017

PROJECT STATUS

Go-Live

Completed

March 2018

Single Sign-On (SSO)

Completed

June 2019

Sunnyvale

Asset Management Program

WHAT IS IT?

WPCP infrastructure consists of approximately 3,225 assets that each have life expectancy and maintenance needs. The WPCP's Asset Management Program is a strategic, organization-wide program that achieves an appropriate balance of risk, cost, performance and longevity to maximize asset value. The WPCP's Asset Management Program is supported by an Asset Information System, which is the main business process tool used for tracking asset maintenance needs, repair costs, and life cycle costs used in evaluating replacement versus repair decisions at the Plant. The project is intended to update the Asset Management Program at the WPCP and upgrade the existing, outdated and unsupported Maximo Asset Management System with a new Enterprise Asset Management System (EAMS) that will better align with the needs of the new Plant being built as part of the Clean Water Program. 'Infor EAM' was selected as the new EAMS and went live in March of 2018.

WHY?

The WPCP's Asset Management Program contributes to the economic health of the WPCP by keeping its facilities and infrastructure functioning effectively at the lowest life cycle cost. The WPCP's Asset Information System received its last major upgrade at the WPCP in 1999 and has not been supported by the manufacturer since 2008. City IT staff assessed the current Maximo system as unstable and prone to frequent failures causing significant disruption to work flow and availability of assets in a critical situation.

PROJECT AREAS

12.0. LEVEE MAINTENANCE PROGRAM

SUNNYVALE
CAPITAL IMPROVEMENT
PROGRAM

PROJECT TITLE

Oxidation Pond Levee Rehabilitation

ASSESSMENT FIRM

Cal Engineering & Geology, Inc. and NVS

DEVELOPMENT FIRM

HDR

START DATE

April 2016

PROJECT STATUS

<u>O&M Manual</u>

Completed

November 2018

<u>Levee Repairs</u>

In Progress

Sunnyvale

Levee Maintenance Program

WHAT IS IT?

Oxidation Pond Levees

The City has developed the Operation and Maintenance Manual of Oxidation Pond Levees (O&M) to assist in managing repairs and maintenance efforts for the existing levees surrounding the Water Pollution Control Plant (WPCP) ponds. The 440 acres of Oxidation Ponds at the WPCP are enclosed by inner and outer levee roads that are in various stages of erosion. The inner levees form the pond distribution and recirculation channels, and the outer levees are responsible for containing the wastewater and preventing its release into the environment. In 2016, contractors completed the Levee Asset Management Plan (LAMP), a comprehensive condition assessment of the city roads and bridges, which included the WPCP pond levees. The City has used the results to complete a corresponding digital GIS mapping and O&M to successfully monitor and maintain the levees for the next 20 plus years.

WHY?

The levee roads are critical to the successful operation of the WPCP for the next 20 plus years. These levees are in various stages of erosion and require immediate attention to safeguard public and WPCP staff safety.

PROJECT AREAS

13.0. ELECTRONIC O&M MANUAL

SUNNYVALE
CAPITAL IMPROVEMENT
PROGRAM

PROJECT TITLE
Electronic Operation and Maintenance Manual

CONTRACTOR
Atlassian

START DATE
August 2018

PROJECT STATUS
In Progress

Sunnyvale

Electronic O&M Manual

WHAT IS IT?

This project includes the implementation of a comprehensive Electronic Operations & Maintenance Manual for the WPCP to replace the current limited, narrative-based, paper O&M manual. The goal of the electronic O&M manual is to develop a living document repository and interface where information pertinent to operations and maintenance is located and that leverages information in the City's other enterprise applications. Quick access to facility documentation is imperative to effective process operations and troubleshooting by reducing the amount of time spent searching through endless folders of partially obsolete information.

WHY?

With the reconstruction of the Water Pollution Control Plant already underway, an intuitive method of storing and retrieving all of the facility documentation is needed. With significant changes in nearly every future process, Operations and Maintenance staff will need a centralized, user friendly, interface that allows access to SOPs, record drawings, equipment information, process control descriptions, operating manuals, regulatory information and historical data from LIMS, EAMS/CMMS and SCADA. An electronic O&M manual would facilitate training new employees, refreshing the knowledge of existing staff and function as an up-to-date reference for a wide variety of information.

PROJECT AREAS

V. PERMIT SPECIAL STUDIES

Under Provision VI.C of the previous Order (R2-2009-0061), the City was required to perform several special studies, including 1) Chronic Toxicity Identification and Toxicity Reduction Study; 2) Receiving Water Ammonia Characterization Study; and 3) Total Suspended Solids Removal Study. All of these special studies were completed and reported prior to 2015. The current Order (R2-2014-0035) does not contain any special study provisions.

VI. OTHER STUDIES AND PROGRAMS

1.0. EFFLUENT CHARACTERIZATION STUDY AND REPORT

The WPCP is required under Provision VI.C.2 of its current NPDES permit to continue to characterize and evaluate the final effluent to verify that the reasonable potential analysis conclusions of the current Order remain valid and to inform the next permit issuance. The results of the effluent monitoring for priority pollutants are included in **Attachment C**. No pollutants were identified as having reasonable potential based on the 2015 results, and no significant increases were observed between the datasets where analytical results were above detection limits.

No priority pollutant data other than the parameters listed in **Chapter II** were collected in 2019 as the WPCP elected to divert the analytical costs associated with priority pollutant monitoring to supplement the Regional Monitoring Program under the *Alternate Monitoring and Reporting Requirements for Municipal Wastewater Discharges,* Order No. R2-2016-0008. With the exception of the parameters listed in **Chapter II**, the WPCP will not collect additional priority pollutant data until the next permit reissuance, as data collected in 2015 satisfy the once-per-permit-cycle requirement established in Provision VI.C.1 of the Order.

2.0. NUTRIENT MONITORING FOR REGIONAL NUTRIENT PERMIT

In 2019, the City continued to collect influent and effluent samples for analysis of nutrients in accordance with the RWQCB's April 2014 Nutrients from Municipal Dischargers to San Francisco Bay, Order No. R2-2014-0014 until June 30, 2019 and Order R2-2019-0017 became effective July 1, 2019. As required by that Order, results from the WPCP's ongoing monitoring of its effluent are submitted electronically to CIWQS in monthly SMRs. These results are compiled by BACWA into a group annual report and submitted to the RWQCB. In addition, the WPCP has elected to include nutrient data in **Chapter II, Section 1.5** of this report.

3.0. REGIONAL WATER MONITORING PROGRAM

Provision VI in Attachment E of the WPCP's current NPDES permit requires the City to continue its participation in the Regional Water Monitoring Program (RMP), which was formally established in 1993 and is the only comprehensive environmental monitoring program to measure pollutants and trends in the SF Bay. The goal of the RMP is to collect data and communicate information about water quality in the SF Bay in support of management decisions. The accomplishments of the RMP over the past two years are summarized in the *Pulse of the Bay* report that can be accessed from http://www.sfei.org/rmp/pulse.

In March 2016, the Water Board adopted Order R2-2016-0008, establishing an alternative monitoring requirement (AMR) for municipal wastewater discharges to San Francisco Bay and its tributaries, in exchange for a set schedule of increased payments to the RMP. Participating wastewater treatment facilities who opt-in to this alternative are able to reduce their effluent monitoring costs for most organic priority pollutants and chronic toxicity species rescreening. In exchange for the reduced monitoring requirements, facilities make supplemental payments to the RMP for regional studies to inform management decisions about water quality in the Bay. Through these financial contributions, the RMP is able to conduct regional monitoring to assess the cumulative impact of multiple sources of pollutants to the SF Bay. The City's RMP participation is documented in a letter issued by BACWA annually, located at https://bacwa.org/wp-content/uploads/2020/01/BACWA-NPDES-Permit-Letter-2020-submitted.pdf

ATTACHMENTS

ATTACHMENT A

Wastewater Treatment Process Schematic

Solids Treatment Process Schematic

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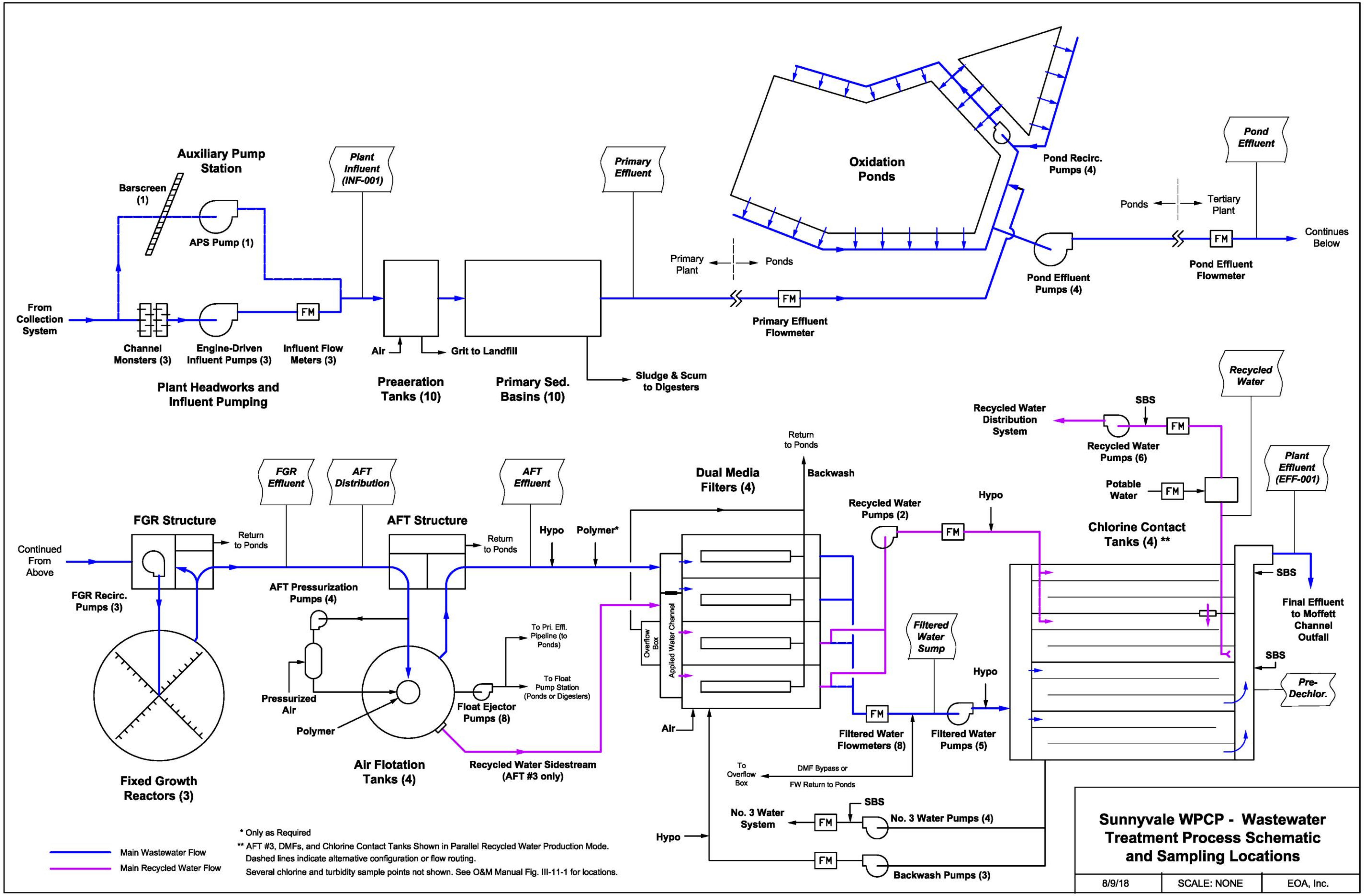
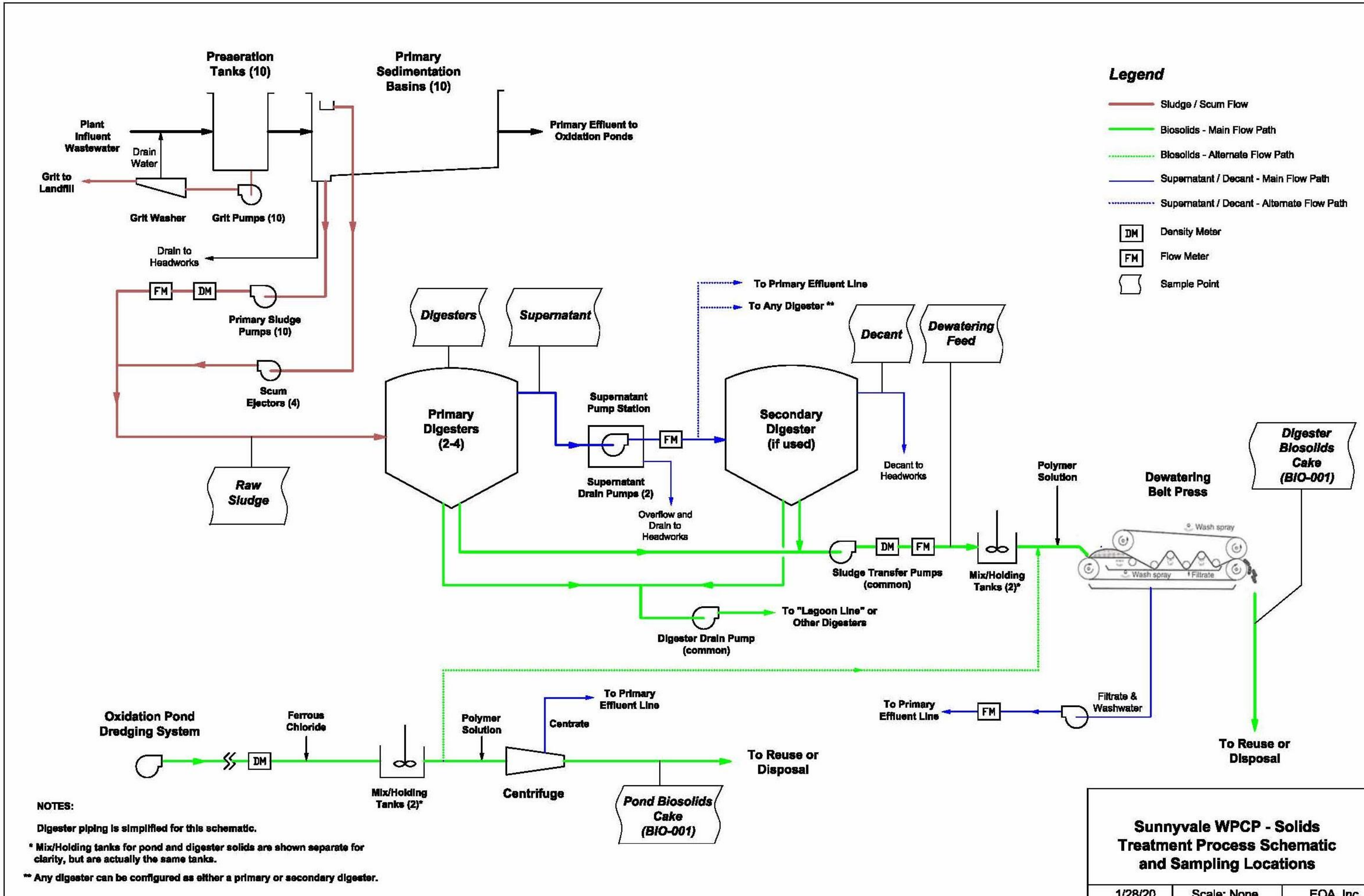

Auxiliary Pump Station
Barscreen (1)
APS Pump (1)
Plant Influent (INF-001)
Primary Effluent
Oxidation Ponds
Pond Recirc. Pumps (4)
Pond Effluent
Ponds
Tertiary Plant
Continues Below
Pond Effluent Flowmeter
Pond Effluent Pumps (4)
Primary Plant
Ponds
Primary Effluent Flowmeter
From Collection System
Channel Monsters (3)
Engine-Driven Influent Pumps (3)
Influent Flow Meters (3)
Air
Grit to Landfill
Sludge & Scum to Digesters
Plant Headworks and Influent Pumping
Preaeration Tanks (10)
Primary Sed. Basins (10)
Recycled Water
Recycled Water Distribution System
SBS
Recycled Water Pumps (6)
Potable Water
Plant Effluent (EFF-001)
Return to Ponds
Dual Media Filters (4)
Backwash
Recycled Water Pumps (2)
Hypo
Chlorine Contact Tanks (4) **
FGR Effluent
AFT Distribution
AFT Effluent
FGR Structure
AFT Structure
Return to Ponds
Return to Ponds
Hypo
Polymer*
Continued From Above
FGR Recirc. Pumps (3)
AFT Pressurization Pumps (4)
To Pri. Effl. Pipeline (to Ponds)
To Float Pump Station (Ponds or Digesters)
Pressurized Air
Polymer
Float Ejector Pumps (8)
Overflow Box
Applied Water Channel
Air
Filtered Water Sump
Hypo
Filtered Water Flowmeters (8)
Filtered Water Pumps (5)
SBS
Final Effluent to Moffett Channel Outfall
SBS
Pre-Dechlor.
Fixed Growth Reactors (3)
Air Flotation Tanks (4)
Recycled Water Sidestream (AFT #3 only)
To Overflow Box
DMF Bypass or FW Return to Ponds
SBS
No. 3 Water System
No. 3 Water Pumps (4)
Hypo
Backwash Pumps (3)
FM
Main Wastewater Flow
Main Recycled Water Flow
* Only as Required
** AFT #3, DMFs, and Chlorine Contact Tanks Shown in Parallel Recycled Water Production Mode.
Dashed lines indicate alternative configuration or flow routing.
Several chlorine and turbidity sample points not shown. See O&M Manual Fig. III-11-1 for locations.
Sunnyvale WPCP - Wastewater Treatment Process Schematic and Sampling Locations
8/9/18
SCALE: NONE
EOA, Inc.


Preaeration Tanks (10)
Primary Sedimentation Basins (10)
Plant Influent Wastewater
Drain Water
Primary Effluent to Oxidation Ponds
Grit to Landfill
Grit Washer
Grit Pumps (10)
Drain to Headworks
FM
DM
Primary Sludge Pumps (10)
Scum Ejectors (4)
Raw Sludge
Digesters
Supernatant
Primary Digesters (2-4)
Supernatant Pump Station
Supernatant Drain Pumps (2)
Overflow and Drain to Headworks
To Primary Effluent Line
To Any Digester **
Secondary Digester (if used)
Decant
Dewatering Feed
Decant to Headworks
Sludge Transfer Pumps (common)
Mix/Holding Tanks (2)*
Polymer Solution
Dewatering Belt Press
Wash spray
Filtrate
Digester Biosolids Cake (BIO-001)
Digester Drain Pump (common)
To "Lagoon Line" or Other Digesters
To Primary Effluent Line
Filtrate & Washwater
To Reuse or Disposal
Oxidation Pond Dredging System
Ferrous Chloride
Mix/Holding Tanks (2)*
Polymer Solution
Centrifuge
Centrate
To Primary Effluent Line
To Reuse or Disposal
Pond Biosolids Cake (BIO-001)
Legend
Sludge / Scum Flow
Biosolids - Main Flow Path
Biosolids - Alternate Flow Path
Supernatant / Decant - Main Flow Path
Supernatant / Decant - Alternate Flow Path
Density Meter
Flow Meter
Sample Point
NOTES:
Digester piping is simplified for this schematic.
* Mix/Holding tanks for pond and digester solids are shown separate for clarity, but are actually the same tanks.
** Any digester can be configured as either a primary or secondary digester.
Sunnyvale WPCP - Solids Treatment Process Schematic and Sampling Locations
1/28/20
Scale: None
EOA, Inc.

ATTACHMENT B

WPCP Certificate of Environmental Accreditation

WPCP Approved Analyses

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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

City of Sunnyvale Environmental Laboratory

Environmental Services Dept. - Regulatory Programs

1444 Borregas Avenue

Sunnyvale, CA 94088

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.: **1340**

Expiration Date: **10/31/2020**

Effective Date: **11/1/2018**

Sacramento, California
subject to forfeiture or revocation

Christine Sotelo, Chief
Environmental Laboratory Accreditation Program

CALIFORNIA STATE
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
Accredited Fields of Testing

City of Sunnyvale Environmental Laboratory
Environmental Services Dept. - Regulatory Programs
1444 Borregas Avenue
Sunnyvale, CA 94088
Phone: 4087307704

Certificate No. 1340
Expiration Date 10/31/2020

Field of Testing: 101 - Microbiology of Drinking Water			
101.010	002	Heterotrophic Bacteria	SimPlate
101.050	001	Total Coliform P/A	SM 9223 B Colilert
101.050	002	E. coli P/A	SM 9223 B Colilert
101.050	003	Total Coliform (Enumeration)	SM 9223 B Colilert
101.050	004	E. coli (Enumeration)	SM 9223 B Colilert
Field of Testing: 102 - Inorganic Chemistry of Drinking Water			
102.030	003	Chloride	EPA 300.0
102.030	006	Nitrate (as N)	EPA 300.0
102.030	008	Phosphate,Ortho (as P)	EPA 300.0
102.030	009	Sulfate (as SO4)	EPA 300.0
102.095	001	Turbidity	SM 2130 B-2001
102.100	001	Alkalinity	SM 2320 B-1997
102.121	001	Hardness	SM 2340 C-1997
102.130	001	Specific Conductance	SM 2510 B-1997
102.148	001	Calcium	SM 3500-Ca B-1997
102.175	001	Chlorine, Free	SM 4500-Cl G-2000
102.175	002	Chlorine, Total Residual	SM 4500-Cl G-2000
102.200	001	Fluoride	SM 4500-F C-2011
102.203	001	Hydrogen Ion (pH)	SM 4500-H+ B-2000
102.220	001	Nitrite (as N)	SM 4500-NO2 B-2000
Field of Testing: 103 - Toxic Chemical Elements of Drinking Water			
103.140	001	Aluminum	EPA 200.8
103.140	002	Antimony	EPA 200.8
103.140	003	Arsenic	EPA 200.8
103.140	004	Barium	EPA 200.8
103.140	005	Beryllium	EPA 200.8
103.140	006	Cadmium	EPA 200.8
103.140	007	Chromium	EPA 200.8
103.140	008	Copper	EPA 200.8
103.140	009	Lead	EPA 200.8
103.140	010	Manganese	EPA 200.8
103.140	012	Nickel	EPA 200.8
103.140	013	Selenium	EPA 200.8

As of 10/23/2019 , this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

103.140	014	Silver	EPA 200.8
103.140	015	Thallium	EPA 200.8
103.140	016	Zinc	EPA 200.8
103.140	017	Boron	EPA 200.8
103.140	018	Vanadium	EPA 200.8

Field of Testing: 104 - Volatile Organic Chemistry of Drinking Water

104.040	000	Volatile Organic Compounds	EPA 524.2
104.040	001	Benzene	EPA 524.2
104.040	007	n-Butylbenzene	EPA 524.2
104.040	008	sec-Butylbenzene	EPA 524.2
104.040	009	tert-Butylbenzene	EPA 524.2
104.040	010	Carbon Tetrachloride	EPA 524.2
104.040	011	Chlorobenzene	EPA 524.2
104.040	015	2-Chlorotoluene	EPA 524.2
104.040	016	4-Chlorotoluene	EPA 524.2
104.040	019	1,3-Dichlorobenzene	EPA 524.2
104.040	020	1,2-Dichlorobenzene	EPA 524.2
104.040	021	1,4-Dichlorobenzene	EPA 524.2
104.040	022	Dichlorodifluoromethane	EPA 524.2
104.040	023	1,1-Dichloroethane	EPA 524.2
104.040	024	1,2-Dichloroethane	EPA 524.2
104.040	025	1,1-Dichloroethene (1,1-Dichloroethylene)	EPA 524.2
104.040	026	cis-1,2-Dichloroethene	EPA 524.2
104.040	027	trans-1,2-Dichloroethene	EPA 524.2
104.040	028	Dichloromethane (Methylene Chloride)	EPA 524.2
104.040	029	1,2-Dichloropropane	EPA 524.2
104.040	033	cis-1,3-Dichloropropene	EPA 524.2
104.040	034	trans-1,3-Dichloropropene	EPA 524.2
104.040	035	Ethylbenzene	EPA 524.2
104.040	037	Isopropylbenzene	EPA 524.2
104.040	039	Naphthalene	EPA 524.2
104.040	041	N-propylbenzene	EPA 524.2
104.040	042	Styrene	EPA 524.2
104.040	043	1,1,1,2-Tetrachloroethane	EPA 524.2
104.040	044	1,1,2,2-Tetrachloroethane	EPA 524.2
104.040	045	Tetrachloroethylene (Tetrachloroethene)	EPA 524.2
104.040	046	Toluene	EPA 524.2
104.040	047	1,2,3-Trichlorobenzene	EPA 524.2
104.040	048	1,2,4-Trichlorobenzene	EPA 524.2
104.040	049	1,1,1-Trichloroethane	EPA 524.2
104.040	050	1,1,2-Trichloroethane	EPA 524.2
104.040	051	Trichloroethene	EPA 524.2

As of 10/23/2019 , this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

108.532	001	Oxygen, Dissolved	SM 4500-O C-2001
108.536	001	Oxygen, Dissolved	SM 4500-O G-2001
108.540	001	Phosphate, Ortho (as P)	SM 4500-P E-1999
108.541	001	Phosphorus, Total	SM 4500-P E-1999
108.592	001	Biochemical Oxygen Demand	SM 5210 B -2001
108.592	002	Carbonaceous BOD	SM 5210 B -2001
108.596	001	Organic Carbon-Total (TOC)	SM 5310 B-2000
108.660	001	Chemical Oxygen Demand	Hach 8000
Field of Testing: 109 - Metals and Trace Elements in Non-Potable Water			
109.020	001	Aluminum	EPA 200.8
109.020	002	Antimony	EPA 200.8
109.020	003	Arsenic	EPA 200.8
109.020	004	Barium	EPA 200.8
109.020	005	Beryllium	EPA 200.8
109.020	006	Cadmium	EPA 200.8
109.020	007	Chromium	EPA 200.8
109.020	008	Cobalt	EPA 200.8
109.020	009	Copper	EPA 200.8
109.020	010	Lead	EPA 200.8
109.020	011	Manganese	EPA 200.8
109.020	012	Molybdenum	EPA 200.8
109.020	013	Nickel	EPA 200.8
109.020	014	Selenium	EPA 200.8
109.020	015	Silver	EPA 200.8
109.020	016	Thallium	EPA 200.8
109.020	017	Vanadium	EPA 200.8
109.020	018	Zinc	EPA 200.8
109.020	021	Iron	EPA 200.8
Field of Testing: 110 - Volatile Organic Constituents in Non-Potable Water			
110.040	000	Purgeable Organic Compounds	EPA 624
Field of Testing: 113 - Environmental Toxicity Methods			
113.022	003C	Rainbow trout (O. mykiss)	EPA 2019 (EPA-821-R-02-012), Continuous Flow
Field of Testing: 120 - Physical Properties of Hazardous Waste			
120.010	001	Ignitability	EPA 1010
Field of Testing: 126 - Microbiological Methods for Ambient Water			
126.050	001	Total Coliform (Enumeration)	SM 9223 B Colilert
126.050	002	E. coli (Enumeration)	SM 9223 B Colilert
126.080	001	Enterococci	Enterolert

As of 10/23/2019, this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

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ATTACHMENT C

Effluent Characterization Study and Report Monitoring Results 2014 - 2015

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Table 5: Analytical Results and Significance Determination for Priority Pollutants 2014-2015

CTR #	Priority Pollutant	Governing Water Quality Objective (ug/L)	2014 Result (ug/L)	2015 Result (ug/L)	Significant Increase (Y/N)	Comment /Note
1	Antimony	4,300	0.355	0.205 DNQ	N	
2	Arsenic	36	1.03 DNQ	0.893 DNQ	N	
3	Beryllium	NNC	ND	ND	N	
4	Cadmium	7.31	ND	ND	N	
5a	Chromium (III)	644	ND	ND	N	
5b	Chromium (VI)	180	ND	ND	N	
6	Copper	13	2.27	1.94	N	
7	Lead	135	0.406	0.32 DNQ	N	
8	Mercury (303(d) listed) [4]	---	0.00241	0.00140	N	
9	Nickel	27	3.86	4.02	N	
10	Selenium (303(d) listed)	5	0.708	0.605 DNQ	N	
11	Silver	2.20	ND	ND	N	
12	Thallium	6	ND	ND	N	
13	Zinc	161	7.44 DNQ	7.44 DNQ	N	
14	Cyanide	2.9	2.8	1.72	N	
15	Asbestos	NNC	NA	NA	N	
16	2,3,7,8-TCDD (303(d) listed)	1.40×10^{-8}	ND	ND	N	
	Dioxin-TEQ (303(d) listed)	1.40×10^{-8}	ND	ND	N	
17	Acrolein	780	ND	ND	N	
18	Acrylonitrile	0.66	ND	ND	N	
19	Benzene	71	ND	ND	N	
20	Bromoform	360	26.80	5.65	N	
21	Carbon Tetrachloride	4.4	0.18 DNQ	0.58	N	
22	Chlorobenzene	21,000	ND	ND	N	
23	Chlorodibromomethane	34	11.8	16.2	N	
24	Chloroethane	NNC	ND	ND	N	
25	2-Chloroethylvinyl ether	NNC	ND	ND	N	
26	Chloroform	NNC	9.15	8.45	N	
27	Dichlorobromomethane	46	8.70	16.6	N	
28	1,1-Dichloroethane	---	ND	ND	N	
29	1,2-Dichloroethane	99	ND	ND	N	
30	1,1-Dichloroethylene	3.20	ND	ND	N	
31	1,2-Dichloropropane	39	ND	ND	N	
32	1,3-Dichloropropylene	1,700	ND	ND	N	
33	Ethylbenzene	29,000	ND	ND	N	
34	Methyl Bromide	4,000	ND	ND	N	
35	Methyl Chloride	---	ND	ND	N	
36	Methylene Chloride	1,600	ND	ND	N	
37	1,1,2,2-Tetrachloroethane	11	ND	ND	N	

CTR #	Priority Pollutant	Governing Water Quality Objective (ug/L)	2014 Result (ug/L)	2015 Result (ug/L)	Significant Increase (Y/N)	Comment /Note
38	Tetrachloroethylene	8.85	ND	ND	N	
39	Toluene	200,000	ND	ND	N	
40	1,2-Trans-Dichloroethylene	140,000	ND	ND	N	
41	1,1,1-Trichloroethane	---	ND	ND	N	
42	1,1,2-Trichloroethane	42	ND	ND	N	
43	Trichloroethylene	81	ND	ND	N	
44	Vinyl Chloride	525	ND	ND	N	
45	2-Chlorophenol	400	ND	ND	N	
46	2,4-Dichlorophenol	790	ND	ND	N	
47	2,4-Dimethylphenol	2,300	ND	ND	N	
48	2-Methyl-4,6-Dinitrophenol	765	ND	ND	N	
49	2,4-Dinitrophenol	14,000	ND	ND	N	
50	2-Nitrophenol	---	ND	ND	N	
51	4-Nitrophenol	---	ND	ND	N	
52	3-Methyl 4-Chlorophenol	---	ND	ND	N	
53	Pentachlorophenol	7.9	ND	ND	N	
54	Phenol	4,600,000	ND	ND	N	
55	2,4,6-Trichlorophenol	7	ND	ND	N	
56	Acenaphthene	2,700	ND	ND	N	
57	Acenaphthylene	---	ND	ND	N	
58	Anthracene	110,000	ND	ND	N	
59	Benzidine	0	ND	ND	N	
60	Benzo(a)Anthracene	0	ND	ND	N	
61	Benzo(a)Pyrene	0.049	ND	ND	N	
62	Benzo(b)Fluoranthene	0.05	ND	ND	N	
63	Benzo(ghi)Perylene	---	ND	ND	N	
64	Benzo(k)Fluoranthene	0	ND	ND	N	
65	Bis(2-Chloroethoxy)Methane	---	ND	ND	N	
66	Bis(2-Chloroethyl)Ether	1.40	ND	ND	N	
67	Bis(2-Chloroisopropyl)Ether	170,000	ND	ND	N	
68	Bis(2-Ethylhexyl)Phthalate	5.9	ND	ND	N	
69	4-Bromophenyl Phenyl Ether	---	ND	ND	N	
70	Butylbenzyl Phthalate	5,200	ND	ND	N	
71	2-Chloronaphthalene	4,300	ND	ND	N	
72	4-Chlorophenyl Phenyl Ether	---	ND	ND	N	
73	Chrysene	0.049	ND	ND	N	
74	Dibenzo(a,h)Anthracene	0.05	ND	ND	N	
75	1,2-Dichlorobenzene	17,000	ND	ND	N	
76	1,3-Dichlorobenzene	2,600	ND	ND	N	
77	1,4-Dichlorobenzene	2,600	ND	ND	N	

CTR #	Priority Pollutant	Governing Water Quality Objective (ug/L)	2014 Result (ug/L)	2015 Result (ug/L)	Significant Increase (Y/N)	Comment /Note
78	3,3 Dichlorobenzidine	0.08	ND	ND	N	
79	Diethyl Phthalate	120,000	ND	ND	N	
80	Dimethyl Phthalate	2,900,000	ND	ND	N	
81	Di-n-Butyl Phthalate	12,000	ND	ND	N	
82	2,4- Dinitrotoluene	9.10	ND	ND	N	
83	2,6 - Dinitrotoluene	---	ND	ND	N	
84	Di-n-Octyl Phthalate	---	ND	0.835 DNQ	N	
85	1,2-Diphenyhydrazine	0.54	ND	ND	N	
86	Fluoranthene	370	ND	ND	N	
87	Fluorene	14,000	ND	ND	N	
88	Hexachlorobenzene	0	ND	ND	N	
89	Hexachlorobutadiene	50	ND	ND	N	
90	Hexachlorocyclopentadiene	17,000	ND	ND	N	
91	Hexachloroethane	9	ND	ND	N	
92	Indeno(1,2,3-cd)Pyrene	0	ND	ND	N	
93	Isophorone	600	ND	ND	N	
94	Naphthalene	---	ND	ND	N	
95	Nitrobenzene	1,900	ND	ND	N	
96	N-Nitrosodimethylamine	8	ND	ND	N	
97	N-Nitrosodi-n-Propylamine	1.4	ND	ND	N	
98	N-Nitrosodiphenyl	16.00	ND	ND	N	
99	Phenanthrene	---	ND	ND	N	
100	Pyrene	11,000	ND	ND	N	
101	1,2,4-Trichlorobenzene	---	ND	ND	N	
102	Aldrin	0.00	ND	ND	N	
103	Alpha-BHC	0	ND	ND	N	
104	Beta-BHC	0	ND	ND	N	
105	Gamma-BHC	0.063	ND	ND	N	
106	Delta-BHC	---	ND	ND	N	
107	Chlordane (303(d) listed)	0	ND	ND	N	
108	4,4'-DDT (303(d) listed)	0	ND	ND	N	
109	4,4'-DDE (linked to DDT)	0.00059	ND	ND	N	
110	4,4'-DDD	0	ND	ND	N	
111	Dieldrin (303d listed)	0	ND	ND	N	
112	Alpha-Endosulfan	0	ND	ND	N	
113	beta-Endosulfan	0.0087	ND	ND	N	
114	Endosulfan Sulfate	240	ND	ND	N	
115	Endrin	0	ND	ND	N	
116	Endrin Aldehyde	1	ND	ND	N	
117	Heptachlor	0.00021	ND	ND	N	

CTR #	Priority Pollutant	Governing Water Quality Objective (ug/L)	2014 Result (ug/L)	2015 Result (ug/L)	Significant Increase (Y/N)	Comment /Note
118	Heptachlor Epoxide	0	ND	ND	N	
119-125	PCBs sum (303(d) listed) [4]	---	ND	ND	N	
126	Toxaphene	0	ND	ND	N	
127	Tributyltin	0.0074	ND	NA	N	

Legend:

ND: "Non-detect" – analytical result was not detected above laboratory method detection limit.

DNQ: "Does not qualify" – analytical result is less than minimum limit or reporting limit but greater than or equal to the method detection limit.

---: Indicates no numeric criteria have been set for the criteria pollutant.