CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

RESOLUTION R2-2007-0042

To amend the Water Quality Control Plan for the San Francisco Bay Region
to Adopt Site-Specific Objectives for Copper
for San Francisco Bay and an Implementation Plan

WHEREAS, the California Regional Water Quality Control Board, San Francisco Bay Region (Water Board), finds that:

1. The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was duly adopted by the Water Board and approved by the State Water Resources Control Board, Office of Administrative Law and the United States Environmental Protection Agency (U.S. EPA), where required.

2. The proposed Basin Plan Amendment, including specifications on its physical placement in the Basin Plan, is set forth in Exhibit A hereto. The proposed Basin Plan Amendment consists of the following: (a) adoption of marine site-specific water quality objectives (SSOs) for copper in all segments of San Francisco Bay excluding South San Francisco Bay; (b) defined ratios of total to dissolved copper (translators) for calculating effluent limits for wastewater sources discharging to deepwater portions of the Bay; (c) adoption of a Bay-wide implementation strategy that includes required studies to address technical uncertainties, mandatory effluent limits for all municipal and industrial wastewater dischargers, and control measures for major sources of copper (urban runoff, wastewater treatment facilities, lagoons, and marine anti-fouling coatings); (d) an ambient water quality monitoring program designed to detect small changes in dissolved copper concentrations in the Bay that may trigger additional control measures; and (e) revisions to Chapter 7 of the Basin Plan to make it clear that the implementation plan for the copper SSOs is a Bay-wide strategy. All of the above are regulatory changes with the exception of control measures for marine anti-fouling coatings and lagoons, the water quality monitoring program, and the revisions to Chapter 7 clarifying Bay-wide implementation.

3. On May 18, 2000, the U.S. EPA promulgated the California Toxics Rule (CTR) prescribing numeric water quality criteria for priority toxic pollutants, including copper, that apply to the San Francisco Bay.

4. On March 2, 2000, the State Water Board adopted the Policy for Implementation of Toxics Standards For Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Plan or SIP), which among other things, established implementation provisions for priority pollutant criteria promulgated by U.S. EPA, including the CTR.

5. The SIP authorizes the Water Board to adopt SSOs in lieu of the CTR criteria whenever the Water Board determines, in the exercise of its professional judgment, that it is appropriate to do so. Under the SIP, SSOs are appropriate if (a) a priority pollutant criterion or objective is not achieved in the receiving water, or a National Pollutant Discharge Elimination System (NPDES) permit holder demonstrates that it does not, or may not in the future, meet an existing or potential effluent limitation based on the priority pollutant criterion or objective and (b) there is a demonstration that the discharger cannot be assured of achieving the criterion or objective and/or effluent limitation through reasonable treatment, source control and pollution prevention measures.

6. The Basin Plan Amendment proposes chronic and acute copper SSOs to replace the existing CTR objectives (3.1 µg/L chronic, and 4.8 µg/L acute). The proposed SSOs for Suisun Bay, San Pablo Bay, Central Bay, and Lower Bay north of the Hayward Shoals are 6.0 and 9.4 (µg/L chronic / acute), and, for the portion of Lower Bay south of the Hayward Shoals, are 6.9 and 10.8. These SSOs are necessary and appropriate because: (a) despite the performance of reasonable treatment, source control and pollution prevention measures, effluent limits based on the current CTR objectives are not being consistently met; (b) they are based on U.S. EPA-approved procedures for establishing SSOs.

7. The proposed SSOs for copper in San Francisco Bay were derived through U.S. EPA-approved methods, are based on sound scientific rationale, and are fully protective of the most sensitive aquatic life beneficial uses in San Francisco Bay, as required under 40 C.F.R. §131.11.

8. The proposed SSOs are currently being met in San Francisco Bay and must be maintained. Therefore, the SSOs are supported by an implementation plan designed to prevent water quality degradation. The implementation plan (described above under Finding 2.) satisfies the requirement for a program of implementation for achieving water quality objectives under California Water Code (CWC) § 13242.

9. The proposed SSOs for copper in San Francisco Bay and the corresponding implementation plan comply with state and federal antidegradation requirements as set forth in the Staff Report dated June 6, 2007 (Staff Report).

10. The Board has considered those CWC § 13241 factors to be considered when establishing water quality objectives such as SSOs, as set forth in the Staff Report.

11. The Board has considered the impacts of the proposed Basin Plan Amendment on those affected by the proposed Basin Plan Amendment, including economic impacts. There are minimal economic impacts that would result from the proposed Basin Plan Amendment because most of the implementation plan measures are already required or being implemented.

12. The scientific basis for the regulatory elements of the proposed Basin Plan Amendment was subjected to an independent, external peer review pursuant to the requirements of Health and Safety Code section 57004.

13. On March 2, 2007, the Water Board publicly noticed the proposed Basin Plan Amendment and distributed the proposed Basin Plan Amendment, a draft Staff

Report, and Environmental Checklist in accordance with applicable state and federal environmental regulations (CWC § 13244, title 23, California Code of Regulations, § 3775 et seq., and 40 CFR Part 25).

14. On May 9, 2007, the Water Board held a public hearing to consider the Basin Plan Amendment, after a 45-day public comment period.

15. On June 13, 2007, the Water Board held a second public hearing to consider the Basin Plan Amendment, including response to public comments on the amendment.

16. The process of basin planning has been certified by the Secretary for Resources as exempt from the requirement of the California Environmental Quality Act (Public Resources Code Section 21000 et seq.) to prepare an Environmental Impact Report or Negative Declaration. The Basin Plan Amendment package includes a Staff Report, an Environmental Checklist, an assessment of the potential environmental impacts of the Basin Plan amendments, and a discussion of alternatives. The Basin Plan Amendment, Environmental Checklist, Staff Report, and supporting documentation serve as a substitute environmental document under the Water Board's certified regulatory program. The Water Board has duly considered the Environmental Checklist, Staff Report and supporting documentation with respect to environmental impacts and finds that the proposed Basin Plan Amendment will not have a significant impact on the environment. The Water Board further finds, based on consideration of the record as a whole, that there is no potential for adverse effect, either individually or cumulatively, on wildlife as a result of the proposed Basin Plan Amendment.

17. The Basin Plan Amendment must be submitted for review and approval by the State Water Board, the Office of Administrative Law (OAL), and U.S. EPA. Once approved by the State Water Board, the amendment is submitted to OAL and U.S. EPA. The Basin Plan Amendment will become effective upon approval by OAL and U.S. EPA. Additionally, for the SSOs to apply over the CTR criteria for copper, USEPA must also amend the CTR to remove the applicability of the CTR copper criteria in the San Francisco Bay, which amendment can and should be done concurrently with U.S. EPA approval of the Basin Plan Amendment.

NOW, THEREFORE BE IT RESOLVED THAT:

1. The Water Board adopts the Basin Plan Amendment as set forth in Exhibit A hereto.
2. The Executive Officer is directed to forward copies of the Basin Plan Amendment to the State Water Board in accordance with the requirement of CWC Section 13245.
3. The Water Board requests that the State Water Board approve the Basin Plan Amendment in accordance with the requirements of CWC Sections 13245 and 13246 and forward it to the OAL and USEPA for approval.
4. If, during the approval process, Water Board staff, the State Water Board or OAL determines that minor, non-substantive corrections to the language of the amendment are needed for clarity or consistency, the Executive Officer may make such changes, and shall inform the Water Board of any such changes.
5. Since the Basin Plan Amendment will involve no potential for adverse effect, either individually or cumulatively, on wildlife, the Executive Officer is directed to sign a Certificate of Fee Exemption.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of a Resolution adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on June 13, 2007.

Bruce H. Wolfe

BRUCE H. WOLFE
Executive Officer

Exhibit A

Proposed Basin Plan Amendment

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PROPOSED BASIN PLAN AMENDMENT

Revisions indicated in single underline/strikeout represent new language. A small amount of double underlined text at the beginning of the amendment under 'Site Specific Objectives' is text that has been approved by the Water Board and is pending approval by the State Water Board.

Amend the following language in Chapter 3 of the Basin Plan as follows:

Site-specific objectives have been adopted for copper in segments of San Francisco Bay shown (see Figure 7.1), for nickel, ~~adopted for~~in South San Francisco Bay ~~south of the Dumbarton Bridge~~, (Table 3-3A) and for cyanide in all San Francisco Bay segments (Table 3-3C) ~~are listed in Table 3-3A.~~

Table 3-3A: Water Quality Objectives for Copper and Nickel in ~~Lower South~~ San Francisco Bay segments

Compound	4-day Average (CCC)[1]	1-hr Average (CMC)[2]	Extent of Applicability
Copper	6.9	10.8	~~Marine and Estuarine Waters Contiguous to SF Bay, South of Dumbarton Bridge~~ The portion of Lower San Francisco Bay south of the line representing the Hayward Shoals shown on Figure 7.1, and South San Francisco Bay.
Copper	6.0	9.4	The portion of the delta located in the San Francisco Bay Region, Suisun Bay, Carquinez Strait, San Pablo Bay, Central San Francisco Bay, and the portion of Lower San Francisco Bay north of the line representing the Hayward Shoals on Figure 7.1.
Nickel	11.9	62.4*	~~Marine and Estuarine Waters Contiguous to SF Bay, South of Dumbarton Bridge~~ South San Francisco Bay

*Handbook of ~~WQS~~Water Quality Standards, 2nd ed. 1994 in Section 3.7.6 states that the CMC = Final AcuteValue/2; 62.4 is the Final Acute Value (resident species database)/2; so the site-specific CMC is lower than the California Toxics Rule value because we are using the resident species database instead of the National Species Database.

[1]Criteria Continuous Concentration

[2]Criteria Maximum Concentration

Amend the following language in Chapter 4 of the Basin Plan as follows:

SITE-SPECIFIC OBJECTIVES

Site-specific objectives have been adopted by the Water Board for copper in San Francisco Bay and for nickel in ~~Lower~~ South San Francisco Bay, (Table 3-3A) and for cyanide in San Francisco Bay (Table 3-3C).

7.2.~~1~~ A WATER QUALITY ATTAINMENT STRATEGY TO SUPPORT COPPER SITE-SPECIFIC OBJECTIVES FOR SAN FRANCISCO BAY AND NICKEL SITE-SPECIFIC OBJECTIVES FOR SOUTH ~~OF THE DUMBARTON BRIDGE~~SAN FRANCISCO BAY

The Water Quality Attainment Strategy (WQAS) for copper in all San Francisco Bay segments (see Figure 7.1) and nickel in South San Francisco Bay ~~south of the Dumbarton~~

~~Bridge (Lower South SF Bay)~~ is designed to prevent water quality degradation and ensure attainment of the ~~ongoing maintenance of the~~ copper and nickel site-specific objectives (SSOs). ~~both for copper and nickel in Lower South SF Bay.~~ This section describes the details of the WQAS and how the Water Board will use its regulatory authority to implement this strategy.

The four elements of the WQAS ~~for copper and nickel in Lower South SF Bay~~ are:

- ~~Current c~~Control measures/actions to minimize the discharge of copper ~~and nickel releases (~~from ~~municipal~~ wastewater treatment plants, ~~and~~ urban runoff ~~programs~~, anti-fouling boat paints, and lagoons to ensure that significant copper sources are properly managed~~)~~; ~~to Lower South SF Bay;~~
- Statistically-based water quality "triggers" and a receiving water monitoring program that would initiate additional control measures/actions if the "triggers" are exceeded ~~met~~;
- ~~A proactive framework for addressing increases to future copper and nickel concentrations in Lower South SF Bay, if they occur; and~~
- Metal translators that will be used to compute copper and nickel effluent limits for the municipal wastewater treatment plants discharging to ~~Lower~~ South ~~SF~~ San Francisco Bay.
- Metal translators that will be used to compute copper effluent limits for municipal and industrial wastewater treatment plants that discharge to deep water (see Section 4.5.2.2 for definition) north of the Dumbarton Bridge.

~~Except for the specification of metal translators, all actions and monitoring obligations described in this section have been required by the National Pollutant Discharge Elimination System (NPDES) permits for the three municipal wastewater dischargers and the municipal urban runoff (stormwater) dischargers in Lower South SF Bay since October 2000 and March 2001, respectively.~~

7.2~~1~~.1 BACKGROUND

All San Francisco Bay segments (see Figure 7.1) meet water quality objectives for copper and nickel. Since the mid-1980s, because of effective treatment and successful pollution prevention and source control efforts, substantial reductions in metal loading to San Francisco Bay segments have been achieved. Other sources that are difficult to manage such as urban runoff (which includes copper from automobile brake pads), historical deposits of copper in the Bay sediments and natural sources of copper are among the dominant contributions to current ambient water concentrations. SSOs (see Chapter 3) for dissolved copper in all Bay segments (and nickel in South San Francisco Bay) have been derived using toxicity data representing site-specific conditions in all San Francisco Bay segments, and these SSOs fully protect San Francisco Bay beneficial uses.

~~Lower South SF Bay has been listed as impaired due to point source discharges of generic metals since 1990 (Clean Water Act §304(l) listing) and most recently for copper and nickel from point and urban runoff sources in the State's 1998 list required by Clean Water Act §303(d). The primary reason for the copper and nickel impairment listings had been that ambient water concentrations of dissolved copper and nickel exceeded Basin Plan water quality objectives or US EPA national water quality criteria for the protection of aquatic life. Despite significant reductions in wastewater loadings over the past two decades, ambient concentrations at stations monitored through the San Francisco Estuary Regional Monitoring Program for Trace Substances (RMP) or the City of San Jose monitoring program still approach or exceed the previously-applicable federal criteria or water quality objectives in Lower South SF Bay. The Water Board has now adopted site-specific water quality objectives. As discussed below, it is likely that these new objectives are being attained.~~

~~*7.1.1.1 SOURCES*~~

~~The external sources of copper and nickel to Lower South SF Bay include a minor contribution from atmospheric deposition and substantial discharges from tributaries/urban runoff and municipal wastewater. The dischargers responsible for the urban runoff discharges are the Santa Clara Valley Water District, County of Santa Clara, City of Campbell, City of Cupertino, City of Los Altos, Town of Los Altos Hills, Town of Los Gatos, City of Milpitas, City of Monte Sereno, City of Mountain View, City of Palo Alto, City of San Jose, City of Santa Clara, City of Saratoga, and City of Sunnyvale. These cities have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program. The municipal wastewater dischargers are the Cities of San Jose and Santa Clara, Sunnyvale, and Palo Alto. Each of these cities owns and operates a wastewater treatment plant (Publicly-Owned Treatment Works or POTW) that discharges into the Lower South Bay.~~

~~On an annual basis, about 1100 kilograms (kg) of copper and 1500 kg of nickel enters Lower South SF Bay from POTWs. From tributaries, roughly 3800 kg copper and 6000 kg nickel enters this Bay segment each year. During the dry season (June-November), POTW loading is dominant, and tributary loading is dominant during the wet season (December-May). Substantial amounts of copper (about 1.9 million kg) and nickel (about 50 million kg) already existing in the sediments of Lower South SF Bay can also contribute to water concentrations when the sediments are resuspended by waves, winds, tides, and currents. The metals deposited in the sediments consist of those deposited historically (higher than current levels) and those currently deposited metals. The historical and current external loadings have elevated the total copper and possibly the total nickel concentrations of Lower South SF Bay sediments above what they would be in the absence of anthropogenic sources.~~

~~*7.1.1.2 STAKEHOLDER INVOLVEMENT*~~

~~The stakeholder group recognized by the Water Board to assist in developing watershed-based programs to address both short and long-term water quality issues in Lower South SF Bay is the Santa Clara Basin Watershed Management Initiative (SCBWMI). The SCBWMI, formed in 1996, is a collaborative effort of representatives from business and industrial sectors, professional and trade organizations, civic, environmental, resource conservation and agricultural groups, regional and local public agencies, resource agencies, and the general public. These groups have joined forces to address all sources of pollution that threaten the water bodies draining into the Lower South Bay. A major aim of the SCBWMI is to coordinate existing watershed activities on a basin-wide scale, ensuring that environmental protection efforts are addressed efficiently and cost-effectively. The Water Board will continue to recognize and rely on the leadership of the SCBWMI to ensure the ongoing success of the WQAS.~~

~~A working subgroup of the SCBWMI, the Bay Monitoring and Modeling Subgroup, took the lead to address the water quality issues and to provide the basic strategy and information necessary to address both the water quality technical and related regulatory questions. In 1998, the Copper and Nickel TMDL Work Group (Workgroup) was formed by the SCBWMI to provide guidance for the development of the TMDLs for copper and nickel in Lower South SF Bay. A broad group of stakeholders was represented on the Workgroup including several environmental groups, local wastewater dischargers, local public agencies responsible for the urban runoff program, state and federal regulators, industry and local business representatives, and national organizations such as the Copper Development Association.~~

~~7.1.2 OVERVIEW OF THE TMDL PROJECT FOR COPPER AND NICKEL IN LOWER SOUTH BAY~~

~~In 1996, the State Water Board included the South San Francisco Bay on the §303(d) impaired water body list as a high priority impaired water body. In 1998, the list was updated and specifically identified copper, nickel, mercury and selenium as the metal pollutants of concern. The listing triggered the Clean Water Act §303(d) mandate for the State of California, specifically the Water Board, to establish TMDLs for these pollutants of concern. To address NPDES permit issues for its wastewater treatment plant, the City of San Jose and other local municipalities took the lead in providing funding for the development of the copper and nickel TMDLs for Lower South Bay, and other Lower South Bay communities contributed to related SCBWMI activities.~~

~~The TMDL effort focused on:~~

~~1.Conducting an Impairment Assessment to determine if ambient concentrations of copper and nickel were negatively impacting the designated beneficial uses of Lower South Bay;~~

~~2.Developing a range of scientifically defensible water quality objectives for copper and nickel;~~

~~3.Developing a conceptual model of copper and nickel cycling to evaluate attainment of the range of objectives; and~~

~~4.Characterizing sources and identifying pollution prevention and control actions.~~

~~The Workgroup oversaw the preparation and review of several technical reports. These reports provide the basis of the conclusions and recommendations of the Workgroup regarding the effects of ambient concentrations of copper and nickel on the beneficial uses of Lower South Bay.~~

~~7.1.3 IMPAIRMENT ASSESSMENT AND SITE-SPECIFIC OBJECTIVES~~

~~The Impairment Assessment Report was finalized in June 2000 to present new information and to re-evaluate the determination that the beneficial uses of Lower South Bay were impaired due to ambient concentrations of copper and nickel. Specifically, the goals of the assessment were to:~~

- ~~Compile and evaluate data on ambient concentrations and toxicity information for copper and nickel in Lower South Bay;~~
- ~~Identify, evaluate and select indicators of beneficial use impairment. The categories of parameters and criteria considered included toxicity (acute and chronic), biological (biota composition, health, abundance, and physical habitat vs. a reference site), chemical (numeric values), and physical (capacity to support uses);~~
- ~~Develop endpoints for the selected indicators that can be used to assess the existence of impairment and compare these values to ambient concentrations in Lower South Bay. The intent of this assessment was to provide policy makers, regulators, and other stakeholders with the best technical laboratory and ambient information currently available to compare with known threshold impact levels on selected indicators;~~
- ~~Assess the level of certainty with which it can be shown ambient concentrations of copper and nickel are or are not resulting in beneficial use impairment; and~~
- ~~Recommend numeric values for site-specific objectives (SSOs) for dissolved copper and nickel in Lower South Bay in lieu of TMDL development upon finding that the Lower South Bay is not impaired due to these metals.~~

~~The final results of the impairment assessment indicated that impairment to beneficial uses of Lower South Bay due to ambient copper and nickel concentrations is unlikely. There are several lines of evidence to support the finding for each metal, and these are discussed at length in the Impairment Assessment Report. One important factor in the impairment decision was the recognition that the chemical features of Lower South Bay reduce the toxicity and bioavailability of copper and nickel. These chemical features include binding of copper and nickel by dissolved organic compounds and the abundance of dissolved metals like manganese and iron that compete with copper and nickel for receptor sites on aquatic organisms.~~

~~From the established ranges of acute and chronic values of copper and nickel site-specific objectives developed through the Impairment Assessement Report, the Water Board selected specific values for copper and nickel that it deemed protective of beneficial uses and incorporated them into Chapter 3 of this Basin Plan. The acute and chronic site-specific water quality objectives in Lower South Bay for dissolved copper are 10.8 µg/L and 6.9 µg/L, respectively. The acute and chronic site-specific water quality objectives in Lower South Bay for dissolved nickel are 62.4 µg/L and 11.9 µg/L, respectively.~~

~~**While the conclusions of the Impairment Assessment Report are scientifically sound, like most statements about complex environmental systems, its conclusions on the lack of impairment have some degree of uncertainty. The existence of these uncertainties underscores the need for continued monitoring and studies that are described below. The four primary areas of uncertainty are the toxicity of copper to phytoplankton, copper and nickel cycling in Lower South Bay, sediment toxicity, and uncertainties in loading estimates.**~~

7.2~~1~~.2 ~~4~~ IMPLEMENTATION PLAN AND MONITORING PROGRAM

This section discusses the actions and ambient monitoring program ~~that will be~~ needed ~~taken~~ to ensure continued attainment of ~~maintain~~ the copper ~~and nickel~~ site-specific objectives throughout San Francisco Bay and~~. The underlying goal of these actions is to~~ ensure that copper sources are properly managed so ambient copper levels do not increase due to potential increases in loading of copper to San Francisco ~~and nickel to Lower South~~ Bay. The implementation plan also calls for requirements in NPDES permits to support investigations to resolve three key areas of remaining technical uncertainty regarding copper: urban tributary loads and trends; toxicity to benthic organisms; and possible effects on the olfactory system of salmonids.

~~Except for the specification of metal translators, all actions and monitoring obligations described in this section are already required in the NPDES permits for the three municipal wastewater dischargers and the municipal urban runoff (stormwater) dischargers in Lower South Bay. Other non-regulatory, collaborative actions discussed here will be implemented via the SCBWMI and its participants on a voluntary basis.~~

~~7.1.4.1 MONITORING PROGRAM~~

~~Fundamental to the monitoring program is the concept of a water quality indicator. An indicator is a measurable quantity that is so strongly associated with particular environmental conditions that the value of the measurable quantity can be used to indicate the existence and maintenance of these conditions. The indicators used in the monitoring program to support the site-specific objectives are dissolved copper and nickel concentrations in Lower South Bay. The monitoring program described here has been required by the NPDES permits for the three municipal wastewater dischargers since October 2000. (Order No. 00-108). The monitoring program consists of monthly dissolved copper and nickel measurements at the ten stations shown in Table 7-1. As of the adoption of this WQAS, the municipal wastewater dischargers defined dissolved metal as those metal constituents that pass through a 0.45 micron (µm) filter prior to chemical analysis. Any changes to this operational definition of dissolved metal or details of the monitoring program will be addressed through amendments to the NPDES permits.~~

~~The purpose of the monitoring component of the WQAS is to assess ambient conditions compared to the specific trigger levels described below. The ambient data collected through the WQAS monitoring program may be considered along with other ambient monitoring data to determine whether additional controls are necessary.~~

~~7.1.4.2 TRIGGER VALUES~~

~~The NPDES permits for municipal wastewater and stormwater dischargers contain a series of trigger values and corresponding actions that are required to be taken by the dischargers if the triggers are reached. For copper, an increase in dry season dissolved copper concentration of 0.8 µg/L can be reliably detected despite inherent variability, and this specific increase is used to define the copper trigger levels. The copper Phase I trigger is reached and copper-specific Phase I actions will be conducted if the average dry season dissolved copper concentration at stations SB3, SB4, SB5, SB7, SB8, SB9 increases from 3.2 µg/L (overall dry season mean from indicator stations during the period June 1997 to November 1998) to 4.0 µg/L. The copper Phase II trigger is reached and Phase II actions will be conducted if the dry season mean concentration of the indicator stations increases further to 4.4 µg/L. This 0.4 µg/L change can still be detected with reasonable statistical certainty to justify the more aggressive Phase II actions.~~

~~For nickel, an increase in dry season dissolved concentration of 2.0 µg/L can be reliably detected despite inherent variability, and this increase is used to define the trigger levels for nickel. The nickel Phase I trigger is reached and Phase I actions will be conducted if the average dry season dissolved nickel concentration at stations SB3, SB6, SB7, SB8, SB9, SB10 increases from 4.0 µg/L (overall dry season mean from indicator stations during the period June 1997 to November 1998) to 6.0 µg/L. The nickel Phase II trigger is reached and Phase II actions will be conducted if the dry season mean dissolved concentration from the indicator stations increases another 2.0 µg/L to 8.0 µg/L. Note that the copper and nickel Phase I and Phase II triggers are well below the site-specific objectives for these metals and reaching the triggers indicates a negative trend in water quality but not impairment of beneficial uses.~~

~~The Executive Officer will review the monitoring program results annually and determine whether the trigger values have been reached. The Executive Officer will report findings to the Water Board and will notify interested agencies and interested persons of these findings and will provide them with an opportunity to submit their views and recommendations concerning the findings either in written form or at a public hearing.~~

~~If the trigger values for ambient copper and nickel concentrations have not been exceeded, the monitoring program will continue to provide information for the next review period. The Water Board shall evaluate performance of the monitoring program during the annual review to determine if the necessary information is being provided.~~

~~7.1.4.3 BASELINE ACTIONS~~

~~These actions are already being implemented through the NPDES permits and will continue until the Water Board directs otherwise through the permitting process. These actions include: 1) pollution prevention and control actions by public agencies; 2) actions to conduct or track special studies that address specific technical areas of uncertainty (the toxicity of copper to phytoplankton, copper and nickel cycling in Lower South Bay, sediment toxicity, and uncertainties in loading~~

~~estimates); and 3) planning-type studies to track, evaluate, and/or develop additional indicators and associated triggers (i.e., indicators for growth, development, or increased use or discharge of copper and nickel in the watershed).~~

~~*BASELINE ACTIONS CONDUCTED BY MUNICIPAL WASTEWATER DISCHARGERS*~~

~~Baseline actions applicable to municipal wastewater dischargers are actions associated with implementation of reasonable treatment, source control, and pollution prevention measures to limit discharges of copper and/or nickel.~~

~~In the consideration of the site-specific objectives for copper and nickel, the "Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California" (State Implementation Plan, or SIP) requires that dischargers demonstrate that they are implementing reasonable treatment, source control, and pollution prevention measures for these metals. The Water Board found that continuation of baseline actions satisfies this requirement as long as the copper and nickel trigger levels are not reached in Lower South Bay. Pollution prevention and minimization are a significant part of these dischargers' efforts to limit the discharges of copper and nickel. These dischargers have approved Pretreatment Programs and have established Pollution Prevention Programs under the requirements specified by the Water Board in their NPDES permits.~~

~~These findings and specific baseline actions are already being implemented through the NPDES permits for these dischargers (Order No. 00-108, October 2000). The municipal wastewater dischargers are required by their permits to maintain these baseline actions and review and report to the Water Board on their implementation on an annual basis. Modifications to the current baseline actions may be considered through the permit process, provided that these dischargers demonstrate to the Water Board that such modifications are consistent with maintaining reasonable treatment, source control, and pollution prevention measures.~~

~~*BASELINE ACTIONS CONDUCTED BY URBAN RUNOFF (MUNICIPAL STORMWATER) DISCHARGERS*~~

~~The Urban Runoff Management requirements (see Section 4.14 Urban Runoff Management) and specific copper and nickel baseline actions have been required by the NPDES permit for the Santa Clara Valley Urban Runoff Pollution Prevention Program and its dischargers since March 2001 (Order No. 01-024). These requirements include actions associated with implementation of controls to reduce copper and/or nickel in discharges to the maximum extent practicable, actions associated with prohibiting discharges other than stormwater to storm drain systems and waterways, and actions associated with monitoring to evaluate effectiveness of controls, identify sources of pollutants, and to measure or estimate pollutant concentrations and loads. On an annual basis, these dischargers are required to describe the controls that they are implementing and any additional controls that will be implemented. These dischargers are required to provide to the Water Board detailed descriptions of activities in each fiscal year in annual workplans and associated evaluations and results in annual reports. Modifications to the current baseline actions may be considered through the NPDES permit, provided that the Dischargers demonstrate to Water Board that such modifications are consistent with maintaining programs that control copper and nickel discharges to the maximum extent practicable in accordance with the requirements of the Water Board's Comprehensive Control Program for Urban Runoff Management and the Clean Water Act. As long as Lower South Bay ambient concentrations of copper and nickel remain below the established Phase I trigger levels, the Water Board has determined that the baseline actions applicable to urban runoff (municipal stormwater) dischargers satisfy the copper- and nickel-specific requirements of the Comprehensive Control Program for Urban Runoff Management and federal regulations (40 CFR 122.26).~~

~~*BASELINE ACTIONS CONDUCTED BY SANTA CLARA BASIN WATERSHED MANAGEMENT INITIATIVE*~~

~~As described above, the SCBWMI is a collaborative, stakeholder-participation forum that seeks integration of regulatory and watershed management actions that affect Lower South SF Bay and its tributaries. In addition to the actions required in the NPDES permits for the three municipal wastewater dischargers and the municipal urban runoff dischargers, there are other non-regulatory, collaborative actions that the SCBWMI and participants have committed to implement. These collaborative actions are described in attachments to the NPDES permit for the SCVURPPP and include: establishing a forum on transportation issues and impervious surfaces and for reviewing the appropriateness of transportation control measures with a view toward reducing traffic congestion; implementing measures to improve classification and assessment of watersheds; establishing an environmental clearinghouse of information related to tracking and disseminating new scientific information related to copper toxicity, loadings, fate and transport, and impairment of aquatic ecosystems; and planning-type studies to track, evaluate, and/or develop additional indicators to use and future potential indicators and triggers (i.e.,~~

~~indicators for growth, development, or increased use or discharge of copper and nickel in the watershed). In addition, the SCBWMI serves as a stakeholder participation forum to track, review, and evaluate the baseline actions required by the NPDES permits.~~

~~7.1.4.4 PHASE I ACTIONS~~

~~Phase I actions are already specified in the NPDES permits for municipal wastewater and stormwater dischargers. These actions are implemented when the mean value of selected monitoring parameters exceeds specified Phase I water quality triggers. The exceedance of the Phase I trigger indicates a negative trend in water quality and not impairment. Phase I actions consist of both specific remedial actions and planning for implementation of future actions if the Phase II triggers are exceeded.~~

~~If the Phase I copper or nickel triggers are exceeded, the Regional Board will consider execution of Phase I and Baseline actions as satisfying both the SIP requirement that municipal wastewater dischargers are implementing reasonable treatment, source control, and pollution prevention measures for copper and nickel and the Basin Plan requirement that municipal stormwater dischargers are implementing controls to reduce copper and/or nickel in discharges to the maximum extent practicable. Within 90 days after the determination of Phase I trigger exceedance, the Regional Board expects both the municipal wastewater and municipal stormwater dischargers to submit, for Executive Officer concurrence, their proposed Phase I plans with implementation schedules to implement additional measures to limit their relative cause or contribution to the exceedance. This submittal should, at a minimum, include evaluation of the Phase I actions and development of a Phase II plan. If the submittal is not received within 90 days of the determination of Phase I trigger exceedance or is not being implemented in accordance with the dischargers' implementation schedule following the Executive Officer's concurrence, the Regional Board may consider enforcement action to enforce the terms of the dischargers' permits.~~

~~7.1.4.5 PHASE II ACTIONS~~

~~Phase II actions are already specified in the NPDES permits for municipal wastewater and stormwater dischargers. Phase II actions are implemented when the mean value of selected monitoring parameters exceeds specified Phase II water quality triggers. Phase II actions are intended to reduce controllable sources further to maintain compliance with the site-specific water quality objectives.~~

~~If the Phase II copper or nickel triggers are exceeded, the Regional Board will consider execution of Phase II, Phase I and Baseline actions as satisfying both the SIP requirement that municipal wastewater dischargers are implementing reasonable treatment, source control, and pollution prevention measures for copper and nickel and the Basin Plan and Clean Water Act requirement that municipal stormwater dischargers are implementing controls to reduce copper and/or nickel in discharges to the maximum extent practicable. Within 90 days after the determination of Phase II trigger exceedance, the Regional Board expects the dischargers to submit, for Executive Officer concurrence, the proposed Phase II plans with implementation schedules to implement additional measures to limit their relative cause or contribution to the exceedance. If the submittal is not received within 90 days of the determination of Phase II trigger exceedance or is not being implemented in accordance with the dischargers' implementation schedule upon the Executive Officer's concurrence, the Regional Board may consider enforcement action to enforce the terms of the dischargers' permits.~~

~~An important regulatory element of the WQAS is the specification of metal translators applicable to the three Lower South SF Bay municipal wastewater dischargers. When the NPDES permits are re-issued, concentration-based effluent limits for these three facilities will be calculated from the chronic copper and nickel SSOs. Water quality objectives for copper and nickel are expressed as dissolved metal concentrations. Effluent limits for thePOTWs are expressed as total metal concentrations and must be calculated according to the procedure outlined in the SIP. Therefore, for metals like copper and nickel, the calculation of the effluent limit requires the use of a ratio of total to dissolved metal called the metal translator.~~

~~Analyses of data from 12 monitoring stations in Lower South SF Bay (Dumbarton to sloughs) collected from February 1997 to August 2000 and including dissolved and total copper and nickel, total suspended solids (TSS), and tidal data, showed a strong TSS dependence. The statistical analyses explored relationships between translator values and TSS, tide, site, and season. Linear regression with log-transformed dissolved fraction (translator) and TSS data provided the best regression fit. The best-fit regression line and its 95% confidence intervals provided the basis for translator values for copper and nickel.~~

~~U.S. EPA guidance (U.S. EPA Office of Water, June 1996. The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion. EPA 823-B-96-007) states that, when there is a relationship between the translator and TSS, regression equations should be used to develop translator values using representative TSS values the for the site under consideration. There is a fairly wide variation in TSS, and the guidance on translator development suggests~~

~~using a representative TSS value. In Lower South SF Bay, a median TSS value may not account for the higher translator values and dissolved metal levels that result during high TSS episodes. For this reason, copper and nickel translators computed from 95% confidence interval TSS values were used to develop the POTW effluent limits. A copper translátor of 0.53, and a nickel translator of 0.44 resulted from this procedure. Using the 95% confidence interval translator provides an additional measure of beneficial use protection in that effluent limits, expressed at total metal, will be lower using a higher value for metal translators. These translators shall be used to compute copper and nickel effluent limits for POTWs discharging to the Lower South SF Bay when NPDES permits for Lower South SF municipal wastewater dischargers are reissued.~~

~~Table 7-1: Monitoring Stations for Copper and Nickel in Lower South San Francisco Bay~~

~~SBS Site ID~~	~~Reference Location~~	~~Longitude~~	~~Latitude~~	~~RMP Site ID~~
~~SB01~~	~~Channel Marker #14~~	~~37° 30.782'~~	~~122° 8.036'~~	~~BA30~~
~~SB02~~	~~Channel Marker #16~~	~~37° 29.595'~~	~~122° 5.243'~~	~~BA20~~
~~SB03~~	~~Channel Marker #20~~	~~37° 27.437'~~	~~122° 3.033'~~	~~BA10~~
~~SB04~~	~~Coyote Creek Railroad Bridge~~	~~37° 27.600'~~	~~121° 58.540'~~	~~C-3-0~~
~~SB05~~	~~Coyote Creek at Guadalupe River confluence~~	~~37° 27.875'~~	~~122° 1.406'~~	~~NA~~
~~SB06~~	~~Between Channel Markers #17 & #18~~	~~37° 28.390'~~	~~122° 4.180'~~	~~NA~~
~~SB07~~	~~Mouth of Mowry Slough~~	~~37° 29.499'~~	~~122° 3.110'~~	~~NA~~
~~SB08~~	~~Mouth of Newark Slough~~	~~37° 30.066'~~	~~122° 5.231'~~	~~NA~~
~~SB09~~	~~North of Cooley Landing~~	~~37° 28.959'~~	~~122° 7.068'~~	~~NA~~
~~SB10~~	~~Old Palo Alto Yacht Club Channel Mouth~~	~~37° 28.087'~~	~~122° 5.846'~~	~~NA~~
~~SB11~~	~~Standish Dam in Coyote Creek~~	~~37° 27.150'~~	~~121° 55.501'~~	~~BW10~~
~~SB12~~	~~Alviso Yacht Club Dock~~	~~37° 25.574'~~	~~121° 58.778'~~	~~BW15~~

7.2~~1~~.2.1 Control Measures for Urban Runoff Management Agencies

The NPDES permits for urban runoff management agencies shall require the implementation of best management practices and copper control measures designed to prevent urban runoff discharges from causing or contributing to exceedances of copper water quality objectives. Requirements in each permit issued or reissued and applicable for the term of the permit shall be based on an updated assessment of control measures intended to reduce copper in stormwater runoff to the maximum extent practicable. Urban runoff management agencies must implement control measures targeting: vehicle brake pads, architectural copper, copper pesticides, and industrial copper use. Additionally, these permits shall contain requirements to conduct or cause to be conducted: monitoring of copper loading to the Bay at locations and frequency sufficient to track loading trends; and technical studies to investigate possible copper sediment toxicity and sublethal effects on salmonids.

If an ambient trigger concentration in any San Francisco Bay segment (see Section 7.2.2.5) is exceeded, all urban runoff management agencies discharging to that segment shall submit a report to the Water Board that describes best management practices that are currently being implemented and additional measures, with a schedule, that will be implemented to prevent their copper discharges from causing or contributing to the exceedance.

7.2~~1~~.2.2 Control Measures for Wastewater Treatment Facilities

The management measures for municipal and industrial wastewater treatment facilities will be implemented through their individual NPDES permits, which shall include the following elements:

- Water quality-based effluent limits (WQBELs) computed from the SSOs.
- Baseline Program of pollution prevention measures.
- Requirement to conduct or cause to be conducted technical studies to investigate possible copper sediment toxicity and sublethal effects on salmonids.
- Effluent Monitoring and Reporting.

The baseline pollution prevention measures for wastewater facilities include:

- Evaluate copper sources (all municipal and industrial facilities)
- Confirm industrial facility compliance with local pre-treatment copper limits (municipal facilities only)
- Control municipal water supply pipeline corrosion from commercial and residential sources (municipal facilities only)

More advanced, facility-specific pollution prevention measures shall be implemented by facilities that exceed a copper effluent limit due to increased copper influent loading compared to the previous year's performance. Additionally, if an ambient trigger concentration (see Section 7.2.2.5) is exceeded, each municipal and industrial wastewater facility discharging to that segment of the Bay shall evaluate the history of its facility's effluent copper concentrations. Those facilities with increasing copper effluent trends shall develop and implement plans to control these increasing levels.

METAL TRANSLATORS

An important regulatory element of the WQAS is the specification of metal translators. Water quality objectives for copper and nickel are expressed as dissolved metal concentrations. Effluent limits for the wastewater dischargers' treatment facilities are expressed as total metal concentrations and must be calculated according to the procedure outlined in the "Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California". Therefore, for metals like copper and nickel, the calculation of an effluent limit requires the use of a ratio of total to dissolved metals called the metal translator.

South San Francisco Bay copper and nickel translators were developed using a regression relationship between the translators and total suspended solids (TSS). The translators were computed by evaluating the upper 95% confidence interval regression relationship at the median TSS value for South San Francisco Bay. For this reason, there is a single translator value for each metal (Table 7.2-1). The higher translators that result from using the upper confidence level regression result in lower numeric effluent limits and provide an additional measure of protection of beneficial uses.

There is not a strong relationship between TSS and translators for the segments of the Bay north of the Dumbarton Bridge. There are geographic differences in computed translators between the northernmost segments and those in the southern segments the Bay. In such

cases, median and 90th percentile translators can be computed from available data for use in computing average monthly and maximum daily effluent limits, respectively. The translators in Table 7.2-2 apply only to deepwater wastewater discharges to San Francisco Bay because the available translator data are not representative of shallow water discharge (defined as those wastewater discharges that have been granted an exception to the prohibition against wastewater discharges into non-tidal water, dead-end sloughs or at any point that wastewater does not receive dilution of at least 10:1) locations. Shallow water wastewater dischargers must develop translators applicable to the discharge location at the time of permit reissuance.

Table 7.2-1 Translators Applicable to South San Francisco Bay Municipal Wastewater Discharges for Copper and Nickel

Bay Segments	Copper Translator For Effluent Limit Calculation	Nickel Translator For Effluent Limit Calculation
South San Francisco Bay	0.53	0.44

Table 7.2-2 Translators Applicable to Other San Francisco Bay Municipal and Industrial Wastewater Deep Water Discharges for Copper

Bay Segments	Copper Translator For Average Monthly Effluent Limit Calculation	Copper Translator For Maximum Daily Effluent Limit Calculation
Suisun Bay San Pablo Bay	0.38	0.66
Central San Francisco Bay Lower San Francisco Bay	0.73	0.87

7.2.2.3 Copper From Anti-Fouling Boat Paint

Paints applied to boats and ships to control unwanted "fouling" growth on their hulls often contain copper-based biocides. In San Francisco Bay, there are major ports, industrial piers, and dozens of marinas. Boats and ships coated with copper-containing biocides may release copper directly into the Bay during storage, operation, and in-water maintenance.

The Water Board is relying on the authority of the California Department of Pesticide Regulation (DPR) to regulate the pesticidal use of copper in antifouling paints such that water quality objectives will be attained. The Water Board will work with DPR as it executes its regulatory strategy for biocides in marine antifouling coatings, which includes monitoring to evaluate water quality impacts and review of registration status.

7.2.2.4 Control Measures for Lagoons

There are many managed lagoons that are hydraulically connected to the Bay. Because of nutrient loading and stagnant conditions, excessive growth of aquatic plants and algae can cause nuisance conditions. In addition to mechanical harvesting, copper-based algaecides are used to control nuisance plant and algae growth. The application of these algaecides is

permitted under the State Water Board's Statewide General NPDES Permit (Order No. 2004-0009-DWQ) for discharges of aquatic pesticides to surface waters. The Water Board recognizes coverage under the general permit as being sufficient to ensure that application of copper pesticides to lagoons shall not cause or contribute to violations of the water quality objectives.

7.2.2.5 Ambient Monitoring Program

The implementation plan establishes copper control measures in order to prevent increases in ambient dissolved copper concentrations. Ambient concentrations of copper in the Bay have remained essentially unchanged from 1993 through 2006 and are not expected to increase in the future. In order to determine systematically if ambient concentrations have increased, specific copper concentration triggers are compared to data collected through the Regional Monitoring Program for Trace Substances (RMP). This is accomplished by calculating every year the three-year rolling mean of RMP copper concentrations in segments of the Bay. These rolling mean concentrations will be compared to trigger concentration values for each segment. The trigger concentrations (shown in Table 7.3) were calculated in order to detect a change (from 2003 concentrations) in dissolved copper concentration of about 1 µg/L with a statistical power of 99%. If the trigger concentration is exceeded in any Bay segment, the Water Board will investigate causes of the exceedance and potential control options and require wastewater and urban runoff dischargers to that segment to investigate whether they have caused or contributed to the exceedance and, if so, to identify and submit a plan and schedule to implement controls to resolve their contribution to the exceedance.

The Water Board will assess the continued appropriateness of the SSOs for San Francisco Bay should conditions change in Bay water quality. Dissolved organic carbon (DOC) will be used as a surrogate measure of the protective effect of Bay water against copper water column toxicity. An analysis and evaluation of trends in DOC data collected through the RMP will determine whether or not additional water column toxicity tests are needed to confirm that the SSOs are protective. In addition, the Water Board will evaluate sediment copper concentration and sediment toxicity data collected through the RMP to assess possible effects related to copper accumulation in Bay sediments. The need for a reevaluation of the SSOs or other regulatory actions will be established through the triennial review of the Basin Plan.

Table 7.3 Dissolved Copper (µg/L) Trigger Concentrations at 99% Statistical Power.

Bay Segment (or portion thereof)	Trigger Level (µg/L)
Suisun Bay	2.8
San Pablo Bay	3.0
Central San Francisco Bay Lower San Francisco Bay (north Hayward Shoals)	2.2
Lower San Francisco Bay (south of Hayward Shoals)	3.6
South San Francisco Bay	4.2

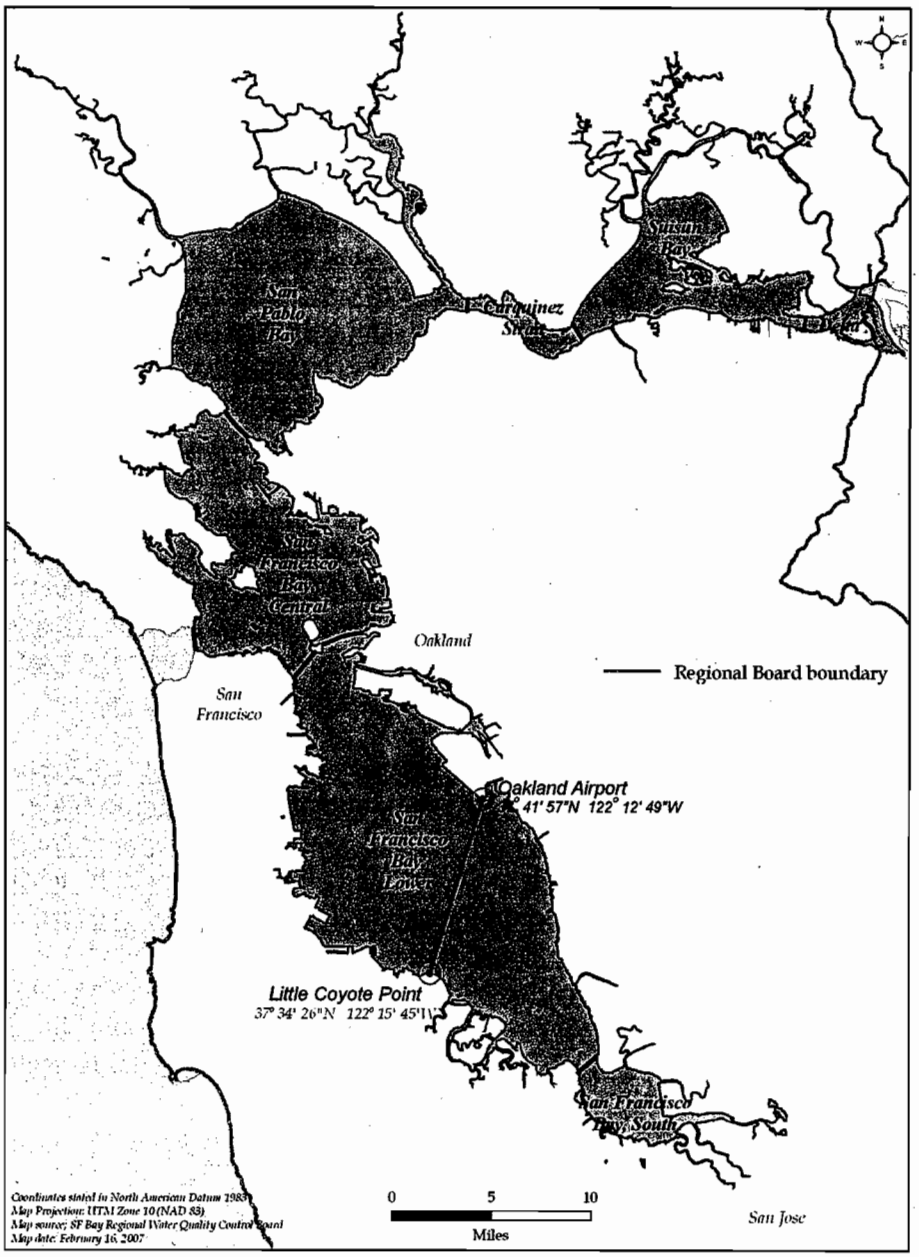

Figure 7.1 Segments of San Francisco Bay showing location of Hayward Shoals as a line connecting Little Coyote Point and the Oakland Airport.