APPENDIX A

Proposed Basin Plan Amendment

San Francisco Bay PCBs TMDL

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Add the following language to Chapter 7, Water Quality Attainment Strategies including Total Maximum Daily Loads, of the Basin Plan:

San Francisco Bay Polychlorinated Biphenyls TMDL

The following sections establish the TMDL for total polychlorinated biphenyls including dioxin-like PCBs congeners (hereinafter referred to as PCBs) for the San Francisco Bay. The associated numeric target, allocations, and implementation plan are designed to ensure attainment of beneficial uses and water quality objectives for the San Francisco Bay.

Problem Statement

All segments of the San Francisco Bay have been identified as impaired due to elevated levels of PCBs in sport fish. Neither the narrative water quality objective, which states that controllable water quality factors shall not cause a detrimental increase in toxic substances found in bottom sediments or aquatic life, nor the numeric water quality objective of 0.00017 µg/L total PCBs in water is attained in the San Francisco Bay. Existing beneficial uses not fully supported, are commercial and sport fishing, preservation of rare and endangered species, estuarine habitat, and wildlife habitat.

This TMDL addresses impairment of San Francisco Bay segments by PCBs. In the context of this TMDL, "San Francisco Bay" refers to all of the following water bodies:

- Sacramento/San Joaquin Delta (within Region 2)
- Suisun Bay
- Carquinez Strait
- San Pablo Bay
- Richardson Bay
- San Francisco Bay, Central
- San Francisco Bay, Lower (including)
    - Central Basin, San Francisco
    - Mission Creek
    - Oakland Inner Harbor (Fruitvale site)
    - Oakland Inner Harbor (Pacific Dry-Dock Yard 1 site)
- San Francisco Bay, South

Numeric Target

The numeric target (also referred to as the TMDL target) to protect both human health and wildlife is an average fish issue concentration of 10 micrograms total PCBs per kilogram of typically consumed fish, on a wet weight basis (10 µg/kg wet weight). The targeted fish species are white croaker and shiner surfperch). Attainment of the total PCBs fish tissue numeric target will also protect human health and wildlife for dioxin-like PCBs.

Attainment of the fish tissue target for PCBs in San Francisco Bay will be evaluated in white croaker (size class, 20 to 30 centimeters in length) and shiner surfperch (size class, 10 to 15 centimeters in length). The average total PCBs concentration in the edible portion of these fish will be used to determine attainment of the PCBs target. The number of fish samples collected to

determine compliance with the target will be based on guidance described in USEPA's Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories (EPA 823-B-00-007) and on the statistical power needed to demonstrate trends in total PCBs concentration over time.

Sources

Sources of PCBs to fish and the water column of San Francisco Bay fall into two categories: (1) external sources including atmospheric deposition, Central Valley inflow, municipal and industrial wastewater discharges, and urban and non-urban stormwater runoff; and (2) internal sources, including movement or release of PCBs already in San Francisco Bay sediments, specifically, dredging and in-Bay disposal of dredged sediment, erosion of bay bottom sediment containing PCBs (bed erosion), and in-Bay contaminated sediment sites. These sources and estimates of associated loads are shown in Table A-1. Decreases of PCBs in San Francisco Bay occur via out-of-Bay dredge material disposal, natural attenuation, and outflow through the Golden Gate.

Table A- 1 PCBs Sources and Current Loads to San Francisco Bay

Source Category	PCBs Loads
	Kilograms per year
External	
Direct Atmospheric Deposition	net loss
Central Valley Watershed	42
Municipal Wastewater Dischargers	2.3
Industrial Wastewater Dischargers	0.035
Urban Stormwater Runoff	40
Non-Urban Stormwater Runoff	0.1
Total	***84[a]***
Internal	
Sediment Dredging and Disposal	Net Loss
Bed Erosion	Not Quantified
In-Bay Contaminated Sediment	Not Quantified

a) Total differs from column sum due to rounding

Total Maximum Daily Load

The TMDL for PCBs in San Francisco Bay is 10 kg/year. Calculation of the TMDL is based on two models: a food-web PCBs bioaccumulation model and a long-term fate mass balance model. The model results predict that attainment of the numeric target will occur when the total PCBs concentration in surface sediments in the Bay declines to one µg/kg, which will be achieved when loads from external sources are reduced to 10 kg/year.

Load and Wasteload Allocations

Load allocations presented in Table A-2 are based on apportioning the TMDL of 10 kg/year to the external sources only. Load and wasteload allocations to Central Valley inflow, and urban and non-urban stormwater runoff are based on sustained constant sediment mass input with a sediment PCBs concentration of one µg/kg. Wasteload allocations to municipal and industrial wastewater dischargers are set at current loads. The remaining portion of the TMDL is allocated to future treatment of urban stormwater runoff by municipal wastewater dischargers.

Individual wasteload allocations for municipal wastewater dischargers and industrial wastewater dischargers are presented in Table A-3 and Table A-4. Individual wasteload allocations to county-based watersheds are presented in Table A-5.

Table A- 2 Load and Wasteload Allocations

Source Category	Allocations
	Kilograms per year
External	
Direct Atmospheric Deposition	0 [a]
Central Valley Watershed	5
Municipal Wastewater Dischargers	2
Industrial Wastewater Dischargers	0.035
Urban Stormwater Runoff	2
Non-Urban Stormwater Runoff	0.1
Urban Stormwater Runoff Treatment by POTWs	0.9
Total	***10*** [b]

a) Zero allocation reflects overall net loss to the atmosphere

b) Total differs from column sum due to rounding

Table A - 3 Individual Wasteload Allocations For Municipal Wastewater Dischargers

Permitted Entity	NPDES Permit	Allocations
		kilograms per year
American Canyon, City of	CA0038768	0.002
California Department of Parks and Recreation, Angel Island State Park	CA0037401	0.00003
Benicia, City of	CA0038091	0.009
Burlingame, City of	CA0037788	0.01
Calistoga, City of	CA0037966	0.002
Central Contra Costa Sanitary District	CA0037648	0.1
Central Marin Sanitation Agency	CA0038628	0.04
Delta Diablo Sanitation District	CA0038547	0.04
East Bay Dischargers Authority Dublin-San Ramon Services District (CA0037613) Hayward Shoreline Marsh (CA0037702) Livermore, City of (CA0038008) Union Sanitary District, Wet Weather (CA0038733)	CA0037869	0.3
East Bay Municipal Utilities District	CA0037702	0.3
East Brother Light Station	CA0038806	0.00030
Fairfield-Suisun Sewer District	CA0038024	0.05
Las Gallinas Valley Sanitary District	CA0037851	0.01
Marin County Sanitary District, Paradise Cove	CA0037427	0.00003
Marin County Sanitary District, Tiburon	CA0037753	0.002
Millbrae, City of	CA0037532	0.007
Mt. View Sanitary District	CA0037770	0.007
Napa Sanitation District	CA0037575	0.04
Novato Sanitary District	CA0037958	0.02
Palo Alto, City of	CA0037834	0.09
Petaluma, City of	CA0037810	0.02
Pinole, City of	CA0037796	0.009
Contra Costa County, Port Costa Wastewater Treatment Plant	CA0037885	0.0001
Rodeo Sanitary District	CA0037826	0.002
Saint Helena, City of	CA0038016	0.001
San Francisco, City and County of, San Francisco International Airport WQCP	CA0038318	0.002
San Francisco, City and County of, Southeast Plant	CA0037664	0.3
San Jose/Santa Clara WPCP	CA0037842	0.4
San Mateo, City of	CA0037541	0.04
Sausalito-Marin City Sanitary District	CA0038067	0.005
Seafirth Estates	CA0038893	0.00001
Sewerage Agency of Southern Marin	CA0037711	0.01
Sonoma Valley County Sanitary District	CA0037800	0.01
South Bayside System Authority	CA0038369	0.06
South San Francisco/San Bruno WQCP	CA0038130	0.03
Sunnyvale, City of	CA0037621	0.05
US Naval Support Activity, Treasure Island WWTP	CA0110116	0.002
Vallejo Sanitation & Flood Control District	CA0037699	0.05
West County Agency, Combined Outfall	CA0038539	0.05
Yountville, Town of	CA0038121	0.001
Total		***2[a]***

a) Total differs from column sum due to rounding

Table A - 4 Individual Wasteload Allocations for Industrial Wastewater Dischargers

Permitted Entity	NPDES Permit	Allocations
		kilograms per year
C&H Sugar Co.	CA0005240	0.00006
Chevron Products Company	CA0005134	0.003
ConocoPhillips	CA0005053	0.0006
Crockett Cogeneration	CA0029904	0.0006
General Chemical	CA0004979	0.0009
GWF Power Systems, Site I	CA0029106	0.0001
GWF Power Systems, Site V	CA0029122	0.0001
Hanson Aggregates, Amador Street	CA0030139	0.00003
Hanson Aggregates, Olin Jones Dredge Spoils Disposal	CA0028321	0.00003
Hanson Aggregates, Tidewater Ave. Oakland	CA0030147	0.00003
Morton Salt	CA0005185	0.00008
Pacific Gas and Electric, East Shell Pond	CA0030082	0.00003
Pacific Gas and Electric, Hunters Point Power Plant	CA0005649	0.002
Rhodia, Inc.	CA0006165	0.0003
San Francisco, City and Co., SF International Airport Industrial WTP	CA0028070	0.002
Shell Oil Products US and Equilon Enterprises LLC	CA0005789	0.002
Southern Energy California, Pittsburg Power Plant	CA0004880	0.0008
Southern Energy Delta LLC, Potrero Power Plant	CA0005657	0.0003
Tesoro Refining and Marketing Company	CA0004961	0.002
The Dow Chemical Company	CA0004910	0.0006
United States Navy, Point Molate	CA0030074	0.00005
USS-Posco	CA0005002	0.02
Valero Refining Company	CA0005550	0.0007
Total		***0.035[a]***

a) Total differs from column sum due to rounding

Table A- 5 County-Based Watershed Wasteload Allocations for Urban Stormwater Runoff

County[b]	Allocations[a] kilograms per year
Alameda	0.5
Contra Costa	0.3
Marin	0.1
Napa	0.05
San Francisco[c]	0.2
San Mateo	0.2
Santa Clara	0.5
Solano	0.1
Sonoma	0.05
Total	***2***

[a] Allocations implicitly include all current and future permitted discharges within the geographic boundaries of municipalities and unincorporated areas within the County. Examples of discharges include but are 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] Includes unincorporated areas and all municipalities in the county that drain to the Bay and are part of the San Francisco Bay Region.

[c] Does not account for treatment provided by San Francisco's combined sewer system. The treatment provided by the City and County of San Francisco's Southeast Plant (NPDES permit CA0037664) will be credited toward meeting the allocation and load reduction.

Implementation Plan

The implementation plan includes three general implementation categories: control of external loadings of PCBs to the Bay, control of internal sources of PCBs within the Bay, and actions to manage risks to Bay fish consumers. In addition, the plan includes monitoring to measure attainment of the numeric target and load allocations, and measuring implementation progress. Adaptive implementation, including a time schedule, is the method for evaluating and adapting the TMDL and implementation plan as needed to assure water quality standards are attained.

External Sources

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

Central Valley Watershed

Sediments entering the Bay from the Central Valley have lower concentrations of PCBs than in-Bay sediment. Major mass loading events that occur during episodic high flow conditions generally flow directly out of the Bay through the Golden Gate. It is anticipated that the Central Valley allocation will be attained through natural attenuation.

Municipal and Industrial Wastewater Dischargers

Wasteload allocations shall be implemented through NPDES permits that require implementation of best management practices to maintain optimum treatment performance for solids removal and the identification and management of controllable sources. NPDES permits shall include a

numeric effluent limit of 0.5 µg/L and a requirement for quantification of PCBs loads to the Bay every five years in order to determine attainment of the wasteload allocations. In addition, municipal and industrial wastewater dischargers will be required to support actions to reduce the health risks of people who eat PCBs-contaminated, San Francisco Bay fish and to conduct or cause to be conducted monitoring, and studies to fill critical data needs identified in the adaptive implementation section.

Urban Stormwater Runoff

Urban stormwater runoff wasteload allocations shall be achieved within 20 years and shall be implemented through the NPDES stormwater permits issued to urban stormwater runoff management agencies and the California Department of Transportation (Caltrans). The urban stormwater runoff wasteload 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 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.

Requirements in each NPDES permit issued or reissued, shall be based on an updated assessment of best management practices and control measures intended to reduce PCBs in urban runoff. Control measures implemented by urban runoff management agencies and other entities (except construction and industrial sites) shall reduce PCBs in urban runoff to the maximum extent practicable. Control measures for construction and industrial sites shall reduce discharges based on best available technology economically achievable. All permits shall remain consistent with Section 4.8 - Stormwater Discharges.

Stormwater permittees shall demonstrate progress toward attainment of the wasteload allocations shown in Table A-5, by using one of the following methods:

1. Quantify the annual average PCBs loads reduced by implementing (a) pollution prevention activities, and (b) source and treatment controls. The Water Board will recognize such efforts as progress toward achieving the wasteload allocations and the PCBs-related water quality standards upon which the allocations and corresponding load reductions are based. Loads reduced as a result of actions implemented after 2001 may be used to estimate load reductions.
2. Quantify the PCBs loads as a rolling five-year annual average using data on flow and water column total PCBs concentration.
3. Quantitatively demonstrate that the total PCBs concentration of suspended sediment that best represents sediment discharged from drainage areas is below the in-Bay surface sediment PCBs concentration goal of 1 µg/kg, which is the basis for the urban stormwater runoff wasteload allocations.

In addition, stormwater permittees will be required to develop and implement a monitoring system to quantify PCBs urban runoff loads and the load reductions achieved through treatment, source control and other actions; support actions to reduce the health risks of people who consume PCBs-contaminated San Francisco Bay fish; and conduct or cause to be conducted monitoring, and studies to fill critical data needs identified in the adaptive implementation section.

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 PCBs 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.

Urban Stormwater Runoff Treatment by Municipal Wastewater Dischargers

Routing of urban stormwater runoff through municipal wastewater treatment facilities can be an efficient means of reducing PCBs, and other particle-associated contaminant loads to the Bay. This load allocation shall be implemented through a permit. Within five years of adoption of this TMDL, the Water Board will consider issuance of a permit under which municipal wastewater dischargers can apply for a portion of this reserved allocation.

Internal Sources

In-Bay PCB-Contaminated Sites

A number of former industrial and military sites adjacent to PCBs-enriched sediment are found throughout the Bay. Cleanup of these sites is a Water Board priority and many cleanups are underway. The Water Board will maintain an inventory of contaminated sites and set priorities for investigating and remediating the sites. The Water Board will coordinate clean-up actions with U.S. EPA and the Department of Toxic Substances Control, and issue clean-up orders as necessary. The Water Board will require responsible parties for each specific Bay margin contaminated site to:

1. Estimate the existing and post-cleanup vertical and lateral extent of PCBs in Bay sediments;
2. Estimate the existing and post-cleanup mass of PCBs in Bay sediments;
3. Quantify rate(s) of sediment accretion, erosion or natural attenuation;
4. Implement site source control measures;
5. Evaluate post-cleanup, the residual risks to humans and wildlife;
6. Support actions to reduce the health risks of people who consume PCBs-contaminated San Francisco Bay fish;
7. Conduct or cause to be conducted studies to fill critical data needs identified in the Adaptive Implementation section.

These requirements shall be incorporated into relevant site cleanup plans within five years of the effective date of this TMDL, and the actions shall be fully implemented within ten years of the effective date of this TMDL or as agreed to in the individual site cleanup plan.

Sediment Dredging

The PCBs concentration in dredged material disposed of in the Bay shall not exceed the 99th percentile PCBs concentration of the previous 10 years of Bay sediment samples collected through the 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 Section 4.20, entitled Dredging and Disposal of Dredged Sediment, including the Long Term Management Strategy. Additionally, dredged material dischargers will be required to conduct or cause to be conducted studies to fill critical data needs identified in the Adaptive Implementation section.

Risk Management

Load reductions and attainment of the numeric target to support fishing in the Bay as a beneficial use will take time to achieve. However, there are actions that should be undertaken prior to achievement of the numeric fish tissue target to help manage the risk to consumers of PCBs-contaminated fish. The Water Board will work with the California Office of Environmental Health Hazard Assessment, the California Department of Toxic Substances Control, the California Department of Health Services, dischargers, and interested parties to pursue risk management strategies. The risk management activities will include the following:

- Investigating and implementing actions to address the public health impacts of PCBs in San Francisco Bay/Delta fish, including activities that reduce the actual and potential exposure of, and mitigate health impacts to, people and communities most likely to be consuming PCB-contaminated fish from San Francisco Bay, such as recreational and subsistence fishers and their families;
- Providing multilingual fish-consumption advice to the public to help reduce PCBs 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 PCB-contaminated fish; and
- Performing special studies needed to support health risk assessment and risk communication.

Monitoring

Monitoring to demonstrate progress toward attainment of the TMDL target shall be conducted by maintaining discharger-funded RMP monitoring of PCBs in San Francisco Bay fish, sediments, and water at a spatial scale and frequency to track trends in the decline of PCBs in the Bay. Monitoring of load allocations to demonstrate progress towards attainment shall be conducted by municipal and industrial wastewater dischargers and stormwater permittees as discussed in external sources above.
Continued regular monitoring of PCB loads from the Central Valley and other tributaries to the Bay shall be conducted by maintaining discharger-funded RMP monitoring in order to provide information on the long term decline of PCBs to the Bay and to confirm the assumption that Central Valley loads are being reduced due to natural attenuation. Monitoring of allocations to other sources, will be considered as part of the RMP special studies.

Adaptive Implementation

Adaptive implementation entails taking actions commensurate with the existing, available information, reviewing new information as it becomes available, and modifying actions as necessary based on the new information. Taking action allows progress to occur while more and better information is collected and the effectiveness of current actions is evaluated.

Periodic Review

The Water Board will adapt the PCBs TMDL to incorporate new and relevant scientific information such that effective and efficient measures can be taken to achieve the numeric fish tissue target. The Water Board will review the San Francisco Bay PCBs TMDL and evaluate new and relevant information that become available through monitoring, special studies, and the scientific literature and consider modifications to the PCBs TMDL through the Water Board's continuing Basin Planning program, which provides opportunities for stakeholder participation.

Achievement of the allocations for urban stormwater runoff is projected to take 20 years. 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 urban stormwater runoff provided that dischargers have complied with all applicable permit requirements and accomplished all of the following:

- A diligent effort has been made to quantify PCBs loads and the sources of PCBs 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 have been fully implemented and evaluates and quantifies the PCBs load reduction 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.

Critical Data Needs

Additional data and other information will be needed to assess both the progress toward attainment of the TMDL target and to evaluate the need for adaptive implementation of the PCBs TMDL. Dischargers will be required to conduct or cause to be conducted the following studies to fill critical data needs.

- PCBs fate and transport modeling and food web model improvements – Model refinements to improve our ability to predict recovery rates of the Bay from impairment by PCBs, and to help focus implementation actions on those with the most potential for success.

- Rates of natural attenuation of PCBs in the Bay environments –A better understanding of local rates of natural attenuation in order to predict with more certainty the recovery time of the Bay, and to inform whether more implementation actions are needed.