MAY 2009

PINOLE-HERCULES WATER POLLUTION CONTROL PLANT

Antidegradation Analysis for Proposed Wastewater Treatment Plant Discharge Modification

submitted to

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

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Executive Summary

INTRODUCTION

Discharges from the Pinole-Hercules Water Pollution Control Plant (PHWPCP) are regulated by the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board) under an NPDES permit (CA0037796), which was adopted by the Regional Water Board as Order R2-2007-0024 in March 2007. Treated effluent from PHWPCP is pumped to the Rodeo Sanitation District (RSD) where it is combined with RSD effluent and discharged to San Pablo Bay via a deep water outfall. The current permitted average dry weather flows (ADWF) from the PHWPCP and RSD Water Pollution Control Facility (WPCF) are 4.06 MGD and 1.14 MGD, respectively, resulting in a combined ADWF of 5.2 MGD.

The current permitted wet weather capacity for the PHWPCP is 10.3 MGD. This maximum wet weather flowrate is based on the treatment capacity of the PHWPCP's activated sludge system. When wet weather flows exceed 10.3 MGD, blending of primary and secondary effluent occurs to minimize flows through the secondary system, preventing solids washout and ensuring effective treatment. Blending is approved in Order R2-2007-0024 as long as the Cities of Pinole and Hercules implement steps to reduce infiltration and inflow (I/I) and upgrade the secondary capacity of the PHWPCP.

Furthermore, pipe and pump restrictions limit flow to the shared PHWPCP and RSD outfall. When flows from the PHWPCP exceed 10 MGD, an existing shallow water outfall must be used for disposal. Effluent disposed through the shallow water outfall is disinfected and dechlorinated prior to discharge and must comply with all permitted water quality requirements. However, discharges through shallow water outfalls are prohibited in the San Francisco Bay Water Quality Control Plan (SF Basin Plan) and Order R2-2007-0024 requires the City of Pinole to implement alternatives to eliminate use of this outfall.

Pinole and Hercules have decided to upgrade the treatment plant and increase the transmission capacity to the shared PHWPCP and RSD outfall to prevent the need for blending and the use of the shallow water outfall. The cities of Pinole and Hercules are therefore requesting that the Regional Water Board increase the permitted wet weather flow for the PHWPCP to 14.59 MGD (daily average), which coupled with RSD's current wet weather capacity of 2.5 MGD (daily average), would result in 17.09 MGD maximum daily average flow through Outfall 001. No increase in dry weather flows for the two treatment facilities is forecast through 2030 (the design period). The Regional Water Board must address whether the proposed increase in wet weather NPDES-permitted discharge is consistent with state and federal antidegradation policies.

The approach taken to the analysis in this report is to follow guidance provided by the State Water Resources Control Board (SWRCB) regarding the implementation of the antidegradation policies in NPDES permits. The analysis, as summarized in SWRCB Administrative Procedures Update 90-004, includes an assessment of the water quality impacts of the proposed increased discharge. Therefore, the key finding to be established is whether the proposed discharge will produce significant changes in the ambient water quality of San Pablo Bay that would unreasonably change water quality or adversely impact beneficial uses. As ambient water quality in the San Francisco Bay is evaluated, the water quality objectives contained in the San Francisco Bay Water Quality Control Plan have been applied in this antidegradation analysis.

REGULATORY REQUIREMENTS

Antidegradation policies have been issued at both the federal and state level. The federal Clean Water Act (CWA) requires states to adopt, with United States Environmental Protection Agency (USEPA) approval, water quality standards applicable to all its intrastate waters. (33 U.S.C. § 1313.) The CWA also requires state water quality standards to include an antidegradation policy to protect beneficial uses and prevent further degradation of high quality waters. (33 U.S.C. § 1313(d)(4)(B); 40 C.F.R. § 131.12.) In California, water quality standards include the beneficial uses and water quality objectives established within Water Quality Control Plans (Basin Plans) and the State's antidegradation policy as embodied in Resolution 68-16. Both the federal and state antidegradation policies apply to the proposed increase in surface water discharge of treated effluent to San Pablo Bay.

Federal Antidegradation Policy and Guidance

The federal antidegradation policy is designed to protect existing uses and the level of water quality necessary to protect existing uses, and provide protection for higher quality and outstanding national water resources. The federal policy directs states to adopt a statewide policy that includes the following primary provisions, which are intended to classify water body quality as Tier 1, Tier 2 or Tier 3 waters (40 C.F.R. § 131.12):

(1) *Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.* **[Tier 1]**

(2) *Where the quality of waters exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after the full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.* **[Tier 2]**

(3) *Where high quality waters constitute an outstanding national resource, such as waters of national and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.* **[Tier 3]**

State Antidegradation Policy and Guidance

In accordance with the federal regulations requiring states to adopt antidegradation policies, the State's *Statement of Policy with Respect to Maintaining High Quality Waters in California* (Resolution 68-16) is interpreted to incorporate the federal antidegradation policy. Resolution 68-16 states, in part:

1. *Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.*

2. *Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.*

This policy along with guidance issued in 1990 by the State Water Resources Control Board (Administrative Procedures Update 90-004) was addressed for constituents of concern selected due to NPDES permit requirements and Clean Water Act Section 303(d) listings for the San Francisco Bay Region. These constituents are listed in **Table 1** along with the basis for their inclusion. Due to variable lab results in ambient water quality monitoring and the fact that policies to determine reasonable potential are in flux, dioxin and furans are not included in this analysis. Constituents listed on the basis of a preliminary Reasonable Potential Analysis are described as having "Projected Reasonable Potential".

Table ES-1. Constituents of Concern in San Pablo Bay

Constituent	Reason for Inclusion in Antidegradation Analysis
Conventionals	
Ammonia	Projected Reasonable Potential for RSD and PHWPCP
CBOD	Current permit limit for RSD and PHWPCP
Oil and Grease	Current permit limit for RSD and PHWPCP
TSS	Current permit limit for RSD and PHWPCP
Metals	
Copper	Current permit limit for PHWPCP
Mercury	Current permit limit for RSD and PHWPCP / 303(d) list for San Pablo Bay
Nickel	303(d) list for San Pablo Bay
Selenium	303(d) list for San Pablo Bay
Zinc	Current permit limit for RSD
Pesticides	
4,4'-DDT	303(d) list for San Pablo Bay
4,4'-DDE	DDE is a breakdown product of DDT
4,4'-DDD	DDD is a breakdown product of DDT
Chlordane	303(d) list for San Pablo Bay
Dieldrin	303(d) list for San Pablo Bay
Other	
Cyanide	Current permit limit for RSD and PHWPCP
PCBs	303(d) list for San Pablo Bay
PCBs (dioxin-like)	303(d) list for San Pablo Bay

EXISTING CONDITIONS

This antidegradation analysis evaluates water quality impacts to San Pablo Bay, the direct receiving water for PHWPCP treated effluent. For the purposes of this analysis, the boundaries of San Pablo Bay are set to the south at the Richmond San Rafael Bridge and to the east to the mouth of Carquinez Strait. San Pablo Bay is an estuarine waterbody and receives treated municipal wastewater from several agencies; Central Marin Sanitation Agency, Las Gallinas Valley Sanitation District, Novato Sanitation District, and Vallejo Sanitation and Flood Control District in addition to the City of Pinole, the City of Hercules, and the Rodeo Sanitation District.

Water quality conditions in San Pablo Bay are monitored under the Regional Monitoring Program (RMP). Sites used in this analysis to assess San Pablo Bay water quality included:

- Davis Point (RMP site BD40)
- Pinole Point (RMP site BD30)
- San Pablo Bay (RMP site BD20)
- A point in the middle of the Carquinez Strait located just west of the Carquinez Bridge (this point selected for assessment purposes using BD40 water quality)

The RMP's Davis Point (BD40) sampling location is closest to the PHWPCP discharge point. Analysis of RMP data collected at these sites for 1993 to 2001 indicate that water quality in the vicinity of the PHWPCP outfall exhibits a high level of compliance with ambient water quality objectives (WQOs) for the majority of constituents found in PHWPCP treated wastewater. Multiple pesticides and PCBs are 303(d) listed for San Pablo Bay, but none of the pesticides listed in **Table 1** have been detected in PHWPCP effluent. San Pablo Bay is not in 100% compliance with receiving WQOs for mercury, and therefore, the loads of mercury present in receiving waters are discussed in detail within this report.

SOURCES OF CONSTITUENTS OF CONCERN

As part of the RMP's efforts, major sources of selected constituents of concern have been identified and estimates of annual loads from these sources to the San Francisco Bay as a whole have been determined. San Pablo Bay is included in these estimates. Major sources of constituents of concern to San Francisco Bay, as identified by the San Francisco Estuary Institute (SFEI 2000, 2001, 2008), the San Francisco Regional Water Quality Control Board (SFRWQCB, 2004), and the Clean Estuary Partnership (CEP 2003, 2004), include:

- River inputs
- Sediment re-suspension (e.g., dredging, sediment erosion, and in-Bay cycling)
- Urban runoff
- Vessels
- Municipal and industrial treatment plant discharges
- Atmospheric deposition

River inputs account for a large portion of the loadings of constituents of concern into the greater San Francisco Bay. The Richmond inner and outer harbor is dredged annually and the Pinole Shoal has been dredged every other year in the recent past[1], so this source of constituents of concern is particularly relevant in San Pablo Bay. San Pablo Bay is surrounded by urban areas, so urban runoff and atmospheric deposition are also relevant sources. Vessel traffic is present in San Pablo Bay as are municipal and industrial sources.

WATER QUALITY MODELING ANALYSIS

A mathematical model developed by Resource Management Associates (RMA), was used to evaluate the water quality impacts of the proposed increase of PHWPCP discharge into San Pablo Bay. The model is a two-dimensional, free-surface flow-modeling system that is used to simulate hydraulics and hydraulics-related phenomena in an estuary system. The RMA model extends from the Golden Gate Bridge to tributaries of the Delta in order to fully capture inputs to and outputs from San Pablo Bay.

Assumptions used in the modeling effort were chosen to be conservative (i.e., they aim to provide a reasonable worst-case estimate of the water quality impacts of PHWPCP's treated wastewater discharge to San Pablo Bay). Accordingly, no loss or decay in constituents of concern is presumed in the course of mixing and dilution of the PHWPCP effluent in the receiving waters.

The baseline flow scenario for this analysis was defined as current permitted and capacity-related wet weather discharges from the shared PHWPCP and RSD outfall of 12.8 MGD, average daily flows (10.3 MGD from PHWPCP and 2.5 MGD from RSD). The future scenario for this analysis assumes a wet weather discharge rate of 17.09 MGD, average daily flows (representing and upgraded PHWPCP capacity of 14.59 MGD and 2.5 MGD from RSD).

To facilitate analysis of constituents in the PHWPCP discharge and the movement of the discharge plume, a "tracer release" was modeled. The "tracer" analysis yields information regarding the percentage of PHWPCP and RSD combined effluent present at a given location in San Pablo Bay. The tracer simulation was allowed to run for an extended period to allow water column concentrations to approach equilibrium concentration. These percent effluent results were then used to predict incremental changes in receiving water concentrations of constituents of concern.

INCREMENTAL IMPACTS OF PROPOSED PROJECT

In the projected future scenario (17.09 MGD), the percent increase of all constituents of concern in San Pablo Bay (other than ammonia) is approximately zero. Ammonia concentrations increased by a maximum of 1%, and only in the most conservative flow scenario. Ambient water quality in San Pablo Bay has exceeded WQOs for some constituents during RMP monitoring from 1993 to 2001. The projected increase in PHWPCP discharge, however, would not cause any additional exceedances. Of the constituents of concern detected in the combined PHWPCP and RSD effluent, none are projected to be above WQOs in San Pablo Bay in the projected future discharge scenario. Based on these data, the projected increase in PHWPCP discharge in

[1] US Army Corps of Engineers Business Plan for 2007-2009 SF Bay Maintenance Dredging http://www.spn.usace.army.mil/newsrelease/newsrelease_02_26_07.html

not expected to have any significant impacts on ambient water quality conditions in San Pablo Bay.

EVALUATION OF CONSISTENCY WITH ANTIDEGRADATION POLICIES

The impact of the increased PHWPCP discharge has been evaluated by (1) examining the change in ambient water quality that will result for selected constituents and (2) examining the consumption of assimilative capacity that will result based on current ambient water quality. In response to APU 90-004 questions, the findings of this report indicate:

[a] Any reduction in water quality caused by the proposed increased PHWPCP discharge will be spatially localized or limited with respect to the water body (see Spatial Reach of Combined PHWPCP and RSD Discharge)

[b] Any reduction in water quality will be temporally limited to periods of wet weather and will not result in any long-term deleterious effects on water quality (see Spatial Reach of Combined PHWPCP and RSD Discharge)

[c] The proposed increase will produce minor effects which will not result in a significant reduction of water quality (see Projection of Compliance with Water Quality Objectives and Loading Impact to Receiving Waters)

[d] The proposed increase is based on approved General Plans by the planning agencies that would be served by the proposed flow increase. The PHWPCP capacity increase will be adequately subjected to environmental and economic analysis in an EIR required under CEQA. A final EIR is scheduled for approval by the lead agency prior to August 2010.

Primary findings in this analysis are that loadings of constituents in the combined PHWPCP and RSD discharge associated with an incremental increase in permitted capacity at the PHWPCP from 10.3 MGD to 14.59 MGD are not significant. Further, no changes are predicted which would cause exceedances of existing or projected numeric water quality standards in San Pablo Bay. Based on these quantitative results, it is concluded that the proposed increase will not adversely impact beneficial uses of San Pablo Bay or unreasonably change water quality. As a result of the findings of this analysis, the proposed discharge is consistent with federal and state antidegradation policies.

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Introduction

PROJECT DESCRIPTION

The City of Pinole owns and operates a wastewater pollution control plant, the Pinole-Hercules Water Pollution Control Plant (PHWPCP) which provides secondary treatment of domestic wastewater from the cities of Pinole and Hercules. The PHWPCP is located at 11 Tennent Avenue in Pinole, California. The PHWPCP service area is the municipal boundaries of Pinole and Hercules which are shown in **Figure 1**. The PHWPCP discharge is regulated by the San Francisco Regional Water Quality Control Board (Regional Water Board) under an NPDES permit (CA0037796) which was adopted by the Regional Water Board as Order R2-2007-0024 in March 2007.

Treated effluent from the PHWPCP is pumped to the Rodeo Sanitary District (RSD) where it is combined with RSD effluent and discharged to San Pablo Bay via a deep water diffuser (Outfall 001). The diffuser is about 3,000 feet offshore at a depth of about 18 feet below mean lower low water. The permitted average dry weather flows (ADWF) of the PHWPCP and RSD are 4.06 MGD and 1.14 MGD, respectively, resulting in total permitted ADWF of 5.2 MGD at Outfall 001. The current permitted wet weather capacity for the PHWPCP is 10.3 MGD. This maximum wet weather flowrate is based on the treatment capacity of the PHWPCP's activated sludge system. When wet weather flows exceed 10.3 MGD, blending of primary and secondary effluent occurs to minimize flows through the secondary system, preventing solids washout and ensuring effective treatment. Blending is approved in Order R2-2007-0024 as long as the Cities of Pinole and Hercules implement steps to reduce infiltration and inflow (I/I) and upgrade the secondary capacity of the PHWPCP.

Furthermore, pipe and pump restrictions limit flow to the shared PHWPCP and RSD outfall. When the flow from the PHWPCP exceeds the 10 MGD capacity of conveyance infrastructure from the PHWPCP to Outfall 001, excess secondary treated effluent from the PHWPCP is released though a shallow water discharge outfall (Outfall 002) into San Pablo Bay. This outfall is 30 feet offshore at a depth of 2 feet below lower low water. Effluent disposed though the shallow water outfall is disinfected and dechlorinated prior to discharge and must comply with all permitted water quality requirements. However, discharges through shallow water outfalls are prohibited in the San Francisco Bay Water Quality Control Plan (SF Basin Plan), because a minimum 10:1 dilution cannot be guaranteed. Order R2-2007-0024 prohibits use of this shallow water outfall and requires the City of Pinole to examine and implement alternatives to eliminate use of this outfall.

Pinole and Hercules have decided to upgrade the treatment plant and increase the transmission capacity to the shared PHWPCP and RSD outfall to prevent the need for blending and the use of the shallow water outfall. The cities of Pinole and Hercules are therefore requesting that the Regional Water Board increase the permitted wet weather flow for the PWPCP to 14.59 MGD (daily average), which coupled with RSD's current wet weather capacity of 2.5 MGD (daily average), would result in 17.09 MGD maximum daily average flow through Outfall 001. No increase in dry weather flows for the two treatment facilities is forecast through 2030 (the design period). The Regional Water Board must address whether the proposed increase in wet weather NPDES-permitted discharge is consistent with state and federal antidegradation policies.

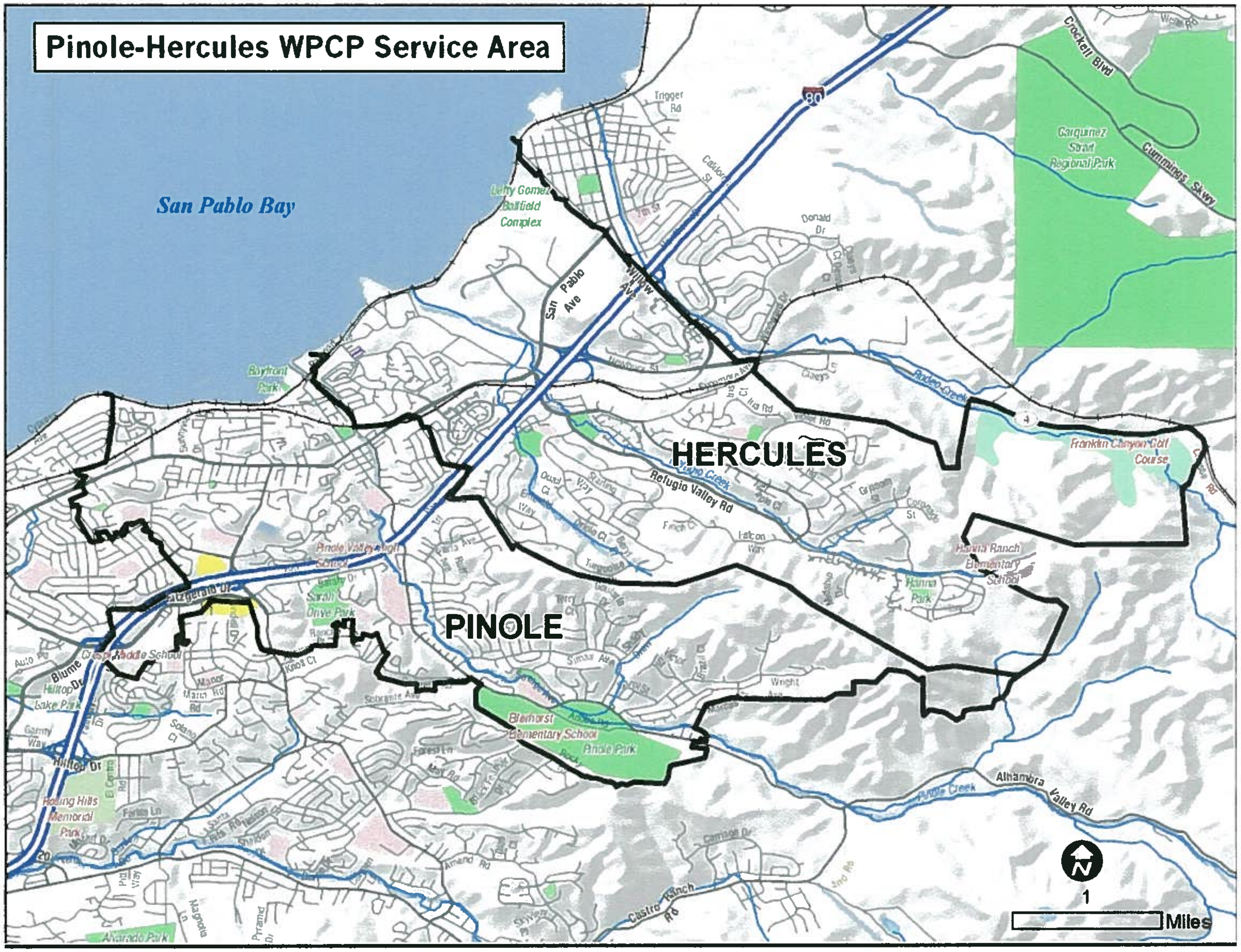

Figure 1. Pinole Hercules Water Pollution Control Plant Service Area Map

PURPOSE OF REPORT

The purpose of this report is to document the antidegradation analysis prepared on behalf of the City of Pinole. The information contained in this analysis is intended to provide the Regional Water Board with the information it needs to evaluate whether the proposed capacity increase is consistent with the antidegradation policy.

APPROACH TO ANALYSIS

The approach taken to the analysis described in this report is to follow federal and state guidance and policy regarding the implementation of the antidegradation policy in NPDES permits.

The analysis, as summarized in State Water Resources Control Board (SWRCB) Administrative Procedures Update (APU) 90-004, consists of an analysis of the water quality impacts that the proposed discharge will have on its receiving water San Pablo Bay. For the purposes of this analysis, San Pablo Bay is defined by the Basin Plan watershed delineation which shows San Pablo Bay's eastern water boundary at approximately the Carquinez Bridge and its southern water boundary stretching from roughly Point San Pablo to Santa Venetia. The boundaries of San Pablo Bay, the PHWPCP outfall, and key sites at which water quality impacts will be assessed (Davis Point RMP site, Carquinez Bridge site, Pinole Point RMP site, and San Pablo Bay RMP site) are shown in **Figure 2**. The primary finding to be established is whether the proposed PHWPCP discharge will produce significant changes in water quality of San Pablo Bay which would unreasonably affect water quality or adversely impact beneficial uses.

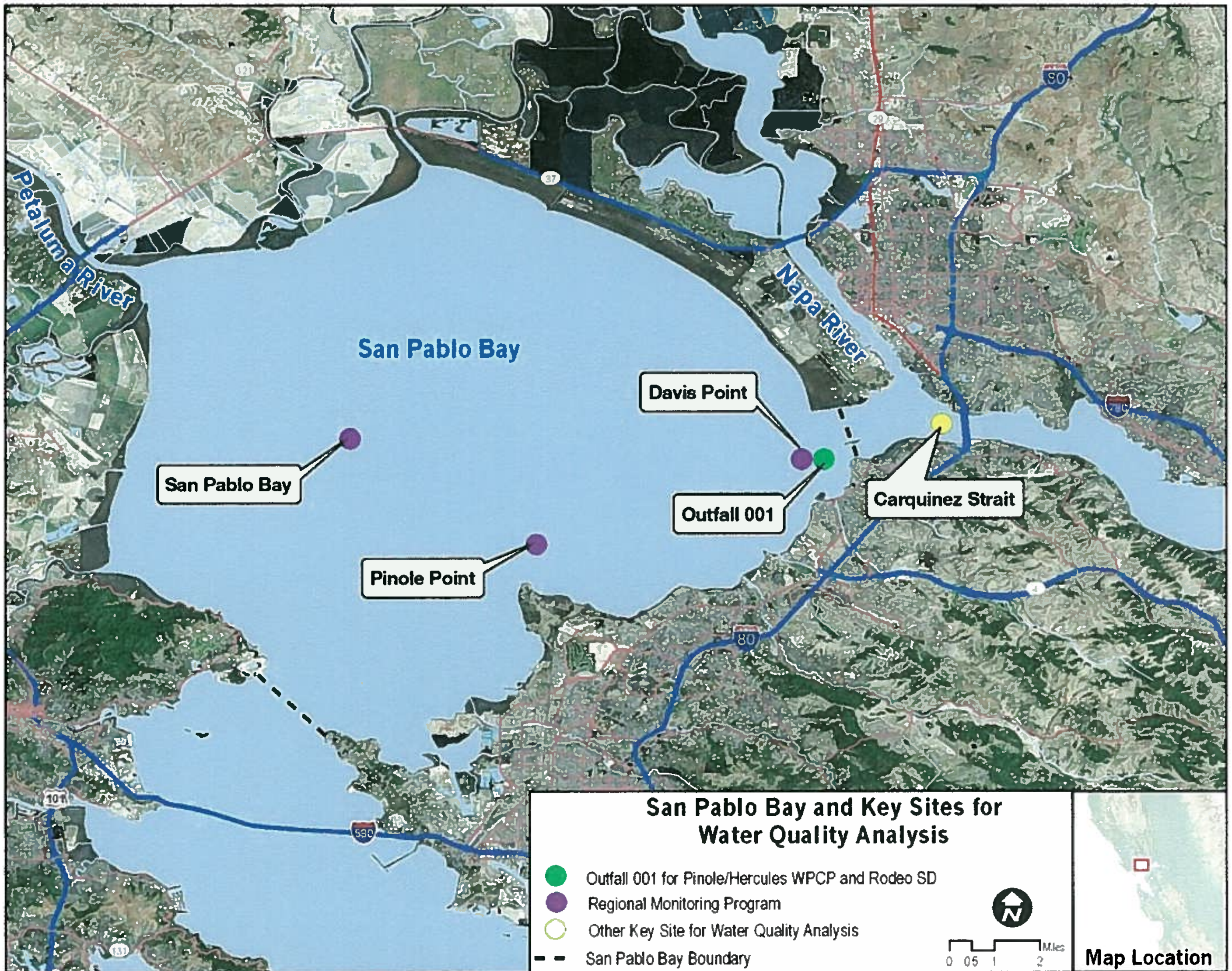

Figure 2. San Pablo Bay and Key Sites for Water Quality Analysis

The analysis is based on an examination of the following: (1) existing water quality standards for San Pablo Bay, (2) ambient conditions in San Pablo Bay in comparison to existing standards, (3) mathematical water quality modeling to assess water quality changes for selected constituents of concern due to the proposed discharge, (4) impact assessment of other constituents based on model results indicating effluent percentages at different locations in San Pablo Bay, (5) loadings of constituents of concern resulting from the proposed increase in PHWPCP discharge, and (6) an assessment of the significance of projected water quality changes in San Pablo Bay. The analysis addresses Clean Water Act Section 303(d) listed and non-303(d)-listed constituents as shown in **Table 1.** Due to variable lab results in ambient water quality monitoring and the fact that policies to determine reasonable potential are in flux, dioxins and furans are not included in this analysis. Constituents listed on the basis of a preliminary Reasonable Potential Analysis are described as having "Projected Reasonable Potential."

Table 1. Constituents of Concern in San Pablo Bay

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Cyanide	Current permit limit for RSD and PHWPCP
PCBs	303(d) list for San Pablo Bay
PCBs (dioxin-like)	303(d) list for San Pablo Bay

Regulatory Requirements

APPLICABLE LAWS AND POLICIES

The federal Clean Water Act (CWA) requires states to adopt, with United States Environmental Protection Agency (USEPA) approval, water quality standards applicable to all its intrastate waters (33 U.S.C. § 1313.). The CWA also requires state water quality standards to include an antidegradation policy to protect beneficial uses and prevent further degradation of high quality waters (33 U.S.C. § 1313(d)(4)(B); 40 C.F.R. § 131.12.). In California, water quality standards include the beneficial uses and water quality objectives established within Water Quality Control Plans (Basin Plans) and the State's antidegradation policy as embodied in Resolution 68-16. Water quality objectives as defined in the SF Basin Plan are applied. Both the federal and state antidegradation policies apply to the proposed increase in surface water discharge of treated effluent to San Pablo Bay.

Federal Antidegradation Policy and Guidance

The federal antidegradation policy is designed to protect existing uses and the level of water quality necessary to protect existing uses, and provide protection for higher quality and outstanding national water resources. The federal policy directs states to adopt a statewide policy that includes the following primary provisions, which are intended to classify water body quality as Tier 1, Tier 2 or Tier 3 waters (40 C.F.R. § 131.12):

> *(1)* *Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.* **[Tier 1]**
>
> *(2)* *Where the quality of waters exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after the full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.* **[Tier 2]**
>
> *(3)* *Where high quality waters constitute an outstanding national resource, such as waters of national and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.* **[Tier 3]**

Based on guidance developed by the USEPA Region 9 (*Guidance on Implementing the Antidegradation Provisions of 40 C.F.R. 131.12* (USEPA 1987)) and guidance issued by the SWRCB with regard to application of the Federal Antidegradation Policy (Memorandum from William R. Attwater to Regional Board Executive Officers *Federal Antidegradation Policy* (Oct. 1987)), application of the federal antidegradation policy is triggered by a lowering, or potential lowering, of surface water quality. A proposed increase in the volume of an existing discharge to a surface water is typically considered a trigger to the application of the federal antidegradation policy. Because the proposed project proposes to increase the PHWPCP existing discharge to surface water, the federal antidegradation policy applies.

San Pablo Bay is not designated an outstanding natural resource water, and therefore the receiving waters are not subject to Tier 3 of the federal policy. The application of Tiers 1 and 2 is determined on a constituent-by-constituent basis. Tier 1 waters represent those waters, or segments of water, where water quality is not significantly better than needed to meet designated uses (i.e., is not considered to be Tier 2 waters), either because the water just meets applicable water quality objectives and/or criteria to protect the beneficial uses, or does not meet applicable water quality objectives/criteria to protect beneficial uses (such as waters listed as impaired on the CWA Section 303(d) list.) Thus, for constituents that fall in the Tier 1 category, the expanded discharge cannot cause Tier 1 waters to be impaired or worsen existing impairments.

Tier 2 waters are those waters with water quality that is better than necessary to support beneficial uses. In such cases, the increased discharge may not lower water quality unless such lowering is necessary to accommodate important economic or social development. In August 2005, the USEPA issued a memorandum discussing Tier 2 antidegradation reviews and significance thresholds (Memorandum from Ephraim S. King, Director, Office of Science and Technology, USEPA, Office of Water to Water Management Division Directors, Regions 1-10 (Aug. 2005)). As discussed in the memorandum, the intent of Tier 2 protection "is to maintain and protect high quality waters and not to allow for any degradation beyond a de minimis level without having made a demonstration, with opportunity for public input, that such lowering is necessary and important." (Memorandum at p. 1.) USEPA has determined that significance threshold of a 10% reduction in available assimilative capacity is "workable and protective in identifying those significant lowerings of water quality that should receive a full Tier 2 antidegradation review, including public participation." (USEPA 2005.) Based on this guidance, this analysis uses the USEPA's significance threshold of 10% to determine if a constituent for which the receiving water is high quality water would be significantly affected by the proposed discharge.

State Antidegradation Policy and Guidance

Resolution 68-16

In accordance with the federal regulations requiring states to adopt antidegradation policies, the State's *Statement of Policy with Respect to Maintaining High Quality Waters in California* (Resolution 68-16) is interpreted to incorporate the federal antidegradation policy. Resolution 68-16 states, in part:

> 1. *Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.*
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> 2. *Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.*

1987 Policy Memorandum

In 1987, the SWRCB issued a policy memorandum to the Regional Water Quality Control Boards (Regional Water Boards) to provide guidance on the application of the federal antidegradation policy for State and Regional Water Board actions, including establishing water quality objectives, issuing NPDES permits, and adopting waivers and exceptions to water quality objectives or control measures. In conducting these actions, the Regional Water Boards must assure protection of existing instream beneficial uses, that significant lowering of water quality is necessary to accommodate important economic or social development, and that outstanding national resource waters be maintained and protected. The recent 2005 USEPA guidance referenced above may be used to determine whether changes in water quality that may result from a proposed action are significant.

Administrative Procedures Updates 90-004

In 1990, the SWRCB issued guidance to the Regional Water Boards for implementing Resolution 68-16 in NPDES permitting in Administrative Procedures Update (APU) 90-004. The guidance requires the Regional Water Boards to determine the need to make findings as to whether water quality degradation is permissible when balanced against benefit to the public. APU 90-004 describes two types of antidegradation analyses – a "simple" analysis and a "complete" analysis.

The following questions stated in APU 90-004 are addressed to evaluate consistency with state and federal anti-degradation policies.

[a] Whether a reduction in water quality will be spatially localized or limited with respect to the water body (e.g., confined to the mixing zone);

[b] Whether a reduction in water quality will be temporally limited and will not result in any long-term deleterious effects on water quality; or

[c] Whether a proposed action will produce minor effects which will not result in a significant reduction of water quality; or

[d] Whether a proposed activity has been approved in a General Plan and has been adequately subjected to the environmental and economic analysis required in an EIR required under CEQA.

Water quality objectives are set based on beneficial uses as discussed in the following section.

BENEFICIAL USES OF SAN PABLO BAY

San Pablo Bay supports a variety of beneficial uses as defined in the Water Quality Control Plan for the San Francisco Basin (SF Basin Plan) (SFBRWQCB, 2007). The San Francisco Basin Plan's Tributary Rule applies the beneficial uses of identified water bodies to its tributaries, so beneficial uses for San Pablo Bay include all of the beneficial uses of San Francisco Bay. Accordingly, the beneficial uses of both San Pablo Bay and San Francisco Bay are:

- Ocean commercial and sport fishing (COMM)
- Estuarine habitat (EST)
- Industrial service supply (IND)
- Fish migration (MIGR)
- Navigation (NAV)
- Preservation of rare and endangered species (RARE)
- Water contact recreation (REC-1)
- Non-contact water recreation (REC-2)
- Shellfish Harvesting (SHELL)
- Fish Spawning (SPWN)
- Wildlife habitat (WILD)

WATER QUALITY OBJECTIVES FOR SAN PABLO BAY

Water quality objectives (WQOs) promulgated in the California Toxics Rule (CTR) (USEPA, 2000) are applicable to the San Francisco Bay Basin and consequently San Pablo Bay, based on 2004 amendments to the SF Basin Plan. The Regional Water Board has designated San Pablo Bay as estuarine; therefore the more stringent of the freshwater and saltwater objectives apply. **Table 2** presents these objectives, taken from the CTR except where indicated. In its May 1995 National Toxics Rule (NTR) revisions, the EPA recommended that States base aquatic life objectives for metals on dissolved measurements. The CTR has confirmed this approach, and the metals objectives listed in **Table 2** are expressed in the dissolved fraction, with the exception of the mercury and selenium objectives. Mercury and selenium objectives are bioaccumulation-based, and are therefore based on total measurements.

Table 2. San Pablo Bay Water Quality Objectives (µg/L) from the CTR (except as noted)

Constituent	Aquatic Life: most stringent of freshwater and saltwater criteria		Human Health: organism consumption only
	1-hour	4-day	
Metals			
Copper, dissolved	9.3[a]	6.0[a]	
Mercury, total		0.025[b]	0.051
Nickel, dissolved	74	8.2	4600
Selenium, total	20[c][d]	5.0[c][d]	
Pesticides			
4,4'-DDT	0.13	0.0010	0.00059
4,4'-DDE			0.00059
4,4'-DDD			0.00084
Chlordane	0.090	0.0040	0.00059
Dieldrin	0.24	0.0019	0.00014
Other			
Cyanide	9.4[e]	2.9[e]	220,000
PCBs		0.014	0.00017

[a] Based on copper SSO adopted by EPA in January 2009.
[b] San Francisco Basin Plan (SFBRWQCB, 2007).
[c] Promulgated in the NTR.
[d] Currently there is a selenium TMDL in development for the area of San Francisco Bay north of the Bay Bridge.
[e] Based on cyanide SSO adopted by EPA in July 2008

Water quality objectives exist to provide reasonable protection of beneficial uses. Different exposure periods are used to address acute and chronic toxicity conditions to aquatic life. In evaluating existing water quality, the 4-day average objectives for aquatic life (which are more stringent than the 1-hour average) have been applied. For human health-based objectives, which are based on consumption of organisms, 30-day average objectives have been applied.

NPDES PERMIT REQUIREMENTS

The PHWPCP is regulated under NPDES permit CA0037796, Order R2-2007-0024, adopted in March 2007. Effluent limitations set forth in PHWPCP's current permit are presented in **Table 3.** The permit is scheduled to be renewed in March 2011 and new effluent limits will be based on an analysis of effluent quality as directed by the State Implementation Plan (SIP) (SWRCB, 2005) and standards set by the CTR.

Table 3. Effluent Limitations in PHWPCP's Current NPDES Permit

Toxics	Monthly Average (µg/L)		Daily Maximum (µg/L)	
Metals				
Copper, total	20		37	
Mercury, total[a]	0.066		0.072	
Other				
Cyanide	20[b]		43[b]	
Conventionals	**Monthly Average (mg/L)**	**Weekly Average (mg/L)**	**Daily Maximum (mg/L)**	**Instantaneous Maximum (mg/L)**
$CBOD_5$[c]	25	40		
Total Suspended Solids[c]	30	45		
Oil and Grease	10		20	
Total Chlorine Residual[d]				0.0 [d]
pH[e]	6 < pH < 9			
Total coliform (MPN/100mL)	Moving median limit for any five consecutive samples = 240; single sample = 10,000			
Acute Toxicity (% survival)[f]	Eleven-sample median value >= 90% survival[g] Eleven-sample 90th percentile >= 70% survival[g]			
Un-ionized Ammonia[h]	Receiving water limits: 0.025 mg/L as N, annual median 0.16 mg/L as N, maximum			

[a] Mercury effluent limits are specified in Order No. R2-2007-0077. Average annual mass limit = 0.055 kg/yr.

[b] Based on cyanide SSO adopted by EPA in July 2008.

[c] The arithmetic mean of $CBOD_5$ and TSS concentrations collected during a calendar month shall not exceed 15% of the arithmetic mean of the respective values for influent samples collected during the same month. Percent removal shall be 85%.

[d] Requirement defined as below the limit of detection in standard test methods defined in the latest USEPA approved 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, chlorine, and sodium bisulfite dosage or other dechlorination chemical (including a safety factor) and concentration to prove that chlorine residual exceedances are false positives. If convincing evidence is provided, Board staff will conclude that these false positive chlorine residual exceedances are not violations of this permit limitation.

[e] pH shall not exceed these limits for more than 7 hrs and 26 min in any calendar month and no individual excursion from these limits shall exceed 60 min.

[f] Any bioassay test showing survival of 70 percent or greater is not a violation of this limitation. A bioassay test showing survival of less than 70 percent represents a violation of this effluent limitation, if one or more of the past ten or fewer bioassay tests also show less than 70 percent survival.

[g] Any bioassay test showing survival of 90 percent or greater is not a violation of this limitation. A bioassay test showing survival of less than 90 percent represents a violation of this effluent limitation, if five or more of the past ten or fewer bioassay tests also show less than 90 percent survival.

[h] In each annual SMR, the City of Pinole must document how it complies with this receiving water limit. Compliance can be demonstrated through mass balance calculations using effluent quality data, receiving water data, or a combination of both.

Existing Conditions in San Pablo Bay

Wastewater treatment plants discharging to San Pablo Bay are shown in **Figure 3**. In addition to the PHWPCP, Las Gallinas Valley Sanitation District, and Novato Sanitary District discharge to San Pablo Bay. Vallejo Sanitary District discharges in the vicinity of San Pablo Bay at the mouth of the Napa River and in the Carquinez Strait. West County Agency and Central Marin Sanitation District discharges occur just south of San Pablo Bay in the northernmost portion of the Central San Francisco Bay. The physical characteristics, water quality, and regulatory environment of San Pablo Bay are presented in the following sections.

PHYSICAL CHARACTERISTICS AND HYDROLOGIC CONDITIONS

San Pablo Bay is a shallow tidal estuary spanning 68,349 acres. It is defined by the water boundaries shown in **Figure 3** which are roughly the mouth of the Carquinez Strait to the east and a border drawn between Point San Pablo and Santa Venicia. Tides typically follow a pattern of episodic Delta outflows to San Pablo Bay between December and March with declining flows in April-May, and low freshwater inflows from July through October. The majority of freshwater inflow to San Pablo Bay is from the Central Valley through the Delta and Suisun Bay although local rivers and creeks such as the Napa River also provide freshwater inflow. Because the majority of freshwater comes from the Delta, the amount and timing of precipitation events in the Delta watershed can have a major impact on freshwater inflows, which in turn can significantly affect habitat conditions and circulation patterns in San Pablo Bay. San Pablo Bay is primarily a mud bottom bay, reflecting its characteristic as a catchment for fine sediments.

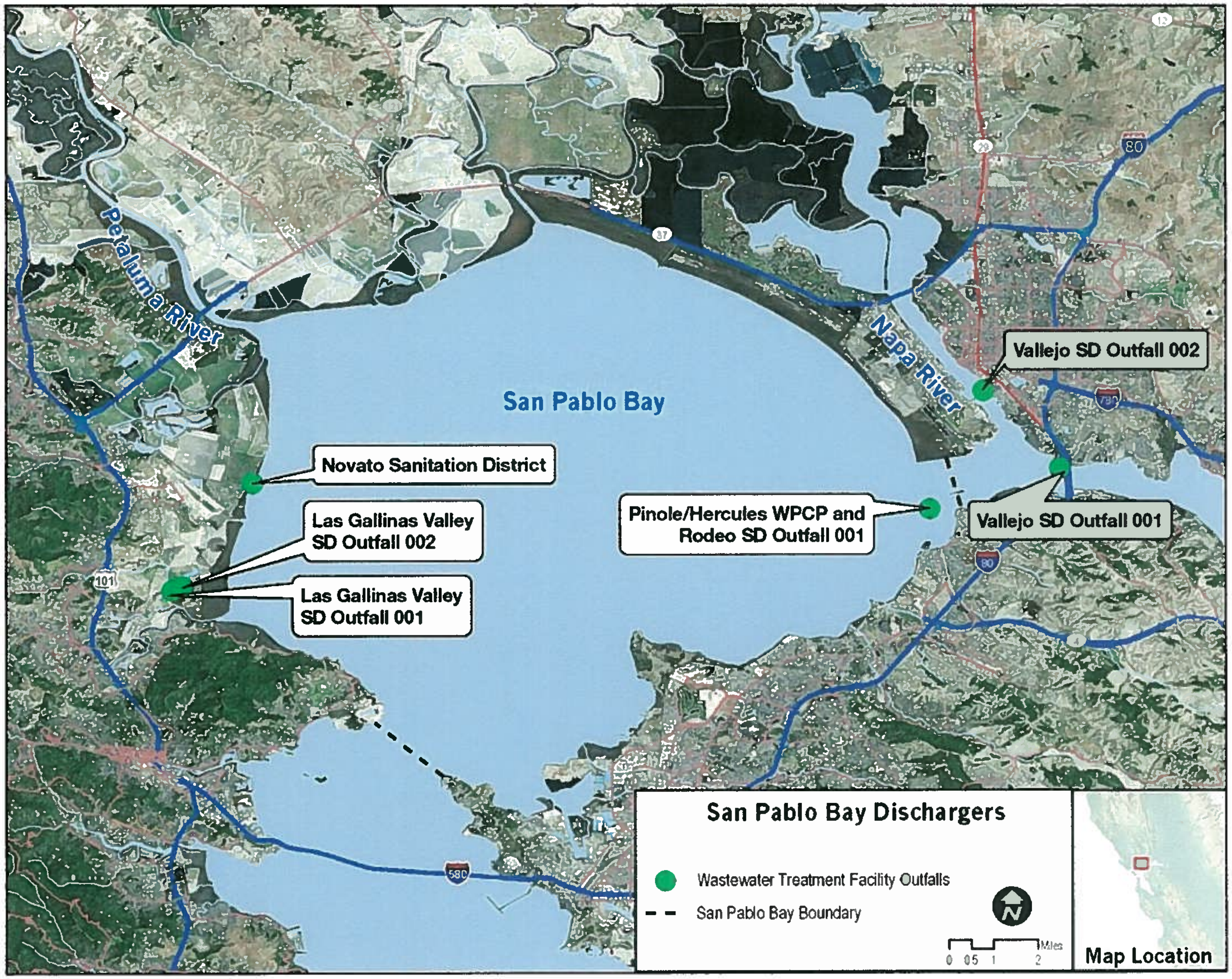

Figure 3. San Pablo Bay and Local Dischargers

WATER QUALITY CONDITIONS

Water quality conditions throughout the San Francisco Estuary are monitored under the Regional Monitoring Program (RMP). The RMP is an ongoing program that was initiated at full scale in 1993. The program monitors contaminant concentrations in water, sediments, and fish and shellfish tissue in San Francisco Bay and the Delta. The objectives of the program are to:

- Describe patterns and trends in contaminant concentration and distribution
- Describe general sources and loadings of contamination to the San Francisco Estuary
- Measure contaminant effect on selected parts of the San Francisco Estuary ecosystem
- Compare monitoring information to relevant water quality objectives and other guidelines
- Synthesize and distribute information from a range of sources to present a more complete picture of the sources, distribution, fates, and effects of contaminants in the San Francisco Estuary ecosystem

Results of the RMP are assembled in an on-line accessible database (www.sfei.org). The stations analyzed in this report are:

- Davis Point (BD40)
- Pinole Point (BD30)
- San Pablo Bay (BD20)

Of these the Davis Point station is closest to the PHWPCP outfalls. RMP water quality and water toxicity data for these RMP sites are discussed in the following sections. The RMP sites are shown in **Figure 2** along with the PHWPCP/RSD discharge location.

Water Quality

Water quality data for constituents of concern sampled at RMP sites have been selected to provide a representative evaluation of water quality in San Pablo Bay. Constituents of concern were identified in **Table 1** based on 303(d) listings, current RSD and PHWPCP permit limits, and projected reasonable potential to affect water quality of San Pablo Bay. Ambient receiving water data for these constituents are summarized by RMP site in **Table 4** (Davis Point), **Table 5** (Pinole Point), and **Table 6** (San Pablo Bay). If no water quality objective (WQO) is listed, this means a WQO has not been set for the receiving water.

Table 4. Summary of RMP 1993 to 2001 Data at Davis Point (BD40)

Constituent	Units	Aquatic Life WQO[a]	Human Health WQO[b]	Number of Samples	Max Value Detected	Number of Samples Above Lowest Applicable Objective	Percent of Time Below Lowest Applicable Objective
Conventionals							
Ammonia, dissolved	mg/L	1.49[c]		25	0.160	0	100%
Total Suspended Solids	mg/L	NA		25	443	---	---
Metals							
Copper, dissolved	µg/L	3.1	1300	25	2.6	0	100%
Mercury, total	µg/L	0.025	0.051	24	0.09	5	79%
Nickel, dissolved	µg/L	8.2	4,600	25	3.8	0	100%
Selenium, total	µg/L	5.0[d]		23	0.5	0	100%
Zinc, dissolved	µg/L	81		25	2.58	0	100%
Pesticides							
4,4'-DDT, total	pg/L	1.0	0.59	20	497	20	0%
4,4'-DDD, total	pg/L	NA	0.84	18	810	18	0%
4,4'-DDE, total	pg/L	NA	0.59	21	1827	21	0%
Chlordane, total	pg/L	4.0	0.59	19	337	19	0%
Dieldrin, total	pg/L	1.9	0.14	21	294	21	0%
Other							
PCB, total	pg/L	30	0.17	20	1827	20	0%

[a] Some receiving water quality objectives are dependent on temperature, pH, and salinity. If applicable, these are calculated based on Davis Point RMP site data from 1993 to 2001.
[b] Human health objectives listed are for organism consumption only.
[c] Receiving water quality objectives are dependent on temperature, pH, and salinity.
[d] Promulgated in the NTR.
NA = Not applicable. Where no WQO is available, summary statistics are not calculated.

Table 5. Summary of RMP 1993 to 2006 Data at Pinole Point (BD30)

Constituent	Units	Aquatic Life WQO[a]	Human Health WQO[b]	Number of Samples	Percent Detected	Max Value Detected	Number of Samples Above Lowest Applicable Objective	Percent of Time Below Lowest Applicable Objective
Conventionals								
Ammonia, dissolved	mg/L	1.33[c]		25	100%	0.152	0	100%
Total Suspended Solids	mg/L	NA		25	100%	178	—	—
Metals								
Copper, dissolved	µg/L	3.1	1300	25	100%	2.3	0	100%
Mercury, total	µg/L	0.025	0.051	24	100%	0.046	4	83%
Nickel, dissolved	µg/L	8.2	4,600	25	100%	3.6	0	100%
Selenium, total	µg/L	5.0[d]		24	96%	0.39	0	100%
Zinc, dissolved	µg/L	81		25	100%	1.23	0	100%
Pesticides								
4,4'-DDT, total	pg/L	1.0	0.59	18	94%	729	17	6%
4,4'-DDD, total	pg/L	NA	0.84	18	100%	579	18	0%
4,4'-DDE, total	pg/L	NA	0.59	20	100%	990	20	0%
Chlordane, total	pg/L	4.0	0.59	19	100%	478	19	0%
Dieldrin, total	pg/L	1.9	0.14	21	100%	336	21	0%
Other								
PCB, total	pg/L	30	0.17	20	100%	2804	20	0%

[a] Some receiving water quality objectives are dependent on temperature, pH, and salinity. If applicable, these are calculated based on Pinole Point RMP site data from 1993 to 2001.
[b] Human health objectives listed are for organism consumption only.
[c] Receiving water quality objectives are dependent on temperature, pH, and salinity.
[d] Promulgated in the NTR.
NA = Not applicable. Where no WQO is available, summary statistics are not calculated.

Table 6. Summary of RMP 1993 to 2001 Data at San Pablo Bay (BD20)

Constituent	Units	Aquatic Life WQO[a]	Human Health WQO[b]	Number of Samples	Percent Detected	Max Value Detected	Number of Samples Above Lowest Applicable Objective	Percent of Time Below Lowest Applicable Objective
Conventionals								
Ammonia, dissolved	mg/L	1.33[c]		25	100.0%	0.161	0	100%
Total Suspended Solids	mg/L	NA		25	100.0%	242	—	—
Metals								
Copper, dissolved	µg/L	3.1	1300	25	100.0%	2.54	0	100%
Mercury, total	µg/L	0.025	0.051	24	100.0%	0.088	7	70%
Nickel, dissolved	µg/L	8.2	4,600	25	100.0%	3.73	0	100%
Selenium, total	µg/L	5.0[d]		24	95.8%	0.33	0	100%
Zinc, dissolved	µg/L	81		25	100.0%	1.28	0	100%
Pesticides								
4,4'-DDT, total	pg/L	1.0	0.59	18	100.0%	416	18	0%
4,4'-DDD, total	pg/L	NA	0.84	18	100.0%	670	19	0%
4,4'-DDE, total	pg/L	NA	0.59	20	100.0%	1159	21	0%
Chlordane, total	pg/L	4.0	0.59	19	100.0%	344	19	0%
Dieldrin, total	pg/L	1.9	0.14	21	90.0%	237	18	10%
Other								
PCB, total	pg/L	30	0.17	20	100.0%	3343	21	0%

[a] Some receiving water quality objectives are dependent on temperature, pH, and salinity. If applicable, these are calculated based on San Pablo Bay RMP site data from 1993 to 2001.

[b] Human health objectives listed are for organism consumption only.

[c] Receiving water quality objectives are dependent on temperature, pH, and salinity.

[d] Promulgated in the NTR.

NA = Not applicable. Where no WQO is available, summary statistics are not calculated.

Analysis of these data indicates that water quality in the vicinity of the PHWPCP/RSD outfall exhibits a high level of compliance with ambient water quality objectives for metals other than mercury. At all sites, water quality was in compliance with the WQOs for ammonia and all metals (other than mercury) 100% of the time. Sites were in compliance with the mercury WQO 70% to 85% of the time. In contrast, all of the sites were out of compliance with pesticide and PCB WQOs the majority of the time. Pinole Point samples were in compliance with the 4,4'-DDT WQO 6% of the time and San Pablo Bay samples were in compliance with the total Dieldrin WQO 10% of the time. Otherwise pesticide and PCB samples at all sites were not in compliance. The PCB and pesticide data in **Table 4** through **Table 6** are shown due to the constituents' 303(d) listing, however, these constituents have not been detected in the PHWPCP or RSD effluent. Of the non-metal constituents of concern monitored at RMP sites, only TSS and ammonia are present in the PHWPCP and RSD effluent. However, pbjectives for TSS are not in place. Objectives for dissolved ammonia are based on the San Francisco Bay Basin Plan for Region 2. The objectives are dependent on site specific conditions for pH, temperature, and salinity. Using RMP data from 1993 to 2001, ammonia WQOs were calculated for each day where pH, temperature, and salinity data were available and the average of the calculated WOQ for each of these days was applied.

Water Toxicity Monitoring

Monitoring of ambient water toxicity in San Francisco Bay using sensitive test organisms has been an integral component of the RMP since its inception in 1993. Most monitoring results have shown no ambient toxicity in the San Francisco Bay water column. The first observation of significant ambient water toxicity was observed in the winter of 1995-96. The toxicity observed in February 1996 extended throughout the northern San Francisco Bay system and provided nearly complete mortality of the tested crustacean species (*Americamysis bahia*) occurring in samples from the Sacramento River and San Joaquin River locations. The water samples for this event were collected immediately following a major rainstorm, suggesting that ambient water toxicity may be occurring on small time scales and is probably the result of stormwater runoff. Significant toxicity was again observed in January 1997 at the Sacramento River and San Joaquin River on samples collected following a storm event.

Based on toxicity results during monitoring years 1995-96 and 1996-97, modifications were made to the toxicity testing program for 1997-98. Specifically, episodic monitoring during the storm season was increased to document the frequency and duration of toxic episodes in the North Bay and to expand the spatial extent of urban stormwater runoff monitoring in the San Francisco Bay system.

Toxicity testing in San Pablo Bay took place between 1993 and 2001 and was limited to the Pinole Point monitoring station (BD30). Test species used included *Americamysis bahia*, *Crassostrea gigas*, *Mytilus edulis*, and *Thalassiosira psuedonana*. The summary of toxicity data from 1993 to 2001 for each species is given in **Table 7**, with blank cells indicating that no data was collected. It shows that with the exception of one toxicity test on *Americamysis bahia*, toxicity tests have not been significantly different from controls.

Table 7. Summary of Toxicity Data Taken at Pinole Point Monitoring Station (BD30) from 1993 to 2001

Test Species	% of Tests in which Cell Count or Growth Was Not Statistically Different from Control	% of Tests in which % Normal Development Was Not Statistically Different from Control	% of Tests in which Mean % Survival Was Not Statistically Different from Control
Americamysis bahia	100%	90%	100%
Crassostrea gigas		100%	
Mytilus edulis		100%	
Thalassiosira psuedonana	100%		

303(d) LISTINGS FOR SAN PABLO BAY

The 2006 Clean Water Act Section 303(d) list for the San Francisco Bay was approved by the EPA in 2007. Listings for San Pablo Bay found in the approved 303(d) lists are summarized in **Table 8**. The Clean Water Act requires that a Total Maximum Daily Load (TMDL) be developed for each constituent of concern on the 303(d) list when water quality standards are not met despite control of wastewater point sources to the level prescribed in the Act and in USEPA regulations. A TMDL is the amount of loading of a constituent of concern from all sources that a waterbody can receive and still meet water quality standards.

Most TMDLs that include San Pablo Bay address the San Francisco Bay as a whole. The San Francisco Bay Mercury TMDL was adopted by the EPA at the beginning of 2008. The San Francisco Bay PCB TMDL is currently being reviewed by the San Francisco Bay RegionalWater Board. A Selenium TMDL is under development for the North San Francisco Bay. TMDLs that are yet to be adopted by the EPA will likely modify the water quality objectives listed in **Table 2** once they are adopted.

Table 8. 303(d) Listings for San Pablo Bay and TMDL Schedule

Constituent of Concern/Stressor	Potential Sources	2006 303(d) List: TMDL End Date[a]
Metals		
Mercury	Municipal point sources, resource extraction, atmospheric deposition, natural sources, nonpoint source.	EPA approved 2008
Nickel	Unknown.	[b]
Selenium	Industrial point sources, agriculture, natural sources, exotic species.	In progress
Pesticides		
DDT	Nonpoint.	2008, estimated
Chlordane	Nonpoint.	2008, estimated
Dieldrin	Nonpoint.	2008, estimated
Other		
Dioxin compounds	Atmospheric deposition.	2019
Furan compounds	Atmospheric deposition.	2019
PCBs	Unknown nonpoint source.	In progress
PCBs (dioxin-like)	Unknown nonpoint source.	In progress
Exotic Species	Ballast water.	2019

[a] Sources of approval dates for Region 2 are 303(d) lists approved by USEPA on June 28, 2007: http://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/303dlists2006/epa/r2_06_303d_reqtmdls.pdf

[b] Since the EPA approved the 2006 303(d) in 2007, Nickel has been recommended for delisting.

Sources of Constituents of Concern to San Pablo Bay

As part of RMP efforts, major sources of selected constituents of concern have been identified and estimates of annual loads from these sources to the greater San Francisco Bay have been determined in several reports. These results are summarized in **Table 9**. While the loads are not directly applicable to San Pablo Bay alone, the same constituent sources that are of concern to the greater San Francisco Bay (including San Pablo Bay) are also of concern to San Pablo Bay as a separate unit. In the following sections, the results in **Table 9** and their applicability to San Pablo Bay are discussed. Data for all the loading tables are based on reports by the San Francisco Estuary Institute (SFEI 2000, 2001), the Regional Water Board (SFBRWQCB, 2004), and the Clean Estuary Partnership (CEP 2003, 2004). The sources evaluated include urban runoff, atmospheric deposition, river input, sediment erosion and resuspension, vessels, and dredging.

SOURCES OF LOADING DATA FOR CONSTITUENTS OF CONCERN

Copper and Nickel

Copper and nickel sources have been investigated in multiple studies of different sections of the San Francisco Bay. Loads from the *North of Dumbarton Bridge Copper and Nickel Conceptual Model and Impairment Assessment Report* (CEP, 2005) are given in **Table 9**.

Mercury

Mercury sources have been investigated and quantified as part of the San Francisco Bay mercury draft and final TMDL (SFBRWQCB, 2000 and 2004). Identified sources of mercury in San Pablo Bay include (from largest to smallest) Central Valley riverine inputs, dredging and sediment remobilization, bay area stormwater, industrial discharges, municipal discharges, and direct atmospheric deposition. The most recent SFEI *Pulse of the Estuary* (SFEI, 2008), has modified estimates of mercury loadings from these same sources. The new estimates give more weight to small urban tributaries (urban runoff) as sources and less weight to large rivers. Overall the total load to the bay is estimated to be 266 kg/yr lower than in the San Francisco Bay TMDL. The more recent SFEI loadings estimates are shown in **Table 9**.

Selenium

Selenium loads to the greater San Francisco Bay have been estimated in the Clean Estuary Project's *Draft Selenium Impairment Assessment* (CEP, 2004). In this report, the dominant source of selenium is identified as 5,000 kg/yr from the Sacramento and San Joaquin Rivers and other sources are considered negligible. More recent estimates have been prepared for the North San Francisco Bay Selenium TMDL. According to *The North San Francisco Bay Selenium Data Summary and Source Analysis* (SFBRWQCB, 2008), the total loads to the north San Francisco Bay exceed the previous estimates of loads to the greater San Francisco Bay by 610 kg/yr. The source analysis also quantifies non-riverine sources. In the interest of including more recent data and data for more sources, the results of North San Francisco Bay selenium TMDL are included in **Table 9**. The major source of selenium to San Pablo Bay remains riverine input.

Zinc

Loads of many constituents of concern to the San Francisco Bay were estimated by SFEI in a report entitled *Contaminant Loads from Stormwater to Coastal Waters in the San Francisco Bay Region: Comparison to Other Pathways and Recommended Approach for Future Evaluation* (SFEI, 2000). SFEI has since further investigated loads of priority constituents of concern, but has not focused on zinc since it is not 303(d) listed for San Francisco Bay and is not a constituent of emerging concern. This report therefore gives loads dependent on knowledge available at the time of publication of this report and loads should be considered a rough estimate of current conditions.

Pesticides

Legacy pollutants such as chlordane, DDT, DDT breakdown products, and dieldrin, have been 303(d) listed due to historic use as pesticides and the consequent residue of these constituents primarily in agricultural soils. Use of organochlorine pesticides peaked in the San Francisco Bay watershed 30 to 40 years ago, but as load calculations show, continue to enter the San Francisco

Bay through various sources. These load calculations are based on *Legacy Pesticides in San Francisco Bay: Conceptual Model / Impairment Assessment* (CEP, 2004)

PCBs and Furans

PCB sources have been most recently quantified in the 2008 Pulse of the Estuary (SFEI, 2008). Sources of PCBs to the greater San Francisco Bay include stormwater, riverine input, in-bay erosion, and municipal and industrial dischargers, and these sources are quantified in **Table 9**. POTWs are a minor source of PCBs to the Bay. As breakdown products of PCBs, Furan compounds have the same sources as PCBs, although their loads have not been calculated.

Other Constituents

The remaining constituents of concern to San Pablo Bay are considered in this document due to current Pinole PHWPCP permit limits and projected reasonable potential. In most cases, these constituents are not of concern to the greater San Francisco Bay and source loads have not been investigated. For example, the 2006 *Pulse of the Estuary* (SFEI, 2006) states that while the Regional Water Board has developed site specific water quality objectives for cyanide, RMP data have shown cyanide concentrations to generally be below the threshold of concern. Ammonia, CBOD, oil and grease, and zinc are similarly regulated but have not been 303(d) listed and source loads to San Pablo Bay have not been estimated.

The source of TSS is sedimentation and resuspension. Sedimentation is a result of riverine discharge, particle flocculation, wind, tidal currents, and other factors that cause turbidity. While USGS reports that there may be a net loss of sediments from San Pablo Bay (Jaffe, et. al, 1998), it is not appropriate to estimate a load of TSS entering San Pablo Bay as TSS can increase through resuspension without an increase in the amount of sediments entering San Pablo Bay. Accordingly, loads of TSS are not given in **Table 9**, but driving factors are discussed following **Table 9**.

Table 9. Summary of Average Annual Loads to San Francisco Bay (kg/yr)

Constituent	Municipal Discharge	Atmospheric Deposition (direct)	In-Bay Sources (dredging, sediment erosion and cycling)	Riverine Inputs	Bay Area Stormwater	Industrial	Total Estimated Load to Bay	Data Source
Conventionals								
BOD	No data	No data	No data	No data	1.5E+07	No data	Insufficient data	1
Metals								
Copper	8,170	760	18,000	101,000	4,310	218	132,000	2
Mercury	17	27	460	366	160	2.1	668	3
Nickel	4,260	440	19,200	155,000	6,270	526	186,000	2
Selenium	255	45.9	211	3,962	594	538	5,610	4
Zinc	35,200	No data	8,000	3,800,000	278,000	No data	4,120,000	5
Pesticides								
DDT	0.2	1	7	15	40	< 0.2	63	6
Total Chlordane	0.1	0.9	1.7	2	30	< 0.1	35	6
Total Dieldrin	0.06	1	0.17	5	3	< 0.06	9	6
Other								
Total PCBs	2.3	0	12	9.6	21	0.035	53	3

Sources:

1. SFEI 2000. Contaminant Loads from Stormwater to Coastal Waters in the San Francisco Bay Region.
2. CEP 2005. North of Dumbarton Bridge Copper and Nickel Conceptual Model and Impairment Assessment Report
3. SFEI 2008. The Pulse of the Estuary: Monitoring and Managing Water Quality in the San Francisco Bay Estuary. SFEI Contribution 559. San Francisco Estuary Institute, Oakland, CA.
4. SFBRWQCB 2008. North San Francisco Bay Selenium Data Summary and Source Analysis.
5. SFEI 2000. Contaminant Loads from Stormwater to Coastal Waters in the San Francisco Bay Region: Comparison of Other Pathways and Recommended Approach for Future Evaluation. September 2000. http://www.sfei.org/rmp/reports/AB1429/ab14.html
6. CEP 2003. Legacy Pesticides in San Francisco Bay: Impairment Assessment/Conceptual Model. Final.

DISCUSSION OF SOURCES OF CONSTITUENTS OF CONCERN

The following section discusses each of the sources quantified in **Table 9**.

Municipal Wastewater Treatment Plant and Industrial Discharges

Constituents of existing or potential concern in the San Francisco Bay include biodegradable organics, trace elements, trace organics, pathogens, and suspended particulates. Beginning in the 1950's and continuing into the 1980's, municipalities and industries discharging wastewater to San Pablo Bay and the greater San Francisco Bay have constructed secondary and advanced secondary treatment plants. In addition, municipalities implemented industrial pretreatment programs in the 1970's and 1980's and pollution prevention programs for specific toxic constituents of concern in the 1990's. The net effect of these treatment, pretreatment and pollution prevention programs has been a significant decrease in loadings of essentially all constituents from municipal and industrial sources. For example, loadings of biodegradable organics and suspended solids from municipal treatment plants have decreased by over 75% since 1955. Significant reductions in municipal and industrial loadings of trace elements and trace organics have also occurred. As a result of these reductions, municipal and industrial loadings now comprise a small percentage of the total loadings of constituents of concern to the Bay/Delta. Additionally, conventional constituents of concern are no longer considered to present problems in the San Francisco Bay (historically such problems included low dissolved oxygen, ammonia toxicity, odors, and floating material). The relative contributions of specific constituents of concern by the PHWPCP, and other wastewater treatment plants are estimated in **Table 9** under the heading of municipal dischargers. Industrial discharges are separated where data was available. Locations of industrial dischargers throughout the greater San Francisco Bay are shown in **Figure 4**. In San Pablo Bay, the only industrial dischargers are Chevron and Tosco, although C&H discharges just east of the Carquinez Bridge thus contributes wastewater to San Pablo Bay.

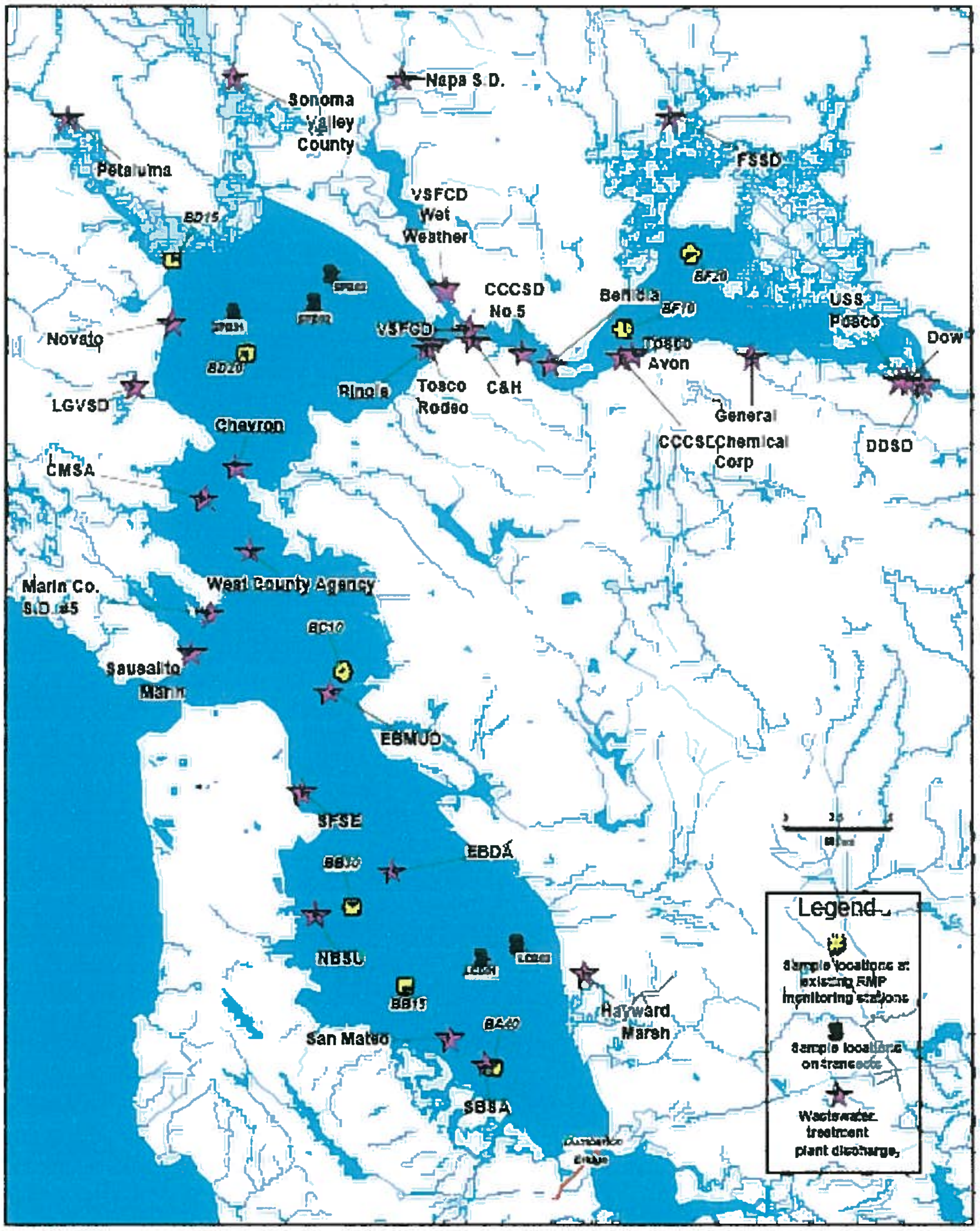

Figure 4. Major Industrial Dischargers and Municipal Dischargers in San Francisco Bay

Urban Runoff Inputs

Urban runoff from small tributaries and storm drains has been identified as a potentially significant mechanism for transport of some constituents of concern to the San Francisco Bay, including trace metals, pesticides, dioxins and PCBs. Tributaries convey constituents of concern deposited and washed off in the watershed as well as constituents of concern from other sources. For example, PCBs deposited onto streets from motor vehicle emissions and copper deposited onto streets from vehicle brake pads are transported to the San Francisco Bay in creeks and storm drains. Drainage from localized areas with high PCBs may also enter the San Francisco Bay via local tributaries. RMP sediment data show elevated PCB concentrations at some locations where local tributaries enter the San Francisco Bay.

Atmospheric Inputs

Constituents of concern in the air may be directly deposited to the surface of San Pablo Bay or may reach San Pablo Bay indirectly via runoff from surrounding land areas. An Atmospheric Deposition Pilot Study has been conducted under the RMP to evaluate the magnitude of air deposition and its relative significance of contribution to the total pollutant loading to the San Francisco Estuary (SFEI, 2001). The first phase of the Pilot Study focused on mercury and trace element components (specifically copper, mercury, and nickel); the next phase expanded to include trace organics (e.g. PCBs) monitoring. Sample collection began in August 1999 and was conducted every 14 days through November 2000.

The first phase of the pilot study estimated dry and wet deposition loads of constituents of concern, as shown in **Table 10**. While these are not the same estimates given in later reports as shown in **Table 9**, they give a relative comparison between dry and wet deposition and are shown here specifically to give more detail regarding mercury sources in particular. The pilot study concluded that atmospheric deposition contributed very little of the trace metal loading to the San Francisco Estuary. Between 10% and 70% of these atmospheric loadings were delivered in precipitation, depending on the pollutant. The authors of the SFEI study also noted that they associate a moderate level of uncertainty to their results regarding dry atmospheric deposition, especially deposition to tributaries.

Table 10. Estimated Direct Atmospheric Deposition Loads to the San Francisco Estuary[2]

Pollutant	Dry Deposition (kg/year)	Wet Deposition (kg/year)	Total Direct Deposition (kg/year)
Copper	1200	710	1900
Mercury	22	4.8	27
Nickel	680	260	930

Some preliminary evaluations have been conducted that provide an indication of the potential significance of both direct and indirect atmospheric deposition as pathways for copper, nickel, and mercury. Atmospheric deposition sources of mercury were evaluated in the SFEI 2008 Pulse of the Estuary and are included in **Table 9**. Estimates from the Pilot Study and mercury TMDL suggest that indirect atmospheric deposition to the San Francisco Bay (e.g., mercury that is deposited on land surfaces and is washed off) may be more than twice the amount of mercury deposited from direct atmospheric deposition. Atmospheric deposition of PCBs was also evaluated in the 2008 Pulse of the Estuary. The report found that direct atmospheric deposition of PCBs to the San Francisco Bay is roughly equal to volatilization from the San Francisco Bay to the atmosphere, resulting in a net 0% contribution of PCBs from the atmosphere.

Pesticides may enter San Pablo Bay through atmospheric deposition or be removed through volatilization. The majority of atmospheric deposition of pesticides is indirect deposition onto land surfaces which results in higher pesticide concentrations in stormwater.

[2] SFEI, 2001. San Francisco Bay Atmospheric Deposition Pilot Study, Parts 1 and 2.

Riverine Inputs

Riverine inputs are largely from the Delta and comprise urban and agricultural runoff, erosion of native soils, atmospheric deposition, treated wastewater discharges, and other sources. Riverine flow volumes vary significantly from year to year, depending on the rainfall patterns occurring in the Central Valley. The sediments carried by these flows are a significant source of particulate-associated constituents of concern (e.g., trace metals and PCBs) and can contain legacy pollutant pesticides from agricultural lands.

Sediment Remobilization and Cycling

Sediment remobilization has been identified as a significant source of many constituents of concern to San Pablo Bay. Anthropogenic activities in the Bay and its tributaries have contributed to the accumulation of various constituents in surface and buried sediments. From 1856 to 1887 massive quantities of sediment were deposited in San Pablo Bay from hydraulic gold mining (Jaffe, et al., 1998). Up until 1951, sediments continued to accumulate in San Pablo Bay which may have been higher in PCBs and other pollutants than sediment current deposited in San Pablo Bay. Through sediment remobilization (scour, suspension, and redeposition) and transport, deposited material is gradually exposed, resulting in a net input of mercury, trace metals, PCBs, and other pollutants to the water column.

Other Sources

Maritime vessels have been identified as a potential source of PCBs to the San Francisco Bay. Paints containing copper and PCBs were used on Navy vessels and PCB-containing equipment was used on many ships. Specific loadings of these constituents of concern from vessels have not been determined. Other constituents of concern that may be contributed to the Bay from vessels have not yet been identified or quantified.

PHWPCP DISCHARGE CHARACTERIZATION

As discussed in the previous sections, sources of constituents of concern to San Pablo Bay include municipal and industrial wastewater discharges, urban and non-urban runoff, riverine inflows, atmospheric deposition, sediment remobilization, and dredging. Central Valley riverine inputs are typically the largest sources to San Francisco Bay on a mass basis, due in large part to the high flows and sediment loads associated with this contribution. The values shown in **Table 9** demonstrate that in comparison to the riverine inputs and other, municipal and industrial discharges are consistently a small percentage of the total loads.

The PHWPCP final effluent is in compliance with NPDES effluent limits set to protect ambient water quality and minimize total loads to San Pablo Bay as shown in **Table 11**. The table includes effluent data summary statistics for constituents detected in PHWPCP effluent from October 2003 to May 2008. Ambient water quality objectives for DDT and DDT derivatives, Chlordane, Dieldrin, and PCBs were exceeded in San Pablo Bay (see **Table 4** through **Table 6**), but these constituents have not been detected in the PHWPCP effluent. Compliance probabilities are not given for constituents for which there are no effluent limits.

Table 11. Summary of Constituents Detected in PHWPCP Final Effluent Compared to Effluent Limits Specified in the Existing NPDES Permit and the Mercury Watershed Permit

Constituent	Units	N	Percent detected	Measured Concentration (Mean) [a]	Maximum Detected Value	Maximum Daily Effluent Limit	Weekly Average Effluent Limit	Monthly Average Effluent limit[b]	Probability of Compliance
Conventionals									
Ammonia	(mg/L)	28	100%	8.04	21.6				
CBOD[c]	(mg/L)	642	100%	11.9	33		40	25	96%
Oil & Grease	(mg/L)	109	38%	2.06	6			10	100%
TSS[c]	(mg/L)	1222	100%	18.8	274		45	30	92%
Metals									
Copper	(µg/L)	56	100%	7.0	15	37		20	100%
Mercury	(µg/L)	56	100%	0.0102	0.042		0.072	0.066	100%
Nickel	(µg/L)	20	100%	5.6	9.1				
Selenium	(µg/L)	21	86%	1.16	4				
Zinc	(µg/L)	20	100%	36.8	57				
Pesticides									
4,4'-DDT	(µg/L)	8	0%	ND	ND				
4,4'-DDE	(µg/L)	7	0%	ND	ND				
4,4'-DDD	(µg/L)	8	0%	ND	ND				
Chlordane	(µg/L)	8	0%	ND	ND				
Dieldrin	(µg/L)	8	0 %	ND	ND				
Other									
Cyanide	(µg/L)	64	81%	3.5	11	43		20	100%
PCBs	(µg/L)	8	0%	ND	ND				

[a] Mean is calculated by fitting non-detect values to regression of detected values.
[b] Where two effluent limits are given, the most stringent is applied.
[c] In addition to the effluent limits given, The arithmetic mean of the CBOD5 and TSS values, by concentration, for effluent samples collected during a calendar month shall not exceed 15 percent of the arithmetic mean of the respective values for influent samples collected during the same calendar month.

The PHWPCP has a high level of compliance with its effluent limits for the constituents of concern shown in **Table 11**. The combined effect of PHWPCP and RSD discharges on ambient concentrations and loadings to San Pablo Bay were modeled as part of this analysis and the modeled results are described in the following sections.

WATER QUALITY MODELING ANALYSIS

EFFLUENT MODELING APPROACH

A computer model developed by Resource Management Associates (RMA) was used to evaluate the dispersion and dilution of the PHWPCP effluent and calculate the percent effluent present at points throughout San Pablo Bay. The average measured concentrations of constituents of concern in PHWPCP effluent from October 2003 to May 2008 were then applied to the percent effluent at points of interest in San Pablo Bay and Carquinez Strait to predict water quality under different receiving water flow scenarios. The RMA model description, modeling approach, and model results are summarized in a separate technical report prepared by RMA (RMA, 2009).

The modeling effort used two models, RMA-2 and RMA-11. RMA-2 is a generalized free surface hydrodynamic model that computes a continuous temporal and spatial description of fluid velocities and depth through an estuary system. It incorporates the effects of momentum transfer, wind, bottom friction, Coriolis force, and turbulent diffusion. RMA-11 is a generalized two-dimensional water quality model that computes a temporal and spatial description of conservation and non-conservative water quality parameters. RMA-11 is designed to simulate both inter-tidal and tidally averaged water quality conditions by accounting for advection and turbulent mixing. RMA-11 uses the results from RMA-2 for its description of the flow field.

The RMA model domain extends from the Golden Gate to tributary rivers of the Delta. NOAA tide data at San Francisco were used to set the tidal boundary at the Golden Gate for each simulation period. Flow data from the Interagency Ecological Program (IEP) database[3] and Dayflow were used to set flow boundaries for the Sacramento River, San Joaquin River, Yolo Bypass, Mokelumne and Cosumnes Rivers, miscellaneous eastside flows (including Calaveras River, French Camp Slough and other minor tributaries), and exports. USGS flow data[4] were used to set Napa River flows. DWR's computed monthly average channel depletions/ precipitation data[5] were also used. Bottom elevations were based on bathymetry data from NOAA, DWR, USACE, and USGS[6]. Delta channels and tributary streams were represented using a one dimensional cross-sectionally averaged approximation.

MODELING ASSUMPTIONS

Assumptions used in the modeling effort are intended to be conservative (i.e., they aim to provide a reasonable worst-case estimate of the water quality impacts of the combined PHWPCP and RSD wastewater discharge to San Pablo Bay). Accordingly, the model assumes no loss or

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[3] http://www.iep.water.ca.gov/dss/all/
[4] http://waterdata.usgs.gov/nwis/dv/?site_no=11458000
[5] http://baydeltaoffice.water.ca.gov/modeling/deltamodeling/models/dicu/dicu.cfm
[6] These data have been compiled at:
http://baydeltaoffice.water.ca.gov/modeling/deltamodeling/models/csdp/index.htm

decay of constituents of concern during transport. This assumption leads to an overestimation of the incremental impact of the combined PHWPCP and RSD discharge for some constituents, increasing with distance from the proposed discharge points. This is particularly true for constituents such as ammonia and cyanide which degrade in natural environments and dissolved metals or other constituents which bind to particulates.

The assumption that loads of constituents of concern from the PHWPCP will increase with increased wastewater treatment plant capacity also overestimates ambient concentrations of constituents of concern. This assumption ignores ongoing efforts to decrease the concentration of constituents of concern in the combined PHWPCP and RSD discharge (e.g., pollution prevention programs and urban runoff management) and discounts trends toward more restrictive regulation of municipal and industrial effluents. This assumption is intended to be conservative, not predictive. In fact, it is otherwise acknowledged that municipal effluent quality is expected to continue to improve with increased emphasis on pollution prevention and wastewater reclamation in the San Francisco Bay Basin Plan.

In the creation of one dimensional and two dimensional models, velocities are averaged over depth. Effluent may be concentrated at a particular level of the water column, such as the surface if it is buoyant (e.g., oil and grease). Thus the use of a depth-averaged flow could be more or less conservative at different times and locations, depending on the flow scenario. The net effect of the assumptions made in the water quality modeling work, however, is that the results provide a "worst-case" scenario for water quality impacts of the combined PHWPCP and RSD wastewater discharge to San Pablo Bay.

MODEL CALIBRATION

RMA-2 and RMA-11 were previously calibrated during recent modeling completed throughout the San Francisco Bay, San Pablo Bay, and Suisun Bay. Model parameters were fine-tuned to ensure that flows, current velocity and tidal stage were well represented throughout the San Francisco Bay and Delta system. These calibration efforts used stage and current velocity measurements recorded in Suisun Bay, San Pablo Bay, Central Bay, South Bay, Lower Bay and the Delta, as well as flow measurements at the Sacramento – San Joaquin River confluence.

Hydrodynamic model calibration was performed by varying the bottom roughness and eddy viscosity coefficients until adequate agreement was obtained between the computed and observed stage, velocity and flow at selected locations throughout the Bay and Delta.
For the present study, flow, velocity and stage data in San Pablo Bay and Carquinez Strait were used to ensure that the finite element model representation developed to meet the specific needs of the Pinole-Hercules project retained an accurate representation of the hydrodynamic characteristics of the Bay as demonstrated in previous calibration efforts. The calibration period of October 10 through November 14, 1980 was selected because of availability of extensive stage, velocity and salinity data.

The San Francisco Bay velocity and stage monitoring program occurred during 1979 and 1980. Current velocity meters and stage recorders were deployed at several locations. The length of deployment ranged from two weeks to several months. Up to three velocity meters at different depths were used at several locations to provide a measure for the bottom friction and density stratification effects on the velocity profile.

For water quality model calibration, the model was calibrated using USGS salinity observations in San Pablo Bay and Carquinez Strait. The distribution of salinity controls the transport of other dissolved and particulate matter such as coliforms that are passively transported with water movement. Therefore the accuracy of salinity calibration is a good indicator of the accuracy of model results for effluent concentration at any given point.

DISCHARGE SCENARIOS USED FOR ANALYSIS

Treated effluent discharged through Outfall 001 identified in NPDES Permits CA0037796 (City of Pinole) and CA0037826 (Rodeo Sanitary District) is a combination of flows from the PHWPCP and the RSD WPCF. Both jurisdictions have evaluated their permitted average dry weather flowrates (ADWF) and determined that the existing permitted capacities will be sufficient through 2030. However, some upgrades will occur at the PHWPCP to ensure reliable achievement of its permitted secondary capacity of 4.06 MGD. For the purposes of this antidegradation analysis, the PHWPCP ADWF will remain at 4.06 MGD and the RSD ADWF will remain at 1.14 MGD, resulting in a combined ADWF at Outfall 001 of 5.2 MGD. Since no increase in dry weather flows is forecast, this antidegradation analysis does not include a review of dry weather impacts of the combined discharge.

The PHWPCP will be increasing its wet weather secondary capacity to eliminate blending. The activated sludge treatment system will be upgraded to guarantee a treatment capacity of 4.06 MGD and flow equalization will be provided to ensure all flows receive secondary treatment. In addition, the facilities used to transport treated effluent to the RSD outfall will be upgraded to provide maximum transmission capacity and prevent use of the shallow water outfall. With planned improvements, the maximum projected wet weather flowrate from the PHWPCP will be 14.59 MGD. The current NPDES Permit for RSD (Order R2-2006-0062) does not include a wet weather capacity restriction. Per communication with the RSD Manager (S. Beall, personal communication), the peak wet weather flowrate from the RSD WPCF is 2.5 MGD and that value is not expected to change. For the purposes of this antidegradation analysis, baseline peak wet weather flows at Outfall 001 are 12.8 MGD (10.3 MGD from the PHWPCP and 2.5 MGD from the RSD WPCF). Future peak wet weather flows at Outfall 001 will be equal to 17.09 MGD (14.59 MGD from the PHWPCP and 2.5 MGD from the RSD WPCF).

A schematic of the projected contributions to the PHWPCP from the Pinole and Hercules collection systems combined with the RSD discharge is shown in **Figure 5**.

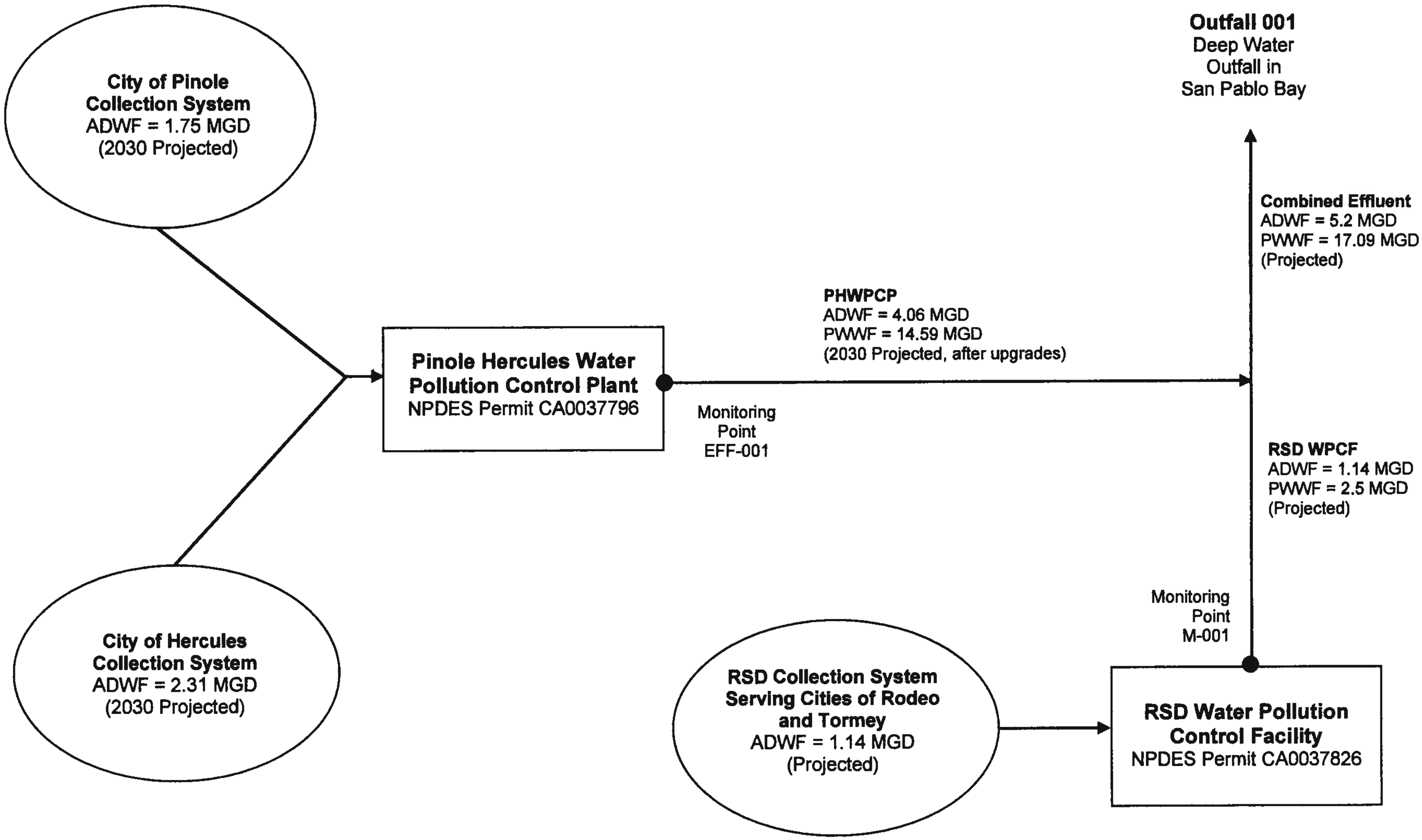

Figure 5. Schematic of Projected Discharges to the Outfall 001 (shared outfall for PHWPCP and RSD WPCF)

Movement of water within San Pablo Bay is determined by tidal conditions and outflows from the Sacramento-San Joaquin Delta. These far-field flow conditions were utilized in the hydrodynamic modeling conducted for this antidegradation analysis. NOAA historical tide data and DWR flow data for the period 2000 to 2006 were evaluated to determine critical net Delta outflow (NDO) conditions. The "low NDO" regime, using the 10th percentile NDO, occurred from August 16 through September 13, 2002. However, this type of flow condition does not coincide with peak wet weather flowrates, so the simulation period was not utilized. Two other critical NDO conditions could occur during peak wet weather flow conditions, "high" and "moderate" NDO. The "high NDO" regime uses the 90th percentile NDO which occurred between February 13 and March 12, 2004. During 2000 to 2006, the 29-day running average net Delta outflow was lower than this period approximately 90% of the time. The "moderate NDO" regime uses the 50th percentile NDO which occurred between April 8 and May 16, 2002. During 2000 to 2006, the 29-day running average net Delta outflow was lower than this period approximately 50% of the time.

Salinity data from the Department of Water Resources (DWR) metering stations near the RSD deepwater outfall were reviewed to assess stratification effects. Minor stratification occurs near the Mare Island Jetty (DWR Station C316) under moderate NDO conditions. The C316 meter is located close to the depth of the RSD deepwater outfall, however San Pablo Bay circulation at this site probably results in a different salinity response than actually occurs near the Rodeo outfall. The flood tide waters at C316 have a flow component from the northwest (the shallower northern portion of San Pablo Bay) which would not be present at the Rodeo outfall. Salinity data from a DWR meter located near the west opening to Carquinez Straits (DWR Station C24) indicates some stratification following high NDO and during transitional tidal conditions. However, this is a deep water station with the upper meter placed at approximately 20 ft below Mean Lower Low Water (MLLW). The Rodeo outfall is located 18 ft below MLLW, so the C24 results are difficult to extrapolate to the Rodeo outfall/diffuser.

In summary, it is difficult to quantify the density profile at the diffuser site based on the available data. However, any stratification at the Rodeo outfall/diffuser site will be small and will have only a minor impact on near-field or far-field plume fate. During very high flows (utilized in the hydrodynamic modeling), salinity throughout depth will be the lowest and the difference between the effluent and ambient density will be small. Therefore, a conservative assumption is low salinity without any stratification.

Three different combined effluent discharge scenarios were used as inputs to the hydrodynamic model:

- Discharge Scenario A – Effluent Flow Pattern #1 occurring during High NDO conditions (February 13 through March 12)
- Discharge Scenario B – Effluent Flow Pattern #2 occurring during High NDO conditions (February 13 through March 12)
- Discharge Scenario C – Typical Effluent Flow pattern occurring during Moderate NDO conditions (April 8 through May 16)

The three scenarios were based on actual patterns of effluent wet weather flows occurring at Outfall 001 during the critical NDO time periods. The baseline condition coincides with measured flows scaled up to match existing permitted flowrates. Typical non-storm, wet season effluent flowrates range from 19 to 55% of actual dry weather flows. During February/March of the previous 5 years, the storm events and associated wet weather effluent flowrates followed two distinct patterns, defined for this analysis as Scenario A and Scenario B. The February/March Baseline and Projected Scenario A are presented as **Figure 6**. Scenario A involves several peak wet weather events occurring off and on from February 14th through March 7th. The projected peak wet weather flowrate of 17.09 MGD would occur around February 20th. The February/March Baseline and Projected Scenario B are presented as **Figure 7**. Scenario B involves large wet weather flowrates occurring towards the end of the modeled time period, between February 25th and March 10th. The baseline condition coincides with measured flows scaled up to match existing permitted flowrates. The projected peak wet weather flowrate of 17.09 MGD would occur around March 6th.

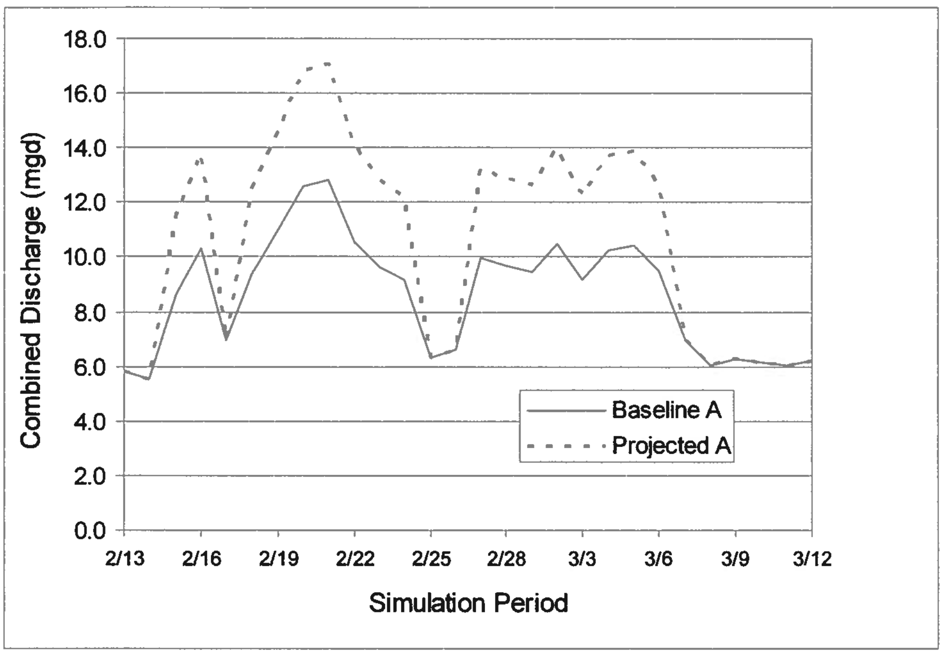

Figure 6. February/March Combined Discharge at Outfall 001 (Scenario A)

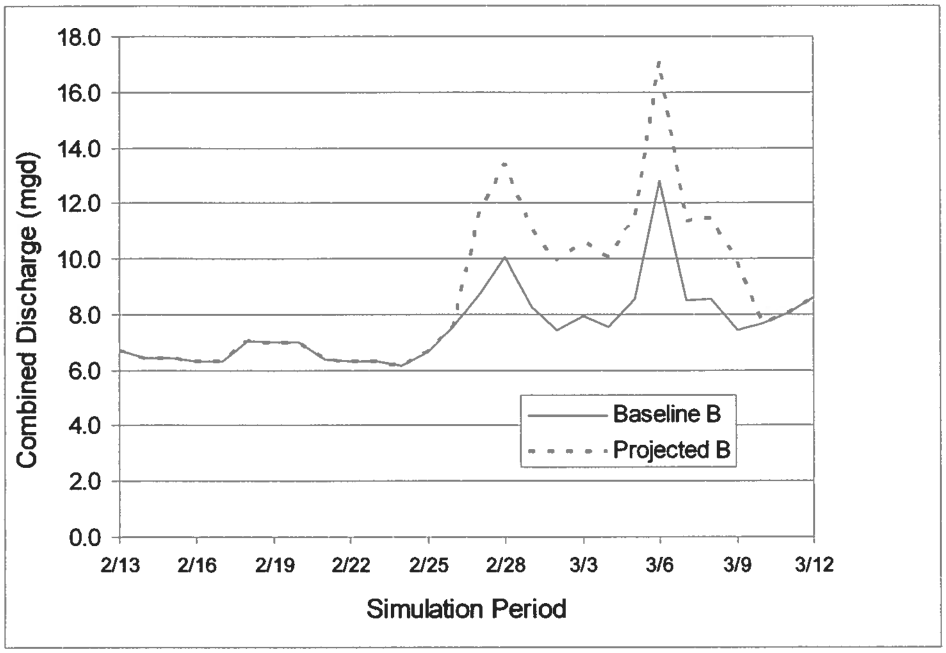

Figure 7. February/March Combined Discharge at Outfall 001 (Scenario B)

During April/May of the previous 5 years, the storm events and associated wet weather effluent flowrates followed one distinct pattern, defined for this analysis as Scenario C. The April/May Baseline and Projected Scenario C are presented as **Figure 8**. Scenario C involves three peak wet weather events during the beginning of the modeled period, from April 8th to April 20th. The baseline condition coincides with measured flows scaled up to match existing permitted flowrates. The projected peak wet weather flowrate of 17.09 MGD would occur around April 12th.

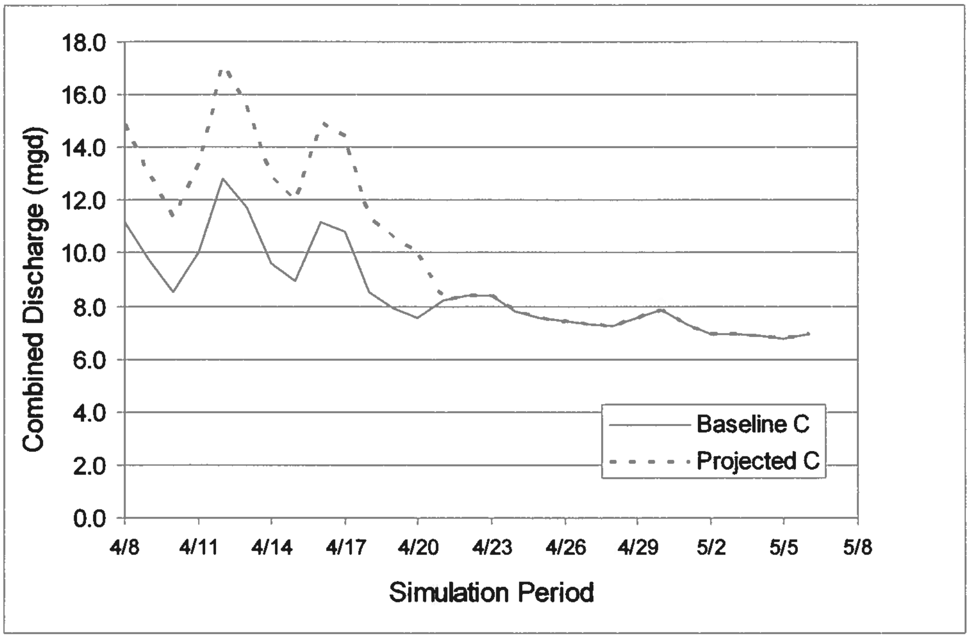

Figure 8. April/May Combined Discharge at Outfall 001 (Scenario C)

CONSTITUENTS OF CONCERN SELECTED FOR RIGOROUS ANALYSIS

Percent effluent values present throughout San Pablo Bay were modeled under the three scenarios described in the previous section. Current effluent concentrations for the constituents of concern were then applied to the percent effluent present in areas of San Pablo Bay to determine the impact on San Pablo Bay. Only those constituents present in the PHWPCP or RSD effluent were analyzed. **Table 12** shows the constituents of concern and indicates if they are present in PHWPCP or RSD effluent.

Table 12. Constituents of Concern in San Pablo Bay

Constituent	Reason for Inclusion in Antidegradation Analysis	Present in PHWPCP or RSD Effluent?
Conventionals		
Ammonia	Projected Reasonable Potential for RSD and PH	Y
CBOD	Current permit limit for RSD and PH	Y
Oil and Grease	Current permit limit for RSD and PH	Y
TSS	Current permit limit for RSD and PH	Y
Metals		
Copper	Current permit limit for PH	Y
Mercury	Current permit limit for RSD and PH / 303(d) list for San Pablo Bay	Y
Nickel	303(d) list for San Pablo Bay	Y
Selenium	303(d) list for San Pablo Bay	Y
Zinc	Current permit limit for RSD	Y
Pesticides		
4,4'-DDT	303(d) list for San Pablo Bay	N
4,4'-DDE	DDE is a breakdown product of DDT	N
4,4'-DDD	DDD is a breakdown product of DDT	N
Chlordane	303(d) list for San Pablo Bay	N
Dieldrin	303(d) list for San Pablo Bay	N
Other		
Cyanide	Current permit limit for RSD and PH	Y
PCBs	303(d) list for San Pablo Bay	N
PCBs (dioxin-like)	303(d) list for San Pablo Bay	N

INCREMENTAL IMPACTS OF PROPOSED PROJECT

SPATIAL REACH OF THE COMBINED PHWPCP AND RSD DISCHARGE

The following figures show the percent change in percent effluent from baseline to the projected discharge during the three scenarios. Any detectable change in areas within San Pablo Bay and Carquinez Strait are shown in color contours. The change was modeled over 1-day periods in order to select days with the peak change at the points of interest shown in **Figure 2**. Each 1-day average comes from one of the 29 days in the scenario period modeled. Scenario C results in the most conservative scenario in terms of the largest spatial reach of detectable changes in percent effluent in San Pablo Bay. Scenarios A and B show a much more confined area in which percent effluent shows a detectable change. However, with more confined detectable changes in effluent, the change in percent effluent at the outfall is greatest of in Scenario B out of all the scenarios.

Multiple figures were selected to show the spatial reach of effluent in Scenario C (**Figure 9** through **Figure 11**) because the spatial reach of detectable change in percent effluent varied significantly depending on which 1-day average showed the highest change in percent effluent in which areas. A 1-day average change in percent effluent modeled on April 18th (**Figure 9**) showed the greatest change at the Davis Point RMP site and Carquinez Bridge site out of all the 29 days modeled in Scenario C. The 1-day average on April 21st (**Figure 10**) showed the greatest change at Pinole Point with a significantly different spatial pattern of change. Finally, a closer view of the April 18th contours (at time of peak change at Davis Point) shows that the change in percent effluent is less than 0.02% except within the close vicinity of Outfall 001 (**Figure 11**). This gives a conservative view of the change in percent effluent at the outfall because it shows the time of peak change at the the closest point of interest to Outfall 001.

Since the model results near Davis Point showed the highest change in percent effluent at the outfall, only these figures focusing on the outfall area are shown for Scenario A (**Figure 12**) and Scenario B (**Figure 13**). These figures demonstrate that even when change in percent effluent is highest at the Davis Point site, the change in percent effluent above 0.02% is isolated to the area around the outfall. Other 1-day averaging periods showed similar or significantly smaller spatial reach of change in percent effluent. A complete set of figures for different 1-day averaging periods is presented in the *Pinole-Hercules Water Pollution Control Plant: Anti-Degradation Analysis for Proposed Wastewater Treatment Plant Discharge Modification – Supplemental Report* (LWA, 2009).

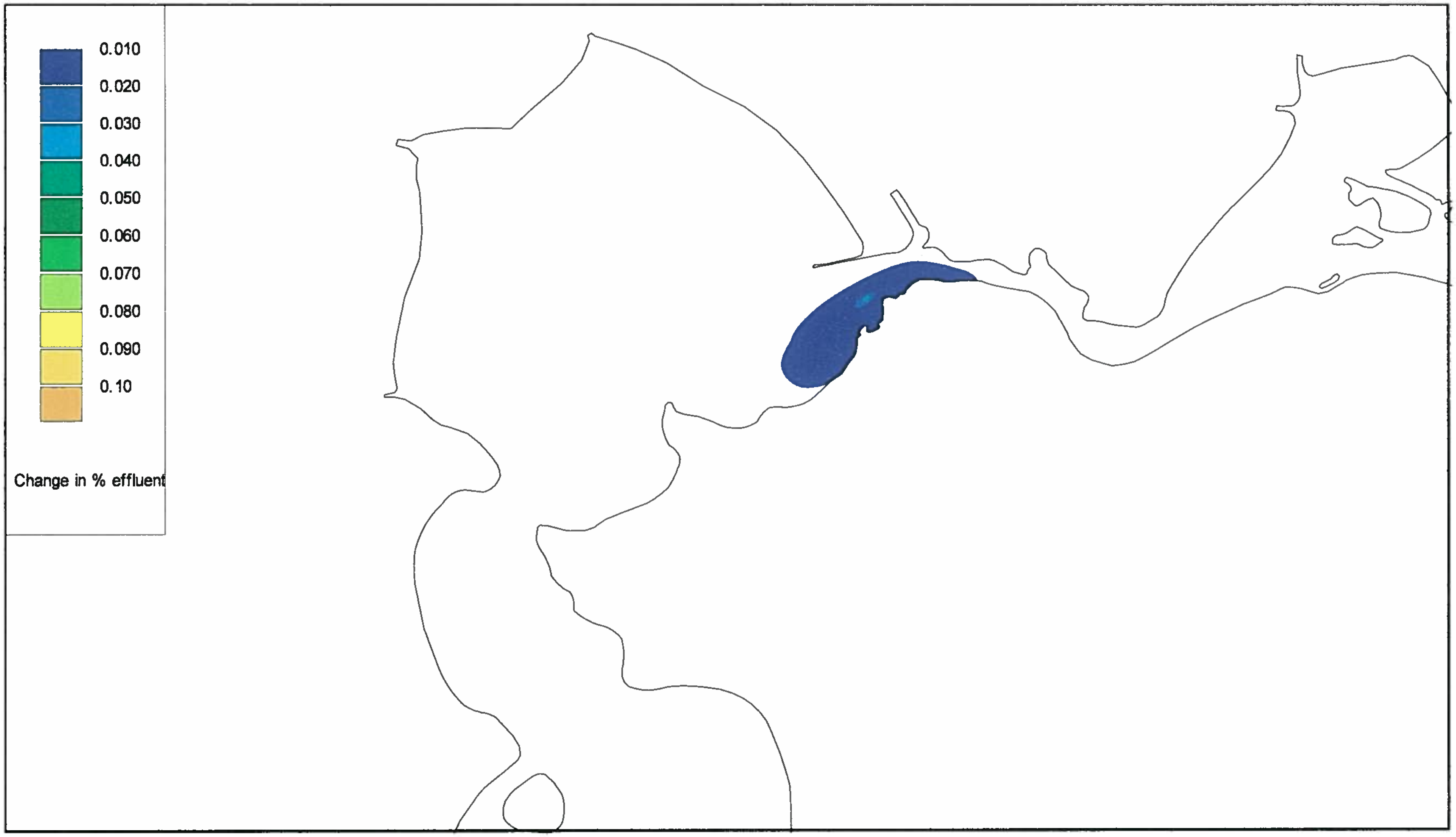

Figure 9. Color Contours of Change in Percent Effluent between Baseline (12.8 MGD) and Projected Future Discharge (17.09 MGD) - Shown at a Time of Peak Change at Davis Point and downstream of the Carquinez Bridge site in <u>Scenario C</u> (1-Day Averaging Period, April 18th)

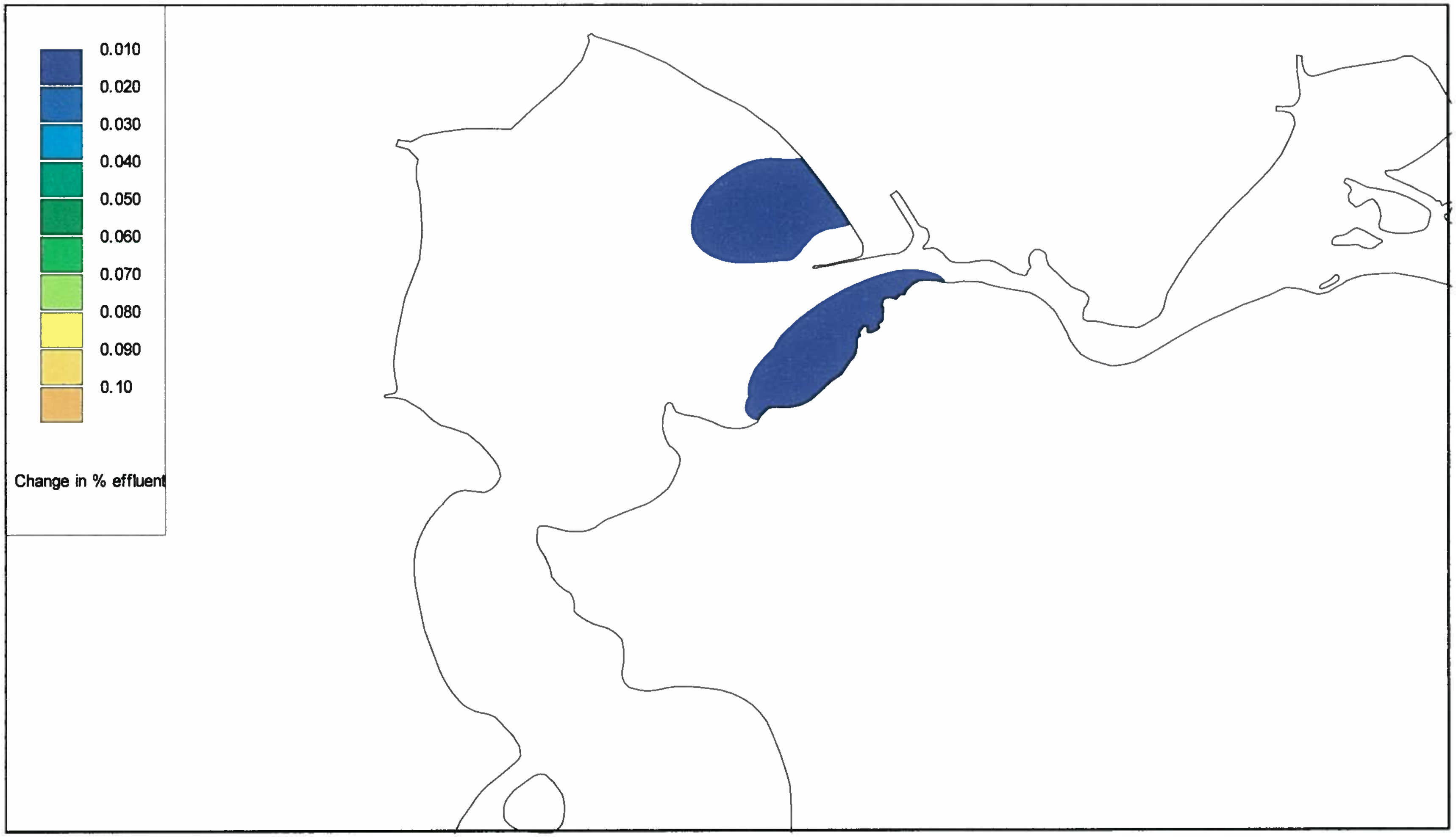

Figure 10. Color Contours of Change in Percent Effluent between Baseline (12.8 MGD) and Projected Future Discharge (17.09 MGD) – Shown at Time of Peak Change at the Pinole Point RMP Site in <u>Scenario C</u> (1-day Averaging Period, April 21st)

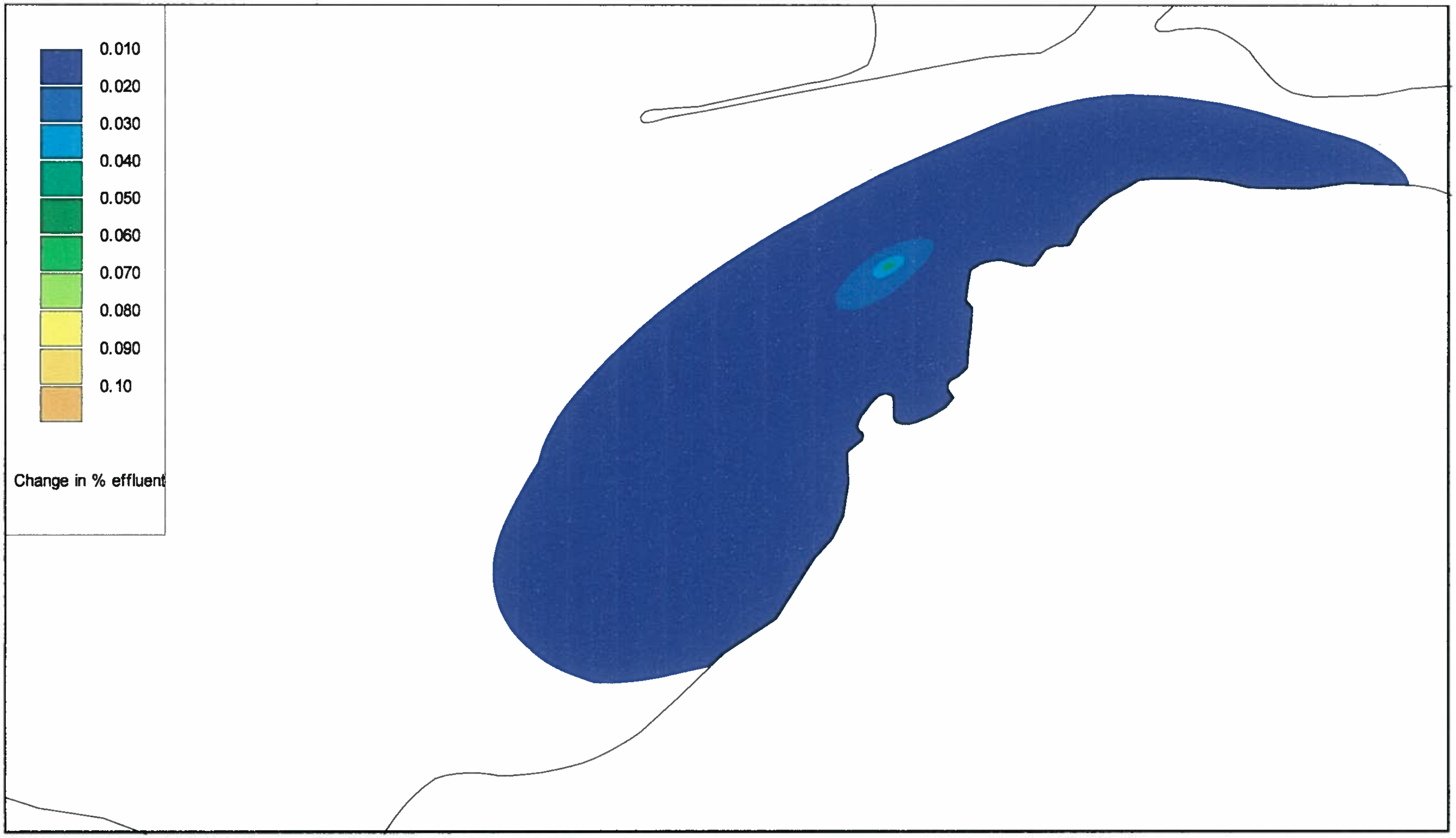

Figure 11. Color Contours of Change in Percent Effluent between Baseline (12.8 MGD) and Projected Future Discharge (17.09 MGD) – Shown at Time of Peak Change at the Davis Point RMP site and the Carquinez Bridge site in Scenario C (1-day Averaging Period, April 18th)

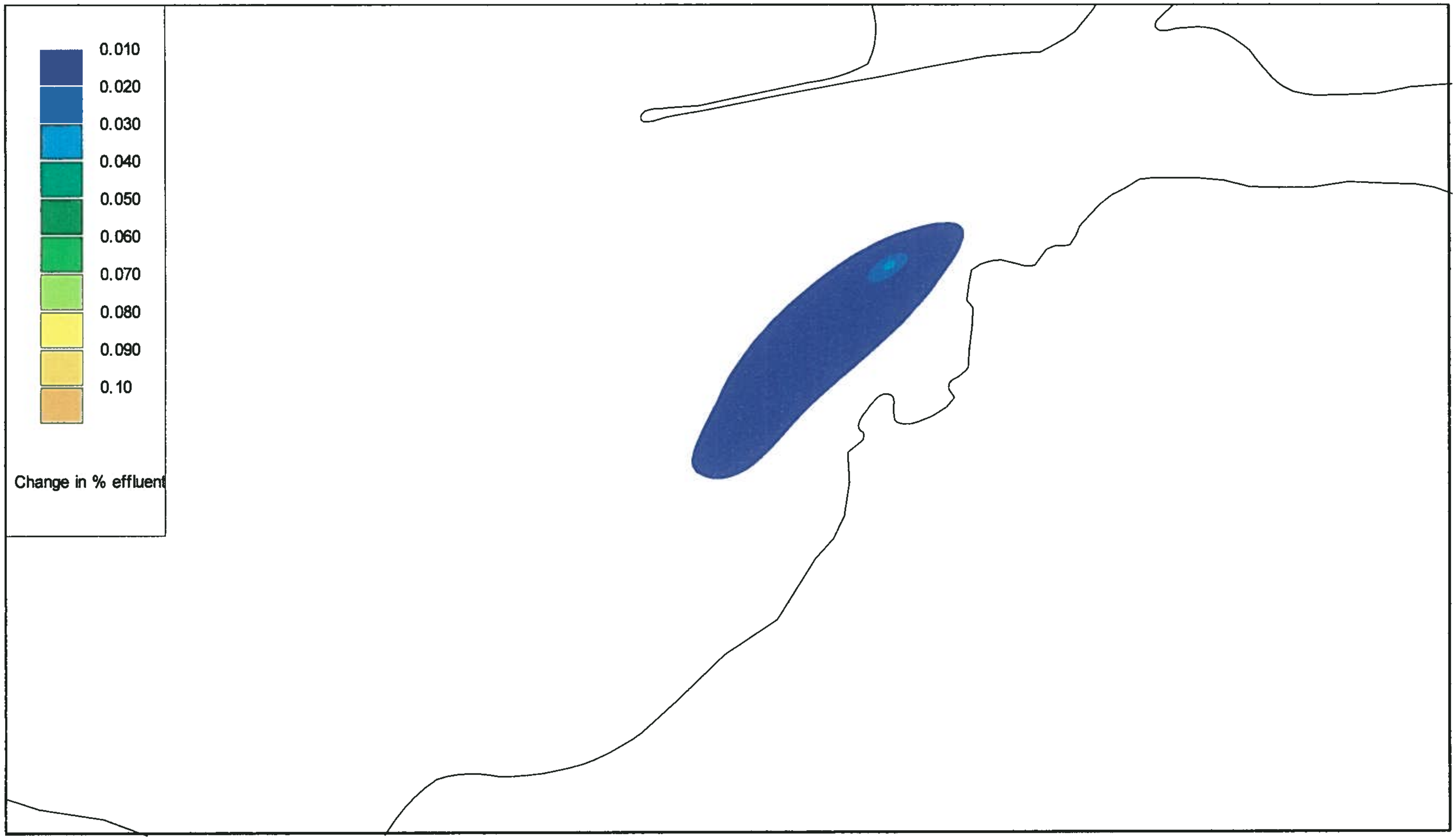

Figure 12. Color Contours of Change in Percent Effluent between Baseline (12.8 MGD) and Projected Future Discharge (17.09 MGD) – Shown at Time of Peak Change at the Davis Point RMP site in Scenario A (1-day Averaging Period, February 22nd)

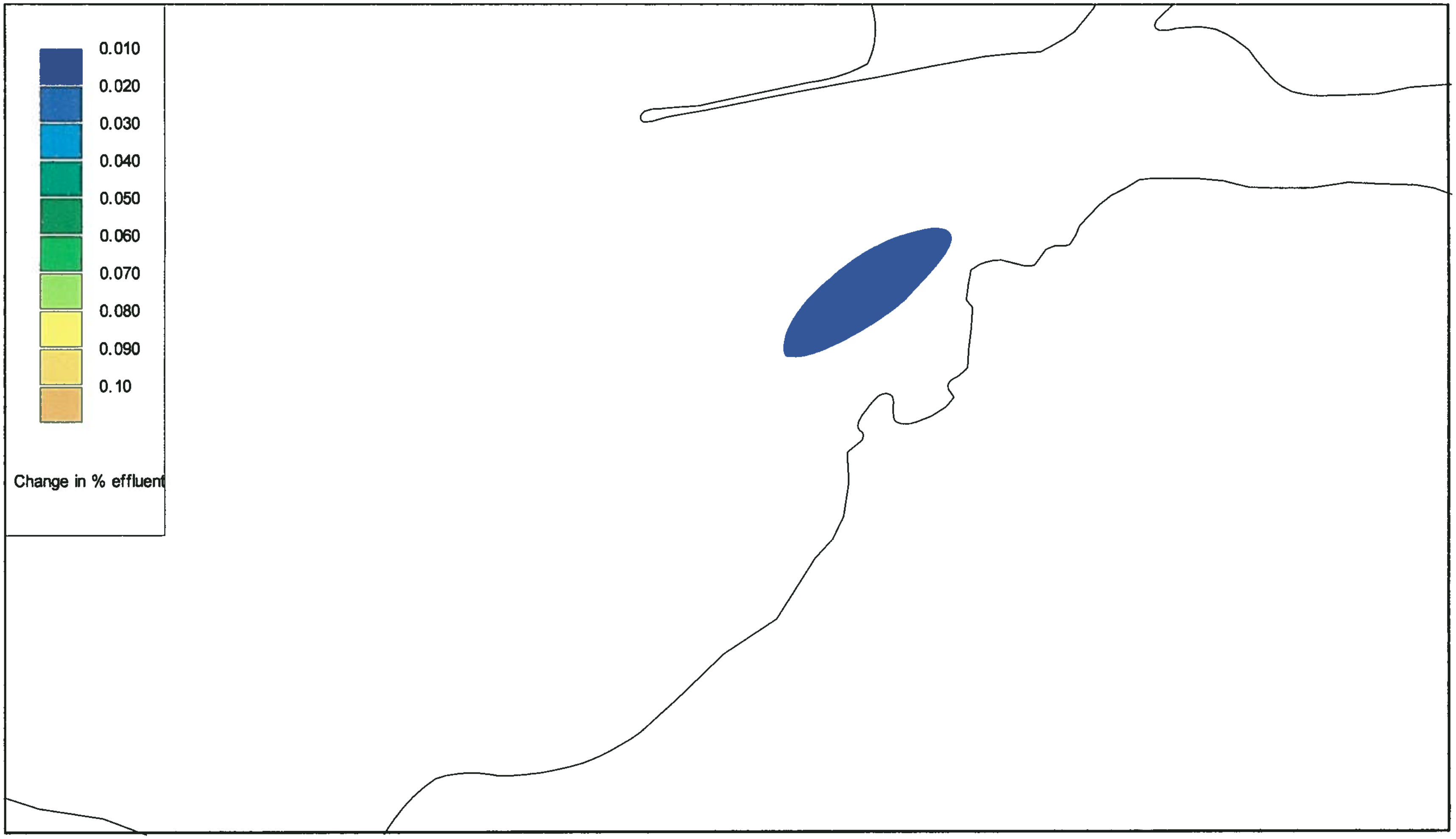

Figure 13. Color Contours of Change in Percent Effluent between Baseline (12.8 MGD) and Projected Future Discharge (17.09 MGD) – Shown at Time of Peak Change at the Davis Point RMP site in Scenario B (1-day Averaging Period, March 13th)

To further characterize the percent effluent present in each scenario under the baseline and projected discharge, profile plots of effluent versus distance from the outfall are presented. **Figure 14** shows in red the centerline of the PHWPCP/RSD effluent plume line. The percent effluent that occurs along the plume centerline is then shown for both the baseline discharge (blue) and projected discharge (red) in **Figures 15, 16, and 17**. Only the 1-day averaging periods with peak percent effluent change near the outfall are depicted. The figures show that percent effluent is highest within the area that is 1 kilometer west or east of the outfall. Outside of this region, the percent effluent decreases to well below 0.1%.

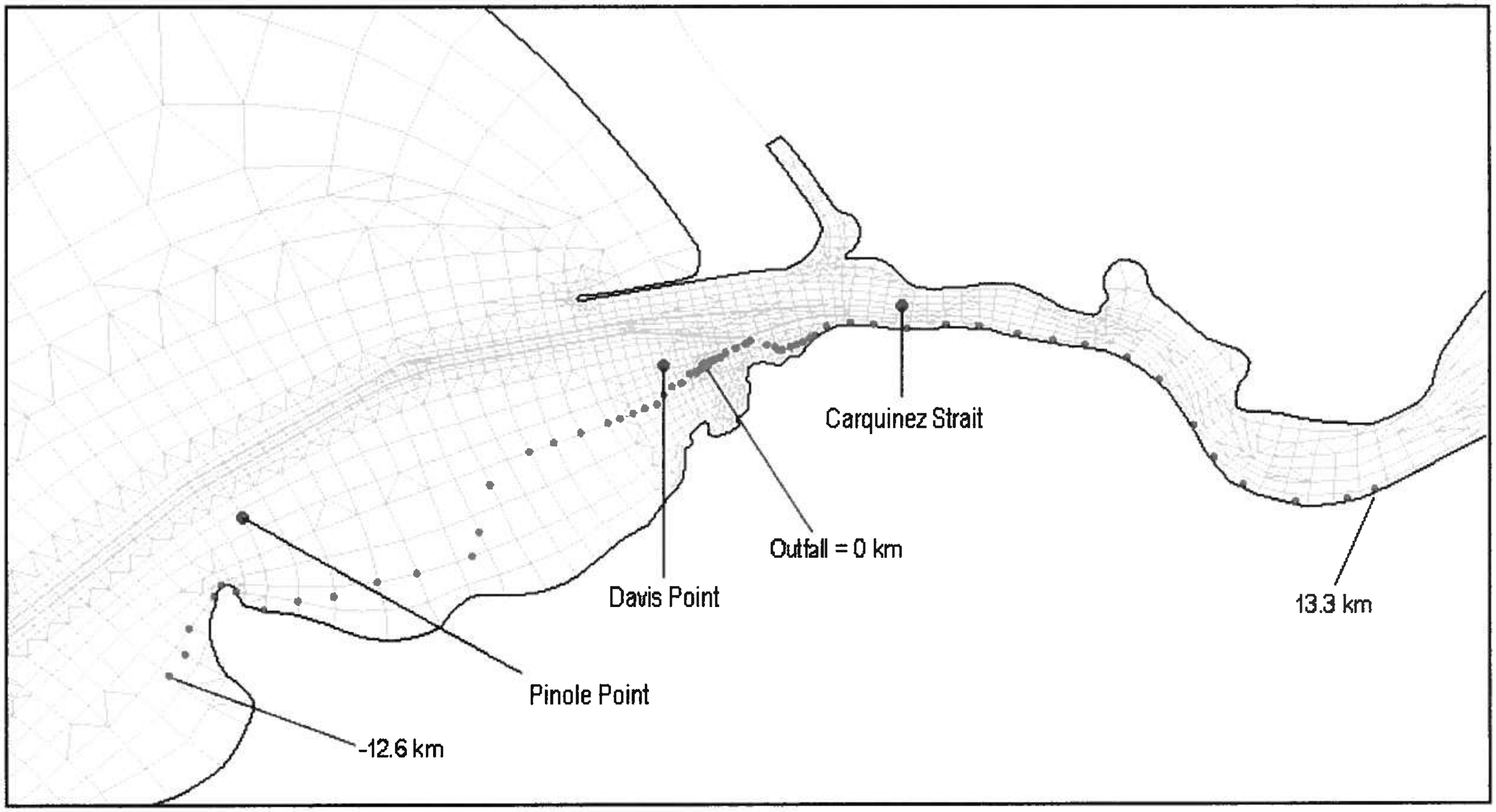

Figure 14. Profile Node Locations Used to Create Figure 15 through Figure 17

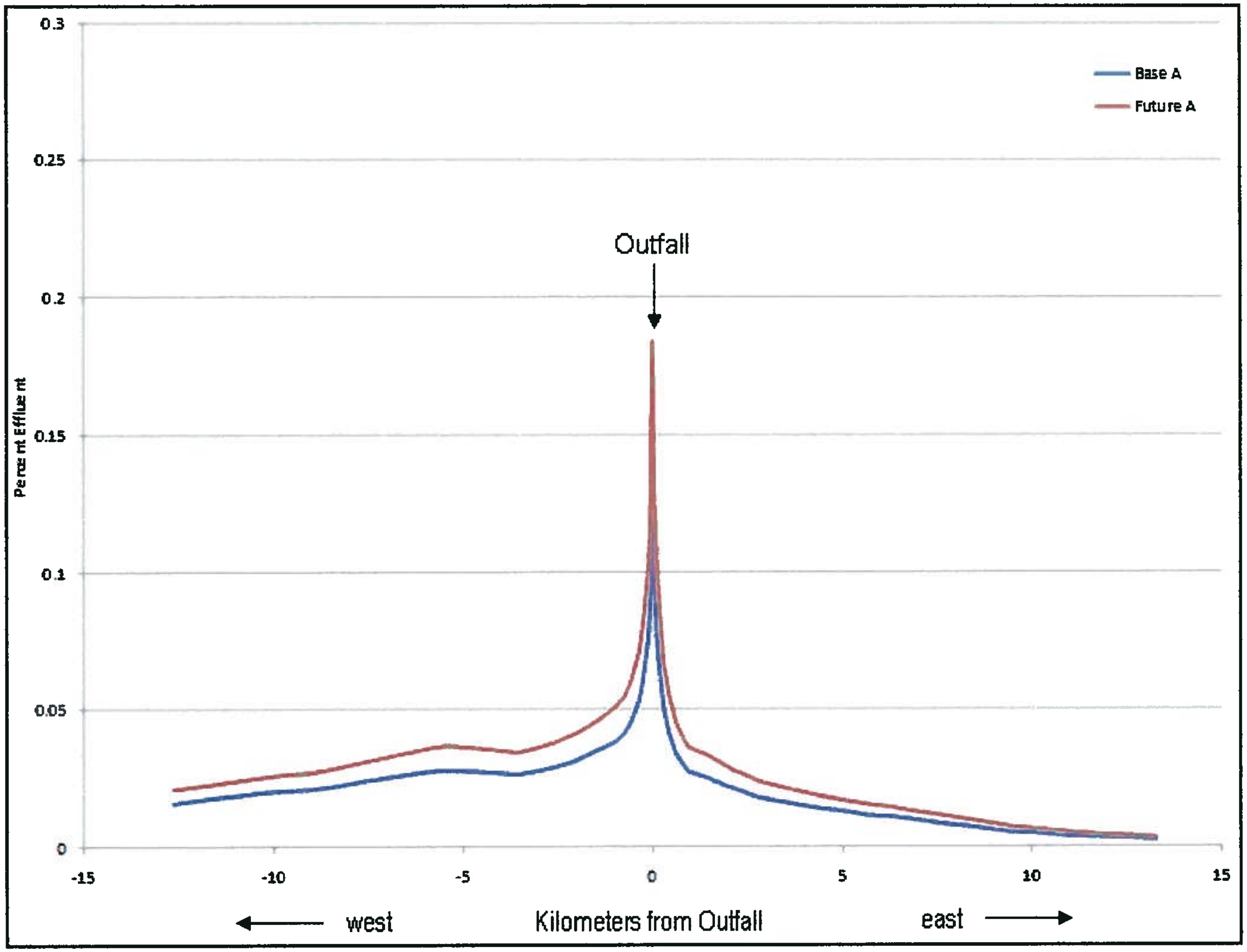

Figure 15. Profile of Baseline and Projected Future Discharge During 1-Day Averaging Period with Peak Percent Effluent at the Davis Point RMP site in Scenario A (February 22nd)

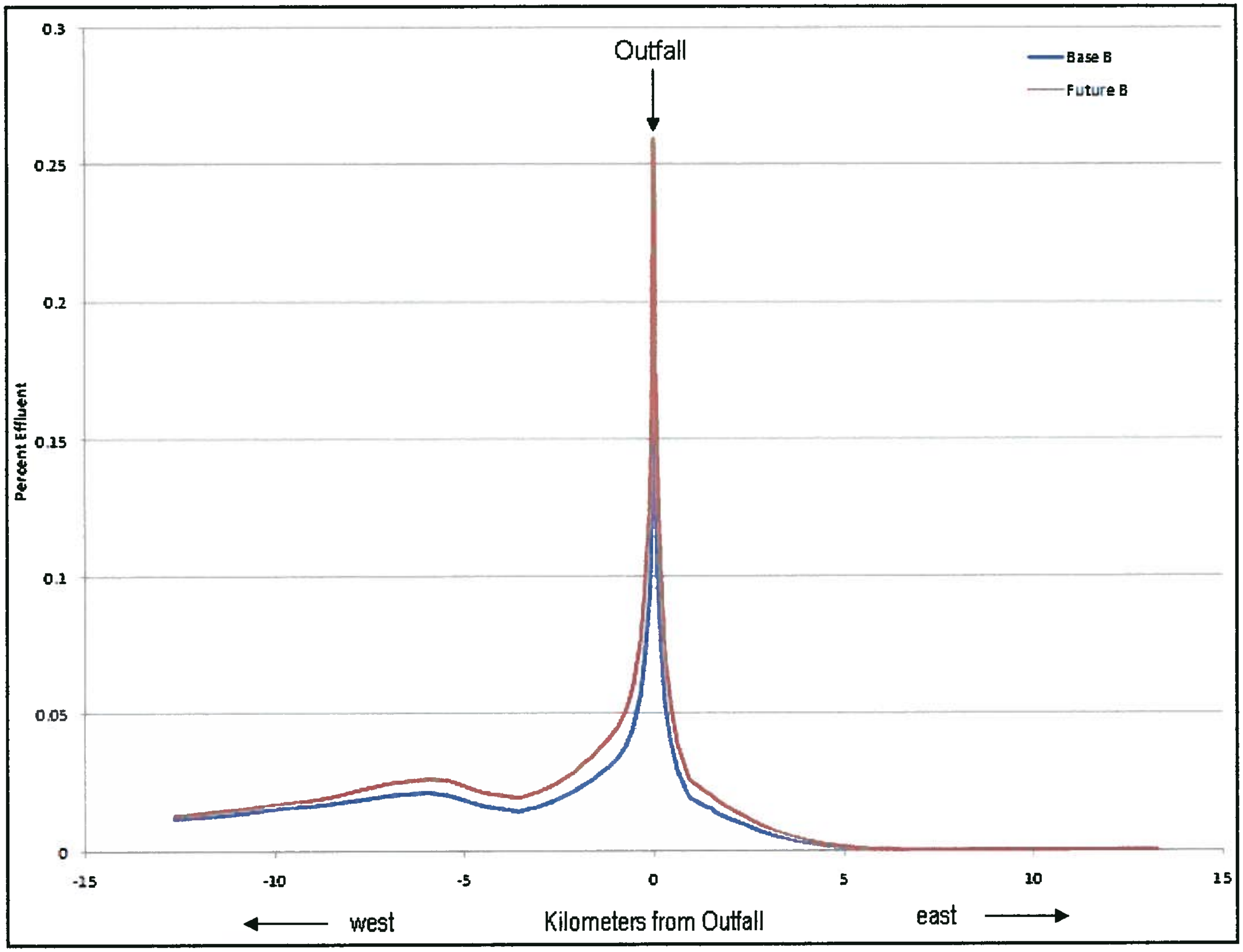

Figure 16. Profile of Baseline and Projected Future Discharge During 1-Day Averaging Period with Peak Percent Effluent at the Davis Point RMP site in Scenario B (March 13th)

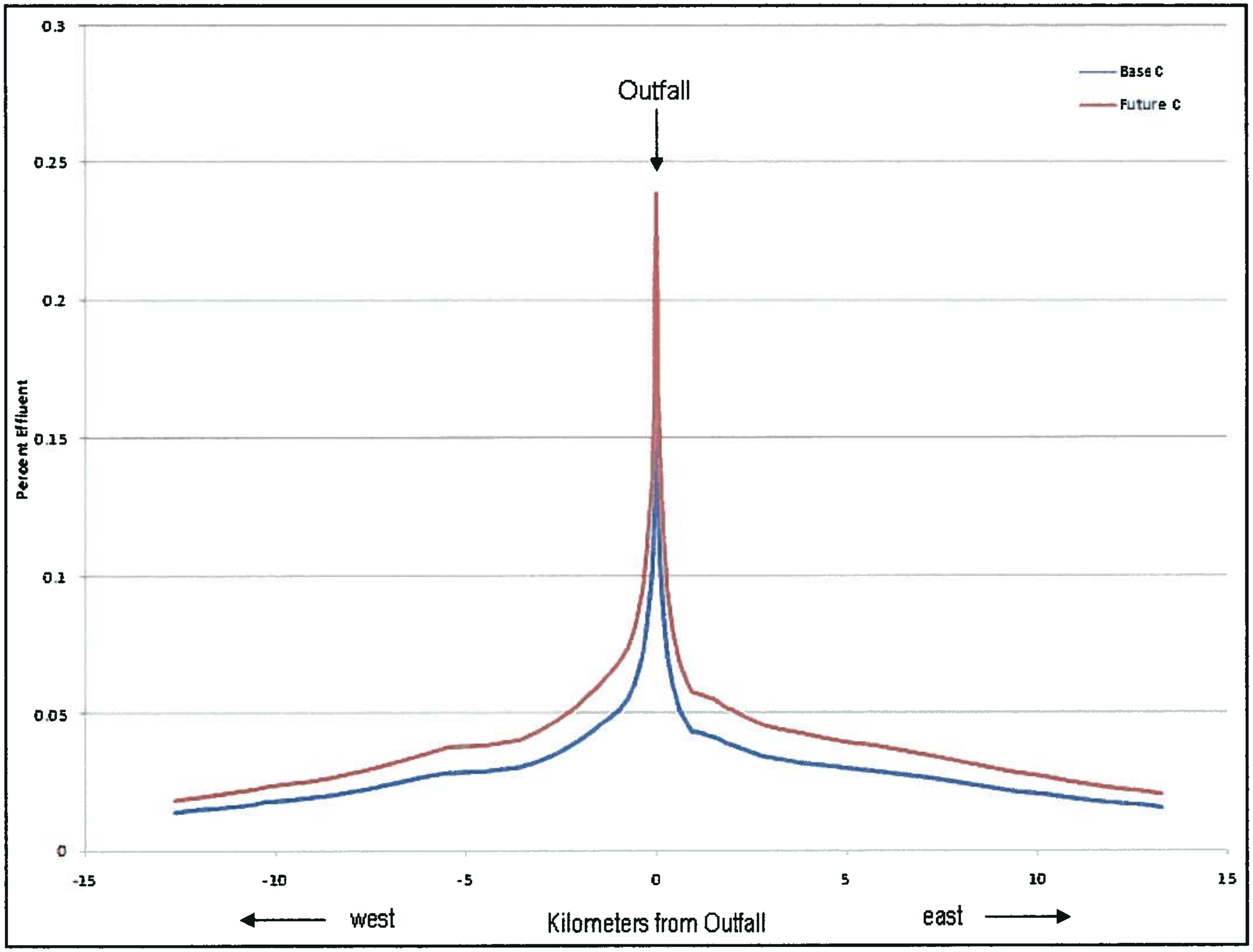

Figure 17. Profile of Baseline and Projected Future Discharge During 1-Day Averaging Period with Peak Percent Effluent at the Davis Point RMP site and the Carquinez Bridge site in <u>Scenario C</u> (April 18th)

PROJECTION OF COMPLIANCE WITH WATER QUALITY OBJECTIVES

In order to gage the impact of the planned increase in combined PHWPCP and RSD discharge on receiving water conditions, the projected concentrations of constituents of concern were determined from the Scenario C simulation. The results are presented in **Tables 15, 16, 17, and 18** for each key site in San Pablo Bay (Davis Point RMP site, Carquinez Bridge site, Pinole Point RMP site, and San Pablo Bay RMP site). The tables demonstrate that at all of the selected locations, the percent change in concentration for all of the constituents (except ammonia) would be negligible. Only Scenario C receiving water conditions are shown in this report, because the Scenario C simulation produced the most significant changes in receiving water quality. The receiving water conditions determined under Scenarios A and B are included in the *Pinole-Hercules Water Pollution Control Plant: Anti-Degradation Analysis for Proposed Wastewater Treatment Plant Discharge Modification – Supplemental Report* (LWA, 2009).

Modeled ammonia concentrations increase by 1% or less at all locations and under all modeled discharge scenarios. **Table 13** summarizes the changes in ammonia concentrations under the Scenarios A, B, and C. Although percent effluent is greatest at the outfall in Scenario B (**Figure 16**), the *change* in percent effluent is greater in Scenario C followed by Scenario A, leading to the greatest changes in the concentration of ammonia in theses scenarios. The percent consumption of available assimilative capacity due to the projected increase in ammonia concentration is shown in **Table 14**. The WQOs used to calculate the consumption of assimilative capacity are based on pH, temperature and salinity. RMP data for all of these variables were used to calculate a WQO for each day that data was collected between 1993 and 2001 and then the average WQO was used for these comparisons.

Table 13. Percent Change in Ammonia Concentrations Under the Three Scenarios

Impact Evaluation Point	Scenario A	Scenario B	Scenario C
Davis Point RMP Site	~0	~0	1%
Carquinez Bridge Site	~0	~0	1%
Pinole Point RMP Site	~0	~0	~0
San Pablo Bay RMP Site	0.02%	~0	~0

Table 14. Percent Consumption of Available Assimilative Capacity for Ammonia

Impact Evaluation Point	Scenario A	Scenario B	Scenario C
Davis Point RMP Site	~0	~0	0.08%
Carquinez Bridge Site	~0	~0	0.07%
Pinole Point RMP Site	~0	~0	~0
San Pablo Bay RMP Site	0.08%	~0	~0

While ammonia concentrations are projected to increase slightly, the increase shown does not reflect degradation of ammonia to nitrate under natural conditions. As such, the projected concentrations are the maximum that could be measured in the water column. Even with these over-estimated projections, the ammonia concentrations will remain below water quality objectives and reflect a less than 0.01% consumption of available assimilative capacity in all cases examined. This decrease is well below the 10% reduction benchmark set by the USEPA (Tier 2 Antidegradation Reviews and Significance Thresholds, August 2005).

The projected concentrations of CBOD and oil and grease are located in **Tables 15 through 18.** The calculations of CBOD and oil and grease are based on data that include non-detected results for receiving water and/or effluent samples. The method detection limit was used whenever a non-detected data point was incorporated into calculations. As such, projected receiving water concentrations of each of these constituents represent an upper limit.

Oil and grease was not detected in RMP sampling, but was detected in PHWPCP effluent 37.6% of the time. Because the water quality objective for oil and grease is 0 mg/L, any discharge of oil and grease is in violation of the objective. The impact of effluent oil and grease on receiving water concentrations, however, is so low that the calculated receiving water concentrations are below the method detection limit. Accordingly, **Tables 15 through 18** indicate that the effect on receiving waters is unknown because the impacts of the effluent are too low to measure.

Table 15. Davis Point RMP Site Net Delta Outflow Scenario C Receiving Water Conditions

Constituents of Concern Detected in DDSD Effluent	Units	Ambient Water Quality Objective	Baseline Scenario (12.8 MGD) Receiving Water Concentration	Baseline Scenario (12.8 MGD) Does Baseline Meet WQOs?	Future Scenario (17.09 MGD) Receiving Water Concentration	Future Scenario (17.09 MGD) Does Scenario 2 Meet WQOs?	Percent Increase in Receiving Water Concentration	Consumption of Available Assimilative Capacity
Conventionals								
Ammonia as N (mg/L)	mg/L	1.49[a]	0.076	NA	0.077	NA	1%	0.08%
CBOD (mg/L)	mg/L	NA	<5.0	Unknown	<5.0	Unknown	~0	NA
Oil & Grease (mg/L)	mg/L	0	<5.0	Unknown	<5.0	Unknown	~0	~0
TSS (mg/L)	mg/L	NA	46.4	NA	46.4	NA	~0	NA
Metals								
Copper (ug/L)	µg/L	6.0[b]	5.0	Yes	5.0	Yes	~0	~0
Mercury (ug/L)	µg/L	0.025	0.016	Yes	0.016	Yes	~0	~0
Nickel (ug/L)	µg/L	8.2	7.5	Yes	7.5	Yes	~0	~0
Selenium (ug/L)	µg/L	5	0.18	Yes	0.18	Yes	~0	~0
Zinc (ug/L)	µg/L	81	9.1	Yes	9.1	Yes	~0	~0
Other								
Cyanide (ug/L)	µg/L	2.9[c]	0.4	Yes	0.4	Yes	~0	~0

[a] Receiving water quality objectives are dependent on temperature, pH, and salinity and are calculated based on Davis Point RMP site data from 1993 to 2001
[b] Copper WQO based on SSO approved by EPA in January 2009.
[c] Cyanide WQO based on SSO approved by EPA in July 2008
NA = Not applicable
Unknown = Minimal impact, insufficient detected data are available to make a definitive conclusion.
< = Some or all measured concentrations were below the detection limit.
~0 = Statistics were not calculated for constituents for which no detectable change is projected.

Table 16. Carquinez Bridge Net Delta Outflow Scenario C Receiving Water Conditions

Constituents of Concern Detected in DDSD Effluent	Units	Ambient Water Quality Objective	Baseline Scenario (12.8 MGD) Receiving Water Concentration	Baseline Scenario (12.8 MGD) Does Baseline Meet WQOs?	Future Scenario (17.09 MGD) Receiving Water Concentration	Future Scenario (17.09 MGD) Does Scenario 2 Meet WQOs?	Percent Increase in Receiving Water Concentration	Consumption of Available Assimilative Capacity
Conventionals								
Ammonia as N (mg/L)	mg/L	1.49[a]	0.074	NA	0.075	NA	1%	0.07%
CBOD (mg/L)	mg/L	NA	<5.0	Unknown	<5.0	Unknown	~0	NA
Oil & Grease (mg/L)	mg/L	0	<5.0	Unknown	<5.0	Unknown	~0	~0
TSS (mg/L)	mg/L	NA	46.4	NA	46.4	NA	~0	NA
Metals								
Copper (ug/L)	µg/L	6.0[b]	5.0	Yes	5.0	Yes	~0	~0
Mercury (ug/L)	µg/L	0.025	0.016	Yes	0.016	Yes	~0	~0
Nickel (ug/L)	µg/L	8.2	7.5	Yes	7.5	Yes	~0	~0
Selenium (ug/L)	µg/L	5	0.18	Yes	0.18	Yes	~0	~0
Zinc (ug/L)	µg/L	81	9.1	Yes	9.1	Yes	~0	~0
Other								
Cyanide (ug/L)	µg/L	2.9[c]	0.4	Yes	0.4	Yes	~0	~0

[a] Receiving water quality objectives are dependent on temperature, pH, and salinity and are calculated based on Davis Point RMP site data from 1993 to 2001.
[b] Copper WQO based on SSO approved by EPA in January 2009.
[c] Cyanide WQO based on SSO approved by EPA in July 2008
NA = Not applicable
Unknown = Minimal impact, insufficient detected data are available to make a definitive conclusion.
< = Some or all measured concentrations were below the detection limit.
~0 = Statistics were not calculated for constituents for which no detectable change is projected.

Table 17. Pinole Point RMP Site Net Delta Outflow Scenario C Receiving Water Conditions

Constituents of Concern Detected in DDSD Effluent	Units	Ambient Water Quality Objective	Baseline Scenario (12.8 MGD) Receiving Water Concentration	Baseline Scenario (12.8 MGD) Does Baseline Meet WQOs?	Future Scenario (17.09 MGD) Receiving Water Concentration	Future Scenario (17.09 MGD) Does Scenario 2 Meet WQOs?	Percent Increase in Receiving Water Concentration	Consumption of Available Assimilative Capacity
Conventionals								
Ammonia as N (mg/L)	mg/L	1.33[a]	0.062	NA	0.062	NA	~0	NA
CBOD (mg/L)	mg/L	NA	<5.0	Unknown	<5.0	Unknown	~0	NA
Oil & Grease (mg/L)	mg/L	0	<5.0	Unknown	<5.0	Unknown	~0	~0
TSS (mg/L)	mg/L	NA	24.4	NA	24.4	NA	~0	NA
Metals								
Copper (ug/L)	µg/L	6.0[b]	3.4	Yes	3.4	Yes	~0	~0
Mercury (ug/L)	µg/L	0.025	0.009	Yes	0.009	Yes	~0	~0
Nickel (ug/L)	µg/L	8.2	4.9	Yes	4.9	Yes	~0	~0
Selenium (ug/L)	µg/L	5	0.16	Yes	0.16	Yes	~0	~0
Zinc (ug/L)	µg/L	81	5.1	Yes	5.1	Yes	~0	~0
Other								
Cyanide (ug/L)	µg/L	2.9[c]	0.4	Yes	0.4	Yes	~0	~0

[a] Receiving water quality objectives are dependent on temperature, pH, and salinity and are calculated based on Pinole Point RMP site data from 1993 to 2001
[b] Copper WQO based on SSO approved by EPA in January 2009.
[c] Cyanide WQO based on SSO approved by EPA in July 2008
NA = Not applicable
Unknown = Minimal impact, insufficient detected data are available to make a definitive conclusion.
< = Some or all measured concentrations were below the detection limit.
~0 = Statistics were not calculated for constituents for which no detectable change is projected.

Table 18. San Pablo Bay RMP Site Net Delta Outflow Scenario C Receiving Water Conditions

Constituents of Concern Detected in DDSD Effluent	Units	Ambient Water Quality Objective	Baseline Scenario (12.8 MGD) Receiving Water Concentration	Baseline Scenario (12.8 MGD) Does Baseline Meet WQOs?	Future Scenario (17.09 MGD) Receiving Water Concentration	Future Scenario (17.09 MGD) Does Scenario 2 Meet WQOs?	Percent Increase in Receiving Water Concentration	Consumption of Available Assimilative Capacity
Conventionals								
Ammonia as N (mg/L)	mg/L	1.33[a]	0.050	NA	0.050	NA	~0	NA
CBOD (mg/L)	mg/L	NA	<5.0	Unknown	<5.0	Unknown	~0	NA
Oil & Grease (mg/L)	mg/L	0	<5.0	Unknown	<5.0	Unknown	~0	~0
TSS (mg/L)	mg/L	NA	45.2	NA	45.2	NA	~0	NA
Metals								
Copper (ug/L)	μg/L	6.0[b]	4.7	Yes	4.7	Yes	~0	~0
Mercury (ug/L)	μg/L	0.025	0.014	Yes	0.014	Yes	~0	~0
Nickel (ug/L)	μg/L	8.2	7.0	Yes	7.0	Yes	~0	~0
Selenium (ug/L)	μg/L	5	0.16	Yes	0.16	Yes	~0	~0
Zinc (ug/L)	μg/L	81	8.0	Yes	8.0	Yes	~0	~0
Other								
Cyanide (ug/L)	μg/L	2.9[c]	0.4	Yes	0.4	Yes	~0	~0

[a] Receiving water quality objectives are dependent on temperature, pH, and salinity and are calculated based on San Pablo Bay RMP site data from 1993 to 2001.
[b] Copper WQO based on SSO approved by EPA in January 2009.
[c] Cyanide WQO based on SSO approved by EPA in July 2008
NA = Not applicable
Unknown = Minimal impact, insufficient detected data are available to make a definitive conclusion.
< = Some or all measured concentrations were below the detection limit.
~0 = Statistics were not calculated for constituents for which no detectable change is projected.

EVALUATION OF CONSISTENCY WITH ANTIDEGRADATION POLICIES

APPLICABLE LAWS AND POLICIES

The federal Clean Water Act requires states to adopt, with USEPA approval, water quality standards applicable to all its intrastate waters. (33 U.S.C. § 1313.) The CWA also requires state water quality standards to include an antidegradation policy to protect beneficial uses and prevent further degradation of high quality waters. (33 U.S.C. § 1313(d)(4)(B); 40 C.F.R. § 131.12.) In California, water quality standards include the beneficial uses and water quality objectives established within Basin Plans and the State's antidegradation policy as embodied in Resolution 68-16. Both the federal and state antidegradation policies apply to the proposed increase in surface water discharge of treated effluent to San Pablo Bay.

ANALYSIS

The following questions stated in APU 90-004 are addressed to evaluate consistency with state and federal anti-degradation policies.

[a] Whether a reduction in water quality will be spatially localized or limited with respect to the water body (e.g., confined to the mixing zone);

[b] Whether a reduction in water quality will be temporally limited and will not result in any long-term deleterious effects on water quality; or

[c] Whether a proposed action will produce minor effects which will not result in a significant reduction of water quality; or

[d] Whether a proposed activity has been approved in a General Plan and has been adequately subjected to the environmental and economic analysis required in an EIR required under CEQA.

Basis for Evaluation

The impact of the increased PHWPCP discharge has been evaluated by (1) examining the change in ambient water quality that will result for selected constituents and (2) examining the consumption of assimilative capacity that will result based on current ambient water quality. **Tables 15 though 18** summarize results from the water quality modeling effort and show changes in ambient concentrations for selected constituents at selected locations. These tables indicate that the change in concentration of constituents of concern is undetectable for all constituents (other than ammonia). The increase in ammonia concentrations is 1% or less as presented in **Table 13**. Consumption of available assimilative capacity is accordingly 0% for all constituents except ammonia. The consumption of available assimilative capacity for ammonia is less than 1% as shown in **Table 14**. These results were used to quantify across-the-board water quality impacts of the proposed increase in discharge.

Consistency Evaluation

In response to items [a], [b], [c] and [d], above, the findings in this report indicate that:

[a] Any reduction in water quality caused by the proposed increased PHWPCP discharge will be spatially localized or limited with respect to the water body (see Spatial Reach of Combined PHWPCP and RSD Discharge)

[b] Any reduction in water quality will be temporally limited to periods of wet weather and will not result in any long-term deleterious effects on water quality (see Spatial Reach of Combined PHWPCP and RSD Discharge)

[c] The proposed increase will produce minor effects which will not result in a significant reduction of water quality (see Projection of Compliance with Water Quality Objectives and Loading Impact to Receiving Waters)

[d] The proposed increase is based on approved General Plans by the planning agencies that would be served by the proposed flow increase. The PHWPCP capacity increase will be adequately subjected to environmental and economic analysis in an EIR required under CEQA. A final EIR is scheduled for approval by the lead agency prior to August 2010.

Tier 1 Constituents

The Tier 1 constituents of concern for San Pablo Bay are mercury, nickel, selenium, DDT, DDD, DDE, chlordane, dieldrin, and PCBs. Of these constituents, only mercury, nickel, and selenium have been detected in the PHWPCP or RSD effluent. The combined effluent discharged through Outfall 001 will comply with WQOs for mercury, nickel, and selenium, and thus satisfies the test for discharges to Tier 1 waters that the expanded discharge not cause the waters to be impaired or worsen existing impairments.

Tier 2 Constituents

San Pablo Bay is considered a Tier 2 receiving water for ammonia because ambient water quality is in compliance with WQOs and there is assimilative capacity remaining. With regard to ammonia, concentrations are projected to increase, but the increase shown does not reflect degradation of ammonia to nitrate under natural conditions. As such, the projected concentrations are the maximum that will actually be measured in the water column. Even with these over-estimated projections, the ammonia concentrations will remain below water quality objectives and reflect a less than 1% change in available assimilative capacity in all cases examined. Thus, the discharge is consistent with the test for Tier 2 that the proposed activity shall not lower water quality beyond a de minimis level.

Summary of Findings

The water column modeling performed for this analysis provides quantitative estimates of changes in water column concentrations of constituents of concern as a result of the proposed increase in permitted discharge. These results provide a clear indication that the magnitude of impact of the increased discharge on San Pablo Bay would be minimal. Direct modeling of changes in pollutant concentrations in surface sediments or biota were not performed, due to the complexity and uncertainty involved in such an analysis. As a result, in this analysis, such changes in sediment and tissue concentrations have been inferred from the water column results.

Primary findings in this analysis are that the changes in water quality associated with an incremental increase in PHWPCP permitted maximum wet weather capacity from 10.3 MGD to 14.59 MGD (average daily flow) are not significant. Further, no changes are predicted which would cause exceedances of existing or projected numeric water quality standards for San Pablo Bay. Based on these quantitative results, it is concluded that the proposed increase will not adversely impact beneficial uses of San Pablo Bay or unreasonably change water quality. As a result of the findings of this analysis, the proposed discharge is consistent with federal and state antidegradation policies.

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