City of San José

San José/Santa Clara Water Pollution
Control Plant Master Plan

TASK NO. 4
PROJECT MEMORANDUM NO. 3
MASTER PLANNING REGULATORY SCENARIOS

FINAL DRAFT
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in association with

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CITY OF SAN JOSÉ

SAN JOSÉ/SANTA CLARA WATER POLLUTION CONTROL PLANT MASTER PLAN

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PROJECT MEMORANDUM NO. 3
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TABLE OF CONTENTS

Page No.

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

MASTER PLANNING REGULATORY SCENARIOS

1.0 INTRODUCTION

This project memorandum (PM) provides insight into the future regulatory considerations that may impact how the San José /Santa Clara Water Pollution Control Plant (WPCP) will need to manage wastewater discharges, air emissions, and biosolids production and disposal over the course of the 30-year San José /Santa Clara Water Pollution Control Plant Master Plan (Master Plan) horizon. The PM compares near-term regulatory scenarios, as reflected in a preliminary National Pollutant Discharge Elimination System (NPDES) Permit (RWQCB, 2008), and longer term considerations out to the 2040 planning horizon, to the current regulatory conditions.

Because regulatory compliance is a major objective of the Master Plan, identifying future regulatory trends is a key component in developing Master Plan options, alternatives, and scenarios, allowing 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 Master 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).

2.0 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.
- Examination of growth and other non-regulatory developments that may affect areas where the WPCP is currently in compliance.

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

3.0 REGULATORY TRENDS

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

3.1 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. 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 1 shows the key wastewater components and their corresponding regulatory issues.

3.2 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 Master 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.

Master 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 WPCP 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 WPCP. 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.

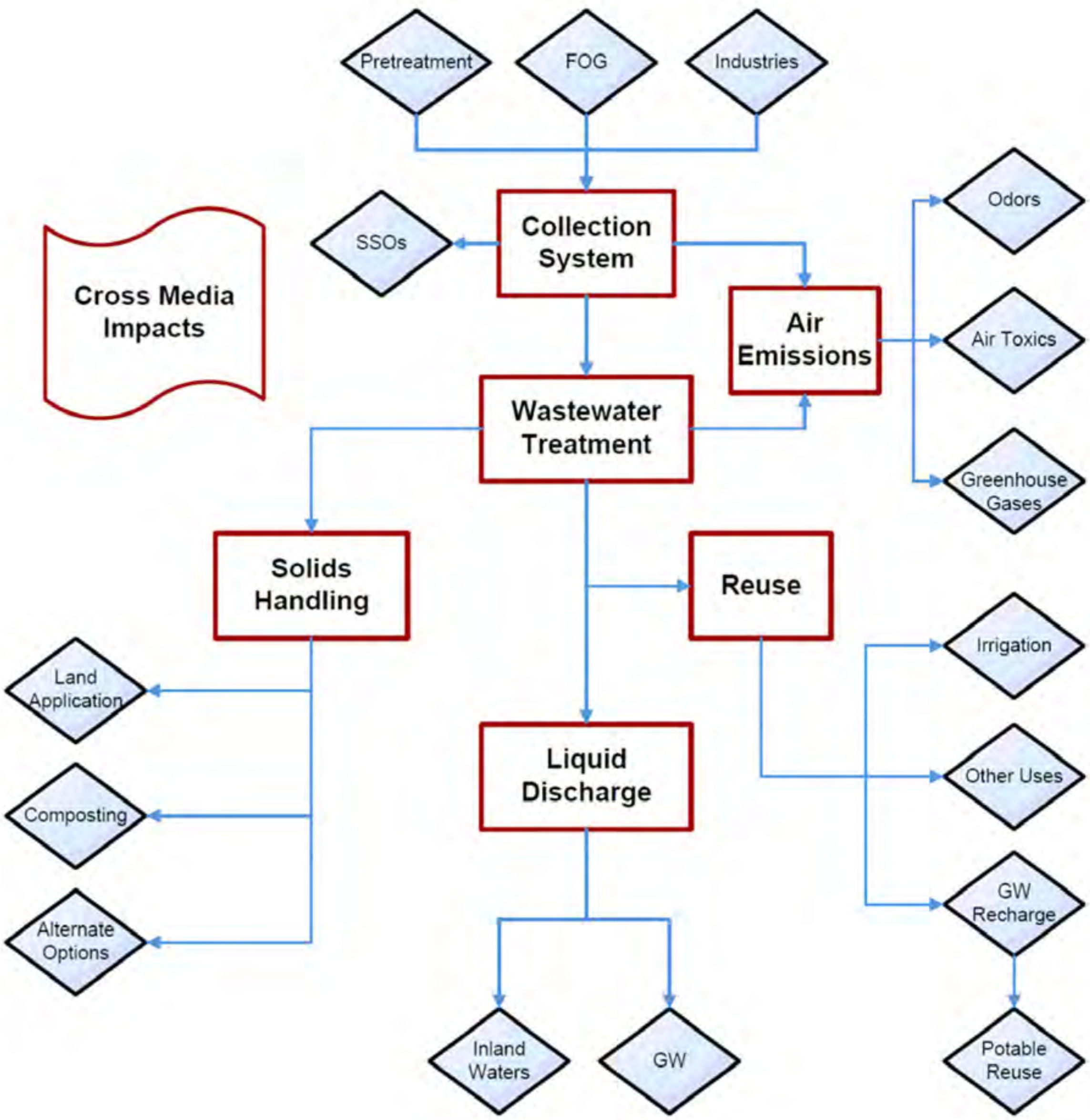

Figure 1
CROSS-MEDIA IMPACTS
SAN JOSÉ/SANTA CLARA WPCP MASTER PLAN
CITY OF SAN JOSÉ

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3.3 San Francisco Bay

South San Francisco Bay has been identified as an impaired waterbody. The 303(d) list updated by the State Water Resources Control Board (SWRCB) in 2006 lists Lower South San Francisco Bay as impaired for chlordane, DDT, dieldrin, dioxin compounds, exotic species, furan compounds, mercury, PCBs, dioxin-like PCBs and selenium. Essentially all of those impairments are attributed in the listings to causes unrelated to the WPCP – nonpoint source runoff, legacy mercury mines, atmospheric deposition, historic agricultural activities, contaminated sediments in the San Francisco Bay, and (in the case of exotic species) shipping. Total maximum daily loads (TMDLs) have been developed for mercury and PCBs in the San Francisco Bay; those TMDLs include mass limits and other provisions that affect the WPCP. Although other pollutants/constituents are listed as needing TMDLs over the next thirteen years, as discussed in PM 4.1, the timing and expected outcomes are more uncertain. Legacy organochlorine pesticides (DDT, dieldrin, and chlordane) are declining following the ban on use and production (Connor et al., 2004), and therefore have a lower priority for TMDLs. Dioxins and furans were placed on the 303(d) list at the direction of EPA; the timing and method for development of a TMDL is uncertain, but there is existing pressure by EPA to develop and implement effluent limits for dioxin-like potency, as described below. Because the WPCP already operates at a high level of treatment, the Master Plan should consider options to reduce flow to the San Francisco Bay via increased water recycling as a means of moving towards compliance with mass limits for bioaccumulative pollutants that have already developed TMDLs (e.g., mercury and PCBs) or may have TMDLs adopted in the future (e.g., dioxins and furans).

3.4 Limited Dilution Credits

Dilution credits are given to dischargers in recognition of attenuation of wastewater-derived constituents after discharge into the environment. The WPCP is a shallow water discharger, and is not given dilution credits for any constituents except for cyanide, as provided by the preliminary Draft Permit. Alterations to the dilution credit can be granted to wastewater treatment facilities on a case-by-case basis, recognizing the site-specific discharge conditions influencing available dilution. No dilution credits are given for bioaccumulative constituents such as dioxins. In recent San Francisco Bay area permits, the RWQCB has applied actual dilution for the calculation of final ammonia limits, and partial dilution for the calculation of cyanide effluent limits. There is continued debate regarding the appropriate use of dilution credits and mixing zones.

To mitigate the risks involved if the allowance of dilution credit for cyanide was decreased or eliminated in the San Francisco Bay, the Master Plan process should develop options and alternatives that provide flexibility to provide higher levels of treatment should the WPCP be required to meet water quality objectives (WQOs) with less or no dilution, even as the City explores regulatory options that expand the justification for dilution for non-conservative pollutants.

3.5 Increasing Requirements for Stormwater

Stormwater flows are being required to meet increasingly higher levels of treatment/storage for protection of beneficial uses in receiving waters. According to the Clean Water Act's municipal separate storm sewer system (MS4) provisions, stormwater flows need to provide MEP pollutant removal. To date, MEP does not require the treatment of stormwater, except in some cases for new developments or redevelopments. Additionally, stormwater collection systems serving areas with a population greater than 50,000 must protect beneficial uses by having stormwater flows comply with water quality standards, although this requirement is not strictly applied.

At the present time, the WPCP is only responsible for treating its onsite stormwater, which is collected and sent to the headworks. However, as part of the Draft Municipal Regional Permit for Urban Runoff, the stormwater programs are being asked by the RWQCB to coordinate with wastewater treatment plants to investigate the feasibility of diverting dry weather stormwater flows and first flush events into collection systems for treatment.

This could conflict with directions in the PCB TMDL and associated waste load allocation (WLA) for treatment plants to identify and prevent sources of PCBs from discharging into their collection systems, and may also have real or perceived negative impacts on biosolids quality. The requirement to divert stormwater flows to wastewater treatment plants remains a future concern.

When developing scenarios for future uses of WPCP land, stormwater collection should be a Master Planning consideration. It is likely that in future development, all stormwater will need to be collected, and beneficially used. The Master Plan will explore how low impact development can help the WPCP achieve these goals.

3.6 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 understood, 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. If future research shows that nutrient loadings need to be reduced in the San Francisco Bay, water quality standards may be developed in the future.

It is known that San Francisco Bay is light limited, rather than nutrient limited, with respect to phytoplankton production (Cloern, 1996). Reducing nutrient loads to the San Francisco Bay is not expected to have an impact on eutrophication in a light limited estuary. Furthermore, eutrophication is not generally a problem in South San Francisco Bay, with the exception of the adjacent managed former salt producing ponds, where water management and residence time is the key to avoiding excess algal blooms.

In the current NPDES permit, the WPCP 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 WPCP currently provides nitrification/denitrification for its effluent, but would likely not be able to meet future nitrogen limits of less than 8 mg/L without an upgrade or change in operations. Also, the Master Plan process could need to consider ways to meet a potential future phosphorus limit. However, before doing so, the WPCP 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.

3.7 Restrictions on Discharge Flow Rates

WPCP discharges affect the salinity in the vicinity of its outfall, and the surrounding salt marsh habitat. At the present time, the South Bay Action Plan includes an upper average dry weather effluent flow (ADWEF) trigger of 120 million gallons per day (mgd) for the WPCP discharge, and this is not expected to change in the future.

There is currently no minimum flow requirement for the WPCP, however, increased recycling in the future has the potential to greatly diminish the WPCP's discharge flow. A potential flow minimum has been mentioned to the City by members of the RWQCB to preserve the existing brackish marsh habitat that is used by egrets and other waterfowl, but no regulatory action is expected in the near uture.

3.8 Increasing Demand for Recycled Water

The SWRCB recognizes that a burdensome and inconsistent permitting process can impede the implementation of recycled water projects. The SWRCB began to develop a Recycled Water Policy in 2006 to establish more uniform requirements for water recycling projects throughout California and to streamline the permit application process in most instances. The SWRCB held a hearing on March 18, 2008, to consider adopting a Draft Policy, but halted the process due to stakeholder opposition. As an alternative, the stakeholders - the regulated community and environmental groups - were tasked by the SWRCB to work together to draft a new policy with which each group could be comfortable. They were given 90 days (later extended to 150 days) to revise the Draft Policy. On September 2, 2008, this Draft Policy was presented at the SWRCB meeting. The SWRCB Board Members agreed that they would use the stakeholders' Draft Policy as the basis for a

Final Policy, and instructed staff to begin the process of checking the text for consistency with existing law.

The Draft Policy 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. As discussed in the previous section, a potential flow minimum for the WPCP discharge may ultimately limit the volume of water the WPCP is able to recycle as part of the South Bay Water Recycling (SBWR) Program. However, maximizing water recycling up to this point will help the WPCP reduce loading to the South San Francisco Bay, and help meet mass-based and load-based effluent limits. Before pursuing a strategy of increased water recycling, the overall environmental impacts will be studied.

3.9 Increased Filter Loading Rates for Recycled Water Treatment

Current Title 22 regulations allow filter loading "[a]t a rate that does not exceed 5 gallons per minute per square foot of surface area in mono, dual or mixed media gravity, upflow or pressure filtration systems." While CDPH has recommended to the RWQCB to approve increased loading rates for Monterey Regional, others will be approved on a case by case basis (as an "Other Methods of Treatment" under Section 60320.5) until such time as an actual regulatory change to Title 22 is made. However, CDPH does not have any specific plans to allow greater than 5 gallons per minute per square foot as a general rule in the near-term (Stone, 2009).

3.10 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, Santa Clara 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 WPCP facilities. Since public perception is a large driver of restrictions, producing high quality solids and including a public education component should be part of the Master Plan considerations.

3.11 Increasing Requirements for Groundwater Protection

The WPCP has monitored the groundwater beneath the WPCP's residual sludge management (RSM) facility, and has detected elevated levels of total dissolved solids (TDS), as well as some metals, as discussed in PM 3.2. Historically, sludge drying beds were permitted to be lined with compacted dirt, as is the case at the RSM facility. However, sludge beds are increasingly required to be lined with concrete to protect the underlying groundwater from contamination. The Master Plan process should consider lining sludge drying beds or other pollutant control measures to protect the groundwater.

3.12 Regulations on the Emissions of Greenhouse Gases

The State of California adopted the Global Warming Solutions Act of 2006 (AB32) in September of 2006. AB32 is the first regulatory program in the US that will require public and private agencies statewide to reduce GHG emissions to 1990 levels by 2020. Currently, there is no mandate on publicly owned treatment works (POTWs); however, the California Air Resources Board (CARB) has stated that POTWs would be included in the near future and early voluntary reporting is recommended. The planning process will include a quantification of current emissions, as well as an estimate of the emissions associated with options and alternatives.

Pursuant to AB32, GHG evaluations for the WPCP will use the California Climate Action Registry General Reporting Protocol (CCARGRP), a set of measuring standards and protocols aligned with the international Greenhouse Gas Protocol Initiative and adapted to California. AB32 recommends using this protocol "where appropriate and to the maximum extent feasible." Agencies that choose to participate in the CCARGRP process will not be required to significantly alter their reporting or verification program except as determined by CARB for compliance purposes.

Additionally, the City has adopted the San José Green Vision, which puts forth an even more aggressive plan. The Green Vision goals that will affect the WPCP are:

- Reduce per capita energy use by 50 percent.
- Receive 100 percent of our electrical power from clean renewable sources.
- Build or retrofit 50 million square feet of green buildings.
- Divert 100 percent of the waste from our landfill and convert waste to energy.
- Recycle or beneficially reuse 100 percent of our wastewater (100 million gallons per day).
- Adopt a General Plan with measurable standards for sustainable development.
- Ensure that 100 percent of public fleet vehicles run on alternative fuels.

4.0 SUMMARY OF FUTURE REGULATORY CONSIDERATIONS AND TRENDS FOR POLLUTANTS OF CONCERN

4.1 Near and Long Term Pollutants of Concern Considerations

4.1.1 New Water Quality Standards

Water quality standards may be updated in the future, possibly resulting in more stringent requirements. New or updated WQC for other parameters such as alachlor, arsenic, atrazine, chloroform and selenium are in the process of being developed. Section 4.2.5 discusses selenium in more detail, since it particularly could be of future concern to the WPCP. Polybrominated diphenyl ethers (PBDEs) are being closely monitored around the San Francisco Bay (Oros, 2005). The EPA is beginning to look at developing WQC for new types of trace constituents like PPCPs (Environmental Protection Agency, 2008). New criteria or bioassay screening for these compounds will eventually be developed and could be included as effluent requirements.

4.1.2 Sediment Quality Objectives

Sediment quality objectives are being developed by the SWRCB and Phase I of the program was finalized in June 2008 (Phase II is scheduled to be completed by December 2010). Initially, only monitoring will be required, but if problem areas are found and on-going effluent discharges are identified as the source of pollution, mass loading objectives may be developed and applied to the WPCP's discharges. However, since the WPCP already practices tertiary treatment and supports sediment monitoring through the Regional Monitoring Program (RMP), sediment objectives are not expected to be a significant Master Plan consideration.

Metal concentrations have been measured in Salt Pond A18 (H.T. Harvey, 2007). In a 2002 study, median concentrations of metals in sediment were within the range of sediments in South San Francisco Bay, although some individual samples of cadmium, selenium, arsenic and silver exceeded these ranges. Total mercury concentrations in Salt Pond A18 were below EPA criteria for contaminated sediments.

4.1.3 Bacteria

Recent review of the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) by the SWRCB has identified discrepancies in the bacteria criteria for Shellfish Harvesting (SHELL) beneficial uses. There is confusion as to the basis of the bacteria criteria, leading to questioning of the appropriate bacteria criteria for SHELL uses. SHELL is a listed beneficial use of the South San Francisco Bay. The RWQCB has stated that they are planning to address this discrepancy during the next triennial review process. In the meantime, the RWQCB is keeping existing bacteria limits in permits. The WPCP is able to comply with existing bacteria criteria.

The SHELL bacteria objectives in question are significantly lower than the existing bacteria limit. Depending on the outcome of the triennial review process or other SWRCB initiatives, the WPCP may be faced with significantly lower bacteria limits.

4.1.4 Lower Detection Limits

As analytical techniques are improved and detection levels drop, additional parameters may be found to cause reasonable potential and additional effluent limits may be added to the permit. In particular, attention should be given to emerging microconstituents (personal care products, pharmaceuticals, steroids, hormones, and other endocrine disruptors).

Conventional wastewater treatment is not designed to address these types of parameters. Measures such as source control, public education and outreach, additional/advanced treatment, and other measures may be necessary if new criteria were imposed. The WPCP should plan to address these types of constituents over the planning horizon. One possible approach would be to change the method of disinfection. Many disinfection methods, such as ultraviolet irradiation (UV), chlorination, and ozonation, have higher removal efficiencies than chloramination owing to their relatively greater oxidizing power (Snyder et al., 2007).

4.1.5 Population Growth and Conservation

Growing populations will increase the loading of constituents in influent wastewater, and conservation will increase the concentrations due to decreased dilution. This could cause the WPCP to have difficulty meeting effluent concentration and load limits with which they are currently in compliance. However, the removal of some constituents during wastewater treatment is governed by a minimum concentration (i.e. the concentration in the effluent is constant, regardless of the concentration in the influent), including some metals whose concentrations are governed by their solubility. For these constituents, increased influent concentrations due to water conservation provide an opportunity for greater percent reductions in effluent loading. However, increased removal of metals from the liquid stream results in greater concentrations in biosolids. Future planning for the WPCP should take increased loads as well as organics and solids treatment capacities into consideration.

4.1.6 Considerations for Salt Pond A18

At the present time, Salt Pond A18 is in compliance with its discharge permit as discussed in PM 4.1. However, future reductions in WQC, such as for selenium, could pose a problem for discharge during continuous circulation. If this development occurs, compliance would need to be achieved by altering the salt pond management regime.

4.2 Identification of Future Pollutants of Concern

Future POCs include constituents that are already regulated in the WPCP's NPDES permit, as well as those that are on the horizon. Table 1 summarizes current POCs, those that may be included in the next Permit, and those that will are anticipated to be POCs through 2040.

Table 1 Existing and Potential POCs
San José / Santa Clara Water Pollution Control Plant Master Plan
City of San José

	Constituent/Parameter	Why of Concern
Existing POC (2003 Permit)	Copper	South San Francisco Bay Copper Action Plan(1)
	Mercury	TMDL adopted for South San Francisco Bay(1)
	Nickel	South San Francisco Bay Nickel Action Plan(1)
	Dieldrin	Below detection, but ML above criteria
	4,4-DDE	Below detection, but ML above criteria
	Dioxin Toxicity Equivalent (TEQ)	Below detection, but ML above criteria - monitoring requirements in current permit
	Benzo(b)Fluoranthene	Background concentration exceeded WQC
	Indeno(1,2,3-cd)Pyrene	Background concentration exceeded WQC
	Heptachlor Epoxide	Below detection, but ML above criteria
Expected POCs (based on 2008 preliminary Draft Permit)	Copper	South San Francisco Bay Copper Action Plan(1)
	Mercury	TMDL Adopted for South San Francisco Bay(1)
	Nickel	South San Francisco Bay Nickel Action Plan(1)
	Dioxin TEQ	MEC exceeded WQC - given compliance schedule
	Heptachlor	MEC exceeded WQC (possibly due to dumping or bad data), but generally in compliance
	Tributyltin	MEC exceeded WQC, but generally in compliance
	Cyanide	MEC exceeded WQC (possibly due to dumping incident), but generally in compliance
Anticipated Long Term POCs	Copper	South San Francisco Bay Copper Action Plan(1)
	Mercury	TMDL adopted for South San Francisco Bay(1)
	Nickel	South San Francisco Bay Nickel Action Plan(1)
	Dioxin TEQ	Bioaccumulative and toxic
	Cyanide	May eliminate dilution credit
	Ammonia	May disrupt aquatic food chain
	PCBs	TMDL soon to be adopted for South San Francisco Bay(1)
	Selenium	Aquatic life criteria could change
	Microconstituents	Possible endocrine disruptor and other toxic effects on aquatic life at low concentrations

Notes:
MEC = Maximum Effluent Concentration.
ML = Minimum Limit.
WQC = Water Quality Criteria.
(1) See PM 4.1.

A detailed description of the RPA process is included in Appendices A through C. Table 2 examines the long term POCs and compares future potential limits to current limits, and Table 3 compares the required removal of long term POCs in the future with current removals.

Table 2 Near-Term and Long-Term POC Limits
San José / Santa Clara Water Pollution Control Plant Master Plan
City of San José

Constituent/Parameter	Preliminary Permit Monthly Average Limit (μg/L)(1)	Future Limit (μg/L)
Copper	11	<11
Mercury	0.025	0.025
Nickel	25	<25
Selenium	None(2)	Unknown
Cyanide	5.7	3.7 - 5.7
Dioxin TEQ	1.4×10^{-8}	1.4×10^{-8}
PCBs	None	1.7×10^{-4} (3)
Total Nitrogen	None	3,000
Ammonia	None(4)	< 70 (5)
Microconstituents	None	<0.01(6)

Notes:

(1) Average monthly effluent limits.

(2) Aquatic life criteria is 5.0 μg/L.

(3) California Toxics Rule (CTR) Human Health Criterion - not included in TMDL, but may be litigated.

(4) WQBEL was removed from preliminary Draft Permit - it is unknown whether technology based limit of 3 mg/L (monthly average) / 8 mg/L (daily max) from current permit will be reinstated.

(5) Depending on whether ammonia is regulated based on fish toxicity, or phytoplankton inhibition.

(6) For some endocrine disrupting compounds (Lange et al., 2001)

4.2.1 Nickel and Copper

The WPCP can meet its current nickel and copper limits. However, it will continue to be given water quality based effluent limits (WQBELs) in future NPDES permits because nickel and copper are governed by Action Plans in the South San Francisco Bay. Because of anti-backsliding regulations, WQBELs for nickel and copper will either remain the same or be incrementally reduced in future NPDES permits.

Table 3 Existing and Future POC Removal
San José / Santa Clara Water Pollution Control Plant Master Plan
City of San José

Constituent/Parameter	Existing Removal	Future Removal (1)
Copper	97%	97%
Mercury	98%	98%
Nickel	51%	51%
Selenium	73%	Unknown(2)
Cyanide	-3%	0-30%
Dioxin TEQ	86%(3)	>99%
PCBs	77%(4)	>99.9%
Total Nitrogen(5)	Unknown	Unknown
Ammonia	98%	>99%
Microconstituents	Unknown(6)	>99%

Notes:
(1) See Appendix D for rationale behind percent removals.
(2) Guidance for future objective for selenium coming from EPA in 2009.
(3) Removal was calculated with only one set of influent/effluent samples where dioxin TEQ was above the detection limit.
(4) Removal was calculated with only one set of influent/effluent samples where dioxin PCBs were above the detection limit.
(5) The WPCP does not currently monitor for total nitrogen.
(6) The WPCP has not yet completed a sampling program for microconstituents.

4.2.2 <u>Mercury</u>

The WPCP can meet its current mercury limits, which are specified on both a mass and a concentration basis in the Basin-wide discharge permit for mercury (NPDES CA0038849). In 2017, the WPCP's mass-based annual average effluent limit will drop from 1.0 kilograms (kg)/year to 0.8 kg/year (San Francisco Bay Regional Water Quality Control Board, 2006). At the same time, population growth could increase mercury loading. Therefore, incrementally higher percent removals may be necessary to meet present discharge loads in the future, unless current flow discharge rates are maintained with increased water recycling.

The SWRCB is contemplating methylmercury water quality objectives (State Water Resources Control Board, 2007). It is unknown how these would be implemented. However, the WPCP has conducted studies of methylmercury within its treatment system and determined that removal of methylmercury within the WPCP is already extremely effective. Therefore, it is unlikely that new methylmercury regulations will drive planning decisions.

4.2.3 Nitrogen Forms

The only nitrogen form that is currently regulated in WPCP effluent is ammonia. As discussed in Section 3.6, it is expected that total nitrogen will be regulated in the future, and that WQBELs may be as low as 3 mg/L.

The WPCP reduces ammonia to extremely low levels (i.e. less than 0.5 mg/L as N, including the additional ammonia adding during chloramination). If the WPCP reduced or eliminated the addition of ammonia into the wastewater for chloramination, it would likely achieve 0.1 mg/L in the effluent, which is the typical ammonia concentration in the secondary effluent.

Recent research in the San Francisco Bay and delta ecosystems has implicated low levels of ammonia with disrupting the aquatic food chain (Dugdale, 2007). Phytoplankton has been shown to prefer ammonia to nitrate as a nitrogen source, but its uptake is slower than for nitrate, so ammonia has an inhibitory effect on phytoplankton growth compared to nitrate. Major sources of ammonia to the San Francisco Bay and delta are wastewater effluent and agricultural runoff. Researchers report that phytoplankton blooms are inhibited when ammonia concentrations are above 0.072 mg/L (as NH_4), and when there is sufficient light penetration into the water column. While a WQBEL as low as 0.072 mg/L is unlikely in the future, the WPCP may face pressure to further reduce effluent ammonia.

4.2.4 Cyanide

The WPCP does not anticipate any difficulty in meeting the preliminary Draft Permit WQBELs of 5.7 micrograms per liter (μg/L) (monthly average) and 14 μg/L (daily maximum) for cyanide. These WQBELs were calculated using a dilution factor of 2.0, since cyanide is quickly attenuated by dilution and degradation after discharge. However, this approach is new for the RWQCB, and in the future, the dilution credit may be rescinded. If so, the WQBELs for cyanide would be recalculated as 3.7 μg/L (monthly average) and 9.6 μg/L (daily maximum). Cyanide is created in the disinfection process at the WPCP, and, per WPCP staff, spikes in the effluent during filter backwash, so cyanide may be controlled by changing operational procedures. Efforts led by the Santa Ana River Dischargers Association are underway to assess cyanide compliance and sampling issues, which could affect the sampling techniques, laboratory analyses, and limits for the WPCP.

4.2.5 Selenium

In 2004, the EPA released a draft WQC for selenium, which was based on fish tissue concentrations rather than water quality concentrations. When these criteria are adopted, site-specific water quality limits will be developed to attain the fish tissue limits, which may be lower than current WQC. This may affect whether the receiving waters are judged as impaired. However, there is currently no evidence of selenium impairment in the food web of Lower South San Francisco Bay (Abusaba and Ogle, 2005). In fact, dilution provided by discharges from the WPCP may be a benefit to Lower San Francisco Bay, given the presence of elevated selenium in the water column of the Alviso Slough that has been tentatively attributed to dewatering discharges. Further guidance from the EPA is expected on this issue in 2009, and could affect long-term regional planning scenarios; however, it is unlikely that selenium would drive substantive planning decisions for the WPCP.

4.2.6 PCBs

As discussed in PM 4.1, the PCB TMDL for the San Francisco Bay has been adopted by the RWQCB (San Francisco Bay Regional Water Quality Control Board, 2008), but has not yet been approved by the SWRCB. The TMDL issues a waste load allocation (WLA) of 0.4 kg/year to the WPCP, but due to the lack of an approved method to measure PCB concentrations in the effluent, it is difficult to determine attainment. The TMDL does not prescribe an effluent concentration limit for the WPCP. Instead, the TMDL requires municipal dischargers to improve solids removal at their facilities, practice source control, and take actions to minimize the risk of people who eat PCB-contaminated fish. Additionally, further monitoring is required.

The California Toxics Rule (CTR) includes a PCB criterion for human health of 1.7×10^{-4} μg/L. If in the future this limit is applied to create a WQBEL for PCBs, it would be very difficult for the WPCP to comply using conventional wastewater treatment technology since the WPCP's maximum reported effluent concentration was several orders of magnitude higher than the criterion. It is important to note that even the most pristine water will exceed this WQC if the water is analyzed by the sensitive EPA Method 1668A (Gregor and Grummer, 1989).

4.2.7 Dioxin Equivalent Toxicity

Like PCBs, dioxins are bioaccumulative compounds that are not readily detectable in water at the concentrations at which they are regulated (Connor et al., 2005). Dioxins are made up of a set of 17 congeners, which are converted to 2,3,7,8-TCDD using toxicity equivalency factors (TEFs), so they can be regulated as a bulk parameter: dioxin-TEQ. Only a few of the congeners are usually detected in wastewater, and 2,3,7,8-TCDD is not one of them. Dioxin congeners other than 2,3,7,8-TCDD are not regulated by the CTR, so the WQBEL for dioxin-TEQ in the preliminary Draft Permit is an interpretation of the Basin Plan's narrative toxicity limit.

The few effluent samples in which dioxins were measurable indicate that dioxin is likely at least ten times higher than the effluent limit. It is therefore unclear how the WPCP will achieve the limit within the 10-year compliance schedule given.

The EPA has recently released guidance on using bioaccumulation factors (BAFs) to determine site-specific dioxin criteria. It is possible that when the BAFs are applied to the TEFs, the resulting criteria would be attainable by the WPCP. However, without significant scientific study, it is unclear whether this is a reasonable hope for regulatory relief. Instead, the RWQCB may choose to pursue a program similar to PCBs, where compliance is based on management practices rather than effluent concentrations.

4.2.8 <u>Microconstituents</u>

Microconstituents include pharmaceuticals, personal care products, and other compounds presents in wastewater at concentrations below one part-per-billion, in complex mixtures. While many microconstituents have been present in the environment for decades, concern about their possible effects on humans and wildlife is being driven by improved analytical techniques that are able to detect them at lower concentrations. These microconstituents are not currently regulated with WQC, but future regulations will likely be based on protecting aquatic life from the effects of endocrine disrupting compounds. The EPA recently released a draft white paper that addressed a potential basis for setting aquatic life criteria for endocrine disrupting microconstituents (Environmental Protection Agency, 2008).

It is likely that microconstituents are already quite low in the WPCP effluent, since secondary processes are operated for nutrient removal, which has been shown to remove many microconstituents to below the level of detection. However, detection limits are dropping as analytical techniques improve, and public sentiment is driven by whether these compounds are present or absent (i.e. above or below the level of detection). Additionally, aquatic effects due to some of these compounds have been observed at concentrations that are less than one part-per-trillion. Therefore, the WPCP may need to aggressively remove some microconstituents to below part-per-trillion levels in the future.

5.0 POTENTIAL REGULATORY SCENARIOS

The above regulatory developments will inform the planning basis for the WPCP in the near and long term. This section summarizes the regulatory scenarios that result from these considerations.

5.1 Regulatory Scenario for Draft NPDES Permit (2008) Through 2013

In general, the WPCP appears able to meet the regulatory requirements of the preliminary Draft Permit and other requirements over the next five years without significant changes to capital facilities or operating procedures. The WQBELs in the preliminary Draft Permit are attainable at the present time, except for dioxin-TEQ, which is given a ten-year compliance schedule.

To address source control for dioxin-TEQ, the City is pursuing the following actions:

- Support continuing regional discussions regarding development of dioxin management strategies.

- Continue towards goal of reducing municipal vehicle emissions by 25 percent by 2013.

- Continue purchasing municipal paper supply from a 100 percent certified renewable, carbon neutral energy source, as long as this paper continues to be available at a reasonable cost and is compatible with WPCP equipment and processes.

If the PCB TMDL is approved by the SWRCB, the Office of Administrative Law (OAL), and the EPA, the WPCP will be required to move ahead with the management practices to reduce PCBs. The WPCP should support regional discussions regarding source control. The Master Plan process should take into account source control, as well as upgrading the tertiary treatment and solids management facilities at the WPCP.

5.2 Long Term Regulatory Scenario Through 2040

Through the planning horizon of 2040, the WPCP 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 -** Ammonia is the nutrient constituent that could potentially cause the greatest problem for the WPCP discharge. Because the WPCP already nitrifies, further ammonia reductions would require optimizing the process, stopping or reducing the addition of ammonia for disinfection by chloramination, or potentially requiring additional facilities. Additionally, if further nutrient reduction requirements are implemented, the WPCP 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.

- **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 or dioxins without some regulatory relief.

- **Disinfection Byproducts** - At this time, cyanide is the only POC 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.

- **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.

In general, as conservation increases, concentrations of constituents are expected to rise, and as population increases, loads are expected to rise. Therefore, attainment of effluent limits is a constantly moving target.

It will not be necessary to implement all of the advanced treatment technologies for the entire treatment train. Effluent destined for discharge will have different requirements than effluent that is recycled, and even different recycling demands will have different quality requirements. The Master Plan process should consider the approach of using “designer” treatment trains to optimize the energy and expense to treat the effluent for different end uses.

The planning process will also need to account for cross-media impacts. For example, future advanced treatment requirements will drive increased energy demands, as well as transferring constituents into biosolids. Energy conservation and alternative energy sources need to be incorporated into the Master Plan process so that future GHG emissions do not increase.

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APPENDIX A – FINDINGS OF PRELIMINARY RPA

City of San José

San José/Santa Clara Water Pollution
Control Plant Master Plan

TASK NO. 4
PROJECT MEMORANDUM NO. 3
APPENDIX A - FINDINGS OF PRELIMINARY RPA

December 2008

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CITY OF SAN JOSÉ

SAN JOSÉ /SANTA CLARA WATER POLLUTION CONTROL PLANT MASTER PLAN

TASK NO. 4
PROJECT MEMORANDUM NO. 3
APPENDIX A - FINDINGS OF PRELIMINARY RPA

TABLE OF CONTENTS

Page No.

LIST OF TABLES

LIST OF FIGURES

FINDINGS OF PRELIMINARY RPA

1.0 INTRODUCTION

A reasonable potential analysis (RPA) provides a basis for anticipating constituents that will have water quality-based effluent limits (WQBELs) in future National Pollutant Discharge Elimination System (NPDES) permits. Constituents with the reasonable potential to cause or contribute to an exceedance of water quality criteria (WQC) are required to have effluent limitations. Awareness of upcoming permit requirements can help the City of San José (City) plan operational changes and process upgrades at the San José/Santa Clara Water Pollution Control Plant (WPCP) that will enable compliance with those limits.

The City conducted a preliminary RPA to anticipate the constituents that may be given WQBELs using the method outlined in the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy, or SIP). This RPA was used by the City as part of the NPDES permit renewal process. The RPA identified seven constituents that trigger reasonable potential. The SIP's method for conducting a RPA compares the ambient (receiving water) and effluent concentrations for a constituent to the lowest applicable criterion for that constituent.

The San Francisco Bay Regional Water Quality Control Board (RWQCB) also conducted a separate RPA to develop WQBELs that will be included in the next permit. Although there were some differences in the monitoring data sets used by the City and the RWQCB, the RWQCB's analysis identified the same seven constituents, and added one more (ammonia) to that list, which they subsequently removed.

2.0 KEY RPA VARIABLES

In addition to effluent and receiving water monitoring data, other information is required to complete an RPA. This section reviews key variables and how they apply to the City's preliminary RPA, which is attached in Appendix B.

2.1 Assumptions

The process for conducting an RPA, as defined in the SIP, models the simultaneous occurrence of worst-case assumptions for a number of variables. These worst-case assumptions include disregarding the effects of dilution in the assessment of reasonable potential, utilizing minimum measured effluent and receiving water hardness values when calculating aquatic life criteria, using the maximum effluent and receiving water concentrations, and the use of 95th and 99th percentile probability factors in the calculation of effluent limits.

2.2 Water Quality Standards

Based on the Clean Water Act and Environmental Protection Agency (EPA) regulations, federal water quality standards are legally enforceable requirements to be achieved in ambient waters. Water quality standards for a specific water body combine the appropriate designated/beneficial uses of the water body with the applicable water quality objectives and criteria protective of those uses.

2.2.1 Designated/Beneficial Uses

Designated uses are appropriate water uses to be achieved and protected. Per the EPA, appropriate uses are identified by taking into consideration the use and value of the water body for public water supply; for protection of fish, shellfish, and wildlife; and for recreational, agricultural, industrial, and navigational purposes. Designated uses are referred to as beneficial uses in California.

2.2.2 Objectives and Criteria

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) regulates water quality in California. Under the Porter-Cologne Act, water quality objectives are legally enforceable numeric or narrative requirements. Water quality objectives are established through independent RWQCB Water Quality Control Plans (Basin Plans) to be protective of the specific beneficial uses of the water body.

WQC are adopted to provide protection of designated/beneficial uses. The EPA promulgated federal WQC for priority pollutants in the National Toxics Rule (NTR) and California Toxics Rule (CTR). The CTR criteria were adopted in 2000 specifically to supplement NTR criteria in California. These criteria are subdivided into freshwater aquatic life criteria, saltwater aquatic life criteria, human health criteria for the consumption of water and organisms, and human health criteria for the consumption of organisms only.

Freshwater and saltwater aquatic life criteria include both a maximum concentration and a chronic concentration. The CTR defines the maximum (acute) concentration as “the highest concentration of a pollutant to which aquatic life can be exposed to for a short period of time without deleterious effects.” Usually, a “short period of time” is considered to have a duration of one hour. The CTR defines the continuous (chronic) concentration as “the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects.” The CTR criteria apply to the South San Francisco Bay and its tributaries, except where they are overridden by site specific objective (SSOs) as put forth in the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan).

2.2.3 Receiving Water Hardness

The hardness measured at the monitoring station at the Artesian Slough (C-3-0), as shown in Figure 1, served as the basis for determining hardness-dependent water quality objectives. Hardness is expressed as "hardness as calcium carbonate ($CaCO_3$)", and is calculated based on the concentrations of the cations calcium and magnesium. Calculated hardness is equal to 2.497 times the concentration of calcium in milligrams per liter (mg/L) plus 4.118 times the concentration of magnesium in mg/L. Monitoring data show that the hardness in the Artesian Slough has a minimum of 510 mg/L as $CaCO_3$. However, the maximum hardness allowed by the CTR and Basin Plan for WQC calculations is 400 mg/L as $CaCO_3$. Therefore, the hardness used for criteria calculations is 400 mg/L as $CaCO_3$.

3.0 STEPS OF A REASONABLE POTENTIAL ANALYSIS

This section outlines how the City's RPA was conducted, as per the SIP.

3.1 Identify Applicable Water Quality Standards

The first steps in an RPA are to determine the most stringent applicable criterion or objective for each listed constituent, based on the defined beneficial uses.

3.1.1 Beneficial Uses

The Basin Plan specifically designates the beneficial uses of the receiving waters for the WPCP discharge, which are the Artesian Slough, Coyote Creek, and the South San Francisco Bay. The beneficial uses of these water bodies are outlined in PM 4.1.

3.1.2 Identify Applicable Water Quality Standards

Based on these beneficial uses, the applicable CTR criteria include the more stringent of the freshwater and saltwater aquatic life criteria (maximum and continuous) and the human health criteria for consumption of organisms. There are also SSOs for copper and nickel specified in the Basin Plan, and an SSO for cyanide is in development.

3.1.3 Calculate CTR Metals Criteria

Freshwater aquatic life CTR criteria for the metals cadmium, chromium (III), lead, silver, and zinc were calculated as specified in the CTR. A hardness value of 400 mg/L as $CaCO_3$ was used in the metals criteria calculations to determine whether they were more stringent than the analogous marine criteria.

3.1.4 Adjust Water Quality Criteria as Necessary

Dissolved-fraction criteria listed for metals were expressed as total recoverable, by dividing each criterion by the applicable EPA conversion factor or site-specific translators for copper, nickel, zinc, chromium (VI), and lead, which are listed in PM 4.1.

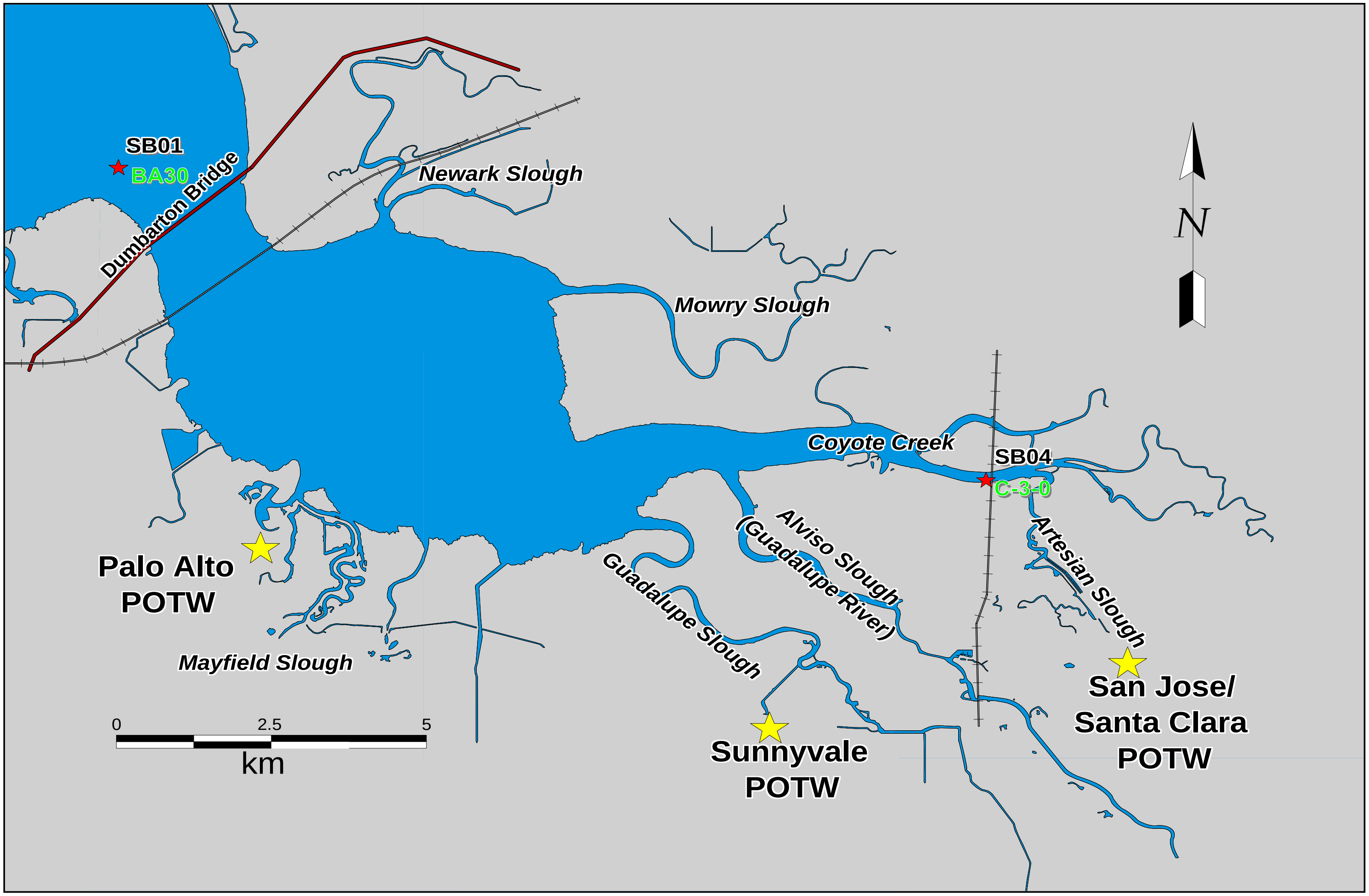

Figure A1
LOCATION OF SB04/C-3-0 AND SB01/BA30
MONITORING STATIONS
SAN JOSÉ/SANTA CLARA WPCP MASTER PLAN
CITY OF SAN JOSÉ

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All criteria and conversion factors are compiled in Appendix C.

3.1.5 Identify Lowest Applicable Criteria

For each constituent, the lowest applicable criterion is utilized in the RPA.

3.2 Effluent and Receiving Water Data Review

The City reports effluent data to the RWQCB via the Electronic Reporting System (ERS). Data reported to ERS for the period of November 2003 through December 2007 were used in the City's preliminary RPA. The November 1 start date was selected because it was the effective date of the previous permit, and is consistent with the permit application's request that dischargers should submit up to four and one-half years of effluent data.

Ambient (receiving water) data used in the RPA were compiled from the following sources:

- San Francisco Bay Regional Monitoring Program (RMP) data from the Dumbarton Bridge station, March 1993 through August 2006. The RMP does not collect data for all 126 priority pollutants. RMP data were used for the constituents available.
- Bay Area Clean Water Association (BACWA) 2002-2003 Ambient Water Monitoring data, collected in collaboration with the RMP, for the Dumbarton Bridge station. This study was conducted to provide ambient background data for the remainder of the CTR priority pollutants not regularly collected by the RMP.

The location of the Dumbarton Bridge Station (SB01/BA30) is shown in Figure 1. The list of constituents that were evaluated as part of the RPA is included in Appendix C.

3.3 RPA Procedure

The data described above were used to determine whether a discharge might cause, have a reasonable potential to cause, or contribute to an excursion above the applicable WQC.

The steps outlined in the SIP were followed for each priority pollutant:

- Determine the observed maximum effluent concentration (MEC) of the pollutant. For those analytes with a detected concentration for a sample, as either measured or estimated by the laboratory, the MEC was set equal to the maximum of the reported measured or estimated concentrations. (A notable change was made to the RPA method in the 2005 SIP revisions. No longer does the SIP require the development of a WQBEL for those constituents with an ambient concentration that exceeds the criterion if the constituent is not present in the effluent.) An MEC that is higher than the applicable criteria triggers reasonable potential.
- Compare the MEC and the observed maximum ambient background concentration with the lowest applicable WQC. A maximum ambient background concentration that

is higher than the applicable criteria, for a constituent detected in the effluent, triggers reasonable potential.

- Review other information that may impact effluent limitations (i.e., presence of endangered species), as necessary. Other factors based on "best professional judgment" could cause the pollutant to trigger reasonable potential.

3.4 Results

Table 1 lists the results of the City's preliminary RPA that was submitted to the RWQCB. Seven constituents triggered reasonable potential out of the 157 that were considered in the analysis.

Table A1 Preliminary RPA Results
San José/Santa Clara Water Pollution Control Plant Master Plan
City of San José

Constituent	Applicable Water Quality Criterion (μg/L)	Maximum Effluent Concentration (μg/L)	Maximum Observed Ambient Background Concentration (μg/L)	Reasonable Potential	Trigger for Reasonable Potential
Copper(1)	13	9.54	8.59	No	NA
Mercury(2)	0.051	0.0049	0.07	NA	NA(2)
Nickel(1)	27	12.3	15.8	No	NA
Cyanide	1.0	63(3)	0.4	Yes	1- Effluent
Dioxin-TEQ(4)	1.4E-08	DNQ 4.24E^{-10}	2.59E-07	Qualified	2 - Background
Heptachlor	0.00021	0.038	0.000022	Yes	1 - Effluent
Tributyltin(5)	0.0074	0.013	0.003	Qualified	1 - Effluent

Notes:
NA = Not Available.
(1) Although reasonable potential is not triggered for copper and nickel, effluent limits are anticipated under the site-specific objectives for these parameters.
(2) Mercury requirements will not be included in the renewed NPDES permit because they are included in the mercury watershed permit, but are included in this table for completeness.
(3) Reasonable potential for cyanide is triggered by data conducted using a modified EPA method. This special study was developed by the South San Francisco Bay dischargers working with the RWQCB to develop a shallow water cyanide policy. It is expected that these data will not be used beyond the triggering of reasonable potential due to their research nature. The cyanide MEC reported to the RWQCB's ERS using routine EPA-approved effluent monitoring for NPDES compliance is 5 µg/L, which also triggers reasonable potential.
(4) No WQC have been adopted for Dioxin-TEQ (toxicity equivalent), however the RWQCB's practice in recent permits has been to use the criteria for 2,3,7,8-TCDD. The City does not agree that this is an appropriate way to conduct the RPA.
(5) No WQC have been adopted for tributyltin, however the RWQCB has used EPA guidance for this constituents in recent permits. The City does not agree that this is an appropriate way to conduct the RPA.

3.5 RPA Developed by RWQCB

The RWQCB is in the process of developing a new permit, for which they performed their own RPA. There are several discrepancies in the MEC and ambient background concentrations between the City's and the RWQCB's RPAs due to different monitoring data sets utilized. However, the results of the RWQCB analysis were the same as the City's study, except that total ammonia was also considered to have reasonable potential. Total ammonia was not on the list of WQC that the City used to perform its analysis. For the RWQCB study, the MEC for total ammonia (as nitrogen) was 0.9 mg/L, the WQC was 1.48 mg/L and the maximum background concentration was 0.89 mg/L.

All of these constituents were given WQBELs in the Draft Permit, with the exception of mercury. The effluent limit for mercury is applied via the Basin-wide NPDES permit CA0038849.

4.0 CONSTITUENTS WITH REASONABLE POTENTIAL

This section describes the relevant issues for each of the constituents that trigger reasonable potential.

4.1 Copper

The MEC for copper used by the RWQCB was 9.5 μg/L, which was lower than the governing WQC of 13 μg/L. Although reasonable potential was not triggered by effluent or ambient concentrations, copper effluent limits are implemented via the SSO for the Lower South San Francisco Bay.

4.2 Mercury

The MEC for mercury used by the RWQCB was 0.02 μg/L, which was lower than the governing WQC of 0.051 μg/L. Mercury is considered to have reasonable potential because ambient concentrations are higher than applicable WQC and it is detected in the effluent. Mercury is 303(d) listed for the San Francisco Bay, and has been issued a total maximum daily load (TMDL). Effluent limits for mercury are included in a separate Basin-wide permit, as discussed in PM 4.1.

4.3 Nickel

The MEC for nickel used by the RWQCB was 12 μg/L, which was lower than the governing WQC of 27 μg/L. Although reasonable potential was not triggered by effluent or ambient concentrations, nickel effluent limits are implemented via the SSO for the Lower South San Francisco Bay.

4.4 Cyanide

The MEC for cyanide used by the RWQCB was 31 μg/L, and the governing WQC was 1.0 μg/L, although the SSO of 2.9 μg/L could also be considered to be the governing criteria. The MEC for cyanide exceeds both the proposed SSO in the Basin Plan and also the existing CTR criterion. As discussed in the Draft Permit Fact Sheet (Appendix C), cyanide is the only constituent that will be given dilution credit when calculating WQBELs, since it is quickly attenuated through both degradation and dilution. A dilution credit (D) of 2.0 will be applied for cyanide.

4.5 Dioxin-Toxicity Equivalent (TEQ)

The MEC for dioxin-TEQ used by the RWQCB was 1.7×10^{-8} μg/L (from a very limited effluent data set), was higher than the governing WQC of 1.4×10^{-8} μg/L. The ambient background concentration of 1.1×10^{-7} μg/L was also above the governing WQC, so reasonable potential is triggered by both of these parameters.

The CTR establishes a human-health limit for 2,3,7,8-TCDD. Sixteen other dioxin compounds and dioxin-like compounds are regulated by the RWQCB based on their relative toxicity to 2,3,7,8-TCDD as toxicity equivalencies (TEQ). Therefore, dioxin-TEQ is a bulk parameter, and the other related pollutants are assigned toxic equivalency factors. In the City's data set, reasonable potential is triggered by the ambient background concentration, and in the RWQCB's data set, reasonable potential is triggered by both the MEC and the ambient background concentration.

The RWQCB states in the Draft Permit that the existing effluent data for dioxin-TEQ is limited. In general, where there is insufficient information to calculate final WQBELs, the SIP allows the interim performance-based effluent limits. However, the Draft Permit states that no interim limit is proposed for dioxin-TEQ because the WQBEL implements the Basin Plan's narrative bioaccumulation water quality objective. The Draft Permit defines a 10-year compliance schedule and additional monitoring to develop a meaningful interim limit. Therefore the WPCP has ten years to comply with a new WQBEL, unless a new TMDL for dioxin-TEQ is adopted into the Basin Plan during that period.

4.6 Heptachlor

The MEC for heptachlor used by the RWQCB was 0.038 μg/L, and the governing WQC was 0.00021 μg/L, The MEC for heptachlor exceeds the WQC from the CTR, therefore reasonable potential is triggered.

4.7 Tributyltin

The MEC for tributyltin used by the RWQCB was 0.013 μg/L, and the governing WQC was 0.0074 μg/L, The MEC for tributyltin is greater than the lowest applicable criteria, therefore reasonable potential is triggered. Although there is no objective for tributyltin in the CTR, the RWQCB applies EPA recommended WQC via the Basin Plan's narrative toxicity objective.

4.8 Total Ammonia

Total ammonia was not identified in the City's preliminary RPA because it was not included in the list of constituents with criteria. The total ammonia criteria used in the RWQCB's RPA were determined by converting the objectives for unionized ammonia included in the Basin Plan using a factor that was equivalent to the fraction of unionized ammonia measured at the San José Slough monitoring station. The MEC for ammonia used by the RWQCB was 900 μg/L, and the governing WQC was 11480 μg/L. However, reasonable potential was not triggered due to the MEC or background concentration, but instead was due to RWQCB consideration of the sensitivity of the ecosystem south of the Dumbarton Bridge to the effects of ammonia toxicity.

5.0 SIGNIFICANCE FOR MASTER PLANNING

Except for dioxin-TEQ, none of the constituents that triggered reasonable potential and were given WQBELs by the RWQCB should pose a problem for attainment over the 5-year timeframe that will be governed by the next Permit. Past the 5-year timeframe, all of the constituents given WQBELs in the next Permit are expected to continue to be regulated in future permits, with the exception of heptachlor and tributyltin, which were assumed to have triggered reasonable potential either due to bad data or a rare illegal dumping event,

Dioxin-TEQ was given a 10-year compliance schedule, since immediate attainment of the 1.4×10^{-8} μg/L limit is currently infeasible. The effluent data for dioxin-TEQ are limited, and generally below the limit of quantification, but are likely up to ten times higher than the WQBEL. It is uncertain whether future compliance will be feasible, but the City is moving ahead with source control alternatives, and treatment will be considered as part of the Master Plan process.

The majority of dioxin compounds come from atmospheric deposition. Therefore, source control alternatives available to the City include limits on combustion and incineration processes that create dioxins. The City already purchases its paper products from non-dioxin-producing sources, and is implementing policies to reduce vehicle emissions. Because dioxins are associated with particles, the Master Plan process should consider upgrading to a more advanced filtration technology, such as microfiltration, that will help to remove dioxins from the wastewater stream.

There may be regulatory relief on the horizon, since meeting WQBELs for dioxins is difficult for all wastewater treatment facilities in the San Francisco Bay area. Nonetheless, in the near term, the City should continue to participate in regional discussions about what constitute best management and treatment practices for dioxins.

6.0 CONCLUSIONS

Based on the effluent and receiving water monitoring results, it was determined that the vast majority of constituents do not have reasonable potential to cause or contribute to an excursion above applicable water quality objectives. WQBELs are required for seven constituents that do exhibit reasonable potential, which were:

- Copper.
- Mercury.
- Nickel.
- Cyanide.
- Dioxin-TEQ.
- Heptachlor.
- Tributyltin.

The City's preliminary RPA anticipated all seven of these constituents. Of the above constituents, only dioxin-TEQ is expected to be infeasible to comply with immediately, and was given a 10-yar compliance schedule in the Draft Permit. Part of the uncertainty lies in the difficulty in quantifying dioxin-TEQ, since the limit of detection is close to the WQC. Source control and improved tertiary processes are alternatives to reduce the concentration of dioxin-TEQ.

APPENDIX B – PRELIMINARY RPA

San Jose/Santa Clara Water Pollution Control Plant
2008 NPDES Permit Renewal

Reasonable Potential Analysis

-- DRAFT --

March 24, 2008

Introduction

The purpose of this memorandum is to summarize and discuss the results of the attached Reasonable Potential Analysis (RPA) conducted for the San Jose/Santa Clara Water Pollution Control Plant (Cities).

Summary Results of Reasonable Potential Analysis (RPA)

Results of the RPA are shown in **Table 1**.

Table 1. Summary of the Reasonable Potential Analysis (RPA)

Constituent	Applicable Water Quality Criterion (µg/L)	Maximum Effluent Concentration (µg/L)[1]	Maximum Observed Ambient Background Concentration (or Minimum Detection Limit) (µg/L)[1]	Reasonable Potential?	Trigger for Reasonable Potential
Copper[1]	13	9.54	8.59	No	N/A
Mercury[2]	0.051	0.0049	0.07	N/A	N/A[2]
Nickel[1]	27	12.3	15.8	No	N/A
Cyanide	1.0	63[3]	0.4	Yes	Effluent
Dioxin-TEQ[4]	1.4E-08	DNQ 4.24E-10	2.59E-07	Qualified	Background
Heptachlor	0.00021	0.038	0.000022	Yes	Effluent
Tributyltin[5]	0.0074	0.013	0.003	Qualified	Effluent

Notes

1. Although reasonable potential is not triggered for copper and nickel, effluent limits are anticipated under the site-specific objectives for these parameters.
2. Mercury requirements will not be included in the renewed NPDES permit because they are included in the mercury watershed permit, but are included in this table for completeness.
3. Reasonable potential for cyanide is triggered by data conducted using a modified EPA method. This special study was part of the South Bay dischargers in working with the Regional Water Board to develop a shallow water cyanide policy. It is expected that these data will not be used beyond the triggering of reasonable potential due to their research nature. The cyanide MEC reported to the Regional Water Board's Electronic Reporting System (ERS) using routine EPA-approved effluent monitoring for NPDES compliance is 5 µg/L, which also triggers reasonable potential.
4. No water quality criteria have been adopted for Dioxin-TEQ, however the Regional Water Board's practice in recent permits has been to use the criteria for 2,3,7,8-TCDD. The Cities do not agree that this is an appropriate way to conduct the reasonable potential analysis.
5. No water quality criteria have been adopted for tributyltin, however the Regional Water Board has used EPA guidance for this constituents in recent permits. The Cities do not agree that this is an appropriate way to conduct the reasonable potential analysis.

Applicable Water Quality Criteria and Objectives

The applicable numeric water quality criteria (federal) and water quality objectives (state) for the receiving waters were used in the RPA. The term "criteria" is used as a shorthand in this document to refer to both types of standards (criteria and objectives). The RPA was completed according to procedures outlined in the *Policy for Implementation of Toxic Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California*, also known as the State Implementation Policy (SIP).

Salinity, Hardness, and pH

Since the vicinity of the Cities' discharge has been classified as estuarine, the lower criteria between the salt water or fresh water apply for any particular constituent. This designation was retained from the Cities' previous NPDES permit in this analysis.

A hardness value of 400 mg/L was also retained from the Cities' previous NPDES permit (which reported that hardness values ranged from 510 – 2650 mg/L). As stipulated in the California Toxics Rule (CTR), a maximum hardness of 400 is used for hardness values equal to or greater than 400.

The pH of 7.9 is the average of pH data collected at the Lower South Bay Regional Monitoring Program (RMP) stations (including Dumbarton Bridge) from March, 1993 to August, 2006 (all dates available at this time).

Metals and Cyanide (CTR priority pollutant nos. 1-14)

<u>CTR Criteria for Constituents Without Adjustments</u>

CTR criteria and conversion factors (as applicable) were used for the following constituents (Basin Plan tables 3-3 and 3-4 do not apply to the Lower South Bay):

- Antimony
- Arsenic
- Beryllium (there are no criteria available for this constituent)
- Cadmium
- Chromium III (no effluent data, chromium VI criteria are applied to total chromium instead)
- Lead
- Selenium
- Silver
- Thallium
- Cyanide

<u>Copper and Nickel</u>

The site-specific copper and nickel criteria from *Basin Plan Table 3-3A: Water Quality Objectives for Copper and Nickel in Lower South San Francisco Bay* were used with a copper site-specific translator of 0.53 (same value for both chronic and acute criteria) and nickel site-specific translators of 0.53 and 0.2 for acute and chronic criteria, respectively.

Chromium and Zinc

Chromium VI and zinc CTR criteria were used with site-specific translators that were calculated during the previous permit renewal process. The acute and chronic translators for chromium VI are 0.08 and 0.03, respectively. The acute and chronic translators for zinc are 0.53 and 0.2, respectively. These translators were calculated based on RMP data collected at the Dumbarton Bridge station.

Dioxin-TEQ (using CTR priority pollutant no. 16)

Following current practice by the San Francisco Bay Regional Water Board, the highest dioxin-TEQ value was compared to the CTR criteria for 2,3,7,8-TCDD (priority pollutant #16). However, it should be noted that the Cities disagree with the Regional Water Board's reasonable potential approach, as there are no approved criteria for dioxin-TEQ, but only for the one listed congener. The RPA has been included here for informational purposes only.

Remaining Organic Constituents (CTR priority pollutant nos. 16 and 17-126)

CTR criteria were used for these constituents where available.

Tributyltin

Although tributyltin is not included on the list of 126 CTR priority pollutants, the Basin Plan contains the following reference for tributyltin criteria (in footnotes in Tables 3-3 and 3-4):

> *U.S. EPA has published draft criteria for protection of aquatic life (Federal Register: December 27, 2002, Vol. 67, No. 249, Page 79090-79091). These criteria are cited for advisory purposes. The draft criteria may be revised.*

These draft criteria were revised, and the EPA released final ambient water quality criteria for tributyltin in January, 2004, which are available online at: www.epa.gov/waterscience/criteria/tributyltin/fd-final. The criteria used for this RPA were taken from this website.

It should also be noted that Tables 3-3 and 3-4 in the Basin Plan do not apply to the Lower South Bay.

Effluent and Receiving Water Data

Effluent Data

The Cities report effluent data to the Regional Water Board via the Electronic Reporting System (ERS). Data reported to ERS for the period of November 1, 2003 through December, 2007 were used in this RPA. The November 1 date was selected because it was the effective date of the previous permit, and is consistent with the permit application's indication that dischargers should submit up to four and one-half years of effluent data.

Ambient Data

Ambient (receiving water) data used in this RPA were compiled from the following sources:

- RMP data from the Dumbarton Bridge station, March, 1993 through August, 2006 – The RMP does not collect data for all 126 priority pollutants. RMP data were used for the priority pollutants available.

- BACWA 2002-2003 Ambient Water Monitoring data, collected in collaboration with the RMP, for the Dumbarton Bridge station – This study was conducted to provide ambient background data for the remainder of the CTR priority pollutants not regularly collected by the RMP.

Discussion of Constituents of Interest

Based on the criteria and data discussed above, as well as other sources, constituents with likely reasonable potential (and/or other effluent limit triggers) are shown in **Table 1**, above. Each of these constituents is discussed briefly below. A detailed RPA is included in the spreadsheets that accompany this memorandum.

Copper

Although reasonable potential was not triggered, effluent limits are anticipated for copper under the copper site-specific objective for the Lower South Bay.

Mercury

The mercury watershed permit became fully effective on March 1, 2008. Although limits for this constituent will not appear in individual NPDES permits, the watershed permit includes effluent limits and other requirements that apply to the Cities separate from an RPA.

Nickel

Although reasonable potential was not triggered, effluent limits are anticipated for nickel under the nickel site-specific objective for the Lower South Bay.

Cyanide

Reasonable potential for cyanide was triggered by a Maximum Effluent Concentration (MEC) of 63 µg/L (on 5/26/04), using a modified EPA method, which exceeded the lowest applicable criterion (1 µg/L). These data collected by the Cities under a special study by South Bay dischargers in working with the Regional Water Board to develop a shallow water cyanide policy. It is expected that these data will not be used beyond the triggering of reasonable potential due to their research nature. The cyanide MEC reported to the Regional Water Board's Electronic Reporting System (ERS) using routine EPA-approved effluent monitoring for NPDES compliance is 5 µg/L, which also triggers reasonable potential.

Dioxin-TEQ

According to current practice by the Regional Water Board, reasonable potential was triggered because the maximum observed ambient concentration of 2.59E-07 µg/L exceeds the water quality criterion for 2,3,7,8 TCDD of 1.4E-08 µg/L, and dioxins were detected in the effluent.

The 100-liter background sample results that are reported with the 2002-2003 BACWA study are also included in the report *Dioxins in San Francisco Bay: Impairment Assessment/Conceptual Model*, prepared by the San Francisco Estuary Institute for the Clean Estuary Partnership in 2004.

As indicated above, the Cities do not agree that this is an appropriate way to conduct the reasonable potential analysis.

Heptachlor

Reasonable potential was triggered for this constituent because the one detected data point in the data set (0.038 µg/L, from 9/7/05), was above the applicable water quality criterion (0.00021 µg/L).

Tributyltin

As indicated above, only USEPA *recommended* water quality criteria are indicated in Basin Plan tables 3-3 and 3-4, which are not applicable to the South Bay. The Cities do not agree that these types of criteria should be used to conduct a reasonable potential analysis. The one detected data point in the data set (12.6 µg/l, from 7/7/04), is above the applicable water quality criterion (0.0074 µg/l), triggering reasonable potential using the Regional Water Board's current approach.

APPENDIX C – DATA FROM RPA CALCULATIONS

San Jose/Santa Clara WPCP
Calculation of Coefficient of Variation
(Effluent Data)

Copper				Nickel			
Date	Qual	Value	Calc Value	Date	Qual	Value	Calc Value
11/04/03		2.4	2.4	11/04/03		6	6
12/02/03		5.4	5.4	12/02/03		7	7
01/06/04		4.8	4.8	01/06/04		6	6
02/05/04		3.4	3.4	02/05/04		7	7
03/08/04		2.6	2.6	03/08/04		6	6
04/06/04		3.1	3.1	04/06/04		8	8
05/03/04		2.2	2.2	05/03/04		6	6
06/09/04		2.4	2.4	06/09/04		6	6
07/07/04		1.5	1.5	07/07/04		5	5
08/10/04		1.7	1.7	08/10/04		7	7
09/08/04		2.5	2.5	09/08/04		6	6
10/04/04		1.6	1.6	10/04/04		5	5
11/08/04		1.9	1.9	11/08/04		5	5
12/09/04		2.0	2.0	12/09/04		6	6
01/04/05		2.3	2.3	01/04/05		8	8
01/10/05		2.5	2.5	01/10/05		6	6
01/19/05		2.6	2.6	01/19/05		6	6
01/25/05		3.4	3.4	01/25/05		9	9
02/02/05		2.7	2.7	02/02/05		6	6
02/07/05		3.0	3.0	02/07/05		7	7
02/15/05		3.4	3.4	02/15/05		6	6
02/21/05		3.4	3.4	02/21/05		7	7
03/02/05		2.6	2.6	03/02/05		9	9
03/08/05		2.8	2.8	03/08/05		6	6
03/14/05		2.6	2.6	03/14/05		5	5
03/22/05		2.6	2.6	03/22/05		6	6
03/28/05		2.9	2.9	03/28/05		5	5
04/06/05		2.8	2.8	04/06/05		6	6
04/11/05		2.5	2.5	04/11/05		5	5
04/19/05		2.2	2.2	04/19/05		6	6
04/27/05		2.4	2.4	04/27/05		5	5
05/05/05		2.9	2.9	05/05/05		5	5
05/09/05		2.3	2.3	05/09/05		5	5
05/17/05		2.8	2.8	05/17/05		6	6
05/25/05		2.3	2.3	05/25/05		6	6
06/01/05		2.1	2.1	06/01/05		6.2	6.2
06/06/05		2.3	2.3	06/06/05		5.9	5.9
06/15/05		2.6	2.6	06/15/05		6.4	6.4
06/21/05		3.4	3.4	06/21/05		6.5	6.5
06/27/05		2.4	2.4	06/27/05		5.9	5.9
07/05/05		1.7	1.7	07/05/05		5.10	5.10
08/04/05		1.67	1.67	08/04/05		6.12	6.12
09/07/05		2.00	2.00	09/07/05		6.72	6.72
10/05/05		1.65	1.65	10/05/05		5.07	5.07
11/07/05		1.66	1.66	11/07/05		5.44	5.44
12/07/05		2.02	2.02	12/07/05		5.99	5.99
01/05/06		3.01	3.01	01/05/06		5.56	5.56
02/06/06		4.26	4.26	02/06/06		6.65	6.65
03/07/06		2.46	2.46	03/07/06		7.18	7.18
04/05/06		2.09	2.09	04/05/06		5.87	5.87
05/04/06		3.79	3.79	05/04/06		8.19	8.19
06/05/06		1.97	1.97	06/05/06		7.43	7.43
07/06/06		2.75	2.75	07/06/06		6.11	6.11
08/07/06		2.01	2.01	08/07/06		5.85	5.85
09/07/06		1.99	1.99	09/07/06		5.92	5.92
10/04/06		2.28	2.28	10/04/06		7.17	7.17
10/18/06		6.5	6.5	10/18/06		5.4	5.4
10/19/06		4.0	4.0	10/19/06		5.4	5.4
10/20/06		3.61	3.61	10/20/06		5.69	5.69
10/21/06		3.92	3.92	10/21/06		7.27	7.27
10/22/06		4.17	4.17	10/22/06		6.93	6.93
10/23/06		4.75	4.75	10/23/06		6.47	6.47
10/24/06		4.65	4.65	10/24/06		7.36	7.36
10/25/06		3.87	3.87	10/25/06		6.25	6.25
10/26/06		4.14	4.14	10/26/06		6.24	6.24
10/27/06		4.02	4.02	10/27/06		6.31	6.31
10/28/06		4.39	4.39	10/28/06		6.50	6.50
10/29/06		4.08	4.08	10/29/06		6.08	6.08
10/30/06		3.83	3.83	10/30/06		5.53	5.53
10/31/06		4.61	4.61	10/31/06		6.05	6.05
11/01/06		4.35	4.35	11/01/06		5.46	5.46
11/02/06		4.31	4.31	11/02/06		5.60	5.60
11/03/06		5.29	5.29	11/03/06		6.52	6.52
11/04/06		3.84	3.84	11/04/06		6.33	6.33
11/05/06		4.01	4.01	11/05/06		5.95	5.95
11/06/06		4.31	4.31	11/06/06		6.76	6.76
11/07/06		4.42	4.42	11/07/06		7.73	7.73
11/08/06		4.11	4.11	11/08/06		7.74	7.74
11/09/06		5.01	5.01	11/09/06		6.98	6.98
11/10/06		4.69	4.69	11/10/06		7.83	7.83
11/11/06		4.68	4.68	11/11/06		9.50	9.50
11/12/06		4.21	4.21	11/12/06		8.17	8.17
11/13/06		4.48	4.48	11/13/06		6.22	6.22
11/14/06		4.51	4.51	11/14/06		6.37	6.37
11/15/06		5.20	5.20	11/15/06		6.56	6.56
11/16/06		4.93	4.93	11/16/06		6.44	6.44
11/17/06		4.77	4.77	11/17/06		6.85	6.85
11/18/06		4.49	4.49	11/18/06		6.75	6.75
11/19/06		4.27	4.27	11/19/06		5.96	5.96
11/20/06		4.68	4.68	11/20/06		5.89	5.89
12/05/06		2.33	2.33	12/05/06		5.94	5.94
01/02/07		2.62	2.62	1/4/2007		6.14	6.14
01/03/07		3.05	3.05	2/5/2007		5.99	5.99
1/4/2007		9.54	9.54	2/20/2007		6.12	6.12
1/5/2007		2.81	2.81	2/27/2007		6.87	6.87
1/6/2007		2.35	2.35	3/4/2007		6.29	6.29
2/5/2007		2.27	2.27	3/5/2007		10.8	10.8
2/20/2007		3.66	3.66	3/6/2007		12.3	12.3
2/27/2007		3.15	3.15	3/7/2007		10.4	10.4
3/6/2007		3.05	3.05	3/8/2007		9.12	9.12
3/27/2007		2.55	2.55	3/13/2007		9.36	9.36
4/3/2007		2.91	2.91	3/20/2007		8.45	8.45
4/5/2007		2.50	2.50	3/27/2007		6.46	6.46
4/10/2007		2.82	2.82	4/3/2007		6.94	6.94
4/17/2007		2.43	2.43	4/5/2007		7.41	7.41
4/24/2007		2.22	2.22	4/10/2007		6.67	6.67
5/1/2007		2.27	2.27	4/17/2007		7.11	7.11
5/2/2007		2.45	2.45	4/24/2007		7.20	7.20
5/8/2007		2.15	2.15	5/1/2007		5.63	5.63
5/9/2007		2.55	2.55	5/2/2007		5.73	5.73
5/10/2007		2.37	2.37	5/8/2007		7.31	7.31
5/11/2007		2.46	2.46	5/9/2007		6.64	6.64
5/12/2007		2.40	2.40	5/10/2007		5.99	5.99
5/13/2007		2.64	2.64	5/11/2007		6.53	6.53
5/14/2007		2.44	2.44	5/12/2007		6.58	6.58
5/15/2007		2.74	2.74	5/13/2007		8.46	8.46
5/22/2007		2.42	2.42	5/14/2007		6.72	6.72
5/29/2007		2.59	2.59	5/15/2007		6.57	6.57
5/31/2007		2.62	2.62	5/22/2007		6.12	6.12
6/5/2007		2.30	2.30	5/29/2007		5.78	5.78
6/12/2007		2.83	2.83	5/31/2007		5.76	5.76
6/19/2007		2.72	2.72	6/5/2007		8.16	8.16
6/26/2007		2.66	2.66	6/12/2007		7.06	7.06
7/2/2007		2.42	2.42	6/19/2007		5.77	5.77
7/3/2007		2.23	2.23	6/26/2007		5.47	5.47
7/10/2007		2.27	2.27	7/2/2007		5.25	5.25
7/17/2007		2.53	2.53	7/3/2007		6.95	6.95
7/24/2007		3.05	3.05	7/10/2007		5.42	5.42
7/31/2007		2.23	2.23	7/17/2007		5.85	5.85
8/7/2007		2.45	2.45	7/24/2007		6.77	6.77
8/14/2007		2.13	2.13	7/31/2007		5.36	5.36
8/21/2007		2.76	2.76	8/7/2007		6.90	6.90
8/28/2007		2.20	2.20	8/14/2007		6.64	6.64
9/4/2007		1.82	1.82	8/21/2007		7.29	7.29
9/5/2007		2.05	2.05	8/28/2007		5.33	5.33
9/11/2007		1.86	1.86	9/4/2007		4.78	4.78
9/18/2007		2.04	2.04	9/5/2007		5.31	5.31
9/25/2007		2.28	2.28	9/11/2007		5.10	5.10
10/2/2007		1.99	1.99	9/18/2007		6.24	6.24
10/3/2007		2.13	2.13	9/25/2007		6.29	6.29
10/9/2007		1.95	1.95	10/2/2007		6.87	6.87
10/16/2007		1.99	1.99	10/3/2007		7.07	7.07
10/23/2007		2.31	2.31	10/9/2007		5.65	5.65
10/30/2007		2.23	2.23	10/16/2007		5.21	5.21
11/6/2007		2.29	2.29	10/23/2007		5.27	5.27
11/13/2007		2.30	2.30	10/30/2007		5.52	5.52
11/20/2007		2.28	2.28	11/6/2007		5.32	5.32
11/27/2007		3.16	3.16	11/13/2007		5.25	5.25
12/5/2007		3.65	3.65	11/20/2007		5.41	5.41
12/11/2007		2.20	2.20	11/27/2007		5.53	5.53
12/18/2007		2.46	2.46	12/5/2007		5.27	5.27
12/25/2007		2.15	2.15	12/11/2007		5.16	5.16
				12/18/2007		6.80	6.80
				12/25/2007		5.11	5.11
% ND		**0%**		**% ND**		**0%**	
Mean			**3.0**	**Mean**			**6.4**
St Dev			**1.1**	**St Dev**			**1.2**
CV			**0.37**	**CV**			**0.18**

Cyanide			
Date	Qual	Value	Calc Value
11/12/03	J	2	2
12/16/03		5	5
01/06/04	J	2	2
02/05/04	J	2	2
03/08/04	J	2	2
04/06/04		5.3	5.3
05/03/04	J	3	3
06/09/04	J	2	2
07/07/04	J	3	3
08/10/04	J	3	3
09/08/04	J	2	2
10/04/04	J	2	2
11/08/04	J	3	3
12/09/04	J	2	2
01/04/05	J	2	2
02/07/05	J	3	3
03/08/05		4.6	4.6
04/06/05		3	3
05/05/05		3	3
06/06/05	J	2	2
07/05/05	J	2	2
08/04/05	J	2	2
09/07/05	J	2	2
10/05/05	J	2	2
11/07/05	J	2	2
12/07/05	J	2	2
01/05/06	J	2	2
02/06/06	J	3	3
03/07/06		3	3
04/05/06	J	1	1
05/04/06	J	2	2
06/05/06	J	2	2
07/06/06	J	2	2
08/07/06	J	2	2
09/07/06	J	2	2
10/04/06	J	3	3
11/06/06		3	3
12/05/06	J	2	2
01/04/07	J	2	2
02/05/07	J	2	2
03/06/07	J	2	2
04/05/07	ND	1	0.5
05/02/07		3	3
06/05/07	J	2	2
07/02/07	J	1	1
08/07/07	J	2	2
09/05/07		3	3
10/03/07	J	2	2
11/06/07	J	2	2
12/05/07	J	2	2
% ND		**2%**	
Mean			**2.4**
St Dev			**0.9**
CV			**0.37**

Cyanide by Trace Method		
Date	Qual	Value
11/4/2003	ADD	3.0
11/12/2003	ADD	2.5
11/19/2003	ADD	2.7
12/3/2003	ADD	5.2
12/9/2003	ADD	1.5
12/16/2003	ADD	4.6
12/22/2003	ADD	2.1
12/29/2003	ADD	1.9
1/6/2004	ADD	1.9
1/13/2004	ADD	2.2
1/20/2004	ADD	1.8
1/27/2004	ADD	2.8
2/3/2004	ADD	2.0
2/10/2004	ADD	1.9
2/17/2004	ADD	2.1
2/24/2004	ADD	2.0
3/17/2004	ADD	3.1
4/15/2004	ADD	4.7
5/26/2004	ADD	63
6/23/2004	ADD	2.5
7/28/2004	ADD	2.0
8/25/2004	ADD	4.7
9/23/2004	ADD	2.1
10/27/2004	ADD	2.1
11/17/2004	ADD	10.1
11/18/2004	ADD	3.7
12/15/2004	ADD	2.6
12/28/2004	ADD	2.2
1/19/2005	ADD	2.2
1/23/2005	ADD	3.7
1/24/2005	ADD	3.3
1/25/2005	ADD	27.9
1/25/2005	ADD	20.8
1/26/2005	ADD	8.1
1/27/2005	ADD	3.7
2/2/2005	ADD	2.6
2/16/2005	ADD	2.9
2/23/2005	ADD	3.1
3/2/2005	ADD	2.2
3/8/2005	ADD	3.5
3/16/2005	ADD	2.6
3/23/2005	ADD	2.5
3/30/2005	ADD	2.5
4/6/2005	ADD	3.1
4/13/2005	ADD	2.1
11/16/2007	ADD	2.0
12/5/2007	ADD	1.7
% ND		**0%**
Mean		
St Dev		
CV		

ADD = additional data from San Jose not inclu

Stats for both sets of cyanide data, combined

% ND	**1%**	
Mean		**3.7**
St Dev		**7.0**
CV		**1.9**

APPENDIX D - PERCENTAGE REMOVAL CALCULATIONS AND CONSIDERATIONS

Table D1 Percentage Removal Calculations and Considerations for Table 3

Constituent	Current Removal[1]	Future Required Removal
Copper	97% - Based on average removal 2003-2007	97% - should still be able to meet limits, even with decreasing WQBELs and increased influent concentrations, assuming future influent over 100μg/L (currently 95 μg/L), WQBEL <10 μg/L (currently 11μg/L).
Mercury	98% Based on average removal 2003-2007	98% - will continue to meet waste load allocation of 0.8 kg/yr assum8ing increased influent loads due to increased population will be offset by increased recycling.
Nickel	51%- Based on average removal 2003-2007	51% - should still be able to meet limits, even with decreasing WQBELs, increased influent concentrations, assuming future influent over 20μg/L (currently 14 μg/L), WQBEL < 25 μg/L (currently 25 μg/L).
Selenium	77% - Based on average removal 2003-2007 Need a number here	Future regulatory scenario for selenium is uncertain.
Cyanide	-3% (created during treatment) - Based on average removal 2003-2007	Up to 30% - based on current influent concentration of 5μg/L and possible future WQBEL of 3.7μg/L.
Dioxin	88% - calculated based on one set of influent/effluent data (3/8/2000), since most data points are near or below limit of detection.	>99% - current maximum influent dioxin-TEQ concentration is approximately 1 pg/L ($1x10^{-6}$ μg/L). The WQBEL is 1.4 $x10^{-8}$ μg/L.
PCBs	77% - calculated based on one set of influent/effluent data (9/3/2003), since most data points are near or below limit of detection.	>99.9% - current max influent PCB concentration is approximately 1 μg/L. The CTR human health criteria is 1.7 $x10^{-4}$ μg/L.
Ammonia	98% - Based on average removal 2006-2007	>99% - based on current influent concentration of 25,100 μg/L and possible future WQBEL of 70μg/L.
Microconstituents	Sampling not yet performed.	Assuming typical influent concentration of 1,000 μg/L and future limits for some constituents of 10 μg/L.
Note: (1) Average removals were calculated by comparing influent and effluent concentrations on individual sampling dates, then taking the mean.		