Appendix A

Proposed Basin Plan Amendment

Proposed amendments to the following chapters of the
San Francisco Bay Basin Water Quality Control Plan

Chapter 3 Water Quality Objectives

Chapter 4 Continuing Planning

Chapter 6 Surveillance and Monitoring

Chapter 7 Water Quality Attainment Strategies, Including Total Maximum Daily Loads

Chapter 3. Water Quality Objectives

The following revisions indicated in underline/strikeout are proposed for Chapter 3, Water Quality Objectives.

OBJECTIVES FOR SPECIFIC CHEMICAL CONSTITUENTS

Surface waters shall not contain concentrations of chemical constituents in amounts that adversely affect any designated beneficial use. Water quality objectives for selected toxic pollutants for surface waters are given in Tables 3-3, 3-3A, 3-3B, and 3-4.

The Water Board intends to work towards the derivation of site-specific objectives for the Bay-Delta estuarine system. Site-specific objectives to be considered by the Water Board shall be developed in accordance with the provisions of the federal Clean Water Act, the State Water Code, State Water Board water quality control plans, and this Plan. These site-specific objectives will take into consideration factors such as all available scientific information and monitoring data and the latest U.S. EPA guidance, and local environmental conditions and impacts caused by bioaccumulation. Pending the adoption of site-specific objectives, the objectives in Tables 3-3 and 3-4 apply throughout the region except as otherwise indicated in the Tables or when site-specific objectives for the pollutant parameter have been adopted. Site-specific objectives for copper and nickel, adopted for South San Francisco Bay south of the Dumbarton Bridge, are listed in Table 3-3A. Objectives for mercury that apply to San Francisco Bay are listed in Table 3-3B.

South San Francisco Bay south of the Dumbarton Bridge is a unique, water-quality-limited, hydrodynamic and biological environment that merits continued special attention by the Water Board. Controlling urban and upland runoff sources is critical to the success of maintaining water quality in this portion of the Bay. Site-specific water quality objectives have been adopted for dissolved copper and nickel in this Bay segment. Site-specific objectives may be appropriate for other pollutants of concern, but this determination will be made on a case-by-case basis, and after it has been demonstrated that all other reasonable treatment, source control and pollution prevention measures have been exhausted. The Water Board will determine whether revised water quality objectives and/or effluent limitations are appropriate based on sound technical information and scientific studies, stakeholder input, and the need for flexibility to address priority problems in the watershed.

Table 3-3: Marine[a] Water Quality Objectives for Toxic Pollutants for Surface Waters (all values in ug/l)			
Compound	**4-day Average**	**1-hr Average**	**24-hr Average**
Arsenic[b, c, d]	36	69	
Cadmium[b, c, d]	9.3	42	
Chromium VI[b, c, d, e]	50	1100	
Copper[c, d, f]			
Cyanide[g]			
Lead[b, c, d]	8.1	210	
Mercury[h]	0.025	2.1	
Nickel[b, c, d]	8.2	74	
Selenium[i]			
Silver[b, c, d]		1.9	
Tributyltin[j]			
Zinc[b, c, d]	81	90	
PAHs[k]			15

Notes:

a. Marine waters are those in which the salinity is equal to or greater than 10 parts per thousand 95% of the time, as set forth in Chapter 4 of the Basin Plan. Unless a site-specific objective has been adopted, these objectives shall apply to all marine waters, except for the South Bay south of Dumbarton Bridge, (where the California Toxics Rule (CTR) applies) or as specified in Note h (below). For waters in which the salinity is between 1 and 10 parts per thousand, the applicable objectives are the more stringent of the freshwater (Table 3-4) or marine objectives.

b. Source: 40 CFR Part 131.38 (California Toxics Rule or CTR), May 18, 2000.

c. These objectives for metals are expressed in terms of the dissolved fraction of the metal in the water column.

d. According to the CTR, these objectives are expressed as a function of the water-effect ratio (WER), which is a measure of the toxicity of a pollutant in site water divided by the same measure of the toxicity of the same pollutant in laboratory dilution water. The 1-hr. and 4-day objectives = table value X WER. The table values assume a WER equal to one.

e. This objective may be met as total chromium.

f. Water quality objectives for copper were promulgated by the CTR and may be updated by U.S. EPA without amending the Basin Plan. Note: at the time of writing, the values are 3.1 ug/l (4-day average)

and 4.8 ug/l (1-hr. average). The most recent version of the CTR should be consulted before applying these values.

g. Cyanide criteria were promulgated in the National Toxics Rule (NTR). The NTR criteria specifically apply to San Francisco Bay upstream to and including Suisun Bay and Sacramento-San Joaquin Delta. Note: at the time of writing, the values are 1.0 ug/l (4-day average) and 1.0 ug/l (1-hr. average).

h. Source: U.S. EPA Ambient Water Quality Criteria for Mercury (1984). The 4-day average value for mercury does not apply to San Francisco Bay; instead, the water quality objectives specified in Table 3-3B apply. The 1-hour average value continues to apply to San Francisco Bay.

i. Selenium criteria were promulgated for all San Francisco Bay/Delta waters in the National Toxics Rule (NTR). The NTR criteria specifically apply to San Francisco Bay upstream to and including Suisun Bay and Sacramento-San Joaquin Delta. Note: at the time of writing, the values are 5.0 ug/l (4-day average) and 20 ug/l (1-hr. average).

j. Tributyltin is a compound used as an antifouling ingredient in marine paints and toxic to aquatic life in low concentrations. U.S. EPA has published draft criteria for protection of aquatic life (Federal Register: December 27, 2002, Vol. 67, No. 249, Page 79090-79091). These criteria are cited for advisory purposes. The draft criteria may be revised.

k. The 24-hour average aquatic life protection objective for total PAHs is retained from the 1995 Basin Plan. Source: U.S. EPA 1980.

Table 3-3B: Marine[a] Water Quality Objectives for Mercury in San Francisco Bay[b]

Protection of Human Health	0.2 mg mercury per kg fish tissue	Average wet weight concentration measured in the edible portion of trophic level 3 and trophic level 4 fish[c]
Protection of Aquatic Organisms and Wildlife	0.03 mg mercury per kg fish	Average wet weight concentration measured in whole fish 3–5 cm in length

Notes:

a. Marine waters are those in which the salinity is equal to or greater than 10 parts per thousand 95% of the time, as set forth in Chapter 4 of the Basin Plan. For waters in which the salinity is between 1 and 10 parts per thousand, the applicable objectives are the more stringent of the freshwater or marine objectives.

b. Objectives apply to all segments of San Francisco Bay, including all marine and estuarine waters contiguous to San Francisco Bay

c. Compliance shall be determined by analysis of fish tissue as described in Chapter 6, Surveillance and Monitoring

Chapter 4. Continuing Planning

The following revisions indicated in underline/strikeout are proposed for the section at the end of Chapter 4, Continuing Planning.

WATER BOARD RESOURCE ALLOCATION

The items indicated below have been identified in this review as specific areas for which Water Board planning resources should be allocated. The items are divided into categories and each item is followed by an estimate of the frequency at which the item will be reviewed or the staff time and/or contract dollars needed to complete the item. Resolution of these items may result in future Basin Plan amendments.

TOTAL MAXIMUM DAILY LOAD	
Review the San Francisco Bay Mercury TMDL and evaluate new and relevant information from monitoring, special studies, and scientific literature. Determine if modifications to the targets, allocations, or implementation plan are necessary.	Every 5 years

Chapter 6. Surveillance and Monitoring

The following insertion indicated in underline is proposed for Chapter 6, Surveillance and Monitoring, immediately after the "Compliance Monitoring" section, and before the "Complaint Investigation" section.

Compliance Monitoring – San Francisco Bay Mercury Human Health Objective

Compliance with the human health marine water quality objective for mercury in San Francisco Bay (Table 3-3B) will be evaluated in fish at the lengths shown below. The mercury concentration in the edible portion of these five species will be averaged and compared to the human health water quality objective.

Table 6-4. Five Most Commonly Consumed Bay Fish	
Species and Edible Portion	Evaluation Length (cm)
Striped bass, muscle without skin	60
California halibut, muscle without skin	75
Jacksmelt, muscle with skin and skeleton	25
White sturgeon, muscle without skin	135
White croaker, muscle with skin	25

Chapter 7. WATER QUALITY ATTAINMENT STRATEGIES, INCLUDING TOTAL MAXIMUM DAILY LOADS

The following text is proposed for insertion into Chapter 7, Water Quality Attainment Strategies, Including Total Maximum Daily Loads, immediately after the introduction of the section Toxic Pollutant Management in the Larger San Francisco Bay Estuary System. For clarity, revisions to text adopted by the Water Board in September 2004 are indicated below in underline/strikeout.

San Francisco Bay Mercury TMDL

The following sections establish the allowable annual mercury load (Total Maximum Daily Load [TMDL]) to San Francisco Bay, and actions and monitoring necessary to implement the TMDL. The numeric targets, allocations, and associated implementation plan will ensure that all San Francisco Bay segments attain applicable water quality standards, including the mercury water quality objectives set forth in Table 3-3B, established to protect and support beneficial uses.

The TMDL allocations and implementation plan focus on controlling the amount of mercury that reaches the Bay and identifying and implementing actions to minimize mercury bioavailability. The organic form of mercury (methylmercury) is toxic and bioavailable, but information on ways of controlling methylmercury production is limited. However, this is an area of active research and strategies for controlling this process are forthcoming. The effectiveness of implementation actions, monitoring to track progress toward targets, and the scientific understanding pertaining to mercury will be periodically reviewed and the TMDL may be adapted as warranted.

Problem Statement

San Francisco Bay is impaired because mercury contamination is adversely affecting existing beneficial uses, including sport fishing, preservation of rare and endangered species, and wildlife habitat. Mercury concentrations in San Francisco Bay fish are high enough to threaten the health of humans who consume them. In addition, mercury concentrations in some bird eggs harvested from the shores of San Francisco Bay are high enough to account for abnormally high rates of eggs failing to hatch.

In the context of this TMDL, "San Francisco Bay" refers to the following water bodies:

- Sacramento/San Joaquin River Delta (within San Francisco Bay region)
- Suisun Bay
- Carquinez Strait
- San Pablo Bay
- Richardson Bay
- Central San Francisco Bay
- Lower San Francisco Bay
- South San Francisco Bay (including the Lower South Bay)

This TMDL also addresses the following mercury-impaired water bodies that exist within the water bodies listed above:

- Castro Cove (part of San Pablo Bay)
- Oakland Inner Harbor (part of Central San Francisco Bay)
- San Leandro Bay (part of Central San Francisco Bay)

Numeric Targets

TMDL numeric targets interpret narrative and/or numeric water quality standards, including beneficial uses and water quality objectives. To protect ~~sport fishing and human health~~humans who consume Bay fish, the average fish tissue mercury concentration for a ~~typically~~ commonly consumed fish species ~~shall not exceed 0.2 mg mercury per kg fish tissue (wet weight)~~ is specified below as a human health target. To protect wildlife and rare and endangered species, the average fish tissue mercury concentration ~~of mercury~~ in fish consumed by piscivorous birds is specified below as a wildlife target.~~bird eggs shall be less than 0.05 mg mercury per kg wet weight.~~ The goal of this target is that controllable water quality factors not cause detrimental mercury concentrations in San Francisco Bay ~~bird eggs~~wildlife, which is consistent with the bioaccumulation objective in Chapter 3. To achieve the human health and wildlife ~~fish tissue and bird egg~~ targets and to attain water quality standards, the Baywide suspended sediment mercury concentration target is 0.2 mg mercury per kg dry sediment.

The Regional Monitoring Program (RMP) conducts monitoring relevant to evaluating progress toward meeting the sediment and human health and wildlife ~~fish tissue~~ targets~~, and the U.S. Fish and Wildlife Service collects information on bird egg mercury concentrations useful to evaluate progress toward meeting the bird egg target~~. The following passages describe acceptable approaches to evaluate progress toward meeting the targets. Other approaches can be considered during adaptive implementation reviews.

Suspended Sediment Target

The suspended sediment target (0.2 mg mercury per kg dry sediment) shall be compared to the annual median Bay suspended sediment mercury concentration found through RMP monitoring. The suspended sediment mercury concentration shall be computed as the difference between total and dissolved mercury concentration in a water sample (at each location) divided by the suspended sediment concentration for that same sample.

Human Health Target

The human health target is a fish tissue mercury concentration (0.2 mg mercury per kg fish tissue). This target applies to average wet weight fish tissue muscle concentrations in 60 cm long striped bass. The RMP conducts fish tissue sampling and analysis in San Francisco Bay every three years. Progress toward attainment of the human health target shall be evaluated by tracking mercury concentrations in striped bass, a ~~frequently~~ commonly consumed sport fish with relatively high mercury concentrations. Striped bass are routinely caught in three size ranges: 45-59 cm (small), 60-82 cm (medium), and larger than 82 cm (large). To provide sufficient data to evaluate the target, striped bass in the small and medium size ranges should be caught and analyzed. The best functional

relationship between mercury concentration and length shall be established for the fish caught, and the resulting equation of fit shall be evaluated at 60 cm to compute the mercury concentration to compare to the human health target. The RMP tracks mercury concentrations in other San Francisco Bay sportfish, such as halibut and jack-smelt. This information will be used to assess overall trends and human health risks.

Wildlife Target

The wildlife target is ~~expressed as~~ a ~~bird egg~~ fish tissue mercury concentration (~~less than 0.5~~ 0.03 mg mercury per kg fish). This target applies to average wet weight whole fish concentrations in 3–5 cm length fish. ~~The RMP is collaborating with the U.S. Fish and Wildlife Service on long-term monitoring and analysis of bird eggs. Eggs will be collected at several locations throughout San Francisco Bay. The wildlife target will be compared to the computed 99th percentile mercury concentration in eggs.~~

~~In addition to measuring mercury concentrations in bird eggs directly, it is also useful to measure the amount of mercury in bird prey. The Water Board will work with t~~The RMP ~~to~~ is developing a long term monitoring program to evaluate mercury concentrations in ~~prey~~ small fish typically consumed by birds, including by the California least tern. Progress toward attainment of the wildlife target will be evaluated by tracking mercury concentrations in 3–5 cm long Bay fish. The RMP is also collaborating with the U.S. Fish and Wildlife Service on long-term monitoring and analysis of bird egg mercury concentrations. ~~Prey species should include benthic invertebrates and small fish that are typically consumed by piscivorous birds. According to the U.S. Fish and Wildlife Service, the sensitive and endangered California least tern will be protected if the average mercury concentration in the fish it consumes does not exceed 0.03 mg per kg fish tissue (wet weight). Achieving this prey fish concentration is an alternative method of demonstrating attainment of the wildlife target.~~

Sources and Losses

During the California Gold Rush, cinnabar mines in the Central Coast Ranges produced the mercury used to extract gold from the Sierra Nevada foothills. Mercury was later mined and used to produce munitions, electronics, and health care and commercial products.

The year 2003 estimate of total mercury inputs to the San Francisco Bay is about 1220 kg/yr. The sources of mercury in San Francisco Bay include bed erosion (about 460 kg/yr), the Central Valley watershed (about 440 kg/yr), urban stormwater runoff (about 160 kg/yr), the Guadalupe River watershed (about 92 kg/yr), direct atmospheric deposition (about 27 kg/yr), non-urban stormwater runoff (about 25 kg/yr), and wastewater discharges (about ~~20~~18 kg/yr). There is a potential that mercury may enter the Bay from Bay margin contaminated sites and abandoned mercury mines outside the Guadalupe watershed. An evaluation of these potential sources is addressed below under Mercury TMDL Implementation.

Using box models for sediment and mercury inputs and outputs to and from San Francisco Bay, the 2003 estimate for San Francisco Bay mercury losses is approximately 1700 kg/yr. Mercury leaves the Bay by transport to the Pacific Ocean via the Golden Gate, the net result of dredging and disposal (in-Bay and upland), and other losses.

Allocations

Tables 4-v through 4-z present load and wasteload allocations for San Francisco Bay mercury sources. Table 4-v presents load and wasteload allocations by source category and the 2003 estimated annual loads. Tables 4-w through 4-z contain wasteload allocations for individual wastewater and urban stormwater discharges to San Francisco Bay. When summed, the individual allocations equal the category totals for urban stormwater and wastewater shown in Table 4-v.

Total Maximum Daily Load

The mercury TMDL for San Francisco Bay is the sum of the load and wasteload allocations, ~~706~~ 700 kg/yr. The Bay will attain applicable water quality standards for mercury when the overall mercury load is reduced to the TMDL and mercury methylation control measures are implemented.

A TMDL must include a margin of safety to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality. This TMDL's targets and allocations rely on conservative assumptions, which thereby provide an implicit margin of safety. The adaptive approach to implementation provides an additional margin of safety.

There is no evidence that mercury contamination in San Francisco Bay is worse at any particular time of year. Therefore, the TMDL and allocation scheme do not have a seasonal component.

Mercury TMDL Implementation

The San Francisco Bay mercury TMDL implementation plan has four objectives: (1) reduce mercury loads to achieve load and wasteload allocations, (2) reduce methylmercury production and consequent risk to humans and wildlife exposed to methylmercury, (3) conduct monitoring and focused studies to track progress and improve the scientific understanding of the system, and (4) encourage actions that address multiple pollutants. The plan establishes requirements for dischargers to reduce or control mercury loads and identifies actions necessary to better understand and control methylmercury production. In addition, it addresses potential mercury sources and describes actions necessary to manage risks to Bay fish consumers. The adaptive implementation section describes the method and schedule for evaluating and adapting the TMDL and implementation plan as needed to assure water quality standards are attained.

Mercury Source Control Actions

This section, organized by mercury source categories, specifies actions required to achieve allocations and implement the TMDL.

TABLE 4-v: Mercury Load and Wasteload Allocations By Source Category

Source	2003 Mercury Load (kg/yr)	Allocation (kg/yr)
Bed Erosion[a]	460	220
Central Valley Watershed	440	330
Urban Stormwater Runoff	160	82
Guadalupe River Watershed (mining legacy)	92 [b]	2
Atmospheric Deposition	27	27
Non-Urban Stormwater Runoff	25	25
Wastewater (municipal and industrial)	~~20~~18	~~20~~12
Sediment Dredging and Disposal[c]	net loss	0 ≤ ambient concentration

Notes:

a. Bed erosion occurs as mercury buried in Bay sediment becomes available for biological uptake when overlying sediment erodes.

b. This load does not account for mercury captured in ongoing sediment removal programs conducted in the watershed.

c. Sediment dredging and disposal often moves mercury-containing sediment from one part of the Bay to another. The dredged sediment mercury concentration generally reflects ambient conditions in San Francisco Bay sediment. This allocation is both mass-based and concentration-based. The allocation will be implemented by confirming both that the combined effect of dredging and disposal continues to be a net loss and that the mercury concentration of dredged material disposed in the Bay must be at or below the Baywide ambient mercury concentration. This allocation ensures that this source category continues to represent a net loss of mercury.

Central Valley Watershed

The Central Valley Regional Water Quality Control Board (Central Valley Water Board) is developing mercury TMDLs for several mercury-impaired water bodies in its region that drain to San Francisco Bay. The Central Valley Water Board staff is currently developing a mercury TMDL for portions of the Delta within the Central Valley region designed to meet the Central Valley watershed's load allocation. This Delta mercury TMDL is scheduled for consideration as a Basin Plan Amendment by the Central Valley Water Board by December ~~2005~~2006.

Attainment of the load allocation shall be assessed as a five-year average annual mercury load by one of two methods. First, attainment may be demonstrated by documentation provided by the Central Valley Water Board that shows a net 110 kg/yr decrease in total mercury entering the Delta from within the Central Valley region. Alternatively, attainment of the load allocation may be demonstrated by multiplying the flow-weighted suspended sediment mercury concentration by the sediment load measured at the RMP Mallard Island monitoring station. If sediment load estimates are unavailable, the load shall be assumed to be 1,600 million kg of sediment per year. The mercury load fluxing past Mallard Island will be less than or equal to 330 kg/yr after attainment of the allocation.

TABLE 4-w: Individual Wasteload Allocations for Urban Stormwater Discharges			
Entity	**NPDES Permit**	**Allocation (kg/yr)[a]**	**Load Reduction (kg/yr)[b]**
Santa Clara Valley Urban Runoff Pollution Prevention Program	CAS029718	23	21
Alameda Countywide Clean Water Program	CAS029831	20	19
Contra Costa Clean Water Program	CAS029912	11	11
San Mateo County Stormwater Pollution Prevention Program	CAS029921	8.4	8.0
Vallejo Sanitation and Flood Control District	CAS612006	1.6	1.6
Fairfield-Suisun Urban Runoff Management Program	CAS612005	1.6	1.5
American Canyon	CAS612007	0.14	0.13
Sonoma County area [c]	CAS000004	1.6	1.5
Napa County area [c]	CAS000004	1.6	1.5
Marin County area [c]	CAS000004	3.3	3.2
Solano County area [c]	CAS000004	0.81	0.77
San Francisco County area [c,d]	CAS000004	8.8	8.4
Total		*82*[e]	*78*[e]

Notes:

[a] Allocations implicitly include all current and future permitted discharges within the geographic boundaries of municipalities and unincorporated areas including, but not limited to, California Department of Transportation (Caltrans) roadways and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

[b] This column contains calculated load reductions relative to the estimated 2003 urban stormwater runoff annual load that are consistent with attaining the wasteload allocation. Demonstration of such load reductions is an alternative manner of showing compliance with the allocations.

[c] Includes unincorporated areas and all municipalities in the county that are in the Region and drain to the Bay. The statewide municipal stormwater general permit issued by the State Water Resources Control Board covers these municipalities.

[d] This urban stormwater runoff load estimate does not account for treatment provided by San Francisco's combined sewer system. The treatment provided by the Bayside facilities (NPDES permit CA0037664) will be credited toward meeting the allocation and load reduction.

[e] These totals differ slightly from the column sum due to rounding.

TABLE 4-x: Individual Wasteload Allocations for Municipal Wastewater Discharges

Permitted Entity	NPDES Permit	~~Allocation~~ 2000–2003 Load (kg/yr)	Interim Allocation (kg/yr)	Final Allocation (kg/yr)
American Canyon, City of	**CA0038768**	**0.12**	0.095	0.095
California Department of Parks and Recreation, Angel Island State Park	CA0037401	0.013	0.013	0.013
Benicia, City of	CA0038091	0.088	0.088	0.088
Burlingame, City of	CA0037788	0.089	0.089	0.089
Calistoga, City of	CA0037966	0.016	0.016	0.016
Central Contra Costa Sanitary District	CA0037648	2.23	1.8	1.3
Central Marin Sanitation Agency	CA0038628	0.18	0.15	0.11
Delta Diablo Sanitation District	CA0038547	0.31	0.25	0.19
East Bay Dischargers Authority Dublin-San Ramon Services District (CA0037613) Hayward Shoreline Marsh (CA0038636) Livermore, City of (CA0038008) Union Sanitary District, wet weather (CA0038733)	CA0037869	~~3.67~~3.6	2.9	2.2
East Bay Municipal Utilities District	CA0037702	2.~~57~~6[a]	2.1	1.5
East Brother Light Station	CA0038806	0.00001	0.000012	0.000012
Fairfield-Suisun Sewer District	**CA0038024**	**0.22**	**0.17**	**0.17**
Las Gallinas Valley Sanitary District	CA0037851	0.17	0.13	0.10
Marin County Sanitary District, Paradise Cove	CA0037427	0.~~001~~00055	0.00055	0.00055
Marin County Sanitary District, Tiburon	CA0037753	0.~~01~~0099	0.0099	0.0099
Millbrae, City of	CA0037532	0.052	0.052	0.052
Mountain View Sanitary District	**CA0037770**	**0.034**	**0.034**	**0.034**
Napa Sanitation District	CA0037575	0.28	0.23	0.17
Novato Sanitary District	CA0037958	0.079	0.079	0.079
Palo Alto, City of	**CA0037834**	**0.38**	**0.31**	**0.31**
Petaluma, City of	CA0037810	0.063	0.063	0.063
Pinole, City of	CA0037796	0.055	0.055	0.055
Contra Costa County, Port Costa Wastewater Treatment Plant	CA0037885	0.~~001~~00072	0.00072	0.00072
Rodeo Sanitary District	CA0037826	0.060	0.060	0.060
Saint Helena, City of	CA0038016	0.047	0.047	0.047
San Francisco, City and County of, San Francisco International Airport WQCP	CA0038318	0.032	0.032	0.032
San Francisco, City and County of, Southeast Plant	CA0037664	2.~~68~~7	2.1	1.6
San Jose/Santa Clara WPCP	**CA0037842**	**1.0**	**0.80**	**0.80**
San Mateo, City of	CA0037541	0.32	0.26	0.19
Sausalito-Marin City Sanitary District	CA0038067	0.078	0.078	0.078
Seafirth Estates	CA0038893	0.~~001~~00036	0.00036	0.00036

TABLE 4-x (continued): Individual Wasteload Allocations for Municipal Wastewater Discharges

Permitted Entity	NPDES Permit	~~Allocation~~ 2000–2003 Load (kg/yr)	Interim Allocation (kg/yr)	Final Allocation (kg/yr)
Sewerage Agency of Southern Marin	CA0037711	0.13	0.10	0.076
Sonoma Valley County Sanitary District	CA0037800	0.041	0.041	0.041
South Bayside System Authority	CA0038369	0.53	0.42	0.32
South San Francisco/San Bruno WQCP	CA0038130	0.29	0.24	0.18
Sunnyvale, City of	**CA0037621**	**0.15**	**0.12**	**0.12**
US Naval Support Activity, Treasure Island WWTP	CA0110116	0.026	0.026	0.026
Vallejo Sanitation & Flood Control District	CA0037699	0.57	0.46	0.34
West County Agency, Combined Outfall	CA0038539	0.38[c]	0.30	0.23
Yountville, Town of	CA0038121	0.040	0.040	0.04
Total		***17***[b]	***14***[b]	***11***[b]

Notes:

Bold text indicates advanced treatment

[a] This allocation includes wastewater treatment and all wet weather facilities.

[b] Total differs slightly from the column sum due to rounding.

[c] Mercury monitoring data quality concerns pertaining to this discharger will need to be addressed during the next review.

TABLE 4-y: Individual Wasteload Allocations for Petroleum Refinery Wastewater Discharges

Permitted Entity	NPDES Permit	Allocation (kg/yr)
Chevron Products Company	CA0005134	~~0.38~~0.34
ConocoPhillips	CA0005053	~~0.15~~0.13
Martinez Refining Co. (formerly Shell)	CA0005789	~~0.25~~0.22
Ultramar, Golden Eagle	CA0004961	~~0.13~~0.11
Valero Refining Company	CA0005550	~~0.09~~0.08
Total		***~~1.0~~0.9***

TABLE 4-z: Individual Wasteload Allocations for Industrial (Non-Petroleum Refinery) Wastewater Discharges[c]		
Permitted Entity	**NPDES Permit**	**Allocation (kg/yr)**
C&H Sugar Co.	CA0005240	~~1.56~~0.0013
Crockett Cogeneration	CA0029904	~~0.005~~0.0047
The Dow Chemical Company	CA0004910	~~0.044~~0.041
General Chemical	CA0004979	~~0.23~~0.21[a]
GWF Power Systems, Site I	CA0029106	~~0.002~~0.0016
GWF Power Systems, Site V	CA0029122	~~0.003~~0.0025
Hanson Aggregates, Amador Street	CA0030139	~~0.001~~0.000005
Hanson Aggregates, Olin Jones Dredge Spoils Disposal	CA0028321	~~0.001~~0.000005
Hanson Aggregates, Tidewater Ave. Oakland	CAA030147	~~0.001~~0.000005
Pacific Gas and Electric, East Shell Pond	CA0030082	~~0.001~~0.00063
Pacific Gas and Electric, Hunters Point Power Plant	CA0005649	~~0.022~~0.020
Rhodia, Inc.	CA0006165	~~0.012~~0.011
San Francisco, City and Co., SF International Airport Industrial WTP	CA0028070	~~0.055~~0.051
Southern Energy California, Pittsburg Power Plant	CA0004880	~~0.008~~0.0078
Southern Energy Delta LLC, Potrero Power Plant	CA0005657	0.0031
United States Navy, Point Molate	CA0030074	0.013
USS-Posco	CA0005002	~~0.047~~0.045
Total		***~~2.00~~.4***[b]

Notes:

[a] Data quality concerns pertaining to this discharger will need to be addressed during the next review.

[b] Total differs slightly from the column sum due to rounding.

[c] Wasteload allocations for industrial wastewater discharges do not include mass from once-through cooling water. The Water Board will apply intake credits to once-through cooling water as allowed by law.

The allocation for the Central Valley watershed should be achieved within 20 years after the Central Valley Water Board begins implementing its TMDL load reduction program. Studies need to be conducted to evaluate the time lag between the remediation of mercury sources and resulting load reductions from the Delta. An interim loading milestone of 385 kg/yr of mercury, halfway between the current load and the allocation, should be attained ten years after implementation of the Central Valley Delta TMDL begins. This schedule will be reevaluated as the load reduction plans are implemented.

Urban Stormwater Runoff

The wasteload allocations shown in Table 4-w shall be implemented through the NPDES stormwater permits issued to urban runoff management agencies and the California Department of Transportation (Caltrans). The urban stormwater runoff allocations implicitly include all current and future permitted discharges, not otherwise addressed by another allocation, and unpermitted discharges within the geographic boundaries of urban

runoff management agencies (collectively, "source category") including, but not limited to, Caltrans roadway and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

The allocations for this source category should be achieved within 20 years, and, as a way to measure progress, an interim loading milestone of 120 kg/yr, halfway between the current load and the allocation, should be achieved within ten years. If the interim loading milestone is not achieved, NPDES-permitted entities shall demonstrate reasonable and measurable progress toward achieving the 10-year loading milestone.

The NPDES permits for urban runoff management agencies shall require the implementation of best management practices and control measures designed to achieve the allocations or accomplish the load reductions derived from the allocations. In addition to controlling mercury loads, best management practices or control measures shall include actions to reduce mercury-related risks to humans and wildlife. 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 pollutants in stormwater runoff to the maximum extent practicable and remain consistent with the section of this chapter titled "Surface Water Protection and Management—Point Source Control—Stormwater Discharges". The following additional requirements are or shall be incorporated into NPDES permits issued or reissued by the Water Board for urban runoff management agencies.

i) Evaluate and report on the spatial extent, magnitude, and cause of contamination for locations where elevated mercury concentrations exist;

ii) Develop and implement a mercury source control program;

iii) Develop and implement a monitoring system to quantify either mercury loads or loads reduced through treatment, source control, and other management efforts;

iv) Monitor levels of methylmercury in discharges;

~~iv~~v) Conduct or cause to be conducted studies aimed at better understanding mercury fate, transport, and biological uptake in San Francisco Bay and tidal areas;

~~v~~vi) Develop an equitable allocation-sharing scheme in consultation with Caltrans (see below) to address Caltrans roadway and non-roadway facilities in the program area, and report the details to the Water Board;

vii) Prepare an annual report that documents compliance with the above requirements and documents either mercury loads discharged, or loads reduced through ongoing pollution prevention and control activities; and

viii) Demonstrate progress toward (a) the interim loading milestone, or (b) attainment of the allocations shown in Table 4-w, by using one of the following methods:

1) Quantify the annual average mercury load reduced by implementing (a) pollution prevention activities, and (b) source and treatment controls. The benefit of efforts to reduce mercury-related risk to wildlife and humans should also be quantified. The Water Board will recognize such efforts as progress toward achieving the interim milestone and the mercury-related water quality

standards upon which the allocations and corresponding load reductions are based. Loads reduced as a result of actions implemented after 2001 (or earlier if actions taken are not reflected in the 2001 load estimate) may be used to estimate load reductions.

2) Quantify the mercury load as a rolling five-year annual average using data on flow and water column mercury concentrations.

3) Quantitatively demonstrate that the mercury concentration of suspended sediment that best represents sediment discharged with urban runoff is below the suspended sediment target.

An urban runoff management agency that complies with these permit requirements shall be deemed to be in compliance with receiving water limitations relative to mercury. Once the Water Board accepts that a requirement has been completed by an urban runoff management agency, it need not be included in subsequent permits for that agency. These requirements apply to municipalities covered by the statewide municipal stormwater general permit (issued by the State Water Resources Control Board) five years after the effective date of this Mercury TMDL.

Urban runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to mercury loads to the Bay or is outside the jurisdiction or authority of an agency the Water Board will consider a request from an urban runoff management agency which may include an allocation, load reduction, and/or other regulatory requirements for the source in question.

Within the jurisdiction of each urban runoff management agency, Caltrans is responsible for discharges associated with roadways and non-roadway facilities. Consequently, Caltrans shall be required to implement the following actions:

i) Develop and implement a system to quantify mercury loads or loads reduced through control actions;

ii) Prepare an annual report that documents mercury loads or loads reduced through control actions; and

iii) Develop an equitable allocation-sharing scheme that reflects Caltrans load reduction responsibility in consultation with the urban runoff management agencies, and report the details to the Water Board. Alternatively, Caltrans may choose to implement load reduction actions on a watershed or regionwide basis in lieu of sharing a portion of an urban runoff management agency's allocation. In such a case, the Water Board will consider a separate allocation for Caltrans for which they may demonstrate progress toward attaining an allocation or load reduction in the same manner mentioned previously for municipal programs.

Guadalupe River Watershed (Mining Legacy)

In the near term, the effort underway to develop the Guadalupe River Watershed Mercury TMDL will be the mechanism used to implement and track progress toward achieving the load allocation. Ultimately, the Water Board expects the implementation plan for the Guadalupe River Watershed Mercury TMDL to integrate implementation efforts relative

to that TMDL with those implementation efforts for the San Francisco Bay Mercury TMDL.

The Guadalupe River Watershed Mercury TMDL will provide a watershed-wide mercury management strategy. Efforts are already underway in the watershed to take early actions to reduce mercury loads, and more are planned. A high priority for the watershed-based strategy is to control upper watershed sources associated with the mining legacy to avoid compromising actions taken in the lower watershed. The strategy will include measures that prevent mercury-laden sediment from reaching the Bay, either by removal or by preventing their transport to the Bay. The strategy will also feature measures intended to reduce methylmercury production and risks to human health and wildlife. An essential component of the strategy will also involve testing and evaluation of new techniques and control measures, the benefits of that may apply throughout the Bay. As the mercury load, methylation, and reductions resulting from these efforts are quantified by the dischargers identified through the Guadalupe River Watershed Mercury TMDL process, the Water Board will consider how the reductions achieved will be counted toward fulfillment of the load reductions required to meet the Guadalupe River watershed load allocation.

The Guadalupe River watershed mining legacy mercury load allocation is expected to be attained within 20 years after the Water Board begins implementing the Guadalupe River Watershed Mercury TMDL. As a way to measure progress, an interim-loading milestone of 47 kg/yr of mercury, halfway between the current load and the allocation, should be achieved within ten years. If the interim loading milestone is not achieved, dischargers shall make reasonable and measurable progress toward achieving the ten-year load reduction through implementation of the watershed-wide strategy.

Progress toward (a) the interim loading milestone, or (b) attainment of the allocation, shall be demonstrated by the dischargers identified through the Guadalupe River Watershed TMDL using one of the methods listed below:

1. Quantify the annual average mercury load reduced by implementing (a) pollution prevention activities, (b) source and treatment controls, and (c) if applicable, other efforts to reduce methylation or mercury-related risks to humans and wildlife consistent with the watershed-based strategy. The Water Board will recognize loads reduced resulting from activities implemented after 1996 (or earlier if actions taken are not reflected in the 2001 load estimate) to estimate load reductions.
2. Quantify the mercury load as a rolling five-year annual average using data on flow and water column mercury concentrations.
3. Quantitatively demonstrate that the mercury concentration of suspended sediment that best represents sediment discharged from the watershed to San Francisco Bay is below the suspended sediment target.

Municipal Wastewater

The individual municipal wastewater wasteload allocations shown in Table 4-x shall be implemented via individual mass limits and an aggregate mass limit that is the sum of the individual allocations, 11 kg/yr. ~~as a group mass limit.~~ The Water Board will issue a San

Francisco Bay watershed mercury NPDES permit to all dischargers listed in Table 4-x to implement the individual and aggregate mass limits. ~~. The group mass limit is the sum of the individual allocations for these facilities, 17 kg/yr. If the group mass limit is exceeded, the Water Board will pursue enforcement actions against those individual dischargers whose mass emissions exceed their individual wasteload allocations.~~

The wasteload allocations for this source category shall be achieved within 20 years, and, as a way to measure progress, interim individual allocations equal to a 20 percent reduction from 2000-2003 annual mass discharge levels shall be achieved within 10 years. These interim allocations, shown in Table 4-x, shall be implemented via individual mass limits and an aggregate mass limit that is the sum of the individual interim allocations, 14 kg/yr. During the initial ten years, individual mass limits shall be the 2000-2003 annual mass discharge levels shown in Table 4-x, and the aggregate mass limit is the sum of these individual mass discharge levels.

If ~~the group mass limit is~~ any aggregate mass limit is exceeded, the Water Board will pursue enforcement actions against those individual dischargers whose mass ~~emissions~~ discharges exceed their individual ~~wasteload allocations~~ mass limits.

The ~~group~~ mass limits and the following requirements shall be incorporated into the watershed NPDES permit for municipal wastewater dischargers:

- Develop and implement effective programs that include but are not limited to pollution prevention to control mercury sources and loading, a plan and schedule of actions and effectiveness measures ~~and reduce mercury-related risks to humans and wildlife~~ applicable for the term of the permit, based on identification of the largest and most controllable sources and an updated assessment of source control measures and wastewater treatment technologies (the level of effort shall be commensurate with the mercury load and performance of the facility) and quantify the mercury load avoided or reduced ~~and risk reductions resulting from these activities~~;
- Develop and implement effective programs to reduce mercury-related risks to humans and wildlife and quantify risk reductions resulting from these activities;
- Comply with water quality-based effluent limitations, to be elaborated through the permit, that are consistent with the assumptions and requirements of the mercury wasteload allocation;
- Track individual facility and aggregate wastewater loads and the status of source control and pollution prevention activities;
- Monitor levels of methylmercury in discharges;
- Conduct or cause to be conducted studies aimed at better understanding mercury fate, transport, and biological uptake in San Francisco Bay and tidal areas;

- Conduct or cause to be conducted studies to evaluate the presence or potential for local effects on fish, wildlife, and rare and endangered species in the vicinity of wastewater discharges; and
- Prepare an annual report that documents mercury loads from each facility, mercury and methylmercury effluent concentrations, and ongoing source control activities, including mercury loads avoided through control actions.

The watershed NPDES permit shall also specify conditions that apply to each individual facility. These conditions are intended to minimize the potential for adverse effects in the immediate vicinity of discharges and to ensure that municipal wastewater facilities maintain proper operation, maintenance, and performance. If a facility exceeds its individual mercury load allocation ~~and~~ or an effluent mercury trigger concentration, it shall be required to report the exceedance in its individual Self-Monitoring Report, and to submit a report that:

- Evaluates the cause of the trigger or mass exceedances;
- Evaluates the effectiveness of existing pollution prevention or pretreatment programs and methods for preventing future exceedances;
- Evaluates the feasibility and effectiveness of technology enhancements to improve plant performance.

Effluent mercury trigger concentrations for secondary treatment facilities are a daily maximum of 0.065 µg/l total mercury and monthly average of 0.041 µg/l total mercury. For advanced treatment facilities, effluent mercury trigger concentrations are a daily maximum of 0.021 µg/l total mercury and a monthly average of 0.011 µg/l total mercury.

Industrial Wastewater

The individual wasteload allocations for the industrial wastewater discharges from the five Bay Area petroleum refineries (Chevron, ConocoPhillips, ~~Shell~~Martinez Refining Co., Ultramar Golden Eagle, and Valero) ~~are shown~~listed in Table 4-y, and the ~~.The~~ individual wasteload allocations for all other industrial wastewater facilities ~~are~~ listed in Table 4-z shall be implemented via individual mass limits and an aggregate mass limit that is the sum of the individual allocations, 1.3 kg/yr. ~~. The total group allocation for industrial and refinery wastewater facilities is 3 kg/yr and shall be implemented as a group mass limit.~~ If the ~~group~~ aggregate mass limit is exceeded, the Water Board will pursue enforcement actions against those individual dischargers whose mass ~~emissions~~ discharges exceed their individual mass limits~~wasteload allocations~~.

The ~~group~~ mass limits and the following requirements shall be incorporated into NPDES permits for all industrial wastewater dischargers:

- Develop and implement effective programs to control mercury sources and loading including demonstration that discharge levels represent good performance based on an updated assessment of source control measures and wastewater treatment technologies ~~and reduce mercury-related risks to humans and wildlife~~ (the level of effort will be commensurate with the mercury load and performance of the facility)

and quantify the mercury load avoided or reduced ~~and risk reductions resulting from these activities~~;

- Develop and implement effective programs to reduce mercury-related risks to humans and wildlife and quantify the risk reductions resulting from these activities;
- Comply with water quality-based effluent limitations, to be elaborated through the permit, that are consistent with the assumptions and requirements of the mercury wasteload allocation;
- Monitor levels of methylmercury in discharges;
- Conduct or cause to be conducted studies aimed at better understanding mercury fate, transport, and biological uptake in San Francisco Bay and tidal areas;
- Conduct or cause to be conducted studies to evaluate the presence or potential for local effects on fish, wildlife, and rare and endangered species in the vicinity of wastewater discharges; and
- Prepare an annual report that documents mercury loads from each facility, mercury and methylmercury effluent concentrations, and ongoing source control activities, including mercury loads avoided through control actions.

The NPDES permits for industrial facilities shall also specify conditions that apply to each individual facility. These conditions are intended to minimize the potential for adverse effects in the immediate vicinity of discharges and to ensure that industrial facilities maintain proper operation, maintenance, and performance. If a facility exceeds its individual mercury load allocation ~~and~~ or an effluent mercury trigger concentration, it shall be required to report the exceedance in its individual Self-Monitoring Report, and to submit a report that:

- Evaluates the cause of the trigger or mass exceedances;
- Evaluates the effectiveness of existing pollution prevention or pretreatment programs and methods for preventing future exceedances;
- Evaluates the feasibility and effectiveness of technology enhancements to improve plant performance.

Effluent mercury trigger concentrations are a daily maximum of 0.062 µg/l total mercury and monthly average of 0.037 µg/l total mercury.

Bay Area petroleum refineries shall be required to work collaboratively with the Water Board to investigate the environmental fate of mercury in crude oil and report findings to the Water Board within five years of the effective date of this Mercury TMDL implementation plan. These requirements may be implemented via the Water Board's authority under Section 13267 of the California Water Code or petroleum refinery wastewater NPDES permits. The report shall address two key questions:

1. What are the potential pathways by which crude oil mercury could be discharged to the Bay from Bay Area petroleum refining facilities?
2. What are the annual mercury loads associated with these discharge pathways?

Sediment Dredging and Disposal

The allocation for sediment dredging and disposal is both mass-based and concentration-based. The mercury concentration in dredged material disposed of in the Bay shall not exceed the 99th percentile mercury concentration of the previous 10 years of Bay sediment samples collected through RMP (excluding stations outside the Bay like the Sacramento River, San Joaquin River, Guadalupe River and Standish Dam stations). Prior to disposal, the material shall be sampled and analyzed according to the procedures outlined in the 2001 U.S. Army Corps of Engineers document "Guidelines for Implementing the Inland Testing Manual in the San Francisco Bay Region." All in-Bay disposal of dredged material shall comply with the Dredging and Disposal of Dredged Sediment program described in Chapter 4 and the Long Term Management Strategy for the Disposal of Dredge Material in San Francisco Bay.

The process of dredging and disposing of dredged material in the Bay may enhance biological uptake and methylmercury exposure. To address this concern, permitted dredging and disposal operations shall demonstrate that their activities are accomplished in a manner that does not increase bioavailability of mercury. As part of this demonstration, the Waste Discharge Requirements for such operations shall include requirements to conduct or cause to be conducted studies to better understand how their operations affect mercury fate, transport, and biological uptake.

Atmospheric Deposition

Mercury that deposits directly on the Bay surface and the surrounding watershed is attributed to both remote and local sources. The extent to which these sources can be controlled is unknown and the Water Board's authority to control such sources is limited. The load allocation does not allow an increase of current loads, and does not require a reduction from this source category at this time. Recent scientific studies suggest that mercury newly deposited from the atmosphere may be more available for biological uptake than mercury already present in an aquatic system. As such, the following implementation efforts need to be undertaken to evaluate the significance of atmospheric deposition and the feasibility of load reductions:

- The U.S. Environmental Protection Agency should investigate the significance of atmospheric deposition and actively pursue national and international efforts to reduce the amount of mercury released through combustion of fossil fuels; and
- The Bay Area Air Quality Management District should conduct a local mercury emissions inventory, investigate the significance of local mercury air emissions, evaluate the effectiveness of existing control measures and the feasibility of additional controls.

If local air sources are found to contribute substantially to atmospheric deposition loading to the Bay and its surrounding watershed, the Water Board will consider assigning allocations and load reductions to individual air sources and work with the Bay Area Air Quality Management District to ensure allocations are achieved.

New Mercury Sources

As the TMDL is implemented, new sources of mercury may emerge either as the result of a new facility applying for a discharge permit or as a result of a new source being discovered. The Water Board will consider establishing a load or wasteload allocation for a new mercury source under any of the following circumstances:

- The allocation from one or more existing sources of the same category (e.g., municipal wastewater) will be reduced by an amount equal to the new allocation; or
- The Water Board finds that the magnitude of the new allocation is negligible compared to load reductions from all sources that will have been realized prior to establishing the new allocation; or
- The allocation is for a previously unquantified discharge of mercury from a source category that does not already have an allocation.

This section specifies actions required for sources that are potentially either discharging mercury or enhancing methylmercury production in the Bay.

Mercury Mines

Local inactive mercury mines shall be addressed through continued implementation of the Mines and Mineral Producers Discharge Control Program (Mines Program) described later in this chapter. The key regulatory component of this established program is that property owners of inactive and active mine sites that discharge stormwater contaminated by contact with any overburden, raw material, intermediate products, finished products, byproducts, or waste products are required to comply with NPDES industrial stormwater regulations. Under the Mines Program, the Water Board has the authority to issue individual industrial permits or allow the discharger to obtain coverage under the industrial stormwater general permit issued by the State Water Resources Control Board. For those mines that are not currently meeting the conditions set forth in the Mines Program, responsible parties shall attain compliance within five years of the effective date of this Mercury TMDL implementation plan.

Bay Margin Contaminated Sites

A number of former industrial and military sites that contain mercury-enriched sediment surround the Bay. Available data are insufficient at this time to determine whether these sites may be discharging to the Bay. While the load these sites contribute to the Bay may be small relative to known sources, these sites may pose local threats. As such, cleanup of these sites is a Water Board priority and many cleanups are underway. The Water Board will require parties responsible for Bay margin contaminated sites to:

1. Quantify mercury mass on site such that the upper 95% confidence limit of the mean value is no more than 20% higher than the estimated mean;
2. Determine seasonal and spatial patterns of total mercury and methylmercury in sediments on site;
3. Estimate future mercury mass on site and patterns of contamination after planned remediation efforts are complete;

4. Determine seasonal patterns of total mercury and methylmercury in the water column at the site;
5. Collect prey items for local fish and birds and assess mercury concentrations; and
6. Quantify rate of sediment accretion or erosion at the site.

These requirements shall be incorporated into relevant site cleanup plans within five years of the effective date of this mercury TMDL, and the actions shall be fully implemented within ten years of the effective date of this TMDL.

Wetlands

Wetlands may contribute substantially to methylmercury production and biological exposure to mercury within the Bay. Plans for extensive wetland restoration in the San Francisco Bay region raise the concern that mercury methylation may increase, thereby increasing the amount of mercury entering the food web. Implementation tasks related to wetlands focus on managing existing wetlands and ensuring that new constructed wetlands are designed to minimize methylmercury production and subsequent transfer to the food web.

The Water Board issues Waste Discharge Requirements and Clean Water Act Section 401 certifications that set forth conditions related to Bay filling and the construction and management of wetlands. To implement the mercury TMDL, the Waste Discharge Requirements and Section 401 certifications for wetland projects shall include provisions that the restored wetland region be designed and operated to minimize methylmercury production and biological uptake, and result in no net increase in mercury or methylmercury loads to the Bay. Additionally, projects must include pre- and post-restoration monitoring to demonstrate compliance. There is much active research on mercury cycling in wetlands. Information about how to manage wetlands to suppress or minimize mercury methylation will be adaptively incorporated into this implementation plan as it becomes available.

Risk Management

The mercury problem in San Francisco Bay may take decades to solve. However, there are activities that should be undertaken immediately to help manage the risk to consumers of mercury-contaminated fish. In this effort, the Water Board will work with the California Office of Environmental Health Hazard Assessment, the California Department of Health Services, and dischargers that pursue risk management as part of their mercury-related programs. The risk management activities will include the following:

- Providing multilingual fish-consumption advice to the public to help reduce methylmercury exposure through community outreach, broadcast and print media, and signs posted at popular fishing locations;
- Regularly informing the public about monitoring data and findings regarding hazards of eating mercury-contaminated fish; and

- Performing special studies needed to support health risk assessment and risk communication.
- Investigate ways to address public health impacts of mercury in San Francisco Bay/Delta fish, including activities that reduce actual and potential exposure of and mitigate health impacts to those people and communities most likely to be affected by mercury in San Francisco Bay caught fish, such as subsistence fishers and their families.

Adaptive Implementation

The Water Board will adapt the TMDL to incorporate new and relevant scientific information such that effective and efficient actions can be taken to achieve TMDL goals. Approximately every five years, the Water Board will review the San Francisco Bay Mercury TMDL and evaluate new and relevant information from monitoring, special studies, and scientific literature. The reviews will be coordinated through the Water Board's continuing planning program and will provide opportunities for stakeholder participation. Any necessary modifications to the targets, allocations, or implementation plan will be incorporated into the Basin Plan. At a minimum, the following focusing questions will be used to conduct the reviews. Additional focusing questions will be developed in collaboration with stakeholders during each review.

1. Is the Bay progressing toward TMDL targets as expected? If it is unclear whether there is progress, how should monitoring efforts be modified to detect trends? If there has not been adequate progress, how might the implementation actions or allocations be modified?
2. What are the loads for the various source categories, how have these loads changed over time, and how might source control measures be modified to improve load reduction?
3. Is there new, reliable, and widely accepted scientific information that suggests modifications to targets, allocations, or implementation actions? If so, how should the TMDL be modified?
4. Are effective risk management activities in place to reduce human and wildlife exposure to methylmercury? If not, how should these activities be modified or enhanced?
5. Do prey fish monitoring data confirm that TMDL load allocations are adequate to attain the wildlife target?

Using available data, the load and wasteload allocations were determined on the basis of their sufficiency to achieve water quality standards. As part of the adaptive implementation process, the Water Board will review the TMDL as a whole and determine whether new evidence suggests revisions of specific load and wasteload allocations that will result in more strategic, efficient, and cost effective achievement of water quality standards. For example, as reliable information becomes available regarding methylation control or the relative bioavailability of sources, the Water Board will consider adjusting allocations to implement the TMDL more effectively. The Water Board may also consider revising implementation requirements and/or resulting permit requirements if such changes are consistent with the assumptions and requirements of the

allocations and the cumulative effect of such changes will ensure attainment of water quality standards.

Achievement of the allocations for three of the largest source categories (Central Valley Watershed, Urban Stormwater Runoff, Guadalupe River Watershed) is projected to take 20 years, with an interim 10-year milestone of fifty percent achievement. Approximately 10 years after the effective date of the TMDL or any time thereafter, the Water Board will consider modifying the schedule for achievement of the load allocations for a source category or individual discharger provided that they have complied with all applicable permit requirements and all of the following have been accomplished relative to that source category or discharger:

- A diligent effort has been made to quantify mercury loads and the sources of mercury and potential bioavailability of mercury in the discharge;
- Documentation has been prepared that demonstrates that all technically and economically feasible and cost effective control measures recognized by the Water Board as applicable for that source category or discharger have been fully implemented, and evaluates and quantifies the comprehensive water quality benefit of such measures;
- A demonstration has been made that achievement of the allocation will require more than the remaining 10 years originally envisioned; and
- A plan has been prepared that includes a schedule for evaluating the effectiveness and feasibility of additional control measures and implementing additional controls as appropriate.

Achievement of the wasteload allocations for municipal wastewater dischargers is required within 20 years, and interim allocations within 10 years. The interim allocations are expected to be attained though aggressive pollution prevention and other cost-effective mercury reduction methods. The final wasteload allocations are expected to be attained through wastewater treatment system improvements and/or implementation of a pollutant offset program. Approximately 10 years after the effective date of the TMDL or any time thereafter, the Water Board will consider modifying the schedule for achievement of the wasteload allocations or revisions to wasteload allocations if the State Board has not established a pollutant offset program that can be implemented within the 20 years required to achieve final wasteload allocations.

At approximately 20 years after the start of implementation and after taking the steps regarding schedule modification listed above, if a source category or individual discharger cannot demonstrate achievement of its allocation, despite implementation of all technically and economically feasible and cost effective control measures recognized by the Water Board as applicable for that source category or discharger, the Water Board will consider revising the allocation scheme provided that any resulting revisions ensure water quality standards are attained.

Load and wasteload allocations have been assigned to individual entities. However, assigning loads by watersheds could be a useful approach for managing pollutant loads,

particularly if net environmental benefits can be realized. A watershed-based allocation program would only involve watersheds in the San Francisco Bay region that drain to the Bay. Such an approach could involve urban runoff management programs, wastewater facilities, and other dischargers in a watershed accepting joint responsibility for load reductions. An acceptable watershed allocation program may include incentives for agencies to implement load reduction activities and account for avoided mercury loads as well as incentives for strategic removal or sequestration of mercury already in the system. Credits could be used to offset annual loads and attain allocations for multiple sources. In addition, the Water Board will encourage and consider a pilot mercury mass offset program if it is demonstrated that such a program is a more cost effective and efficient means of achieving water quality standards, and the relative potential for mercury from different sources to enter the food web and the potential for adverse local impacts have been evaluated. These programs should recognize and reward ongoing efforts that are above and beyond those required by this TMDL. Until such programs are established, the Water Board will consider mercury source control and risk reduction activities on a case-by-case basis to determine how they contribute toward achievement of TMDL goals. The Water Board will also include in any new or modified NPDES permit a reopener to implement a pollutant offset program when it is established.