January 30, 2015

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

Attn: NPDES Division

Subject: **City of Sunnyvale Water Pollution Control Plant 2014 Annual Self Monitoring Report**

The attached 2014 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.

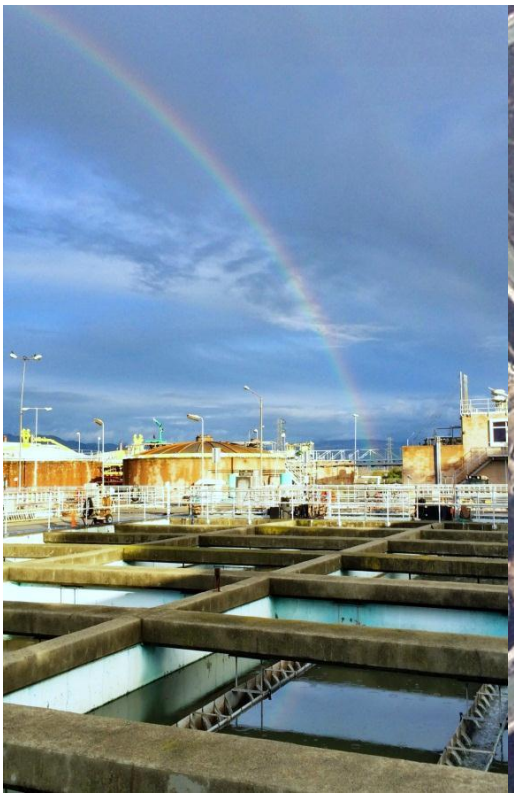
If you have any questions, please contact me at (408) 730-7260.

Sincerely,

Bhavani Yerrapotu
WPCP Division Manager

Attachment: 2014 NPDES Annual Report

City of Sunnyvale | Environmental Services Department



Sunnyvale Water Pollution Control Plant

Plant Compliance

NPDES Annual Report
R2-2014-0035

2014

2014 ANNUAL NPDES REPORT

City of Sunnyvale

Prepared for:

Mr. Bruce Wolfe

California Regional Water Quality Control Board

San Francisco Bay Region

1515 Clay Street, Suite #1400

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January 30, 2015

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I. INTRODUCTION

1.0. BACKGROUND

The 2014 National Pollutant Discharge Elimination System (NPDES) Annual Report for the City of Sunnyvale Water Pollution Control Plant (WPCP) is prepared in accordance with NPDES Permit Number CA0037621, and San Francisco Bay Regional Water Quality Control Board (RWQCB) Orders R2-2009-0061 and R2-2014-0035. This report summarizes the discharge monitoring results from the reporting period of January 1 to December 31, 2014, and has been divided into six chapters to address the requirements contained 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.

During the 2014 reporting period, the RWQCB issued a new Order (R2-2014-0035) for NPDES CA0037621, which included several changes to monitoring parameters and frequencies (**Table 1**).

Table 1: Changes to WPCP Effluent Limitations Included in Order R2-2014-0035

Parameter	NDPES Order No.							
	R2-2009-0061				***R2-2014-0035***			
	AMEL (ug/L)	MDEL (ug/L)	IMEL (NTU)	Sampling Frequency	AMEL (ug/L)	MDEL (ug/L)	IMEL (NTU)	Sampling Frequency
Copper	10	20	---	1 /month	10	19	---	1 /month
Nickel	24	37	---	1 /month	24	35	---	1 /month
Cyanide	8	18	---	1 /month	7.5	17	---	1 /month
Tributyltin (TBT)[1]	0.0061	0.012	---	1/quarter	---	---	---	---
Endrin[1]	0.0019	0.0038	---	1/quarter	---	---	---	---
Chlorodibromomethane[1]	34	93	---	1/month	---	---	---	---
Bis (2-Ethylhexyl) Phthalate	---	---	---	2/yr	5.9	12	---	1/quarter

Note:
1: Parameter effluent monitoring limitation removed was removed from R2-2014-0035 but continues to be monitored as a priority pollutant.

San Francisco Bay Mercury and PCBs Watershed Permit

The City of Sunnyvale is also subject to Waste Discharge Requirements of the Mercury and PCB Watershed Permit issued January 1, 2013 by the RWQCB under Order No. R2-2012-0096, NPDES Permit No. CA0038849. 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 Annual NPDES Report with the reporting summarized in Chapter II Sections 2.1.3 and 2.1.4, respectively.

San Francisco Bay Nutrients Watershed Permit

The City of Sunnyvale is also subject to Waste Discharge Requirements of the Nutrient Watershed Permit issued July 1, 2014 by the San Francisco Bay RWQCB under Order No. R2-2014-0014, NPDES Permit No. CA0038873. Beginning in 2015, by September 1 of each year, the City will provide its nutrient

information in a separate annual report or state that it is participating in a group report submitted by BACWA.

2.0. FACILITY DESCRIPTION

The City of Sunnyvale (City) owns and operates the Donald M. Sommers WPCP, located at 1444 Borregas Avenue, Sunnyvale, CA 94089 (**Figure 1**). The WPCP was originally constructed in 1956, and the City has periodically increased treatment capacity as the City's population has grown to 147,000 and has incorporated new technologies in wastewater treatment processes to improve effluent water quality.

The WPCP combines physical, chemical, and natural biological processes to remove pollutants from wastewater and produce effluent that meets or exceeds water quality standards defined in its NPDES permit. Residential, commercial, and industrial wastewater collected from the surrounding service areas enters the WPCP via 283 miles of gravity sewer pipes and is subsequently treated by advanced-secondary processes before being discharged to Moffett Channel, tributary to South San Francisco Bay via Guadalupe Slough (**Figure 2**).

The average dry weather flow design capacity at the WPCP is 29.5 million gallons per day (MGD), and its peak wet weather capacity is 40 MGD. To prevent system overloading during higher-than-normal wastewater inflows, the WPCP is equipped with an emergency bypass pipeline that runs from the sedimentation basins to the Oxidation Ponds via above and below-ground sections, including an underground crossing of Moffett Channel. Over the past 5 years (January 1, 2010 to present), the WPCP's highest daily dry weather discharge was 21.1 MGD and occurred on October 5, 2012, and the highest wet weather discharge was 28.4 MGD on December 11, 2014. Currently, the average annual dry weather flow is approximately 13 MGD.

2.1. Wastewater Treatment Processes

The WPCP is comprised of four distinct process areas: the headworks and primary treatment facilities, Oxidation Ponds, advanced-secondary treatment facilities, and solids processing facilities (**Figure 3**). Wastewater entering the WPCP is treated using physical, biological, and chemical processes to remove pollutants from wastewater and produce effluent that meets or exceeds water quality standards. More detailed Liquids and Solids Process Flow Diagrams are presented in **Attachment A**.

The City is in the process of implementing a 20-year Capital Improvement and Master Plan that will replace the majority of plant facilities to address rehabilitation and repair, as well as anticipated treatment needs. Individual Capital Improvement projects are referenced below as they pertain to the various treatment steps described and are described more completely in **Chapter IV**.

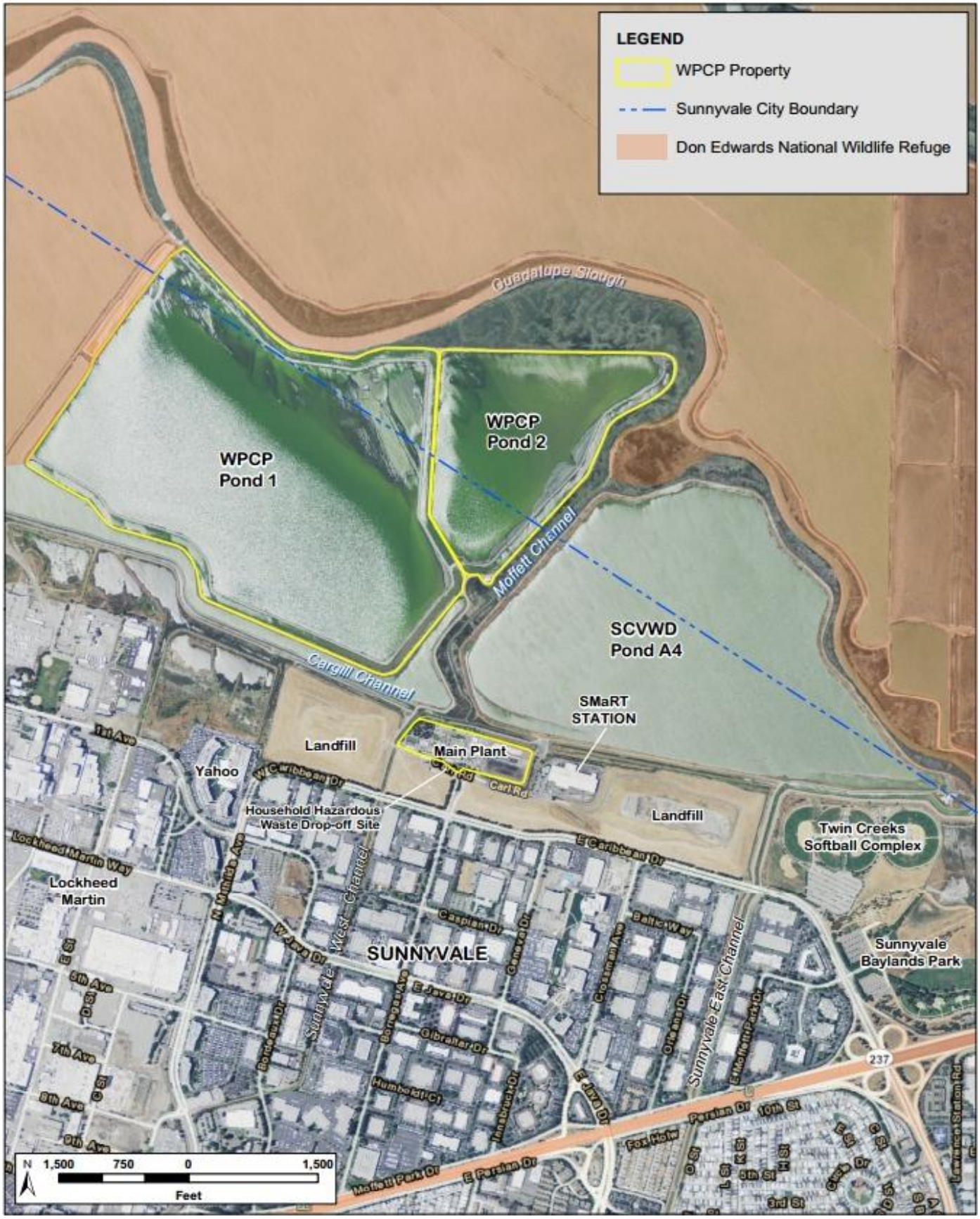


Figure 1: WPCP Site Location Map

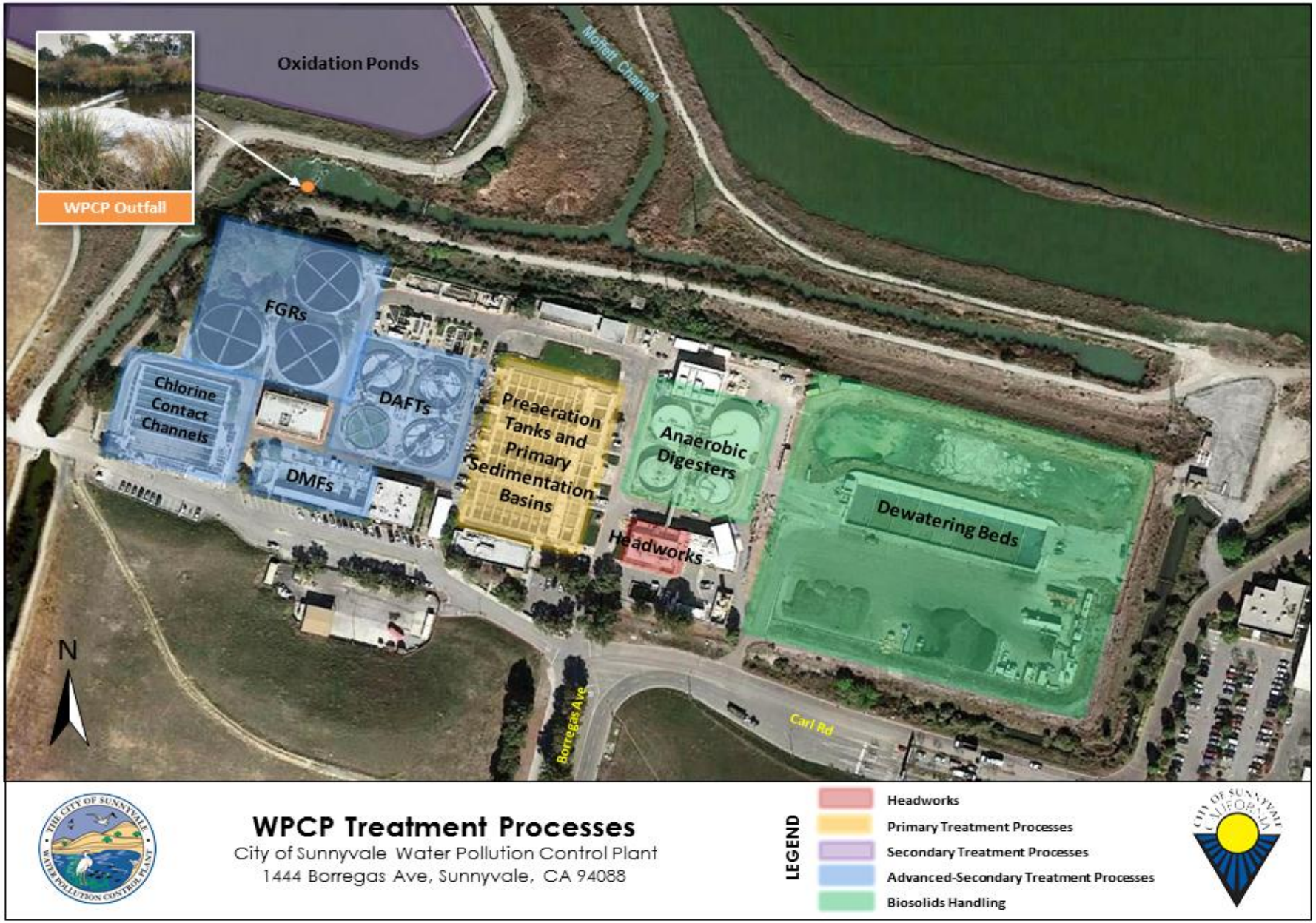


Figure 2: Aerial Photo of WPCP Treatment Processes Spatial Locations and Outfall

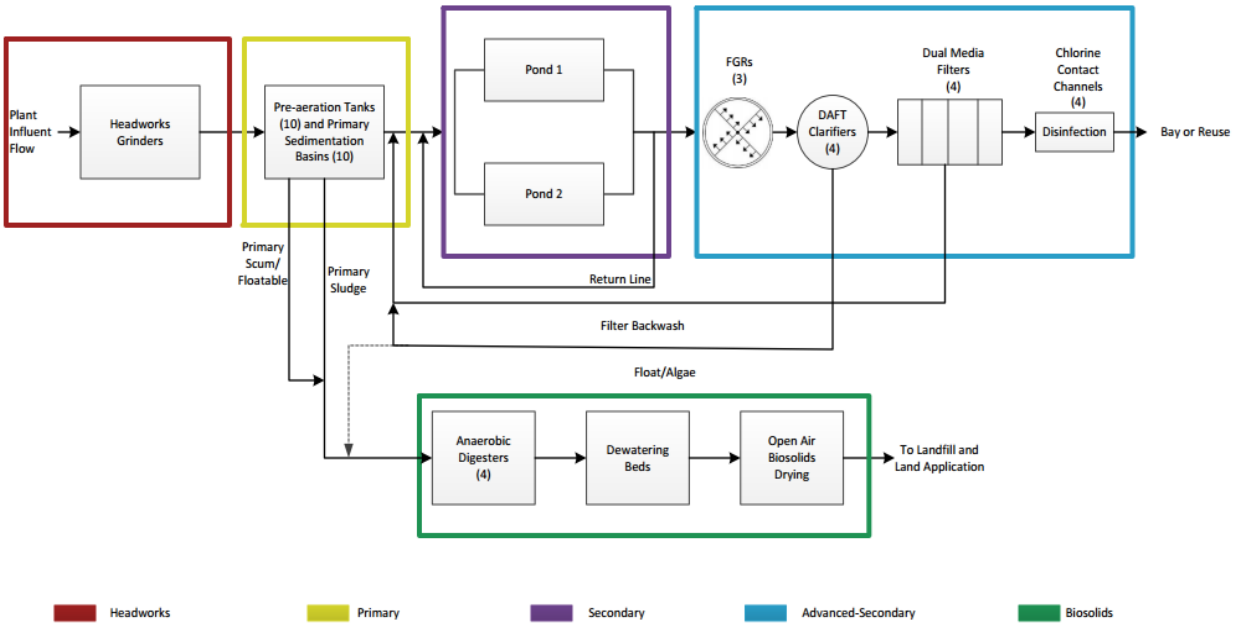


Figure 3: WPCP Process Flow Diagram

2.1.1. Preliminary and Primary Treatment

The primary treatment facilities were initially 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 with the construction of the tenth sedimentation basin, grit handling equipment, and the auxiliary pump station in 1984. Design is under way for a new influent pump station and primary treatment facilities to replace aging facilities. This project will also address Title V air regulatory requirements.

Figure 4: Preaeration Tanks and Primary Sedimentation Basins

Wastewater from the City of Sunnyvale, Rancho Rinconada, and Moffett Field initially enters the Headworks 30 feet below ground where a series of Channel Monsters grind large debris prior to pumping the raw sewage into the Preaeration Tanks and subsequent Primary Sedimentation Basins for removal of floatable and settleable material (**Figure 4**). Floatable materials are skimmed off the surface water, settled primary solids are removed from the bottom of the basins, and primary sludge is pumped to Anaerobic Digesters.

The City is embarking on an Emergency Flow Management project that will address vulnerabilities to the aging 60-inch to 66-inch primary effluent pipeline.

2.1.2. Secondary Treatment

Primary effluent is subjected to secondary (biological) treatment through the use of 440 acres of mechanically aerated Oxidation Ponds (**Figure 5**). The Oxidation Ponds were constructed in their present form in 1968. The ponds were originally designed for high BOD loadings during the summer canning season, through the use of supplemental aeration (2500 hp of total surface aeration capacity). Pond BOD loadings were greatly reduced with the departure of the canneries in 1983, and the original surface aerators were replaced by seven small (15 hp) surface aerators to provide supplemental aeration if needed.

Figure 5: Bottom: Aerial Photo of 440 Acres of Facultative Oxidation Ponds. Top: Snowy Egret Commonly Found in and around the Oxidation Ponds

Primary effluent discharged into the ponds is mixed by recirculation of effluent back into the influent channel (the ratio of recirculation flow to influent flow is approximately 4:1), which essentially creates in effect a single large pond. Organic material present in the primary effluent is readily degraded in the ponds by aerobic and anaerobic bacteria and algae sequestration prior to reentering the WPCP advanced-secondary processes. The average detention time of the ponds is 30-45 days and dependent on seasonal variability. The Oxidation Ponds simultaneously provide flow equalization for primary effluent so downstream advanced treatment processes can be operated at a constant flow rate. Flow equalization capacity is a function of pond depth but typically ranges from 50-100 million gallons.

To maintain treatment performance, the City has a long-term pond dredging project underway that will remove solids that have been deposited over the year, recovering lost pond volume which will improve overall pond treatment.

2.1.3. Advanced-Secondary Treatment

The advanced-secondary facilities were originally constructed in 1973 (and expanded in 1984), to provide additional treatment of Oxidation Ponds effluent. Additional improvements were made in the 1990s to facilitate recycled water production.

Figure 6: Rotating Arm of FGR Distributing Pond Effluent over Plastic Growth Media

Pond effluent is pumped to the advanced-secondary facilities, which provide nitrification, solids removal, effluent filtering, disinfection, and dechlorination prior to discharge. Initially, pond effluent is pumped to Fixed Growth Reactors (FGRs), commonly known as Trickling Filters, which provide biological nitrification treatment process consisting of a tank filled with plastic media (**Figure 6**) on which a film of microorganisms (biofilm) convert ammonia (NH_3) in wastewater to nitrate (NO_3^-).

Figure 7: Algae being skimmed off the Surface of FGR Effluent Wastewater in a DAFT

FGR effluent flows by gravity to the Dissolved Air Flotation Tanks (DAFTs), where compressed air and polymer are injected to coagulate and flocculate any residual algae and particulate matter. Flocculates rise to the water surface, and are skimmed off and fed into the Anaerobic Digesters (ADs) or returned to the Oxidation Ponds (**Figure 7**). The City is continuing with AFT improvements which consist of equipment and concrete repair and rehabilitation. This project is nearing completion and is anticipated to become operational in early 2015.

As a final polishing step, effluent from the DAFTs is conveyed to the Dual Media Filters (DMFs), which provide removal of any remaining algae and particulate matter via gravity filtration (**Figure 8**). The filters are periodically backwashed, and the backwash water is returned to the Oxidation Ponds for treatment.

2.1.4. Disinfection Treatment

Secondary effluent from the DMFs is then disinfected with chlorine gas for at least one hour in a series of Chlorine Contact Channels (CCCs), prior to dechlorination with sodium bisulfite and discharge to Moffett Channel, tributary to the San Francisco Bay via Guadalupe Slough (**Figure 9**). A portion of the dechlorinated final effluent is redistributed throughout the WPCP for filter backwashing and other uses.

Figure 8: DMFs Treating FGR Effluent

The City is in the design phase for disinfection improvements which include replacing gaseous chlorine with liquid chlorine as well as other mechanical, electrical, and instrumentation and control improvements. As part of this project, the City will add an additional sodium bisulfite dosing location to provide additional flexibility and reliability to meet residual chlorine effluent discharge limits.

Figure 9: Chlorine Contact Channels Treating DMF Effluent Prior to Discharge to Moffett Channel

2.2. WPCP Laboratory

The WPCP operates an on-site laboratory that analyzes plant compliance and process monitoring samples, industrial pretreatment samples collected from various treatment processes, and City drinking water samples to monitor regulatory compliance. A list of the approved analyses for the laboratory, as well as a current environmental certification, is included in **Attachment B**.

Figure 10: Laboratory Technician Analyzing Wastewater Effluent Sample on the WPCPs new ICPMS

In October 2014, the WPCP acquired a new Inductively Coupled Plasma Mass Spectrometer (ICP-MS). The ICP-MS technology is the industry standard and current technology used in Environmental and Research Laboratories across the world for metals analyses due to its high performance, reliability, ease of use and efficiency. Among its biggest advantages, the ICP-MS system can measure multiple metals (elements) simultaneously at extremely low detection levels, providing the sensitivity and accuracy required by the NPDES permit (**Figure 10**).

2.3. Sludge and Biosolids Management

Figure 11: One of Two Caterpillar Power-Generating 1130 HP Reciprocating Internal Combustion Engines

Sludge and biosolids removed during primary treatment, as well as a portion from secondary treatment[1], are fed into Anaerobic Digesters (ADs) and detained for approximately 37-41 days at a temperature of 100°F, and occasionally followed by an additional 16 days in an unheated secondary AD. Within the ADs, anaerobic bacteria breakdown organic matter, producing a mixture of methane gas, carbon dioxide, and hydrogen sulfide (biogas), in addition to stabilized organic solids and water. The City is continuing with Digester improvements which consist of replacing floating with fixed covers and other equipment and structural rehabilitation and repair. This project is nearing completion and is anticipated to become operational in 2015.

A portion of the biogas produced in the ADs powers three Influent Pump Engines (IPEs), which drive the pumps that usher wastewater into the Headworks from the service area. The remainder of the biogas is blended with landfill gas (LFG) from the adjacent landfill and air-blended natural gas (ABNG) and utilized by two power-generating engines (**Figure 11**), which form the backbone of the WPCPs Power Generation Facility (PGF). The PGF on average produces 1.2 megawatts (MW) of power which offsets PG&E power purchases. A small portion of the biogas and LFG are flared off if production outweighs WPCP demand. To improve PGF operational reliability and provide an independent emergency power source, the City has begun the PGF Gas Improvements and Emergency Generator project. When

[1] Secondary treatment solids consist of algae "float" removed from the Oxidation Ponds effluent in the DAFTs.

completed, this project will significantly improve PGF reliability and provide backup power if required (**Chapter IV**).

Anaerobically digested sludge is conditioned with polymer and dewatered on a collection of gravity drainage tiles (Dewatering Beds) to approximately 15-20% solids (**Figure 12**) and then solar dried to approximately 50-70% solids prior to land application at nearby landfills. In addition, secondary treatment solids removed by dredging the Oxidation Ponds are chemically conditioned and dewatered using a centrifuge to approximately 20-25% solids prior to land application or disposal at nearby landfills. A solids process flow diagram is included in **Attachment A**.

Figure 12: Dewatering Beds Treating Biosolids Prior to being hauled Off-Site for Beneficial Use

During the 2014 reporting period, the WPCP produced a total of approximately 5,304 dry tons of biosolids, with approximately 232 dry tons from ADs and 5,072 dry tons from the Oxidation Ponds (**Figure 13**). Approximately 221 dry tons were retained on-site in short term storage.

The biosolids produced at the WPCP undergo a series of analytical tests prior to being hauled off-site for beneficial use to ensure they are in compliance with regulations set forth in 40 CFR Part 503. Beneficial uses include land application and placement in the Newby Island Sanitary Landfill as alternative daily cover. The WPCP has never used incineration as a means of disposal of biosolids. For additional information on sludge and biosolids management at the WPCP, refer to *Biosolids Annual Report for 2014*, scheduled for submittal to the RWQCB on February 15, 2014 per Provision VI.C.5.b of Order No. R2-2009-0061 and VI.C.4.b of Order No. R2-2014-0035.

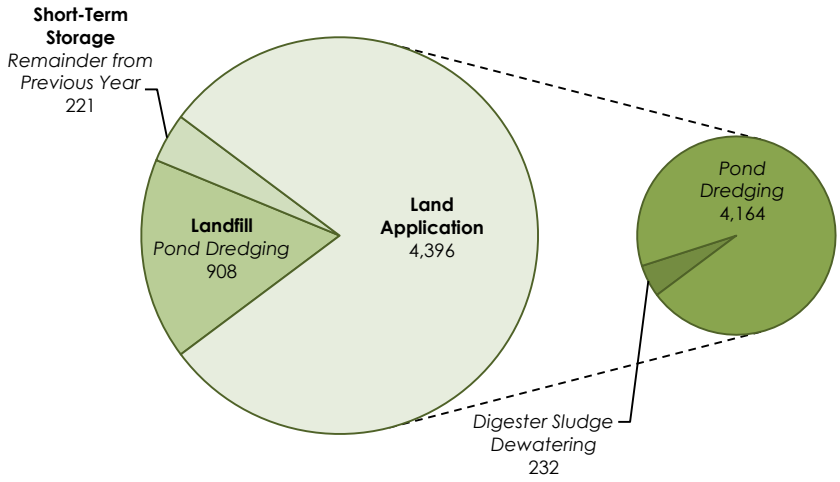


Figure 13: Application Type and Dry Tons of Biosolids Disposed from WPCP in 2014

2.4. Recycled Water Production

The Plant may operate in two different treatment modes – Bay discharge wastewater treatment and recycled water production (**Figure 14**). During periods of recycled water production, a portion of the secondary treated wastewater from the DMFs effluent is further treated to meet Title 22 requirements for disinfected tertiary recycled water. When recycled water is in high demand seasons (typically 12–16 hours a day), the DAFT polymer dose, chlorine dose, and chlorine contact time are adjusted to meet Title 22 requirements (recycled water effluent turbidity needs to be below 2 NTU versus 10 NTU for Bay discharge). The portion of the effluent that is diverted to the recycled water pump station is partially dechlorinated using sodium bisulfite.

Figure 14: Recycled Water Treatment Processes

Following dechlorination, recycled water is distributed for use by numerous businesses throughout the service area for irrigation of landscape, parks, and golf courses; for use in decorative ponds; and for other approved uses **(Figure 15)**. Recycled water is also available for construction use at remote locations. Historically, up to about 10 percent of the daily flow has been diverted for reuse. Also, disinfected secondary RW is used at the plant for landscape irrigation. All water recycling is accomplished in accordance with water reclamation requirements in Regional Water Board Order No. 94-069. In 2014, the WPCP produced approximately 173 million gallons of recycled, with the highest production rates between June and September (**Figure 16**). As part of the Hypochlorite Conversion and Continuous Recycled Water Production Facility project, plant facilities will be modified to allow for production of recycled water while concurrently discharging to the San Francisco Bay. This project will improve overall reliability for recycled water production.

Figure 15: Recycled Water used for Landscaping at NetApp

2.5. Stormwater Management

All stormwater from within the plant boundaries, including the Sunnyvale Biosolids Monofill (SBM)[2] located near the main treatment plant area (**Figure 1**) is directed to the plant headworks; therefore, coverage under the statewide permit for discharges of stormwater associated with industrial activities (NPDES General Permit No. CAS000001) is not required.

[2] The SBM is regulated as a surface disposal site under Order No. R2-2004-0030.

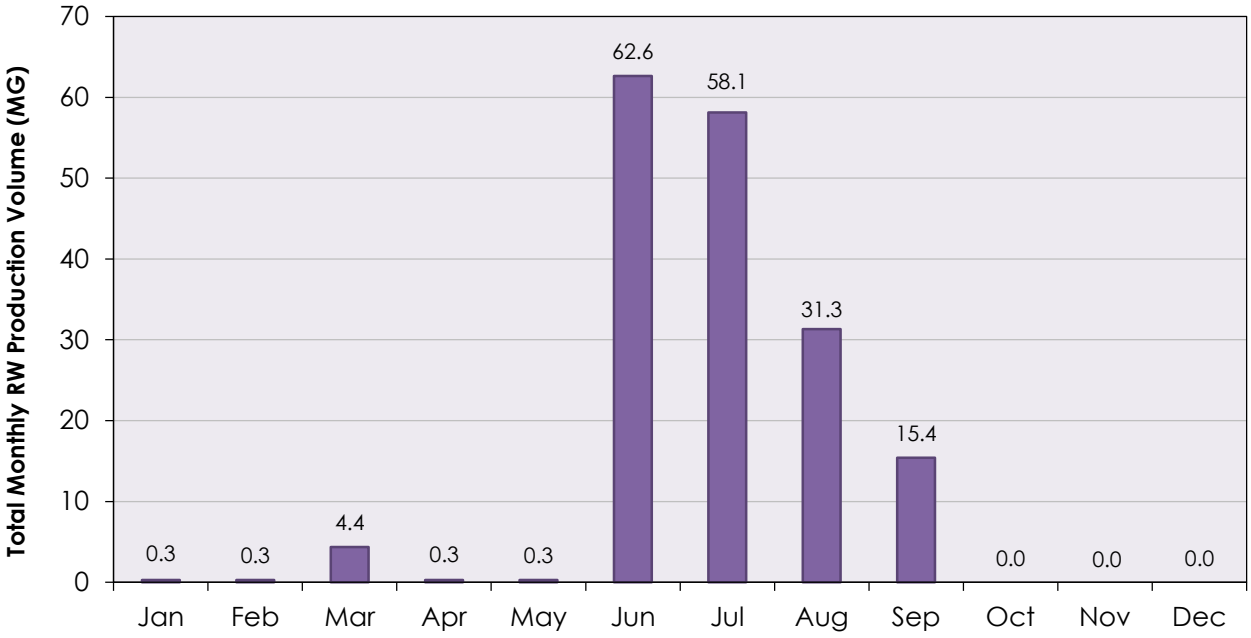


Figure 16: Monthly Recycled Water Production at the WPCP during 2014

II. PLANT PERFORMANCE AND COMPLIANCE

1.0. PLANT PERFORMANCE

Overall, the WPCP maintained a high level of performance over the entire reporting period. A description of Plant Performance follows. Permit Compliance is discussed in **Section 2.0**.

1.1. WPCP Wastewater Flows

The WPCP is designed and permitted for an average dry weather flow of 29.5 MGD and a peak wet weather flow of 40 MGD. The average annual influent and effluent flow rates for the reporting period were 12.9 MGD and 11.3 MGD, respectively (**Figure 17**). The difference in these two flow rates is primarily attributed to recycled water production and evaporation from the Oxidation Ponds.

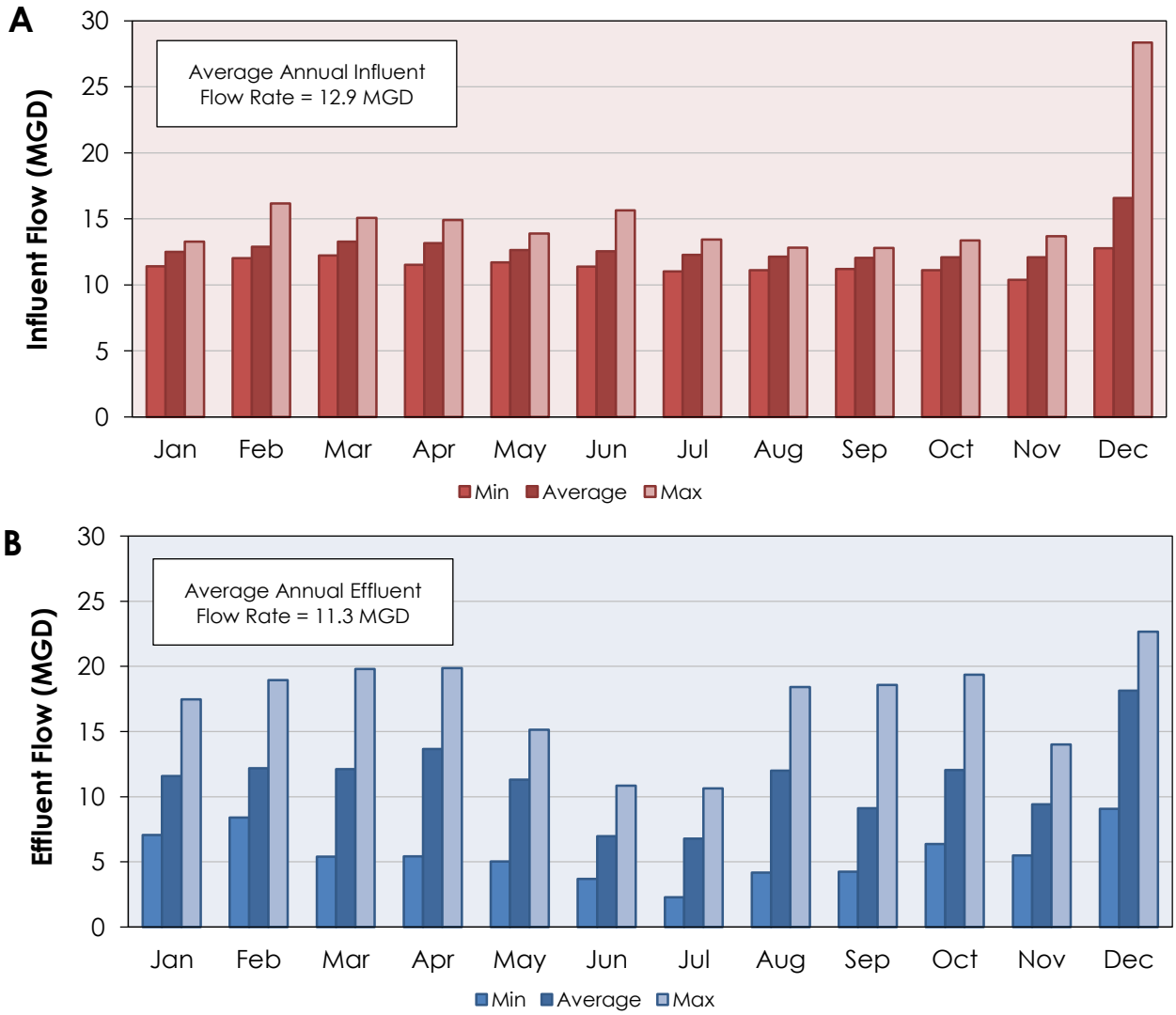


Figure 17: Daily Average A) Influent and B) Effluent Wastewater Flow Rates through the WPCP during 2014

Monthly minimum, average, and maximum daily influent flow rates during this reporting period are shown in **Figure 17A**. Influent daily flow rates ranged from 10.4 to 28.4 MGD. The maximum daily average flow rate occurred during the December 11, 2014 storm event when approximately 2.5-inches of rain fell. The WPCP experienced an influent peak hourly flow rate of 50 MGD and an instantaneous flow rate of 55 MGD during this storm event. Throughout the duration of this storm event, the WPCP was able to convey the flow rates and maintain effluent discharge requirements.

Monthly minimum, average, and maximum daily effluent flow rate values during this reporting period are shown in **Figure 17B.** Effluent daily flow rates ranged from 2.3 to 22.7 MGD. Effluent daily flow rate values below approximately 8 MGD correspond to WPCP's Flow Management Strategy, which is described in more detail at the end of this Section. A comparison between influent and effluent monthly average flow rates reveals the seasonal effects of recycled water production and evaporation from the Oxidation Ponds. For example, during summer months (May - Aug) when recycled water production and evaporation rates are highest, influent monthly average flow rates are generally higher than their effluent counterparts (**Figure 17**). The opposite is true during the fall and winter months (Sept - Jan), where recycled water production and evaporation rates are generally at their lowest.

Flow Rates

MGD	Influent	Effluent
Daily	10-28	2.3-23
Peak-Hour	50	---
Instantaneous	55	---

Influent daily flow rates recorded between 2010-2014 reveal a slight downward trend (**Figure 18**). This trend is consistent with the City's decreasing water usage and on-going sewer repair program which reduces infiltration into the system. Inasmuch, effluent daily flow rates mirror the downward trend observed in influent flow rates. The large variability in effluent flow rates relative to influent is due to the storage capacity of the Oxidation Ponds, which affords the flexibility of setting the effluent flow rate to achieve the specific objectives of the day or week. Higher-than-normal influent and effluent flow rates toward the end of the reporting period reflect a series of storms that occurred in December 2014.

As described above, effluent daily flow rates below approximately 8 MGD correspond to WPCP operation that utilizes the storage capacity of the Oxidation Ponds, which ranges from 50 MG to 100 MG depending on the initial pond depth. This storage capacity is employed as part of the WPCP's Flow Management Strategy, which allows for Operations staff to do the following:

- Maintain water elevation for optimal treatment and required storage.
- Maintain flexibility to repair and rehabilitate aging advanced-secondary facilities.
- Investigate process tuning opportunities to improve overall system performance.

The Flow Management Strategy provides Operations staff with a tool to address the historic variability in pond treatment performance, especially in regards to ammonia removal.

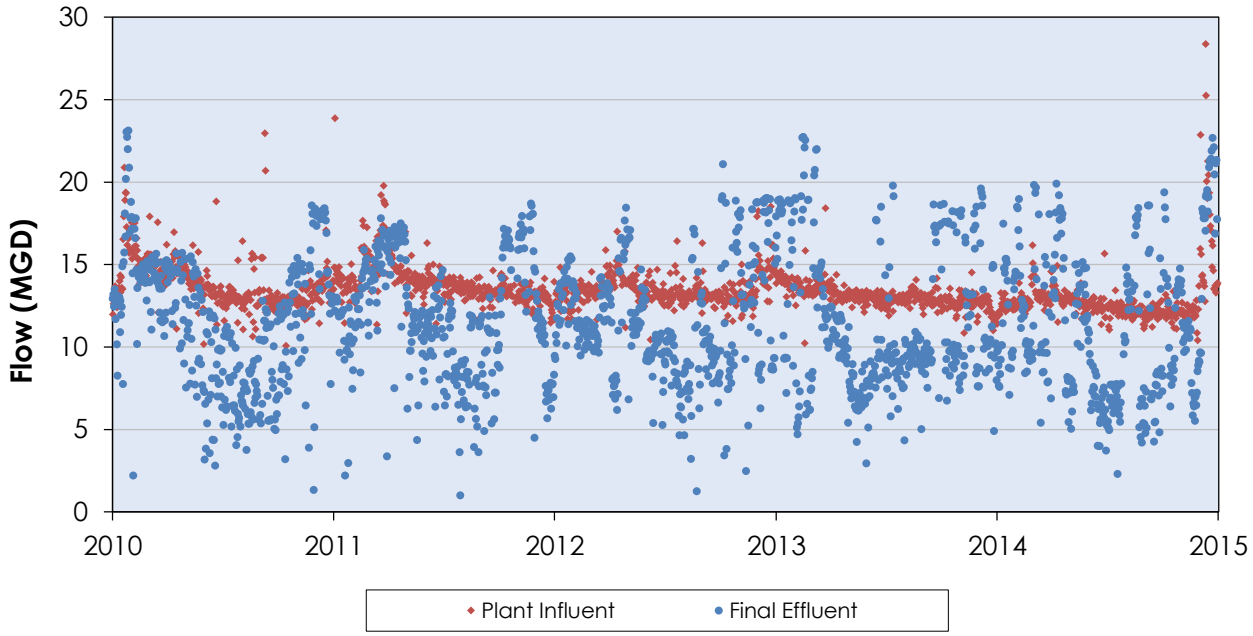


Figure 18: Historical Daily Average Influent and Effluent Wastewater Flows through the WPCP from 2010 to 2014

1.2. Carbonaceous Biochemical Oxygen Demand

Carbonaceous Biochemical Oxygen Demand (CBOD) measures organic pollution in wastewater and is used by the RWQCB as one of the parameters for evaluating and regulating WPCP performance. The WPCP's NPDES permit includes the following limits for CBOD:

- Maximum Daily Effluent Limit (MDEL) concentration = 20 mg/L
- Average Monthly Effluent Limit (AMEL) concentration = 10 mg/L
- Average monthly minimum percent removal = 85%

Figure 19 summarizes CBOD concentration data and removal performance from 2010-2014. In general, CBOD influent concentrations are trending slightly upwards. This increasing trend may be attributed to the City's population growth and daytime work force influx (~ 15% population increase), coupled with lower water usage through conservation efforts. The decrease in influent CBOD concentrations near the end of the reporting period can be attributed to the wet weather storm events. These events produced inflow and infiltration into the collection system and the WPCP with the corresponding dilution of pollutant concentrations.

CBOD Removal

	Limit	Performance
% Removal:	85%	97%
Daily (MDEL):	20 mg/L	2 - 10 mg/L
Monthly (AMEL):	10 mg/L	3.6 - 7.9 mg/L

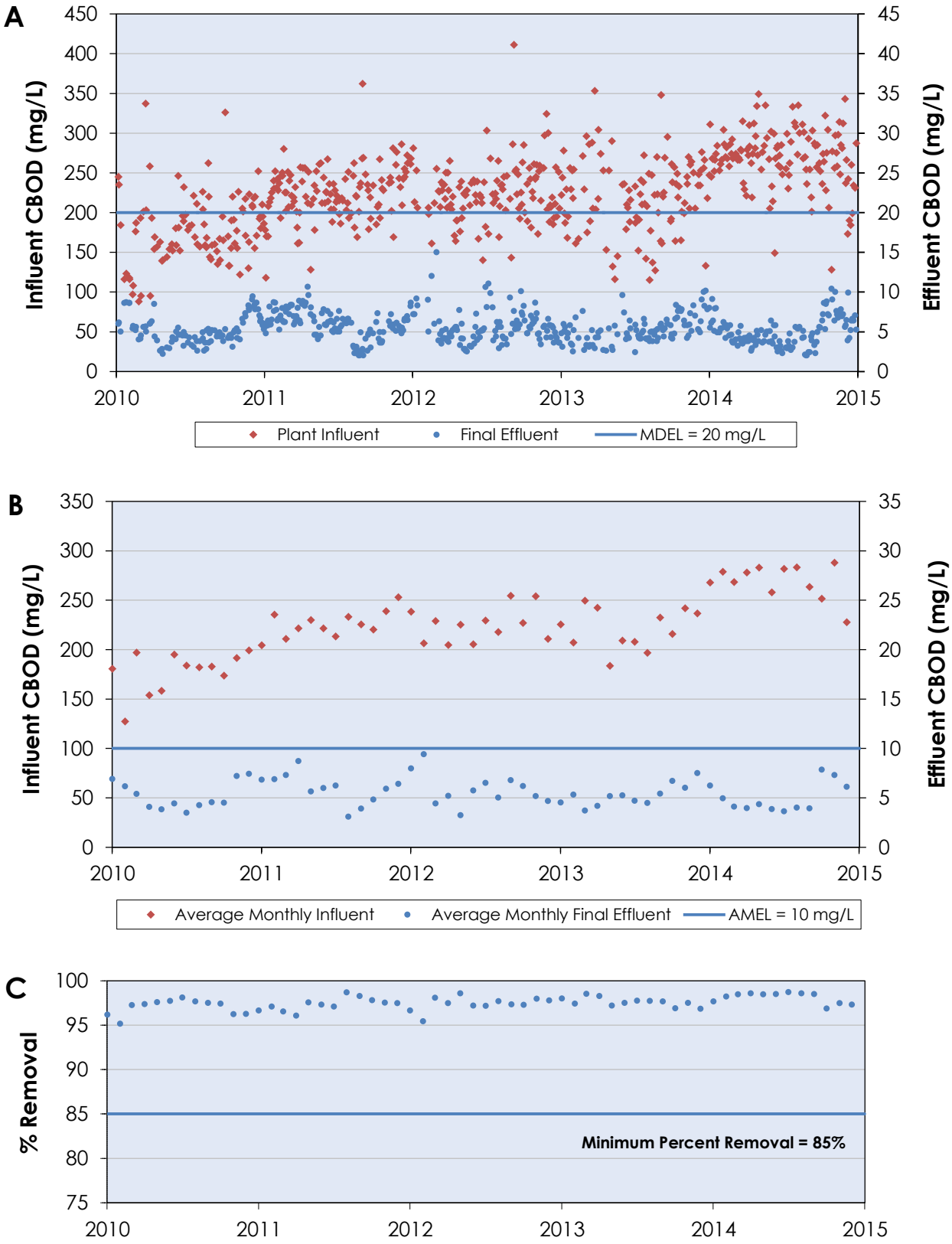


Figure 19: CBOD Trends through the WPCP. A) Daily and B) Average Monthly Influent and Effluent CBOD (mg/L) through the WPCP from 2010-2014. C) Average Monthly Final Effluent Percent Removal (%) of CBOD from 2010-2014

As shown in **Figure 19A** and **Figure 19B**, daily and average monthly effluent CBOD concentrations remained below their respective permit limits. Similarly, the percent removal of CBOD, as measured by the difference in influent and effluent concentrations, remains above the permit removal rate of 85% with an average of 98% over the reporting period (**Figure 19C**). Effluent CBOD concentrations show a general trend of lower removal during the colder months and higher removal during the warmer months. This trend can be attributed to the Oxidation Pond treatment unit process whose CBOD removal performance is typically governed by temperature.

Figure 20 summarizes influent and effluent CBOD loading rates as measured in pounds per day (lbs/day) from 2010-2014. Influent CBOD loading rates are trending slightly upwards, mirroring the influent CBOD concentration data trend shown in Figure 18. This similarity in trending is plausible, given the City's population growth and daytime work force influx which will increase pollutant loads to the wastewater system. The effluent CBOD loading rates are trending in a relatively consistent pattern and reflect the WPCP's ability to remove CBOD loads.

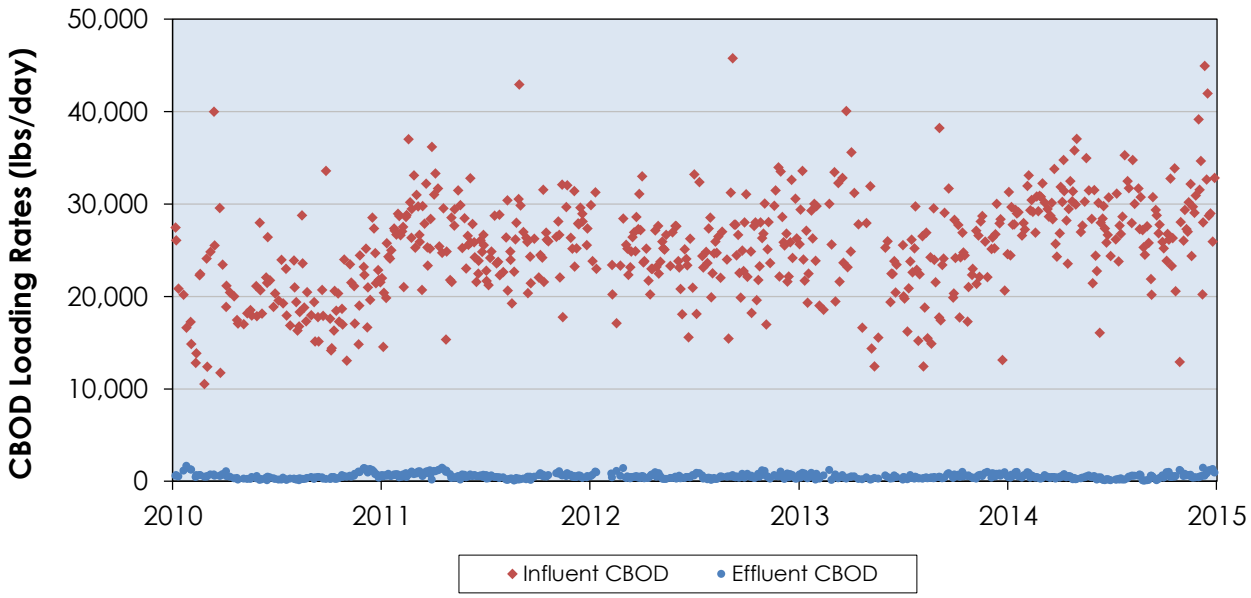


Figure 20: CBOD Daily Influent and Effluent Loading Rates through the WPCP from 2010-2014

1.3. Total Suspended Solids (TSS)

Total Suspended Solids (TSS) is a measure of the suspended solids content of wastewater which will not pass through a filter, and similar to CBOD is used by the RWQCB for evaluating and regulating WPCP performance. The WPCPs NPDES permit includes the following limits for TSS:

- Maximum Daily Effluent Limit (MDEL) concentration = 30 mg/L
- Average Monthly Effluent Limit (AMEL) concentration = 20 mg/L
- Average monthly minimum percent removal = 85%

Figure 21 summarizes TSS concentration data and removal performance from 2010-2014. As shown in **Figure 21A** and **Figure 21B**, daily and average monthly effluent TSS concentrations remain below their

respective permit limits. Similarly, during the reporting period the average monthly TSS percent removal of 97%, as measured by the difference in influent and effluent concentrations, remained above the minimum of 85% (**Figure 22C**).

In general, TSS influent concentration data exhibited a consistent trend, despite significant variability during the 2010 reporting period. In late 2010, and again in September 2013, the influent compliance sample location was relocated upstream to address this issue, resulting in more adequate mixing and accurate data collection during subsequent reporting periods. Consequently, influent TSS concentration data from October 2013 to December 2014 show less variability and a more consistent and stable upwards trend. As discussed in **Section 1.2**, the increasing TSS concentration trend may be attributed to the City's population growth and daytime work force influx (~ 15% population increase), coupled with lower water usage during this time period. Moreover, the decrease in influent TSS concentrations near the end of the reporting period can be attributed to wet weather storm events.

TSS Removal

	Limit	Performance
% Removal:	85%	97%
Daily (MDEL):	30 mg/L	2.2 - 15 mg/L
Monthly (AMEL):	20 mg/L	4.0 - 12 mg/L

Effluent TSS concentration data from 2010 – 2014 show a somewhat annual periodic trend, with the exception of 2014 data. The effluent concentrations in mid-2014 correspond to recycled water production where the entire effluent flow rate (recycled water and discharge) was treated to Title 22 recycled water requirements. Title 22 recycled water requirements stipulate achieving an effluent turbidity value of 2 NTU; whereas, WPCP discharge requirement stipulate a WPCP discharge turbidity value of 10 NTU. In prior years, recycled water was produced in a batch mode, meaning the WPCP was either producing recycled water or discharging to the San Francisco Bay. Batch mode required less chemical addition but was more difficult to operate especially when transitioning between recycled water production and Bay discharge. To address this issue, the City initiated the Hypochlorite Conversion and Continuous Recycled Water Production Facility project, which will allow for production of recycled water while concurrently discharging to the San Francisco Bay (Refer to **Chapter IV** for a description of the project).

Figure 22 summarizes influent and effluent TSS loading rates (lbs/day) from 2010-2014. The October 2013 to December 2014 influent TSS loading rates trended slightly upwards, mirroring the influent TSS concentration data trend shown in **Figure 21**. These trends are similar to the influent CBOD concentration and influent CBOD loading rates trends. As with the CBOD trends, the similarity of the influent TSS concentration and TSS loading rates trending is plausible, given the City's population growth and daytime work force influx which will increase pollutant loads to the wastewater system. The effluent TSS loading rates are trending in a relatively consistent pattern and reflect the WPCP's ability to remove TSS loads.

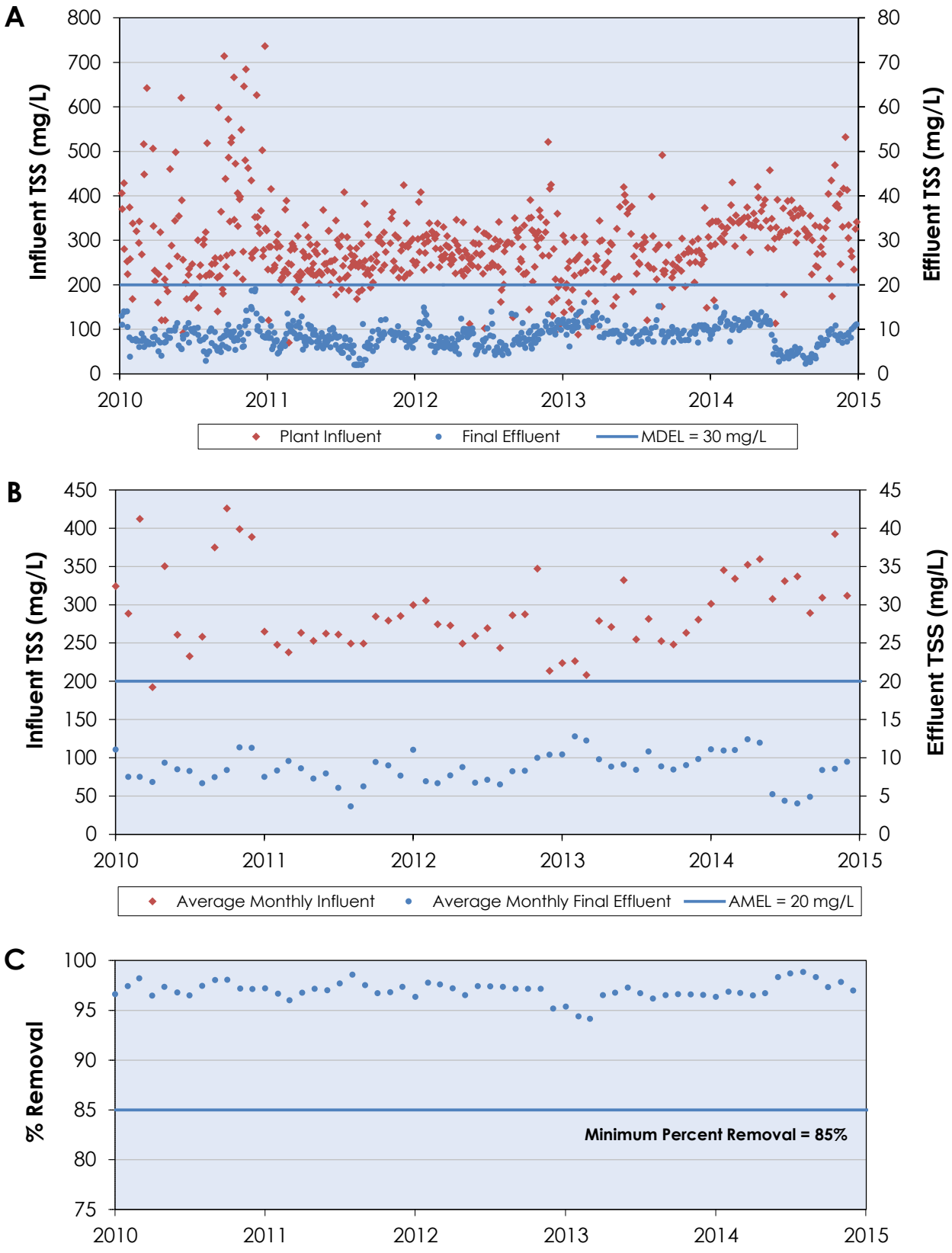


Figure 21: TSS Trends through the WPCP. A) Daily and B) Average Monthly Influent and Effluent TSS (mg/L) through the WPCP from 2010-2015. C) Average Monthly Final Effluent Percent Removal (%) of TSS from 2010-2014

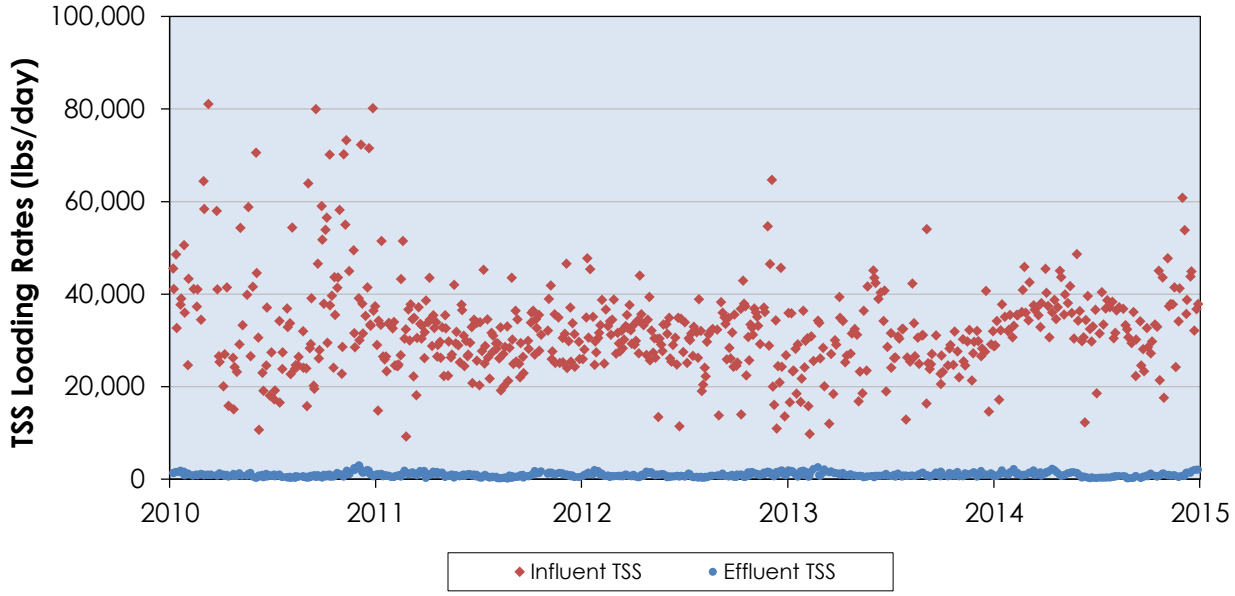


Figure 22: TSS Daily Influent and Effluent Loading Rates through the WPCP from 2010-2014

As part of complying with NPDES Permit CA0037621 Order R2-2009-0061, the City submitted a report on April 3, 2014 entitled *Total Suspended Solids Removal Study* in accordance with Provision VI.C.2.f. The purpose of this study was to summarize the influent and effluent TSS concentration data and evaluate operational changes to enhance TSS removal. The study re-iterated the variability in Oxidation Ponds TSS removal performance and the lack of operator tools to address this condition. As a result of this study, the City has been conducting bench scale testing to evaluate the performance of different chemicals and combinations of chemical to improve TSS removal in the processes downstream of the Oxidation Ponds. It is anticipated that this study will be completed in 2015.

1.4. Total Ammonia

Overview and Permit Limits

Ammonia removal occurs in both the Oxidation Ponds and the FGRs. Ammonia removal in the Oxidation Ponds (as a result of uptake by algae and bacterial nitrification) is highly seasonal, with low removal rates observed during the fall and winter (Oct-May), and nearly complete removal during the summer (May-Sept). Consequently, from October to May, the FGRs are the primary process for ammonia removal. The NPDES permit includes seasonal performance limits for ammonia that reflect the variability in the performance of the two processes. The effluent limits remain the same with the NPDES permit reissued in November 2014 and are as follows:

- Maximum Daily Effluent Limit (MDEL) concentration: Oct-May = 26 mg/L; Jun-Sept = 5 mg/L
- Average Monthly Effluent Limit (AMEL) concentration: Oct-May = 18 mg/L; Jun-Sept = 2 mg/L

Strategies to Optimize Performance

Historically, ammonia removal via the Oxidation Ponds has been highly variable and seasonal in nature. Although variability in weather patterns likely plays a role, the loss of pond volume due to solids deposition has had a potential to impact performance as the "working" capacity of the Oxidation Ponds has been reduced. In 2009, the City began a long-term dredging project to restore the pond capacity (Refer to **Section IV**). Dredging was conducted during this reporting period and occurred over the winter season with minimal impact to ammonia removal performance as the FGRs are the primary process for ammonia removal in the winter months and not the Oxidation Ponds.

Furthermore, the City instituted a periodic FGR snail control program in 2013 to optimize FGR nitrification. Trickling filters, such as the FGRs, are prone to declining ammonia removal performance as a result of snail predation on nitrifying bacteria inhabiting the plastic growth media. This chemical treatment process instituted at the WPCP doses Oxidation Ponds effluent with ammonium sulfate and sodium hydroxide in a batch process. The rise in pH from the sodium hydroxide effectively converts the ammonium sulfate to unionized ammonia, which is toxic to the snails but beneficial to nitrifying bacteria. The City also employs Pond Flow Management as a strategy to control ammonia loading to the FGRs to maximize performance to the FGRs.

Data Review

Figure 23 summarizes ammonia concentration data and removal performance. **Figure 23A** shows removal performance of the Oxidation Ponds and FGRs, respectively. Seasonal removal rates are clearly apparent, with the Oxidation Ponds demonstrating ammonia removal from May to October, and the FGR removing the majority of the ammonia during the remainder of the year. Daily and average monthly effluent ammonia concentrations remain below their respective seasonal permit limits for the reporting period. Influent ammonia concentrations in 2014 remain below their respective seasonal permit limits as shown in **Figure 23B** and **Figure 23C**. Trends remain stable over the past five years (2010-2014). However, these concentrations reflect the upward trend observed from 2002 to 2010, which can be attributed to a dramatic increase in water conservation efforts and population growth.

Ammonia Removal

	Limit	Performance
Daily (MDEL):	26 mg/L (Oct-May) 5 mg/L (Jun-Sept)	0.1 - 12 mg/L 0.1 - 1.8 mg/L
Monthly (AMEL):	18 mg/L (Oct-May) 2 mg/L (Jun-Sept)	0.5 - 5.6 mg/L 0.1 - 0.6 mg/L

Figure 24 summarizes influent and effluent ammonia loading rates in pounds per day (lbs/day) from 2010-2014. The influent ammonia loads remained stable from 2010-2014. Effluent ammonia loading rates are scattered with the higher values generally occurring during the winter season and lower values generally occurring during the summer season, which is reflective of the seasonal nature of the Oxidation Ponds and FGRs performance.

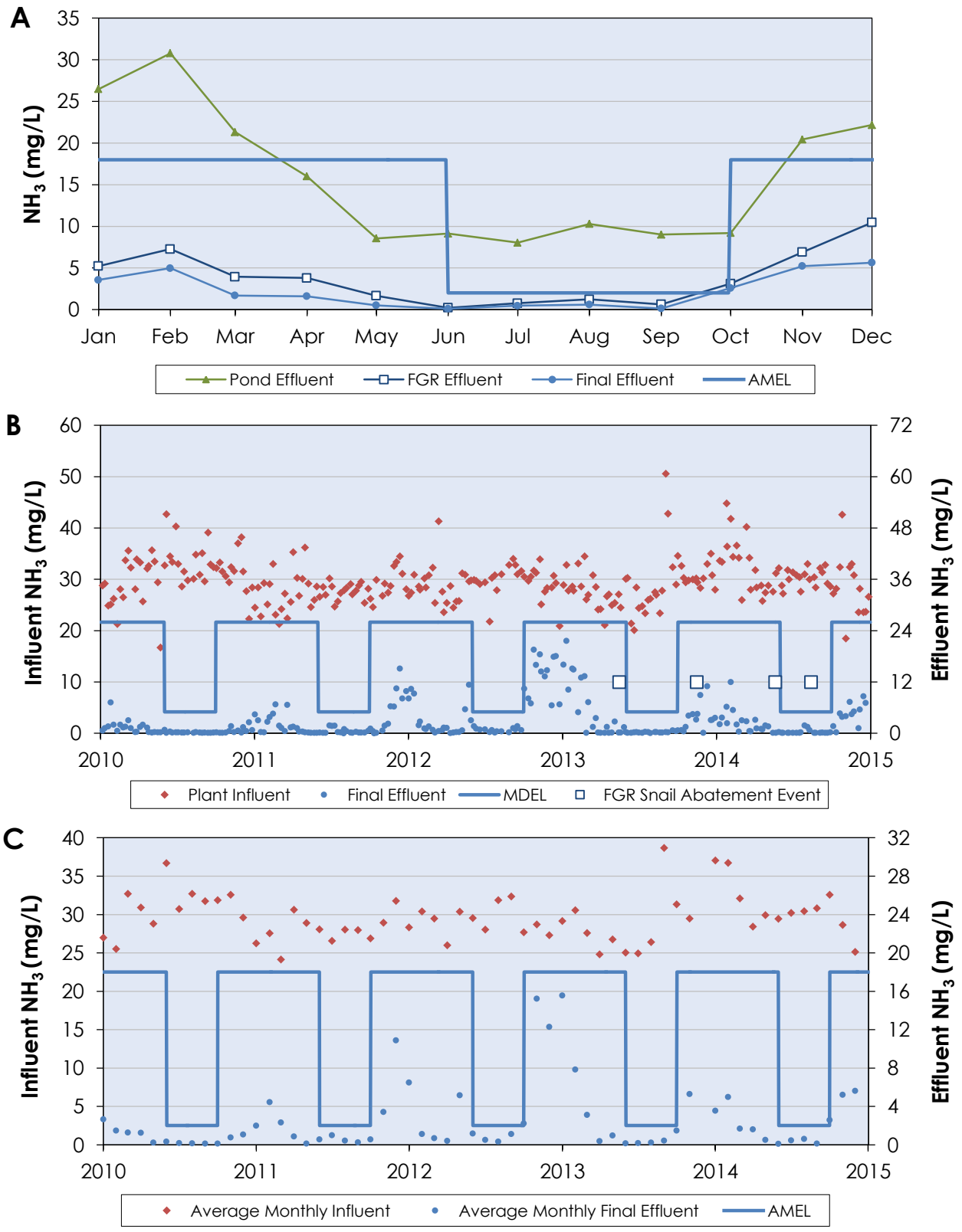


Figure 23: A) Monthly Average Total Ammonia from Pond, FGR, and Final Effluent during 2014. B) Daily and C) Average Monthly Influent and Effluent Total Ammonia through the WPCP from 2010-2015. MDEL: Oct-May = 26 mg/L, Jun-Sept = 5 mg/L; AMEL: Oct-May = 18 mg/L, Jun-Sept = 2 mg/L

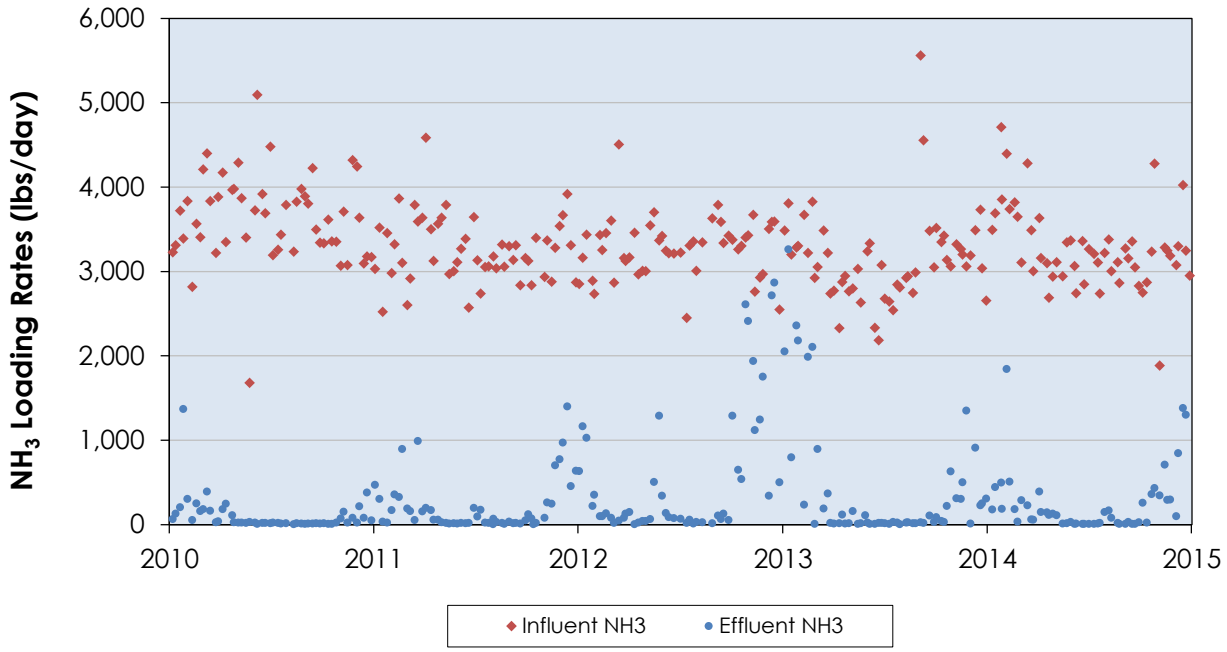


Figure 24: Daily Ammonia Influent and Effluent Loading Rates through the WPCP from 2010-2014

2.0. PERMIT COMPLIANCE

Table 2 summarizes effluent compliance sampling during this reporting period. One exceedance occurred involving residual chlorine which happened during a meter maintenance event and resulted in less than 0.05 pounds of chlorine released. The City has initiated the Hypochlorite Conversion and Continuous Recycled Water Production Facilities project that will add a second sodium bisulfite dosing location to improve operations flexibility to further reduce the chance of any residual chlorine exceedances (Refer to **Section IV** Capital Improvements Projects).

2.1. Effluent Limitations

During this reporting period, the WPCP's NPDES permit was reissued under Order R2-2014-0035, effective November 1, 2014. The required monitoring program changed across permits, with some parameters removed (TBT, endrin and chlorodibromomethane) and others added (Bis (2-Ehtylhexyl) Phthalate), as shown in **Table 1**. In addition, there were sampling frequency changes to several effluent monitoring parameters (**Table 3**). Consequently, report data for some parameters is available for only part of 2014.

All required monitoring data was reported through the monthly Self-monitoring Reports (SMRs) in electronic format through the State's CIWQS system as required in the permit. Per Attachment G, Provision V.C.1.h.3 of the permit, such reporting precludes 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 included them here for informational purposes.

Table 2: 2014 Final Effluent Monitoring Sample Results for Standard Parameters

Parameter Class	Parameter	Parameter Limit Type	Parameter Limit	2014 Final Effluent Sample Results			Number of Samples / Exceedance		
				Min	*Avg*	*Max*			
Standard	**CBOD**	MDEL (mg/L)	20	2.00	4.74	10.40	126	/	0
		AMEL (mg/L)	10	3.63	4.44	6.24	12	/	0
		Percent Removal (%)	85	98	98	99	12	/	0
	TSS	MDEL (mg/L)	30	2.20	8.41	15.0	104	/	0
		AMEL (mg/L)	20	4.34	9.55	12.4	12	/	0
		Percent Removal (%)	85	96	97	99	12	/	0
	Ammonia (as N)	MDEL [Oct-May]* (mg/L)	26	0.09	2.88	12.0	56	/	0
		AMEL [Oct-May]* (mg/L)	18	0.52	2.92	5.3	8	/	0
		MDEL [Jun-Sept] (mg/L)	5	0.10	0.74	4.62	18	/	0
		AMEL [Jun-Sept] (mg/L)	2	0.10	0.29	0.48	4	/	0
	Oil & Grease	MDEL (mg/L)	10	<1.4	<1.4	<1.4	4	/	0
		AMEL (mg/L)	5	<1.4	<1.4	<1.4	4	/	0
	Turbidity	MDEL (NTU)	10	0.76	6.36	9.30	293	/	0
	pH	CMax	8.5	6.60	7.10	7.82	315	/	0
		CMin	6.2	6.60	7.10	7.82	315	/	0
	Chlorine Residual	IMEL (mg/L)	0	0	0	0.09	303	/	1
	Enterococci	30 day Geo Mean (MPN/100mL)	35	1.00	4.03	313.0	297	/	0
Toxicity	**Acute Toxicity**	90th% (% Survival)	70	100	100	100	11	/	0
		Moving Median (% Survival)	90	100	100	100	11	/	0
Organics	**Tributyltin**	MDEL (ug/L)	0.012	<0.0026	<0.0026	<0.0026	3	/	0
		AMEL (ug/L)	0.0061	<0.0026	<0.0026	<0.0026	3	/	0
	Cyanide	MDEL (ug/L)	18	0.9	3	11	16	/	0
		AMEL (ug/L)	8	0.9	4.7	25.0	12	/	0
	Endrin	MDEL (ug/L)	0.0038	<0.005	<0.005	<0.005	5	/	0
		AMEL (ug/L)	0.0019	<0.005	<0.005	<0.005	4	/	0
	Chlorodibromo-methane	MDEL (ug/L)	93	0.5	12.5	67	16	/	0
		AMEL (ug/L)	34	0.65	10.0	30.2	12	/	0
	TCDD-TEQ	AMEL (ug/L)	63	0	0	0	2	/	0
	Bis (2-Ethylhexyl) Phthalate	MDEL (mg/L)	12	<0.6	<0.6	<0.6	3	/	0
		AMEL (mg/L)	5.9	<0.6	<0.6	<0.6	3	/	0
	PCBs	MDEL (ug/L)	0.00049	ND	ND	ND	2	/	0
		AMEL (ug/L)	0.00039	ND	ND	ND	2	/	0
Metals	**Copper**	MDEL (ug/L)	20	1.47	2.24	3.70	23	/	0
		AMEL (ug/L)	10	1.58	2.25	3.43	12	/	0
	Mercury	AWEL (ug/L)	0.027	0.0011	0.0025	0.0052	12	/	0
		AMEL (ug/L)	0.025	0.0011	0.0025	0.0052	12	/	0
		ALEL (kg/yr)	0.15	0.0011	0.0025	0.0052	1	/	0
	Nickel	MDEL (ug/L)	37	2.97	3.90	5.39	23	/	0
		AMEL (ug/L)	24	3.05	3.91	4.86	12	/	0

Legend:
AMEL: Average monthly effluent limit.
AWEL: Average weekly effluent limit.
IMEL: Instantaneous maximum effluent limit.
MDEL: Maximum daily effluent limit.
MPN: Most probable number.
mL: Milliliter
mg/L: Milligram per liter.
ug/L: Microgram per liter.
kg/yr: Kilogram per year.
NTU: Nephelometric turbidity unit.
<#: Indicates that sample concentration was below the laboratory detection limit.
ND: Non-detect. Indicates concentrations were below laboratory detection limits.

2.1.1. *Constituent Removal*

Figure 25 through **Figure 29** show constituent removal and any applicable corresponding effluent limitation (MDEL, AMEL) or water quality objective (WQO) values. WQOs are numerical standards established in the Basin Plan and are distinct from effluent limitations. Whereas effluent limitations apply to the actual discharge from the plant, WQOs are designed to protect water quality, aquatic life, and human health and carry no immediate regulatory action. Therefore, WQO values presented in the following Section, which are taken directly from the current NPDES permit, are included solely for informational purposes.

Table 3: Changes to Effluent Monitoring Parameters with R2-2014-0035

Parameter	NDPES Order No.	
	R2-2009-0061	*R2-2014-0035*
	Sampling Frequency	Sampling Frequency
Temperature	1/day	1/week
Dissolved Oxygen	1/day	---
Dissolved Sulfides	1/day if DO < 5 mg/L	---
Turbidity	1/day	1/week

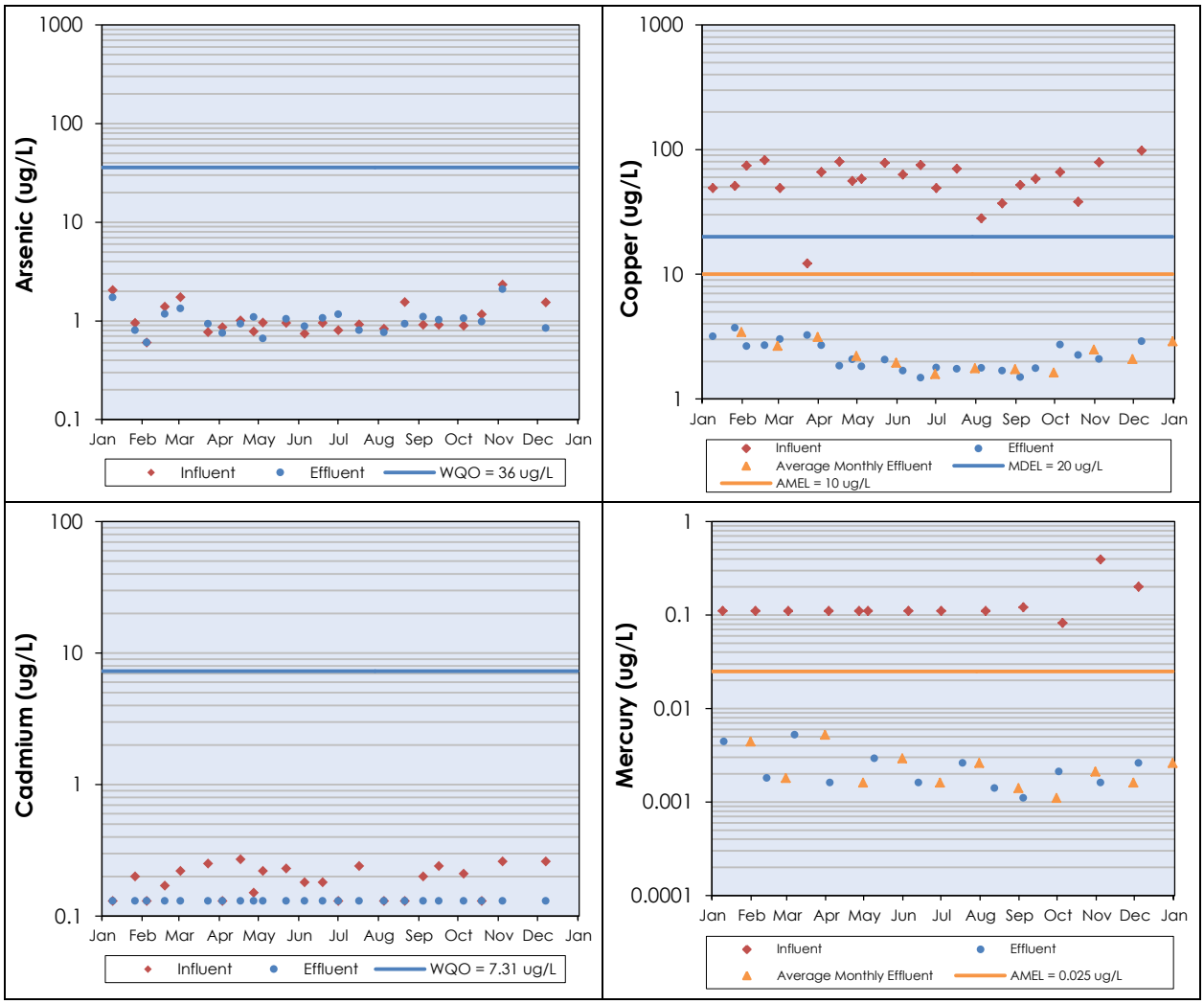


Figure 25: Influent and Effluent Concentrations of Common Metal Pollutants through the WPCP in 2014

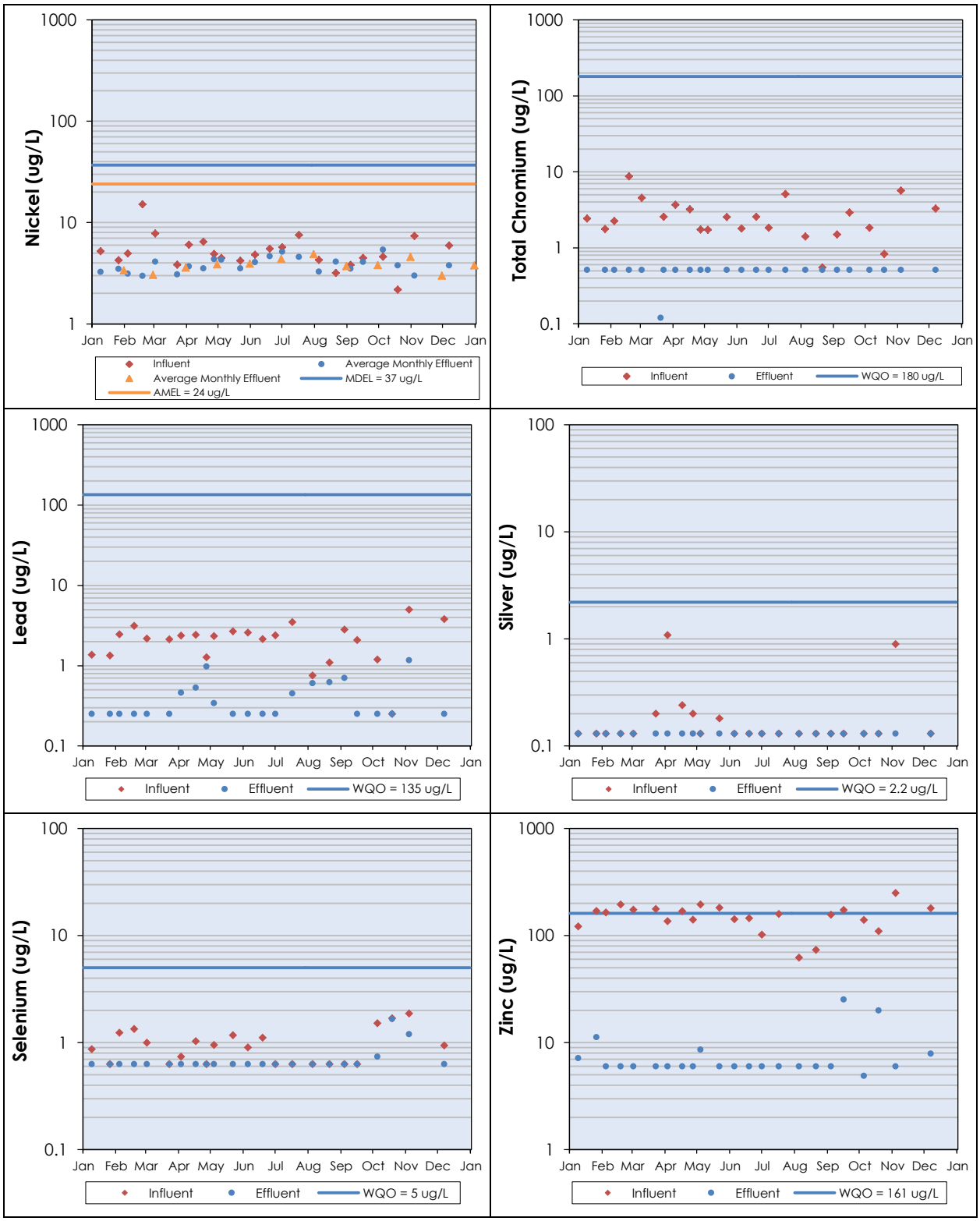


Figure 26: Influent and Effluent Concentrations of Common Metal Pollutants through the WPCP in 2014

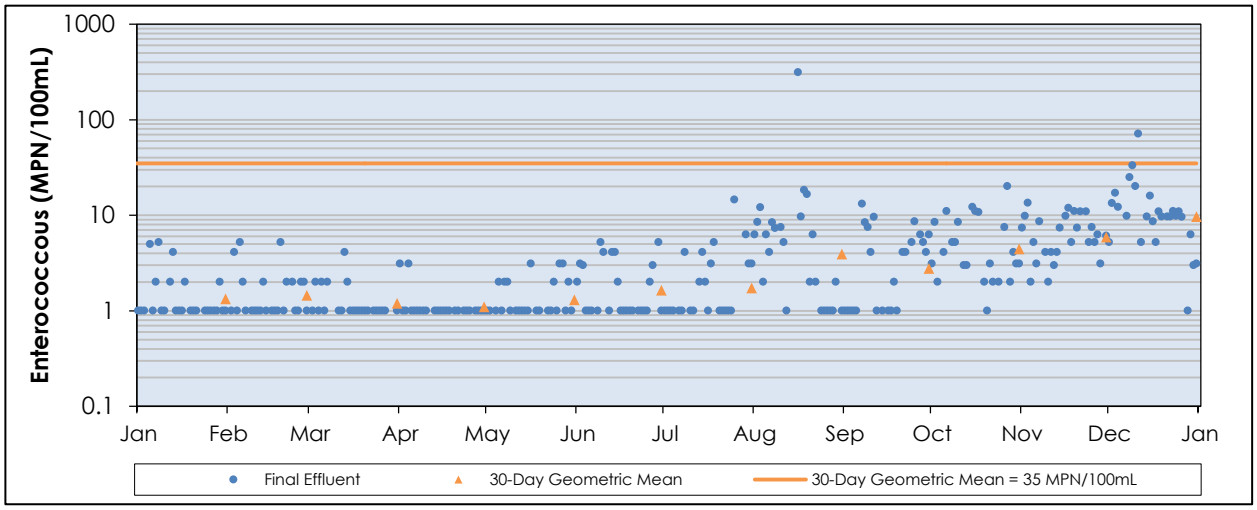


Figure 27: Daily Final and 30-Day Geometric Mean Effluent Enterococcus Data for 2014

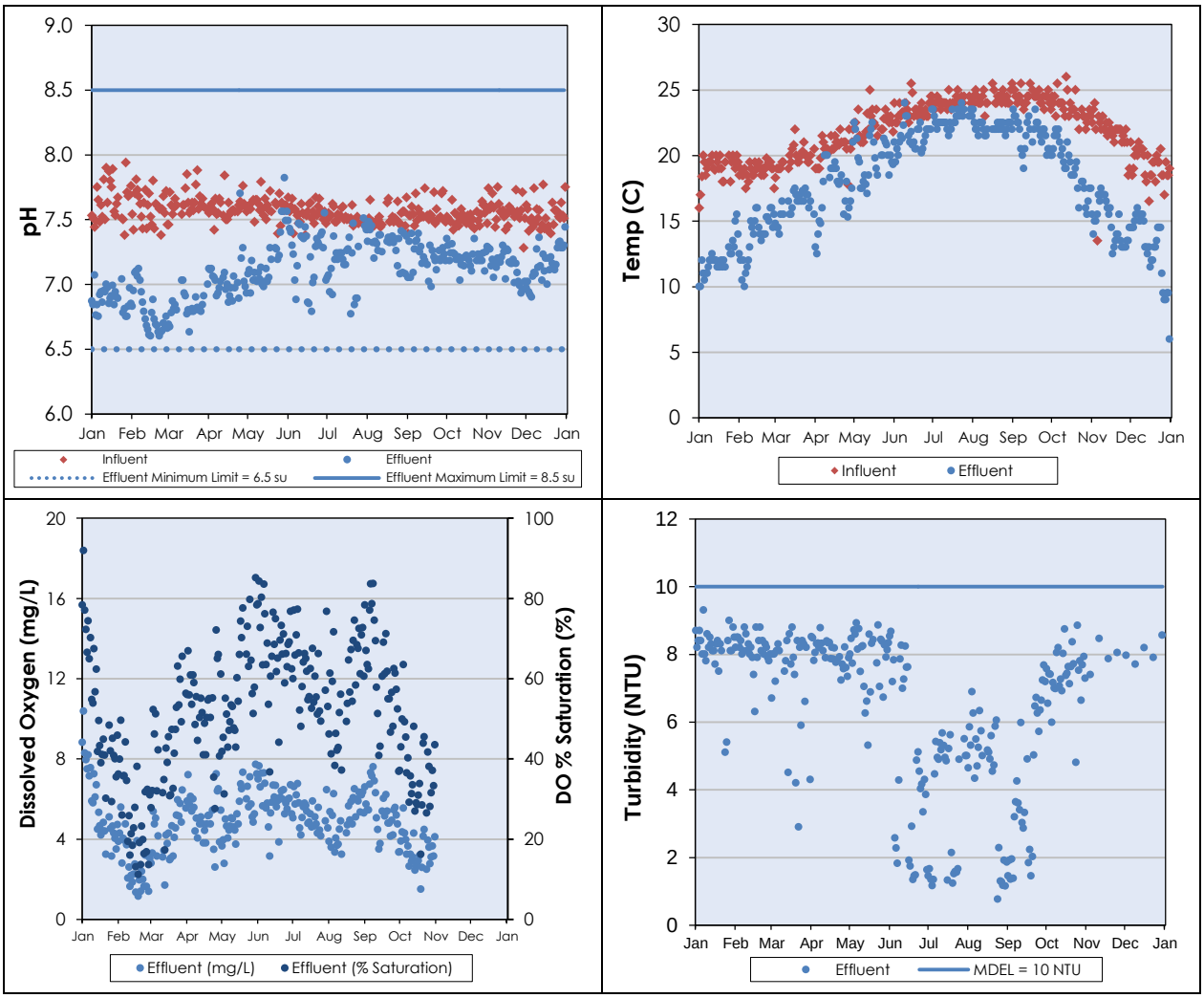


Figure 28: Monitoring Results for Common Physical Parameters Measured at the WPCP during 2014

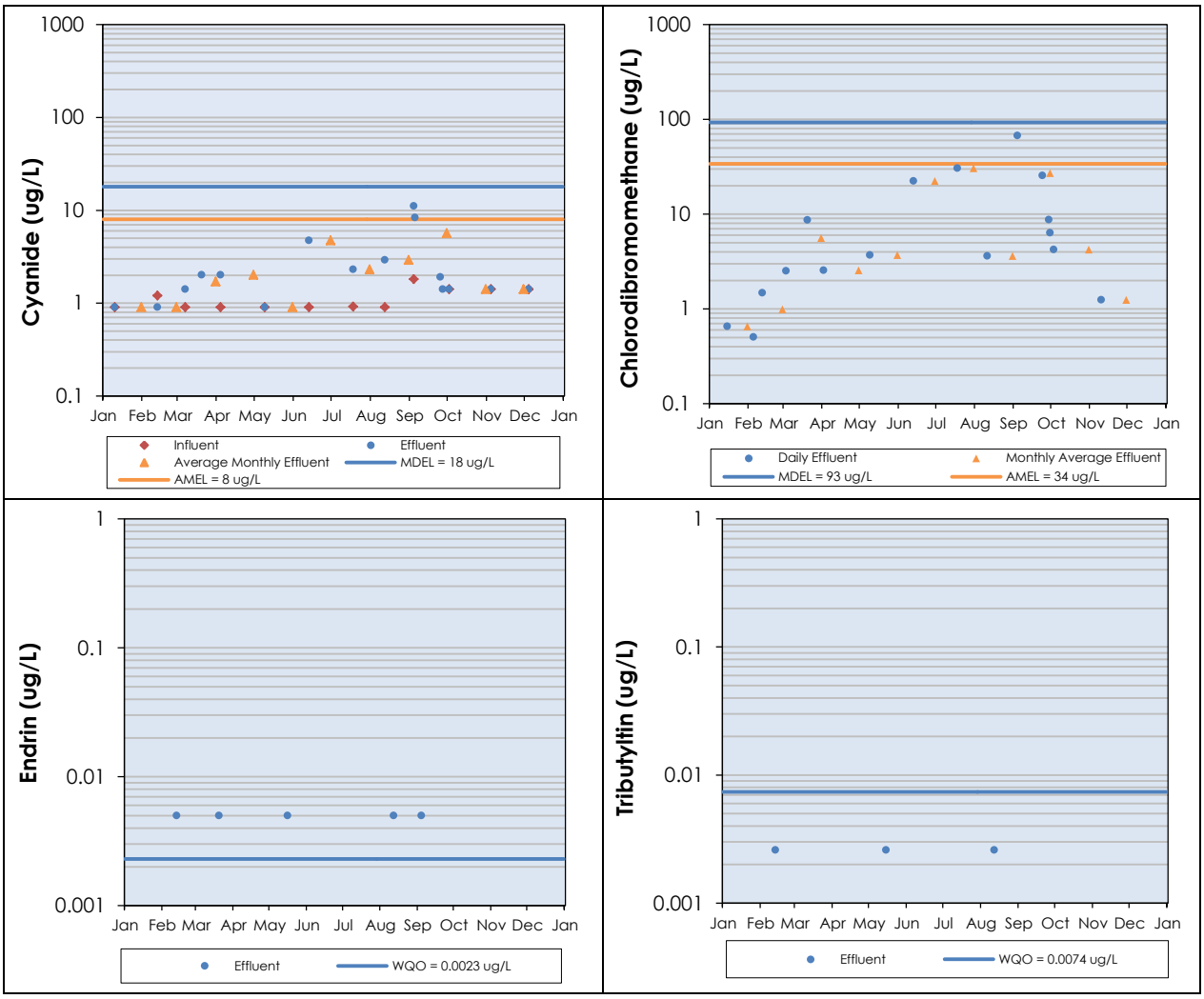


Figure 29: Monitoring Results for Common Organic Pollutants Measured at the WPCP during 2014

Note: Analytical values for endrin concentrations were not detected above laboratory method detection limits (MDLs). The values shown represent the MDL and not a detectable concentration of endrin.

During the reporting period, effluent from the WPCP was in compliance with all effluent limitations and WQOs. On occasion, effluent arsenic concentrations slightly exceeded their influent counterparts, but remained below the effluent WQO of 36 ug/L. This phenomenon has been observed during previous reporting periods and is believed to be associated with the long detention times afforded by the Oxidation Ponds and the subsequent accumulation of the compound. In addition, effluent DO concentrations dropped below 5 mg/L on several occasions during this reporting period, triggering the requirement to analyze samples for dissolved sulfides. Analytical results on every occasion were reported non-detect (<0.1 mg/L), indicating oxic conditions present in the effluent.

2.1.2. Chronic Toxicity Effluent Triggers

The NPDES permit contains effluent triggers for chronic toxicity if the single test maximum exceeds 2.0 toxicity units (TUc) and the three sample median exceeds 1.0 TUc. **Table 4** lists results for testing conducted between July 2013 and December 2014. Note that the prior permit, which was effective through October 2014, stipulated *Americamysis Bahia* (mysid shrimp) as the test species in chronic toxicity testing; the current permit stipulates that a different species (*Thalassiosira pseudonana*) be used in chronic toxicity testing.

Table 4: Summary of Chronic Toxicity Testing Results for WPCP Effluent

Test # (Year)	Sample Dates	Survival TU_c	Growth TU_c	3-Sample Median (Growth TU_c)
1 (2013)	7/15/13 - 7/21/13	<1	2.7	2.7
2 (2013)	8/5/13 - 8/11/13	<1	1.4	2.7
3 (2013)	8/19/13 - 8/25/13	<1	<1	1.4
4 (2012)	9/9/13 - 9/15/13	<1	<1	<1
5 (2013)	10/8/13 - 10/14/13	<1	<1	<1
6 (2013)	11/11/13 - 11/17/13	<1	<1	<1
7 (2013)	12/9/13 - 12/15/13	<1	4.5	<1
8 (2013)	12/30/13 - 1/5/14	<1	1.3	1.3
1(2014)	1/13/14 - 1/19/14	<1	<1	1.3
2 (2014)	1/27/14 - 2/2/14	<1	1.4	1.3
3 (2014)	2/10/14 - 2/16/14	<1	1.1	1.1
4 (2014)	2/18/14 - 2/24/14	<1	<1	1.1
5 (2014)	3/13/14 - 3/19/14	<1	1.4	1.1
6 (2014)	3/31/14 - 4/6/14	1.8	4.7	1.4
7 (2014)	4/14/14 - 4/20/14	2.4	5.7	4.7
8 (2014)	4/28/14 - 5/4/14	<1	2.7	4.7
9 (2014)	5/12/14 - 5/18/14	2.2	3.0	3.0
10 (2014)	5/27/14 - 6/1/14	<1	<1	2.7
11 (2014)	6/9/14 - 6/15/14	<1	1.4	1.4
12 (2014)	6/23/14 - 6/29/14	<1	<1	1.4
13 (2014)	7/7/14 - 7/13/14	<1	<1	<1
14 (2014)	8/5/14 - 8/11/14	<1	<1	<1
15 (2014)	9/6/14 - 9/12/14	<1	<1	<1
16 (2014)	10/13/14 - 10/19/14	<1	<1	<1
17 (2014)	11/5/14	<1	<1	<1
18 (2014)	12/5/14	<1	<1	<1

Prior year's chronic toxicity testing with *Americamysis Bahia* proved challenging given the test protocol's requirement to elevate the sample's pH which converted effluent ammonia into the more toxic unionized ammonia that could have induced false positives . The test protocol for *Thalassiosira pseudonana* does not require a pH adjustment and therefore minimizes the likelihood of this type of false positive from occurring.

Chronic toxicity testing under the current permit has resulted in no detection of toxicity in November 2014 and December 2014 tests.

During the period between July 2013 and August 2014, a total of 22 chronic toxicity tests were conducted on the WPCP Effluent. Toxicity was detected in 12 tests conducted in July, August and December (2) 2013 as well as January, February, March (2), April (2), May and June 2014. Detection of toxicity in the WPCP Effluent triggered accelerated monitoring of two tests per month in August 2013 and every month from December 2013 to June 2014 with the tests exceeding permit triggers for accelerated monitoring.

Consequently, the WPCP initiated a Toxicity Reduction Evaluation (TRE) and Toxicity Identification Evaluation (TIE) as required. The TIE was conducted with no conclusive identification of a causal toxicant. The TIE results pointed toward ammonia and the polymer added to the AFT as two potential sources of toxicity to the WPCP effluent. TIE results indicated that the toxicant was likely an organic compound. Also, toxicity degraded over time which is suggestive of an organic compound, as metals do not degrade. There was also complete removal of toxicity with cation-exchange treatment that typically indicates that metals may be a source of the observed toxicity. However, there was no increase in the concentration of metals in the effluent samples during the chronic toxicity events. Cation-exchange treatment can also remove organic compounds that have cationic properties. While by no means definitive, these TIE observations strongly indicate the cationic polymer added to the AFT process as the potential cause of the observed toxicity.

The City has taken the following steps toward identifying and responding to the results:

- Continue to evaluate potential enhancements with an emphasis on improving the efficiency of downstream processes (i.e., filtration and disinfection) in removing any residual polymer present by conducting pilot studies to identify the optimum type and dose of polymer to use for the flocculation process in the AFTs.
- Continue planning, design, and environmental studies for long-term WPCP facility upgrade and implications for chronic toxicity testing.
- The City resumed routine monitoring (once/month) for chronic toxicity compliance testing in July 2014 as toxicity dropped below permit triggers and appropriate elements of the TRE workplan were implemented.

2.1.3. Mercury Effluent Limitations and Trigger

The WPCP continues to be an active member of Bay Area Clean Water Agencies (BACWA) and participates in the annual submittal of water quality data pertaining to mercury discharge. In accordance

with the Mercury and PCBs Watershed Permit, Permit CA0038849, reissued as Order R2-2012-0096, 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) or limit (0.025 ug/L). Moreover, the annual effluent mercury loading for the City was 0.037 kg/yr, which is below the permit limit of 0.12 kg/yr (**Figure 30**).

2.1.4. PCB Effluent Limitations

The WPCP continues to be an active member of BACWA and participates in the annual submittal of water quality data pertaining to PCB discharge. In accordance with the Mercury and PCBs Watershed Permit, Permit CA0038849, reissued as Order R2-2012-0096, PCB concentrations are measured semi-annually as total aroclors using EPA Method 608 for regulatory compliance. PCBs were not detected using this method during the current reporting period (**Table 2**). In addition to the regulatory compliance monitoring, the WPCP is also required to measure total PCB congeners using EPA Proposed Method 1668c on a quarterly basis. Data from this method are for informational purposes only and were collected in February, May, August, and November of this reporting period.

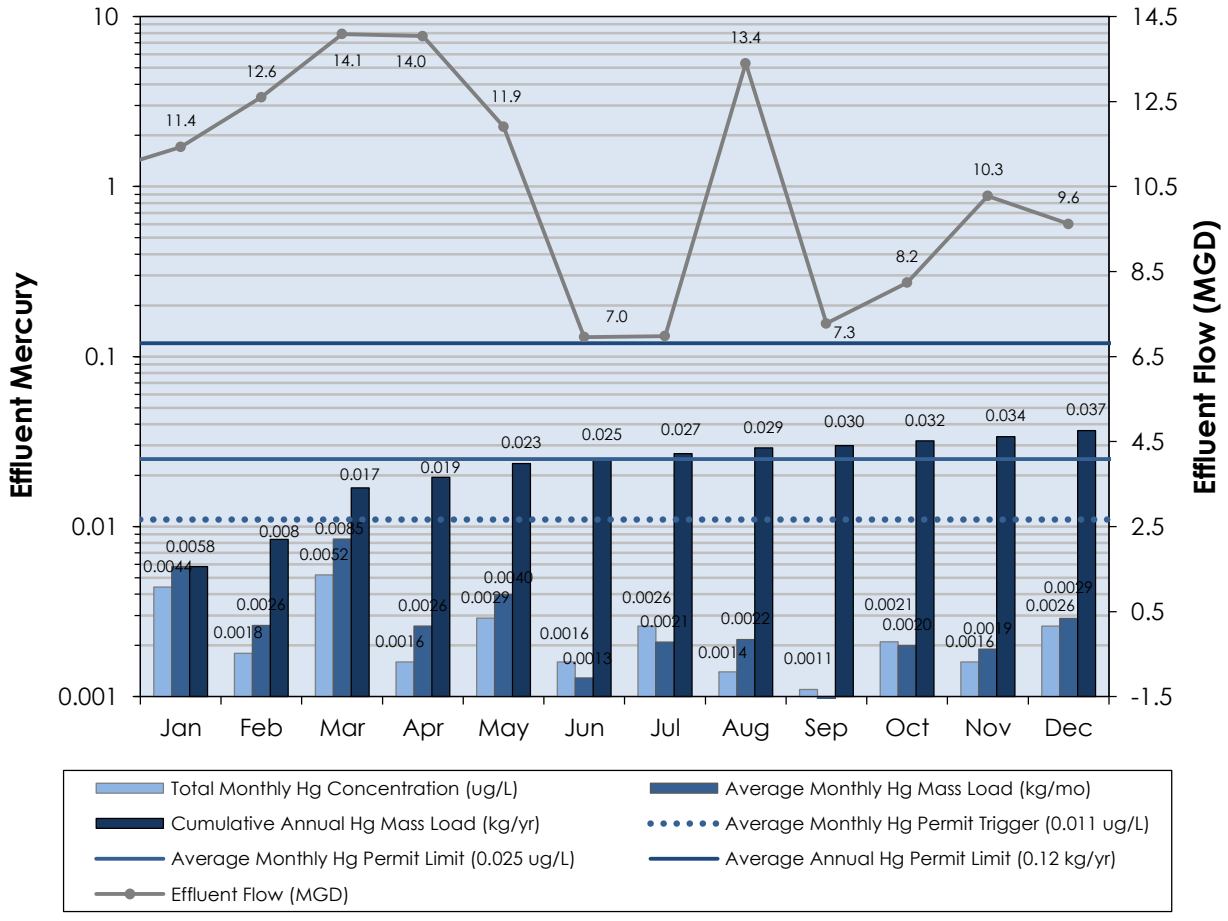


Figure 30: Effluent Mercury Concentrations and Mass Loads during 2014

Note: Effluent flow rates were recorded on the day in which the effluent mercury sample was collected and used to calculate mass loading rates

2.2. Avian Botulism Control Program

In accordance with Provision VI.C.5.A of Order R2-2014-0035, the City submits an annual Avian Botulism Control Program Report by February 28 of 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 WPCP 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 (SFBBO) was contracted by the City of Sunnyvale to locate and collect sick birds and dead vertebrates along the Guadalupe Slough, Moffett Channel, and WPCP Oxidation Ponds from June through November of 2014. WPCP personnel also conduct surveys on a regular basis (weekly) throughout the year around the Oxidation Ponds and collect sick, injured, or dead birds and mammals.

III. FACILITY REPORTS

1.0. OPERATION AND MAINTENANCE (O&M) MANUAL

The WPCP's O&M Manual is maintained in both electronic and hard copy formats. The electronic version is located at J:\ESD\WPCP\General\Operations\O&M Manual. The Manual's Table of Contents listings are hyperlinked to individual sections. From 2010 through 2014, the Manual was used extensively for training new WPCP operators, and a number of minor corrections and revisions were noted. The corresponding changes were made to the master document, and the electronic files on the WPCP network were updated. Because most of the revisions were relatively minor or typographic in nature, replacement of the affected sections in all of the "hard-copy" Manuals is being deferred until significant updates are made to individual sections. WPCP operators are aware that the electronic version of the O&M Manual is the most current.

In addition to the minor revisions noted above, substantive revisions were made during 2014 to the following sections. The updated sections have been added to hard copies of the Manual:

- Gas Flare Replacement: The Manual's section for the new gas flare was updated.
- Sodium Bisulfite Electrical System Improvements: Figure II-19 Recycled Water Pump Station MCC-D Single Line Diagram was revised to reflect these changes which also included a new control panel.
- New Manual Overview Section: Added to describe the regulatory framework and WPCP unit processes. As part of this work, the Liquid Process Flow schematic was updated.

In addition to the WPCP O&M Manual, the WPCP maintains an Operator in Training (OIT) Manual. This manual includes 35 "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. The following Ops Tasks were updated in 2014:

- OPS TASK 11: Grit Washer Nozzle Unplugging
- OPS Task 17: Sample Pump Clean Out/Priming – DELETED
- OPS TASK 18: Float Pumping Station Operation
- OPS TASK 23: Polymer Feed System Operation
- OPS TASK 25: Chlorine Gas & Sodium Bisulfite Injectors and Water Champs
- OPS Task 29: Process Control Computer Start-Up / Shutdown Procedure – DELETED
- OPS Task 31:Turbidity Samples and Meter Operation – DELETED
- OPS TASK 32: Chlorine And Sodium Bisulfite Residual Titrations
- OPS TASK 35: Rotating LFGF Blowers

Ops Tasks are kept on the WPCP network at J:\ESD\WPCP\general\Operations\OIT Manual\OIT Manual Updated.

Finally, the WPCP also maintains a series of Standard Operating Procedures (SOPs), which also contain detailed instructions for certain operational and administrative tasks. A number of the SOPs are safety-related, such as the SOPs for confined space entry or loading or unloading of one-ton chlorine cylinders. Updating of WPCP SOPs is an ongoing process. In addition, every operator is required to review every SOP annually. This process is tracked by support staff. These reviews feed into the annual SOP updating process.

The following SOPs were updated in 2014:

- #1011C T-3 Composite Sampler Operation After a Shutdown
- #1013D Reporting Influent Incidents
- #2021C Plant Shut-Down Notification Procedure
- #3036B Operation, Calibration And Maintenance Of ITX Multi-Gas Monitors
- #3038B State Agency Notification For Wastewater Spills, Upsets, Bypasses, Or Permit Violations
- #3050A Effluent Chlorine Residual Monitoring And Reporting
- #5400A Dewatered Dry Bed Sludge Sampling

Some of the above SOPs were revised and are in final review for management signature. The WPCP SOPs (including revision drafts) are kept at J:\ESD\WPCP\Admin\SupportServices\SOP Original Word Doc.

2.0. PLANT MAINTENANCE PROGRAM

The WPCP continues to use the Maximo computerized maintenance management system (CMMS) software as the core data management tool for its maintenance program. Electronic versions of Maximo documents reside on the WPCP network drive at J:\ESD\WPCP\WPCPData\SOPs\SOP - signed PDF.

The WPCP uses DataSplice handheld computing units and software to interface with the Maximo system. The DataSplice handhelds provide a field interface to work orders for corrective maintenance (CM) and preventative maintenance (PM) procedures, preventative operations procedures (POPs), and equipment information (via a bar-code reader) and also expedite data entry for work orders and other maintenance/process control measurements. The Maintenance section is considering supplementing the DataSplice units with laptop computers, whose larger screens would provide a more convenient interface for certain maintenance functions.

In 2014, WPCP operations and maintenance staff continued the ongoing process of updating (and where necessary, developing) PMs and POPs. 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.

The WPCP uses the Maximo computerized maintenance management system (CMMS) to manage and document maintenance activities. An outside consultant provides ongoing support for its use and improvement. There are currently over 7,600 pieces of equipment identified in the Maximo 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 advanced features such as predictive maintenance. In a given year, the Maximo CMMS generates and tracks about 1,250 Preventative Maintenance procedures (PMs) that are performed by Maintenance staff, and about 15,000 Preventative Operational Procedures (POPs) that are performed by Operations staff.

The WPCP 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 non-CIP maintenance and upgrades to WPCP equipment in 2014 included:

- Rehabilitation of Headworks #2 Channel Macerator
- Replacement of primary sedimentation basin #5 solids removal flight and chain guide rails to improve sludge removal
- Replacement of 9 Raw Sludge Pump
- Rehabilitation of Box 10 to improve resistance to corrosion
- Rotated #1 FGR distribution arms to improve nitrogen removal
- Replacement of obsolete effluent residual chlorine discharge meter
- Replacement of #4 3-Water Pump
- Upgrades to the OPTO SCADA system to increase system speed

Modifications to the Landfill Gas Burner programing modifications to improve startup system reliability and operator flexibility

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 operated and maintained in a manner to ensure that all 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. A description or summary of review and evaluation procedures, and applicable wastewater facility programs or Capital Improvement Projects is included in each annual self-monitoring report. For a description of the Capital Improvement Projects, see Chapter IV.

The City's review and evaluation procedures are not formally described in a single document. The responsibility to conduct such reviews, to develop goals, objectives and priorities, to formulate rules and procedures, and to maintain budgetary control are explicitly listed as duties of the Environmental Services Department Division Managers (WPCP, Water and Sewer Services, Solid Waste and Recycling, and Regulatory Compliance), 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 effort. 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.

Staffing and Supervision

The WPCP is operated and maintained by the City's Environmental Services Department (ESD), WPCP Division, with offices at the WPCP. Staffing is as follows:

- Division Managers: The WPCP Division Manager is responsible for overall operation and maintenance of the WPCP. The Regulatory Programs Division Manager provides support to 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 and WPCP Maintenance Manager report to the WPCP Division Manager. The Lab Manager reports to the Regulatory Programs Division Manager. The WPCP Maintenance Manager is currently vacant; it is anticipated that this position will be filled early 2015.
- Operations staff: 25 full-time operators including five senior operators and 19 operators.
- Maintenance staff: two senior mechanics, six mechanics and one senior storekeeper.
- Laboratory staff: two senior environmental chemists, three chemists, and three lab/field technicians.
- Industrial Pretreatment Program: One senior inspector, four inspectors, and two lab/field technicians.
- Compliance and Technical Support: One Senior Environmental Engineer and one Environmental Engineering Coordinator.

The City has created two new positions to support the WPCP during this time of significant capital improvement:

- Principal Design and Construction Operator: provides supervisor level coordination, evaluation and scheduling work for all capital projects related to the reconstruction of the WPCP.
- WPCP Control Systems Integrator: supervises and performs control system work of considerable complexity in the planning, design, construction, and operation of the WPCP.

These positions will be filled in early 2015. For a description of the City's WPCP Capital Improvements Plan (**Chapter IV**).

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. Staffing is as follows (wastewater-related positions only):

- Managers: Water and Sewer Services Division Manager, Wastewater Operations Manager.
- Operations & Maintenance Staff: twelve full-time workers, including a wastewater collections supervisor, two wastewater collections crew leaders, two senior wastewater collections workers, four utility workers, and three maintenance workers.

WPCP and Water and Sewer Services operations are supported by local administrative staff at the WPCP and Corporation Yard, by the ESD Director, by the Department of Public Works Engineering Division (providing engineering support for capital projects), and by staff from other City Departments (City Attorney's Office, Purchasing, Finance, Human Resources). The City also has contracts with various consultant firms for technical and regulatory support, planning studies, engineering design for capital projects, and other needs. The City believes that current staff allocation and supervision are sufficient to perform its mission and meet the requirements listed in the introduction to this section.

Financing

The WPCP and Collection System are financed by revenues generated from fees levied on users of the 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 in June 2014, approving a 9% increase in the rate for sewer service. This increase translates into a monthly increase of $3.04 for an average single-family residence.

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 2014. City budgets also provide for ongoing rehabilitation of the sewer system.

Operations

WPCP operations are performed by a highly skilled group of State Water Board-certified operators organized into five shifts (Day, Swing, Grave, Relief 1 and Relief 2). A minimum of four operators are on duty at all times, including at least one Senior Operator. The WPCP places a major emphasis on training of new operators as a way to maintain a high level of operator skill as operators retire. The Operator-in-Training (OIT) Program provides both mentoring and rigorous training in all aspects of WPCP operations. The WPCP O&M Manual is a key element of the OIT Program. In addition to demonstrating an understanding of the O&M Manual, OITs must also be familiar with applicable SOPs and be certified by a Senior Operator in 35 specific Operations Tasks before being allowed to perform those tasks independently. 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 Preventative Operational

Procedures (POPs) as described under the Plant Maintenance Program. Operators receive ongoing support from the WPCP Operations Manager, the WPCP Division Manager, WPCP Support Services staff, and outside consultants.

Maintenance

WPCP Maintenance is performed by a skilled crew of six Maintenance Mechanics under the direction of the WPCP Maintenance Manager and the two Senior Mechanics. Maintenance staff members are responsible for most preventive and corrective maintenance tasks, with certain specialty maintenance functions (such as PGF engine overhauls) performed by outside contractors. Maintenance staff members also have mandatory training requirements and have opportunities for elective training. The Maintenance section uses the Maximo CMMS as described under the Plant Maintenance Program.

The Wastewater Collections Section utilizes the staffing described above for maintenance of the wastewater and stormwater 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.

Facility Upgrades

Numerous WPCP upgrade projects are currently in progress as described above under Section IV Capital Improvement Projects. Also described in this section is the City's current WPCP Master Planning process. As indicated, a contract for design of new influent pumping/headworks/primary treatment facilities was approved in 2013, and preliminary work related to the design is underway. A consultant has been selected to provide Program Management service for this and other Master Plan projects.

Collection System

A series of prioritized capital projects has also been developed for the sewer system. As part of these priorities, the City allocates funding annually for ongoing emergency or incidental sewer repair and rehabilitation. In 2014, the City completed most of the design work for the Baylands Storm Pump Station No. 2 Rehabilitation Project, which is projected to start construction in early 2015. The City is also in the process of rehabilitating its five wastewater lift stations which includes structural, mechanical, electrical, and SCADA work. Three of the stations are scheduled to be completed during 2015. The collection system Wastewater Master Plan is scheduled to be completed during 2015. The plan will analyze and develop alternatives for future wastewater capital projects and funding.

In 2012, the City purchased a video camera truck that is used by City staff for conducting condition assessments and as an aid to sewer system O&M activities. The City runs its own construction crews and does 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.

For the 2014 annual review, the "Emergency Only" Telephone Notification List was updated and attached to the existing Plan.

In 2014, the City embarked on the primary effluent pipeline alternatives analysis to begin evaluating options for conveying raw wastewater around the WPCP's primary treatment system in the event of an emergency that disables some or all of that system, and for providing an alternative means of conveying primary effluent to the Oxidation Ponds in the event of a failure of the existing primary effluent line. This task is part of the Emergency Flow Management Project (**Chapter IV** Capital Improvements Projects). Results of this work will update the preventatives measures in Section 4: Spill Prevention Plan of the Contingency Plan. Specifically, the results of this study will update 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.

5.0. SPILL PREVENTION CONTROL AND COUNTERMEASURE (SPCC)

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 to this document, the WPCP's Spill Prevention Control and Countermeasure (SPCC) Plan addresses spill response for non-wastewater spills at the WPCP.

IV. CAPITAL IMPROVEMENT PROJECTS

1.0. OVERVIEW

The City of Sunnyvale is in the process of developing a comprehensive Master Plan for the WPCP and is aligning resources to escalate the degree of capital project implementation at the WPCP. The original components of the WPCP were completed in 1956, many of which are still in service. Other components of the plant were completed over the subsequent 15-20 years. Based on a 2006 Asset Condition Assessment Report, the City began implementing several rehabilitation projects and also developed a long-term Strategic Infrastructure Plant 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 comprehensive Master Plan, which included the "basis of design" development for the various process areas to be rebuilt and a programmatic environmental impact report (PEIR). The implementation of the Master Plan is estimated to cost over $400 million in the next 20 years.

In the near term, the City is embarking on Capital Improvement Projects (CIP) to address identified needs and commence with the first stage of the Master Plan with a ten-year project budget of approximately $100 million (**Table5**). The projects are intended to maintain or enhance WPCP reliability, and virtually every treatment process at the WPCP will be improved upon in some manner. In some cases, more than one treatment process will be influenced by a single project, such as the Primary Design and Construction project. The major projects are discussed in the following Sections.

Table5: Summary of CIP and Estimated Costs and Completion Dates

CIP Name	Estimated 10 year Project Life Total Cost	Estimated Completion Date	Treatment Process Improvements					
			Headworks	Primary	Secondary	Advanced Secondary	Solids Handling	PGF
AFT Construction	$ 5,136,560	2015				X		
Primary Effluent Pipeline Emergency Flow Management	$ 2,183,001	2015		X				
Anaerobic Digester Rehabilitation	$ 13,947,955	2015					X	X
Hypochlorite Conversion & Continuous Recycled Water Production Facilities	$ 5,240,000	2016				X		
PGF Gas Improvement and Emergency Generator	$ 2,100,000	2015						X
Oxidation Ponds Dewatering and Dredging	$ 6,248,272	2015			X			
Primary Design and Construction	$ 58,396,482	2018	X	X				
Master Plan	$ 7,100,400	2017	X	X	X	X	X	X
CIP Total	***$ 100,352,670***							

2.0. AFT CONSTRUCTION

PROJECT:

AFT CONSTRUCTION

START DATE:

MARCH 2014

WORKING ON THIS PROJECT:

ANDERSON PACIFIC

AREA OF THE PLANT THAT WILL BE AFFECTED:

AFTs 1 & 4

WPCP
Project in Progress
Fact Sheet

AFT Construction - #1 & #4

WHAT IS IT?

This project includes repair/replacement of the influent gates on AFTs #1-4, and coating of the concrete walls — extending their life for approximately 15-20 years.

During construction of the first two AFTs (2&3) several unforeseen conditions were encountered that escalated the project costs. As a result, additional retrofit scope was added to the next two AFTs (1&4). These items include the replacement of the pressurization tanks on each AFT, a collector drive on AFT #4, and other mechanical components.

This photo, taken in 2009, gives us a glimpse inside one of the aging AFTs.

WHY?

AFTs are used to remove algae that grow during secondary treatment in the oxidation ponds. AFTs #1-3 were built in 1975 and the fourth in 1982, and all are in need of significant rehabilitation.

3.0. PRIMARY EFFLUENT PIPELINE EMERGENCY FLOW MANAGEMENT

PROJECT:

EMERGENCY FLOW MANAGEMENT

START DATE:

SEPTEMBER 2014

WORKING ON THIS PROJECT:

CDM SMITH

AREA OF THE PLANT THAT WILL BE AFFECTED:

AREA BETWEEN AFTs AND CHLORINE BUILDING

WPCP
Project in Progress
Fact Sheet

Emergency Flow Management

WHAT IS IT?

The primary effluent pipeline is used to gravity flow primary effluent from the primary sedimentation tanks to the recirculation channel through a combination of 60" and 66" pipe.

The project consists of the following elements: inspect the primary effluent pipeline; based on inspection finding, conduct an alternatives analysis and select the most suitable option; and prepare a basis of design report for a future construction project. The project will also address alternative means of conveying primary effluent to the oxidation ponds in the event of a failure of the existing primary effluent line. The primary effluent line inspection was completed in October 2014. The alternatives analysis is in progress.

WHY?

The WPCP relies on a single, 2,000-foot , 60-66 inch diameter reinforced concrete pipeline, constructed in the 1970s, to convey effluent from the primary sedimentation tanks to the oxidation ponds. According to a 2006 Condition Assessment, the primary effluent pipeline is one of the most vulnerable facilities at the Plant. An alternative bypass conveyance system needs to be constructed to address this vulnerability.

The selected option will be integrated into the primary design project.

4.0. ANAEROBIC DIGESTER REHABILITATION

PROJECT:

DIGESTER REHABILITATION

START DATE:

JANUARY 2014

WORKING ON THIS PROJECT:

AZTEC CONSTRUCTION

AREA OF THE PLANT THAT WILL BE AFFECTED:

DIGESTERS #1 & 2

WPCP
Project in Progress
Fact Sheet

Digester Rehabilitation

WHAT IS IT?

The Digester Rehab project focuses on the design and construction to renovate digesters #1 & 2. This includes replacement of lids, rehabilitation and seismic retrofit of the digester tanks themselves, the sludge mixing equipment, and related peripheral equipment. The structural integrity of the digester lids must be maintained to prevent releases of potentially hazardous methane gas that could pose the potential for explosion and/or result in BAAQM violations.

Contractors working on a digester lid in May 2014

WHY?

Digesters #1 and #2 were built in 1955. The digester lids have deteriorated, and methane gas has been found between the structural layers of the lids. Spot repairs have been completed and have provided some addition to the lids' useful life, but are no longer adequate. To prevent failure, the lids need to be replaced. Replacement is estimated to extend the life of the digesters by 30 years.

5.0. HYPOCHLORITE CONVERSION AND CONTINUOUS RECYCLED WATER PRODUCTION FACILITIES

PROJECT:

Hypo Conversion & Continuous Recycled Water Production Facilities

START DATE:

March 2013

WORKING ON THIS PROJECT:

HDR

AREA OF THE PLANT THAT WILL BE AFFECTED:

NOTHING AT THIS TIME

WPCP
Project in Progress
Fact Sheet

Hypo Conversion & Continuous Recycled Water Production Facilities

WHAT IS IT?

The Chlorine project element provides for the design and construction of a liquid chlorine disinfection system to replace the existing gaseous chlorine system. Upon completion, the liquid chlorine system will be used for all disinfection in the short term.

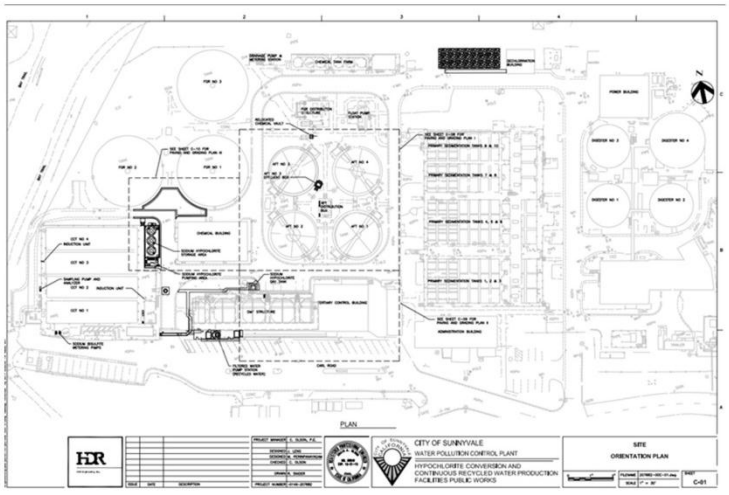
The design phase included evaluating an alternate de-chlorination injection point and the reduction of total dissolved solids in the recycled water.

The Continuous Recycled Water Production Facilities project element will rehabilitate the plant production facilities to allow for production of recycled water while concurrently discharging to the San Francisco Bay which will improve the overall reliability and flexibility to produce recycled water. The design of the liquid chlorine disinfection system is currently at 90% completion.

WHY?

Chlorine gas is a hazardous chemical and most plants have transitioned away from gaseous chlorine. The long-term plan for disinfection at WPCP is likely a combination of liquid chlorine and ultraviolet (UV) disinfection. UV disinfection involves no chemicals, so is even safer than liquid chlorine. However, UV disinfection technology is expensive to construct and operate, so immediate installation may be premature as the technology is still improving.

Continuous recycled water production will improve overall system reliability and reduce chemical cost.



6.0. PGF GAS IMPROVEMENT AND EMERGENCY GENERATOR

PROJECT:

GAS IMPROVEMENTS

START DATE:

November 2013

WORKING ON THIS PROJECT:

CDM SMITH

AREA OF THE PLANT THAT WILL BE AFFECTED:

NOTHING AT THIS TIME

WPCP
Project in Progress
Fact Sheet

Gas Improvements/ Emergency Generator

Gas Improvements

WHAT IS IT?

Recommended improvements to the gas handling system are summarized in the following:

- Add the capacity to add a NG (undiluted) feed stream into the blended gas flow
- Relocate the feed point of the ABNG stream to upstream of the LFG blowers
- Install a gas chromatograph on the blended gas stream just upstream of the PGF.

The recommended changes to the ABNG feed are to continue to the current operation of the existing ABNG mixing system where the ABNG is "mixed down" and stored in the surge tank, but to also provide the capabilities of a new feed point on the suction side of the LFG blowers.

WHY?

These improvements significantly increase the reliability of the PGF engines and reduce engine breakdowns.

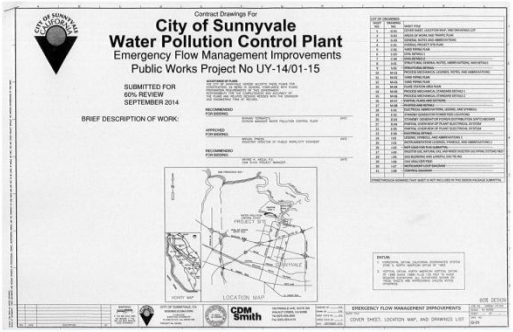
Emergency Generator

WHAT IS IT?

The Emergency Standby generator will provide standby power for existing APS and other essential equipment.

WHY?

Power failures and/or electrical equipment failures at the WPCP need an alternate source of power to keep the facility functioning beyond just storing influent in the oxidation ponds.



7.0. OXIDATION POND DEWATERING AND DREDGING

PROJECT:

SYNAGRO DEWATERING

START DATE:

2009

WORKING ON THIS PROJECT:

SYNAGRO

AREA OF THE PLANT THAT WILL BE AFFECTED:

DEWATERING AREA

WPCP
Project in Progress
Fact Sheet

Synagro Dewatering

WHAT IS IT?

The Synagro Dewatering project is sediment removal from the oxidation ponds. The oxidation ponds provide secondary treatment using the natural action of sun and wind to facilitate the growth of algae, which takes up dissolved waste from the wastewater. No solids have been removed from the ponds since inception of secondary pond treatment in the late 1960s. An estimate from 2006 calculates the accumulation of solids to be at 35% to 45% of the pond volume.

This project was initiated in 2009 to address the accumulation of these solids through dredging and pumping the slurry to a centrifuge to remove water prior to hauling it off site for disposal.

WHY?

Based on the successful dredging rates in FY 2012/13, this rate of activity will need to continue into FY 2014/15. At that point, the development of the WPCP Master Plan will be complete, which will define the future uses of the ponds.

The City will be modifying the pond solids removal project beginning in 2015 to reduce the amount removed to keep up with the solids deposition. Dredging at the reduced rate will continue for approximately the next ten years.

8.0. PRIMARY DESIGN

PROJECT:

PRIMARY DESIGN

START DATE:

January 2014

WORKING ON THIS PROJECT:

CAROLLO ENGINEERS

AREA OF THE PLANT THAT WILL BE AFFECTED:

NOTHING AT THIS TIME

WPCP
Project in Progress
Fact Sheet

Primary Design

WHAT IS IT?

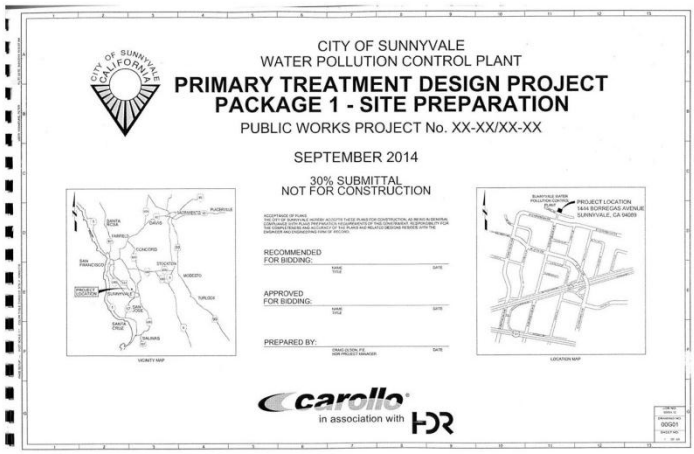
The Primary Design project includes design and construction of the replacement of the current headworks, primary sedimentation tanks, influent pump station, grit removal facilities, and associated electrical, mechanical, and control systems. Primary treatment provides the removal of solids and floating material from the wastewater stream. The ten primary sedimentation basins are reinforced concrete structures with process piping, mechanical drives and motors, and associated instrumentation.

The design phase is currently at 30%.

WHY?

The oldest of the primary tanks were part of the original plant built in 1955. The concrete in these tanks is falling off in large chunks, exposing the reinforced steel inside the structures. In addition, the primary tanks were built before the current, more stringent seismic requirements were put in place, so the current structures are vulnerable to earthquake damage.

The WPCP strategic Infrastructure Plan was completed in 2010, and it recommended full replacement and relocation of primary treatment, influent pumping and headworks, grit removal, and power distribution facilities, to the current sludge drying paved area east of the current primary tanks.



9.0. MASTER PLAN

PROJECT:

MASTER PLAN

START DATE:

January 2014

WORKING ON THIS PROJECT:

CAROLLO ENGINEERS

AREA OF THE PLANT THAT WILL BE AFFECTED:

NOTHING AT THIS TIME

WPCP
Project in Progress
Fact Sheet

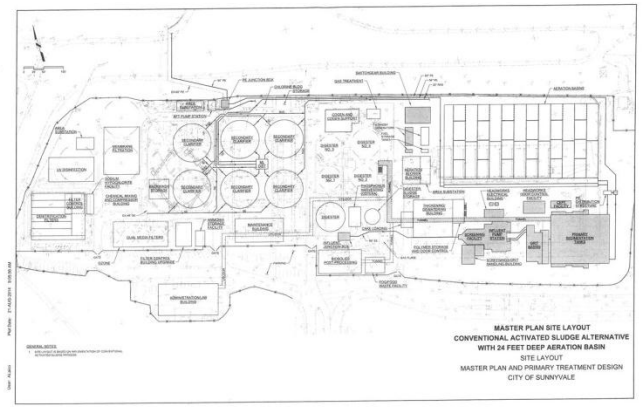
Master Plan

WHAT IS IT?

The Master Plan project is related to the WPCP reconstruction program. Carollo Engineers will be preparing preliminary engineering studies, reports and investigations necessary to further analyze and develop the concepts outlined in the Strategic Infrastructure Plan. Carollo will also be responsible for preparing the Programmatic Environmental Impact Report for the entire program. The final outcome of this project will include taking each of the program's design elements to the 10% design stage and completing all the necessary, related design standards. At the conclusion of this project, the program will be fully developed and all the necessary design and construction packages will be defined. The City can then begin implementing the design and construction of the various components necessary to reconstruct the WPCP.

WHY?

The goal of this project is to further analyze those concepts and develop a master plan for reconstructing the WPCP. This is essential so that the City can fully understand the scope, schedule, and budget for the entire reconstruction program and have a well thought out plan to complete it.



V. PERMIT SPECIAL STUDIES

Under Provision VI.C of 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 2014, with the exception of the Total Suspended Solids Removal Study which is discussed in more detail in the following section.

1.0. TOTAL SUSPENDED SOLIDS REMOVAL STUDY

On April 3, 2014, the City submitted a report entitled *Total Suspended Solids Removal Study* in accordance with Provision VI.C.2.f NPDES Order R2-2009-0061. As required by the Provision, the report included a summary of influent and effluent TSS data for the previous five-year period, description of existing components of wastewater treatment, including processes employed and equipment/treatment units age, discussion of TSS removals achieved versus expected, in light of the specific treatment processes employed and/or then available at the WPCP, and evaluation of operational changes to enhance TSS removal.

VI. OTHER STUDIES AND PROGRAMS

1.0. CHRONIC TOXICITY IDENTIFICATION AND TOXICITY REDUCTION STUDY

The City has developed a Draft Final Report entitled *Chronic Toxicity Identification and Toxicity Reduction Studies* under NPDES Order R2-2009-0061 Provision VI.C.2.d. The report presented the results from mandatory monthly chronic toxicity of its effluent discharge using the mysid shrimp *Americamysis Bahia* (**Figure 31**). This species was selected as the most sensitive species based on a chronic toxicity species screening test conducted during the 2009 permit renewal process. The test is performed over a 7-day period using daily 24-hour composite effluent samples, and at the end of the seven day test period, survival and growth (biomass) endpoints are calculated. This report will be finalized and submitted first quarter 2015.

Figure 31: *Americamysis Bahia* (mysid shrimp used in chronic toxicity studies)

2.0. 13267 TECHNICAL REPORT ORDER ON NUTRIENTS

From July 2012 through June 2014, the City collected influent and effluent samples for nutrients in accordance with the Water Board's March 2, 2012 "13267" letter requiring submittal of information on nutrients in wastewater discharges, and the subsequent group sampling plan developed by BACWA and approved by the Water Board on June 28, 2012 (revised version). The City has submitted quarterly monitoring reports and a final summary report in July 2014 in accordance with the letter. Results from the WPCPs ongoing monitoring are submitted in monthly SMRs and therefore will not be discussed in detail in this report.

3.0. DILUTION STUDY

In 2013, a Preliminary Dilution Study was conducted to analyze the spatial and temporal dilution of WPCP effluent in Moffett Channel and Guadalupe Slough, based on data measurements. The next step to further substantiate the analysis is to conduct a second Dilution Study that will develop a numeric model to estimate dilution. This effort is currently in progress.

4.0. REGIONAL WATER MONITORING PROGRAM AND RECEIVING WATER MONITORING REQUIREMENTS

Provision VI in Attachment E requires the City to continue its participation in the Regional Water Monitoring Program (RMP), which was formally established in 1993. This monitoring is necessary to characterize the receiving water and the effects of the discharges authorized in R2-2014-0035. The City's RMP participation is documented in a letter issued by Bay Area Clean Water Agencies (BACWA) dated January 17, 2014.

The Discharger is also required to monitor receiving waters at or between RMP monitoring station C-1-3 and Sunnyvale station C-2-0 (**Figure 32**) near the confluence of Guadalupe Slough and Moffett Channel to provide data necessary for reasonable potential analyses. This is the area where the highest un-ionized ammonia would be expected based on the Discharger's Receiving Water Ammonia Characterization Study – Final Report, dated April 15, 2012. The parameters to sampling include: Salinity, Temperature, pH, and Total Ammonia Nitrogen.

This sampling needs to occur over a 12 month contiguous period sometime over the duration of the Permit. The Board also provides two alternatives for meeting this requirement:

- The City may conduct this receiving water monitoring on its own or
- Rely upon equivalent data obtained following another alternative approach through the RMP or in coordination with others.

Before pursuing an alternative approach, the City will first obtain written concurrence from the RWQCB's Executive Officer that the alternative approach is equivalent to the monitoring described above. The City will then submit the data in a report with its application for permit reissuance. The City is evaluating how to proceed regarding meeting this monitoring requirement.

Figure 32: RMP Monitoring Station Locations along Guadalupe Slough

ATTACHMENTS

ATTACHMENT A

Wastewater Treatment Process:

Liquids and Solids Handling Process Schematics

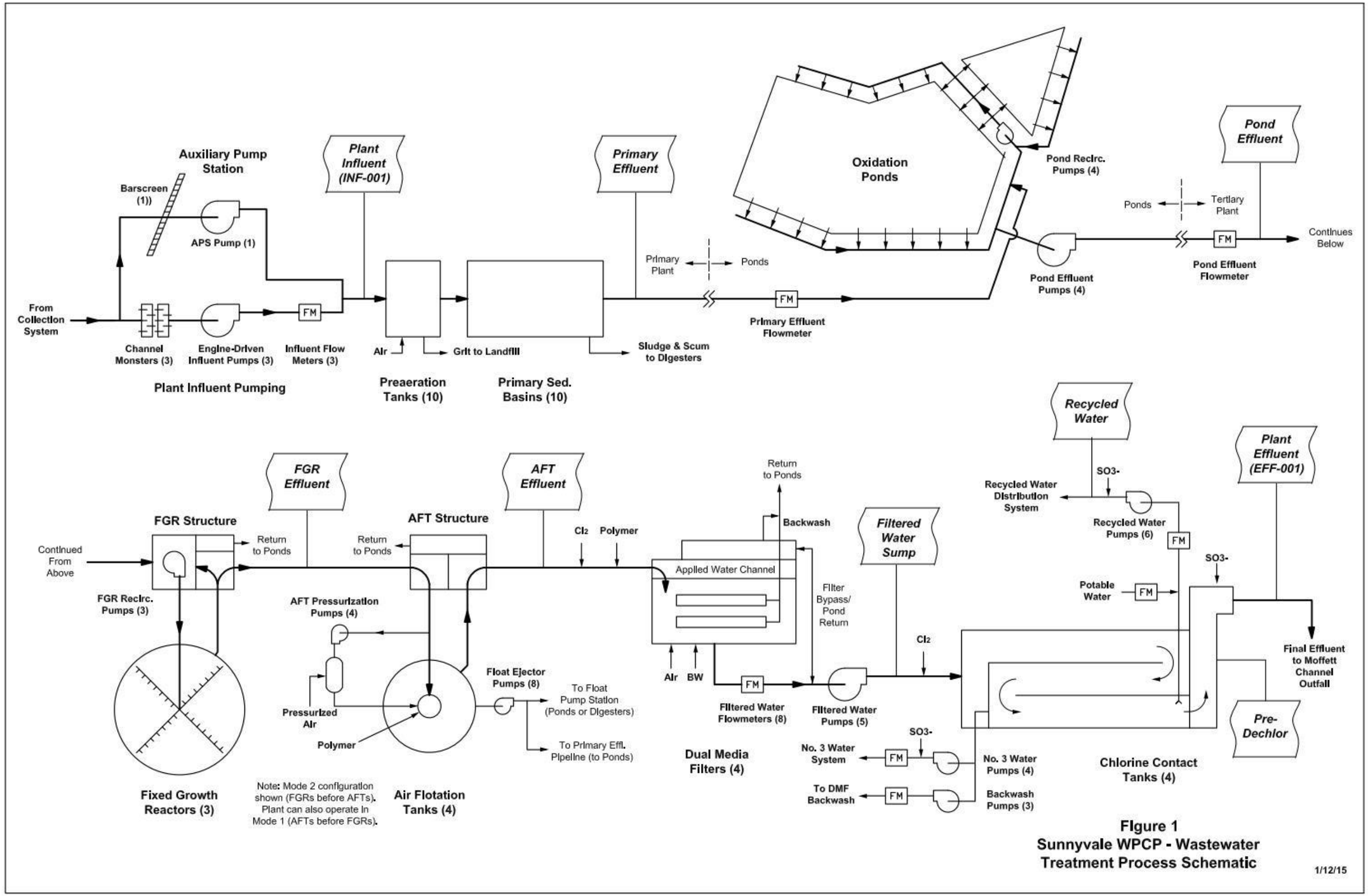


Figure 1
Sunnyvale WPCP - Wastewater Treatment Process Schematic

1/12/15

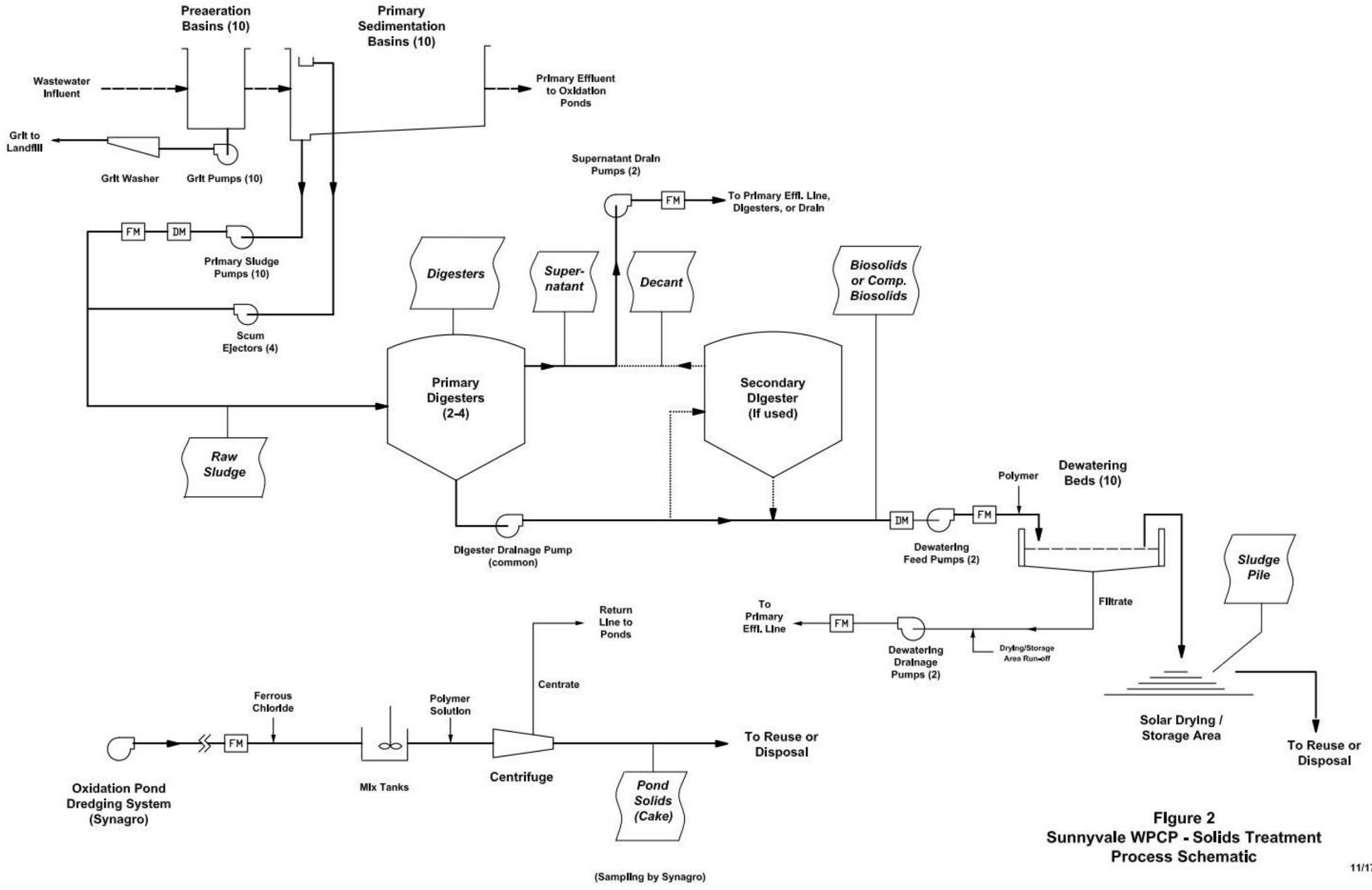


Figure 2
Sunnyvale WPCP - Solids Treatment Process Schematic

11/17/14

ATTACHMENT B

WPCP Certificate of Environmental Accreditation

WPCP Approved Analyses

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 Division

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, 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: **10/31/2016**

Effective Date: **11/01/2014**

Sacramento, California
subject to forfeiture or revocation

Christine Sotelo, Chief
Environmental Laboratory Accreditation Program

CDPH

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
Accredited Fields of Testing

City of Sunnyvale Environmental Laboratory
Environmental Laboratory
1444 Borregas Avenue
Sunnyvale, CA 94089
Phone: (408) 730-7276

Certificate No.: 1340
Renew Date: 10/31/2012

Field of Testing: 101 - Microbiology of Drinking Water			
101.010	001	Heterotrophic Bacteria	SM9215B
101.060	002	Total Coliform	SM9223
101.060	003	E. coli	SM9223
Field of Testing: 102 - Inorganic Chemistry of Drinking Water			
102.030	003	Chloride	EPA 300.0
102.030	006	Nitrate	EPA 300.0
102.030	008	Phosphate, Ortho	EPA 300.0
102.030	010	Sulfate	EPA 300.0
102.100	001	Alkalinity	SM2320B
102.121	001	Hardness	SM2340C
102.130	001	Conductivity	SM2510B
102.163	001	Chlorine, Free and Total	SM4500-Cl G
102.200	001	Fluoride	SM4500-F C
102.500	004	Sodium	SM3111B
102.540	001	Calcium	SM3500-Ca B (20th)
Field of Testing: 103 - Toxic Chemical Elements of Drinking Water			
103.010	002	Copper	SM3111B
103.010	003	Iron	SM3111B
103.010	010	Zinc	SM3111B
103.040	002	Antimony	SM3113B
103.040	003	Arsenic	SM3113B
103.040	005	Beryllium	SM3113B
103.040	006	Cadmium	SM3113B
103.040	007	Chromium	SM3113B
103.040	008	Copper	SM3113B
103.040	010	Lead	SM3113B
103.040	012	Nickel	SM3113B
103.040	013	Selenium	SM3113B
103.040	014	Silver	SM3113B
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

As of 6/11/2013 , this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

City of Sunnyvale Environmental Laboratory

Certificate No 1340
Renew Date: 10/31/2012

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	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	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	044	1,1,2,2-Tetrachloroethane	EPA 524.2
104.040	045	Tetrachloroethene	EPA 524.2
104.040	046	Toluene	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
104.040	052	Trichlorofluoromethane	EPA 524.2
104.040	054	1,2,4-Trimethylbenzene	EPA 524.2
104.040	055	1,3,5-Trimethylbenzene	EPA 524.2
104.040	056	Vinyl Chloride	EPA 524.2
104.040	057	Xylenes, Total	EPA 524.2
104.045	001	Bromodichloromethane	EPA 524.2
104.045	002	Bromoform	EPA 524.2
104.045	003	Chloroform	EPA 524.2
104.045	004	Dibromochloromethane	EPA 524.2
104.045	005	Trihalomethanes	EPA 524.2
104.050	002	Methyl tert-butyl Ether (MTBE)	EPA 524.2
104.050	006	Trichlorotrifluoroethane	EPA 524.2

Field of Testing: 107 - Microbiology of Wastewater

107.020	001	Total Coliform	SM9221B

As of 6/11/2013 , this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

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City of Sunnyvale Environmental Laboratory

Certificate No 1340
Renew Date: 10/31/2012

107.242	001	Enterococci	Enterolert
Field of Testing:		108 - Inorganic Chemistry of Wastewater	
108.020	001	Conductivity	EPA 120.1
108.090	001	Residue, Volatile	EPA 160.4
108.110	001	Turbidity	EPA 180.1
108.120	002	Chloride	EPA 300.0
108.120	004	Nitrate	EPA 300.0
108.120	008	Sulfate	EPA 300.0
108.360	001	Phenols, Total	EPA 420.1
108.410	001	Alkalinity	SM2320B
108.421	001	Hardness	SM2340C
108.441	001	Residue, Filterable	SM2540C
108.442	001	Residue, Non-filterable	SM2540D
108.445	005	Sodium	SM3111B
108.461	001	Chlorine, Total	SM4500-Cl C
108.465	001	Chlorine, Total	SM4500-Cl G
108.470	001	Cyanide, Manual Distillation	SM4500-CN C
108.472	001	Cyanide, Total	SM4500-CN E
108.480	001	Fluoride	SM4500-F C
108.490	001	pH	SM4500-H+ B
108.493	001	Ammonia	SM4500-NH3 D or E (19th/20th)
108.510	001	Nitrite	SM4500-NO2 B
108.530	001	Dissolved Oxygen	SM4500-O C
108.531	001	Dissolved Oxygen	SM4500-O G
108.541	001	Phosphorus, Total	SM4500-P E
108.590	001	Biochemical Oxygen Demand	SM5210B
108.591	001	Carbonaceous BOD	SM5210B
108.610	001	Total Organic Carbon	SM5310B-2000
108.905	001	Magnesium	SM3500-Mg D
108.909	001	Calcium	SM3500-Ca B (20th)
Field of Testing:		109 - Toxic Chemical Elements of Wastewater	
109.190	001	Mercury	EPA 245.1
109.370	002	Cadmium	SM3111B
109.370	005	Cobalt	SM3111B
109.370	006	Copper	SM3111B
109.370	009	Iron	SM3111B
109.370	010	Lead	SM3111B
109.370	013	Nickel	SM3111B
109.370	019	Silver	SM3111B
109.370	023	Zinc	SM3111B
109.410	002	Antimony	SM3113B
109.410	003	Arsenic	SM3113B
109.410	005	Beryllium	SM3113B

As of 6/11/2013 , this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

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City of Sunnyvale Environmental Laboratory

Certificate No 1340
Renew Date: 10/31/2012

109.410	006	Cadmium	SM3113B
109.410	007	Chromium	SM3113B
109.410	009	Copper	SM3113B
109.410	011	Lead	SM3113B
109.410	014	Nickel	SM3113B
109.410	015	Selenium	SM3113B
109.410	016	Silver	SM3113B
Field of Testing:		110 - Volatile Organic Chemistry of Wastewater	
110.040	040	Halogenated Hydrocarbons	EPA 624
110.040	041	Aromatic Compounds	EPA 624
Field of Testing:		113 - Whole Effluent Toxicity of Wastewater	
113.022	003	Rainbow trout (O. mykiss)	EPA-821-R-02-012
Field of Testing:		120 - Physical Properties of Hazardous Waste	
120.010	001	Ignitability	EPA 1010
Field of Testing:		126 - Microbiology of Recreational Water	
126.080	001	Enterococci	IDEXX

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