South San Francisco/San Bruno
Water Quality Control Plant

FACILITY PLAN UPDATE

FINAL

April 2011

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SOUTH SAN FRANCISCO/SAN BRUNO WATER QUALITY CONTROL PLANT
FACILITY PLAN UPDATE

TABLE OF CONTENTS

Page No.

CHAPTER 4 – CONDITION ASSESSMENT

CHAPTER 5 – REGULATORY REQUIREMENTS

CHAPTER 6 – WET WEATHER FLOW PROJECTS

CHAPTER 7 – ENERGY ALTERNATIVES

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

1.1 INTRODUCTION AND PROJECT OBJECTIVES

The South San Francisco/San Bruno Water Quality Control Plant (WQCP) provides wastewater treatment for the communities of South San Francisco, San Bruno and portions of Daly City and Colma. The most recent facility plan was completed in 1997 to address the need to comply with the effluent discharge permit, to add treatment capacity, to improve treatment reliability. The facility plan provided the basis for several WQCP improvement projects over the 1998 to 2005 time frame. Major projects included the capacity expansion and improvements project (completed in 2000) and the wet weather improvements project (completed in 2005).

The current facility plan effort was commissioned by the Cities of South San Francisco and San Bruno to develop a capital improvements plan (CIP) in three areas:

- **Discharge Permit Compliance.** Improvements required to satisfy new (2008) effluent discharge permit requirements (the most important of which are related to new wet weather flow management requirements), and to provide a strategy for complying with potential future permit requirements.
- **Critical Reliability and Rehabilitation.** Improvements to the existing treatment facilities to improve treatment reliability and to replace aging infrastructure including the three oldest anaerobic digesters (over 60 years old) and the older aeration basins (about 40 years old).
- **Green Energy Opportunities.** Development of green energy sources to reduce dependence on the power utility, including utilization of digester gas for power generation, solar energy, wind power and hydroelectric power.

The objectives of the facility plan include:

- Estimate future flows and loadings and establish required treatment capacity for the next 30 years (from 2010-2040).
- Identify improvements to satisfy the 2008 discharge permit requirements with respect to managing peak wet weather flows.
- Formulate a strategy to meet future effluent discharge requirements.
- Assess the impacts of climate change.
- Develop a comprehensive CIP for reliability upgrades, permit compliance upgrades and energy projects.
- Prioritize the CIP projects and identify project phasing.

- Establish a cash flow projection to coordinate with the City's projected sewer rate structure and finance plan.
- Provide the required documentation for pursuit of State Revolving Fund loans to offset construction and financing costs.

1.2 EXISTING FACILITIES

The WQCP provides secondary treatment that employs a conventional air-activated sludge process. Solids separated from the wastewater are treated with anaerobic digesters. Digested sludge is dewatered and hauled to the landfill for final disposal. Treated effluent from the WQCP combines with secondary effluent discharges from the Cities of Burlingame and Millbrae, and the San Francisco International Airport. The combined flows are pumped into the North Bayside System Unit (NBSU) outfall, which discharges to the San Francisco Bay.

The current rated treatment capacity for average dry weather flow is 13 million gallons per day (mgd). In addition, the WQCP has a peak wet weather flow capacity of 62 mgd, which corresponds to the estimated flow from a 5-year storm.

Figure 1.1 illustrates the routing of peak wet weather flows through the plant. The secondary treatment system has a peak secondary treatment capacity of 30 mgd. If the WQCP receives a peak flow of 62 mgd, the remaining 32 mgd of influent flow receives primary treatment and is blended with the secondary effluent, disinfected and discharged to the outfall.

The NBSU effluent pump station and outfall have a flow capacity of 64 mgd. By agreement, South San Francisco and San Bruno are limited to pumping a peak flow of only 35 mgd. When effluent flows from the WQCP exceed 35 mgd, the excess is stored in a 7-million gallon (MG) storage pond, and released later when peak flows subside. The flow diversion system is designed to divert only secondary treated effluent to the ponds. If the pond fills to capacity, the excess flow must be discharged to the near-shore outfall to Colma Creek. The Colma Creek outfall is a simple overflow weir that discharges directly to the creek. Only secondary treated effluent can be discharged to the near-shore outfall. Near shore discharges have occurred 2 times over the last 5 years, and only once since the 7-MG secondary effluent storage pond was completed in October 2005.

1.3 FLOWS AND LOADINGS PROJECTIONS AND TREATMENT CAPACITY REQUIREMENTS

Future wastewater flows and loadings (waste strengths) were estimated to assess the treatment capacity needs over the planning period. Population growth in the WQCP service area has been moderate over the last 10 years, largely due to a relatively built out service area with little growth potential. According to the planning agencies, this modest growth rate

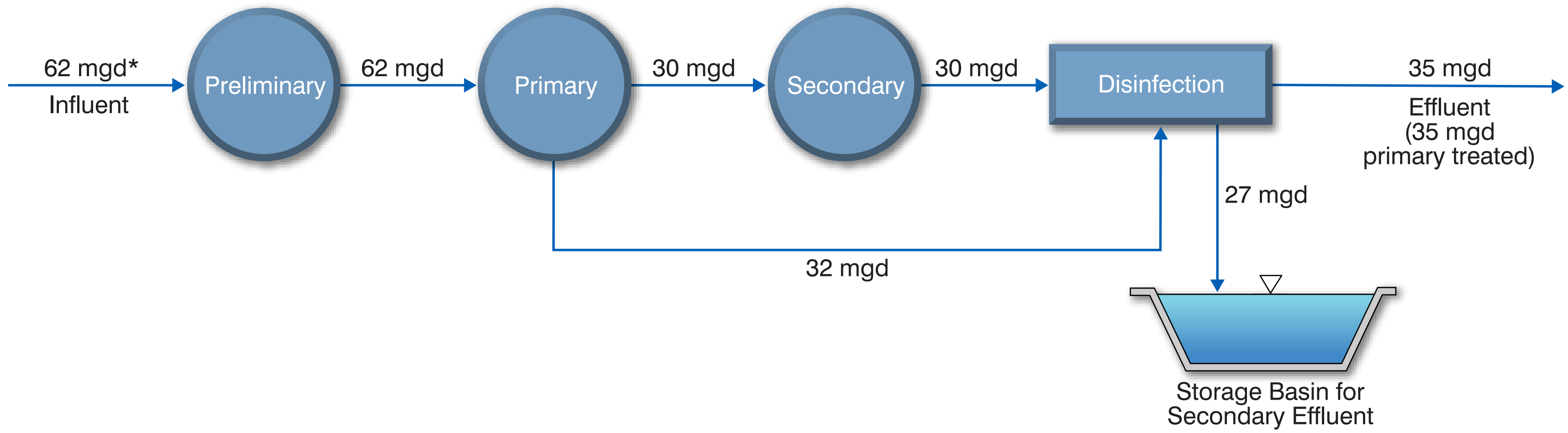

Figure 1.1
FLOW THROUGH WQCP FOR
10-YEAR, 24-HOUR STORM
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SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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is expected to continue for the foreseeable future. Additionally, some of the commercial and industrial growth that was previously planned for in the service area has not occurred. For example, the projected industrial growth for South San Francisco has dropped by 10 percent. Most of the growth in the service area is expected to consist of new developments in South San Francisco's East of 101 industrial park. Currently planned East of 101 projects include relatively "dry" industries (research and development and office space). Growth in other parts of the service area, including San Bruno and west of 101 in South San Francisco, is expected to be mostly residential infill of vacant land.

Population growth projections were obtained from the general plans for each city served by the WQCP (South San Francisco, San Bruno, a part of Daly City, and Colma). The resulting combined growth rate for the service area is 0.5 percent per year. Figure 1.2 shows the population projections for the thirty year planning period, which extends through 2040.

Dry weather wastewater flows to the WQCP were projected by multiplying the population estimates by a per capita flow rate (flow per person). The per capita flow rate over the last five years has averaged 79 gallons per capita per day (gpcd). Figure 1.3 is a plot of the projected average dry weather flows. As shown, the current treatment capacity, if process improvements are implemented, will be adequate for the entire planning period. The projected average dry weather flow for the year 2040 is only 10.3 million gallons per day (mgd), which amounts to 2.6 mgd less than the current rated treatment capacity of 13 mgd.

Wastewater influent loads for biochemical oxygen demand (BOD) and total suspended solids (TSS) were projected based on recent data provided by the WQCP (2004-2009). The historical average concentrations are typical values for largely residential communities. Therefore, it is anticipated that the future concentrations will continue to be similar to existing conditions. Table 1.1 presents a summary of updated projected wastewater flow and loadings.

In summary, wastewater flows have not increased significantly over recent years. If the current trend of low per capita flows and limited residential development continue, the current treatment capacity of 13 mgd will be adequate for the 30 year period, with an available reserve capacity of about 2.6 mgd. Therefore, capacity expansion projects are not expected to be required for the foreseeable future. The cities may elect to adopt a policy to maintain a capacity reserve to attract industries or other developments. If a major industry were to locate in the service area, the cities would need to reevaluate capacity needs at that time.

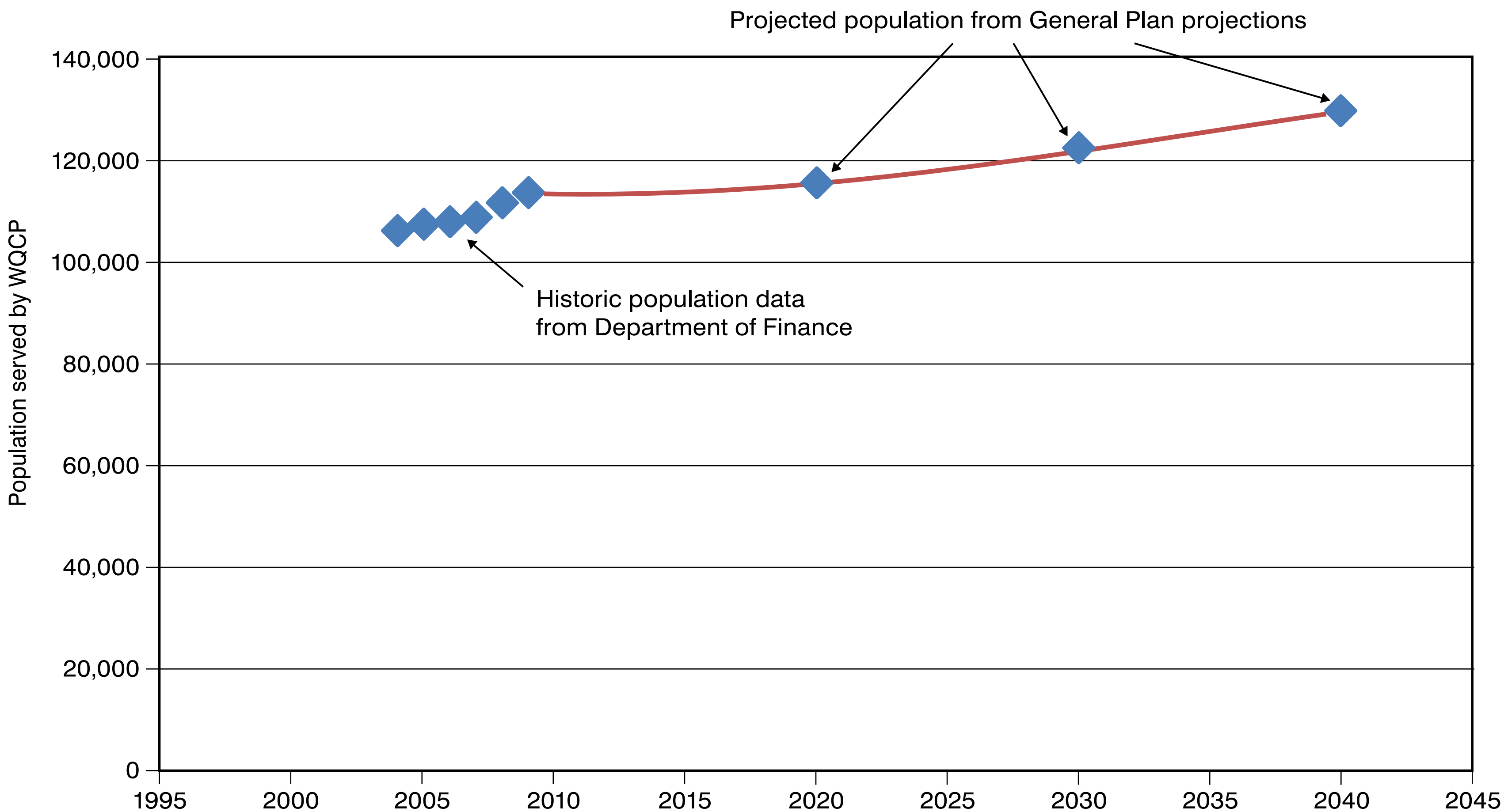

Figure 1.2
PROJECTED POPULATION AT BUILDOUT
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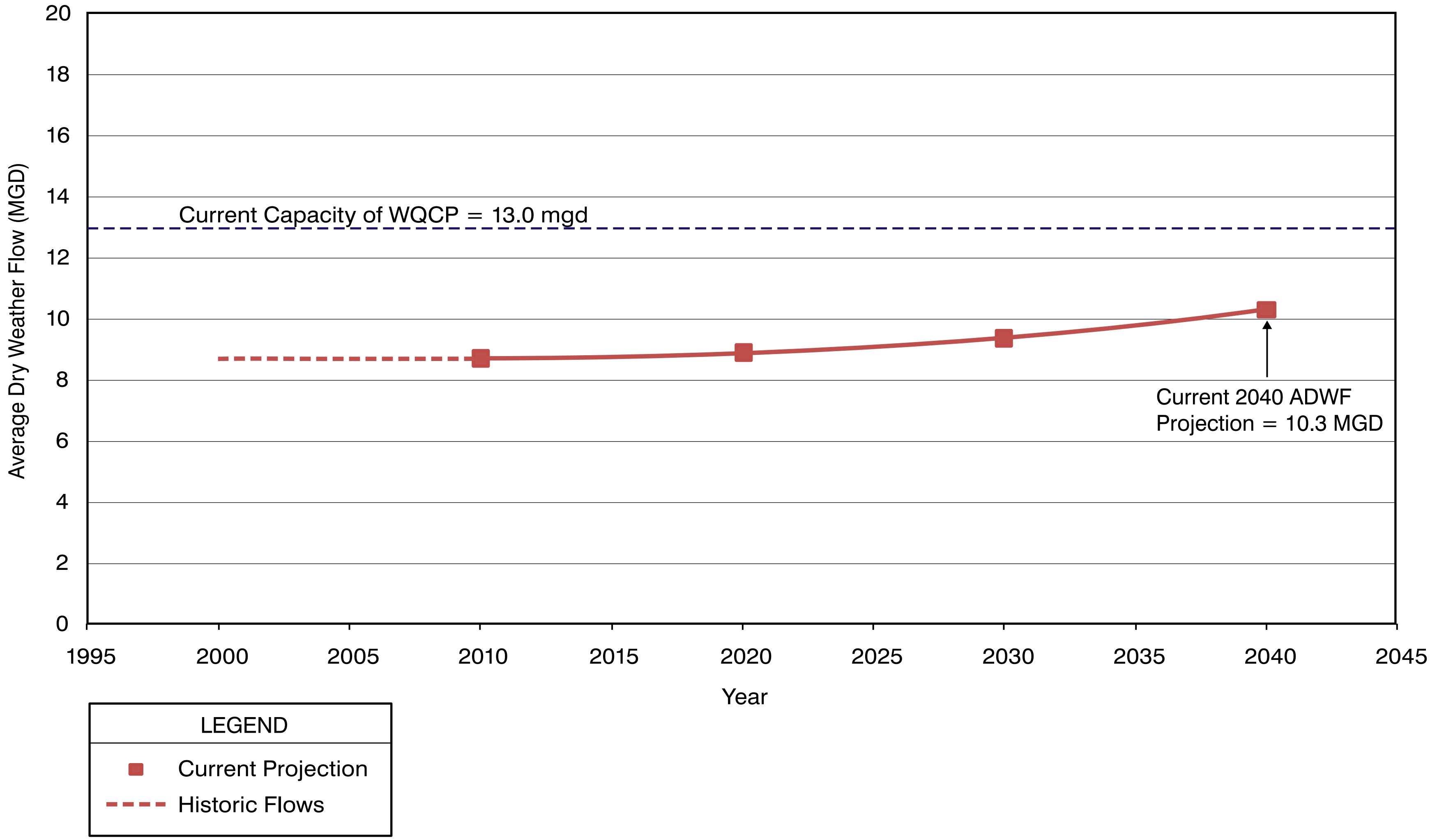

Note:
Projection lines drawn are approximations.

Figure 1.3
AVERAGE DRY WEATHER FLOW PROJECTION
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SOUTH SAN FRANCISCO/SAN BRUNO WQCP

Table 1.1 Historical and Projected Flows, Loads, and Concentrations Facility Plan Update South San Francisco/San Bruno WQCP				
	Current (Average of 2004-2009)	**2020**	**2030**	**2040**
Flows				
Per capita average dry weather flow (gpcd)	79.2	79.2	79.2	79.2
Average Dry Weather Flow (mgd)	8.7	9.2	9.7	10.3
Average Annual Flow (mgd)	9.5	10.6	11.1	11.7
Maximum Month Flow (mgd)	12.0	13.9	14.6	15.4
Maximum Day Flow (mgd)	25.8	39.6	41.6	44.0
Loadings				
Average Dry Weather BOD (ppd)	25,200	26,900	28,200	29,900
Maximum Month BOD (ppd)	28,800	36,300	38,500	40,800
Average Dry Weather TSS (ppd)	19,400	20,700	21,700	23,000
Maximum Month TSS (ppd)	25,100	34,800	36,800	39,000
Concentrations				
Average Dry Weather BOD (mg/L)	347	350	348	348
Maximum Month BOD (mg/L)	288	313	316	317
Average Dry Weather TSS (mg/L)	268	269	268	268
Maximum Month TSS (mg/L)	251	300	302	303

Notes:
(1) gpcd = gallons per capita per day
(2) mgd = million gallons per day
(3) ppd = pounds per day

1.4 TREATMENT PERFORMANCE AND CONDITION ASSESSMENT

The WQCP treatment performance was evaluated for the Facility Plan to determine if improvements would be required to expand or enhance the existing facilities. In general, all plant processes are performing as designed, except for the secondary treatment system, which is underperforming due to poor sludge settleability in the secondary clarifiers. When the activated sludge particles do not settle properly, they are drawn over the clarifier weirs to the final effluent, leading to excursions over the total suspended solids limits. The rated treatment capacity with current settleability issues is about 10.3 mgd, compared to the original 13 mgd rating. Recommended process improvements for the activated sludge system include adding a secondary clarifier to reduce overflow rates, and adding an anoxic zone on the aeration basins to improve sludge settling. These are described in greater detail in Chapters 3 and 6 of this Facility Plan.

A condition assessment of the WQCP was conducted to identify and develop a list of repair and replacement projects that are included in the overall CIP. Key findings include:

- The 2-megawatt standby generator that serves the influent pumping and primary treatment is outdated and unreliable during power outages, and it should be replaced. This was identified as a critical project that should be implemented as soon as possible.
- The elevated electrical bus duct has experienced multiple failures and is in need of replacement as soon as possible.
- Metal buildings for the standby generator, the digester 3 heating and mixing building are severely corroded and should be replaced with masonry structures.
- Aeration basins 1 through 4 are severely damaged from corrosion and should be abandoned.
- Digesters 1 and 2 have also reached their useful life, and should be replaced.
- Digester 3 should be rehabilitated. Digesters 1 through 3 are important elements because they can provide a means to convert fats oils and grease (FOG) to biogas, which can be utilized for power cogeneration.
- There are many small miscellaneous repair and replacement projects that have been incorporated into the 5 year CIP.

1.5 CURRENT REGULATORY REQUIREMENTS

The Regional Water Quality Control Board (RWQCB) adopted a new National Pollution Discharge Elimination System (NPDES) discharge permit for the WQCP in 2008. The most significant changes in the 2008 permit are new restrictions in managing peak wet weather flows. The existing treatment facilities cannot achieve these requirements.

The permit restrictions include:

1. Eliminate near-shore discharges of secondary or primary treated effluent to Colma Creek. Near-shore discharges are prohibited regardless of the size of the storm. Near-shore discharges are prohibited because there is currently no permit for the discharge point, and the requirement to provide at least a 10:1 dilution factor has not been demonstrated.

2. Minimize primary/secondary effluent blending. Per the permit, the City must begin a program to reduce or eliminate blending of secondary and primary effluent. Neither a timeline nor the actual design flows are specified. However, the current language is

likely the first step for the EPA and the Regional Board to eliminate blending in the future. The EPA has taken a much stronger stance against blending in other parts of the country. Pressure from outside groups may eventually lead to a uniform ban of primary/secondary blending for all dischargers.

1.6 WET WEATHER FLOW PROJECTS

The recommended strategy for complying with the requirements to reduce primary and secondary effluent blending and eliminate near shore discharges to Colma Creek is in two parts:

1. Increase the secondary treatment capacity from 30 mgd to 40 mgd. The expansion will consist of a new secondary clarifier, improvements to the older aeration basins to improve sludge settlability, and a new 2.4 million gallon storage basin to reduce peak wet weather flows. These improvements will accommodate flows from a 10-year, 24-hour storm, which is considered a Bay Area standard for wet weather flow management.

2. Apply for a new discharge permit to allow restricted discharges of secondary effluent to Colma Creek during extreme events. Successfully obtaining the permit will require a study to demonstrate that the Creek can assimilate pollutants from the secondary effluent and that the flow in the creek would provide at least a 10 to 1 dilution during the near shore discharges. This approach will require at least one year of monitoring data for Colma Creek to assess the current water quality and flows. Additional environmental studies will be required to demonstrate that using the creek for infrequent discharges under peak flow conditions would not degrade the condition of the creek. Additionally, the permit may require a diffuser to increase the initial dilution for the effluent.

If the above wet weather compliance strategy is implemented, the City would be able to contain flows from a 10-year, 24-hour storm without discharging to Colma Creek. However, larger storms could still trigger the need to discharge to the near-shore outfall. Therefore, to provide flexibility and to reduce the risk of fines or actions from non-government organizations, it is recommended that the City continue to pursue securing the Colma Creek discharge permit in addition to implementing improvements to contain a 10 year, 24-hour storm.

Because of space constraints at the WQCP site, the only available land for the 2.4 MG storage basin is at the “fingers” or former dry docks at the shoreline on the southern plant boundary. This area is under the jurisdiction of the Bay Conservation and Development Commission (BCDC) which regulates construction along the bay shore. A permit will be required for all construction projects that are located within 100 feet of the shore line. A special permit will be required for the storage basin because it will fill in part of the bay. It is recommended that the City begin the permit application process with BCDC. Based on previous experience with the 2000 WQCP project, the permit will require Commission approval. The permit application process will include establishing the critical need for this basin, demonstrating its environmental benefits, and identifying the mitigation requirements that will likely be a condition of the permit.

1.7 FUTURE REGULATORY REQUIREMENTS

In developing a 30 year facility plan, the impacts of potential future regulations on facility layout and sizing should be considered. The two water quality constituents that may be regulated in the future are nutrients (nitrogen and phosphorus) and micro-contaminants (personal care products and pharmaceuticals). Air quality regulations are also anticipated to be stricter in the future.

Nutrients. The National Resources Defense Council (NRDC) filed a petition with the EPA to require that nutrient removal be included in the definition of secondary treatment. This would mean that secondary treatment, as defined in the Water Quality Act, will include removal of the nutrients nitrogen and phosphorus. In addition, studies are being conducted in the Bay to determine the effects of nutrients on the aquatic life in the Bay. If nutrient limits were to be imposed for the WQCP, a significant expansion of the current secondary treatment process would be required.

Micro-Contaminants. The EPA is currently evaluating the potential effects of personal care products and pharmaceuticals on the aquatic environment and human health if the receiving water is a potable water source. These contaminants are present in every day consumer products included hair products, cosmetics, pharmaceuticals and caffeine, all of which pass through treatment processes. Growing concerns in the industry for these constituents points to the need to establish micro-contaminant standards for wastewater effluents. Research programs are being conducted to investigate treatment processes to remove micro-constituents. So far the most promising process is to add ozone to the effluent to oxidize and break up the compounds into less offending parts.

The Facility Plan includes a possible site plan for adding treatment facilities in case nutrient limits are eventually imposed. Space should also be reserved to add a future treatment process to reduce micro-contaminants. It is uncertain at this time if more restrictive limits will be developed for nutrients or micro-constituents. Therefore, costs for these future improvements have not been included in the CIP. The facility plan should be updated periodically and revised if either of these constituents is incorporated in a future discharge permit.

Air Limits. Emissions from stationary engines are expected to become more stringent within the next three to four years. Strict limits for smog precursors (nitrogen oxides and sulfur oxides) were recently imposed for Southern California. The new limits require new emission control systems to allow continued use of the engines. According to air officials, it is a matter of time for the same limits to be adopted by the Bay Area Air Quality

Management District (BAAQMD). Continued operation of the engine at WQCP will require improvements to meet these future limits. Estimated costs for emission controls on the existing engine generator have been included in the CIP.

Recycled Water. Increased water recycling will be driven both by water scarcity and by regulatory pressure. The State of California has mandated an increase in recycled water and developed the 2009 State Recycled Water Policy to create a uniform regulatory environment for facilities permitting for recycled water projects. The City of South San Francisco is considering implementing a recycled water project to serve local users. Tertiary facilities, including filters and disinfection, may be constructed at the WQCP to produce recycled water. Space on-site should be reserved for these facilities.

Figure 1.4 shows the potential future project layouts, where space should be reserved in event that a recycled water program is implemented or that additional secondary treatment is required either for capacity or for future nutrient removal requirements.

1.8 ENERGY MANAGEMENT PLAN

The WQCP has a current power demand of about 1,200 kilowatts (kW). The WQCP has a 400 kW engine cogeneration system that produces 32 percent of the plant power needs by utilizing digester gas as fuel. Digester gas is produced by the anaerobic digesters that stabilize the solids removed by the treatment processes. A byproduct of the digestion process is digester gas, which consists of methane and carbon dioxide. Approximately one third of the gas produced by the digesters is being flared to the atmosphere because gas production exceeds the fuel demands for the cogeneration system. If additional cogeneration facilities were available, the current gas production could supply fuel for up to 600 kW.

An option available to increase the fuel source beyond 600 kW is to increase digester gas production by introducing fats, oils and grease (FOG) to the digesters. Many agencies (including the City of Millbrae and the South Bay Dischargers Agency) are boosting gas production with FOG. FOG has five times more energy per pound than wastewater biosolids. Based on experience from other agencies, adding FOG could increase gas production by as much as 50 percent. However, there are many unknowns at this time regarding the actual FOG volumes that can be expected, especially if other agencies adopt FOG programs and compete for the material. On the other hand, if the potential FOG volumes were obtained, the additional digester gas would increase the available energy from 600 kW to 900 kW. The addition of FOG could also provide a significant revenue source from increased power production and disposal fees charged to the haulers.

Opportunities to increase the production of green energy include an expanded engine generator system using FOG to augment gas production, fuel cells that also utilize digester gas, and renewable energy sources including solar photovoltaic (PV) cells, wind, and hydroelectric power.

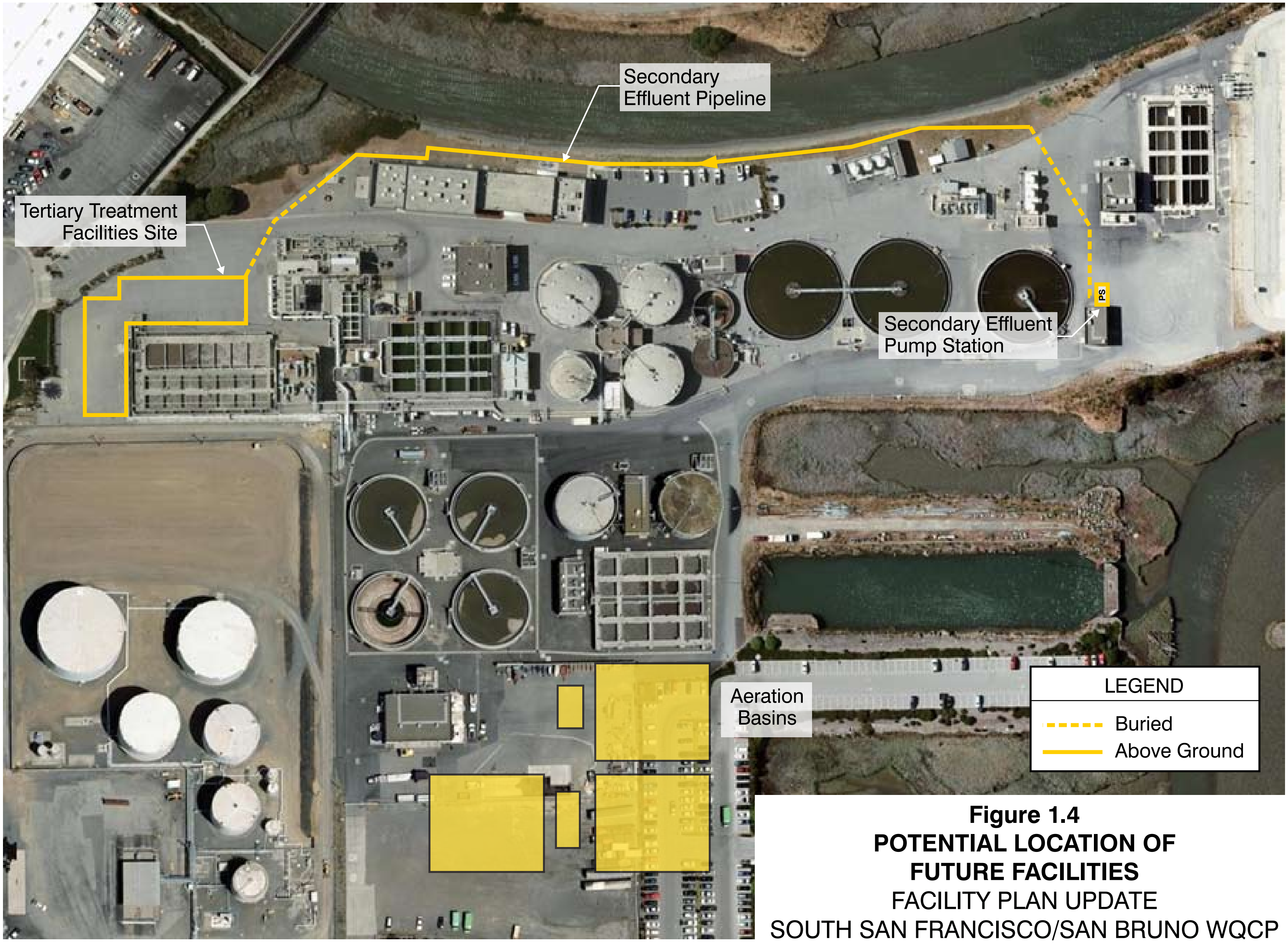

Figure 1.4
POTENTIAL LOCATION OF FUTURE FACILITIES
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SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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The recommended energy management plan consists of the following elements:

- Implement the first phase of solar power by installing PV cells on existing WQCP buildings and on new parking lot covers for employee parking. If the first phase is successful, consider expanding the PV cell installation cover parking areas (TRUX and COSTCO parking lots). The solar project is a relatively attractive investment so, at least for the first phase, it should be owned and financed by the City to maximize its economic benefits.
- Implement a FOG program to increase digester gas production to allow expansion of the current cogeneration system. If grant funding remains available, add two - 300 kW fuel cells that will use digester gas as fuel. The fuel cells will be equipped with a fuel conditioning system to clean the gas for the fuel cells.
- After implementation of the fuel cells, continue to operate the existing cogeneration system but convert the fuel source from digester gas to natural gas. Add emissions controls to comply with impending air permit requirements. If the FOG program yields sufficient digester gas volumes, the existing 400 kW engine could be switched back to digester gas, retaining the ability to use natural gas as a backup fuel.
- Consider implementing two, 250 kW wind turbines at the WQCP site, provided that bird studies determine that the installation can be designed to mitigate bird kills to acceptable levels. Although the site has adequate wind, it is also a habitat for the endangered clapper rail. The wind program should not be undertaken until the bird studies and other environmental impact studies can demonstrate that it is feasible to mitigate environmental impacts. Apart from environmental concerns, wind power is not an attractive investment because the payback period is about 20 years, assuming it is City owned and financed. The project delivery approach that represents the least risk to the City is to enter into a power-purchase agreement (PPA) with a private developer. The developer would finance, construct and operate the wind turbines, and return a percentage of the power revenue to the City. A private developer gains the advantage over municipal agencies by qualifying for tax incentive credits that amount to about 30 percent of the capital costs.
- Hydroelectric power, using the available head in the NBSU outfall to drive a turbine generator, was not economically feasible and is not recommended.

By implementing the cogeneration, solar (Phase 1) and wind projects, the City could self-generate up to 1,100 kW, or 92 percent of its current energy demands.

1.9 RECOMMENDATIONS

There are three main categories of projects that have resulted from the Facility Plan:

1. Wet weather flow projects driven by the NPDES permit requirements,

2. Repair/rehabilitation projects needed for the upkeep of the existing facilities, and

3. Energy projects.

These projects are grouped into phases based on 5 year, 10 year and 15 year capital improvement plan (CIP) schedules. The phases were selected to reflect the order of priority and limit capital expenditures to conform to the City's financing constraints.

A summary of the recommended projects is presented in Table 1.2. Figure 1.5 provides a preliminary site plan for the recommended projects. The master implementation schedule for the 5, 10 and 15 year CIP phases is shown in Figure 1.6.

Table 1.2 Recommended Projects
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South San Francisco/San Bruno WQCP

Phase and Project	**Project Cost [(1)] ($M)**
Phase 1 - 5-Year CIP Projects • Secondary treatment improvements and capacity increase to 40 mgd • Colma Creek discharge permit and flood study • Emergency generator and electrical improvements • Digester 3 and support facilities rehabilitation • Headworks and stormwater improvements • Miscellaneous repair and replacement • Solar PV (150 kW)	22.6
Phase 2 - 10 Year CIP Projects • Wet Weather Storage • Replace Digesters 1 and 2 • Improve Solids Thickening • Improve cogeneration, add FOG, add fuel cells	39.9
Phase 3 - 15 Year CIP Projects • New Aeration Basin	8.6
Phase 4 - Ongoing Maintenance	0.3
Total	**71.4**

Note:
(1) Costs are presented in January 2010 dollars, and include construction costs, estimating contingencies, contractor overhead and profit, design fees, sales tax, and construction management. In addition to the projects in the 5, 10, and 15 year CIPs, an ongoing maintenance program is included in the CIP starting in FY 2017.

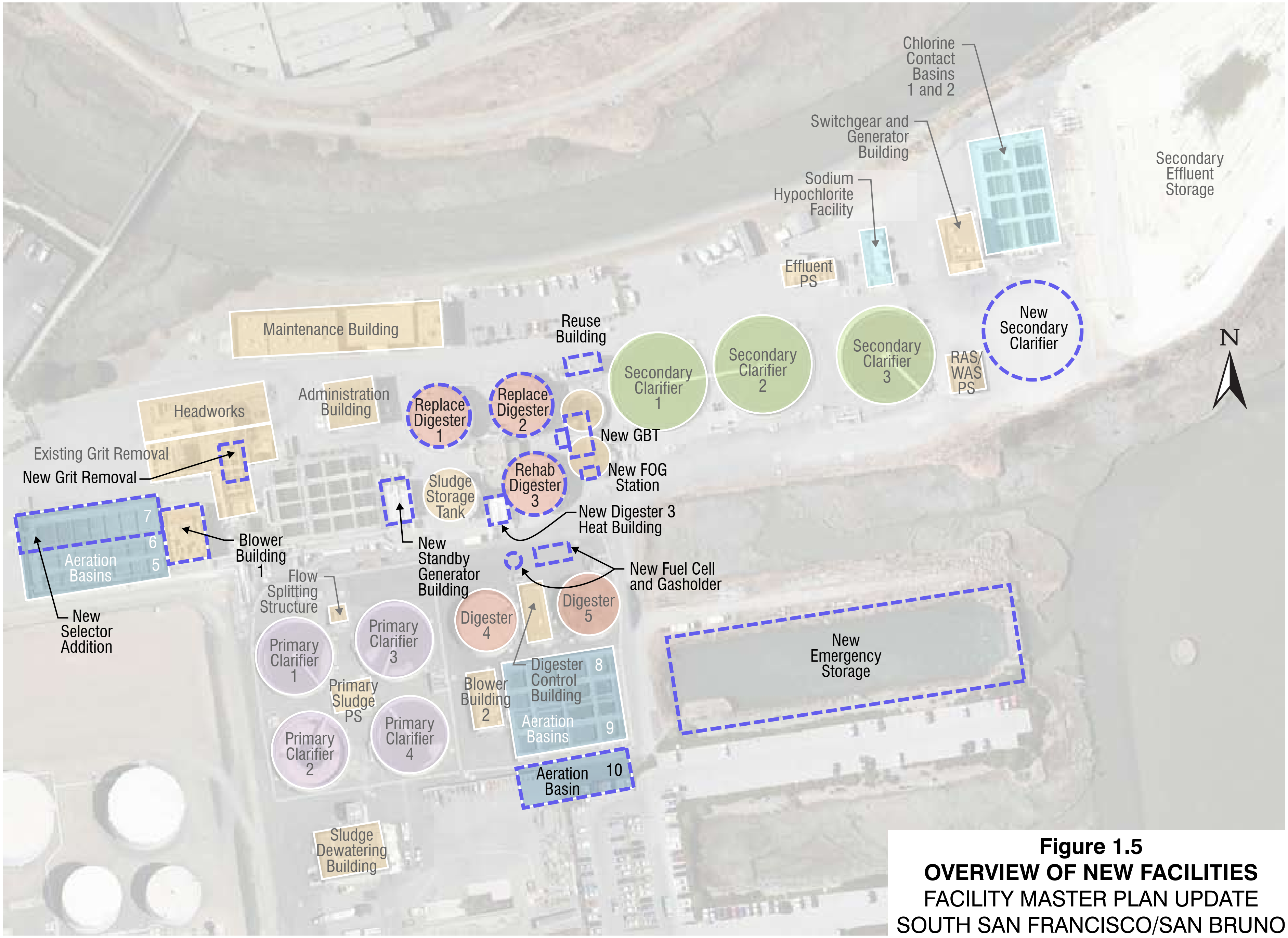

Figure 1.5
OVERVIEW OF NEW FACILITIES
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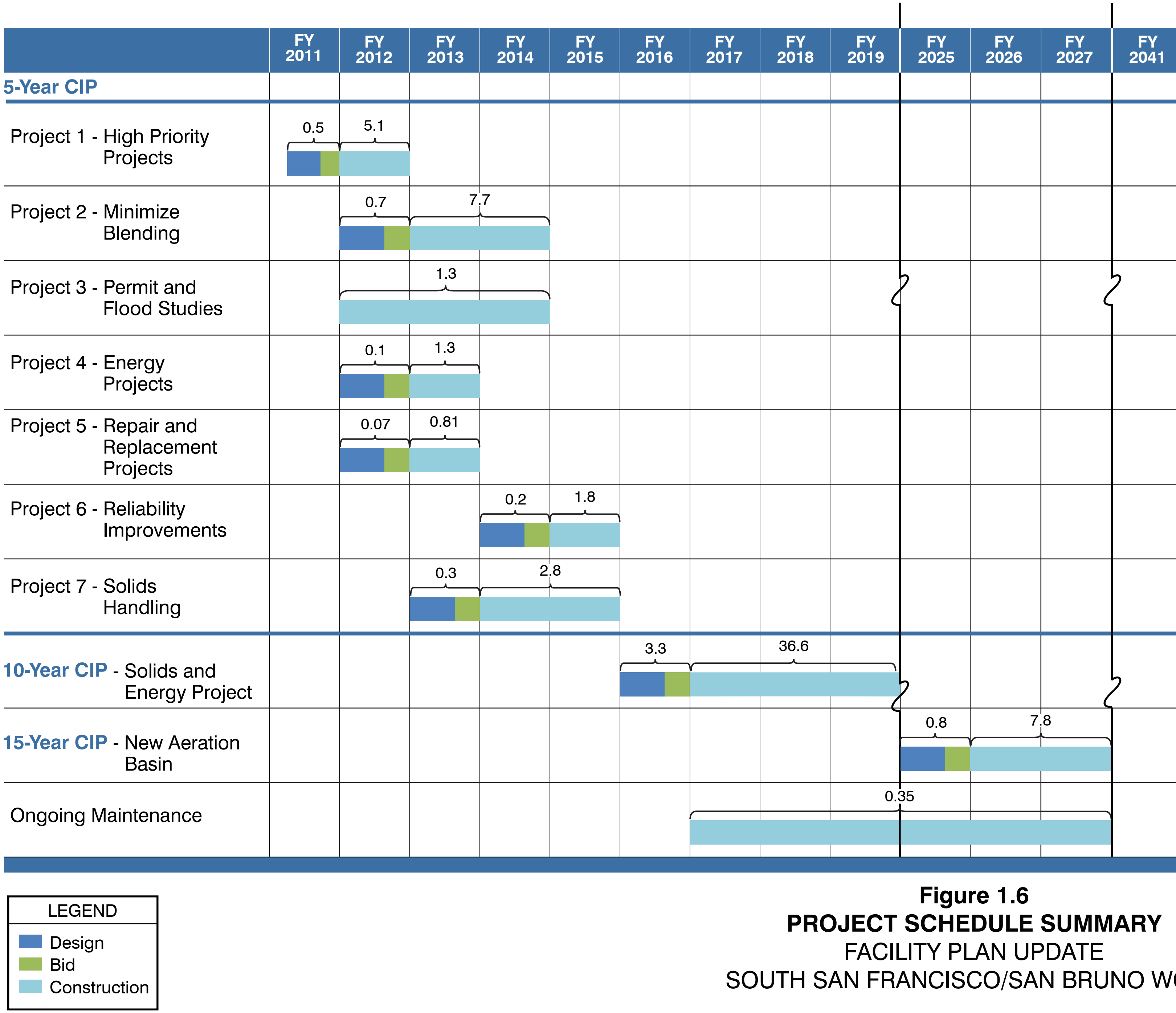

Figure 1.6
PROJECT SCHEDULE SUMMARY
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SOUTH SAN FRANCISCO/SAN BRUNO WQCP

FLOWS AND LOADS PROJECTION

The purpose of this section is to project the wastewater flows and loads that are expected at the South San Francisco/San Bruno Water Quality Control Plant (WQCP). These projections allow the Cities to identify and plan for new infrastructure needed in the future. Presented below is a summary of the historical and projected wastewater flows and loads through 2040.

2.1 POPULATION PROJECTIONS

The WQCP serves the Cities of South San Francisco, San Bruno, the Town of Colma, and a portion of the City of Daly City. The current population served in South San Francisco, San Bruno, and Colma was estimated using California Department of Finance estimates for 2009. The current population served in Daly City was estimated from East of Highway 101 2002 Sewer System Master Plan (Carollo Engineers, May 2007). Future population for each City was determined from each City's General Plan, discussions with City Planning Departments and projected using the established General Plan growth rates. The industrial growth anticipated in the service area was evaluated in the East of Highway 101 2002 Sewer System Master Plan (Carollo Engineers, May 2007), and confirmed with the South San Francisco planning department.

Table 2.1 presents the current population estimates and projected populations for the WQCP service area.

Table 2.1 Historic and Projected Populations Served by the WQCP
Facility Plan Update
South San Francisco/San Bruno WQCP

	2009(1)	2020	2030	2040
City of South San Francisco(2)	65,100	69,700	74,000	78,600
City of San Bruno(3)	43,800	41,100	43,400	45,800
Town of Colma(4)	1,600	1,400	1,500	1,600
City of Daly City(5)	3,300(6)	3,500	3,700	3,900
Total Population Served	**113,800**	**115,700**	**122,600**	**129,900**

Notes:
(1) California Department of Finance 2009 estimates
(2) Assuming an annual growth rate of 0.6% as per City's General Plan, 1999.
(3) Assuming an annual growth rate of 0.54% as per City's General Plan, 2009.
(4) Assuming an annual growth rate of 0.8% as per City's General Plan, 1999.
(5) Assuming an annual growth rate of 0.5% as per Technical Memorandum, East of Highway 101, 2002 Sewer System Master Plan, Carollo Engineers, May 2007, as confirmed by City Planning Staff.
(6) Estimate based on the Technical Memorandum, East of Highway 101, 2002 Sewer System Master Plan, Carollo Engineers, May 2007, and confirmed by City Planning Staff.

2.2 HISTORICAL FLOWS AND LOADS

Six years of data from the WQCP (from January 1, 2004 - October 31, 2009) was analyzed to evaluate historical flows and loadings. Average Dry Weather Flows (the lowest consecutive three calendar month average in one year) were analyzed to evaluate the dry weather per capita flows. Per capita flow and load values are used to project future flows and loads as discussed in Section 2.6. Table 2.2 summarizes the historical flows and loads.

Table 2.2 Historical Average Dry Weather Flows, Loads, and Concentrations Facility Plan Update South San Francisco/San Bruno WQCP

	2004	2005	2006	2007	2008	2009	Average
Total Influent Flow[1] (mgd)	8.70	8.73	8.79	8.89	8.47	8.39	8.66
Industrial Flow (mgd)	1.54	1.50	1.68	1.49	1.37	1.35	1.49
BOD loading (ppd)	22,800	26,800	24,300	23,700	27,300	26,200	25,200
BOD concentration (mg/L)	314	367	332	320	386	374	349
TSS loading (ppd)	18,900	19,700	18,100	18,900	20,600	20,100	19,400
TSS concentration (mg/L)	260	270	247	255	291	288	268
COD loading (ppd)	50,900	51,900	52,400	49400	54,000	52,000	51,800
COD concentration (mg/L)	701	712	715	667	764	744	717

Note:
(1) Total influent flow includes residential, commercial, and industrial flows.

Figures 2.1 and 2.2 illustrate the historical flow and loading trends. As can be seen from Figure 2.1, the average dry weather flow has remained relatively constant since 2004, with a slight drop starting in 2007. This could be due to a reduction in commercial activity in the service area, stemming from the current economic recession. As can be seen from Figure 2.2, BOD and TSS loadings have remained relatively constant, with a slight upward trend.

Per capita values of average dry weather flows and loads were calculated using estimated historical populations from the California Department of Finance and historical flow and load values from WQCP data. The average of per capita values over the last six years was subsequently used for dry weather projections into the future. Table 2.3 presents the average dry weather per capita flow and load values.

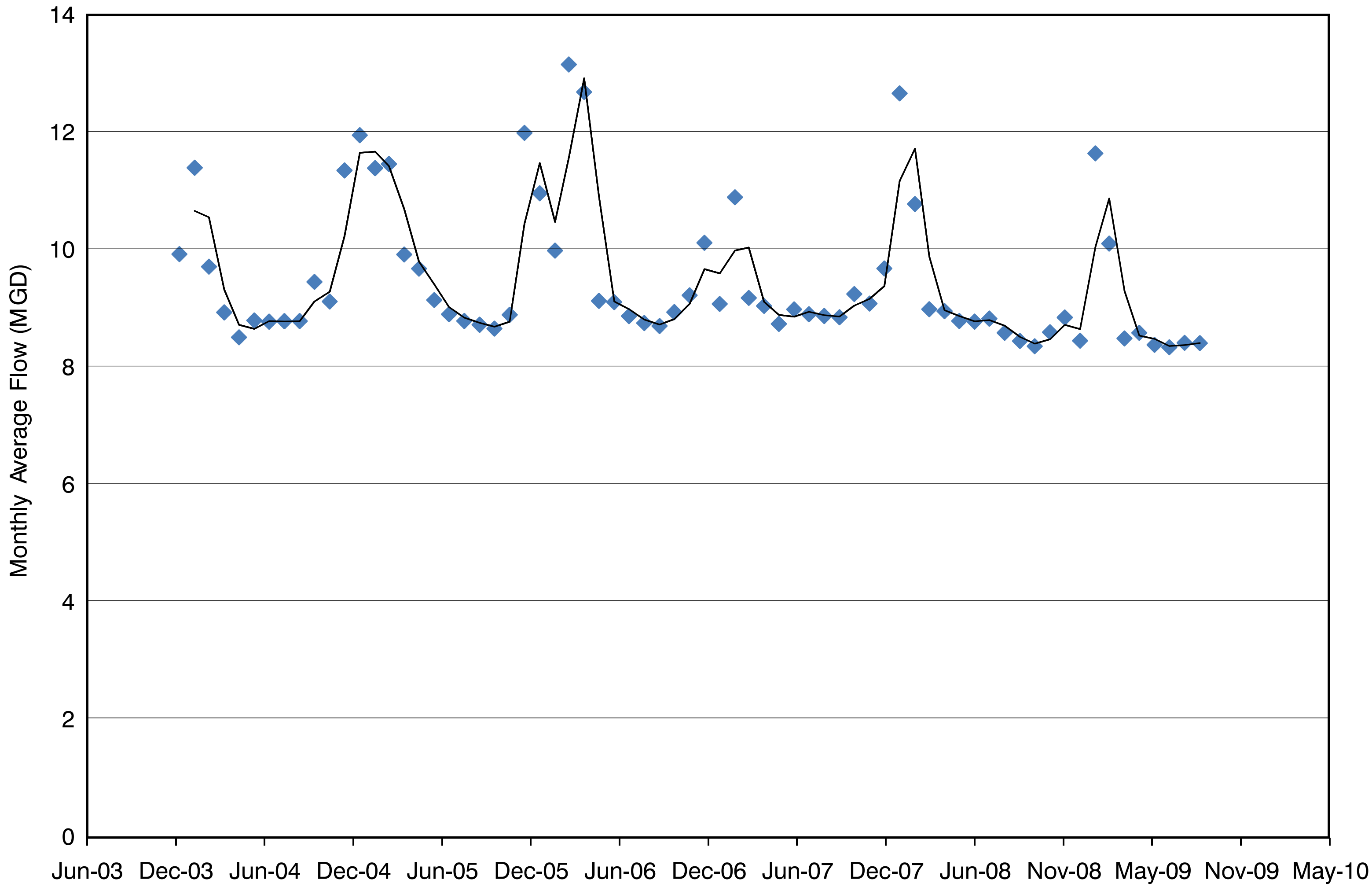

Figure 2.1
HISTORICAL AVERAGE MONTHLY FLOWS
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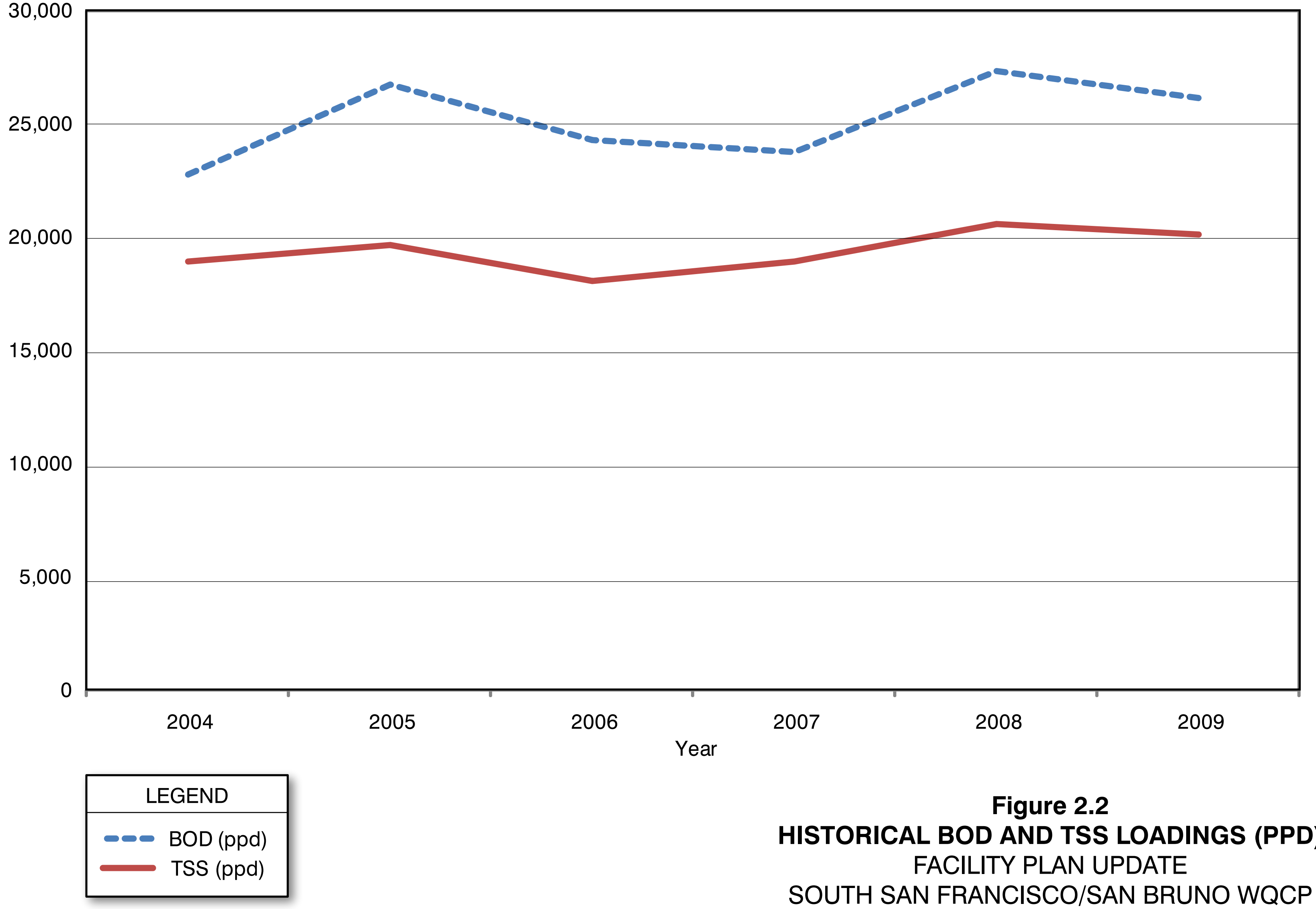

Figure 2.2
HISTORICAL BOD AND TSS LOADINGS (PPD)
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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Table 2.3	Historical Average Dry Weather Per Capita Flows and Loads Facility Plan Update South San Francisco/San Bruno WQCP						
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**Average**
ADWF(1) (gpcd)	81.9	81.2	81.3	81.6	75.8	73.7	79.2
BOD loading (ppcd)	0.21	0.25	0.22	0.22	0.24	0.23	0.23
TSS loading (ppcd)	0.18	0.18	0.17	0.17	0.18	0.18	0.18
COD loading (ppcd)	0.48	0.48	0.48	0.45	0.48	0.46	0.47

Notes:
(1) Total influent flow includes residential, commercial, and industrial flows.
(2) Gpcd = Gallons per capita per day.
(3) Ppcd = Pounds per capital per day.

Average Annual, Maximum Month, and Maximum Day conditions were also analyzed for the same 2004-2009 period. Table 2.4 presents the historical peaking factors for the Maximum Month condition. Also presented in Table 2.4 is the maximum peaking factor that occurred since 2004, which is used to project the future Maximum Month flows and loadings.

Table 2.4	Historical Maximum Month/Average Dry Weather Peaking Factors Facility Plan Update South San Francisco/San Bruno WQCP						
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**Maximum**
Total Influent Flow(1)	1.31	1.37	1.50	1.23	1.50	1.39	1.50
Industrial Flow	1.09	1.22	1.14	1.11	1.23	1.18	1.23
BOD loading	1.16	1.05	1.27	1.37	1.02	1.04	1.37
TSS loading	1.14	1.7	1.43	1.17	1.15	1.19	1.7
COD loading	1.06	1.05	1.12	1.21	1.09	1.09	1.21

Note:
(1) Total influent flow includes industrial flows.

2.3 PROJECTION OF DRY WEATHER FLOWS

Using the population projections and historical flow and load data presented in Section 2.2, projections for flows and loads were made into the future. A modest rate of residential, commercial, and industrial growth is predicted by the Cities' General Plans and based on conversations with Planning Staff at the Cities of South San Francisco and San Bruno. The service area of the WQCP is fairly built out, and any new development is likely to be infill and re-development of existing areas. Thus, no substantial increases in dry weather flows are predicted at this time. Table 2.5 presents the projected dry weather flows, loads, and concentrations for the WQCP.

Table 2.5 Projected Dry Weather Flows, Loads, and Concentrations
Facility Master Plan Update
South San Francisco/San Bruno

	Current	2020	2030	2040
Flows				
Per capita average dry weather flow (gpcd)	79.2	79.2	79.2	79.2
Average Dry Weather Flow (mgd)	8.7	9.2	9.7	10.3
Average Annual Flow (mgd)	9.5	10.6	11.1	11.7
Loadings				
Average Dry Weather BOD (ppd)	25,200	26,900	28,200	29,900
Average Dry Weather TSS (ppd)	19,400	20,700	21,700	23,000
Concentrations				
Average Dry Weather BOD (mg/L)	347	350	348	348
Average Dry Weather TSS (mg/L)	268	269	268	268

2.4 PROJECTION OF WET WEATHER FLOWS

Wet weather flows are influenced by precipitation and infiltration and inflow (I/I). The following sections describe the influences on precipitation and I/I, which directly affect the WQCP wet weather flows.

2.4.1 Climate Change – Precipitation Patterns

The purpose of this section is to summarize the potential effects of future climate change, specifically changes in precipitation patterns, on peak wet weather flows at the WQCP. A more comprehensive discussion of this topic is included in Appendix A. The scientific literature referenced in this section and Appendix A includes key studies recently analyzing climate change impacts, which generally or specifically affect South San Francisco. This information will be used to support the Facility Plan strategy for accommodating future wet weather flows.

2.4.1.1 <u>Current Trends in Annual Precipitation and "Extreme" Events</u>

The key climate variable that could impact wet weather flows is precipitation. The long-term average precipitation in South San Francisco is 20 inches per year, while the U.S. average is 37 inches. Figure 2.3 shows the total annual precipitation and long-term average as recorded at San Francisco's International Airport from 1948 to 2008.

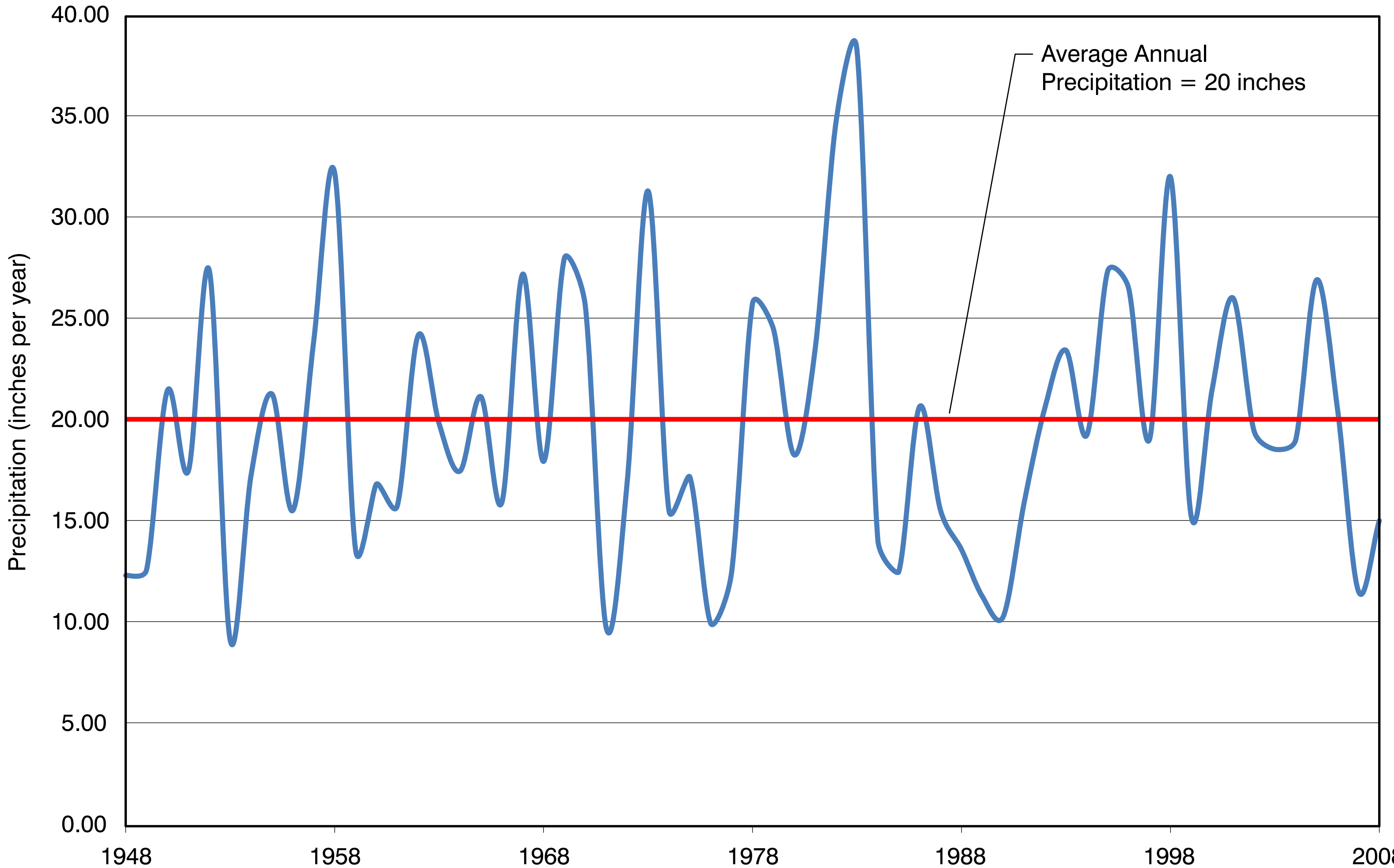

Figure 2.3
PRECIPITATION RECORDED AT SAN FRANCISCO INTERNATIONAL AIRPORT FROM 1948 TO 2008
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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From 1910 to 1996 precipitation increased by about 10 percent across the contiguous United States. Over half of this increase in precipitation is due to an increase in the extreme daily (i.e., 24-hour) precipitation events – that is, daily (24-hour) precipitation events exceeding two inches (Karl and Knight, 1998).

The Environment California Research and Policy Center (ECRPC) published a study in December 2007 evaluating trends in the frequency of extreme precipitation events across the contiguous U.S. The analysis considered daily (24-hour) precipitation records from 1948 through 2006 for more than 3,000 weather stations in 48 states. Patterns in the timing of heavy precipitation relative to the local climate at each weather station were examined (Madsen and Figdor, 2007). The study focused on extreme 24-hour precipitation totals with an average recurrence interval of 1 year or more. Records show a 26 percent average increase in frequency of these events across California since 1948.

Detection of statistically significant trends becomes more difficult at the metropolitan level. While the study did not show the results for areas in northern California, a review of extreme precipitation for areas in southern California was provided for Bakersfield, Los Angeles, Santa Barbara, and San Diego. Extreme precipitation events there increased in frequency by 51 to 93 percent since 1948 (Madsen and Figdor 2007).

2.4.1.2 Future Projections and Recommendations

While projected temperature changes due to climate change are broadly consistent across most climate modeling efforts, projected changes in total annual precipitation have varied widely across models and emissions scenarios (Kiparsky and Gleick, 2003; Madsen and Figdor, 2007). In addition, as models are run at smaller scales (e.g., regional or metropolitan level) the accuracy decreases.

While the results are a bit scattered and uncertain for projected changes in *total annual precipitation*, most yield a small and narrow range of changes (Dettinger, 2005). Therefore, it is recommended that long-term planning be based on current trends of total annual precipitation.

Although projected changes in *total annual precipitation* are mostly small and uncertain, the intensity of precipitation is likely to increase around the world, with the most significant increases occurring in the middle to high latitudes (Meehl, 2005). Kharin and Zwiers show the projected frequency of daily (24-hour) precipitation events considered to be extreme (i.e. exceeding two inches) will occur twice as often by the period of 2046 to 2065 and three times as often by the end of the 21st century relative to those that occurred during the period of 1981 to 2000. This means that 24-hour precipitation events with current return periods of 1, 5, 10, 20, 50, and 100 years will occur 2 or more times as often by the year 2100 due to climate change (Kharin and Zwiers, 2005; Kharin et al, 2007). It is recommended that long-term planning include updates to intensity-duration-frequency curves to track the recent changes in extreme events and the potential impacts to the design and operation of the WQCP.

In summary, it is important to consider the potential impact global climate change may have on precipitation events (i.e., total annual average and extreme events) in order to anticipate necessary modifications to WQCP design and operations management for flood prevention. Until recently, the Cities used the 6-hour duration event with a 5-year return period as a basis for design and operation of their collection systems (previous collection system models, see section 2.4.3). Prudent planning for the WQCP must consider the projected changes in extreme events due to global climate change, which includes considering longer duration and increased frequencies of precipitation events.

2.4.2 Minimizing I&I

High wet weather flows to the WQCP result from large infiltration and inflows (I&I). The City of San Bruno has been implementing a collection system improvement program that is described in more detail in the next section. The program is geared towards reducing wet weather flows to the WQCP which are caused due to infiltration into wastewater pipes.

The City of South San Francisco completed an I/I study in 1999 which identified improvements to the influent pump stations, and sewer mains. These improvements have been accomplished. The City could also consider further programs to reduce I&I flows. These would include an annual lateral replacement program, or an ordinance to replace laterals upon the sale of any residence.

It is recommended that the WQCP proceed with the wet weather improvements described in Chapter 6, regardless of the implementation of any I&I reduction programs, because any collection system improvements would be made over a long time. Therefore, the benefits of a collection system improvement program would not be realized immediately.

2.4.3 Collection System Model

Wet weather flows to the WQCP are substantial, and they result from an increase in infiltration and inflow (I&I) occurring in the collection systems of the service area during storm events. As described in the Executive Summary, the WQCP has been directed by the Regional Board to manage its wet weather flows such that blending of primary and secondary effluents is minimized, and discharges to Colma Creek eliminated. For the Facility Plan to adequately estimate the facilities needed to comply with the Regional Board's directives, it is necessary to accurately predict the wet weather flows that will be seen at the WQCP.

Three design storms were analyzed to predict wet weather flows. They are:

1. 5-year, 6-hour storm event with approximately 2.09 inches total precipitation
2. 10-year, 6-hour storm event with approximately 2.95 inches total precipitation
3. 10-year, 24-hour storm event with approximately 3.97 inches total precipitation

While the collection system for both South San Francisco and San Bruno have been evaluated (with collection system models) and designed to handle a 5-year, 6-hour storm event, flows higher than these have been recorded at the WQCP. Therefore in evaluating future impacts to the WPCP of wet weather flows, it is prudent to evaluate the 10-year return events as well.

Wet weather flow hydrographs are generated by modeling the flows from the Cities of South San Francisco and San Bruno. The following models were used to generate wet weather hydrographs:

1. City of South San Francisco – West of Highway 101: This hydraulic model was developed as a part of the 1999 Infiltration and Inflow Study, West of Highway 101.
2. City of South San Francisco – East of Highway 101: This hydraulic model was developed as part of the 2002 Sewer Collection Master Plan, East of Highway 101.
3. City of San Bruno: This hydraulic model was developed as a part of the 2000 Sewer Master Plan and Infiltration and Inflow Study. It was updated by Akel Engineering in January 2010 to include sewer system improvements in the City of San Bruno that have been completed since 2000. A detailed report is provided in Appendix B.

The City of San Bruno is in the midst of implementing an approximately $14 million dollar sewer collection system improvement program to reduce its I&I flows (per communication with City of San Bruno staff). The details of the improvement program are provided in Appendix B. These improvements are predicted to reduce wet weather flows from San Bruno's collection system. The 2000 Sewer System Master Plan considered three possible future flow reductions. The first alternative assumed there would be no reductions realized as a result of the improvements. The second alternative assumed that there would be a reduction of 22 percent in wet weather flows from San Bruno. The third alternative assumed that there would be a reduction of 44 percent in wet weather flows from San Bruno. A reduction in I&I flows from San Bruno results in a proportionate reduction in the wet weather flows to the WQCP during storm events. At this juncture, enough information does not exist to predict the success of the improvements at reducing flows. Therefore, for the purposes of this Facility Plan, both the first two alternatives were analyzed – the first assuming that no reductions in flows would occur due to the improvements, and the second assuming that the target reduction of 22 percent is achieved. The third alternative was not analyzed as it was described in the Sewer Master Plan as being "aggressive," and 44 percent reductions will probably not be realized.

2.4.3.1 Projected Peak Hour Flows

The collection system models were used to predict peak hour flows reaching the WQCP. Table 2.6 summarizes the peak hour wet weather flows that are expected due to the three design storms, under the two San Bruno flow reduction alternatives.

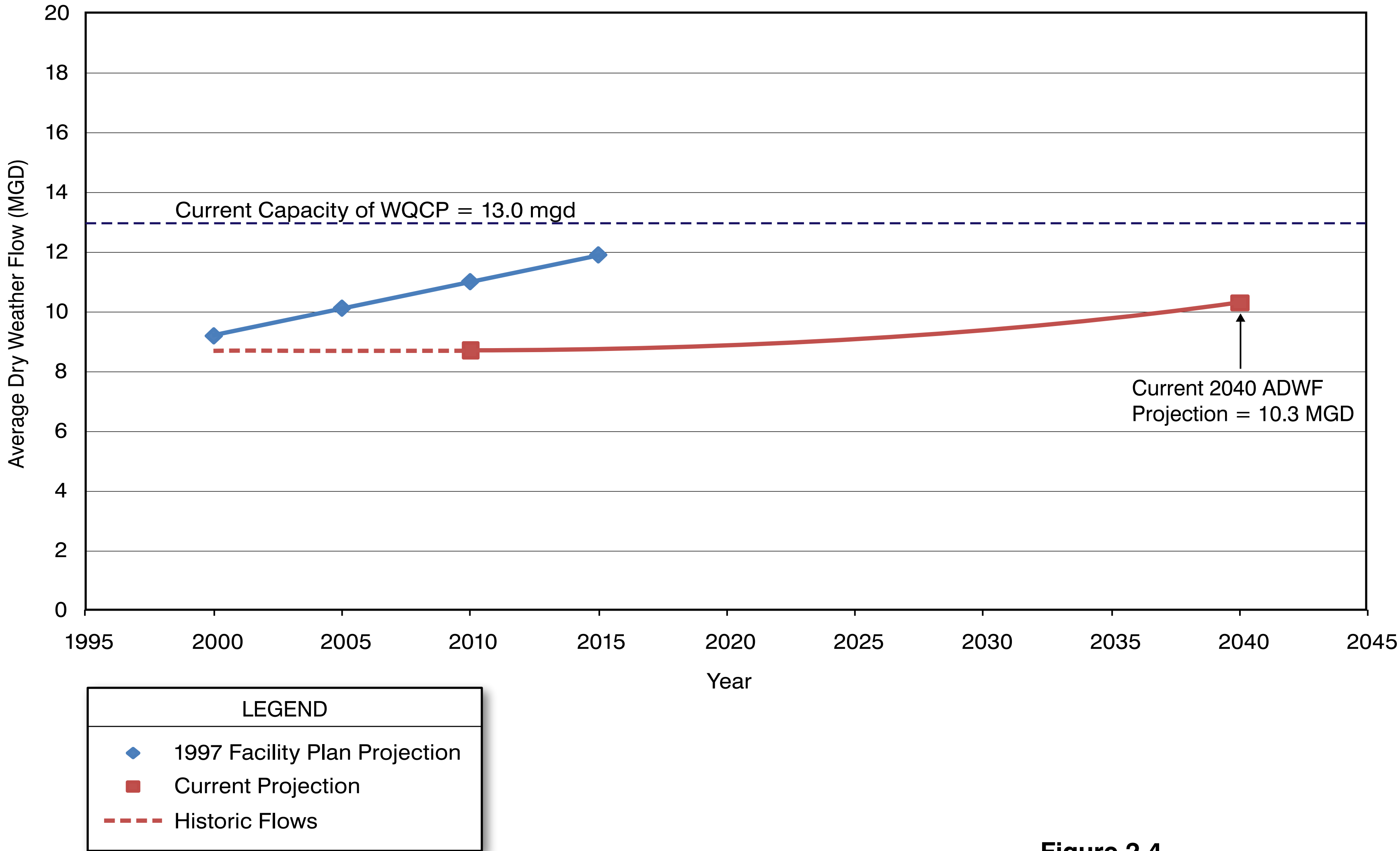
2.4.4 Projected Wet Weather Flows and Loads

Table 2.7 summarizes the projected wet weather flows, loads, and concentrations. Dry weather flows, loads, and concentrations are also shown for comparison.

Table 2.6	**Projected Peak Hour Wet Weather Flows at the WQCP Facility Plan Update South San Francisco/San Bruno WQCP**	
	PHWWF at the WQCP (mgd)	
Design Storm	**Assuming no Reductions in San Bruno Flows**	**Assuming 22% Reduction in San Bruno Flows**
5-year, 6-hour	50.4	48.3
10-year, 6-hour	58.7	55.6
10-year, 24-hour	62.8	59.1

Table 2.7	**Projected Wet and Dry Weather Flows, Loads, and Concentrations Facility Master Plan Update South San Francisco/San Bruno**			
	Current	**2020**	**2030**	**2040**
Flows				
Average Dry Weather Flow (mgd)	8.7	9.2	9.7	10.3
Average Annual Flow (mgd)	9.5	10.6	11.1	11.7
Maximum Month Flow (mgd)	12.0	13.9	14.6	15.4
Maximum Day Flow (mgd)	25.8	39.6	41.6	44.0
Loadings				
Average Dry Weather BOD (ppd)	25,200	26,900	28,200	29,900
Maximum Month BOD (ppd)	28,800	36,300	38,500	40,800
Average Dry Weather TSS (ppd)	19,400	20,700	21,700	23,000
Maximum Month TSS (ppd)	25,100	34,800	36,800	39,000
Concentrations				
Average Dry Weather BOD (mg/L)	347	350	348	348
Maximum Month BOD (mg/L)	288	313	316	317
Average Dry Weather TSS (mg/L)	268	269	268	268
Maximum Month TSS (mg/L)	251	300	302	303

Figures 2.4, 2.5 and 2.6 illustrate the projected dry weather flows and loadings at the WQCP.



Note:
Projection lines drawn are approximations.

Figure 2.4
AVERAGE DRY WEATHER FLOW PROJECTION
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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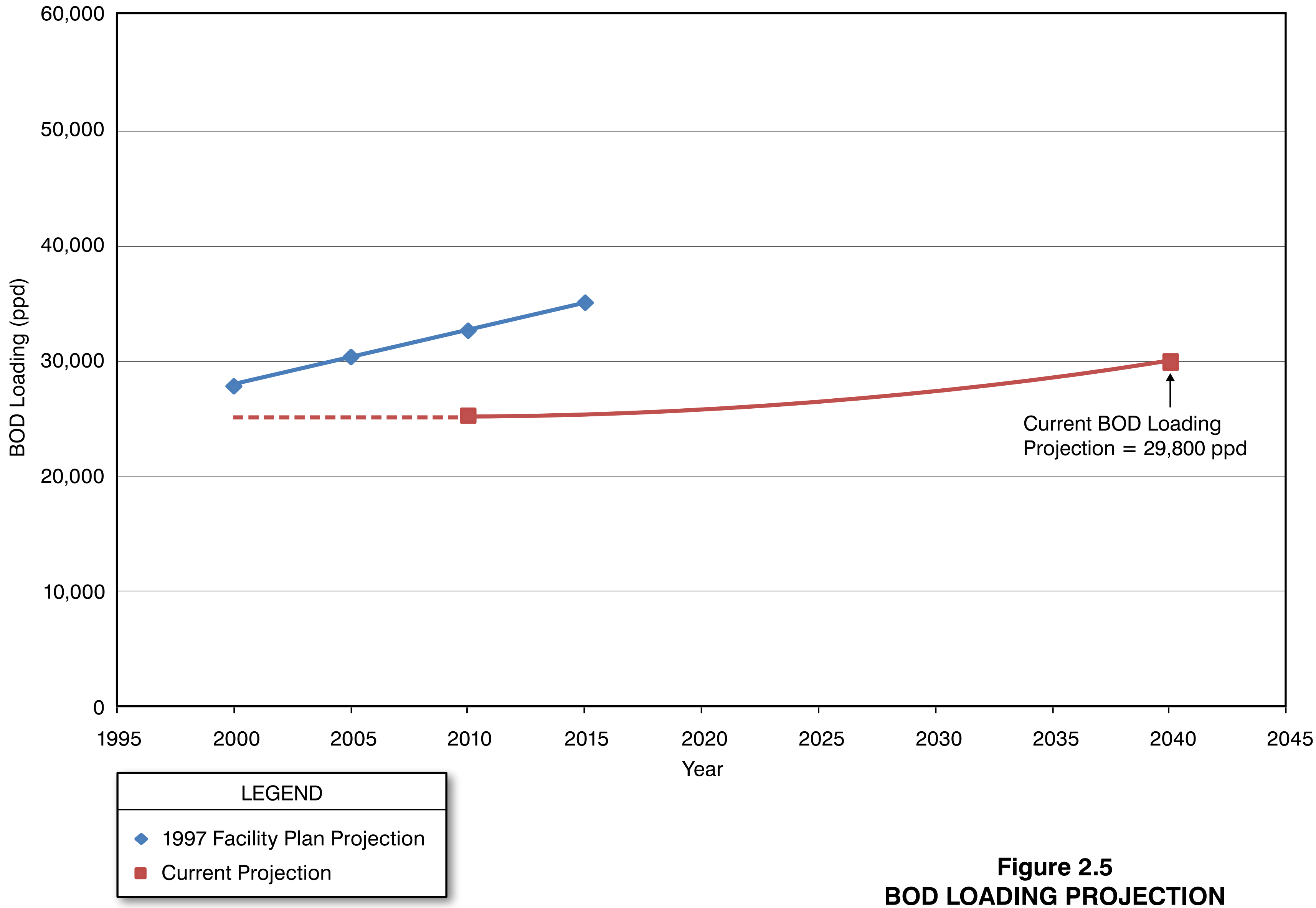

Note:
Projection lines drawn are approximations.

Figure 2.5
BOD LOADING PROJECTION
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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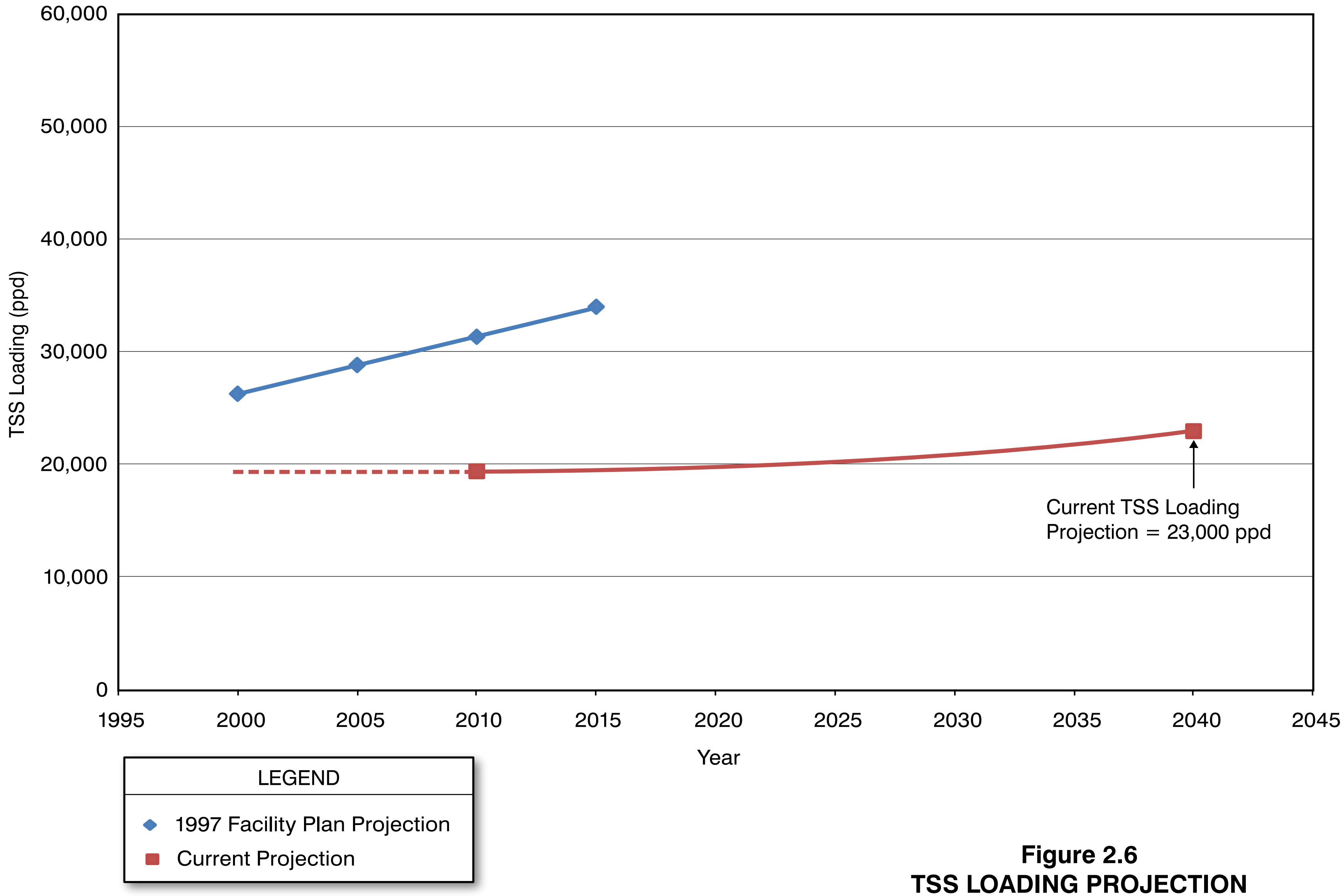

Note:
Projection lines drawn are approximations.

Figure 2.6
TSS LOADING PROJECTION
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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EXISTING FACILITIES AND CAPACITY EVALUATION

3.1 HISTORY OF THE WQCP

In 1945, the Cities of South San Francisco and San Bruno constructed a joint-use wastewater pumping station (Shaw Road) and a single outfall to dispose untreated waste to San Francisco Bay. In 1952, a primary treatment plant was constructed at the site of the present treatment facility. The plant consisted of screening and grit removal equipment, primary clarifiers, and anaerobic digesters.

More improvements were made in 1963, including an activated sludge process for secondary treatment (aeration basins and secondary clarifiers), disinfection facilities, and sludge handling facilities.

The WQCP was expanded again in 1972. Improvements included the Effluent Pump Station, an outfall force main and submarine outfall, and a new aeration tank. Another major plant upgrade in 1977 added flow metering and sampling, screening, grit removal, waste activated sludge pumping, heat recovery, clarifier skimming, standby power, sludge pumping, solids mixing, solids handling and transporting, and sludge drying beds.

Three more plant upgrades were constructed in the 1990s to improve the performance and reliability of the treatment units. Modifications included new headworks equipment, a new fine bubble aeration system for Aeration Basins 1 through 6, construction of Blower Building 1 with five blowers and a gas engine generator system, new floating covers for Digesters 1 through 4. In 1996, a fine bubble aeration system was installed in Aeration Basin 7. The gaseous chlorine system was converted to liquid sodium hypochlorite (bleach) disinfection system in 1997.

A major expansion and upgrade project was completed in 2000. The project provided increased treatment capacities to all unit processes while replacing aged or outdated processes. Modifications were also added to improve the treatment reliability. Major additions to the plant included a second headworks (Headworks 2), a new influent pumping station, four new primary clarifiers, two new aeration basins, one new secondary clarifier, a new RAS/WAS pumping station, two new chlorine contact basins, two new anerobic digesters, and a new sludge dewatering facility. Modifications to the plant included increasing the capacity of the effluent pumping station, converting the former Digester 3 to a sludge storage tank, rerouting of digester sludge piping, upgrades to the existing secondary clarifiers, and a conversion of the gravity thickeners to a dissolved air flotation (DAF) system.

In 2005 a project was implemented to accommodate peak wet weather flows from the collection system. Improvements included a 7-million gallon (MG) secondary effluent storage basin, an expansion of the influent pump station, and effluent pump station.

The joint use outfall (North Bayside System Unit) was cleaned, inspected and repaired in 2009, including replacing the end gate and thrust block and placing new gravel bedding. Inspections in 2010 indicated no settlement had occurred and the diffusers remained clear and functional.

3.2 EXISTING WQCP FACILITIES

An overview of the existing facilities layout is provided in Figure 3.1. Process flow diagrams for the liquids and solids stream are shown in Figures 3.2 and 3.3. The treatment processes at the WQCP consists of preliminary, primary, secondary treatment and solids handling. Each unit process is described below, and details are summarized in Table 3.1.

3.2.1 Preliminary Treatment and Influent Pump Station

Preliminary treatment (or “Headworks”) consists of the influent junction box, influent flow measurement, bar screens, screenings conveyance, grit removal, and grit conveyance. There are two process trains. The influent junction box collects flows from the Shaw Road Pumping Plant, San Mateo Avenue Pumping Plant, and Pump Station 4 (Industrial) and distributes flow to the two trains of headworks processes. The old Headworks 1 includes three Parshall flumes, three bar screens, two gravity grit chambers, and Junction Box 3. The newer train (Headworks No. 2) was part of the 1998 plant upgrade and includes one Parshall flume, one bar screen, and a vortex grit chamber. Either train may be used, depending on flow conditions and treatment requirements. Normally, the newer Headworks No. 2 is used for dry flow conditions and Headworks 1 enters service during wet flow conditions.

The Influent Pump Station includes two wet well influent boxes, two wet wells, and six submersible influent pumps. During normal operations, both wet wells are in service.

3.2.2 Primary Treatment

Raw wastewater from Primary Influent Pump Station enters Flow Splitting Structure 1 and splits to four primary clarifiers. Primary effluent leaves each primary clarifier and meets at the Flow Splitting Structure 2. Flow entering the Splitting Structure 2 is distributed to either the aeration basins, during dry weather flow conditions, or to Chlorine Contact Basin 1, during wet weather flows exceeding 30 million gallons per day (mgd).

The primary treatment process includes facilities for adding ferric chloride and polymer to enhance sedimentation. Ferric chloride destabilizes the suspended particles in the primary influent wastewater to promote flocculation. The addition of polymer after floc formation produces a much larger floc, enhancing the settling of suspended solids in the primary clarifiers. Chemical enhancement would be needed if flows and loadings are excessive and impacting the performance of the clarifiers. However, current operations at the WQCP do not require chemical addition since the primary clarifiers are providing adequate removal for BOD and TSS under the current flows and loadings.

Figure 3.1
EXISTING FACILITIES
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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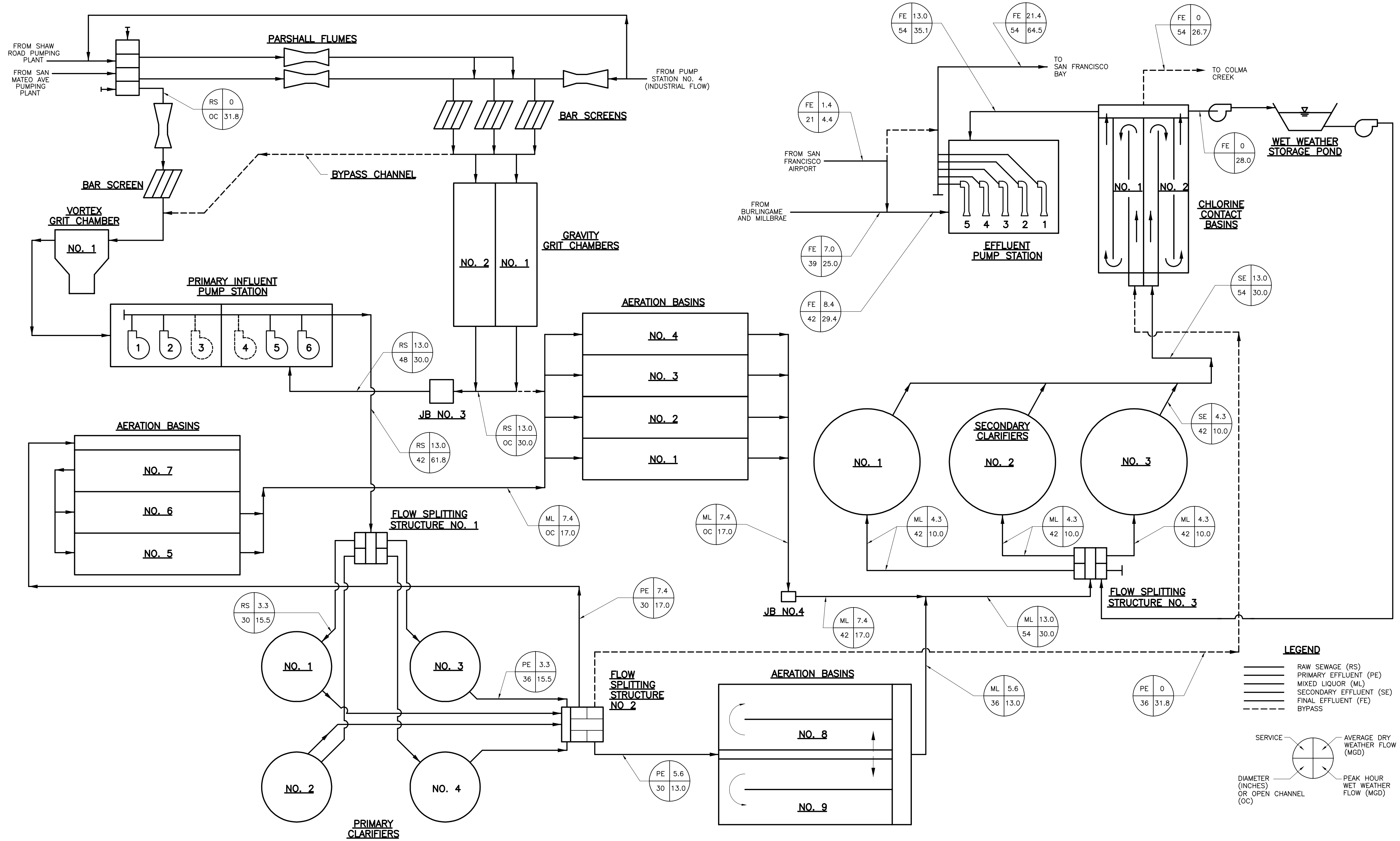

Figure 3.2
LIQUID STREAM PROCESS SCHEMATIC
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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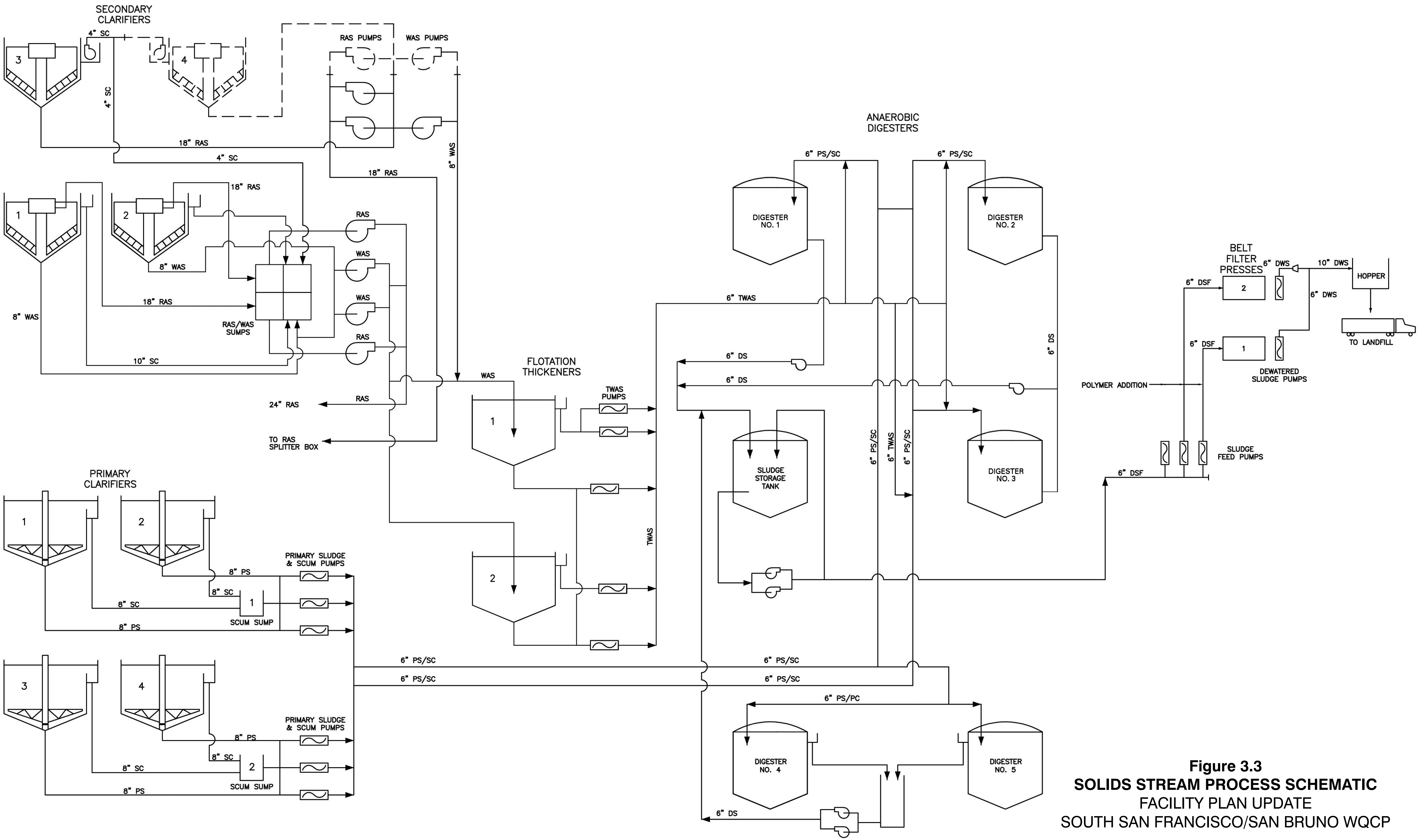

Figure 3.3
SOLIDS STREAM PROCESS SCHEMATIC
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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Table 3.1 Summary of Existing Facilities
Facility Plan Update
South San Francisco/San Bruno WQCP

Item	Value
<u>Preliminary Treatment</u>	
Influent flow measurement (parshall flumes)	
Number of units	4
Year of construction	3 in 1991,1 in 1998
Throat width, inches	2@18, 1@24 , 1@36
Barscreens	
Number of units	4
Year of construction	3 in 1991,1 in 1998
Width, feet	3 (old), 6 (new)
Depth, feet	4.1 (old), 6 (new)
Opening size, inches	0.5 (old), 0.75 (new)
Grit Removal	
Number of units	3
Year of construction	2 in 1977, 1 in 1998
Type	2 gravity, 1 vortex
Length, feet (gravity)	64
Width, feet (gravity)	9
Diameter, feet (vortex)	18
Influent Pump Station	
Number of pumps	6
Year of construction	1998
Type	Submersible
<u>Primary Treatment</u>	
Primary Clarifiers	
Number of units	4
Year of construction	1998
Diameter, feet	80
Side Water Depth, feet	12
Effective surface area (each), sf	5020
Primary Sludge Pumps	
Number of units	4
Year of construction	1998
Type	Progressing Cavity
Primary Scum Pumps	
Number of units	2
Year of construction	1998
Type	Progressing Cavity
<u>Secondary Treatment</u>	
Aeration Basins 1-4	
Number of units	4

Table 3.1 Summary of Existing Facilities
Facility Plan Update
South San Francisco/San Bruno WQCP

Item	Value
Year of construction	Modified as ABs in 1963
Length, feet	113
Width, feet	20
Side Water Depth, feet	9.75
Volume, MG (each)	0.16
Percentage of total volume, %	18
Aeration Basins 5-6	
Number of units	2
Year of construction	1963
Length, feet	148
Width, feet	20
Side Water Depth, feet	15.25
Volume, MG (each)	0.34
Percentage of total volume, %	19
Aeration Basin 7	
Number of units	1
Year of construction	1963
Length, feet	148
Width, feet	41
Side Water Depth, feet	15.75
Volume, MG	0.71
Percentage of total volume, %	20
Aeration Basins 8-9	
Number of units	2
Year of construction	1998
Length, feet	240
Width, feet	24
Side Water Depth, feet	18
Volume, MG (each)	0.78
Percentage of total volume, %	19
Secondary Clarifiers	
Number of units	3
Year of construction	2 in 1974, 1 in 1998
Diameter, feet	110
Side Water Depth, feet	10 (old), 14 (new)
Effective surface area (each), sf	9490
RAS Pumps	
Number of units	4
Year of construction	2 in 1974, 2 in 1998
Type	Centrifugal

Table 3.1	Summary of Existing Facilities Facility Plan Update South San Francisco/San Bruno WQCP
Item	**Value**
WAS Pumps	
Number of units	3
Year of construction	2 in 1974, 1 in 1998
Type	Centrifugal
Disinfection	
Chlorine Contact Basins	
Number of units	2
Year of construction	1998
Length, ft	360
Width, ft	12
Volume, MG (each)	0.33
Detention time, minutes (ADWF)	73
Detention time, minutes (PHWWF)	15
Solids Handling	
DAFTs	
Number of units	2
Year of construction	Originally as gravity thickeners in 1963, conversion to DAFTs: 1 in 1991, 1 in 1998
Diameter, feet	45
Side Water Depth, feet	10
Effective surface area, sf (each)	1600
Digesters	
Number of units	5
Year of construction	2 in 1950, 1 in 1973, 2 in 1998
Side Water Depth, feet	2@25.1,1@27.5,2@27
Volume, MG (each)	2@0.72, 3@0.78 Total Volume = 3.78 MG
Belt Filter Presses	
Number of units	2
Year of construction	1998
Belt width, meters	2
Length	22

The Primary Sludge Pump Station pumps settled solids and scum from the primary clarifiers to the anaerobic digesters.

3.2.3 Secondary Treatment

The secondary treatment system uses an air-activated sludge process that removes organic material (biochemical oxygen demand, [BOD]) from primary effluent. Typical values of BOD removal efficiency in the process are 85 to 95 percent. The City's discharge permit for the facility does not currently require nitrogen or phosphorus removal.

The secondary treatment system is comprised of aeration basins and secondary clarifiers. First, the wastewater is concentrated and aerated in the aeration basins to remove BOD and convert the BOD to biological solids that can be settled out of the flow. Next, the solids settle in the secondary clarifiers. Settled solids, known as "return activated sludge" (RAS), are returned to the aeration basins to seed the biological process. A portion of the settled solids are wasted to control the population of the microorganisms in the process. These solids are referred to as "waste activated sludge" (WAS).

Primary effluent from Flow Splitting Structure 2 enters either Aeration Basins 1 through 7 or 8 and 9. Flow to basins 1 through 7 first enters Basin 7, splits to Basins 5 and 6, merges in a mixed liquor open channel, splits to Basins 1 through 4, and collects in a mixed liquor open channel. However, Basins 1 through 4 have not been operational for several years. Flow to Aeration Basins 8 and 9 splits to either basin and collects in a 36-inch diameter mixed liquor pipe.

Blower Buildings 1 and 2 house the aeration blower equipment. Eleven centrifugal blowers supply air to the aeration basins to provide oxygen for the activated sludge microorganisms and mixing of the mixed liquor. Air drawn into the blowers is compressed, and then discharged through dedicated headers to the fine bubble diffusers.

Flow Splitting Structure 3 distributes the flow from the aeration basins to the secondary clarifiers. Flow enters the center of each clarifier, flows upward, and then radially outward. As solids settle, clarified flow passes under a circular scum baffle and over a circular V-notch weir into the effluent channel. The bottoms of the primary clarifiers are sloped to a sludge hopper near the center. Settled solids are removed from the clarifiers separately as RAS and WAS.Secondary effluent flows in 42-inch diameter pipes to the chlorine contact channels.

3.2.4 Effluent Disinfection/Dechlorination

Chlorination using sodium hypochlorite and dechlorination using sodium bisulfite are the final liquid treatment processes at the WQCP. Their primary function is to disinfect the effluent before it is discharged to San Francisco Bay. Disinfection with sodium hypochlorite solution (12 to 15 percent chlorine bleach) inactivates pathogens by oxidation during a "contact time" of 30 minutes to an hour. Chlorine contact tanks are provided to slow the flow and allow time for disinfection to occur. Chlorine residual in the plant effluent is toxic to aquatic organisms so it must be completely removed by adding sodium bisulfite solution. The reaction between the chlorine residual and sodium bisulfite is essentially immediate.

For effluent disinfection under typical operating conditions, flow enters the chlorine contact basins and mixes with sodium hypochlorite pumped from the Sodium Hypochlorite Facility. The detention time should be long enough to ensure adequate contact between the chlorine and organisms in the water. Low coliform concentrations in the final effluent (in accordance with NPDES permit requirement) indicate effective chlorination. Sodium bisulfite is added at the Effluent Pump Station for dechlorination of the combined North Bayside System Unit (NBSU) effluent from South San Francisco, San Bruno, Burlingame, Millbrae, and San Francisco Airport prior to discharge to the San Francisco Bay.

Chlorine Contact Basins 1 and 2 are designed to disinfect secondary effluent (SE) during dry weather flows and peak wet weather flows. During dry weather, both tanks are operated in parallel. Currently, during peak wet weather flow conditions the basins operate separately, with Basin No. 2 receiving secondary effluent from the secondary clarifiers and Basin No. 1 receiving primary effluent (PE) from the primary bypass pipeline.

Secondary uses for sodium hypochlorite in the plant include odor control, activated sludge bulking control, and standby effluent dosing.

3.2.5 Solids Handling

The solids handling facilities at the WQCP consist of two dissolved air flotation thickeners (DAFTs) for solids thickening, five anaerobic digesters, and two belt filter presses (BFPs) for dewatering.

WAS and scum from the secondary clarifiers are pumped from the RAS/WAS pump stations to the DAFTs. The DAFTs separate the solids from the liquid in the WAS flow by using fine air bubbles to float the sludge particles to the surface, where it is then scraped off. Volume reduction from WAS thickening benefits the sludge digestion and dewatering processes by reducing the volume of sludge to be processed, quantity of chemicals required for sludge conditioning, and amount of heat required for digestion. The units were originally designed and constructed as gravity thickeners in 1963, but were converted to DAFTs in 1991 and 1998. The thickened solids are pumped to the digesters for digestion.

The main purpose of anaerobic digestion is to biologically decompose organic material in primary and secondary scum and sludge to a relatively stable form. Anaerobic digestion also reduces the amount of solids to dewater, reduces the volume of sludge cake that is hauled to the landfill, reduces pathogens in the sludge and produces digester gas that is high in methane and useful for fueling other equipment.

The solids dewatering facility consists of the belt filter press (BFP) process in the Sludge Dewatering Building south of the primary clarifiers. Dewatered sludge (“cake”) is disposed of at an offsite landfill facility. The BFP system is designed to concentrate the anaerobically digested sludge from a solids content of less than 3 percent to a range of 18 to 20 percent. Polymer is mixed with digested sludge upstream of the BFPs to promote flocculation and solids capture so that the solids will concentrate into cake form. BFP sludge cake is conveyed to the hopper area and loaded into hauling trucks for transport to a landfill. Digested sludge is held in the sludge storage tank so that the BFP system does not need to operate continuously.

3.2.6 Effluent Pump Station and Outfall

The effluent pump station and outfall dispose treated wastewater to the San Francisco Bay. The system includes in-plant conveyance piping, a junction box, a pump station, an outfall to San Francisco Bay, and currently, an outfall to Colma Creek. The effluent pump station is jointly owned by the NBSU.

The effluent junction box and effluent pump station are located north of Secondary Clarifiers 2 and 3. Sodium bisulfite solution (SBS) is added at the effluent pump station for dechlorination of combined NBSU effluent prior to discharge to the San Francisco Bay. When the Colma Creek bypass is used, SBS is also added at the chlorine contact basin effluent box.

The San Francisco Bay submarine outfall is located about 1.5 miles northeast of the WQCP plant. The 54-inch diameter gravity outfall discharges to Junction Box 2 at Point San Bruno. The submerged outfall extends 5,300 feet northeast from Point San Bruno into lower San Francisco Bay, and from there the outfall transitions to a submerged pipeline. Flow exits the outfall through a submerged diffuser at a depth of about 16 feet below mean lower low water (MLLW).

The 54-inch diameter wet weather outfall to Colma Creek extends approximately 80 feet north of the chlorine contact basins. The bypass crosses under the plant access road.

Dechlorinated secondary effluent is discharged at the creek bottom at elevation 0.0 when flows exceed the maximum capacity of the effluent pump station. A weir (elevation 7.25) upstream of the bypass at the chlorine contact basin effluent channel prevents high Colma Creek flows from backing up into the treatment plant.

3.3 PLANT PERFORMANCE AND CRITERIA REVIEW

This section summarizes the performance of the WQCP's treatment processes. The existing performance provided a benchmark for the planning of new facilities. The plant performance review was used to calibrate a process model and establish sizing criteria for use in the capacity analysis. The review period over which performance has been evaluated is from January 2004 through December 2008. Historical process loadings and criteria presented are based on reported data provided by the WQCP staff.

With the exception of one month, the plant met BOD, TSS, and other conventional pollutant limits during the entire review period. In October 2005, the effluent BOD was 31 milligrams per liter (mg/L), which exceeds the 30 mg/L limit.

Table 3.2 summarizes key loading and performance data from the review period. In addition, the original design, typical values, and the recommended values to use for the capacity analysis are also provided for these parameters. Appendix C contains plots for the process data.

Table 3.2 Plant Performance and Criteria Summary
Facility Plan Update
South San Francisco/San Bruno WQCP

Process/Design Parameter	Units	Original Design	Existing Performance	MOP-8 (1) or Typical Values (2)	Recommended Value for Capacity Analysis
<u>Primary Clarifiers</u>					
Overflow Rate					
ADWF	gpd/sf	647	720	800-1,200	800
ADMMF	gpd/sf	906	970	800-1,200 (1)	1,000
PHWWF	gpd/sf	3,078	2,400	1,500-4,000 (1)	3,078
% BOD removal	%	41	20-48 (avg 35)	25-30	41
% TSS removal	%	70	49-73 (avg 63)	50	70
<u>Aeration Basins</u>					
SRT	days	3.0 at ADMM	1 – 3; Avg = 2.0	Variable	3.0 at ADMMF
MLSS	mg/l	2,600 at ADMM	700 – 1,650; Avg = 1,060	1,000-4,000 (1)	2,600 (4) at ADMM
Sludge Volume Index (SVI)	mL/g	150	Avg = 250; 90%ile = 415	150	150
<u>Secondary Clarifiers</u>					
Overflow Rate					
ADWF	gpd/sf	457	440	300 – 600 (1)	Not Used for Sizing
ADMMF	gpd/sf	639	750	300 – 600 (1)	Not Used for Sizing
PHWWF	gpd/sf	1,053	1,300	1,000 – 1,500 (1)	1,053 (5)
<u>Chlorine Contact</u>					
Detention Time					
ADWF	min	73	62	30 – 60 (2)	60
PHWWF	min	15	18	15 – 30 (2)	15
<u>Dissolved Air Flotation Thickening</u>					
Solids Loading	ppd/sf	8.7 at ADMM	3.2 – 11.9; Avg = 5.9	9.6-24 (1)	12 at ADMM
Hydraulic Loading	gpm/sf	0.14 at ADMM	0.05 - 0.66; Avg = 0.20	0.5-2 (1)	0.5 at ADMM
Percent Capture	%	85	Avg = 93	98-99	93
% TWAS	%	N/A (3)	4.4 – 6.6; Avg = 5.5	3.5-5.0	5.5
<u>Anaerobic Digestion</u>					
Volatile Solids Load	ppd/cf	0.11 at ADMM		0.1-0.4 (1)	0.11 at ADMM
HRT	days	18 at ADMM	36 - 75	10-20 (1)	18 at ADMM
VS Reduction	%		40 – 70; Avg = 58	50 – 65 (2)	58
<u>Solids Dewatering</u>					
Belt Filter Press					
Solids Loading	lb/day	19,020	14,450		19,020
Solids Capture	%	N/A (3)	90 – 95; Avg = 92		92
Cake % Solids	%	N/A (3)	14 – 18; Avg = 16		16
	lb/day	18,190	N/A (3)		18,190

Notes:
(1) Water Environment Federation / American Society of Civil Engineers, 1998.
(2) Typical values based on Carollo experience.
(3) Not available or applicable.
(4) Based on SVI of 150 mL/g and limiting PHWWF to existing secondary clarifiers to 30 mgd.
(5) Based on SVI of 150 mL/g and MLSS of 2,600 mg/L.

The following sections review key findings from the plant performance review for each process during the four year review period.

3.3.1 Primary Clarifiers

During the review period, the plant has typically operated with only two or three of the four primary clarifiers. Although they have performed well within the range for typical primary clarifiers, their performance with respect to BOD and TSS removal has been slightly less than the original design criteria; 63 vs. 70 for TSS removal and 35 vs. 41 for BOD removal. The reason for the reduced performance is because the facility was designed to operate with chemical addition to enhance performance. However, the chemical system has not been in operation for several years to save costs. Although this does not appear to be an issue for the plant, it is anticipated that primary treatment performance could be restored back to the original design criteria of 70 percent for TSS and 41 percent for BOD removal with chemical addition. It should also be noted that the primary clarifiers have demonstrated satisfactory performance at higher overflow rates (during ADW and ADMM conditions) than the original design. Therefore, the recommended rates were slightly increased from the original design criteria.

3.3.2 Aeration Basins

The plant has typically had aeration basins 5 through 9 in service, while basins 1 through 4 have been out of service. In addition, this process has been operated at a solids retention time (SRT) ranging from 1.0 to 2.5 days with an average mixed liquor suspended solids (MLSS) concentration of 1,060 mg/L. Although the aeration basins have generally performed well with respect to BOD removal and biomass flocculation, poor settleability for mixed liquor solids is important as it has a significant impact on the resulting capacity of the secondary clarifiers. Figure 3.4 illustrates the sludge volume index (SVI), which is a measure of settleability during the entire review period. The SVI measurement reflects the volume the solids in a mixed liquor sample will compress to after 30 minutes. In general, the lower the SVI, the faster the solids will settle.

The average SVI was approximately 250 milliliters per gram (mL/g) and the 90th percentile value was 415 mL/g. The 90th percentile SVI for a typical, properly functioning activated sludge process is generally close to 150 mL/g. During periods when the SVIs are too high, the plant adds chlorine to the process, which temporarily improves settleability. Some of the operating conditions that are potential contributors to the poor settling sludge are:

- Operation at very low SRT (1 to 2 days). This can result in growth and proliferation that can deteriorate settleability.
- Low Dissolved Oxygen. Filament identifications performed for the MLSS show S. Natans and type 1701, which are commonly found in low DO environments.

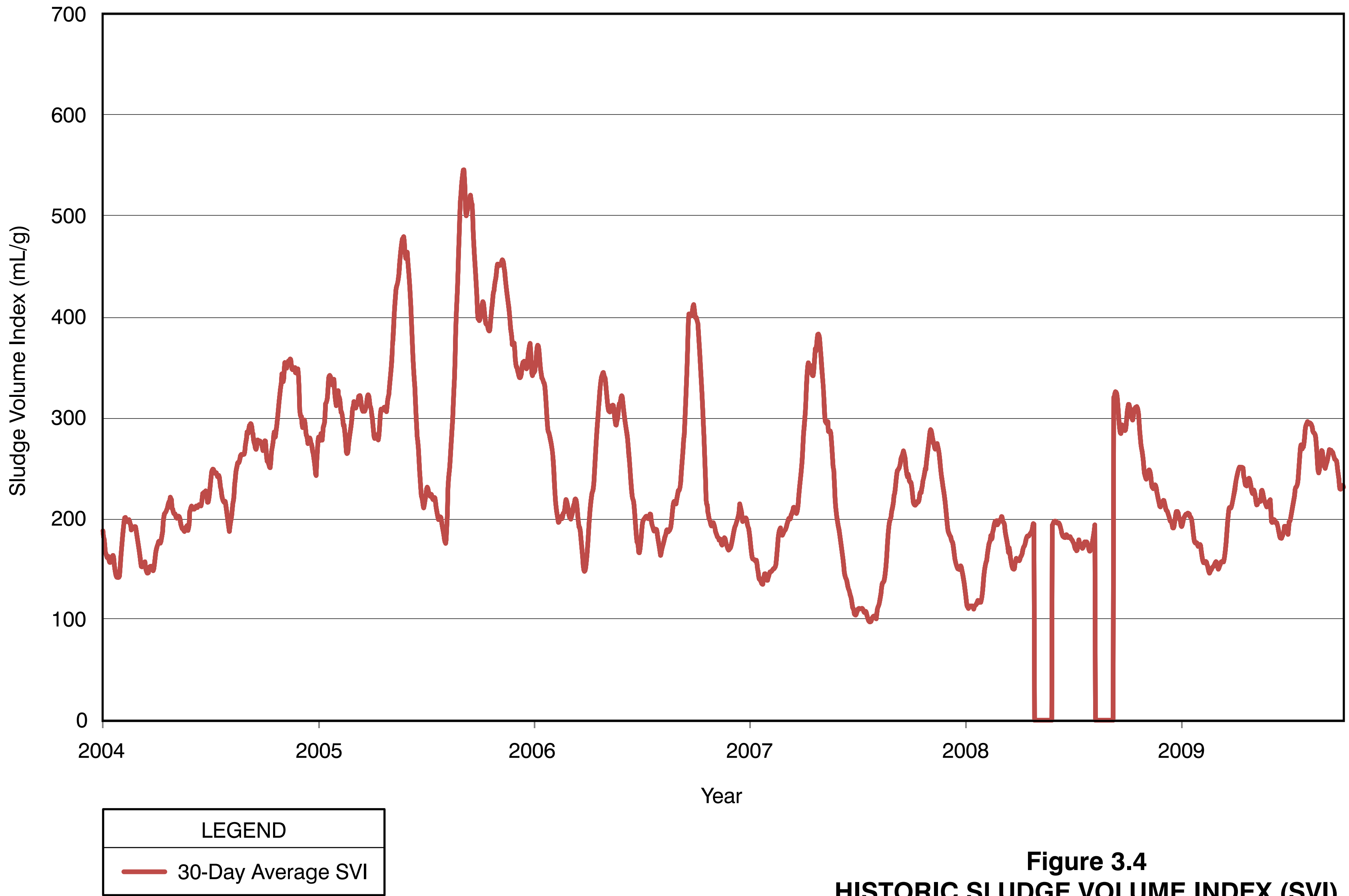

Figure 3.4
HISTORIC SLUDGE VOLUME INDEX (SVI)
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SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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- Low Selector Efficiency. Anaerobic selectors are commonly used to improve settleability for low SRT plants. Anaerobic selectors work by growing phosphorus accumulating organisms (PAO), which settle well. Although aeration basins 8 and 9 have anaerobic selector zones, MLSS from these basins is mixed with MLSS from the other basins which do not have selector zones. This reduces the overall effectiveness of the selector zones. This assessment is supported with phosphorus data collected in November and December of 2006. This data shows little additional phosphorus removal in the aeration basins beyond what is expected from uptake for biomass growth. Filament identifications also suggest the presence of some PAOs, but not in enough quantity for a well-established anaerobic selector.
- Industrial or Other Unidentified Constituent in Wastewater Influent. An interesting observation is that during wet weather periods, settleability has generally improved. It may be that the cause of the poor settleability is from a constituent found in the influent wastewater, such as salinity, which is diluted during wet weather periods. ,

Although some of the settleability issues could be mitigated by operating at longer SRTs, this could also result in partial nitrification in the aeration basins. Partial nitrification is not desirable as it reduces the chlorination process performance.

Recommended criteria for evaluating the aeration basin capacity are the same as the original design criteria. Although the plant has historically operated at lower SRTs, a 3-day SRT is recommended. This is sufficient for BOD removal and leaves adequate volume to incorporate an anaerobic selector into the existing tanks. A design MLSS of 2,600 mg/L is based on the maximum MLSS concentrations that the existing clarifiers can accommodate with a PHWWF of 30 mgd and an SVI of 150 mL/g. Although SVIs have historically been higher due to poor settleability, it is anticipated that incorporating selectors into the remaining aeration tanks will improve settleability and lower SVIs. Operation at different MLSS concentrations and settleability conditions is discussed further in the Capacity Analysis section.

3.3.3 Secondary Clarifiers

Despite the fact that 2 of the 3 clarifiers are shallow (10 feet sidewater depth) and that settleability conditions are highly variable and oftentimes poor, the secondary clarifiers have performed well. The clarifiers have even operated at peak hour wet weather flows up to 1,300 gpd/sf while achieving adequate solids removal. Figure 3.5 shows the clarifier performance during the review period.

The clarifiers have been able to accommodate the high overflow rates primarily because the aeration basins have been operated at a low MLSS concentration; with an average of 1,060 mg/L during the review period. A solids flux analysis indicates that at such low MLSS concentrations, the clarifiers should be able to accommodate the high overflow rate of 1,300 gpd/sf, even with poor settleability. Based on operating the aeration basins at an

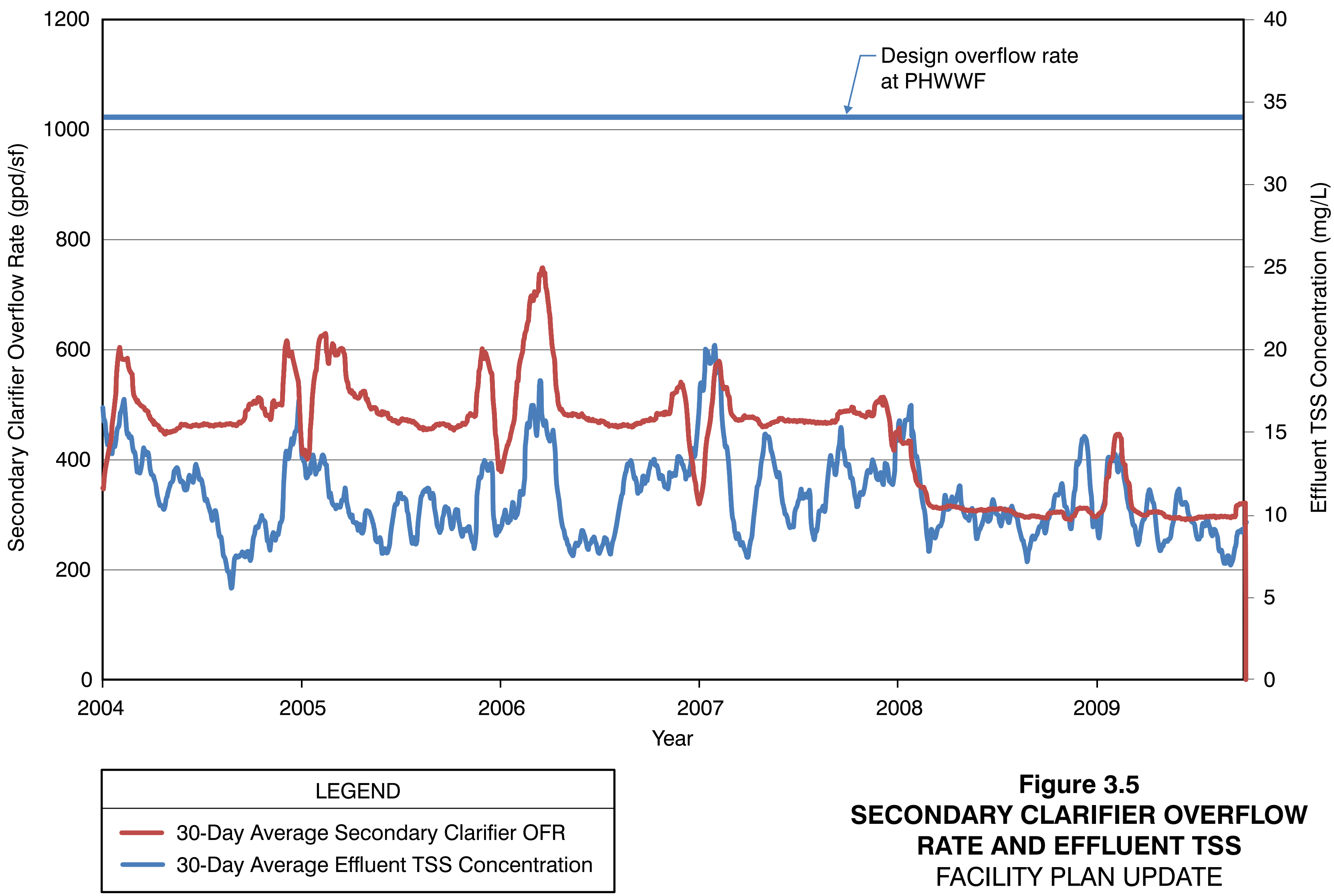

Figure 3.5
SECONDARY CLARIFIER OVERFLOW RATE AND EFFLUENT TSS
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SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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MLSS of 2,600 mg/L with an SVI of 150 mg/L, it is recommended that the PHWWF overflow rate not exceed the original criteria of 1,053 gpd/sf.

3.3.4 Chlorine Contact Tanks

Based on successful operating experience under these conditions, the recommended contact time for estimating the capacity of the chlorine contact tanks is 60 minutes for ADWF conditions. This is slightly lower than the original design criteria of 73 minutes.

3.3.5 Dissolved Air Flotation Thickening (DAFT)

Even with hydraulic and solids loading rates exceeding original design criteria, the DAF thickeners have performed well, achieving an average percent total solids (TS) concentration of 5.5 percent with a capture of 93 percent. Based on successful operating experience at higher loadings, the recommended loading criteria are 12 pounds per day per square foot (ppd/sf) TS loading at 0.5 gallons per minute per square foot (gpm/sf) hydraulic loading. The original design criteria design criteria are 8.7 ppd/sf TS and 0.14 gpm/sf.

3.3.6 Anaerobic Digesters

The anaerobic digesters have performed well, with an average volatile solids reduction (VSR) of 58 percent. Loading rates with respect to volatile solids and detention time have been well below original design criteria. Recommended criteria for digesters are the original design criteria of 18 days and 0.11 lb volatile solids per cf of digester during ADMM conditions.

3.3.7 Dewatering

Although the average cake solids percentage of 16 is less than typical values for belt filter presses, the average capture of 92 percent is well within industry standards. The BFP units are typically operated 3 shifts per week.

3.4 CAPACITY ANALYSIS

This section summarizes the results of the capacity analysis. Capacities were estimated for each of these processes based on the recommended criteria in Table 3.2.

3.4.1 Peak Hour Wet Weather Flow Capacity

The Peak Hour Wet Weather Flow (PHWWF) capacity was estimated for facilities where sizing is established by the peak flow. These facilities include the headworks, influent pumping, primary clarifiers, secondary clarifiers, chlorine contact tanks, and effluent pumping. Capacities for process units are based on all units being in service, while pumping capacities are based on the large unit being out of service. Table 3.3 summarizes the PHWWF capacity for each of these processes. Figure 3.6 illustrates this same information.

Table 3.3	Peak Hour Wet Weather Flow Capacity Facility Plan Update South San Francisco/San Bruno WQCP
Process	**PHWWF Capacity (mgd)**
Headworks	61.8 (1)
Primary Clarifiers	61.8
Secondary Clarifiers	30.0 (2)
Chlorine Contact Tanks	63.4
Effluent Pumping	35.0

Notes:

(1) Based on hydraulic design capacity (maximum influent pumping)

(2) Based on an MLSS concentration of 2,600 mg/L and an SVI of 150 mL/g.

3.4.2 ADWF Capacity

The ADWF capacity was estimated for facilities where sizing is established by average flows, or influent BOD and TSS loading to the plant. These facilities include the primary clarifiers, aeration basins, DAF thickeners, anaerobic digesters, and dewatering. To determine the capacity for these facilities, a plant process model was developed and calibrated to historical operating data from 2008. Using the process model to simulate maximum month conditions, the influent flow was increased until the operating limits (as established in Table 3.2) were exceeded for each particular unit. This influent flow was taken as the maximum month capacity limit for that particular unit. The maximum month capacity was converted to an equivalent ADWF based on the historical peaking factors observed (see flow and load analysis). Appendix D includes a summary of the model outputs and operational data for the calibration period. Table 3.4 summarizes the ADMM and ADWF capacity for each process. Figure 3.7 shows the ADWF capacities of each process.

3.4.3 SVI Impacts to Secondary Process Capacity

As discussed previously, the plant has experienced periods of poor mixed liquor settleability as measured by the SVI. Despite this, the capacity of the secondary process has been presented based on a more typical, or normal SVI of 150 mL/g. This was done as it is anticipated that process improvements will be made to improve the settleability. Not improving the settleability will significantly reduce the secondary process capacity.

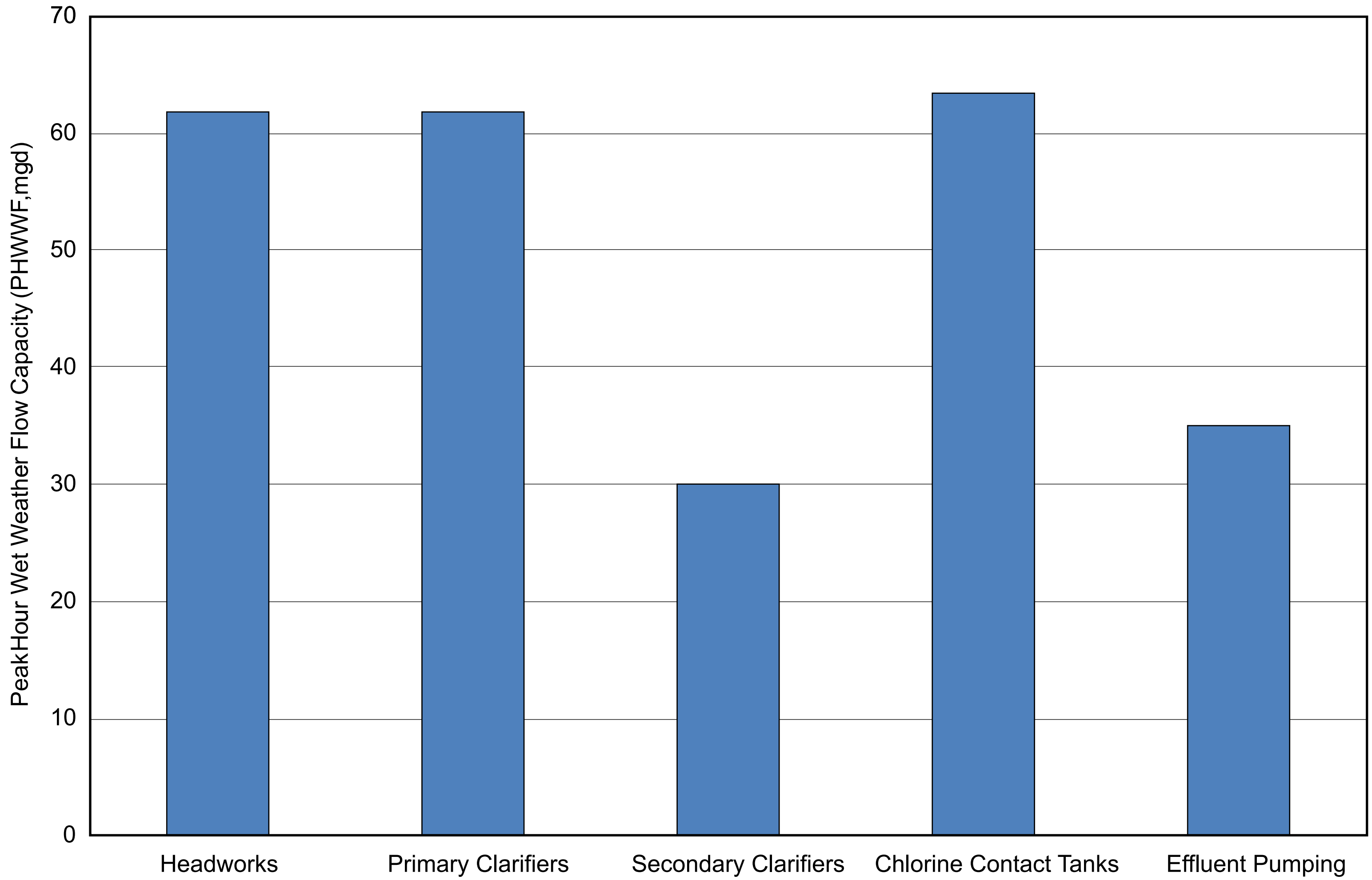

Figure 3.6
PHWWF CAPACITIES OF
FACILITIES SIZED ON PEAK FLOW
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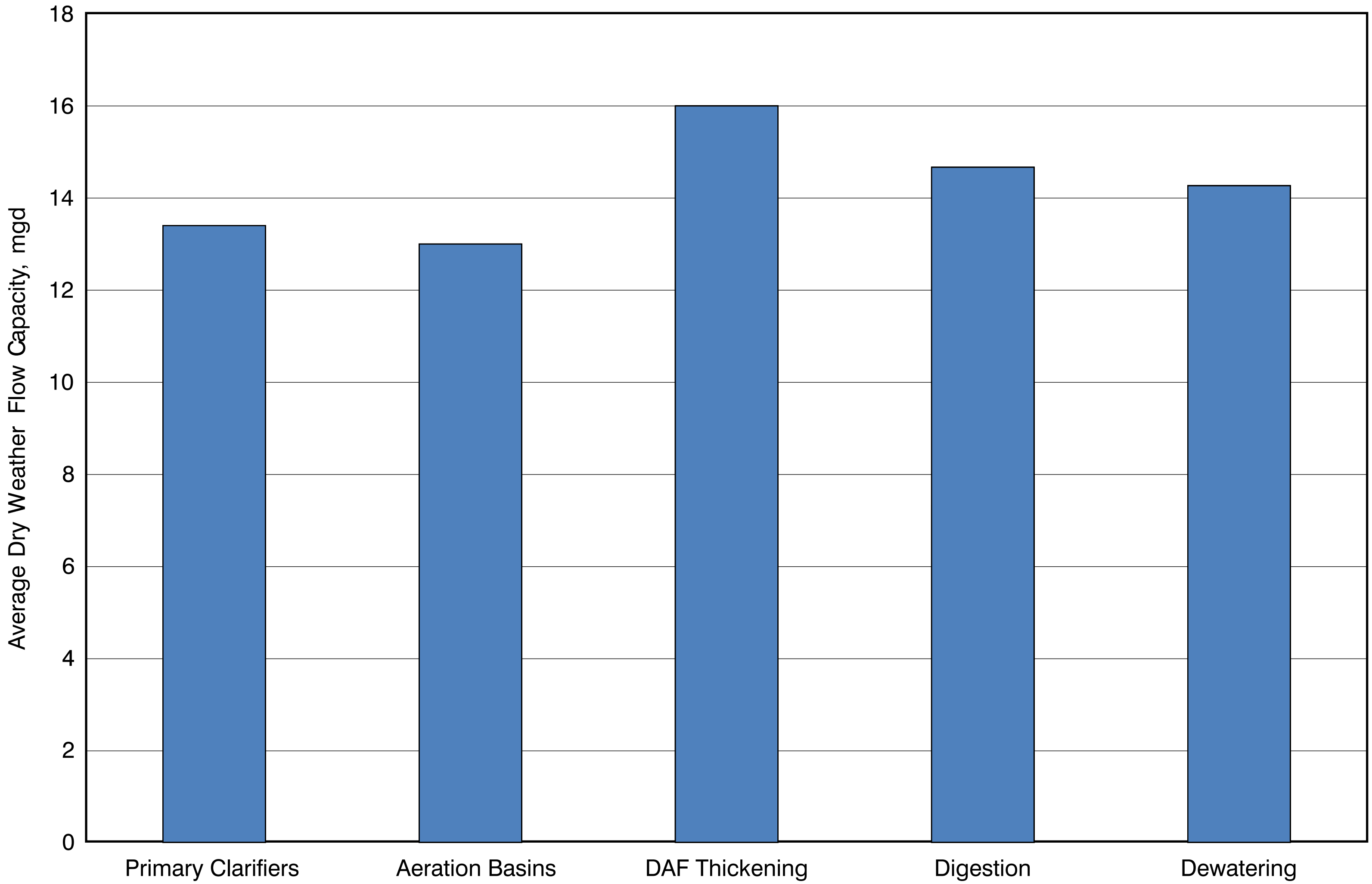

Figure 3.7
ADWF CAPACITIES FOR FACILITIES SIZED ON DRY WEATHER FLOW
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SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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Table 3.4 ADWF Capacity Facility Plan Update South San Francisco/San Bruno WQCP		
Process	**ADMM Capacity (all units in service), mgd**	**Equivalent ADWF Capacity, mgd (1)**
Primary Clarifiers	20.1	13.4
Aeration Basins	19.5	13.0 (2)
DAF Thickener	24.0	16.0
Anaerobic Digester	22.0	14.7
Dewatering	21.4	14.3

Notes:

(1) Equivalent ADWF Capacity = ADMM Capacity / 1.50

(2) Capacity with units 1 through 4 out of service = 10.8 mgd ADWF.

Table 3.5 summarizes the equivalent ADWF capacity based on a typical SVI of 150 mL/g, but also for the historical average SVI of 250 mL/g, and the 90 percentile historical value of 415 mL/g. The 90 percentile value is often used as a worst case condition for evaluating process capacity. Capacities are presented based on all units in service. Note that as the SVI increases (i.e. settleability degrades), the MLSS concentration must be reduced so that the secondary clarifiers do not fail during peak flow conditions. Reducing the MLSS, however, lowers the calculated ADWF capacity. At the historical average SVI of 250 mL/g, the ADWF capacity is reduced to 10.3 mgd, while the ADWF capacity is even further reduced to 7.7 mgd during periods when the SVI reaches the 90 percentile historical value of 415 mL/g. This highlights the need to implement process improvements so that the secondary process capacity can be restored to the original design capacity of 13 mgd ADWF.

3.4.4 Impacts of MLSS Concentrations on Secondary Treatment Capacity

Table 3.6 shows how operating the aeration basins at different MLSS concentrations affect the secondary process capacity. As MLSS concentrations increase, so does the ADWF capacity. However, this also reduces the peak flow capacity, because MLSS will settle more slowly at higher concentrations, effectively reducing the peak flow capacity of the secondary clarifiers. Conversely, reducing the MLSS concentration will lower the ADWF capacity, but increase the peak flow capacity. This relationship will be considered further when evaluating flow equalization alternatives.

Table 3.5 SVI Impacts to Secondary Process Capacity (with ABs 1 – 9 in service)
Facility Plan Update
South San Francisco/San Bruno WQCP

Secondary Process Criteria	SVI = 150 mL/g (Typical)	SVI = 250 mL/g (Avg Historical)	SVI = 415 mL/g (90%ile Historical)
Peak Flow to Secondary Clarifiers, mgd	30	30	30
Allowable MLSS, mg/L (1)	2,600	1,900	1,300
SRT, days	3.0	3.0	3.0
ADMM Capacity, mgd	19.5	15.4	11.5
Equivalent ADWF Capacity, mgd (2)	13.0	10.3	7.7

Notes:
(1) Estimated from solids flux analysis.
(2) Equivalent ADWF Capacity = ADMM Capacity / 1.50.

Table 3.6 MLSS Impacts to Secondary Process Capacity (with ABs 1 – 9 in Service)
Facility Plan Update
South San Francisco/San Bruno WQCP

Secondary Process Criteria	2008 Operating MLSS	Original Design MLSS	Typical Maximum MLSS
MLSS, mg/L	1,250	2,600	3,000
SRT, days	3.0	3.0	3.0
ADMM Capacity, mgd	11.4	19.5	21.5
Equivalent ADWF Capacity, mgd (2)	7.6	13.0	14.3
Allowable Peak Flow at SVI = 150 mL/g	43	30	26

Notes:
(1) Equivalent ADWF Capacity = ADMM Capacity / 1.50.
(2) Estimated from solids flux analysis.

3.5 CLIMATE CHANGE – SEA LEVEL RISE

The purpose of this section is to summarize the potential effects of future global climate change, specifically sea level rise, relevant to the WQCP for the Facility Master Plan Update. As the WQCP facilities are located adjacent to the San Francisco Bay, risk of inundation due to sea level rise is a concern. A more comprehensive discussion of this topic is included in Appendix A. The scientific literature referenced in this section and Appendix A includes key studies recently analyzing climate change impacts, which affect the WQCP. The literature is identified as being the most recent and relevant or internationally recognized analyses with implications for California.

3.5.1 Sea Level Rise Projections

Sea levels vary over time for several reasons, including:

- Melting land ice.
- Thermal expansion of the ocean's marine mixed layer.
- Vertical land movement.
- Meteorological forcings.
- Lunar cycle.

Increased average atmospheric temperatures at the poles due to global climate change have increased the rate of melting land ice (specifically in Greenland and Antarctica) adding to the total mass of the oceans. This has resulted in thermal expansion of the marine mixed layer of the ocean adding to the total volume of the oceans. Independent of global climate change, vertical land movements and meteorological forcings also contribute to relative sea level change and astronomical tides can cause changes in water level along the California coast of about 3 meters (10 feet) (Cayan et al, 2006).

Data for this analysis were obtained from the National Oceanic and Atmospheric Administration's (NOAA) National Ocean Service Center for Operational Oceanographic Products and Services (NOS CO-OPS) website. Data (relative to the North American Vertical Datum established in 1988, NAVD 88) were collected from the Redwood City, Alameda, and San Francisco tide gages within the San Francisco Bay since these have the longest running records within proximity to the WQCP's facilities.

In addition to the record data, the most recent and widely accepted (published) ranges of projected sea level rise due to global climate change were considered in this analysis. Sources considered include:

1. Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report of 2007 (IPCC, 2007).
2. Scientist Stefan Rahmstorf's *Science* Journal paper (Rahmstorf, 2007).
3. U.S. Marine Board Commission on Engineering and Technical Systems National Research Council (NRC) of 1987 (U.S. NRC, 1987).

Table 3.7 summarizes the projected sea level rise for each source.

Table 3.7	Projected Sea Level Rise (in Inches) due to Global Climate Change Facility Plan Update South San Francisco/San Bruno WQCP			
	2050		2100	
Sources	**Low**	**High**	**Low**	**High**
IPCC 2007	3.8	12.5	7	23
Rahmstorf 2007	10.9	30.0	20	55
NRC(1) 1987	6.0	24.0	20	59

Note:

(1) In Figure 2-2 of the NRC text, the Scenario I curve represents the low end of the projected range in sea level rise and the Scenario III curve represents the high end.

The Rahmstorf projections take into account the latest observations and science of sea level rise (specifically, the latest understanding of ice sheet dynamics and the increasing rate of land ice melt observed at the polar ice caps).

Figure 3.8 shows the observed record and the range of projected monthly mean higher high water (MHHW) levels configure to NAVD 88. The projected ranges of sea levels extend from the 1990 MHHW levels through the year 2100.[1] Figure 3.8 also includes the elevation of the effluent pump station (top slab) as a point of reference.

The water level in Colma Creek is of special concern to the WQCP since the creek flows along the plant's northern boundary. Colma Creek water levels are highly influenced by both tidal action and storm events. The Federal Emergency Management Agency (FEMA) developed an insurance rate map[2] for San Mateo County in 1981 showing the estimated hydraulic grade line (HGL) due to a 100-year storm event at high tide to be at 9.7 feet relative to NAVD 88 at South San Francisco. While the water level is not regularly monitored in the stretch of the creek bordering the WQCP, plant staff have observed near-flooding conditions outside the Maintenance Building. As recently as October 13, 2009, the water level was measured to be 1.6 feet above the 100-year HGL (i.e., 11.3 feet relative to NAVD 88), which is approximately 1.5 feet below the Maintenance Building's foundation elevation.

Figure 3.9 shows the elevation of FEMA's current estimate of the 100-year HGL near South San Francisco as well as the highest observed water level in Colma Creek and the elevation of the Maintenance Building foundation (12.82 feet NAVD 88). The other critical area of concern for flooding or backflow into the system has been the Effluent Pump Station and the Bypass Weir downstream the Effluent Pump Station; however, the Bypass Weir has been raised in the last decade to a level preventing backflow into the current system. Figure 3.10 goes a step further, showing projected rise of the FEMA 100-year HGL and the highest observed water level in Colma Creek through the year 2100.

[1] Projected ranges of sea levels are shown with respect to 1990 MHHW levels, since that is the year from which climate models start simulating projected changes in sea level due to climate change.

[2] The most recent map was released in September of 1981 and the release of a revised map is expected in September of 2011.

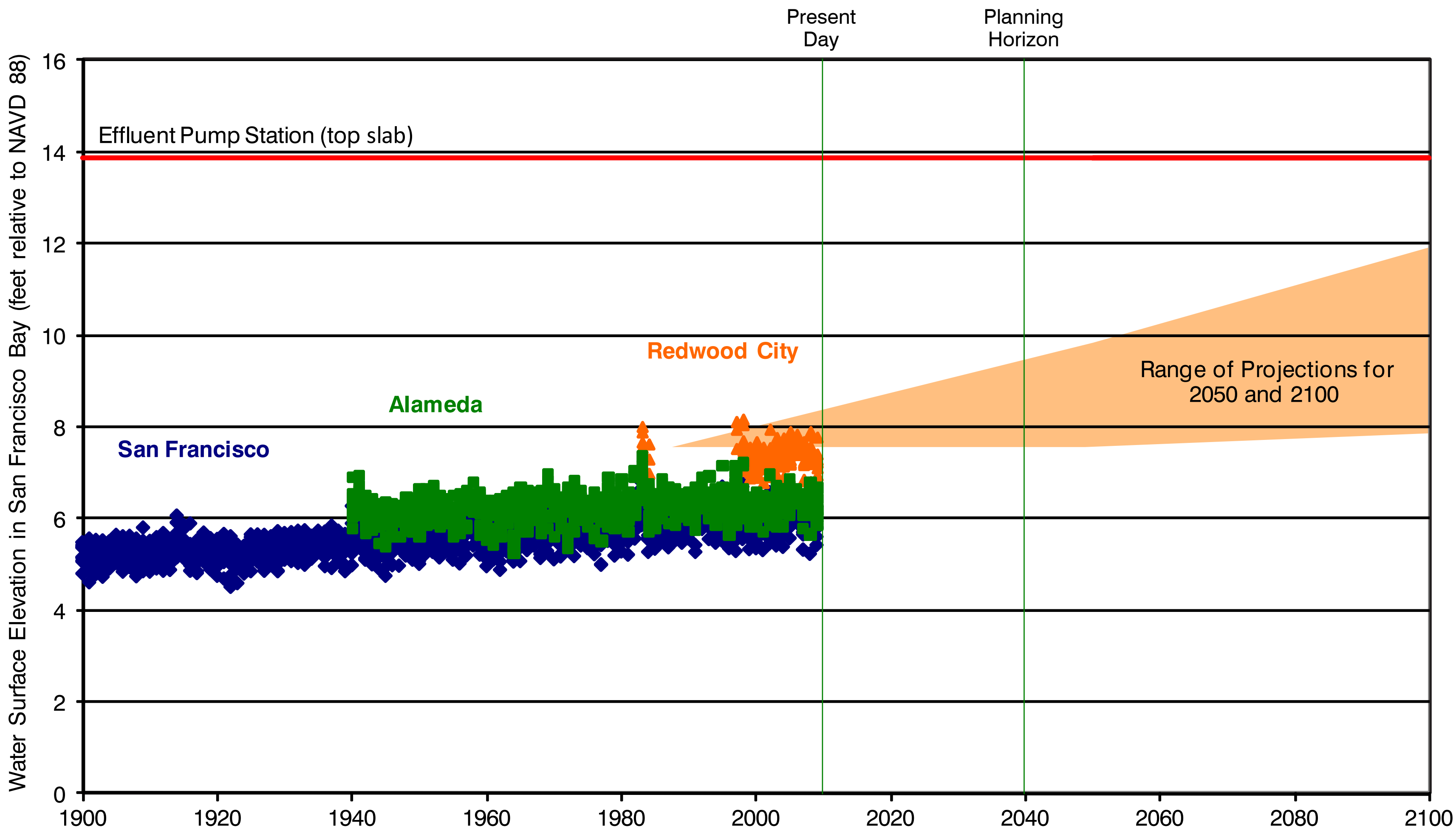
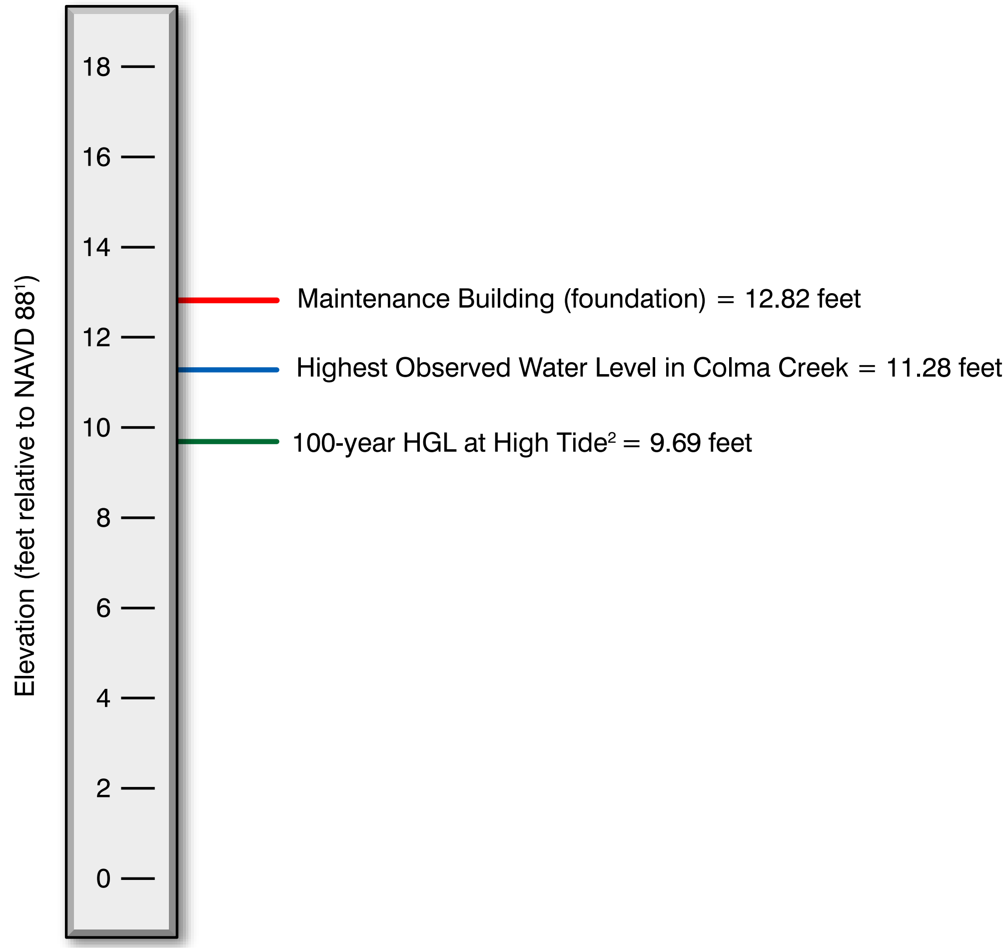


Figure 3.8
OBSERVED AND PROJECTED SEA LEVELS IN SAN FRANCISCO BAY
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP



NOTES:

1. Convert the elevation to be relative to plant datum by subtracting 2.69 feet.
2. 1981 Federal Emergency Management Agency 100-year storm hydraulic grade line elevation at high tide.

Figure 3.9
WQCP MAINTENANCE BUILDING FOUNDATION AND COLMA CREEK WATER LEVELS
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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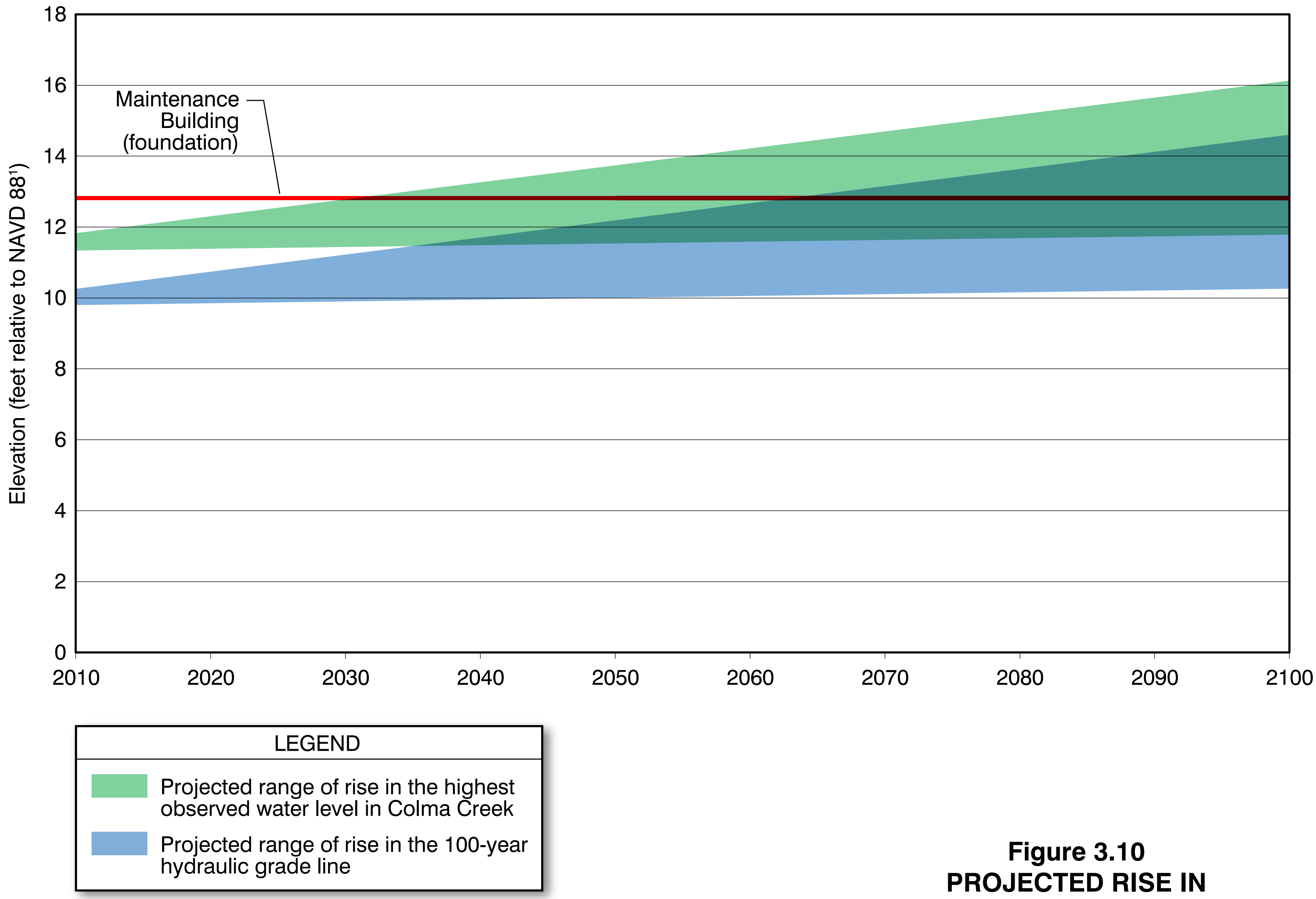

NOTE:

1. Convert the elevation to be relative to plant datum by subtracting 2.69 feet.

Figure 3.10
PROJECTED RISE IN COLMA CREEK WATER LEVELS
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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3.5.2 Conclusions and Recommendations of Sea Level Rise Impacts

The findings and recommendations of the sea level rise analysis are as follows:

- The sea level is expected to rise in response to global warming. Predicting sea level rise depends on many assumptions. The models considered for the facility plan indicate that the sea level could rise anywhere from 3.8 inches to 30 inches by the year 2050. Higher seas levels will impact Colma Creek water levels during major storm events.
- There needs to be coordination with other ongoing efforts, including the Army Corps of Engineers Shoreline Study. This section of the creek needs to be surveyed and hydraulic models (e.g., HEC-RAS) need to be run to better understand the combined effect of heavy rain events during high winter tides.
- The WQCP site needs to be protected from flooding. Recent storms that coincided with high tides caused levels in Colma Creek to rise within inches of the top of the Creek bank. New floodplain maps are currently being prepared by FEMA for the Colma Creek Area. When the flood level maps are ready, the City should conduct a hydrology study to project water levels around the WQCP site.
- Potential flood protection measures include dredging Colma Creek to reduce bottlenecks in the flow, removal of chord grass infestations along the north bank or as a last resort, construction of a sea wall system.
- Colma Creek levels and sea levels should be monitored periodically to gauge when corrective actions should be initiated. A long range plan should be prepared, including evaluation of potential state and federal funding.

WQCP CONDITION ASSESSMENT

4.1 CONDITION ASSESSMENT

Carollo conducted a visual condition assessment of the WQCP facilities on January 28, 2010. The assessment team consisted of specialists in the process, mechanical, and electrical engineering disciplines. Senior operators Robert Keen, Brian Schumacker, and Manuel Dos Santos accompanied the team and provided information on operations and maintenance history for each process area. The assessment findings are described below. The assessment resulted in recommendations for several rehabilitation and replacement (R&R) projects, which are documented in Table 4.1 at the end of this chapter.

4.1.1 Preliminary Treatment Facilities

1. The modulating gate at the Influent Junction Box is not being utilized due to concerns that the gate could become stuck in one position and no alarms would trigger. The status and alarm controls for this equipment are not currently connected to a plant PLC, and no path is available to install a conduit. Carollo recommends that the City install a short-distance radio transmitter and field input/output (I/O) to connect the modulating influent gate to PLC-1. This will require a 120V power supply for the radio transmitter.

2. Plant staff requested a bypass channel to allow wastewater to flow into the west bar screen bypass channel when bar screen 4 plugs from excess rags or grease. The bypass will prevent overflowing of the channel. A project is recommended to cut the bypass channel.

3. The rake for bar screen 4 moves slower than desired, contributing to backup during high flows. The bar screen manufacturer should be consulted to adjust the rake speed.

4. Hydrogen sulfide (H_2S) damage was observed in the headworks channels, and cracking was noted on the construction joint north of the flume. Concrete repair is recommended.

5. The screenings room interior surfaces have some corrosion, with paint peeling on the walls, ceiling, and floors. The floor is reported to not drain well. Significant corrosion was found on the anchors of the screenings conveyor and rag press, and the screenings ram is no longer anchored because the weld has rusted through. Recommended improvements include resurfacing the interior of the screenings room and to replacing the anchorages on the screenings conveyor and rag press.

6. The manual swing gates in the gravity grit chambers are heavily corroded and are missing the manual cranks. They are therefore left open at all times except annual maintenance, in which they are closed but leak heavily. The gravity grit chambers were resurfaced in the mid-1990s, but the epoxy coating is peeling off. The chain collectors and buckets on the gravity grit chambers were also corroded. Exposed reinforcement and corrosion damage were observed at the outfall channel structure. A project is recommended to replace the gravity grit chambers with a new vortex grit removal system.

7. There is a gap in the incline screw conveyor between the screw and housing that allows fine particles to fall back into the Gravity Grit Chamber. The screw compactor is in need of a zero speed switch. The City is advised to install liners on incline screw conveyors and to install a zero-speed switch on the shear pin of the grit classifier.

8. The Wemco grit slurry pumps for the vortex grit chambers are in good condition, but the legs on the support frame need to be widened to allow access for maintenance. No other issues were reported with the Vortex Grit Chambers and associated equipment.

4.1.2 Primary Treatment

1. Primary Clarifiers 1 and 2 were empty at the time of assessment. The team found localized failures of the paint on the feed well and sludge scrapers.

2. Plant staff identified the need for motorized operators at Flow Splitter 1 so that flows could be better controlled during wet weather. Currently an operator has to manually control the gates in the rain in order to carefully maximize flow through the primary clarifiers. A project is recommended to install motorized, modulating, SCADA-controlled valves at flow splitter No. 1 with ultrasonic level controller and set-point.

3. No deficiencies were found for the primary sludge and scum pumps. However, some corrosion was noted on the exterior of the piping flanges and valves.

4.1.3 Secondary Treatment

1. Aeration Basins 1 through 4 were out of service because of severe corrosion of the concrete structure and mechanical equipment. Exposed reinforcement was visible at the walkways. The air diffuser pipe coating has failed, and all wire and baffle plates are heavily corroded.

2. The outlet weir plates on Aeration Basins 5 and 6 were worn.

3. The gates at the return activated sludge (RAS) tower flow splitter box need to be motorized and automatically controlled to allow storing mixed liquor solids during peak wet weather flows.

4. Aeration Basins 8 and 9 have a temporary selector mixing system. The selector zones should be retrofitted to provide a permanent mixing system.

5. Blower building 1 has several cracks in the walls and seismic deficiencies. A long, horizontal crack was observed in the east wall, as well as minor deformities and cracks in the concrete masonry units. A project is recommended to perform a seismic upgrade on this building. The hot water system in the building needs to be equipped with sensors in order to indicate loss of water pressure within the pipes and increase control data.

6. The door trim on the RAS/WAS pump station is corroded. Coating as part of a plant-wide painting program is recommended.

4.1.4 Effluent Disinfection/Dechlorination

1. The Chlorine Contact Basins has shrinkage cracks in the slab near one interior wall. Minor concrete repairs are recommended. The coatings are failing on the gate frame, valves, and pumps at the influent end of the basin.

2. The coatings on the Wet Weather Pump Station pad and equipment are peeling and corrosion is evident on the unprotected surfaces. These defects should be addressed as part of a plant-wide coating program, which would involve conducting miscellaneous structural repairs and regularly re-applying epoxy coatings throughout plant.

3. The sodium hydroxide storage tank has interior delamination.

4. At the effluent pump station, there have been difficulties maintaining sufficient cooling in the variable frequency drive (VFD) room for all VFDs to operate. Since the site visit, staff has adjusted the temperature set point and the VFDs have been more reliable.

4.1.5 Solids Handling Facilities

1. All metal needs coating at the DAFTs. While generally performing well, a project is recommended to replace the DAFTs with a gravity belt thickener (GBT) due to their age/condition, significant energy consumption and odor potential. The GBTs would be housed inside a new building with odor control.

4.1.6 Digesters

A separate report on the digester evaluation is presented in the Digester Evaluation Technical Memorandum. The findings are summarized below.

1. Digesters 1 and 2 require retrofits or replacement to improve seismic reliability, improve operating efficiency, and to extend useful life. Digesters 1 and 2 were constructed in 1950 of prestressed concrete and have floating covers. Structural

improvements are necessary to ensure the integrity of the digesters during a seismic event. These improvements include re-wrapping of the pre-stressing steel wire to prevent overstressing during a seismic event, strengthening the wall to bottom slab connection to prevent sliding due to shear forces, and raising the wall elevation and providing a fixed cover to prevent sloshing during a seismic event. In addition to structural improvements, the mixing and heating systems are aged and need to be replaced to improve operating efficiency.

2. Digester 3 requires retrofits to improve static and seismic reliability, and improve operating efficiency. The tank is made of reinforced concrete. The circular reinforcing in the foundation slab is overstressed both at static and seismic loadings. Additional conventional reinforcing or post-tensioned rods can mitigate this condition. Structural improvements to improve seismic performance include increasing the digester wall height to provide the necessary freeboard during sloshing caused by a seismic event. Mechanical improvements include installation of a mechanical mixing system and upgrade of the heating system to improve operating efficiency.

3. The Digester 3 Heat Building is severely corroded, with air gaps visible between the walls and floor, which creates concern over keeping the controls dry. The MCC in this building is outdated and not well protected against the environment. The heat exchanger is insufficiently sized. This structure and all equipment contained within it should be replaced.

4. The boilers for Digesters 1 and 2 operate on thermostat control only, are not controlled by temperature in hot water loop or gas pressure. Automatic controls should be added.

5. Plant staff report the inability to maintain head on the sludge transfer sump pump. Installation of an eductor is recommended. The sludge storage tank is currently being recoated.

6. The housing for the cooling fans on the digester compressor motors is severely corroded and presents a safety issue. Given the small size of these motors, full replacement is recommended. The gas flare and orifice meter are presently undersized and should be replaced with larger models.

4.1.7 Plant Power and Support Systems

1. The 2,000 kW standby generator and switchgear and automatic transfer controls are obsolete, unreliable, and unsafe. Plant staff reports that the generator does not reliably start. The metal Standby Generator Building is deteriorated. Therefore, a project to construct a new building and replace all of the electrical equipment is strongly recommended as a high priority.

2. The normal and standby power feeds to Switchboard K-2 are in an overhead bus duct. The bus duct has already experienced multiple failures, and deflection of the support structure may be causing unacceptable levels of stress on bus duct joints. Plant staff is concerned about the integrity and reliability of the bus duct. A project is recommended to replace the elevated bus duct with conduit and cable or a cable bus system. This project should be given the highest priority.

3. Transformer K-1 is no longer used, meaning the load on Switchboard K-1 is being powered from Switchboards K and K-3 at all times. A project is recommended to replace Transformer K-1 or verify capacity of Switchboards K and K-3 and Transformers K and K-3 for carrying the load of Switchboard K-1.

4. Electrical equipment in the plant is not labeled to identify arc flash hazards or the required level of personal protective equipment (PPE) as required by California Electric Code (CEC) 110.16, NFPA 70E 130.3 and OSHA 1910-132(d). A comprehensive Arc Flash Hazard Analysis is recommended to improve plant safety.

5. The cogeneration engine lacks sufficient controls to automatically regulate power output. A project is recommended to install controls. In addition, install flow switch, suction and discharge pressure gauges on the cogeneration hot water pipes.

6. The SCADA terminals are not continuously attended, as operators are frequently performing tasks in other areas of the plant. The plant has had to install horns and beacons for some critical alarms to ensure that operators are able to respond when SCADA is not being monitored. Not all desired signals from the bar screens and associated equipment (such as gates) are reaching the SCADA system, due to the unavailability of sufficient wiring. A project is recommended to replace SCADA computers and software and to upgrade the existing SCADAlarm software or consider alternate alarm packages to allow text messaging of alarms to mobile phones and/or monitoring of certain system flows/levels via mobile phones.

7. Plant staff reports a loss of pressure in the 2-inch pipe bringing potable water to the Administration Building. This is believed to be due to interior corrosion in the pipe, which is of unknown age. A project is therefore recommended to replace the pipe.

4.1.8 Miscellaneous Projects

The following projects were identified during the condition assessment as deficiencies that should be addressed.

1. There is a lack of real-time flow data transmission from the effluent pump stations at San Francisco International Airport, Millbrae, and Burlingame. The North Bayside System Unit (NBSU) would be expected to fund these improvements, since the project improves the reliability and wet weather performance of all NBSU member

agencies. Options for improved flow monitoring and coordination between agencies should be explored.

2. The City needs to address fine sand entering the primary clarifiers from street sweeper loadings at the vactor facility.

3. A Stormwater pump station is needed at the west end of the WQCP site to contain runoff and send it to the head of the plant for treatment. Costs for this new pump station have been estimated at $620,000.

4.1.9 Recommended Projects

The projects that were recommended as a result of the visual condition assessment are presented in Table 4.1.

Table 4.1 Summary of Condition Assessment Findings
Facility Plan Update
South San Francisco/San Bruno WQCP

Process/Area	Installation Year	Condition	Cost for R&R project(1)	Comments	Recommended Action
Preliminary Treatment					
Screening	1991 and 1998	Fair	$61,000	Bypass channel needed. Screen 4 has rake speed issues. Screenings building needs interior resurfacing. Anchorage on screenings press corroded.	Cut a bypass channel. Adjust rake for Screen 4. Resurface screenings room. Replace anchorage on screenings conveyor and rag press. Install a short-distance radio transmitter and field I/O to connect the modulating influent gate to PLC-1.
Gravity Grit Chambers	1977	Fair	$1,775,000	Exposed reinforcement, corrosion damage.	Replace gravity grit chambers with vortex grit removal system. Install liners on incline screw conveyors. Install zero speed switch on shear pin of grit classifier.
Vortex Grit Chambers	1998	Good	-	Wemco pumps need new legs to ease service.	Relocate legs on Wemco grit slurry pumps associated with existing Vortex Grit Removal System.
Primary Treatment					
Primary Clarifiers	1998	Good	-	Mechanical components need recoating.	Minor concrete repair.
Primary Sludge Pump Station	1998	Good	-	Pumps run well. Some corrosion at flanges and valves.	Implement coating program.
Flow Split Structure No. 1	1998	Good	$131,000	Under wet weather conditions operators manually control gates to control flow to Primary Clarifiers.	Install motorized operators at Flow Splitter No. 1.
Chemical Feed System	1998		$66,000		Install new roof over chemical feed system
Secondary Treatment					
Aeration Basins 1-4	Modified as ABs in 1963	Poor	$0	Not in service. Exposed reinforcement. All weir and baffle plates heavily corroded.	Abandon.
Aeration Basins 5-7	1963	Fair	$830,000	Exposed reinforcement. Corrosion. Process modifications recommended.	Addition of selectors. Project described in Chapter 6, Wet Weather Flow Projects.
Aeration Basins 8-9	1998	Good	$177,000	No changes necessary to basin structures. Operations staff wants SCADA controlled operators on gates on RAS Tower Flow Splitter to allow storage of solids.	Automate RAS gate.
			$404,000	Have temporary mixing in the selector zone	Retrofit selector zone to provide a permanent mizing system.
Blower Building 1	1974	Poor	$420,000	Exterior cracks. Silencer coating failed. Seismically deficient drag strut. Large openings in east wall.	Perform seismic upgrade.
Blower Building 2	1998	Good	$550,000	Corrosion on exterior of door and window trim.	Implement coating program. Replace 1 blower with high speed turbo blower for energy efficiency.
Secondary Clarifiers	1973 and 1998	Fair	-	Exposed reinforcement. Poor coating.	Implement coating program.
RAS/WAS Pump Station	1973	Good	-	Corrosion on exterior door and window trim.	Implement coating program.
Secondary Effluent Storage	1998	Good	$0	Liner in good condition.	None.
Wet Weather Pump Station	1998	Fair	-	Corroded. Needs recoating.	Implement coating program.

Table 4.1 Summary of Condition Assessment Findings
Facility Plan Update
South San Francisco/San Bruno WQCP

Process/Area	Installation Year	Condition	Cost for R&R project(1)	Comments	Recommended Action
Effluent Disinfection/Dechlorination					
Chlorine Contact Basins	1998	Good	-	Shrinkage cracks in slab near interior wall. Coating failure on gate frame, valves, and pumps at influent.	Minor concrete repair. Implement coating program.
Sodium Hypochlorite Facility	1998	Good	-	Interior delamination of storage tank.	Implement coating program.
Sodium Bisulfite Facility	1998	Good	$0	No issues noted.	None.
Effluent Pump Station	Modified in 1998	Good	-		None.
Solids Handling					
Dissolved Air Flotation Thickeners	Converted to DAFTs in 1991 and 1998, original structure built in 1963	Fair	$4,796,000	All metal needs coating.	Consider replacing DAFs with GBT/alternative and provide odor control.
Digesters 1-3	Digesters 1 and 2 in 1950 and No. 3 in 1973	Poor	$11,400,000	Digester 3 Heat Building needs replacement. Rehabilitate or replace Digesters 1-3.	Replace Digesters 1 and 2. Rehabilitate Digester 3. Replace Digester 3 Heat Building.
Digesters 4-5	1998	Good	$0	No issues noted.	None.
Waste Gas Flare	1973	Fair	$72,000	Digester gas compression pumps severely corroded.	Replace digester gas compression motors.
Sludge Storage Tank	1998	Good	$0	Currently being recoated.	None.
Belt Filter Press Dewatering	1998	Good	$0	No issues noted.	None.
Plant Power and Support Systems					
Switchgear and Generator Building	1998	Good	$0	No issues noted.	None.
Standby Generator Building	1973	Poor	$3,135,000	All equipment and building needs replacement.	Replace 2000 kW generator and switchgear, construct new generator building.
Elevated bus duct	1973	Poor	$1,927,000	Unacceptable levels of stress on bus duct joints carrying normal and standby power feed to Switchboard K-2.	Replace elevated bus duct with alternate. Perform arc flash study.
Plant Hot Water System	1973	Fair	$10,000	Need suction and discharge pressure tied into SCADA.	Install suction and discharge pressure gauges with transmitters to SCADA.
Potable Water line to Administrative Building	1950	Fair	$68,000	2” pipe carrying potable water to Administrative Building needs replacement.	Replace potable water pipe to administrative building.
Plant SCADA System	1998	Fair	$100,000	Due for upgrade.	Upgrade SCADA server.
Maintenance Building	1998	Good	$55,000	A staircase to the roof is required.	Provide staircase to the roof.
Administration Building	1950	Fair	$68,000	Building is aging.	None.

Note:
(1) When an individual project is part of a larger program, the cost of the individual project is shown as “-“. For example, the cost of coating each component for corrosion protection is grouped under a plant-wide coating program.

REGULATORY REQUIREMENTS

The purpose of this chapter is to review the existing discharge permit requirements and consider potential future regulatory requirements that may affect the WQCP discharge to the San Francisco Bay. This chapter also addresses regulatory considerations for future discharges to Colma Creek.

5.1 SUMMARY OF EXISTING NPDES PERMIT

The WQCP has a National Pollutant Discharge Elimination System (NPDES) permit adopted November 12, 2008 that regulates the WQCP's effluent discharges: NPDES Permit No. CA0038130/WDR Order No. R2 2008-0094 (Appendix E).

The WQCP is a member of the North Bayside System Unit (NBSU), a joint powers authority that also includes the Cities of Burlingame, Millbrae and the San Francisco International Airport. The WQCP has an allocation of up to 35 mgd capacity (for wet weather) in the NBSU outfall. Treated effluent from the WQCP enters the NBSU force main, combines with treated effluent from other NBSU users, and is discharged through a submerged diffuser to the Lower San Francisco Bay. The NBSU discharge is considered a deep water discharge and each discharger (member) is allocated a dilution credit of at least 10:1 (San Francisco Bay Basin Water Quality Control Plan, 2007, Section 4.6.1.)

In the past, during extreme wet weather events, the WQCP has discharged disinfected secondary effluent to Colma Creek as a near shore discharge, and blended disinfected primary and secondary effluent to the San Francisco Bay through the NBSU outfall. The 2008 NPDES permit states that nearshore discharges to Colma Creek are prohibited, and the WQCP should minimize blending its primary and secondary effluent to discharge to the Bay. Chapter 6, Wet Weather Flow Projects discusses the steps required by the WQCP to meet the 2008 permit requirements.

The following sections summarize the City's discharge permit requirements.

5.1.1 Existing Permit Effluent Limits

Table 5.1 summarizes the current NPDES Permit effluent limitations. In addition to the limits in the table, the average monthly removal must be at least 85 percent for biochemical oxygen demand (BOD) and total suspended solids (TSS). For fecal coliform bacteria, the geometric mean value for the last five samples analyzed within a 30-day period shall not exceed 200 MPN/100 ml, and the 90th percentile of the last ten samples collected within a 30-day period shall not exceed 400 MPN/100 mL. The permit also contains limits for acute and chronic toxicity.

Table 5.1 Effluent Limits in 2008 NPDES Permit
Facility Plan Update
South San Francisco/San Bruno WQCP

Constituent	Units	Monthly Average	Weekly Average	Daily Maximum	Instantaneous Maximum	Range
BOD	mg/L	30	40	-	–	–
Oil and Grease	mg/L	10	-	20	–	–
pH	-	–		–	–	6.5 - 8.5
Total Suspended Solids (TSS)	mg/L	20	45	-	–	–
Chlorine Residual	mg/L	–	-	–	0.0(1)	–
Copper(2)	µg/L	55	-	69	-	–
Nickel	µg/L	31	-	68	-	–
Cyanide	µg/L	20	-	43	–	-
Dioxin-TEQ	µg/L	1.4×10^{-8}	-	2.8×10^{-8}	–	–
Benzo(k)fluoranthene	µg/L	0.48	-	2.1	–	–
Bis(2-ethylhexyl)phthalate	µg/L	58	-	117		
Chrysene	µg/L	0.48	-	0.96	–	–
Dibenzo(a,h)anthracene	µg/L	0.49	-	0.98	–	–
Indeno(1,2,3-cd)pyrene)	µg/L	0.48	-	0.96	–	–
Alpha-BHC	µg/L	0.13	-	0.26	–	–
4,4'-DDD	µg/L	0.00084	-	0.0017	–	–
Tributyltin	µg/L	0.045	-	0.095		
Ammonia	mg/L N	110		230		
Fecal coliform	µg/L	–	-	0.05	–	–
Enterococcus	Colonies /100 mL	35	-	–	-	–

Notes:
(1) This requirement is defined as below the limit of detection in standard test methods as defined in the latest edition of *Standard Methods for the Examination of Water and Wastewater.*
(2) Based on site-specific copper objectives in the San Francisco Bay (Basin Plan Amendment, January 2009)

Mercury is now controlled by the San Francisco Bay Mercury Watershed Permit (Watershed Permit) (CA0038849) that sets effluent limits for all the dischargers to the San Francisco Bay and its tributaries. The mercury limits are 0.066 μg/L as a monthly average and 0.072 μg/L as a weekly average.

When the NPDES permit was issued in 2008, the WQCP was not immediately able to comply with the dioxin-TEQ limit and was issued interim effluent limits. In February 2010, a blanket permit amendment for dioxin and furan compounds was issued for dischargers in the San Francisco Bay area (Order No. R2-2010-0054). The main impact of this amendment is to change how dioxin-TEQ is calculated. With this new method, all San Francisco Bay dischargers, including the WQCP will be in compliance with their dioxin-TEQ permit limits.

5.1.2 Other Permit Provisions

Other provisions in the permit include the following:

- Monitoring and reporting of selected constituents.
- Participate in an ambient background receiving water study.
- Investigation of mass offset programs for 303(d)-listed pollutants.
- Pollution prevention/minimization program and reporting.
- Evaluation and status reports for wastewater facilities, operations and maintenance and contingency plans.
- Implementation and enforcement of a pretreatment program.
- Appropriate management of sludge.
- Implementation of a management plan to prevent sanitary sewer overflows.
- Implementation of action plans to control copper and cyanide discharges.

5.1.3 Wet Weather Discharges

During wet weather conditions that exceed the secondary capacity of 30 mgd (yet remain under the effluent pumping capacity of 35 mgd), the WQCP discharges blended primary and secondary effluent to the NBSU outfall and subsequently to the Bay. The bypassed discharge must comply with effluent and receiving water limits. In general, bypasses are prohibited under the Federal Clean Water Act; however, the WQCP's bypass is permitted while the City performs the following corrective measures to minimize blending:

- Submit a technical report that evaluates wet weather conveyance and treatment plant improvement alternatives.
- Prepare a workplan to implement the preferred alternatives.
- Implement preferred alternative and file annual updates on progress.
- Complete a “No Feasible Alternatives” Analysis if the City needs to continue bypassing.

During wet weather events when the final effluent exceeds the City's available effluent pumping capacity (35 mgd) in the NBSU pump station, secondary effluent flows are diverted to a wet weather storage basin of 7 mg capacity and disinfected primary effluent is sent to NBSU, and subsequently, the Bay. If the secondary effluent storage basin fills up and flows remain above 35 mgd, the secondary effluent is discharged to Colma Creek via a near shore outfall. The permit requires progressing towards an elimination of this near shore discharge to Colma Creek.

The permit contains the following measures to eliminate the use of the nearshore outfall:

- Implement alternatives in “No Feasible Alternatives Analysis” submitted August 26, 2008. At a minimum this should include using the effluent storage pond as needed during wet weather events.
- Investigate the conditions under which the discharges have occurred. Identify alternatives to eliminate the use of the outfall.
- Submit proposal to monitor Colma Creek during wet weather months.
- Implement the preferred alternatives and monitoring program, and submit annual progress reports.

5.2 COLMA CREEK DISCHARGES

This section describes the historical discharges to Colma Creek and reviews the regulatory requirements to obtain a permit to discharge to Colma Creek under extreme wet weather flow conditions.

5.2.1 Effluent Discharges to Colma Creek

Table 5.2 summarizes historical Colma Creek discharges from 2002 to 2009. An effluent storage basin with a volume of 7 mg was added to the WQCP in 2005. Following addition of this storage, only one incidence of wet-weather discharge to Colma Creek was reported. This discharge occurred during a storm that produced approximately 3.3 inches of rainfall over a 24 hour period, corresponding to greater than a 10-year, 6 hour storm.

The United States Geologic Survey (USGS) monitored flow in Colma Creek at a flow monitoring gauge located at Orange Memorial Park from October 1963 to November 1996. As seen from Figure 5.1, this monitoring station is located well upstream of the WQCP Colma Creek discharge location, and several known stormwater discharges. Thus, the flow measured at this flow gauge is lower than the creek flow at the WQCP discharge point.

Analysis of NOAA data for Station 47769 (San Francisco International Airport) between 1948 to 2009 shows that each of the Colma Creek discharge events corresponded to extreme wet weather periods observed in the South San Francisco area.

Table 5.2 Summary of Historical Discharges to Colma Creek
Facility Plan Update
South San Francisco/San Bruno WQCP

Date	Pond Volume Stored (MG)(1)	Peak Effluent Flow (mgd)	Rainfall for 24 hr period (inches)	Volume (gallons)(2)	Duration (min)(3)	Flow Rate (mgd)(4)
11/08/2002	N/A	69	1.58	30,645	20	2.21
12/13/2002	N/A	73	2.47	16,000	20	1.15
12/13/2002	N/A	69	2.47	335,778	362	1.34
12/14/2002	N/A	72	0.88	162,134	76	3.07
12/16/2002	N/A	69	2.1	1,222,955	337	5.23
02/15/2005	N/A	66	1.91	1,100,000	70	22.63
01/25/2008	7.0	66	3.3	1,540,000	340	6.52

Notes:
(1) N/A = Not Applicable (Pond became operational in October 2005).
(2) Volume of discharge to Colma Creek.
(3) Duration of discharge to Colma Creek.
(4) Flow rate of discharge to Colma Creek = volume/duration.

Comparison of the historical rainfall data with Colma Creek flow shows that measured high flow in the creek corresponds to high rainfall events. A trend line was developed from the measured data and the expected streamflow was forecast for rain events. Table 5.3 summarizes the expected streamflow rate in Colma Creek for the various storm events. This information is also illustrated in Figure 5.2.

As noted previously, these flow estimates are conservative as the flow gauge was located well upstream of the discharge location. Actual flows at the Colma Creek discharge location will be higher.

Figure 5.3 compares the expected flow rate in Colma Creek (based on rainfall events) to the Colma Creek historical discharge events. As seen from the figure, in all cases, including those prior to the construction of the additional storage, a 10 to 1 dilution of the discharge flows was exceeded.

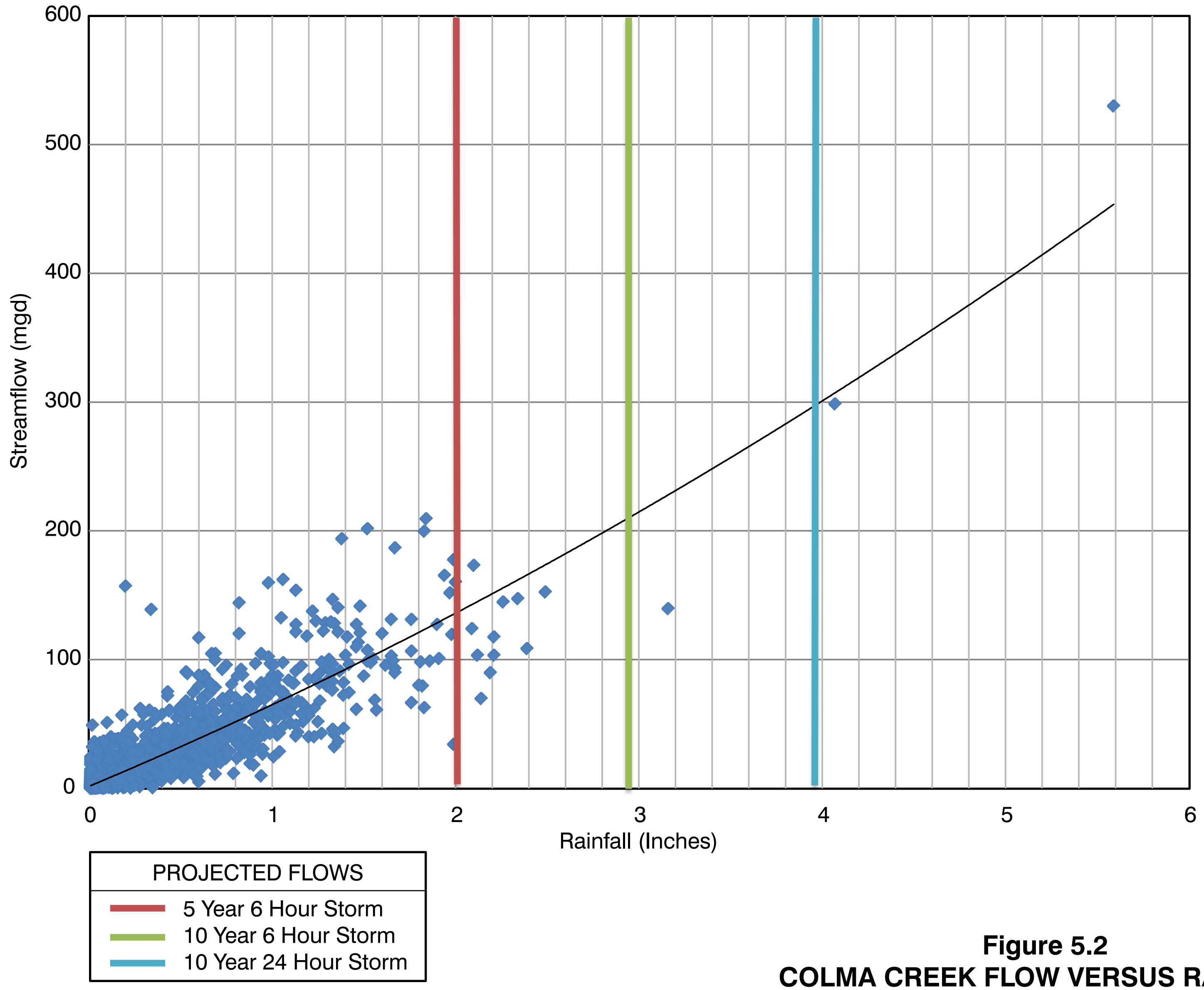
5.2.2 Future Colma Creek Discharges

An alternative to the elimination of near shore discharge is obtaining a permit to continue discharge of secondary effluent to Colma Creek. The water quality objectives required for continued near-shore discharge is dependent upon existing Colma Creek water quality and the beneficial uses of the Creek. The Clean Water Act and the San Francisco Bay Basin Water Quality Control Plan (Basin Plan) serve as a guide for water quality objectives for Colma Creek.

LEGEND

- WQCP
- USGS Flow Monitor Location (1964-1996)
- Colma Creek Discharge Location

Figure 5.1
LOCATION OF USGS FLOW MONITOR
FOR COLMA CREEK
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP



Note: Equation of stream flow as it relates to rainfall is "$y = 3.7966x^2 + 59.654x + 1.5$" with an $R^2 = 0.7661$.

Figure 5.2
COLMA CREEK FLOW VERSUS RAINFALL
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

ssf310f13-8376.ai

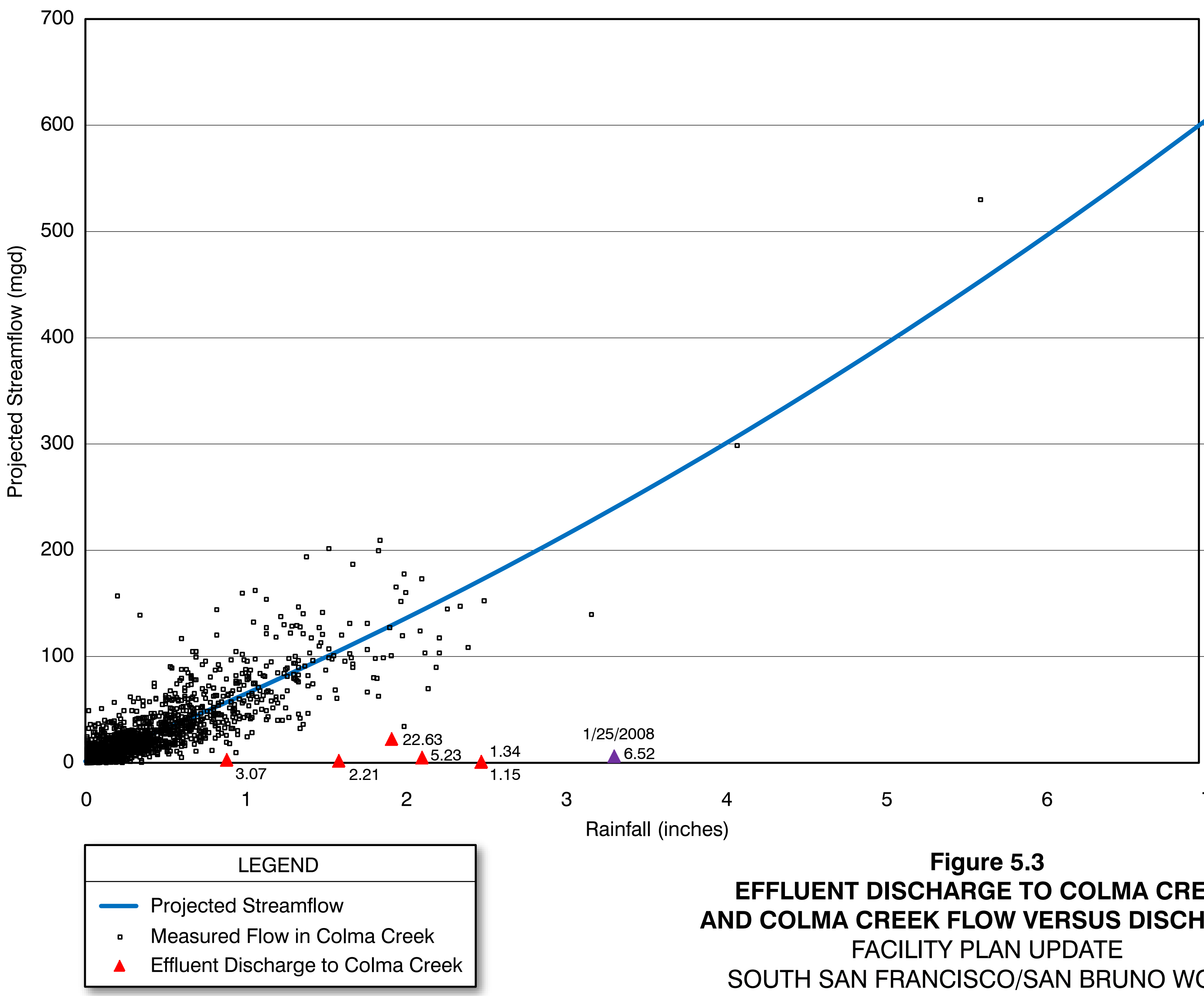


Figure 5.3
EFFLUENT DISCHARGE TO COLMA CREEK AND COLMA CREEK FLOW VERSUS DISCHARGE
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

ssf310f14-8376.ai

Table 5.3	Expected Streamflow in Colma Creek During Wet Weather Conditions Facility Plan Update South San Francisco/San Bruno WQCP		
Wet Weather Event	**Rainfall over 24 hours**	**Colma Creek Flow (mgd)**	**Colma Creek Flow (cfs)**
5-year, 6-hour	2.00 inches	162	250
10-year, 6-hour	2.95 inches	259	400
10-year, 24-hour	4.00 inches	355	550

Section 303(d) of the Clean Water Act requires states, territories, and authorized tribes to develop a list of water quality limited segments. Neither Colma Creek nor any neighboring water bodies are listed in the State Water Resources Control Board (SWRCB) Region 2 – San Francisco Bay list of impaired water bodies.

Beneficial uses of surface waters, groundwaters, marshes, and mudflats presented in the San Francisco Bay Basin Water Quality Control Plan (Basin Plan) serve as a basis for establishing accepted beneficial use, water quality objectives, and discharge prohibitions. Neither Colma Creek nor any neighboring water bodies that drain east to the San Francisco Bay are listed in the 2007 Basin Plan for beneficial use criteria. However, an amendment to the Basin Plan released in July 2010 does list beneficial uses for Colma Creek and neighboring water bodies.

Figure 5.4 presents the water bodies with beneficial use in the vicinity identified in the Basin Plan Amendment (2010). The amendment identifies beneficial use for Colma Creek as outlined in Table 5.4. The amendment to the Basin Plan includes contact recreation as an existing beneficial use for Colma Creek.

As stated in the Basin Plan, the overall goals of water quality regulation are to protect and maintain thriving aquatic ecosystems and the resources those systems provide to society and to accomplish these in an economically and socially sound manner. The Regional Board establishes and enforces waste discharge requirements for point and nonpoint source of pollutants at levels necessary to meet numerical and narrative water quality objectives. In setting waste discharge requirements, the Regional Board considers among other things, the potential impact on beneficial uses within the area of influence of the discharge, the existing quality of receiving waters, and the appropriate water quality objectives.

The discharge to Colma Creek is a shallow submerged discharge. Typically in shallow water submerged discharges, surface discharges, and nonbuoyant discharges, turbulent mixing results primarily from the momentum of discharge. The Basin Plan states that in these cases initial dilution is considered to be completed when the momentum-induced velocity of the discharge ceases to produce significant mixing of the waste, or the diluting

Figure 5.4
WATER BODIES IDENTIFIED IN THE
2010 AMENDMENT TO THE BASIN PLAN
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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Table 5.4 Basin Plan Beneficial Uses for Colma Creek
Facility Plan Update
South San Francisco/San Bruno WQCP

Agricultural Supply	Municipal Supply	Freshwater Supply	Groundwater Recharge	Industrial Supply	Process Supply	Commercial Fishing	Shellfish Harvesting	Cold Habitat	Estuarine Habitat	Marine	Fish Migration	Rare Species	Fish Spawning	Warm	Wildlife Habitat	Water Contact (REC-1)	Non-Contact Recreation (REC-2)	Navigation
														E	E	E	E	

Notes:
(1) E = Existing Beneficial Use and P = Potential Beneficial Use.
(2) Source: 2010 Basin Plan Amendment (July 2010).

plume reaches a fixed distance from the discharge to be specified by the Regional Board, whichever results in the lower estimate for initial dilution. The water quality objectives for continued near shore discharge is therefore dependent on impacts of the blended discharge from the WQCP to Colma Creek in extreme wet weather events. Table 5.5 summarizes the key objectives for all surface waters except the Pacific Ocean.

5.3 FUTURE REGULATORY SCENARIOS

This section provides insight into the future regulatory considerations that may impact the WQCP's discharges, air emissions, and biosolids production and disposal over the course of the 30-year planning horizon. Because regulatory compliance is a major objective of the Facility Plan Update, identifying future regulatory trends is a key component in developing alternatives and scenarios, allowing and planning for major design and budgeting considerations. For example, identification of future pollutants of concern (POCs), such as metals, nutrients, and/or pathogens, allows for the Facility Plan options and alternatives to consider flexibility to add treatment solutions that address these concerns (such as allowing space in the site layout for membrane filtration, advanced oxidation, or alternate disinfection methods).

5.3.1 Approach to Development of Regulatory Scenarios

The development of regulatory scenarios for the Master Plan is based on several factors:

- Other waste discharge requirements (WDRs) issued to dischargers in the San Francisco Bay area and California.
- Pending regulations.
- Discussions with regulators.

Table 5.5 Water Quality Objectives Parameters for All Surface Waters
Facility Plan Update
South San Francisco/San Bruno WQCP

Bacteria	Numeric objective, see Table 6.4 in Chapter 6, Wet Weather Flow Projects.
Bioaccumulation	Controllable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life.
Biostimulatory Substances	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.
Color	Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.
Dissolved Oxygen	Numeric objective, see Table 6.5 in Chapter 6, Wet Weather Flow Projects.
Floating Material	Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.
Oil and Grease	Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.
Population and Community Ecology	All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce significant alterations in population or community ecology or receiving water biota.
pH	Numeric objective, see Table 6.5 in Chapter 6, Wet Weather Flow Projects.
Radioactivity	Radionuclides shall not be present in concentrations that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life.
Salinity	Controllable water quality factors shall not increase the total dissolved solids or salinity of waters of the state so as to adversely affect beneficial uses, particularly fish migration and estuarine habitat.
Sediment	The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.
Settleable Material	Waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses.
Suspended Material	Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.
Sulfide	All water shall be free from dissolved sulfide concentrations above natural background levels.

Table 5.5 Water Quality Objectives Parameters for All Surface Waters Facility Plan Update South San Francisco/San Bruno WQCP	
Taste and Odors	Waters shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin, that cause nuisance, or that adversely affect beneficial uses.
Temperature	Temperature objectives for enclosed bays and estuaries are as specified in the "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays of California," including any revisions to the plan. In addition, the temperature of any cold or warm freshwater habitat shall not be increased by more than 5°F (2.8°C) above natural receiving water temperature.
Toxicity	All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms.
Turbidity	Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses.
Note: (1) Source: 2007 Basin Plan and 2010 Proposed Amendment.	

- Examination of growth and other non-regulatory developments that may affect areas where the WQCP is currently in compliance.

These factors provide a basis for decision-making on regulatory issues to meet the needs of the WQCP through the planning horizon in 2040.

5.3.2 Regulatory Trends

The following review of current environmental issues and upcoming regulatory developments describes the overall anticipated trends that are important considerations in the planning process for future wastewater facilities at the WQCP.

5.3.2.1 Cross-Media Impacts

The interconnection of regulations between various areas related to wastewater is an important consideration. Recently representatives from various air districts, Regional Water Quality Control Boards (RWQCBs), Caltrans, and the Environmental Protection Agency (EPA) came to an agreement to develop a cross-media checklist for use during the development of regulations. California Association of Sanitation Agencies (CASA) is coordinating the efforts to develop the checklist, as a result of the May 16, 2008 Biosolids Cross-Media Roundtable. The components of the cross-media checklist include biosolids, compost processing, recycled water, California Assembly Bill 32 (AB32) (regulating greenhouse gas (GHG) emissions), California Environmental Quality Act (CEQA), regulatory processes, development of Water Quality Control Plans (Basin Plans) and water quality standards/ regulations, and impact assessments to air, water, and land media.

Figure 5.5 shows the key wastewater components and their corresponding regulatory issues.

5.3.2.2 Increasing Regulation of Microconstituents and Bioaccumulative Constituents

There is a trend towards increasing regulation of some inorganic constituents (e.g., ammonia), emerging microconstituents (e.g., pharmaceuticals, personal care products, hormones, and other endocrine disrupting compounds and nano-materials), and bioaccumulative pollutants (e.g. mercury, polychlorinated biphenyls (PCBs), and dioxins) in treated effluent discharges. Monitoring requirements for these trace pollutants are increasing, including requirements to analyze constituents at lower detection limits. Over the 30-year horizon of the Facility Plan, it is likely that new effluent limits will be added to permits. End-of-pipe requirements, with no dilution allowance, will likely continue to be required for bioaccumulative pollutants to the San Francisco Bay.

Planning efforts should consider options and alternatives that minimize the sources of these pollutants and remove them from the influent wastewater through increased source control and pollution prevention programs, where practicable. However, many of these compounds of emerging concern are ubiquitous, such as those found in pharmaceuticals and personal care products (PPCPs), and will be difficult to control at the source. The WQCP should work with legislature and industry representatives to reduce or restrict the use of certain products where feasible, and continue public outreach efforts to discourage improper disposal of consumer products.

Current pollution prevention efforts for mercury, PCBs, and dioxins may be close to the maximum extent practicable (MEP) for the service area of the WQCP. While more aggressive inspection and additional pretreatment requirements on dental facilities to reduce mercury may be possible, it is expected that eventual replacement of mercury amalgam with superior substitutes may render additional controls unnecessary.

5.3.2.3 Increasing Concern Over Nutrient Impacts in the San Francisco Bay

There is an ongoing controversy concerning the impacts of nutrient loadings to San Francisco Bay, which are not fully understood. Although the impacts of nutrient loadings to the San Francisco Bay, including loadings from wastewater treatment plant effluents, are not fully characterized, it is known that nutrients do play a key role in the phytoplankton ecology of the San Francisco Bay. Currently, there are information gaps about how the productivity rates of phytoplankton affect the higher organisms in the San Francisco Bay food webs, and how nitrogen and phosphorus loadings affect the San Francisco Bay's beneficial uses. Additionally, there is some evidence that the San Francisco Bay, which has historically been light-limited, is becoming nutrient-limited, and is therefore at risk of algae

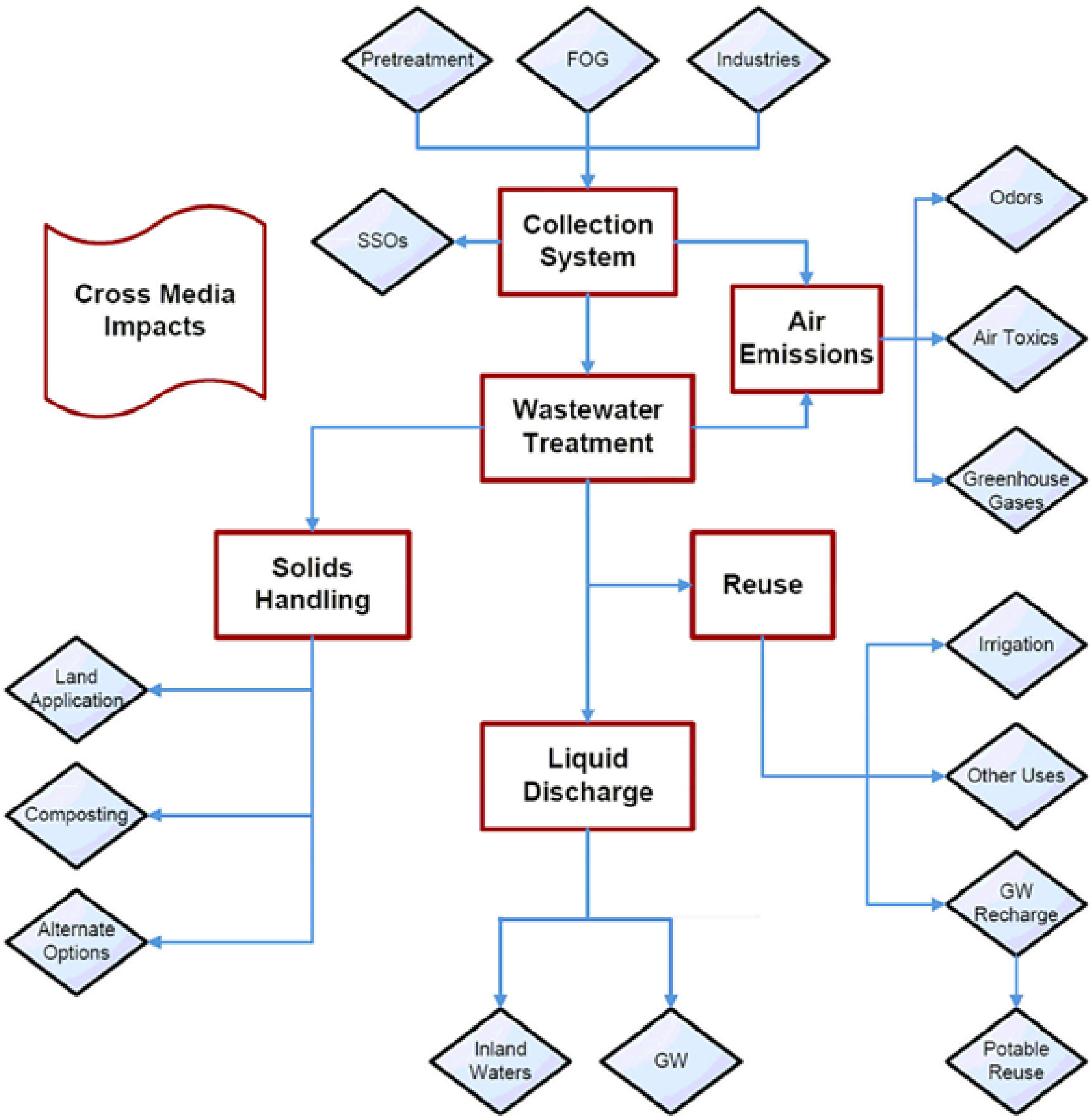

Figure 5.5
CROSS-MEDIA IMPACTS:
KEY WASTEWATER REGULATORY ISSUES
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

blooms. If future research shows that nutrient loadings need to be reduced in the San Francisco Bay, water quality standards may be developed. In the current NPDES permit, the WQCP is given an effluent limit for ammonia, but not total nitrogen or phosphorus.

In November 2007, the National Resources Defense Council (NRDC) filed a petition with the EPA to require that nutrient removal be included in the definition of secondary treatment. The petition stated that “there are many [biological processes] which can achieve total phosphorus levels of 1.0 milligrams per liter (mg/L) as a monthly average, and a total nitrogen of 6 to 8 mg/L as an annual average” (National Resources Defense Council, 2007).

The State of Florida has become the initial focus of efforts by environmental groups to force development by EPA of federal numeric nutrient criteria, to be imposed on the states. EPA has agreed to a consent decree in the environmental suit, and has made a determination that numeric nutrient standards are necessary in Florida. Proposed criteria for total nitrogen and total phosphorus were released in January, 2010. This action is possibly precedential, and may result in environmental groups suing the EPA to impose nutrient criteria in other areas of the country.

If the EPA changes the definition of secondary treatment or imposes nutrient criteria in California, the WPCP would likely need to implement nutrient removal. Also, the Facility Plan would need to consider ways to meet a potential future phosphorus limit. However, before doing so, the WQCP would be well served by a meaningful discussion with the RWQCB over the lack of nutrient impairment in receiving waters, and the fact that phosphorus removal can have substantial impacts on energy, greenhouse gases, and production of sludge from chemical coprecipitation.

5.3.3 Increasing Demand for Recycled Water

The 2009 State Recycled Water Policy was developed to create a uniform regulatory environment for facilities permitting for recycled water projects. It contains provisions to help streamline recycled water permitting, but also requires the development of a Salt and Nutrient Management Plans (Management Plans) for every sub basin in California. These Management Plans will be developed by local stakeholders and funded by the regulated community, so the City can choose to take this opportunity to steer the direction of recycled water regulations in the local area.

Increased water recycling will be driven both by water scarcity and by regulatory pressure. Maximizing water recycling will help the WQCP reduce loading to the South San Francisco Bay, and help meet mass-based and load-based effluent limits.

The City of South San Francisco is considering implementing a recycled water project to serve local users. Tertiary facilities, including filters and disinfection, may be constructed at the WQCP to produce recycled water. Space should be reserved for these facilities. Figure 5.6 shows the potential location of recycled water facilities at the WQCP.

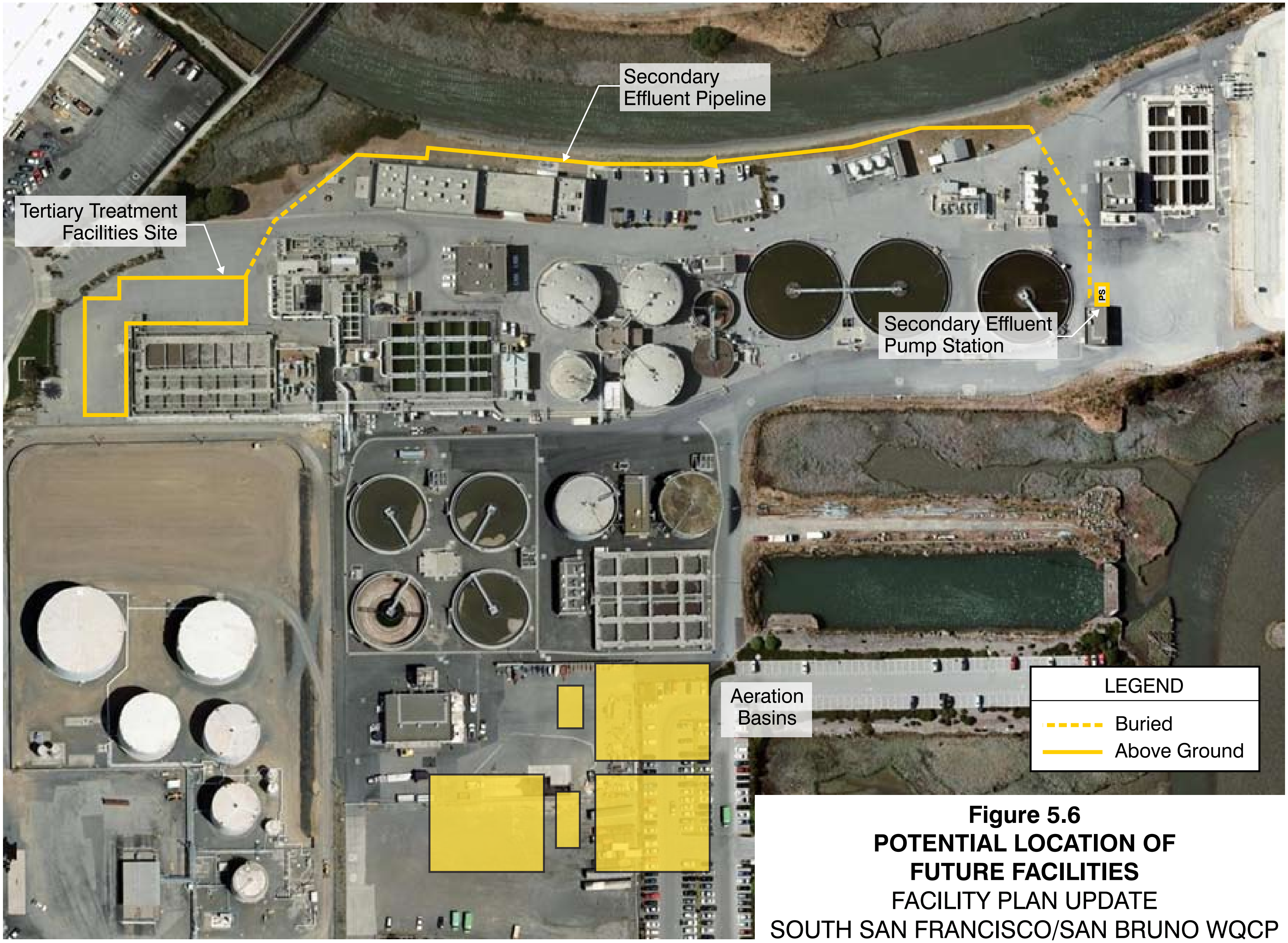

Figure 5.6
POTENTIAL LOCATION OF FUTURE FACILITIES
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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5.3.4 Increasing Regulations on the Land Application and Disposal of Biosolids

Reuse or disposal of biosolids is becoming progressively difficult in California. Land application of biosolids is becoming increasingly restricted by California counties, and fewer landfills are accepting biosolids. Counties that have banned, or practically banned, all biosolids applications include Shasta, Lassen, Glenn, Yuba, Lake Sutter, Contra Costa, San Joaquin, Stanislaus, Madera, Santa Cruz, Monterey, San Benito, Tulare, San Bernardino, and Imperial. Other counties, such as Fresno, Kings, Kern, and Riverside have passed ordinances banning land application of Class B biosolids. At the present time, San Mateo County allows the land application of biosolids.

To comply with possible future restrictions, the planning process will need to consider alternative biosolids reuse scenarios that are cost effective and will operate within the existing WQCP facilities.

5.3.5 Regulations on the Emissions of Greenhouse Gases

The State of California adopted the Global Warming Solutions Act of 2006 (AB 32) in September of 2006. AB 32 is the first regulatory program in the US that requires public and private agencies statewide to reduce GHG emissions to 1990 levels by 2020 and 80 percent below 1990 levels by 2050. Currently, there is no direct mandate on publicly owned treatment works (POTWs). However, in addition to a list of specific sectors, CARB's Proposed Scoping Plan (released in October 2008) listed two thresholds by which agencies (including POTWs) are to check if they are required to report their GHG emissions to CARB. The reporting thresholds for years 2011 and beyond are:

- Threshold 1: If an agency's electricity generating unit(s) emits over 10,000 metric tons of CO_2 equivalent emissions.
- Threshold 2: If an agency emits over 10,000 metric tons of CO_2 equivalent emissions from its general stationary combustion units.

Pursuant to AB 32, GHG evaluations for the WQCP will be based on the Madatory Reporting of GHG Emissions: Instructional Guidance for Operators which follows The Climate Registry General Reporting Protocol (TCRGRP). The TCRGRP a set of measuring standards and protocols aligned with the international Greenhouse Gas Protocol Initiative and adapted to California. AB 32 recommends using the TCRGRP "where appropriate and to the maximum extent feasible."

5.3.6 Air Emissions Regulations

The WQCP is subject to the regulations of the Bay Area Air Quality Management District (BAAQMD). Emissions limitations throughout the state have gotten more stringent through the last decade. In the past, the BAAQMD has tightened emission regulations similarly to follow the lead of the South Coast Air Quality Management District (SCAQMD) in southern California. Historically, regulations adopted in SCAQMD become adopted by BAAQMD in the following years. Recently, SCAQMD amended Rule 1110.2 - Emissions from Gaseous and Liquid-Fueled Engines. The Rule was amended to ensure emission compliance and provide documentation for combustion engines, through use of continuous emission monitoring systems (CEMS) or inspection and monitoring programs. The amended rule also established new long-term emission requirements. The SCAQMD regulations which currently apply to the engine generators are indicated in Table 5.6. These regulations require that all engine generators meet the state of California's CARB '07 emission requirements for all units. Digester gas fueled equipment is no longer being granted higher emission limits.

Table 5.6 SCAQMD Emission Standards for Internal Combustion Engines
Facility Plan Update
South San Francisco/San Bruno WQCP

Engine Size	NO_x (ppm)(1)	VOC (ppm)(1)(2)	CO (ppm)(1)
Rule 1110.2 - Current Standards			
Greater than or equal to 500 bhp	36	250	2,000
Between 50 and 500 bhp	45	250	2,000
Effective July 1, 2010			
Greater than or equal to 500 bhp	11	30	250
Between 50 and 500 bhp	45	250	2,000
Effective July 1, 2011			
All sizes	11	30	250

Notes:
(1) Corrected to 15% oxygen on a dry basis and averaged over 15 minutes.
(2) Measured as methane.

For comparison, current BAAQMD emission regulations for engines powered by waste derived fuels are as shown in Table 5.7.

Table 5.7 BAAQMD Emission Standards for Internal Combustion Engines
Facility Plan Update
South San Francisco/San Bruno WQCP

Engine	NO_x (ppm)(1)	CO (ppm)(1)
Rule 1110.2 - Current Standards		
Lean Burn Engines	210	2,000
Rich Burn Engines	140	2,000
Effective January 1, 2012		
All	70	2,000

Note:
(1) Corrected to 15% oxygen on a dry basis and averaged over 15 minutes.

In addition to the above listed limits, new equipment must meet Best Available Control Technology (BACT). In 2008, BAAQMD required a new landfill gas unit to meet 0.55 g/bhp-hr NO_x and 2.1 g/bhp-hr CO requirements. This required the use of CO catalysts and is practically the lowest levels that can be met for NO_x without the use of Selective Catalytic Reduction (SCR). As projects demonstrate lower levels elsewhere in the state, BACT levels are also lowered. It is reasonable to assume that in coming years BACT will be identical to the levels currently required by SCAQMD.

Fuel cell emissions are currently significantly lower than CARB ’07 requirements and as such, there are no limits on emissions in any air district; nor are any limits expected in the planning time frame for this project.

5.3.7 Pollutants of Long-Term Concern

Through the planning horizon of 2040, the WQCP will consider many strategies to deal with emerging regulations. At this level of planning, it makes sense to review groups of similar contaminants, rather than individual constituents, to determine ways to control their discharge.

Nutrients - Nitrogen is the nutrient constituent that could potentially cause the greatest problem for the WQCP discharge. For nitrification and denitrification at the WQCP, an aeration basin of 2 to 3 times the current capacity would be required. The WQCP is space-constrained, therefore the WQCP may need to consider membrane bio reactors if nitrification/denitrification is required by the Regional Board. Additionally, if further nutrient reduction requirements are implemented, the WQCP may have to implement phosphorus removal. While it is possible that neither of these measures will be necessary, they are both considerations for the planning process. Figure 5.6 shows a plant layout for additional aeration basins required for nutrient removal.

Metals - There is no single treatment method that will remove all of the metals of concern. Improving solids removal through chemical addition and more advanced tertiary treatment, such as microfiltration, could help reduce the concentrations of most metals.

Bioaccumulative Organic Compounds - These constituents pose problems because they are typically present at several orders of magnitude higher than criteria. Decreased discharge through increased water recycling will help reduce the loading of bioaccumulative compounds to the South San Francisco Bay. Improved solids removal through chemical addition and more advanced tertiary treatment such as microfiltration will minimize their concentrations in the discharge. However, it is unlikely that any treatment facility will be able to meet criteria levels for constituents such as PCBs without some regulatory relief. As discussed in section 5.1, regulatory relief via the blanket permit amendment R2-2010-0054 has already been provided for dioxin.

Disinfection Byproducts - At this time, cyanide is the only pollutant of concern that is a disinfection byproduct. However, switching to alternative forms of disinfection such as UV or ozone will reduce the occurrence of cyanide as well as myriad regulated and unregulated halogenated disinfection byproducts. However, ozone is responsible for the formation of bromate, its own disinfection byproduct, which will need to be considered during master planning. Laboratory procedures (preservative addition) are also being evaluated as a source of cyanide formation. The WQCP should consider getting their lab certified for running cyanide tests on-site so no preservatives are required.

Microconstituents - There are many processes that have been shown to remove microconstituents from wastewater, such as activated carbon and advanced oxidation. Ozone has been shown to be among the most reliable and cost effective. Ozone also provides a disinfection benefit, and removes color and odor.

5.4 SUMMARY

Table 5.8 summarizes current and future potential regulatory issues and their solutions discussed in this chapter.

Table 5.8 Summary of Regulatory Issues and Potential Solutions
Facility Plan Update
South San Francisco/San Bruno WQCP

Topic	Issue	Potential Solution
Eliminate Near Shore Discharges	New directive in 2008 NPDES permit; near shore discharge is a very rarely used safety valve for the WQCP under extreme wet weather conditions, which is now prohibited.	Storage and obtain permit to discharge to Colma Creek. For more details see Chapter 6, Wet Weather Flow Alternatives.
Minimize Blending	New directive in the 2008 NPDES permit; the WQCP blends primary and secondary effluent to the NBSU outfall when influent flows exceed current secondary treatment capacity (30 mgd). Blending is now discouraged.	Increase secondary treatment capacity. For more details see Chapter 6, Wet Weather Flow Alternatives.
Microconstituents and Bioaccumulative constituents	There is a trend of increasing regulation and it is likely that new effluent limits will be added to permits.	Maximize removal from the influent wastewater through increased source control and pollution prevention programs. For ubiquitous compounds, work with legislature to restrict their use and improper disposal.
Nutrient removal	If EPA modifies the definition of secondary treatment to include nutrient removal, the WQCP will need to remove N and P.	Add aeration basin capacity if space is available, or move to an MBR process.
Recycled water	Increasing push for recycled water usage in the state.	Implement a recycled water project.
Biosolids	Land application of biosolids is becoming increasingly restricted by and fewer landfills are accepting biosolids.	Consider biosolids reuse/disposal alternatives.
Greenhouse Gases	POTWs are not directly required to report GHG emissions but may need to report general stationary combustion emissions..	Monitor GHG emissions regulations and comply when necessary. Implement energy efficiency and green energy projects.
Air Emissions Regulations	SCAQMD recently amended its air emissions regulations for combustion engines requiring CEMS. BAAQMD is likely to follow suit.	Plan for increasingly stringent emissions requirements. Install emissions control equipment for existing engine, and consider moving towards fuel cells.
Metals	Likely to be regulated through the planning horizon.	Improve solids removal through chemical addition and advanced tertiary treatment.
Disinfection By Products	Halogenated disinfection by products are of increasing concern.	Consider switching to alternative forms of disinfection such as UV and ozone when necessary. Consider doing cyanide tests on-site.
Trace organic compounds	Currently eight trace organic compounds have WQBELs in the permit.	Continue monitoring and source control.

Note:
(1) Consult the glossary for an explanation of all abbreviations.

WET WEATHER FLOW PROJECTS

As presented in Chapter 5, the City's new NPDES permit requires the City to minimize primary effluent and secondary effluent during wet weather conditions and to eliminate discharges of effluent to Colma Creek. This chapter presents the recommended strategy for complying with these constraints. The wet weather management approach consists of the following elements:

- Minimize blending by increasing the peak treatment capacity for the secondary treatment train from 30 mgd to 40 mgd. The secondary treatment process expansion can be achieved by adding a fourth secondary clarifier and improving the activated sludge settleability to allow more flow to pass through the secondary clarifiers without washing out solids to the effluent.
- Eliminate discharges to the near shore outfall at Colma Creek by revising the site piping to better utilize the existing 7 million gallon (MG) effluent storage basin, and add an additional storage basin with a volume of 2.4 MG. These improvements are expected to prevent near shore discharges for up to a 10-year, 24 hour storm.
- Apply for a new NPDES permit for the near shore discharge during peak flow events. This will require additional studies to demonstrate that discharges to Colma Creek will not adversely affect the water quality of the creek.

6.1 MINIMIZING BLENDING

The WQCP was designed for a preliminary and primary treatment capacity (wet weather) of 62 mgd, and a secondary treatment capacity (wet weather) of 30 mgd, as documented in Chapter 3. Currently, flows over 30 mgd are sent through the primaries, and then directly to the second chlorine contact channel, where they are disinfected along with secondary effluent flows. During wet weather flow conditions, the WQCP can discharge up to 35 mgd flow, which is a blend of primary and secondary effluent that has been disinfected. This is illustrated in Figure 6.1 for a 10-year, 24-hour storm.

The NPDES permit adopted on November 12, 2008 requires the WQCP to minimize blending of primary and secondary effluents. Currently the plant is only able to store secondary effluent. Reducing the blending of primary and secondary effluents for discharge would require modifying existing piping to be able to store primary effluent during wet weather events so that only secondary effluent is discharged. In addition, the WQCP would need to increase the wet weather secondary treatment capacity, so that the entire effluent discharged to NBSU, and subsequently the Bay, is secondary treated.

The wet weather secondary treatment capacity of the WQCP can be increased in the following two ways: improve aeration basin performance through the addition of selectors and provide additional secondary clarifier capacity.

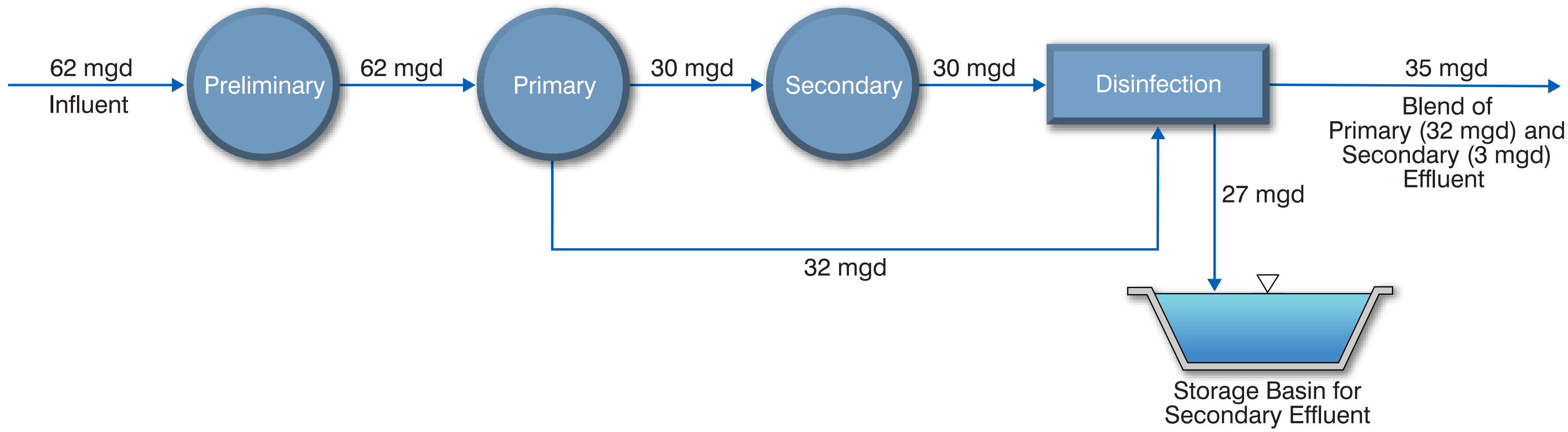

Figure 6.1
EXISTING FLOW THROUGH WQCP
DURING A 10-YEAR, 24-HOUR STORM
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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6.1.1 Improve Sludge Settleability

As described in Chapter 3, the aeration basins have historically performed well for BOD removal and biomass flocculation; however, they have been unable to reliably generate a sludge that settles well.

Wet weather capacity of the secondary treatment system is driven by the performance of the secondary clarifiers. The performance of the secondary clarifiers is driven by the sludge settleability, indicated by the SVIs. Thus, improving the SVIs has a direct impact on the capacity of the secondary treatment system, by increasing the capacity of the clarifiers. SVIs can be improved by encouraging the “right bugs” to grow in the aeration basins, which form a well settling sludge. The WQCP has already made progress in this direction by installing selectors in aeration basins 8 and 9. Plant operations staff have noticed an improvement in the sludge settling since the installation of these selectors, although a permanent mixing system is required. It is recommended that selectors be installed in aeration basins 5 through 7 as well. Figure 6.2 shows a preliminary diagram for installing the selector.

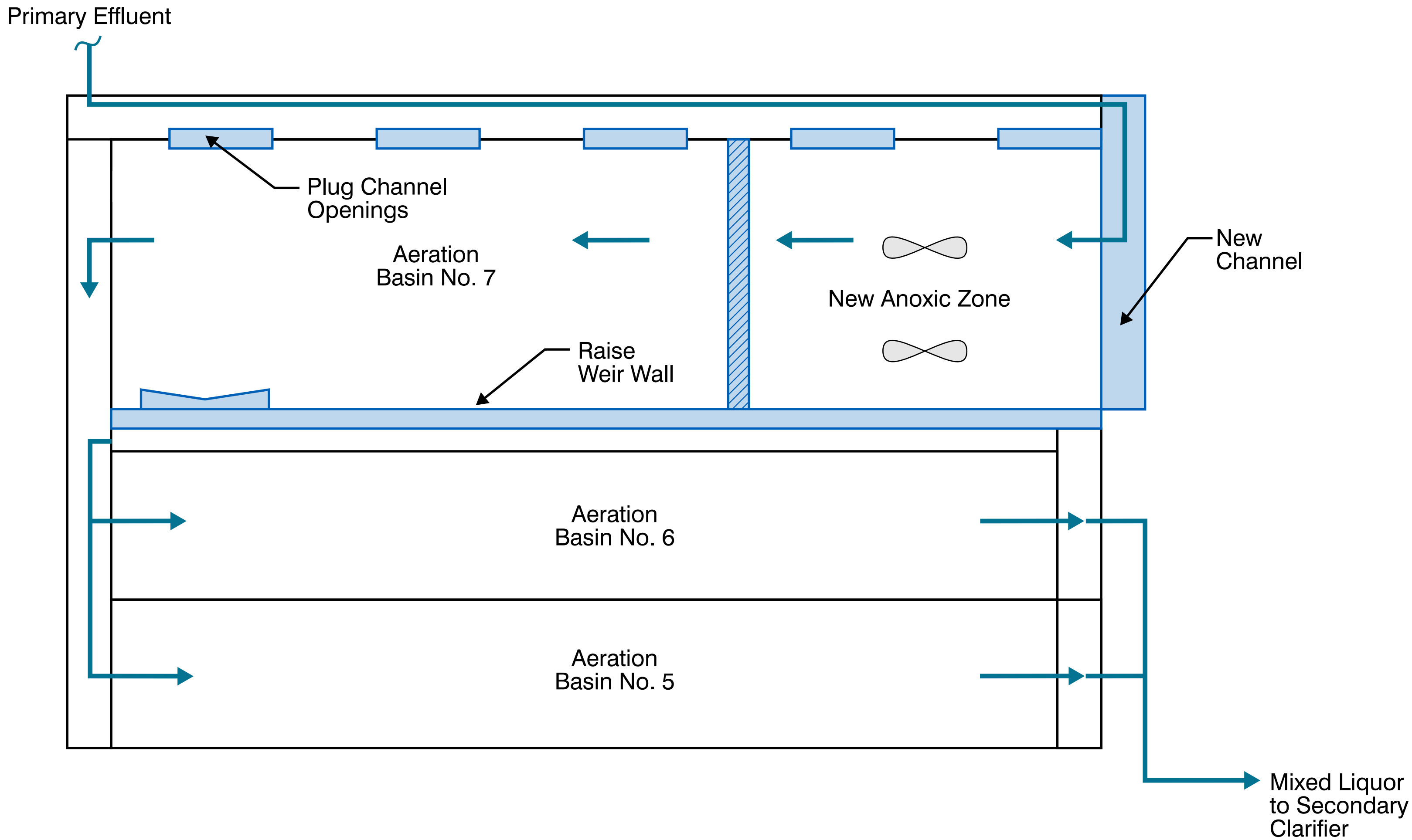
6.1.2 New Secondary Clarifier

Currently the three existing secondary clarifiers have a combined capacity of 30 mgd. To provide secondary treatment to all flows sent to NBSU, additional clarifier capacity is required. Adding a clarifier of the same size as Clarifier No. 3 increases the wet weather flow capacity of the secondary treatment system to 40 mgd. In addition to a new clarifier, additional piping from the flow splitter box, piping from the RAS/WAS pump station, and piping to the chlorine contact basins is needed. The RAS/WAS pump station also needs to be expanded. During the previous design of the RAS/WAS pump station, space was left for its expansion, so only a new pump and some additional piping needs to be installed. Figure 6.3 shows the recommended new clarifier and piping. Table 6.1 summarizes the costs for minimizing blending.

Table 6.1 Costs to Minimize Blending
Facility Plan Update
South San Francisco/San Bruno WQCP

Project	Project Cost(1)
Improve Sludge Settleability (Selectors in ABs 5-7)	0.8 M
New Secondary Clarifier(2)	4.9 M
Total	5.7 M

Notes
(1) Costs are presented in January 2010 dollars, and include construction costs, estimating contingencies, contractor overhead and profit, design fees, sales tax, and construction management.
(2) Includes costs for new piping to RAS/WAS pump station, flow split structure, and chlorine contact tanks.



LEGEND

- Existing Facility
- New or Modified Facility

Figure 6.2
SELECTOR MODIFICATIONS FOR AERATION BASIN 7
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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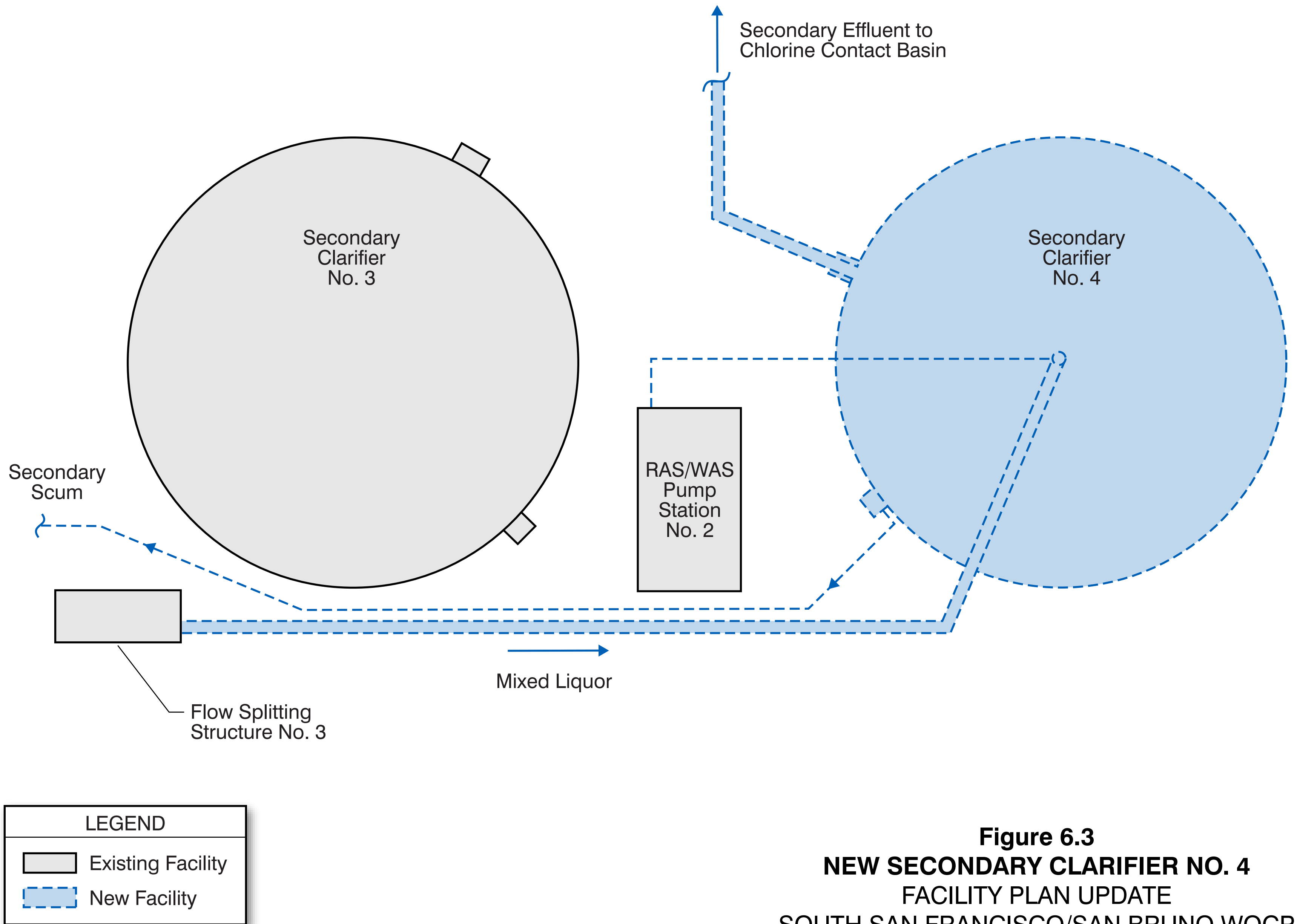

Figure 6.3
NEW SECONDARY CLARIFIER NO. 4
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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6.2 ELIMINATING NEAR SHORE DISCHARGES TO COLMA CREEK

6.2.1 Provide Additional Storage for Peak Wet Weather Flows

The WQCP is limited to 35 mgd in its capacity to discharge to the NBSU outfall. Thus, any influent flow above 35 mgd has to be stored. Presently, any flow above 35 mgd is sent to an existing storage basin. When this basin fills up and wet weather flows continue to rise above 35 mgd into the plant, the WQCP has historically been allowed to release excess flows to Colma Creek. Since the 2008 NPDES permit prohibits these near shore discharges, the WQCP needs to provide additional storage to manage extreme wet weather flows.

The volume of storage required was calculated using flow hydrographs. Based on modeling work that was previously discussed in Chapter 2[1], the following storage volumes were determined:

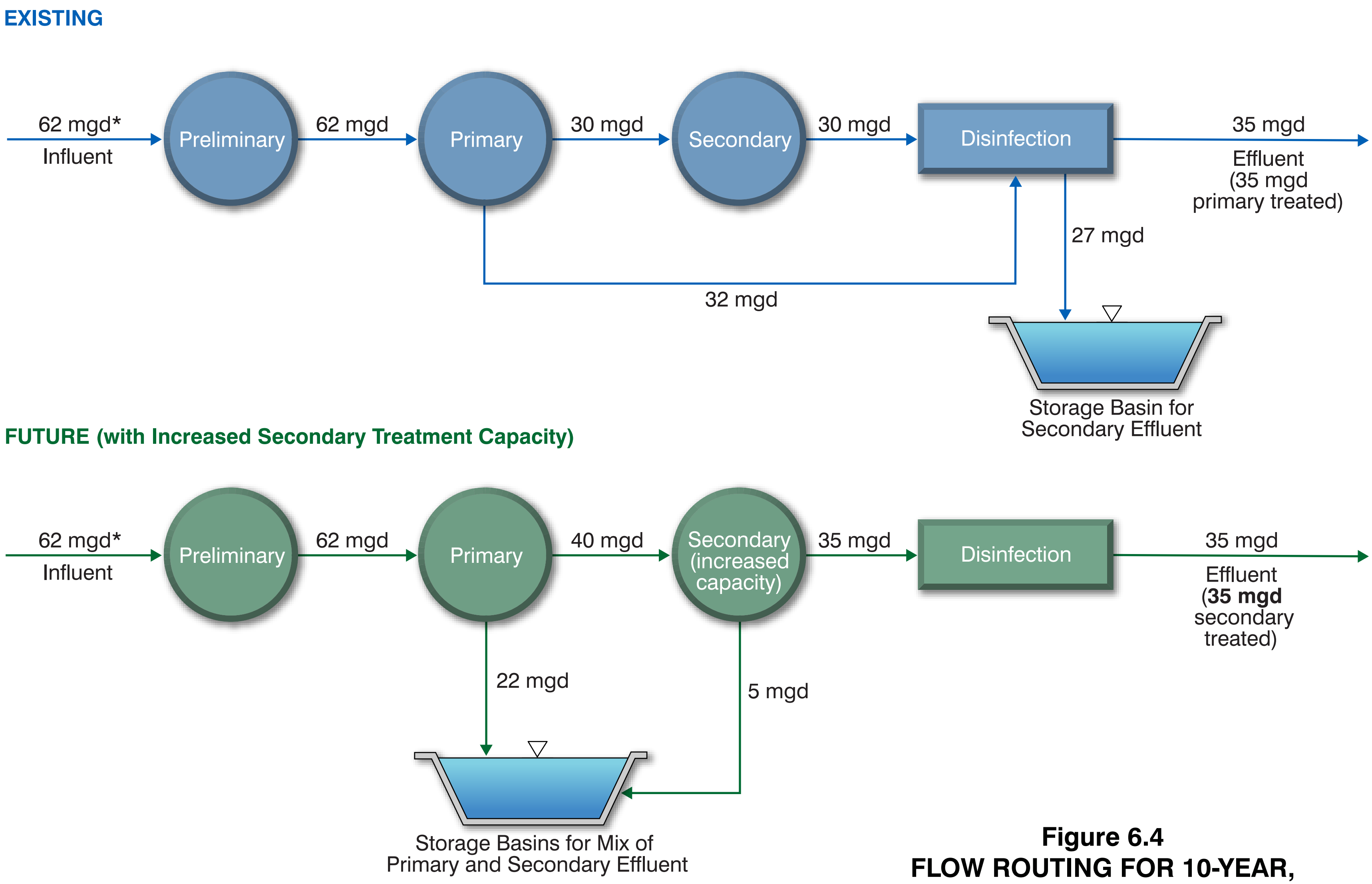
- Total storage volume required for a 5-year, 6-hour storm = 1.4 MG
- Total storage volume required for a 10-year, 6-hour storm = 7.7 MG
- Total storage volume required for a 10-year, 24-hour storm = 9.4 MG

The WQCP has an existing 7-MG effluent storage basin, and can thus handle a 5-year, 6-hour storm without additional storage capacity.

The Regional Board has not provided guidance on the design storm to use for facility planning. However, many agencies around the Bay area are moving towards designing for a 10-year, 24-hour storm. Therefore, it is recommended that the City adopts the same criterion, in case the Regional Board specifies this in the future. Thus, a storage basin was sized for 2.4 MG (9.4 MG storm flow – 7 MG existing storage = 2.4 MG). Figure 6.4 shows the new wet weather flow route through the plant with higher secondary treatment capacity and the additional storage.

There is very little room at the WQCP site to locate new storage basins. Given the space constraints, constructing a storage basin in the “fingers” area (i.e., former dry docks at the shoreline of the southern plant boundary) was considered as shown in Figure 6.5. It was assumed that the basin will be constructed of concrete and supported on pile foundations. Further geotechnical investigations during a pre-design phase may deem pile foundations unnecessary, which will significantly reduce the construction cost of the basin. The “fingers” come under the jurisdiction of the San Francisco Bay Conservation and Development Commission (BCDC). Construction in this area would be considered a Bay infill.

[1] More detail is provided in the hydraulic analysis by Akel Engineering, in Appendix B.



* Assuming no reductions in
I&I flows from San Bruno.

Figure 6.4
FLOW ROUTING FOR 10-YEAR, 24-HOUR STORM
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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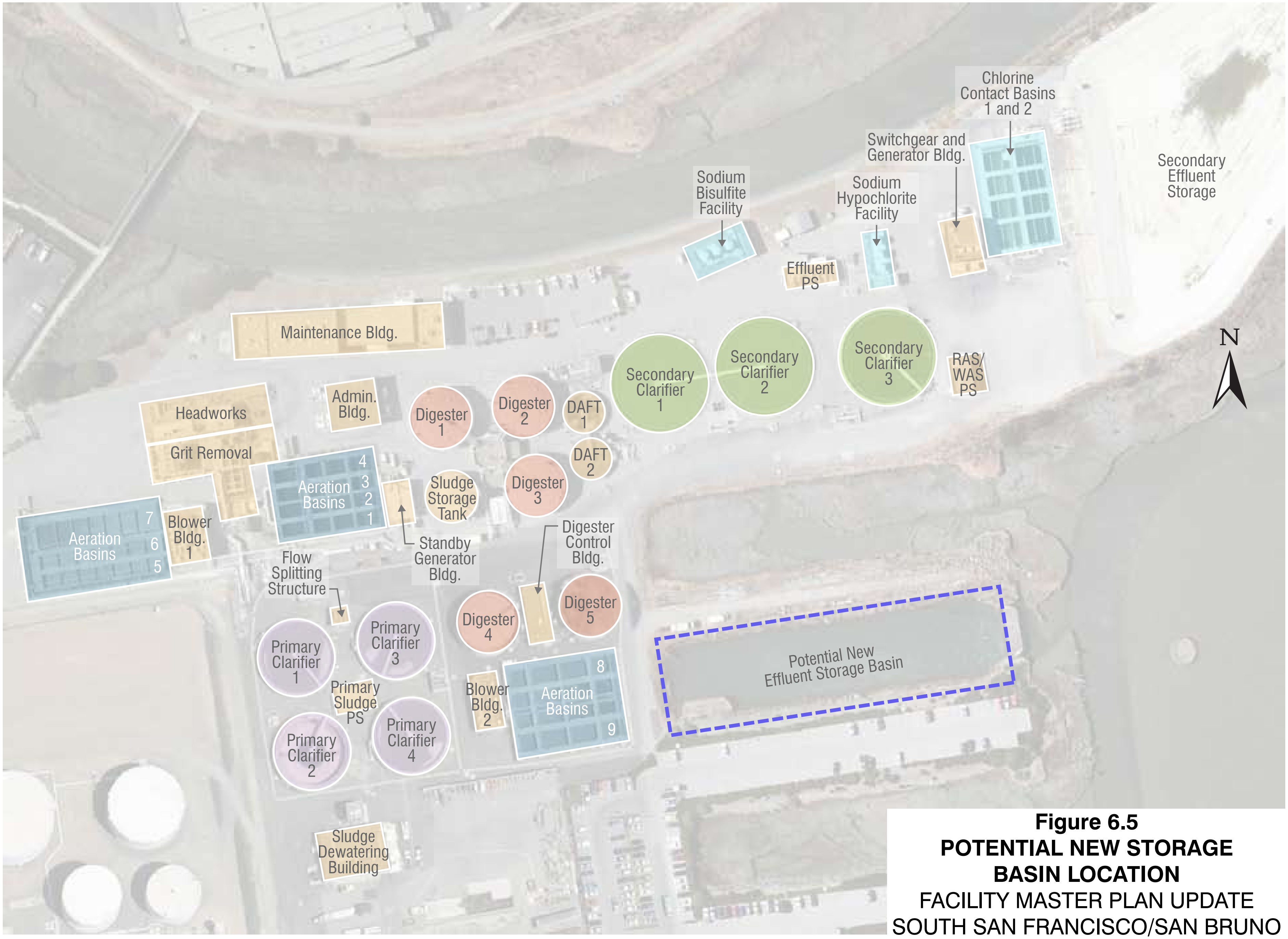

Figure 6.5
POTENTIAL NEW STORAGE BASIN LOCATION
FACILITY MASTER PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO

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Preliminary discussions with BCDC staff indicate that a storage basin for the WQCP falls under the “water oriented uses” listed in the McAteer-Petrus Act, and its approval will be governed by the Act. To get approval for this project, the following steps are likely to be required:

- Prove that the project’s public benefits exceed the public detriment
- Prove there is no upland alternative location available
- Prove that the area of fill is the minimum necessary to achieve the objective
- Minimize harmful effects to the Bay such as reduction in volume, surface area, or circulation of water, water quality, fertility of marshes or fish or wildlife resources
- Safeguard public safety, protect against hazards of unstable geologic or soil conditions or of flood or storm waters
- Establish a permanent shoreline to the maximum extent possible
- Prove that the WQCP has valid title to the property in question

6.2.2 Permit to Discharge to Colma Creek in Extreme Wet Weather Events

An alternative to providing storage is obtaining a permit to continue discharge of secondary effluent to Colma Creek during extreme wet weather events. To obtain a new NPDES permit, the City would first have to provide a Report of Waste Discharge (RWD) to the Regional Board. The following steps would be required as part of the RWD:

- Hold discussions with Regional Board Staff to determine whether a new discharge would be permittable.
- Complete EPA Form 3510-2A (Appendix F), including a full characterization of the quality and quantity of the intended discharge.
- Provide a characterization of the receiving water quality and flow. This would likely require a minimum of four sampling events during wet weather.
- Submit other studies that may be required by the Regional Board, such as an antidegradation analysis for the proposed discharge.

After filing the RWD, the following will take place before the issuance of an NPDES permit:

- State or Regional Water Board staff reviews the application for completeness and may request additional information.
- Staff determines if the discharge is to be permitted or prohibited. If a permit is needed and the application is complete, staff prepares a draft and sends out a notice for a 30-day public comment period.

- The discharger must publish the public notice for one day in the largest circulated paper in the municipality or county and submit proof of posting or publication to the Regional Water Board within 15 days after posting or publication.
- The Regional Water Board holds a public hearing after the 30-day public notification. The State or Regional Water Board may adopt the permit as proposed or with modification, or not adopt it at all. A majority vote of the Water Board members is required to adopt the permit. USEPA has 30 days to object to the draft permit, and the objection must be satisfied before the permit becomes effective.

This process takes at least 6 months to receive a final permit and likely would take longer.

Water quality based effluent limits (WQBELs) will be a major component of a new NPDES permit. Constituents are given WQBELs based on whether they have “reasonable potential” to cause an exceedence of water quality standards or objectives in the receiving water. As per the State Implementation Policy (SIP), a constituent has reasonable potential to cause an exceedence if:

- the maximum effluent concentration is greater than receiving water quality objectives or criteria,
- the receiving water background concentration is greater than receiving water quality objectives or criteria and the constituent is above the limit of detection in the effluent, or
- if there is other information available that suggests that there is reasonable potential.

Background water quality data is not available for Colma Creek. However, a partial reasonable potential analysis (RPA) can be conducted by comparing maximum effluent concentration in the WQCP discharge to objectives in Colma Creek. It has not yet been determined whether the receiving water’s salinity qualifies it as estuarine or freshwater body. The more restrictive water quality objective of either freshwater or marine criteria for each constituent are used for a brief review of reasonable potential to exceed objectives. Many freshwater criteria for metals are calculated based on the hardness of the receiving water. Since hardness data for Colma Creek during wet weather is not available, hardness was assumed to be 100 mg/L as $CaCO_3$ for the purpose of calculating freshwater criteria.

Table 6.2 provides a comparison of the most stringent water quality objective or criteria and the WQCP maximum effluent concentration for each constituent. All metal constituents with water quality objectives are included in the table. Many metals have more stringent objectives in freshwater than saltwater and therefore need additional analysis in the permit. Only organic constituents that triggered reasonable potential in the permit are included in the table, since water quality objectives are the same for freshwater and saltwater. Therefore it is not necessary to repeat the RPA in the permit for these constituents.

Table 6.2 Marine Water Quality Objectives for Surface Waters
Facility Plan Update
South San Francisco/San Bruno WQCP

Constituent[9]	Governing Objective/Criteria(µg/L)	Maximum Effluent Concentration [8] (µg/L)
Antimony	4,300[1]	0.6
Arsenic	36[2]	4.1
Cadmium	1.1[3]	0.538
Chromium VI	11[3]	4.9
Copper	*6.0[4]*	*15*
Cyanide	*2.9[5]*	*8.5*
Lead	2.5[3]	1.2
Nickel	*8.2[2]*	*17*
Selenium	5.0[3]	3.8
Silver	1.9[2]	1.3
Thallium	6.3[1]	0.06
Zinc	81[2]	71
Benzo(k)fluoranthene	*0.049*	*1.2*
Bis(2-Ethylhxyl)Pthalate	*5.9*	*12*
Chrysene	*0.049*	*1.1*
Dibenzo(a,h)Anthracene	*0.049*	*1.6*
Indeno(1,2,3-cd)Pyrene	*0.049*	*1.1*
Alpha BHC	*0.013*	*0.03*
4,4'-DDD	*0.00084*	*0.19*
Tributyltin	*0.0074[2,6]*	*0.0087*
Total Ammonia	*Tbd[7]*	*62,000*

Notes:
(1) Human health criteria
(2) Marine aquatic life criteria
(3) Freshwater aquatic life criteria.
(4) Water quality objectives for Copper in San Francisco Bay Segments (Basin Plan Amendment, January 2009).
(5) Site specific objective for San Francisco Bay
(6) Source: US Environmental Protection Agency (EPA) Water Quality Criteria, http://www.epa.gov/waterscience/criteria/tributyltin/fs-final.htm.
(7) Ammonia criteria are derived based on site-specific temperature, salinity and pH. No receiving data is available to determine criteria.
(8) Highest concentration between MEC in permit RPA and more recent monitoring data from 2009.
(9) Constituents that would trigger reasonable potential because their maximum effluent concentration is higher than the governing objective/criteria are listed in italics.

Those constituents that would trigger reasonable potential because their maximum effluent concentration is higher than the governing objective/criteria are listed in italics.

For constituents that display reasonable potential, WQBELs would be included in a future permit. WQBELs are calculated based on a formula provided by the SIP that takes into account dilution in the receiving water. Table 6.3 shows the estimated WQBELs that would apply to a Colma Creek discharge, calculated assuming no dilution credit, and using the statistical multipliers used in the permit. The third column in Table 6.3 shows the range of effluent concentrations measured for each constituent in 2009. With the exception of copper, the WQCP would likely be able to meet future WQBELs for the constituents that showed reasonable potential. (It is not possible to estimate a WQBEL for ammonia, since ammonia criteria are site specific and currently unknown for Colma Creek.) Therefore, the City may wish to apply for dilution credit to increase the WQBEL for copper.

Table 6.3 Estimated WQBELs for Colma Creek Discharge with No Dilution Credit
Facility Plan Update
South San Francisco/San Bruno WQCP

Constituent	Average Monthly Effluent Limit (μg/L)	Maximum Daily Effluent Limit (μg/L)	2009 Effluent Concentration Range(1) (μg/L)
Copper(2)	7.4	9.4	5.7-15.0
Cyanide	2.3	4.9	0.6-2.7(3)
Nickel (2)	10	21	2.6-3.6
Benzo(k)fluoranthene	0.049	0.098	<0.2
Bis(2-Ethylhxyl)Pthalate	5.9	11.8	<0.83
Chrysene	0.049	0.098	<0.2
Dibenzo(a,h)Anthracene	0.049	0.098	<0.2
Indeno(1,2,3-cd)Pyrene	0.049	0.098	<0.2
Alpha BHC	0.013	0.026	<0.001
4,4'-DDD	0.008	0.017	<0.003
Tributyltin	0.006	0.013	<0.001
Total Ammonia	Tbd(3)	Tbd	6,600-50,700

Notes:
(1) Highest concentration between MEC in permit RPA and more recent monitoring data from 2009.
(2) Calculated using site-specific translators used in the permit.
(3) Measured at compliance point E002.
(4) Ammonia criteria must be calculated based on site-specific conditions that are not currently known.

It may be possible to get dilution credit for the discharge even though the Colma Creek outfall is a shallow water discharge. The steps to apply for dilution credit are outlined in the SIP and the Basin Plan. Briefly, the City would need to determine how much receiving water is available to dilute the discharge, perform a mixing zone study and demonstrate that the discharge would not cause an exceedence of water quality objectives. Dilution credit is granted on a pollutant-by-pollutant basis and may require the City to demonstrate source control efforts for each pollutant for which it is requested.

The discharge at Colma Creek is not expected to cause an exceedence of Basin Plan water quality objectives. The 2010 amendment to the Basin Plan (discussed in Chapter 5) includes contact recreation as an existing beneficial use for Colma Creek. Table 6.4 compares the WQCP effluent quality to the potential bacteria limits for contact recreation. Table 6.5 compares the WQCP effluent quality to the dissolved oxygen and pH water quality objectives in the Basin plan.

Table 6.4 Bacteria Water Quality Objectives for Contact Recreation
Facility Plan Update
South San Francisco/San Bruno WQCP

	Water Quality Objective (MPN/100 ml)	Effluent Quality (MPN/100 ml)
Water Contact Recreation		
Fecal Coliform(1)	geometric mean < 200 90th percentile < 400	Geometric mean = 27.3 90^{th} percentile = 130
Total Coliform(2)	median < 240 no sample > 10,000	N/A

Notes:
(1) Data presented is that for 2009 effluent water quality.
(2) Total Coliform data for WQCP effluent was not available.
(3) Source: San Francisco Bay Region Water Quality Control Plan (Basin Plan), California Regional Water Quality Control Board (January 2007), Amendment (January 2009) and Amendment (July 2010).

Table 6.5 Water Quality Objectives
Facility Plan Update
South San Francisco/San Bruno WQCP

Constituent	Water Quality Objective	Effluent Quality (µg/L)
Dissolved Oxygen	Minimum of 5 mg/L	3.3(1)
pH	6.5 – 8.5	6.7 – 7.6(2)

Notes:
(1) Dissolved oxygen concentration shown is the lowest recorded value for 2009 effluent water quality data. The water quality objective presented is for San Francisco Bay waters downstream of the Carquinez Bridge.
(2) pH range shown is the minimum recorded and maximum recorded pH for 2009 effluent water quality data.

Based on the historical discharge analysis presented in Chapter 4, the recorded discharge from the WQCP to Colma Creek occurs during the wet weather months (September to April). Comparison of the discharge flow data with estimated flow in Colma Creek shows that the historical volumes discharged have met at least a 10 to 1 dilution. The collection system and pump stations improvements and addition of storage onsite allows the WQCP to better manage I/I, reduced wet weather flows to the WQCP, and store a larger volume of treated water onsite, reducing the need for Colma Creek discharges. However, in extreme events when Colma Creek discharges would be necessary, the expected creek flows are sufficient to provide significant dilution.

Before engaging in sampling programs that would be required to support an NPDES permit application, it is recommended that the Cities meet with the Regional Board staff to discuss whether they consider the Colma Creek discharge permittable, and if so, what special studies would be required.

Table 6.6 summarizes the estimated costs to eliminate unpermitted near shore discharges to Colma Creek.

Table 6.6 Costs to Eliminate Unpermitted Near Shore Discharges to Colma Creek
Facility Plan Update
South San Francisco/San Bruno WQCP

Project	Capital Cost
Storage Basin(1)	$ 12 M
Permit to discharge to Colma Creek in extreme wet weather events(2)	1 M
Total	$ 12 M

Notes
(1) Costs are presented in January 2010 dollars, and include construction costs, estimating contingencies, contractor overhead and profit, design fees, sales tax, and construction management for the storage basin. Costs also include $1M for potential mitigation requirements for Bay infill.
(2) At this stage it is not feasible to exactly quantify the cost of obtaining a permit. At a minimum this will include permit fees, WQCP staff time, and the costs to perform the studies required by the Regional Board. It is assumed that the cost will be approximately $1M.

6.3 RECOMMENDATIONS FOR WET WEATHER IMPROVEMENTS

To minimize blending it is recommended that the WQCP be upgraded to improve settleability by adding selectors in Aeration Basins 5 through 7 and by building a new secondary clarifier. These improvements will increase the secondary treatment capacity to 40 mgd during wet weather.

To minimize near shore discharges it is recommended that the WQCP move forward with pursuing a permit for extreme wet-weather discharges to Colma Creek, along with making progress on providing storage to manage a 10-year, 24-hour storm. This will provide the maximum flexibility and safety to the WQCP under wet weather conditions.

GREEN ENERGY ALTERNATIVES

7.1 OPPORTUNITIES FOR GREEN ENERGY

This chapter presents a summary of the evaluation of the green energy alternatives that may be available at the WQCP - cogeneration, solar, wind, and hydroelectric power, and a summary of the energy efficiency improvements that could help save power at the WQCP. Detailed evaluations of the green energy alternatives are provided for reference as Technical Memoranda.

With rising energy costs on the horizon, projected shortfalls in power production from the power utilities, and the State's current goal to reduce greenhouse gas emissions, it would be prudent for the Cities of South San Francisco and San Bruno to develop green energy sources. The Water Quality Control Plant (WQCP) is a major consumer of power within the City, with a demand of about 1,100 kilowatts (kW). At an average current electrical power cost of 13 cents per kWh, the annual average power bill for pump stations and treatment amounts to $1.1 million per year. Green energy at the WQCP would reduce utility power costs as well as secure a reliable source of power for the WQCP operations. Implementing green energy projects at the WQCP would also help achieve the Cities' goal of providing 50 percent energy self sufficient energy at the WQCP.

Table 7.1 summarizes the heat demand and energy use for the WQCP. Currently the energy demand at the WQCP is supplied by the existing engine-generator cogeneration system at the WQCP and power purchased from Pacific Gas and Electric (PG&E). The cogeneration system utilizes about two-thirds of the methane gas produced by the anaerobic digesters to supply approximately 34 percent of the WQCP electrical demands. Figure 7.1 illustrates the current energy utilization at the WQCP. Additional digester gas is available, but because of the limited capacity of the cogeneration system, the excess gas is being flared at the waste gas burner. Waste heat from the cogeneration system, combined from digester gas-fueled boilers, is used to heat the digesters. The engine also uses some natural gas for the pre-combustion chamber, which is a requirement to meet current emission limits.

Although the WQCP is a major consumer of power, it could also provide some promising opportunities to produce power from green energy sources. These include:

- Digester gas to fuel an expanded cogeneration system.
- Available land for solar power using photovoltaic (PV) cells.
- A consistent wind source for wind turbine power.
- Hydroelectric power potential that would utilize the pressure and flow within the NBSU effluent outfall that discharges to the San Francisco Bay near Point San Bruno.

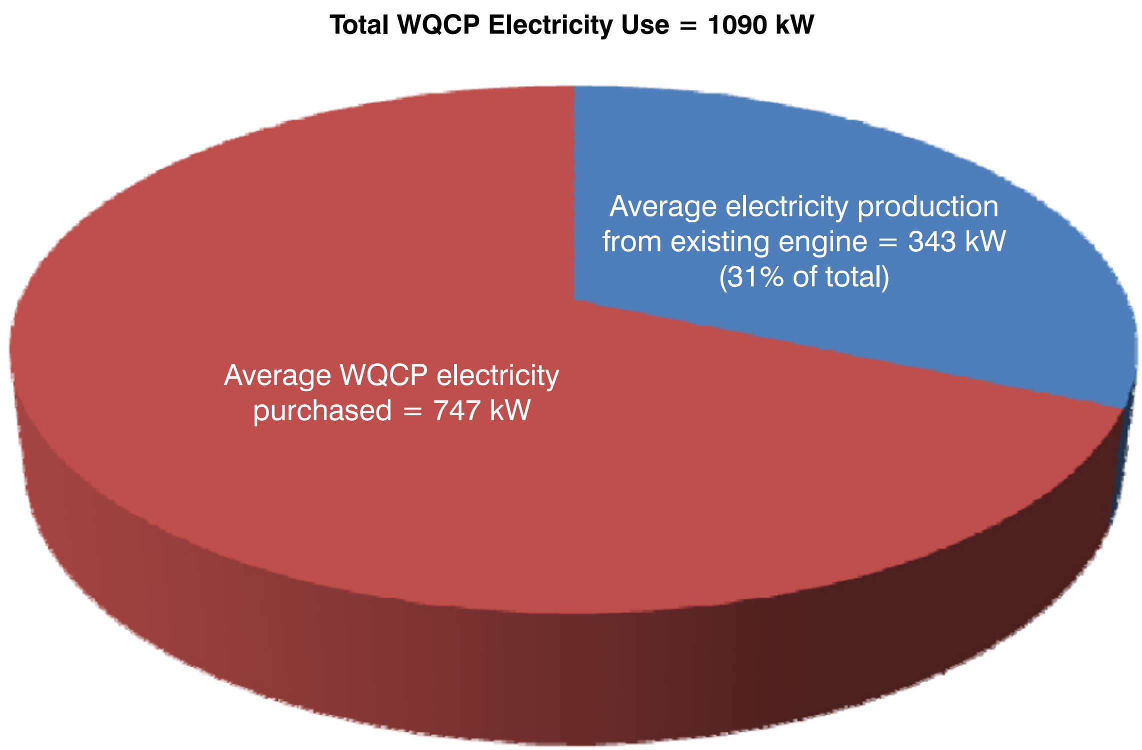

Figure 7.1
CURRENT ELECTRICITY PRODUCTION VERSUS DEMAND
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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Table 7.1	Energy Demand Versus Power Produced Facility Plan Update South San Francisco/San Bruno WQCP
Average Heat Demand, million BTU/hr(1) (for heating anaerobic digesters)	1.13
Peak Heat Demand, million BTU/hr(1)	1.71
Average annual purchase of natural gas for heating (therms)(1)	98,988
Average Power Demand, kW(1)	1,090
Average Power Purchased, kW(1)	747
Average Cogeneration Production from Existing Engine, kW(2)	343

Notes:
(1) Information derived from WQCP 2008-2009 Utility Data.
(2) Information derived from WQCP 2009 Plant Cogeneration Data. Includes engine downtime for repairs.

The benefits of renewable energy include:

- Reduced operational costs and the stabilization of energy expenditures.
- A revenue stream from energy sold back to the grid.
- Reduced emissions of greenhouse gases.
- Ability to meet future air quality limits.
- Greater flexibility in adapting to current and future greenhouse gas regulations.
- Improved power supply reliability and redundancy.

7.1.1 Cogeneration

7.1.1.1 Existing Cogeneration System

The WQCP currently has a 400-kW reciprocating engine-generator system that utilizes methane gas produced by the anaerobic digesters. The engine has been in operation since 1992 and is in good condition. Some minor improvements are necessary to improve the coordination of power with PG&E power. Currently the operations staff must manually synchronize the phasing of the power. Major overhauls are required about every 5 years to remove deposits on the engine components from contaminants in the methane gas. The gas is a byproduct of the anaerobic digestion process, and because of its origin, it contains several constituents that can deposit on the engine or cause corrosion. Contaminants typically found in digester gas include water vapor, carbon dioxide, hydrogen sulfide, and siloxanes (compounds consisting of organics, hydrogen, and silicon dioxide). The operations staff has suggested adding a gas scrubbing system to remove some of the pollutants to increase the life of the engine and to reduce the frequency of overhauls. There are many gas scrubbing technologies of increasing levels of scrubbing efficiency, and the technology required will depend on the gas quality needed. This will be discussed later in this section.

7.1.1.2 Emissions Regulations

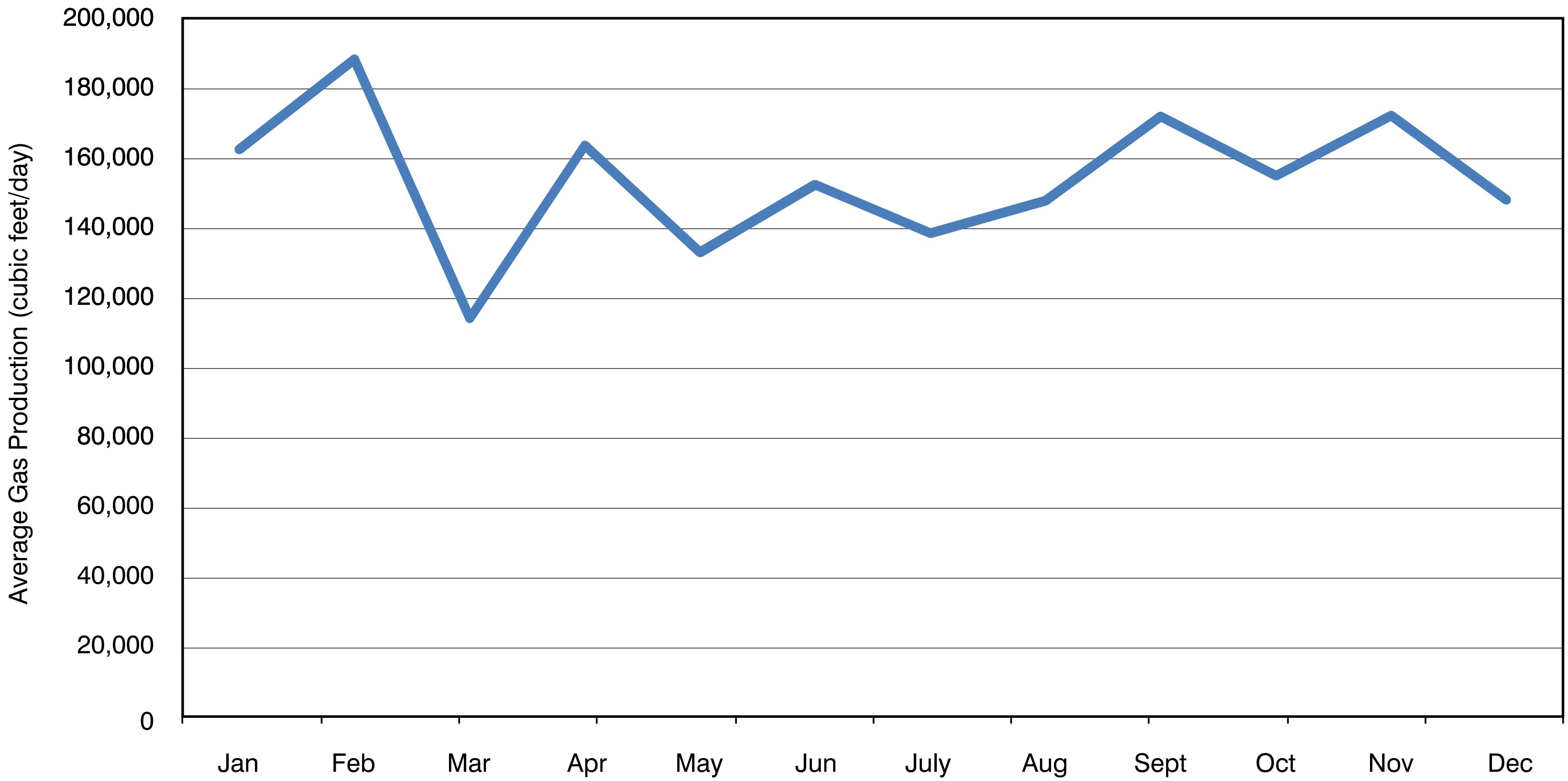
Internal combustion engines are governed by emissions regulations. Future operation of the existing engine-generator will likely be impacted by more restrictive emission requirements. Recently, the South Coast Air Quality Management District (SCAQMD) tightened the emission limits for No_x, VOCs and CO. In the past, the Bay Area Air Quality Management District (BAAQMD) has followed the lead of the South Coast Air Quality Management District (SCAQMD) in tightening emission regulations, and the South Coast rules were recently adopted by the Central Valley air boards, so it is likely that the same restrictions will be adopted by the BAAQMD in the near future. If so, a gas scrubbing system and exhaust gas scrubbing equipment will be required for the current engine.

7.1.1.3 Available Fuel for Cogeneration

Anaerobic digestion is a biological process subject to a number of variables that affect gas production. For example, the net available digester gas production available for cogeneration varies with the seasons. Less gas is available in the winter because more gas is needed for heating the digesters in the colder temperatures (the digesters must be maintained at a temperature of 95 degrees Fahrenheit for maintaining optimum biological processes). Other factors affecting digester gas production include wastewater flows and loads received at the WQCP, and the performance of the digestion process. Gas production is roughly in proportion to influent flows and loadings. If either flows or waste strengths vary, then gas production would follow. In addition, digesters can experience a drop in gas production from process upsets, ineffective mixing, heating, or excessive grit and rags buildup in the digester tanks.

According to WQCP records, the current annual average gas production from the anaerobic digesters is about 164,000 cubic feet per day. Table 7.2 presents the monthly average net gas production for the period 2006-2009, as measured by the flow meters on the digester gas flare and the inlet to the engine generator. This information is also illustrated in Figure 7.2. As indicated, gas production ranged from a low of 114,000 standard cubic feet per day (scfd) in March to 172,000 sfcd in September. Based on digester records, the unit gas production has averaged about 15 standard cubic feet per pound (scf/lb) of volatile solids destroyed in the digester feed, which is in line with typical design values for an activated sludge process. Typical values range from 12 scf/lb to 17 scf/lb of volatile solids destroyed.

As discussed in Chapter 2, influent flows and loadings to the WQCP are expected to increase at a modest rate over the next 30 years.



Note:
Gas production data from 2006 - 2009 was analyzed.

Figure 7.2
AVERAGE DIGESTER GAS PRODUCTION
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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Table 7.2 Average Historical Digester Gas Production
Facility Plan Update
South San Francisco/San Bruno WQCP

Month	Average Daily Gas Production (cubic-feet/day)[1]
January	162,782
February	188,660
March	114,320
April	163,974
May	133,280
June	152,750
July	138,789
Aug	148,149
September	172,228
October	155,208
November	172,458
December	148,319

Note:
(1) Average of values from 2006-2009.

Gas production from current sources is not expected to increase significantly over the planning period. Presently there is enough excess gas available to increase power production from the cogeneration system by another 130 to 200 kW, depending on the technology used for cogeneration.

One strategy available to the City would be to supplement the feed stock to the digesters to increase gas production and generate more power. Digester gas production can be increased substantially by adding fats, oils and grease (FOG) to the anaerobic digesters. FOG would be collected from restaurants and food-processing industries by local grease haulers and unloaded at a FOG receiving station at the WQCP. Accepting FOG at the WQCP could provide several benefits. FOG has an energy value of about five times more than the wastewater sludge. Thus, relatively small volumes of FOG can produce large volumes of gas. Additionally, when FOG is broken down in the digesters, most of the solids are consumed, leaving fewer residual solids to process. Another benefit from collecting FOG is that it reduces grease buildup in the sewer collection system. Grease plugs in the sewers are a common source of dry weather sewer system overflows.

The City of Millbrae and the East Bay Municipal Utilities District are currently operating FOG receiving stations. Based on experience with similar communities, the addition of FOG could increase gas production by as much as 50 percent over the current production. At this level, the cogeneration system could produce as much as 900 kW. Although FOG addition could be an effective way to convert a waste product to energy, the volumes received at the WQCP could vary depending on the production rates at the sources, or competition from other neighboring FOG receiving stations. It is likely that in the FOG program will be popular at other neighboring treatment facilities at San Francisco and other Peninsula cities. Thus, there is some risk in relying on FOG to develop an expansion of the current cogeneration system. One way to mitigate the risk is to enact a city ordinance requiring that FOG collected in the service area to be sent to the WQCP.

Table 7.3 presents the projected net gas production for the planning period[1].

Table 7.3 Projected Digester Gas Production
Facility Plan Update
South San Francisco/San Bruno WQCP

Month	Projected Average Daily Gas Production (cubic-feet/day)[1]	Projected Average Daily Gas Production with FOG addition (cubic-feet/day)[1,2]
2012	166,300	249,500
2013	167,500	251,300
2014	168,800	253,200
2015	170,000	255,000
2016	171,300	257,000
2017	172,500	258,800
2018	173,800	260,700
2019	175,000	262,500
2020	176,200	264,300
2021	177,500	266,300
2022	178,700	268,100
2023	180,000	270,000
2024	181,200	271,800
2025	182,400	273,600
2026	183,700	275,600
2027	184,900	277,400
2028	186,200	279,300
2029	187,400	281,100
2030	188,600	282,900
2031	189,900	284,900

Notes:
(1) Based on an assumption of linear increase in average annual flow to the WQCP for the next 20 years.
(2) Based on an assumption of 50% gas increase due to FOG addition to the digesters.

[1] Based on an assumption of linear increase in average annual flow to the WQCP for the next 20 years.

7.1.1.4 Cogeneration Technologies

Cogeneration systems at wastewater treatment plants utilize digester gas to generate electricity and useable heat. Two technologies were evaluated to utilize digester gas for cogeneration: reciprocating engine generators (the same technology currently operating at the WQCP) and fuel cells.

Reciprocating engines, developed more than 100 years ago, were the first of the fossil fuel-driven distributed generation technologies. They can be found in applications ranging from fractional horsepower units to 60-megawatt (MW) base load electric power plants. Exhaust heat can be recovered in heat exchangers and used to provide heat to digesters and facility hot water heating. The overall efficiency (as a percentage of fuel input energy) of reciprocating engines is around 76 percent, with 34 percent being converted to electricity, and 42 percent to recoverable heat.

A fuel cell is an electrochemical device that combines hydrogen from the digester gas and oxygen from the air to produce electricity and usable heat with virtually no emissions. Fuels cells are similar to batteries except that unlike batteries, fuel cells do not require recharging and will produce electricity as long as fuel is supplied. New generations of fuel cells are extremely reliable, only needing to be taken out of service every 18 months for maintenance/parts replacement. Although fuel cells provide less heat than reciprocating engines, they are much more efficient in producing electricity. Typically, the overall efficiency of fuel cells is 69 percent, with 47 percent of the energy produced converted to electricity and 22 percent to heat.

Fuel cells require a gas conditioning system to remove contaminants from the digester gas and to convert the methane in the gas to hydrogen. Gas conditioning systems are fairly complex and require periodic maintenance to change the scrubbing media.

7.1.2 Solar Photovoltaic Cells

Photovoltaic (PV) systems convert light energy to electrical energy. PV cells consist of a junction between two thin layers of dissimilar semiconducting materials, known respectively as ‘p’ (positive) type and ‘n’ (negative) type semiconductors. ‘P’ type conductors consist of doped silicon with a deficit of free electrons; and ‘n’ type conductors consist of material with an excess of free electrons. A p-n junction is set up by joining these dissimilar semiconductors, which sets up an electric field in the region of the junction, due to the joining of the positive and negative layers.

Light consists of a stream of tiny particles of energy called photons. When light falls in the region of the p-n junction, the photons provide energy for the electrons from the ‘n’ type conductor to move to the ‘p’ type conductor. This movement of electrons induces direct current (DC) power. The DC power is converted to alternating current (AC) with inverters. AC power is required to be compatible with the power grid.

Solar power systems are available in the following configurations:

- Fixed panels. Fixed panels generate the least amount of electricity per panel[2] but have low project and maintenance costs.
- Single axis tracking panels. This arrangement consists of an automatic tracking system that tilts the angle of the PV cells on one axis (up or down) as the sun tracks over the horizon. Single tracking systems can generate up to 30 percent more than fixed panels, but the tracking system makes it more expensive than fixed panels, and requires more maintenance due to moving parts.
- Dual-axis concentrators. A dual-axis system can track up and down and left and right. The PV cells focus the sunlight on a small but efficient solar panel. However, their effectiveness requires a high solar insolation (a measure of solar radiation energy). The insolation values at the WQCP are not high enough to support the dual-axis system.
- Cylindrical reflective panels. This type of solar power system utilizes a solar panel installed within a tube. They have a very high output relative to square footage of area installed because the panels inside the tube generate electricity from both the sun's direct rays as well as the rays reflected off the roof. However, similar to the dual-axis system, the cylindrical reflective panels need a high insolation value to justify its higher cost compared to PV cells, so this arrangement was not considered further for this facility plan.

Based on an economic evaluation (see Technical Memorandum "Solar and Wind Feasibility Study") the fixed panels were determined to be the most cost effective.

7.1.3 Wind Energy

Wind turbines convert wind energy to electrical energy by turning a generator mounted directly on the turbine. The most commonly used wind turbine is the horizontal axis, axial flow type turbine. Power from a wind turbine is proportional to the cube of the wind speed and the square of the blade length. Thus, for a given length of the turbine blade, the energy output from wind turbine is very sensitive to wind velocity (See Figure 7.3).

Another type of wind turbine is the vertical axis, "egg beater" type, also known as the Darrieus blade turbine, named after its inventor. These turbines are less commonly used.

The minimum wind speed at which turbines can produce power is from 7 to 10 miles per hour (mph). An anemometer located at the WQCP site next to Colma Creek registered an average wind speed of 10 mph for the year 2009. At this average speed, a turbine at the WQCP could generate power for about 77 percent of the time. These conditions are rated

[2] The angle of solar incidence plays a significant role in the amount of electricity generated in the solar cell. In fixed cells, the 'perfect' angle is only incident on the solar cell for a small portion of the day, thus fixed cells are unable to generate as much electricity as single-axis tracking panels (which can "track" the solar rays in one axis) or dual-axis panels, which can move in two planes.

Figure 7.3
250 kW WIND TURBINE
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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as “good” and therefore the WQCP site would be suitable for wind power with respect to effective power generation.

The proposed wind turbine installation for this site is two - 250 kW axial flow (propeller) turbines, with two blades. The wind turbines would be about 180 feet high, from the ground to the blade tip. The market is limited for turbines of this size. Wind Energy Solutions (WES) is one of the leading manufacturers for municipal and industrial installations of this size, and the model WES 30 was assumed for the evaluation (see Technical Memorandum “Solar and Wind Feasibility Study”).

Since the WQCP is located within two miles of the San Francisco International Airport, the height of permissible wind turbines is regulated by the Federal Aviation Administration (FAA). As per FAA regulations, wind turbines located at the WQCP must be less than 200 feet tall. The best site for capturing the wind is along the effluent storage pond next to Colma Creek. However, this area is underlain by very weak soils known commonly as “bay mud.” To provide a stable foundation for the wind turbines, they would need to be anchored with pile foundations.

A concern for wind turbines at the WQCP is the impact they may have on the resident and migratory bird populations. For decades, the wind farm in the Altamont Pass Wind Resource area near Tracy, California has been documented as killing many birds, including raptors such as the golden eagle. Estimated bird kills at this site range from 881 to 1,300 raptors per year. However, this could be due to the installation of a wind farm - several rows of wind turbines, creating a maze for the birds to fly in and out of. It is possible that two wind turbines installed at the WQCP site may not cause similar problems. Shown in Appendix G are letters from the Audubon Society, and a professor at the Department of Zoology at the University of Oklahoma, that say that smaller and fewer wind turbines appear to not impact the bird populations that were studied[3].

To assess the impacts of wind energy at Altamont Pass and throughout the state, the California Energy Commission prepared the study entitled: “Developing Methods to Reduce Bird Mortality in the Altamont Pass Wind Resource Area” which was published in final form in 2004. A peer review of the study was conducted in 2006. The incidence of bird mortality from wind turbines depends on a number of conditions: bird populations, predominate height of flight, the types of birds, the height of the wind turbines, whether they are lighted or not (birds tend to fly toward lights in cloudy conditions), and wind turbine spacing. A major conclusion from the report is that the most effective configuration to reduce bird mortality is to install larger and higher turbines. However, the peer review report disputed this conclusion and added that a higher tower (180 feet suggested for the WQCP site) would require some lighting to conform to FAA safety standards, which would attract birds.

[3] From Bergey Windpower, http://www.bergey.com/

A generalized approach to minimize the effects of wind turbines on birds for all sites has not been developed, because each site has specific conditions that would influence design factors to reduce bird kills. However, there are installations that have much lower incidences of bird kills compared to the Altamont Pass experience. A study will be required to estimate the effects of wind turbines on the resident and migratory birds at the WQCP site. The birds at the WQCP come from a salt water estuary/bay ecosystem, so they are likely quite different from the birds at Altamont Pass. In addition, the WQCP site is a recognized habitat for the endangered clapper rail. The study should include a detailed assessment of bird kills, taking into account the types birds expected at the site, fight patterns and other behaviors, and the study should be completed before taking any further steps toward implementing the wind turbine option. This study could be done in conjunction with other California Environmental Quality Act (CEQA) studies required for this project.

7.1.4 Hydroelectric Power

The proposed hydroelectric power system for South San Francisco would consist of a turbine generator installed on the NBSU outfall near Point San Bruno, at the point where the pipeline transitions from an overland to submarine pipe. Approximately 26 feet of head and an average flow of 15 mgd are available to drive the turbine. The recommended turbine technology for these conditions is a cross flow type turbine. The turbine could be installed in the abandoned dechlorination building at this location. Power production from the turbine would average about 43 kW, produced continuously.

7.2 EVALUATION OF POWER GENERATION ALTERNATIVES

7.2.1 Cogeneration – Reciprocating Engines and Fuel Cells

The power generation opportunity from a cogeneration facility at the WQCP depends on the quantity of available digester gas. As discussed previously, the average net digester gas production for cogeneration in 2009 was 164,000 scfd. As discussed, gas generation can vary according to influent loadings, the digester heat demands, and the performance of the digestion process. The 2009 average production of 164,000 scfm was assumed for the analysis of cogeneration alternatives. To provide a sensitivity check, the alternatives were evaluated with a unit gas production of 12 scf/lb volatile solids destroyed, which is equivalent to a gas production of about 131,000 scfd.

The following cogeneration alternatives were evaluated:

- Alternative 1 - Upgrade the existing 400 kW engine generator. Under this alternative the digester gas would be scrubbed to remove hydrogen sulfide (H_2S), moisture, and siloxane. The gas scrubbing system would extend the time between major engine overhauls, and it would be the first step toward meetings the anticipated emissions regulations for the engine. This alternative would provide 31 percent of the WQCP current electrical demands.

- Alternative 2 - Replace the existing engine with a new high efficiency 540 kW engine generator. This alternative would provide 43 percent of the WQCP current electrical demands.
- Alternative 3 - Replace the existing engine with two 300 kW fuel cells. Fuel cells are available in 300 kW modules. At this power capacity all of the gas produced at the WQCP would be utilized, and approximately 6 percent of the fuel cell fuel supply would need to augmented with natural gas. This alternative would provide 50 percent of the WQCP current electrical demands.
- Alternative 4 - Replace the existing engine with a new 900 kW fuel cell system consisting of three 300 kW fuel cell units. This alternative would require the addition of FOG to the digesters. This alternative will provide 79 percent of the WQCP current electrical demands.
- Alternative 5 – Continue the operation of existing 400 kW engine, install fuel conditioning and emission control systems, and install a 300 kW fuel cell. This alternative would require the addition of FOG to the digesters. A gas scrubbing system would be provided to scrub gas for the engine and fuel cell. This alternative will provide 56 percent of the WQCP current electrical demands.
- Alternative 6 - Continue the operation of existing 400 kW engine, install fuel conditioning and emission control systems, and install two- 300 kW fuel cells. This alternative would require the addition of FOG to the digesters. A gas scrubbing system would be provided to scrub gas for the engine and fuel cell. This alternative will provide 85 percent of the WQCP current electrical demands.

An economic comparison is presented in Table 7.4. The attractiveness of a project is determined by a combination of factors – the net benefit (in millions of dollars), the benefit/cost ratio, and the payback period.

The net benefit and benefit cost ratio of alternative 6 are the highest, with alternative 3 being the second highest.

A non-economic comparison is presented in Table 7.5. Based on an economic and non-economic comparison, alternative 6 is recommended.

Presented below is a discussion of Greenhouse Gas Emissions as applicable to the WQCP and the cogeneration alternatives.

7.2.1.1 Greenhouse Gas Emissions Considerations

The California Air Resources Board (CARB) adopted the Global Warming Solutions Act (also referred to as Assembly Bill 32, AB 32) in September 2006. This Act was the first regulatory program in the U.S. to require public and private agencies statewide to reduce

Table 7.4 Economic Analysis of Cogeneration Alternatives
Facility Plan Update
South San Francisco/San Bruno WQCP

Alternative	Net Project Costs (1) ($M)	Net Benefit (2) ($M)	Benefit/ Cost Ratio	Payback (Years)
1) Upgrade existing engine generator	$5.8	$7.5	1.28	9
2) Replace with 540 kW engine generator	$9.9	$10.6	1.07	12
3) Replace with two-300 kW fuel cells	$6.7	$11.4	1.70	7
4) Replace with three-300 kW fuel cells	$9.0	$17.1	1.91	6
5) Upgrade existing engine and install one-300 kW fuel cell(3)	$8.2	$13.2	1.69	7
6) Upgrade existing engine and install two-300 kW fuel cells(3)	$9.4	$19.3	2.05	7

Notes:
(1) Net project cost = (Project cost) – (Grant funding). Project costs are presented in January 2010 dollars, and include construction costs, estimating contingencies, contractor overhead and profit, design fees, sales tax, and construction management.
(2) Net benefit = (Power produced)+(Renewable Energy Credits) – (Operations and Maintenance Costs)
(3) Includes costs for cogeneration system, fuel conditioning equipment, FOG facility, and low pressure digester gas holder.

greenhouse gas (GHG) emissions. The GHGs included under AB 32 are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases. The Act does not affect wastewater treatment process emissions, but it does cover cogeneration facilities and onsite general stationary combustion sources. CARB's Proposed Scoping Plan (released October 2008) listed two thresholds by which agencies are to check if they are required to report. The reporting thresholds for years 2011 and beyond are:

- Threshold 1: If an agency's electricity generating unit(s) emits over 10,000 metric tons of CO_2 equivalent emissions.
- Threshold 2: If an agency emits over 10,000 metric tons of CO_2 equivalent emissions from its general stationary combustion units.

In addition, the U.S. EPA's Mandatory GHG Reporting Rule (Reporting Rule) was adopted October 30, 2009. The Reporting Rule explicitly states that centralized domestic wastewater treatment systems are not required to report; however, any stationary combustion of fossil fuels taking place at a wastewater treatment facility may be considered a "large" source of GHGs if emitting a total of 25,000 metric tons of CO_2 equivalent emissions or more per year.

Table 7.5 Non-Economic Comparison of Cogeneration Alternatives
Facility Plan Update
South San Francisco/San Bruno WQCP

Alternative	Advantages	Disadvantages
Alternative 1 - Upgrade Existing Engine Generator with new Gas Scrubbing System	• No change in operation • Proven technology utilizing biogas for over 40 years • Retain use of installed equipment (no stranded assets)	• Does not take advantage of all the digester gas available onsite • Low efficiency and highest total GHG equivalent emissions • Frequent operator attention required for operations and maintenance
Alternative 2 - New Reciprocating Engine 540 kW with new Gas Scrubbing System	• Proven technology utilizing biogas for over 40 years	• Frequent operator attention required for operations and maintenance • Requires extensive fuel treatment • Will require costly emissions controls and possibly CEMS in the future • High GHG equivalent emissions • Stranded asset for existing engine generator
Alternative 3 - Two-300 kW fuel cells	• Ultra low emissions • High efficiency • Low operator attention for operations and maintenance • Substantial grant money is available • Low total GHG equivalent emissions	• High equipment costs • High O&M costs • Requires extensive fuel treatment • Stranded asset for existing engine generator
Alternative 4 -Three-300 kW fuel cells and FOG receiving station	• Same as Alternative 3 and: • Shorter payback if FOG is realized	• Same as Alternative 3 and: • Requires FOG receiving station and reliance on its gas production to be economically feasible
Alternative 5 – Upgrade Existing Engine Generator and add One-300 kW fuel cell and FOG receiving station	• Reduces reliance on FOG • No stranded assets • Combined use of gas scrubbing system	• Natural gas supplementation required to operate at full load if FOG not realized
Alternative 6 – Upgrade Existing Engine Generator and add Two-300 kW fuel cell and FOG receiving station	• Same as Alternative 5 • Generates most electricity	• Same as Alternative 5

Table 7.6 summarizes the estimated onsite GHG emissions for each cogeneration alternative. The general stationary combustion GHG emissions are well below CARB's thresholds 1 and 2 (10,000 metric tons per year) and U.S. EPA's threshold (25,000 metric tons per year).

Table 7.6 Estimates of Greenhouse Gas Emissions of Cogeneration Alternatives
Facility Plan Update
South San Francisco/San Bruno WQCP

Project Alternative	GHG Emissions from Onsite Combustion[1], CO_2 Equivalent (metric ton/year)	Total WQCP GHG Emissions[2], CO_2 Equivalent (metric ton/year)
Alternative 1 - Base Case, Current 400 kW Cogeneration System with Gas Scrubbing System	1,944	4,501
Alternative 2 - Replace Existing Engine with New 540 kW Engine with Gas Scrubbing System	2,191	4,379
Alternative 3 - Replace Existing Engine with 2 - 300 kW Fuel Cells	2,021	3,891
Alternative 4 - Replace Existing Engine with 3 - 300 kW Fuel Cells[3]	2,945	4,042
Alternative 5 – Refurbish the Existing Engine and add 1 - 300 kW Fuel Cell[3]	2,847	4,632
Alternative 6 – Refurbish the Existing Engine and add 2 - 300 kW Fuel Cells[3]	3,676	4,645

Notes:
(1) CO_2 equivalent emissions from CO_2, CH_4, and N_2O produced onsite from combustion of digester gas and natural gas through cogeneration or by flaring the gas.
(2) CO_2 equivalent emissions from CO_2, CH_4, and N_2O produced from onsite combustion and the emissions produced from electricity generation by Pacific Gas & Electric.
(3) This includes GHG emissions from the combustion of both the current plant digester gas and estimated future gas production from a FOG project.

7.2.2 Renewable Energy Projects – Solar, Wind, and Hydroelectric Power

An economic analysis (summarized in Table 7.7) was prepared for the renewable energy projects to evaluate the feasibility of the projects in terms of the initial investment, potential grants, projected benefits (net revenue), and payback time. Results of the analysis are as follows.

<u>Solar</u>

Alternatives for solar PVs were developed using a phased approach for installation as follows:

- Phase 1: Install solar PVs on WQCP buildings, on “fingers” on the ground, and on new carpark cover for employee parking.
- Phase 2: Install solar PVs on carports on City owned land that is leased for airport parking.
- Phase 3: Install solar PVs on carports for Costco parking lot next to WQCP.

Phase 1 (Installing PV cells with a capacity of 150 kW on WQCP buildings and on new carpark cover for employee parking) would require an initial investment of $1.2 million, but with self generation grants and renewable energy credits, the net project cost is estimated at $0.8 million. Subsequent Phases 2 and 3 would have a capacity of 120 kW each, on the SFO Parking lots, and the Costco parking lots respectively. This phased approach to solar projects are shown in Figure 7.4. The costs, benefit/cost ratio and payback for each of these phases is shown in Table 7.7.

Table 7.7 Economic Analysis of Renewable Energy Projects-Solar, Wind, Hydroelectric Power
Facility Plan Update
South San Francisco/San Bruno WQCP

Project	Net Project Costs (1) ($M)	Net Benefit(2) ($M)	Benefit/Cost Ratio	Payback (years)
Solar PV, Phase 1(3)	$0.8	$1.5	1.95	9
Solar PV, Phase 2(4)	$0.7	$1.1	1.68	11
Solar PV, Phase 3(5)	$0.7	$1.1	1.68	11
Wind Energy(6)	$2.6	$2.7	1.05	19
Hydroelectric(7)	$0.8	$1.0	1.24	37

Notes:
(1) Net project cost = (Project cost) – (Grants + Renewable Energy Credits). Project costs are presented in January 2010 dollars, and include construction costs, estimating contingencies, contractor overhead and profit, design fees, sales tax, and construction management.
(2) Net benefit = (Power produced) – (Operations and Maintenance Costs)
(3) Solar Phase 1 would consist of installing PV cells of 150 kW capacity on WQCP rooftops and maintenance building car parking lot.
(4) Solar Phase 2 would consist of installing PV cells of 120 kW capacity on covered parking (in the form of carports) in the SFO parking lot currently leased from the City.
(5) Solar Phase 3 would consist of installing PV cells of 120 kW capacity on covered parking (in the form of carports) in the Costco parking lot.
(6) Wind project consists of two-250 kW wind turbines.
(7) Hydroelectric project consists of one-43 kW turbine.

Figure 7.4
SOLAR PANELS AND WIND TURBINE LOCATIONS
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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Wind

The proposed wind project for the WQCP site would consist of two-250 kW wind turbines. Project costs are estimated at $3.3 million, but with grants, the net cost would be $2.6 million. Compared to solar power, the wind component has a less favorable benefit to cost ratio of about 1.0, with an estimated payback of 19 years.

Hydroelectric

The proposed hydroelectric project would have a capacity of 43 kW and it would run more or less continuously. However, because of relatively high project costs of $0.8 million and no available grants, the payback period is about 37 years. Therefore, this project is not recommended to be implemented with City funds. However, business tax incentives (a tax credit of up to 30% of the construction cost of the project) are available for renewable energy such as hydroelectric. Thus, if a private tax liable entity was interested in working with the City, this project may become economically beneficial.

7.3 ENERGY EFFICIENCY ASSESSMENT

The WQCP has already optimized energy efficiency in many ways, such as intermittent blower usage in the aeration basins. Based on the visual condition assessment and performance review, the following additional recommendations were made for adaptations the City could make to save energy:

- **Install occupancy sensors.** Consider the use of occupancy sensors to shut off interior lighting for electrical/mechanical rooms and some process areas when not in use. Several rooms entered during the condition assessment had lights on but did not appear to be in use.
- **Increase head in wet well.** Increase level in influent wet well to increase suction head and decrease pumping requirements.
- **Reduce dissolved oxygen (DO) set-point.** Gradually reduce DO set point from the current 2.0 and 2.5 mg/L to as low as 0.5 mg/L. Calibrate DO sensors to guard against measurement error that could result in anoxic conditions.
- **Upgrade blowers.** As an initial upgrade, replace one blower with a high speed turbo blower.
- **Optimize digester hot water loop.** Install PLC controls with temperature sensors and pressure gauges in digester hot water loop. Program automatic control of boiler operation into PLC with setpoints adjustable at the SCADA system to inhibit boilers when not needed.

7.4 ENERGY PROGRAM – SUMMARY AND RECOMMENDATIONS

It is recommended that the WQCP continue making energy efficiency improvements as discussed in Section 7.3. Further, it is recommended that the WQCP proceed with alternative energy projects. An economic and non-economic analysis of the cogeneration and renewable energy projects led to the following recommended projects to develop energy at the WQCP:

- Cogeneration: Add two 300 kW fuel cell, and gas scrubbing system with capacity for the fuel cell and existing engine-generator. The engine-generator and fuel cell would operate in parallel. A FOG receiving station should be installed to receive FOG from local haulers. The additional gas produced from FOG would be used to replace the natural gas usage, and increase electricity generation.
- Solar Photovoltaics: Implement a 150-kW solar PV project on the rooftops of WQCP buildings and on carports on the maintenance building parking lot. The economic analysis shows that this project will be more beneficial to the WQCP if it invests the money up-front. However, a Power Purchase Agreement (PPA) will also provide the WQCP economic benefit, and either option may be selected based on input from City Council.
- Wind energy: Implement a 500-kW wind energy project after performing environmental studies on bird kills. It is more economically beneficial to the WQCP to implement a wind project using PPA.
- Hydroelectric energy: If a private partner is interested, explore a hydroelectric project through a PPA.

Summarized in Table 7.8 are the project costs of each recommended project.

Table 7.8 Recommended Energy Projects
Facility Plan Update
South San Francisco/San Bruno WQCP

Project	Project Costs (1) ($M)	Grants and RECs ($M)	Net Project Costs ($M)
1) Upgrade existing engine	2.6	0	2.6
2) Fuel conditioning system	1.9	0	1.9
3) Two-300 kW fuel cell(2)	6.9	2.7	4.2
4) FOG facility	0.7	0	0.7
5) Solar PV, 150-kW installation	1.2	0.4	0.8
6) Wind turbines, two-250-kW installation (as a PPA only(3))	3.3	0.7	2.6

Notes:
(1) Costs are presented in January 2010 dollars, and include construction costs, estimating contingencies, contractor overhead and profit, design fees, sales tax, and construction management.
(2) Includes cost for a low pressure digester gas holder.
(3) PPA = Power Purchase Agreement. The Wind turbine project should only be implemented as a privately funded project.

RECOMMENDATIONS

There are three main categories of projects that have resulted from the Facility Plan – wet weather flow projects driven by the National Pollutant Discharge Elimination System (NPDES) permit requirements, repair and rehabilitation projects needed for the upkeep of the existing facilities, and energy projects driven by a goal to offset the WQCP's energy use with renewable energy, and generate revenue for the WQCP.

8.1 NPDES PERMIT DRIVEN/WET WEATHER FLOW PROJECTS

The 2008 NPDES permit requires the WQCP to minimize blending and eliminate near shore discharges.

Blending can be minimized by discharging secondary effluent to the NBSU outfall, and storing the primary effluent, which is a change from current wet weather operating procedures. In addition, the WQCP should increase the wet weather secondary treatment capacity, so that the entire effluent discharged to NBSU, and subsequently the Bay, is secondary treated. The wet weather secondary treatment capacity of the WQCP can be increased by improving the sludge settleability by installing selectors in Aeration Basins 5 through 7, and by constructing a new secondary clarifier.

Un-permitted near shore discharges to Colma Creek can be eliminated by constructing a storage basin to store the excess flows from a 10-year, 24-hour storm, and obtaining a permit to discharge to Colma Creek under such extreme wet weather conditions.

8.2 REPAIR AND REHABILITATION PROJECTS

The visual condition assessment on January 28, 2010 led to the development of a repair and rehabilitation project list. This is documented in Chapter 4, Condition Assessment, Table 4.1. Many of these projects are small, and will likely be grouped together during execution. For the purposes of the CIP, these projects were grouped together by area.

8.3 GREEN ENERGY PROJECTS

Opportunities for cogeneration and green energy were evaluated at the WQCP. The WQCP already has a 400-kW engine that produces 32% of the plant power needs. The alternatives analysis included existing and other cogeneration options, fuel cells, solar photovoltaics, wind, and hydro power. It is recommended to keep utilizing its existing engine at the WQCP and install emissions control equipment, a fuel conditioning system, and 2-300-kW fuel cell. The fuel cell projects should be pursued if grant funding to offset costs are available. It is also recommended that the City invest in solar photovoltaics on existing WQCP buildings and parking lots. It only makes sense to invest in wind and hydro energy if private partners are willing to participate and share in the capital costs.

8.4 FUTURE PROJECTS

Aeration basins 1 through 4 are in poor condition and therefore are recommended to be abandoned. This will result in the WQCP is losing 18 percent of its secondary capacity. This reduces the plant’s rated capacity to 10.6 mgd instead of matching the permitted capacity of 13 mgd. It is not recommended that the WQCP lose its rated capacity. It is not advised to rehabilitate aeration basins 1 through 4, instead it is recommended that the WQCP build a new, modern aeration basin similar to basins 8 and 9 that includes selectors to improve sludge settleability and overall secondary process performance. The 1997 Facility Plan planned for expansion of aeration basins 10 and 11 and reserved space for it.

The trigger for the construction of additional aeration basin 10 could be two-fold. One is if the WQCP sees growth in its service area that causes flows to approach its capacity of 10.6. The second is triggered by regulation. If the WQCP is required to nitrify and denitrify, it will need to provide more aeration basin capacity. It is recommended that the WQCP invest in building aeration basin 10 over the 30-year planning period to restore the WQCP capacity to 13 mgd.

The City of South San Francisco is in the process of evaluating opportunities to implement recycled water. A decision has not yet been made about the size and location of facilities. For the purposes of this Facility Plan, it is prudent to leave space for the addition of tertiary treatment should a recycled water program be implemented.

8.5 SUMMARY OF RECOMMENDATIONS

Table 8.1 summarizes the projects recommended by the Facility Plan, and their costs.

Figures 8.1 and 8.2 show the organization of the recommended projects, and their layout at the WQCP site. Figure 8.3 shows the space reserved for future projects, including future nutrient removal and future recycled water facilities.

Table 8.1 Recommended Projects Facility Plan Update South San Francisco/San Bruno WQCP

Phase and Project	Project Cost[1] ($M)
5-Year CIP	
Project 1 – High Priority Projects	
Replace 2000 kW generator, switchgear and building	3.2
Replace elevated bus duct/arc flash study	1.9
SCADA server upgrade	0.1
Seismic Improvements to Blower Building #1	0.4
Subtotal for Project 1	**5.6**
Project 2 – Minimize Blending	
Improve flow monitoring, automation of flow split, gate operators	0.4
Improve Sludge Settleability (Selectors in ABs 5-7, mixers in AB 8 & 9)	1.2
New Secondary Clarifier[2]	5.0
Wet Weather Mixed Liquor Lift Station and RAS/WAS PS	0.8
Piping to pond fill/drain pump station	1.0
Subtotal for Project 2	**8.4**
Project 3 – Permit and Flood Studies	
Permit to discharge to Colma Creek[3]	1.0
Flood protection study	0.3
Subtotal for Project 3	**1.3**
Project 4 – Energy Projects	
Solar PV, 150 kW installation[4]	0.9
Replace 1 blower with a high efficiency blower	0.5
Subtotal for Project 4	**1.4**
Project 5 –Repair and Replacement Projects	
Stormwater Pumpstation	0.6
Miscellaneous R&R projects[5]	0.3
Subtotal for Project 5	**0.9**
Project 6– Reliability Improvements	
New vortex grit removal system	1.8
Miscellaneous reliability projects[6]	0.2
Subtotal for Project 6	**2.0**

Table 8.1	Recommended Projects Facility Plan Update South San Francisco/San Bruno WQCP
Project 7 – Solids Handling	
Replace Digester 3 heat building	0.1
Digester 3 rehabilitation	2.8
Clean out solids from Digesters 1, 2 & 3	0.1
Subtotal for Project 6	**3.0**
Subtotal for 5 Year CIP Projects	**22.6**
10 Year CIP Projects	
Upgrade existing engine/600 kW fuel cell/FOG	12.1
Effluent Storage Basin(7)	12.1
Digesters 1 and 2 replacement	10.8
Replace DAFs with GBT and provide odor control	4.9
Subtotal for 10 Year CIP Projects	**39.9**
15 Year CIP Projects	
Aeration Basin 10	8.6
Subtotal for 15 Year CIP Projects	**8.6**
Ongoing Maintenance	
Annual Painting Program(8)	**0.3**
Total	**71.4**

Notes

(1) Costs are presented in January 2010 dollars, and include construction costs, estimating contingencies, contractor overhead and profit, design fees, sales tax, and construction management.
(2) Includes costs for new piping to RAS/WAS pump station, flow split structure, and piping to chlorine contact tanks.
(3) At this stage it is not feasible to exactly quantify the cost of obtaining a permit. At a minimum this will include permit fees, WQCP staff time, and the costs to perform the studies required by the Regional Board. It is assumed that the cost will be approximately $1M. However, the cost will be spread out over several years.
(4) Includes a grant of $0.4 M.
(5) Miscellaneous repair and replacement projects include bar screen 4 bypass, resurfacing of the screening room, and a plant wide painting program.
(6) Miscellaneous reliability improvements include construction of a new roof over the primary clarifier chemical feed system, addition of staircase to the maintenance building roof, and replacement of the potable water system to the administration building.
(7) Costs include $1M for potential mitigation requirements for Bay infill.
(8) In addition to the projects in the 5, 10, and 15 year CIPs, an ongoing maintenance program is included in the CIP starting in FY 2017.

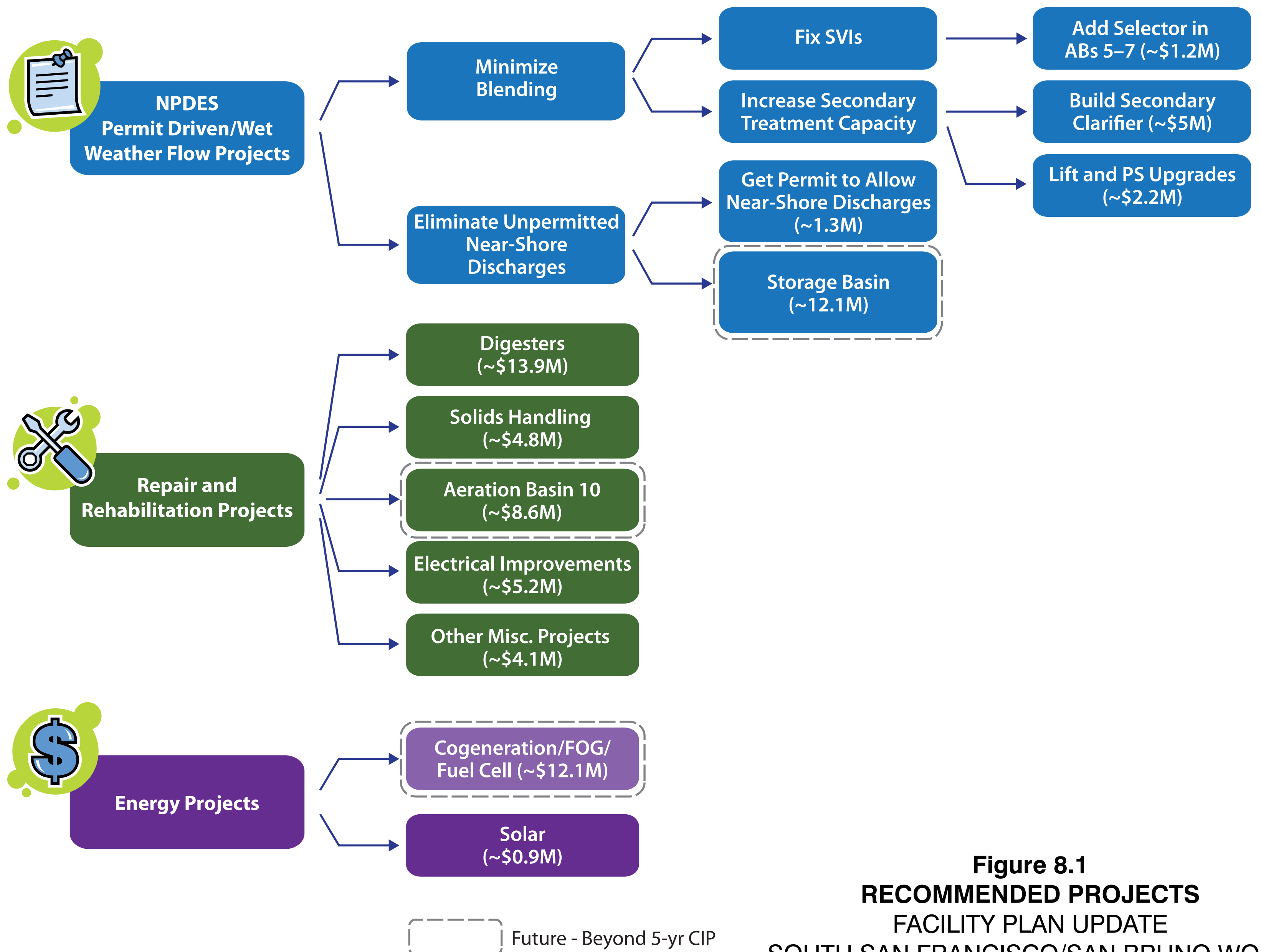

Figure 8.1
RECOMMENDED PROJECTS
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

Figure 8.2
OVERVIEW OF NEW FACILITIES
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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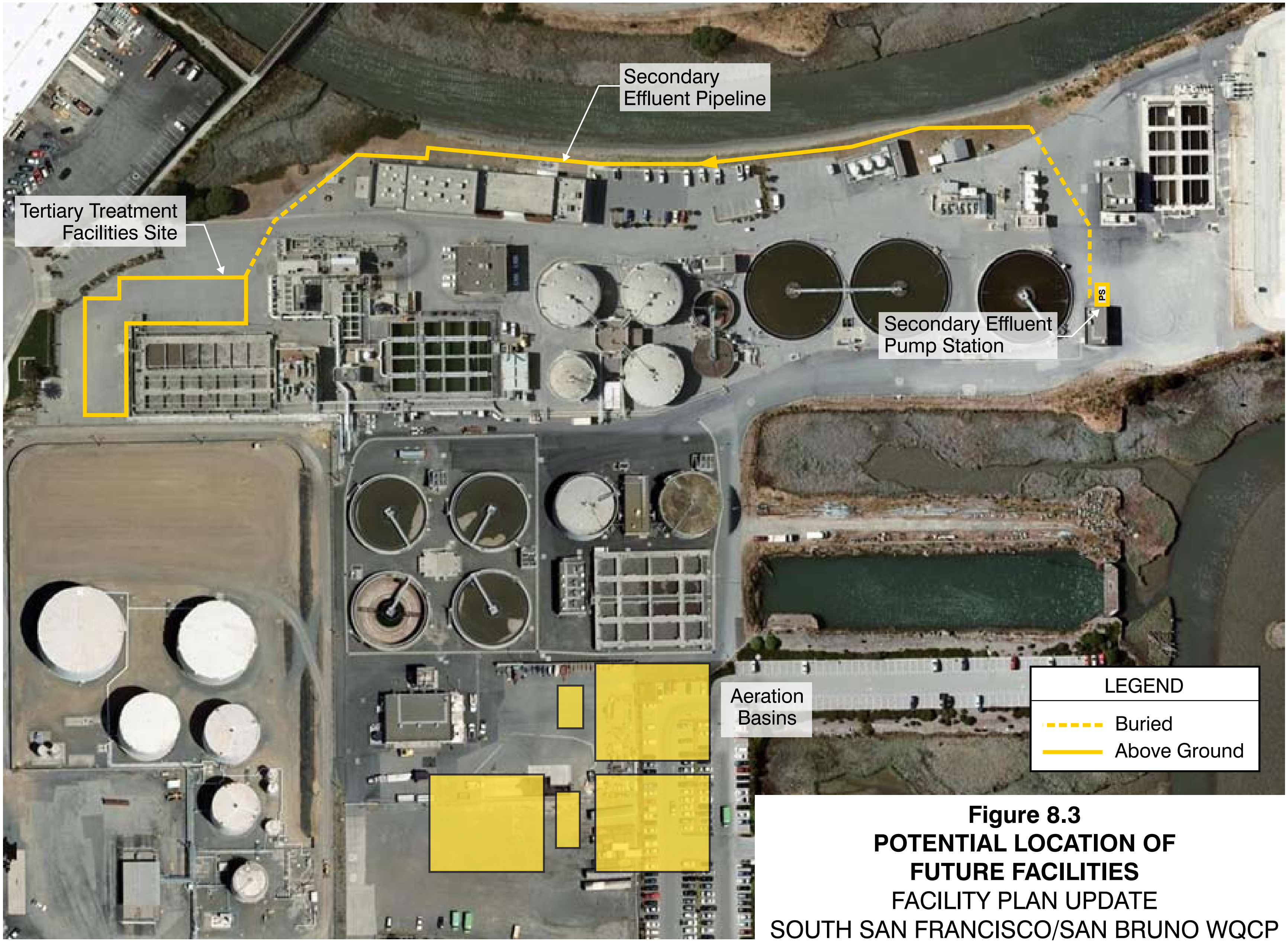

Figure 8.3
POTENTIAL LOCATION OF
FUTURE FACILITIES
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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FINANCIAL PLAN AND SCHEDULE

9.1 CAPITAL IMPROVEMENT PROGRAM

The South San Francisco/San Bruno WQCP capital improvement plan (CIP) was developed to meet the requirements for facility reliability and permit compliance. Factors considered in the development of the CIP include the existing system condition, regulatory requirements, and future capacity needs. The detailed CIP is provided in Appendix H.

9.1.1 5-Year CIP

The City of South San Francisco has established a 5-year CIP for fiscal year (FY) 2011 through FY 2015. To match this planning horizon, the 5-year CIP for the WQCP was developed to include projects that will start during the FY 2011 to FY 2015 time frame, but would not exceed the budget constraints established by the City's sewer rates.

The 5-year CIP includes projects that are needed to provide reliable permit compliant service at the lowest cost. The 5-year CIP projects were categorized into seven projects based on project timing and ease of implementation. Projects included in the 5-year CIP include:

- Project 1 – High Priority Projects
- Project 2 – Minimize Flooding
- Project 3 – Permit and Flood Studies
- Project 4 – Energy Projects
- Project 5 – Repair and Replacement
- Project 6 – Reliability Improvements
- Project 7 – Solids Handling

Table 9.1 presents the 5-Year WQCP CIP projects, their start and end dates, and estimated construction and project costs. The estimated total project cost for the projects in the 5-year CIP period totals $22.7 million.

9.1.2 10-Year CIP

The 10-year CIP includes projects to address the aged digesters, improve solids handling and odors. In addition the 10-year CIP includes construction of wet-weather storage to eliminate discharge to Colma Creek and energy improvements.

The estimated project cost for the 10-year CIP is $39.8 million. Table 9.2 presents the 10-year WQCP CIP.

Table 9.1 5-Year Capital Improvement Plan
Facility Plan Update
South San Francisco/San Bruno WQCP

No.	Category	Project	Start Date	End Date	Construction Cost ($M)	Project Cost[(1)] ($M)
1	High Priority Projects	Replace 2000kW Generator/Switchgear	2011	2012	$2.6	$3.1
	High Priority Projects	Replace Elevated Bus Duct/Arc Flash Study	2011	2012	$1.6	$1.9
	High Priority Projects	SCADA Server Upgrade	2011	2012	$0.1	$0.1
	High Priority Projects	Seismic Improvements to Blower Building #1	2011	2012	$0.4	$0.4
2	Minimize Blending	Flow Monitoring From NBSU Users	2012	2013	$0.0	$0.0
	Repair and Replacement	Automation/operators at Flow Split #1	2012	2013	$0.1	$0.1
	Minimize Blending	RAS Gate operators/Automation (ABs 8-9)	2012	2013	$0.1	$0.2
	Minimize Blending	Hydraulic Modification + Selectors (AB 5-7)	2012	2013	$0.7	$0.8
	Minimize Blending	Mixers in Aeration Basins 8 & 9	2012	2013	$0.4	$0.4
	Minimize Blending	New Secondary Clarifier	2012	2014	$4.1	$5.0
	Minimize Blending	RAS/WAS PS Expansion	2012	2013	$0.2	$0.2
	Minimize Blending	Wet Weather Mixed Liquor Lift Station (Flow Split #3)	2012	2013	$0.5	$0.6
	Minimize Blending	36" PE Pipe to Pond Fill/Drain PS	2012	2013	$0.8	$1.0
3	Facility Reliability	Flood Protection Study	2012	2013	$0.3	$0.3
	Eliminate Colma Creek Discharge	Colma Creek Permit	2012	2014	$1.0	$1.0
4	Energy Projects	Solar PV	2012	2013	$0.8	$0.9
	Repair and Replacement	Replace 1 Blower with High Speed Turbo Blower	2011	2012	$0.4	$0.5

Table 9.1 5-Year Capital Improvement Plan
Facility Plan Update
South San Francisco/San Bruno WQCP

No.	Category	Project	Start Date	End Date	Construction Cost ($M)	Project Cost[1] ($M)
5	Headworks/Primary Improvements	Stormwater PS to Route Onsite Flows to Headworks	2012	2013	$0.5	$0.6
	Repair and Replacement	Bar Screen 4 Bypass	2012	2013	$0.1	$0.1
	Repair and Replacement	Screenings Room Resurfacing	2012	2013	$0.1	$0.1
	Repair and Replacement	Plant-wide Painting Program	2012	2012	$0.1	$0.1
6	Facility Reliability	New Roof over Primary Chemical Feed System	2014	2015	$0.1	$0.1
	Facility Reliability	Add Staircase to Maintenance Building Roof	2014	2015	$0.0	$0.1
	Facility Reliability	Replace Potable Water Pipe to Admin. Bldg.	2014	2015	$0.1	$0.1
	Headworks/Primary Improvements	New Vortex Grit Removal System	2014	2015	$1.5	$1.8
7	Solids Handling	Replace Digester #3 Heat Building	2013	2014	$0.1	$0.1
	Solids Handling	Digester 3	2013	2015	$2.3	$2.8
	Repair and Replacement	Clean out Digesters 1, 4 and 5	2015	2015	$0.1	$0.2
				5-Year CIP Total	**$19.0**	**$22.6**

Note:
(1) Costs are presented in January 2010 dollars, and include construction costs, estimating contingencies, contractor overhead and profit, design fees, sales tax, and construction management.

Table 9.2 10-Year Capital Improvement Plan
Facility Plan Update
South San Francisco/San Bruno WQCP

Category	Project	Start Date	End Date	Construction Cost ($M)	Project Cost[(1)] ($M)
Energy Projects	Existing Engine Upgrade/600 kW Fuel Cell/FOG	2016	2017	$10.4	$12.1
Eliminate Colma Creek Discharge	Wet Weather Storage	2016	2019	$10.0	$12.1
Solids Handling	Replace Digester 1 and 2	2016	2018	$8.9	$10.8
Solids Handling	Replace DAFs with GBT/Odor Control	2016	2018	$4.0	$4.9
			10-Year CIP Total	**$33.3**	**$39.9**

Note:
(1) Costs are presented in January 2010 dollars, and include construction costs, estimating contingencies, contractor overhead and profit, design fees, sales tax, and construction management.

9.1.3 15-Year CIP

The 15-year CIP was developed to address longer term WQCP needs such as those needed to address potential new permit requirements or future capacity needs.

As discussed in Chapter 8, abandoning Aeration Basins 1 through 4 is recommended because the useful life for these structures has been reached and rehabilitation is not feasible. Removing the basins will reduce the aeration basin capacity by approximately 18 percent. However, the flows and loadings projections indicate that the current capacity of the remaining aeration basins will be sufficient for the entire planning period, so basins 1 through 4 would not be needed in any case. If the City wishes to preserve the original 13 million gallons per day (mgd) capacity rating, it would be necessary to construct an additional aeration basin. For planning purposes it was assumed that in the future the City will need additional capacity to attract new businesses, and there will be a need to add the aeration basin. Accordingly, the 15-year CIP includes construction of a new aeration basin. A start date of 2025 was assumed.

As discussed in Chapter 5, future regulatory scenarios include potential nutrient removal requirements. As the likelihood of this requirement is currently uncertain, no capital expenditures to address nutrient removal are included in the CIP at this time.

Table 9.3 presents the 15-year WQCP CIP. The estimated cost is $8.6 million.

9.1.4 On-Going Maintenance

Salt air from the Bay constantly attacks metal surfaces at the WQCP. An on-going painting program is recommended to minimize corrosion and other environmental effects. A plant-wide painting program to address these needs is included in the CIP starting in FY 2016. The estimated annual cost of the maintenance program is $30,000 per year from FY 2016 to FY 2021 and $10,000 per year thereafter. The program total cost over the duration of the 30-year CIP is $350,000.

Table 9.3 15-Year Capital Improvement Plan
Facility Plan Update
South San Francisco/San Bruno WQCP

Category	Project	Start Date	End Date	Construction Cost ($M)	Project Cost [1] ($M)
Repair and Replacement	New Aeration Basin 10	2025	2027	$7.1	$8.6
		15-Year CIP Total		**$7.1**	**$8.6**

Note:
(1) Costs are presented in January 2010 dollars, and include construction costs, estimating contingencies, contractor overhead and profit, design fees, sales tax, and construction management.

9.1.5 Project Schedule and Phasing

The CIP project schedule was developed by balancing the project need with availability of funds. The CIP is phased into 4 main phases:

1. 5-Year CIP.
2. 10-Year CIP.
3. 15-Year CIP.
4. On-Going Maintenance.

In order to maximize potential funding opportunities, the 5-year CIP was assumed to start in FY 2011. As previously described, the 5-year CIP is grouped in seven projects. Figure 9.1 presents an implementation schedule for the WQCP CIP. The annual cash flow resulting from the projects is presented in Appendix H.

Each of these 5 phases is described in the sections that follow.

9.1.5.1 Phase 1 – 5-Year CIP

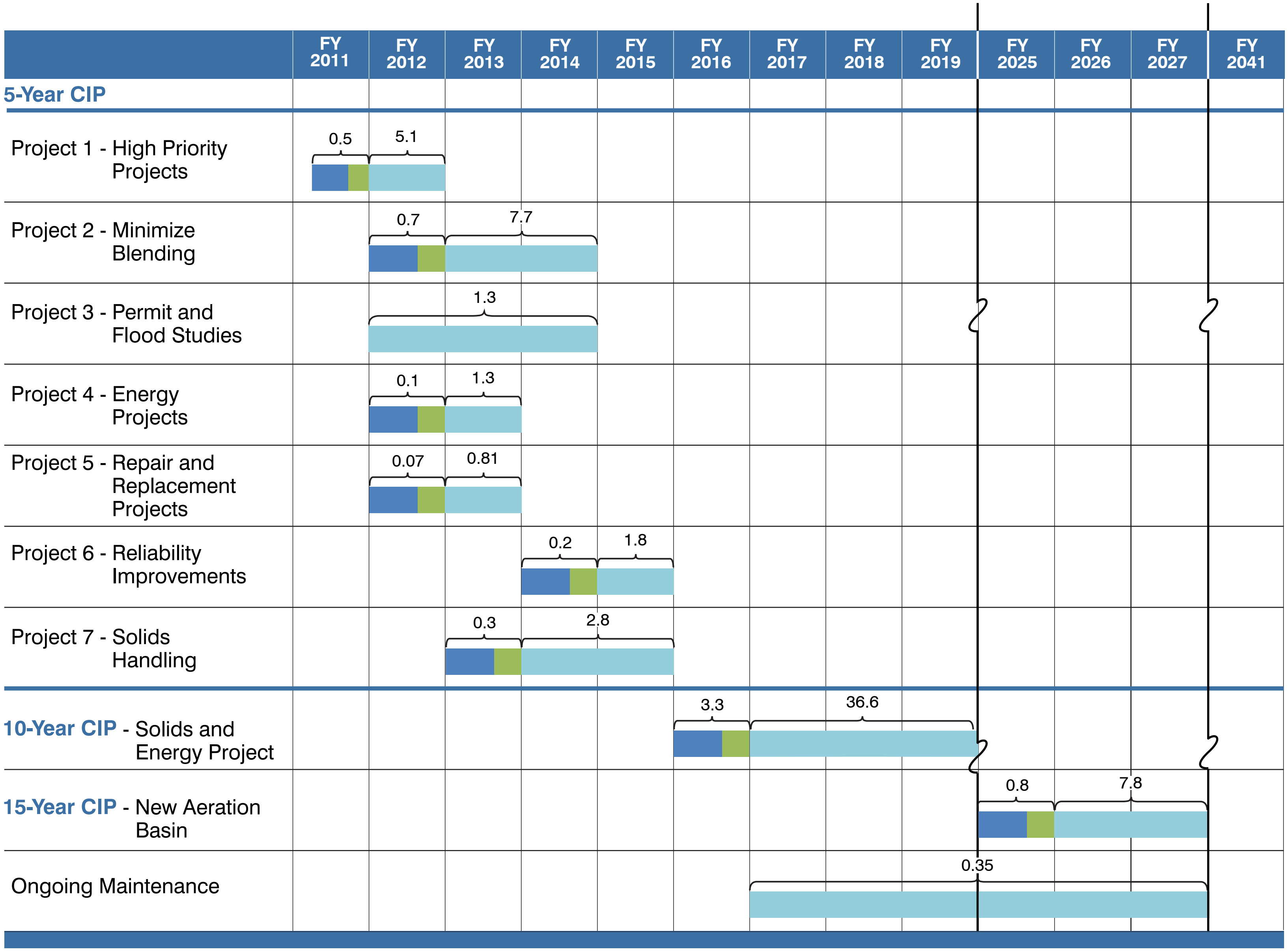
The 5-year CIP includes projects needed to immediately address operational deficiencies and reliability of the WQCP facilities. The projects needed for critical functions at the WQCP have been grouped together as “high priority projects.”

The 5-year CIP includes energy projects are driven by a goal to offset the WQCP’s energy use with renewable energy and to generate revenue for the WQCP. The CIP also includes facility reliability, permit compliance, and repair and replacement projects.

The Cities expect to pursue State Revolving Fund (SRF) grants and loans to finance the construction of the CIP projects. The SRF program requires that projects meet specific levels of design at the time of application. Therefore, the design costs associated with projects that complete construction outside the FY 2011 through FY 2015 period are also included in FY 2011 to FY 2015 expenditures.

9.1.5.2 Phase 2 – 10-Year CIP

The 10-year CIP includes the projects that start in FY 2016 and are completed by FY 2020. Projects in the 10-year CIP include non-critical projects that address aging infrastructure, improve operational efficiency, and eliminate Colma Creek discharge during wet-weather periods.



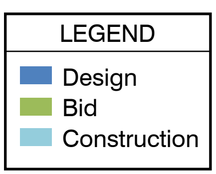


Figure 9.1
PROJECT SCHEDULE SUMMARY
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

9.1.5.3 Phase 3 – 15-Year CIP

The 15-year CIP includes future projects include projects that must be designed and constructed beyond the FY 2015 period to meet capacity and reliability needs. As discussed in the preceding sections no new capacity is required to meet future capacity needs. However, Aeration Basins 1 – 4 needs be abandoned due to structural unreliability. In order to maintain the existing aeration basin capacity at 13 mgd, a new aeration basin must be constructed. This project is not required immediately and is thus included in Phase 2.

The construction of the aeration basin is expected to start in FY 2025 and end in FY 2027. The project construction is estimated to cost $7.78 million. The timing of the project may be updated in the future as conditions change.

9.1.5.4 Phase 4 - Ongoing Maintenance

Following completion of Phase 1 through 3 projects that address immediate and near term facility needs, the WQCP will need to continue its ongoing maintenance program to maintain facility reliability. Much of these ongoing maintenance projects are included in the annual Operations and Maintenance (O&M) budget. However, in addition to the annual O&M expenditures, the WQCP will need to implement an annual, on-going painting program. This program is included in the CIP starting in FY 2016. The ongoing painting program is estimated to cost $0.35 million over the duration of the project.

9.1.6 Cost Allocations to Existing and Future Users

Typically, costs allocated with system maintenance, repair and replacement of facilities to meet a desired level of service, and regulatory compliance are attributed to existing system users. Costs associated with facility expansion to meet future demands are attributed to future users.

The projects included in the 5-year CIP are all required to provide service to existing users.

- Facility reliability projects will not provide any capacity expansion attributable to new users. The facilities replaced to address aged infrastructure or operational efficiency improvements are not expected to add any new system capacity that could be used to provide new dry-weather capacity at the WQCP.
- Expansion of secondary wet-weather capacity and wet-weather storage is required to meet State mandated requirements and is not expected to increase dry-weather capacity available to new users.
- Digester replacement projects will not provide additional dry-weather capacity attributable to new users.

The construction of Aeration Basin 10 included in the 30-year CIP is required to restore the capacity of the WQCP to 13 mgd. The cost of the new aeration basin is also attributable to existing users.

9.1.7 Project Cash Flows

The annual project cash flows were developed using the project start year, project duration, and the estimated annual expenditure dependent on project duration. Capital costs were escalated at 5 percent per year.

9.2 OPERATIONS AND MAINTENANCE COSTS

The WQCP O&M costs were developed by adjusting the current O&M costs for estimated decreases in O&M costs resulting from energy efficiency improvements and escalating the current O&M costs at 3 percent per year.

The WQCP currently expends approximately $13.5 million for its O&M expenses, including costs associated with administration, maintenance, and process and facility operation. The implementation of the solar energy project is expected to generate savings of approximately $27,000 per year (2010 dollars). The implementation of the fuel cell project in the 10-year CIP could yield up to an additional $400,000 per year (2010 dollars). Due to uncertainty surrounding availability of grants that would make the project feasible, the potential O&M savings from this project has been excluded. Similarly, no costs savings resulting from wind energy were included as no capital expenditures were assumed for wind energy projects. Appendix I presents the O&M cost projection for the WQCP.

9.3 TOTAL ANNUAL COST PROJECTION

The total annual cost projection was developed by combining the estimated annual capital costs and estimated annual O&M costs. Figure 9.2 presents the projected cumulative annual expenditures for capital and O&M.

Section 9.4 presents the funding alternatives available to the Cities. As discussed in this section, the WQCP has several financing instruments available to pay for the implementation of the CIP projects. It is assumed that the WQCP will cash finance the capital projects using revenues from rates, SRF funds and alternate financing mechanisms.

9.4 FUNDING OPTIONS

The adequate funding of capital projects is a primary constraint in project implementation. The WQCP has several funding options available for the financing of its projects. The term “funding” refers to the method of collecting funds; the term “financing” refers to methods of addressing cash flow needs. The following sections provide examples of several instruments can be utilized to fund the CIP capital costs.

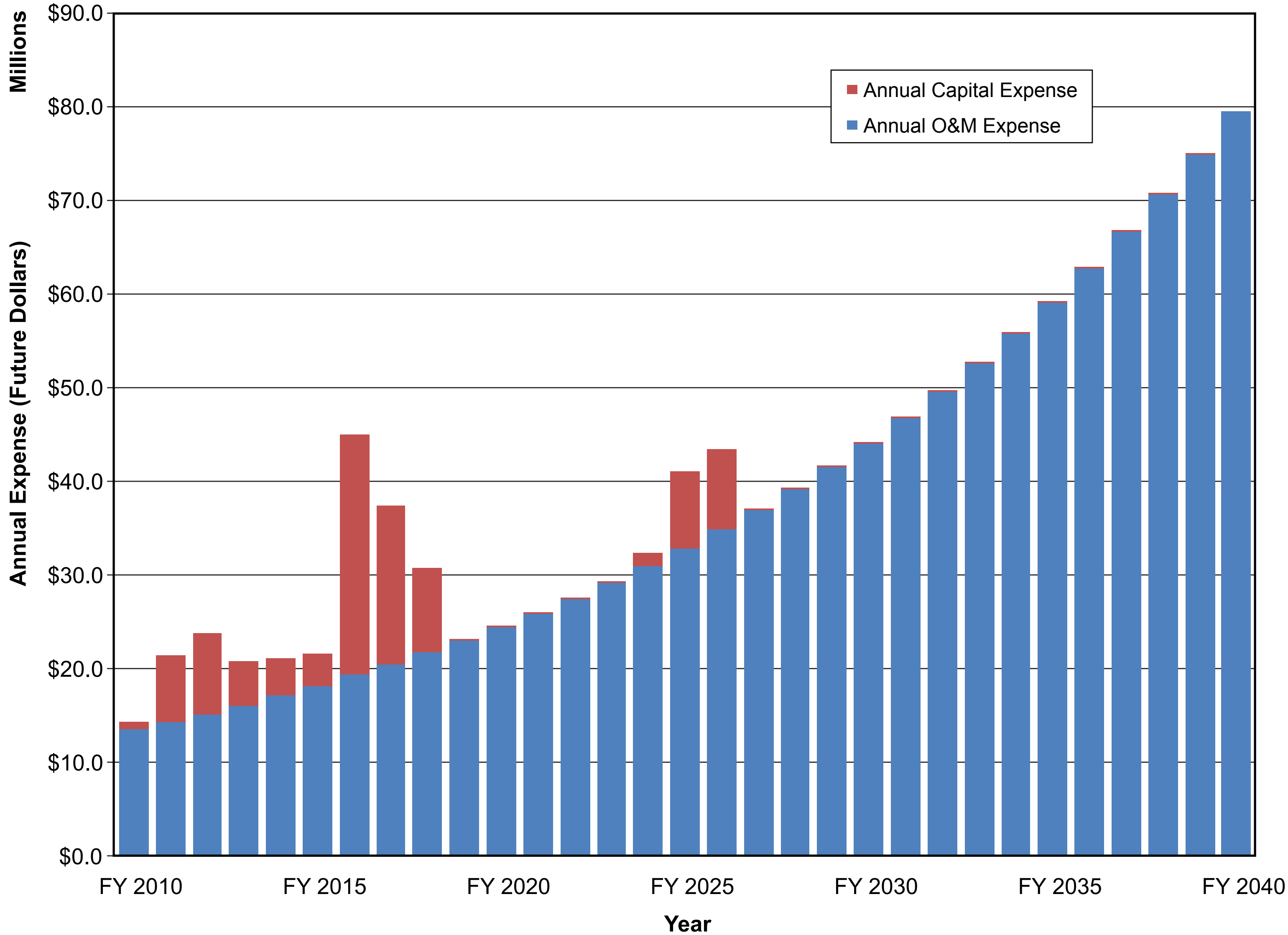


Figure 9.2
ANNUAL CAPITAL AND O&M EXPENSE
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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9.4.1 CIP Cost Recovery

Rarely does a city or an agency have sufficient revenue to fund large capital improvements directly from user fees, which is the case with pay-as-you-go financing. Therefore, it is common to use financing instruments to meet necessary funding requirements. The main financing instruments available to the WQCP for funding the capital costs include:

- Pay-as-you-go financing.
- Debt financing.
- Grants and loans.
- Market based programs.

Pay-as-you-go financing refers to upfront collection of project costs from existing and new users for future capital improvement projects. Pay-as-you-go financing generally requires large rate increases and creates cash flow problems.

Debt financing refers to the acquisition of funds through borrowing mechanisms. Debt financing requires the borrower to raise money for working capital or capital expenditures by selling bonds, bills, or notes to individual and/or institutional investors. In return for borrowed money, the individuals or institutions become creditors and receive a promise to repay principal and interest on the debt.

Grants and loans provide an alternate source of funds at no or minimal cost. Federal, State, and local grants provide funding at no cost for projects that meet select criteria. Grant funding is limited and is generally not a long-term solution to meet financing needs. State and Federal loan programs provide low-cost methods of borrowing for projects that meet select criteria. Most projects receiving grant and loan funding generally will need to secure supplemental funding sources.

Market based programs refer to financing through funds obtained from tax credits, purchase agreements, voluntary programs and trading and offset programs.

All of these funding sources are discussed in additional detail in the following sections.

9.4.2 Pay-As-You-Go Financing

Pay-as-you-go financing involves periodic collection of capital charges or assessments from customers within the municipality’s jurisdiction for funding future capital improvements. These revenues are accumulated in a capital reserve fund and are used for capital projects in future years. Pay-as-you-go financing can be used to finance 100 percent or only a portion of a given project.

One of the primary advantages of pay-as-you-go financing is that it avoids the transaction costs (e.g., legal fees, underwriters’ discounts, etc.) associated with debt financing alternatives, such as revenue bonds. However, there are two common disadvantages associated with this method. First, it is difficult to raise the required capital within the allowable time without charging existing users elevated rates. Second, it may result in inequities in that existing residents would be paying for facilities that would be utilized by, and benefit, future residents.

Several existing funding sources can be utilized to pay-as-you-go finance the project costs. These are the current fees, existing general funds, existing reserve funds, and connection fees.

The Cities have passed rate ordinances that will generate $6 million per year from sewer rates over the next four years. Capital expenditures exceeding this value will need to be financed through other mechanisms.

9.4.2.1 Utility Fees and Benefit Assessment Fees

Utility fees or benefit assessments, sometimes called service fees or user fees, consist of a fee imposed on each property in proportion to the service provided to that property. Benefit assessment fees are usually included as a separate line item on the annual property tax bill sent to each property owner.

Utility fees are usually billed on a monthly or bi-monthly interval. In all other respects, benefit assessments, utility fees, and service charges are essentially identical. A utility has the authority to collect a benefit assessment fee, but only after approval by a majority of the voters, affected property owners, or rate payers.

Both the Cities of South San Francisco and San Bruno charge its customers wastewater service fees. Table 9.4 presents the current sewer utility fee for each City.

Table 9.4 Existing Residential Sewer Rates
Facility Plan Update
South San Francisco/San Bruno WQCP

	Fixed Charge	Variable Charges
City of South San Francisco	$384 per year per residence	---
City of San Bruno	$15.12 per account per month	$5.19 per hundred cubic feet of average metered water consumption per billing period measured between December and April every year

9.4.2.2 General Fund

General funds are one type of federal funds whose receipt account is credited with federal revenues and offsetting receipts not earmarked by law for a specific purpose. General fund money comes largely from property taxes and sales taxes. Usually, the demand for funds by all departments exceeds the supply available, and therefore, these funds will likely be less available than other potential funding sources.

9.4.2.3 Development Charges/Connection Fees

The system development charges/connection fees/impact fees represent the cost of providing regional conveyance and treatment facilities to serve the new recycled water customers. They are one-time fees charged to customers at the time of system connection approval or permit/contract issuance. The charges for individual properties may be based on whatever assessment measures the City desires for equity.

A disadvantage to utilizing impact fees is that the fees cannot be collected until the system constructions permit stage at the earliest. The amount collected each year depends solely on the rate of growth of the City. Consequently, funds may not be available to construct new capacity at the time it is needed.

9.4.3 Debt Financing

There are several different options for debt financing of recycled water projects, such as issuance of bonds. Bonds used for financing public works projects are generally local government tax-exempt bonds.

9.4.3.1 Revenue Bonds

Revenue bonds are historically the principal method of incurring long-term debt. This method of debt obligation requires specific non-tax revenues pledged to guarantee repayment. Because non-tax revenues, such as user charges, facility income, and other funds are the bondholder's sole source of repayment, revenue bonds are not considered general obligations of the issuer. Revenue bonds are secured solely by a pledge of revenues. Usually the City's revenues are derived from the facility that the bonds are used to acquire, construct, or improve. There is no legal limitation on the amount of authorized revenue bonds that may be issued, but from a practical standpoint, the size of the issue must be limited to an amount where annual interest and principal payments are well within the revenues available for debt service on the bonds. Revenue bond covenants generally include coverage provisions, which require that revenue from fees minus operating expenses be greater than debt service costs.

9.4.3.2 Certificates of Participation

Certificates of participation provide long-term financing through a lease agreement that does not require voter approval. The legislative body of the issuing agency is required to approve the lease arrangement by a resolution. The lesser may be a redevelopment agency, a non-profit organization, a joint powers authority, a for-profit corporation or other agency. The lessee is required to make payments typically from revenues derived from the operation of the leased facilities. The amount financed may include reserves and capitalized interest for the period that facilities will be under construction. One disadvantage with certificates of participation, as compared with revenue bonds, is that interest rates can be slightly higher than with revenue bonds due to the insecurity associated with the obligation to make lease payments.

9.4.3.3 General Obligation Bonds

General obligation (GO) bonds are municipal securities secured by the issuer's pledge of its full faith, credit, and taxing power. GO bonds are backed by the general taxing authority of local governments and are often repaid using utility revenues when issued in support of a sewer or water enterprise fund.

9.4.3.4 Assessment District Bonds

Financing by this method involves initiating assessment proceedings. Assessment proceedings are documents in "Assessment Acts" and "Bond Acts".

An assessment act specifies a procedure for the formation of a district (boundaries), the ordering, and making of an acquisition or improvement, and the levy and confirmation of an assessment secured by liens on land. A bond act provides the procedure for issuance of bonds to represent liens resulting from proceedings taken under an assessment act. Procedural acts include the Municipal Improvements Acts of 1911 and 1913. The commonly used bond acts are the 1911 Act and the Improvement Bond Act of 1915. The procedure most prevalent currently is a combination of the 1913 Improvement Act with the 1915 Bond Act. Charges for debt service can be included as a special assessment on the annual property tax bill. The procedure necessary to establish an assessment district may vary depending on the acts under which it is established and the district size.

9.4.3.5 Marks-Roos Bonds

The Marks-Roos Local Bond Pooling Act of 1985 has proven to be one of the more useful and flexible financing devices. It expands the types of projects and programs that can be financed by joint powers authorities, facilitates regional projects and pool financing, and may offer significant economies of scale and convenience.

Marks-Roos bonds generally refer to bonds issued by a joint powers authority to make loans to or entering financing leases with or acquire bonds from two or more public entities or to a single entity for more than one project. Starting in 1989, public entities in California have been making increasing use of Marks-Roos bonds.

Advantages of Marks-Roos bonds are the ability to lock in current interest rates, and the cost savings of financing multiple projects with one bond issue versus separate stand alone bond issues for each project's financing. Disadvantages include higher interest rates if rates decrease after bonds are issued, greater legal and administrative complexity and risk, and additional costs resulting from the complexity and size of the bonds if proceeds are not entirely used to acquire obligations.

9.4.4 Grants and Loans

Several grant and loan programs can be utilized to finance wastewater projects. The grant and loan options include State funded programs such as the SRF and Federal programs such as grants and loans through the Environmental Protection Agency (EPA) and US Bureau of Reclamation (USBR). Please refer to the program websites for the most up to date information for each of these grants and loans. It is possible that some of these grant and loan programs are discontinued and/or that new programs become available.

The advantage of these grant and loan programs is the lower cost of borrowing. However, these grant and loan programs are highly competitive and dependent upon State and Federal budget cycles.

GLOSSARY OF TERMS

5-Year, 6-Hour Storm Event: A 5-year, 6-hour storm event means the maximum 6-hour precipitation event with a probable recurrence interval of once in 5 years.

10-Year, 6-Hour Storm Event: A 10-year,6-hour storm event means the maximum 6-hour precipitation event with a probable recurrence interval of once in 10 years.

10-Year, 24-Hour Storm Event: A 10-year, 24-hour storm event means the maximum 24-hour precipitation event with a probable recurrence interval of once in 10 years.

AAF: Annual Average Flow (average flow over 365 days).

ACE: Army Corps of Engineers.

ACTIVATED SLUDGE: A secondary treatment process in which primary effluent is aerated to convert wastes to microorganisms, which are subsequently removed by secondary clarification.

AMMF: Average day, maximum month (maximum monthly average for the year).

ADWF: Average Dry Weather Flow; is the average flow though the system during dry weather, which is defined as the lowest consecutive three month average during the year.

ANAEROBIC DIGESTION: Digestion of organic and inorganic matter in the absence of oxygen. By products of anaerobic digestion are methane and carbon dioxide gas.

BAR SCREEN: A mechanism that removes debris and rags from raw wastewater.

Bay: The San Francisco Bay.

BAAQMD: Bay Area Air Quality Management District

BNR/TERTIARY TREATMENT: Biological Nutrient Removal and Tertiary Treatment. This is a two-phase process in which Nitrogen is removed, followed by additional filtration, and a high level of disinfection.

BOD_5: Five Day - Biochemical Oxygen Demand; is a widely used parameter for measuring organic pollution; BOD_5 is a measurement of the oxygen demand of microorganisms used in the biochemical oxidation of organic matter. Measure by the amount of oxygen depleted in a sample after five days.

CEMS: Continuous Emissions Monitoring Systems. This is equipment that may be required for the existing combustion engine, when more stringent emissions regulations are passed by the BAAQMD.

CEQA: California Environmental Quality Act

CIP: Capital Improvement Program.

CTR: California Toxics Rule - limitations for metals and toxicity for discharges to inland surface waters.

d/D: The maximum flow depth to pipe diameter ratio is the maximum ratio of depth of the water in the pipe to the diameter of the pipe.

DAF: Dissolved Air Flotation. Used to separate particles from a liquid phase by using fine air bubbles to float the particles to the surface. Used to remove algae from treatment pond effluent.

DHS: Department of Health Services.

DISINFECTION: Disinfection of treated water before discharge to deactivate pathogens or organisms carried over from treatment process.

ECRPC: Environment California Research and Policy Center.

ELECTIRCAL CONDUCTIVITY (EC): A measurement of concentrations of salt and other minerals. See TDS.

FEMA: Federal Emergency Management Agency.

FIRM CAPACITY: Maximum designed capacity of the system, with the largest unit out of service.

FIXED FILM REACTOR: A biological reactor that employs a biological film or slime layer adhered to either a plastic or natural media. The purpose of the reactor is waste stabilization and the removal of organics.

GHG: Greenhouse Gases

gpd: Gallons per day.

gpm: Gallons per minute.

GRIT REMOVAL: Removal of sand and similar debris before subsequent treatment.

HEADWORKS: The facilities that provide influent pumping and preliminary treatment to remove large particles such as rags and grit.

HEC-RAS: Hydrologic Engineering Centers River Analysis System.

HGL: Hydraulic grade line.

HYDRAULIC MODEL: Mathematical hydraulic model used to calculate flows and capacity of the collection system.

HYDRAULIC PROFILE: Pressure profile in terms of feet and water.

IPCC: Intergovernmental Panel on Climate Change.

MEDIA FILTRATION: Use of sand or cloth to filter water.

mg or MG: Million Gallons.

mgd or MGD: Million Gallons Per Day.

MHHW: Mean higher high water.

MICRO FILTRATION: Use of membranes to filter water.

MIXED LIQUOR: Contents of an aeration basin containing microorganisms that treat BOD.

MMF: Maximum monthly flow.

NAVD 88: North American Vertical Datum established in 1988.

NITRIFYING TRICKLING FILTER: Similar to a Fixed Film Reactor but used to remove ammonia nitrogen from secondary or tertiary effluent.

NOAA: National Oceanic and Atmospheric Administration.

NOS CO-OPS: National Ocean Service Center for Operational Oceanographic Products and Services

NPDES: National Pollutant Discharge Elimination System is a permit program enforced by the USEPA to limit pollution from point sources and non-point sources.

NRC: U.S. Marine Board Commission on Engineering and Technical Systems National Research Council.

O&M: Operations and Maintenance.

OXIDATION PONDS: Stabilization ponds that may be aerated to supply oxygen in order to remove organic matter and settle solids.

PARSHALL FLUME: An open channel flow meter, used by the WQCP to measure influent flow.

PDWF: Peak Dry Weather Flow; the maximum flow during dry weather conditions.

PHWWF: Peak Hour Wet Weather Flow; The maximum hourly flow experiences at the WQCP during wet weather conditions.

PLC: Programmable Logic Controller

PPCPs: Pharmaceuticals and Personal Care Products

PRIMARY CLARIFIER: A sedimentation process that settle out solids by gravity.

PRIMARY EFFLUENT: Wastewater that has undergone primary treatment.

PS: Pump station.

R&R: Rehabilitation and Replacement

RECs: Renewable Energy Credits

RCP: Reinforced Concrete Pipe is concrete pipe with steel rebar added in the concrete to increase strength. RCP may be susceptible to corrosion.

RO: Reverse osmosis (a membrane system to remove salinity and other minute constituents).

ROWD: Report of Waste Discharge. A document submitted with NPDES to permit removal application.

RWQCB: Regional Water Quality Control Board.

SCADA: Supervisory Control and Data Acquisition; monitoring and control equipment within wastewater treatment plants and collection system (lift stations).

SCAQMD: South Coast Air Quality Management District.

SECONDARY CLARIFIERS: Basins that settle out secondary solids from aeration basins.

SECONDARY EFFLUENT: Wastewater that has undergone secondary treatment.

SECONDARY TREATMENT: A biological process to remove organic matter in wastewater.

Shoreline Study: South San Francisco Bay Shoreline Study.

SIP: State Implementation Plan (metals and toxicity limitations in effluent discharged to inland surface waters).

SOI: Sphere of Influence.

SSF/SB: South San Francisco/San Bruno

SSO: Sanitary Sewer Overflows; exceedance of sewer collection system capacity.

STORAGE PONDS: Ponds for storing treated wastewater.

SVI: Sludge Volume Index, a measure of the settleability of the sludge generated in the secondary treatment process.

TDS: Totals dissolved solids.

TMDL: Total maximum daily loads.

TITLE 22: California regulations for recycled wastewater.

TRUNK SEWER: Backbone sewer pipeline used for conveyance of sewer flows from smaller diameter collection mains.

TSS: Total Suspended Solids - a measure of solid material contained in wastewaters. Main parameter in designing solids handling facilities.

UV: Ultra violet radiation. Used for disinfection of wastewater effluent.

VCP: Vitrified Clay Pipe.

VSS: Volatile Suspended Solids - a measure of organic material inside an anaerobic digester.

WCO: Water quality objectives.

WDR: Waste Discharge Requirements - issued by the state to cover land disposal requirements.

WLA: Waste load allocation.

WQBELs: Water Quality Based Effluent Limits

WQCP: Water Quality Control Plant.

WWTP: Waste Water Treatment Plant.

APPENDIX A – CLIMATE CHANGES

APPENDIX A - CLIMATE CHANGES

INTRODUCTION

The earth's climate is expected to change due to an increased concentration of greenhouse gas (GHG) emissions altering the chemical and radiative characteristics of the atmosphere. Although there are uncertainties about future emissions of GHGs and how and when the earth's climate will respond to the enhanced concentrations of GHGs, various studies report that detectable changes are already under way. Among a wide range of climate responses are increases in temperature and changes in precipitation, soil moisture, and sea level, which could have adverse effects on many ecological systems, as well as on human health, infrastructure, and economic systems. Because of these changes, water managers are increasingly being urged to factor future climate changes into long-term designs for infrastructure and water management systems.

The purpose of this appendix is to provide an overview of the potential effects of future climate change, specifically changes in precipitation patterns and sea level, relevant to the South San Francisco/San Bruno Water Quality Control Plant (WQCP) for the Facility Master Plan Update.

The scientific literature referenced includes key studies recently analyzing climate change impacts, which generally or specifically affect South San Francisco. The literature is identified as being the most recent and relevant or, in the case of the IPCC, internationally recognized analyses with implications for California.

PRECIPITATION PATTERNS

The purpose of this section is to summarize the potential effects of future climate change, specifically changes in precipitation patterns, relevant to the South San Francisco/San Bruno WQCP for the Facility Master Plan Update.

Current Trends in Annual Precipitation and "Extreme" Events

The key climate variable of concern to storm water management is precipitation, especially at a daily or finer timestep (Watt et al, 2003). The long-term annual average of precipitation (rainfall) South San Francisco receives is 20 inches, while the U.S. average is 37 inches. Figure A.1 shows the total annual precipitation and long-term average as recorded at San Francisco's International Airport from 1948 to 2008. More than 80 percent of California's annual precipitation occurs between November and April.

From 1910 to 1996 precipitation increased by about 10 percent across the contiguous United States. Over half of this increase in precipitation is due to an increase in the heavy and extreme daily precipitation events; in other words, daily precipitation events exceeding

2 inches (Karl and Knight, 1998). In 2004, the National Climatic Data Center (NCDC) concluded that most of the observed increase in storms with heavy and extreme precipitation levels since the early 1900s had occurred in the last three decades (Madsen and Figdor, 2007).

During the late 1970s and into the 1980s, a large-scale redistribution of atmospheric mass took place in the North Pacific associated with a change in the jet stream over the North Pacific and North America (Karl et al, 1996). Since the winter of 1976-77, the frequency and intensity of El Niño events have increased relative to previous decades (NOAA, 2006).

The results of various recent studies that analyzed data across the U.S. during the twentieth century show a trend of more frequent heavy storms, some examples are:

- In 1995, a study was completed by the NCDC showing storms with extreme rainfall becoming more frequent, and the area of the U.S. receiving this type of an event increased by 2 percent during the 20th century (Karl et al, 1995).
- In 1999, a study was completed by researchers at the Illinois State Water Survey and the NCDC that examined the period from 1931 to 1996. The study identified a trend toward more frequent extreme storms increased by 3 percent per decade from 1931 to 1996 (Kunkel et al, 1999).
- Another study was completed in 2007 using two data sets of global rainfall from 1925 through 1999. This study showed increased annual precipitation in temperate regions of the Northern Hemisphere (Zhang et al, 2007).

The Environment California Research and Policy Center (ECRPC) released a study in December 2007 evaluating trends in the frequency of extreme levels of precipitation (rainfall or snowfall) across the contiguous U.S. (as well as finer levels of geography). The analysis considered daily (24-hour duration) precipitation records obtained from the NCDC spanning from 1948 through 2006 at more than 3,000 weather stations in 48 states. Patterns in the timing of heavy precipitation relative to the local climate at each weather station were examined (Madsen and Figdor, 2007).

The 2007 ECRPC study focused on storms with extreme daily 24-hour precipitation totals that are defined relative to the local climate, selecting those with an average recurrence interval of 1 year or more. With 95 percent confidence, records show that the average increase in frequency of extreme precipitation events lies between 22 and 26 percent across the contiguous U.S. since 1948. The largest increases occurred across New England, New York, the Great Lakes area, the upper Midwest, in addition to Louisiana, New Mexico, Northern Washington, and Southern California (Madsen and Figdor, 2007).

At the state level, the trend toward increasingly frequent extreme precipitation events remains consistent. Records show a 26 percent average increase in frequency of extreme precipitation events across California since 1948. Detection of statistically significant trends in the frequency of extreme precipitation events becomes more difficult at the metropolitan level. However, 55 of the 248 metropolitan areas (as defined by the U.S. Census Bureau) showed a statistically significant increase in the frequency of extreme precipitation events. While the study did not show the results for areas in northern California, a review of extreme precipitation for areas in southern California was provided for Bakersfield, Los Angeles, Santa Barbara, and San Diego. Extreme precipitation events increased in frequency by as much as 51 to 93 percent since 1948 (Madsen and Figdor 2007).

Future Projections and Recommendations

To examine the potential future impacts of global climate change, scientists have developed computer models simulating climate. While projected temperature changes are broadly consistent across most modeling efforts, projected changes in total annual precipitation have varied widely across models and emissions scenarios (Kiparsky and Gleick, 2003; Madsen and Figdor, 2007). In addition, as models are run at finer levels of geographic resolution (e.g., regional or metropolitan level) the accuracy decreases.

California's precipitation patterns vary in different parts of the region. Precipitation relies on meteorological conditions that occur at scales smaller than general circulation models (GCMs) currently resolve, therefore GCMs do not reproduce detailed precipitation patterns accurately and down-scaled regional circulation models (RCMs) are being developed. The usefulness of these types of models is judged based on their ability to reproduce recent changes. In recent years, RCMs have become increasingly accurate and have been applied to more regions of the country.

Many regional-level models have been applied to Northern California. While the results are a bit scattered and uncertain for projected changes in *total annual precipitation*, most yield a small and narrow range of changes (Dettinger, 2005). Therefore, it is recommended that long term planning be based on current trends of total annual precipitation analyzed on a monthly basis. Monthly trending provides more specific information on the timing of precipitation events (e.g., events occurring earlier in the water year).

Although projected changes in *total annual precipitation* are mostly small and uncertain, both GCMs and RCMs project the intensity of precipitation is likely to increase around the world, with the most significant increases occurring in the middle to high latitudes (Meehl, 2005). Global simulations show the percentage increase in the extreme precipitation rate is greater than the percentage increase in the mean rainfall precipitation rate. Kharin and Zwiers show that daily (24-hour) precipitation events considered to be extreme will occur twice as often by 2046 to 2065 and three times as often by the end of the 21st century relative to those that occurred during the period of 1981 to 2000. This means that 24-hour precipitation events with return periods of 1, 5, 10, 20, 50, and 100 years (i.e., "extreme" events) will occur 2 or more times as often by the year 2100 due to climate change (Kharin and Zwiers, 2005; Kharin et al, 2007).

In addition, Karl and Knight show the annual 24-hour precipitation event with the highest amount of rainfall across the U.S. turned out to be the one projected to return more frequently (Karl and Knight, 1998). While projected changes in regions of California are less accurate, models suggest that the extreme daily (24-hour) precipitation rate will increase relative to changes in the annual mean precipitation rate. This is mainly associated with changes in moisture flowing in from the Pacific Ocean and the increase in elevation of freezing levels during the winter. By the year 2100, northern California is projected to experience an increase in both low and high intensity events (Dettinger, 2005).

In summary, it is important to consider the potential impact global climate change may have on precipitation events (i.e., total annual average and extreme events) in order to anticipate necessary modifications to WQCP design and operations management for flood prevention. Until recently, the City considered the 6-hour duration event with a 5-year return period as a basis for design and operation. The City is now evaluating impacts resulting from events having a 10-year return period, which is in line with the projected changes in extreme events due to global climate change.

SEA LEVEL RISE

The purpose of this section is to summarize the potential effects of future climate change, specifically sea level rise, relevant to the WQCP for the Facility Master Plan Update.

There are multiple reasons why sea levels vary over time, including:

- Melting land ice.
- Thermal expansion of the ocean's marine mixed layer.
- Vertical land movement.
- Meteorological forcings.
- Lunar cycle.

Increased average atmospheric temperatures at the poles due to global climate change have 1) increased the rate of melting land ice (specifically in Greenland and Antarctica) adding to the total mass of the oceans and 2) also results in thermal expansion of the marine mixed layer of the ocean adding to the total volume of the oceans. Independent of global climate change, vertical land movements and meteorological forcings also contribute to relative sea level change and astronomical tides can cause changes in water level along the California coast of about 3 meters (10 feet) (Cayan et al, 2006).

Current Trends and Future Projections

Data for the San Francisco Bay were obtained from the National Oceanic and Atmospheric Administration's (NOAA) National Ocean Service Center for Operational Oceanographic

Products and Services (NOS CO-OPS) website. Data (relative to the North American Vertical Datum established in 1988, NAVD 88) were collected from the Redwood City, Alameda, and San Francisco tide gages within the San Francisco Bay since these have the longest running records within proximity to the WQCP's facilities.

While the Redwood City tide gage is the closest to the WQCP site, it has the least data on record – beginning in 1983 and recording through 1984, then began recording data again in 1997 to present. The Alameda tide gage has the second longest record from 1940 to present. San Francisco's tide gage has the longest record of all tide gages in the U.S., from approximately 1850 to present.

In addition to the observed record, the most recent and widely accepted (published) ranges of projected sea level rise due to global climate change were researched and considered in this analysis. The National Research Council's (NRC) projections of 1987 are also included since they are being considered in the South San Francisco Bay Shoreline Study (Shoreline Study) currently under way. The selected ranges of projected sea level rise due to global climate change shown in Table A.1 come from three sources:

1. Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report of 2007 (IPCC, 2007).
2. Scientist Stefan Rahmstorf's *Science* Journal paper (Rahmstorf, 2007).
3. U.S. Marine Board Commission on Engineering and Technical Systems National Research Council (NRC) of 1987 (U.S. NRC, 1987).

Table A.1 Projected Sea Level Rise (in Inches) Due to Global Climate Change
Facility Plan Update
South San Francisco/San Bruno WQCP

	2050		2100	
Sources	**Low**	**High**	**Low**	**High**
IPCC 2007	3.8	12.5	7	23
Rahmstorf 2007	10.9	30.0	20	55
NRC(1) 1987	6.0	24.0	20	59

Note:
(1) In Figure 2-2 of the NRC text, the scenario I curve represents the low end of the projected range in sea level rise and the scenario III curve represents the high end.

The Rahmstorf projections shown in Table A.1 take into account the latest observations and science of sea level rise (specifically, the latest understanding of ice sheet dynamics and the increasing rate of land ice melt observed at the polar ice caps).

The Army Corps of Engineers is currently using the NRC projections as part of the ongoing Shoreline Study to identify and recommend federal funding for one or more projects to address a variety of land issues, one of which is sea level rise. This Shoreline Study is in the process of developing floodplain maps for South San Francisco Bay based solely on the NRC projections.

Figure A.2 shows the observed record and the range of projected monthly mean higher high water (MHHW) levels configure to NAVD 88. The projected ranges of sea levels extend from the 1990 MHHW levels through the year 2100.[1] Figure A.2 also includes the elevation of the effluent pump station (top slab) as a point of reference. Figures A.3 and A.4 show the projected inundation due to sea level rise for years 2050 and 2100, respectively.

The water level in Colma Creek is of special concern to the WQCP since the creek flows along the plant's northern boundary. Colma Creek water levels are highly influenced by both tidal action and storm events. The Federal Emergency Management Agency (FEMA) developed an insurance rate map[2] for San Mateo County in 1981 showing the estimated hydraulic grade line (HGL) due to a 100-year storm event at high tide to be at 9.7 feet relative to NAVD 88 at South San Francisco. While the water level is not regularly monitored in the stretch of the creek bordering the WQCP, plant staff have observed near-flooding conditions outside the Maintenance Building. As recently as October 13, 2009, the water level was measured to be 1.6 feet above the 100-year HGL (i.e., 11.3 feet relative to NAVD 88), which is approximately 1.5 feet below the Maintenance Building's foundation elevation.

Figure A.5 shows the elevation of FEMA's current estimate of the 100-year HGL[2] near South San Francisco as well as the highest observed water level in Colma Creek and the elevation of the Maintenance Building foundation (12.82 feet NAVD 88). The other critical area of concern for flooding or backflow into the system has been the Effluent Pump Station and the Bypass Weir downstream the Effluent Pump Station; however, the Bypass Weir has been raised in the last decade to a level preventing backflow into the current system. Figure A.6 goes a step further, showing projected rise of the FEMA 100-year HGL and the highest observed water level in Colma Creek through the year 2100.

Related Studies

In addition to the analysis presented in this appendix, there are other ongoing efforts to inform the public of the potential impact of sea level rise due to global climate change. Some of those efforts relevant to South San Francisco Bay include:

- Santa Clara Valley Water District has a map-based tool link on their website developed by U.S. Geological Survey showing inundated areas of the South Bay under 3 scenarios (18 inches, 39 inches, and 55 inches of sea level rise): http://arcview.valleywater.org/Development/SLR/SLR_Map.html

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[1] Projected ranges of sea levels are shown with respect to 1990 MHHW levels, since that is the year from which climate models start simulating projected changes in sea level due to climate change.

[2] The most recent map was released in September of 1981 and the release of a revised map is expected in September of 2010.

- The Nature Conservancy's Climate Wizard: http://www.climatewizard.org/
- San Francisco Bay Hydrodynamics Modeling Project by Stanford University and University of California - Berkeley: http://suntans.stanford.edu/projects/sfbay.php OR http://www.cal-span.org/calspan-media/metadata/COPC/COPC_07-06-14/0607COPC14_SF%20Bay%20Model.pdf
- San Francisco Bay Conservation and Development Commission's (BCDC) international design competition for ideas responding to sea level rise in San Francisco Bay and beyond. http://www.risingtidescompetition.com/risingtides/Home.html
- San Francisco BCDC report, *Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on the Shoreline*. http://www.bcdc.ca.gov/planning/climate_change/climate_change.shtml
- U.S. Geological Survey's CASCaDE (Computational Assessments of Scenarios of Change for the Delta Ecosystem) Project. http://cascade.wr.usgs.gov/data/Task2b-SFBay/
- The Pacific Institute report, *The Impacts of Sea-Level Rise on the California Coast*, and maps. http://www.pacinst.org/reports/sea_level_rise/#
- Public Policy Institute of California. http://www.ppic.org/main/publication.asp?i=755
- California Natural Resources Agency's report, *2009 California Climate Adaptation Strategy*. http://www.energy.ca.gov/2009publications/CNRA-1000-2009-027/CNRA-1000-2009-027-F.PDF

RECOMMENDATIONS

The projected ranges of sea level rise as presented in Table A.1 should be considered a minimum for planning purposes. It is recommended that implementation and operations and maintenance costs be estimated as well.

As the South San Francisco Bay Shoreline Study progresses, it is recommended that efforts be taken to coordinate results, specifically with respect to any proposed projects and funding mechanisms. It is also recommended that the projected range of sea level rise be evaluated regularly (at least every five years), as models are improving and producing more accurate results.

The WQCP site needs to be protected from flooding. Coordination with the Shoreline Study and FEMA mapping is recommended. When the flood level maps are ready, the City should conduct a hydrology study to project water levels around the WQCP site. This section of the creek likely needs to be surveyed and hydraulic models (e.g., HEC-RAS) need to be run to better understand the combined effect of heavy rain events during high winter tides. Potential flood protection measures include dredging Colma Creek to reduce bottlenecks in the flow, removal of chord grass infestations along the north bank or as a last resort, construction of a sea wall system.

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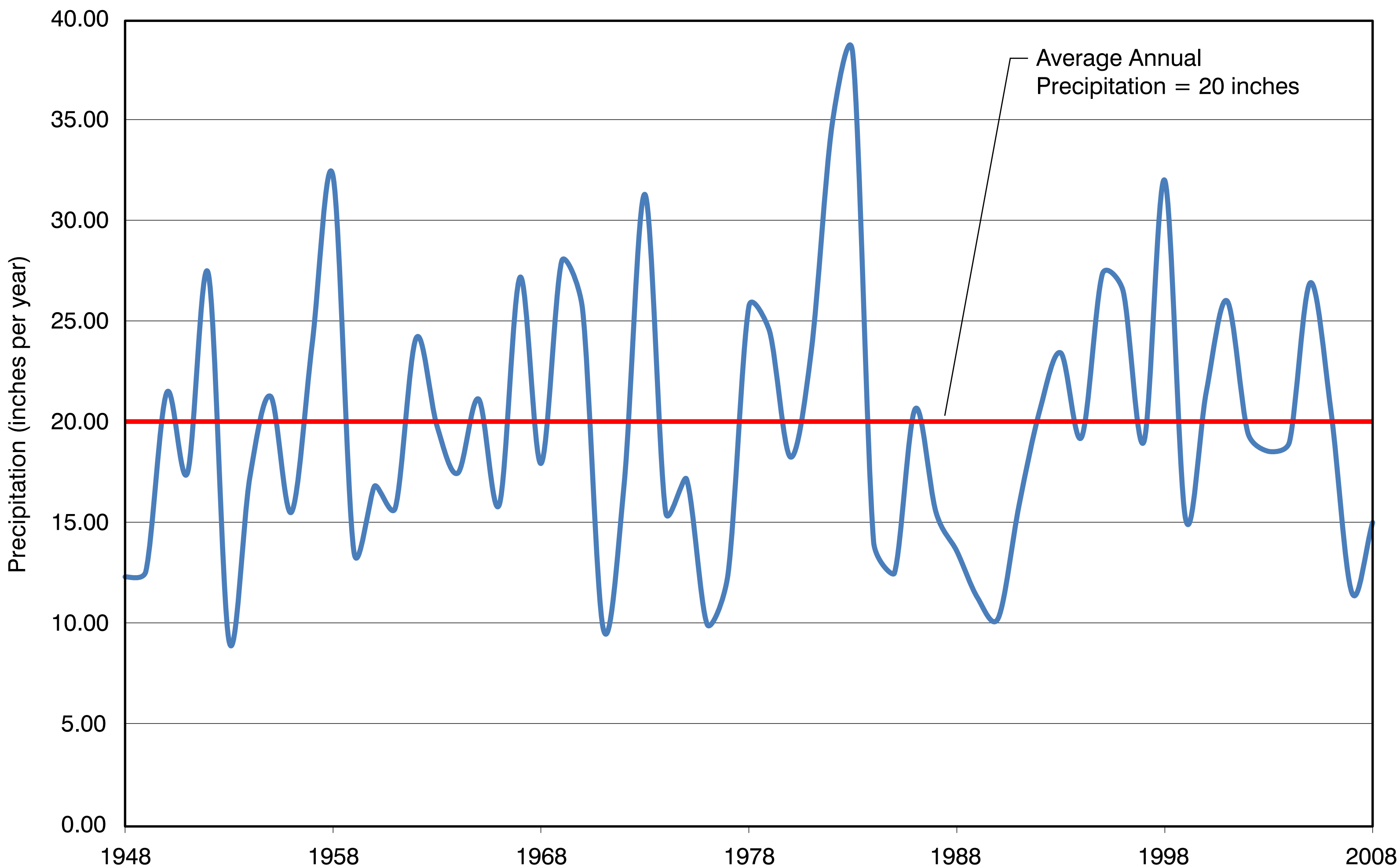

Figure A1
PRECIPITATION RECORDED AT SAN FRANCISCO INTERNATIONAL AIRPORT FROM 1948 TO 2008
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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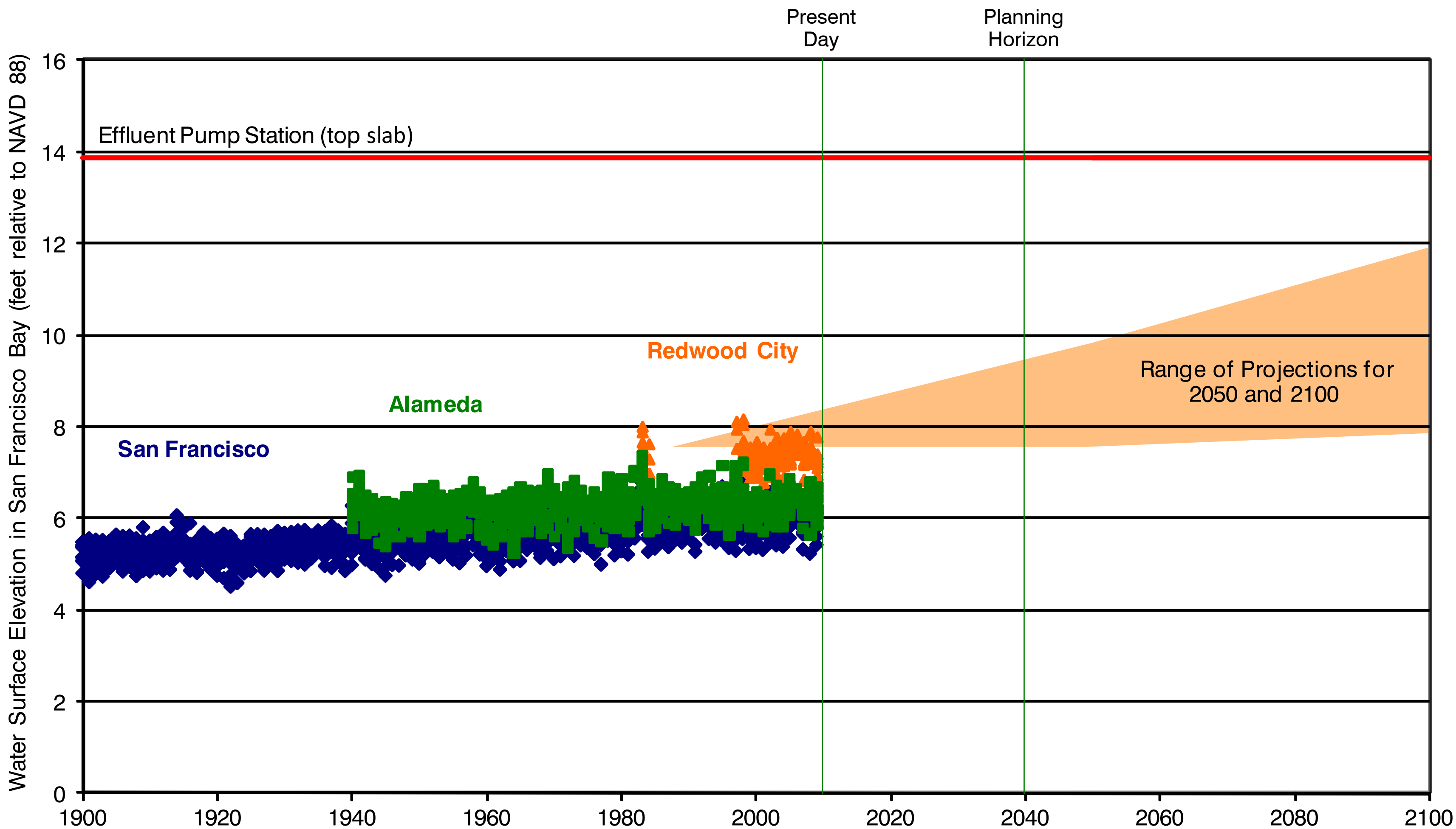

Figure A2
OBSERVED AND PROJECTED SEA LEVELS IN SAN FRANCISCO BAY
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

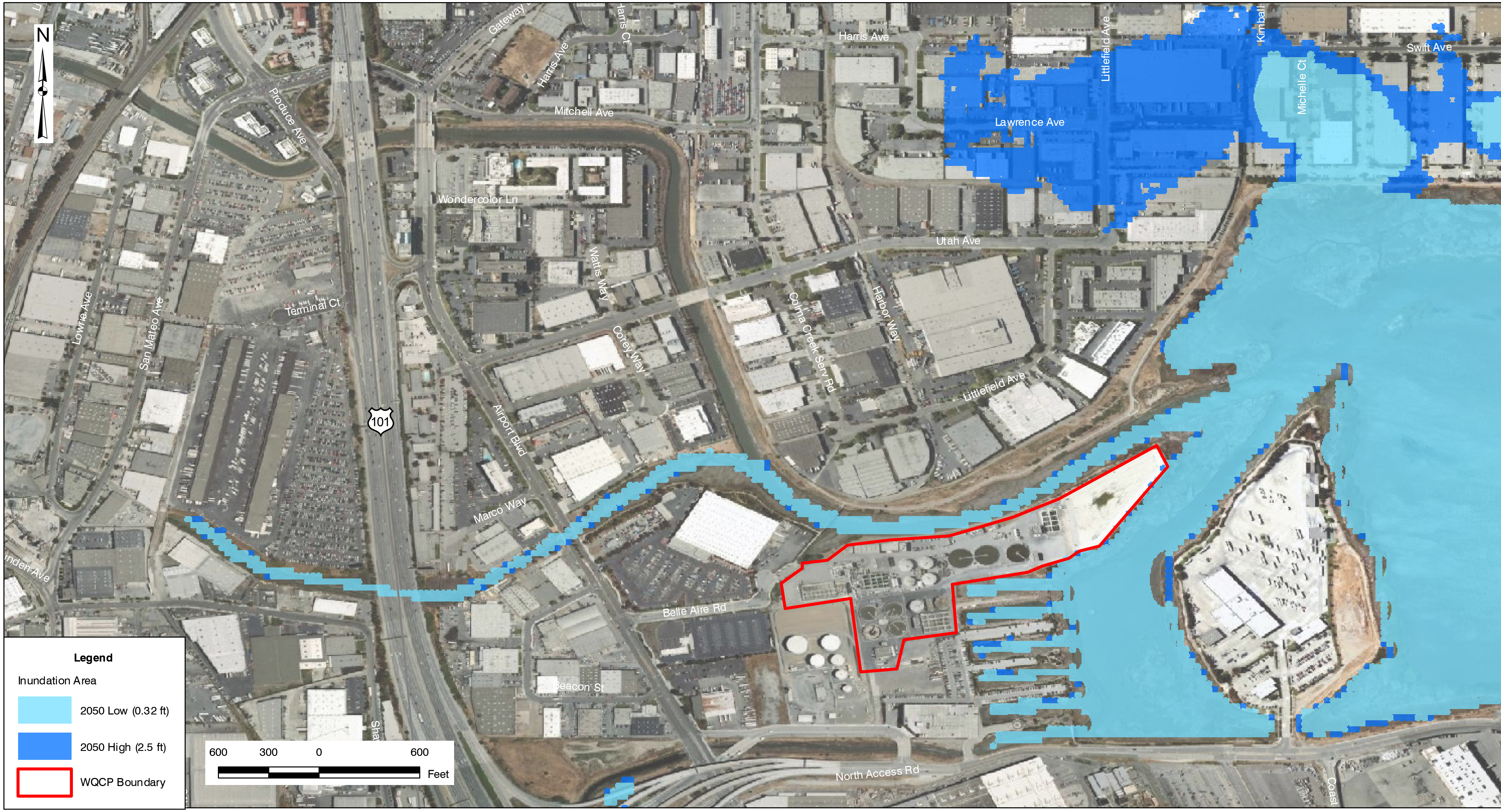

Figure A3
PROJECTED RANGE OF INUNDATION DUE TO SEA LEVEL RISE BY 2050
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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3/31/2010

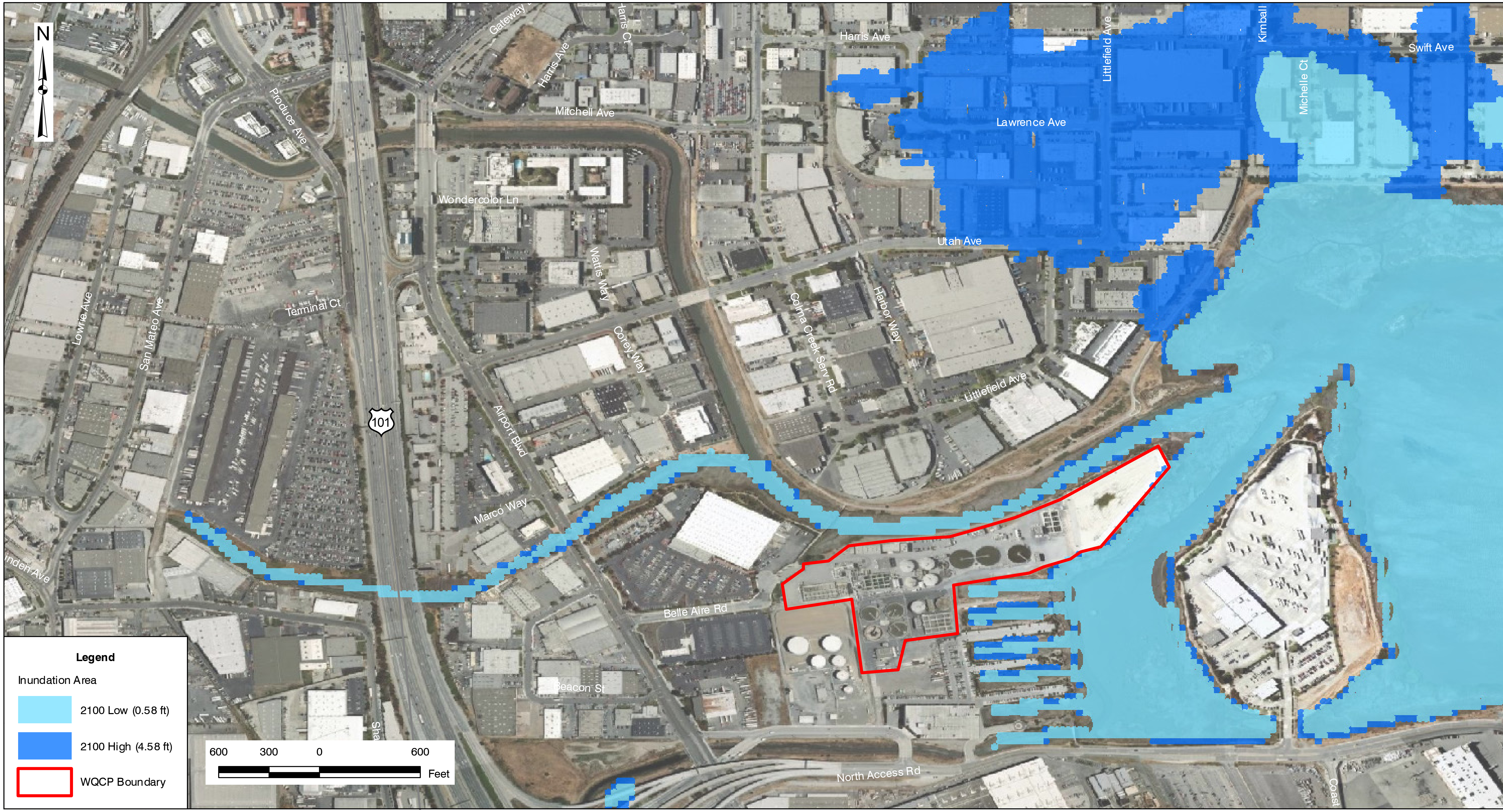

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Figure A4
PROJECTED RANGE OF INUNDATION DUE TO SEA LEVEL RISE BY 2100
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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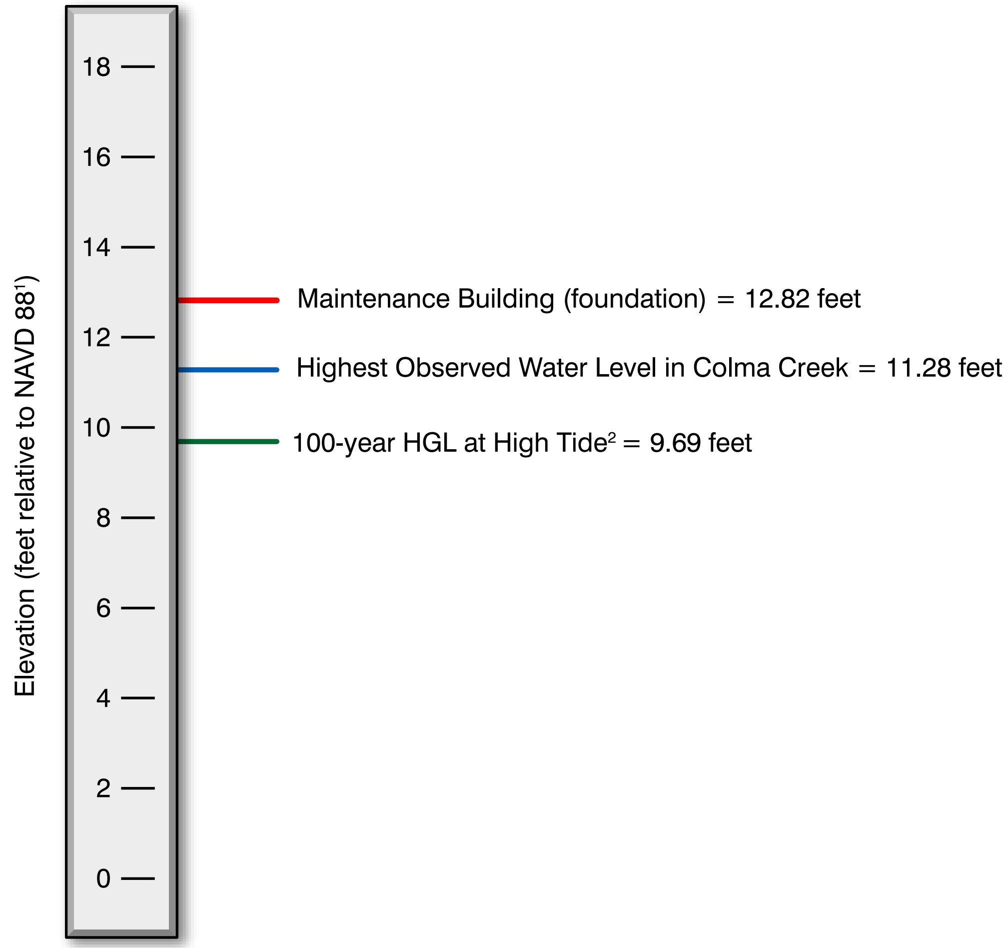
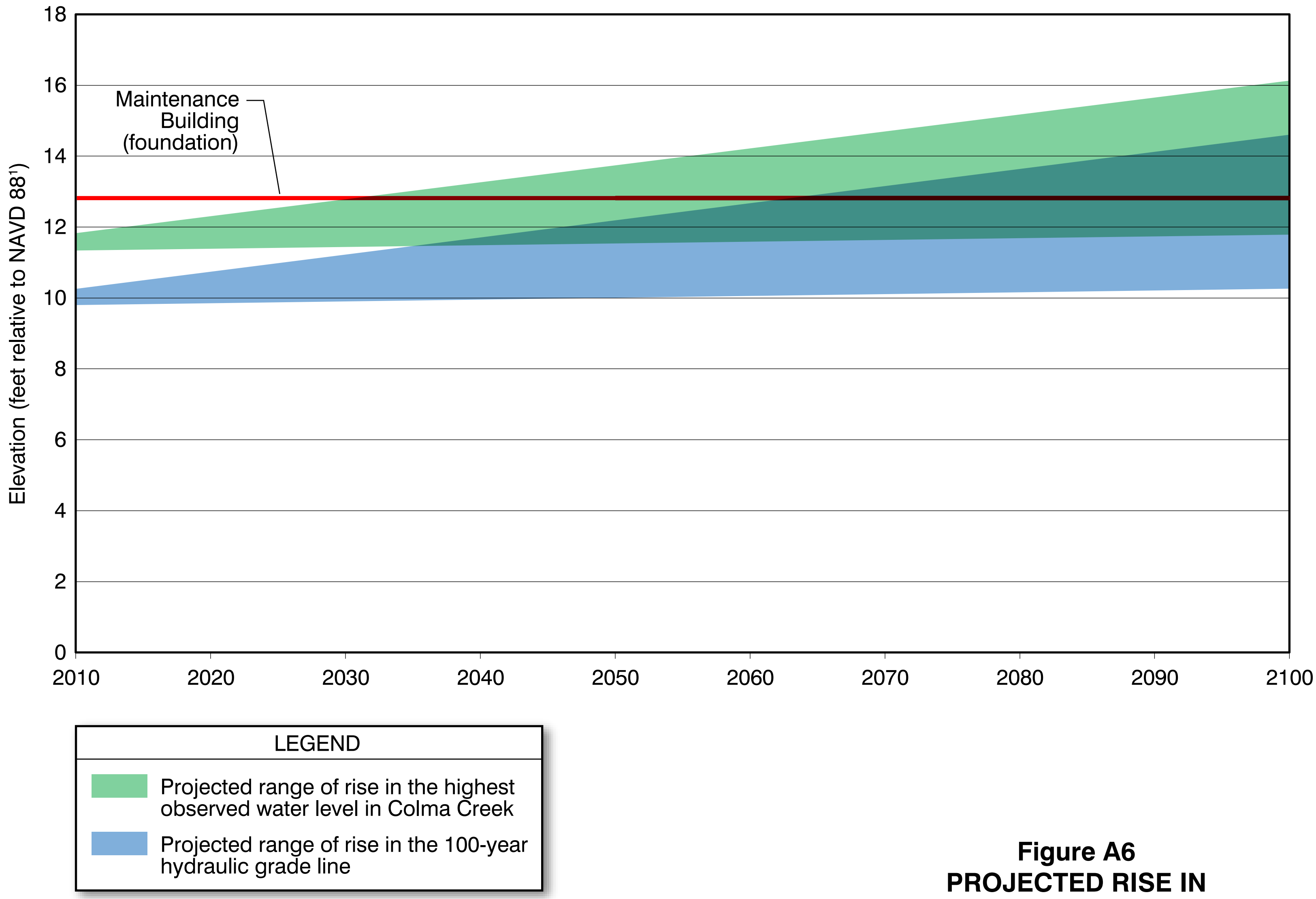
3/31/2010



NOTES:

1. Convert the elevation to be relative to plant datum by subtracting 2.69 feet.
2. 1981 Federal Emergency Management Agency 100-year storm hydraulic grade line elevation at high tide.

Figure A5
WQCP MAINTENANCE BUILDING FOUNDATION AND COLMA CREEK WATER LEVELS
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP



NOTE:

1. Convert the elevation to be relative to plant datum by subtracting 2.69 feet.

Figure A6
PROJECTED RISE IN COLMA CREEK WATER LEVELS
FACILITY PLAN UPDATE
SOUTH SAN FRANCISCO/SAN BRUNO WQCP

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APPENDIX B – COLLECTION SYSTEM MODELING WRITEUP

CITY OF SOUTH SAN FRANCISCO

HYDRAULIC ANALYSIS

SOUTH SAN FRANCISCO WATER QUALITY CONTROL PLANT UPGRADES AND UPDATES

Prepared for

Carollo Engineers

Draft No. 1

March 2010

AKEL ENGINEERING GROUP, INC.

AKEL
ENGINEERING GROUP, INC.

March 1, 2010

Carollo Engineers
2700 Ygnacio Road, Suite 300
Walnut Creek, CA. 94598

Attention: Lydia Holmes, PE
Partner

Subject: Hydraulic Analysis - South San Francisco Water Quality Control Plant Updates and Upgrades

Dear Lydia:

We are pleased to submit this letter report summarizing the hydraulic analysis results in support of the South San Francisco Water Quality Control Plant Upgrades and Updates.

This letter report summarizes the influent flows to the South San Francisco Water Quality Control Plant during the following considered potential design storms: 1) 5-year 6-hour, 2) 10-year 6-hour, and 3) 10-year 24-hour. The study also includes two potential flow alternatives from the City of San Bruno.

We are extending our thanks to the cities of South San Francisco and San Bruno staff for their assistance in providing critical information needed for completing this study and producing this report.

Sincerely,

AKEL ENGINEERING GROUP, INC.

Tony Akel, P.E.
Principal

Enclosure: Report

City of South San Francisco
Water Quality Control Plant Updates and Upgrades
Sanitary Sewer System Evaluation

Table of Contents

Page No.

Figures

Tables

Appendices

1.0 BACKGROUND AND PURPOSE

The South San Francisco Water Quality Control Plant (WQCP) is located in the City of South San Francisco in San Mateo County (**Figure 1**). The Water Quality Control Plant is bounded on the north by San Bruno Canal, the south by the North Access Road, the west by Airport Boulevard, and the east by the San Francisco Bay.

The purpose of this study is to support the WQCP Updates and Upgrades Project (Project) by estimating future anticipated known peak flows based on selected design storm events. The flow projections are based on the land use projections documented in the City of South San Francisco and San Bruno sewer system master plans, as documented in this report.

2.0 RELEVANT DOCUMENTS

Relevant documents include the following:

- **City of South San Francisco Infiltration and Inflow Study, October 1999 (1999 SSF-IIS).** This project evaluated the existing sewer system for the west of Highway 101 portion of South San Francisco. This report served as a master plan for the area, and evaluated the existing sewer system, projected future flows, and identified improvements and project cost estimates.

- **City of South San Francisco East of Highway 101 Sewer System Master Plan (2002 SSF-SSMP).** This project evaluated the sewer system of the eastern portion of South San Francisco (east of Highway 101). A hydraulic model was used to evaluate the sewer collection system based on existing land use and projected growth. The report includes recommended improvements and cost estimates.

- **City of South San Francisco Technical Memorandum East of Highway 101 2002 Sewer System Master Plan (2007 SSF-SSMP).** This project is an update to the 2002 SSF-SSMP (east of Highway 1010) and it re-evaluated the sewer collection system based on updated growth projections. The report includes recommended improvements and cost estimates.

- **City of San Bruno Sewer Master Plan and Infiltration/Inflow Study, April 2000 (2000 SB-SMPIIS).** This project evaluated the City of San Bruno sewer collection system. The project included the development of a hydraulic model which was used to evaluate and recommend improvements based on projected reductions in infiltrations and inflows.

3.0 HYDRAULIC MODELS

This project used the following existing hydraulic models for the cities of South San Francisco and San Bruno:

- City of South San Francisco – west of Highway 101: this hydraulic model was developed as a part of the 1999 Infiltration and Inflow Study (SSF-IIS), west of Highway 101. The model, developed using Hydra (Pizer, Inc), has since been used for confirming upgrades and other numerous needs.

- City of South San Francisco – east of Highway 101: this hydraulic model was developed as a part of the 2002 Sewer Collection System Master Plan (SSF-SSM), east of Highway 101. The model, developed using Hydra (Pizer, Inc), was updated in 2006 to reflect the updated growth projections documented in the 2007 SSF-SSM study. The model has since been used for other needs.

- City of San Bruno: this hydraulic model was developed as a part of the 2000 Sewer Master Plan and Infiltration and Inflow Study (SSF-SSMIIS). The model, developed using Hydra (Pizer, Inc.) was obtained from Carollo Engineers in November 2009. The project team worked with the City of San Bruno to identify sewer collection system improvements completed since 2000.

  Appendix A includes exhibits and a table that document the sewer improvements identified by City of San Bruno staff as either recently constructed or planned for short-term construction.

Figure 2 was developed to graphically depict the sewer collection systems for both the Cities of South San Francisco and San Bruno.

4.0 DESIGN STORM EVENTS

The 5-year 6-hour design storm event was used for estimating peak wet weather flows in the previously prepared studies for both South San Francisco and San Bruno. This study estimated the peak wet weather diurnal flows at the WQCP for the following design storm events:

- 5-year 6-hour design storm event with approximately 2.09 inches total precipitation

- 10-year 6-hour design storm event with approximately 2.95 inches total precipitation

- 10-year 24-hour design storm event with approximately 3.97 inches total precipitation

5.0 SEWER DESIGN FLOWS

Sewer flows were identified in the respective South San Francisco and San Bruno studies, and summarized on **Table 1**. The following flows were extracted from the previous studies:

- Average Dry Weather Flow (ADWF). Existing ADWF were based on existing land use assumptions and projected ADWF based on growth assumptions documented in each master plan.

- Peak Dry Weather Flow (PDWF). PDWF represents the maximum hourly flow occurring on a dry weather day. PDWF values range from 1.5 to 2.5 times the ADWF.

- Peak Wet Weather Flow (PWWF). PWWF represents the maximum hourly flow occurring during a design storm event and accounts for estimated infiltration and inflows, as estimated in the respective master plans. The design storms in the master plans refer to the 5-year 6-hour events (**Table 1**), although this study calculated flows from three possible design storm events, as summarized in **Table 2**.

It should be noted that the City of San Bruno 2000 study (SB-SSMIIS) considered three potential PWWF alternatives. The first alternative (Alternative A) did not include reductions in infiltrations and inflows and resulted with future PWWF of approximately 20.21 mgd. Alternative B, the preferred alternative accounted for 22 percent reduction in Infiltration and Inflows and resulted with future PWWF of approximately 15.69 mgd. Alternative C accounted for 44 percent reduction in Infiltration and Inflows and resulted with future PWWF of approximately 11.28 mgd.

Both Alternatives A and B were considered in this analysis. Alternative C, which was described as aggressive in the master plan, was not included.

Table 2 lists the flows extracted from this study's hydraulic modeling effort for the Cities of South San Francisco and San Bruno (Alterative A and B). The flows are summarized by pump station, by design storm event, and for each pump station tributary to the WQCP.

6.0 ANALYSIS RESULTS SUMMARY

In addition to the flow summaries from the hydraulic modeling effort (**Table 2**), this analysis included estimating storage pond requirements in excess of existing process capacities. **Table 3** summarizes the results for each considered design storm event and for both of San Bruno's Alternatives A and B. **Table 3** lists the peak wet weather flows, but also the maximum day wet weather flow which was used to estimate the required storage pond volume for primary and secondary effluents.

The following 6 scenarios were considered:

- **Scenario 1** – This scenario consists of a 5-year 6-hour design storm event with San Bruno flow Alternative A (**Figure 3**). The analysis results indicate that the primary effluent volume exceeding 35 million gallons per day (mgd) process capacity is 1.4 million gallons (MG), while the primary effluent volume exceeding 40 mgd process capacity is 0.1 MG.

- **Scenario 2** – This scenario consists of a 5-year 6-hour design storm event with San Bruno flow Alternative B (**Figure 4**). The analysis results indicate that the primary effluent volume exceeding 35 million gallons per day (mgd) process capacity is 0.4 million gallons (MG), while the primary effluent volume exceeding 40 mgd process capacity is 0 MG.

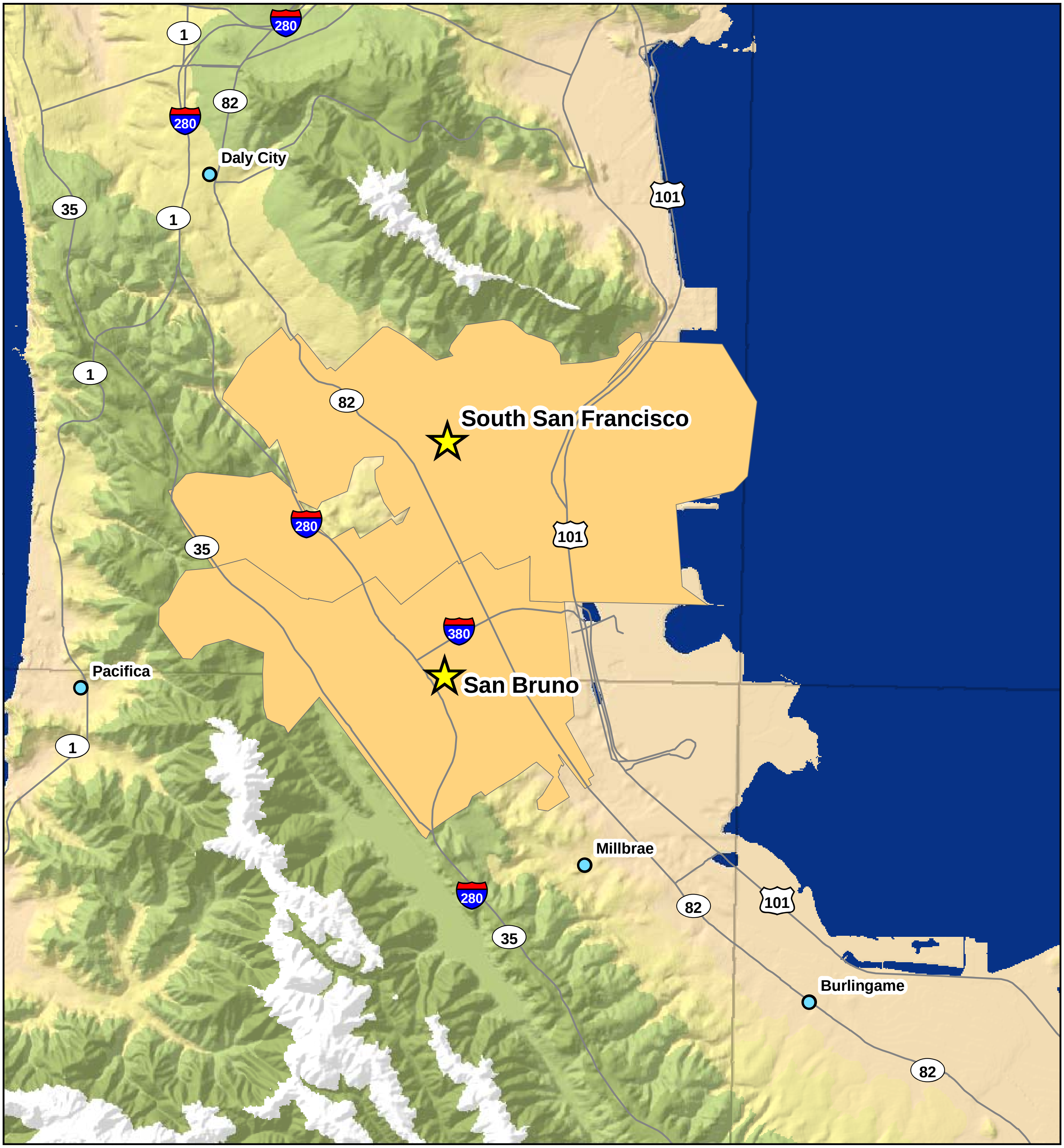
- **Scenario 3** – This scenario consists of a 10-year 6-hour design storm event with San Bruno flow Alternative A (**Figure 5**). The analysis results indicate that the primary effluent volume exceeding 35 million gallons per day (mgd) process capacity is 7.7 million gallons (MG), while the primary effluent volume exceeding 40 mgd process capacity is 4.5 MG.

- **Scenario 4** –This scenario consists of a 10-year 6-hour design storm event with San Bruno flow Alternative B (**Figure 6**). The analysis results indicate that the primary effluent volume exceeding 35 million gallons per day (mgd) process capacity is 5.1 million gallons (MG), while the primary effluent volume exceeding 40 mgd process capacity is 2.2 MG.

- **Scenario 5** –This scenario consists of a 10-year 24-hour design storm event with San Bruno flow Alternative A (**Figure 7**). The analysis results indicate that the primary effluent volume exceeding 35 million gallons per day (mgd) process capacity is 9.4 million gallons (MG), while the primary effluent volume exceeding 40 mgd process capacity is 5.8 MG.

- **Scenario 6** – This scenario consists of a 10-year 24-hour design storm event with San Bruno flow Alternative B (**Figure 8**). The analysis results indicate that the primary effluent volume exceeding 35 million gallons per day (mgd) process capacity is 6.5 million gallons (MG), while the primary effluent volume exceeding 40 mgd process capacity is 3.4 MG.

FIGURES



Legend

- Cities
- Highways
- City Boundary (Census 2000)

Elevation (ft)

- 0
- 1-50
- 51-100
- 101-250
- 251-500
- 501-1,000
- 1,000-2,000

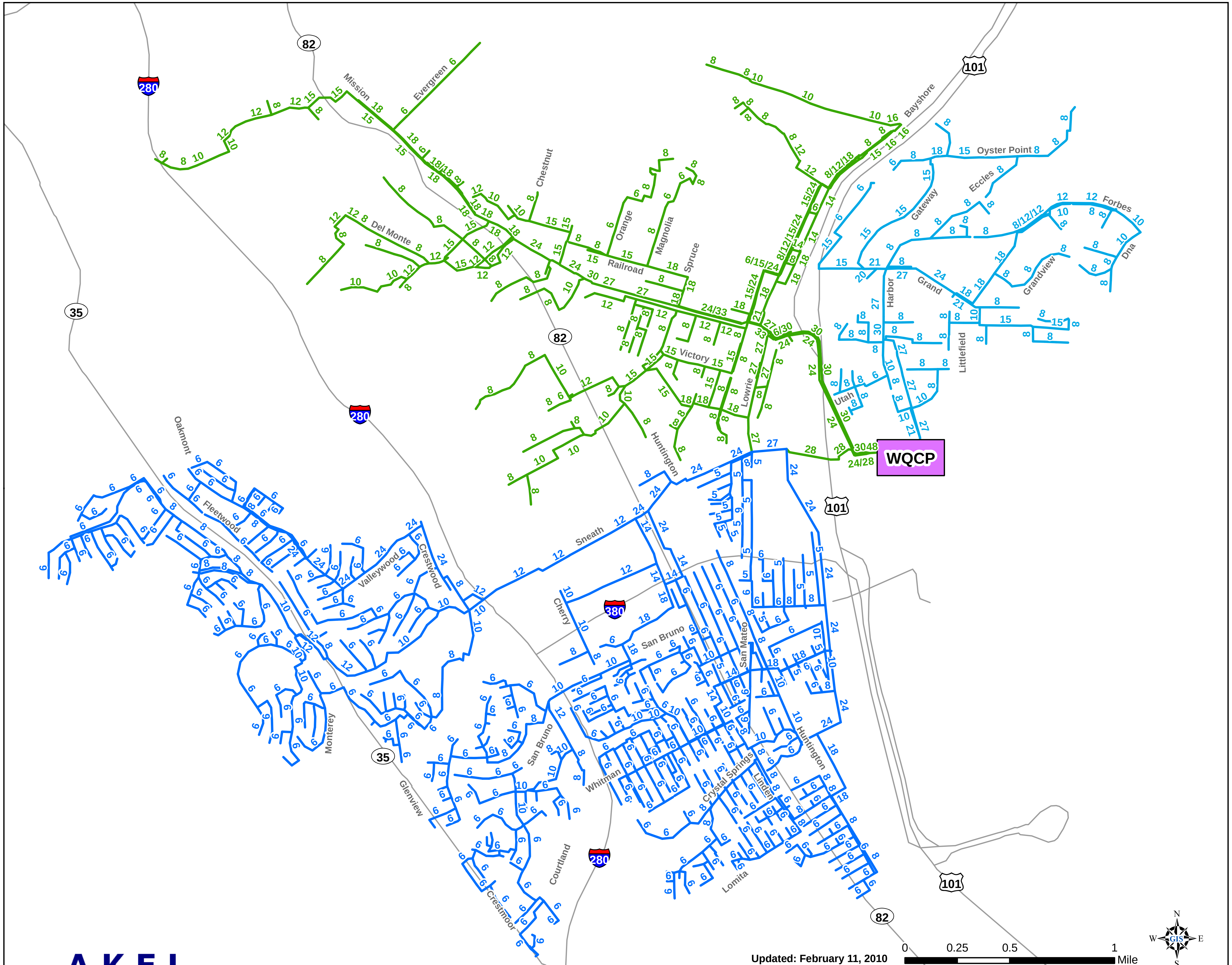
0 0.25 0.5 1 Mile

Updated: February 11, 2010

Figure 1
Regional Location Map
South San Francisco WQCP
Upgrades and Updates

AKEL ENGINEERING GROUP, INC.

File Name: SBSSF_Fig1RLM_021110 File Location: [P:] XGIS/GISProjects/SSF



Legend

WQCP

Existing Pipes

- South San Francisco East
- South San Francisco West
- San Bruno
- Highways

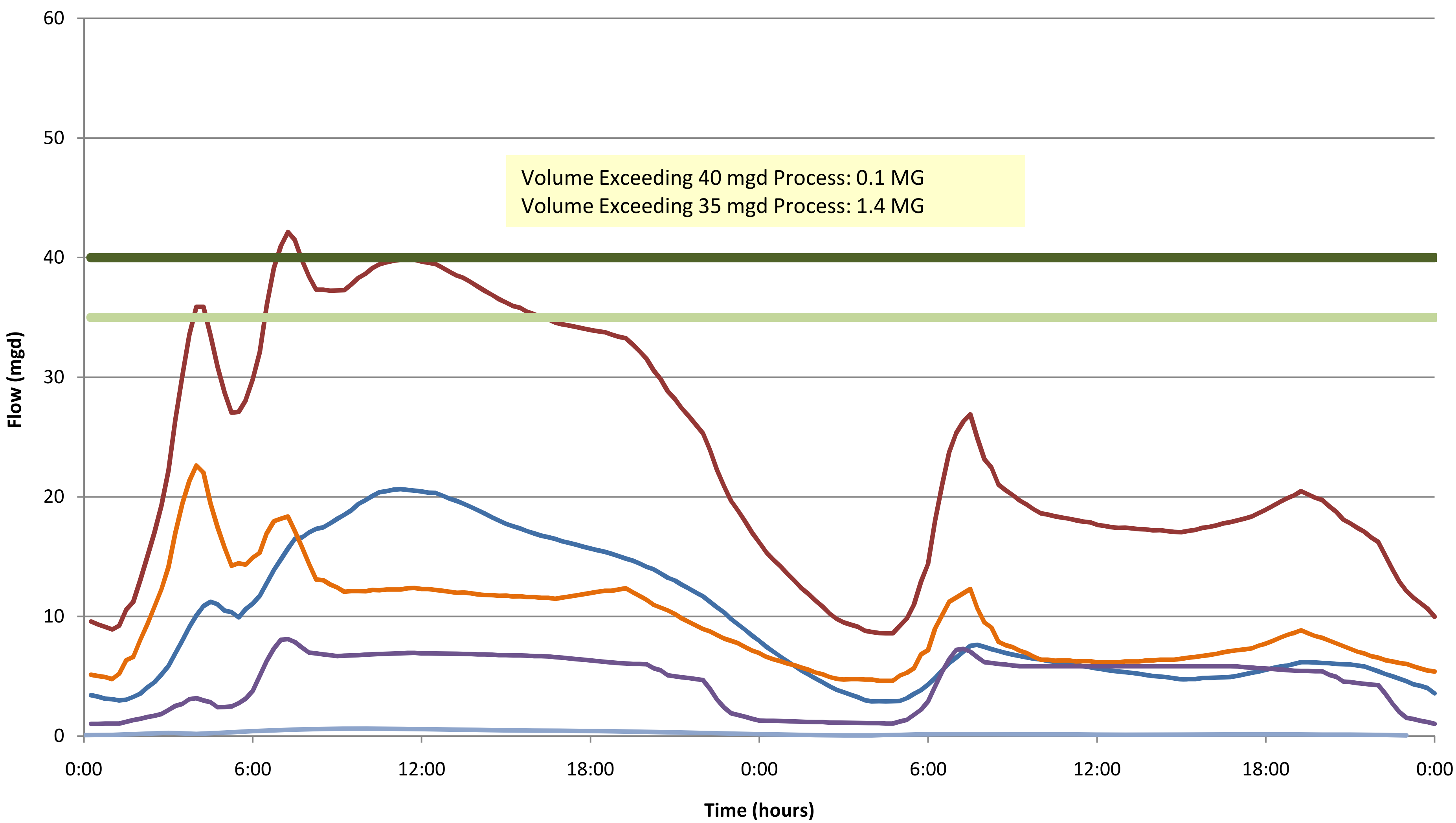
PRELIMINARY

Figure 2
Existing Sanitary Sewer System by City

WQCP Updates and Upgrades
City of South San Francisco

AKEL
ENGINEERING GROUP, INC.

File Name: SSF_Fig2ESS_021110 File Location: [P:] XGIS/GISProjects/SSF



LEGEND

- PS No. 11 (Shaw Road)
- PS No. 9 (San Mateo)
- PS Nos. 4/7 (Industial)
- Basin PS No. 5
- Total Sanitay Sewer Flow
- 35 MGD
- 40 MGD

February 4,2010

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Figure 3

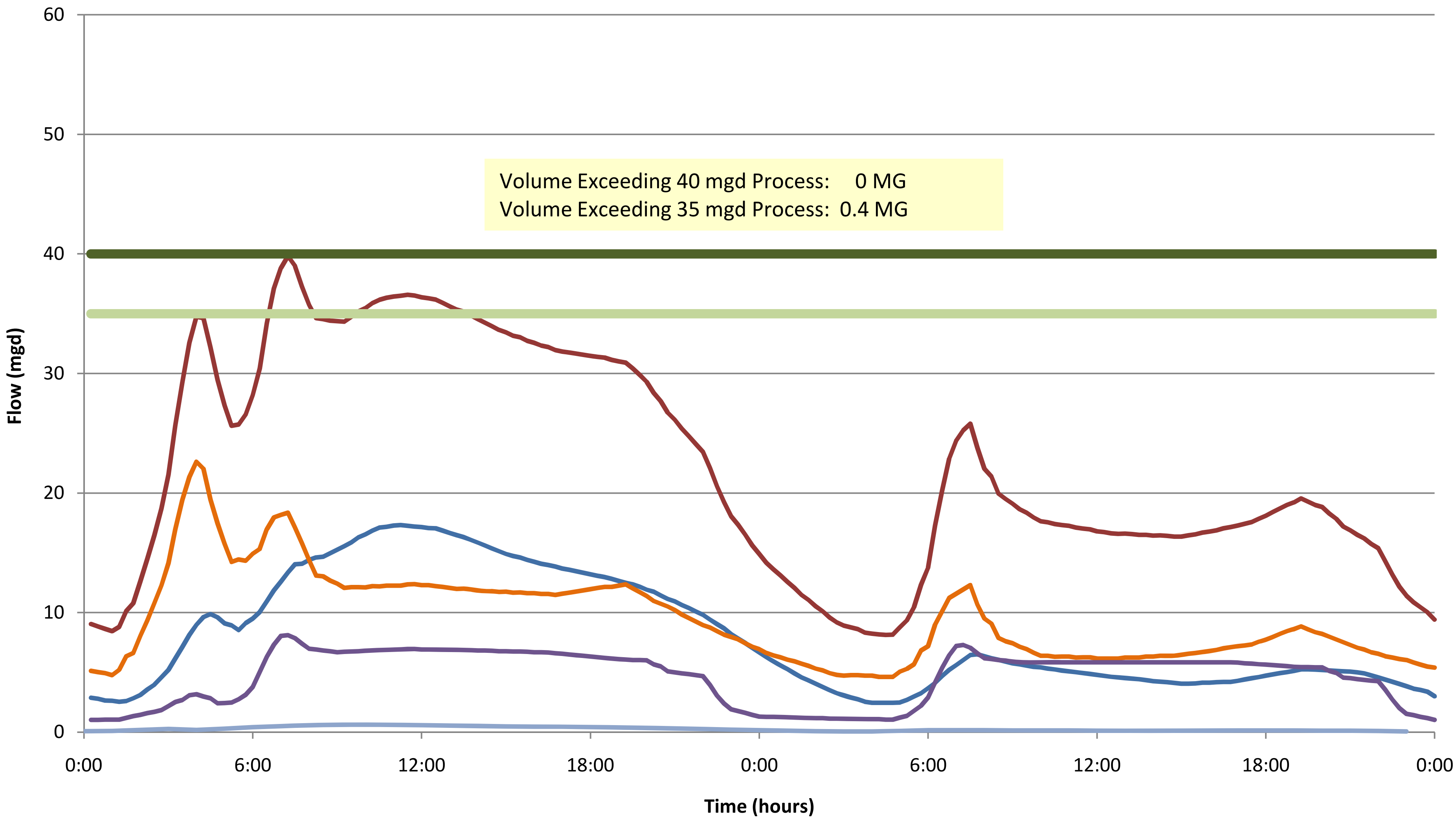
PWWF Hydrographs

Scenario 1 5-Yr 6-Hr

(San Bruno Alt A)

WQCP Upgrades and Updates

City of South San Francisco



LEGEND

- PS No. 11 (Shaw Road)
- PS No. 9 (San Mateo)
- PS Nos. 4/7 (Industial)
- Basin PS No. 5
- Total Sanitay Sewer Flow
- 35 MGD
- 40 MGD

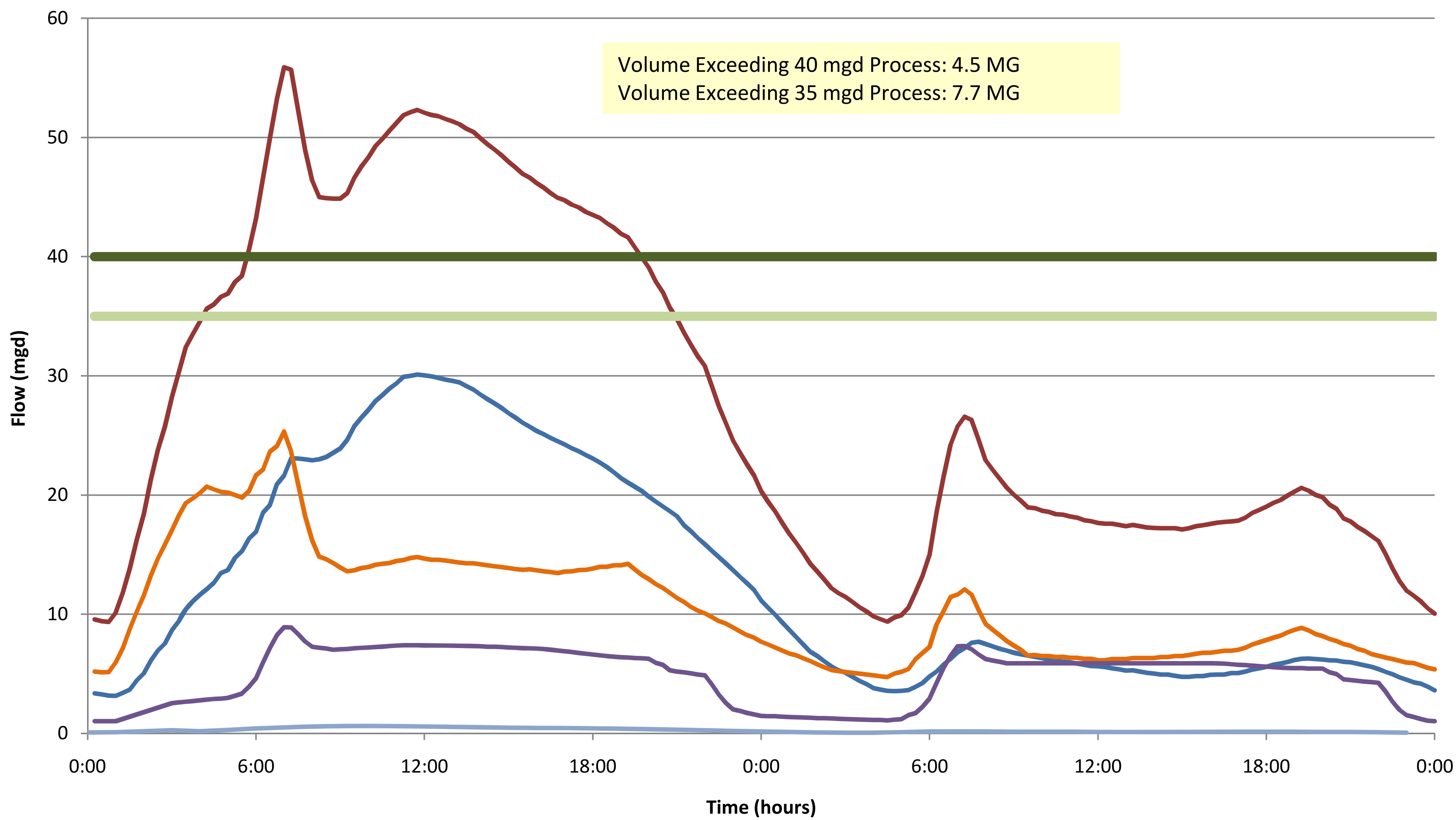
February 4,2010

AKEL ENGINEERING GROUP, INC.

Figure 4

PWWF Hydrographs
Scenario 2 5-Yr 6-Hr
(San Bruno Alt B)

WQCP Upgrades and Updates
City of South San Francisco



LEGEND

- PS No. 11 (Shaw Road)
- PS No. 9 (San Mateo)
- PS Nos. 4/7 (Industial)
- Basin PS No. 5
- Total Sanitay Sewer Flow
- 35 MGD
- 40 MGD

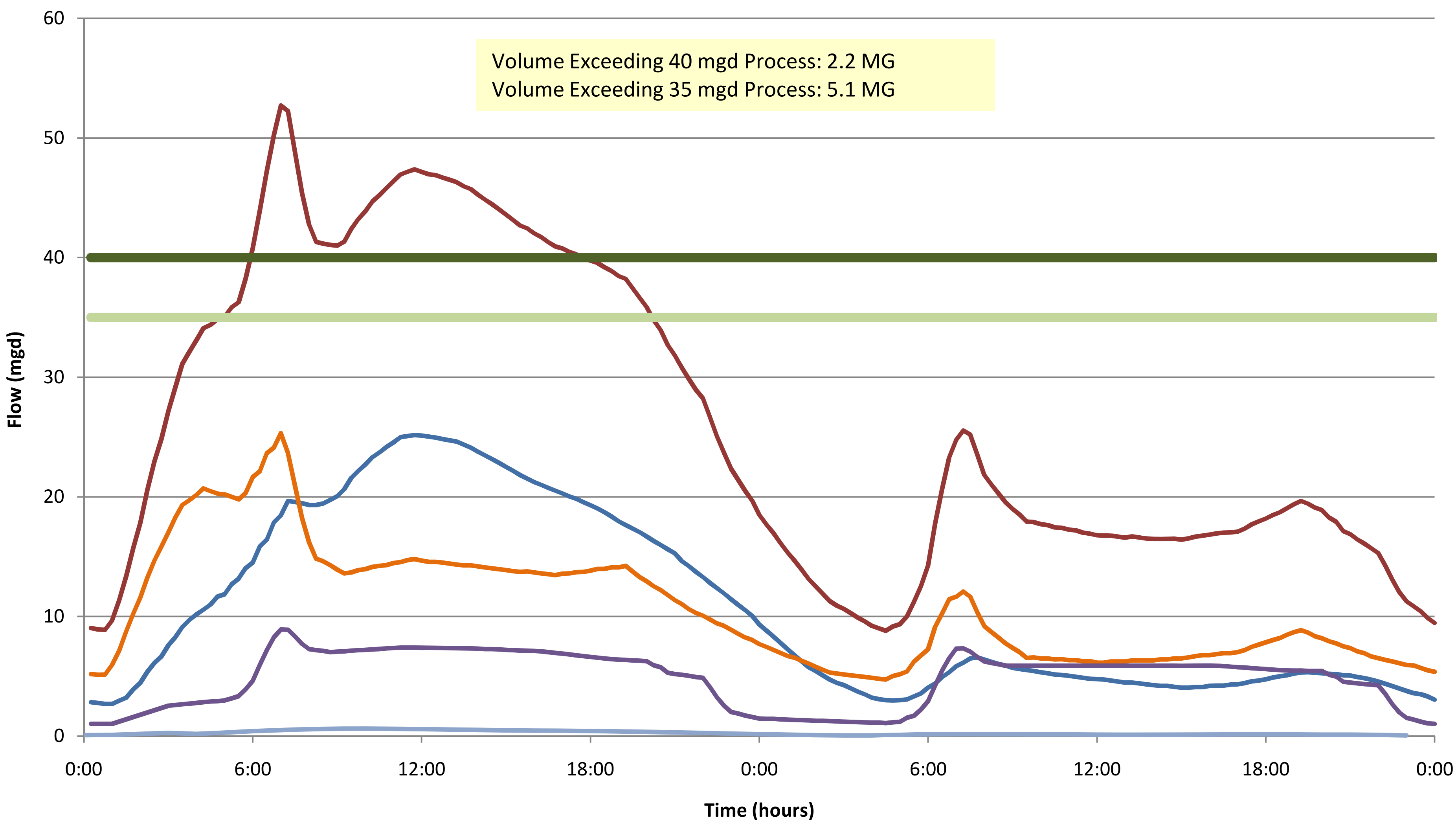
February 4,2010

Figure 5

PWWF Hydrographs
Scenario 3 10-Yr 6-Hr
(San Bruno Alt A)

WQCP Upgrades and Updates
City of South San Francisco

AKEL ENGINEERING GROUP, INC.



LEGEND

- PS No. 11 (Shaw Road)
- PS No. 9 (San Mateo)
- PS Nos. 4/7 (Industial)
- Basin PS No. 5
- Total Sanitay Sewer Flow
- 35 MGD
- 40 MGD

February 4,2010

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Figure 6

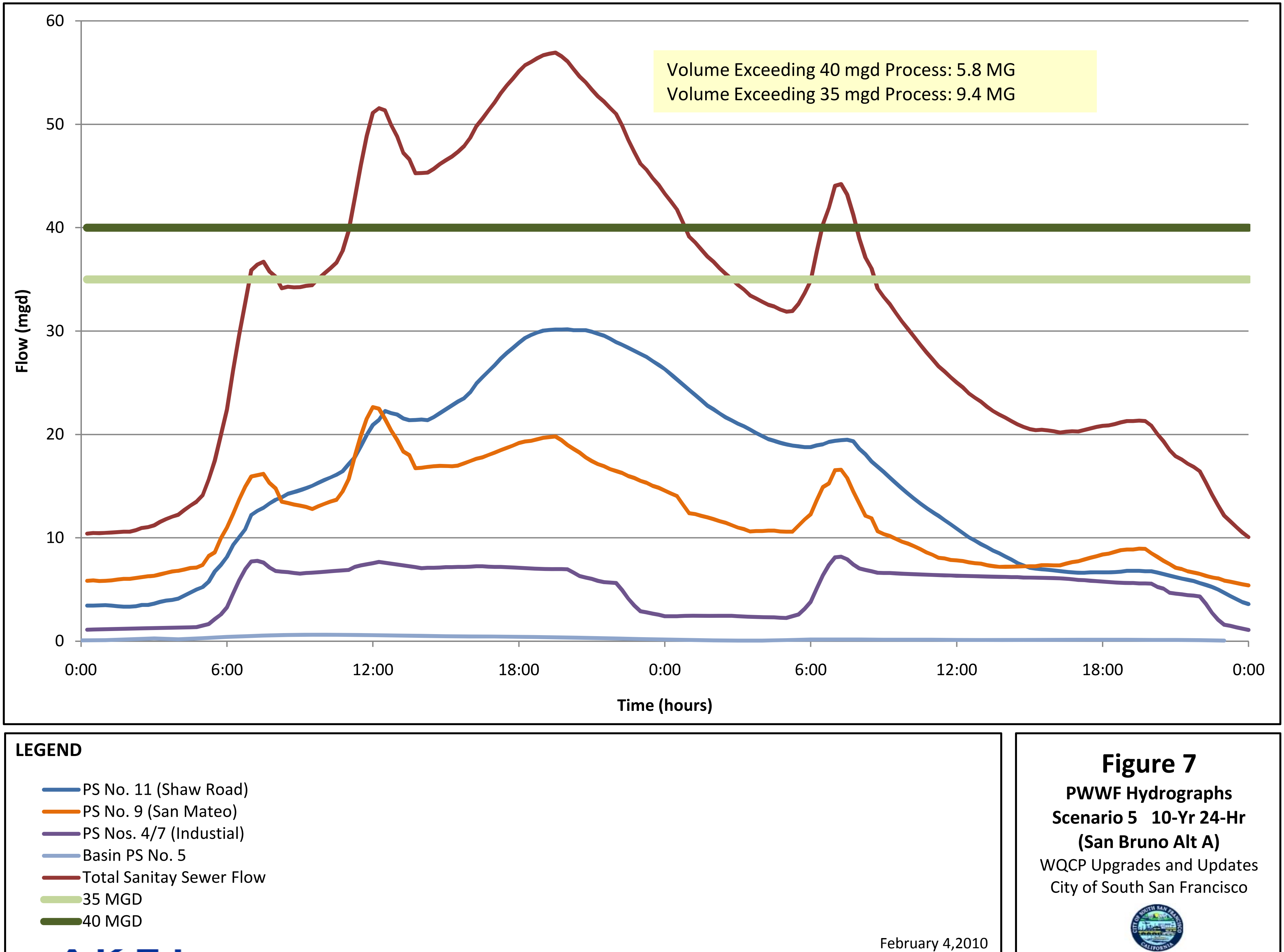
PWWF Hydrographs

Scenario 4 10-Yr 6-Hr

(San Bruno Alt B)

WQCP Upgrades and Updates

City of South San Francisco



February 4,2010

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Figure 7

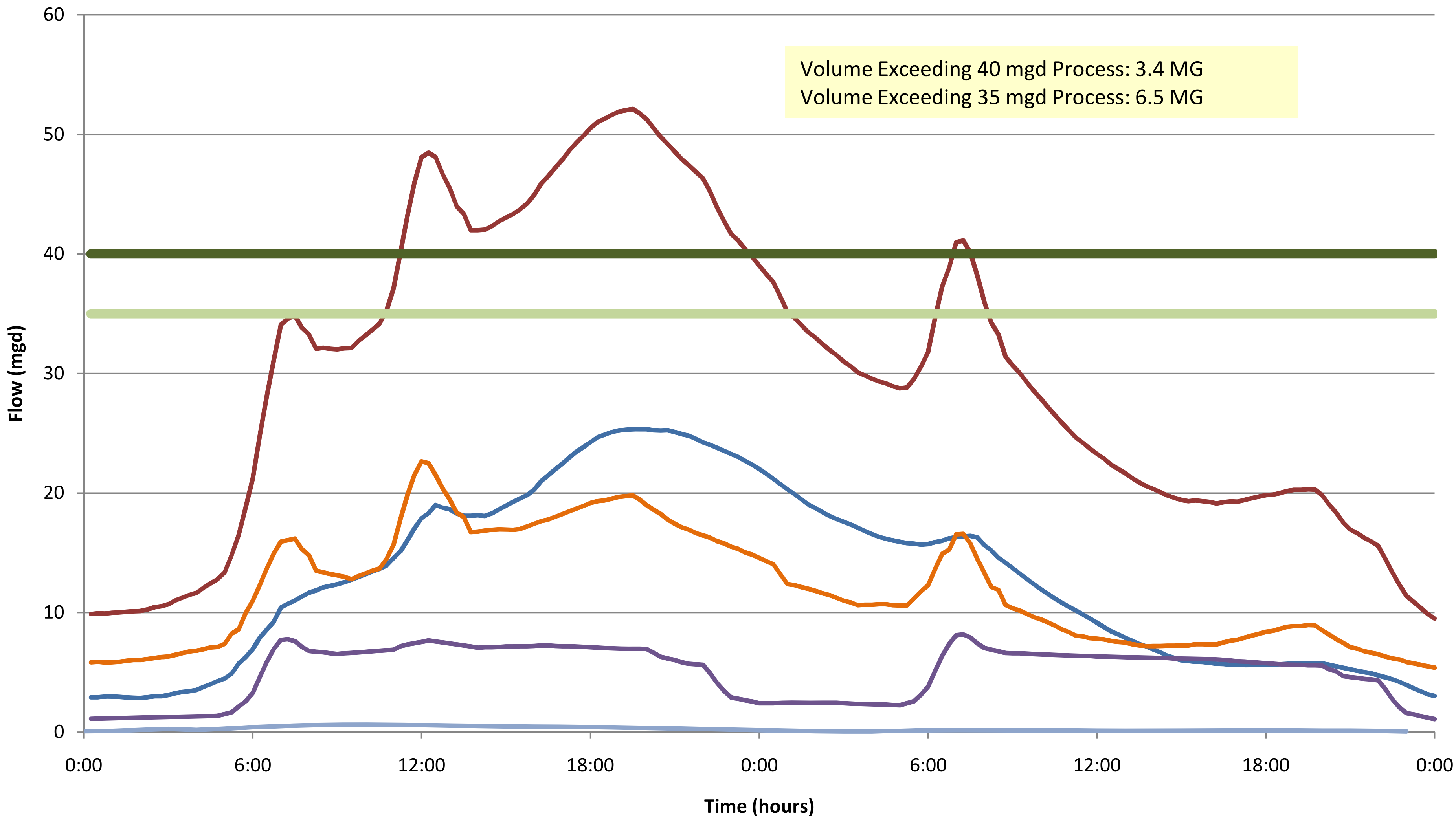
PWWF Hydrographs

Scenario 5 10-Yr 24-Hr

(San Bruno Alt A)

WQCP Upgrades and Updates

City of South San Francisco



LEGEND

- PS No. 11 (Shaw Road)
- PS No. 9 (San Mateo)
- PS Nos. 4/7 (Industial)
- Basin PS No. 5
- Total Sanitay Sewer Flow
- 35 MGD
- 40 MGD

AKEL ENGINEERING GROUP, INC.

February 4,2010

Figure 8

PWWF Hydrographs
Scenario 6 10-Yr 24-Hr
(San Bruno Alt B)

WQCP Upgrades and Updates
City of South San Francisco

TABLES

Table 1 Previous Master Plans Flow Projections

WQCP Upgrades and Updates
City of South San Francisco

Flow Condition	South San Francisco West of Hwy 101 (October 1999[1])		South San Francisco East of Hwy 101 (September 2002[2])		South San Francisco East of Hwy 101, Update (May 2007[3])			San Bruno (April 2000[4])	
	1999 (mgd)	Future (mgd)	2001 (mgd)	2020 (mgd)	2006 (mgd)	2015 (mgd)	2030 (mgd)	Existing (mgd)	Future[5] (mgd)
ADWF	3.37	-	1.5	5.50	1.70	2.40	3.20	3.61	-
PDWF	6.47	6.90	3.40	12.10	2.90	4.20	5.50	-	-
PWWF (5-Yr 6-Hr)	14.07	26.50	5.50	14.10	4.40	5.90	7.10	17.80	**20.21** (Alt. A, no reduction in I/I) **15.69** (Alt. B, 22% reduction in PWWF) **11.28** (Alt. C, 44% reduction in PWWF)

Notes:

2/4/2010

1. Source: City of South San Francisco Infiltration and Inflow Study, Oct. 1999, Table 3.3 and Page 36
2. Source: City of South San Francisco East of Highway 101 Sewer System Master Plan, Sept. 2002, Table 5.1
3. Source: City of South San Francisco East of Highway 101 Sewer System Master Plan, May 2007, Table 2
4. Source: City of San Bruno Sewer Master Plan and Infiltration / Inflow Study, April 2000, Table 4.2 and Page 7-6.
5. San Bruno's Sewer System Master Plan included 3 Potential Scenarios for Flow Projections

   Alternate A does not account for potential reductions in Infiltrations and Inflows

   Alternate B assumes a 22% reduction in Peak Wet Weather Flows (this alternate was the basis for developing the CIP).

   Alternate C assumes a 44% reduction in Peak Wet Weather Flows (this alternate was considered less realistic)

Table 2 Design Storms and Updated Hydraulic Model Design Flows

WQCP Upgrades and Updates

City of South San Francisco

Design Storm	Units	South San Francisco						San Bruno				Total
		PS No. 9 (San Mateo)		PS No. 4/7 (Industrial)		PS No. 11 (Shaw Road)						Total
						SSF Basins 9 and 10 (Intertie)		San Bruno (Alt B)		Total		
Dry Weather Flows (Average Day and Peak Hour)												
		ADWF	PDWF	ADWF	PDWF	ADWF	PDWF	ADWF	PDWF	ADWF	PDWF	ADWF
	(mgd)	4.28	10.04	3.55	6.27	0.63	1.34	3.51	5.52	4.14	6.86	11.97
Wet Weather Flows (Maximum Day and Peak Hour)												
		MDWWF	PWWF	MDWWF	PWWF	MDWWF	PWWF	MDWWF	PWWF	MDWWF	PWWF	MDWWF
5-Yr 6-Hr (Used in previous master plans)	(mgd)	9.47	22.62	4.67	8.11	1.39	3.92	6.69	15.19	8.08	19.11	22.22
10-Yr 6-Hr	(mgd)	10.61	25.34	4.85	8.91	1.63	4.10	9.03	22.59	10.66	26.70	26.12
10-Yr 24-Hr	(mgd)	11.92	22.65	5.04	8.18	1.91	4.25	11.01	22.11	12.92	26.36	29.89

Notes:

2/4/2010

1. Definitions:
   ADWF - Average Dry Weather Flow
   PDWF - Peak Dry Weather Flow
   MDWWF - Maximum Day Wet Weather Flow
   PWWF - Peak Wet Weather Flow
2. San Bruno Alternate B allows for a 22% reduction in PWWF.

Table 3 Analysis Results and Storage Pond Capacity Alternatives
WQCP Upgrades and Updates
City of South San Francisco

Preliminary

		Units	5-Year 6-Hour				10-Year 6-Hour				10-Year 24-Hour			
			Scenario 1 (San Bruno Alt. A, No I/I Reduction)		Scenario 2 (San Bruno Alt. B, 22% I/I Reduction)		Scenario 3 (San Bruno Alt. A, No I/I Reduction)		Scenario 4 (San Bruno Alt. B, 22% I/I Reduction)		Scenario 5 (San Bruno Alt. A, No I/I Reduction)		Scenario 6 (San Bruno Alt. B, 22% I/I Reduction)	
			MDWWF	PWWF	MDWWF	PWWF	MDWWF	PWWF	MDWWF	PWWF	MDWWF	PWWF	MDWWF	PWWF
Flow Summary														
Cities of South San Francisco and San Bruno														
PS No. 9 (San Mateo)	South San Francisco	(mgd)	12.1	20.4	12.1	20.4	14.2	22.9	14.2	22.9	15.4	21.8	15.4	21.8
Basins 9/10 to PS No. 11 (Shaw Road)	South San Francisco	(mgd)	1.9	3.7	1.9	3.7	2.4	3.8	2.4	3.8	2.4	4.1	2.4	4.1
San Bruno to PS No. 11 (Shaw Road)	San Bruno	(mgd)	11.8	18.4	9.7	15.1	17.1	27.2	14.0	22.3	20.3	26.8	16.7	22.0
Basin to PS No. 5	South San Francisco	(mgd)	0.4	0.6	0.4	0.6	0.4	0.6	0.4	0.6	0.4	0.6	0.4	0.6
Industrial Area to PS No. 4/7	South San Francisco	(mgd)	5.1	7.9	5.1	7.9	5.4	8.5	5.4	8.5	5.0	7.6	5.0	7.6
Subtotal Flows to W.Q.C.P.	SSF + San Bruno	(mgd)	31.2	51.0	29.1	47.6	39.5	63.0	36.4	58.1	43.6	60.9	40.0	56.1
Airport and M+B														
Airport Flows	Airport	(mgd)	1.7	2.7	1.7	2.7	1.7	2.7	1.7	2.7	1.7	2.7	1.7	2.7
M+B Flows	M+B	(mgd)	17.5	29.0	17.5	29.0	17.5	29.0	17.5	29.0	17.5	29.0	17.5	29.0
Subtotal Flows to W.Q.C.P.	Airport and M+B	(mgd)	19.2	31.6	19.2	31.6	19.2	31.6	19.2	31.6	19.2	31.6	19.2	31.6
Total														
Total Flows to W.Q.C.P.		(mgd)	50.4		48.3		58.7		55.6		62.8		59.1	
Storage Pond Capacity Alternatives - Primary Effluent														
Storage Capacity Requirements	35 mgd Process	(MG)	1.4		0.4		7.7		5.1		9.4		6.5	
Storage Capacity Requirements	40 mgd Process	(MG)	0.1		0.0		4.5		2.2		5.8		3.4	
Existing Storage Capacity		(MG)	0.0		0.0		n/a		0.0		0.0		0.0	
Storage Pond Capacity Alternatives - Secondary Effluent														
Maximum Pumping Rate		(mgd)	64.0		64.0		64.0		64.0		64.0		64.0	
Storage Capacity Requirements		(MG)	1.2		0.5		5.5		3.4		6.3		4.3	
Existing Storage Capacity		(MG)	7.0		7.0		7.0		7.0		7.0		7.0	

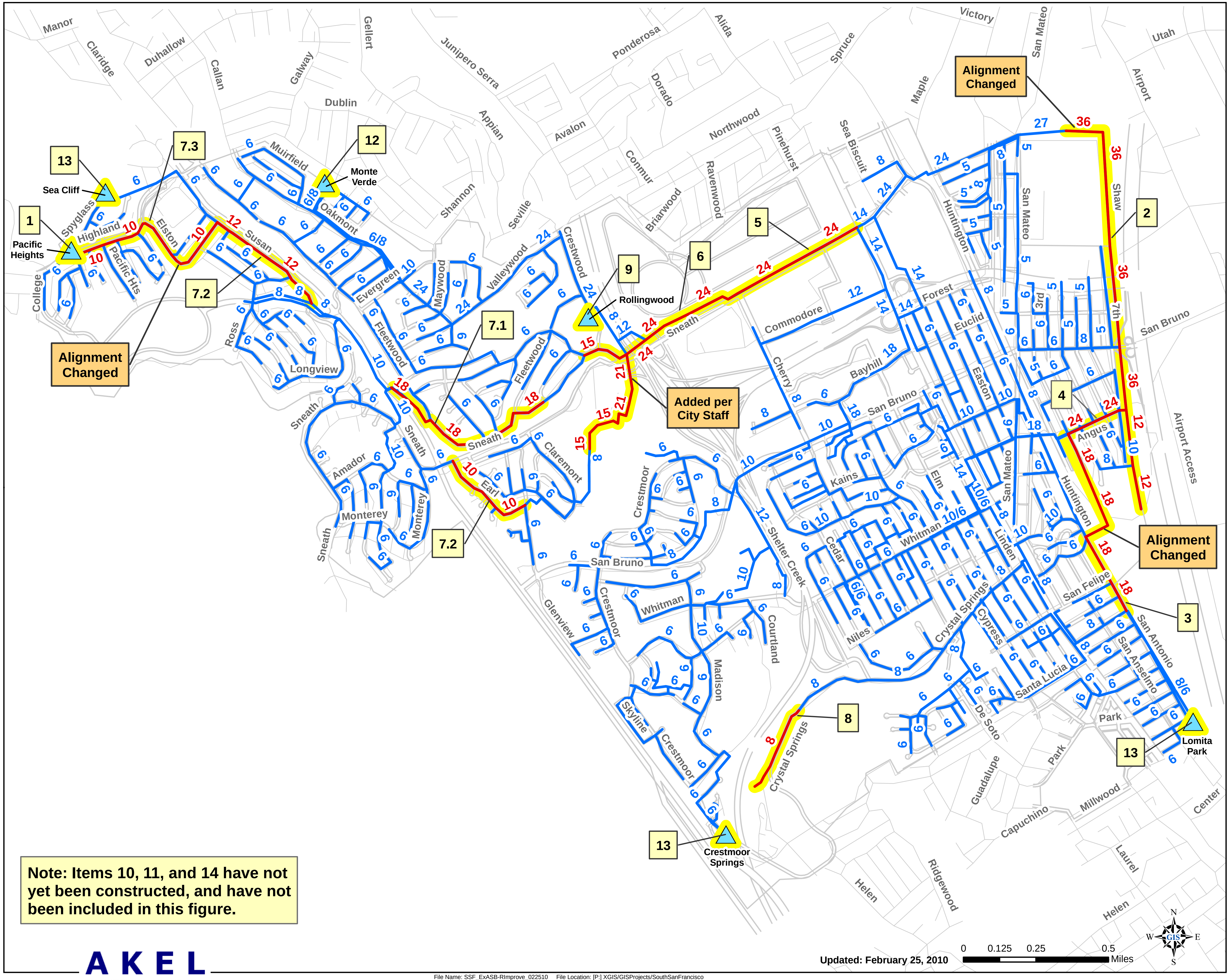
Notes:

2/4/2010

1. Alternate A accounts for no reduction in Peak Wet Weather Flow (PWWF) in San Bruno.
2. Alternate B accounts for a 22% reduction in PWWF in San Bruno.
3. MDWWF - Maximum Day Wet Weather Flow
4. PWWF - Peak Wet Weather Flow
5. M+B flows in this table reflect a 2-hour storm delay and result in a secondary effluent storage pond volume reduction of approximately 0.5 MG.

Appendix A –

City of San Bruno Sewer System Improvements



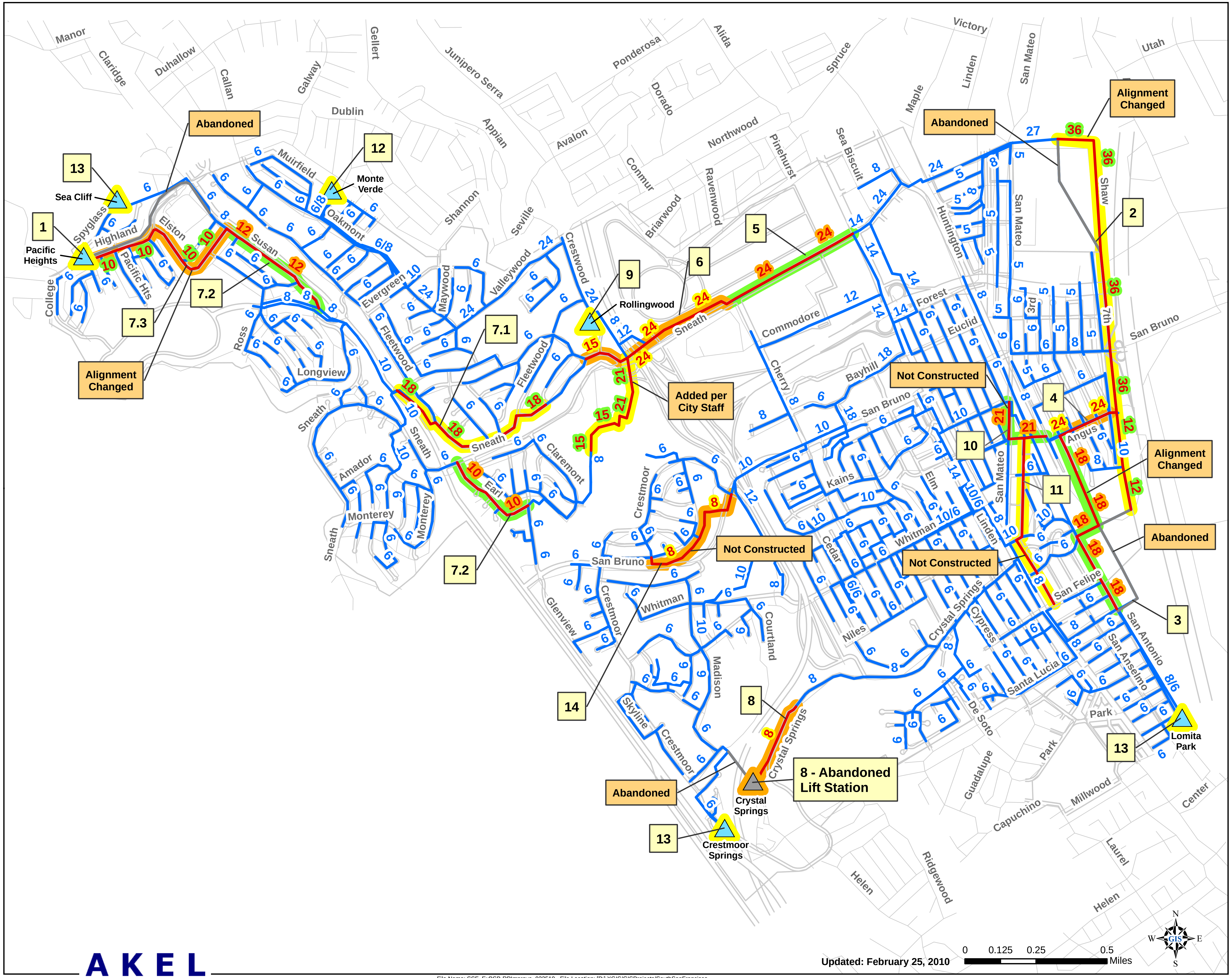
Legend

- Lift Station Modification
- Existing Pipes
- Pipe Improvements
- Streets

PRELIMINARY

Exhibit A
Recent City of San Bruno Sewer System Improvements

WQCP Updates and Upgrades
City of South San Francisco



Legend

- Lift Stations
- Lift Station Modification
- Abandoned Lift Station
- Existing Pipes
- Pipe Improvements
- Abandoned Pipes
- Streets

PRELIMINARY

Exhibit B
Recent and Planned City of San Bruno Sewer System Improvements

WQCP Updates and Upgrades
City of South San Francisco

AKEL ENGINEERING GROUP, INC.

Table A San Bruno CIP for Sewer Collection System Improvements
Water Quality Control Plant Updates and Upgrades
City of South San Francisco

San Bruno Sewer System Improvements					
Improvement Name	Improvement Type	Pump Station		Sewer Main	
		Head (ft)	Flow (gpm)	Size (in)	Length (ft)
1. Pacific Heights Pump Station Modification	Pump Station	-	-		
2. Seventh Avenue Relief Sewer Project	Sewer Main			36 / 12	5,280 / 1,100
3. Lomita Park Outfall Sewer Project	Sewer Main			18 / 24	2,800
4. Angus Connector Sewer Project	Sewer Main			-	1,300
5. Lower Sneath Trunk Sewer Replacement Project	Sewer Main			12	3,800
6. Engvall Relief Sewer Project	Sewer Main			Varies	3,300
7. Rollingwood Sewer basin Improvements					
7.1 Phase 1	Sewer Main			8 / 10 / 18	5,000
7.2 Phase 2	Sewer Main			12 / 10	3,000 / 1,700
7.3 Phase 3	Sewer Main			12	2,300
8. Crystal Springs Pump Station Abandonment	Pump Station / Sewer Main	Abandoned		-	1,100
9. Crestwood Sewer Pump Station Improvements	Pump Station	-	-		
10. Kains to Angus Sewer Bypass	Sewer Main			21	1,000
11. Mastick Avenue Wastewater Main Replacement Project	Sewer Main			-	-
12. Olympic Pump Station Rehab and Force Main	Pump Station / Force Main	-	-		
13. Pump Station Replacement Project	Pump Station	-	-		
14. Trenton Drive Wastewater Main Replacement Project	Sewer Main			8	2,000

Sources:

1. *City of San Bruno Sanitary Sewer Collection System Improvements from 1997-2009, 2009.*
2. *City Manager's Recommended 2009-10 General Fund, Special Revenue Funds, Enterprise Funds, and Five Year Capital Improvement Program Budget, 2009*

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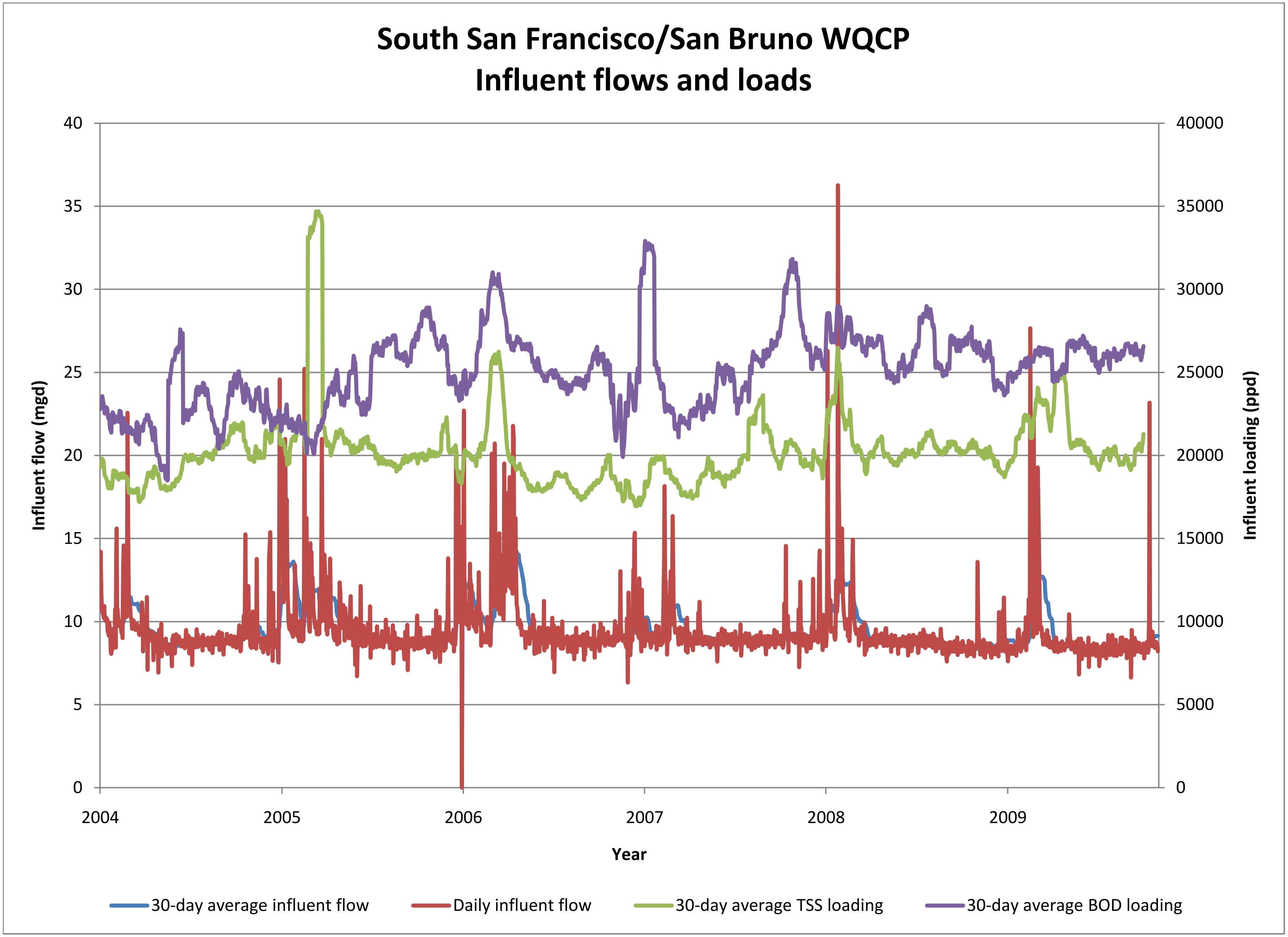
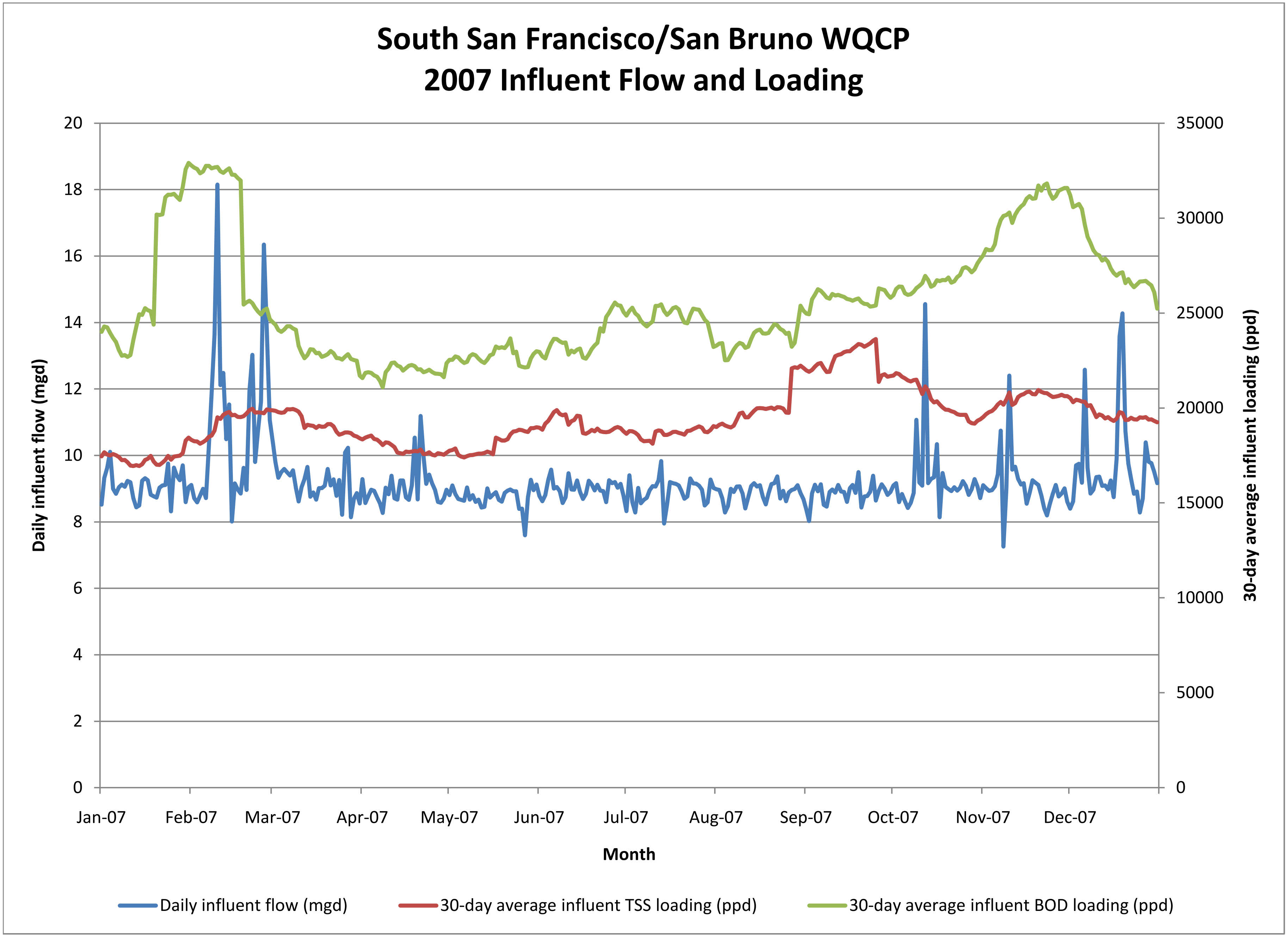
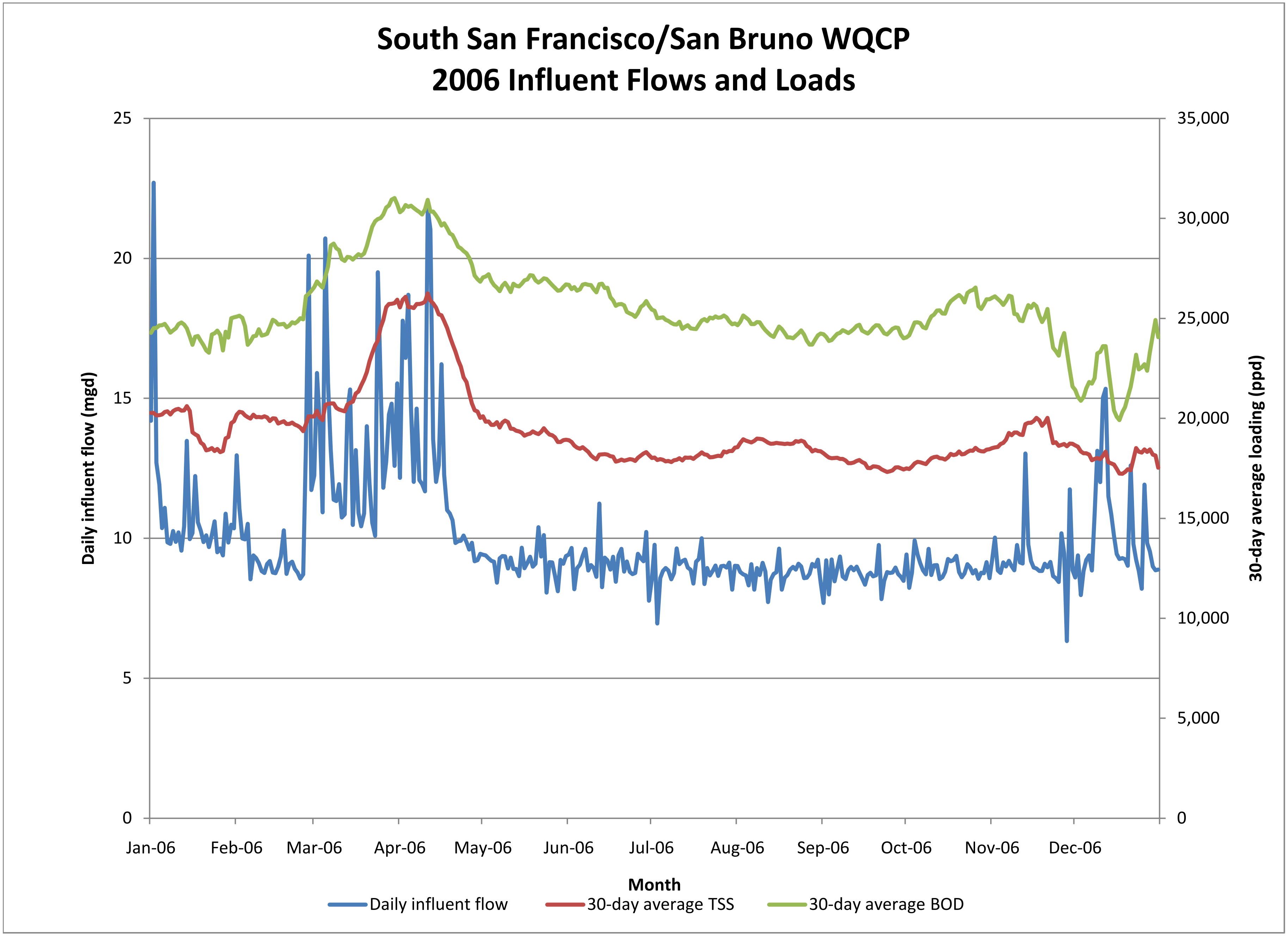
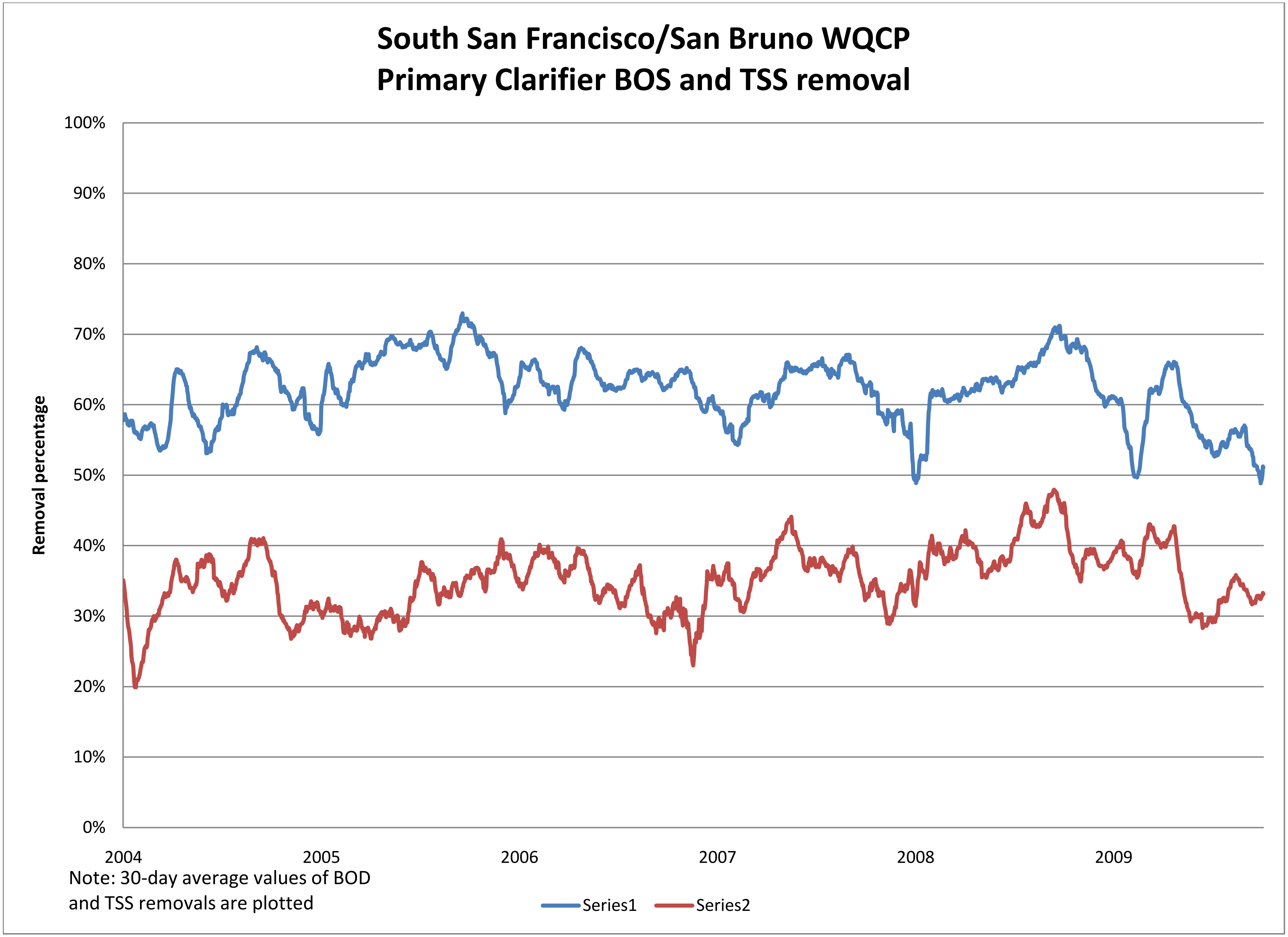
APPENDIX C – PERFORMANCE GRAPHS

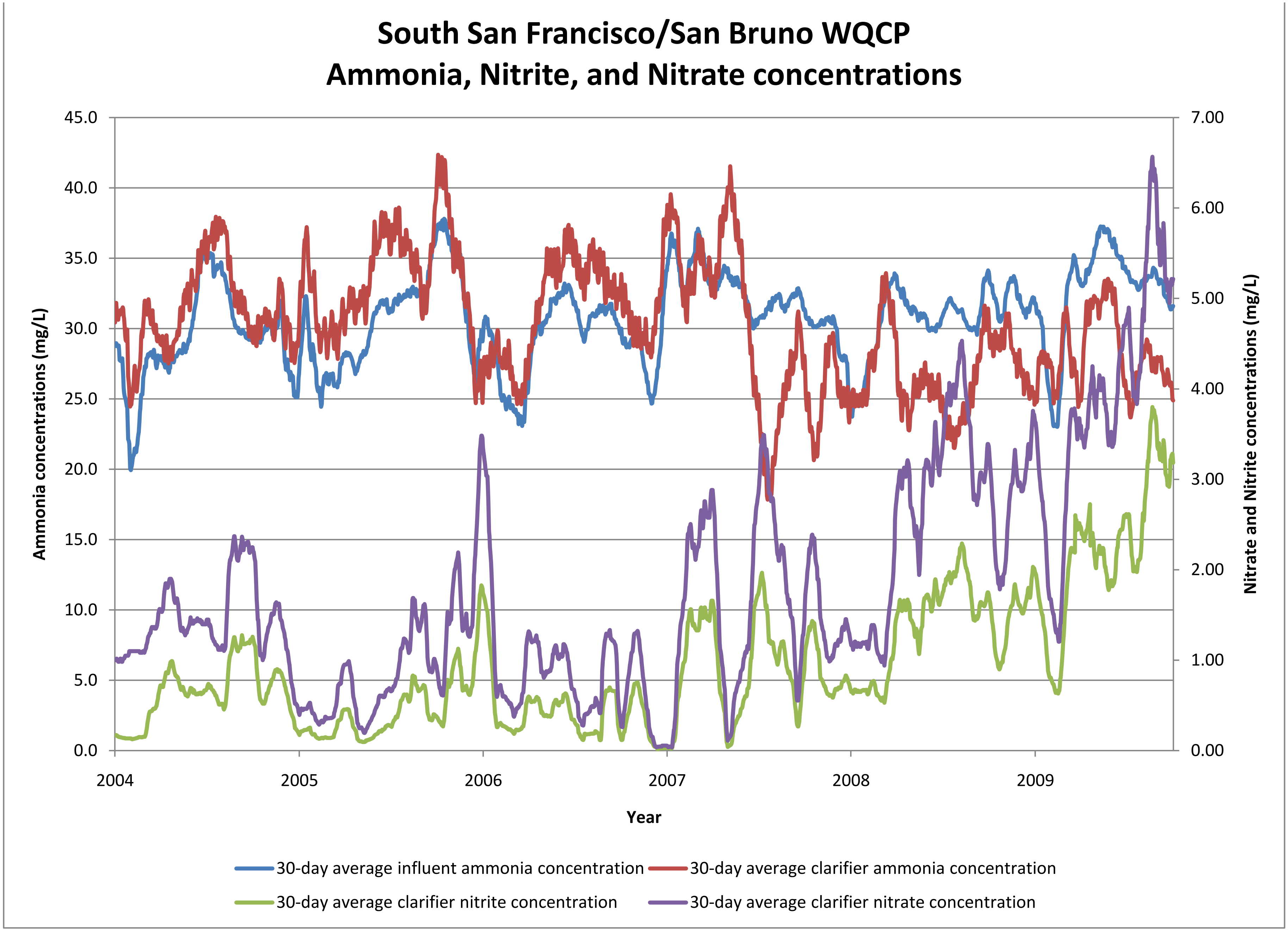

South San Francisco/San Bruno WQCP
Influent flows and loads
Influent flow (mgd)
Influent loading (ppd)
Year
0
5
10
15
20
25
30
35
40
0
5000
10000
15000
20000
25000
30000
35000
40000
2004
2005
2006
2007
2008
2009
30-day average influent flow
Daily influent flow
30-day average TSS loading
30-day average BOD loading


South San Francisco/San Bruno WQCP
2007 Influent Flow and Loading
Daily influent flow (mgd)
30-day average influent loading (ppd)
20
18
16
14
12
10
8
6
4
2
0
35000
30000
25000
20000
15000
10000
5000
0
Jan-07
Feb-07
Mar-07
Apr-07
May-07
Jun-07
Jul-07
Aug-07
Sep-07
Oct-07
Nov-07
Dec-07
Month
Daily influent flow (mgd)
30-day average influent TSS loading (ppd)
30-day average influent BOD loading (ppd)

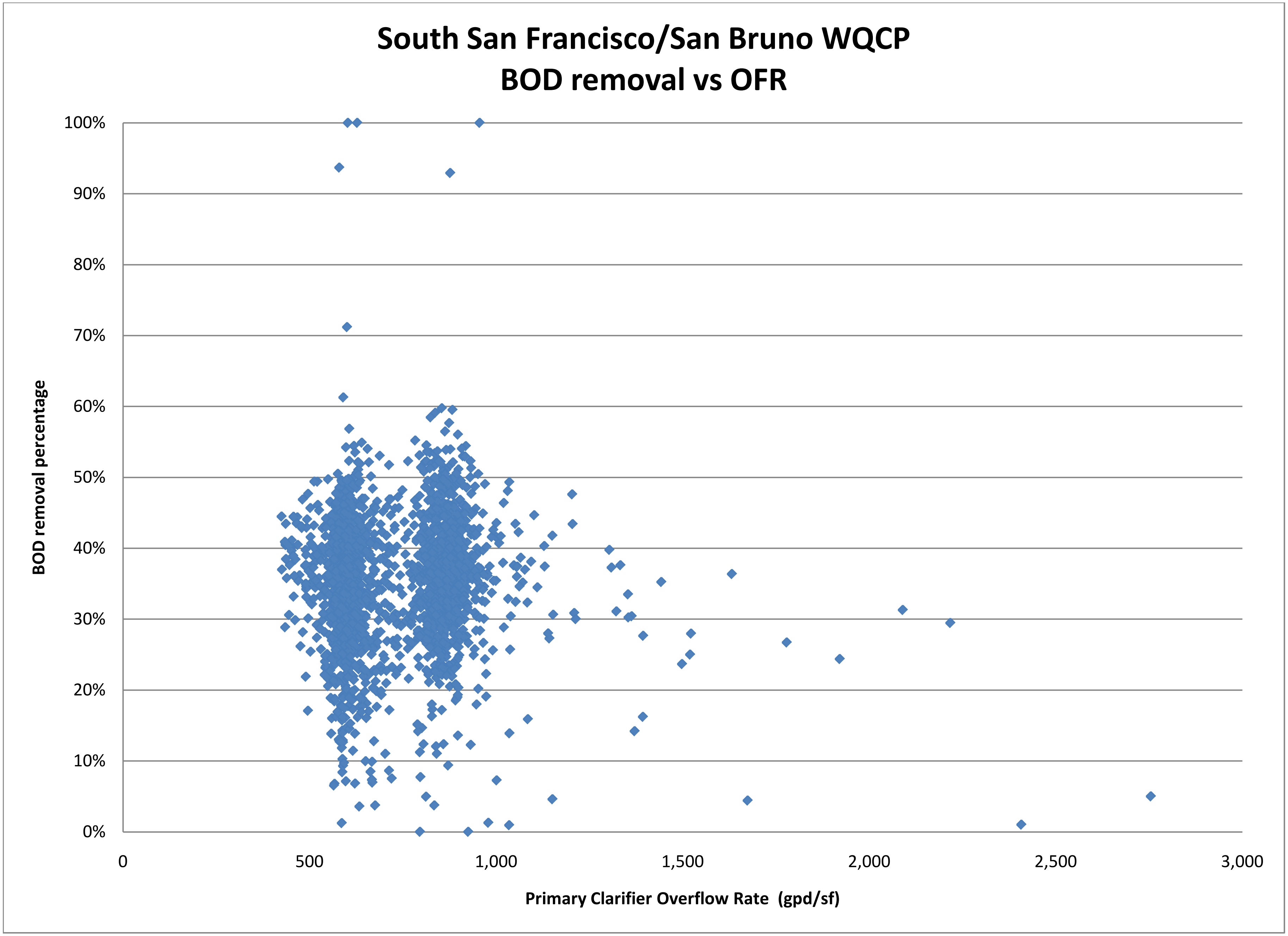

South San Francisco/San Bruno WQCP
2006 Influent Flows and Loads
Daily influent flow (mgd)
30-day average loading (ppd)
0
5
10
15
20
25
0
5,000
10,000
15,000
20,000
25,000
30,000
35,000
Jan-06
Feb-06
Mar-06
Apr-06
May-06
Jun-06
Jul-06
Aug-06
Sep-06
Oct-06
Nov-06
Dec-06
Month
Daily influent flow
30-day average TSS
30-day average BOD

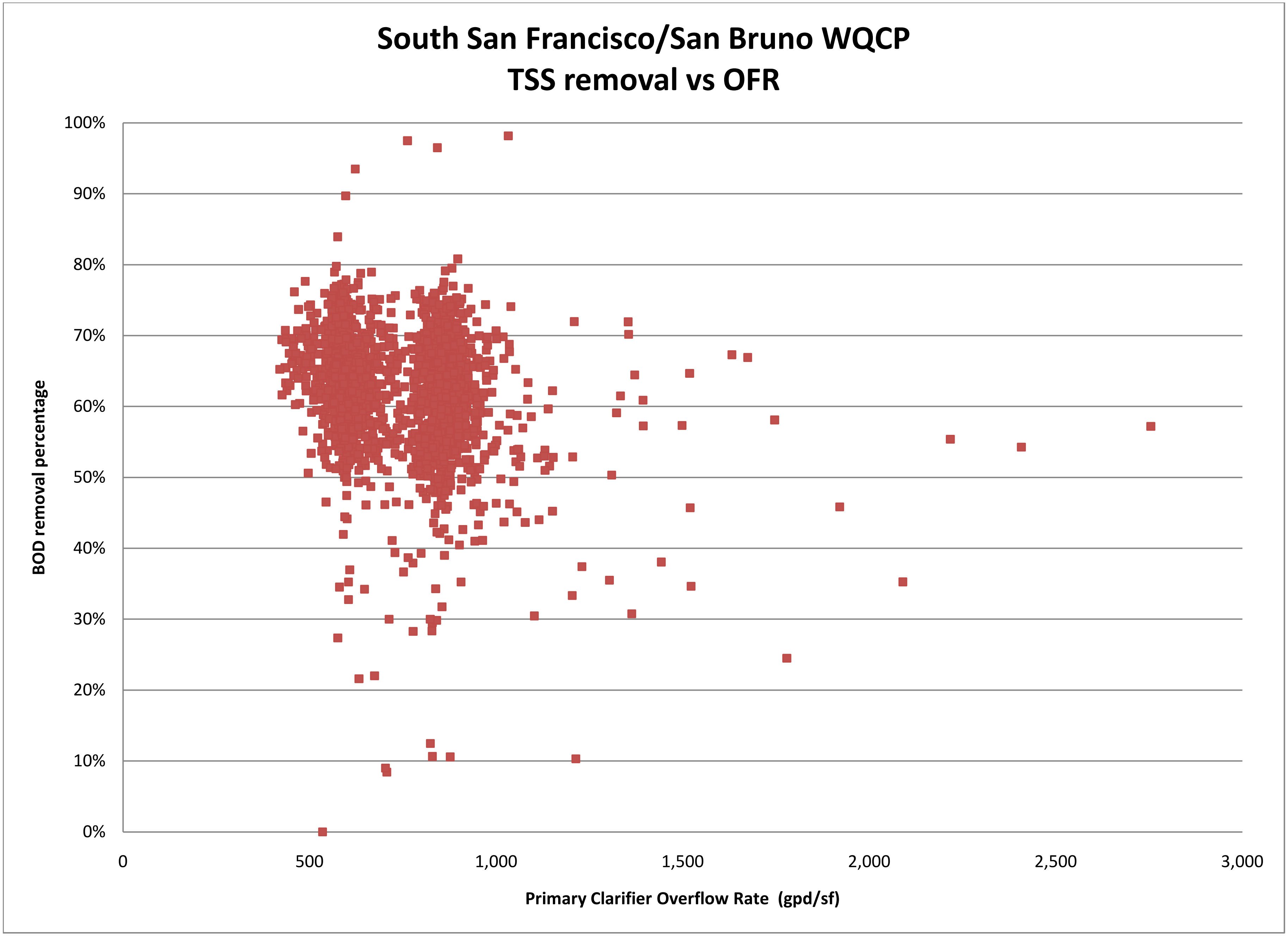


Note: 30-day average values of BOD and TSS removals are plotted

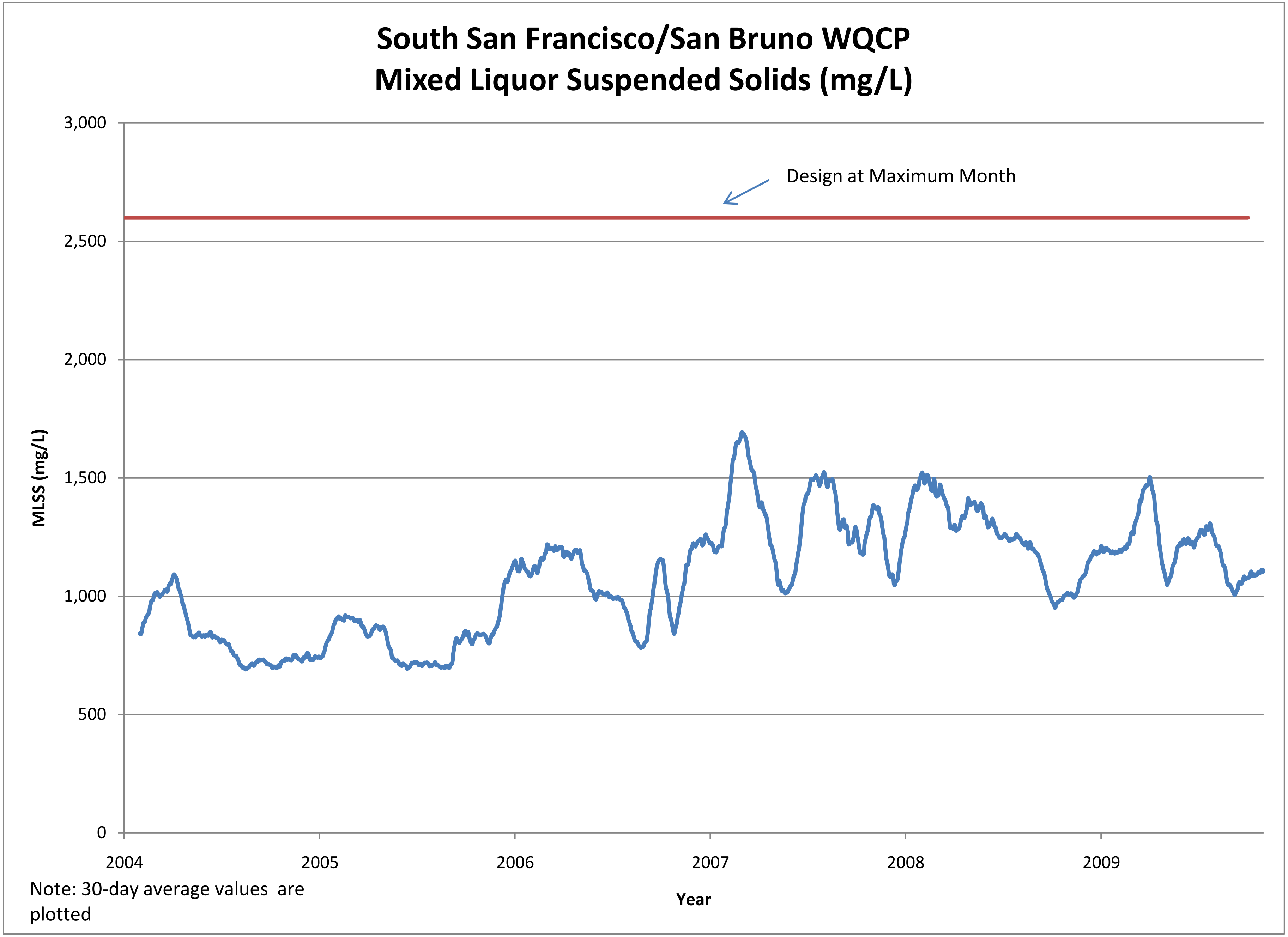


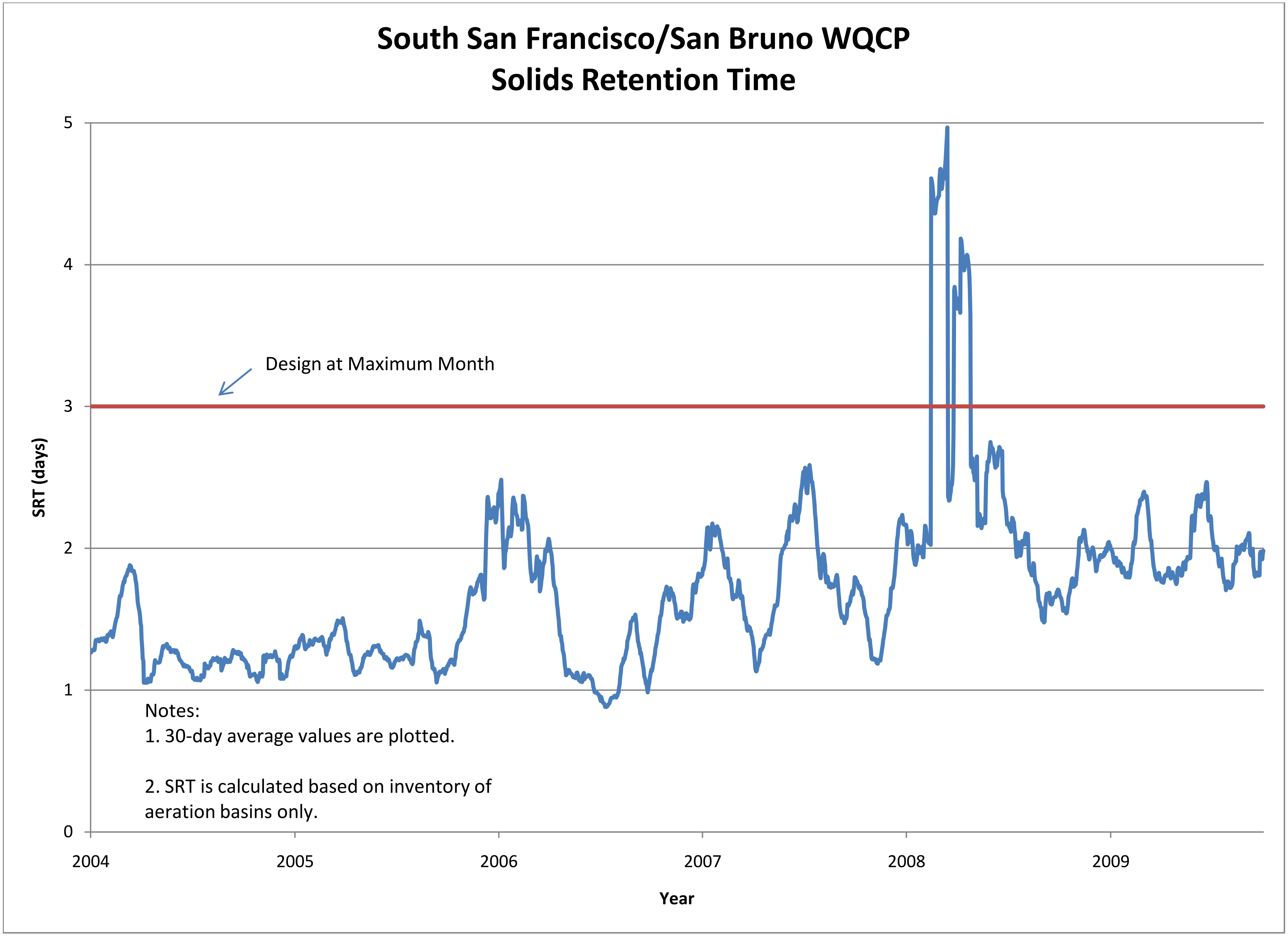
South San Francisco/San Bruno WQCP
Ammonia, Nitrite, and Nitrate concentrations
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Ammonia concentrations (mg/L)
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Nitrate and Nitrite concentrations (mg/L)
2004
2005
2006
2007
2008
2009
Year
30-day average influent ammonia concentration
30-day average clarifier ammonia concentration
30-day average clarifier nitrite concentration
30-day average clarifier nitrate concentration

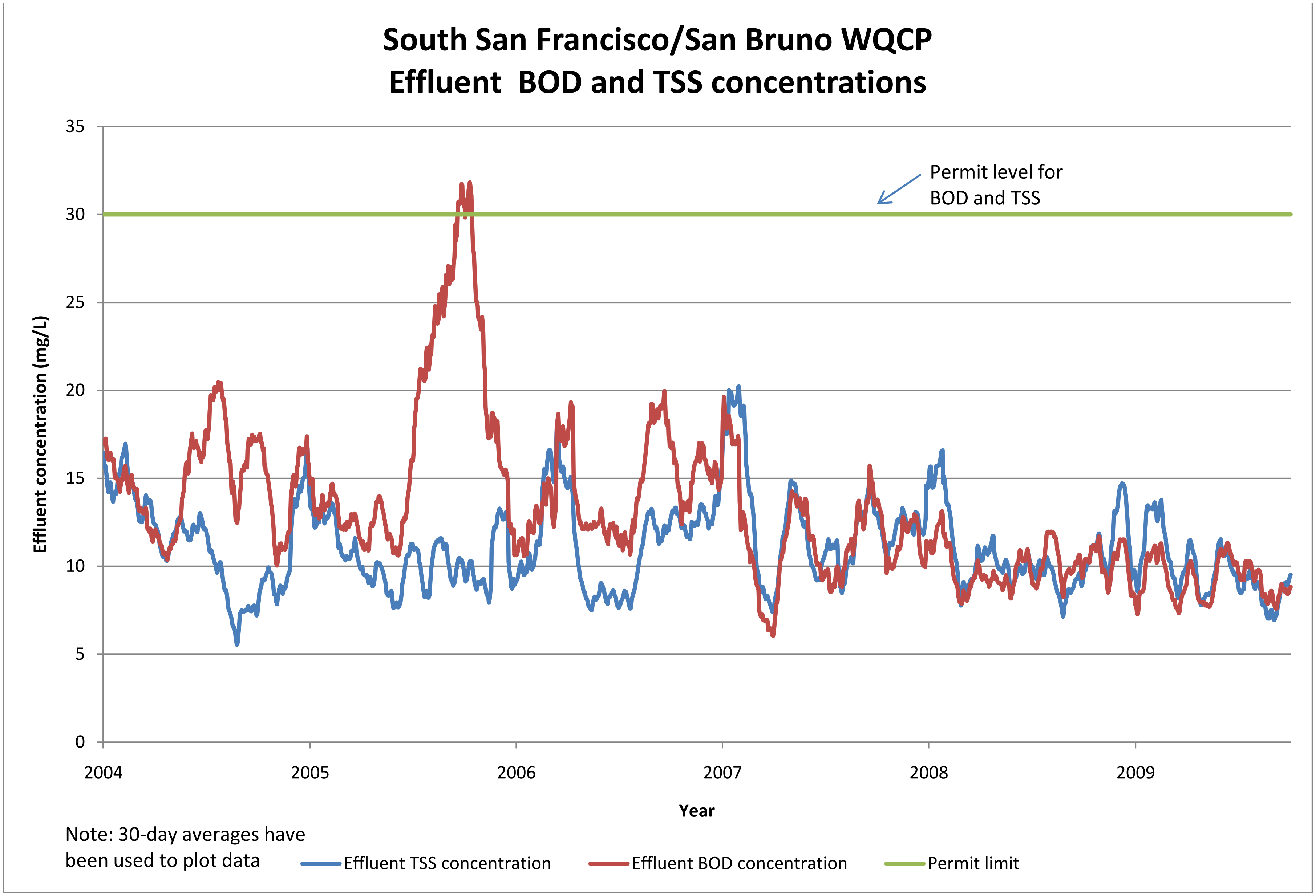

South San Francisco/San Bruno WQCP
BOD removal vs OFR
BOD removal percentage
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
500
1,000
1,500
2,000
2,500
3,000
Primary Clarifier Overflow Rate (gpd/sf)

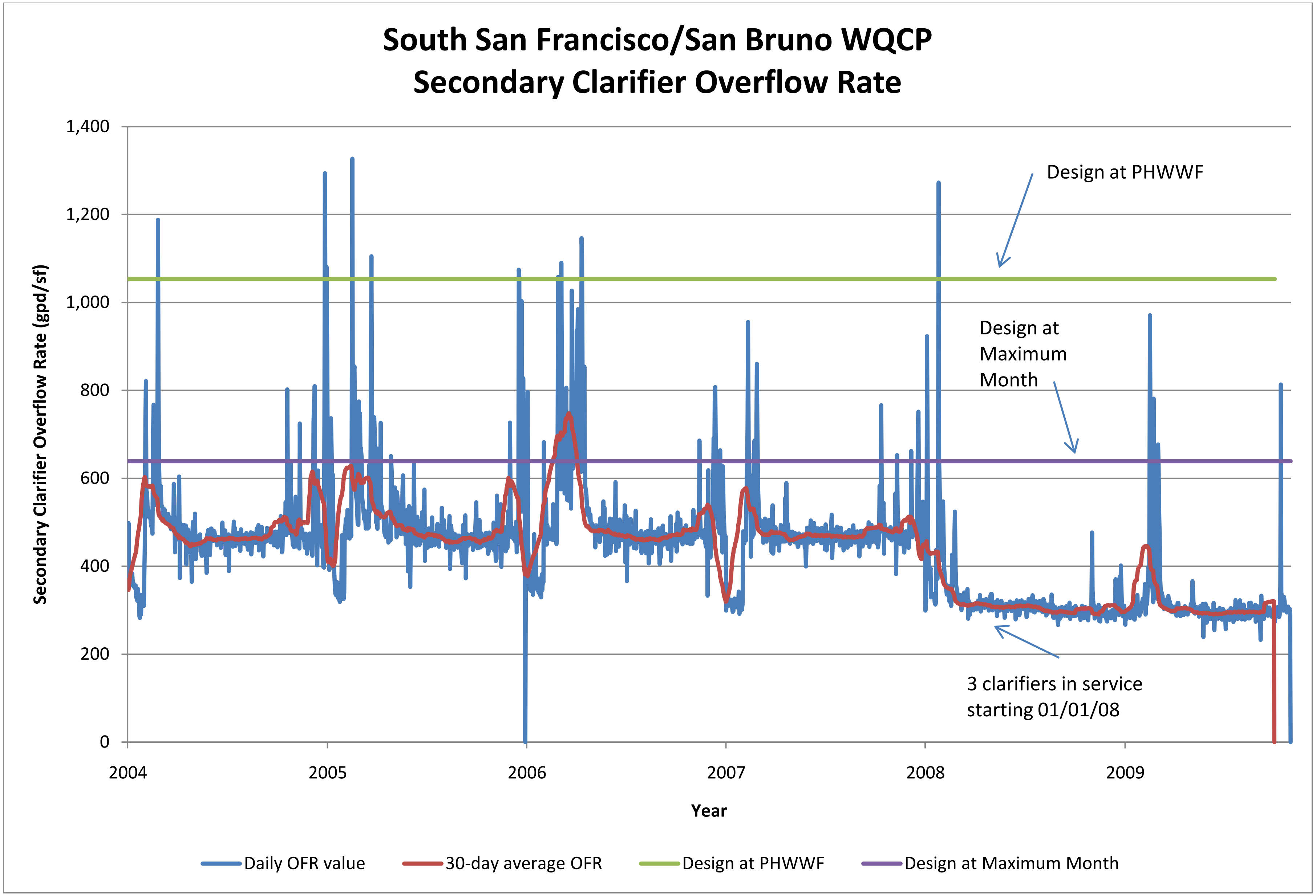


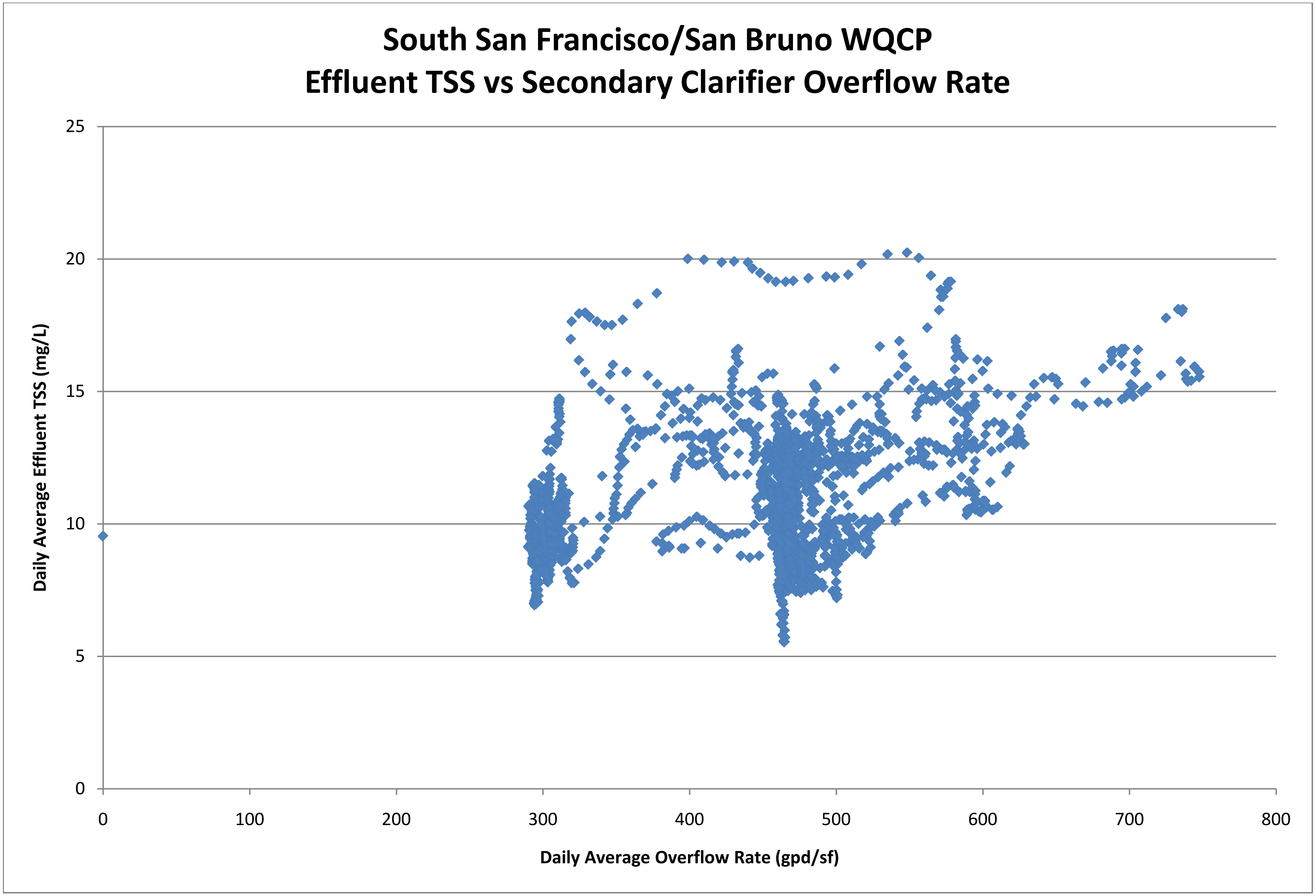
South San Francisco/San Bruno WQCP
TSS removal vs OFR
BOD removal percentage
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
500
1,000
1,500
2,000
2,500
3,000
Primary Clarifier Overflow Rate (gpd/sf)


South San Francisco/San Bruno WQCP
Mixed Liquor Suspended Solids (mg/L)
Design at Maximum Month
MLSS (mg/L)
3,000
2,500
2,000
1,500
1,000
500
0
2004
2005
2006
2007
2008
2009
Year
Note: 30-day average values are plotted

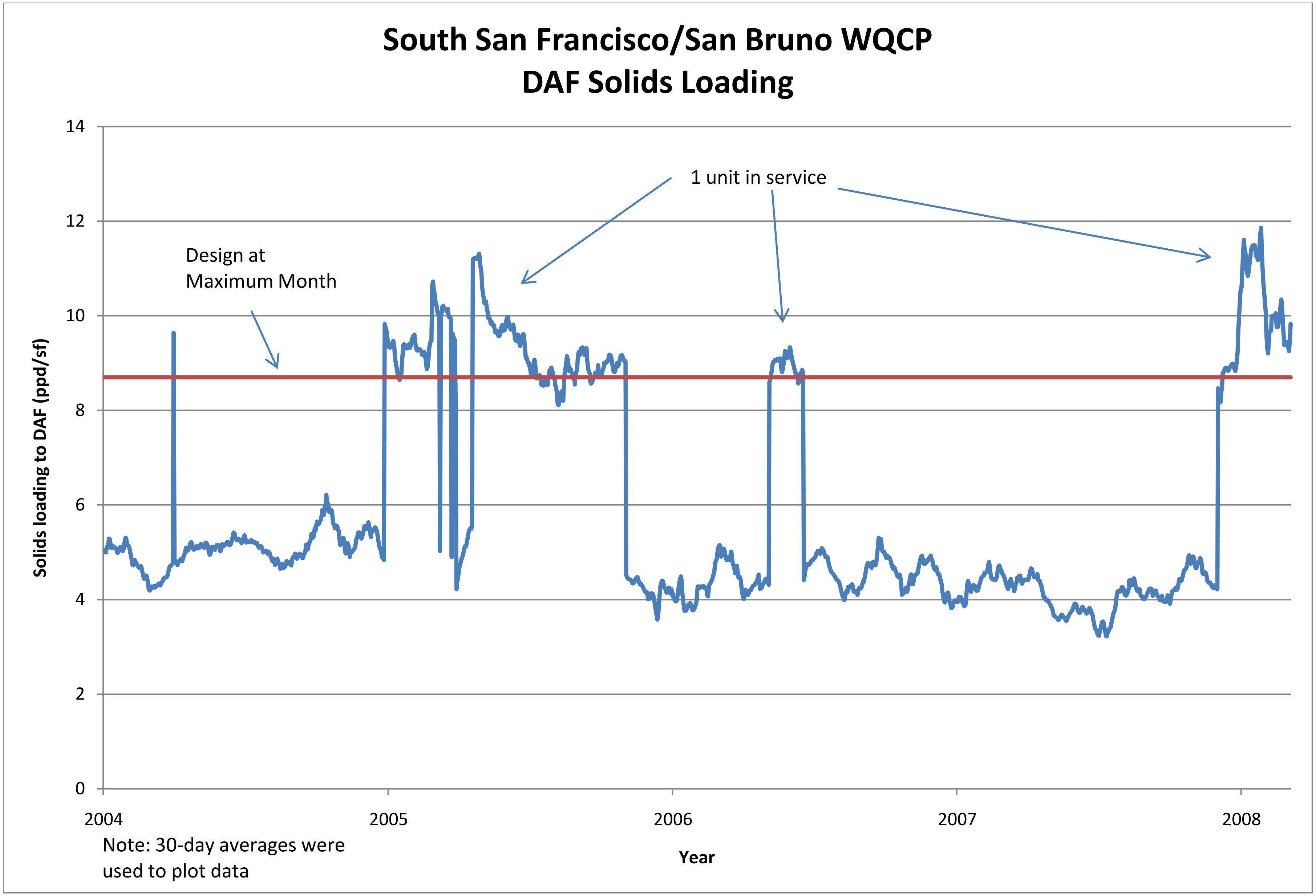

South San Francisco/San Bruno WQCP
Solids Retention Time
SRT (days)
5
4
3
2
1
0
Design at Maximum Month
Notes:
1. 30-day average values are plotted.
2. SRT is calculated based on inventory of aeration basins only.
2004
2005
2006
2007
2008
2009
Year

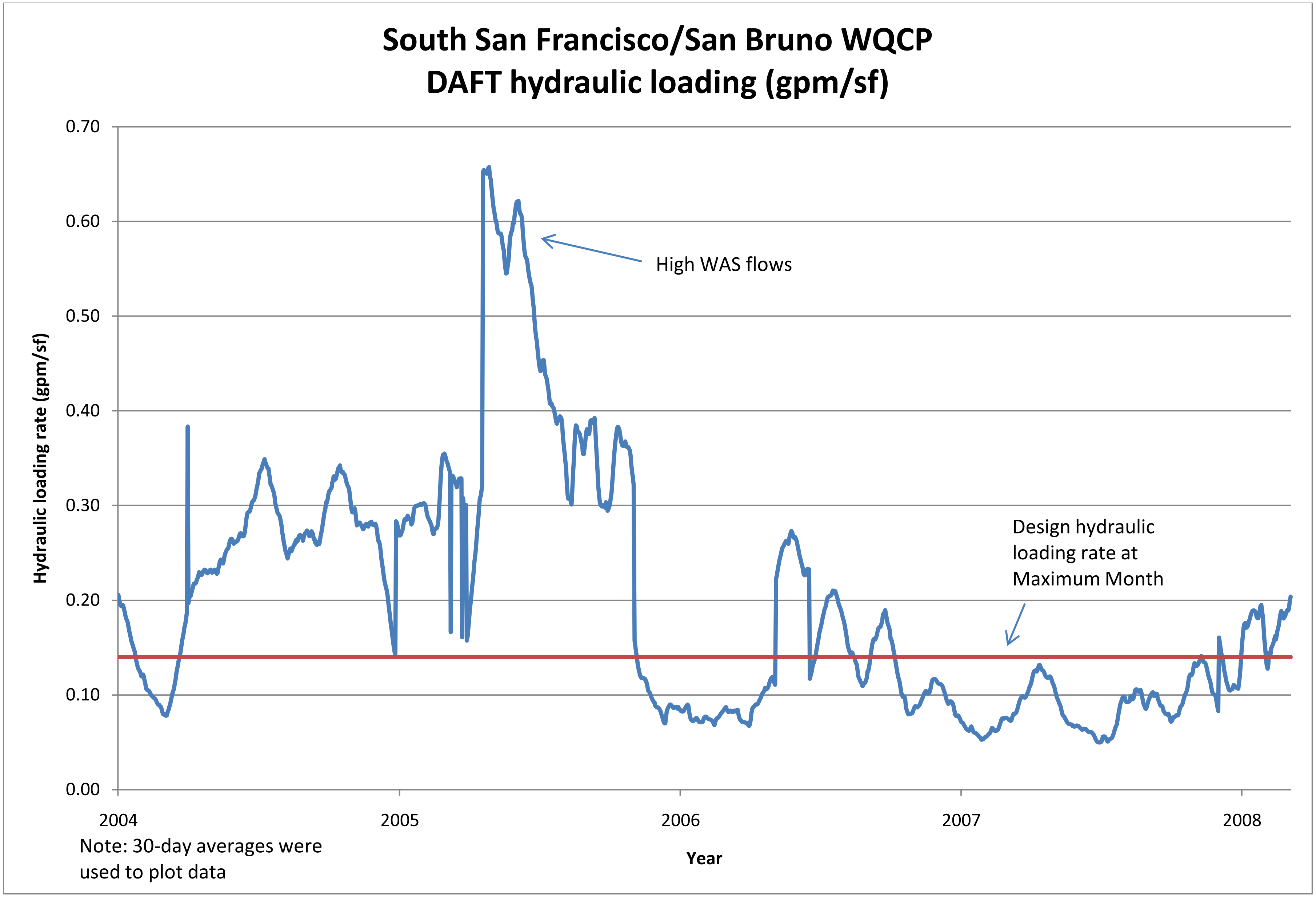

South San Francisco/San Bruno WQCP
Effluent BOD and TSS concentrations
Permit level for
BOD and TSS
Effluent concentration (mg/L)
35
30
25
20
15
10
5
0
2004
2005
2006
2007
2008
2009
Year
Note: 30-day averages have
been used to plot data
Effluent TSS concentration
Effluent BOD concentration
Permit limit

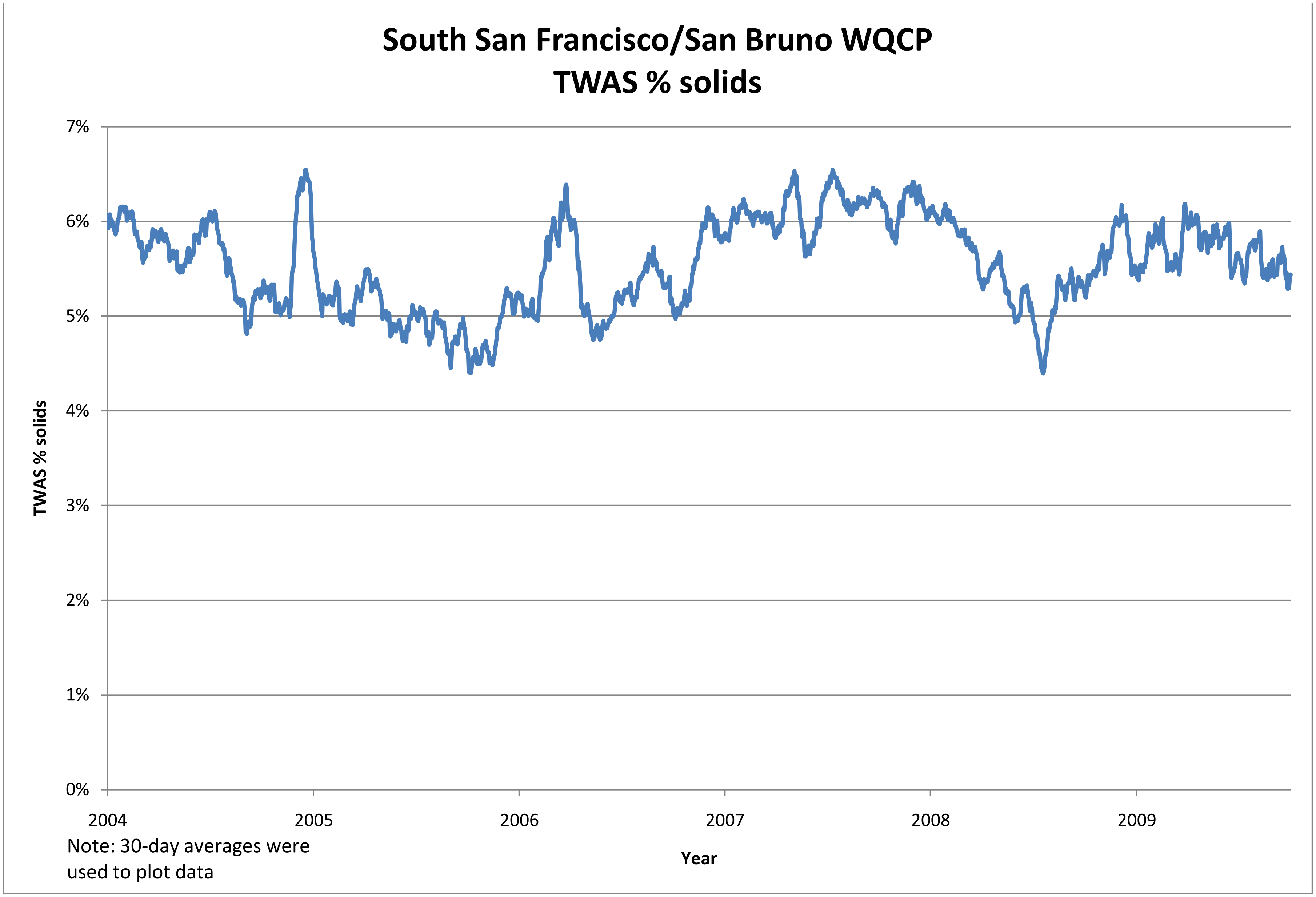

South San Francisco/San Bruno WQCP
Secondary Clarifier Overflow Rate
Secondary Clarifier Overflow Rate (gpd/sf)
1,400
1,200
1,000
800
600
400
200
0
2004
2005
2006
2007
2008
2009
Year
Design at PHWWF
Design at Maximum Month
3 clarifiers in service starting 01/01/08
Daily OFR value
30-day average OFR
Design at PHWWF
Design at Maximum Month

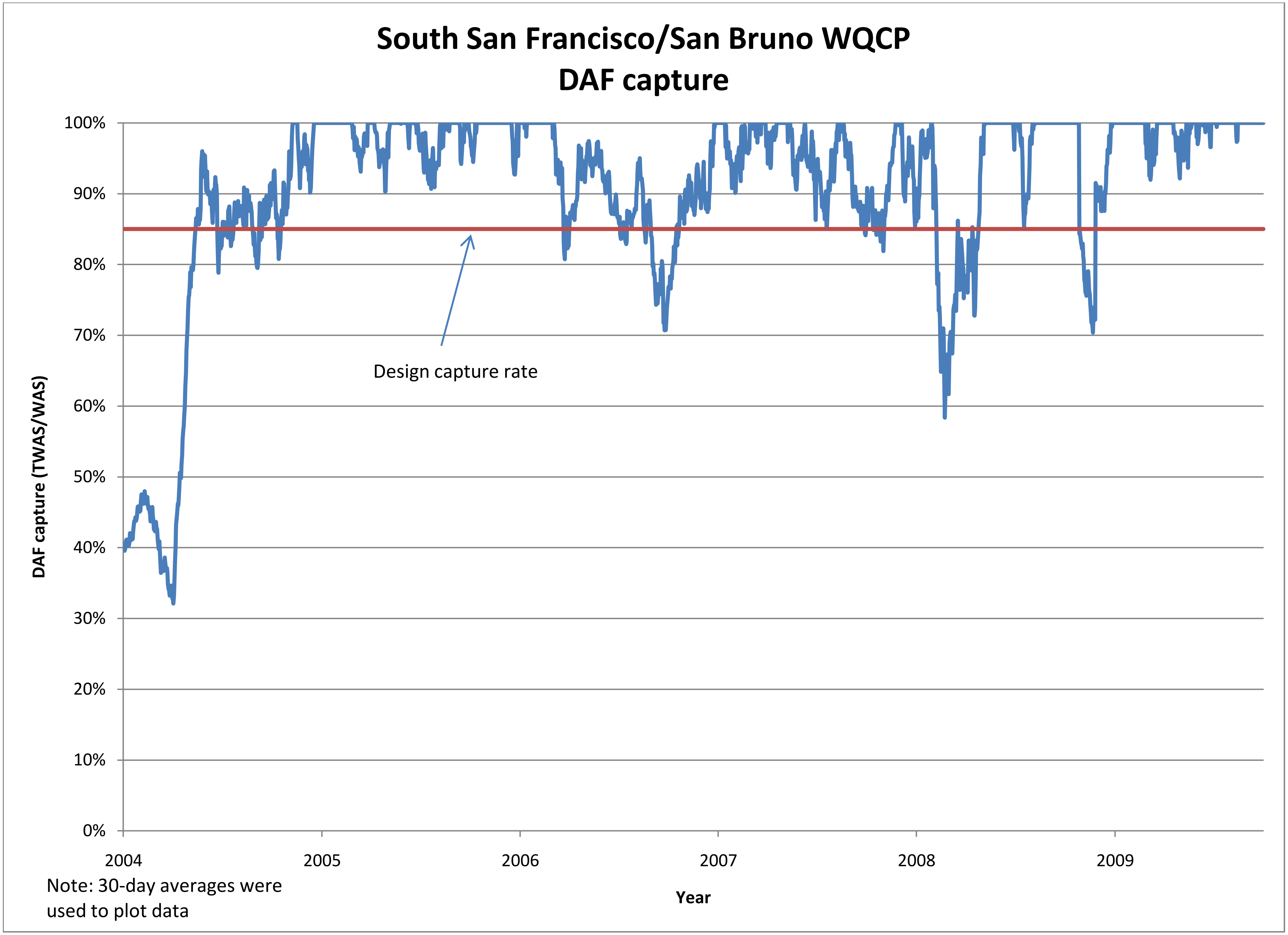


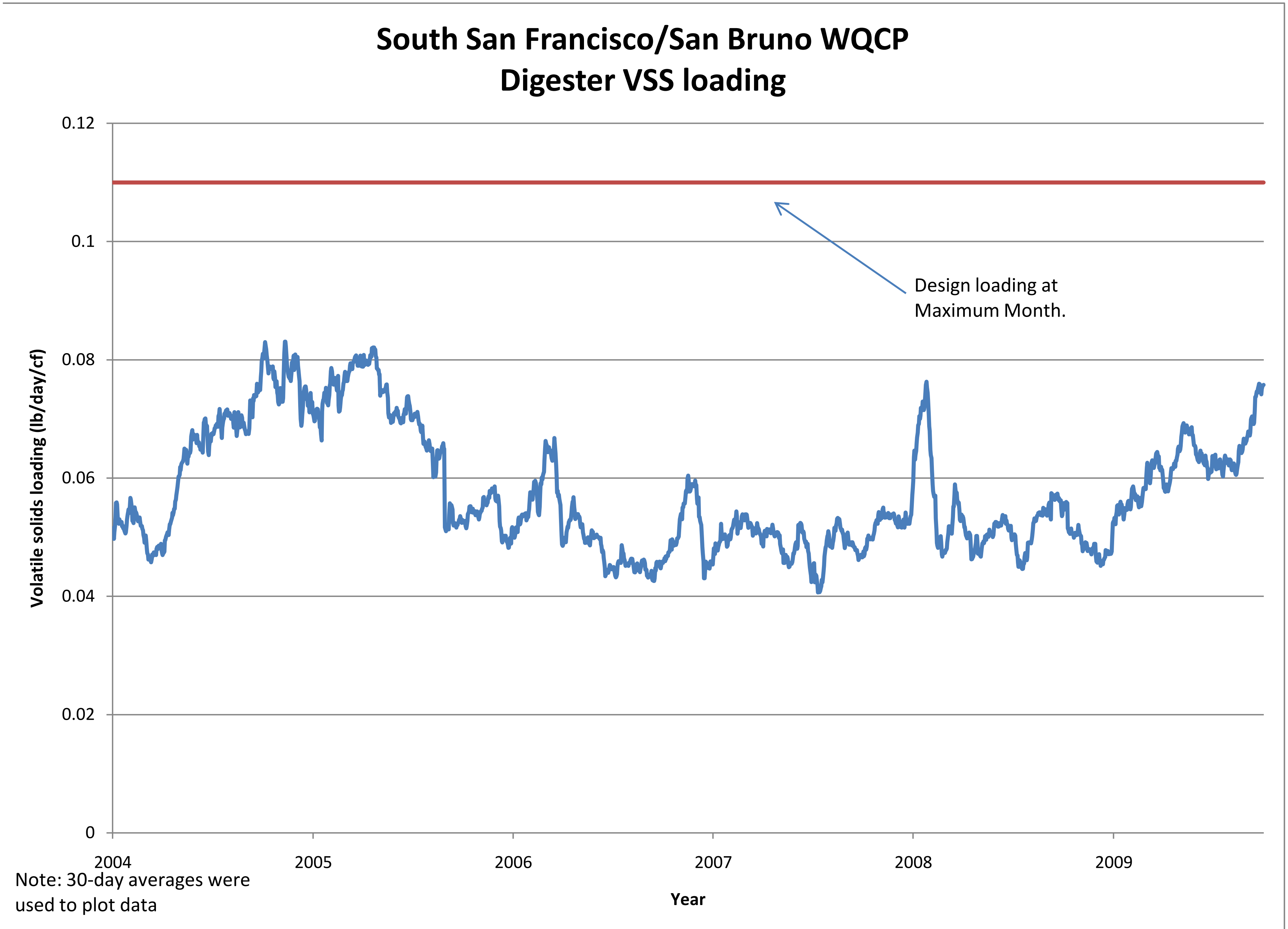
South San Francisco/San Bruno WQCP
Effluent TSS vs Secondary Clarifier Overflow Rate
Daily Average Effluent TSS (mg/L)
Daily Average Overflow Rate (gpd/sf)
0
5
10
15
20
25
0
100
200
300
400
500
600
700
800

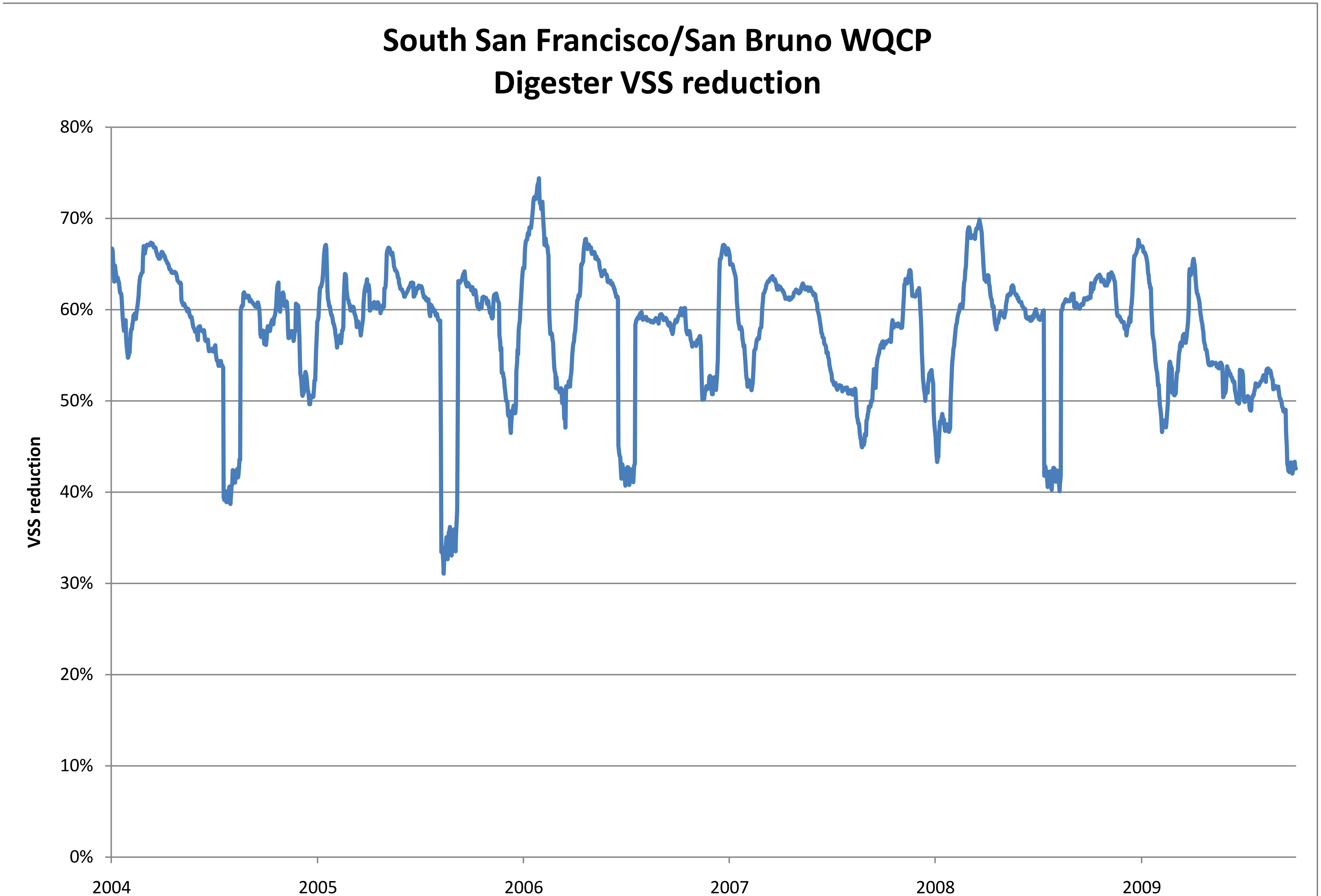

South San Francisco/San Bruno WQCP
DAF Solids Loading
1 unit in service
Design at
Maximum Month
Solids loading to DAF (ppd/sf)
14
12
10
8
6
4
2
0
2004
2005
2006
2007
2008
Year
Note: 30-day averages were
used to plot data


South San Francisco/San Bruno WQCP
DAFT hydraulic loading (gpm/sf)
Hydraulic loading rate (gpm/sf)
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
High WAS flows
Design hydraulic loading rate at Maximum Month
2004
2005
2006
2007
2008
Year
Note: 30-day averages were used to plot data

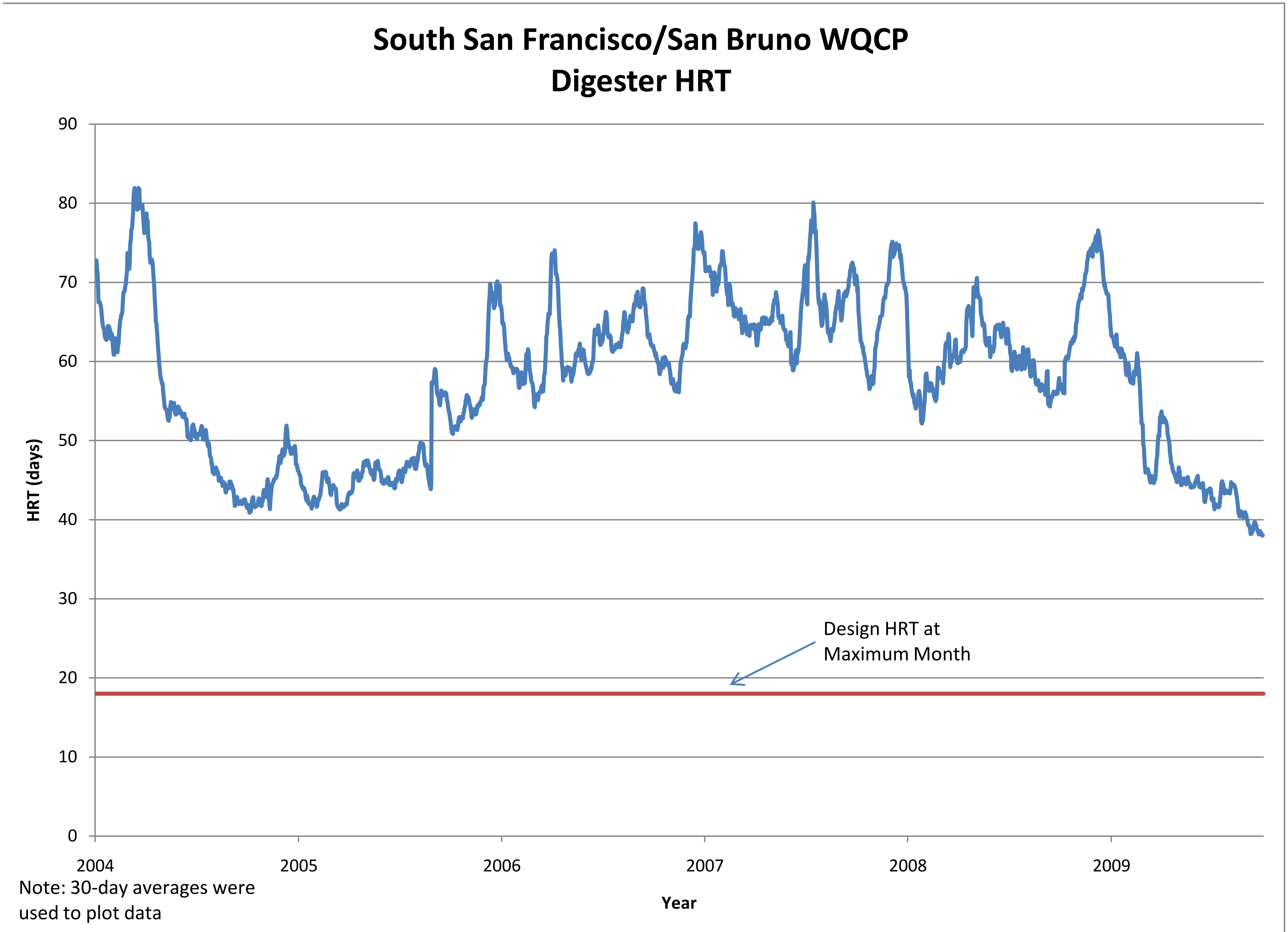

South San Francisco/San Bruno WQCP
TWAS % solids
7%
6%
5%
4%
3%
2%
1%
0%
TWAS % solids
2004
2005
2006
2007
2008
2009
Note: 30-day averages were
used to plot data
Year

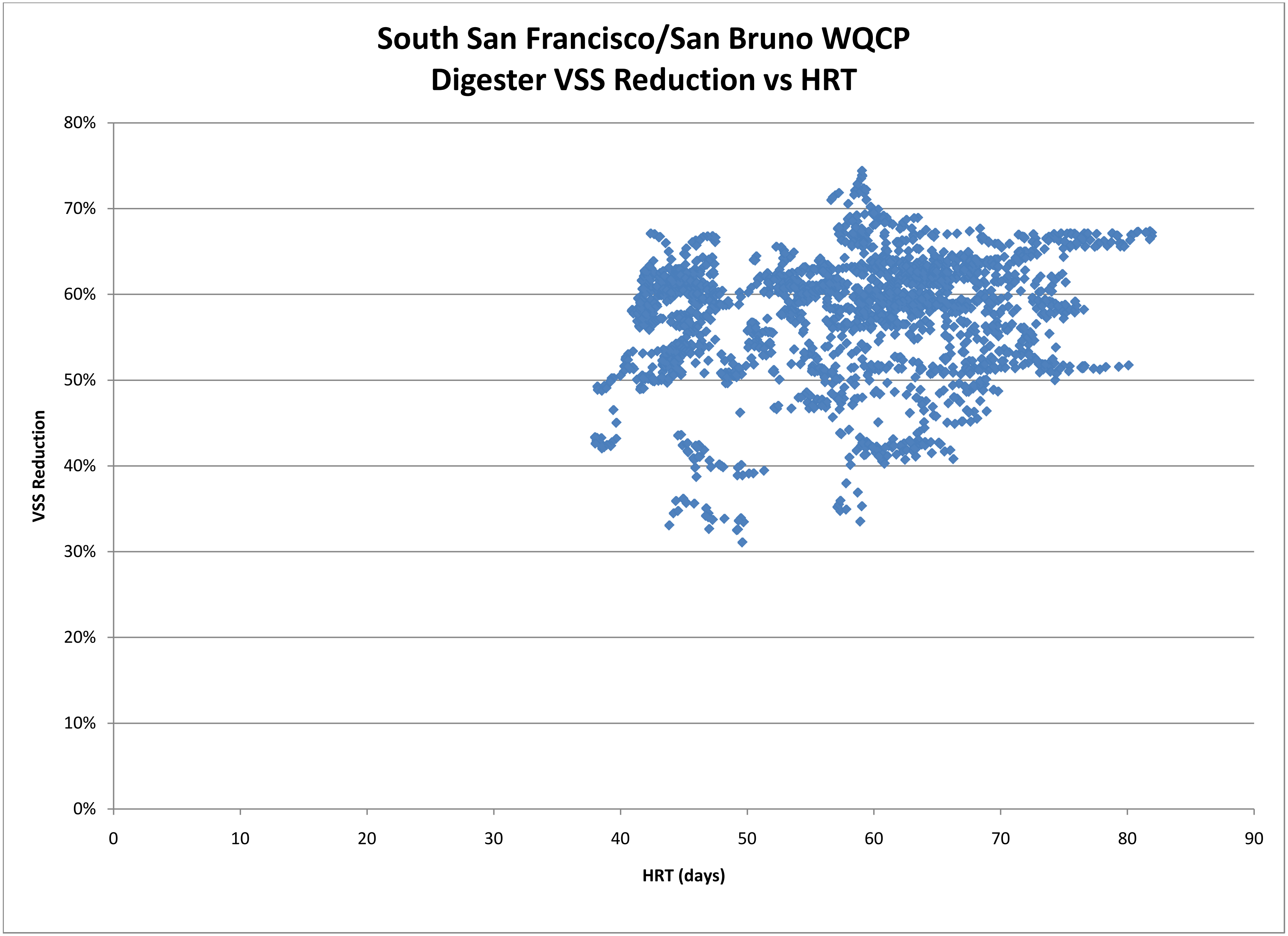

South San Francisco/San Bruno WQCP
DAF capture
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
DAF capture (TWAS/WAS)
Design capture rate
2004
2005
2006
2007
2008
2009
Year
Note: 30-day averages were used to plot data

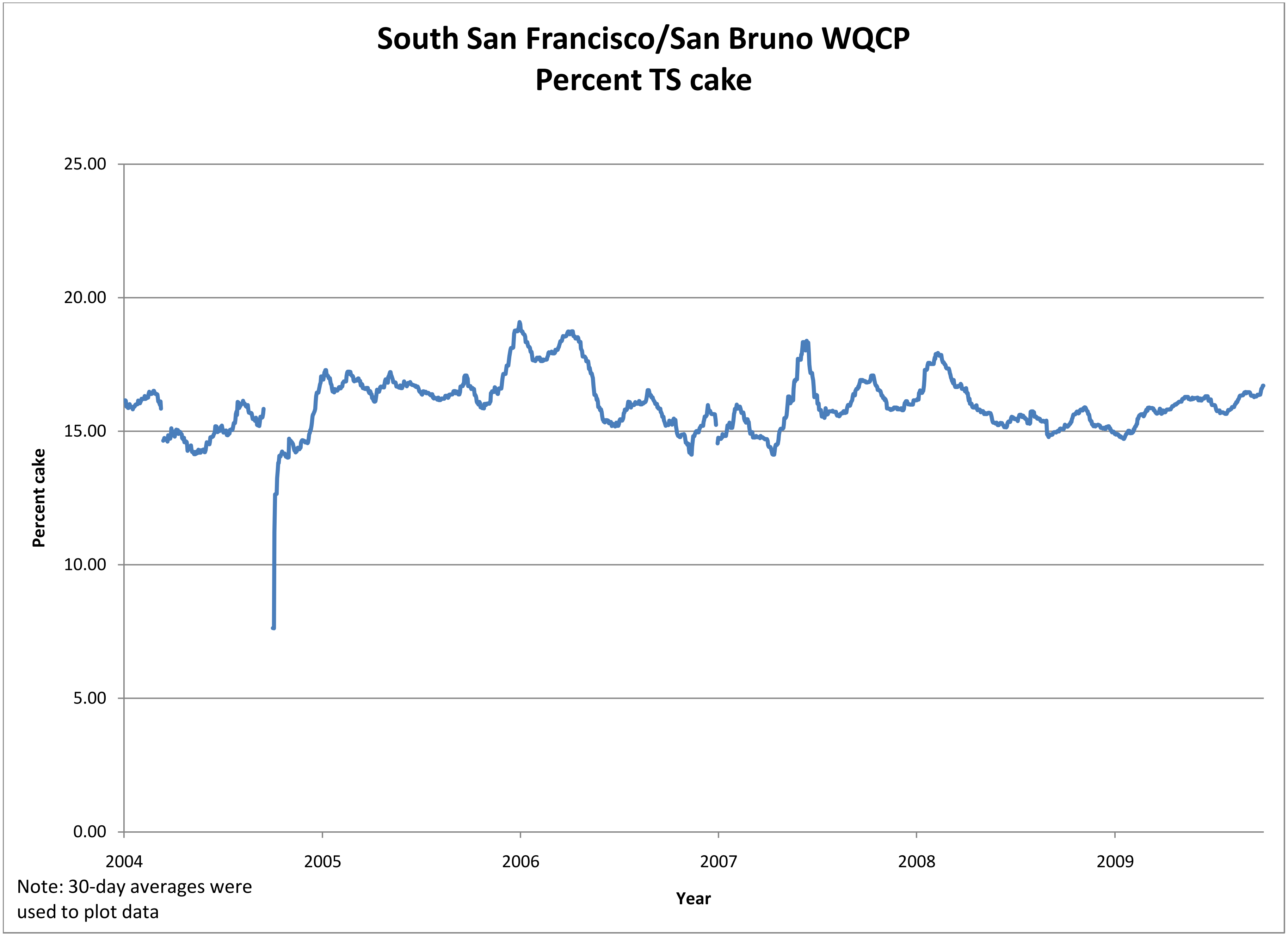

South San Francisco/San Bruno WQCP
Digester VSS loading
Design loading at Maximum Month.
Volatile solids loading (lb/day/cf)
0.12
0.1
0.08
0.06
0.04
0.02
0
2004
2005
2006
2007
2008
2009
Year
Note: 30-day averages were used to plot data



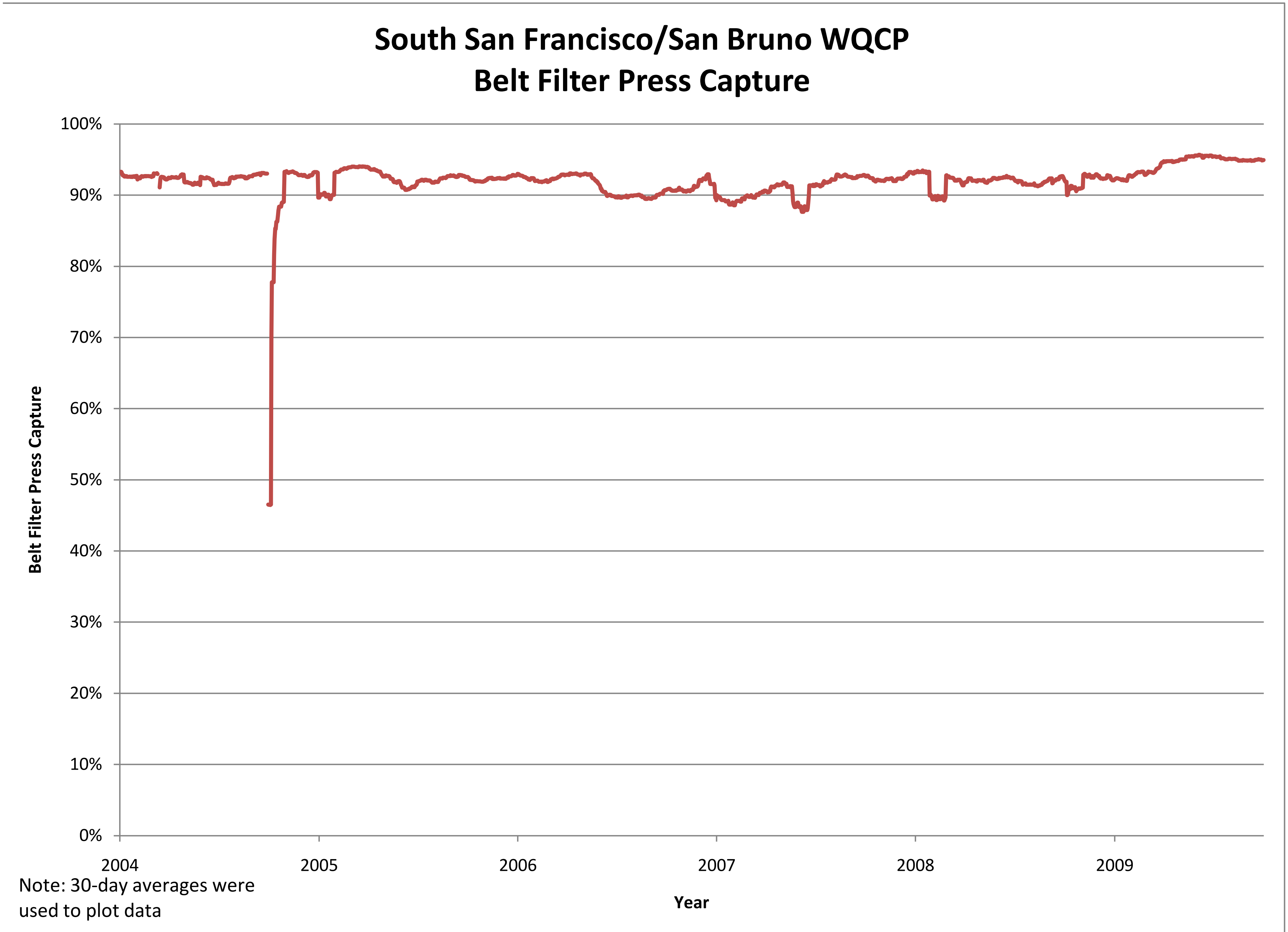
Note: 30-day averages were used to plot data

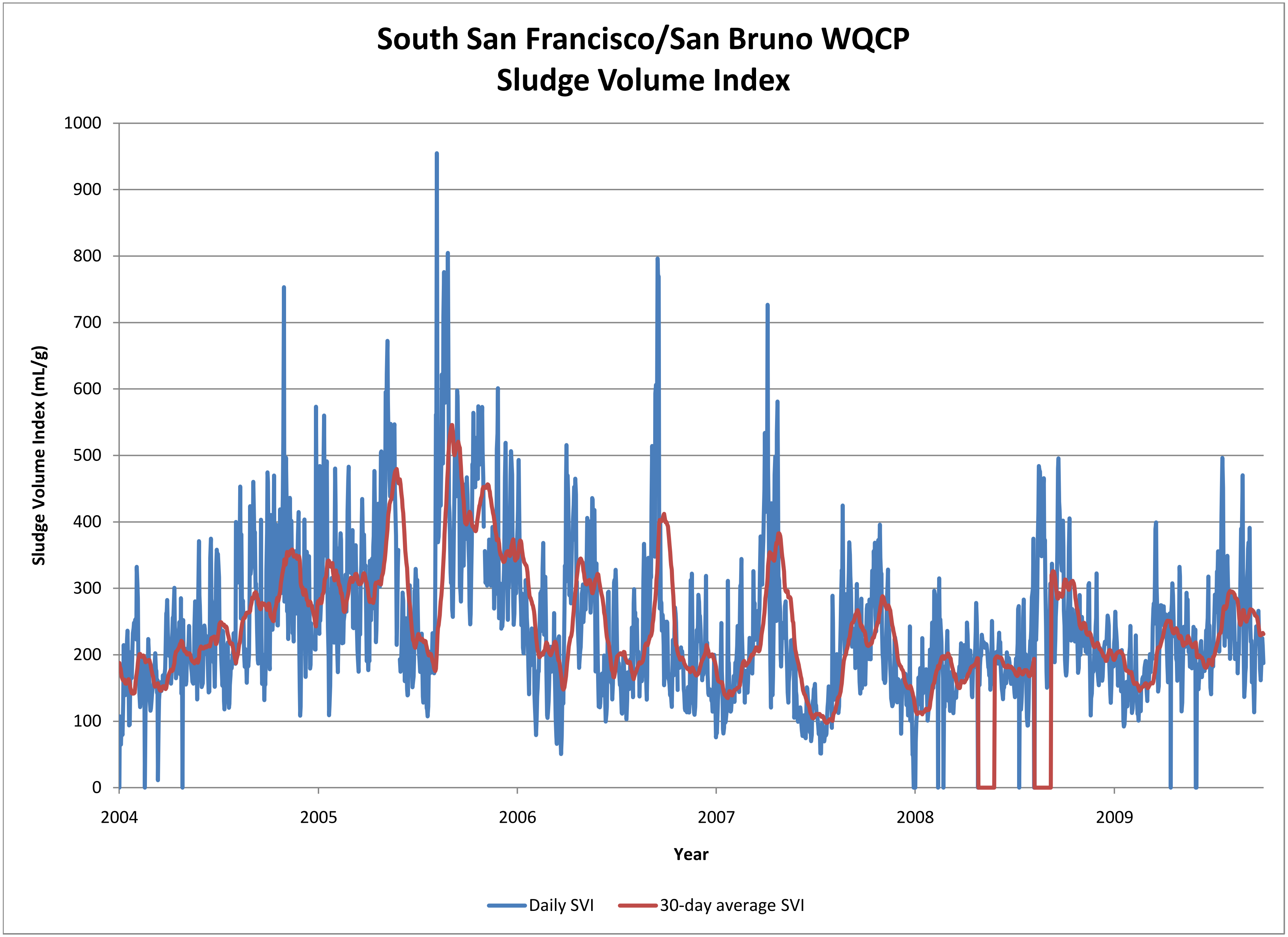

South San Francisco/San Bruno WQCP
Digester HRT
90
80
70
60
50
40
30
20
10
0
HRT (days)
Design HRT at
Maximum Month
2004
2005
2006
2007
2008
2009
Note: 30-day averages were
used to plot data
Year


South San Francisco/San Bruno WQCP
Digester VSS Reduction vs HRT
VSS Reduction
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
10
20
30
40
50
60
70
80
90
HRT (days)



South San Francisco/San Bruno WQCP
Percent TS cake
25.00
20.00
15.00
10.00
5.00
0.00
Percent cake
2004
2005
2006
2007
2008
2009
Year
Note: 30-day averages were used to plot data


South San Francisco/San Bruno WQCP
Belt Filter Press Capture
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Belt Filter Press Capture
2004
2005
2006
2007
2008
2009
Year
Note: 30-day averages were used to plot data



South San Francisco/San Bruno WQCP
Sludge Volume Index
Sludge Volume Index (mL/g)
1000
900
800
700
600
500
400
300
200
100
0
2004
2005
2006
2007
2008
2009
Year
Daily SVI
30-day average SVI

APPENDIX D – CALIBRATION

CAROLLO ENGINEERS, PC			
W.O./CLIENT:	8376A.00 / SSF		
PROJECT:	WQCP - Master Plan		
SUBJECT:	PROCESS ANALYSIS AND MASS BALANCE		
Calc by	Date Time	Chk by/Date	FileName:
AG	12/22/2009 2:23 PM		Calibration 122209.xls

Biotran-1402		Calibration AA	AA Data 2008
Annual Average Plant Flow, mgd	*	9.23	
Design (Max-Month) Flow, mgd		9.2	

NOTES regarding this application:

Used default biotran parameters except for following:		
Fpv, VSS fraction	0.83	Default 0.83
Fpc, Fraction Slowly Settleable	0.240	Default 0.33
Fvu, Fraction VSS that is Unbiodeg	0.450	Default 0.35
Fraction influent BOD that is soluble	0.320	Default 0.38
Am suppressing nitrification		

ALL-PURPOSE ENTRY SECTION:			
Quick-Correct Factor (1 = cancel circular ERR's)	*	*0*	
ITERATION MONITOR		***OK***	
- Sum of Error^2		**0.0000**	

"Converge" macro - To break out, press <Esc>, <Esc>, E

- Not converging? Try the following:			
-- Stabilization Fctr (1=Normal, 2, 3=High&Slow)	*	*1*	
-- Speed up Non-Nitrif convergence? (Y=1)	*	*1*	
..Note - ONLY for Non-Nitrifying conditions!		*No*	
-- Borderline P-Removal?			
INPUT DATA:			
- **Select Last-Pass MLSS* HERE, mg/L**	*	1,250	1,250

*Normally, use MLSS proposed in Sec. Clarifier section, based on selected Clarification Safety Fa

*For MBR, this must be MLSS in Membrane Zone

- **Select ML Recirc flow rate HERE, mgd**	*	0	
-- ML Recirc ratio		0.00	
-- Guideline: Remaining Denitrif Capacity, lb/d		0	
[appropriate for typical 2-st NdN config. only]			

PROCESS CRITERIA SUMMARY:

PRIMARY CLARIFIERS

- # of Clarifiers	4	4
- # in Service	2	2
- Avg Surface Overflow Rate, gpd/sf	929	
- Peak Diurnal Surface Overflow Rate, gpd/sf	1,208	
- Peak WW Surface Overflow Rate, gpd/sf	3,019	
- BOD % Removal	40.2	40%
- TSS % Removal	65.8	63%
- PS % Solids	5.1	5.1
- PS VSS/TSS	0.81	0.84

CAROLLO ENGINEERS, PC

W.O./CLIENT:	8376A.00 / SSF
PROJECT:	WQCP - Master Plan
SUBJECT:	PROCESS ANALYSIS AND MASS BALANCE

Calc by	Date Time	Chk by/Date	FileName:
AG	12/22/2009 2:23 PM		Calibration 122209.xls

Biotran-1402

		Calibration AA	AA Data 2008
Annual Average Plant Flow, mgd	*	9.23	
Design (Max-Month) Flow, mgd		9.2	
AERATION BASINS			
- # of Basins		1	9
- # in Service		1	8
- Hydraulic Deten. Time, hr		7.2	
- Operating Last-Pass MLSS, mg/L		1,250	1,250
- VSS/TSS		0.86	0.86
- Design Temperature, deg C		21.6	
- Unaerated Volume Fraction		0.00	
- Aerobic SRT, days		2.10	2.11
-- Min. Aerobic SRT for Nitrification		3.14	
- Total SRT, days		2.10	
-- Recommended Min. Total SRT for Nitrification		3.14	
- F/M, lb BOD Appl./lb MLSS-day		0.54	0.64
- Aer. BOD Loading, lb BOD/1000 cf-day		42	
- ML Recirculation Ratio		0.0	
- AOTR, ppd		14,162	
- lb O2 / lb PE BOD		0.88	
- AOTR/SOTR		0.22	
- SOTR, ppd		63,945	
- Avg Air Flow, scfm		7,910	10,900
- Avg hp Required		410	
- Peak hp Required		0	
SECONDARY CLARIFIERS			
- # of Basins		3	3
- # in Service		3	3
- Sec. Clarifier SOR, gpd/sf		326	325
- Sec. Clar. Solids Loading, lb/day-sf		6	
- Clarifier Safety Factor (CSF)		2.4	
- CSF Target		3.7	
SECONDARY EFFLUENT QUALITY, mg/L:			
- BOD (est.), mg/L		7	11
- TSS (nominal), mg/L		14	14
- NH3-N, mg/L	[Note]	33.46	27.0
- NO3-N, mg/L		0.0	2.6
- NO2-N, mg/L		0.00	1.40
- T.I.N., mg/L		33.5	

CAROLLO ENGINEERS, PC			
W.O./CLIENT:	8376A.00 / SSF		
PROJECT:	WQCP - Master Plan		
SUBJECT:	PROCESS ANALYSIS AND MASS BALANCE		
Calc by	Date Time	Chk by/Date	FileName:
AG	12/22/2009 2:23 PM		Calibration 122209.xls

Biotran-1402		Calibration AA	AA Data 2008
Annual Average Plant Flow, mgd	*	9.23	
Design (Max-Month) Flow, mgd		9.2	
DAF			
- # of Basins		2	2
- # in Service		1	1
- gpm/sf		0.36	
- ppd/sf		9	
- Capture. %		92.0	0.92
- TWAS % Solids		5.5	5.5
ANAEROBIC DIGESTERS			
- # of Basins		5	5
- # in Service		5	5
- HRT, days		59.2	64.7
- VSS ppd/cf		0.05	0.04
- % TSS Feed		5.28	5.21
- % VSS Reduction		56.2	58%
- Digested Sludge % TSS		2.88	2.14
- Digested Sludge VSS/TSS		68.7	70
DEWATERING			
- # of Units		2	2
- # in Service		2	2
- Cake % Solids		16	15.9
- % Capture		92	92
- Days of Operation / Week		2.8	2.8
- Hrs of Operation / Day		11.3	

CAROLLO ENGINEERS, PC			
W.O./CLIENT:	8376A.00 / SSF		
PROJECT:	WQCP - Master Plan		
SUBJECT:	PROCESS ANALYSIS AND MASS BALANCE		
Calc by	Date Time	Chk by/Date	FileName:
AG	12/22/2009 2:23 PM		Calibration 122209.xls

Biotran-1402		Calibration AA	AA Data 2008
Annual Average Plant Flow, mgd	*	9.23	
Design (Max-Month) Flow, mgd		9.2	

FLOW AND MASS BALANCE SUMMARY:

	Calibration AA	AA Data 2008
FLOWS, MGD		
- Design	9.2	9.2
- Peak Diurnal	12.0	
- Peak Wet Weather	30.0	36.3
INFLUENT		
- Flow, mgd	9.2	
- BOD, ppd	26,788	26,778
- TSS, ppd	20,630	20,659
- Ammonia, ppd	2,309	2,296
RECYCLE TO HEADWORKS		
- Flow, mgd	0.109	
- BOD, ppd	373	
- TSS, ppd	1,141	
- Ammonia, ppd	809	
PRIMARY INFLUENT		
- Flow, mgd	9.3	
- BOD, ppd	27,161	
- TSS, ppd	21,771	
- Ammonia, ppd	3,119	
PRIMARY EFFLUENT		
- Flow, mgd	9.3	
- BOD, ppd	16,181	16,200
- TSS, ppd	7,429	7,500
- Ammonia, ppd	3,148	
RECYCLE TO AERATION BASINS		
- Flow, mgd	0.591	
- BOD, ppd	471	
- TSS, ppd	1,088	
- Ammonia, ppd	157	
SECONDARY EFFLUENT		
- Flow, mgd	9.3	
- BOD, ppd	543	844
- TSS, ppd	1,087	1,074
- Ammonia, ppd	2,597	2,072
PRIMARY SLUDGE		
- Flow, mgd	0.034	0.028
- VSS, ppd	11,610	10,293
- TSS, ppd	14,342	12,253

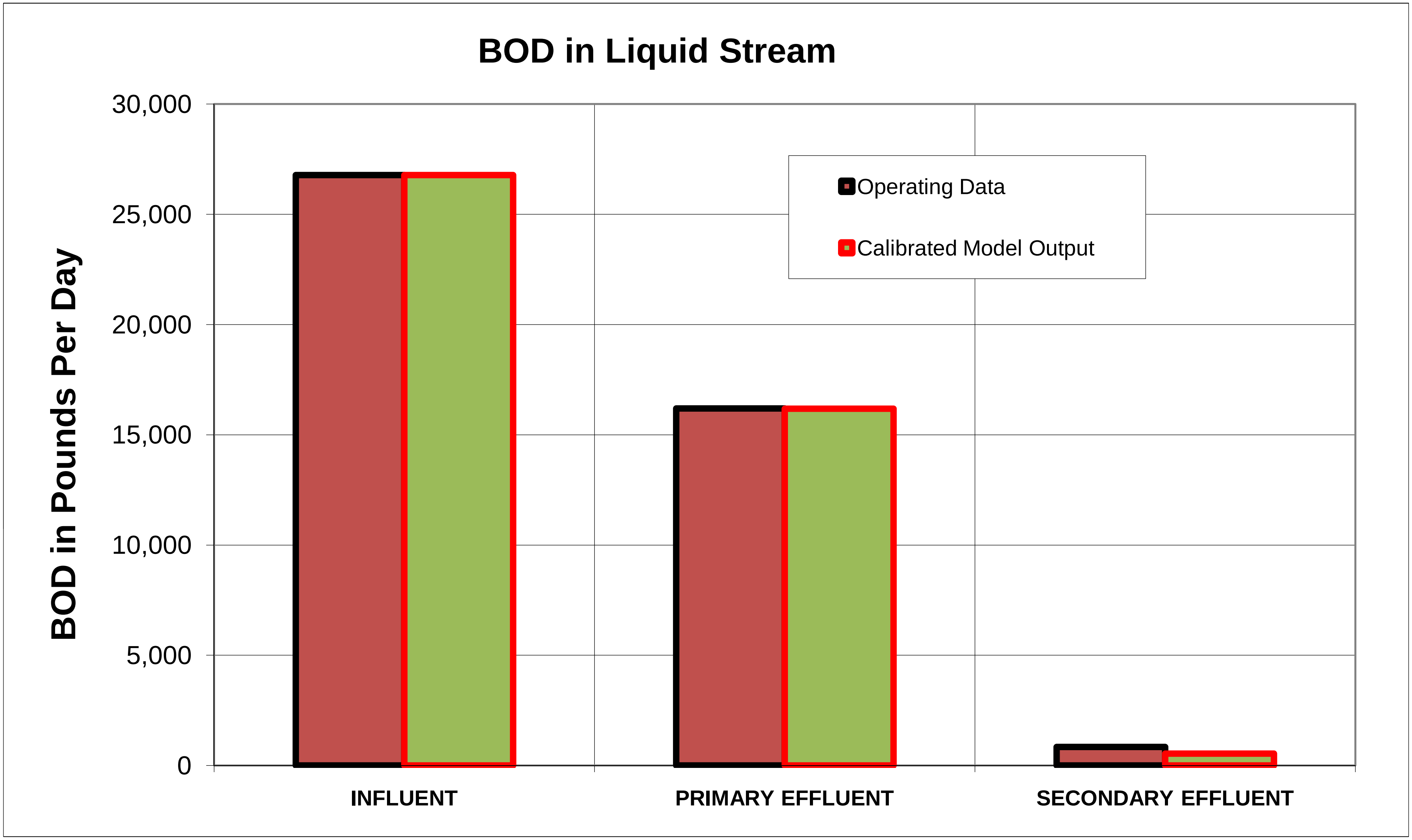
CAROLLO ENGINEERS, PC

W.O./CLIENT:	8376A.00 / SSF
PROJECT:	WQCP - Master Plan
SUBJECT:	PROCESS ANALYSIS AND MASS BALANCE

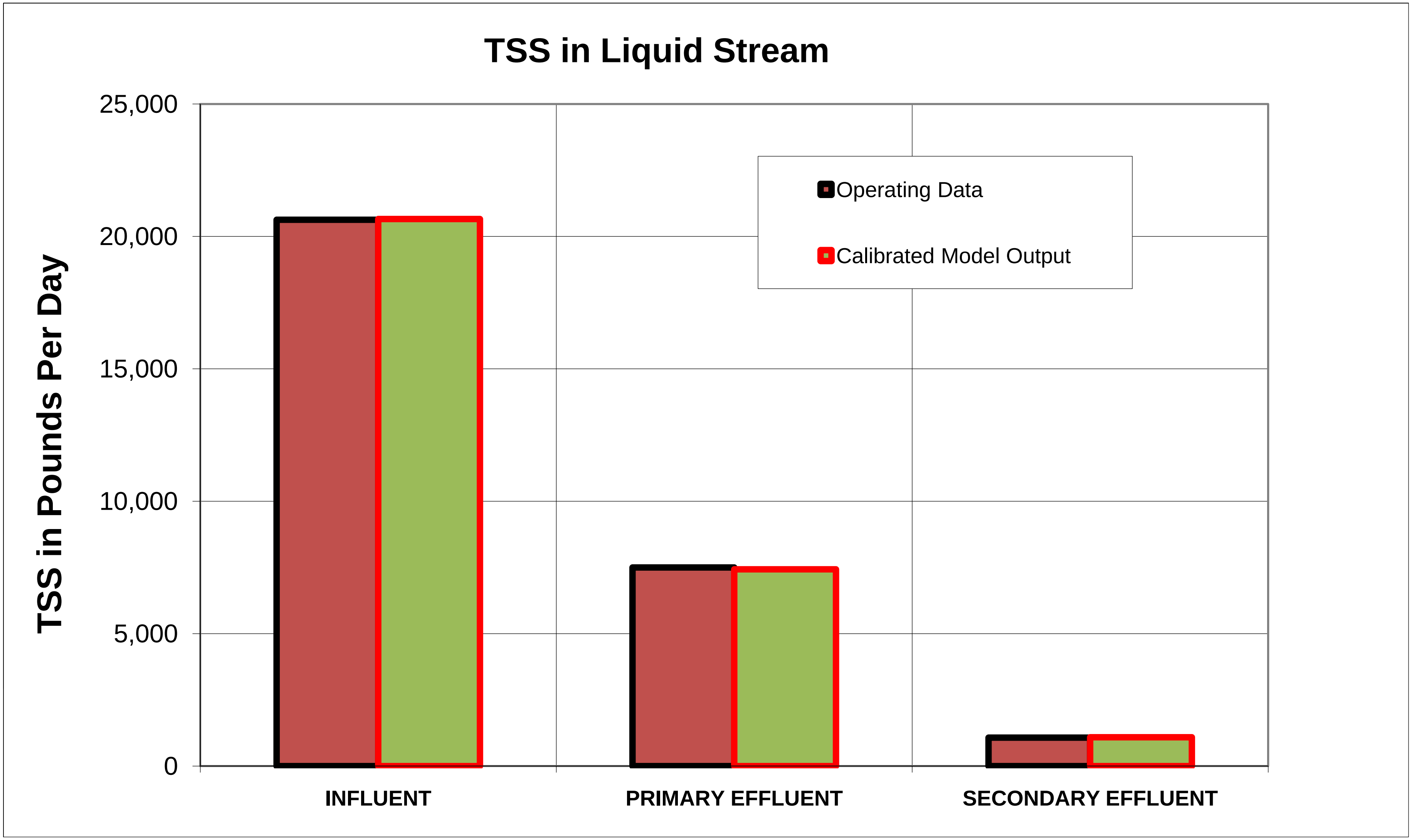
Calc by	Date Time	Chk by/Date	FileName:
AG	12/22/2009 2:23 PM		Calibration 122209.xls

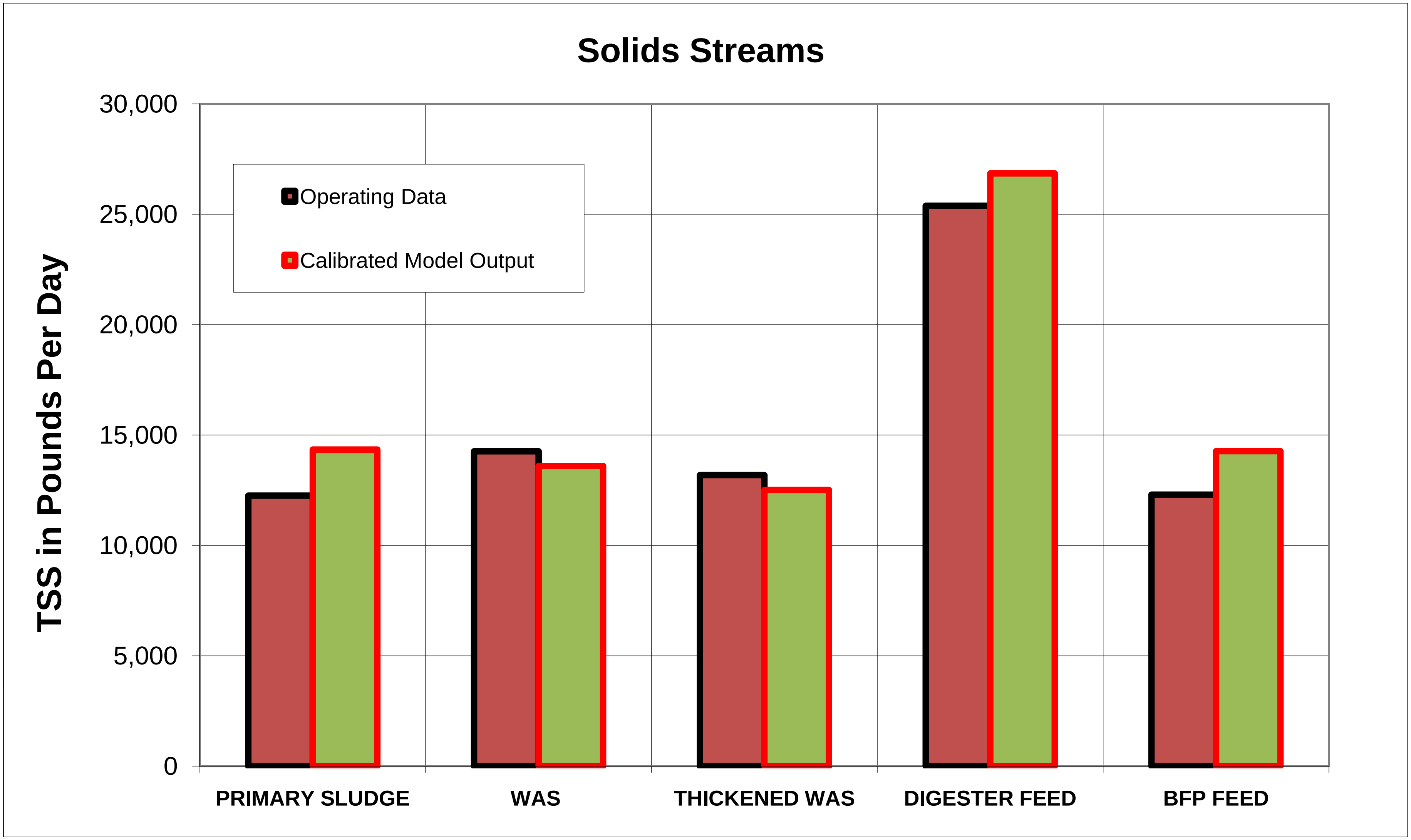
Biotran-1402

		Calibration AA	AA Data 2008
Annual Average Plant Flow, mgd	*	9.23	
Design (Max-Month) Flow, mgd		9.2	
WASTE SLUDGE TO DAF			
- Flow, mgd		0.591	0.409
- VSS, ppd		11,717	12,266
- TSS, ppd		13,596	14,263
SECONDARY SLUDGE YIELD			
- Total Yield, lb TSS / lb BOD in PE		0.91	
- WAS Yield, lb TSS / lb BOD in PE		0.84	
THICKENED WASTE SLUDGE			
- Flow, mgd		0.027	0.032
- VSS, ppd		10,779	11,338
- TSS, ppd		12,509	13,184
DIGESTER FEED			
- Flow, mgd		0.061	0.058
- VSS, ppd		22,389	21,578
- TSS, ppd		26,851	25,386
DIGESTED SLUDGE			
- Flow, mgd		0.061	0.058
- VSS, ppd		9,804	8,500
- TSS, ppd		14,266	12,300



BOD in Liquid Stream
BOD in Pounds Per Day
30,000
25,000
20,000
15,000
10,000
5,000
0
Operating Data
Calibrated Model Output
INFLUENT
PRIMARY EFFLUENT
SECONDARY EFFLUENT


TSS in Liquid Stream
TSS in Pounds Per Day
25,000
20,000
15,000
10,000
5,000
0
Operating Data
Calibrated Model Output
INFLUENT
PRIMARY EFFLUENT
SECONDARY EFFLUENT


Solids Streams
TSS in Pounds Per Day
30,000
25,000
20,000
15,000
10,000
5,000
0
Operating Data
Calibrated Model Output
PRIMARY SLUDGE
WAS
THICKENED WAS
DIGESTER FEED
BFP FEED

APPENDIX E – NPDES PERMIT

Linda S. Adams
Secretary for Environmental Protection

California Regional Water Quality Control Board

Arnold Schwarzenegger
Governor

San Francisco Bay Region

1515 Clay Street, Suite 1400, Oakland CA 94612
(510) 622-2300 • Fax (510) 622-2460
http://www.waterboards.ca.gov/sanfranciscobay

ORDER NO. R2-2008-0094
NPDES NO. CA0038130

The following Discharger is subject to waste discharge requirements set forth in this Order.

Table 1. Discharger Information

Discharger	Cities of South San Francisco and San Bruno
Name of Facility	South San Francisco and San Bruno Water Quality Control Plant and Collection System
Facility Address	195 Belle Air Road
	South San Francisco, CA 94080
	San Mateo County
The U.S. Environmental Protection Agency (USEPA) and the Regional Water Quality Control Board have classified this discharge as a major discharge.	

The discharge by the South San Francisco and San Bruno Water Quality Control Plant from the discharge point identified below is subject to waste discharge requirements as set forth in this Order.

Table 2. Discharge Location

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
E-002	Secondary Treated Municipal Wastewater	37º 39’ 55” N	122º 21’ 41” W	Lower San Francisco Bay

Table 3. Administrative Information

This Order was adopted by the Regional Water Board on:	**November 12, 2008**
This Order shall become effective on:	**January 1, 2009**
This Order shall expire on:	**December 31, 2013**
The Discharger shall file a Report of Waste Discharge in accordance with title 23, California Code of Regulations, as application for issuance of new waste discharge requirements no later than:	**180 days prior to the Order expiration date**

IT IS HEREBY ORDERED that this Order supersedes Order No. R2-2003-0010 except for enforcement purposes, and, in order to meet the provisions contained in Division 7 of the California Water Code (commencing with section 13000) and regulations adopted thereunder, and the provisions of the federal Clean Water Act (CWA) and regulations and guidelines adopted thereunder, the Discharger shall comply with the requirements in this Order.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on **November 12, 2008**.

____

Bruce H. Wolfe**,** Executive Officer

Table of Contents

Tables

Attachments

I. FACILITY INFORMATION

The following Discharger is subject to the waste discharge requirements set forth in this Order:

Table 4. Facility Information

Discharger	Cities of South San Francisco and San Bruno
Name of Facility	South San Francisco and San Bruno Water Quality Control Plant and Collection System
Facility Address	195 Belle Air Road
	South San Francisco, CA 94080
	San Mateo County
Facility Contact, Title, and Phone	David Castagnola, Plant Superintendent (650) 829-3844
Mailing Address	Same as Facility Address
Type of Facility	Publicly Owned Treatment Works (POTW)
Facility Design Flow	13 million gallons per day (MGD) (average dry weather design treatment capacity)
Service Areas	Cities of South San Francisco and San Bruno; portions of Daly City; and the town of Colma
Service Population	105,870

II. FINDINGS

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter the Regional Water Board), finds:

A. Background. The Cities of South San Francisco and San Bruno (hereinafter the Discharger) are currently discharging under Order No. R2-2003-0010 and National Pollutant Discharge Elimination System (NPDES) Permit No. CA0038130. The Discharger submitted a Report of Waste Discharge, dated September 24, 2007, and applied to renew its NPDES permit to discharge up to 13 million gallons per day (MGD) of secondary treated wastewater (average dry weather flow) from the South San Francisco and San Bruno Water Quality Control Plant and its collection system (Plant).

For the purposes of this Order, references to the "discharger" or "permittee" in applicable federal and state laws, regulations, plans, or policy are held to be equivalent to references to the Discharger herein.

B. Facility Description. The Discharger owns and operates the Plant, which provides secondary treatment of wastewater from domestic, commercial and industrial sources from the service areas listed in Table 4, above. The total service population is approximately 105,867 (2007 estimate). The Discharger has an average dry weather design treatment capacity of 13 MGD. The average discharge rate is 9.82 MGD, based on flow data from 2003 to 2006, and the maximum daily effluent flow rate from 2003 to 2006 was 24.31 MGD. The collection system is 100% separate sanitary sewer.

Wastewater treatment processes at the Plant include screening and grit removal, primary clarification, secondary treatment by an activated sludge process, secondary clarification, filtration, disinfection, and dechlorination. Biosolids are concentrated using dissolved air flotation thickeners, anaerobically digested, and filtered in belt filter presses. Biosolids are placed in a landfill in

Livermore. The Discharger is a member of the North Bayside System Unit (NBSU), a joint powers authority that also includes the Cities of Burlingame and Millbrae, and the San Francisco International Airport. Treated, disinfected wastewater from the Plant enters the NBSU force main and combines with treated, disinfected wastewaters from other NBSU members. The combined effluent is dechlorinated and discharged through the NBSU outfall at Discharge Point E-002. The Order also establishes two effluent monitoring locations to determine compliance with the requirements of the Order. Monitoring Location E-001 is located at a point after full treatment of wastewater but prior to its entry into the NBSU force main, and Monitoring Location E-002 is located at a point after entry of treated wastewater into the NBSU force main and after dechlorination, but prior to discharge into Lower San Francisco Bay.

Recent Plant improvements allow full secondary treatment of the design dry weather flow (13 MGD) plus peak wet weather flows up to 30 MGD. To prevent hydraulic overload of the activated sludge process, influent flows greater than 30 MGD receive primary treatment and disinfection only, and are blended with secondary treated wastewater prior to being discharged. Effluent flows greater than 62 MGD, which exceed the Plant's pumping capacity, are retained in a 7 million gallon storage pond until flow rates subside; however, during extreme wet weather events, when the effluent storage capacity is exceeded, treated wastewater is sometimes discharged through a nearshore outfall to Colma Creek. Consistent with Basin Plan requirements, discharges at any location other than Discharge Point E-002 are not authorized by this Order.

Attachment B provides a map of the area around the Plant. Attachment C provides a flow schematic of the Plant.

C. **Legal Authorities.** This Order is issued pursuant to Clean Water Act (CWA) section 402 and implements regulations adopted by the U.S. Environmental Protection Agency (USEPA) and Chapters 5.5, Division 7 of the California Water Code (CWC) (commencing with section 13370). It shall serve as an NPDES permit for point source discharges from the Plant to surface waters. This Order also serves as Waste Discharge Requirements pursuant to Article 4, Chapter 4, Division 7 of the CWC (commencing with section 13260).

D. **Background and Rationale for Requirements.** The Regional Water Board developed the requirements in this Order based on information submitted as part of the application, through monitoring and reporting programs, and other available information. The Fact Sheet (Attachment F), which contains background information and rationale for requirements of the Order, is hereby incorporated into this Order and constitutes part of the findings for this Order. Attachments A through E and G through H are also incorporated into this Order.

E. **California Environmental Quality Act (CEQA).** Under CWC section 13389, this action to adopt an NPDES permit is exempt from the provisions of CEQA.

F. **Technology-Based Effluent Limitations.** CWA Section 301(b) and NPDES regulations at 40 CFR 122.44 require that permits include conditions meeting applicable technology-based requirements at minimum and any more stringent effluent limitations necessary to meet applicable water quality standards. The discharge authorized by this Order must meet minimum federal technology-based requirements based on Secondary Treatment Standards at 40 CFR 133.
A detailed discussion of technology-based effluent limitation development is included in the Fact Sheet.

G. Water Quality-Based Effluent Limitations. CWA section 301(b) and NPDES regulations at 40 CFR 122.44(d) require that permits include limitations more stringent than applicable federal technology-based requirements where necessary to achieve applicable water quality standards.

NPDES regulations at 40 CFR 122.44(d)(1)(i) mandate that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant that has no numeric criterion or objective, water quality-based effluent limitations (WQBELs) must be established using (1) USEPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting the state's narrative criterion, supplemented with other relevant information, as provided in 40 CFR 122.44(d)(1)(vi).

H. Water Quality Control Plans. *The Water Quality Control Plan for the San Francisco Bay Basin* (the Basin Plan) is the Regional Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was duly adopted by the Regional Water Board and approved by the State Water Resources Control Board (State Water Board), USEPA, and the Office of Administrative Law. Requirements of this Order implement the Basin Plan.

The Basin Plan implements State Water Board Resolution No. 88-63, which establishes State policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply (MUN). Because of the marine influence on receiving waters of San Francisco Bay, total dissolved solids levels in San Francisco Bay exceed 3,000 milligrams per liter (mg/L) and thereby meet an exception to State Water Board Resolution No. 88-63. The MUN designation is therefore not applicable to Lower San Francisco Bay. Beneficial uses applicable to Lower San Francisco Bay are as follows.

Table 5. Basin Plan Beneficial Uses of Lower San Francisco Bay

Discharge Point	Receiving Water Name	Beneficial Uses
E-002	Lower San Francisco Bay	Industrial Service Supply (IND) Navigation (NAV) Water Contact Recreation (REC1) Non-Contact Water Recreation (REC2) Ocean, Commercial and Sport Fishing (COMM) Wildlife Habitat (WILD) Preservation of Rare and Endangered Species (RARE) Fish Migration (MIGR) Shellfish Harvesting (SHELL) Estuarine Habitat (EST)

I. National Toxics Rule (NTR) and California Toxics Rule (CTR). USEPA adopted the NTR on December 22, 1992, and later amended it on May 4, 1995, and November 9, 1999. About forty criteria in the NTR apply in California. On May 18, 2000, USEPA adopted the CTR. The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the State. The CTR was amended on February 13, 2001. These rules contain water quality criteria for priority pollutants.

J. State Implementation Policy. On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy or SIP). The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria promulgated for California by the USEPA through the NTR and to the priority pollutant objectives established by the Regional Water Board in the Basin Plan. The SIP became effective on May 18, 2000, with respect to the priority pollutant criteria promulgated by the USEPA through the CTR. The State Water Board adopted amendments to the SIP on February 24, 2005, that became effective on July 13, 2005. The SIP establishes implementation provisions for priority pollutant criteria and objectives and provisions for chronic toxicity control. Requirements of this Order implement the SIP.

K. Compliance Schedules and Interim Requirements. Section 2.1 of the SIP provides that, based on an existing discharger's request and demonstration that it is infeasible for it to achieve immediate compliance with an effluent limitation derived from a CTR criterion, a compliance schedule may be allowed in an NPDES permit. Unless an exception has been granted under section 5.3 of the SIP, a compliance schedule may not exceed 5 years from the date that the permit is issued or reissued, nor may it extend beyond 10 years from the effective date of the SIP (or May 18, 2010) to establish and comply with CTR criterion-based effluent limitations. Where a compliance schedule for a final effluent limitation exceeds 1 year, the Order must include interim numeric limitations for that constituent or parameter. The Basin Plan allows compliance schedules and interim effluent limitations or discharge specifications to allow time to implement a new or revised water quality objective.

On April 15, 2008, the State Water Board adopted Resolution No. 2008-0025, *Policy for Compliance Schedules in National Pollutant Discharge Elimination System Permits*, which was approved by the U.S. EPA on August 27, 2008. This Order includes a compliance schedule and discharge specifications for dioxin-TEQ. A detailed discussion of the basis for the compliance schedule and discharge specifications is included in the Fact Sheet.

L. Alaska Rule. On March 30, 2000, USEPA revised its regulation that specifies when new and revised state and tribal water quality standards become effective for CWA purposes [65 Fed. Reg. 24641 (April 27, 2000) (codified at 40 CFR 131.21)]. Under the revised regulation (also known as the Alaska Rule), new and revised standards submitted to USEPA after May 30, 2000, must be approved by USEPA before being used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by May 30, 2000, may be used for CWA purposes, whether or not approved by USEPA.

M. Stringency of Requirements for Individual Pollutants. This Order contains both technology-based and WQBELs for individual pollutants. The technology-based effluent limitations consist of restrictions on oil and grease, pH, total suspended solids (TSS), and biochemical oxygen demand (BOD). Derivation of these technology-based limitations is discussed in the Fact Sheet (Attachment F). This Order's technology-based pollutant restrictions implement the minimum applicable federal technology-based requirements. In addition, this Order contains effluent limitations more stringent than the minimum federal technology-based requirements as necessary to meet water quality standards.

WQBELs have been derived to implement water quality objectives that protect beneficial uses. Both the beneficial uses and the water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. To the extent that toxic pollutant WQBELs were derived from the CTR, the CTR is the applicable standard pursuant to 40 CFR 131.38. The procedures for calculating the individual water quality-based effluent limitations for priority pollutants are based on the SIP, which was approved by USEPA on May 18, 2000. All beneficial uses and water quality objectives contained in the Basin Plan were approved under State law and submitted to USEPA prior to May 30, 2000. Any water quality objectives and beneficial uses submitted to USEPA prior to May 30, 2000, but not approved by USEPA before that date, are nonetheless "applicable water quality standards for the purposes of the CWA" pursuant to 40 CFR 131.21(c)(1). Collectively, this Order's restrictions on individual pollutants are no more stringent than required to implement the requirements of the CWA.

N. Antidegradation Policy. NPDES regulations at 40 CFR 131.12 require that the State water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law and requires that existing water quality be maintained unless degradation is justified based on specific findings. The Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies. As discussed in detail in the Fact Sheet, the permitted discharge is consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Board Resolution No. 68-16.

O. Anti-Backsliding Requirements. CWA Sections 402(o)(2) and 303(d)(4) and NPDES regulations at 40 CFR 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued permit to be as stringent as those in the previous permit, with some exceptions where limitations may be relaxed. Some effluent limitations in this Order are less stringent than those in Order No. R2-2003-0010. As discussed in detail in the Fact Sheet, this relaxation of effluent limitations is consistent with the anti-backsliding requirements of the CWA and federal regulations.

P. Monitoring and Reporting. NPDES regulations at 40 CFR 122.48 require that all NPDES permits specify requirements for recording and reporting monitoring results. CWC sections 13267 and 13383 authorize the Regional Water Board to require technical and monitoring reports. The Monitoring and Reporting Program establishes monitoring and reporting requirements to implement federal and State requirements. This Monitoring and Reporting Program is provided in Attachment E.

Q. Standard and Special Provisions. Standard Provisions, which apply to all NPDES permits in accordance with 40 CFR 122.41, and additional conditions applicable to specified categories of permits in accordance with 40 CFR 122.42, are provided in Attachment D. The Discharger must comply with all standard provisions and with those additional conditions that are applicable under 40 CFR 122.42. The Regional Water Board has also included in this Order special provisions applicable to the Discharger. A rationale for the special provisions contained in this Order is provided in the attached Fact Sheet.

R. Provisions and Requirements Implementing State Law. The provisions/requirements in subsections IV.C, IV.D, and V.B of this Order are included to implement State law only. These provisions/requirements are not required or authorized under the federal CWA, and consequently, violations of these provisions/requirements are not subject to the enforcement remedies that are available for NPDES violations.

S. Notification of Interested Parties. The Regional Water Board has notified the Discharger and interested agencies and persons of its intent to prescribe Waste Discharge Requirements for the discharge and has provided them with an opportunity to submit their written comments and recommendations. Details of notification are provided in the Fact Sheet.

T. Consideration of Public Comment. The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. Details of the Public Hearing are provided in the Fact Sheet.

III. DISCHARGE PROHIBITIONS

A. Discharge of treated wastewater at a location or in a manner different from that described in this Order is prohibited.

B. The average dry weather flow, as measured at Monitoring Location E-001, as described in the attached Monitoring and Reporting Plan (MRP) (Attachment E), shall not exceed 13 MGD. The average dry weather flow shall be determined for compliance with this prohibition over three consecutive dry weather months each year.

C. Discharge of treated wastewater into Lower San Francisco Bay at any point where it does not receive an initial dilution of at least 10:1 is prohibited.

D. The bypass of untreated or partially treated wastewater to waters of the United States is prohibited, except as provided for in Section I.G.2 of Attachment D of this Order.

Blended wastewater is biologically treated wastewater blended with wastewater that has been diverted around biological treatment units or advanced treatment units. Such discharges are approved under the bypass conditions stated in 40 CFR 122.41(m)(4) when (1) the Discharger's peak wet weather influent flow volumes exceed the capacity of the secondary treatment unit(s) of 30 MG, (2) the discharge complies with the effluent and receiving water limitations contained in this Order, and (3) the Discharger is in compliance with Provision VI.C.7 of this Order. Furthermore, the Discharger shall operate the Plant as designed and in accordance with the Plant's Operations and Maintenance Manual. This means that it shall optimize storage and use of equalization units, and shall fully utilize the biological treatment units and advanced treatment units if applicable. The Discharger shall report incidents of blended effluent discharges in routine monitoring reports and shall conduct monitoring of this discharge as specified in the MRP (Attachment E).

E. Any sanitary sewer overflow that results in a discharge of untreated or partially treated wastewater to waters of the United States is prohibited.

IV. EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

A. Effluent Limitations – Discharge Point E-001

1. Effluent Limitations for Conventional and Non-Conventional Pollutants

The Discharger shall maintain compliance with the following effluent limitations at Discharge Point E-001, with compliance measured at Monitoring Location E-001 as described in the attached MRP (Attachment E).

a. The Discharger shall maintain compliance with the following effluent limitations.

Table 6. Effluent Limitations for Conventional and Non-Conventional Pollutants

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Biochemical Oxygen Demand (BOD)	mg/L	30	45	---	---	---
Oil and Grease	mg/L	10	---	20	---	---
pH [(1)]	s.u.	---	---	---	6.0	9.0
Total Suspended Solids (TSS)	mg/L	30	45	---	---	---
Total Residual Chlorine	mg/L	---	---	---	---	0.0 [(2)]

Footnotes for Table 6:

(1) If the Discharger monitors pH continuously, pursuant to 40 CFR 401.17, the Discharger shall be in compliance with the pH limitation specified herein, provided that both of the following conditions are satisfied: (i) the total time during which the pH values are outside the required range of pH values shall not exceed 7 hours and 26 minutes in any calendar month; and (ii) no individual excursion from the range of pH values shall exceed 60 minutes.

(2) This requirement is defined as below the limit of detection in standard test methods as defined in the latest edition of *Standard Methods for the Examination of Water and Wastewater*. The Discharger may elect to use a continuous on-line monitoring system(s) for measuring flows, sodium hypochlorite, and sodium bisulfite dosage (including a safety factor) and concentration to prove that chlorine residual exceedances are false positives. If convincing evidence is provided, Regional Water Board staff will conclude that these chlorine residual exceedances are false positives and are not violations of the Order’s Total Residual Chlorine limit. Chlorine residual compliance shall be demonstrated by monitoring at the NBSU common outfall (E-002).

b. BOD and TSS 85 Percent Removal: The concentration-based average monthly percent removal of BOD and TSS shall not be less than 85 percent.

c. Fecal Coliform Bacteria: The treated wastewater shall meet the following limits of bacteriological quality:

(1) The geometric mean value for the last five samples analyzed for fecal coliform bacteria within a 30-day period shall not exceed 200 MPN/100 mL; and

(2) The 90th percentile of the last ten samples collected within a 30-day period shall not exceed a fecal coliform bacteria level of 400 MPN/100 mL.

d. Enterococci Bacteria: The monthly geometric mean enterococci bacteria density in samples of treated wastewater collected at Monitoring Location E-001 shall not exceed a Most Probable Number (MPN) of 35 per 100 milliliters (MPN/100 mL).

2. Effluent Limitations for Toxic Pollutants

a. The Discharger shall maintain compliance with the following effluent limitations at Discharge Point E-001, with compliance measured at Monitoring Location E-001 (except as specified), as described in the attached MRP (Attachment E).

Table 7. Effluent Limitations for Toxic Pollutants

Parameter	Units	Effluent Limitations (1,2)	
		AMEL	MDEL
Copper (3)	µg/L	73	92
Nickel	µg/L	31	68
Cyanide(4)	µg/L	20	43
Dioxin-TEQ (5)	µg/L	1.4×10^{-8}	2.8×10^{-8}
Benzo(k)fluoranthene	µg/L	0.48	0.97
Bis(2-ethylhexyl)phthalate	µg/L	58	117
Chrysene	µg/L	0.48	0.96
Dibenzo(a,h)anthracene	µg/L	0.49	0.98
Indeno(1,2,3-cd)pyrene	µg/L	0.48	0.96
alpha-BHC	µg/L	0.13	0.26
4,4'-DDD	µg/L	0.00084	0.0017
Tributyltin	µg/L	0.045	0.095
Ammonia, Total	mg/L N	110	230

Footnotes for Table 7:

(1) a. Limitations for toxic pollutants apply to the average concentration of all samples collected during the averaging period (daily = 24-hour period; monthly = calendar month).
b. All metals limitations are expressed as total recoverable metal.

(2) A daily maximum or average monthly value for a given constituent shall be considered noncompliant with the effluent limitations only if it exceeds the effluent limitation and the Reporting Level for that constituent. As outlined in SIP Section 2.4.5, Table 8, below, indicates the Minimum Level (ML) for compliance determination purposes. An ML is the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

(3) Alternate Effluent Limits for Copper:
a. If copper Site Specific Objectives (SSOs) for the receiving water become legally effective, resulting in an adjusted saltwater Criterion Continuous Concentration (CCC) of 2.5 micrograms per liter (µg/L) and a Criterion Maximum Concentration (CMC) of 3.9 µg/L, as documented in the Basin Plan Amendment Resolution R2-2007-0042 and in *Copper Site-Specific Objectives in San Francisco Bay: Proposed Basin Plan Amendment and Draft Staff Report* (dated June 6, 2007), then upon their effective date, the following limitations shall supersede those copper limitations listed in Table 7 (the rationale for these effluent limitations can be found in the Fact Sheet [Attachment F]).
Maximum Daily Effluent Limitation (MDEL) = 69 µg/L and Average Monthly Effluent Limitation (AMEL) = 55 µg/L.
b. If a different copper SSO for the receiving water is adopted, alternate WQBELs based on the SSO will be determined after the SSO effective date.

(4) Compliance with the effluent limitations for cyanide shall be determined at Monitoring Location E-002, as described in the attached MRP. The Discharger shall be solely responsible for all violations of the cyanide limitations at Discharge Point E-002.

(5) Dioxin-TEQ is subject to the compliance schedule in Provision C.8. of this Order. The final effluent limitations shall become effective ten years following the effective date of this Order on January 1, 2019.

Table 8. Minimum Levels for Pollutants with Effluent Limitations

Parameter	Minimum Level	Units
Copper	0.5 or 2	µg/L
Nickel	1 or 5	µg/L
Cyanide	5	µg/L
Benzo(k)fluoranthene	2	µg/L
Bis(2-ethylhexyl)phthalate	5	µg/L
Chrysene	5	µg/L
Dibenzo(a,h)anthracene	0.1	µg/L
Indeno(1,2,3-cd)pyrene	0.05	µg/L
alpha-BHC	0.01	µg/L
4,4'-DDD	0.05	µg/L
Tributyltin	0.005	µg/L
Ammonia	0.1	mg/L
Dioxin-TEQ	½ the USEPA specified MLs for Method 1613	µg/L
2,3,7,8-TCDD	5	pg/L
1,2,3,7,8-PeCDD	25	pg/L
1,2,3,4,7,8-HxCDD	25	pg/L
1,2,3,6,7,8-HxCDD	25	pg/L
1,2,3,7,8,9-HxCDD	25	pg/L
1,2,3,4,6,7,8-HpCDD	25	pg/L
OCDD	50	pg/L
2,3,7,8-TCDF	5	pg/L
1,2,3,7,8-PeCDF	25	pg/L
2,3,4,7,8-PeCDF	25	pg/L
1,2,3,4,7,8-HxCDF	25	pg/L
1,2,3,6,7,8-HxCDF	25	pg/L
1,2,3,7,8,9-HxCDF	25	pg/L
2,3,4,6,7,8-HxCDF	25	pg/L
1,2,3,4,6,7,8-HpCDF	25	pg/L
1,2,3,4,7,8,9-HpCDF	25	pg/L
OCDF	50	pg/L

3. Interim Effluent Limitations

a. The Discharger shall maintain compliance with the following effluent limitation at Discharge Point E-001, with compliance measured at Monitoring Location E-001, as described in the attached MRP (Attachment E). The interim limit for dioxin-TEQ shall remain in effect until 10 years from the effective date of this Order on January 1, 2019. At that time, the final limits in Table 7 shall become effective.

Table 9. Interim Effluent Limitations for Dioxin-TEQ

Parameter	Units	AMEL
Dioxin-TEQ	µg/L	1.3×10^{-6} µg/L

4. Acute Toxicity:

a. Representative samples of the effluent at Monitoring Location E-001 shall meet the following limits for acute toxicity: Bioassays shall be conducted in compliance with Section V.A of the MRP (Attachment E).

The survival of organisms in undiluted effluent shall be:

- an eleven (11) sample median value of not less than 90 percent survival, and
- an eleven (11) sample 90 percentile value of not less than 70 percent survival.

b. These acute toxicity limitations are further defined as follows:

11 sample median: A bioassay test showing survival of less than 90 percent represents a violation of this effluent limit, if five or more of the past ten or less bioassay tests show less than 90 percent survival.

90th percentile: A bioassay test showing survival of less than 70 percent represents a violation of this effluent limit, if one or more of the past ten or less bioassay tests show less than 70 percent survival.

c. Bioassays shall be performed using the most up-to-date USEPA protocol and the most sensitive species based on the most recent screening test results. Bioassays shall be conducted in compliance with *Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms,* currently 5th Edition (EPA-821-R-02-012).

d. If the Discharger can demonstrate to the satisfaction of the Executive Officer that toxicity exceeding the levels cited above is caused by ammonia and that the ammonia in the discharge is in compliance with effluent limits, then such toxicity does not constitute a violation of this effluent limitation.

5. Chronic Toxicity

a. Compliance with the Basin Plan narrative chronic toxicity objective shall be demonstrated according to the following tiered requirements based on results from representative samples of the treated final effluent at Discharge Point E-001 meeting test acceptability criteria and Section V.B of the MRP (Attachment E). Failure to conduct the required toxicity tests or a TRE within the period designated in the MRP, shall result in the establishment of effluent limitations for chronic toxicity.

(1) Conduct routine monitoring.

(2) Accelerate monitoring after exceeding a three sample median of 10 chronic toxicity units (TUc) or single-sample maximum of 20 TUc, consistent with Table 4-5 of the Basin Plan for dischargers monitoring chronic toxicity more frequently than semi-annually. Accelerated monitoring shall consist of monthly monitoring.

(3) Return to routine monitoring if accelerated monitoring does not exceed the "trigger" in (2), above.

(4) If accelerated monitoring confirms consistent toxicity above the "trigger" in (2), above, initiate toxicity identification evaluation/toxicity reduction evaluation (TIE/TRE) in accordance with a work plan submitted in accordance with Section V.B.3 of the MRP (Attachment E) that incorporates any and all comments from the Executive Officer.

(5) Return to routine monitoring after appropriate elements of the TRE work plan are implemented and either the toxicity drops below the "trigger" level in (2), above, or, based on the results of the TRE, the Executive Officer authorizes a return to routine monitoring.

b. The Discharger shall conduct routine monitoring with the test species and protocols specified in Section V.B of the MRP (Attachment E). The Discharger shall also perform Chronic Toxicity Screening Phase monitoring as described in the Appendix E-1 of the MRP (Attachment E). Chronic Toxicity Monitoring Screening Phase Requirements, Critical Life Stage Toxicity Tests and definitions of terms used in the chronic toxicity monitoring are identified in Appendices E-1 and E-2 of the MRP (Attachment E).

V. RECEIVING WATER LIMITATIONS

A. Surface Water Limitations

1. Receiving water limitations are based on water quality objectives contained in the Basin Plan and are a required part of this Order. The discharges shall not cause the following in Lower San Francisco Bay:

   a. Floating, suspended, or deposited macroscopic particulate matter or foams;

   b. Bottom deposits or aquatic growths to the extent that such deposits or growths cause nuisance or adversely affect beneficial uses;

   c. Alteration of temperature, turbidity, or apparent color beyond present natural background levels;

   d. Visible, floating, suspended, or deposited oil and other products of petroleum origin; or

   e. Toxic or other deleterious substances to be present in concentrations or quantities that will cause deleterious effects on wildlife, waterfowl, or other aquatic biota, or that render any of these unfit for human consumption, either at levels created in the receiving waters or as a result of biological concentration.

2. The discharge of waste shall not cause the following limits to be exceeded in waters of the State within one foot of the water surface:

   a. Dissolved Oxygen 5.0 mg/L, minimum

The median dissolved oxygen concentration for any three consecutive months shall not be less than 80% of the dissolved oxygen content at saturation. When natural factors cause concentrations less than that specified above, the discharge shall not cause further reduction in ambient dissolved oxygen concentrations.

b. Dissolved Sulfide	Natural background levels
c. pH	Within a range from 6.5 to 8.5
d. Nutrients:	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.

VI. PROVISIONS

A. Standard Provisions

1. The Discharger shall comply with Federal Standard Provisions included in Attachment D of this Order.

2. The Discharger shall comply with all applicable items of the Standard Provisions and Reporting Requirements for NPDES Surface Water Discharge Permits, August 1993 (Standard Provisions, Attachment G). Where provisions or reporting requirements specified in this Order and Attachment G are different from equivalent or related provisions or reporting requirements given in the Standard Provisions in Attachment D, the specifications of this Order and/or Attachment G shall apply in areas where those provisions are more stringent. Duplicative requirements in the federal Standard Provisions in VI.A.1, above (Attachment D), and the regional Standard Provisions (Attachment G) are not separate requirements. A violation of a duplicative requirement does not constitute two separate violations.

B. Monitoring and Reporting Program Requirements

The Discharger shall comply with the MRP (Attachment E) and future revisions thereto. The Discharger shall also comply with the requirements contained in *Self Monitoring Programs, Part A*, August 1993 (Attachment G).

C. Special Provisions

1. Reopener Provisions

The Regional Water Board may modify or reopen this Order prior to its expiration date in any of the following circumstances as allowed by law:

a. If present or future investigations demonstrate that the discharges governed by this Order will have, or will cease to have, a reasonable potential to cause or contribute to adverse impacts on water quality or beneficial uses of the receiving waters.

b. If new or revised WQOs or Total Maximum Daily Loads (TMDLs) come into effect for the San Francisco Bay estuary and contiguous water bodies (whether statewide, regional, or site-specific). In such cases, effluent limitations in this Order will be modified as necessary to reflect updated WQOs and wasteload allocations in TMDLs. Adoption of effluent limitations contained in this Order is not intended to restrict in any way future modifications based on legally adopted WQOs or TMDLs, or as otherwise permitted under Federal regulations governing NPDES permit modifications.

c. If translator or other water quality studies provide a basis for determining that a permit condition should be modified.

d. If an administrative or judicial decision on a separate NPDES permit or WDR addresses requirements similar to this discharge.

e. Or as otherwise authorized by law.

The Discharger may request permit modifications based on the above. The Discharger shall include in any such request an antidegradation and antibacksliding analysis.

2. Special Studies, Technical Reports and Additional Monitoring Requirements

a. Effluent Characterization for Selected Constituents

The Discharger shall continue to monitor and evaluate the discharge from the Plant to the NBSU force main (measured at Monitoring Location E-001) for the constituents listed in Enclosure A of the Regional Water Board's August 6, 2001, Letter entitled, *Requirement for Monitoring of Pollutants in Effluent and Receiving Water to Implement New Statewide Regulations and Policy* (Attachment G) according to the sampling frequency specified in the attached MRP (Attachment E). Compliance with this requirement shall be achieved in accordance with the specifications stated in the Regional Water Board's August 6, 2001, Letter under Effluent Monitoring for Major Dischargers.

The Discharger shall evaluate on an annual basis if concentrations of any constituent increase over past performance. The Discharger shall investigate the cause of the increase. The investigation may include, but need not be limited to, an increase in the effluent monitoring frequency, monitoring of internal process streams, and monitoring of influent sources. This requirement may be satisfied through identification of these constituents as "pollutants of concern" in the Discharger's Pollutant Minimization Program described in Provision VI.C.3, below. A summary of the annual evaluation of data and source investigation activities shall also be reported in the annual self-monitoring report.

A final report that presents all the data shall be submitted to the Regional Water Board no later than 180 days prior to the Order expiration date. This final report shall be submitted with the application for permit reissuance.

b. Ambient Background Receiving Water Study

The Discharger shall collect or participate in collecting background ambient receiving water monitoring data for priority pollutants for which the Regional Water Board is required to perform reasonable potential analyses and calculate effluent limitations. The data for the conventional water quality parameters (pH, salinity, and hardness) shall be sufficient to characterize these parameters in the receiving water at a point after the discharge has mixed with the receiving waters. This provision may be met through monitoring through a collaborative Bay Area Clean Water Agencies (BACWA) study or a similar ambient monitoring program for San Francisco Bay. This Order may be reopened, as appropriate, to incorporate effluent limits or other requirements based on Regional Water Board review of these data.

The Discharger shall submit a final report that presents all these data to the Regional Water Board 180 days prior to Order expiration, or cause one to be submitted on its behalf. This final report shall be submitted prior to or with the application for permit reissuance.

c. Optional Mass Offset

If the Discharger can demonstrate that further net reductions of the total mass loadings of 303(d)-listed pollutants (e.g., dioxin-TEQ) to the receiving water cannot be achieved through economically feasible measures such as aggressive source control, wastewater reuse, and treatment plant optimization, but only through a mass offset program, the Discharger may submit to the Regional Water Board for approval a mass offset plan to reduce 303(d)-listed pollutants to the same watershed or drainage basin. The Regional Water Board may modify this Order to allow an approved mass offset program.

3. Best Management Practices and Pollution Minimization

a. Pollution Minimization Program

The Discharger shall continue to improve, in a manner acceptable to the Executive Officer, its existing Pollutant Minimization Program (PMP) to promote minimization of pollutant loadings to the treatment plant and therefore to the receiving waters.

b. Annual Pollution Prevention Report

The Discharger shall submit an annual report, acceptable to the Executive Officer, no later than February 28th of each calendar year. The annual report shall cover January through December of the preceding year. Each annual report shall include at least the following information:

(1) *A brief description of its treatment plant, treatment plant processes and service area.*

(2) *A discussion of the current pollutants of concern.* Periodically, the Discharger shall determine which pollutants are currently a problem and/or which pollutants may be potential future problems. This discussion shall include the reasons why the pollutants were chosen.

(3) *Identification of sources for the pollutants of concern.* This discussion shall include how the Discharger intends to estimate and identify pollutant sources. The Discharger should also identify sources or potential sources not directly within the ability or authority of the Discharger to control, such as pollutants in the potable water supply and air deposition.

(4) *Identification of tasks to reduce the sources of the pollutants of concern.* This discussion shall identify and prioritize tasks to address the Discharger's pollutants of concern. The Discharger may implement the tasks themselves or participate in group, regional, or national tasks that will address its pollutants of concern whenever it is efficient and appropriate to do so. A time line shall be included for the implementation of each task.

(5) *Outreach to employees.* The Discharger shall inform its employees about the pollutants of concern, potential sources, and how they might be able to help reduce the discharge of these pollutants. The Discharger may provide a forum for employees to provide input to the program.

(6) *Continuation of Public Outreach Program.* The Discharger shall prepare a public outreach program to communicate pollution minimization measures to its service area. Outreach may include participation in existing community events such as county fairs, initiating new community events such as displays and contests during Pollution Prevention Week, conducting school outreach programs, conducting plant tours, and providing public information in various media. Information shall be specific to target audiences. The Discharger shall coordinate with other agencies as appropriate.

(7) *Discussion of criteria used to measure PMP's and tasks' effectiveness.* The Discharger shall establish criteria to evaluate the effectiveness of its PMP. This discussion shall address the specific criteria used to measure the effectiveness of each of the tasks in Provision VI.C.3.b.(3-6), above.

(8) *Documentation of efforts and progress.* This discussion shall detail all of the Discharger's activities in the Pollution Minimization Program during the reporting year.

(9) *Evaluation of Program's and tasks' effectiveness.* The Discharger shall use the criteria established in b.(7), above, to evaluate the Pollutant Minimization Program's and tasks' effectiveness.

(10) *Identification of specific tasks and time schedules for future efforts.* Based on the evaluation of effectiveness, the Discharger shall describe how it will continue or change its PMP tasks to more effectively reduce the loadings of pollutant to the treatment plant, and subsequently to receiving waters.

c. Pollutant Minimization Program for Reportable Priority Pollutants

The Discharger shall develop and conduct a PMP as further described below when there is evidence (e.g., sample results reported as Detected but Not Quantified [DNQ] when the effluent limitation is less than the method detection limit [MDL]), sample results from analytical methods more sensitive than those methods required by this Order, presence of whole effluent toxicity, health advisories for fish consumption, results of benthic or aquatic organism tissue sampling) that a priority pollutant is present in the effluent above an effluent limitation and either:

(1) A sample result is reported as DNQ and the effluent limitation is less than the Reporting Limit (RL); or

(2) A sample result is reported as Not Detected (ND) and the effluent limitation is less than the MDL, using definitions described in the SIP.

d. If triggered by the reasons in c. above, the Discharger's PMP shall include, but not be limited to, the following actions and submittals acceptable to the Regional Water Board:

(1) An annual review and semi-annual monitoring of potential sources of the reportable priority pollutant(s), which may include fish tissue monitoring and other bio-uptake sampling, or alternative measures approved by the Executive Officer when it is demonstrated that source monitoring is unlikely to produce useful analytical data;

(2) Quarterly monitoring for the reportable priority pollutant(s) in the influent to the wastewater treatment system, or alternative measures approved by the Executive Officer when it is demonstrated that influent monitoring is unlikely to produce useful analytical data;

(3) Submittal of a control strategy designed to proceed toward the goal of maintaining concentrations of the reportable priority pollutant(s) in the effluent at or below the effluent limitation;

(4) Implementation of appropriate cost-effective control measures for the reportable priority pollutant(s), consistent with the control strategy; and

(5) The annual report required by 3.b. above, shall specifically address the following items:

i. All PMP monitoring results for the previous year;

ii. A list of potential sources of the reportable priority pollutant(s);

iii. A summary of all actions undertaken pursuant to the control strategy; and

iv. A description of actions to be taken in the following year.

4. Construction, Operation, and Maintenance Specifications

a. Wastewater Facilities Review and Evaluation and Status Reports

(1) The Discharger shall operate and maintain its wastewater collection, treatment, and disposal facilities 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 Discharger's service responsibilities.

(2) The Discharger shall regularly review and evaluate its wastewater facilities and operation practices in accordance with (1) above. Reviews and evaluations shall be conducted as an ongoing component of the Discharger's administration of its wastewater facilities.

(3) The Discharger shall provide the Executive Officer, upon request, a report describing the current status of its wastewater facilities and operation practices, including any recommended or planned actions and an estimated time schedule for these actions. The Discharger shall also include, in each annual Self-Monitoring Report, a description or summary of review and evaluation procedures, and applicable wastewater facility programs or capital improvement projects.

b. Operations and Maintenance (O&M) Manual, Review and Status Reports

(1) The Discharger shall maintain an O&M manual for its wastewater facilities. The O&M Manual shall be maintained in usable condition and be available for reference and use by all applicable personnel.

(2) The Discharger shall regularly review, revise, or update, as necessary, the O&M Manual(s) to ensure that the document(s) may remain useful and relevant to current equipment and operation practices. Reviews shall be conducted annually, and revisions or updates shall be completed as necessary. Applicable revisions of the O&M manual shall be completed within 90 days of any significant changes being made in the Plant equipment or operation practices.

(3) The Discharger shall provide the Executive Officer a report describing the current status of its O&M manual, including any recommended or planned actions and an estimated time schedule for these actions, upon request. The Discharger shall also include a description or summary of review and evaluation procedures and applicable changes to its O&M manual in each Annual Self-Monitoring Report.

c. Contingency Plan, Review and Status Reports

(1) The Discharger shall maintain a Contingency Plan as required by Regional Water Board Resolution 74-10 (Attachment G) and as prudent in accordance with current municipal facility emergency planning. The discharge of pollutants in violation of this Order where the Discharger has failed to develop and/or adequately implement a Contingency Plan will be the basis for considering such discharge a willful and negligent violation of this Order pursuant to Section 13387 of the California CWC.

(2) The Discharger shall regularly review the Contingency Plan so that the plan may remain useful and relevant to current equipment and operation practices. Reviews shall be conducted annually, and updates shall be completed as necessary.

(3) The Discharger shall provide the Executive Officer a report describing the current status of its review and update of the Contingency Plan upon request. The Discharger

shall also include a description or summary of review and evaluation procedures and applicable changes to its Contingency Plan in each Annual Self-Monitoring Report.

5. Special Provisions for POTWs

a. Pretreatment Program

(1) The Discharger shall implement and enforce its approved pretreatment program in accordance with federal Pretreatment Regulations (40 CFR 403); pretreatment standards promulgated under Sections 307(b), 307(c), and 307(d) of the Clean Water Act; pretreatment requirements specified under 40 CFR 122.44(j); and the requirements in Attachment H, "Pretreatment Requirements." The Discharger's responsibilities include, but are not limited to:

i. Enforcement of National Pretreatment Standards of 40 CFR 403.5 and 403.6;

ii. Implementation of its pretreatment program in accordance with legal authorities, policies, procedures, and financial provisions described in the General Pretreatment regulations (40 CFR 403) and its approved pretreatment program;

iii. Submission of reports to USEPA, the State Water Board, and the Regional Water Board, as described in Attachment H "Pretreatment Requirements"; and

iv. Evaluation of the need to revise local limits under 40 CFR 403.5(c)(1) and, within 180 days after the effective date of this Order, submission of a report describing the changes, with a plan and schedule for implementation. To ensure no significant increase in the discharge of copper, and thus compliance with antidegradation requirements, the Discharger shall not consider eliminating or relaxing local limits for copper in this evaluation.

(2) The Discharger shall implement its approved pretreatment program and the program shall be an enforceable condition of this Order. If the Discharger fails to perform the pretreatment functions, the Regional Water Board, the State Water Board, or USEPA may take enforcement actions against the Discharger as authorized by the Clean Water Act.

b. Sludge Management Practices Requirements

(1) All sludge generated by the Discharger must be disposed of in a municipal solid waste landfill, reused by land application, or disposed of in a sludge-only landfill in accordance with 40 CFR 503. If the Discharger desires to dispose of sludge by a different method, a request for permit modification must be submitted to USEPA 180 days before start-up of the alternative disposal practice. All the requirements in 40 CFR 503 are enforceable by USEPA whether or not they are stated in an NPDES permit or other permit issued to the Discharger. The Regional Water Board should be copied on relevant correspondence and reports forwarded to USEPA regarding sludge management practices.

(2) Sludge treatment, storage and disposal or reuse shall not create a nuisance, such as objectionable odors or flies, or result in groundwater contamination.

(3) The Discharger shall take all reasonable steps to prevent or minimize any sludge use or disposal which has a likelihood of adversely affecting human health or the environment.

(4) The discharge of sludge shall not cause waste material to be in a position where it is or can be carried from the sludge treatment and storage site and deposited in waters of the State.

(5) The sludge treatment and storage site shall have facilities adequate to divert surface runoff from adjacent areas, to protect boundaries of the site from erosion, and to prevent any conditions that would cause drainage from the materials in the temporary storage site. Adequate protection is defined as protection from at least a 100-year storm and protection from the highest possible tidal stage that may occur.

(6) For sludge that is applied to the land, placed on a surface disposal site, or fired in a sludge incinerator as defined in 40 CFR 503, the Discharger shall submit an annual report to USEPA and the Regional Water Board containing monitoring results and pathogen and vector attraction reduction requirements as specified by 40 CFR 503, postmarked February 15 of each year, for the period covering the previous calendar year.

(7) Sludge that is disposed of in a municipal solid waste landfill must meet the requirements of 40 CFR 258. In the annual Self-Monitoring Report, the Discharger shall include the amount of sludge disposed of and the landfill(s) to which it was sent.

(8) Permanent on-site sludge storage or disposal activities are not authorized by this Order. A report of Waste Discharge shall be filed and the site brought into compliance with all applicable regulations prior to commencement of any such activity by the Discharger.

(9) Sludge Monitoring and Reporting Provisions of this Regional Water Board's Standard Provisions (Attachment G), apply to sludge handling, disposal and reporting practices.

(10) The Regional Water Board may amend this Order prior to expiration if changes occur in applicable state and federal sludge regulations.

c. Sanitary Sewer Overflows and Sewer System Management Plan

The Discharger's collection system is part of the Plant subject to this Order. As such, the Discharger must properly operate and maintain its collection system (Attachment D, Standard Provisions - Permit Compliance, subsection I.D). The Discharger must report any noncompliance (Attachment D, Standard Provision - Reporting, subsections V.E.1 and V.E.2) and mitigate any discharge from the Discharger's collection system in violation of this Order (Attachment D, Standard Provisions - Permit Compliance, subsection I.C). The General Waste Discharge Requirements for Sanitary Sewer Systems

(General WRDs for Wastewater Collection Agencies, State Water Board Order No. 2006-0003 DWQ) has requirements for operation and maintenance of collection systems and for reporting and mitigating sanitary sewer overflows. While the Discharger must comply with both the General WDRs for Wastewater Collection Agencies and this Order, the General WDRs for Wastewater Collection Agencies more clearly and specifically stipulate requirements for operation and maintenance and for reporting and mitigating sanitary sewer overflows.

Implementation of the requirements of the General WDR for Wastewater Collection Agencies for proper operation and maintenance and mitigation of spills will satisfy the corresponding federal NPDES requirements specified in this Order. Following reporting requirements in the General WDRs for Wastewater Collection Agencies will satisfy NPDES reporting requirements for sewage spills. Furthermore, the Discharger shall comply with the schedule for development of sewer system management plans (SSMPs) as indicated in the letter issued by the Regional Water Board on July 7, 2005, pursuant to CWC Section 13267; and with the sanitary sewer overflow and unauthorized discharge notification and reporting requirements of the letter issued by the Regional Water Board on May 1, 2008, pursuant to CWC Section 13267. The Discharger shall report sanitary sewer overflows electronically using the State Water Board's on-line reporting system.

6. Corrective Measures to Eliminate Use of the Nearshore Outfall

Any discharge of wastewater from the nearshore outfall is a violation of Discharge Prohibitions III.A and C of this Order. The Discharger shall undertake the following steps to eliminate discharges from the nearshore outfall.

Table 10. Corrective Measures to Eliminate Use of the Nearshore Outfall

Task	Deadline
1. Implement the alternatives identified in the Discharger's No Feasible Alternatives Analysis submitted on August 26, 2008. At a minimum, these should include using the effluent storage pond as needed during wet weather events.	Effective date of this Order on January 1, 2009
2.a. Investigate the conditions under which nearshore discharges have occurred. Identify alternatives to eliminate the use of the nearshore outfall. b. Submit a proposal to monitor Colma Creek during wet weather months.	Six months after the effective date of this Order
3. Implement actions identified in Task 2 and provide annual progress updates for Tasks 1 and 2.	Annually with the Annual Report

7. Corrective Measures to Minimize Blending

The Discharger shall adhere to the following requirements to minimize the occurrence of blending primary and secondary treated wastewaters prior to discharge.

Table 11. Corrective Measures to Minimize Blending

Task	Deadline
1. *Wet Weather Improvements*. Submit a technical report to the Regional Water Board that evaluates alternatives for potential wet weather conveyance and treatment plant improvements. Comparisons of various alternatives should be based on costs,	August 10, 2009

effectiveness, and implementability. The report should propose preferred alternative(s) based on the results of the analysis. At a minimum, the report should include the alternatives identified in the Discharger's No Feasible Alternatives Analysis submitted on August 26, 2008: • Remediate and/or replace gravity and trunk lines and reduce Inflow and Infiltration in the South San Francisco collection system. • Minimize slug loading from industrial users through Pretreatment and Pollution Prevention Program prohibitions. • Implement "enhanced primary treatment" through adding ferric chloride and anionic polymer to enhance settling in the primary clarifiers. • Revise the South San Francisco Municipal Code to strengthen provisions relating to pretreatment, slug discharges, etc. • Implement the Capacity, Management, Operations, and Maintenance (C-MOM) Program. • Install an ultrasonic level sensor and totalizer to better quantify the bypassed primary effluent. • Develop and implement operational guidelines for blending operations for primary effluent in chlorine contact tank no. 1 (CCT-1) to be routed back to Return Activated Sludge Pump Station for additional treatment. • Identify and implement wet weather procedures so flows up to 40 MGD will receive full secondary treatment. • Tasks identified in Provision 6 will also minimize blending	
2. *Workplan*. Prepare a workplan to implement the preferred alternatives from the technical report.	November 10, 2009
3. *Alternatives*. Begin implementing the measures identified in the workplan upon approval of the plan by the Regional Water Board.	In accordance with the workplan described in Task 2, above
4. *Completion Report*. Provide annual updates on the progress in completing measures specified in the workplan.	Annually with the Annual Report
5. *No Feasible Alternatives Analysis*. Complete a utility analysis if the Discharger seeks to continue to bypass peak wet weather flows around its secondary treatment units. The utility analysis must satisfy 40 CFR 122.41(m)(4)(i)(A)-(C) and any applicable policy or guidance such as the process set forth in Part 1 of USEPA's Peak Wet Weather Policy's No Feasible Alternatives Analysis Process (available at http://cfpub.epa.gov/npdes/wetweather.cfm) once it is finalized.	180 days prior to the Order expiration date

8. Compliance Schedule

The Discharger shall adhere to the following schedule to comply with final effluent limitations established by this Order for dioxin-TEQ.

Table 12. Dioxin-TEQ Compliance Schedule

Task	Deadline
1. Continue source control measures identified in the Discharger's Infeasibility Report to reduce concentrations of dioxin-TEQ to the treatment plant, and therefore to receiving waters.	Upon the effective date of this Order on January 1, 2009
2. Evaluate and report on the effectiveness of source control measures in reducing concentrations of dioxin-TEQ to the treatment plant. If previous measures have not been successful in	Annually by February 28th with the Annual Pollution Prevention Report required by Section

enabling the Discharger to comply with final limits for dioxin-TEQ, the Discharger shall also identify and implement additional source control measures to further reduce concentrations of these pollutants.	VI.C.3.b, above
3. In the event that source control measures are insufficient for meeting the final water quality based effluent limit specified in Effluent Limitations and Discharge Specifications A.2 for dioxin-TEQ, submit a schedule for implementation of additional actions to reduce the concentrations of these pollutants.	No later than 12 months after a detection of dioxin-TEQ that is out of compliance with the final effluent limits
4. Commence implementation of the identified additional actions in accordance with the schedule submitted in task 3, above.	Annually by February 28th with the Annual Pollution Prevention Report required by Section VI.C.3.b, above
5. Comply with IV. Effluent Limitations and Discharger Specifications A.2 for dioxin-TEQ. Alternatively, the Discharger may comply with the limit through implementation of a mass offset strategy for dioxin-TEQ in accordance with policies in effect at that time (see Provision VI.C.2c).	10 years following the effective date of this Order on January 1, 2019

9. Action Plan for Copper

The Discharger shall implement pretreatment, source control, and pollution prevention for copper in accordance with the following tasks and time schedule.

Table 13. Copper Action Plan

Task	Compliance Date
1. Review Potential Copper Sources The Discharger shall submit an inventory of potential copper sources to the treatment plant.	By February 28, 2009
2. Implement Copper Control Program The Discharger shall submit a plan for and begin implementation of a program to reduce copper discharges identified in Task 1 consisting, at a minimum, of the following elements: a. Provide education and outreach to the public (e.g., focus on proper pool and spa maintenance and plumbers' roles in reducing corrosion). b. If corrosion is determined to be a significant copper source, work cooperatively with local water purveyors to reduce and control water corrosivity, as appropriate, and ensure that local plumbing contractors implement best management practices to reduce corrosion in pipes. c. Educate plumbers, designers, and maintenance contractors for pools and spas to encourage best management practices that minimize copper discharges.	February 28, 2010, with 2009 annual pollution prevention report
3. Implement Additional Measures If the three-year rolling mean copper concentration of the receiving water exceeds 2.2 μg/L, evaluate the effluent copper concentration trend, and if it is increasing, develop and implement additional measures to control copper discharges.	Within 90 days of exceedance
4. Report Status of Copper Control Program Submit a report to the Regional Water Board documenting implementation of the copper control program.	Annually with annual pollution prevention reports due February 28

10. Action Plan for Cyanide

The Discharger shall implement monitoring and surveillance, pretreatment, source control, and pollution prevention for cyanide in accordance with the following tasks and time schedule.

Table 14. Cyanide Action Plan

Task	Compliance Date
1. Review Potential Cyanide Contributors The Discharger shall submit an inventory of potential contributors of cyanide to the treatment plant (e.g., metal plate operators, hazardous waste recycling, etc.). If no contributors of cyanide are identified, Task 2 and 3 are not required, unless the Discharger receives a request to discharge detectable levels of cyanide to its treatment plant. If so, the Discharger shall notify the Executive Officer and implement Tasks 2 and 3.	Within 90 days of the effective date of this Order
2. Implement Cyanide Control Program The Discharger shall submit a plan for and begin implementation of a program to minimize cyanide discharges to the sanitary sewer system consisting, at a minimum, of the following elements: a. Inspect each potential contributor to assess the need to include that contributing source in the control program. b. Inspect contributing sources included in the control program annually. Inspection elements may be based on U.S. EPA guidance, such as Industrial User Inspection and Sampling Manual for POTWs (EPA 831-B-94-01). c. Develop and distribute educational materials to contributing sources and potential contributing sources regarding the need to prevent cyanide discharges. d. Prepare an emergency monitoring and response plan to be implemented if a significant cyanide discharge occurs. e. If ambient monitoring shows cyanide concentrations of 1.0 μg/L or higher in the main body of San Francisco Bay, undertake actions to identify and abate cyanide sources responsible for the elevated ambient concentrations.	With the Annual Pollution Prevention report due each year on February 28th, or within 90 days of completing Task 1
3. Report Status of Cyanide Control Program Submit a report to the Regional Water Board documenting implementation of the cyanide control program.	With the Annual Pollution Prevention report due February 28th of each year

VII. COMPLIANCE DETERMINATION

Compliance with the effluent limitations contained in Section IV of this Order will be determined as specified below:

A. General.

Compliance with effluent limitations for priority pollutants shall be determined using sample reporting protocols defined in Attachment A to the MRP (Attachment E) and Fact Sheet Section VI. For purposes of reporting and administrative enforcement by the Regional and State Water Boards, the Discharger shall be deemed out of compliance with effluent limitations if the concentration of the priority pollutant in the monitoring sample is greater than the effluent limitation and greater than or equal to the reporting level (RL).

B. Multiple Sample Data.

When determining compliance with an AMEL or MDEL for priority pollutants and more than one sample result is available, the Discharger shall compute the arithmetic mean unless the data set contains one or more reported determinations of DNQ or ND. In those cases, the Discharger shall compute the median in place of the arithmetic mean in accordance with the following procedure:

1. The data set shall be ranked from low to high, ranking the reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

2. The median value of the data set shall be determined. If the data set has an odd number of data points, then the median is the middle value. If the data set has an even number of data points, then the median is the average of the two values around the middle unless one or both of the points are ND or DNQ, in which case the median value shall be the lower of the two data points where DNQ is lower than a value and ND is lower than DNQ.

ATTACHMENT A – DEFINITIONS

Arithmetic Mean (μ), also called the average, is the sum of measured values divided by the number of samples. For ambient water concentrations, the arithmetic mean is calculated as follows:

> **Arithmetic mean = $\mu = \Sigma x / n$**
>
> where: Σx is the sum of the measured ambient water concentrations, and n is the number of samples.

Average Monthly Effluent Limitation (AMEL): the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Effluent Limitation (AWEL) is the highest allowable average of daily discharges over a calendar week (Sunday through Saturday), calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Bioaccumulative pollutants are those substances taken up by an organism from its surrounding medium through gill membranes, epithelial tissue, or from food and subsequently concentrated and retained in the body of the organism.

Carcinogenic pollutants are substances that are known to cause cancer in living organisms.

Coefficient of Variation (*CV*) is a measure of the data variability and is calculated as the estimated standard deviation divided by the arithmetic mean of the observed values.

Daily Discharge is defined as either: (1) the total mass of the constituent discharged over the calendar day (12:00 am through 11:59 pm) or any 24-hour period that reasonably represents a calendar day for purposes of sampling (as specified in this Order), for a constituent with limitations expressed in units of mass or; (2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g., concentration).

The daily discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day or other 24-hour period defined as a day) or by the arithmetic mean of analytical results from one or more grab samples taken over the course of the day.

For composite sampling, if 1 day is defined as a 24-hour period other than a calendar day, the analytical result for the 24-hour period will be considered as the result for the calendar day in which the 24-hour period ends.

Detected, but Not Quantified (DNQ) are those sample results less than the RL, but greater than or equal to the laboratory's MDL.

Dilution Credit is the amount of dilution granted to a discharge in the calculation of a water quality-based effluent limitation, based on the allowance of a specified mixing zone. It is calculated from the dilution ratio or determined through conducting a mixing zone study or modeling of the discharge and receiving water.

Effluent Concentration Allowance (ECA) is a value derived from the water quality criterion/objective, dilution credit, and ambient background concentration that is used, in conjunction with the coefficient of variation for the effluent monitoring data, to calculate a long-term average (LTA) discharge concentration. The ECA has the same meaning as waste load allocation (WLA) as used in USEPA guidance (Technical Support Document For Water Quality-based Toxics Control, March 1991, second printing, EPA/505/2-90-001).

Enclosed Bays means indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between the headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of San Francisco Bay. Enclosed bays include, but are not limited to, Humboldt Bay, Bodega Harbor, Tomales Bay, Drake's Estero, San Francisco Bay, Morro Bay, Los Angeles-Long Beach Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay. Enclosed bays do not include inland surface waters or ocean waters.

Estimated Chemical Concentration is the estimated chemical concentration that results from the confirmed detection of the substance by the analytical method below the ML value.

Estuaries means waters, including coastal lagoons, located at the mouths of streams that serve as areas of mixing for fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and seawater. Estuarine waters include, but are not limited to, the Sacramento-San Joaquin Delta, as defined in California Water Code section 12220, Suisun Bay, Carquinez Strait downstream to the Carquinez Bridge, and appropriate areas of the Smith, Mad, Eel, Noyo, Russian, Klamath, San Diego, and Otay rivers. Estuaries do not include inland surface waters or ocean waters.

Inland Surface Waters are all surface waters of the State that do not include the ocean, enclosed bays, or estuaries.

Instantaneous Maximum Effluent Limitation is the highest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous maximum limitation).

Instantaneous Minimum Effluent Limitation is the lowest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous minimum limitation).

Maximum Daily Effluent Limitation (MDEL) means the highest allowable daily discharge of a pollutant, over a calendar day (or 24-hour period). For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Median is the middle measurement in a set of data. The median of a set of data is found by first arranging the measurements in order of magnitude (either increasing or decreasing order). If the number of measurements (n) is odd, then the median = $X_{(n+1)/2}$. If n is even, then the median = $(X_{n/2} + X_{(n/2)+1})/2$ (i.e., the midpoint between the $n/2$ and $n/2+1$).

Method Detection Limit (MDL) is the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, as defined in title 40 of the Code of Federal Regulations, Part 136, Attachment B, revised as of July 3, 1999.

Minimum Level (ML) is the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

Mixing Zone is a limited volume of receiving water that is allocated for mixing with a wastewater discharge where water quality criteria can be exceeded without causing adverse effects to the overall water body.

Not Detected (ND) are those sample results less than the laboratory's MDL.

Ocean Waters are the territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. Discharges to ocean waters are regulated in accordance with the State Water Board's California Ocean Plan.

Persistent pollutants are substances for which degradation or decomposition in the environment is nonexistent or very slow.

Pollutant Minimization Program (PMP) means waste minimization and pollution prevention actions that include, but are not limited to, product substitution, waste stream recycling, alternative waste management methods, and education of the public and businesses. The goal of the PMP shall be to reduce all potential sources of a priority pollutant(s) through pollutant minimization (control) strategies, including pollution prevention measures as appropriate, to maintain the effluent concentration at or below the water quality-based effluent limitation. Pollution prevention measures may be particularly appropriate for persistent bioaccumulative priority pollutants where there is evidence that beneficial uses are being impacted. The Regional Water Board may consider cost effectiveness when establishing the requirements of a PMP. The completion and implementation of a Pollution Prevention Plan, if required pursuant to California Water Code section 13263.3(d), shall be considered to fulfill the PMP requirements.

Pollution Prevention means any action that causes a net reduction in the use or generation of a hazardous substance or other pollutant that is discharged into water and includes, but is not limited to, input change, operational improvement, production process change, and product reformulation (as defined in California Water Code section 13263.3). Pollution prevention does not include actions that merely shift a pollutant in wastewater from one environmental medium to another environmental medium, unless clear environmental benefits of such an approach are identified to the satisfaction of the State or Regional Water Board.

Reporting Level (RL) is the ML (and its associated analytical method) chosen by the Discharger for reporting and compliance determination from the MLs included in this Order. The MLs included in this Order correspond to approved analytical methods for reporting a sample result that are selected by the Regional Water Board either from Appendix 4 of the SIP in accordance with section 2.4.2 of the SIP or established in accordance with section 2.4.3 of the SIP. The ML is based on the proper application of method-based analytical procedures for sample preparation and the absence of any matrix interferences.

Other factors may be applied to the ML depending on the specific sample preparation steps employed. For example, the treatment typically applied in cases where there are matrix-effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied to the ML in the computation of the RL.

Satellite Collection System is the portion, if any, of a sanitary sewer system owned or operated by a different public agency than the agency that owns and operates the wastewater treatment facility that a sanitary sewer system is tributary to.

Source of Drinking Water is any water designated as municipal or domestic supply (MUN) in a Regional Water Board Basin Plan.

Standard Deviation (σ) is a measure of variability that is calculated as follows:

$$\sigma = (\sum[(x - \mu)^2]/(n - 1))^{0.5}$$

where:

x is the observed value;

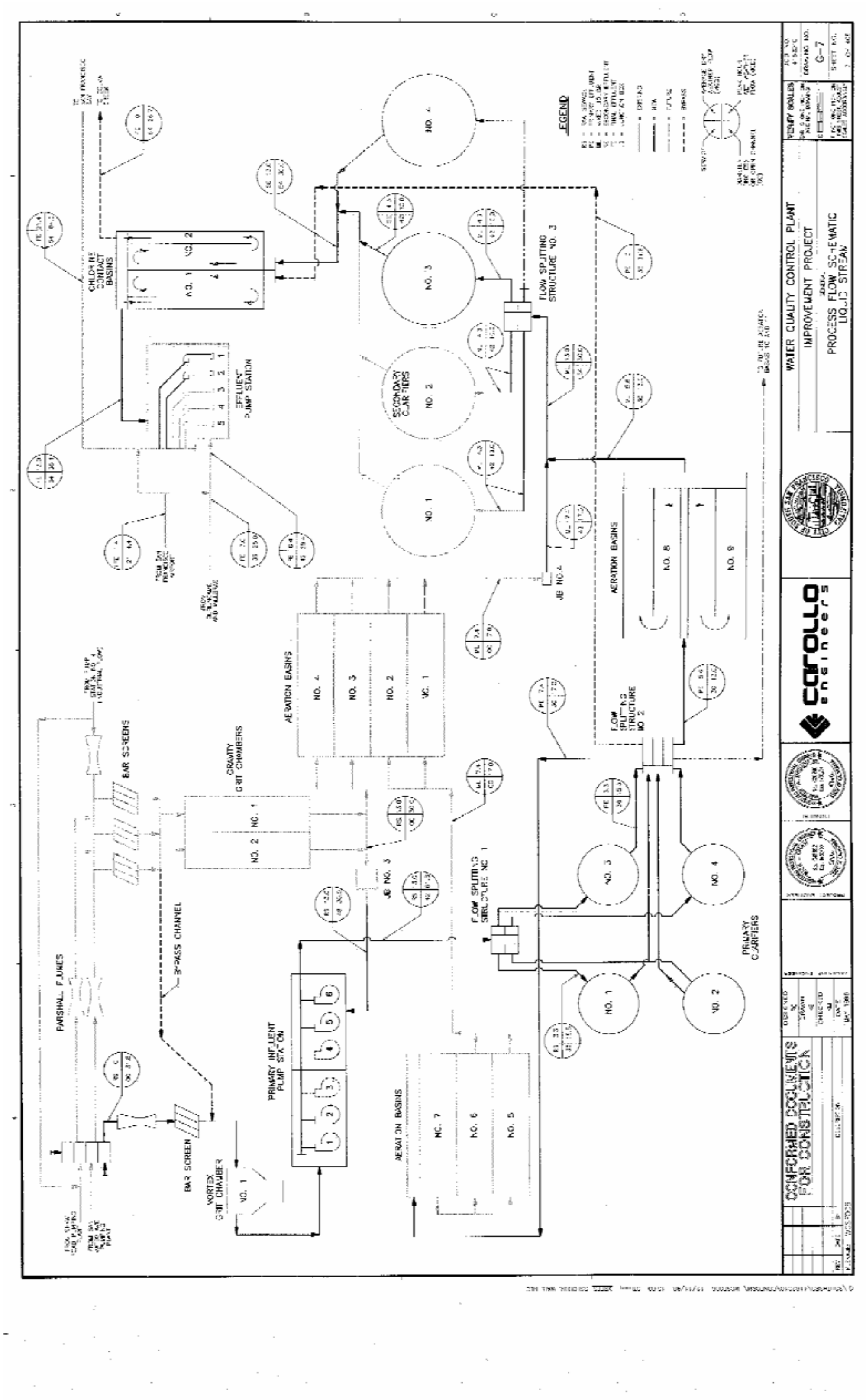
μ is the arithmetic mean of the observed values; and

n is the number of samples.

Toxicity Reduction Evaluation (TRE) is a study conducted in a step-wise process designed to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. The first steps of the TRE consist of the collection of data relevant to the toxicity, including additional toxicity testing, and an evaluation of facility operations and maintenance practices, and best management practices. A Toxicity Identification Evaluation (TIE) may be required as part of the TRE, if appropriate. (A TIE is a set of procedures to identify the specific chemical(s) responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.)

ATTACHMENT B – FACILITY MAP

ATTACHMENT C – PROCESS FLOW DIAGRAM



ATTACHMENT D –STANDARD PROVISIONS

I. STANDARD PROVISIONS – PERMIT COMPLIANCE

A. Duty to Comply

1. The Discharger must comply with all of the conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code and is grounds for enforcement action, for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. (40 C.F.R. § 122.41(a).)

2. The Discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants and with standards for sewage sludge use or disposal established under Section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions, even if this Order has not yet been modified to incorporate the requirement. (40 C.F.R. § 122.41(a)(1).)

B. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order. (40 C.F.R. § 122.41(c).)

C. Duty to Mitigate

The Discharger shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment. (40 C.F.R. § 122.41(d).)

D. Proper Operation and Maintenance

The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by a Discharger only when necessary to achieve compliance with the conditions of this Order (40 C.F.R. § 122.41(e)).

E. Property Rights

1. This Order does not convey any property rights of any sort or any exclusive privileges. (40 C.F.R. § 122.41(g).)

2. The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of state or local law or regulations. (40 C.F.R. § 122.5(c).)

F. Inspection and Entry

The Discharger shall allow the Regional Water Board, State Water Board, United States Environmental Protection Agency (USEPA), and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be required by law, to (40 C.F.R. § 122.41(i); Wat. Code, § 13383):

1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order (40 C.F.R. § 122.41(i)(1));
2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order (40 C.F.R. § 122.41(i)(2));
3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order (40 C.F.R. § 122.41(i)(3)); and
4. Sample or monitor, at reasonable times, for the purposes of assuring Order compliance or as otherwise authorized by the CWA or the Water Code, any substances or parameters at any location. (40 C.F.R. § 122.41(i)(4).)

G. Bypass

1. Definitions
   a. “Bypass” means the intentional diversion of waste streams from any portion of a treatment facility. (40 C.F.R. § 122.41(m)(1)(i).)
   b. “Severe property damage” means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. (40 C.F.R. § 122.41(m)(1)(ii).)
2. Bypass not exceeding limitations. The Discharger may allow any bypass to occur which does not cause exceedances of effluent limitations, but only if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions listed in Standard Provisions – Permit Compliance I.G.3, I.G.4, and I.G.5 below. (40 C.F.R. § 122.41(m)(2).)
3. Prohibition of bypass. Bypass is prohibited, and the Regional Water Board may take enforcement action against a Discharger for bypass, unless (40 C.F.R. § 122.41(m)(4)(i)):
   a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage (40 C.F.R. § 122.41(m)(4)(i)(A));
   b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment

should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance (40 C.F.R. § 122.41(m)(4)(i)(B)); and

c. The Discharger submitted notice to the Regional Water Board as required under Standard Provisions – Permit Compliance I.G.5 below. (40 C.F.R. § 122.41(m)(4)(i)(C).)

4. The Regional Water Board may approve an anticipated bypass, after considering its adverse effects, if the Regional Water Board determines that it will meet the three conditions listed in Standard Provisions – Permit Compliance I.G.3 above. (40 C.F.R. § 122.41(m)(4)(ii).)

5. Notice

   a. Anticipated bypass. If the Discharger knows in advance of the need for a bypass, it shall submit a notice, if possible at least 10 days before the date of the bypass. (40 C.F.R. § 122.41(m)(3)(i).)

   b. Unanticipated bypass. The Discharger shall submit notice of an unanticipated bypass as required in Standard Provisions - Reporting V.E below (24-hour notice). (40 C.F.R. § 122.41(m)(3)(ii).)

H. Upset

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. (40 C.F.R. § 122.41(n)(1).)

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance I.H.2 below are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. (40 C.F.R. § 122.41(n)(2).).

2. Conditions necessary for a demonstration of upset. A Discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that (40 C.F.R. § 122.41(n)(3)):

   a. An upset occurred and that the Discharger can identify the cause(s) of the upset (40 C.F.R. § 122.41(n)(3)(i));

   b. The permitted facility was, at the time, being properly operated (40 C.F.R. § 122.41(n)(3)(ii));

   c. The Discharger submitted notice of the upset as required in Standard Provisions – Reporting V.E.2.b below (24-hour notice) (40 C.F.R. § 122.41(n)(3)(iii)); and

d. The Discharger complied with any remedial measures required under Standard Provisions – Permit Compliance I.C above. (40 C.F.R. § 122.41(n)(3)(iv).)

3. Burden of proof. In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset has the burden of proof. (40 C.F.R. § 122.41(n)(4).)

II. STANDARD PROVISIONS – PERMIT ACTION

A. General

This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition. (40 C.F.R. § 122.41(f).)

B. Duty to Reapply

If the Discharger wishes to continue an activity regulated by this Order after the expiration date of this Order, the Discharger must apply for and obtain a new permit. (40 C.F.R. § 122.41(b).)

C. Transfers

This Order is not transferable to any person except after notice to the Regional Water Board. The Regional Water Board may require modification or revocation and reissuance of this Order to change the name of the Discharger and incorporate such other requirements as may be necessary under the CWA and the Water Code. (40 C.F.R. § 122.41(l)(3); § 122.61.)

III. STANDARD PROVISIONS – MONITORING

A. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. (40 C.F.R. § 122.41(j)(1).)

B. Monitoring results must be conducted according to test procedures under Part 136 or, in the case of sludge use or disposal, approved under Part 136 unless otherwise specified in Part 503 unless other test procedures have been specified in this Order. (40 C.F.R. § 122.41(j)(4); § 122.44(i)(1)(iv).)

IV. STANDARD PROVISIONS – RECORDS

A. Except for records of monitoring information required by this Order related to the Discharger's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by Part 503), the Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Regional Water Board Executive Officer at any time. (40 C.F.R. § 122.41(j)(2).)

B. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements (40 C.F.R. § 122.41(j)(3)(i));

2. The individual(s) who performed the sampling or measurements (40 C.F.R. § 122.41(j)(3)(ii));

3. The date(s) analyses were performed (40 C.F.R. § 122.41(j)(3)(iii));

4. The individual(s) who performed the analyses (40 C.F.R. § 122.41(j)(3)(iv));

5. The analytical techniques or methods used (40 C.F.R. § 122.41(j)(3)(v)); and

6. The results of such analyses. (40 C.F.R. § 122.41(j)(3)(vi).)

C. Claims of confidentiality for the following information will be denied (40 C.F.R. § 122.7(b)):

1. The name and address of any permit applicant or Discharger (40 C.F.R. § 122.7(b)(1)); and

2. Permit applications and attachments, permits and effluent data. (40 C.F.R. § 122.7(b)(2).)

V. STANDARD PROVISIONS – REPORTING

A. Duty to Provide Information

The Discharger shall furnish to the Regional Water Board, State Water Board, or USEPA within a reasonable time, any information which the Regional Water Board, State Water Board, or USEPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Discharger shall also furnish to the Regional Water Board, State Water Board, or USEPA copies of records required to be kept by this Order. (40 C.F.R. § 122.41(h); Wat. Code, § 13267.)

B. Signatory and Certification Requirements

1. All applications, reports, or information submitted to the Regional Water Board, State Water Board, and/or USEPA shall be signed and certified in accordance with Standard Provisions – Reporting V.B.2, V.B.3, V.B.4, and V.B.5 below. (40 C.F.R. § 122.41(k).)

2. All permit applications shall be signed by either a principal executive officer or ranking elected official. For purposes of this provision, a principal executive officer of a federal agency includes: (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of USEPA). (40 C.F.R. § 122.22(a)(3).).

3. All reports required by this Order and other information requested by the Regional Water Board, State Water Board, or USEPA shall be signed by a person described in Standard Provisions – Reporting V.B.2 above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described in Standard Provisions – Reporting V.B.2 above (40 C.F.R. § 122.22(b)(1));

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) (40 C.F.R. § 122.22(b)(2)); and

c. The written authorization is submitted to the Regional Water Board and State Water Board. (40 C.F.R. § 122.22(b)(3).)

4. If an authorization under Standard Provisions – Reporting V.B.3 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting V.B.3 above must be submitted to the Regional Water Board and State Water Board prior to or together with any reports, information, or applications, to be signed by an authorized representative. (40 C.F.R. § 122.22(c).)

5. Any person signing a document under Standard Provisions – Reporting V.B.2 or V.B.3 above shall make the following 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." (40 C.F.R. § 122.22(d).)

C. Monitoring Reports

1. Monitoring results shall be reported at the intervals specified in the Monitoring and Reporting Program (Attachment E) in this Order. (40 C.F.R. § 122.22(l)(4).)

2. Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the Regional Water Board or State Water Board for reporting results of monitoring of sludge use or disposal practices. (40 C.F.R. § 122.41(l)(4)(i).)

3. If the Discharger monitors any pollutant more frequently than required by this Order using test procedures approved under Part 136 or, in the case of sludge use or disposal, approved under Part 136 unless otherwise specified in Part 503, or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Regional Water Board. (40 C.F.R. § 122.41(l)(4)(ii).)

4. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order. (40 C.F.R. § 122.41(l)(4)(iii).)

D. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Order, shall be submitted no later than 14 days following each schedule date. (40 C.F.R. § 122.41(l)(5).)

E. Twenty-Four Hour Reporting

1. The Discharger shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A written submission shall also be provided within five (5) days of the time the Discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. (40 C.F.R. § 122.41(l)(6)(i).)

2. The following shall be included as information that must be reported within 24 hours under this paragraph (40 C.F.R. § 122.41(l)(6)(ii)):

   a. Any unanticipated bypass that exceeds any effluent limitation in this Order. (40 C.F.R. § 122.41(l)(6)(ii)(A).)

   b. Any upset that exceeds any effluent limitation in this Order. (40 C.F.R. § 122.41(l)(6)(ii)(B).)

3. The Regional Water Board may waive the above-required written report under this provision on a case-by-case basis if an oral report has been received within 24 hours. (40 C.F.R. § 122.41(l)(6)(iii).)

F. Planned Changes

The Discharger shall give notice to the Regional Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when (40 C.F.R. § 122.41(l)(1)):

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in section 122.29(b) (40 C.F.R. § 122.41(l)(1)(i)); or

2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in this Order. (40 C.F.R. § 122.41(l)(1)(ii).)

3. The alteration or addition results in a significant change in the Discharger's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application

process or not reported pursuant to an approved land application plan. (40 C.F.R.§ 122.41(l)(1)(iii).)

G. Anticipated Noncompliance

The Discharger shall give advance notice to the Regional Water Board or State Water Board of any planned changes in the permitted facility or activity that may result in noncompliance with General Order requirements. (40 C.F.R. § 122.41(l)(2).)

H. Other Noncompliance

The Discharger shall report all instances of noncompliance not reported under Standard Provisions – Reporting V.C, V.D, and V.E above at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting V.E above. (40 C.F.R. § 122.41(l)(7).)

I. Other Information

When the Discharger becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Water Board, State Water Board, or USEPA, the Discharger shall promptly submit such facts or information. (40 C.F.R. § 122.41(l)(8).)

VI. STANDARD PROVISIONS – ENFORCEMENT

A. The Regional Water Board is authorized to enforce the terms of this Order under several provisions of the Water Code, including, but not limited to, sections 13385, 13386, and 13387.

VII. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS

A. Publicly-Owned Treatment Works (POTWs)

All POTWs shall provide adequate notice to the Regional Water Board of the following (40 C.F.R. § 122.42(b)):

1. Any new introduction of pollutants into the POTW from an indirect discharger that would be subject to sections 301 or 306 of the CWA if it were directly discharging those pollutants (40 C.F.R. § 122.42(b)(1)); and

2. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of adoption of this Order. (40 C.F.R. § 122.42(b)(2).)

3. Adequate notice shall include information on the quality and quantity of effluent introduced into the POTW as well as any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW. (40 C.F.R. § 122.42(b)(3).)

ATTACHMENT E – MONITORING AND REPORTING PROGRAM

Table of Contents

Tables

ATTACHMENT E – MONITORING AND REPORTING PROGRAM (MRP)

National Pollutant Discharge Elimination System (NPDES) regulations at 40 CFR 122.48 require that all NPDES permits specify monitoring and reporting requirements. California Water Code (CWC) sections 13267 and 13383 also authorize the Regional Water Quality Control Board (Regional Water Board) to require technical and monitoring reports. This MRP establishes monitoring and reporting requirements, which implement the federal and State regulations.

I. GENERAL MONITORING PROVISIONS

A. The Discharger shall comply with the MRP for this Order as adopted by the Regional Water Board, and with all of Self-Monitoring Program (SMP), Part A, dated August 1993 (SMP, Attachment G). The MRP and SMP may be amended by the Executive Officer pursuant to U.S. Environmental Protection Agency (USEPA) regulations 40 CFR 122.62, 122.63, and 124.5. If any discrepancies exist between the MRP and SMP, the MRP prevails.

B. All analyses shall be conducted using current USEPA methods, methods that have been approved by the USEPA Regional Administrator pursuant to 40 CFR 136.4 and 40 CFR 136.5, or equivalent methods that are commercially and reasonably available and that provide quantification of sampling parameters and constituents sufficient to evaluate compliance with applicable effluent limits and to perform reasonable potential analyses. Equivalent methods must be more sensitive than those specified in 40 CFR 136, must be specified in the permit, and must be approved for use by the Executive Officer, following consultation with the State Water Quality Control Board (State Water Board) Quality Assurance Program.

C. Sampling and analysis of additional constituents is required pursuant to Table 1 of the Regional Water Board's August 6, 2001, Letter entitled *Requirement for Monitoring of Pollutants in Effluent and Receiving Water to Implement New Statewide Regulations and Policy* (Attachment G).

D. Laboratories analyzing monitoring samples shall be certified by the Department of Health Services, in accordance with Water Code section 13176 and shall include quality assurance/quality control data with their reports.

E. For compliance and reasonable potential monitoring, analyses shall be conducted using commercially available and reasonably achievable detection levels that are lower than the effluent limitations. The objective is to provide quantification of constituents sufficient to allow evaluation of observed concentrations with respect to the Minimum Levels (MLs) given below.

MLs are the concentrations at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method-specified sample weights, volumes, and processing steps have been followed. All MLs are expressed as micrograms per liter (μg/L).

Table E-1 lists the test methods the Discharger may use for compliance and reasonable potential monitoring for the pollutants with effluent limits.

Table E-1. Test Methods and Minimum Levels for Pollutants with Reasonable Potential

CTR #	Constituent	Types of Analytical Methods [1] Minimum Levels (μg/L)											
		GC	GCMS	LC	Color	FAA	GFAA	ICP	ICPMS	SPGFAA	HYDRIDE	CVAF	DCP
6	Copper								0.5	2			
9	Nickel								1	5			
14	Cyanide				5								
	Dioxin-TEQ [2]												
64	Benzo(k)fluoranthene			2									
68	Bis(2-ethylhexyl) phthalate		5										
73	Chrysene			5									
74	Dibenzo(a,h) anthracene			0.1									
92	Indeno(1,2,3 cd) pyrene			0.05									
103	alpha-BHC	0.01											
110	4,4'-DDD	0.05											
--	Tributyltin [3]	0.005											
--	Ammonia [4]												

Footnotes for Table E-1:

[1] Analytical Methods / Laboratory techniques are defined as follows:
Color = Colorimetric;
CVAF = Cold Vapor Atomic Fluorescence.
DCP = Direct Current Plasma
FAA = Furnace Atomic Absorption;
GC = Gas Chromatography
GCMS = Gas Chromatography Mass Spectroscopy
GFAA = Graphite Furnace Atomic Absorption;
ICP = Inductively Coupled Plasma
ICPMS = Inductively Coupled Plasma/Mass Spectrometry;
LC = Liquid Chromatography
SPGFAA = Stabilized Platform Graphite Furnace Atomic Absorption (i.e. USEPA 200.9)

[2] Use USEPA Method 1613. MLs shall be those specified by Table 8 of the Order for each congener.

[3] Analysis of tributyltin shall be by GC-FPD, GS-MS, or a USEPA-approved method; the method shall be capable of speciating organotins and have limits of detection for tributyltin of 5 ng/L. Alternative methods of analysis must be approved by the Executive Officer.

[4] Ammonia-N measured by Ammonia Selective Electrode Method, Reference SM 4500-NH3 F (18th Edition), Minimum Detection Level 0.1 mg/L.

II. MONITORING LOCATIONS

The Discharger shall establish the following monitoring locations to demonstrate compliance with the effluent limitations, discharge specifications, and other requirements in this Order.

Table E-2. Monitoring Station Locations

Type of Sampling Location	Monitoring Location Name	Monitoring Location Description
Influent	A-001	At a point in the treatment facilities upstream of the primary clarifiers and immediately downstream from where all influent flow streams combine.
Effluent	E-001	At a point after full treatment, including disinfection, and prior to entry into the North Bayside System Unit (NBSU) joint force main.

Effluent	E-002	At a point where all wastes tributary to the NBSU combined outfall are present, after dechlorination and preceding discharge into Lower San Francisco Bay.
Overflows and Bypass Station	OV-1 through OV-'n'	Locations of bypass or overflow from manholes, pump stations, or the collection system under the Discharger's control.

III. INFLUENT MONITORING REQUIREMENTS

The Discharger shall monitor influent to the Plant at A-001 as follows.

Table E-3. Influent Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Flow Rate (1)	MGD	Cont/D	Cont	(2)
Biochemical Oxygen Demand (BOD)	mg/L	C-24	3/Week	(2)
	kg/day	C-24	3/Week	(2)
Total Suspended Solids (TSS)	mg/L	C-24	5/Week	(2)
	kg/day	C-24	5/Week	(2)

Footnotes for Table E-3:

(1) For influent flows, the following information shall also be reported monthly:
Daily: Total Daily Flow Volume (MG)
Monthly: Monthly Average Flow (MGD)
Monthly: Maximum Daily Flow (MGD)
Monthly: Minimum Daily Flow (MGD)
Monthly: Total Flow Volume (MG)

(2) Pollutants shall be analyzed using the analytical methods described in 40 CFR Part 136.

IV. EFFLUENT MONITORING REQUIREMENTS

A. The Discharger shall monitor treated effluent from the Plant at E-001 as follows:

Table E-4. Effluent Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Flow Rate (1)	MGD	Cont	Cont/D	(2)
Oil and Grease (3)	mg/L	G	1/Month	(2)
	kg/day	G	1/Month	(2)
pH (4)	s.u.	G	1/Day	(2)
BOD_5 (5)	mg/L	C-24	3/Week	(2)
	kg/day	C-24	3/Week	(2)
TSS (5)	mg/L	C-24	5/Week	(2)
	kg/day	C-24	5/Week	(2)
Acute Toxicity (6)	% survival	C-24	1/Month	(2)
Chronic Toxicity (7)	TUc	C-24	2/Year	(2)
Dissolved Oxygen	mg/L	G	1/Day	(2)
	% saturation	G	1/Day	(2)
Fecal Coliform Bacteria	MPN/100mL	G	3/Week	(2)
Enterococcus Bacteria (8)	MPN/100mL	G	M	(2)
Temperature	^{o}C	G	1/Day	(2)

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Ammonia (total as N)	mg/L as N	C-24	1/Month	(2)
	kg/day as N	C-24	1/Month	(2)
Unionized Ammonia	mg/L as N	C-24	1/Month	Calculated
Copper	µg/L	C-24	1/Month	(2)
Nickel	µg/L	C-24	1/Month	(2)
Dioxin-TEQ	µg/L	G	2/Year	(2)
Benzo(k)fluoranthene	µg/L	G	2/Year	(2)
Bis(2-ethylhexyl)phthalate	µg/L	G	2/Year	(2)
Chrysene	µg/L	G	2/Year	(2)
Dibenzo(a,h)anthracene	µg/L	G	2/Year	(2)
Indeno(1,2,3-cd)pyrene	µg/L	G	2/Year	(2)
alpha-BHC	µg/L	G	2/Year	(2)
4,4'-DDD	µg/L	G	2/Year	(2)
Tributyltin	µg/L	G	2/Year	(2)
Remaining Priority Pollutants	µg/L	G	2/Year (9)	(2)

Footnotes for Table E-4:
Units:

MG	=	million gallons
MGD	=	million gallons per day
s.u.	=	standard units
TUc	=	chronic toxicity units
MPN/100mL	=	most probable number per 100 milliliters
^{o}C	=	degrees Celsius
µg/L	=	micrograms per liter
mg/L	=	milligrams per liter
kg/d	=	kilograms per day

(1) For effluent flows, the following information shall also be reported monthly:
Daily: Total Daily Flow Volume (MG)
Monthly: Monthly Average Flow (MGD)
Monthly: Maximum Daily Flow (MGD)
Monthly: Minimum Daily Flow (MGD)
Monthly: Total Flow Volume (MG)

(2) Pollutants and pollutant parameters shall be analyzed using the analytical methods described in 40 CFR 136. For priority pollutants, the methods shall meet the lowest MLs specified in Attachment 4 of the SIP. Where no methods are specified for a given pollutant, the methods shall be approved by this Regional Water Board or the State Water Board.

(3) Each oil and grease sampling event shall consist of three grab samples taken at equal intervals during the sampling date, with each grab sample being collected in a glass container. The grab samples shall be analyzed separately with the result of each analysis weighted by instantaneous flow rates to calculate a composite sample result. Each glass container used for sample collection or mixing shall be thoroughly rinsed with solvent rinsings as soon as possible after use, and the solvent rinsings shall be added to the respective grab sample for extraction and analysis.

(4) If pH is monitored continuously, the minimum and maximum pH values for each day shall be reported in monthly Self-Monitoring Reports (SMRs).

(5) The percent removal for BOD and TSS shall be reported for each calendar month. Samples for BOD and TSS shall be collected simultaneously with influent samples.

(6) Acute bioassay tests shall be performed in accordance with Section V.A of this MRP.

(7) Critical Life Stage Toxicity Test shall be performed and reported in accordance with the Chronic Toxicity Requirements specified in Section V.B of this MRP.

(8) The Discharger shall monitor for Enterococci using EPA-approved methods, including the IDEXX Enterolert Method.

(9) Sampling for all priority pollutants in the State Implementation Plan (SIP) is addressed in a Regional Water Board letter dated August 6, 2001, entitled *Requirements for Monitoring of Pollutants in Effluent and Receiving Water to Implement New Statewide Regulations and Policy* (not attached but available for review or download on the Regional Water Board's website at http://www.waterboards.ca.gov/sanfranciscobay/). For these pollutants, the sampling frequencies shall be the higher ones under this table or under the pretreatment program sampling required in Section X.A of this MRP. Pretreatment program monitoring can be used to satisfy part of these sampling requirements.

B. The Discharger shall monitor treated effluent from the Plant at E-002 as follows:

Table E-5. Effluent Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Flow Rate [1]	MGD	Cont	Cont/D	[2]
Cyanide [3]	µg/L	G	1/Month	[2]
Total Chlorine Residual [4]	mg/L	Cont	Cont/D	[2]
Standard Observations [5]	---	---	1/Day	[2]

Footnotes for Table E-5:
Units:

MG = million gallons
MGD = million gallons per day
µg/L = micrograms per liter
mg/L = milligrams per liter
kg/d = kilograms per day

[1] For effluent flows, the following information shall also be reported monthly:
Daily: Total Daily Flow Volume (MG)
Monthly: Monthly Average Flow (MGD)
Monthly: Maximum Daily Flow (MGD)
Monthly: Minimum Daily Flow (MGD)
Monthly: Total Flow Volume (MG)

[2] Pollutants and pollutant parameters shall be analyzed using the analytical methods described in 40 CFR 136. For priority pollutants, the methods shall meet the lowest MLs specified in Attachment 4 of the SIP. Where no methods are specified for a given pollutant, the methods shall be approved by this Regional Water Board or the State Water Board.

[3] The Discharger may, at its option, analyze for cyanide as Weak Acid Dissociable Cyanide using protocols specified in Standard Method Part 4500-CN-I, USEPA Method OI 1677, or equivalent alternatives in the latest edition. Alternative methods of analysis must be approved by the Executive Officer.

[4] During all times when chlorination is used for disinfection of the effluent, effluent chlorine residual concentrations shall be monitored continuously or by grab samples taken once every two hours. The Discharger may record discrete readings from the continuous monitoring every hour on the hour, and report on a daily basis, the maximum concentration observed following dechlorination. Chlorine residual concentrations shall be monitored and reported for sampling points both prior to and following dechlorination. Total chlorine dosage (kg/day) shall be recorded on a daily basis, and dechlorination chemical dosage and/or residual shall also be recorded for proof of any false exceedance. However, any confirmed chlorine residual exceedance occurring at any time of the day is an effluent limitation violation and must be reported in accordance with SMP Part A and Standard Provisions, Attachments D and G

[5] Standard observations. As specified in the SMP, Part A.

V. WHOLE EFFLUENT TOXICITY TESTING REQUIREMENTS

The Discharger shall monitor acute and chronic toxicity at E-001 as follows.

A. Whole Effluent Acute Toxicity

1. Compliance with the acute toxicity effluent limitations of this Order shall be evaluated by measuring survival of test organisms exposed to 96-hour continuous flow-through bioassays.

2. Test organisms shall be fathead minnow or rainbow trout unless specified otherwise in writing by the Executive Officer.

3. All bioassays shall be performed according to the most up-to-date protocols in 40 CFR 136, currently in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms*, 5th Edition.

4. If specific identifiable substances in the discharge can be demonstrated by the Discharger as being rapidly rendered harmless upon discharge to the receiving water, compliance with the acute toxicity limit may be determined after the test samples are adjusted to remove the influence of those substances. Written approval from the Executive Officer must be obtained to authorize such an adjustment. Compliance with the acute toxicity limitation may be demonstrated after adjusting the effluent pH through the addition of concentrated sulfuric acid to minimize the concentration of un-ionized ammonia.

5. Effluent used for fish bioassays shall be dechlorinated prior to testing. The effluent sample may be taken from E-001 prior to disinfection instead of continuously dechlorinating effluent at E-001 for an acute toxicity monitoring sample. Monitoring of the bioassay water shall include, on a daily basis, the following parameters: pH, dissolved oxygen, ammonia (if toxicity is observed), temperature, hardness, and alkalinity. These results shall be recorded and maintained with all other analytical documents.

   If final or intermediate results of an acute bioassay test indicate a violation or threatened violation (e.g., the percentage of surviving test organisms of any single acute bioassay test is less than 70 percent), or if the control fish survival rate is less than 90 percent; a new test shall be initiated and the Discharger shall investigate the cause of the mortalities and report its findings in the next self-monitoring report (SMR). Bioassay tests shall continue back-to-back until compliance is demonstrated.

B. Whole Effluent Chronic Toxicity

1. Chronic Toxicity Monitoring Requirements

   a. *Sampling*. The Discharger shall collect 24-hour composite samples of the effluent at the compliance point specified in Table E-4 above for critical life stage toxicity testing. For toxicity tests requiring renewals, 24-hour composite samples collected on consecutive days are required.

   b. *Test Species*. The test species shall be *Mysidopsis bahia*. The Executive Officer may change to another test species if data suggest that another test species is more sensitive to the discharge.

   c. *Methodology*. Sample collection, handling and preservation shall be in accordance with USEPA protocols. In addition, bioassays shall be conducted in compliance with the most recently promulgated test methods, as shown in **Appendix E-1.** These are *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms,* currently third edition (EPA-821-R-02-014), and *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms,* currently fourth Edition (EPA-821-R-02-013), with exceptions granted the Discharger by the Executive Officer and the Environmental Laboratory Accreditation Program (ELAP).

   d. *Dilution Series.* The Discharger shall conduct tests at 2%, 5%, 10%, 20%, and 40%. The "%" represents percent effluent as discharged. The Discharger may use a buffer only after obtaining written approval from the Executive Officer.

2. Chronic Toxicity Reporting Requirements

   a. *Routine Reporting*. Toxicity test results for the current reporting period shall include, at a minimum, for each test:

      (1) Sample dates

      (2) Test initiation date

      (3) Test species

      (4) End point values for each dilution (e.g., number of young, growth rate, percent survival)

      (5) No Observed Effect Concentration (NOEC) values in terms of "percent effluent"

      (6) Inhibition Concentration (IC) values at IC_{15}, IC_{25}, IC_{40}, and IC_{50} (or Effective Concentration (EC) values at EC_{15}, EC_{25} ... etc.) in terms of "percent effluent"

      (7) Chronic Toxicity Units (TUc) values (100/NOEC, 100/IC_{25}, or 100/EC_{25})

      (8) Mean percent mortality (±s.d.) after 96 hours in 100% effluent (if applicable)

      (9) NOEC and Lowest Observed Effect Concentration (LOEC) values for reference toxicant tests

      (10) IC_{50} or EC_{50} values for reference toxicant tests

      (11) Available water quality measurements for each test (pH, dissolved oxygen [DO], temperature, conductivity, hardness, salinity, ammonia)

   b. *Compliance Summary*. The results of the chronic toxicity testing shall be provided in the Self-Monitoring Report (SMR) and shall include a summary table of chronic toxicity data from at least eleven of the most recent samples. The information in the table shall include items listed above under 2.a, specifically item numbers (1), (3), (5), (6) (IC_{25} or EC_{25}), (7), and (8).

3. Chronic Toxicity Reduction Evaluation (TRE)

   a. To be ready to respond to toxicity events, the Discharger shall prepare a generic TRE work plan within 90 days of the effective date of this Order. The Discharger shall review and update the work plan as necessary to remain current and applicable to the discharge and discharge facilities.

   b. Within 30 days of exceeding the trigger for accelerated monitoring, the Discharger shall submit to the Regional Water Board a specific TRE work plan, which should be the generic work plan revised as appropriate for this toxicity event after consideration of available discharge data.

c. Within 30 days of the date of completion of the accelerated monitoring tests observed to exceed either trigger, the Discharger shall initiate a TRE in accordance with a TRE work plan that incorporates any and all comments from the Executive Officer.

d. The TRE shall be specific to the discharge and be prepared in accordance with current technical guidance and reference materials, including USEPA guidance materials. The TRE shall be conducted as a tiered evaluation process, such as summarized below:

(1) Tier 1 consists of basic data collection (routine and accelerated monitoring).

(2) Tier 2 consists of evaluation of optimization of the treatment process, including operation practices and in-plant process chemicals.

(3) Tier 3 consists of a toxicity identification evaluation (TIE).

(4) Tier 4 consists of evaluation of options for additional effluent treatment processes.

(5) Tier 5 consists of evaluation of options for modifications of in-plant treatment processes.

(6) Tier 6 consists of implementation of selected toxicity control measures, and follow-up monitoring and confirmation of implementation success.

e. The TRE may be ended at any stage if monitoring finds there is no longer consistent toxicity (complying with requirements of Section IV.A.4 of this Order).

f. The objective of the TIE shall be to identify the substance or combination of substances causing the observed toxicity. All reasonable efforts using currently available TIE methodologies shall be employed.

g. As toxic substances are identified or characterized, the Discharger shall continue the TRE by determining the sources and evaluating alternative strategies for reducing or eliminating the substances from the discharge. All reasonable steps shall be taken to reduce toxicity to levels consistent with chronic toxicity evaluation parameters.

h. Many recommended TRE elements parallel required or recommended efforts of source control, pollution prevention and storm water control programs. TRE efforts should be coordinated with such efforts. To prevent duplication of efforts, evidence of complying with requirements or recommended efforts of such programs may be acceptable to comply with TRE requirements.

i. The Regional Water Board recognizes that chronic toxicity may be episodic and identification of causes of and reduction of sources of chronic toxicity may not be successful in all cases. Consideration of enforcement action by the Regional Water Board will be based in part on the Discharger's actions and efforts to identify and control or reduce sources of consistent toxicity.

VI. LAND DISCHARGE MONITORING REQUIREMENTS

Not Applicable.

VII. RECLAMATION MONITORING REQUIREMENTS

Not Applicable.

VIII. RECEIVING WATER MONITORING REQUIREMENTS

The Discharger shall continue to participate in the Regional Monitoring Program for Trace Substances (RMP), which involves collection of data on pollutants and toxicity in water, sediment, and biota of the Estuary. The Discharger's participation and support of the RMP is used in consideration of the level of receiving water monitoring required by this Order.

IX. LEGEND FOR MRP TABLES

<u>Types of Samples</u>

C-24	=	composite sample, 24 hours (includes continuous sampling, such as for flows)
C-X	=	composite sample, X hours
G	=	grab sample

<u>Frequency of Sampling</u>

Cont.	=	Continuous
Cont/D	=	Continuous monitoring & daily reporting
H	=	Once each hour (at about hourly intervals)
2H	=	once every 2 hours
1/W	=	Once each week
2/W	=	Twice each week
4/W	=	Four times each week
1/M	=	Once each month
1/Q	=	Once each calendar quarter (at about three month intervals)
1/Y	=	Once each calendar year
2/Y	=	Twice each calendar year (at about 6 months intervals, once during dry season, once during wet season)

<u>Parameter and Unit Abbreviations</u>

BNA	=	Base, Neutral, Acid-extractable compounds
CBOD	=	Carbonaceous Biochemical Oxygen Demand
TUc	=	Chronic Toxicity Units
°C	=	Degrees Celsius
DO	=	Dissolved Oxygen
kg/d	=	Kilograms per day
kg/mo	=	Kilograms per month
µg/L	=	Micrograms per liter
mg/L	=	Milligrams per liter
MG	=	Million Gallons
MGD	=	Million Gallons per Day
MPN/100 mL	=	Most Probable Number per 100 milliliters
Metals	=	Multiple metals; See SMP Section VI.G.
% survival	=	Percent survival
s.u.	=	Standard units
TSS	=	Total Suspended Solids

VOC = Volatile Organic Compounds

X. OTHER MONITORING REQUIREMENTS

A. Pretreatment Requirements

The Discharger shall comply with the pretreatment requirements specified in Table E-5 for influent (A-001), effluent (E-001), and biosolids.

Table E-6. Pretreatment Monitoring Requirements

Constituents/EPA Method	Influent [(1)] (A-001)	Effluent [(1)] (E-001)	Biosolids
VOCs / 624 [(2)]	2/Y	2/Y	
BNA / 625 [(3)]	2/Y	2/Y	
Metals [(4)]	M	M	
Organophosphorus Pesticides	2/Y	2/Y	
Carbamate and Urea Pesticides	2/Y	2/Y	
Biosolids [(5)]			2/Y

Footnotes for Table E-6:

(1) Influent and effluent monitoring conducted in accordance with Tables E-3 and E-4 can be used to satisfy these pretreatment monitoring requirements.

(2) Volatile organic compounds.

(3) Base neutral, acid extractable compounds.

(4) Same USEPA method used to determine compliance with the respective NPDES permit. Analyses for metals shall include arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, zinc, selenium and cyanide.

(5) USEPA approved methods.

B. Biosolids Monitoring

The Discharger shall adhere to sludge monitoring requirements required by 40 CFR 503.

XI. MODIFICATIONS TO PART A OF SELF-MONITORING PROGRAM (ATTACHMENT G)

A. If any discrepancies exist between SMP Part A, August 1993 (Attachment G) and this MRP, this MRP prevails.

B. Modify SMP, Part A, as follows:

1. Sections C.3, C.4, and C.5 are satisfied by participation in the Regional Monitoring Program.

7. Section C.2.h of Part A:

   When any type of bypass occurs (except for bypasses caused by high wet weather inflow), composite samples shall be collected on a daily basis for all constituents at all affected discharge points which have effluent limits for the duration of the bypass.

   When bypassing occurs from any treatment process (primary, secondary, chlorination, dechlorination, etc.) in the treatment facility during high wet weather inflow, the self-monitoring program shall include the following sampling and analysis:

i. When bypassing occurs from any primary or secondary treatment unit(s), composite samples for the duration of the bypass event for BOD and TSS analyses, and continuous monitoring of flow. If BOD or TSS exceed the effluent limits, the bypass monitoring shall be expanded to include all constituents that have effluent limits for the duration of the bypass, until the BOD and TSS values stabilize to compliance with effluent limitations.

ii. When bypassing the chlorination process grab samples at least daily for fecal coliform analysis, and continuous monitoring of flow.

iii. When bypassing the dechlorination process, grab samples hourly for chlorine residual, and continuous monitoring of flow.

12. Modify Section F.4 of Part A as follows:

For each calendar month, a self-monitoring report (SMR) shall be submitted to the Regional Water Board in accordance with the requirements listed in Self-Monitoring Program, Part A. The purpose of the report is to document treatment performance, effluent quality and compliance with waste discharge requirements prescribed by this Order, as demonstrated by the monitoring program data and the Discharger's operation practices.

[And add at the end of Section F.4 the following:]

g. If the Discharger wishes to invalidate any measurement, the letter of transmittal will include identification of the measurement suspected to be invalid and notification of intent to submit, within 60 days, a formal request to invalidate the measurement, the original measurement in question, the reason for invalidating the measurement, all relevant documentation that supports the invalidation (e.g., laboratory sheet, log entry, test results, etc.), and discussion of the corrective actions taken or planned (with a time schedule for completion), to prevent recurrence of the sampling or measurement problem.

h. Reporting Data in Electronic Format

The Discharger has the option to submit all monitoring results in an electronic reporting format approved by the Executive Officer. If the Discharger chooses to submit SMRs electronically, the following shall apply:

1) Reporting Method: The Discharger shall submit SMRs electronically via the process approved by the Executive Officer in a letter dated December 17, 1999, Official Implementation of Electronic Reporting System (ERS) and in the Progress Report letter dated December 17, 2000, or in a subsequently approved format that the Permit has been modified to include.

2) Monthly or Quarterly Reporting Requirements: For each reporting period (monthly or quarterly as specified in SMP Part B), an electronic SMR shall be submitted to the Regional Water Board in accordance with Section F.4.a-g. above. However, until U.S. EPA approves the electronic signature or other signature technologies, Dischargers that are using the ERS must submit a hard copy of the original transmittal letter, an ERS printout of the data sheet, a violation report, and a receipt of the electronic transmittal.

3) Annual Reporting Requirements: Dischargers who have submitted data using the ERS for at least one calendar year are exempt from submitting an annual report electronically, but a hard copy of the annual report per Sections F.5.b, F.5.c, and F.5.d below shall be submitted.

XII. REPORTING REQUIREMENTS

A. General Monitoring and Reporting Requirements

The Discharger shall comply with all Standard Provisions (Attachments D and G) related to monitoring, reporting, and recordkeeping.

B. Self Monitoring Reports

1. At any time during the term of this Order, the State or Regional Water Board may notify the Discharger to electronically submit SMRs using the State Water Board's California Integrated Water Quality System (CIWQS) Program Web site (http://www.waterboards.ca.gov/ciwqs/index.html). Until such notification is given, the Discharger shall submit hard copy SMRs. The CIWQS Web site will provide additional directions for SMR submittal in the event that there will be service interruption for electronic submittal.

2. The Discharger shall submit monthly and annual SMRs including the results of all required monitoring using USEPA-approved test methods or other test methods specified in this Order for each calendar month. If the Discharger monitors any pollutant more frequently than required by this Order, the results of this monitoring shall be included in the calculations and reporting of the data submitted in the SMR. Monthly SMRs shall be due on the 30th day following the end of each calendar month, covering samples collected during that calendar month; Annual Reports shall be due on February 1 following each calendar year.

3. Monitoring periods and reporting for all required monitoring shall be completed according to the following schedule:

Table E-7. Monitoring Periods and Reporting Schedule

Sampling Frequency	Monitoring Period Begins On…	Monitoring Period
Continuous	Day after permit effective date	All
Hourly	Day after permit effective date	Hourly
Daily	Day after permit effective date	Midnight through 11:59 PM or any 24-hour period that reasonably represents a calendar day for purposes of sampling.
Weekly	Sunday following permit effective date or on permit effective date if on a Sunday	Sunday through Saturday
Monthly	First day of calendar month following permit effective date or on permit effective date if that date is first day of the month	1st day of calendar month through last day of calendar month

Sampling Frequency	Monitoring Period Begins On…	Monitoring Period
Quarterly	Closest of January 1, April 1, July 1, or October 1 following (or on) permit effective date	January 1 through March 31 April 1 through June 30 July 1 through September 30 October 1 through December 31
Semiannually	Closest of January 1 or July 1 following (or on) permit effective date	January 1 through June 30 July 1 through December 31
Annually	January 1 following (or on) permit effective date	January 1 through December 31
Per Discharge Event	Anytime during the discharge event or as soon as possible after aware of the event	At a time when sampling can characterize the discharge event

4. The Discharger shall report with each sample result the applicable Reporting Level (RL) and the current Method Detection Limit (MDL) as determined by the procedure in 40 CFR 136.

   The Discharger shall report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

   a. Sample results greater than or equal to the RL shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample).

   b. Sample results less than the RL, but greater than or equal to the laboratory's MDL, shall be reported as "Detected, but Not Quantified," or DNQ. The estimated chemical concentration of the sample shall also be reported.

      For the purposes of data collection, the laboratory shall write the estimated chemical concentration next to DNQ as well as the words "Estimated Concentration" (may be shortened to "Est. Conc."). The laboratory may, if such information is available, include numerical estimates of the data quality for the reported result. Numerical estimates of data quality may be percent accuracy (± a percentage of the reported value), numerical ranges (low to high), or any other means considered appropriate by the laboratory.

   c. Sample results less than the laboratory's MDL shall be reported as "Not Detected" or ND.

   d. Dischargers are to instruct laboratories to establish calibration standards so that the ML value (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is the Discharger to use analytical data derived from *extrapolation* beyond the lowest point of the calibration curve.

5. The Discharger shall submit SMRs in accordance with the following requirements:

   a. The Discharger shall arrange all reported data in a tabular format. The data shall be summarized to clearly illustrate whether the Plant is operating in compliance with effluent limitations in this Order. The Discharger is not required to duplicate the submittal of data that is entered in a tabular format within CIWQS. When electronic submittal of data are required and CIWQS does not provide for entry into a tabular format within the system, the Discharger shall electronically submit the data in a tabular format as an attachment.

b. The Discharger shall attach a cover letter to the SMR. The information contained in the cover letter shall clearly identify violations of the WDRs, discuss corrective actions taken or planned, and the proposed time schedule for corrective actions. Identified violations must include a description of the requirement that was violated and a description of the violation.

c. SMRs must be submitted to the Regional Water Board, signed and certified as required by the Standard Provisions (Attachment D), to the address listed below:

Executive Officer
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612
ATTN: NPDES Wastewater Division

C. Discharge Monitoring Reports

1. As described in Section XII.B.1 above, at any time during the term of this Order, the State or Regional Water Board may notify the Discharger to electronically submit SMRs that will satisfy federal requirements for submittal of Discharge Monitoring Reports (DMRs). Until such notification is given, the Discharger shall submit DMRs in accordance with the requirements described below.

2. DMRs must be signed and certified as required by the standard provisions (Attachment D). The Discharge shall submit the original DMR and one copy of the DMR to one of the addresses listed below:

Standard Mail	FedEx/UPS/Other Private Carriers
State Water Resources Control Board Division of Water Quality c/o DMR Processing Center PO Box 100 Sacramento, CA 95812-1000	State Water Resources Control Board Division of Water Quality c/o DMR Processing Center 1001 I Street, 15th Floor Sacramento, CA 95814

3. All discharge monitoring results must be reported on the official USEPA pre-printed DMR forms (EPA Form 3320-1). Forms that are self-generated will not be accepted unless they follow the exact same format of EPA Form 3320-1.

D. Other Reports

The Discharger shall report the results of any special studies, monitoring, and reporting required by Section VI.C.2 (Special Studies, Technical Reports, and Additional Monitoring Requirements) of this Order with the first monthly SMR following the respective due date. The Discharger shall include a report of progress towards meeting compliance schedules established by section VI.C.2 of this Order in the annual SMR.

APPENDIX E-1
CHRONIC TOXICITY
DEFINITION OF TERMS AND SCREENING PHASE REQUIREMENTS

I. Definition of Terms

A. No observed effect level (NOEL) for compliance determination is equal to IC_{25} or EC_{25}. If the IC_{25} or EC_{25} cannot be statistically determined, the NOEL shall be equal to the NOEC derived using hypothesis testing.

B. Effective concentration (EC) is a point estimate of the toxicant concentration that would cause an adverse effect on a quantal, "all or nothing," response (such as death, immobilization, or serious incapacitation) in a given percent of the test organisms. If the effect is death or immobility, the term lethal concentration (LC) may be used. EC values may be calculated using point estimation techniques such as probit, logit, and Spearman-Karber. EC_{25} is the concentration of toxicant (in percent effluent) that causes a response in 25 percent of the test organisms.

C. Inhibition concentration (IC) is a point estimate of the toxicant concentration that would cause a given percent reduction in a nonlethal, nonquantal biological measurement, such as growth. For example, an IC_{25} is the estimated concentration of toxicant that would cause a 25 percent reduction in average young per female or growth. IC values may be calculated using a linear interpolation method such as USEPA's Bootstrap Procedure.

D. No observed effect concentration (NOEC) is the highest tested concentration of an effluent or a toxicant at which no adverse effects are observed on the aquatic test organisms at a specific time of observation. It is determined using hypothesis testing.

II. Chronic Toxicity Screening Phase Requirements

A. The Discharger shall perform screening phase monitoring:

1. Subsequent to any significant change in the nature of the effluent discharged through changes in sources or treatment, except those changes resulting from reductions in pollutant concentrations attributable to source control efforts, or

2. Prior to permit reissuance. Screening phase monitoring data shall be included in the NPDES permit application for reissuance. The information shall be as recent as possible, but may be based on screening phase monitoring conducted within 5 years before the permit expiration date.

B. Design of the screening phase shall, at a minimum, consist of the following elements:

1. Use of test species specified in **Appendix E-2**, attached, and use of the protocols referenced in those tables.

2. Two stages:

a. Stage 1 shall consist of a minimum of one battery of tests conducted concurrently. Selection of the type of test species and minimum number of tests shall be based on **Appendix E-2** (attached).

b. Stage 2 shall consist of a minimum of two test batteries conducted at a monthly frequency using the three most sensitive species based on the Stage 1 test results.

3. Appropriate controls.

4. Concurrent reference toxicant tests.

5. Dilution series of 2%, 5%, 10%, 20%, and 40%, where "%" is percent effluent as discharged.

C. The Discharger shall submit a screening phase proposal acceptable to the Executive Officer. The proposal shall address each of the elements listed above. If within 30 days, the Executive Officer does not comment, the Discharge shall commence with screening phase monitoring.

APPENDIX E-2
SUMMARY OF TOXICITY TEST SPECIES REQUIREMENTS

Critical Life Stage Toxicity Tests for Estuarine Waters

Species	(Scientific Name)	Effect	Test Duration	Reference
Alga	*(Skeletonema costatum)* *(Thalassiosira pseudonana)*	Growth rate	4 days	1
Red alga	*(Champia parvula)*	Number of cystocarps	7–9 days	3
Giant kelp	*(Macrocystis pyrifera)*	Percent germination; germ tube length	48 hours	2
Abalone	*(Haliotis rufescens)*	Abnormal shell development	48 hours	2
Oyster Mussel	*(Crassostrea gigas)* *(Mytilus edulis)*	Abnormal shell development; percent survival	48 hours	2
Echinoderms - Urchins Sand dollar	*(Strongylocentrotus purpuratus, S. franciscanus)* *(Dendraster excentricus)*	Percent fertilization	1 hour	2
Shrimp	*(Mysidopsis bahia)*	Percent survival; growth	7 days	3
Shrimp	*(Holmesimysis costata)*	Percent survival; growth	7 days	2
Topsmelt	*(Atherinops affinis)*	Percent survival; growth	7 days	2
Silversides	*(Menidia beryllina)*	Larval growth rate; percent survival	7 days	3

Toxicity Test References:

1. American Society for Testing Materials (ASTM). 1990. Standard Guide for Conducting Static 96-Hour Toxicity Tests with Microalgae. Procedure E 1218-90. ASTM, Philadelphia, PA.
2. Short-term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to West Coast Marine and Estuarine Organisms. EPA/600/R-95/136. August 1995.
3. Short-term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to Marine and Estuarine Organisms. EPA/600/4-90/003. July 1994.

Critical Life Stage Toxicity Tests for Fresh Waters

Species	(Scientific Name)	Effect	Test Duration	Reference
Fathead minnow	*(Pimephales promelas)*	Survival; growth rate	7 days	4
Water flea	*(Ceriodaphnia dubia)*	Survival; number of young	7 days	4
Alga	*(Selenastrum capricornutum)*	Cell division rate	4 days	4

Toxicity Test Reference:

4. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, third edition. EPA/600/4-91/002. July 1994.

Toxicity Test Requirements for Stage One Screening Phase

Requirements	Receiving Water Characteristics		
	Discharges to Coast	Discharges to San Francisco Bay[(2)]	
	Ocean	Marine/Estuarine	Freshwater
Taxonomic diversity	1 plant 1 invertebrate 1 fish	1 plant 1 invertebrate 1 fish	1 plant 1 invertebrate 1 fish
Number of tests of each salinity type: Freshwater[(1)] Marine/Estuarine	0 4	1 or 2 3 or 4	3 0
Total number of tests	4	5	3

Footnotes:

(1) The freshwater species may be substituted with marine species if:
  a. The salinity of the effluent is above 1 part per thousand (ppt) greater than 95 percent of the time, or
  b. The ionic strength (TDS or conductivity) of the effluent at the test concentration used to determine compliance is documented to be toxic to the test species.

(2) a. Marine/Estuarine refers to receiving water salinities greater than 1 ppt at least 95 percent of the time during a normal water year.
  b. Fresh refers to receiving water with salinities less than 1 ppt at least 95 percent of the time during a normal water year.

ATTACHMENT F - FACT SHEET

Table of Contents

List of Tables

ATTACHMENT F – FACT SHEET

As described in Section II of this Order, this Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this Order.

This Order has been prepared under a standardized format to accommodate a broad range of discharge requirements for dischargers in California. Only those sections or subsections of this Order that are specifically identified as "not applicable" have been determined not to apply to this Discharger. Sections or subsections of this Order not specifically identified as "not applicable" are fully applicable to this Discharger.

I. PERMIT INFORMATION

The following table summarizes administrative information related to the South San Francisco and San Bruno Water Quality Control Plant (Plant) and its collection system.

Table F-1. Facility Information

WDID	2 417038001
Discharger	Cities of South San Francisco and San Bruno
Name of Facility	South San Francisco and San Bruno Water Quality Control Plant and Collection System
Facility Address	195 Belle Air Road
	South San Francisco, CA 94080
	San Mateo County
Facility Contact, Title, Phone	David Castagnola, Superintendent, (650) 829-3844
Authorized Person to Sign and Submit Reports	David Castagnola, Superintendent, (650) 829-3844
Mailing Address	Same as Facility Address
Billing Address	Same as Facility Address
Type of Facility	Publicly Owned Treatment Works (POTW)
Major or Minor Facility	Major
Threat to Water Quality	1
Complexity	A
Pretreatment Program	Yes
Reclamation Requirements	N
Facility Permitted Flow	13 million gallons per day (MGD) average dry weather flow
Facility Design Flow	13 MGD (average daily dry weather treatment capacity)
Watershed	San Francisco Bay
Receiving Water	Lower San Francisco Bay
Receiving Water Type	Marine

A. The Cities of South San Francisco and San Bruno own and operate the Plant, which discharges to Lower San Francisco Bay through the North Bayside System Unit (NBSU) force main.

For the purposes of this Order, references to the "discharger" or "permittee" in applicable federal and state laws, regulations, plans, or policy are held to be equivalent to references to the Discharger herein.

B. The Plant discharges treated wastewater through the NBSU force main into the deep-water channel of Lower San Francisco Bay, a water of the United States, and is currently regulated by Order No. R2-2003-0010 (NPDES Permit No. CA0038130), which was adopted on January 22, 2003.

The terms and conditions of Order No. R2-2003-0010 have been automatically continued past the Order's original expiration date of March 31, 2008, and remain in effect until new Waste Discharge Requirements (WDRs) and a new NPDES permit are adopted pursuant to this Order.

C. The Discharger filed a Report of Waste Discharge and submitted an application for renewal of its WDRs and NPDES permit on September 24, 2007.

II. FACILITY DESCRIPTION

A. Description of Wastewater Treatment

The Discharger owns and operates the Plant and its collection system, which provides primary and secondary treatment of domestic and commercial wastewater, serving a population of approximately 105, 900 in the Cities of South San Francisco and San Bruno. The Plant has an average daily dry weather design treatment capacity of 13 MGD and can treat up to 62 MGD during wet weather. The Discharger is a member of the North Bayside System Unit (NBSU), a joint powers authority that includes the Cities of Burlingame, Millbrae, South San Francisco, and San Bruno, and the San Francisco International Airport (both industrial and domestic waste treatment plants).

The Plant consists of bar screens, grit chambers, primary sedimentation, secondary aeration tanks, final clarifiers, and disinfection equipment. A treatment process schematic diagram is included as Attachment C.

Chlorinated secondary effluent enters the NBSU force main, where it combines with chlorinated treated wastewater from the other members of the NBSU. The combined effluent is dechlorinated at the Plant prior to discharge into Lower San Francisco Bay through the NBSU outfall (Discharge Point E-002), a submerged diffuser located northeast of Point San Bruno about 5,300 feet offshore at a depth of 20 feet below mean lower low water (37º 39' 55" N latitude and 122º 21' 41" W longitude).

Most stormwater captured within the Plant's site is directed to the headworks of the Plant except for two locations where storm drains flow directly to Colma Creek. Stormwater discharge from the Plant entrance and parking lots that are directed to the two storm drains are covered under the Statewide Industrial Storm Water Permit (NPDES General Permit No. CAS000001).

B. Discharge Points and Receiving Waters

The receiving water and the location of the NBSU discharge point are shown in Table F-2 below and Attachment B. Discharge Point E-002 is location where the combined effluent is discharged to Lower San Francisco Bay. Compliance monitoring for this Discharger for most parameters takes place at Monitoring Location E-001, as described in the attached MRP. A second compliance monitoring station (E-002) for the combined effluent, as described in the attached MRP, is located at the outfall prior to contact with the receiving water. Lower San Francisco Bay is located in the

South Bay Basin watershed management area, between the Dumbarton Bridge and the San Francisco-Oakland Bay Bridge.

Table F-2. Outfall Location

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
E-002	POTW Effluent	37º 39' 55" N	122º 21' 41" W	Lower San Francisco Bay

C. Summary of Existing Requirements and Self-Monitoring Report Data

Effluent limitations contained in the previous Order (Order No. R2-2003-0010) for discharges to Lower San Francisco Bay and representative monitoring data from the term of Order No. R2-2003-0010 are as follows:

Table F-3. Effluent Limitations (Order No. R2-2003-0010) and Monitoring Data for Conventional and Non-Conventional Pollutants

Parameter	(units)	Effluent Limitations			Monitoring Data (From 01/02 to 05/08)		
		Monthly Average	Weekly Average	Daily Maximum	Highest Monthly Average	Highest Weekly Average	Highest Daily Discharge
Oil and Grease	mg/L	10	---	20	8.12	NA	35
pH	standard units	6.0 – 9.0			6.7 (min)	NA	8.0
Total Suspended Solids (TSS)	mg/L	30	45	---	19.04	26.71	72
Acute Toxicity	% survival	(1)	(1)	(1)	NA	NA	NA
Biochemical Oxygen Demand (BOD)	mg/L	30	45	---	36.76	53.86	128
Fecal Coliform	MPN/100 mL	(2)	(2)	(2)	56.96	NA	9,200
Chlorine, Total Residual (TRC)	mg/L	---	---	0.0 (3)	(4)	(4)	(4)
Settleable Matter	mL/L-hr.	0.1	---	0.2	3.5	NA	3.5

Footnotes for Table F-3:
mg/L = milligrams per liter
mL/L-hr = milliliters per liter per hour
Most Probable Number per 100 milliliters = MPN/100 mL
ND = Non-Detect
NA = Not Applicable
% survival = percent survival

(1) An 11-sample median value of not less than 90 percent survival and an 11-sample 90th percentile value of not less than 70 percent survival.

(2) The geometric mean for each calendar month shall not exceed 200 MPN/100 mL, and no more than 10 percent of the samples in each calendar month shall exceed 400 MPN/100 mL.

(3) For TRC, 0.0 mg/L was established as an instantaneous maximum effluent limitation.

(4) Compliance is measured at the NBSU outfall for all NBSU dischargers. TRC was not detected at the NBSU outfall over the time period covered in this table.

Table F-4. Effluent Limitations (Order No. R2-2003-0010) and Monitoring Data for Toxic Pollutants

Parameter	Units	Final Limits		Interim Limits		Monitoring Data (From 02/02 to 08/07)
		Daily Maximum	Monthly Average	Daily Maximum	Monthly Average	Highest Daily Concentration
Copper	µg/L	-----	-----	37	-----	14
Mercury	µg/L	-----	-----	-----	0.087	0.023
Nickel	µg/L	68	31	-----	-----	17
Silver	µg/L	22	5	-----	-----	1.3
Selenium	µg/L	-----	-----	17	-----	3.8
Zinc	µg/L	500	483	-----	-----	62
Cyanide	µg/L	-----	-----	10	-----	8.5
Dieldrin	µg/L	0.00028	0.00014	-----	-----	(0.002) (1)
4,4-DDE	µg/L	0.00119	0.00059	-----	-----	(0.003) (1)
Tributyltin	µg/L	-----	-----	0.045	-----	0.00873
Tetrachloroethylene	µg/L	178	89	-----	-----	1.5

Footnotes for Table F-4:

Units: µg/L = micrograms per liter

(1) Analyte not detected in effluent. Number in parenthesis is the method detection limit (MDL) as reported by the analytical laboratory.

D. Compliance Summary

1. **Compliance with Numeric Effluent Limits.** Exceedances of numeric effluent limits were observed during the permit term for total settleable solids, fecal coliform, and BOD. The exceedances are outlined below:

Table F-5. Numeric Effluent Exceedances

Date of Violation	Exceeded Parameter	Units	Effluent Limitation	Reported Concentration
January 30, 2003	Cyanide – Effluent Daily Maximum	µg/L	10	119
April 1, 2003	Oil and Grease – Effluent Daily Maximum	mg/L	20	35
July 1, 2003	Cyanide – Effluent Daily Maximum	µg/L	10	19
October 3, 2003	BOD – Effluent Weekly Average	mg/L	45	52
October 11, 2003	BOD – Effluent Weekly Average	mg/L	45	54
October 31, 2003	BOD – Effluent Monthly Average	mg/L	30	37
December 2, 2003	Acute Toxicity – An 11-Sample 90th Percentile Value Less Than 70% Survival	%	70	45
December 4, 2003	Acute Toxicity – An 11-Sample 90th Percentile Value Less Than 70% Survival	%	70	0
December 5, 2003	Acute Toxicity – An 11-Sample 90th Percentile Value Less Than 70% Survival	%	70	0
December 7, 2003	Acute Toxicity – An 11-Sample 90th Percentile Value Less Than 70% Survival	%	70	0
December 7, 2003	Acute Toxicity – An 11-Sample Median Value Less Than 90% Survival	%	90	75
January 5, 2005	Acute Toxicity – An 11-sample 90th percentile of Less Than 70% Survival	%	70	0
February 15, 2005	Total Settleable Solids - Effluent Daily Maximum	mL/L-hr	0.2	3.5
March 23, 2005	Fecal Coliform – 90th Percentile of last 10 Samples	MPN/100 mL	400	490

Date of Violation	Exceeded Parameter	Units	Effluent Limitation	Reported Concentration
September 30, 2006	Oil & Grease – Average Monthly Effluent Limit	-----	10	11

2. **Enforcement Summary**

As directed by the Regional Water Board's 1997 Cease and Desist Order, in 2007 the City of So. San Francisco completed improvements to its collection system to reduce the occurrences of sanitary sewer overflows (SSOs). With the completion of the infiltration and inflow (I/I) improvements and the upgrade of 2 major raw sewage pump stations, peak wet-weather flow at the treatment plant was increased to provide treatment for a 5-year storm of 60 MGD. The pumping capacity of two of the large raw sewage pump stations has been increased in order to draw down the levels of sewage and I/I in the collection system in order to prevent SSOs.

The Discharger also constructed a 7 million gallon effluent storage pond at the site of the former sludge drying beds to control the rate of discharge to the NBSU effluent pump station, which is equipped with five vertical turbine pumps having a maximum rated capacity of 64 MGD and a firm rated capacity (with the largest pump out of service) of 47 MGD.

Regional Water Board Enforcement Order R2-2002-0119 imposed Mandatory Minimum Penalties for violations incurred up until January 30, 2003. Regional Water Board Enforcement Order R2-2004-0075 imposed Mandatory Minimum Penalties for violations incurred between April 1, 2003 and October 31, 2003. In 2006, the Regional Water Board issued Complaint R2-2006-0012 assessing $516,000 against the City of So. San Francisco for a 1.8 million gallon sewage spill from a 2004 pump station failure, along with other smaller volume sewage spills going back to 2003. In July 2008, State Water Board Notice of Violation for Mandatory Minimum Penalties issued a settlement for violations incurred between November 1, 2003 and March 31, 2008.

E. Planned Changes

No major changes are planned at the Plant at this time.

III. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in the proposed Order are based on the requirements and authorities described in this section.

A. Legal Authorities

This Order is issued pursuant to the Clean Water Act (CWA) section 402 and implementing regulations adopted by the USEPA and Chapter 5.5, Division 7 of the CWC (commencing with section 13370). It shall serve as an NPDES permit for point source discharges from the Plant to surface waters. This Order also serves as WDRs pursuant to CWC Article 4, Chapter 4, Division 7 (commencing with section 13260).

B. California Environmental Quality Act (CEQA)

Under CWC section 13389, this action to adopt an NPDES permit is exempt from the provisions of CEQA.

C. State and Federal Regulations, Policies, and Plans

1. **Water Quality Control Plans.** The Water Quality Control Plan for the San Francisco Bay Basin (the Basin Plan) is the Regional Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was adopted by the Regional Water Board and approved by the State Water Resources Control Board, USEPA, and the Office of Administrative Law. Requirements of this Order implement the Basin Plan.

   The Basin Plan implements State Water Resources Control Board (State Water Board) Resolution No. 88-63, which establishes State policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply (MUN). Because of the marine influence on receiving waters of San Francisco Bay, total dissolved solids levels in San Francisco Bay commonly (and often significantly) exceed 3,000 mg/L and thereby meet an exception to State Water Board Resolution No. 88-63. The designation MUN does not apply to Lower San Francisco Bay. Beneficial uses applicable to Lower San Francisco Bay are as follows:

Table F-6. Basin Plan Beneficial Uses

Discharge Point	Receiving Water Name	Beneficial Use(s)
E-002	Lower San Francisco Bay	Industrial Service Supply (IND) Navigation (NAV) Water Contact Recreation (REC1) Non-Contact Water Recreation (REC2) Ocean, Commercial and Sport Fishing (COMM) Wildlife Habitat (WILD) Preservation of Rare and Endangered Species (RARE) Fish Migration (MIGR) Shellfish Harvesting (SHELL) Estuarine Habitat (EST)

2. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** USEPA adopted the NTR on December 22, 1992, and amended it on May 4, 1995, and November 9, 1999. About 40 criteria in the NTR applied in California. On May 18, 2000, USEPA adopted the CTR. The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the state. The CTR was amended on February 13, 2001. These rules contain water quality criteria for priority toxic pollutants, which are applicable to Lower San Francisco Bay.

3. **State Implementation Policy.** On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and*

Estuaries of California (State Implementation Policy or SIP*)*. The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria promulgated for California by the USEPA through the NTR and to the priority pollutant objectives established by the Regional Water Board in the Basin Plan. The SIP became effective on May 18, 2000, with respect to the priority pollutant criteria promulgated by the USEPA through the CTR. The State Water Board adopted amendments to the SIP on February 24, 2005 that became effective on July 13, 2005. The SIP establishes implementation provisions for priority pollutant criteria and objectives and provisions for chronic toxicity control. Requirements of this Order implement the SIP.

4. **Alaska Rule.** On March 30, 2000, USEPA revised its regulation that specifies when new and revised state and tribal water quality standards become effective for CWA purposes [40 CFR 131.21, 65 Fed. Reg. 24641 (April 27, 2000)]. Under the revised regulation (also known as the Alaska Rule), new and revised standards submitted to USEPA after May 30, 2000, must be approved by USEPA before being used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by May 30, 2000, may be used for CWA purposes, whether or not approved by USEPA.

5. **Antidegradation Policy.** 40 CFR 131.12 requires that State water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution 68-16. Resolution 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution 68-16 requires that existing water quality be maintained unless degradation is justified based on specific findings. The Regional Water Board's Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies.

   The permitted discharge is consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Board Resolution 68-16. With limited exceptions discussed in section IV.D.2 of the Fact Sheet, the Order does not authorize increases in discharges of pollutants, in terms of mass or concentration, and therefore, will not result in a change in receiving water quality from the level of water quality ensured by the previous permit. Final effluent limitations limits in this Order comply with applicable State and federal antidegradation requirements and meet the requirements of the SIP. These limits hold the Discharger to performance levels that will neither cause nor contribute to water quality impairment, nor further water quality degradation.

   As antidegradation has been addressed, there will be no lowering of water quality beyond the current level authorized in the previous permit, which is the baseline by which to measure whether degradation will occur, and further analysis in this permit is unnecessary. Findings authorizing degradation are thus unnecessary.

6. **Anti-Backsliding Requirements.** CWA Sections 402(o)(2) and 303(d)(4) and NPDES regulations at 40 CFR 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require that effluent limitations in a reissued permit must be as stringent as those in the previous permit, with some exceptions in which limitations may be relaxed.

D. Impaired Water Bodies on CWA 303(d) List

In November 2006, the USEPA approved a revised list of impaired water bodies prepared by the State [hereinafter referred to as the 303(d) list], prepared pursuant to provisions of CWA section 303(d), which requires identification of specific water bodies where it is expected that water quality standards will not be met after implementation of technology-based effluent limitations on point sources. Lower San Francisco Bay is listed as an impaired waterbody for chlordane, DDT, dieldrin, dioxin compounds, exotic species, furan compounds, mercury, PCBs, and dioxin-like PCBs. The SIP requires final effluent limitations for all 303(d)-listed pollutants to be consistent with total maximum daily loads and associated waste load allocations.

The Regional Water Board plans to adopt Total Maximum Daily Loads (TMDLs) for pollutants on the 303(d) list in Lower San Francisco Bay within the next ten years. (A TMDL for mercury was adopted February 12, 2008.)

TMDLs will establish waste load allocations (WLAs) for point sources and load allocations (LAs) for non-point sources, and will result in achieving the water quality standards for the waterbodies. The discharge of mercury from the Plant is regulated by Regional Water Board Order No. R2-2007-0077, which implements the adopted mercury TMDL and contains monitoring and reporting requirements.

IV. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

The CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants that are discharged into waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two principal bases for effluent limitations in the NPDES regulations: 40 CFR 122.44(a) requires that permits include applicable technology-based limitations and standards; and 40 CFR 122.44(d) requires that permits include water quality-based effluent limitations (WQBELs) to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water. Where Reasonable Potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, WQBELs may be established (1) using USEPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) using an indicator parameter for the pollutant of concern; or (3) using a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting the state’s narrative criterion, supplemented with other relevant information, as provided in 40 CFR 122.44(d)(1)(vi).

Several specific factors affecting the development of limitations and requirements in this Order are discussed as follows.

A. Discharge Prohibitions

1. **Discharge Prohibition III.A (No discharge other than that described in this Order):** This prohibition is the same as in the previous permit and is based on CWC section 13260, which requires filing a Report of Waste Discharge (ROWD) before discharges can occur. Discharges not described in the ROWD, and subsequently in this Order, are prohibited.

2. **Discharge Prohibition III.B (Average dry weather flow not to exceed dry weather design capacity):** This prohibition is based on the design treatment capacity of the Plant. Exceedance of the Plant's average dry weather flow design capacity of 13 MGD may result in lowering the reliability of achieving compliance with water quality requirements.

3. **Discharge Prohibition III.C (No discharge receiving less than 10:1 dilution):** This prohibition is the same as in the previous permit and is based on Discharge Prohibition No. 1 from Table 4-1 of the Basin Plan, which prohibits discharges that do not receive a minimum 10:1 initial dilution. Further, this Order allows a 10:1 dilution credit in the calculation of some water quality based effluent limitations, and these limits would not be protective of water quality if the discharge did not actually achieve a 10:1 minimum initial dilution.

4. **Discharge Prohibition III.D (No bypass or overflow of untreated or partially treated wastewaters):** This prohibition grants bypass of peak wet weather flows above 30 MGD when recombined with secondary treatment flows and discharged at the combined outfall in accordance with the conditions at 40 CFR 122.41(m)(4)(i)(A)-(C).

Background
During significant storm events, high influent flows can overwhelm certain parts of the wastewater treatment process and may cause damage or failure of the system. Operators of wastewater treatment plants must manage these high flows to both ensure the continued operation of the treatment process and to prevent backups and overflows of raw wastewater in basements or on city streets. USEPA recognizes that peak wet weather flow diversions around secondary treatment units (blending) at POTW treatment plants serving separate sanitary sewer conveyance systems may be necessary in some circumstances.

In December 2005, USEPA invited public comment on a proposed Peak Wet Weather Policy that interprets 40 CFR 122.41(m) to apply to wet weather diversions recombined with flow from secondary treatment, and provides guidance regarding when the Regional Water Board may approved blending in an NPDES permit. The draft policy requires that dischargers must meet all the requirements of NPDES permits and encourages municipalities to make investments in ongoing maintenance and capital improvements to improve their system's long-term performance. While USEPA has not formally adopted the draft policy, the proposal is a useful tool for Regional Water Board consideration.

Criteria of 40 CFR 122.41(m)(4)(i)(A)-(C)
If the criteria of 40 CFR 122.41(m)(4)(i)(A)-(C) are met, the Regional Water Board can approve wet weather diversions that are recombined with flow from secondary treatment. The criteria of 40 CFR 122.41(m)(4)(i) (Federal Standard Provisions, Attachment D) are (A) bypass was unavoidable to prevent loss of life, personal injury, or severe property damage; (B) there were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime; and (C) the Discharger submitted notice to the Regional Water Board as required under Federal Standard Provision – Permit Compliance I.G.5.

On August 26, 2008, the Discharger submitted a No Feasible Alternatives Analysis that addresses measures it has taken and plans to take to reduce and eliminate bypasses during wet weather events so that such bypasses can be approved by 40 CFR 122.41(m)(4). During the past several years, the Discharger has undertaken sewer system improvements that have reduced the volume of storm flows to the treatment plant. The Discharger has implemented Phase II of the Plant's Wet Weather Improvements for replacing two major sanitary sewage pump stations. Those improvements began in 2004 and were completed in 2005. The Discharger also plans to continue improvements to the South San Francisco collection system to remediate or replace gravity and trunk lines and to reduce inflow and infiltration. The Discharger has also proposed the following actions, which are required by Provision VI.C.7:

- Minimize slug loading from industrial users through Pretreatment and Pollution Prevention Program prohibitions;
- Implement "enhanced primary treatment" through adding ferric chloride and anionic polymer to enhance settling in the primary clarifiers;
- Revise the South San Francisco Municipal Code to strengthen provisions relating to pretreatment, slug discharges, etc.;
- Implement the Capacity, Management, Operations, and Maintenance (C-MOM) Program.
- Install an ultrasonic level sensor and totalizer to better quantify volume of the bypassed primary effluent;
- Develop and implement operational guidelines for blending operations for primary effluent in chlorine contact tank no. 1 (CCT-1) to be routed back to the return activated sludge pump station for additional treatment; and
- Identify and implement wet weather procedures so flows up to 40 MGD will receive full secondary treatment.

The Discharger has satisfied the criteria of 40 CFR 122.41(m)(4)(i)(A-C). Bypasses are necessary to prevent severe property damage when flows exceed the capacity of the secondary treatment. The Discharger has analyzed alternatives to bypassing and has determined that no feasible alternatives exist at this time. The Discharger has submitted notice to the Regional Water Board as required under Federal Standard Provision – Permit Compliance I.G.5.

5. **Discharge Prohibition III. E (No sanitary sewer overflows to waters of the United States).** Discharge Prohibition No. 15 from Basin Plan Table 4-1 and the CWA prohibit the discharge of wastewater to surface waters except as authorized under an NPDES permit. POTWs must achieve secondary treatment, at a minimum, and any more stringent limitations necessary to achieve water quality standards [33 U.S.C. § 1311 (b)(1)(B and C)]. Therefore, a sanitary sewer overflow that results in the discharge of raw sewage, or sewage not meeting secondary treatment requirements, to surface waters is prohibited under the CWA and the Basin Plan.

B. Technology-Based Effluent Limitations

1. Scope and Authority

CWA section 301(b)(1)(B) requires USEPA to develop secondary treatment standards (the level of effluent quality attainable through application of secondary or equivalent treatment) for POTWs. USEPA promulgated such technology-based effluent guidelines for POTWs at 40 CFR 133. These Secondary Treatment Regulations include the following minimum requirements for POTWs, which are applicable to discharges from the Plant.

Table F-7. Secondary Treatment Requirements

	30-Day Average	7-Day Average
BOD [1]	30 mg/L	45 mg/L
TSS [1]	30 mg/L	45 mg/L
pH	6.0 – 9.0	

Footnotes for Table F-7:
(1) The 30 day average percent removal shall not be less than 85 percent.

2. Applicable Technology-Based Effluent Limitations

This Order retains the following technology-based effluent limitations, applicable to Discharge Point E-001, from Order No. R2-2003-0010.

Table F-8. Summary of Technology-Based Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
BOD_5	mg/L	30	45		---	---
TSS	mg/L	30	45		---	---
Oil and Grease	mg/L	10	---	20	---	---
pH	s.u.	---	---	---	6.0	9.0
Total Residual Chlorine	mg/L	---	---	---	---	0.0 [1]

Footnotes for Table F-8:
(1) Chlorine residual compliance are to be demonstrated by monitoring at the NBSU common outfall (E-002).

Effluent limitations for BOD and TSS, including the 85% removal requirement, are retained from Order No. R2-2003-0010. 40 CFR 122.45(d)(2) specifies that discharge limitations for POTWs shall be stated as average weekly limitations and average monthly limitations, unless impracticable.

The limitations established for Oil and Grease are levels attainable by secondary treatment and are required by the Basin Plan Table 4-2 for all discharges to inland surface waters and enclosed bays and estuaries of the San Francisco Bay Region.

The pH limitation is retained from Order No. R2-2003-0010 and is required by USEPA's Secondary Treatment Regulation at 40 CFR 133 and by Basin Plan Table 4-2 for deep water discharges.

This Order retains the instantaneous maximum limitation for chlorine of 0.0 mg/L, which is based on Basin Plan Table 4-2.

The technology-based effluent limitations for settleable matter are not retained from Order No. R2-2003-0010 as the Regional Water Board has determined that compliance with the Secondary Treatment Regulations at 40 CFR 133 and with Basin Plan Table 4-2 requirements for all discharges to inland surface waters and enclosed bays and estuaries of the San Francisco Bay Region will ensure removal of settleable solids to acceptably low levels below 0.1 mL/L-hr (30 day average) and 0.2 mL/L-hr (daily maximum).

3. Bacteria

a. Fecal Coliform: Effluent limitations for fecal coliform bacteria are retained from Order No. R2-2003-0010. These limitations reflect applicable water quality objectives for water contact recreation in established by Basin Plan Table 3-1 and are applied as end-of-pipe effluent limitations.

b. Enterococci: This Order establishes a technology-based effluent limitation for enterococci bacteria. This limitation is based on the enterococci concentration currently economically and technologically achievable by six other POTWs in the San Francisco Bay Region. This limitation is also consistent with the requirements of the Basin Plan at Table 4-2, footnote d, and with the BEACH Act of 2004 [40CFR 133.41(e)(1)]. This effluent limitation will ensure that there are no “unacceptable adverse impacts on the beneficial uses” of Lower San Francisco Bay.

Enterococci are more closely associated with gastrointestinal disease contracted by water contact than are fecal coliform bacteria. USEPA established bacteriological criteria for water contact recreation in coastal waters, including coastal estuaries such as San Francisco Bay, pursuant to the BEACH Act on November 16, 2004 (Federal Register, Volume 69, No. 220). This Order’s effluent limitation on enterococci, a geometric mean of 35 MPN/100 mL, is equivalent to the BEACH Act’s saltwater bacteriological criterion for water contact recreation.

Bacteria concentrations in sewage treatment plant effluent are primarily a function of disinfectant application, so the Discharger can meet this limitation with its existing technology. Because this technology-based limitation does not account for dilution in the receiving waters, it is likely to be conservative in terms of protecting beneficial uses, and therefore consistent with Basin Plan Table 4-2, footnote d.

Although USEPA also established single sample maximum criteria for enterococci bacteria, this Order implements only the geometric mean criterion of 35 MPN/100 mL. When these criteria were promulgated, USEPA expected that the single sample maximum values would be used for making beach notification and beach closure decisions. “Other than in the beach notification and closure decision context, the geometric mean is the more relevant value for assuring that appropriate actions are taken to protect and improve water quality because it is a more reliable measure, being less subject to random variation…” [Federal Register, Volume 69, No 220].

C. Water Quality-Based Effluent Limitations (WQBELs)

1. Scope and Authority

a. NPDES regulations at 40 CFR 122.44(d)(1)(i) require permits to include WQBELs for pollutants (including toxicity) that are or may be discharged at levels that cause, have reasonable potential to cause, or contribute to an excursion above any state water quality standard (Reasonable Potential). The process for determining Reasonable Potential and, when necessary, calculating WQBELs is intended to (1) protect the designated beneficial uses of the receiving water specified in the Basin Plan and (2) achieve applicable Water

Quality Objectives contained in the California Toxics Rule (CTR), National Toxics Rule (NTR), and the Basin Plan.

b. NPDES regulations and the SIP provide the basis to establish Maximum Daily Effluent Limitations (MDELs).

(1) NPDES Regulations. NPDES regulations at 40 CFR 122.45(d) state, "For continuous discharges all permit effluent limitations, standards, and prohibitions, including those necessary to achieve water quality standards, shall *unless impracticable* be stated as maximum daily and average monthly discharge limitations for all discharges other than publicly owned treatment works."

(2) SIP. The SIP (page 8, Section 1.4) requires that WQBELs be expressed as MDELs and average monthly effluent limitations (AMELs). Since the SIP requires MDELs, not average weekly effluent limits, it is impracticable to impose average weekly effluent limits. MDELs are necessary to protect against acute water quality effects (e.g., for preventing fish kills or acute mortality to aquatic organisms).

2. Applicable Beneficial Uses and Water Quality Criteria and Objectives

The Water Quality Criteria (WQC) and Water Quality Objectives (WQOs) applicable to the receiving waters for this discharge are from the Basin Plan; the CTR, established by USEPA at 40 CFR 131.38; and the NTR, established by USEPA at 40 CFR 131.36. Some pollutants have WQC or WQOs established by more than one of these three sources.

a. Basin Plan. The Basin Plan specifies numeric WQOs for ten priority toxic pollutants, as well as narrative WQOs for toxicity and bioaccumulation in order to protect beneficial uses. The pollutants for which the Basin Plan specifies numeric objectives are arsenic, cadmium, chromium (VI), copper in freshwater, lead, mercury, nickel, silver, zinc, and cyanide. The narrative toxicity objective states in part, "[a]ll waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms." The narrative bioaccumulation objective states in part, "[c]ontrollable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered." Effluent limitations and provisions contained in this Order are based on available information to implement these objectives.

b. CTR. The CTR specifies numeric aquatic life criteria for 23 toxic pollutants and numeric human health criteria for 57 toxic pollutants. These criteria apply to all inland surface waters and enclosed bays and estuaries of the San Francisco Bay Region, although Basin Plan Tables 3-3 and 3-4 contain numeric objectives for certain toxic pollutants that supersede the CTR criteria (except in the South Bay south of the Dumbarton Bridge).

c. NTR. The NTR establishes numeric aquatic life criteria for selenium and numeric human health criteria for 33 toxic pollutants for waters of San Francisco Bay upstream to and including Suisun Bay and the Sacramento River Delta. These criteria apply to Lower San Francisco Bay, the receiving water for this Discharge.

d. **Basin Plan Receiving Water Salinity Policy.** The Basin Plan (like the CTR and the NTR) states that the salinity characteristics (i.e., freshwater vs. saltwater) of the receiving water shall be considered in determining the applicable WQO. Freshwater objectives apply to discharges to waters with salinities equal to or less than one part per thousand (ppt) at least 95 percent of the time. Saltwater criteria apply to discharges to waters with salinities equal to or greater than 10 ppt at least 95 percent of the time in a normal water year. For discharges to water with salinities in between these two categories, or tidally influenced freshwaters that support estuarine beneficial uses, the criteria shall be the lower of the salt or freshwater criteria (the latter calculated based on ambient hardness) for each substance.

The receiving water for this discharge, Lower San Francisco Bay, is a salt water environment based on salinity data generated through the Regional Monitoring Program for Trace Substances (RMP) at the Alameda (BB70), Oyster Point (BB30), and San Bruno Shoal (BB15) sampling stations between 1993 and 2001. In that period, the average salinity at the three sampling stations was 23.8 ppt; the minimum observed salinity levels were 12, 11, and 0.5 ppt. As salinity was greater than 10 ppt in at least 95 percent of these receiving water samples, the saltwater objectives from the Basin Plan, NTR, and CTR apply to this discharge.

f. **Site-Specific Metals Translators.** Because NPDES regulations at 40 CFR 122.45(c) require that effluent limitations for metals be expressed as total recoverable metal, and applicable WQOs for metals are typically expressed as dissolved metal, factors or translators must be used to convert metals concentrations from dissolved to total recoverable and vice versa. In the CTR, USEPA establishes default translators that are used in NPDES permitting activities; however, site-specific conditions, such as water temperature, pH, suspended solids, and organic carbon, greatly affect the form of metal (dissolved, filterable, or otherwise) that is present in the water and therefore available to cause toxicity. In general, the dissolved form of the metals is more available and more toxic to aquatic life than the filterable forms. Site-specific translators can be developed to account for site-specific conditions, thereby preventing exceedingly stringent or under protective WQOs.

For deep water discharges to Lower San Francisco Bay, the Regional Water Board used the following translators for copper and nickel, based on recommendations of the Clean Estuary Partnership's *North of Dumbarton Bridge Copper and Nickel Development and Selection of Final Translators* (2005). In determining the need for and calculating WQBELs for all other metals, the Regional Water Board staff used thr default translators established by the USEPA in the CTR at 40 CFR 131.38(b)(2), Table 2.

Table F-9. Translators for Copper and Nickel for Deepwater Discharges of North of Dumbarton Bridge

Cu and Ni Translators for Deepwater Discharges to Lower San Francisco Bay	**Copper**		**Nickel**	
	AMEL Translator	**MDEL Translator**	**AMEL Translator**	**MDEL Translator**
	0.74	0.88	0.65	0.85

3. Determining the Need for WQBELs

NPDES regulations at 40 CFR 122.44(d)(1)(i) require permits to include WQBELs for all pollutants (non-priority and priority) "which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any narrative or numeric criteria within a State water quality standard." Thus, assessing whether a pollutant has "Reasonable Potential" is the fundamental step in determining whether or not a WQBEL is required. For non-priority pollutants, Regional Water Board staff used available monitoring data, the receiving water's designated beneficial uses, and/or previous permit pollutant limitations to determine Reasonable Potential. For priority pollutants, Regional Water Board staff used the methods prescribed in Section 1.3 of the SIP to determine if the discharge from the Plant demonstrates Reasonable Potential as described below in sections 3.a – 3.e.

a. Reasonable Potential Analysis (RPA)

Using the methods prescribed in Section 1.3 of the SIP, Regional Water Board staff analyzed the effluent data to determine if the discharge from the Plant demonstrates Reasonable Potential. The RPA compares the effluent data with numeric and narrative WQOs in the Basin Plan and numeric WQC in the NTR and CTR. The governing Basin Plan objectives and CTR criteria are shown in Table F-10.

b. Reasonable Potential Methodology

Using the methods and procedures prescribed in Section 1.3 of the SIP, Regional Water Board staff analyzed the effluent and background data and the nature of the Plant's operations to determine if the discharge has Reasonable Potential to cause or contribute to exceedances of applicable WQOs and WQC. The RPA considers the maximum effluent concentration (MEC) for each pollutant based on existing data, while accounting for a limited data set and effluent variability. There are three triggers in determining Reasonable Potential.

(1) The first trigger is activated if the MEC is greater than or equal to the lowest applicable WQO (MEC $\geq$ WQO), which has been adjusted, if appropriate, for pH, hardness, and translator data. If the MEC is greater than or equal to the adjusted WQO, then that pollutant has Reasonable Potential, and a WQBEL is required.

(2) The second trigger is activated if the observed maximum ambient background concentration (B) is greater than the adjusted WQO (B > WQO) and the pollutant is detected in any of the effluent samples (MEC > ND).

(3) The third trigger is activated if a review of other information determines that a WQBEL is required to protect beneficial uses, even though both MEC and B are less than the WQO. A limitation may be required under certain circumstances to protect beneficial uses.

c. Effluent Data

The Regional Water Board's August 6, 2001, letter titled *Requirement for Monitoring of Pollutants in Effluent and Receiving Water to Implement New Statewide Regulations and Policy* (August 6, 2001 Letter – available online; see Standard Language and Other References Available Online, below) to all permittees, formally required the Discharger (pursuant to Section 13267 of the CWC) to initiate or continue monitoring for the priority pollutants using analytical methods that provide the best detection limits reasonably feasible. Regional Water Board staff analyzed these effluent data and the nature of the Plant to determine if the discharge has Reasonable Potential. The RPA was based on the effluent monitoring data collected by the Discharger from June 2005 through May 2008 for most inorganic pollutants, and from August 2003 through August 2007 for most organic pollutants.

d. Ambient Background Data

Ambient background values are used to determine reasonable potential and to calculate effluent limitations, when necessary. For the RPA, ambient background concentrations are the observed maximum detected water column concentrations. The SIP states that for calculating WQBELs, ambient background concentrations are either the observed maximum ambient water column concentrations or, for WQOs intended to protect human health from carcinogenic effects, the arithmetic mean of observed ambient water concentrations. The RMP station at Yerba Buena Island, located in the Central Bay, has been monitored for most of the inorganic (CTR constituent numbers 1–15) and some of the organic (CTR constituent numbers 16–126) toxic pollutants, and these data from the RMP were used as background data in performing the RPA for this discharge.

Not all the constituents listed in the CTR have been analyzed by the RMP. These data gaps are addressed by the August 6, 2001, Letter. The August 6, 2001, Letter formally requires Dischargers (pursuant to CWC Section 13267) to conduct ambient background monitoring and effluent monitoring for those constituents not currently monitored by the RMP, and to provide this technical information to the Regional Water Board.

On May 15, 2003, a group of several San Francisco Bay Region dischargers (known as the Bay Area Clean Water Agencies, or BACWA) submitted a collaborative receiving water study, entitled the *San Francisco Bay Ambient Water Monitoring Interim Report* (2003). This study includes monitoring results from sampling events in 2002 and 2003 for the remaining priority pollutants not monitored by the RMP. The RPA was conducted and the WQBELs were calculated using RMP data from 1996 through 2003 for inorganics and organics at the Yerba Buena Island RMP station, and additional data from BACWA's *Ambient Water Monitoring: Final CTR Sampling Update* (2004) for the Yerba Buena Island RMP station.

e. Reasonable Potential Determination

The MECs, most stringent applicable WQOs, and background concentrations used in the RPA are presented in Table F-10, along with the RPA results (Yes or No) for each pollutant analyzed. Reasonable Potential was not determined for all pollutants as there are not applicable WQOs for all pollutants and monitoring data are not available for others. Based on a review of the effluent data collected during the previous permit term, the pollutants that exhibit Reasonable Potential (all by Trigger 1) are copper, nickel, cyanide, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, alpha-BHC, 4,4'-DDD, and total ammonia. The pollutants that exhibit Reasonable Potential (by Trigger 3) are dioxin-TEQ and tributyltin and are discussed in below in Sections C.4.d.(4) and (12).

Table F-10. Reasonable Potential Analysis Summary

CTR #	Priority Pollutants	MEC or Minimum DL [(a)(b)] (μg/L)	Governing WQO/WQC (μg/L)	Maximum Background or Minimum DL [(a)(b)] (μg/L)	RPA Results [(c)]
1	Antimony	**0.6**	4300	1.8	No
2	Arsenic	**4.1**	36	2.81	No
3	Beryllium	**0.007**	No Criteria	0.215	Ud
4	Cadmium	**0.538**	9.4	0.16	No
5a	Chromium (III)	**5.39**	No Criteria	Not Available	Ud
5b	Chromium (VI)	**4.9**	50	4.4	Ud
6	**Copper**	**14**	4.2	2.55	**Yes**
7	Lead	**1.2**	8.5	0.80	No
8	Mercury (303d listed) [(d)]	---	---	---	---
9	**Nickel**	**17**	13	3.7	**Yes**
10	Selenium	**3.8**	5.0	0.39	No
11	Silver	**1.3**	2.2	0.052	No
12	Thallium	**0.06**	6.3	0.21	No
13	Zinc	**62**	86	5.1	No
14	**Cyanide**	**8.5**	2.9	< 0.4	**Yes**
15	Asbestos	< 0.1977	No Criteria	Not Available	Ud
16	2,3,7,8-TCDD (303d listed)	< 5.58E-07	1.4E-08	8.00E-08	No
	Dioxin TEQ (303d listed)	1.3E-06	1.4E-08	7.10E-08	**Yes**
17	Acrolein	< 1	780	< 0.5	No
18	Acrylonitrile	< 0.354	0.66	0.03	No
19	Benzene	< 0.176	71	< 0.05	No
20	Bromoform	< 0.219	360	< 0.5	No
21	Carbon Tetrachloride	< 0.148	4.4	0.06	No
22	Chlorobenzene	< 0.101	21000	< 0.5	No
23	Chlorodibromomethane	< 0.148	34	< 0.05	No
24	Chloroethane	< 0.232	No Criteria	< 0.5	Ud
25	2-Chloroethylvinyl ether	< 0.33	No Criteria	< 0.5	Ud
26	Chloroform	**5.8**	No Criteria	< 0.5	Ud
27	Dichlorobromomethane	**0.8**	46	< 0.05	No
28	1,1-Dichloroethane	< 0.11	No Criteria	< 0.05	Ud
29	1,2-Dichloroethane	< 0.167	99	0.04	No
30	1,1-Dichloroethylene	< 0.139	3.2	< 0.5	No
31	1,2-Dichloropropane	< 0.197	39	< 0.05	No
32	1,3-Dichloropropylene	< 0.158	1700	Not Available	No
33	Ethylbenzene	< 0.378	29000	< 0.5	No
34	Methyl Bromide	< 0.132	4000	< 0.5	No
35	Methyl Chloride	< 0.363	No Criteria	< 0.5	Ud
36	Methylene Chloride	**20**	1600	22	No
37	1,1,2,2-Tetrachloroethane	< 0.355	11	< 0.05	No
38	Tetrachloroethylene	**1.5**	8.85	< 0.05	No
39	Toluene	**2.6**	200000	< 0.3	No
40	1,2-Trans-Dichloroethylene	< 0.084	140000	< 0.5	No
41	1,1,1-Trichloroethane	< 0.29	No Criteria	< 0.5	Ud
42	1,1,2-Trichloroethane	< 0.172	42	< 0.05	No

CTR #	Priority Pollutants	MEC or Minimum DL [(a)(b)] (μg/L)	Governing WQO/WQC (μg/L)	Maximum Background or Minimum DL [(a)(b)] (μg/L)	RPA Results [(c)]
43	Trichloroethylene	**0.9**	81	< 0.5	No
44	Vinyl Chloride	< 0.36	525	< 0.5	No
45	2-Chlorophenol	< 0.7	400	< 1.2	No
46	2,4-Dichlorophenol	< 0.15	790	< 1.3	No
47	2,4-Dimethylphenol	< 0.23	2300	< 1.3	No
48	2-Methyl- 4,6-Dinitrophenol	< 0.6	765	< 1.2	No
49	2,4-Dinitrophenol	< 0.21	14000	< 0.7	No
50	2-Nitrophenol	< 0.13	No Criteria	< 1.3	Ud
51	4-Nitrophenol	< 0.31	No Criteria	< 1.6	Ud
52	3-Methyl 4-Chlorophenol	< 0.13	No Criteria	< 1.1	Ud
53	Pentachlorophenol	< 0.52	7.9	< 1.0	No
54	Phenol	**100**	4600000	< 1.3	No
55	2,4,6-Trichlorophenol	< 0.13	6.5	< 1.3	No
56	Acenaphthene	< 0.0153	2700	0.0019	No
57	Acenaphthylene	< 0.0119	No Criteria	0.00053	Ud
58	Anthracene	< 0.0001	110000	0.0005	No
59	Benzidine	< 1	0.00054	< 0.0015	No
60	Benzo(a)Anthracene	**0.0168**	0.049	0.0053	No
61	Benzo(a)Pyrene	< 0.0153	0.049	0.00029	No
62	Benzo(b)Fluoranthene	< 0.0153	0.049	0.0046	No
63	Benzo(ghi)Perylene	**1.1**	No Criteria	0.0027	Ud
64	**Benzo(k)Fluoranthene**	**1.2**	0.049	0.0015	**Yes**
65	Bis(2-Chloroethoxy)Methane	< 0.18	No Criteria	< 0.3	Ud
66	Bis(2-Chloroethyl)Ether	< 0.14	1.4	< 0.3	No
67	Bis(2-Chloroisopropyl)Ether	< 0.22	170000	Not Available	No
68	**Bis(2-Ethylhexyl)Phthalate**	**12**	5.9	0.091	**Yes**
69	4-Bromophenyl Phenyl Ether	< 0.2	No Criteria	< 0.23	Ud
70	Butylbenzyl Phthalate	**1.8**	5200	0.0056	No
71	2-Chloronaphthalene	< 0.18	4300	< 0.3	No
72	4-Chlorophenyl Phenyl Ether	< 0.11	No Criteria	< 0.3	Ud
73	**Chrysene**	**1.1**	0.049	0.0024	**Yes**
74	**Dibenzo(a,h)Anthracene**	**1.6**	0.049	0.00064	**Yes**
75	1,2-Dichlorobenzene	**0.5**	17000	< 0.8	No
76	1,3-Dichlorobenzene	**0.5**	2600	< 0.8	No
77	1,4-Dichlorobenzene	**2**	2600	< 0.8	No
78	3,3 Dichlorobenzidine	< 0.52	0.077	< 0.001	No
79	Diethyl Phthalate	**5.2**	120000	< 0.24	No
80	Dimethyl Phthalate	< 0.24	2900000	< 0.24	No
81	Di-n-Butyl Phthalate	**1**	12000	0.016	No
82	2,4-Dinitrotoluene	< 0.15	9.1	< 0.27	No
83	2,6-Dinitrotoluene	< 0.17	No Criteria	< 0.29	Ud
84	Di-n-Octyl Phthalate	< 0.29	No Criteria	< 0.38	Ud
85	1,2-Diphenylhydrazine	< 0.6	0.54	0.0037	No
86	Fluoranthene	< 0.0119	370	0.011	No
87	Fluorene	< 0.0168	14000	0.0035	No
88	Hexachlorobenzene	< 0.15	0.00077	0.000022	No
89	Hexachlorobutadiene	**0.36**	50	< 0.3	No
90	Hexachlorocyclopentadiene	< 0.36	17000	< 0.31	No
91	Hexachloroethane	< 0.2	8.9	< 0.2	No
92	**Indeno(1,2,3-cd)Pyrene**	**1.1**	0.049	0.004	**Yes**
93	Isophorone	< 0.15	600	< 0.3	No
94	Naphthalene	< 0.001	No Criteria	0.0026	Ud
95	Nitrobenzene	< 0.29	1900	< 0.25	No

CTR #	Priority Pollutants	MEC or Minimum DL [a][b] (μg/L)	Governing WQO/WQC (μg/L)	Maximum Background or Minimum DL [a][b] (μg/L)	RPA Results [c]
96	N-Nitrosodimethylamine	< 0.8	8.1	< 0.3	No
97	N-Nitrosodi-n-Propylamine	< 0.14	1.4	< 0.001	No
98	N-Nitrosodiphenylamine	< 0.24	16	< 0.001	No
99	Phenanthrene	< 0.0168	No Criteria	0.0061	Ud
100	Pyrene	< 0.0001	11000	0.0194	No
101	1,2,4-Trichlorobenzene	**0.14**	No Criteria	< 0.3	Ud
102	Aldrin	< 0.002	0.00014	Not Available	No
103	**Alpha-BHC**	**0.03**	0.013	0.00050	**Yes**
104	Beta-BHC	< 0.003	0.046	0.00041	No
105	Gamma-BHC	< 0.002	0.063	0.00070	No
106	Delta-BHC	< 0.003	No Criteria	0.000053	Ud
107	Chlordane (303d listed)	< 0.02	0.00059	0.00018	No
108	4,4'-DDT (303d listed)	< 0.003	0.00059	0.00017	No
109	4,4'-DDE (linked to DDT)	< 0.003	0.00059	0.00069	No
110	**4,4'-DDD**	**0.019**	0.00084	0.00031	**Yes**
111	Dieldrin (303d listed)	< 0.002	0.00014	0.00026	No
112	Alpha-Endosulfan	< 0.003	0.0087	0.000031	No
113	beta-Endolsulfan	< 0.003	0.0087	0.000069	No
114	Endosulfan Sulfate	< 0.002	240	0.000082	No
115	Endrin	< 0.002	0.0023	0.00004	No
116	Endrin Aldehyde	< 0.003	0.81	Not Available	No
117	Heptachlor	< 0.003	0.00021	0.000019	No
118	Heptachlor Epoxide	< 0.002	0.00011	0.000094	No
119-125	PCBs sum (303d listed)	< 0.01	0.00017	0.0015	No
126	Toxaphene	< 0.06	0.0002	Not Available	No
	Tributylin	0.0087	0.0074	0.002	**Yes**
	Total PAHs	**6.1**	15	0.051	No
	Total Ammonia (mg/L N)	**62**	1.52	0.21	**Yes**

Footnotes for Table F-10:

(a) The Maximum Effluent Concentration (MEC) and maximum background concentration are the actual detected concentrations unless preceded by a "<" sign, in which case the value shown is the minimum detection level (DL).

(b) The MEC or maximum background concentration is "Not Available" when there are no monitoring data for the constituent.

(c) A Results = Yes, if MEC > WQO/WQC, B > WQO/WQC and MEC is detected, or Trigger 3;
= No, if MEC and B are < WQO/WQC or all effluent data are undetected;
= Undetermined (Ud), if no objectives have been promulgated or there are insufficient data.

(d) Discharges of mercury to the San Francisco Bay are now regulated by Regional Water Board Order No. R2-2007-0077, which became effective March 1, 2008. Order No. R2-2007-0077 is a Watershed Permit that implements the San Francisco Bay Mercury TMDL and establishes wasteload allocations for industrial and municipal wastewater discharges of this pollutant. The discharge of mercury from the Plant is therefore still regulated by another means.

(1) Constituents with limited data. The Discharger has performed sampling and analysis for the constituents listed in the CTR. This data set was used to perform the RPA. In some cases, Reasonable Potential cannot be determined because effluent data are limited or ambient background concentrations are not available. The Discharger will continue to monitor for these constituents in the effluent using analytical methods that provide the best feasible detection limits. When additional data become available, further RPA will be conducted to determine whether to add numeric effluent limitations to this Order or to continue monitoring.

(2) Pollutants with no Reasonable Potential. WQBELs are not included in this Order for constituents that do not demonstrate Reasonable Potential; however, monitoring for these pollutants is still required. If concentrations of these constituents are found to have increased significantly, the Discharger is required to investigate the source(s) of the increase(s) (See Provision VI.C.2.a of this Order). Remedial measures are required if the increases pose a threat to water quality in the receiving water.

Order No. R2-2003-0010 included WQBELs for silver, zinc, dieldrin, 4,4'-DDE, and tetrachloroethylene; however, because the RPA showed that discharges from the Plant no longer demonstrate Reasonable Potential for these pollutants, this Order does not retain the effluent limitations for these pollutants and does not establish new effluent limitations. This is consistent with State Water Board Order WQ 2001-16.

4. WQBEL Calculations.

a. Pollutants with Reasonable Potential

WQBELs were developed for the toxic pollutants that were determined to have reasonable potential to cause or contribute to exceedances of WQOs. The WQBELs were calculated based on appropriate WQOs and the appropriate procedures specified in Section 1.4 of the SIP. The WQOs used for each pollutant with Reasonable Potential are discussed in Section 4.d below.

b. Shallow/Deep Water Discharge

The discharge from the Plant to Lower San Francisco Bay is viewed as a deep water discharge, which is defined the Basin Plan defines as a discharge through a diffuser that receives a minimum initial dilution of 10 to 1.

c. Dilution Credit

The SIP provides the basis for a dilution credit. The Plant outfall (the NBSU outfall) is designed to achieve a minimum initial dilution of at least 10:1. Based on review of RMP data from local and Central Bay stations, there is variability in receiving water quality, and the hydrology of the receiving water is complex. There is uncertainty therefore regarding the representative nature of ambient background data for effluent limitation calculations. Pursuant to section 1.4.2.1 of the SIP, "dilution credit may be limited or denied on a pollutant-by-pollutant basis…." The Regional Water Board has determined that a conservative 10:1 (D=9) dilution credit for non-bioaccumulative priority pollutants and a zero dilution credit for bioaccumulative pollutants are necessary for protection of beneficial uses. The detailed basis for each are explained below.

(1) For certain pollutants, dilution credits are not included in calculating WQBELs. This decision is based on the concentrations of these pollutants in aquatic organisms, sediment, and the water column. The Clean Water Act 303(d) list was updated and approved by the Regional Water Board on October 25, 2006. For Lower San Francisco Bay, the Regional Water Board placed polychlorinated biphenyls (PCBs) on the 303(d) list. USEPA added dioxin and furan compounds, chlordane, dieldrin, and 4,4'-DDT to the 303(d) list. The reasoning for these decisions is based on the following factors that suggest there is no more assimilative capacity in San Francisco Bay for these pollutants.

Samples of tissue taken from fish in San Francisco Bay show the presence of these pollutants at concentrations greater than screening levels (*Contaminant Concentrations in Fish from San Francisco Bay*, May 1997). The Office of Environmental Health and Hazard Assessment (OEHHA) also completed a preliminary review of data in the 1994 San Francisco Bay pilot study, *Contaminated Levels in Fish Tissue from San Francisco Bay*. The results of the study also showed elevated levels of chemical contaminants in fish tissues. In December 1994, OEHHA issued an interim consumption advisory covering certain fish species in the San Francisco Bay. This advisory is still in effect for exposure to sport fish that are found to be contaminated with dioxins and the pesticides mentioned above (e.g., DDT).

(2) For most other constituents (except ammonia, which is discussed below), a conservative allowance of 10:1 dilution has been assigned to protect beneficial uses and is retained from the previous permit. This 10:1 dilution ratio also follows the Basin Plan's prohibition Number 1, which prohibits discharges with less than 10:1 dilution. The dilution credit is also based on SIP provisions, Section 1.4.2, that consider the following:

(a) A far-field background station is appropriate because the receiving water body (Lower San Francisco Bay) is a very complex estuarine system with highly variable and seasonal upstream freshwater inflows and diurnal tidal saltwater inputs. The SIP allows background to be determined on a discharge-by-discharge or water body-by-water body basis (SIP section 1.4.3). Consistent with the SIP, Regional Water Board staff chose to use a water body-by-water body basis because of the uncertainties inherent in accurately characterizing ambient background conditions in a complex estuarine system on a discharge-by-discharge basis.

(b) Because of the complex hydrology of the San Francisco Bay, a mixing zone has not been established. There are uncertainties in accurately determining the mixing zones for each discharge. The models that have been used to predict dilution have not considered the three-dimensional nature of the currents in the estuary resulting from the interaction of tidal flushes and seasonal fresh water outflows. Being heavier and colder than fresh water, ocean salt water enters San Francisco Bay on diurnal tidal cycles, generally beneath the warmer fresh water that flows seaward during wet seasons. When these waters mix and interact, complex circulation patterns occur throughout the Estuary but are most prevalent in the San Pablo, Carquinez Straight, and Suisun Bay areas. The locations of this mixing and interaction change, depending on the strength of each tide and variable rate of delta outflow. Additionally, sediment loads from the Central Valley change on a longer term basis, affecting the depth of different parts of San Francisco Bay and resulting in alteration of flow patterns and mixing and dilution achieved at an outfall.

(c) The SIP allows a limited mixing zone and dilution credit for persistent pollutants. Discharges to the San Francisco Bay are defined by the SIP as incompletely mixed discharges. Thus, dilution credit should be determined using site-specific information. Section 1.4.2.2 of the SIP specifies that the Regional Water Board shall "significantly limit a mixing zone and dilution credit as necessary. … For example, in determining the extent of a mixing zone or dilution credit, the RWQCB shall consider the presence of pollutants in the discharge that are … persistent." The SIP defines persistent pollutants as "substances for which degradation or decomposition in the environment is nonexistent or very slow." The pollutants at issue here are persistent pollutants (e.g., copper). The dilution studies that estimate initial dilution do not address the effects of these persistent pollutants in the San Francisco Bay environment, such as their long term effects on sediment concentrations. Though this concern does not apply to non-persistent pollutants like ammonia, a conservative dilution credit is still appropriate because of the lack of near field receiving water data for most pollutants.

(4) Estimated actual initial dilution levels have been used to calculate the effluent limits for ammonia, a non-persistent pollutant that is rapidly dispersed and degraded to a non-toxic state. As part of a study to estimate hydrodynamic impacts on San Francisco Bay by the proposed extension to San Francisco International Airport runways, a dilution study was completed on behalf of the NBSU in December 2000.

NBSU effluent is pumped through a 60 inch pipe to a 654-foot diffuser section located approximately 5,200 feet offshore from Point San Bruno, at a depth 20 feet below mean lower low water. The diffuser consists of 66 three-inch openings spaced 7 feet apart. At a point in the immediate vicinity of the diffuser, a 74:1 instantaneous dilution was calculated using the CORMIX model to estimate mixing of the effluent under tidal conditions. At a point approximately 1.5 km from the diffuser (to the east), a dilution ratio of 270:1 was estimated. In calculating the WQBELs (maximum daily and average monthly), the lowest dilution rate from the December 2000 dilution study [74:1 (or D = 73)] was used.

d. Calculation of Pollutant-Specific WQBELs

WQBELs were developed for the toxic and priority pollutants that were determined to have reasonable potential to cause or contribute to exceedances of applicable WQOs. The WQBELs were calculated based on appropriate WQOs and the appropriate procedures specified in Section 1.4 of the SIP. The WQOs used for each pollutant with Reasonable Potential are discussed below.

(1) Copper

(a) Copper WQC. The chronic and acute marine WQC for copper from the Basin Plan and the CTR are 3.1 and 4.8 micrograms per liter (µg/L), respectively, expressed as dissolved metal. Regional Water Board staff converted these WQC to total recoverable metal using the site-specific translators of 0.74 (chronic) and 0.88 (acute), as recommended by the Clean Estuary Partnership's (CEP) *North of Dumbarton Bridge Copper and Nickel Development and Selection of Final Translators* (2005). The resulting chronic water quality criterion of 4.2 µg/L and acute water quality criterion of 5.5 µg/L were used to perform the RPA.

(b) **RPA Results**. This Order establishes effluent limitations for copper because the MEC of 13 µg/L exceeds the WQC for copper, demonstrating Reasonable Potential by Trigger 1.

(c) **Copper WQBELs**. WQBELs are calculated based on the CTR's WQC and the site-specific WQOs documented in the *Copper Site-Specific Objectives in San Francisco Bay: Proposed Basin Plan Amendment and Draft Staff Report*, dated June 6, 2007. Both sets of criteria are expressed as total recoverable metal using the site-specific translators and water effects ratio (WER) of 2.4. The Regional Water Board adopted Basin Plan Amendment Resolution R2-2007-0042. Upon its effective date, the alternate SSO limitations shall supersede those copper limitations listed in Table 7 of this Order.

The following table compares effluent limitations for copper calculated according to SIP procedures (and a coefficient of variation (CV) of 0.16) using the two sets of criteria described above. The limitations take into account the deep water nature of the discharge, and are therefore based on an initial dilution of 10 to 1.

Table F-11. Effluent Limitations for Copper

Effluent Limitations for Copper		
	AMEL	**MDEL**
Based on CTR Criteria	73 µg/L	92 µg/L
Based on Proposed SSOs	55 µg/L	69 µg/L

(d) **Immediate Compliance Feasible**. Statistical analysis of effluent data for copper, collected over the period of June 2005 through May 2008, shows that the 95th percentile (12 µg/L) is less than the AMEL (73 µg/L); the 99th percentile (14 µg/L) is less than the MDEL (92 µg/L); and the mean (9.7 µg/L) is less than the long term average of the projected normal distribution of the effluent data set after accounting for effluent variability (65 µg/L). The Regional Water Board concludes therefore that immediate compliance with these effluent limitations is feasible; Final effluent limitations based on the CTR criteria will become effective on the effective date of this Order.

(e) **Alternate Limitations for Copper**. As described in the CEP's *North of Dumbarton Bridge Copper and Nickel Site-Specific Objective Determination* (December 2004), the Regional Water Board proposed site-specific criteria for copper in non-ocean, marine waters of the Region. Proposed SSOs for copper are 2.5 and 3.9 µg/L as four-day and one-hour average (i.e., chronic and acute) criteria, respectively. If these SSOs for copper become effective, effluent limitations, calculated according to Section 1.4 of the SIP, using a WER of 2.4, would be an AMEL of 55 µg/L and an MDEL of 69 µg/L. Therefore, the alternate effluent limitations will become effective, as long as the SSOs and their current justification remain unchanged.

(f) **Antibacksliding**. Antibacksliding requirements are satisfied as Order No. R2-2003-0010 did not include final effluent limitations for copper.

(2) Nickel

(a) Nickel WQC. The most stringent applicable WQC criteria for nickel, expressed as dissolved metal, are acute and chronic criteria from the CTR of 74 and 8.2 µg/L, respectively, established for protection of aquatic life. Regional Water Board staff converted these WQC to total recoverable metal using the site-specific translators of 0.65 µg/L (chronic) and 0.85 µg/L (acute), as recommended by the CEP's *North of Dumbarton Bridge Copper and Nickel Development and Selection of Final Translators* (2005). The resulting chronic WQC of 13 µg/L and acute WQC of 87 µg/L were used to perform the RPA.

(b) RPA Results. This Order establishes effluent limitations for nickel because the MEC of 17 µg/L exceeds the applicable WQC for this pollutant, demonstrating Reasonable Potential by Trigger 1.

(c) Nickel WQBELs. WQBELs for nickel, calculated according to SIP procedures (and a CV of 0.59), are an AMEL of 31 µg/L and an MDEL of 68 µg/L. These limitations take into account the deep water nature of the discharge and are therefore based on a minimum initial dilution of 10 to 1. The newly calculated limitations for nickel are equal to the effluent limitations established in the previous permit (Order No. R2-2003-0010).

(d) Immediate Compliance Feasible. Statistical analysis of effluent data for nickel, collected over the period of June 2005 through May 2008, shows that the 95th percentile (13 µg/L) is less than the AMEL (31 µg/L); the 99th percentile (17 µg/L) is less than the MDEL (68 µg/L); and the mean (5.3 µg/L) is less than the long term average of the actual distribution of the effluent data (49 µg/L). The Regional Water Board concludes that immediate compliance with these effluent limitations is feasible.

(**e) Antibacksliding**. Antibacksliding requirements are satisfied, as the effluent limitations for nickel are the same as those established by Order No. R2-2003-0010.

(3) Cyanide

(a) Cyanide WQC. The most stringent applicable WQC criteria for cyanide are an acute criterion of 9.4 µg/L from the Basin Plan Table 3-3 for protection of marine aquatic life in San Francisco Bay. These site-specific criteria were established by Regional Water Board Order No. R2-2006-0086 and approved by USEPA on July 22, 2008.

(b) RPA Results. This Order establishes effluent limitations for cyanide because the MEC of 8.5 µg/L exceeds the governing WQC of 2.9 µg/L, demonstrating Reasonable Potential by Trigger 1.

(c) Cyanide WQBELs. Final WQBELs for cyanide, calculated according to SIP procedures (and a CV of 0.66), are an AMEL of 20 µg/L and an MDEL of

43 µg/L. These limitations take into account the deep water nature of the discharge and are therefore based on a minimum initial dilution of 10 to 1.

(d) Immediate Compliance Feasible. Statistical analysis of effluent data for cyanide collected over the period of May 2005 through May 2008, shows that the 95th percentile (7 µg/L) is less than the AMEL (20 µg/L); the 99th percentile (10 µg/L) is less than the MDEL (43 µg/L); and the mean (3 µg/L) is less than the long term average of the projected lognormal distribution of the effluent data set after accounting for effluent variability (13 µg/L). Based on this analysis, the Regional Water Board concludes that immediate compliance with these WQBELs for cyanide is feasible.

(**e) Antibacksliding**. Antibacksliding requirements are satisfied because Order No. R2-2003-0010 did not include final effluent limitations for cyanide.

(4) Dioxin-TEQ

(a) WQC. The Basin Plan narrative WQO for bioaccumulative substances states:

> *Many pollutants can accumulate on particulates, in sediments, or bioaccumulate in fish and other aquatic organisms. Controllable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered.*

Because it is the consensus of the scientific community that dioxins and furans associate with particulates, accumulate in sediments, and bioaccumulate in the fatty tissue of fish and other organisms, the Basin Plan's narrative bioaccumulation WQO is applicable to these pollutants. Elevated levels of dioxins and furans in fish tissue in San Francisco Bay demonstrate that the narrative bioaccumulation WQO is not being met. USEPA has therefore included the Lower San Francisco Bay as impaired by dioxin and furan compounds in the current 303(d) listing of receiving waters where WQOs are not being met after imposition of applicable technology-based requirements.

The CTR establishes a numeric WQO for 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (2,3,7,8-TCDD) of 1.4×10^{-8} µg/L for the protection of human health, when aquatic organisms are consumed. When the CTR was promulgated, USEPA stated its support of the regulation of other dioxin and dioxin-like compounds through the use of toxicity equivalencies (TEQs) in NPDES permits. For California waters, USEPA stated specifically, "if the discharge of dioxin or dioxin-like compounds has reasonable potential to cause or contribute to a violation of a narrative criterion, numeric WQBELs for dioxin or dioxin-like compounds should be included in NPDES permits and should be expressed using a TEQ scheme." [65 Fed. Reg. 31682, 31695 (2000)] This procedure, developed by the World Health Organization (WHO) in 1998, uses a set of toxicity equivalency factors (TEFs) to convert the concentration of any congener of dioxin or furan into an equivalent concentration of 2,3,7,8-TCDD. The CTR criterion is used as a criterion for dioxin-TEQ.

To determine if the discharge of dioxin or dioxin-like compounds from the South San Francisco and San Bruno WPCP has reasonable potential to cause or contribute to a violation of the Basin Plan's narrative bioaccumulation WQO, Regional Water Board staff used TEFs to express the measured concentrations of 16 dioxin congeners in effluent and background samples as a toxicity weighted concentration equivalent to 2,3,7,8-TCDD. These "equivalent" concentrations were then compared to the CTR numeric criterion for 2,3,7,8-TCDD (1.4×10^{-8} μg/L) thus translating the narrative bioaccumulation objective into a numeric criterion appropriate for the RPA. Although the 1998 WHO scheme includes TEFs for dioxin-like PCBs, they were not considered in this Order's version of the TEF procedure. The CTR includes a specific WQC for dioxin-like PCBs, and they are considered independently in the analysis of total PCBs.

(b) **RPA Results.** This Order establishes effluent limitations for dioxin-TEQ because the MEC (1.3×10^{-6} μg/L) exceeds the translated Basin Plan narrative objective (the CTR numeric water quality criterion) for 2,3,7,8-TCDD (1.4×10^{-8} μg/L). The maximum observed ambient background concentration of dioxin-TEQ in San Francisco Bay (7.1×10^{-8} μg/L) also exceeds the CTR numeric water quality criterion for 2,3,7,8-TCDD. Both of these facts are comparable to Trigger 1 and Trigger 2; therefore, this Order established RP based on Trigger 3.

(c) **WQBELs.** WQBELs for dioxin–TEQ, calculated using SIP procedures and the CTR WQC for 2,3,7,8-TCDD as guidance (and a default CV of 0.6), are an AMEL of 1.4×10^{-8} μg/L and an MDEL of 2.8×10^{-8} μg/L. Because Lower San Francisco Bay is impaired by dioxins and furans, no assimilative capacity exists, and these limitations are calculated without credit for dilution.

(d) **Immediate Compliance Infeasible.** The Discharger's Feasibility Study asserts that the Plant cannot immediately comply with these WQBELs for dioxin-TEQ. With insufficient effluent data to determine the distribution of the effluent data set or to calculate a mean and standard deviation, feasibility to comply with effluent limitations is determined by comparing the MEC (1.3×10^{-6} μg/L) to the AMEL (1.4×10^{-8} μg/L) and the MDEL (2.8×10^{-8} μg/L). Based on this comparison, the Regional Water Board concurs with the Discharger's assertion of infeasibility to comply.

(e) **Need for a Compliance Schedule.** Because the Discharger cannot immediately comply with the WQBELs, this Order includes a compliance schedule based on a new interpretation of the narrative objective as authorized by State Water Board Resolution No. 2008-0025, *Policy for Compliance Schedules in National Pollutant Discharge Elimination System Permits*, which was approved by USEPA on August 27, 2008.

(f) **Antibacksliding.** Antibacksliding requirements are satisfied, as Order R2-2003-0010 did not include a final effluent limitation for dioxin-TEQ.

(g) **Interim Effluent Limitations.** A interim effluent limitation is granted for dioxin-TEQ since the Discharger has demonstrated and the Regional Water Board staff has verified that it is infeasible to immediately comply with the final WQBELs. Order No. R2-2003-0010 did not include a final effluent limitation for dioxin-TEQ and there are insufficient data to statistically determine a performance based interim limitation. Therefore, Regional Water Board staff propose that the interim limit be the MEC (1.3×10^{-6} μg/L).

This Order requires further monitoring for dioxin-TEQ in the effluent to support the development of a meaningful interim limitation in the future. This monitoring requirement will remain in effect for ten years following the effective date of this Order on January 1, 2019. The Regional Water Board may amend these limits based in new information or a TMDL for dioxin-TEQ.

(5) **Benzo(k)fluoranthene.**

(a) **Benzo(k)fluoranthene WQC.** The most stringent applicable WQC for benzo(k)fluoranthene is the CTR criterion for protection of human health of 0.049 μg/L.

(b) **RPA Results.** This Order establishes effluent limitations for benzo(k)fluoranthene because the MEC (1.2 μg/L) exceeds the most stringent applicable criterion (0.049 μg/L), demonstrating reasonable potential by Trigger 1.

(c) **Benzo(k)fluoranthene WQBELs.** WQBELs for benzo(k)fluoranthene, calculated according to SIP procedures (and a default CV of 0.60), are an AMEL of 0.48 μg/L and an MDEL of 0.97 μg/L. These limitations take into account the deep water nature of the discharge and are therefore based on a minimum initial dilution of 10 to 1.

(d) **Immediate Compliance Feasible.** The Discharger's Feasibility Study asserts that the Plant can immediately comply with WQBELs. The Discharger believes the single occurrence of benzo(k)fluoranthene in the last 5 years was an anomaly. The Regional Water Board accepts the Discharger's assertion.

(e) **Antibacksliding.** Antibacksliding requirements are satisfied because limitations for benzo(k)fluoranthene were not included in the previous Order.

(6) **Bis(2-ethylhexyl)phthalate.**

(a) **Bis(2-ethylhexyl)phthalate WQC.** The most stringent applicable WQC for bis(2-ethylhexyl)phthalate is the CTR criterion for protection of human health of 5.9 μg/L.

(b) **RPA Results.** This Order finds reasonable potential and thus establishes effluent limitations for bis(2-ethylhexyl)phthalate because the MEC (12 μg/L) exceeds the most stringent applicable criterion (5.9 μg/L), demonstrating reasonable potential by Trigger 1.

(c) **Bis(2-ethylhexyl)phthalate WQBELs.** WQBELs for bis(2-ethylhexyl)phthalate, calculated according to SIP procedures (and a default CV of 0.60), are an AMEL of 58 μg/L and an MDEL of 117 μg/L. These limitations take into account the deep water nature of the discharge and are therefore based on a minimum actual dilution of 10 to 1.

(d) **Immediate Compliance Feasible.** With insufficient data to determine the distribution of the data set or to calculate a mean and standard deviation, feasibility to comply with final effluent limitations is determined by comparing the MEC (12 μg/L) to the AMEL (58 μg/L) and the MDEL (117 μg/L). Based on this comparison, the Regional Water Board concludes that immediate compliance with the WQBELs is feasible.

(e) **Antibacksliding.** Antibacksliding requirements are satisfied because limitations for bis(2-ethylhexyl)phthalate were not included in the previous Order.

(7) Chrysene.

(a) **Chrysene WQC.** The most stringent applicable WQC for chrysene is the CTR criterion for protection of human health of 0.049 μg/L.

(b) **RPA Results.** This Order finds reasonable potential and thus establishes effluent limitations for chrysene because the MEC (1.1 μg/L) exceeds the most stringent applicable criterion (0.049 μg/L), demonstrating reasonable potential by Trigger 1.

(c) **Chrysene WQBELs.** WQBELs for chrysene, calculated according to SIP procedures (and a default CV of 0.60), are an AMEL of 0.48 μg/L and an MDEL of 0.96 μg/L. These limitations take into account the deep water nature of the discharge and are therefore based on a minimum initial dilution of 10 to 1.

(d) **Immediate Compliance Feasible.** The Discharger's Feasibility Study asserts that the Plant can immediately comply with final WQBELs for chrysene. The Discharger believes the single occurrence of chrysene in the last 5 years was an anomaly. The Regional Water Board accepts the Discharger's assertion.

(e) **Antibacksliding.** Antibacksliding requirements are satisfied because limitations for chrysene were not included in the previous Order.

(8) Dibenzo(a,h)anthracene.

(a) **Dibenzo(a,h)anthracene WQC.** The most stringent applicable WQC for dibenzo(a,h)anthracene is the CTR criterion for protection of human health of 0.049 μg/L.

(b) **RPA Results.** This Order finds reasonable potential and thus establishes effluent limitations for dibenzo(a,h)anthracene because the MEC (1.6 μg/L) exceeds the most stringent applicable criterion (0.049 μg/L), demonstrating reasonable potential by Trigger 1.

(c) **Dibenzo(a,h)anthracene WQBELs.** WQBELs for dibenzo(a,h)anthracene, calculated according to SIP procedures (and a default CV of 0.60), are an AMEL of 0.49 µg/L and an MDEL of 0.98 µg/L. The limitations take into account the deep water nature of the discharge and are based on an initial dilution of 10 to 1.

(d) **Immediate Compliance Feasible.** The Discharger's Feasibility Study asserts that the Plant can immediately comply with the WQBELs. The Discharger believes the two occurrences of dibenzo(a,h)anthracene in the last 5 years were anomalies. The Regional Water Board accepts the Discharger's assertion.

(e) **Antibacksliding.** Antibacksliding requirements are satisfied because final limitations for dibenzo(a,h)anthracene were not included in the previous Order.

(9) Indeno(1,2,3-cd)pyrene.

(a) **Indeno(1,2,3-cd)pyrene WQC.** The most stringent applicable WQC for indeno(1,2,3-cd)pyrene is the CTR criterion for protection of human health of 0.049 µg/L.

(b) **RPA Results.** This Order finds reasonable potential and thus establishes effluent limitations for indeno(1,2,3-cd)pyrene because the MEC (1.1 µg/L) exceeds the most stringent applicable criterion (0.049 µg/L).

(c) **Indeno(1,2,3-cd)pyrene WQBELs.** WQBELs for indeno(1,2,3-cd)pyrene, calculated according to SIP procedures (and a default CV of 0.60), are an AMEL of 0.48 µg/L and an MDEL of 0.96 µg/L. These limitations take into account the deep water nature of the discharge, and are therefore based on an initial dilution of 10 to 1.

(d) **Immediate Compliance Feasible.** The Discharger's Feasibility Study asserts that the Plant can immediately comply with the WQBELs. The Discharger believes the two occurrences of dibenzo(a,h)anthracene in the last 5 years were anomalies. The Regional Water Board accepts the Discharger's assertion.

(e) **Antibacksliding.** Antibacksliding requirements are satisfied because limitations for indeno(1,2,3-cd)pyrene were not included in the previous Order.

(10) Alpha-BHC.

(a) **Alpha-BHC WQC.** The most stringent applicable WQC for alpha-BHC is the CTR criterion for protection of human health of 0.013 µg/L.

(b) **RPA Results.** This Order finds reasonable potential and thus establishes effluent limitations for alpha-BHC because the MEC (0.030 µg/L) exceeds the most stringent applicable criterion (0.013 µg/L).

(c) **Alpha-BHC WQBELs.** WQBELs for alpha-BHC, calculated according to SIP procedures (and a default CV of 0.60), are an AMEL of 0.13 µg/L and an MDEL of 0.26 µg/L. The WQBEL calculations take into account the deep water nature of the discharge and therefore are based on an initial dilution of 10:1.

(d) **Immediate Compliance Feasible.** The Discharger's Feasibility Study asserts that the Plant can immediately comply with the WQBELs. The Discharger believes the single occurrence of alpha-BHC in the last 5 years was an anomaly. The Regional Water Board concurs with the Discharger's assertion.

(e) **Antibacksliding.** Antibacksliding requirements are satisfied because limitations for alpha-BHC were not included in the previous Order.

(11) 4,4'-DDD.

(a) **4,4'-DDD WQC.** The most stringent applicable WQC for 4,4'-DDD is the CTR criterion for protection of human health of 0.00084 µg/L.

(b) **RPA Results.** This Order finds reasonable potential and thus establishes effluent limitations for 4,4'-DDD because the MEC (0.019 µg/L) exceeds the most stringent applicable criterion (0.00084 µg/L), demonstrating reasonable potential by Trigger 1.

(c) **4,4'-DDD WQBELs.** WQBELs for 4,4'-DDD, calculated according to SIP procedures (and a default CV of 0.60), are an AMEL of 0.00084 µg/L and an MDEL of 0.0017 µg/L. No credit for dilution was granted because 4,4'-DDD is degradation product of DDT, which is 303(d) listed for Lower San Francisco Bay.

(d) **Immediate Compliance Feasible.** The Discharger's Feasibility Study asserts that the Plant can immediately comply with WQBELs. The Discharger believes the single occurrence of 4,4'-DDD in the last 5 years was an anomaly. The Regional Water Board accepts the Discharger's assertion.

(e) **Antibacksliding.** Antibacksliding requirements are satisfied because final limitations for 4,4'-DDD were not included in the previous Order.

(12) Tributyltin.

(a) **Tributyltin WQC.** The Basin Plan contains a narrative WQO for toxicity: "All waters shall be maintained free of toxic substances in concentrations that are lethal to or produce other detrimental responses in aquatic organisms." This narrative WQO applies to tributyltin because the pollutant is a toxic biocide that is problematic in the aquatic environment. USEPA has developed water quality criteria for tributyltin through its authority under Section 304(a) of the CWA [Ambient Aquatic Life Water Quality Criteria for Tributyltin (TBT) – Final EPA-822-R-03-031, December 2003]. The Regional Water Board has used USEPA's recommended criteria for tributyltin (0.042 µg/L and 0.0074 µg/L - acute and chronic criteria, respectively) to interpret the Basin Plan's narrative objective for toxicity and, therefore, to perform the RPA for tributyltin.

(b) RPA Results. Because the MEC (0.0087 µg/L) exceeds the most stringent, USEPA recommended criterion for tributyltin (0.0074 µg/L), this Order finds reasonable potential for the discharge to cause or contribute to exceedances of the Basin Plan narrative objective for toxicity. Therefore, this Order establishes effluent limitations for tributyltin.

(c) Tributyltin WQBELs. WQBELs for tributyltin, calculated according to SIP procedures (and a CV of 0.69), are an AMEL of 0.045 µg/L and an MDEL of 0.095 µg/L. These limitations take into account the deep water nature of the discharge and are therefore based on an initial dilution of 10:1.

(d) Immediate Compliance Feasible. Statistical analysis of effluent data for tributyltin, collected over the period of August 2003 through February 2008, shows that the 95th percentile (0.0066 µg/L) is less than the AMEL (0.045 µg/L); the 99th percentile (0.010 µg/L) is less than the MDEL (0.095 µg/L); and the mean (0.0031 µg/L) is less than the long term average of the projected lognormal distribution of the effluent data set after accounting for effluent variability (0.027 µg/L). The Regional Water Board concludes that immediate compliance with the WQBELs for tributyltin is feasible.

(e) Antibacksliding. Antibacksliding requirements are satisfied because limitations for tributyltin were not included in the previous Order.

(13) Ammonia.

(a) Ammonia WQO. The Basin Plan contains WQOs for un-ionized ammonia of 0.025 milligrams per liter (mg/L) as an annual median, and 0.4 mg/L as a maximum for the Lower San Francisco Bay. Regional Water Board staff translated these WQOs for un-ionized ammonia to equivalent total ammonia concentrations (as nitrogen) since (1) sampling and laboratory methods are not available to analyze for un-ionized ammonia and (2) the fraction of total ammonia that exists in the toxic un-ionized form depends on the pH, salinity, and temperature of the receiving water. To translate the Basin Plan un-ionized ammonia objective, Regional Water Board staff used pH, salinity, and temperature data from 1994 through 2002 from the nearest RMP station to the outfall, the Oyster Point station (BB30). Regional Water Board staff used the following equations to determine the fraction of total ammonia that would exist in the toxic un-ionized form in the receiving water [*Ambient Water Quality Criteria for Ammonia* (saltwater) – 1989, EPA Publication 440/5-88-004, USEPA, 1989]:

For salinity > 10 ppt: fraction of $NH_3 = \frac{1}{1 + 10^{(pK - pH)}}$

Where:

pK = 9.245 + 0.116*(I) + 0.0324*(298-T) + 0.0415*(P)/(T+273)
I = the molal ionic strength of saltwater = 19.9273*(S)/(1000-1.005109*S)
S = Salinity (parts per thousand)
T = Temperature in degrees Celsius

P = Pressure (one atmosphere)

To convert the Basin Plan's chronic un-ionized ammonia WQO to an equivalent total ammonia concentration, the median un-ionized ammonia fraction at the Oyster Point monitoring station was used. To convert the Basin Plan's acute un-ionized ammonia WQO to an equivalent total ammonia concentration, the 90th percentile un-ionized ammonia fraction at the Oyster Point RMP station was used. Using the 90th percentile and median to express the acute and chronic un-ionized ammonia WQOs as equivalent total ammonia concentrations is consistent with USEPA guidance, as expressed by USEPA in *The Metals Translator: Guidance for Calculating a Total Recoverable Limit from a Dissolved Criterion* (EPA Publication Number 823-B-96-007, 1996). The equivalent total ammonia acute and chronic WQOs are 14 mg/L and 1.5 mg/L, respectively.

(b) RPA Results. This Order establishes effluent limitations for total ammonia because the MEC of 62 mg/L exceeds the translated WQO for this pollutant, demonstrating Reasonable Potential by Trigger 1.

(c) Ammonia WQBELs. To set limitations for toxic pollutants, Basin Plan Section 4.5.5.2 indicates that WQBELs shall be calculated according to the SIP. Section 3.3.20 of the Basin Plan refers to ammonia as a toxic pollutant; therefore, it is consistent with the Basin Plan to use the SIP methodology to determine and establish effluent limitations for ammonia. The total ammonia WQBELs, calculated according to SIP procedures (and a CV of 0.39) and a dilution credit of 74:1 (D=73), are an AMEL of 110 mg/L and an MDEL of 230 mg/L.

To calculate total ammonia limits, some statistical adjustments were made because the Basin Plan's chronic WQO for un-ionized ammonia is based on an annual median, while chronic criteria are usually based on a 4-day average; also, the SIP assumes a monthly sampling frequency of 4 days per month to calculate effluent limitations based on chronic criteria. To use the SIP methodology to calculate effluent limits for a Basin Plan objective that is based on an annual median, an averaging period of 365 days and a monitoring frequency of 30 days per month (the maximum daily sampling frequency in a month since the averaging period for a chronic criterion is longer than 30 days) were used. These statistical adjustments are supported by USEPA's *Water Quality Criteria; Notice of Availability; 1999 Update of Ambient Water Quality Criteria for Ammonia*; published on December 22, 1999, in the Federal Register.

Following the SIP methodology as guidance, Regional Water Board staff used the maximum ambient background total ammonia concentration to calculate effluent limitations based on the acute criterion, and the median background total ammonia concentration to calculate effluent limitations based on the chronic criterion. Because the Basin Plan's chronic un-ionized ammonia objective is an annual median, the median background concentration is more representative of ambient conditions than a daily maximum.

The estimated actual initial dilution of 74:1(D=73) was used to calculate the effluent limitations for ammonia because ammonia, a non-persistent pollutant, is quickly dispersed and degraded to a non-toxic state, and cumulative toxicity effects are unlikely. The actual initial dilution was modeled as part of an engineering study titled *Modeling of Potential Impacts of The New Runway Reconfiguration on the NBSU Outfall* (December 12, 2000) performed by the Airfield Development Engineering Consultant on behalf of the NBSU as part of a larger study to estimate hydrodynamic impacts on San Francisco Bay by the proposed airport runway extension.

(d) **Immediate Compliance Feasibility.** Statistical analysis of effluent data for total ammonia collected over the period of April 2003 through May 2008 shows that the 95th percentile (52 mg/L) is less than the AMEL (113 mg/L); the 99th percentile (58 mg/L) is less than the MDEL (226 mg/L); and the mean (30 mg/L) is less than the long-term average of the projected non-parametric effluent data set after accounting for effluent variability (100 mg/L). Based on this comparison, the Regional Water Board concludes that immediate compliance with the WQBELs is feasible.

(e) **Antibacksliding.** Antibacksliding requirements are satisfied because limitations for total ammonia were not included in the previous Order.

e. Effluent Limit Calculations

The following table summarizes the calculation of WQBELs for copper, nickel, cyanide, dioxin-TEQ, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, alpha-BHC, 4,4-DDD, tributyltin, and total ammonia.

Table F-12. Effluent Limit Calculations

PRIORITY POLLUTANTS	Copper		Nickel	Cyanide	Dioxin TEQ	Benzo(k) Fluoranthene
Units	ug/L		ug/L	ug/L	ug/L	ug/L
Basis and Criteria type	BP & CTR SW Aq Life	Alternate limits using SSOs (December 2004)	BP & CTR SW Aq Life	BP SSOs	BP Narrative	CTR HH
CTR Criteria -Acute	5.5	-----	87	9.4	-----	-----
CTR Criteria -Chronic	4.2	-----	13	2.9	-----	-----
SSO Criteria -Acute (December 2004) (Diss.)		3.9				
SSO Criteria -Chronic (December 2004) (Diss.)		2.5				
Water Effects ratio (WER)	2.4	2.4	1	1	1	1
Lowest WQO	4.2		13	2.9	1.4E-08	0.049
Site Specific Translator - MDEL	0.88	0.88	0.85			
Site Specific Translator - AMEL	0.74	0.74	0.65			
Dilution Factor (D) (if applicable)	9	9	9	9	0	9
No. of samples per month	4	4	4	4	4	4
Aquatic life criteria analysis required? (Y/N)	Y	Y	Y	Y	N	N
HH criteria analysis required? (Y/N)	N	N	Y	Y	Y	Y
Applicable Acute WQO	13	11	87	9.4		
Applicable Chronic WQO	10	8.1	13	2.9		
HH criteria	-----	-----	4,600	220,000	1.4E-08	0.049
Background (Maximum Conc for Aquatic Life calc)	2.55	2.55	3.73	0.4		
Background (Average Conc for Human Health calc)	-----	-----	1.79	0.4	1.1E-07	7.75E-04
Is the pollutant Bioaccumulative(Y/N)? (e.g., Hg)	N	N	N	N	Y	N
ECA acute	108.0	83.4	837	90.4		
ECA chronic	77.6	58.1	93	25.4		
ECA HH			45984	2199996	1.4E-08	4.83E-01
No. of data points <10 or at least 80% of data reported non detect? (Y/N)	N	N	N	N	Y	Y
Avg of effluent data points	9.7	9.7	5.3	3		
Std Dev of effluent data points	1.5	1.5	3.1	2		
CV calculated	0.16	0.16	0.59	0.66	N/A	N/A
CV (Selected) - Final	0.16	0.16	0.59	0.66	0.60	0.60
ECA acute mult99	0.70	0.70	0.33	0.30		
ECA chronic mult99	0.83	0.83	0.53	0.50		
LTA acute	76	58	273	26.91		
LTA chronic	65	48	49	12.72		
minimum of LTAs	65	48	49	13		
AMEL mult95	1.1	1.1	1.5	1.61	1.55	1.55
MDEL mult99	1.4	1.4	3.1	3.36	3.11	3.11
AMEL (aq life)	73	55	76	20.43		
MDEL(aq life)	92	69	151	42.72		
MDEL/AMEL Multiplier	1.3	1.3	2.0	2.09	2.01	2.01
AMEL (human hlth)			45984	2199996	1.4E-08	4.8E-01
MDEL (human hlth)			91541	4599392	2.8E-08	9.7E-01
minimum of AMEL for Aq. life vs HH	73	55	76	20	1.4E-08	4.8E-01
minimum of MDEL for Aq. Life vs HH	92	69	151	43	2.8E-08	9.7E-01
Current limit in permit (30-day average)	-----	-----	31	-----	-----	-----
Current limit in permit (daily)	37 (Interim)	37 (Interim)	68	10 (Interim)	-----	-----
Final limit - AMEL	73	55	31	20	1.4E-08	0.48
Final limit - MDEL	92	69	68	43	2.8E-08	0.97
Max Effl Conc (MEC)	14	14	17	8.5	1.3E-06	1.2

PRIORITY POLLUTANTS	Chrysene	Dibenzo(a,h) Anthracene	Indeno(1,2,3-cd) Pyrene	alpha-BHC	4,4-DDD	Total Ammonia (acute)	Total Ammonia (chronic)	Tributyltin
Units	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L N	mg/L N	ug/L
Basis and Criteria type	CTR HH	CTR HH	CTR HH	CTR HH	CTR HH	Basin Plan Aquatic Life	Basin Plan Aquatic Life	BP Toxicity Narrative
CTR Criteria -Acute	-----	-----	-----	-----	-----	-----	-----	-----
CTR Criteria -Chronic	-----	-----	-----	-----	-----	-----	-----	-----
SSO Criteria -Acute (December 2004) (Diss.)						-----	-----	-----
SSO Criteria -Chronic (December 2004) (Diss.)						-----	-----	-----
Water Effects ratio (WER)	1	1	1	1	1	1	1	1
Lowest WQO	0.049	0.049	0.049	0.013	0.00084	14.45	1.52	0.0074
Site Specific Translator - MDEL						-----	-----	-----
Site Specific Translator - AMEL						-----	-----	-----
Dilution Factor (D) (if applicable)	9	9	9	9	0	73	73	9
No. of samples per month	4	4	4	4	4	4	30	4
Aquatic life criteria analysis required? (Y/N)	N	N	N	N	N	Y	Y	Y
HH criteria analysis required? (Y/N)	Y	Y	Y	Y	Y	N	N	N
Applicable Acute WQO						14.45		0.42
Applicable Chronic WQO							1.52	0.0074
HH criteria	0.049	0.049	0.049	0.013	0.00084			
Background (Maximum Conc for Aquatic Life calc)						0.21	0.10	0.002
Background (Average Conc for Human Health calc)	1.00E-03	2.78E-04	1.49E-03	2.42E-04	1.14E-04			
Is the pollutant Bioaccumulative(Y/N)? (e.g., Hg)	N	N	N	N	Y	N	N	N
ECA acute						1054		4.182
ECA chronic							105.2	0.056
ECA HH	4.81E-01	4.87E-01	4.77E-01	1.28E-01	8.40E-04			
No. of data points <10 or at least 80% of data reported non detect? (Y/N)	Y	Y	Y	Y	Y	N	N	N
Avg of effluent data points						30	30	0.0031
Std Dev of effluent data points						12	12	0.0021
CV calculated	N/A	N/A	N/A	N/A	N/A	0.39	0.39	0.69
CV (Selected) - Final	0.60	0.60	0.60	0.60	0.60	0.39	0.39	0.69
ECA acute mult99						0.444		0.29
ECA chronic mult99							0.953	0.49
LTA acute						468.0		1.20
LTA chronic							100	0.027
minimum of LTAs						468.0	100	0.027
AMEL mult95	1.55	1.55	1.55	1.55	1.55	-----	1.12	1.64
MDEL mult99	3.11	3.11	3.11	3.11	3.11	-----	2.25	3.50
AMEL (aq life)						-----	112.57	0.045
MDEL(aq life)						-----	225.81	0.095
MDEL/AMEL Multiplier	2.01	2.01	2.01	2.01	2.01	-----	2.01	2.14
AMEL (human hlth)	4.8E-01	4.9E-01	4.8E-01	1.3E-01	8.4E-04			0
MDEL (human hlth)	9.6E-01	9.8E-01	9.6E-01	2.6E-01	1.7E-03			0
minimum of AMEL for Aq. life vs HH	4.8E-01	4.9E-01	4.8E-01	1.3E-01	8.4E-04	-----	113	0.045
minimum of MDEL for Aq. Life vs HH	9.6E-01	9.8E-01	9.6E-01	2.6E-01	1.7E-03	-----	226	0.095
Current limit in permit (30-day average)	-----	-----	-----	-----	-----	-----	-----	-----
Current limit in permit (daily)	-----	-----	-----	-----	-----	-----	-----	-----
Final limit - AMEL	0.48	0.49	0.48	0.128	0.00084	-----	113	0.045
Final limit - MDEL	0.96	0.98	0.96	0.256	0.0017	-----	226	0.095
Max Effl Conc (MEC)	1.1	1.6	1.1	0.030	0.019	-----	62	0.00873

5. Whole Effluent Toxicity

The Basin Plan requires dischargers to either conduct flow-through effluent toxicity tests or perform static renewal bioassays (Chapter 4, Acute Toxicity) to measure the toxicity of wastewaters and to assess negative impacts upon water quality and beneficial uses caused by the aggregate toxic effect of the discharge of pollutants. This Order includes effluent limitations for whole effluent acute toxicity. Compliance evaluation is based on 96-hour static-renewal bioassays. All bioassays shall be performed according to the USEPA-approved method in 40 CFR Part 136, currently *"Methods for Measuring the Acute Toxicity of Effluents and Receiving Water, 5th Edition."*

D. Anti-Backsliding and Anti-Degradation

1. **Effluent Limitations Retained from Order No. R2-2003-0010**. Limitations for the following parameters are retained and are unchanged from Order No. R2-2003-0010.

   - Oil and grease
   - pH
   - BOD_5 and TSS
   - Total residual chlorine
   - 85% removal requirement for BOD and TSS
   - Fecal coliform bacteria
   - Acute toxicity

   Retaining effluent limitations for these parameters in this Order ensures that these limitations are at least as stringent as those in Order No. R2-2003-0010, meeting anti-backsliding requirements of the CWA. Retaining effluent limitations for these parameters also ensures that the existing receiving water quality will not be degraded in terms of these parameters, meeting anti-degradation.

2. **New Effluent Limitations**. Final concentration-based limitations for the following parameters were not contained in Order No. R2-2003-0010 and are established by this Order.

   - Copper
   - Cyanide
   - Dioxin-TEQ
   - Benzo(k)fluoranthene
   - Bis(2-ethylhexyl)phthalate
   - Chrysene
   - Dibenzo(a,h)anthracene
   - Indeno(1,2,3-cd)pyrene
   - alpha-BHC
   - 4,4'-DDD
   - Ammonia

   The establishment of effluent limitations for these pollutants effectively creates limitations that are more stringent than in Order No. R2-2003-0010, therefore meeting applicable anti-backsliding requirements and ensuring that the existing quality of the receiving water will not be degraded meeting anti-degradation requirements. The copper, cyanide, and tributyltin effluent limits in this order are new final limits. Although these new final limits are higher than the interim limits in Order No. R2-2003-0010 for copper and cyanide, interim limits and final limits are not comparable for purposes of complying with antibacksliding requirements.

3. **More Stringent Effluent Limitations**. No limitations established by Order No. R2-2003-0010 are made more stringent by this Order.

4. **Effluent Limitations Not Retained from Order No. R2-2003-0010.** Final limitations for the following parameters are not retained by this Order.

   - Settleable matter
   - Mercury
   - Lead
   - Silver
   - Selenium
   - Zinc
   - 4,4'-DDE
   - Dieldrin

   This Order does not retain effluent limitations for settleable matter. For the Plant, like other facilities achieving secondary or more advanced levels of treatment, compliance with the requirements of 40 CFR 133 and of Basin Plan Table 4-2 will also ensure removal of settleable solids to acceptably low levels - below 0.1 mL/L-hr (30-day average) and 0.2 mL/L-hr (daily maximum).

   The previous permit included an interim effluent limitation for mercury, which is not retained by this Order, because discharges of mercury to the San Francisco Bay are now regulated by Regional Water Board Order No. R2-2007-0077, which became effective March 1, 2008. Order No. R2-2007-0077 is a Watershed Permit that implements the San Francisco Bay Mercury TMDL and establishes wasteload allocations for industrial and municipal wastewater discharges of this pollutant. The Plant discharge of mercury is therefore regulated by another means. Order No. R2-2007-0077 was established to be consistent with anti-backsliding and antidegradation requirements.

   Order No. R2-2003-0010 included effluent limitations for lead, silver, zinc, 4,4'-DDE and dieldrin; however, because the RPA showed that Plant discharges no longer demonstrate a reasonable potential to cause or contribute to exceedances of applicable water quality criteria for these pollutants, this Order does not retain these limitations. Elimination of WQBELs for lead, silver, zinc, 4,4'-DDE and dieldrin is consistent with State Water Board Order WQ 2001-16.

5. **Effluent Limitations Higher Than in Order No. R2-2003-0010.** Limitations for the following parameters are higher than in the previous Order.

   - Cyanide
   - Copper

   The final effluent limits for cyanide are higher than the previous interim effluent limit in Order No. R2-2003-0010. The previous interim effluent limitation for cyanide has not been retained, and this Order establishes less stringent (final) limitations for cyanide based on newly effective (July 22, 2008) site-specific water quality objectives. The Regional Water Board has determined that implementation of the newly established site-specific water quality objectives for cyanide in the San Francisco Bay is consistent with applicable antidegradation requirements. [See *Staff Report on Proposed Site-Specific Water Quality Objectives and Effluent Limit Policy for Cyanide for San Francisco Bay* (December 4, 2006)]. Backsliding requirements are satisfied because Order No. R2-2003-0010 did not include final effluent limitations for cyanide. This conclusion is based, in part, on assumed implementation of a cyanide action plan (See Order Section VI.C.10).

Both the effluent limits for copper that will take effect with this Order, and the alternate effluent limits for copper based on site-specific objectives (SSOs) to take effect if the SSOs become effective, are higher than the current interim limits. The standards-setting process for the copper SSOs addressed antidegradation, concluding that water quality would not be degraded [See *Copper Site-Specific Objectives in San Francisco Bay: Proposed Basin Plan Amendment and Draft Staff Report,* June 6, 2007]. This conclusion was based on assumed implementation of a copper action plan (See Order Section VI.C.9). To ensure that the new, higher copper limits that will take effect immediately also comply with anti-degradation policies, the copper action plan is required as soon as the Order becomes effective.

Backsliding requirements are satisfied because Order No. R2-2003-0010 did not include final effluent limitations for copper.

E. Land Discharge Specifications

Not Applicable

F. Reclamation Specifications

Not Applicable

V. RATIONALE FOR RECEIVING WATER LIMITATIONS

Receiving water limitations are retained from Order No. R2-2003-0010 and reflect applicable water quality standards from the Basin Plan.

VI. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

The principal purposes of a monitoring and reporting program by a discharger are to:

- document compliance with waste discharge requirements and prohibitions established by the Regional Water Board;
- facilitate self-policing by the discharger in the prevention and abatement of pollution arising from waste discharge;
- develop or assist in the development of limitations, discharge prohibitions, national standards of performance, pretreatment and toxicity standards, and other standards; and to
- prepare water and wastewater quality inventories.

The Monitoring and Reporting Program is a standard requirement in almost all NPDES permits issued by the Regional Water Board, including this Order. It contains definitions of terms, specifies general sampling and analytical protocols, and sets out requirements for reporting of spills, violations, and routine monitoring data in accordance with NPDES regulations, the CWC, and Regional Water Board's policies. The Monitoring and Reporting Program also defines the sampling stations and frequency, the pollutants to be monitored, and additional reporting requirements. Pollutants to be monitored include all parameters for which effluent limitations are specified. Monitoring for additional constituents, for which no effluent limitations are established, is also required to provide data for future completion of RPAs for them.

A. Influent Monitoring

Influent monitoring requirements for BOD_5 and TSS allow determination of compliance with this Order's 85 percent removal requirement.

B. Effluent Monitoring

The MRP retains most effluent monitoring requirements from the previous permit. Changes in effluent monitoring are summarized as follows.

- Monitoring for settleable matter is no longer required, because the effluent limitation for this parameter has not been retained by this Order.

- Monthly and/or semi-annual monitoring for silver, selenium, zinc, dieldrin, and tetrachloroethylene is no longer required because these pollutants no longer demonstrate reasonable potential. Monthly monitoring for mercury is no longer required under this MRP because the discharge of mercury from the Plant is now regulated by Regional Water Board Order No. R2-2007-0077.

- Routine effluent monitoring for benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, alpha-BHC, and 4,4'-DDD (priority toxic pollutants with effluent limitations established by this Order) is established by this Order. Monitoring for all other priority toxic pollutants must be conducted in accordance with methods described in the August 6, 2001 Letter. Routine effluent monitoring for ammonia is also required.

- Monitoring for and compliance with effluent chlorine residual requirements at E-002 is the City of South San Francisco's responsibility as part of its NBSU Outfall duties and authorities.

C. Bypasses or Sewer Overflow Monitoring

Monitoring to record observations related to bypasses or sewer overflows is required by the Self-Monitoring Plan Part A (Attachment G).

D. Whole Effluent Toxicity Testing Requirements

1. **Acute Toxicity.** Monthly 96-hour bioassay testing is required to demonstrate compliance with the effluent limitation for acute toxicity.

2. **Chronic Toxicity.** Chronic whole effluent toxicity testing is required twice per year in order to demonstrate compliance with the Basin Plan's narrative toxicity objective.

E. Receiving Water Monitoring

On April 15, 1992, the Regional Water Board adopted Resolution No. 92-043 directing the Executive Officer to implement the Regional Monitoring Program for Trace Substances (RMP) for San Francisco Bay. Subsequent to a public hearing and various meetings, Regional Water Board staff requested under authority of CWC section 13267 that major permit holders in the San Francisco Bay region report on the water quality of the San Francisco Estuary. These permit holders responded to this request by participating in a collaborative effort through the RMP. This Order specifies that the Discharger shall continue to participate in the RMP, which involves collection of data on pollutants and toxicity in water, sediment, and biota of the estuary.

VII. RATIONALE FOR PROVISIONS

A. Standard Provisions (Provision VI.A)

Standard Provisions, which in accordance with 40 CFR 122.41and 122.42 apply to all NPDES discharges and must be included in every NPDES permit, are provided in Attachments D and G of this Order.

B. Monitoring and Reporting Requirements (Provision VI.B)

The Discharger is required to monitor the permitted discharges in order to evaluate compliance with permit conditions. Monitoring requirements are contained in the MRP (Attachment E) and Standard Provisions and SMP, Part A (Attachment G), of this Order. This provision requires compliance with these documents and is based on 40 CFR 122.63.

The Standard Provisions and SMP, Part A, are standard requirements in almost all NPDES permits issued by the Regional Water Board, including this Order. They contain definitions of terms, specify general sampling and analytical protocols, and set out requirements for reporting spills, violations, and routine monitoring data in accordance with NPDES regulations, the CWC, and Regional Water Board's policies. The MRP contains a sampling program specific for the Plant. It defines sampling stations and frequencies, the pollutants to be monitored, and additional reporting requirements. Pollutants to be monitored include all parameters for which effluent limitations are specified. Monitoring for additional constituents, for which no effluent limitations are established, is also required to provide data for future completion of RPAs.

C. Special Provisions (Provision VI.C)

1. Reopener Provisions

These provisions are based on 40 CFR 123 and allow modification of this Order and its effluent limitations as necessary in response to updated WQOs that may be established in the future.

2. Special Studies and Additional Monitoring Requirements

a. Effluent Characterization Study. This Order does not include effluent limitations for constituents addressed in the August 6, 2001 Letter that do not demonstrate Reasonable Potential, but this provision requires the Discharger to continue monitoring for these pollutants as described in the August 6, 2001 Letter and as specified in the MRP. If concentrations of these constituents increase significantly, the Discharger is required to investigate the source of the increases and establish remedial measures if the increases result in reasonable potential to cause or contribute to an excursion above the applicable WQOs. This provision is based on the Basin Plan and the SIP.

b. Ambient Background Receiving Water Study. This provision is based on the Basin Plan, the SIP, and the August 6, 2001 Letter for priority pollutant monitoring. As indicated in this Order, this requirement may be met by participating in a collaborative study.

c. Optional Mass Offset Plan: This option is provided to encourage the Discharger to further implement aggressive reduction of mass loads to Lower San Francisco Bay. If the Discharger wishes to pursue a mass offset program, a mass offset plan for reducing 303(d)-listed pollutants to the same receiving water needs to be submitted for Regional Water Board approval. The Regional Water Board will consider any proposed mass offset plan and amend this Order accordingly.

3. Best Management Practices and Pollution Minimization Program

This provision is based on Chapter 4 of the Basin Plan and Section 2.4.5 of the SIP.

4. Construction, Operation, and Maintenance Specifications

a. Wastewater Facilities, Review and Evaluation, Status Reports: This provision is based on Order No. R2-2003-0010 and the Basin Plan.

b. Operations and Maintenance Manual, Review and Status Reports: This provision is based on the Basin Plan, the requirements of 40 CFR 122, and Order No. R2-2003-0010.

c. Contingency Plan, Review and Status Reports: This provision is based on the Basin Plan, the requirements of 40 CFR 122 and Order No. R2-2003-0010.

5. Special Provisions for Municipal Facilities (POTWs Only)

a. Pretreatment Program. This provision is based on 40 CFR 403 and carried over from the previous permit.

b. Sludge Management Practices Requirements: This provision is based on the Basin Plan (Chapter IV), and 40 CFR §§257 and 503, and the previous permit.

c. Sanitary Sewer Overflows and Sewer System Management Plan: This provision is to explain this Order's requirements as they relate to the Discharger's conveyance system and to promote consistency with the State Water Board-adopted Statewide General Waste Discharge Requirements for Sanitary Sewer Overflow (SSO WDRs) and a related Monitoring and Reporting Program (Order No. 2006-0003-DWQ).

6. Corrective Measures to Eliminate Use of the Nearshore Outfall

This provision is based on Discharge Prohibition III.A and C and Chapter 4 of the Basin Plan, which prohibits discharges that do not receive an initial 10:1 dilution. During very high wet weather flows, secondary-treated wastewater is sometimes discharged from the nearshore outfall. The Discharger reported using the outfall once during the most recent permit term. The Discharger's No Feasible Alternatives Analysis submitted on August 26, 2008, primarily addresses blending during wet weather conditions, but also identifies options for eliminating the need for the shallow water discharge. One option is use of an effluent storage pond during wet weather events.

The schedule to implement these alternatives has been established to ensure future discharges to the nearshore outfall do not occur; it does not allow discharges to the nearshore outfall at any time. Any discharge of wastewater from the nearshore outfall is a violation of Discharge Prohibitions III.A and C.

7. Corrective Measures to Minimize Blending

This provision is based on 40 CFR 122.41(m)(4) as detailed in section IV.A.4 of this Fact Sheet. According to the Discharger's No Feasible Alternatives Analysis submitted on August 26, 2008, four blending events have occurred since 2002. The primary effluent bypassed from one of those events was recovered and sent back to the aeration basins for full secondary treatment. The Discharger's No Feasible Alternatives Analysis also indicates that elimination or reduction of blending is currently infeasible in the short-term. This provision is necessary to ensure that the Discharger implements corrective measures to minimize or eliminate blending consistent with 40 CFR 122.41(m). This provision also requires the Discharger to submit another No Feasible Alternatives Analysis 180 days prior to the Order expiration date to provide a current assessment for the need to blend.

8. Compliance Schedule

The compliance schedule and the requirement to submit reports on further measures to reduce concentrations of dioxin-TEQ to ensure compliance with final limits are based on State Water Board Resolution No. 2008-0025, *Policy for Compliance Schedules in National Pollutant Discharge Elimination System Permits*, which was approved by the U.S. EPA on August 27, 2008. This Order includes a compliance schedule and discharge specifications for dioxin-TEQ.

A maximum compliance schedule is reasonable for dioxin-TEQ, because of the considerable uncertainty in determining effective measures (e.g., pollution prevention, treatment upgrades) that should be implemented to ensure compliance with final limitations. In the Regional Water Board's view, it is appropriate to allow the Discharger sufficient time to explore source control measures before requiring it to propose further actions, such as treatment plant upgrades, that are likely to be much more costly. This approach is supported by the Basin Plan (section 4.13), which states, "In general, it is often more economical to reduce overall pollutant loading into treatment systems than to install complex and expensive technology at the plant."

9. Action Plan for Copper

The action plan for copper is needed with this Order because the copper limit is higher than in the last permit. Implementation is needed to ensure that any increase in copper limits would be consistent with anti-degradation policies (i.e., the limits would not degrade the quality of the receiving water). The copper action plan is required with this permit, before the SSO will go into effect triggering the action plan requirement, because this permit has a higher copper effluent limit than the previous permit. Therefore, early implementation of a copper action plan will ensure consistency with anti-degradation policies.

10. Action Plan for Cyanide

This provision is based on the Basin Plan Amendment that establishes SSOs for cyanide for San Francisco Bay (Regional Water Board Resolution R2-2006-0086). The cyanide SSO Basin Plan amendment requires an action plan for source control to ensure compliance with anti-degradation policies. The action plan requires the Discharger to implement monitoring and surveillance, pretreatment, source control, and pollution prevention for cyanide.

VIII. PUBLIC PARTICIPATION

The San Francisco Bay Regional Water Board is considering the issuance of Waste Discharge Requirements (WDRs) that will serve as an NPDES permit for the Plant. As a step in the WDR adoption process, the Regional Water Board developed tentative WDRs. The Regional Water Board encourages public participation in the WDR adoption process.

A. Notification of Interested Parties

The Regional Water Board notified the Dischargers and interested agencies and persons of its intent to prescribe WDRs for the discharge and provided them with an opportunity to submit their written comments and recommendations. Notification was provided through the **San Mateo County Times.**

B. Written Comments

Staff determinations are tentative. Interested persons are invited to submit written comments concerning these tentative WDRs. Comments must be submitted either in person or by mail to the attention of Adrienne Miller at the Regional Water Board at the address above on the cover page of this Order.

To be fully responded to by staff and considered by the Regional Water Board, written comments should be received at the Regional Water Board offices by 5:00 p.m. on **October 15, 2008.**

C. Public Hearing

The Regional Water Board will hold a public hearing on the tentative WDRs during its regular Board meeting on the following date and time and at the following location:

Date:	**November 12, 2008**
Time:	9:00 am
Location:	Elihu Harris State Office Building 1515 Clay Street, 1st Floor Auditorium Oakland, CA 94612
Contact:	Adrienne Miller, (510) 622-2415, email admiller@waterboards.ca.gov

Interested persons are invited to attend. At the public hearing, the Regional Water Board will hear testimony, if any, pertinent to the discharge, WDRs, and permit. Oral testimony will be heard; however, for accuracy of the record, important testimony should be in writing.

Dates and venues may change. The Regional Water Board Web address is http://www.waterboards.ca.gov/sanfranciscobay where one can access the current agenda for changes in dates and locations.

D. Waste Discharge Requirements Petitions

Any aggrieved person may petition the State Water Resources Control Board to review the decision of the Regional Water Board regarding the final WDRs. The petition must be submitted within 30 days of the Regional Water Board's action to the following address:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

E. Information and Copying

The Report of Waste Discharge, related documents, tentative effluent limitations and special provisions, comments received, and other information are on file and may be inspected at the address above at any time between 8:30 a.m. and 4:45 p.m., except from noon to 1:00 p.m., Monday through Friday. Copying of documents may be arranged through the Regional Water Board by calling 510-622-2300.

F. Register of Interested Persons

Any person interested in being placed on the mailing list for information regarding these WDRs and NPDES permit should contact the Regional Water Board, reference the Plant, and provide a name, address, and phone number.

G. Additional Information

Requests for additional information or questions regarding this Order should be directed to Adrienne Miller at 510-622-2415 (e-mail at ADMiller@waterboards.ca.gov).

ATTACHMENT H - PRETREATMENT REQUIREMENTS

Pretreatment Program Provisions

1. The Discharger shall implement all pretreatment requirements contained in 40 CFR 403, as amended. The Discharger shall be subject to enforcement actions, penalties, and fines as provided in the Clean Water Act (33 USC 1351 et seq.), as amended. The Discharger shall implement and enforce its Approved Pretreatment Program or modified Pretreatment Program as directed by the Board's Executive Officer or USEPA. USEPA and/or the State may initiate enforcement action against an industrial user for noncompliance with applicable standards and requirements as provided in the Clean Water Act.

2. The Discharger shall enforce the requirements promulgated under Sections 307(b), 307(c), 307(d) and 402(b) of the Clean Water Act. The Discharger shall cause industrial users subject to Federal Categorical Standards to achieve compliance no later than the date specified in those requirements or, in the case of a new industrial user, upon commencement of the discharge.

3. The Discharger shall perform the pretreatment functions as required in 40 CFR Part 403 and amendments or modifications thereto including, but not limited to:

    a. Implement the necessary legal authorities to fully implement the pretreatment regulations as provided in 40 CFR 403.8(f)(1);

    b. Implement the programmatic functions as provided in 40 CFR 403.8(f)(2);

    c. Publish an annual list of industrial users in significant noncompliance as provided per 40 CFR 403.8(f)(2)(vii);

    d. Provide for the requisite funding and personnel to implement the pretreatment program as provided in 40 CFR 403.8(f)(3); and

    e. Enforce the national pretreatment standards for prohibited discharges and categorical standards as provided in 40 CFR 403.5 and 403.6, respectively.

4. The Discharger shall submit annually a report to USEPA Region 9, the State Water Board and the Regional Water Board describing its pretreatment program activities over the previous twelve months. In the event that the Discharger is not in compliance with any conditions or requirements of the Pretreatment Program, the Discharger shall also include the reasons for noncompliance and a plan and schedule for achieving compliance. The report shall contain, but is not limited to, the information specified in Appendix A entitled, "Requirements for Pretreatment Annual Reports," which is made a part of this Order. The annual report is due on the last day of February each year.

5. The Discharger shall submit semiannual pretreatment reports to USEPA Region 9, the State Water Board and the Board describing the status of its significant industrial users (SIUs). The report shall contain, but is not limited to, the information specified in Appendix B entitled, "Requirements for Semiannual Pretreatment Reports," which is made part of this Order. The semiannual reports are due July 31st (for the period January through June) and January 31st (for the period July through December) of each year. The Executive Officer may exempt a Discharger from the semiannual reporting requirements on a case by case basis subject to State Water Board and USEPA comment and approval.

6. The Discharger may combine the annual pretreatment report with the semiannual pretreatment report (for the July through December reporting period). The combined report shall contain all of the information requested in Appendices A and B and will be due on January 31st of each year.

7. The Discharger shall conduct the monitoring of its treatment plant's influent, effluent, and sludge as described in Appendix C entitled, "Requirements for Influent, Effluent and Sludge Monitoring," which is made part of this Order. The results of the sampling and analysis, along with a discussion of any trends, shall be submitted in the semiannual reports. A tabulation of the data shall be included in the annual pretreatment report. The Executive Officer may require more or less frequent monitoring on a case by case basis.

APPENDIX A

REQUIREMENTS FOR PRETREATMENT ANNUAL REPORTS

The Pretreatment Annual Report is due each year on the last day of February. [If the annual report is combined with the semiannual report (for the July through December period) the submittal deadline is January 31st of each year.] The purpose of the Annual Report is 1) to describe the status of the Publicly Owned Treatment Works (POTW) pretreatment program and 2) to report on the effectiveness of the program, as determined by comparing the results of the preceding year's program implementation. The report shall contain at a minimum, but is not limited to, the following information:

1. **Cover Sheet**

   The cover sheet must contain the name(s) and National Pollutant Discharge Elimination Discharge System (NPDES) permit number(s) of those POTWs that are part of the Pretreatment Program. Additionally, the cover sheet must include: the name, address and telephone number of a pretreatment contact person; the period covered in the report; a statement of truthfulness; and the dated signature of a principal executive officer, ranking elected official, or other duly authorized employee who is responsible for overall operation of the POTW (40 CFR 403.12(j)).

2. **Introduction**

   The Introduction shall include any pertinent background information related to the Discharger, the POTW and/or the industrial user base of the area. Also, this section shall include an update on the status of any Pretreatment Compliance Inspection (PCI) tasks, Pretreatment Performance Evaluation tasks, Pretreatment Compliance Audit (PCA) tasks, Cleanup and Abatement Order (CAO) tasks, or other pretreatment-related enforcement actions required by the Regional Water Board or USEPA. A more specific discussion shall be included in the section entitled, "Program Changes."

3. **Definitions**

   This section shall contain a list of key terms and their definitions that the Discharger uses to describe or characterize elements of its pretreatment program.

4. **Discussion of Upset, Interference and Pass Through**

   This section shall include a discussion of Upset, Interference or Pass Through incidents, if any, at the POTW(s) that the Discharger knows of or suspects were caused by industrial discharges. Each incident shall be described, at a minimum, consisting of the following information:

   a. a description of what occurred;

   b. a description of what was done to identify the source;

   c. the name and address of the IU responsible

   d. the reason(s) why the incident occurred;

   e. a description of the corrective actions taken; and

f. an examination of the local and federal discharge limits and requirements for the purposes of determining whether any additional limits or changes to existing requirements may be necessary to prevent other Upset, Interference or Pass Through incidents.

5. Influent, Effluent and Sludge Monitoring Results

This section shall provide a summary of the analytical results from the "Influent, Effluent and Sludge Monitoring" as specified in Appendix C. The results should be reported in a summary matrix that lists monthly influent and effluent metal results for the reporting year.

A graphical representation of the influent and effluent metal monitoring data for the past five years shall also be provided with a discussion of any trends.

6. Inspection and Sampling Program

This section shall contain at a minimum, but is not limited to, the following information:

a. Inspections: the number of inspections performed for each type of IU; the criteria for determining the frequency of inspections; the inspection format procedures;

b. Sampling Events: the number of sampling events performed for each type of IU; the criteria for determining the frequency of sampling; the chain of custody procedures.

7. Enforcement Procedures

This section shall provide information as to when the approved Enforcement Response Plan (ERP) had been formally adopted or last revised. In addition, the date the finalized ERP was submitted to the Regional Water Board shall also be given.

8. Federal Categories

This section shall contain a list of all of the federal categories that apply to the Discharger. The specific category shall be listed including the subpart and 40 CFR section that applies. The maximum and average limits for the each category shall be provided. This list shall indicate the number of Categorical Industrial Users (CIUs) per category and the CIUs that are being regulated pursuant to the category. The information and data used to determine the limits for those CIUs for which a combined waste stream formula is applied shall also be provided.

9. Local Standards

This section shall include a table presenting the local limits.

10. Updated List of Regulated SIUs

This section shall contain a complete and updated list of the Discharger's Significant Industrial Users (SIUs), including their names, addresses, and a brief description of the individual SIU's type of business. The list shall include all deletions and additions keyed to the list as submitted in the previous annual report. All deletions shall be briefly explained.

11. Compliance Activities

a. **Inspection and Sampling Summary:** This section shall contain a summary of all the inspections and sampling activities conducted by the Discharger over the past year to gather information and data regarding the SIUs. The summary shall include:

(1) the number of inspections and sampling events conducted for each SIU;

(2) the quarters in which these activities were conducted; and

(3) the compliance status of each SIU, delineated by quarter, and characterized using all applicable descriptions as given below:

(a) in consistent compliance;

(b) in inconsistent compliance;

(c) in significant noncompliance;

(d) on a compliance schedule to achieve compliance, (include the date final compliance is required);

(e) not in compliance and not on a compliance schedule;

(f) compliance status unknown, and why not.

b. **Enforcement Summary:** This section shall contain a summary of the compliance and enforcement activities during the past year. The summary shall include the names of all the SIUs affected by the following actions:

(1) Warning letters or notices of violations regarding SIUs' apparent noncompliance with or violation of any federal pretreatment categorical standards and/or requirements, or local limits and/or requirements. For each notice, indicate whether it was for an infraction of a federal or local standard/limit or requirement.

(2) Administrative Orders regarding the SIUs' apparent noncompliance with or violation of any federal pretreatment categorical standards and/or requirements, or local limits and/or requirements. For each notice, indicate whether it was for an infraction of a federal or local standard/limit or requirement.

(3) Civil actions regarding the SIUs' apparent noncompliance with or violation of any federal pretreatment categorical standards and/or requirements, or local limits and/or requirements. For each notice, indicate whether it was for an infraction of a federal or local standard/limit or requirement.

(4) Criminal actions regarding the SIUs' apparent noncompliance with or violation of any federal pretreatment categorical standards and/or requirements, or local limits and/or requirements. For each notice, indicate whether it was for an infraction of a federal or local standard/limit or requirement.

(5) Assessment of monetary penalties. Identify the amount of penalty in each case and reason for assessing the penalty.

(6) Order to restrict/suspend discharge to the POTW.

(7) Order to disconnect the discharge from entering the POTW.

12. Baseline Monitoring Report Update

This section shall provide a list of CIUs that have been added to the pretreatment program since the last annual report. This list of new CIUs shall summarize the status of the respective Baseline Monitoring Reports (BMR). The BMR must contain all of the information specified in 40 CFR 403.12(b). For each of the new CIUs, the summary shall indicate when the BMR was due; when the CIU was notified by the POTW of this requirement; when the CIU submitted the report; and/or when the report is due.

13. Pretreatment Program Changes

This section shall contain a description of any significant changes in the Pretreatment Program during the past year including, but not limited to: legal authority, local limits, monitoring/inspection program and frequency, enforcement protocol, program's administrative structure, staffing level, resource requirements and funding mechanism. If the manager of the pretreatment program changes, a revised organizational chart shall be included. If any element(s) of the program is in the process of being modified, this intention shall also be indicated.

14. Pretreatment Program Budget

This section shall present the budget spent on the Pretreatment Program. The budget, either by the calendar or fiscal year, shall show the amounts spent on personnel, equipment, chemical analyses and any other appropriate categories. A brief discussion of the source(s) of funding shall be provided.

15. Public Participation Summary

This section shall include a copy of the public notice as required in 40 CFR 403.8(f)(2)(vii). If a notice was not published, the reason shall be stated.

16. Sludge Storage and Disposal Practice

This section shall have a description of how the treated sludge is stored and ultimately disposed. The sludge storage area, if one is used, shall be described in detail. Its location, a description of the containment features and the sludge handling procedures shall be included.

17. PCS Data Entry Form

The annual report shall include the PCS Data Entry Form. This form shall summarize the enforcement actions taken against SIUs in the past year. This form shall include the following information: the POTW name, NPDES Permit number, period covered by the report, the number of SIUs in significant noncompliance (SNC) that are on a pretreatment compliance schedule, the number of notices of violation and administrative orders issued against SIUs, the number of civil and criminal judicial actions against SIUs, the number of SIUs that have been published as a result of being in SNC, and the number of SIUs from which penalties have been collected.

18. Other Subjects

Other information related to the Pretreatment Program that does not fit into one of the above categories should be included in this section.

Signed copies of the reports shall be submitted to the Regional Administrator at USEPA, the State Water Resources Control Board and the Regional Water Board at the following addresses:

Regional Administrator
United States Environmental Protection Agency
Region 9, Mail Code: WTR-7
Clean Water Act Compliance Office
Water Division
75 Hawthorne Street
San Francisco, CA 94105

Pretreatment Program Manager
Regulatory Unit
State Water Resources Control Board
Division of Water Quality
1001 I Street
Sacramento, CA 95814

Pretreatment Coordinator
NPDES Permits Division
SF Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

APPENDIX B:

REQUIREMENTS FOR SEMIANNUAL PRETREATMENT REPORTS

The semiannual pretreatment reports are due on July 31st (for pretreatment program activities conducted from January through June) and January 31st (for pretreatment activities conducted from July through December) of each year, unless an exception has been granted by the Board's Executive Officer. The semiannual reports shall contain, at a minimum, but is not limited to, the following information:

1. Influent, Effluent and Sludge Monitoring

The influent, effluent and sludge monitoring results shall be included in the report. The analytical laboratory report shall also be included, with the QA/QC data validation provided upon request. A description of the sampling procedures and a discussion of the results shall be given. (Please see Appendix C for specific detailed requirements.) The contributing source(s) of the parameters that exceed NPDES limits shall be investigated and discussed. In addition, a brief discussion of the contributing source(s) of all organic compounds identified shall be provided.

The Discharger has the option to submit all monitoring results via an electronic reporting format approved by the Executive Officer. The procedures for submitting the data will be similar to the electronic submittal of the NPDES self-monitoring reports as outlined in the December 17, 1999 Regional Water Board letter, Official Implementation of Electronic Reporting System (ERS). The Discharger shall contact the Regional Water Board's ERS Project Manager for specific details in submitting the monitoring data.

If the monitoring results are submitted electronically, the analytical laboratory reports (along with the QA/QC data validation) should be kept at the Plant.

2. Industrial User Compliance Status

This section shall contain a list of all Significant Industrial Users (SIUs) that were not in consistent compliance with all pretreatment standards/limits or requirements for the reporting period. The compliance status for the previous reporting period shall also be included. Once the SIU has determined to be out of compliance, the SIU shall be included in the report until consistent compliance has been achieved. A brief description detailing the actions that the SIU undertook to come back into compliance shall be provided.

For each SIU on the list, the following information shall be provided:

a. Indicate if the SIU is subject to Federal categorical standards; if so, specify the category including the subpart that applies.

b. For SIUs subject to Federal Categorical Standards, indicate if the violation is of a categorical or local standard.

c. Indicate the compliance status of the SIU for the two quarters of the reporting period.

d. For violations/noncompliance occurring in the reporting period, provide (1) the date(s) of violation(s); (2) the parameters and corresponding concentrations exceeding the limits and the discharge limits for these parameters and (3) a brief summary of the noncompliant event(s) and the steps that are being taken to achieve compliance.

3. POTW's Compliance with Pretreatment Program Requirements

This section shall contain a discussion of the Discharger's compliance status with the Pretreatment Program Requirements as indicated in the latest Pretreatment Compliance Audit (PCA) Report, Pretreatment Compliance Inspection (PCI) Report or Pretreatment Performance Evaluation (PPE) Report. It shall contain a summary of the following information:

a. Date of latest PCA, PCI or PPE and report.

b. Date of the Discharger's response.

c. List of unresolved issues.

d. Plan and schedule for resolving the remaining issues.

The reports shall be signed by a principal executive officer, ranking elected official, or other duly authorized employee who is responsible for the overall operation of the Publicly Owned Treatment Works (POTW)(40 CFR 403.12(j)). Signed copies of the reports shall be submitted to the Regional Administrator at USEPA, the State Water Resources Control Board and the Regional Water Board at the following addresses:

Regional Administrator
United States Environmental Protection Agency
Region 9, Mail Code: WTR-7
Clean Water Act Compliance Office
Water Division
75 Hawthorne Street
San Francisco, CA 94105

Pretreatment Program Manager
Regulatory Unit
State Water Resources Control Board
Division of Water Quality
1001 I Street
Sacramento, CA 95814

Pretreatment Coordinator
NPDES Permits Division, SF Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

APPENDIX C

REQUIREMENTS FOR INFLUENT, EFFLUENT AND SLUDGE MONITORING

The Discharger shall conduct sampling of its treatment plant's influent, effluent and sludge at the frequency as shown in Table E-5 of the Self-Monitoring Program (SMP).

The monitoring and reporting requirements of the POTW's Pretreatment Program are in addition to those specified in Tables E-3 and E-4 of the SMP. Any subsequent modifications of the requirements specified in Tables E-3 and E-4 shall be adhered to and shall not affect the requirements described in this Appendix unless written notice from the Regional Water Board is received. When sampling periods coincide, one set of test results, reported separately, may be used for those parameters that are required to be monitored by both Table E-5 and the Pretreatment Program. The Pretreatment Program monitoring reports shall be sent to the Pretreatment Program Coordinator.

1. Influent and Effluent Monitoring

The Discharger shall monitor for the parameters using the required test methods listed in Tables E-3 and E-4 of the SMP. Any test method substitutions must have received prior written Regional Water Board approval. Influent and Effluent sampling locations shall be the same as those sites specified in the Self-Monitoring Program.

The influent and effluent sampled should be taken during the same 24-hour period. All samples must be representative of daily operations. A grab sample shall be used for volatile organic compounds, cyanide, phenol, and tributyltin. In addition, any samples for oil and grease, polychlorinated biphenyls, dioxins/furans, polynuclear aromatic hydrocarbons, BNA/625, and carbamate and urea pesticides shall be grab samples. For all other pollutants, 24-hour composite samples must be obtained through flow-proportioned composite sampling. Sampling and analysis shall be performed in accordance with the techniques prescribed in 40 CFR Part 136 and amendments thereto. For effluent monitoring, the reporting limits for the individual parameters shall be at or below the minimum levels (MLs) as stated in the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (2000) [also known as the State Implementation Policy (SIP)]; any revisions to the MLs shall be adhered to. If a parameter does not have a stated minimum level, then the Discharger shall conduct the analysis using the lowest commercially available and reasonably achievable detection levels.

The following standardized report format should be used for submittal of the influent and effluent monitoring report. A similar structured format may be used but will be subject to Regional Water Board approval. The monitoring reports shall be submitted with the Semiannual Reports.

a. Sampling Procedures – This section shall include a brief discussion of the sample locations, collection times, how the sample was collected (i.e., direct collection using vials or bottles, or other types of collection using devices such as automatic samplers, buckets, or beakers), types of containers used, storage procedures and holding times. Include description of prechlorination and chlorination/dechlorination practices during the sampling periods.

b. Method of Sampling Dechlorination – A brief description of the sample dechlorination method prior to analysis shall be provided.

c. Sample Compositing – The manner in which samples are composited shall be described. If the compositing procedure is different from the test method specifications, a reason for the variation shall be provided.

d. Data Validation – All quality assurance/quality control (QA/QC) methods to be used shall be discussed and summarized. These methods include, but are not limited to, spike samples, split samples, blanks and standards. Ways in which the QA/QC data will be used to qualify the analytical test results shall be identified. A certification statement shall be submitted with this discussion stating that the laboratory QA/QC validation data has been reviewed and has met the laboratory acceptance criteria. The QA/QC validation data shall be submitted to the Regional Water Board upon request.

e. A tabulation of the test results shall be provided.

f. Discussion of Results – The report shall include a complete discussion of the test results. If any pollutants are detected in sufficient concentration to upset, interfere or pass through plant operations, the type of pollutant(s) and potential source(s) shall be noted, along with a plan of action to control, eliminate, and/or monitor the pollutant(s). Any apparent generation and/or destruction of pollutants attributable to chlorination/dechlorination sampling and analysis practices shall be noted.

2. Sludge Monitoring

Sludge should be sampled in the same 24-hour period during which the influent and effluent are sampled except as noted in (C) below. The same parameters required for influent and effluent analysis shall be included in the sludge analysis. The sludge analyzed shall be a composite sample of the sludge for final disposal consisting of:

a. Sludge lagoons – 20 grab samples collected at representative equidistant intervals (grid pattern) and composited as a single grab, or

b. Dried stockpile – 20 grab samples collected at various representative locations and depths and composited as a single grab, or

c. Dewatered sludge- daily composite of 4 representative grab samples each day for 5 days taken at equal intervals during the daily operating shift taken from a) the dewatering units or b) from each truckload, and shall be combined into a single 5-day composite.

The USEPA manual, POTW Sludge Sampling and Analysis Guidance Document, August 1989, containing detailed sampling protocols specific to sludge is recommended as a guidance for sampling procedures. The USEPA manual Analytical Methods of the National Sewage Sludge Survey, September 1990, containing detailed analytical protocols specific to sludge, is recommended as a guidance for analytical methods.

In determining if the sludge is a hazardous waste, the Dischargers shall adhere to Article 2, "Criteria for Identifying the Characteristics of Hazardous Waste," and Article 3, "Characteristics of Hazardous Waste," of Title 22, California Code of Regulations, Sections 66261.10 to 66261.24 and all amendments thereto.

Sludge monitoring reports shall be submitted with the appropriate Semiannual Report. The following standardized report format should be used for submittal of the report. A similarly structured form may be used but will be subject to Regional Water Board approval.

a. Sampling procedures – Include sample locations, collection procedures, types of containers used, storage/refrigeration methods, compositing techniques and holding times. Enclose a map of sample locations if sludge lagoons or stockpiled sludge is sampled.

b. Data Validation – All quality assurance/quality control (QA/QC) methods to be used shall be discussed and summarized. These methods include, but are not limited to, spike samples, split samples, blanks and standards. Ways in which the QA/QC data will be used to qualify the analytical test results shall be identified. A certification statement shall be submitted with this discussion stating that the laboratory QA/QC validation data has been reviewed and has met the laboratory acceptance criteria. The QA/QC validation data shall be submitted to the Regional Water Board upon request.

c. Test Results – Tabulate the test results and include the percent solids.

d. Discussion of Results – The report shall include a complete discussion of test results. If the detected pollutant(s) is reasonably deemed to have an adverse effect on sludge disposal, a plan of action to control, eliminate, and/or monitor the pollutant(s) and the known or potential source(s) shall be included. Any apparent generation and/or destruction of pollutants attributable to chlorination/ dechlorination sampling and analysis practices shall be noted.

The Discharger shall also provide any influent, effluent or sludge monitoring data for nonpriority pollutants that the permittee believes may be causing or contributing to Interference, Pass Through or adversely impacting sludge quality.

APPENDIX F – EPA FORM 3510-2A

Disclaimer

This is an updated PDF document that allows you to type your information directly into the form, print it, and save the completed form.

Note: This form can be viewed and saved only using Adobe Acrobat Reader version 7.0 or higher, or if you have the full Adobe Professional version.

Instructions:

1. Type in your information
2. Save file (if desired)
3. Print the completed form
4. Sign and date the printed copy
5. Mail it to the directed contact.

FACILITY NAME AND PERMIT NUMBER:

Form Approved 1/14/99
OMB Number 2040-0086

FORM **2A** NPDES

NPDES FORM 2A APPLICATION OVERVIEW

APPLICATION OVERVIEW

Form 2A has been developed in a modular format and consists of a "Basic Application Information" packet and a "Supplemental Application Information" packet. The Basic Application Information packet is divided into two parts. All applicants must complete Parts A and C. Applicants with a design flow greater than or equal to 0.1 mgd must also complete Part B. Some applicants must also complete the Supplemental Application Information packet. The following items explain which parts of Form 2A you must complete.

BASIC APPLICATION INFORMATION:

A. **Basic Application Information for all Applicants.** All applicants must complete questions A.1 through A.8. A treatment works that discharges effluent to surface waters of the United States must also answer questions A.9 through A.12.

B. **Additional Application Information for Applicants with a Design Flow $\geq$ 0.1 mgd.** All treatment works that have design flows greater than or equal to 0.1 million gallons per day must complete questions B.1 through B.6.

C. **Certification.** All applicants must complete Part C (Certification).

SUPPLEMENTAL APPLICATION INFORMATION:

D. **Expanded Effluent Testing Data.** A treatment works that discharges effluent to surface waters of the United States and meets one or more of the following criteria must complete Part D (Expanded Effluent Testing Data):

1. Has a design flow rate greater than or equal to 1 mgd,
2. Is required to have a pretreatment program (or has one in place), or
3. Is otherwise required by the permitting authority to provide the information.

E. **Toxicity Testing Data.** A treatment works that meets one or more of the following criteria must complete Part E (Toxicity Testing Data):

1. Has a design flow rate greater than or equal to 1 mgd,
2. Is required to have a pretreatment program (or has one in place), or
3. Is otherwise required by the permitting authority to submit results of toxicity testing.

F. **Industrial User Discharges and RCRA/CERCLA Wastes.** A treatment works that accepts process wastewater from any significant industrial users (SIUs) or receives RCRA or CERCLA wastes must complete Part F (Industrial User Discharges and RCRA/CERCLA Wastes). SIUs are defined as:

1. All industrial users subject to Categorical Pretreatment Standards under 40 Code of Federal Regulations (CFR) 403.6 and 40 CFR Chapter I, Subchapter N (see instructions); and
2. Any other industrial user that:
   a. Discharges an average of 25,000 gallons per day or more of process wastewater to the treatment works (with certain exclusions); or
   b. Contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the treatment plant; or
   c. Is designated as an SIU by the control authority.

G. **Combined Sewer Systems.** A treatment works that has a combined sewer system must complete Part G (Combined Sewer Systems).

ALL APPLICANTS MUST COMPLETE PART C (CERTIFICATION)

FACILITY NAME AND PERMIT NUMBER:

Form Approved 1/14/99
OMB Number 2040-0086

BASIC APPLICATION INFORMATION

PART A. BASIC APPLICATION INFORMATION FOR ALL APPLICANTS:

All treatment works must complete questions A.1 through A.8 of this Basic Application Information packet.

A.1. Facility Information.

Facility name __________

Mailing Address __________

Contact person __________

Title __________

Telephone number __________

Facility Address __________
(not P.O. Box)

A.2. Applicant Information. If the applicant is different from the above, provide the following:

Applicant name __________

Mailing Address __________

Contact person __________

Title __________

Telephone number __________

Is the applicant the owner or operator (or both) of the treatment works?

______ owner ______ operator

Indicate whether correspondence regarding this permit should be directed to the facility or the applicant.

______ facility ______ applicant

A.3. Existing Environmental Permits. Provide the permit number of any existing environmental permits that have been issued to the treatment works (include state-issued permits).

NPDES ______	PSD ______
UIC ______	Other ______
RCRA ______	Other ______

A.4. Collection System Information. Provide information on municipalities and areas served by the facility. Provide the name and population of each entity and, if known, provide information on the type of collection system (combined vs. separate) and its ownership (municipal, private, etc.).

Name	**Population Served**	**Type of Collection System**	**Ownership**
Total population served			

FACILITY NAME AND PERMIT NUMBER:

Form Approved 1/14/99
OMB Number 2040-0086

A.5. Indian Country.

a. Is the treatment works located in Indian Country?

_______ Yes _______ No

b. Does the treatment works discharge to a receiving water that is either in Indian Country or that is upstream from (and eventually flows through) Indian Country?

_______ Yes _______ No

A.6. Flow. Indicate the design flow rate of the treatment plant (i.e., the wastewater flow rate that the plant was built to handle). Also provide the average daily flow rate and maximum daily flow rate for each of the last three years. Each year's data must be based on a 12-month time period with the 12th month of "this year" occurring no more than three months prior to this application submittal.

a. Design flow rate ______________ mgd

	Two Years Ago	Last Year	This Year	
b. Annual average daily flow rate				mgd
c. Maximum daily flow rate				mgd

A.7. Collection System. Indicate the type(s) of collection system(s) used by the treatment plant. Check all that apply. Also estimate the percent contribution (by miles) of each.

_______ Separate sanitary sewer _______________ %

_______ Combined storm and sanitary sewer _______________ %

A.8. Discharges and Other Disposal Methods.

a. Does the treatment works discharge effluent to waters of the U.S.? _______ Yes _______ No

If yes, list how many of each of the following types of discharge points the treatment works uses:

i. Discharges of treated effluent _______________

ii. Discharges of untreated or partially treated effluent _______________

iii. Combined sewer overflow points _______________

iv. Constructed emergency overflows (prior to the headworks) _______________

v. Other _______________________________ _______________

b. Does the treatment works discharge effluent to basins, ponds, or other surface impoundments that do not have outlets for discharge to waters of the U.S.? _______ Yes _______ No

If yes, provide the following <u>for each surface impoundment</u>:

Location: ____

Annual average daily volume discharged to surface impoundment(s) _______________________ mgd

Is discharge ________ continuous or ________ intermittent?

c. Does the treatment works land-apply treated wastewater? _______ Yes _______ No

If yes, provide the following <u>for each land application site</u>:

Location: ____

Number of acres: _______________________________

Annual average daily volume applied to site: _____________________ Mgd

Is land application ________ continuous or ________ intermittent?

d. Does the treatment works discharge or transport treated or untreated wastewater to another treatment works? _______ Yes _______ No

If yes, describe the mean(s) by which the wastewater from the treatment works is discharged or transported to the other treatment works (e.g., tank truck, pipe).

If transport is by a party other than the applicant, provide:

Transporter name:

Mailing Address:

Contact person:

Title:

Telephone number:

<u>For each treatment works that receives this discharge</u>, provide the following:

Name:

Mailing Address:

Contact person:

Title:

Telephone number:

If known, provide the NPDES permit number of the treatment works that receives this discharge.

Provide the average daily flow rate from the treatment works into the receiving facility. ______ mgd

e. Does the treatment works discharge or dispose of its wastewater in a manner not included in A.8.a through A.8.d above (e.g., underground percolation, well injection)? ______ Yes ______ No

If yes, provide the following <u>for each disposal method</u>:

Description of method (including location and size of site(s) if applicable):

Annual daily volume disposed of by this method:

Is disposal through this method ______ continuous or ______ intermittent?

FACILITY NAME AND PERMIT NUMBER:

Form Approved 1/14/99
OMB Number 2040-0086

WASTEWATER DISCHARGES:

If you answered "yes" to question A.8.a, complete questions A.9 through A.12 **once for each outfall** (including bypass points) through which effluent is discharged. Do not include information on combined sewer overflows in this section. **If you answered "no" to question A.8.a**, go to Part B, "Additional Application Information for Applicants with a Design Flow Greater than or Equal to 0.1 mgd."

A.9. Description of Outfall.

a. Outfall number ______________

b. Location

(City or town, if applicable) ______________ (Zip Code) ______________

(County) ______________ (State) ______________

(Latitude) ______________ (Longitude) ______________

c. Distance from shore (if applicable) ______________ ft.

d. Depth below surface (if applicable) ______________ ft.

e. Average daily flow rate ______________ mgd

f. Does this outfall have either an intermittent or a periodic discharge? ______ Yes ______ No (go to A.9.g.)

If yes, provide the following information:

Number of times per year discharge occurs: ______________

Average duration of each discharge: ______________

Average flow per discharge: ______________ mgd

Months in which discharge occurs: ______________

g. Is outfall equipped with a diffuser? ______ Yes ______ No

A.10. Description of Receiving Waters.

a. Name of receiving water ______________

b. Name of watershed (if known) ______________

United States Soil Conservation Service 14-digit watershed code (if known): ______________

c. Name of State Management/River Basin (if known): ______________

United States Geological Survey 8-digit hydrologic cataloging unit code (if known): ______________

d. Critical low flow of receiving stream (if applicable):
acute ______________ cfs chronic ______________ cfs

e. Total hardness of receiving stream at critical low flow (if applicable): ______________ mg/l of $CaCO_3$

A.11. Description of Treatment.

a. What levels of treatment are provided? Check all that apply.

_______ Primary _______ Secondary

_______ Advanced _______ Other. Describe: ________________

b. Indicate the following removal rates (as applicable):

Design BOD_5 removal or Design $CBOD_5$ removal ________ %

Design SS removal ________ %

Design P removal ________ %

Design N removal ________ %

Other ________ ________ %

c. What type of disinfection is used for the effluent from this outfall? If disinfection varies by season, please describe.

____

If disinfection is by chlorination, is dechlorination used for this outfall? _______ Yes _______ No

d. Does the treatment plant have post aeration? _______ Yes _______ No

A.12. Effluent Testing Information. All Applicants that discharge to waters of the US must provide effluent testing data for the following parameters. Provide the indicated effluent testing required by the permitting authority for each outfall through which effluent is discharged. Do not include information on combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136. At a minimum, effluent testing data must be based on at least three samples and must be no more than four and one-half years apart.

Outfall number: ________________

PARAMETER	MAXIMUM DAILY VALUE		AVERAGE DAILY VALUE		
	Value	Units	Value	Units	Number of Samples
pH (Minimum)		s.u.			
pH (Maximum)		s.u.			
Flow Rate					
Temperature (Winter)					
Temperature (Summer)					

* For pH please report a minimum and a maximum daily value

POLLUTANT		MAXIMUM DAILY DISCHARGE		AVERAGE DAILY DISCHARGE			ANALYTICAL METHOD	ML / MDL
		Conc.	Units	Conc.	Units	Number of Samples		
CONVENTIONAL AND NONCONVENTIONAL COMPOUNDS.								
BIOCHEMICAL OXYGEN	BOD-5							
DEMAND (Report one)	CBOD-5							
FECAL COLIFORM								
TOTAL SUSPENDED SOLIDS (TSS)								

END OF PART A.
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM 2A YOU MUST COMPLETE

FACILITY NAME AND PERMIT NUMBER:

Form Approved 1/14/99
OMB Number 2040-0086

BASIC APPLICATION INFORMATION

PART B. ADDITIONAL APPLICATION INFORMATION FOR APPLICANTS WITH A DESIGN FLOW GREATER THAN OR EQUAL TO 0.1 MGD (100,000 gallons per day).

All applicants with a design flow rate $\geq$ 0.1 mgd must answer questions B.1 through B.6. All others go to Part C (Certification).

B.1. Inflow and Infiltration. Estimate the average number of gallons per day that flow into the treatment works from inflow and/or infiltration.

__________________gpd

Briefly explain any steps underway or planned to minimize inflow and infiltration.

____

____

B.2. Topographic Map. Attach to this application a topographic map of the area extending at least one mile beyond facility property boundaries. This map must show the outline of the facility and the following information. (You may submit more than one map if one map does not show the entire area.)

a. The area surrounding the treatment plant, including all unit processes.

b. The major pipes or other structures through which wastewater enters the treatment works and the pipes or other structures through which treated wastewater is discharged from the treatment plant. Include outfalls from bypass piping, if applicable.

c. Each well where wastewater from the treatment plant is injected underground.

d. Wells, springs, other surface water bodies, and drinking water wells that are: 1) within 1/4 mile of the property boundaries of the treatment works, and 2) listed in public record or otherwise known to the applicant.

e. Any areas where the sewage sludge produced by the treatment works is stored, treated, or disposed.

f. If the treatment works receives waste that is classified as hazardous under the Resource Conservation and Recovery Act (RCRA) by truck, rail, or special pipe, show on the map where that hazardous waste enters the treatment works and where it is treated, stored, and/or disposed.

B.3. Process Flow Diagram or Schematic. Provide a diagram showing the processes of the treatment plant, including all bypass piping and all backup power sources or redundancy in the system. Also provide a water balance showing all treatment units, including disinfection (e.g, chlorination and dechlorination). The water balance must show daily average flow rates at influent and discharge points and approximate daily flow rates between treatment units. Include a brief narrative description of the diagram.

B.4. Operation/Maintenance Performed by Contractor(s).

Are any operational or maintenance aspects (related to wastewater treatment and effluent quality) of the treatment works the responsibility of a contractor? ____Yes ____No

If yes, list the name, address, telephone number, and status of each contractor and describe the contractor's responsibilities (attach additional pages if necessary).

Name: ____

Mailing Address: ____

____

Telephone Number: ____

Responsibilities of Contractor: ____

B.5. Scheduled Improvements and Schedules of Implementation. Provide information on any uncompleted implementation schedule or uncompleted plans for improvements that will affect the wastewater treatment, effluent quality, or design capacity of the treatment works. If the treatment works has several different implementation schedules or is planning several improvements, submit separate responses to question B.5 for each. (If none, go to question B.6.)

a. List the outfall number (assigned in question A.9) for each outfall that is covered by this implementation schedule.

____

b. Indicate whether the planned improvements or implementation schedule are required by local, State, or Federal agencies.

____Yes ____No

FACILITY NAME AND PERMIT NUMBER:

Form Approved 1/14/99
OMB Number 2040-0086

c If the answer to B.5.b is "Yes," briefly describe, including new maximum daily inflow rate (if applicable).

____

d. Provide dates imposed by any compliance schedule or any actual dates of completion for the implementation steps listed below, as applicable. For improvements planned independently of local, State, or Federal agencies, indicate planned or actual completion dates, as applicable. Indicate dates as accurately as possible.

Implementation Stage	Schedule MM / DD / YYYY	Actual Completion MM / DD / YYYY
– Begin construction	___/ ___/ _____	___/ ___/ _____
– End construction	___/ ___/ _____	___/ ___/ _____
– Begin discharge	___/ ___/ _____	___/ ___/ _____
– Attain operational level	___/ ___/ _____	___/ ___/ _____

e. Have appropriate permits/clearances concerning other Federal/State requirements been obtained? ____Yes ____No

Describe briefly: ____

____

B.6. EFFLUENT TESTING DATA (GREATER THAN O.1 MGD ONLY).

Applicants that discharge to waters of the US must provide effluent testing data for the following parameters. Provide the indicated effluent testing required by the permitting authority for each outfall through which effluent is discharged. Do not include information on combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136. At a minimum, effluent testing data must be based on at least three pollutant scans and must be no more than four and one-half years old.

Outfall Number:_______________

POLLUTANT	MAXIMUM DAILY DISCHARGE		AVERAGE DAILY DISCHARGE			ANALYTICAL METHOD	ML / MDL
	Conc.	Units	Conc.	Units	Number of Samples		
CONVENTIONAL AND NONCONVENTIONAL COMPOUNDS.							
AMMONIA (as N)							
CHLORINE (TOTAL RESIDUAL, TRC)							
DISSOLVED OXYGEN							
TOTAL KJELDAHL NITROGEN (TKN)							
NITRATE PLUS NITRITE NITROGEN							
OIL and GREASE							
PHOSPHORUS (Total)							
TOTAL DISSOLVED SOLIDS (TDS)							
OTHER							

END OF PART B.
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM 2A YOU MUST COMPLETE

FACILITY NAME AND PERMIT NUMBER:

Form Approved 1/14/99
OMB Number 2040-0086

BASIC APPLICATION INFORMATION

PART C. CERTIFICATION

All applicants must complete the Certification Section. Refer to instructions to determine who is an officer for the purposes of this certification. All applicants must complete all applicable sections of Form 2A, as explained in the Application Overview. Indicate below which parts of Form 2A you have completed and are submitting. By signing this certification statement, applicants confirm that they have reviewed Form 2A and have completed all sections that apply to the facility for which this application is submitted.

Indicate which parts of Form 2A you have completed and are submitting:

_____ Basic Application Information packet

Supplemental Application Information packet:

______ Part D (Expanded Effluent Testing Data)

______ Part E (Toxicity Testing: Biomonitoring Data)

______ Part F (Industrial User Discharges and RCRA/CERCLA Wastes)

______ Part G (Combined Sewer Systems)

ALL APPLICANTS MUST COMPLETE THE FOLLOWING 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 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.

Name and official title ____

Signature ____

Telephone number ____

Date signed ____

Upon request of the permitting authority, you must submit any other information necessary to assess wastewater treatment practices at the treatment works or identify appropriate permitting requirements.

SEND COMPLETED FORMS TO:

FACILITY NAME AND PERMIT NUMBER:

Form Approved 1/14/99
OMB Number 2040-0086

SUPPLEMENTAL APPLICATION INFORMATION

PART D. EXPANDED EFFLUENT TESTING DATA

Refer to the directions on the cover page to determine whether this section applies to the treatment works.

Effluent Testing: 1.0 mgd and Pretreatment Treatment Works. If the treatment works has a design flow greater than or equal to 1.0 mgd or it has (or is required to have) a pretreatment program, or is otherwise required by the permitting authority to provide the data, then provide effluent testing data for the following pollutants. Provide the indicated effluent testing information and any other information required by the permitting authority for each outfall through which effluent is discharged. Do not include information on combined sewer overflows in this section. All information reported must be based on data collected through analyses conducted using 40 CFR Part 136 methods. In addition, these data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136. Indicate in the blank rows provided below any data you may have on pollutants not specifically listed in this form. At a minimum, effluent testing data must be based on at least three pollutant scans and must be no more than four and one-half years old.

Outfall number: _______________ (Complete once for each outfall discharging effluent to waters of the United States.)

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/ MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	Number of Samples		
METALS (TOTAL RECOVERABLE), CYANIDE, PHENOLS, AND HARDNESS.											
ANTIMONY											
ARSENIC											
BERYLLIUM											
CADMIUM											
CHROMIUM											
COPPER											
LEAD											
MERCURY											
NICKEL											
SELENIUM											
SILVER											
THALLIUM											
ZINC											
CYANIDE											
TOTAL PHENOLIC COMPOUNDS											
HARDNESS (AS $CaCO_3$)											
Use this space (or a separate sheet) to provide information on other metals requested by the permit writer.											

FACILITY NAME AND PERMIT NUMBER:

Form Approved 1/14/99
OMB Number 2040-0086

Outfall number: _____________ (Complete once for each outfall discharging effluent to waters of the United States.)

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/ MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	Number of Samples		
VOLATILE ORGANIC COMPOUNDS.											
ACROLEIN											
ACRYLONITRILE											
BENZENE											
BROMOFORM											
CARBON TETRACHLORIDE											
CLOROBENZENE											
CHLORODIBROMO-METHANE											
CHLOROETHANE											
2-CHLORO-ETHYLVINYL ETHER											
CHLOROFORM											
DICHLOROBROMO-METHANE											
1,1-DICHLOROETHANE											
1,2-DICHLOROETHANE											
TRANS-1,2-DICHLORO-ETHYLENE											
1,1-DICHLOROETHYLENE											
1,2-DICHLOROPROPANE											
1,3-DICHLORO-PROPYLENE											
ETHYLBENZENE											
METHYL BROMIDE											
METHYL CHLORIDE											
METHYLENE CHLORIDE											
1,1,2,2-TETRACHLORO-ETHANE											
TETRACHLORO-ETHYLENE											
TOLUENE											

FACILITY NAME AND PERMIT NUMBER:

Form Approved 1/14/99
OMB Number 2040-0086

Outfall number: ______________ (Complete once for each outfall discharging effluent to waters of the United States.)

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/ MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	Number of Samples		
1,1,1-TRICHLOROETHANE											
1,1,2-TRICHLOROETHANE											
TRICHLORETHYLENE											
VINYL CHLORIDE											
Use this space (or a separate sheet) to provide information on other volatile organic compounds requested by the permit writer.											
ACID-EXTRACTABLE COMPOUNDS											
P-CHLORO-M-CRESOL											
2-CHLOROPHENOL											
2,4-DICHLOROPHENOL											
2,4-DIMETHYLPHENOL											
4,6-DINITRO-O-CRESOL											
2,4-DINITROPHENOL											
2-NITROPHENOL											
4-NITROPHENOL											
PENTACHLOROPHENOL											
PHENOL											
2,4,6-TRICHLOROPHENOL											
Use this space (or a separate sheet) to provide information on other acid-extractable compounds requested by the permit writer.											
BASE-NEUTRAL COMPOUNDS.											
ACENAPHTHENE											
ACENAPHTHYLENE											
ANTHRACENE											
BENZIDINE											
BENZO(A)ANTHRACENE											
BENZO(A)PYRENE											

FACILITY NAME AND PERMIT NUMBER:

Form Approved 1/14/99
OMB Number 2040-0086

Outfall number: ______________ (Complete once for each outfall discharging effluent to waters of the United States.)

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/ MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	Number of Samples		
3,4 BENZO-FLUORANTHENE											
BENZO(GHI)PERYLENE											
BENZO(K)FLUORANTHENE											
BIS (2-CHLOROETHOXY) METHANE											
BIS (2-CHLOROETHYL)-ETHER											
BIS (2-CHLOROISO-PROPYL) ETHER											
BIS (2-ETHYLHEXYL) PHTHALATE											
4-BROMOPHENYL PHENYL ETHER											
BUTYL BENZYL PHTHALATE											
2-CHLORONAPHTHALENE											
4-CHLORPHENYL PHENYL ETHER											
CHRYSENE											
DI-N-BUTYL PHTHALATE											
DI-N-OCTYL PHTHALATE											
DIBENZO(A,H) ANTHRACENE											
1,2-DICHLOROBENZENE											
1,3-DICHLOROBENZENE											
1,4-DICHLOROBENZENE											
3,3-DICHLOROBENZIDINE											
DIETHYL PHTHALATE											
DIMETHYL PHTHALATE											
2,4-DINITROTOLUENE											
2,6-DINITROTOLUENE											
1,2-DIPHENYLHYDRAZINE											

FACILITY NAME AND PERMIT NUMBER:

Form Approved 1/14/99
OMB Number 2040-0086

Outfall number: ______________ (Complete once for each outfall discharging effluent to waters of the United States.)

POLLUTANT	MAXIMUM DAILY DISCHARGE				AVERAGE DAILY DISCHARGE					ANALYTICAL METHOD	ML/ MDL
	Conc.	Units	Mass	Units	Conc.	Units	Mass	Units	Number of Samples		
FLUORANTHENE											
FLUORENE											
HEXACHLOROBENZENE											
HEXACHLOROBUTADIENE											
HEXACHLOROCYCLO-PENTADIENE											
HEXACHLOROETHANE											
INDENO(1,2,3-CD)PYRENE											
ISOPHORONE											
NAPHTHALENE											
NITROBENZENE											
N-NITROSODI-N-PROPYLAMINE											
N-NITROSODI- METHYLAMINE											
N-NITROSODI-PHENYLAMINE											
PHENANTHRENE											
PYRENE											
1,2,4-TRICHLOROBENZENE											
Use this space (or a separate sheet) to provide information on other base-neutral compounds requested by the permit writer.											
Use this space (or a separate sheet) to provide information on other pollutants (e.g., pesticides) requested by the permit writer.											

END OF PART D.
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM 2A YOU MUST COMPLETE

FACILITY NAME AND PERMIT NUMBER:

Form Approved 1/14/99
OMB Number 2040-0086

SUPPLEMENTAL APPLICATION INFORMATION

PART E. TOXICITY TESTING DATA

POTWs meeting one or more of the following criteria must provide the results of whole effluent toxicity tests for acute or chronic toxicity for each of the facility's discharge points: 1) POTWs with a design flow rate greater than or equal to 1.0 mgd; 2) POTWs with a pretreatment program (or those that are required to have one under 40 CFR Part 403); or 3) POTWs required by the permitting authority to submit data for these parameters.

- At a minimum, these results must include quarterly testing for a 12-month period within the past 1 year using multiple species (minimum of two species), or the results from four tests performed at least annually in the four and one-half years prior to the application, provided the results show no appreciable toxicity, and testing for acute and/or chronic toxicity, depending on the range of receiving water dilution. Do not include information on combined sewer overflows in this section. All information reported must be based on data collected through analysis conducted using 40 CFR Part 136 methods. In addition, this data must comply with QA/QC requirements of 40 CFR Part 136 and other appropriate QA/QC requirements for standard methods for analytes not addressed by 40 CFR Part 136.
- In addition, submit the results of any other whole effluent toxicity tests from the past four and one-half years. If a whole effluent toxicity test conducted during the past four and one-half years revealed toxicity, provide any information on the cause of the toxicity or any results of a toxicity reduction evaluation, if one was conducted.
- If you have already submitted any of the information requested in Part E, you need not submit it again. Rather, provide the information requested in question E.4 for previously submitted information. If EPA methods were not used, report the reasons for using alternate methods. If test summaries are available that contain all of the information requested below, they may be submitted in place of Part E.

If no biomonitoring data is required, do not complete Part E. Refer to the Application Overview for directions on which other sections of the form to complete.

E.1. Required Tests.

Indicate the number of whole effluent toxicity tests conducted in the past four and one-half years.

____chronic ____acute

E.2. Individual Test Data. Complete the following chart for each whole effluent toxicity test conducted in the last four and one-half years. Allow one column per test (where each species constitutes a test). Copy this page if more than three tests are being reported.

	Test number:________	Test number:________	Test number:________
a. Test information.			
Test species & test method number			
Age at initiation of test			
Outfall number			
Dates sample collected			
Date test started			
Duration			
b. Give toxicity test methods followed.			
Manual title			
Edition number and year of publication			
Page number(s)			
c. Give the sample collection method(s) used. For multiple grab samples, indicate the number of grab samples used.			
24-Hour composite			
Grab			
d. Indicate where the sample was taken in relation to disinfection. (Check all that apply for each)			
Before disinfection			
After disinfection			
After dechlorination			

FACILITY NAME AND PERMIT NUMBER:

	Test number:________	Test number:________	Test number:________
e. Describe the point in the treatment process at which the sample was collected.			
Sample was collected:			
f. For each test, include whether the test was intended to assess chronic toxicity, acute toxicity, or both.			
Chronic toxicity			
Acute toxicity			
g. Provide the type of test performed.			
Static			
Static-renewal			
Flow-through			
h. Source of dilution water. If laboratory water, specify type; if receiving water, specify source.			
Laboratory water			
Receiving water			
i. Type of dilution water. It salt water, specify "natural" or type of artificial sea salts or brine used.			
Fresh water			
Salt water			
j. Give the percentage effluent used for all concentrations in the test series.			
k. Parameters measured during the test. (State whether parameter meets test method specifications)			
pH			
Salinity			
Temperature			
Ammonia			
Dissolved oxygen			
l. Test Results.			
Acute:			
Percent survival in 100% effluent	%	%	%
LC_{50}			
95% C.I.	%	%	%
Control percent survival	%	%	%
Other (describe)			

Chronic:			
NOEC	%	%	%
IC_{25}	%	%	%
Control percent survival	%	%	%
Other (describe)			
m. Quality Control/Quality Assurance.			
Is reference toxicant data available?			
Was reference toxicant test within acceptable bounds?			
What date was reference toxicant test run (MM/DD/YYYY)?			
Other (describe)			

E.3. Toxicity Reduction Evaluation. Is the treatment works involved in a Toxicity Reduction Evaluation?

____Yes____No If yes, describe: ____

____

____

E.4. Summary of Submitted Biomonitoring Test Information. If you have submitted biomonitoring test information, or information regarding the cause of toxicity, within the past four and one-half years, provide the dates the information was submitted to the permitting authority and a summary of the results.

Date submitted: _______________ (MM/DD/YYYY)

Summary of results: (see instructions)

____

____

END OF PART E.
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM 2A YOU MUST COMPLETE.

FACILITY NAME AND PERMIT NUMBER:

Form Approved 1/14/99
OMB Number 2040-0086

SUPPLEMENTAL APPLICATION INFORMATION

PART F. INDUSTRIAL USER DISCHARGES AND RCRA/CERCLA WASTES

All treatment works receiving discharges from significant industrial users or which receive RCRA, CERCLA, or other remedial wastes must complete Part F.

GENERAL INFORMATION:

F.1. Pretreatment Program. Does the treatment works have, or is it subject to, an approved pretreatment program?

____Yes ____No

F.2. Number of Significant Industrial Users (SIUs) and Categorical Industrial Users (CIUs). Provide the number of each of the following types of industrial users that discharge to the treatment works.

a. Number of non-categorical SIUs. ___________

b. Number of CIUs. ___________

SIGNIFICANT INDUSTRIAL USER INFORMATION:

Supply the following information for each SIU. If more than one SIU discharges to the treatment works, copy questions F.3 through F.8 and provide the information requested for each SIU.

F.3. Significant Industrial User Information. Provide the name and address of each SIU discharging to the treatment works. Submit additional pages as necessary.

Name: ____

Mailing Address: ____

____

F.4. Industrial Processes. Describe all of the industrial processes that affect or contribute to the SIU's discharge.

____

F.5. Principal Product(s) and Raw Material(s). Describe all of the principal processes and raw materials that affect or contribute to the SIU's discharge.

Principal product(s): ____

Raw material(s): ____

F.6. Flow Rate.

a. Process wastewater flow rate. Indicate the average daily volume of process wastewater discharged into the collection system in gallons per day (gpd) and whether the discharge is continuous or intermittent.

_____________ gpd (_____continuous or ______intermittent)

b. Non-process wastewater flow rate. Indicate the average daily volume of non-process wastewater flow discharged into the collection system in gallons per day (gpd) and whether the discharge is continuous or intermittent.

_____________ gpd (_____continuous or ______intermittent)

F.7. Pretreatment Standards. Indicate whether the SIU is subject to the following:

a. Local limits ____Yes ____No

b. Categorical pretreatment standards ____Yes ____No

If subject to categorical pretreatment standards, which category and subcategory?

____

F.8. Problems at the Treatment Works Attributed to Waste Discharged by the SIU. Has the SIU caused or contributed to any problems (e.g., upsets, interference) at the treatment works in the past three years?

___Yes___No If yes, describe each episode.

____
____

RCRA HAZARDOUS WASTE RECEIVED BY TRUCK, RAIL, OR DEDICATED PIPELINE:

F.9. RCRA Waste. Does the treatment works receive or has it in the past three years received RCRA hazardous waste by truck, rail, or dedicated pipe? ___Yes ___No (go to F.12.)

F.10. Waste Transport. Method by which RCRA waste is received (check all that apply):

_____Truck _____Rail _____Dedicated Pipe

F.11. Waste Description. Give EPA hazardous waste number and amount (volume or mass, specify units).

EPA Hazardous Waste Number	Amount	Units
____________________	____________	____________
____________________	____________	____________
____________________	____________	____________

CERCLA (SUPERFUND) WASTEWATER, RCRA REMEDIATION/CORRECTIVE ACTION WASTEWATER, AND OTHER REMEDIAL ACTIVITY WASTEWATER:

F.12. Remediation Waste. Does the treatment works currently (or has it been notified that it will) receive waste from remedial activities?

___Yes (complete F.13 through F.15.) ___No

Provide a list of sites and the requested information (F.13 - F.15.) for each current and future site.

F.13. Waste Origin. Describe the site and type of facility at which the CERCLA/RCRA/or other remedial waste originates (or is expected to originate in the next five years).

____
____
____

F.14. Pollutants. List the hazardous constituents that are received (or are expected to be received). Include data on volume and concentration, if known. (Attach additional sheets if necessary).

____
____

F.15. Waste Treatment.

a. Is this waste treated (or will it be treated) prior to entering the treatment works?

___Yes ___No

If yes, describe the treatment (provide information about the removal efficiency):

____
____

b. Is the discharge (or will the discharge be) continuous or intermittent?

___Continuous ___Intermittent If intermittent, describe discharge schedule.

____

END OF PART F.
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM 2A YOU MUST COMPLETE

FACILITY NAME AND PERMIT NUMBER:

Form Approved 1/14/99
OMB Number 2040-0086

SUPPLEMENTAL APPLICATION INFORMATION

PART G. COMBINED SEWER SYSTEMS

If the treatment works has a combined sewer system, complete Part G.

G.1. System Map. Provide a map indicating the following: (may be included with Basic Application Information)

a. All CSO discharge points.

b. Sensitive use areas potentially affected by CSOs (e.g., beaches, drinking water supplies, shellfish beds, sensitive aquatic ecosystems, and outstanding natural resource waters).

c. Waters that support threatened and endangered species potentially affected by CSOs.

G.2. System Diagram. Provide a diagram, either in the map provided in G.1. or on a separate drawing, of the combined sewer collection system that includes the following information:

a. Locations of major sewer trunk lines, both combined and separate sanitary.

b. Locations of points where separate sanitary sewers feed into the combined sewer system.

c. Locations of in-line and off-line storage structures.

d. Locations of flow-regulating devices.

e. Locations of pump stations.

CSO OUTFALLS:

Complete questions G.3 through G.6 once for each CSO discharge point.

G.3. Description of Outfall.

a. Outfall number ______________________________

b. Location ____
(City or town, if applicable) (Zip Code)

____
(County) (State)

____
(Latitude) (Longitude)

c. Distance from shore (if applicable) ___________ft.

d. Depth below surface (if applicable) ___________ft.

e. Which of the following were monitored during the last year for this CSO?

____Rainfall ____CSO pollutant concentrations ____CSO frequency

____CSO flow volume ____Receiving water quality

f. How many storm events were monitored during the last year? ____________

G.4. CSO Events.

a. Give the number of CSO events in the last year.

_________ events (___ actual or ___ approx.)

b. Give the average duration per CSO event.

_________ hours (____ actual or ____ approx.)

FACILITY NAME AND PERMIT NUMBER:

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OMB Number 2040-0086

c. Give the average volume per CSO event.

_________ million gallons (_____ actual or _____ approx.)

d. Give the minimum rainfall that caused a CSO event in the last year.

_________ inches of rainfall

G.5. Description of Receiving Waters.

a. Name of receiving water: ____

b. Name of watershed/river/stream system:____

United States Soil Conservation Service 14-digit watershed code (if known): ___________________________

c. Name of State Management/River Basin: ____

United States Geological Survey 8-digit hydrologic cataloging unit code (if known): ______________________

G.6. CSO Operations.

Describe any known water quality impacts on the receiving water caused by this CSO (e.g., permanent or intermittent beach closings, permanent or intermittent shell fish bed closings, fish kills, fish advisories, other recreational loss, or violation of any applicable State water quality standard).

____

____

END OF PART G.
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHICH OTHER PARTS OF FORM 2A YOU MUST COMPLETE.

Additional information, if provided, will appear on the following pages.

APPENDIX G – LETTERS FROM AUDUBON AND UNIVERSITY OF OKLAHOMA REGARDING SMALL WIND TURBINES

Audubon CALIFORNIA

555 Audubon Place
Sacramento, CA 95825
Tel: 916-481-5332
Fax: 916-481-6228
www.audubon-ca.org

July 17, 2001

Assemblyman John Longville
Room 3123, State Capitol
Sacramento, CA 95814

Re: AB 1207: Support

Dear Assemblyman Longville:

The National Audubon Society~California is pleased to support your AB 1207 which requires cities and counties to consider the siting and operation of a small wind energy system as a "use by right" if it meets the specified requirements. We have been asked by your bill sponsors to comment on the potential significant effect of AB 1207 and small wind energy on bird populations in California.

Audubon's main objective is the protection of birds and other wildlife and their habitat. We are also interested in supporting legislation that helps California deal with its current energy crisis, and that supports renewable forms of energy.

Audubon has a long history of working with the wind power industry in an effort to study and minimize the impacts of wind power development on birds and wildlife habitat. It is true that there is a correlation between bird deaths and large wind turbine farms. For example, in a recent eleven month research on Altamont, they found that 95 birds died from the wind turbines.

Unlike large-scale wind turbine operations with hundreds or thousands of turbines, AB 1207 encourages the use of small-scale wind turbines that produce approximately 50 kilowatts versus 1 megawatt of energy produced by large-scale wind turbines.

Unlike large-scale wind turbines (100 meters tall), small-scale wind turbines (30 meters tall) are a lot shorter and will not be used in the construction of large wind farms in California. The problems associated with large-scale turbines are that they are often times in the height range of migrating birds. The turbine blades also move at very high speeds, which is hard to detect by birds moving along a traditional migratory route.

We cannot assure you that there will be no bird deaths from small-scale wind turbines, but the numbers will reflect a death toll similar to the deaths caused by other stationary objects that birds routinely fly into, not the large death tolls seen with large wind turbine farms.

We do not feel that there is any significant threat to bird populations from small-scale wind turbines, and are pleased to support your AB 1207.

Sincerely,

John McCaull

John McCaull
Legislative Director

recycled paper

The University of Oklahoma

DEPARTMENT OF ZOOLOGY

22 June 2001
email: dmock@ou.edu

Mr. Mike Bergey, President and CEO
Bergey Windpower
2001 Priestley Avenue
Norman, OK 73069

Dear Mr. Bergey:

I write today in response to your request for a letter of assessment on how your wind turbines have affected the population of birds we have been studying on North Base. As you know, my wife (Dr. P.L. Schwagmeyer) and I put up nest boxes in 1993 and have been maintaining an individually-marked population of house sparrows (*Passer domesticus*) for the eight breeding seasons since. With a number of able field assistants, we spend literally hundreds of hours capturing, banding, marking, and re-sighting these birds every summer and have built a multi-year data set that has included several thousand of these small songbirds. To this day we have no records of any of our birds having been harmed in any way by the Bergey Windpower turbines, nor by the vertical shafts that support the blades. These structures are within 150' of the nearest nests. Most of the sparrow mortality we see on North Base has come from predatory birds of other species, most notably European starlings (*Sturnus vulgaris*), American kestrels (*Falco sparverius*), and loggerhead shrikes (*Lanius ludovicianus*). The very presence of these birds suggests that your operations are not harming them, either.

Please let me know if you need any further details.

Sincerely yours,

Douglas W. Mock
Professor

730 Van Vleet Oval, Room 314, Norman, Oklahoma 73019-6121 PHONE: (405) 325-4821 FAX: (405) 325-7560 E-Mail: ZOOLOGY@OU.EDU

APPENDIX H – DETAILED CIP

				CIP Time Line						5 Year CIP					
Serial No.	**Category**	**Project**	**Process Area**	**Project Start Date**	**Project End Date**	**Construction Cost**	**Project Cost Estimate**	**Five Year CIP (FY 2011-2015)**		**FY 2010-2011**	**FY 2011 - 2012**	**FY 2012 - 2013**	**FY 2013 - 2014**	**FY 2014 - 2015**	**FY 2015 - 2016**
										2011	**2012**	**2013**	**2014**	**2015**	**2016**
5-Year CIP Projects															
1	High Priority Projects	Replace 2000kW Generator/Switchgear/Generator Building	Other	2011	2012	$2,591,000	$3,135,000	$3,135,000	Project 1	$544,000	$2,591,000	$0	$0	$0	$0
2	High Priority Projects	Replace Elevated Bus Duct/Arc Flash Study	Other	2011	2012	$1,592,700	$1,927,000	$1,927,000	$5,585,000	$159,000	$1,768,000	$0	$0	$0	$0
3	High Priority Projects	SCADA Server Upgrade	Other	2011	2012	$82,000	$99,000	$99,000		$8,000	$91,000	$0	$0	$0	$0
4	High Priority Projects	Seismic Improvements to Blower Building #1	Secondary	2011	2012	$350,000	$424,000	$424,000		$35,000	$389,000	$0	$0	$0	$0
6	Minimize Blending	Flow Monitoring From NBSU Users	Other	2012	2013	$25,000	$28,000	$28,000	Project 2	$0	$2,000	$26,000	$0	$0	$0
9	Repair and Replacement	Automation/operators at Flow Split #1	Primary	2012	2013	$108,000	$131,000	$131,000	$8,388,000	$0	$11,000	$120,000	$0	$0	$0
10	Minimize Blending	RAS Gate operators/Automation (ABs 8-9)	Secondary	2012	2013	$146,000	$177,000	$177,000		$0	$15,000	$162,000	$0	$0	$0
11	Minimize Blending	Hydraulic Modification + Selectors (AB 5-7)	Secondary	2012	2013	$690,000	$835,000	$835,000		$0	$69,000	$766,000	$0	$0	$0
12	Minimize Blending	Mixers in Aeration Basins 8 & 9	Secondary	2012	2013	$367,000	$404,000	$404,000		$0	$33,000	$371,000	$0	$0	$0
19	Minimize Blending	New Secondary Clarifier	Secondary	2012	2014	$4,100,000	$4,961,000	$4,962,000		$0	$410,000	$2,276,000	$2,276,000	$0	$0
20	Minimize Blending	RAS/WAS PS Expansion	Secondary	2012	2013	$180,000	$218,000	$218,000		$0	$18,000	$200,000	$0	$0	$0
21	Minimize Blending	Wet Weather Mixed Liquor Lift Station (Flow Split #3)	Secondary	2012	2013	$510,000	$617,000	$617,000		$0	$51,000	$566,000	$0	$0	$0
22	Minimize Blending	36" PE Pipe to Pond Fill/Drain PS	Equalization	2012	2013	$840,000	$1,016,000	$1,016,000		$0	$84,000	$932,000	$0	$0	$0
17	Facility Reliability	Flood Protection Study	Other	2012	2013	$275,000	$275,000	$275,000	Project 3	$0	$100,000	$175,000	$0	$0	$0
18	Eliminate Colma Creek Discharge	Colma Creek Permit	Other	2012	2014	$1,000,000	$1,000,000	$1,000,000	$1,275,000	$0	$350,000	$450,000	$200,000	$0	$0
30	Energy Projects	Solar PV	Other	2012	2013	$800,000	$880,000	$880,000	Project 4	$0	$80,000	$800,000	$0	$0	$0
31	Repair and Replacement	Replace Small Blower in Bldg. #2 with High Speed Turbo Blower	Secondary	2011	2012	$429,100	$519,000	$519,000	$1,399,000	$0	$550,000	($31,000)	$0	$0	$0
5	Headworks/Primary Improvements	Stormwater PS to Route Onsite Flows to Headworks	Other	2012	2013	$513,000	$620,000	$620,000	Project 5	$0	$51,000	$569,000	$0	$0	$0
8	Repair and Replacement	Bar Screen 4 Bypass	Headworks	2012	2013	$50,000	$61,000	$61,000	$877,000	$0	$5,000	$56,000	$0	$0	$0
24	Repair and Replacement	Screenings Room Resurfacing	Headworks	2012	2013	$71,000	$86,000	$86,000		$0	$7,000	$79,000	$0	$0	$0
25	Repair and Replacement	Plant-wide Painting Program	Other	2012	2012	$100,000	$110,000	$110,000		$0	$110,000	$0	$0	$0	$0
13	Facility Reliability	New Roof over Primary Chemical Feed System	Primary	2014	2015	$60,000	$66,000	$66,000	Project 6	$0	$0	$0	$5,000	$61,000	$0
14	Facility Reliability	Add Staircase to Maintenance Building Roof	Other	2014	2015	$45,500	$56,000	$56,000	$1,981,000	$0	$0	$0	$5,000	$51,000	$0
23	Facility Reliability	Replace Potable Water Pipe to Admin. Bldg.	Other	2014	2015	$56,000	$68,000	$68,000		$0	$0	$0	$6,000	$62,000	$0
26	Headworks/Primary Improvements	New Vortex Grit Removal System	Headworks	2014	2015	$1,480,000	$1,791,000	$1,791,000		$0	$0	$0	$148,000	$1,643,000	$0
15	Solids Handling	Replace Digester #3 Heat Building	Digesters	2013	2014	$120,000	$145,000	$145,000	Project 7	$0	$0	$12,000	$133,000	$0	$0
16	Solids Handling	Digester 3	Digesters	2013	2015	$2,329,000	$2,818,000	$2,819,000	$3,114,000	$0	$0	$233,000	$1,293,000	$1,293,000	$0
27	Repair and Replacement	Clean out Digesters 1, 4 and 5	Solids processing	2015	2015	$135,000	$150,000	$150,000		$0	$0	$0	$0	$150,000	$0
10 Year CIP Projects															
28	Energy Projects	Existing Engine Upgrade/600 kw Fuel Cell/FOG	Other	2016	2017	$10,350,000	$12,100,000	$0		$0	$0	$0	$0	$0	$875,000
32	Eliminate Colma Creek Discharge	Wet Weather Storage	Equalization	2016	2019	$10,000,000	$12,100,000	$0		$0	$0	$0	$0	$0	$484,000
33	Solids Handling	Replace Digester 1 and 2	Digesters	2016	2018	$8,934,000	$10,810,000	$0		$0	$0	$0	$0	$0	$893,000
34	Solids Handling	Replace DAFs with GBT/Odor Control	Solids processing	2016	2018	$4,000,000	$4,840,000	$0		$0	$0	$0	$0	$0	$400,000
15 Year CIP Projects (By FY 2024)															
35	Repair and Replacement	New Aeration Basin 10	Secondary	2025	2027	$7,075,000	$8,561,000	$0		$0	$0	$0	$0	$0	$0
On-going Maintenance															
36	Repair and Replacement	Annual painting	Other	2017	2040		$350,000			$0	$0	$0	$0	$0	$30,000
Projects On-Hold															
29	Energy Projects	SGIP grant for fuel cell	Other							$0	$0	$0	$0	$0	$0
Completed Projects															
7	NPDES mitigation	Colma Creek Flow Monitoring - **Done**	Effluent Discharge	2011	2011	$0	$0	$0		$0	$0	$0	$0	$0	$0
			Total			**$59,405,000**	**$71,378,000**	**$22,619,000**	**$22,619,000**	**$746,000**	**$6,785,000**	**$7,762,000**	**$4,066,000**	**$3,260,000**	**$2,682,000**
			Rate of Escalation	5%											
			Escalation Factor							1.00	1.05	1.10	1.16	1.22	1.28
			Escalated Capital Cost							**$746,000**	**$7,124,000**	**$8,558,000**	**$4,707,000**	**$3,963,000**	**$3,423,000**

	Serial No.	Category	Project	Process Area	CIP Time Line: Project Start Date	CIP Time Line: Project End Date	Construction Cost	Project Cost Estimate	FY 2016 - 2017	FY 2017 - 2018	FY 2018 - 2019	FY 2019 - 2020	FY 2020 - 2021	FY 2021 - 2022	FY 2022 - 2023	FY 2023 - 2024
									2017	2018	2019	2020	2021	2022	2023	2024
5-Year CIP Projects																
	1	High Priority Projects	Replace 2000kW Generator/Switchgear/Generator Building	Other	2011	2012	$2,591,000	$3,135,000	$0	$0	$0	$0	$0	$0	$0	$0
	2	High Priority Projects	Replace Elevated Bus Duct/Arc Flash Study	Other	2011	2012	$1,592,700	$1,927,000	$0	$0	$0	$0	$0	$0	$0	$0
	3	High Priority Projects	SCADA Server Upgrade	Other	2011	2012	$82,000	$99,000	$0	$0	$0	$0	$0	$0	$0	$0
	4	High Priority Projects	Seismic Improvements to Blower Building #1	Secondary	2011	2012	$350,000	$424,000	$0	$0	$0	$0	$0	$0	$0	$0
	6	Minimize Blending	Flow Monitoring From NBSU Users	Other	2012	2013	$25,000	$28,000	$0	$0	$0	$0	$0	$0	$0	$0
	9	Repair and Replacement	Automation/operators at Flow Split #1	Primary	2012	2013	$108,000	$131,000	$0	$0	$0	$0	$0	$0	$0	$0
	10	Minimize Blending	RAS Gate operators/Automation (ABs 8-9)	Secondary	2012	2013	$146,000	$177,000	$0	$0	$0	$0	$0	$0	$0	$0
	11	Minimize Blending	Hydraulic Modification + Selectors (AB 5-7)	Secondary	2012	2013	$690,000	$835,000	$0	$0	$0	$0	$0	$0	$0	$0
	12	Minimize Blending	Mixers in Aeration Basins 8 & 9	Secondary	2012	2013	$367,000	$404,000	$0	$0	$0	$0	$0	$0		
	19	Minimize Blending	New Secondary Clarifier	Secondary	2012	2014	$4,100,000	$4,961,000	$0	$0	$0	$0	$0	$0	$0	$0
	20	Minimize Blending	RAS/WAS PS Expansion	Secondary	2012	2013	$180,000	$218,000	$0	$0	$0	$0	$0	$0	$0	$0
	21	Minimize Blending	Wet Weather Mixed Liquor Lift Station (Flow Split #3)	Secondary	2012	2013	$510,000	$617,000	$0	$0	$0	$0	$0	$0	$0	$0
	22	Minimize Blending	36" PE Pipe to Pond Fill/Drain PS	Equalization	2012	2013	$840,000	$1,016,000	$0	$0	$0	$0	$0	$0	$0	$0
	17	Facility Reliability	Flood Protection Study	Other	2012	2013	$275,000	$275,000	$0	$0	$0	$0	$0	$0	$0	$0
	18	Eliminate Colma Creek Discharge	Colma Creek Permit	Other	2012	2014	$1,000,000	$1,000,000	$0	$0	$0	$0	$0	$0	$0	$0
	30	Energy Projects	Solar PV	Other	2012	2013	$800,000	$880,000	$0	$0	$0	$0	$0	$0	$0	$0
	31	Repair and Replacement	Replace Small Blower in Bldg. #2 with High Speed Turbo Blower	Secondary	2011	2012	$429,100	$519,000	$0	$0	$0	$0	$0	$0	$0	$0
	5	Headworks/Primary Improvements	Stormwater PS to Route Onsite Flows to Headworks	Other	2012	2013	$513,000	$620,000	$0	$0	$0	$0	$0	$0	$0	$0
	8	Repair and Replacement	Bar Screen 4 Bypass	Headworks	2012	2013	$50,000	$61,000	$0	$0	$0	$0	$0	$0	$0	$0
	24	Repair and Replacement	Screenings Room Resurfacing	Headworks	2012	2013	$71,000	$86,000	$0	$0	$0	$0	$0	$0	$0	$0
	25	Repair and Replacement	Plant-wide Painting Program	Other	2012	2012	$100,000	$110,000	$0	$0	$0	$0	$0	$0	$0	$0
	13	Facility Reliability	New Roof over Primary Chemical Feed System	Primary	2014	2015	$60,000	$66,000	$0	$0	$0	$0	$0	$0		
	14	Facility Reliability	Add Staircase to Maintenance Building Roof	Other	2014	2015	$45,500	$56,000	$0	$0	$0	$0	$0	$0	$0	$0
	23	Facility Reliability	Replace Potable Water Pipe to Admin. Bldg.	Other	2014	2015	$56,000	$68,000	$0	$0	$0	$0	$0	$0	$0	$0
	26	Headworks/Primary Improvements	New Vortex Grit Removal System	Headworks	2014	2015	$1,480,000	$1,791,000	$0	$0	$0	$0	$0	$0	$0	$0
	15	Solids Handling	Replace Digester #3 Heat Building	Digesters	2013	2014	$120,000	$145,000	$0	$0	$0	$0	$0	$0	$0	$0
	16	Solids Handling	Digester 3	Digesters	2013	2015	$2,329,000	$2,818,000	$0	$0	$0	$0	$0	$0	$0	$0
	27	Repair and Replacement	Clean out Digesters 1, 4 and 5	Solids processing	2015	2015	$135,000	$150,000	$0	$0	$0	$0	$0	$0	$0	$0
10 Year CIP Projects																
	28	Energy Projects	Existing Engine Upgrade/600 kw Fuel Cell/FOG	Other	2016	2017	$10,350,000	$12,100,000	$11,225,000	$0	$0	$0	$0	$0	$0	$0
	32	Eliminate Colma Creek Discharge	Wet Weather Storage	Equalization	2016	2019	$10,000,000	$12,100,000	$726,000	$4,840,000	$6,050,000	$0	$0	$0	$0	$0
	33	Solids Handling	Replace Digester 1 and 2	Digesters	2016	2018	$8,934,000	$10,810,000	$4,958,000	$4,958,000	$0	$0	$0	$0	$0	$0
	34	Solids Handling	Replace DAFs with GBT/Odor Control	Solids processing	2016	2018	$4,000,000	$4,840,000	$2,220,000	$2,220,000	$0	$0	$0	$0	$0	$0
15 Year CIP Projects (By FY 2024)																
	35	Repair and Replacement	New Aeration Basin 10	Secondary	2025	2027	$7,075,000	$8,561,000	$0	$0	$0	$0	$0	$0	$0	$0
On-going Maintenance																
	36	Repair and Replacement	Annual painting	Other	2017	2040		$350,000	$30,000	$30,000	$30,000	$30,000	$10,000	$10,000	$10,000	$10,000
Projects On-Hold																
	29	Energy Projects	SGIP grant for fuel cell	Other					$0	$0	$0	$0	$0	$0	$0	$0
Completed Projects																
	7	NPDES mitigation	Colma Creek Flow Monitoring - **Done**	Effluent Discharge	2011	2011	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
				Total			**$59,405,000**	**$71,378,000**	**$19,159,000**	**$12,048,000**	**$6,080,000**	**$30,000**	**$10,000**	**$10,000**	**$10,000**	**$10,000**
				Rate of Escalation	5%											
				Escalation Factor					1.34	1.41	1.48	1.55	1.63	1.71	1.80	1.89
				Escalated Capital Cost					**$25,675,000**	**$16,953,000**	**$8,983,000**	**$47,000**	**$16,000**	**$17,000**	**$18,000**	**$19,000**

Serial No.	Category	Project	Process Area	CIP Time Line: Project Start Date	CIP Time Line: Project End Date	Construction Cost	Project Cost Estimate	FY 2024 - 2025	FY 2025 - 2026	FY 2026 - 2027	FY 2027 - 2028	FY 2028 - 2029	FY 2029 - 2030	FY 2030 - 2031	FY 2031 - 2032
								2025	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
5-Year CIP Projects															
1	High Priority Projects	Replace 2000kW Generator/Switchgear/Generator Building	Other	2011	2012	$2,591,000	$3,135,000	$0	$0	$0	$0	$0	$0	$0	$0
2	High Priority Projects	Replace Elevated Bus Duct/Arc Flash Study	Other	2011	2012	$1,592,700	$1,927,000	$0	$0	$0	$0	$0	$0	$0	$0
3	High Priority Projects	SCADA Server Upgrade	Other	2011	2012	$82,000	$99,000	$0	$0	$0	$0	$0	$0	$0	$0
4	High Priority Projects	Seismic Improvements to Blower Building #1	Secondary	2011	2012	$350,000	$424,000	$0	$0	$0	$0	$0	$0	$0	$0
6	Minimize Blending	Flow Monitoring From NBSU Users	Other	2012	2013	$25,000	$28,000	$0	$0	$0	$0	$0	$0	$0	$0
9	Repair and Replacement	Automation/operators at Flow Split #1	Primary	2012	2013	$108,000	$131,000	$0	$0	$0	$0	$0	$0	$0	$0
10	Minimize Blending	RAS Gate operators/Automation (ABs 8-9)	Secondary	2012	2013	$146,000	$177,000	$0	$0	$0	$0	$0	$0	$0	$0
11	Minimize Blending	Hydraulic Modification + Selectors (AB 5-7)	Secondary	2012	2013	$690,000	$835,000	$0	$0	$0	$0	$0	$0	$0	$0
12	Minimize Blending	Mixers in Aeration Basins 8 & 9	Secondary	2012	2013	$367,000	$404,000								
19	Minimize Blending	New Secondary Clarifier	Secondary	2012	2014	$4,100,000	$4,961,000	$0	$0	$0	$0	$0	$0	$0	$0
20	Minimize Blending	RAS/WAS PS Expansion	Secondary	2012	2013	$180,000	$218,000	$0	$0	$0	$0	$0	$0	$0	$0
21	Minimize Blending	Wet Weather Mixed Liquor Lift Station (Flow Split #3)	Secondary	2012	2013	$510,000	$617,000	$0	$0	$0	$0	$0	$0	$0	$0
22	Minimize Blending	36" PE Pipe to Pond Fill/Drain PS	Equalization	2012	2013	$840,000	$1,016,000	$0	$0	$0	$0	$0	$0	$0	$0
17	Facility Reliability	Flood Protection Study	Other	2012	2013	$275,000	$275,000	$0	$0	$0	$0	$0	$0	$0	$0
18	Eliminate Colma Creek Discharge	Colma Creek Permit	Other	2012	2014	$1,000,000	$1,000,000	$0	$0	$0	$0	$0	$0	$0	$0
30	Energy Projects	Solar PV	Other	2012	2013	$800,000	$880,000	$0	$0	$0	$0	$0	$0	$0	$0
31	Repair and Replacement	Replace Small Blower in Bldg. #2 with High Speed Turbo Blower	Secondary	2011	2012	$429,100	$519,000	$0	$0	$0	$0	$0	$0	$0	$0
5	Headworks/Primary Improvements	Stormwater PS to Route Onsite Flows to Headworks	Other	2012	2013	$513,000	$620,000	$0	$0	$0	$0	$0	$0	$0	$0
8	Repair and Replacement	Bar Screen 4 Bypass	Headworks	2012	2013	$50,000	$61,000	$0	$0	$0	$0	$0	$0	$0	$0
24	Repair and Replacement	Screenings Room Resurfacing	Headworks	2012	2013	$71,000	$86,000	$0	$0	$0	$0	$0	$0	$0	$0
25	Repair and Replacement	Plant-wide Painting Program	Other	2012	2012	$100,000	$110,000	$0	$0	$0	$0	$0	$0	$0	$0
13	Facility Reliability	New Roof over Primary Chemical Feed System	Primary	2014	2015	$60,000	$66,000								
14	Facility Reliability	Add Staircase to Maintenance Building Roof	Other	2014	2015	$45,500	$56,000	$0	$0	$0	$0	$0	$0	$0	$0
23	Facility Reliability	Replace Potable Water Pipe to Admin. Bldg.	Other	2014	2015	$56,000	$68,000	$0	$0	$0	$0	$0	$0	$0	$0
26	Headworks/Primary Improvements	New Vortex Grit Removal System	Headworks	2014	2015	$1,480,000	$1,791,000	$0	$0	$0	$0	$0	$0	$0	$0
15	Solids Handling	Replace Digester #3 Heat Building	Digesters	2013	2014	$120,000	$145,000	$0	$0	$0	$0	$0	$0	$0	$0
16	Solids Handling	Digester 3	Digesters	2013	2015	$2,329,000	$2,818,000	$0	$0	$0	$0	$0	$0	$0	$0
27	Repair and Replacement	Clean out Digesters 1, 4 and 5	Solids processing	2015	2015	$135,000	$150,000	$0	$0	$0	$0	$0	$0	$0	$0
10 Year CIP Projects															
28	Energy Projects	Existing Engine Upgrade/600 kw Fuel Cell/FOG	Other	2016	2017	$10,350,000	$12,100,000	$0	$0	$0	$0	$0	$0	$0	$0
32	Eliminate Colma Creek Discharge	Wet Weather Storage	Equalization	2016	2019	$10,000,000	$12,100,000	$0	$0	$0	$0	$0	$0	$0	$0
33	Solids Handling	Replace Digester 1 and 2	Digesters	2016	2018	$8,934,000	$10,810,000	$0	$0	$0	$0	$0	$0	$0	$0
34	Solids Handling	Replace DAFs with GBT/Odor Control	Solids processing	2016	2018	$4,000,000	$4,840,000	$0	$0	$0	$0	$0	$0	$0	$0
15 Year CIP Projects (By FY 2024)								Design	Construction						
35	Repair and Replacement	New Aeration Basin 10	Secondary	2025	2027	$7,075,000	$8,561,000	$707,000	$3,927,000	$3,927,000	$0	$0	$0	$0	$0
On-going Maintenance															
36	Repair and Replacement	Annual painting	Other	2017	2040		$350,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
Projects On-Hold															
29	Energy Projects	SGIP grant for fuel cell	Other					$0	$0	$0	$0	$0	$0	$0	$0
Completed Projects															
7	NPDES mitigation	Colma Creek Flow Monitoring - **Done**	Effluent Discharge	2011	2011	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
			Total			**$59,405,000**	**$71,378,000**	**$717,000**	**$3,937,000**	**$3,937,000**	**$10,000**	**$10,000**	**$10,000**	**$10,000**	**$10,000**
			Rate of Escalation	5%											
			Escalation Factor					1.98	2.08	2.18	2.29	2.41	2.53	2.65	2.79
			Escalated Capital Cost					**$1,420,000**	**$8,185,000**	**$8,594,000**	**$23,000**	**$24,000**	**$25,000**	**$27,000**	**$28,000**

Serial No.	Category	Project	Process Area	CIP Time Line		Construction Cost	Project Cost Estimate	FY 2032 - 2033	FY 2033 - 2034	FY 2034 - 2035	FY 2035 - 2036	FY 2036 - 2037	FY 2037 - 2038	FY 2038 - 2039	FY 2039 - 2040
				Project Start Date	Project End Date										
								2033	2034	2035	2036	2037	2038	2039	2040
5-Year CIP Projects															
1	High Priority Projects	Replace 2000kW Generator/Switchgear/Generator Building	Other	2011	2012	$2,591,000	$3,135,000	$0	$0	$0	$0	$0	$0	$0	$0
2	High Priority Projects	Replace Elevated Bus Duct/Arc Flash Study	Other	2011	2012	$1,592,700	$1,927,000	$0	$0	$0	$0	$0	$0	$0	$0
3	High Priority Projects	SCADA Server Upgrade	Other	2011	2012	$82,000	$99,000	$0	$0	$0	$0	$0	$0	$0	$0
4	High Priority Projects	Seismic Improvements to Blower Building #1	Secondary	2011	2012	$350,000	$424,000	$0	$0	$0	$0	$0	$0	$0	$0
6	Minimize Blending	Flow Monitoring From NBSU Users	Other	2012	2013	$25,000	$28,000	$0	$0	$0	$0	$0	$0	$0	$0
9	Repair and Replacement	Automation/operators at Flow Split #1	Primary	2012	2013	$108,000	$131,000	$0	$0	$0	$0	$0	$0	$0	$0
10	Minimize Blending	RAS Gate operators/Automation (ABs 8-9)	Secondary	2012	2013	$146,000	$177,000	$0	$0	$0	$0	$0	$0	$0	$0
11	Minimize Blending	Hydraulic Modification + Selectors (AB 5-7)	Secondary	2012	2013	$690,000	$835,000	$0	$0	$0	$0	$0	$0	$0	$0
12	Minimize Blending	Mixers in Aeration Basins 8 & 9	Secondary	2012	2013	$367,000	$404,000								
19	Minimize Blending	New Secondary Clarifier	Secondary	2012	2014	$4,100,000	$4,961,000	$0	$0	$0	$0	$0	$0	$0	$0
20	Minimize Blending	RAS/WAS PS Expansion	Secondary	2012	2013	$180,000	$218,000	$0	$0	$0	$0	$0	$0	$0	$0
21	Minimize Blending	Wet Weather Mixed Liquor Lift Station (Flow Split #3)	Secondary	2012	2013	$510,000	$617,000	$0	$0	$0	$0	$0	$0	$0	$0
22	Minimize Blending	36" PE Pipe to Pond Fill/Drain PS	Equalization	2012	2013	$840,000	$1,016,000	$0	$0	$0	$0	$0	$0	$0	$0
17	Facility Reliability	Flood Protection Study	Other	2012	2013	$275,000	$275,000	$0	$0	$0	$0	$0	$0	$0	$0
18	Eliminate Colma Creek Discharge	Colma Creek Permit	Other	2012	2014	$1,000,000	$1,000,000	$0	$0	$0	$0	$0	$0	$0	$0
30	Energy Projects	Solar PV	Other	2012	2013	$800,000	$880,000	$0	$0	$0	$0	$0	$0	$0	$0
31	Repair and Replacement	Replace Small Blower in Bldg. #2 with High Speed Turbo Blower	Secondary	2011	2012	$429,100	$519,000	$0	$0	$0	$0	$0	$0	$0	$0
5	Headworks/Primary Improvements	Stormwater PS to Route Onsite Flows to Headworks	Other	2012	2013	$513,000	$620,000	$0	$0	$0	$0	$0	$0	$0	$0
8	Repair and Replacement	Bar Screen 4 Bypass	Headworks	2012	2013	$50,000	$61,000	$0	$0	$0	$0	$0	$0	$0	$0
24	Repair and Replacement	Screenings Room Resurfacing	Headworks	2012	2013	$71,000	$86,000	$0	$0	$0	$0	$0	$0	$0	$0
25	Repair and Replacement	Plant-wide Painting Program	Other	2012	2012	$100,000	$110,000	$0	$0	$0	$0	$0	$0	$0	$0
13	Facility Reliability	New Roof over Primary Chemical Feed System	Primary	2014	2015	$60,000	$66,000								
14	Facility Reliability	Add Staircase to Maintenance Building Roof	Other	2014	2015	$45,500	$56,000	$0	$0	$0	$0	$0	$0	$0	$0
23	Facility Reliability	Replace Potable Water Pipe to Admin. Bldg.	Other	2014	2015	$56,000	$68,000	$0	$0	$0	$0	$0	$0	$0	$0
26	Headworks/Primary Improvements	New Vortex Grit Removal System	Headworks	2014	2015	$1,480,000	$1,791,000	$0	$0	$0	$0	$0	$0	$0	$0
15	Solids Handling	Replace Digester #3 Heat Building	Digesters	2013	2014	$120,000	$145,000	$0	$0	$0	$0	$0	$0	$0	$0
16	Solids Handling	Digester 3	Digesters	2013	2015	$2,329,000	$2,818,000	$0	$0	$0	$0	$0	$0	$0	$0
27	Repair and Replacement	Clean out Digesters 1, 4 and 5	Solids processing	2015	2015	$135,000	$150,000	$0	$0	$0	$0	$0	$0	$0	$0
10 Year CIP Projects															
28	Energy Projects	Existing Engine Upgrade/600 kw Fuel Cell/FOG	Other	2016	2017	$10,350,000	$12,100,000	$0	$0	$0	$0	$0	$0	$0	$0
32	Eliminate Colma Creek Discharge	Wet Weather Storage	Equalization	2016	2019	$10,000,000	$12,100,000	$0	$0	$0	$0	$0	$0	$0	$0
33	Solids Handling	Replace Digester 1 and 2	Digesters	2016	2018	$8,934,000	$10,810,000	$0	$0	$0	$0	$0	$0	$0	$0
34	Solids Handling	Replace DAFs with GBT/Odor Control	Solids processing	2016	2018	$4,000,000	$4,840,000	$0	$0	$0	$0	$0	$0	$0	$0
15 Year CIP Projects (By FY 2024)															
35	Repair and Replacement	New Aeration Basin 10	Secondary	2025	2027	$7,075,000	$8,561,000	$0	$0	$0	$0	$0	$0	$0	$0
On-going Maintenance															
36	Repair and Replacement	Annual painting	Other	2017	2040		$350,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
Projects On-Hold															
29	Energy Projects	SGIP grant for fuel cell	Other					$0	$0	$0	$0	$0	$0	$0	$0
Completed Projects															
7	NPDES mitigation	Colma Creek Flow Monitoring - **Done**	Effluent Discharge	2011	2011	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
			Total			**$59,405,000**	**$71,378,000**	**$10,000**	**$10,000**	**$10,000**	**$10,000**	**$10,000**	**$10,000**	**$10,000**	**$10,000**
			Rate of Escalation	5%											
			Escalation Factor					2.93	3.07	3.23	3.39	3.56	3.73	3.92	4.12
			Escalated Capital Cost					**$29,000**	**$31,000**	**$32,000**	**$34,000**	**$36,000**	**$37,000**	**$39,000**	**$41,000**

APPENDIX I – O&M PROJECTION

	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
Escalated O&M Expense											
Sewer Administration	$644,500	$664,000	$684,000	$704,000	$725,000	$747,000	$770,000	$793,000	$816,000	$841,000	$866,000
Sewer Maintenance	948,500	977,000	1,006,000	1,036,000	1,068,000	1,100,000	1,133,000	1,167,000	1,202,000	1,238,000	1,275,000
Adjusted Administration	1,946,399	2,005,000	2,065,000	2,127,000	2,191,000	2,256,000	2,324,000	2,394,000	2,466,000	2,540,000	2,616,000
Rents & Leases (4370)	1,471,100	1,515,000	1,561,000	1,608,000	1,656,000	1,705,000	1,757,000	1,809,000	1,864,000	1,919,000	1,977,000
Sewer Engineering Support	0	0	0	0	0	0	0	0	0	0	0
Buildings & Grounds Maintenance	230,407	237,000	244,000	252,000	259,000	267,000	275,000	283,000	292,000	301,000	310,000
Shaw Road Pump Station #11	245,172	253,000	260,000	268,000	276,000	284,000	293,000	302,000	311,000	320,000	329,000
San Mateo Avenue Pump Station #9	310,676	320,000	330,000	339,000	350,000	360,000	371,000	382,000	394,000	405,000	418,000
Industry Pump Station #8	387,003	399,000	411,000	423,000	436,000	449,000	462,000	476,000	490,000	505,000	520,000
Primary Treatment	927,117	955,000	984,000	1,013,000	1,043,000	1,075,000	1,107,000	1,140,000	1,174,000	1,210,000	1,246,000
Secondary Treatment	1,405,944	1,448,000	1,492,000	1,536,000	1,582,000	1,630,000	1,679,000	1,729,000	1,781,000	1,834,000	1,889,000
Sludge Processing	1,051,535	1,083,000	1,116,000	1,149,000	1,184,000	1,219,000	1,256,000	1,293,000	1,332,000	1,372,000	1,413,000
Disinfection	713,358	735,000	757,000	780,000	803,000	827,000	852,000	877,000	904,000	931,000	959,000
Process Control & Monitoring	672,259	692,000	713,000	735,000	757,000	779,000	803,000	827,000	852,000	877,000	903,000
SSF-SB Source Control	888,779	915,000	943,000	971,000	1,000,000	1,030,000	1,061,000	1,093,000	1,126,000	1,160,000	1,194,000
Effluent Pump Station (NBSU)	226,934	234,000	241,000	248,000	255,000	263,000	271,000	279,000	287,000	296,000	305,000
Sludge Dewatering & Disposal	1,031,854	1,063,000	1,095,000	1,128,000	1,161,000	1,196,000	1,232,000	1,269,000	1,307,000	1,346,000	1,387,000
Effluent Storage Basin	200	0	0	0	0	0	0	0	0	0	0
Dechlorination (NBSU)	412,051	424,000	437,000	450,000	464,000	478,000	492,000	507,000	522,000	538,000	554,000
O&M Savings											
Proposed Cogeneration (energy savings here)	0	0	0	0	0	0	0	0	0	0	0
Proposed Solar (energy savings here)	0	(27,000)	(28,000)	(23,000)	(24,000)	(25,000)	42,000	40,000	37,000	34,000	31,000
Proposed Wind (energy savings here)	0	0	0	0	0	0	0	0	0	0	0
Net O&M (2010 Dollars)	$13,514,000	$13,892,000	$14,311,000	$14,744,000	$15,186,000	$15,640,000	$16,180,000	$16,660,000	$17,157,000	$17,667,000	$18,192,000
O&M Escalation Rate	3%										
O&M Escalation Factor	1.00	1.03	1.06	1.09	1.13	1.16	1.19	1.23	1.27	1.30	1.34
Net O&M (Escalated @ 3%)	$13,514,000	$14,308,760	$15,182,540	$16,111,167	$17,091,977	$18,131,047	$19,319,766	$20,489,699	$21,733,974	$23,051,428	$24,448,527

South San Francisco/San Bruno WQCP
Operations and Maintenance Cost Projection

	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Escalated O&M Expense											
Sewer Administration	$892,000	$919,000	$946,000	$975,000	$1,004,000	$1,034,000	$1,065,000	$1,097,000	$1,130,000	$1,164,000	$1,199,000
Sewer Maintenance	1,313,000	1,352,000	1,393,000	1,435,000	1,478,000	1,522,000	1,568,000	1,615,000	1,663,000	1,713,000	1,764,000
Adjusted Administration	2,694,000	2,775,000	2,858,000	2,944,000	3,032,000	3,123,000	3,217,000	3,314,000	3,413,000	3,515,000	3,621,000
Rents & Leases (4370)	2,036,000	2,097,000	2,160,000	2,225,000	2,292,000	2,361,000	2,432,000	2,504,000	2,580,000	2,657,000	2,737,000
Sewer Engineering Support	0	0	0	0	0	0	0	0	0	0	0
Buildings & Grounds Maintenance	319,000	329,000	338,000	349,000	359,000	370,000	381,000	392,000	404,000	416,000	429,000
Shaw Road Pump Station #11	339,000	350,000	360,000	371,000	382,000	393,000	405,000	417,000	430,000	443,000	456,000
San Mateo Avenue Pump Station #9	430,000	443,000	456,000	470,000	484,000	499,000	514,000	529,000	545,000	561,000	578,000
Industry Pump Station #8	536,000	552,000	568,000	585,000	603,000	621,000	640,000	659,000	679,000	699,000	720,000
Primary Treatment	1,283,000	1,322,000	1,362,000	1,402,000	1,444,000	1,488,000	1,532,000	1,578,000	1,626,000	1,674,000	1,725,000
Secondary Treatment	1,946,000	2,005,000	2,065,000	2,127,000	2,190,000	2,256,000	2,324,000	2,394,000	2,465,000	2,539,000	2,615,000
Sludge Processing	1,456,000	1,499,000	1,544,000	1,591,000	1,638,000	1,687,000	1,738,000	1,790,000	1,844,000	1,899,000	1,956,000
Disinfection	987,000	1,017,000	1,048,000	1,079,000	1,111,000	1,145,000	1,179,000	1,214,000	1,251,000	1,288,000	1,327,000
Process Control & Monitoring	931,000	958,000	987,000	1,017,000	1,047,000	1,079,000	1,111,000	1,144,000	1,179,000	1,214,000	1,251,000
SSF-SB Source Control	1,230,000	1,267,000	1,305,000	1,344,000	1,385,000	1,426,000	1,469,000	1,513,000	1,558,000	1,605,000	1,653,000
Effluent Pump Station (NBSU)	314,000	324,000	333,000	343,000	354,000	364,000	375,000	386,000	398,000	410,000	422,000
Sludge Dewatering & Disposal	1,428,000	1,471,000	1,515,000	1,561,000	1,608,000	1,656,000	1,705,000	1,757,000	1,809,000	1,864,000	1,920,000
Effluent Storage Basin	0	0	0	0	0	0	0	0	0	0	0
Dechlorination (NBSU)	570,000	587,000	605,000	623,000	642,000	661,000	681,000	701,000	723,000	744,000	767,000
O&M Savings											
Proposed Cogeneration (energy savings here)	0	0	0	0	0	0	0	0	0	0	0
Proposed Solar (energy savings here)	28,000	26,000	23,000	20,000	18,000	15,000	13,000	11,000	8,000	6,000	(48,000)
Proposed Wind (energy savings here)	0	0	0	0	0	0	0	0	0	0	0
Net O&M (2010 Dollars)	$18,732,000	$19,293,000	$19,866,000	$20,461,000	$21,071,000	$21,700,000	$22,349,000	$23,015,000	$23,705,000	$24,411,000	$25,092,000
O&M Escalation Rate											
O&M Escalation Factor	1.38	1.43	1.47	1.51	1.56	1.60	1.65	1.70	1.75	1.81	1.86
Net O&M (Escalated @ 3%)	$25,929,469	$27,507,205	$29,173,891	$30,949,098	$32,827,931	$34,822,130	$36,939,492	$39,181,497	$41,566,861	$44,088,981	$46,678,511

	FY 2032	FY 2033	FY 2034	FY 2035	FY 2036	FY 2037	FY 2038	FY 2039	FY 2040
Escalated O&M Expense									
Sewer Administration	$1,235,000	$1,272,000	$1,310,000	$1,349,000	$1,390,000	$1,432,000	$1,475,000	$1,519,000	$1,564,000
Sewer Maintenance	1,817,000	1,872,000	1,928,000	1,986,000	2,046,000	2,107,000	2,170,000	2,235,000	2,302,000
Adjusted Administration	3,730,000	3,841,000	3,957,000	4,075,000	4,198,000	4,324,000	4,453,000	4,587,000	4,724,000
Rents & Leases (4370)	2,819,000	2,903,000	2,990,000	3,080,000	3,173,000	3,268,000	3,366,000	3,467,000	3,571,000
Sewer Engineering Support	0	0	0	0	0	0	0	0	0
Buildings & Grounds Maintenance	441,000	455,000	468,000	482,000	497,000	512,000	527,000	543,000	559,000
Shaw Road Pump Station #11	470,000	484,000	498,000	513,000	529,000	545,000	561,000	578,000	595,000
San Mateo Avenue Pump Station #9	595,000	613,000	632,000	650,000	670,000	690,000	711,000	732,000	754,000
Industry Pump Station #8	742,000	764,000	787,000	810,000	835,000	860,000	885,000	912,000	939,000
Primary Treatment	1,776,000	1,830,000	1,885,000	1,941,000	1,999,000	2,059,000	2,121,000	2,185,000	2,250,000
Secondary Treatment	2,694,000	2,775,000	2,858,000	2,944,000	3,032,000	3,123,000	3,217,000	3,313,000	3,413,000
Sludge Processing	2,015,000	2,075,000	2,138,000	2,202,000	2,268,000	2,336,000	2,406,000	2,478,000	2,552,000
Disinfection	1,367,000	1,408,000	1,450,000	1,494,000	1,538,000	1,585,000	1,632,000	1,681,000	1,732,000
Process Control & Monitoring	1,288,000	1,327,000	1,367,000	1,408,000	1,450,000	1,493,000	1,538,000	1,584,000	1,632,000
SSF-SB Source Control	1,703,000	1,754,000	1,807,000	1,861,000	1,917,000	1,974,000	2,033,000	2,094,000	2,157,000
Effluent Pump Station (NBSU)	435,000	448,000	461,000	475,000	489,000	504,000	519,000	535,000	551,000
Sludge Dewatering & Disposal	1,977,000	2,036,000	2,098,000	2,160,000	2,225,000	2,292,000	2,361,000	2,432,000	2,505,000
Effluent Storage Basin	0	0	0	0	0	0	0	0	0
Dechlorination (NBSU)	790,000	813,000	838,000	863,000	889,000	915,000	943,000	971,000	1,000,000
O&M Savings									
Proposed Cogeneration (energy savings here)	0	0	0	0	0	0	0	0	0
Proposed Solar (energy savings here)	(49,000)	(49,000)	(50,000)	(51,000)	(52,000)	(53,000)	(53,000)	(54,000)	(55,000)
Proposed Wind (energy savings here)	0	0	0	0	0	0	0	0	0
Net O&M (2010 Dollars)	$25,845,000	$26,621,000	$27,422,000	$28,242,000	$29,093,000	$29,966,000	$30,865,000	$31,792,000	$32,745,000
O&M Escalation Rate									
O&M Escalation Factor	1.92	1.97	2.03	2.09	2.16	2.22	2.29	2.36	2.43
Net O&M (Escalated @ 3%)	$49,521,693	$52,538,847	$55,743,280	$59,132,476	$62,741,710	$66,563,146	$70,616,888	$74,919,931	$79,480,710