Appendix H: Supporting Information for the Assessment of Allocation and Implementation Options

This appendix provides supporting information for the assessment of allocation and implementation options described in Chapter 7. This appendix includes the following sections:

H.1 Mining Waste and Within-Reservoir Sediment Mercury

Sections 7.2.1, 7.2.7, and 7.3.3 and Table 7.1 describe Water Board staff predictions for where mining waste remediation and reservoir sediment removal/capping may reduce reservoir sediment mercury levels (and hence reduce fish methylmercury levels) in the 74 reservoirs initially included in this Reservoir Mercury Control Program. Table H.1 in this appendix provides supporting information for these predictions, in particular, the table columns titled “Reservoir sediment mercury information”, “Historic mining information”, and “Notes”. Please refer to sections 7.2.1 and 7.3.3 for a description of data analyses and assumptions.

H.2 Atmospheric Deposition

As noted in Chapter 7, Water Board staff proposes that allocations for atmospheric deposition attributed to anthropogenic sources include reductions based on decreases observed since 2001 plus anticipated decreases if feasible controls are implemented.

As described in more detail in Chapter 6 and Appendix D, anthropogenic emissions from California and other United States and European sources have decreased substantially since 2001:

- Total reported emissions from California anthropogenic sources decreased by more than 50% between 2001 and 2008 (Table H.2). Reported emissions from several California emission sectors decreased between 2001 and 2008, particularly municipal and hazardous waste combustion, fuel combustion associated with energy production and industrial boilers, cement production, and oil and gas production.
- The decreasing mercury emission trends in California are consistent with trends nationwide. United States emissions decreased by almost 60% between 1990 and 2005, and by about 40% between 2005 and 2008.
- Similarly, emissions from Europe decreased by more than 60% between 1990 and 2005.

While anthropogenic emissions from several continents have decreased in recent years, mercury emissions from other continents, especially Asia, have increased in recent years. Emissions from Asia increased by more than 50% between 1990 and 1995, with less significant increases between 1995 and 2005. Emissions from Asia account for about 40% (in 1990) to nearly 70% (in 2005) of all global emissions.

Future changes in mercury emissions are dependent on several variables, including development of national and regional economies, development and implementation of technologies for reducing emissions, possible regulatory changes, and global climate change (AMAP/UNEP 2008). To learn about potential future trends in local and global anthropogenic mercury emissions, Water Board staff reviewed the following:

- Recent USEPA emission standards expected to result in mercury emission reductions from anthropogenic sources across the United States and in California and associated mercury emission reduction scenarios for 2016;
- Emission reduction scenarios for oxides of nitrogen [NO_X] and reactive organic gases (two ozone precursors), as well as diesel particulate matter, for 2020 developed by the California Air Resources Board (Cox et al. 2009);
- Mercury emission scenarios for 2020 developed by the United Nations Environment Programme (UNEP) and Artic Monitoring and Assessment Programme (AMAP) (AMAP/UNEP 2008).

The following three sections describe each of these in more detail. The fourth section provides percent reductions based on decreases observed since 2001 plus expected decreases if feasible controls are implemented. These may be used to calculate feasible TMDL allocations for anthropogenic emissions from California and global sources.

H.2.1 USEPA standards and predictions Emission Standards for Hazardous Air Pollutants From Coal-and Oil-Fired Electric Utility Steam

USEPA recently adopted several standards expected to result in substantial mercury emission reductions in the United States within the next ten years. Recent USEPA emission standards that target mercury emissions and their associated compliance schedules include:

- National Emission Standards for Hazardous Air Pollutants From Coal-and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units [Compliance date: 2015]
- 2011 National Emission Standards for Major Sources: Industrial / Commercial / Institutional Boilers and Process Heaters, and National Emission Standards for Area Sources: Industrial / Commercial / Institutional Boilers [Compliance dates: 2011 to 2014]
- 2010 National Emission Standards for Hazardous Air Pollutants From the Portland Cement Manufacturing Industry and Standards of Performance for Portland Cement Plants [Compliance dates: 2013 to 2017]
- 2005 National Emission Standards for Hazardous Air Pollutants for Iron and Steel Foundries [Compliance date: 2007]
- 2007 National Emission Standards for Hazardous Air Pollutants for Area Sources: Electric Arc Furnace Steelmaking Facilities [Compliance date: 2007]

Other recently adopted USEPA standards that will likely result in reduced mercury emissions in California and elsewhere in the United States include, but are not limited to, the Light-Duty Vehicle Tier 2 Rule, the Onroad Heavy-Duty Rule, the Mobile Source Air Toxics (MSAT) final rule, and the category 3 marine diesel engines Clean Air Act and International Maritime Organization standards.

USEPA modeling in support of the Final Mercury and Air Toxics Standard predicted a 60% decrease in United States anthropogenic mercury emissions between 2005 and 2016 (Table H.3) (Houyoux and Strum 2011). The greatest reduction (88%) is expected from electricity-generating utilities.

H.2.2 California-specific programs and predictions

California has the world's most progressive emission controls (Cox et al. 2009). These controls have resulted in significant air quality improvements despite substantial population growth. For example, even though population increased 33% and vehicle miles traveled increased 46% during 1988 through 2007, emissions of reactive organic gas and oxides of nitrogen (precursors to ozone and smog) decreased by about 57% and 34%, respectively. Also, as noted earlier, mercury emissions in California decreased by 50% between 2001 and 2008. The entire state now meets all State and national air quality standards with the exception of ozone and particulate matter. The California Air Resources Board has many programs designed to reduce smog, air toxics (especially diesel particulate matter), and greenhouse gas (GHG) emissions.

Reviews of past trends, forecasts, and implementation programs are in the 2009 edition of the California Almanac of Emissions and Air Quality (Cox et al. 2009) and a suite of State Implementation Plan, attainment plan, and district plan documents for smog (ozone precursors) and air toxics.[1] The ARB's Almanac forecasts take into account emissions data, projected growth rates, and future adopted control measures to calculate emissions in future years. For example, for 2000 to 2020, ARB forecasts 45% and 38% reductions in oxides of nitrogen [NO_X] and reactive organic gases, respectively (two ozone precursors), and 33% to 85% reductions in diesel particulate matter (Cox et al. 2009).[2] In addition, the ARB's cap-and-trade program for GHG emissions recently had its practice auction in August 2012, and its compliance obligations began in January 2013. The cap-and-trade program is one strategy California will employ to achieve its goals of reducing GHG emissions to 1990 levels by the year 2020, and ultimately achieving an 80% reduction from 1990 levels by 2050.[3] Although these programs do not target mercury specifically, substantial mercury reductions are expected from their implementation because many methods also reduce mercury.

In addition, reducing ozone formation is expected to have indirect benefits for mercury bioaccumulation. Reducing ozone formation would reduce the amount of reactive gaseous mercury in the atmosphere that is deposited in reservoir waters and subsequently methylated and bioaccumulated in aquatic food chains. Reactive gaseous mercury (RGM) is thought to be emitted primarily from anthropogenic point sources or formed by oxidation reactions of gaseous elemental mercury with ozone, hydroxyl radical, nitrate, hydrogen peroxide, and/or halogen containing compounds (Peterson et al. 2009). RGM is more likely than other mercury fractions to be converted to methylmercury that is bioaccumulated in aquatic food chains (Whalin et al. 2007). Ground-level ozone is a potent irritant that causes lung damage and a variety of respiratory problems; ozone is the main component of smog and is formed by the reaction of hydrocarbons with nitrogen oxides in the presence of sunlight (USEPA OTAQ 2007). In typical urban areas, a significant fraction of hydrocarbons comes from cars, buses, trucks, and non-road mobile sources such as construction vehicles and boats powered by hydrocarbon-based fuels such as gasoline and diesel; hydrocarbons include many toxic compounds that cause cancer and other adverse effects (USEPA OTAQ 2007). As a result, reducing vehicle exhaust

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[1] Federal clean air laws require areas with unhealthy levels of ozone, inhalable particulate matter, carbon monoxide, nitrogen dioxide, and sulfur dioxide to develop plans, known as State Implementation Plans (SIPs). SIPs are comprehensive plans that describe how an area will attain national ambient air quality standards and are not single documents. They are a compilation of new and previously submitted plans, programs (such as monitoring, modeling, permitting, etc.), district rules, state regulations and federal controls. Many of California's SIPs rely on the same core set of control strategies, including emission standards for cars and heavy trucks, fuel regulations and limits on emissions from consumer products. Please refer to the following ARB website for links to the SIPs, attainment plans and corresponding documents: http://www.arb.ca.gov/planning/sip/sip.htm

[2] Because the estimated risk from diesel particulate matter is higher than the risk from all other toxic air contaminants combined and poses the most significant risk to California's citizens, the ARB developed the Diesel Risk Reduction Plan with the goal of reducing concentrations by 85% by 2020 (Cox et al. 2009). The key elements of the Plan are to clean up existing engines through engine retrofit emission control devices, to adopt stringent standards for new diesel engines, and to lower the sulfur content of diesel fuel to protect new, and very effective, advanced technology emission control devices on diesel engines. Decreasing fuel sulfur content and related emissions also may reduce reservoir fish methylmercury levels, given water sulfate level affects fish methylmercury bioaccumulation. The Diesel Risk Reduction Plan addresses both old and new diesel-fueled motor vehicles and from stationary sources that burn diesel fuel.

[3] Executive Order S-3-05 by the Governor of the State of California on June 1, 2005 established the following GHG emission reduction targets for California: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; by 2050, reduce GHG emissions to 80 percent below 1990 levels

would lead to reductions in hydrocarbon emissions (a benefit for human health), which subsequently could reduce the formation of ground-level ozone (a second benefit for human health). Reducing the formation of ground-level ozone would reduce the formation of RGM, which would be a third benefit for human health by decreasing the amount of RGM to be methylated and bioaccumulated in aquatic food chains. Reductions in vehicle exhaust are expected as a result of the California-specific programs described in earlier paragraphs as well as implementation of federal fuel efficiency standards finalized in 2012 that will nearly double the fuel efficiency of cars and light-duty trucks by model year 2025 (USEPA 2012c).

H.2.3 Potential reductions for global anthropogenic mercury emissions

The United Nations Environment Programme (UNEP) and Artic Monitoring and Assessment Programme (AMAP) developed three emission scenario inventories for a target year of 2020 (AMAP/UNEP 2008) to gain insight into the implications of taking additional actions versus not taking additional actions to control mercury emissions:

- "The 'Status Quo' (SQ) scenario assumes that current *(2005)* patterns, practices and uses that result in mercury emissions to air will continue. Economic activity is assumed to increase, including in those sectors that produce mercury emissions, but emission control practices remain unchanged."
- "The 'Extended Emissions Control' (EXEC) scenario assumes economic progress at a rate dependent on the future development of industrial technologies and emissions control technologies, that is, mercury-reducing technology currently generally employed throughout Europe and North America would be implemented elsewhere. It further assumes that emission control measures currently implemented or committed to in Europe to reduce mercury emissions to air or water would be implemented around the world. These include certain measures adopted under the LRTAP Convention, EU Directives, and also agreements to meet IPCC Kyoto targets on reduction of greenhouse gases causing climate change (which will cause reductions in mercury emissions)."[4]
- "The 'Maximum Feasible Technological Reduction' (MFTR) scenario assumes implementation of all available solutions/measures, leading to the maximum degree of reduction of mercury emissions and its discharges to any environment; cost is taken into account but only as a secondary consideration."
(AMAP/UNEP 2008, pages 54-55)

The AMAP/UNEP study SQ scenario predicted that global emissions may increase by about 20% by 2020 if no major changes in emissions controls are introduced. The EXEC and MFTR 2020 scenarios predicted emission changes of -45% and -55%, respectively (Table H.4). The AMAP/UNEP estimated that the largest increase in mercury emissions will be from stationary combustion in Asia, mainly from coal combustion. The AMAP/UNEP study also predicted that emissions from North America and Europe would have little-to-no change in total amount between 2005 and 2020.

[4] Definitions: LRTAP—United Nations Economic Commission for Europe's Convention on Long-Range Transboundary Air Pollution; EU—European Union; IPCC—Intergovernmental Panel on Climate Change.

H.2.4 Reductions to incorporate in TMDL allocations

As noted in Chapter 7, Water Board staff recommends the statewide allocations for mercury deposition attributed to anthropogenic emission sources incorporate reductions based on emission reductions since 2001 plus feasible emission reductions predicted for the future. Table H.5 outlines predicted reductions for anthropogenic emission sources in California, based on emission reductions observed between 2001 and 2008 and predictions associated with nationwide and California-specific emission reduction standards and programs. Table H.4 outlines AMAP/UNEP study predictions for global anthropogenic emission reductions if all available emission controls are implemented.

In total, compared to the 2001 baseline, it may be feasible to reduce anthropogenic emission sources in California by two thirds (66%) and out-of-state (global) industrial emission by half (50%).

H.3 Runoff from Urbanized Upland Areas

Water Boards staff conducted a GIS-based review to assess the approximate number of communities that may include historic mine sites with potential for mercury contamination within their boundaries. As summarized in Table H.15, the review included:

- Census 2010 community boundaries (USCB 2012a and 2012b)
- Reservoirs formed by jurisdictional state and federal dams (DWR 2010a and 2010b)
- USGS's Mineral Resources Data System (MRDS) mines sites classified as producers, plants, or prospects where gold, mercury, or silver were identified as a commodity (USGS 2005)
- CDOC's Principal Areas of Mine Pollution (PAMP) database where potential for mercury contamination was identified (OMR 2000)
- USGS's Database of Significant Deposits of Gold and Silver in the United States (Long et al. 1998)

Table H.15 identifies all incorporated towns and cities and census designated places with three or more MRDS sites, and one or more PAMP or Significant Deposit sites. See section 7.2.3 in Chapter 7 for a summary and assessment of Table H.15 findings.

H.4 Runoff from Non-urbanized Upland Areas

As noted in Chapter 7, Water Board staff does not recommend including any new requirements for controlling runoff of watershed soils from non-urbanized areas because transport of watershed soils will be adequately controlled through existing, widespread erosion control programs. Tables H.6 through H.10 in this appendix identify the following:

- USEPA-approved sediment TMDLs
- Basin Plan water quality objectives and numeric objectives related to sediment

- Regional and other programs that impose erosion control requirements
- Guidance and other references for erosion control
- Statewide programs that impose erosion control requirements

Refer to section 7.2.4 for additional discussion and recommendations for addressing runoff from non-urbanized upland areas. Refer to section 7.2.1 for discussion and recommendations for addressing runoff of mining waste from mine sites and downstream areas.

H.5 Municipal and Industrial Facility Discharges

Section 7.2.5 in Chapter 7 identifies several considerations for developing an effective TMDL waste load allocation (WLA) approach for municipal and industrial facility discharges that raise the following questions:

- How do we define negligible dischargers?
- How do we define which dischargers are large sources of mercury to impaired reservoirs?
- How do we define good and excellent effluent quality and corresponding allocations?

The following sections address these questions and provide a basis for an effective WLA approach.

H.5.1 Definition of negligible mercury discharge

The source assessment found that the assessment of facility design flows is an adequate surrogate for the assessment of effluent mercury loads to determine whether facilities make significant mercury contributions to reservoirs (section 6.6.2). In addition, the source assessment determined that facility discharges regulated by general permits are negligible sources of mercury (see section 6.6 and Appendix F). However, there are also facilities with individual NPDES permits that have very small discharges.

Several agencies have considered the significance of facility discharges in terms of discharge flow, for example:

- The USEPA typically defines minor discharges as 1 MGD or less.
- The Central Valley Water Board's waste discharge requirements for dewatering and other low threat discharges to surface (Order R5-2013-0074, NPDES No. CAG995001) defines low threat as those discharges that have a daily average discharge flow less than 0.25 MGD or that are four months or less in duration.
- The State of Minnesota's 2012 *Permitting Strategy for Addressing Mercury in Municipal and Industrial Wastewater Permits* does not require effluent limits for minor municipal dischargers with wet weather average discharge less than 0.2 MGD (MPCA 2012).

Following the precedence of the Minnesota Permitting Strategy approach, which was used to implement their TMDL's aggregate waste load allocation, Water Board staff recommends facilities with design flows equal to or less than 0.2 MGD (rounded to one decimal place) be considered negligible sources of mercury to impaired reservoirs, and consequently not assigned waste load allocations or other mercury-specific control requirements. Water Board staff expects that implementation of other Reservoir Mercury Control Program actions will enable proposed fish methylmercury targets to be met without waste load allocations or mercury-specific control requirements for these negligible inputs.

In the absence of discharge or reservoir flow information, facility discharges should not be considered negligible. Some facilities with individual NPDES permits have intermittent discharges for which “design flow” is not defined in the permit. Water Board staff recommends that, if an individual NPDES permit does not define “design flow,” maximum observed discharge may be used to classify a discharge. If no discharge flow data are available, Water Board staff recommends the discharge be assigned a waste load allocation and other mercury control requirements, as described in the following sections. Similarly, if reservoir inflow data are not available, Water Board staff recommends upstream facility discharges be assigned waste load allocations and other mercury control requirements.

As presented in Appendix G, Water Board staff compiled available facility discharge and reservoir flow data for 303(d)-listed reservoir watersheds. We recommend that Water Board staff provide a technical report that provides reservoir inflow data and upstream NPDES facility design flows for all reservoirs throughout California with upstream NPDES facility discharges. Such a technical report would act as a reference for permit writers as they incorporate WLAs in individual NPDES permits for facility discharges directly to or upstream of reservoirs identified as mercury impaired in the future.

H.5.2 Definition of large and small mercury dischargers

Large discharger. The definition of a large discharger should be considered in terms of both a facility’s individual discharge and the sum of all facility discharges to and upstream of an impaired reservoir. The source assessment found that the sum of facility design flows is substantial (with respect to mercury loads) if the sum exceeds 1% of annual or dry season reservoir inflows. In addition, as noted earlier, USEPA typically defines minor discharges as 1 MGD or less.

Consequently, Water Board staff recommends large mercury dischargers be defined as those discharges with individual NPDES permits that have design discharge flows greater than 1 MGD and the sum of the NPDES-permitted facility discharges directly to or upstream of a reservoir exceeds 1% of the reservoir inflow. Additionally, if no discharge flow data are available, staff recommends facility discharges should be classified as large by default, because this is the most environmentally protective assumption.

Small discharger. Small dischargers are neither negligible nor large dischargers. Accordingly, Water Board staff recommends small mercury dischargers be defined as those discharges with individual NPDES permits that have either (a) design discharge flows greater than 0.2 MGD and less than or equal to 1 MGD, or (b) design flows greater than 1 MGD but the sum of the NPDES-permitted facility discharges to or upstream of a reservoir does not exceed 1% of the reservoir inflow.

H.5.3 Definition of good and excellent effluent quality and basis for allocations

San Francisco Bay approach. The San Francisco Bay mercury TMDL and watershed NPDES permit found effluent mercury concentrations to be effective for evaluating treatment performance and developing numeric effluent limits consistent with assumptions and requirements of the San Francisco Bay mercury TMDL (SFBRWQCB 2004, 2006, 2007, and 2012).

San Francisco Bay Water Board staff pooled effluent mercury data from representative sets of wastewater dischargers to calculate limits based on category of treatment and/or similar processes (SFBRWQCB 2007). They grouped data representative of the TMDL analysis period (2000-2003) into three categories: municipal secondary treatment, municipal advanced secondary treatment involving filtration, and industrial treatment. This reduced the likelihood of penalizing plants that implemented effective control measures and are already performing well, and rewarding other plants that may not have implemented similar measures. Their statistical analysis incorporated data from 17 secondary treatment plants (sample size of 984), 7 advanced secondary treatment plants (sample size of 434), and 5 petroleum refineries.

San Francisco Bay Water Board staff determined that the pooled mercury data for each of the three categories fit a log-normal distribution. They calculated average monthly, average weekly, and maximum daily effluent mercury limits for each of the three categories based on the 99.38th percentile (2.5 standard deviations above the mean), 99.57th percentile (2.625 standard deviations above the mean), and 99.87th percentile (3 standard deviations above the mean), respectively. These calculations resulted in mercury WLAs to three categories of wastewater dischargers to San Francisco Bay. A similar strategy was employed to calculate numeric effluent limits (WLAs) for three categories of wastewater dischargers for PCBs to comply with the San Francisco Bay PCBs TMDL (SFBRWQCB 2012).

Statewide approach. This section describes how we used the Bay approach on a statewide basis to develop TMDL waste load allocations that take into account facility treatment performance. San Francisco Bay Water Board staff stated it worked well to use concentration-based effluent limits to implement the Bay mercury and PCB TMDLs. For example, violations of effluent limits indicated poor performance, not random statistical anomalies. Further, San Francisco Bay and Central Valley NPDES staff recommended how the Bay approach could be simplified while still achieving the same intent.

In particular, San Francisco Bay and Central Valley NPDES staff recommended using a single average annual (calendar year) concentration-based waste load allocation, rather than numerous daily, weekly, monthly, and annual concentration-based and load-based limits and aggregate waste load allocation. Given the adverse effects of mercury occur through long-term bioaccumulation, an average annual allocation, with corresponding permit effluent limit, is appropriate for assessing performance. In addition, they recommended that in general we use a similar approach to categorize wastewater dischargers. This resulted in one category for municipal wastewater treatment plants (municipal WWTPs) and one category for other types of facilities, based on analysis described in the following paragraphs.

We evaluated the statewide data set described in the source assessment chapter and provided in Appendix Z to determine if the Bay approach could be used to develop waste load allocations on a statewide basis. As noted in section 6.6.1, we separated the effluent data into four statistically significantly different groups (Kruskal-Wallis test, $p<0.001$): municipal WWTPs, petroleum refineries, combined stormwater sewer systems, and all other facilities. Because no petroleum refineries or combined stormwater sewer systems occur upstream of any reservoirs or flood control basins in California, the rest of this evaluation focuses only on municipal WWTPs (107 facilities, 2016 samples) and other facilities (47 facilities, 409 samples).

We also evaluated differences between subgroups of municipal WWTPs to determine if there should be one or multiple allocation types based on treatment processes. There are significant differences between subgroups based on those with and without filtration and other advanced treatment processes. However, even though facilities with advanced treatment generally have lower effluent mercury concentrations, a surprising number of municipal WWTPs that do not employ filtration have lower effluent mercury concentrations than other WWTPs' tertiary treatment processes. This finding supports grouping municipal WWTPs into one category. See Figure H.1 illustrating effluent data for individual WWTPs, grouped by treatment category.

Next, we evaluated the distribution of effluent data for municipal WWTPs and other facilities. Our analysis indicated the data for each category fit a log-normal distribution (Figure H.2). Consequently, it is possible to calculate statewide performance-based limits based on select percentiles (Table H.11).

The Bay approach based the maximum daily, average weekly, and average monthly effluent mercury limits on the 99.87th percentile, 99.57th percentile, and 99.38th percentile, respectively. Allowable mercury concentrations decrease from daily to weekly to monthly; this approach allows for greater variance in mercury concentrations for shorter time periods.

In keeping with the Bay approach, we recommend that, based on calendar year average mercury concentration, good performance be defined as the 99th percentile, and excellent performance be defined as the 95th percentile. This proposed approach requires lower mercury concentrations from large mercury dischargers than from small mercury dischargers; i.e., large dischargers are expected to maintain excellent performance, and small dischargers are expected to maintain good performance.

These percentiles, combined with definitions of negligible and large mercury dischargers in the previous two sections, would result in the following waste load allocation assignments:

<u>Large dischargers</u>: Dischargers with individual NPDES permits that have either (a) design discharge flows greater than one million gallons per day (>1 MGD), and the sum of the NPDES-permitted facility discharges directly to or upstream of a reservoir exceeds 1% of the reservoir inflow, or

(b) unspecified flow volumes in the NPDES permits

- WLA for municipal WWTPs: 10 ng/L
- WLA for other types of facilities: 30 ng/L

- Small dischargers: Dischargers with individual NPDES permits that have either (a) design discharge flows greater than 0.2 MGD but equal to or less than 1 MGD, or (b) design flows >1 MGD but the sum of the NPDES-permitted facility discharges to or upstream of a reservoir does not exceed 1% of the reservoir inflow
    - WLA for municipal WWTPs: 20 ng/L
    - WLA for other types of facilities: 60 ng/L
- Negligible dischargers: (a) Dischargers subject to State and Regional Water Board general NPDES permits and (b) dischargers with individual NPDES permits that have design discharge flows equal to or less than 0.2 MGD. Negligible dischargers are not assigned a WLA and can discharge without a WLA or corresponding permit effluent limit for mercury.

These recommended WLAs would accomplish the following goals:

- Take into account that many dischargers already have implemented effective mercury control measures and are performing well.
- Apply more stringent limits to discharges that are relatively large mercury contributors.
- Provide a consistent set of WLAs (and associated permit effluent limits) that can be applied uniformly statewide.
- Ensure that facilities maintain proper operation, maintenance, and performance.

These proposed WLAs could result in treatment upgrades or other actions for facilities not performing well.

H.5.4 Assessment of treatment performance at individual facilities

The proposed waste load allocations described in the previous section are intended to require facilities with poor treatment performance to improve performance, and require excellent treatment performance for facilities with large discharges to or upstream of mercury-impaired reservoirs. To assess the rigor and feasibility of the proposed WLAs, Water Board staff evaluated the treatment performance of all facilities on an individual basis.

The evaluation is based on the statewide effluent mercury data set described in Chapter 6; i.e., the data set is not restricted to discharges to or upstream of reservoirs initially included in the Reservoir Mercury Control Program. A statewide approach makes sense for two reasons. First, effluent mercury data are not available for many facilities that discharge to or upstream of 303(d)-listed reservoirs. Second, the proposed WLAs are intended to apply to facility discharges to or upstream of reservoirs identified in the future as mercury impaired. The evaluation does not include effluent data for hydropower facilities and fish hatcheries. Discharges from hydropower facilities and fish hatcheries typically include substantial amounts of ambient surface water, which confounds assessment of their treatment performance.

We evaluated treatment performance for each facility by comparing calendar year average effluent mercury concentration values to the different WLA values (Table H.12). Of 116 municipal WWTP discharges evaluated:

- 97% have good performance, i.e., their calendar year average effluent mercury concentrations are less than 20 ng/L; and
- 94% have excellent performance, i.e., their calendar year average effluent mercury concentrations are less than 10 ng/L.

Of 36 other facilities evaluated (not including petroleum refineries and combined stormwater sewer systems), 100% have calendar year average effluent mercury concentrations less than both WLA values of 30 and 60 ng/L.

Conversely, 3% of the municipal WWTPs have at least one calendar year average effluent mercury concentration that exceeded the proposed WLA value of 20 ng/L, which indicates episodes of poor treatment performance. If any of these facilities were to discharge to or upstream of a mercury-impaired reservoir, they would be required to take actions to assess and reduce their effluent mercury concentrations.

Another 3% of the municipal WWTPs have at least one calendar year average effluent mercury concentration between 10 and 20 ng/L, which indicates episodes of good but not excellent treatment performance. If any of these facilities were to be classified as a large discharger to or upstream of a mercury-impaired reservoir, they also would be required to take actions to assess and reduce their effluent mercury concentrations.

This evaluation indicates that the proposed WLA approach is both rigorous and feasible.

H.6 Reservoir Water Chemistry Management

Section 7.3 and Table 7.1 describe Water Board staff predictions for where reservoir water chemistry management may reduce reservoir fish methylmercury levels in the 74 reservoirs initially included in this Reservoir Mercury Control Program. Table H.1 in this appendix provides supporting information for these predictions, in particular, the table columns titled “Reservoir conditions” and “Notes”. Please refer to section 7.3 for descriptions of data analyses and assumptions.

H.7 Reservoir Fisheries Management

Section 7.4 and Table 7.1 describe Water Board staff predictions for where reservoir fisheries management activities may reduce reservoir fish methylmercury levels in the 74 reservoirs initially included in this Reservoir Mercury Control Program. Table H.1 in this appendix provides supporting information for these predictions, in particular, the table columns titled “Reservoir conditions”, “Stocking information”, “Reservoir fish methylmercury review”, and “Notes”. In addition, Table H.13 defines the fish acronyms used in Table H.1, and Table H.14 and Figure H.3 summarize fish length and age data and relationships, which are cited in Table H.1. Please refer to section 7.4 for a description of data analyses and assumptions.