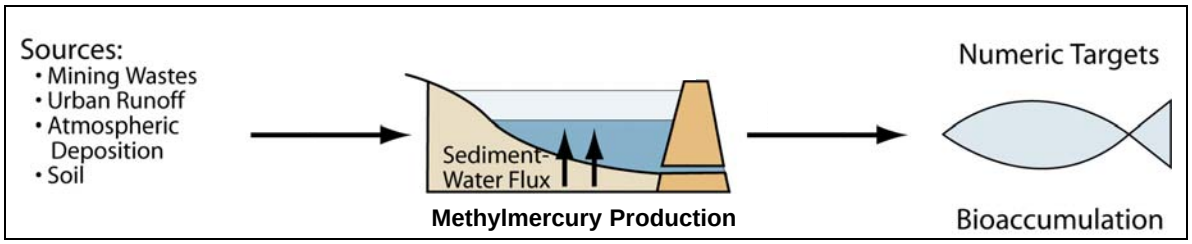
# Guadalupe River Watershed

# Mercury

# Total Maximum Daily Loads (TMDLs) Project

# Staff Responses to Comments




**California Regional Water Quality Control Board**
**San Francisco Bay Region**

**September 2008**

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# Introduction

This document provides Water Board staff's responses to oral and written comments on a proposed Basin Plan amendment and supporting Staff Report for a Total Maximum Daily Load (TMDL) and Implementation Plan for mercury in the Guadalupe River watershed.

We include responses to comments made during the May 14, 2008 Board hearing (Part 1) and written comments on the February 2008 version of the proposed Basin Plan amendment and supporting Staff Report (Part 2). Additionally, we include responses to Peer Review comments on the August 2007 version of the proposed Basin Plan amendment and supporting Staff Report (Part 3). Staff-initiated changes since February 2008 are described in Part 4.

We received fifteen comment letters on the February 2008 version of the proposed Basin Plan amendment and supporting Staff Report. We responded to these comments in several ways. Some comments prompted us to reevaluate our presentation of elements of the TMDL, and led us to clarify parts of the Basin Plan amendment or Staff Report. In some cases, we made more substantive revisions to the documents. We disagreed with some comments, and for those comments we provided detailed rationale in our responses. Importantly, none of these comments resulted in substantial changes to the implementation actions.

The key changes to the proposed Basin Plan amendment are as follows:

- **Allocations to Mercury Mining Waste**
- **Impaired Waters and TMDLs**
- **Clarified Strategy for Alamitos Creek**

A number of important issues were raised in the comment letters, some of them by multiple stakeholders. We review these major overarching issues in this overview. The issues are as follows:

- **What is expected of creekside property owners downstream of mines?**
- **Daily means daily**
- **The allocations to mercury mining waste do not account for dilution by cleaner sediments nor reflect mineralized areas**
- **Lexington Reservoir is not an appropriate reference site because it is not located in mineralized geology**
- **The October 15, 2008 date for submission of a coordinated watershed monitoring plan is impracticable.**

## Allocations to Mercury Mining Waste

In the February 2008 version we proposed two allocations to mercury mining waste of 0.1 and 0.2 mg mercury per kg erodible soil fines (dry wt., median). We received comments on the meaning of "erodible soil fines" and the derivation of these allocations. We eliminated the 0.1 mg/kg allocations, assigned the allocation more clearly to mercury mining waste (rather than soil), and defined erodible (see Table RTC-1).

### TABLE RTC-1: CHANGES IN NUMERIC Load and Wasteload Allocations

| Source | February 2008 Load Allocation | September 2008 Load Allocation |
|---|---|---|
| **Total Mercury Sources:** | | |
| Mercury mining waste discharged… | 0.1 & 0.2 mg mercury per kg erodable soil fines (dry wt., median)[a] | 0.2 mg mercury per kg mercury mining waste (dry wt., median)[a, b, c] |
| Mercury-laden sediment discharged from depositional areas … | 0.1 & 0.2 mg mercury per kg erodable soil fines (dry wt., median)[a] | 0.2 mg mercury per kg erodible sediment (dry wt., median)[a, b] |

February 2008 footnote:

a Soil fines (i.e., particulates, suspended sediment) are less than 63 microns in diameter. Erodable soil is the portion of bulk material that is potentially available for transport by storm runoff or already deposited in the stream. The erodable soil fines allocations are equal to the mercury suspended sediment TMDLs in Table 7-A.

September 2008 footnotes:

a Allocations to mercury mining waste and mercury-laden sediment are not cleanup standards. These allocations are equal to the mercury suspended sediment TMDLs in Table 7-A.

b "Erodible" means material readily available for transport by stormwater runoff to surface waters.

c The mercury mining waste allocation shall be measured in fines less than 63 microns in diameter.

We eliminated the 0.1 mg/kg allocation to mercury mining waste and mercury-laden sediment discharged from depositional areas downstream of mercury mines. We now propose a single allocation to mercury mining waste of 0.2 mg mercury per kg mercury mining waste (dry wt., median); and a single allocation to mercury-laden sediment of 0.2 mg mercury per kg erodible sediment (dry wt., median). Erodible means material readily available for transport by stormwater runoff to surface waters. This allocation applies to industrial process waste; it does not apply to soils that are not mercury mining waste.

We clarified that we are not establishing mercury cleanup standards for mine sites or depositional areas. Instead of establishing numeric goals, we propose to rely upon "best management practices" for erosion control, and rely primarily upon visual assessment of the effectiveness of these measures. The 0.2 mg/kg

allocation is based on the sediment target in the San Francisco Bay mercury TMDL. The allocation of 0.1 mg/kg is based on the reference reservoir for this TMDL project, and now only applies to nonurban stormwater discharges (i.e., non-mineralized, background areas), not to mercury mining wastes.

**Impaired Waters and TMDLs**

In the February 2008 version we proposed three TMDLs (0.1 mg/kg, 0.2 mg/kg, and 1.5 ng/l) to address waters of the Guadalupe River watershed except Los Gatos Creek and its tributaries upstream of Vasona Dam. U.S. EPA requested clarification of which waters are impaired. In response, we clarified that these TMDLs address seven impaired waters, and we eliminated the 0.1 mg/kg TMDL. These changes are shown in Table RTC-2. In contrast to the two TMDLs that address seven specific waters, the six allocations address source of mercury discharged to all waters of the Guadalupe River watershed.

*Table RTC-2 appears on the next page.*

**Clarified Strategy for Alamitos Creek, as follows:**

The Water Board's strategy for Alamitos Creek, which is highly polluted with mercury mining waste, is to encourage a cooperative effort among the District, local agencies, and creekside property owners to undertake a comprehensive creek bank stability and habitat restoration project. The Water Board encourages the District to be the technical lead for this project, and to seek funding for it. The Water Board will identify mercury cleanup as a grant funding priority for the San Francisco Bay region. Where necessary, the Water Board will invoke its cleanup authority to compel upstream dischargers who initially discharged mercury mining waste into depositional areas, to cleanup and abate mercury mining waste. Creekside property owners are responsible to provide reasonable access to the creek for project studies, construction, and monitoring, and to not take actions on their property that worsen the discharge of mercury mining waste into the creek.

### Table RTC-2: Total Maximum Daily Loads

| February 2008 | | September 2008 | |
|---|---|---|---|
| **Waters** | **TMDLs** | **Waters** | **TMDLs** |
| Waters upstream of reservoirs and lakes:<br>• Guadalupe Creek upstream of Guadalupe Reservoir<br>• Alamitos Creek<br>• Percolation ponds along these creeks<br>• Tributaries to these waters | 0.1 mg mercury per kg suspended sediment (dry wt., annual median) | Creeks and river:<br>• Guadalupe Creek<br>• Alamitos Creek<br>• Guadalupe River | 0.2 mg mercury per kg suspended sediment (dry wt., annual median) |
| Reservoirs and lakes:<br>• Guadalupe Reservoir<br>• Almaden Reservoir<br>• Calero Reservoir<br>• Lake Almaden | 1.5 ng total methylmercury per liter water (seasonal maximum, hypolimnion) | Reservoirs and lakes:<br>• Guadalupe Reservoir<br>• Almaden Reservoir<br>• Calero Reservoir<br>• Lake Almaden | 1.5 ng total methylmercury per liter water (seasonal maximum, hypolimnion) |
| Waters downstream of reservoirs and lakes:<br>• Guadalupe Creek downstream of Guadalupe Reservoir<br>• Los Gatos Creek downstream of Vasona Dam<br>• Canoas Creek<br>• Ross Creek<br>• Guadalupe River<br>• Percolation ponds along these creeks and the Guadalupe River<br>• Tributaries to these waters | 0.2 mg mercury per kg suspended sediment (dry wt., annual median) | | |

**Clarified Strategy for Alamitos Creek, as follows:**

The Water Board's strategy for Alamitos Creek, which is highly polluted with mercury mining waste, is to encourage a cooperative effort among the District, local agencies, and creekside property owners to undertake a comprehensive creek bank stability and habitat restoration project. The Water Board encourages the District to be the technical lead for this project, and to seek funding for it. The Water Board will identify mercury cleanup as a grant funding priority for the San Francisco Bay region. Where necessary, the Water Board will invoke its cleanup authority to compel upstream dischargers who initially discharged mercury mining waste into depositional areas, to cleanup and abate mercury mining waste. Creekside property owners are responsible to provide reasonable access to the creek for project studies, construction, and monitoring, and to not

take actions on their property that worsen the discharge of mercury mining waste into the creek.

**Do not adopt the TMDLs until creekside property owners downstream of mercury mines have been informed about them.**

Water Board staff conducted a public meeting in September 2008 for residential property owners along and nearby upper Alamitos Creek, in response to this and similar requests made at the May hearing and in written comments. The goal of the public workshop was to explain the TMDL project to residential property owners and communicate what their roles and responsibilities will be under the TMDL. Staff answered verbal questions at the meeting, and in Appendix A we provide responses to questions from the meeting.

**Daily means daily**

We used a concentration-based approach for TMDLs, rather than a daily mass load, which several parties commented on. In response to their comments, we revised Section 8 to provide a daily load expression in grams per day (g/d).

**The allocations to mercury mining waste do not account for dilution by cleaner sediments; it is not reasonable to set the same sediment mercury standards for mineralized (deposits containing naturally occurring sediment mercury) and non-mineralized areas**

It is not our intent to assign numeric mercury limits to suspended sediment discharge, but rather to implement erosion control for the significant sources and to demonstrate effectiveness through proper installation and maintenance. This is why, despite changes to the TMDLs and allocations, the implementation plan did not change significantly since February 2008.

We explained the technical basis for the allocations in the supporting Staff Report. Currently, there is insufficient information to support revising the allocation to mercury mining waste to account for dilution by cleaner sediments, despite the fact that we are relying on these cleaner sediments to cover mercury mining waste in the bottom of reservoirs. Similarly, there is insufficient information on pre-mining conditions in the mineralized zone. However, with future scientific information, we may be able to propose a revised and substantially higher allocation to mercury mining waste, in accordance with adaptive implementation.

**Lexington Reservoir is not an appropriate reference site because it is not located in mineralized geology**

We explained that both a Technical Review Committee, composed of recognized mercury experts, and the Peer Reviewers, selected by an independent third party, support the use of Lexington Reservoir as a reference reservoir for this TMDL project.

**The October 15, 2008 date for submission of a coordinated watershed monitoring plan is impracticable.**

We extended the due date to October 15, 2009, because monitoring of loads to San Francisco Bay should resume as early as possible—for the 2009-2010 wet season. Section 9.9 of the supporting Staff Report provides extensive details on required monitoring. This, together with previous sampling plans for mercury in the watershed, should make for a minimal amount of work to develop the sampling plan. In Appendix C, we provide an example California Water Code § 13267 Technical Report Requirement for Coordinated Watershed Monitoring. This, together with previous memoranda of understanding (MOUs) between some of the parties for monitoring and other projects (i.e., San Francisco Bay Regional Monitoring Program), should make for a minimal amount of work to develop the MOU. These parties have known since at least the release of the January 2006 TMDL Staff Report they would be expected to either participate in coordinated watershed monitoring or to conduct monitoring individually, if not before.

# Part 1

## PUBLIC COMMENTS:

**Michael Boulland (resident, Town of New Almaden)**

**Michael Cox (New Almaden expert and resident, Town of New Almaden)**

**Roberta Lamons (resident, Town of New Almaden)**

**Steve Ritchie (South Bay Salt Ponds Restoration Project)**

**Beau Goldie (Santa Clara Valley Water District)**

**Kirk Lennington (Midpeninsula Regional Open Space District)**

**Andrew Kenefick (Guadalupe Rubbish Disposal Co.)**

**Lisa Killough (Santa Clara County Parks)**

**Andria Ventura (Clean Water Action)**

**Baykeeper (Sara Aminzadeh)**

## BOARD MEMBER COMMENTS:

**Rameshwar Singh**

**Shalom Eliahu**

**Steven M. Moore**

**James McGrath**

**Rameshwar Singh**

**Terry F. Young, Vice Chair**

**James McGrath**

**William E. Peacock**

## Part 1: Staff responses to verbal comments at the May 14, 2008 public hearing

This section addresses comments received from the public at the May 8, 2008 Water Board testimony hearing on the Guadalupe River watershed mercury TMDL project. The full text of these statements is included in Appendix F (to the staff summary report for the October 8, 2008 Board agenda item no. 7). Revisions made to the draft proposed Basin Plan amendment and supporting Staff Report are indicated in underline/strikeout in Appendices D & E herein.

### Responses to public comments:

**Michael Boulland (resident, Town of New Almaden) requested that adoption of the TMDL be delayed until after residential property owners know about the TMDL.**

Water Board staff conducted a public meeting in September 2008 for residential property owners along and nearby upper Alamitos Creek, in response to this and similar requests made at the May hearing and in written comments. The goal of the public workshop was to explain the TMDL project to residential property owners and communicate what their roles and responsibilities will be under the TMDL. Staff answered questions at the meeting, and in Appendix A we provide responses to questions from the meeting.

**Mr. Boulland also suggested that the proposed Basin Plan amendment be re-written, and cited our Walker Creek mercury TMDL as an example to follow for its clear implementation methods.**

Mr. Boulland subsequently clarified he was citing our reliance on "best management practices" in the Walker Creek mercury TMDL. "Best management practices" are the standard for erosion control, both in the Walker Creek and Guadalupe River watershed mercury TMDL projects.

Erosion controls were completed at the Gambonini mercury mine in Walker Creek prior to the first draft of that TMDL. We modeled the Guadalupe mercury mine implementation actions after the methods used at Gambonini (and at Almaden Quicksilver County Park). For example, in Section 9.1, *Mercury Source Control Actions for Mining Waste*, we describe the goal for mercury mine sites as the following, "… the goal is to prevent further erosion of mercury mining waste by stabilizing and vegetating slopes".

Similarly, we modeled the Walker reservoir actions on the steps the Santa Clara Valley Water District (District) has taken for their Guadalupe reservoirs. Only a few water and fish samples have been collected from Soulajule Reservoir along Walker Creek, whereas the District's reservoir actions are well advanced.

However, there is less similarity in the implementation actions required for downstream depositional areas. Both these TMDLs seek to minimize erosion or resuspension of mercury-laden sediment.

Specifically, the Walker Staff Report, on p. 56, describes that "…site-specific management measures to prevent, to the maximum extent practicable, erosion or resuspension of mercury-laden sediment … [a]pplicants seeking coverage under [waste discharge requirements] or [conditional waivers of waste discharge requirements] to control pathogens, nutrients or sediments in the Walker Creek watershed must also incorporate Best Management Practices (BMPs) to limit unnecessary increases in total, methyl or particulate mercury production or discharges." (SFBRWQCB 2007). Site-specific actions are appropriate for Walker's geomorphology (long stretches of incising creek channel), the far smaller amount of mercury mining waste discharged from Gambonini compared to New Almaden, and Walker's mostly single land use (grazing).

The land use in Walker Creek is primarily grazing, which is quite different from the mix of land uses in Guadalupe. The Water Board recently issued a conditional waiver of waste discharge requirements for grazing lands in Walker and surrounding watersheds. For example, simply fencing the cattle out of the creek (an option under this waiver) will greatly reduce mercury discharges in Walker. In contrast, a conditional waiver of waste discharge requirements is impractical for Guadalupe, given the widely varying land uses along these waters.

Additionally, nearly all the ore from the New Almaden Mining District for about the first century of operations was processed at the Hacienda Furnace Yard, making it the largest mercury processing facility in California. Consequently, a comprehensive mercury cleanup and creek restoration project is needed in Alamitos Creek downstream of Hacienda, rather than site-specific actions as called for in Walker Creek.

Mr. Boulland included comments in his April 2008 comment letter regarding outreach to local residents. We respond to his request for outreach above, and his other written comments in Part 2 of this document.

**Michael Cox (New Almaden expert and resident, Town of New Almaden)**

Mr. Cox described his involvement with New Almaden, which dates from 1974 when he was hired by the County to close mine shafts. Mr. Cox is a recognized expert on mercury mines, particularly New Almaden. Mr. Cox led the County's effort to characterize the most toxic sites in Almaden Quicksilver County Park—an extensive sampling program—in the late 1980's. Similar to Mr. Boulland, Mr. Cox requested that adoption of the TMDL be delayed until local residents know

about the TMDL project. As described in response to Mr. Boulland, staff conducted a public workshop in September 2008.

**Mr. Cox also requested that the TMDL be delayed to incorporate the findings from recent research.**

We believe that delay is not justified at this time because of our adaptive implementation process. We provide specific questions to be addressed in the adaptive implementation portion of the implementation plan. The first questions are, "Is there new, reliable, and widely accepted scientific information that suggests modifications to targets, allocations, or implementation actions? If so, how should this TMDL project be modified?"

**Mr. Cox questioned the TMDL and allocation for the mine site, "I am having a lot of trouble with the sediment quality goal. …We have 0.2 mg/kg at the Bay, but we have 0.1 mg/kg at the mine."**

We revised the proposed Basin Plan amendment (*Tables 7-A & 7-B*, and *Implementation Plan*) and Section 8.1 (*Mining Waste Total Mercury Allocation*), in response to Mr. Cox and others' comments. We revised the mining waste allocation to 0.2 mg/kg, as described in detail in our response to Parks comment no. A.5 (in Part 2 of this document). We revised the proposed Basin Plan amendment (*footnote a in Table 7-B*) and corresponding Section 9 of the Staff Report to clarify that we are not establishing a mercury cleanup standard for mine sites or depositional areas.

In his written comments, Mr. Cox succinctly captured the TMDL requirements: it is not our intent to assign numeric effluent limits to suspended sediment discharge, but rather to implement erosion control for the significant sources and to demonstrate effectiveness through proper installation and maintenance (see Cox comment no. 7 in Part 2).

The allocation of 0.2 mg/kg at the Bay is based on the sediment target for the San Francisco Bay mercury TMDL. The allocation of 0.1 mg/kg is based on the reference reservoir for this TMDL project, and now only applies to nonurban stormwater discharges (i.e., non-mineralized, background areas), not to mercury mining wastes.

**Mr. Cox questioned why the pre-mining concentration gradient from the mines to the Bay was not fully characterized. He also noted that from about 1845 to 1916, "something on the order of 200,000 kg of mercury and one billion kg of waste was discharged in Alamitos Creek and flushed downstream".**

One approach to TMDLs is to characterize the pre-industrial conditions, and use them as the basis of targets and allocations. There is no one approach for any TMDL. The large volume of mining waste in the watershed makes it difficult to establish pre-mining conditions, which is one reason we chose a different approach.

**Mr. Cox stated, "… it appears to me that 80 percent of the money is going to more studies instead of mass removal. We certainly as a community, and I myself personally agree, that mass removal is very important here. …"**

We disagree; monitoring and studies are less than 1% of the implementation costs (see Table 10.3, Summary of Estimated Costs for [TMDL] Implementation.) Our detailed response can be found in Part 2, in response to District comment no. 2.1.

**Mr. Cox again requested that the TMDL be delayed to work out "… some of the issues with the TMDL … You have not talked about the permits, you have not talked about what exactly is being done to ratchet down, say, for example, the park storm water permit."**

Our approach for mercury mine sites, described in the February 2008 proposed Basin Plan amendment, is to "implement the load allocations through Water Code §§ 13267 and 13304 orders to compel investigation, cleanup and monitoring, as well as through Basin Plan Section 4.21.4 to the extent applicable".

**Lastly, Mr. Cox noted, "…there is no daily load in the TMDL. …"**

We used a concentration-based approach for TMDLs, rather than a daily mass load, which several parties commented on. In response to their comments, we revised Section 8 to provide a daily load expression in grams per day (g/d). Our detailed response can be found in Part 2, in response to GRDC comment no. 1.

Several times during his comments Mr. Cox offered to work with Water Board staff and others to resolve these issues. We worked with him, Mr. Boulland, and the District in planning for the September 2008 public workshop on the TMDL.

Mr. Cox included some of the above comments in his April 2008 comment letter. We respond to his other written comments in Part 2.

## Part 1: Staff responses to verbal comments at the May 14, 2008 public hearing

**Roberta Lamons (resident, Town of New Almaden)**

**Dr. Lamons expressed concern that, "[t]he detailed scientific studies mentioned in the report did not include predictions or plans for chemically testing the sediments before and after and during remediation, which [is essential to remediation].**

> We agree that chemical testing is appropriate for typical hazardous waste site cleanups, which commonly include excavation and offsite disposal of contaminated materials. We discuss the applicability of this approach for mercury mine sites in Section 9.10 of the supporting Staff Report. However, we think that such testing will not be needed for many sites, such as those for which revegetation will contain the mining waste on the landscape, and prevent erosion into surface water.

**Additionally, Dr. Lamons expressed concerns relating to mercury cleanup projects at mine sites. "We do not want to deposit more mercury in the air, even though the calcines in Jacques Gulch [an area of Almaden Quicksilver County Park planned for mercury cleanup and creek restoration] do not have a lot, and not a lot would be deposited in the air."**

> We disagree that these earth-moving projects, which are designed to reduce contamination in runoff, will emit significant amounts of mercury-contaminated dust. The permits for these projects, issued by the Water Board and other agencies, will require implementation of best management practices to minimize and control dust and monitoring to evaluate the effectiveness of dust control. The District and Parks are undertaking these projects. Their staff and contractors are experienced in properly deploying the appropriate control measures.
>
> Dr. Lamons repeated other comments from her April 2008 letter. She disputes the scientific basis of these TMDLs. We respond to her written comments in Part 2.

**Steve Ritchie (South Bay Salt Ponds Restoration Project)**
**Mr. Ritchie is the Executive Project Manager of the Coastal Conservancy's South Bay Salt Ponds Restoration Project. Previously, he was Executive Officer of the Water Board. He acknowledged how difficult this mercury problem is in the Guadalupe and Bay, and voiced his support for implementation actions which keep mercury on the landscape and out of the water. "…I would urge moving forward as rapidly as possible with the TMDL to make sure we eliminate [continued discharge of mercury mining waste] because we will be spending in the billion dollars plus downstream, trying to make the Bay as good as we can make it. And one way to do that is to eliminate the source of mercury from the Guadalupe."**

> Staff concurs.

## Part 1: Staff responses to verbal comments at the May 14, 2008 public hearing

**Beau Goldie (Santa Clara Valley Water District)**

**Mr. Goldie urged us to continue our partnership, and to focus on implementation actions.**

> Water Board staff are committed to our partnership with the District. In July 2008, Water Board and District staff met to discuss the District's comments and on the Staff Report and proposed Basin Plan amendment. The meeting was extremely productive and consensus was reached on the timing and scope of the implementation actions the District will be responsible for under this TMDL. The District was instrumental in helping Water Board staff plan and conduct public outreach for the September 2008 public workshop for private property owners along Alamitos Creek. We are committed to working closely and productively with the District into the future.
>
> We think that the TMDL is focused on implementation; monitoring and studies are less than 1% of the implementation costs (see Table 10.3, Summary of Estimated Costs for [TMDL] Implementation.) Our detailed response can be found in Part 2, in response to District comment no. 2.1.
>
> The District submitted a lengthy comment letter, which we respond to in detail in Part 2.

**Kirk Lennington (Midpeninsula Regional Open Space District)**
**Mr. Lennington is a Senior Planner of the Midpeninsula Regional Open Space District. His agency supports the TMDL, although they are concerned about coordinating monitoring with so many disparate interests.**

> Staff understands that coordinating amongst many disparate interests is challenging, but we think we have provided sufficient financial incentive to overcome these challenges. Additionally, we initiated discussions with the District on best ways to achieve a coordinated and cost-effective approach to monitoring.

## Part 1: Staff responses to verbal comments at the May 14, 2008 public hearing

**Andrew Kenefick (Guadalupe Rubbish Disposal Company)**

Mr. Kenefick is Senior Legal Counsel of Waste Management's Western Group Legal Department. Waste Management owns Guadalupe Rubbish Disposal Company (GRDC) and submitted a lengthy comment letter. Mr. Kenefick repeated several comments from GRDC's letter.

**Mr. Kenefick re-stated GRDC's written comment no. 1: The TMDL does not satisfy the Clean Water Act's requirement that TMDLs must be based on a daily limit.**

We used a concentration-based approach for TMDLs, rather than a daily mass load, which several parties commented on. In response to their comments, we revised Section 8 to provide a daily load expression in grams per day (g/d). Our detailed response can be found in Part 2, in response to GRDC comment no. 1.

**Mr. Kenefick discussed GRDC's concerns with an "erodible soil" standard, as expressed in GRDC's written comment nos. 2 & 4, as follows.**

> **GRDC asserts that a TMDL cannot be based on mercury concentration in "erodible soil." … The loading capacity reflects the maximum amount of a pollutant that may be delivered to the waterbody and still achieve water quality standards." EPA Region 9, *Guidance for Developing TMDLs in California* at 4 (Jan. 7, 2000) …**
>
> **The "maximum amount" must be determined based on how much mercury is discharged to the system, and cannot be based on the concentration of mercury in the soil, *i.e.*, one cubic yard of heavily contaminated erodible soil may result in a lower total discharge of mercury than a millions of cubic yards of lightly contaminated soil. … Even if a TMDL based on mercury concentrations in erodible soils were lawful, the standard is unworkable as a practical matter. How does one determine which soils are "erodible?" Aren't all soils erodible to some degree?**

**Mr. Kenefick continued this line of questions, and asked, "[A]s a landowner, … what does it mean? … If you go out there and you test your soil and you find that [mercury concentrations exceed the allocation of either 0.1 or 0.2 mg/kg], what do you do? Do you have to excavate it out? Do you have to vegetate it? What if it is on a hillside? What if it is not on a hillside? Is it now potentially subject to erosion? … I was pleased to [learn from the staff presentation] … that it is not intended to be a cleanup standard. …"**

No, <u>soil</u> mercury concentrations above the allocations do not trigger any requirements under this TMDL. This TMDL project distinguishes between surface soil undisturbed by mining and "mining waste". Implementation actions

are only required at mine sites to abate discharges of mercury from mining waste to surface waters. No actions are required for surface soil undisturbed by mining.

**Mr. Kenefick stated that GRDC does support the sequence of actions as proposed, to address upstream sources of mercury mining waste before addressing downstream sources. "It does not make any sense to focus all of your cleanup efforts downstream, only to have the recontamination occur from the upstream sources. We know it is a challenge, we also know that the time needed to accomplish the cleanup could be substantial. The mercury has been there for a long and it may take some time to solve the problem."**

We appreciate GRDC's support of the proposed implementation phasing.

GRDC included these and many other comments in their April 2008 comment letter. We respond to their numerous written comments in Part 2.

**Lisa Killough (Santa Clara County Parks)**

Ms. Killough is the Director of the Santa Clara County Parks and Recreation Department (Parks), which owns the vast majority of the New Almaden Mining District. Upon purchasing the land in the 1970's, the Parks assumed liability for New Almaden's mercury legacy.

**Ms. Killough described Parks' considerable efforts to cleanup calcines, roasted mercury ore, in Almaden Quicksilver County Park.**

Chairman Muller acknowledged Parks' cleanup actions, and the scope of this legacy mercury problem. For a detailed description of the Parks' cleanup actions, see Staff Report Section 3.5, *Cleanup of Almaden Quicksilver County Park, Remaining Cleanup Challenges in Almaden Quicksilver County Park,* and *Natural Resources Damage(s) Assessment*.

Calcines are one form of mercury mining waste, but this TMDL requires erosion control for all forms of mining waste that are eroding into surface waters (see definition of mining wastes in Section 8.1).

## Part 1: Staff responses to verbal comments at the May 14, 2008 public hearing

**Ms. Killough expressed Parks' concerns about how the mining waste allocation will be applied, the extent of additional cleanup Parks will be required to undertake and fund, potential adverse effects on habitat, and requested greater flexibility in implementation.**

We revised the Staff Report and proposed Basin Plan amendment (*Implementation Plan*), in response to comments regarding allocations to mining waste and potential habitat destruction, as described herein.

We described in response to Mr. Cox that the mining waste allocation is not a cleanup standard, and in response to Mr. Kenefick, described that this allocation applies to mercury mining waste. In other words, we are regulating the discharge of industrial process waste from mining; we are not regulating the natural erosion of soil. We revised the Staff Report and the proposed Basin Plan amendment (*footnote a in Table 7-B*) to clarify that we are not establishing a mercury cleanup standard for mine sites or depositional areas. This revision should help to clarify the extent of additional cleanup Parks will be required to undertake. (The extent is limited to areas where mercury mining waste is eroding into surface waters. However, the full extent will not be known until Parks completes the first task in the implementation plan, a site investigation to evaluate the erosion potential of mercury mining waste by December 31, 2009.)

We revised the Staff Report in response to Parks' comments regarding potential habitat destruction. Although the previously described revision should clarify that no actions are required for areas of natural serpentine soils, which ensures this habitat will be protected, we also revisited our regulatory analysis. We revised Sections 10.3–10.5 (from the February 2008 version) pertaining to analysis required by the California Environmental Quality Act (CEQA), to more completely describe how impacts to habitat and special status species will be minimized.

Specifically, we have revised the Environmental Checklist and explanations sections pertaining to air quality, biological resources, cultural resources, geology and soils, hazards and hazardous materials, hydrology and water quality, and mandatory findings of significance. We added a new section to describe the regulatory framework , revising the descriptions of the environmental protections afforded by the California Water Code, Clean Water Act Section 401 certification process, County of Santa Clara's comprehensive grading ordinance, and permit requirements and project oversight provided by state and federal environmental protection agencies.

In response to Parks' comments requesting flexibility in implementation, we provide flexibility in several ways, such as by *not* specifying the means of compliance, and through our adaptive implementation process.

Parks included these comments in their lengthy April 2008 comment letter. We respond to their other written comments in Part 2.

**Andria Ventura (Clean Water Action)**

Ms. Ventura is the Program Manager of Clean Water Action and Clean Water Fund, and also spoke on behalf of Environmental Justice Coalition for Water.

**Ms. Ventura expressed Clean Water Action's concerns that the TMDLs and proposed water quality objectives are not set at levels that protect subsistence fishers (142.4 g/d), that no exposure reduction activities are required, and that we do not have or plan to collect actual fish consumption rates for this watershed.**

We revised Section 9.7, Adaptive Implementation, in response to this comment, by expanding on the focusing questions to be developed for the adaptive implementation review.

Ms. Ventura referred to the U.S. EPA's default subsistence fisher consumption rate of 142.4 g/d. Our proposed water quality objectives are set at levels that protect consumers up to four meals per month (32 g/d). This consumption rate is greater than or equal to what 95% of all Bay Area anglers reported consuming in a very comprehensive consumption survey of fishers in San Francisco Bay (CDHS & SFEI 2000, 2001).

This study showed that the majority of people who eat fish from the Bay do so safely, without exceeding the health advisory recommendations. However, about one in ten eats more than the recommended amount. Among ethnic groups, Asian anglers stand out as a group of concern due to their large numbers, consumption rates, and methods of preparation and consumption. Anglers' likelihood of eating over the advisory limit varied with ethnicity, with Asians and African Americans more likely than other ethnic groups to eat above the limit. The authors of the study expected to find a correlation between high consumption of Bay fish and a low level of income and/or education, but they did not.

We think this Bay study is a reasonable estimate of consumption from the watershed. Although fish species and seasonal abundance differ between the Bay, Guadalupe River, Lexington Reservoir, and Vasona Lake, access for fishing these waters is similar and relatively easy. In contrast, access to fishing in the other upper watershed reservoirs (Guadalupe, Almaden, and Calero) is more difficult because they are located greater distances from freeways, and of these three, fishing is only allowed at Calero, but restricted to catch and release due to elevated mercury. Using the same consumption rate is one key aspect of

integration between the Delta, Bay, and Guadalupe mercury TMDLs; integration of these TMDLs is required by the State Water Board.

Ms. Ventura commented on lack of exposure reduction activities. Currently, exposure reduction activities consist of signs warning to not consume fish from waters downstream of New Almaden Mining District. These signs are essential to reduce human exposure, given the high mercury levels in fish. Consequently, signs are even posted at Guadalupe and Almaden reservoirs, which are not open for fishing. But, people fish anyway, and people also vandalize the signs. However, based on our discussions with Clean Water Action for the San Francisco Bay mercury TMDL, we believe their concept of "exposure reduction" relies on actions outside the authority of the Water Boards, such as providing alternate sources of fish and/or medical care.

We are further concerned that exposure reduction activities may be interpreted incorrectly, and that the public may be led to believe that watershed fish are safe to eat, even if only occasionally. It is critical that people know these fish are not safe to consume in any amount; they are some of the most mercury-contaminated fish found anywhere in California. In any case, we are willing to reconsider exposure reduction—within the limits of Water Board authority—at the end of Phase 1 of implementation, in accordance with the adaptive implementation process, and we revised Section 9.7 accordingly (as described in the first paragraph of this response).

Regarding plans to conduct local consumption surveys, we plan to rely on the State Water Board. The State Board is currently working on new mercury water quality objectives, and will have to consider local consumption rates, and how they may vary across California. We keep in close contact with the State Board on this project, and know they are giving careful consideration to using the same consumption rate as in the Delta, Bay, and Guadalupe mercury TMDLs (32 g/d, and a level of 0.2 mg/kg in fish that humans consume). If they adopt a higher consumption rate, hence lower fish mercury concentration, we will need to revise the Bay, Guadalupe, and Walker mercury TMDLs and water quality objectives.

Clean Water Action included these comments in their April 2008 comment letter. We respond to their other written comments in Part 2.

**Baykeeper (Sara Aminzadeh)**

Ms. Aminzadeh, a legal fellow at Baykeeper, could not attend this hearing. Ms. Ventura complied with Chairman Muller's request that she read Ms. Aminzadeh's comments into the record.

## Part 1: Staff responses to verbal comments at the May 14, 2008 public hearing

**Baykeeper feels it is particularly important to consider aerial sources in the Guadalupe River Watershed TMDL because as legacy mining mercury is addressed over time, ongoing local aerial sources will become a larger piece of the puzzle.**

> We revised Section 9.7, Adaptive Implementation, in response to this comment, by expanding on the focusing questions to be developed for the adaptive implementation review.
>
> New Almaden was the fifth-largest mercury mine in the world, and much of the waste was disposed of in creeks. This level of pollution makes it impossible to distinguish additional effects from local aerial sources. It will take the full twenty years planned for implementation to cleanup the mercury-laden sediment in creeks downstream of New Almaden. Nonetheless, we are willing to reconsider the importance of mercury from sources other than mining at the end of Phase 1 of implementation, or later, in accordance with the adaptive implementation process; we revised Section 9.7 accordingly (as described in the first paragraph of this response).

**Baykeeper noted that in the San Francisco Bay TMDL the Board has stated that the Bay Area Air Quality Management District "should conduct a local mercury emissions inventory and investigate the significance of local mercury air emissions." … Staff has informed us that this provision in the San Francisco Bay TMDL is intended to cover the Guadalupe River Watershed. However, in our opinion, the phrase "local" does not clearly define the scope of that mandate to include the Guadalupe Watershed.**

> "Local" in the Bay mercury TMDL includes the entire Bay watershed and airshed. The Guadalupe River watershed is located within the Bay watershed and airshed. Therefore, the mercury emission inventory and investigation component of the Bay mercury TMDL implementation plan applies to, and is inclusive of, the Guadalupe River watershed and airshed.

**Baykeeper requested, given that this TMDL is designed specifically to address the Guadalupe Watershed, we request that similar language be added to the Guadalupe TMDL, specifying the Guadalupe Watershed as a local area particularly in need of inventory and investigation. At a minimum, the TMDL should cross reference the atmospheric deposition section in the SF Bay TMDL, to clarify that it is intended to cover the Guadalupe Watershed.**

> We disagree that the Guadalupe River watershed and airshed are particularly in need of inventory and investigation of local mercury air emissions, due to the amount of mercury mining waste already in the waters (see our response to Baykeeper's first comment). The proposed Basin Plan amendment already cross

references the Bay mercury TMDL, in the Implementation Plan, *Mercury Source Control Actions*, "the implementation plan for … atmospheric deposition … is contained in the San Francisco Bay mercury TMDL."

**Baykeeper echoed Clean Water Action's comments regarding subsistence fishing and agreed that a target that only allows people to eat fish out of the watershed one meal per week may not be appropriate. The Board does have a responsibility to investigate fishing practices in the Guadalupe watershed and implement exposure reduction strategies as needed.**

We described in response to Clean Water Action's comments that one meal per week is the same consumption rate as in the Bay and Delta (and Walker Creek) mercury TMDLs; that we relied on an excellent and detailed fish consumption survey for San Francisco Bay; and that we are willing to reconsider exposure reduction strategies, about ten years hence, through the adaptive implementation process.

## Part 1: Staff responses to verbal comments at the May 14, 2008 public hearing

### Responses to comments from Board Members:

This section addresses concerns raised by Board Members at the May 8, 2008 Water Board testimony hearing on the Guadalupe River watershed mercury TMDL project. Dr. Thomas Mumley, Assistant Executive Officer, and Ms. Carrie Austin, Project Manager and Water Resources Control Engineer, answered some questions during the meeting. Those questions and staff responses are recorded in the hearing transcript and are included in Appendix F (to the staff summary report for the October 8, 2008 Board agenda item no. 7). Staff responses to the other concerns expressed by the Board are provided in this section. Revisions made to the draft proposed Basin Plan amendment and supporting Staff Report are indicated in underline/strikeout in Appendices D & E herein.

**Board Member Eliahu voiced his support for the proposed Basin Plan amendment and urged action (i.e., Board adoption).**

**Board Member McGrath noted that total mercury is not the metric that we are going to use for all time as we begin to understand the process of mercury. He suggested we need to begin to move away from total mercury towards methylmercury and perhaps to reactive mercury. The problem with using total mercury is, once there is enough to initiate bioaccumulation, the landscape and factors like grain size, the precise geochemistry, particularly carbon, organic carbon, sulphur and iron, all matter more than concentrations of total, as well as the food chain and the nature of the food chain. So we need as we move forward to begin to reflect the adaptive management process into picking these things up and beginning to use them as metrics.**

Staff proposes to establish both total mercury and methylmercury allocations and TMDLs for the Guadalupe River watershed. At this time, it is impractical to identify, or implement actions to address, reactive mercury separate from other mercury species. Board Member McGrath lists factors important to mercury methylation and bioaccumulation, which we included in Section 9.7 of the Staff Report.

**Board Member McGrath re-stated an issue that came up in testimony regarding the background mercury concentration. He asked, "Are we trying to clean this stream up below background?"**

We established the background mercury concentration in non-mineralized zones of 0.1 mg/kg in the TMDL data collection effort. However, we did not establish the pre-mining mercury concentration in mineralized zones. We anticipated the

need for cleanup levels, and provide various calculation methods in Section 9.10 of the Staff Report, *Calculating the Mining Waste Cleanup Goal*.

We are not proposing to cleanup to below background. We described in response to Mr. Cox and Mr. Kenefick that the mining waste allocation is not a cleanup standard, and that it only applies to industrial process waste associated with mine operations. We revised the Staff Report and proposed Basin Plan amendment (*Implementation Plan*), in response to these comments, to clarify that we are not establishing a mercury cleanup standard for mine sites or depositional areas.

**Board Member McGrath stated that there is a responsibility associated with construction and operation of reservoirs related to controlling mercury.**

Staff concurs.

**Board Member Singh asked whether the benefits from the previous cleanup actions in Almaden Quicksilver County Park have been measured.**

We estimate that erosion control actions required by this TMDL project will achieve greater than 70 percent load reduction. This estimate is based on our measurements at the Gambonini mine in Walker Creek, not from Almaden Quicksilver County Park. As explained in response to Mr. Boulland (above), we modeled the Guadalupe mercury mine implementation actions after the methods used at Gambonini.

In the 1990's, Parks addressed the five worst mercury-contaminated sites in Almaden Quicksilver County Park under a remedial action order issued by CalEPA's Department of Toxic Substances Control (DTSC; see Section 3.5 of the Staff Report). However, the effectiveness of this cleanup action in reducing mercury loads has not been measured.

These sites were cleaned up to visual standards and no confirmation soil mercury samples were collected. Some water data are available from two sets of stormwater samples collected each year to comply with the General Industrial NPDES stormwater permit. The sampling points were not intended to, nor do they, target stormwater only from remediated areas. The sampling points collect stormwater from a much larger area. Consequently, these data illustrate the high mercury concentrations remaining in stormwater post-cleanup, up to 110,000 ng/l, and the need for additional cleanup actions.

In contrast, efforts have been made to precisely quantify the load reduction from the cleanup of the Gambonini mercury mine in the Walker Creek watershed, which drains to Tomales Bay. A preliminary data evaluation indicates about a 70

percent load reduction—from the same types of mercury mining waste erosion control and cleanup actions we anticipate for Guadalupe. We hope to publish these findings in the peer-reviewed literature within the next year.

**Board Vice Chair Young urged staff to clarify the mining waste allocation.**

We revised the Staff Report and proposed Basin Plan amendment (*Implementation Plan*), in response to several comments, to clarify that allocations are not cleanup goals. We described in response to Mr. Cox that we revised the proposed Basin Plan amendment (*footnote a in Table 7-B*) to clarify that we are not establishing a mercury cleanup standard for mine sites or depositional areas. In response to Mr. Kenefick, we described that this allocation applies to mercury mining waste. In other words, we are regulating the discharge of industrial process waste from mining; we are not regulating the natural erosion of soil.

**Board Vice Chair Young indicated she is on the same page as Steve Ritchie, who urged "moving forward as rapidly as possible with the TMDL to make sure we eliminate [continued discharge of mercury mining waste] because we will be spending in the billion dollars plus downstream, trying to make the Bay as good as we can make it. And one way to do that is to eliminate the source of mercury from the Guadalupe."**

Staff concurs.

**Board Vice Chair Young expressed her concern that perhaps we are not giving full or appropriate credit for early implementation and cooperation. She requested that staff clarify how we are giving credit, to provide continued incentive for implementation.**

We revised Section 9.7 (annual TMDL progress report to the Board), and Section 9.3 and the proposed Basin Plan amendment (*Implementation Actions for Mercury Mines*; previous cleanup sites at Almaden Quicksilver County Park exempted from cleanup), in response to this comment, as described in the following paragraphs. (See also responses to Cox in Part 1, and responses to GRDC comment no. A1, and Cox comment no. 3 in Part 2.)

Staff is always willing to acknowledge and give appropriate credit to actions by parties that improve water quality. While we cannot modify concentration-based allocations based on past actions, we can provide credit in some of the following ways. We will consider whether past actions were undertaken voluntarily, monitored for effectiveness, and/or whether they were properly maintained, when reviewing TMDL implementation proposals. If so, we will adjust and provide flexibility in such requirements as level of monitoring, reporting, and

time schedules. Where multiple parties are involved in an implementation action, staff will consider past actions of the parties in determining who has to do what. If, in the future, we revise the allocations to be mass load reductions, we will account for past remedial efforts in assigning these reductions.

Credit can also be in the form of cost savings opportunities, which generally consist of "double credit" for actions that decrease mercury loads both within the watershed, and to the Bay. We identify double credit opportunities in the proposed Basin Plan amendment, as follows (underlined text indicates a revision in response to this comment, to ensure that creekbank stabilization and similar projects also qualify for double credit).

> Implementation actions that reduce loads of mercury from mining waste <u>and/or mercury-laden sediment</u> to the waters of the Guadalupe River watershed downstream of dams will also count towards achieving the San Francisco Bay mercury TMDL allocation to legacy mercury sources in the Guadalupe River watershed. … Urban stormwater runoff implementation actions that reduce loads of mercury to San Francisco Bay will also count towards achieving the Guadalupe TMDL allocation to the urban stormwater runoff source.

In response to this comment, we revised Section 9.7 to describe the accounting of implementation actions and credit earned we will include in our periodic TMDL progress report to the Board. Also in response to this comment, we revised Section 9.3 and the proposed Basin Plan amendment to exclude completed and on-going mercury cleanup projects in Almaden Quicksilver County Park (see responses to GRDC comment no. A1 and Cox comment no. 3, in Part 2). However, continued maintenance of these erosion control measures is required.

We have provided credit, both in the proposed Basin Plan amendment and in the Bay mercury TMDL, in many forms to both Santa Clara County Parks (Parks) and the Santa Clara Valley Water District. In the following paragraphs we describe some of these forms of credit.

## <u>Almaden Quicksilver County Park</u>

We credit Parks for their cleanup actions in Almaden Quicksilver County Park, undertaken prior to adoption of this TMDL project. In the 1990's, Parks addressed the five worst mercury-contaminated sites in Almaden Quicksilver County Park. These cleanup actions helped to restore habitat value in highly disturbed areas that otherwise were unvegetated and actively eroding industrial dumps.

Parks' cleanup efforts are the only cleanup actions to date for mercury mine sites. Guadalupe Rubbish Disposal Co., Inc. (owners of Guadalupe mine) and Midpeninsula Regional Open Space District have yet to undertake cleanup

actions. We credit Parks for their cleanup actions by informing them of grant opportunities—although they have not yet received funding from grant opportunities we identified.

In 2004, the Board adopted the San Francisco Bay mercury TMDL, which potentially provides the Parks (and others) credit for actions towards attaining the legacy mercury allocation, as follows, "1. Quantify the annual average mercury load reduced by implementing … (b) source and treatment controls …. 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."

We are available to work with Parks staff, upon their request, to estimate mercury loads avoided from their prior cleanup actions. Many of these cleanup actions took place in areas that drain to below dams, and so are potentially eligible for "double credit" (if they were not reflected in the 2001 load estimate to the Bay).

## Santa Clara Valley Water District

We credit the Santa Clara Valley Water District (District) for permanently removing nearly 1,000 kilograms of mercury to date from the watershed—and hence from San Francisco Bay. Under their Stream Maintenance Program and for flood control purposes, the District will continue to permanently remove mercury, and we will report on it annually.

We have provided the District many forms of credit, for their excellent watershed stewardship, studies that supported TMDL development, and early implementation actions. In recognition of the District's excellent stewardship, we do not plan to compel the District to undertake any specific Stream Maintenance Program-related sediment removal actions (i.e., implementation actions in depositional areas). In fact, we have allowed for the District, and only the District, to comply voluntarily with methylmercury studies and implementation actions in depositional areas. Further, we designed the phasing and scheduling of implementation actions to align with the District's project and funding schedules.

We greatly appreciate the following from the District's comment cover letter, "much of the … monitoring of fish and water quality, may be integrated into existing District projects and programs." In fact, we are counting on the District to lead the coordinated watershed monitoring effort, and to take the technical lead to address Alamitos Creek, one of the world's most mercury-polluted waterways.

In closing, we propose to provide credit in many ways. We look forward to comments from responsible parties with specific suggested methods for

accounting for credit. We will respond to these suggestions, and report annually to our Board progress on implementing the TMDL project and accrued credit.

**Board Vice Chair Young noted that at least one potential permittee felt that it was going to be placed in a position where it would have to negotiate between what the Water Board, Endangered Species Act, and Fish and Game might require. Dr. Young asked staff to resolve this issue, and not place permittees in such positions.**

We have no intention of placing anyone in an untenable situation, including in a situation in which they have to negotiate between competing agency interests. We do not agree that the proposed Basin Plan amendment places anyone in this situation. The TMDL addresses the challenge of mercury-contaminated fish, which is not in opposition to the goals of other agencies.

**Similarly, Board Vice Chair Young requested that staff clarify that we do not intend to "clean up areas that have rare serpentine habitats".**

We described in response to Mr. Cox and Mr. Kenefick that the mining waste allocation is not a cleanup standard, and that it only applies to industrial process waste, it does not apply to soils that are not mercury mining waste. We revised the Staff Report and proposed Basin Plan amendment (*Implementation Plan*), in response to these comments. This revision should clarify that no actions are required for areas of natural serpentine soils, so this important habitat will be protected.

**In closing, Board Vice Chair Young requested that, particularly for creeks projects, we do not set up unintended consequences that create a disincentive for restoration.**

The toxic legacy and scale of mercury mining does bring challenges to restoration projects in this watershed. The mercury mining waste itself is a disincentive for restoration, principally due to the high costs of complying with hazardous waste regulations.

This TMDL encourages restoration projects that stabilize creek banks, to prevent erosion of mercury mining waste. However, we cannot prescribe the manner of compliance. Nonetheless, many erosion control methods enhance habitat, because they rely on deeply rooted vegetation to keep soil in place.

We have called out Alamitos Creek in particular for restoration. Long stretches of Alamitos Creek downstream of Hacienda Furnace Yard are lined with calcines (roasted ore), a very poor matrix for plants. Consequently, these stretches have poor habitat value. We state in the proposed Basin Plan amendment,

"Particularly in Alamitos Creek which is highly polluted with mercury mining waste, the Water Board encourages the District and creekside property owners to undertake a comprehensive creek bank stability and habitat restoration project."

Early in the project, we considered and rejected two other options. We rejected the option to require excavation and off-site disposal of all mining waste, partly because of its widespread, albeit short-term, destruction of habitat. We selected the erosion control option because it better preserves habitat and is effective, based on our work at the Gambonini mercury mine (described above in response to Board Member Singh). We also rejected the option to require import of fill material to be spread over the mining waste and hold it in place, such as clean top soil or gunnite (spray-on concrete). This option would eliminate habitat for many decades, and it is not durable, so that it would require extensive maintenance to prevent erosion of mining waste.

We considered unintended consequences, and designed this TMDL project to avoid unintended consequences that create a disincentive for restoration. If, during implementation, we realize that this TMDL project has created unintended disincentives, we will propose modifications, in accordance with the adaptive implementation plan.

**Board Member McGrath urged that the monitoring program include grain size, because mercury on fines is more bioavailable than mercury on larger soil particles (sands and larger).**

We agree that grain size is important. Consequently, we propose a revised allocation to mercury mining waste that is to be measured in fines less than 63 microns in diameter. We also propose TMDLs, allocations, and load measurements on suspended sediments (i.e., soil fines).

**Lastly, Board Member McGrath suggested that we consider physical barriers to sediment transport, e.g., covering reservoir bottoms with clean sediment or armoring channels, and not preclude innovative actions that might prevent methylation.**

We considered covering reservoir bottoms with clean sediment or other materials. However, this method will not be effective until the mining waste stops eroding off the mine sites. This is one reason mercury mining waste control actions are phased—so that mercury discharges from upstream will be eliminated or significantly reduced before downstream projects are undertaken.

**Board Member Peacock stated that it is appropriate to try to quantify the number of people who actually do subsistence fishing.**

While we do not know the number of people subsistence fishing, our approach in this TMDL project is to set a safe level such that people can consume the fish. Since 1987, signs have been posted along waters downstream of New Almaden Mining District to warn people to not eat fish.

Our target rate of consumption is one meal per week, the same consumption rate as in the Bay and Delta (and Walker Creek) mercury TMDLs (see response to Clean Water Action and Baykeeper's comments in Parts 1 & 2). Using the same rate is one key aspect of integration between the Delta, Bay, and Guadalupe mercury TMDLs—integration required by the State Water Board. We relied on an excellent and detailed fish consumption survey for San Francisco Bay to develop this consumption rate. We think this Bay study is a reasonable estimate of consumption from the watershed.

Regarding plans to conduct local consumption surveys, we plan to rely on the State Water Board. The State Board is currently working on new mercury water quality objectives, and will have to consider local consumption rates, and how they may vary across California. If they adopt a higher consumption rate, hence lower fish mercury concentration, we will need to revise the Bay, Guadalupe, and Walker mercury TMDLs and water quality objectives.

# Part 2

## APPROVING AGENCY:

1. **U.S. EPA (Peter Kozelka)**

## COUNTY DISTRICTS, AGENCIES & MINE OWNERS:

2. **Santa Clara Valley Water District (Beau Goldie)**
3. **County of Santa Clara, Environmental Resources Agency, Parks and Recreation Department (Lisa Killough)**
4. **Guadalupe Rubbish Disposal Company (Todd Maiden of Reed Smith LLP)**
5. **Hillsdale Mine (Robert Bettencourt)**
6. **Hillsdale Mine (Thomas McCloskey of Strategic Engineering & Science, Inc.)**

## URBAN RUNOFF AGENCIES:

7. **City of San Jose (John Stufflebean)**
8. **Santa Clara Valley Urban Runoff Pollution Prevention Program (Adam Olivieri)**
9. **California Department of Transportation (Joyce Brenner)**

## RESIDENTS:

10. **New Almaden Quicksilver County Park Association (Michael Cox)**
11. **Friends of Los Alamitos Watershed (Roberta Lamons)**
12. **Friends of Los Alamitos Watershed (Mike Boulland)**
13. **Residents (Amanda & Frederick Dill)**

## ENVIRONMENTAL JUSTICE ADVOCATES

14. **Clean Water Action (Andria Ventura)**
15. **Baykeeper (Sara Aminzadeh)**

## Comment letter from the U.S. Environmental Protection Agency

We gratefully acknowledge the U.S. EPA's supportive comment, "We support adoption of the package." We respond to their specific comments below.

**U.S. EPA comment no. 1. … the proposed Basin Plan amendment needs to reference the TMDL Staff Report, …**

We will ensure that the resolution that the Water Board adopts (for which the proposed Basin Plan amendment is "Attachment A") references the supporting Staff Report.

**U.S. EPA comment no. 2. The proposed Basin Plan amendment lists the waters to which the revised water quality objectives and TMDLs apply. The proposed Basin Plan amendment list includes waters that are currently listed as impaired on California's CWA Section 303(d) list, and some waterbodies that are not currently included on the list. … Please ensure that the Staff Report includes a specific record supporting the conclusion that the additional waters are water quality limited, and why it is important to adopt TMDLs for these segments at this time. Also, please clarify in the proposed Basin Plan amendment which of the waters are currently listed and which are not listed but are currently being identified as impaired. …**

We revised Sections 2.4 and 8 in response to this comment. In revising Section 2.4, we clarified that this TMDL project addresses waters "impaired" by mercury, and waters that drain mercury mines, and other waters that convey mercury from other sources to impaired waters—all waters eventually drain to the Guadalupe River, an impaired waterbody. Therefore, this TMDL project assigns allocations to all waters in the watershed. "Impaired" means waters already on the 303(d) list or that will be proposed for listing on 2009 303(d) list.

Section 2.4 now provides an extensive description of the listing status, and a specific record to support listing of additional waters. Also, we clarified the 303(d) listing status in the first paragraphs of Chapter 7 in the proposed Basin Plan amendment. Section 8 now clarifies that TMDLs apply to impaired waters, but allocations apply to all waters.

**U.S. EPA comment no. 3. The proposed Basin Plan amendment does not list the permit numbers to which the waste load allocations apply. Please include the permit numbers, or …**

We revised Table 7-B: Load and Wasteload Allocations in the proposed Basin Plan amendment, and Section 8.3 (*Urban Stormwater Runoff Total Mercury*

*Allocation*) of the Staff Report, to include the permit number for the Santa Clara Valley Urban Runoff Pollution Prevention Program. This is the only NPDES permit affected by this TMDL project.

**U.S. EPA comment no. 4. If any of the permits to which the implementation schedule applies are permits that must comply with Clean Water Act 301(b)(1)(C), we recommend the Water Board ensure that the schedule is consistent with the provisions of the statewide Policy for Compliance Schedules in National Pollutant Discharge Elimination System Permits …**

We do not anticipate issuing or revising any NPDES permits that are covered by the compliance schedule policy, due to this TMDL project.

**U.S. EPA comment no. 5. The proposed Basin Plan amendment does not include a summary of the quantification of mercury and methylmercury sources, nor a summary of the linkage analyses … The proposed Basin Plan amendment needs to contain a summary … or … reference the TMDL Staff Report …**

This comment is similar to U.S. EPA comment no. 2, and we have the same response. We will ensure that the resolution that the Water Board adopts references the supporting Staff Report.

## Comment letter from the Santa Clara Valley Water District

The Santa Clara Valley Water District's (District's) comment letter consists of a cover letter with general comments (numbered 1, 2.1, 2.2a-d, and 2.3) and an attachment with detailed comments (numbered A.1–A.11). The District and the Water Board have a long history of effective partnership. This TMDL is an example of our effective partnership. In 2003, the District and the Water Board entered into a Memorandum of Understanding regarding the District's funding. The District funded the studies that culminated in the Conceptual Model of Mercury Behavior in the Guadalupe River Watershed, which provides the scientific basis for these TMDLs (see Section 3.1). Although the District's comment letter expresses support for continuing our partnership, the letter also expresses many concerns with the TMDL.

### District comment no. 1: District/Water Board Partnership Produced Results

**… the District has demonstrated its intent and commitment to addressing the mercury issue by voluntary early implementation of control measures that have removed nearly one thousand (1,000) kilograms of mercury from the watershed, reduced methylmercury production by over ninety percent (90%) in Almaden Lake in 2006 and 2007, and in mid-2007 expanded the successful Almaden Lake pilot project to the Almaden and Guadalupe reservoirs. … We believe that successful implementation of the TMDL will require a continuation of the collaborative partnership between our agencies.**

We commend the District for permanently removing nearly 1,000 kilograms of mercury from the watershed—and hence from San Francisco Bay. We are optimistic the District will have continued success in reducing methylmercury production. We note and credit the District for undertaking these actions in advance of adoption of the TMDL (see also response to Board Vice Chair Young in Part 1).

Water Board staff are committed to continuing our successful partnership with the Water District. We had face-to-face and teleconference meetings with District staff in the months before and after receiving their written comments. We plan continued communications and close collaboration with District staff.

### District comment no. 2: District's Concern with Implementation

The District expressed several concerns with implementation. In the following paragraphs we respond to their specific concerns, which we numbered 2.1, 2.2a–d, and 2.3.

**District comment no. 2.1: 80% Studies, Only 20% Abatement Action**

**The District analysis of the TMDL Report and Basin Plan amendment identified that over eighty percent (i.e., $19.2M) of the $24 million estimated total cost to the District will be directed toward monitoring, reporting, and "special studies" with only twenty percent (i.e., $4.8M) directed toward actual abatement of mercury contamination. The District believes that the limited resources should be applied to the abatement first rather than conducting studies.**

We estimate that monitoring and studies are less than 1% of the implementation costs, and they range from $600,000 up to $10 million total for all parties, which is less than half the District's estimate of $19.2 million (see Table 10.3, Summary of Estimated Costs for [TMDL] Implementation.) The District's implementation responsibilities are closer to 90% action and 10% studies and include:

a) their "stream maintenance program" particularly for the maintenance of engineered channels that drain New Almaden (Randol, Greystone, Golf, McAbee, and Alamitos creeks, and Guadalupe River),

b) seeking funding for and serving as technical lead for a $135 to $270 million project for Alamitos Creek downstream of Hacienda Furnace Yard (comprehensive creek bank stability, habitat restoration, and cleanup of mercury mining waste),

c) the invention, testing and deployment of methylmercury controls in reservoirs and lakes, and

d) leadership for coordinated watershed monitoring.

The District's concerns with monitoring costs are not specific to the TMDL; rather, these are wide-ranging concerns for all of their activities subject to Water Board permits. We agreed in the 2003 MOU for these TMDLs that monitoring or special studies undertaken for TMDL purposes may be an appropriate substitute for project-specific monitoring requirements. The main consequence of this MOU clause to these TMDLs is that these TMDLs reflect a coordinated approach for mercury monitoring. In fact, we are counting on the District to lead the coordinated watershed monitoring effort. We greatly appreciate the following from the comment cover letter, "much of the … monitoring of fish and water quality, may be integrated into existing District projects and programs."

We look forward to comments with specific suggested revisions to District permits. When received, we will revise the permits as appropriate, and contingent upon the approval of other permitting agencies, to support coordinated watershed monitoring. In this way, we will follow through on our commitment in the MOU to streamline monitoring.

We would like to take this opportunity to assure the District that their "stream maintenance program" (SMP) is integral to both the Guadalupe River watershed and the Bay mercury TMDLs. The SMP includes erosion control of mercury mining waste for stream stewardship and flood control purposes, and improves habitat value, and decreases mercury loading both within the watershed and to the Bay. We did not provide a cost estimate for any permit restrictions or effectiveness monitoring because the TMDL project has not appreciably affected costs, as explained on p. 10-45. Also, we do not plan to compel the District to undertake specific sediment removal actions under the Stream Maintenance Program (see response to District comment no. A.2.)

**District comment no. 2.2: Collaborative Approach Needed for Successful Implementation**

The District expressed several concerns in this comment, which we numbered 2.2a–d, and respond to individually.

**District comment no. 2.2a: Taking a collaborative approach rather than the aggressive command and control approach of the current proposal would be more effective and efficient. Under a collaborative approach, we believe the District is well positioned to assist with the implementation and may act as the lead for implementation of the TMDL in the Guadalupe River Watershed. Much of the interception and extraction of mercury loading to the Bay, as well as much of the monitoring of fish and water quality, may be integrated into existing District projects and programs.**

We revised the proposed Basin Plan amendment (*Implementation Actions for Depositional Areas*) to reflect that we will identify mercury cleanup as a grant funding priority for the San Francisco Bay region.

This TMDL project includes many self-selected implementation actions, several of which the District is already undertaking. Therefore, we have not included a "command and control" approach for the District. Rather, we offer the District, and only the District, the opportunity to comply voluntarily.

We welcome the District's offer to act as lead for implementation, and to integrate monitoring into existing District projects and programs. We are committed to a successful partnership, i.e., a collaborative approach, with the District. In fact, we are counting on the District to take the lead on coordinated watershed monitoring.

A collaborative approach is also needed for Alamitos Creek downstream of Hacienda Furnace Yard. As stated in the proposed Basin Plan amendment, "Particularly in Alamitos Creek which is highly polluted with mercury mining

waste, the Water Board encourages the District and creekside property owners to undertake a comprehensive creek bank stability and habitat restoration project." In other words, we are relying on the District to take the lead on behalf of private property owners to address this, one of the world's ten most mercury-polluted waterways. This is an important effort both within the watershed area addressed by the TMDL, and downstream of the area addressed by these TMDLs, to protect the South Bay Salt Ponds Restoration Project. We modified the proposed Basin Plan amendment to reflect that we will identify mercury cleanup as a grant funding priority for the San Francisco Bay region.

**District comment no. 2.2b: The 2003 MOU between the District and the Water Board included four key commitments ... the Water Board has not yet met the third commitment to provide credits to the District for its early implementation actions …**

We have provided the District many forms of credit, both for their excellent watershed stewardship and for early implementation. We worked with the District to better integrate those implementation actions for which they are responsible with their future funding and project schedule timelines. We further allow the District to comply voluntarily (see response to District comment no. 2.2a), given their excellent track record. Regarding credit for early implementation, see response to District comment no. 1 in Part 2, and response to Board Vice Chair Young in Part 1.

**District comment no. 2.2c: The 2003 MOU between the District and the Water Board included four key commitments ... the Water Board has not yet met the … fourth commitment to reduce duplicative project-specific mercury monitoring activities in permits issued to the District.**

We are willing to reduce duplicative project-specific monitoring requirements, as described in response to District comment no. 2.1.

**District comment no. 2.2d: The District is willing to discuss the continuation of its partnership with the Water Board, and the possibility of revising the March 2003 MOU. A revised MOU would include commitments by the District to focus on implementation of the TMDL, and incorporate credits specified in the 2003 MOU for early implementation actions taken by the District that would be accounted for in load allocations, implementation plans, and compliance schedules for the TMDL; the revised MOU would also include commitments by the Water Board to address duplicative project-specific mercury monitoring activities in permits issued to the District.**

We think that the 2003 MOU together with the proposed Basin Plan amendment are sufficient to support a collaborative and timely effort. In 2003, negotiations for the MOU caused an 8-month delay in the TMDL project. We are committed to removing duplicative project-specific mercury monitoring activities—see response to District comment no. 2.1.

**District comment no. 2.3: Priorities Needed for Limited Public Resources**

**The District is also concerned that the increased burden to local agencies resulting from the proposed TMDL and proposed changes to the Urban Runoff Municipal Permit will result in a failure of both programs due to lack of funding. The recent proposed changes to the Municipal Permit for Stormwater Discharges represent estimated increases of expenditures by as much as thirty percent, at the same time that the TMDL will create the need for extensive new expenditures. The District seeks to have the Water Board prioritize its water quality needs in a manner which allows the efficient use of available resources.**

We understand the District's funding constraints. We support less costly alternatives, as long as they provide an equivalent level of environmental protection. Notably, coordinated watershed monitoring may be less costly and yet provide more information/protection. We acknowledge that the District's urban runoff discharges are comparatively minimal, and we would consider any proposals the District would like to present to us on this matter.

**District comment no. A.1: The Proposed Basin Plan Amendment is Too Detailed and Inflexible**

**The proposed Basin Plan amendment contains far too much detail than that needed for the Basin Plan amendment process. As written, there is little flexibility for Water Board staff and the responsible parties to be creative and pursue a more productive course of action, since any change would then need to be made through the lengthy Basin Plan amendment process. A more prudent approach is to simplify the proposed Basin Plan amendment to adopt the new Water Quality Objectives and specify that Water Board staff shall report back to the Water Board periodically (say, every five years) on progress implementing the plan as described in the TMDL Project Report, including amendments to the plan authorized by the Executive Officer. At a minimum, the proposed Basin Plan amendment should not specify dates, but should use "from the date of" final approval/adoption, and should use "or similar studies" should those contemplated in the far term be determined unnecessary.**

We disagree that the proposed Basin Plan amendment contains more detail than that needed for the Basin Plan amendment process. The proposed Basin Plan amendment briefly and clearly summarizes who is to do what by when.

But, we agree that it would be beneficial to add flexibility to the special studies, and we revised the proposed Basin Plan amendment accordingly (see response to District comment no. A.4b).

We have tried presenting dates as either "from the date of" or "specific calendar date." It is our experience that specific calendar dates are easier for all parties to track and result in fewer disputes. Therefore, we have elected to use specific dates in this proposed Basin Plan amendment.

**District comment no. A.2: Mercury Sources in Alamitos Creek are Mischaracterized**

**In the TMDL Project Report and proposed Basin Plan amendment all of the mercury sources in Alamitos Creek downstream of Almaden Reservoir are characterized as "depositional" and it is proposed to delay addressing these sources for as long as twenty years. ... an incorrect assumption that all deposits of mine waste in this area continue to accumulate mine waste. The District ... provided a preliminary identification of sites with deposits of eroding mine wastes. Most of these sites are creek banks that are being undercut and/or are actively eroding, adding to the load of mercury transported downstream. ... should be evaluated and verified in the first five years, and those that are eroding should be addressed by the end of the first ten years. Since 2003, the District has verified eleven of the sites ... Six of these have already been completed (resulting in the removal of 287 kg of mercury), and the other five are scheduled for completion by 2011.**

**The only significant depositional areas of mine wastes are the mouth of Alamitos Creek as it enters Almaden Lake, the mouth of Guadalupe Creek at its confluence with the downstream end of Almaden Lake, and above the Los Alamitos Drop Structure at the upper end of Guadalupe River. Other areas where deposition occurs (primarily due to mercury-containing fines that pass the Drop Structure) are benches and depositional areas of Guadalupe River, mostly between Montague Expressway and the SPRR crossing. The District agrees that these areas should be addressed after all upstream sources have been controlled. However, under a collaborative approach, sediment removal in these latter areas could be integrated into the ongoing District's long-term stream maintenance program to obtain faster results.**

The proposed Basin Plan amendment, in the sources section, explains that "depositional areas discharge mercury mining waste (in the form of mercury-laden sediment) to surface waters during periods of erosive flows". In other words, these areas do not solely accumulate mining waste, they also discharge it. This is consistent with the Walker Creek mercury TMDL, which described this source as follows:

> **Downstream depositional features –** Mercury-laden sediments in depositional areas (creek beds, banks, and floodplains) downstream of the mercury mines, which discharge mercury to the creek during storms

We are not proposing to delay for twenty years before addressing this source. TMDL implementation is phased, such that downstream depositional areas will be addressed during the second 10-year phase. Ideally, project construction will be completed by about year 17. This would allow for several years of effectiveness monitoring, and time for corrective actions if necessary, within the twenty years planned for implementation.

The District is responsible for many miles of engineered (i.e., flood control) channels that drain New Almaden (Randol, Greystone, Golf, McAbee, and Alamitos creeks, and Guadalupe River). The District regularly undertakes maintenance of its engineered channels, including removal of mercury-laden sediment. These maintenance activities are regulated under the Stream Maintenance Program, and these actions will count towards attaining both the Guadalupe depositional area mercury allocations and Bay legacy mercury allocations.

As previously stated, we do not plan to compel the District to undertake any specific Stream Maintenance Program-related sediment removal actions, rather we allow the District to complete these projects on their self-determined budget and program cycle. Moreover, we urge the District to follow-through on the important geomorphic and related studies needed to cleanup and restore habitat and creekbank stability along Alamitos Creek.

We plan to evaluate the District's progress on cleanup and restoration efforts for Alamitos Creek by the end of Phase 1, and we will consider whether it is necessary to compel the District (and other parties responsible for flood control) to take implementation actions to attain the depositional area allocations, in accordance with the adaptive implementation plan. See response to CWA comment no. 1, in which we describe a revision to the Staff Report regarding compelling cleanup and restoration of Alamitos Creek.

**District comment no. A.3: Percolation Ponds are Mischaracterized**

**The proposed Basin Plan amendment and Project Report list percolation ponds under "Depositional Areas" and intimate that discharges of mercury occurs from the operation and maintenance of these ponds in the form of "sediment-laden" mercury or from "erosive flows" caused by discharges from the ponds. The operation and maintenance of percolation ponds does not result in either of these discharges, nor are the ponds depositional. Operation of the ponds is achieved by in-stream diversions that fill the ponds under controlled conditions when creek flows are low and not**

**transporting sediment. The water is never immediately discharged back to the creek but allowed to percolate into the ground. Maintenance activities consist of periodic scraping of the bottom of the ponds to remove algal mats that inhibit percolation. Occasionally, discharges to the creek occur during intensive rain events that overfill the ponds, but these are neither "sediment-laden" nor "erosive" and are small volumes already permitted.**

The occasional overflow discharges from percolation ponds could be sediment-laden if the intensive rain event has caused erosive and turbulent flows which have stirred up bottom sediments. However, our main concern with these ponds is fish bioaccumulation of mercury. Percolation ponds are shallow impoundments, and as we proposed in the Basin Plan amendment, we "will consider the need to control methylmercury production and bioaccumulation in shallow impoundments" by the end of Phase 1 of implementation. The District's extensive network of percolation ponds has provided tremendous benefit by re-charging the underlying aquifer and stopping subsidence. To date, we have refrained from regulating percolation ponds, but plan to reconsider our regulatory strategy by the end of Phase 1, in accordance with the adaptive implementation plan.

Our concern with percolation ponds is that fish in these ponds have elevated mercury concentrations. Consequently, these ponds were included in the County's 1987 fish consumption advisory/prohibition. We think the appropriate time to address percolation ponds is in Phase 2, because these ponds are located downstream of reservoirs, and we are hopeful that methylmercury controls in reservoirs will have tremendous benefits in downstream areas. During Phase 2, we can address both mercury transport and methylation in percolation ponds, as needed.

**District comment no. A.4: Reservoir Implementation Requirements are Mis-Timed**

The District expressed two concerns in this comment, which we numbered A.4a and A.4b, and respond to individually.

**District comment no. A.4a: The proposed Basin Plan amendment needs to be revised to adjust the timing of implementation of activities that will be required in the TMDL. If elimination of sources upstream is not completed before downstream sources are addressed, then the downstream efforts will be negated by additional contamination. We believe that once background conditions have been restored, the reservoirs will not need treatment or need only minimal treatment to meet applicable requirements.**

**… The Water Board now proposes in the subject documents to allow these uncontrolled discharges to continue up to an additional ten years while exonerating responsibility for the impact on [*surface*] waters for both past and future discharges. Further, the Water Board proposes in the subject documents to place full responsibility onto the District for the treatment and amelioration of the negative effects of these discharges on water quality. The District contends that any discharger of mercury must be held responsible for negative effects on [*surface*] waters, rather than transfer the responsibility to the downstream owner. If treatment is required, the dischargers must participate in a commensurate share of the costs until the discharge is stopped and its effects ameliorated. The District is the injured party, not the responsible party.**

We respectfully disagree. We find the District responsible for constructing reservoirs in streams already polluted with mining waste. We further find the District responsible for constructing "deep impoundments" that experience thermal stratification in the dry season, and thereby causing water quality conditions to be very different from pre-mining or natural stream condition. Prior to the mining era, there were no natural "deep impoundments" in the watershed. Therefore, the District is responsible for addressing methylmercury production and bioaccumulation in reservoirs and lakes polluted with mining waste.

We propose an aggressive schedule to address mercury mine sites, which we describe in the proposed Basin Plan amendment as follows.

> Mercury mining waste control actions are phased so that mercury discharges from upstream will be eliminated or significantly reduced before downstream projects are undertaken. Erosion control actions at mercury mines shall be completed within the first 10 years (Phase 1).

Moreover, in the proposed Basin Plan amendment we offer the District the opportunity to comply voluntarily.

In fact, we are counting on the District's leadership and innovation to develop and promptly implement a cost-effective solution for the methylmercury problem in lakes and reservoirs. The District's success in this endeavor has potential for significance beyond this watershed, as mercury in fish is a global problem.

We are hopeful that once mining waste erosion controls are in place, the reservoirs will only need minimal and low-cost treatment. We are doubtful, based on data from the reference reservoir, that reservoirs will not need any treatment to attain fish targets.

**District comment no. A.4b: The requirements in the proposed basin Plan Amendment for the District to conduct feasibility studies and special studies are prescriptive. Such studies should be allowable as a means of compliance at the option of the District in the event that the District determines that such studies are necessary.**

> We agree that the proposed Basin Plan amendment should provide an explanation of, but not prescribe special studies. (We do not use the term "feasibility study" in the proposed Basin Plan amendment or Staff Report.) Accordingly, we have revised the proposed Basin Plan amendment pertaining to special studies. However, we disagree that compliance should be at the option of the District (or any regulated entity). Nonetheless, in recognition of the District's excellent watershed stewardship, we provide the District, and only the District, the opportunity to comply voluntarily in conducting studies and leading coordinated watershed monitoring.

**District comment no. A.5a: Inappropriate Allocation for Reservoirs**

**The proposed Basin Plan amendment and Project Report include a seasonal maximum water column concentration of 1.5 ng/l of methylmercury in the hypolimnion of the deep impoundments. This is an inappropriate allocation for several reasons, the most important being that it does not relate to the mass of methylmercury that is seasonally produced and potentially available for bioaccumulation.**

> We disagree that a concentration-based, as compared to a mass-based, allocation to reservoirs is inappropriate. In Section 8.2, we presented several alternatives for the allocation to reservoirs, and we recommend a seasonal maximum hypolimnion concentration of methylmercury. Concentration is directly related to mass, as concentration multiplied by volume yields mass. This allocation relates to the mass of methylmercury seasonally produced, accumulated, and potentially available for bioaccumulation. The peer reviewers concurred with our concentration-based approach for allocations and TMDLs.

**District comment no. A.5b: Failed to Establish Assimilative Capacity**

**A more appropriate allocation is one that is related to the assimilative capacity of each reservoir, a necessary component of a TMDL that the Water Board has omitted from this TMDL project. The Water Board has failed to demonstrate that the elaborate calculations in the Project Report using limited data to estimate a relationship between water column methylmercury concentrations and fish tissue concentrations is more valid than estimating assimilative capacity. The proposed Basin Plan amendment also shows that the Water Board intends to require the District to conduct studies related to assimilative capacity, even though the Water Board has not**

**estimated, nor established a reasonable approach as to how to estimate, the assimilative capacity of the reservoirs.**

We agree, we did not describe that the assimilative capacity is equal to the concentration-based TMDLs and allocations, and we have revised the Staff Report accordingly. We had received prior approval from U.S. EPA staff that we did not need to include this description because of our concentration based-approach.

Nonetheless, we agree that with additional data and more detailed studies, the TMDLs, assimilative capacity, and allocations could be revised. We even propose in Section 9.7 that the District may develop innovative reservoir management techniques that increase the assimilative capacity for methylmercury. We look forward to learning, a few years hence, the results of the District's efforts to control methylmercury production and bioaccumulation. We plan to revisit the TMDLs, allocations, and assimilative capacity in accordance with the adaptive implementation plan, by the end of Phase 1 (within the first 10 years of implementation).

**District comment no. A.6: The Water Board Does Not Incorporate Incentives for Implementation, and Emphasizes Monitoring Over Source Control**

**In the proposed Basin Plan amendment, up to ten years is provided for responsible parties to address mining waste discharges, and up to twenty years to address ongoing discharges of mercury from creek banks. Yet, extensive monitoring will be required immediately and most intensively for the first five years, followed by reduced monitoring substituted with "special studies" that are likely to be as costly, if not more costly than the monitoring activities they replace. ... A more proactive approach would be to provide some flexibility and incentives to responsible parties to conduct implementation activities instead of monitoring and special studies. Another streamlining approach would be: instead of requiring "site investigations" (especially for sites already identified on Alamitos Creek), these should be optional if the responsible parties wish to go straight to construction design.**

We have a different interpretation of the implementation plan. Yes, up to 10 years is provided to implement erosion control at mine sites and up to 20 years at depositional locations. However, we purposely did not specify monitoring frequency in the proposed Basin Plan amendment. We did describe our monitoring program in more detail in the Staff Report, and we would appreciate the opportunity to work collaboratively with the District to fine-tune it.

In Section 9.9, we describe that "Monitoring of Mercury Load to San Francisco Bay" should occur at two locations in the Guadalupe River (gage 23b and Highway 101) for the first five years, and one location (Highway 101) for the

remaining 15 years. This is in accordance with previous discussions with and proposals from the District. We understood that the District selected the gage 23b location because it will additionally provide valuable information for design of flood control projects.

Also in Section 9.9 (p. 9-23), we state the following,

> Fish monitoring plans will be required to address the following questions regarding trends in fish tissue mercury concentrations:
>
> - What is the seasonal and inter-annual variation in fish mercury in the first 5 years of implementation, for remediation effectiveness indicators and target fish?
> - What is the trend in fish tissue mercury concentrations in target fish over the subsequent 15 years of implementation?

We see how this could be interpreted as "extensive monitoring will be required immediately and most intensively for the first five years, followed by reduced monitoring." However, that is not our our intent. Rather, the first question will allow us to determine the minimum frequency and sample size to answer the second question. This will save money and reduce the number of fish sacrificed. We are willing to collaborate with the District to answer the first question in the most cost-effective manner.

Also in this comment the District described its interpretation, that after five years "extensive monitoring will be … reduced [and] substituted with 'special studies'." We have a different interpretation of the relationship between monitoring and special studies. The special studies stand alone, and do not substitute for monitoring.

Of course, information from the special studies may be used to modify the monitoring program, if applicable. The special studies should be designed, as described in the Staff Report in Section 9.10, to verify assumptions used in developing the TMDL and to improve the scientific understanding of mercury cycling.

Similarly, information from the monitoring program may be used to answer the special study questions—which we encourage. To do so, the data objectives of the monitoring program should be designed to answer the special study questions.

Regarding the sites on Alamitos Creek, there is nothing in this TMDL project preventing the District from going straight to construction and design.

**District comment no. A.7: Water Board Proposes Fish Sampling that is Potentially Harmful to Endangered and Protected Species**

**The District holds permits from the relevant agencies to conduct fish monitoring and sampling in the Guadalupe River Watershed below the reservoirs. These permits prohibit sampling activities during the months of October through April to protect salmonid species such as steelhead that are listed as Threatened under the Federal Endangered Species Act. ... Therefore, the District suggests that the agencies work together collaboratively to develop a fish sampling program that will allow the responsible parties to avoid this double jeopardy situation.**

We revised the proposed Basin Plan amendment to make the special studies less prescriptive, as described in response to District comment no. A.4b. We are confident that together we (District and Water Board) can write sampling plans to provide necessary answers, and time the sampling to avoid harming endangered or protected species.

**District comment no. A.8: Duplicate Reporting is Required**

The District expressed two concerns in this comment, which we numbered A.8a and A.8b, and respond to individually.

**District comment no. A.8a: The proposed Basin Plan amendment indicates the Water Board will require numerous reports from the responsible parties. In many cases, these reports are duplicative of reporting that is already being done. For example, the District already reports to the Water Board its mercury removal projects throughout the watershed through its existing Stream Maintenance Permit and its project-specific permits. … The District believes that a more appropriate approach is to provide flexibility in the Basin Plan amendment to allow existing reporting mechanisms to suffice. This will conserve resources that are better spent taking action than preparing duplicative reports.**

The proposed Basin Plan amendment provides a comprehensive yet succinct record of the TMDL. More specific requirements will be detailed in permits and orders. We do not plan on duplicative efforts—any new or revised permits will reference and make use of existing efforts, including reporting. For example, we are hopeful that detailed reports prepared for the District's Board, or the District's internal work plans, or articles destined for publication in peer-reviewed journals, may suffice for reporting to the Water Board on the District's methylmercury production and bioaccumulation control studies.

**District comment no. A.8b: The information for the "special studies" is already largely available in existing reports and other reports and work products being prepared for the Fisheries and Aquatic Habitat Collaborative Effort (FAHCE). The**

**FAHCE is a consortium of state and federal agencies, local municipalities, and interested parties that are working toward a common goal of providing restored and improved water resources throughout the watershed and basin. The Water Board has been at arm's-length from this collaborative, yet if it were active as an effective collaborator, many of the issues of project could be addressed more comprehensively.**

We do not plan to take or compel duplicative efforts. Accordingly, the scope of special studies can and will be reduced or modified based on readily available information from FAHCE and other sources.

**District comment no. A.9: Beneficial Uses Supported by the Reservoirs are not Fully Characterized nor Protected**

The District expressed several concerns in this comment, which we numbered A.9a–c, and respond to individually.

**District comment no. A.9a: In the proposed Basin Plan amendment and TMDL Report several beneficial uses of the reservoirs are characterized as "impaired by mercury" but the reports fail to include adequate descriptions of the beneficial uses that are supported by the reservoirs.**

We disagree that the proposed Basin Plan amendment and supporting Staff Report "fail to include adequate descriptions of the beneficial uses that are supported by the reservoirs." The Staff Report satisfies the "minimum required elements of TMDLs" as specified in the U.S. EPA Region IX *Guidance for Developing TMDLs in California* (USEPA 2000). A list of all the beneficial uses supported in the watershed is provided on p. 2-8.

**District comment no. A.9b: In addition to providing municipal water supply and prevention of subsidence of the groundwater basin, the reservoirs support cold water fishery habitat and rare and endangered species. Without the reservoirs, there would be no cold water storage and the creeks would run dry each summer so there would be no cold water habitat; there would be no deep water habitat for the osprey or other diving birds. …. In general, operations to support the beneficial uses conflict with the objectives in the proposed Basin Plan amendment; that is, to support the habitat needs requires operation of the reservoirs that may exacerbate the production of methylmercury (such as retaining storage as long as possible to control temperature of releases).**

We understand that inventing effective controls for methylmercury production and bioaccumulation is very challenging, let alone inventing controls that have no adverse effects on beneficial uses.

We remain hopeful that the District will be successful in developing methylmercury controls that are cost-effective, such as the solar-powered circulators already being tested. We also remain hopeful that this method will fully support beneficial uses. However, we recognize that protecting beneficial uses may require more costly methods, such as liquid oxygen or ozone, and consequently we accounted for these in our cost estimates in Section 10.5.

We plan to address problems such as a potential conflict between beneficial uses and TMDL objectives during adaptive implementation reviews. We provide specific questions to be addressed in the adaptive implementation portion of the implementation plan. The first questions are, "Is there new, reliable, and widely accepted scientific information that suggests modifications to targets, allocations, or implementation actions? If so, how should this TMDL project be modified?"

**District comment no. A.9c: The proposed Basin Plan amendment does not place the water quality issue into context with the environmental setting, nor does it even attempt to strike a balance with the various competing and conflicting objectives of the resource agencies. This places the District in an untenable situation, potentially forcing it to violate one agency's laws and regulations in order to comply with another's. The Regional Board needs to better coordinate with the other federal and state regulatory and trustee agencies to incorporate its concerns into the existing resource protection activities.**

We disagree that the proposed Basin Plan amendment and supporting Staff Report fail to "place the water quality issue into context with the environmental setting." Section 3 provides "Watershed Description and System Characteristics," and many other facets of the environmental setting.

The TMDL addresses the challenge of mercury-contaminated fish. This aim is not in opposition to the goals of other agencies. Through the TMDL, we seek to restore the watershed to the "fishable" quality specified by the authors of the Clean Water Act. The Water Board incorporated many of the actions the District already has underway to improve this watershed in the proposed Basin Plan amendment. We have no intention of placing the District or others in an untenable situation, nor do we agree that the proposed Basin Plan amendment places anyone in an untenable situation. We are committed to continuing our successful partnership with the District, making mercury control actions a grant funding priority (see response to District comment no. 2.2a), and working through the challenges of controlling methylmercury.

**District comment no. A.10: Inclusion of "Reference" Reservoirs and Lake … is Flawed**

The District expressed two concerns in this comment, which we numbered A.10a and A.10b, and respond to individually.

**District comment no. A.10a: The lake and reservoirs that are the subjects of the proposed Basin Plan amendment and the TMDL Project Report are unique from one another in many ways. It is impossible to collect data at the level of resolution needed for the purposes of the TMDL Project Report and the proposed Basin Plan amendment. The level of resolution that we can measure in the reservoirs will not allow meaningful comparisons between reservoirs.**

We disagree that our use of reference reservoirs is flawed, or that "it is impossible to collect data at the level of resolution needed." The Peer Reviewers confirmed that the reference reservoir approach is appropriate (see also response to GRDC comment no. 6). District staff is aware of the anticipated benefits from, as well as the challenges in, the reference reservoir approach relied upon in these TMDLs. The reference reservoir approach was discussed at meetings of the Guadalupe Mercury Work Group, and early in TMDL development brought to the attention of the Technical Review Committee (TRC).

TRC member and mercury expert Don Porcella promoted the use of Lexington as a reference reservoir. In his December 2003 comment letter on the draft Conceptual Model, Don Porcella stated the following:

> Based on the presentations and the conceptual model itself, along with the discussion that took place in the meeting, I offer the following suggestions that are meant to enhance the work undertaken to answer the specific hypotheses listed in Chapter 4: …
>
> 8. Consider the possible use of Lexington Reservoir as a control for the reservoirs most affected by the Almaden mine wastes.

The TRC was an appropriate group to review the reference reservoir approach; the Peer Reviewers were another appropriate group and they also confirmed the reference reservoir approach is appropriate. District staff had full control of the budget for the Technical Review Committee (TRC), and unilaterally and without consultation with the Work Group co-chair, or other members of the Work Group, eliminated the TRC (after two TRC meetings, for which the TRC approved the preliminary Conceptual Model and Data Collection Plan, but before the TRC had a chance to review the Data Collection Report or the Draft Conceptual Model Report.)

These are the District's first written comments on the TMDL despite two previous opportunities (January 2006 and August 2007). Differences of opinion

are common in technical and policy fields. We need to learn from this experience and work together in a more collaborative and productive fashion in the future.

**District comment no. A.10b: The TMDL Project Report also indicates the intention of the Water Board to require the responsible parties to conduct fish tissue monitoring in Lake Elsman, Lexington Reservoir and Vasona Lake. (Note: Lake Elsman is privately-owned by a corporation not identified as a responsible party in the proposed Basin Plan amendment. It is unlikely that the Water Board can compel the responsible parties to collect samples from this lake. Also, despite its name Vasona is a reservoir owned and operated by the District. It bears little resemblance to any of the water bodies that are the subjects of the TMDL). Whatever data would be produced from such sampling is more likely to be confusing than enlightening, and further dilutes available resources away from addressing the problem: controlling the sources of mercury.**

In response to this and other comments, we revised Section 9 to more clearly describe the responsible parties.

We recognize that the fish sampling plan in particular would be improved by collaborating with the District, see response to District comment no. A.7. Together, as we craft the sampling plan, we can decide if sampling Lake Elsman (upstream of Lexington Reservoir), or Vasona Lake (which, like Lake Almaden, receives urban runoff) provides answers to necessary questions.

Regarding compelling San Jose Water Company to sample Lake Elsman, except for naming the District (because of the District's status as watershed stewards), we have chosen to not name the individual responsible parties in the proposed Basin Plan amendment. As described at the outset, we revised Section 9 to more clearly describe the responsible parties. We will name responsible parties in permits and orders. Not naming responsible parties in the proposed Basin Plan amendment does not in any way prevent us from issuing California Water Code § 13267 technical report requirements to responsible parties. These § 13267 letters could require sampling be conducted or that access be provided for sampling by the coordinated watershed monitoring field team.

**District comment no. A.11: The Proposed Basin Plan Amendment and TMDL Project Report Are Not Consistent with or Aligned with Other Water Board Regulations**

**Due to the specific and detailed nature of the proposed Basin Plan amendment [see District comment. no. A.1], it is no longer in alignment with the Municipal Regional Permit for Stormwater Discharges … . The proposed Basin Plan amendment also includes several sections where it is stated that the Water Board will use specific authorities to compel responsible parties to take actions, even though in many cases**

**the responsible parties are already regulated under existing permits issued by the Water Board and these permits already cover those actions.**

We disagree; the proposed Basin Plan amendment is consistent and aligned with the draft Municipal Regional Permit. Where we have already compelled actions, and those actions are sufficient for TMDL purposes, we do not plan to take or compel duplicative efforts.

## Comment letter from County of Santa Clara, Environmental Resources Agency, Parks and Recreation Department (Parks)

The Parks comment letter consists of a cover letter from the Director with general comments (numbered 1.1, 1.2, 2, 3, 4, 5.1, and 5.2), and two attachments by their consultant, URS Corporation. The consultant's first attachment contains detailed comments (numbered A.1–A.8), and the second illustrates their requested changes to the proposed Basin Plan amendment (numbered B.1–B.3).

We thank Parks and their consultant for their constructive comments. Parks' main concerns relate to the mercury mining waste allocations, which we respond to in detail herein. In response to their and others' concerns, we revised the allocation to mining waste, and revised the Staff Report and proposed Basin Plan amendment (*footnote a in Table 7-B*) to clarify that we are not establishing a mercury cleanup standard for mine sites or depositional areas.

### Parks comment no. 1: Data Lacking to Support Correlation between Sediment Mercury and Bioaccumulation

Parks expressed two concerns in this comment, which we numbered 1.1 and 1.2, and respond to individually.

**Parks comment no. 1.1: … [T]here continues to be a dearth of technical understanding regarding effective mercury and methylmercury management actions. This is an overarching concern of the County. In particular, the proposed Basin Plan amendment still lacks a technical justification for its central management approach, which is premised on the notion that a reduction in the concentrations of mercury in soil and sediment will result in a reduction in the levels of methylmercury in fish tissue (see SR pp7-14)**

There is convincing evidence from around the world that source control (which reduces the concentration of mercury in sediment) results in reduction in the levels of methylmercury in fish tissue. Figure RTC-1 illustrates the substantial decreases in fish mercury concentrations from source control and other remediation actions. Figure RTC-1 is based on Table 4.3, *Change in Fish Tissue Mercury Concentration after Remediation Efforts* (CVRWQCB 2004).

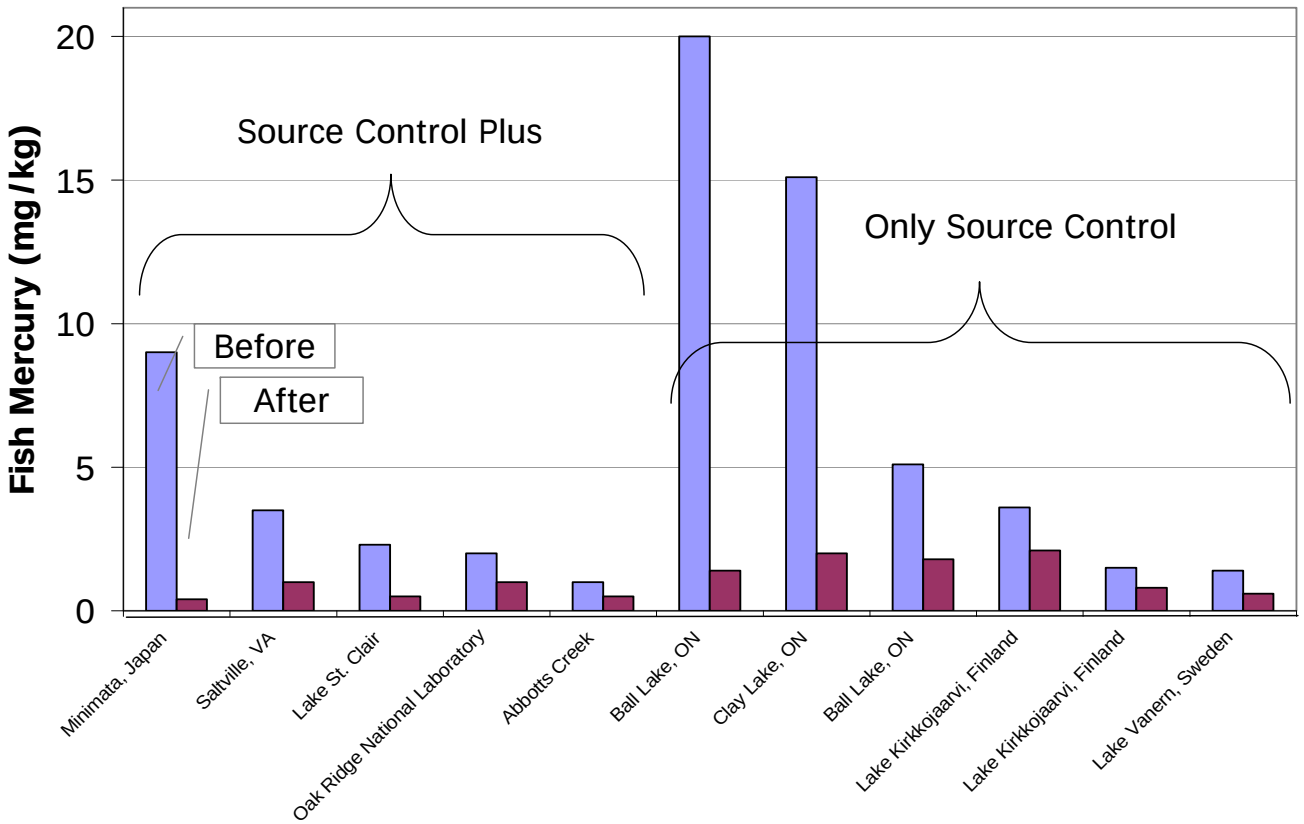


**Figure RTC-1 Change in Fish Tissue Mercury Concentration after Remediation Efforts**

Remediation results in substantial decreases in fish mercury concentrations from, on the right, "only source control," and on the left, source control combined with other remediation actions such as dredging. Figure RTC-1 is based on Table 4.3, Change in Fish Tissue Mercury Concentration After Remediation Efforts (CVRWQCB 2004).

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**Parks comment no. 1.2: Without such a data connection, there is no basis to conclude that reduction of mercury in sediment under the proposed TMDL and Basin Plan amendment would reduce mercury in fish tissue…**

In fact, data from the Guadalupe River watershed provide that connection. These data support that lower mercury concentrations in reservoir and lake bottom sediments result in lower fish tissue methylmercury concentrations (Section 7.1, Qualitative Linkage from Sources to Targets, February 2008 Staff Report for Public Comment).

**Parks comment no. 2: Concern: Proposed Deadlines for Action are not Achievable**

Water Board staff disagrees with changing the deadlines at the outset. We plan that implementation will be phased over 20 years, for integration with the San Francisco Bay mercury TMDL. It is important that erosion control at the mine sites be completed in the first ten years, as these upstream actions will protect downstream areas to be addressed in the second ten years.

Despite the importance of completing upstream actions first, we have left open an opportunity to extend the deadlines. As stated in the adaptive implementation section of the proposed BPA, "The Water Board staff will present an annual progress report to the Water Board on implementation ... Within ten years of the effective date of this TMDL project, the Water Board will consider amending this TMDL project and implementation plan as necessary ... Reviews ... will provide opportunities for stakeholder participation. Water Board staff will propose modifications to the … schedule ..."

**Parks comment no. 3: Recommendation: Consistent Approach to Regional Problem**

**Establish consistent regional (Delta-Bay-Guadalupe) mercury program**

The Guadalupe, Bay, and Delta mercury TMDLs are closely integrated, as required by the State Water Board (Section 8.6). The Guadalupe and Walker mercury TMDLs are also closely integrated (e.g., same water quality objectives and fish targets).

**Parks comment no. 4: Recommendation: Phased Approach**

**… The proposed phased approach would allow the County to: (a) conduct field investigations of mercury in soil and sediment within the park, (b) integrate this research with other studies of the factors that may contribute to the methylation and**

**bioaccumulation of mercury in fish, and (c) propose focused efforts to reduce mercury loading in the Guadalupe watershed. …**

The proposed Basin Plan amendment already incorporates this phased approach, including Parks steps (a) and (c). Under "Implementation Actions for Mercury Mines," the BPA includes both "1. Conduct a site investigation evaluating the erosion potential of mercury mining waste…" and "2. Develop plans and schedules to control mercury mining waste discharges…"

Regarding Parks step (b), Parks has already participated in just such a program as they are proposing with this comment. The Guadalupe Mercury Work Group (see Section 3.1), which Parks participated in, was established to provide oversight for development of the Conceptual Model of Mercury Behavior in the Guadalupe River Watershed. We used this conceptual model as the scientific basis of this TMDL project, and the supporting Staff Report has been subjected to the required Peer Review scrutiny.

Further, we requested that the other stakeholders, including Parks, contribute funds together with the Santa Clara Valley Water District, towards development of the Conceptual Model. Parks declined to contribute funds. At this point in time, we believe that funding is better spent on implementation of the TMDL project, rather than further scientific research.

Also regarding Parks step b), in any case, we do have a method to incorporate new scientific information into the TMDL project. Adaptive implementation allows us to consider how we should modify the TMDL project. Therefore, if Parks chooses to pursue a study of the factors that may contribute to the methylation and bioaccumulation of mercury in fish, we can potentially use these results. We would suggest Parks consider a study on creeks in and immediately downstream of the New Almaden Mining District.

**Parks comment no. 5: The proposed 0.1 ppm erodible soil standard could require elimination or armoring of large areas of natural soils within the park, at great cost in monetary terms, as well substantial ecological damage.**

Parks expressed two concerns in this comment, which we numbered 5.1 and 5.2, and respond to individually.

**Parks comment no. 5.1: Recommendation: Flexibility for Adjusting Sediment Mercury Limits in Mineralized Areas**

**Almaden Quicksilver County Park is located in an area that has a high concentration of naturally occurring sediment mercury …. As noted in [Attachment A], it is not reasonable to set the same sediment mercury standards for mineralized (deposits**

**containing naturally occurring sediment mercury) and non-mineralized areas. Indeed, those differences between mineralized versus non-mineralized areas represent the difficulty inherent in the "one size fits all" 0.1 [mg/kg allocation]. One size does not fit all. … The [Central Valley Water Board, in their mercury TMDLs] acknowledges the differences between mineralized and non-mineralized areas and proposes to allow a higher concentration of sediment mercury in mineralized areas than non-mineralized areas. The County recommends a similar approach, which would allow further study to determine the appropriate limit for sediment mercury in the park.**

Parks restates their comment no. A.7—see our response to Parks comment no. A.7.

**Parks comment no. 5.2: The rare serpentine soils and related ecology, found at many locations within the County including Almaden Quicksilver County Park, provide critical habitat for such endangered species as the Bay Checkerspot Butterfly. These areas are likely to be disturbed, if not eliminated, by steps required under the proposed Guadalupe TMDL.**

We revised the Staff Report in response to Parks' comments regarding potential habitat destruction. In response to comments from several parties about the mining waste allocation, we clarified that implementation actions are directed to controlling erosion of mining waste, and not natural soils. This revision should clarify that no actions are required for areas of natural soils (serpentine or otherwise), and hence minimizes disturbed areas and preserves habitat. Additionally, we revised our regulatory analysis. We revised Sections 10.3–10.5 (from the February 2008 version), pertaining to analysis required by the California Environmental Quality Act, to more completely describe how impacts to habitat and special status species will be minimized (see response to Ms. Killough's second comment in Part 1).

**Parks comments on fish tissue objectives**

Parks' consultant expressed several concerns relating to fish tissue objectives, which we numbered A.1—A.4, and respond to individually.

**Parks comment no. A.1: Fish tissue objectives appear to be reasonable … it appears the objectives are based on the best available science at the time of the analysis.**

We agree. The fish tissue objectives were developed by the U.S. Fish and Wildlife Service.

**Parks comment no. A.2: Reasonable assumptions used to calculate objectives**

Comment noted

**Parks comment no. A.3: Consider conducting a use attainability analysis, like the Central Valley Water Board did for Sulphur Creek**

We considered the Use Attainability Analysis (UAA) in Section 10.4.4, and concluded that it cannot be justified at this time. However, the UAA option could be reconsidered at the ten year mark via the adaptive implementation process, as described in the proposed BPA, "The Water Board staff will present an annual progress report to the Water Board on implementation ... Within ten years of the effective date of this TMDL project, the Water Board will consider amending this TMDL project and implementation plan as necessary ... "

**Parks comment no. A.4: Add trophic level to fish tissue water quality objectives in the proposed Basin Plan amendment and Section 6 of the Staff Report**

We agree, and we corrected this oversight by revising the proposed Basin Plan amendment (Table 3-4A, and *Targets* in Chapter 7) and Staff Report (Section 6) to include "Trophic Level 3".

**Parks comment no. A.5: Linkage between Sediment Loads and Load Allocations and Fish Tissue Objectives**

**The linkage between fish tissue concentration and sediment concentrations as described in the Staff Report is weak, and there does not appear to be a scientific basis for the identification of a TMDL of 0.1 mg/kg mercury in suspended sediments in waters upstream of reservoirs and lakes. There was no attempt to quantitatively link fish tissue concentrations to sediment concentrations, as was done for bioaccumulation factors (BAFs) for fish tissue and water concentrations in Section 7.4. It is not clear why a similar approach was not used to develop biota-sediment accumulation factors (BSAFs) to quantitatively link sediment concentrations to fish tissue concentrations. Even better would be development of a regression equation to predict fish tissue concentrations based on sediment concentrations using historical data. While there may not be enough data to identify a strong correlation, the report does not discuss any attempt to identify a quantitative link.**

We revised the allocations to mercury mining waste and mercury-laden sediment in response to both Parks comment no. A.5 and GRDC comment no. 12; we respond herein to these two comments. We revised the proposed Basin Plan

amendment (Tables 7-A and 7-B) and supporting Staff Report (Section 8.1; Tables 8.1, 8.4, and new Table 8.5; and Figure 8.1).

We disagree that the derivation of the 0.1 mg/kg allocation is arbitrary. The allocations to erodible soil fines, which become bottom sediments in lakes, reservoirs, and San Francisco Bay, were calculated based on their primary destination. The upstream allocation recognized that sediments discharged upstream of reservoirs and lakes are likely to be captured in these deep impoundments. The downstream allocation recognized that eventually these sediments will be transported to San Francisco Bay.

We eliminated the 0.1 mg/kg allocation to mercury mining waste and mercury-laden sediment discharged from depositional areas downstream of mercury mines, for reasons described below. These changes result in a single allocation to mercury mining waste of 0.2 mg/kg. These changes also result in a single allocation to mercury-laden sediment discharged from depositional areas (whether downstream of mercury mines or waters that convey urban stormwater runoff) of 0.2 mg/kg. The allocation to nonurban stormwater runoff discharges, i.e., non-mineralized and non-urban areas, remains 0.1 mg/kg.

Parks commented on an apparent lack of quantitative linkage analysis between fish tissue mercury concentrations and sediment mercury concentrations. The Staff Report in Section 7.1, particularly Figure 7-2, relates increases in reservoir bottom sediment mercury concentrations to increases fish mercury concentration. This is a qualitative linkage. By inspection of Figure 7-2, bottom sediment mercury concentrations lower than 0.1 mg/kg in the reference reservoir would be required to attain fish targets in reservoirs and lakes. A quantitative analysis would require extrapolation beyond the data set. Therefore, we did not pursue a quantitative linkage analysis.

The derivation of the 0.1 mg/kg allocation was provided in Section 8.1. However, the February 2008 Section 8.1, *Mining Waste Total Mercury Allocations*, incorrectly stated that fish in the reference reservoir met targets. This statement was an error from a previous version of the report.

Correction of this error results in a single allocation to mercury mining waste of 0.2 mg/kg, and a single allocation to mercury-laden sediment discharged from depositional areas of 0.2 mg/kg. The allocation to nonurban stormwater runoff discharges, i.e., non-mineralized and non-urban areas, remains 0.1 mg/kg.

**Parks comment no. A.6: Sediment Loads and Load Allocations Not Appropriate for Mineralized Areas**

Parks expressed two concerns in this comment, which we numbered A.6a and A.6b, and respond to individually.

**Parks comment no. A.6a: It is not reasonable to set a load and load allocations for a mineralized area equal to the concentration found in an area that does not have similar geology (deposits containing cinnabar).**

**[Parks provides the following citation from the *Amendments to The Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Mercury in Cache Creek, Bear Creek, Sulphur Creek, and Harley Gulch. Staff Report*. October 2005, by the Central Valley Water Board. This citation discusses concentration goals intended as a guide for cleanup efforts, not TMDL allocations.]**

> **These concentrations are 0.2 mg/kg, dry weight in non-mineralized areas (Churchill and Clinkenbeard, 2004) and 3 mg/kg in mineralized zones (Pearcy and Petersen, 1990), applied to the average of mercury concentrations in samples of fine-grained soil (<63 micron) entering Sulphur Creek. The goal for mineralized zones is intended as a guide for cleanup efforts and may be adjusted as more information is gathered during feasibility studies at individual mine sites.**

**Such site-specific goals for sediment in mineralized areas are mentioned in the Staff report on Page 8-4 under "Potential Allocations Based on Conditions Prior to Mining". There was no justification for not selecting this approach provided in the report. In the BPA such an approach is described under special studies (Section 9.10) but not incorporated into the Tables of numeric TMDL and Load and wasteload allocation in Sections 3 and 7. We suggest modification to the BPA Tables (See Attachment B) to allow such an approach to be used to modify the objectives, TMDLs and allocations. …**

We revised Section 8.1 in response to this comment, to provide a justification for not selecting allocations based on pre-mining conditions. Data are lacking to justify an allocation based on pre-mining conditions.

There are similarities and differences in the Central Valley Water Board's approach to mercury mine-related TMDLs, and our approach in the Guadalupe. Both TMDLs mention cleanup goals in mineralized zones, and we have similar goals for addressing mercury mining waste discharges.

The Central Valley's goals for Cache Creek, Bear Creek, Sulphur Creek, and Harley Gulch are the following.

> 5.2 Sulphur Creek Sediment Implementation Goals
> … The goal for mineralized zones is intended as a guide for cleanup efforts and may be adjusted as more information is gathered during feasibility studies at individual mines. … (p. 31 CVRWQCB 2005)
>
> 5.3 Mercury Mines in the Cache Creek Watershed
> … The goals of mine implementation activities are to eliminate inputs from the mine sites that are related to anthropogenic activities and restore

> the streams as closely as possible to background conditions. …
> (p. 31 ibid).

Similarly, in the Guadalupe River watershed mercury TMDL we include a discussion of cleanup goals in Section 9.10, and our implementation goal is nearly the same as that for Cache Creek.

> 9.10 Special Studies
> Calculating the Mining Waste Cleanup Goal
> … the mining waste allocations to mercury mines are expected to be met by erosion control actions. Some erosion control measures may be designed to attain natural background mercury concentrations (e.g., excavate mining waste down to ambient, pre-mining background concentrations.) …
>
> 8.1 Mining Waste Total Mercury Allocations
> The goal for the mining waste allocations are to eliminate inputs of mercury to surface waters caused by anthropogenic activities (i.e., mining) to restore beneficial uses.

There are significant differences in the Central Valley Water Board's approach to mercury mine-related TMDLs from our approach in the Guadalupe. The Central Valley established TMDL allocations as aqueous (unfiltered) methylmercury concentrations (i.e., total methylmercury in the water column). A component of their mercury reduction program is to "control discharges of sediments in erosive watersheds where the total mercury sediment concentrations are greater than 0.4 mg/kg, dry weight" (p. 28 CVRWQCB 2005). They establish a remediation goal for mine sites of 95% load reduction of total mercury discharged (p. 32 ibid).

In contrast, we propose to establish TMDL allocations as total mercury in suspended sediments (Section 8.1), and our implementation goal for mine sites "is to prevent further erosion of mercury mining waste by stabilizing and vegetating slopes" (Section 9.1).

**Parks comment no. A.6b: Implementing such stringent sediment standards could essentially mean armoring any potentially erosive areas (which is any exposed slope) within the Park with hard surface or complete removal of all park soils and replacement and stabilization with imported fill. Since neither of these solutions are economically achievable or practical (or desired since they would potentially damage the rare serpentine ecology in the Park) the standard would never be met. In fact, such armoring projects could result in decreased infiltration of rainfall, increased runoff, shorter runoff transport times, increased runoff flow velocity and increased**

**erosion of stream banks and bed which could mobilize previously buried and isolated calcine deposits.**

Regarding stringent [*soil cleanup*] standards, we revised the allocations to mercury mining waste and mercury-laden sediment in response comments—see our response to Parks comment no. A.5. Also regarding stringent [*soil cleanup*] standards, we revised the proposed Basin Plan amendment (*footnote a in Table 7-B*) to clarify that we are not establishing a mercury cleanup standard for mine sites or depositional areas—see our response to Mr. Cox in Part 1.

Regarding loss or damage to serpentine habitat, Parks repeats their comment no. 5.2—see our response to Parks comment no. 5.2.

**Parks comment no. A.7: Different sediment objectives for suspended sediments upstream and downstream of reservoirs**

**It is not clear why the allocation for mercury concentrations on suspended sediments upstream of reservoirs and lakes (0.1 mg/kg from Table 7A) should be different from the allocation for mercury concentrations on suspended sediments downstream of reservoirs (0.2 mg/kg). The justification provided in the Report is that the downstream target is based on the Bay Hg TMDL target. However, setting such a target for watersheds draining to the Bay does not take into account the local geology and benefit of sediment mixing with sediments discharged from other non-mineralized areas.**

We respond herein regarding "benefit of sediment mixing" to both Parks comment no. A.7 and GRDC comment no. 3. We respond to upstream allocation different from downstream allocation with our response to Parks comment no. A.5.

The "sediment mixing" approach that we used in our Walker Creek mercury TMDL is not appropriate for the Guadalupe River watershed. The Gambonini mercury mine operated for a very short period and quite recently (1964-1970), and produced much less mercury than mines in the Guadalupe River watershed which operated for roughly 150 years and produced about five percent of the world's mercury production.

Additionally, the Gambonini mercury mine drainage is an ephemeral stream separated from downstream waters by a culvert that is impassable to fish. Fish targets do not apply to the Gambonini mercury mine drainage because it does not support fish.

If we were able to apply the Walker approach to Guadalupe, the logical mixing point is the top of Guadalupe River, where Alamitos and Guadalupe creeks converge. However, Alamitos, Calero, Randol, Greystone, Golf, and Guadalupe

creeks do or potentially support fish (Figures 7-47 & 8-39, SCVWD 2006). Therefore, unlike Walker, allocations would have to meet fish targets. Let us examine fish in the mineralized zone in more detail.

Nearly all creeks on Los Capitancillos and Santa Teresa ridges in the Guadalupe River watershed are ephemeral and do not support fish. However, both Golf and Guadalupe creeks in the New Almaden mineralized zone support fish. Therefore, fish targets do apply to these waters. Golf Creek is located on the northeast portion of Los Capitancillos ridge. The upper portion of Golf Creek is located on Los Capitancillos ridge and does not benefit from sediment mixing. Lastly, we note there are no fish data from upper Golf Creek, which, if they met targets, and if sediment data were available, could be used to establish a sediment mercury allocation.

In contrast, Guadalupe Creek benefits from sediment mixing over its entire length. The upper portion of Guadalupe Creek drains Mt. Umunhum, outside of the mineralized zone. Guadalupe Reservoir extends to the confluence of Guadalupe and Los Capitancillos creeks, the first point at which Guadalupe Creek receives discharges from the mineralized zone. The linkage analysis shows that until methylmercury produced in and released from reservoirs is addressed, we cannot assess the importance of methylmercury production in downstream reaches. Similarly, we cannot use data from Guadalupe Creek to establish sediment mercury allocations, until methylmercury from Guadalupe Reservoir is addressed.

In conclusion, there is insufficient data available and insufficient reservoir methylmercury controls to establish an allocation that takes into account the local geology and benefit of sediment mixing with sediments discharged from other non-mineralized areas.

**Parks comment no. A.8: Phased TMDL Approach**
**Due to the lack of a documented linkage between sediment-based load allocations and target fish tissue concentrations, a phased approach would be appropriate for this TMDL.**

We are relying on the Adaptive Implementation process as described in the proposed BPA and supporting Staff Report, as we do in our other TMDL projects, rather than a "phased TMDL." We are confident that adaptive implementation will lead to the same endpoint as a phased TMDL. Under adaptive implementation, similar to a phased approach future actions are conditioned and in part crafted on the results of earlier work.

## Part 2: Staff responses to written comments on the February 2008 Staff Report for Public Comment

**Parks Comment no. B.1: Suggested changes to Table 3-4A (freshwater water quality objectives for mercury) in the proposed Basin Plan amendment:**

- **Add trophic level 3**
- **Add footnote that water quality objectives will be reviewed every five years … in accordance with phased TMDL approach**
- **Add footnote of trophic level 3 fish species from list in Staff Report**

We agree with adding trophic level 3, and have revised the proposed Basin Plan amendment (Table 3-4A) and Staff Report accordingly, as we described in response to Parks comment no. A.4. We are relying on adaptive implementation in this (and in our other TMDL projects), as described in response to Parks comment no. A.8, therefore, we do not agree with adding the first suggested footnote. We do not think it is necessary to add a footnote listing the trophic level 3 fish species, because the supporting Staff Report provides a suitable reference.

**Parks Comment no. B.2: Suggested changes to Tables 7-A (TMDLs) and 7-B (Allocations) in the proposed Basin Plan amendment regarding reviewing and revising TMDLs and allocations every five years in accordance with the Phased TMDL Approach, and to add the following underlined text to the TMDL and allocation to waters upstream of reservoirs and lakes: 0.1 mg mercury per kg suspended sediment (dry wt., annual median) <u>or site-specific load</u>**

Regarding reviews every five years, Parks repeats their comment no. A.8—see response to Parks comment no. A.8. Regarding revising TMDLs and allocations to a site-specific load based on mineralized geology, Parks repeats their comment no. A.7—see response to Parks comment no. A.7.

**Parks Comment no. B.3: For the implementation actions for mercury mines, add a first step consisting of a work plan to be completed in six months, and then complete the site investigation on a schedule to be provided in the work plan [rather than the schedule outlined in the proposed Basin Plan amendment].**

This comment repeats Parks comment no. 2, in which they expressed concern that the proposed deadlines are not achievable. We disagree with changing the deadlines at the outset, but provide schedule flexibility via adaptive implementation (see our response to Parks comment no. 2).

## Comment letter from Guadalupe Rubbish Disposal Company (Todd Maiden of Reed Smith LLP)

**In their introductory comments, Guadalupe Rubbish Disposal Company, Inc. (GRDC) expressed appreciation for the "significant amount of work that [staff] have committed to both the project and to working with various stakeholders…"**

**Also in their introductory comments, GRDC mentioned some concerns. We respond to their concerns with our responses to their specific comments below. GRDC closed their introductory remarks with a statement of support for the TMDL objectives, and acceptance of the use of BMPs for erosion control at mine sites.**

We thank GRDC for acknowledging our hard work and outreach to stakeholders. We respond to their specific comments below, by topic as enumerated in their letter.

**GRDC comment no. 1: The TMDL Does Not Satisfy The Clean Water Act's Requirement That TMDLs Must Be Based on a Daily Limit.**

We revised Section 8.6 (*Total Maximum Daily Loads [TMDLs]*) to include daily load expressions in grams per day (g/d), in response to numerous comments that "daily means daily", and given U.S. EPA's draft guidance providing calculation methods for "daily load expressions" (USEPA 2007).

TMDLs are "[t]he sum of the individual waste load allocations for point sources and load allocations for nonpoint sources and natural background. … TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure" (Code of Federal Regulations, Title 40, §130.2[i]). We established concentration-based TMDLs in accordance with this provision of the Clean Water Act.

The TMDLs of mercury to the impaired waters of the Guadalupe River Watershed are the combination of concentration-based allocations proposed in Sections 8.1–8.5, and summarized on Table 8.1. A daily or average daily TMDL is inappropriate for the proposed allocations due to both (1) the temporal component embedded in the applicable water quality standards that the allocations were developed to protect, and (2) the nature of mercury transport and methylmercury production in rivers and reservoirs. The allocations protect wildlife and human health beneficial uses related to consuming watershed and Bay fish. The water quality objectives, which protect these uses, are the narrative bioaccumulation objective, the numeric fish tissue objectives, and the numeric mercury CTR criterion. These objectives reflect environmental exposure over time and therefore it is preferable to assign a concentration limit (rather than a daily or average daily load [i.e., mass per time]) to ensure attainment of these objectives.

The District of Columbia (D.C.) Circuit Court of Appeals issued a decision in *Friends of the Earth, Inc. v. EPA, et al.*, No. 05-5015 (D.C. Cir. 2006), in which the D.C. Circuit held that two TMDLs for the Anacostia River (one established by U.S. Environmental Protection Agency [EPA] and one approved by EPA) did not comply with the Clean Water Act because they were not expressed as *daily* loads. As a result of the decision, EPA issued a memorandum entitled *Establishing TMDL "Daily" Loads in Light of the Decision by the U.S. Court of Appeals for the D.C. Circuit in Friends of the Earth, Inc. v. EPA et. al., No. 05-5015 (April 25, 2006) and Implications for NPDES Permits* in November 2006 that recommends that all TMDLs and associated load allocations (LAs) and wasteload allocations (WLAs) include a daily time increment in conjunction with other temporal expressions (e.g., annual, seasonal) that may be necessary to implement the relevant water quality standards. Subsequently, in June 2007, the U.S. EPA Office of Wetlands, Oceans & Watersheds issued draft guidance providing calculation methods for "daily load expressions" (USEPA 2007).

This D.C. Circuit precedent does not apply to California, which is subject to the 9th Circuit Court of Appeals. We nonetheless provide an interpretation of our concentration-based approach as a daily load expression in grams per day (g/d), in accordance with the draft U.S. EPA guidance. U.S. EPA noted in this guidance document that "for pollutants where the [*water quality standard*] has a longer than daily duration (e.g., monthly or seasonal average), individual values that are greater than the daily expression do not necessarily constitute an exceedance of the applicable standard."

**GRDC comment no. 2: A TMDL Cannot Be Based on Mercury Concentration in "Erodible Soil."**

**… The proposed Basin Plan amendment and the [Staff] Report establish a TMDL based not on a daily discharge rate, but rather on a static concentration of mercury in soil, regardless of what total quantity of mercury actually discharges to navigable waters. … the [Staff] admits:**

> **[T]he Guadalupe Linkage Analysis (see Section 7.1) for inorganic mercury is qualitative, so <u>it does not provide a scientific basis for a mass load in the Guadalupe River watershed</u>. [Staff] Report at 8-4 (emphasis added).**

**This admission is tantamount to conceding that the TMDL does not provide the very information that it is required to provide, namely "an understanding of pollutant loading sources and the amounts and timing of pollutant discharges [that] is vital to the development of effective TMDLs." … Moreover, an "erodible soil fines" standard simply will not and cannot serve to determine "the maximum amount of a pollutant that may be delivered to the waterbody and still achieve water quality**

**standards." The "maximum amount" must be determined based on how much mercury is discharged to the system, and cannot be based on the concentration of mercury in the soil, i.e., one cubic yard of heavily contaminated erodible soil may result in a lower total discharge of mercury than a millions of cubic yards of lightly contaminated soil.**

We revised Section 8.1 (*Potential Mass Load Allocations*) in response to this comment. We clarified that because of the high uncertainty in the 2004 load estimates, together with high interannual variability in loads, it would be impractical to regulate on the basis of annual or daily mass loads of total mercury.

We disagree that a TMDL cannot be based on the mass of mercury in erodible soil. Mercury's greatest threat is in waters where it is methylated and bioaccumulated. The primary mercury transport mechanism to waters in this watershed is stormwater erosion of mercury mining waste (see Section 4). We described in Section 8.1 that, "Soil fines on the landscape become suspended sediments when they are transported by stormwater runoff to surface waters. Erosion is assumed to be controllable and "erodible" means material readily available for transport by stormwater runoff to surface waters (see Section 8.1). Therefore, we based our allocation to mining waste on suspended sediments in the water column.

We disagree that the pollutant loading (source) analysis is inadequate. In Sections 4 and 7 we provide a detailed "understanding of pollutant loading sources and the amounts and timing of pollutant discharges [that] is vital to the development of effective TMDLs". In Section 4.3 we provide an estimate of the uncertainty in loads, and state, "these load estimates are useful in comparing the relative loads from different sources and in different locations in the watershed, and [Water Board staff] do not currently anticipate a need for more precise load estimates from the upper watershed." Peer reviewer Prof. Sedlak concurred, as follows.

> The identification of sources, linkage analysis and allocations are based upon data collected recently by [Tetra Tech]. Although the heterogeneity of the system and its complex hydrology make it difficult to estimate some of the values accurately, the staff has attempted to apply best professional judgment in a way that allows for cleanup to begin soon. In my opinion, the adaptive management approach advocated by the staff is superior to spending more time quantifying loadings and sources.

We respond to GRDC's point regarding loading of mercury rather than soil, with our response to GRDC comment no. 4.

**GRDC comment no. 3: An "Erodible Soil" Standard of 0.1 ppm or 0.2 ppm is Excessively Stringent Because It Fails to Account for Dilution**

**...the proposed TMDL's approach fails to consider the dilutive effect of uncontaminated sediments from entering into the watershed. If the concentration-based approach is accepted, then the erodible fines standard needs to be derived using the same method for water-based TMDLs, i.e., the erodible fines standard should be raised to include the dilutive effect of clean sediments. As proposed, the erodible fines requirements of 0.1 ppm and 0.2 ppm are excessively stringent and not consistent with the Clean Water Act.**

> We disagree that the allocations are excessively stringent or not consistent with the Clean Water Act. In fact, the Clean Water Act requirement of a margin of safety in TMDLs results in stringent TMDLs. Also, neither the Clean Water Act nor regulations specify methods by which to establish TMDLs, whether sediment- or water-based TMDLs. We respond regarding "raised to include the dilutive effect of clean sediments" with our response to Parks comment no. A.7. Also as described in response to both Parks comment no. A.5 and GRDC comment no. 12, we revised the mercury mining waste allocation to 0.2 mg/kg.

**GRDC comment no. 4: Standard based on "erodible soil" is vague and unworkable**

**Even if a TMDL based on mercury concentrations in erodible soils were lawful, the standard is unworkable as a practical matter. How does one determine which soils are "erodible?" Aren't all soils erodible to some degree? The Report defines "erodible soil" as "soil that is transported by storm runoff to [*surface*] waters." [Staff] Report at 8-17. Thus, for a landowner to know whether certain soils are "erodible soils" those soils must have already been transported by stormwater runoff to [*surface*] waters, making post hoc control of those discharges impossible...**

> Soil erosion is visually obvious on the landscape. The following are some visual indicators of erosion: rills, gullies, lack of vegetation, turbid stormwater discharged from the area, slumps, and landslides. We described in Section 8.1 that, "Erosion is assumed to be controllable and "erodible" means material readily available for transport by stormwater runoff to surface waters (see Section 8.1). Soil fines on the landscape become suspended sediments when they are transported by stormwater runoff to surface waters."
>
> GRDC asks in this comment, "How does one determine which soils are 'erodible?' Aren't all soils erodible to some degree?" GRDC operates a landfill, and like all landfills, it is an extensive grading and construction site with comprehensive soil erosion controls designed by technical professionals, many of whom are licensed by the State of California, installed by competent operators,

and they rely on their contractors' best professional judgment based on visual assessment of the performance of these controls.

In Section 8.1, we describe "The goal for the mining waste allocations are to eliminate inputs of mercury to surface waters caused by anthropogenic activities (i.e. mining) to restore beneficial uses." Therefore, the only permissible discharge from mine property is that naturally generated by erosion of undisturbed soil. Also from Section 8.1, "The principal concern with mining waste is wet season stormwater transport of inorganic mercury to surface waters. Implementation actions [must be] taken to prevent the erosion and transport of mining waste from the landscape to surface waters …"

We currently propose to implement the allocations at mine sites by requiring the installation and maintenance of best management practices to control erosion of mining waste. These are the same methods that GRDC routinely implements at their landfill operations. Alternatively, we could pursue the same strategy as the Central Valley Water Board. They require a 95 percent load reduction at mine sites in the Cache Creek watershed, which requires mining wastes to be "protected from exposure [to stormwater]" i.e., excavated, then placed over and under impervious liners. However, unlike in the Guadalupe, mercury mines in the Cache Creek watershed generate acid mine drainage. As explained in response to Board Member Singh, we think that erosion control provides better than 70% load reduction, and is sufficient.

**GRDC comment no. 5: An "Erodible Soil" Standard of 0.1 ppm or 0.2 ppm Is a De Facto Soil Cleanup Standard That Is Excessively Stringent.**

**As drafted, the proposed TMDL imposes de facto soil cleanup standards… While the proposed Basin Plan amendment and the [Staff] Report lack any valid basis for setting the erodible soil standard at 0.1 mg/kg, it explains that the 0.2 mg/kg erodible standard is based on the San Francisco Bay Mercury TMDL. Yet, there is no explanation in the [Staff] Report as to why a marine mercury sediment standard is appropriate for a freshwater "erodible soil" standard... the proposed Basin Plan amendment and the [Staff] Report admit that it has not undertaken any kind of scientific evaluation of the purported "cleanup standards" other than adopting a background concentration of 0.1 ppm from "background" sediment concentrations in the Lexington Reservoir.**

We revised the proposed Basin Plan amendment (*footnote a in Table 7-B*), in response to numerous comments about mining waste allocations, to clarify that we are not establishing a mercury cleanup standard for mine sites or depositional areas (see response to Mr. Cox in Part 1). Also, see our responses to Parks comment no. A.5. in which we describe the change in allocation to mercury mining waste.

**GRDC comment no. 6: Lexington Reservoir is not an appropriate reference site because it is not located in mineralized geology**

**The [Water Board's] decision to use Lexington Reservoir sediments to represent background sediment concentrations is neither justified nor logical. An appropriate reference site should be a site that is mineralized but not impacted by mining operations.**

The justification for Lexington Reservoir as the reference reservoir is provided in Section 7.6 (*Mercury in the Reference Reservoir*), and Section 7 *Key Points*, as follows. "Lexington Reservoir was selected as the reference reservoir for this TMDL because it receives no mercury mining waste or urban runoff." Also, see response to District comment no. A.10a regarding Technical Review Committee member Don Porcella's recommendation for Lexington Reservoir as the reference reservoir.

We disagree that Lexington Reservoir is not an <u>appropriate</u> reference site for the reasons provided in response to District comment no. A.10a. Theoretically, there may be <u>better</u> reference sites, such as a (hypothetical) reservoir in this watershed in mineralized soil but not influenced by mining. However, no such reservoir exists in this watershed. Consequently, we were careful to address the challenges of the reference site approach, by drawing this approach to the attention of the Peer Reviewers (see Section 10.3, *Peer Review…*). Prof. Tullos stated, "…Lexington Reservoir appears to be a suitable reference site for this analysis due to [its accessibility to human fishers] and lack of mining in the basin… ." Prof. Sedlak stated, "…land use data support the idea that the Lexington Reservoir may be representative of the pre-disturbance conditions in the watershed…."

(Also as discussed in Section 10.3 *Peer Review…*, Professors Sedlak and Tullos raised some questions with respect to our interpretation of fish tissue mercury concentrations in the reference reservoir. They did not suggest that the reference reservoir approach was flawed, and we revised our interpretation of fish tissue mercury concentrations.)

**GRDC comment no. 7: The TMDL Does Not Provide Evidence That Downstream Mining Wastes from GRDC Are Impacting Guadalupe Creek.**

**The proposed Basin Plan amendment and the [Staff] Report do not provide evidence [of] mining wastes or mercury discharges from the former Guadalupe Mine area [to] Guadalupe Creek.**

Data collection for the TMDL was designed to characterize typical watershed conditions. It was specifically designed to avoid pinpointing any one discharger or responsible party.

In October 2007, Water Board staff inspected GRDC. During the inspection, we pointed out areas to GRDC representatives where mining waste is eroding uncontrollably from GRDC property into Guadalupe Creek. As a result of this inspection, and other Water Board enforcement actions, GRDC has undertaken some erosion control efforts for mercury mining waste, and is in the process of developing an erosion control work plan.

**GRDC comment no. 8: The [Staff] Report Confirms That There Is No Need to Assign Allocations to Mining Sources Downstream of the Reservoirs.**

**The TMDL admits that the reduction of mercury and methylmercury in the reservoirs and upstream mining areas is the key to meeting the water quality objectives.... There is no justification for requiring downstream mining sources to implement load reduction strategies to meet the TMDL target.**

We disagree that there is no need to assign allocations to, or reduce loads from, mercury sources downstream of reservoirs and lakes. (These sources include mercury mines downstream of Guadalupe Reservoir, and depositional areas downstream of reservoirs and lakes.) We agree that reductions of mercury loads from sources downstream of reservoirs and lakes may not be needed to obtain fish targets within the watershed. This TMDL project anticipates that methylmercury controls in reservoirs and lakes will be effective in attaining these downstream targets.

However, reductions of mercury loads from sources downstream of reservoirs and lakes are needed to attain the legacy mercury allocation assigned by the Bay mercury TMDL to this watershed, and to attain the Bay TMDL's sediment target of 0.2 mg/kg. These load reductions are necessary to protect the South Bay Salt Ponds Restoration Project and San Francisco Bay.

**GRDC comment no. 9: The Guadalupe Mines Are Improperly Included in the New Almaden Mining District**

**This is arbitrary and improper as the Guadalupe Mine area is distinctly separated in size and location from the extensive mining operations of the New Almaden Mining District.... The proposed Basin Plan amendment and the [Staff] Report fail to explain the technical basis for creating the "New Almaden Mining District" or provide justification for including the Guadalupe Mine.... The proposed Basin Plan amendment arbitrarily lumps the Guadalupe Mines with other mines to suggest that**

**the extremely high mercury found in other areas is present near the Guadalupe Mines.... Further, the [Staff] Report provides support for excluding the Guadalupe Mine from this arbitrary category "New Almaden Mining District." It indicates that sites located downstream from the reservoir, such as the Guadalupe Mine, appear not to be the cause of elevated methylmercury levels. [Staff] Report at 7-9. Also, much of the Lower Guadalupe Creek has been restored by the Santa Clara Valley Water District by the removal of sediments.**

In response to this comment (although the Guadalupe Mine was correctly included in the New Almaden Mining District), we revised the definition of the New Almaden Mining District in Section 3.4 (*definitions*). We also revised Sections 8 and 9, and the proposed Basin Plan amendment (*Sources*, *Table 7-B*, and *Implementation Actions for Mercury Mines*).

Previously, we defined the New Almaden Mining District as, "Los Capitancillos ridge and its extensions, and the processing areas on adjacent hillsides". Guadalupe mine is located on Los Capitancillos ridge, adjoining Senador mine (p. 158 Bailey & Everhart 1964). Historically, Guadalupe Mine retained a separate name because of separate ownership and operations, despite its location on Los Capitancillos ridge.

Guadalupe mine has similar environmental problems to those identified in Almaden Quicksilver County Park, which comprises the vast majority of the New Almaden Mining District—erosion of mercury mining waste into surface waters (Guadalupe Creek). This uncontrolled erosion has re-contaminated the downstream section of Guadalupe Creek that the District restored.

However, a name change is immaterial. Therefore, we made this name change in deference to GRDC's request, and in deference to historic artifact.

**GRDC comment no. 10: It Will Not Be Necessary to Impose Additional Requirements on Downstream Sources If the Upstream Reductions Achieve the Objectives of the TMDL.**

We disagree for reasons provided in our response to GRDC comment no. 8.

**GRDC comment no. 11: The Allocation for Mining Waste Discharges from Areas Below the Reservoirs Should Be Increased Substantially.**

**Even if the [Staff] Report continues to assign allocations to downstream mining sources, those "erodible soil" concentrations should be increased substantially.... the 0.2 ppm erodible soils standard is arbitrary and unnecessarily stringent for these limited downstream areas.**

We disagree for reasons provided in our response to GRDC comment no. 8.

**GRDC comment no. 12: The Derivation of the 0.1 ppm/0.2 ppm Standards is Arbitrary and Logically Flawed.**

**The Report's target mercury concentrations in "erodible soil" are based on flawed logic. It reasons that: (1) fish in the Lexington Reservoir have acceptable mercury levels; (2) average mercury levels in the Lexington Reservoir sediments are less than 0.1 ppm; therefore (3) locations where sediment mercury concentrations exceed 0.1 ppm or even 0.2 ppm will result in fish with unacceptably high mercury concentrations. Report at 7-2 and 8-4. This logical progression is invalid. One cannot reason that if fish with acceptable mercury burdens live in a reservoir with average mercury concentrations of 0.1 mg/kg, then locations where mercury concentrations exceed 0.1 mg/kg will result in fish with unacceptably high mercury burdens. The Report does not provide any basis or evidence to conclude that fish in areas with sediment mercury concentrations higher than 0.1 ppm or 0.2 ppm will necessarily have mercury concentrations above the fish tissue targets.**

GRDC restates Parks comment no. A.5—see our response to Parks comment no. A.5.

**GRDC comment no. 13: The TMDL is Improperly Limited to Sediment Load Reduction to Attain Water Quality Objectives for Methylmercury in Fish Tissue.**

**...the proposed Basin Plan amendment and the [Staff] Report make two wrong assumptions: (1) all mercury in the system is from former mines; and (2) control of mine wastes will reduce fish tissue methylmercury levels. ...mercury from natural bedrock exposures has been migrating into the watershed for millions of years. The TMDL provides no detailed studies to show that the mine waste piles are eroding any faster or at all. Without distinguishing natural mercury bearing sediments from sediments derived from mine waste piles, the proposed Basin Plan amendment can not properly assume that fish tissue methylmercury levels are not natural for this watershed.**

Mercury in the system is from a number of sources including mining waste piles (see proposed Basin Plan amendment pp. 5 & 6; see Staff Report Section 4). Mercury source control measures do reduce fish mercury levels (see response to Parks comment no. 1.1). Had the ore been at the surface, we would agree that pre-mining creek sediment mercury concentrations were likely equal to current levels. However, miners excavated vast quantities of mercury ore from deep underground; New Almaden was the world's deepest mercury mine. The ore was processed at the surface, and thereby mining greatly increased mercury loads to creeks.

Fish tissue methylmercury concentrations are highest in deep impoundments, but no comparison can be made to pre-mining conditions. This is because, prior to the mining era, there were no deep impoundments (as described in response to District comment no. A.4a). Fish tissue methylmercury concentrations in creeks that receive mining waste and in the River are elevated and unsafe for consumption by wildlife and so need to be reduced, as required by the Clean Water Act.

**GRDC comment no. 14: The TMDL will punish dischargers who reduce sediment loading**

**A significant problem with the proposed TMDL is that it establishes an erodible soil concentration limit without considering the amount of sediment being discharged. High concentrations of mercury in erodible soils will have de minimis impacts on mercury loading into the Guadalupe Watershed if the quantity of erodible soils discharged is negligible. Conversely, large quantity discharges of sediment to the Watershed could substantially increase overall mercury loads to the Watershed even if the mercury concentration in those erodible soils is low. ...**

This issue might be relevant for a mass-based TMDL project. However, we have established concentration-based, not mass-based, TMDLs and allocations.

In fact, reducing loads of mercury from mining waste is an important step towards restoring the watershed to pre-mining conditions. The natural soil erosion rate is quite high in the upper watershed, particularly along the slopes of Loma Prieta and Mt. Umunhum (which have high landslide rates indicated by red shading on Wentworth et al. 1997). This area lies outside the mineralized zone. Therefore, large quantity discharges of sediment with low mercury concentrations is the natural condition of this watershed.

Additionally, we described in response to comments at the May testimony hearing that the mining waste allocation is not a cleanup standard, and that it only applies to industrial process waste, it does not apply to soils that are not mercury mining waste (see Part 1). We revised the Staff Report and proposed Basin Plan amendment (*footnote a in Table 7-B*) accordingly. Further, we rely in this TMDL on the erosion of clean soils to cover contaminated bottom sediments in reservoirs and lakes.

**GRDC comment no. 15: Fish in Lexington Reservoir – the Purported Background Reservoir – Do Not Appear To Meet the 0.3 ppm Target**

**It is unclear why the Board has concluded that the fish from the purported background reservoir meet the 0.3 ppm mercury average in "fish consumed by humans." As noted, TL4 fish are the larger species – e.g., largemouth bass – that are**

**typically consumed by humans; therefore, the 0.3 ppm mercury standard would presumably apply to these TL4 fish. If that is the target, then the 0.3 ppm mercury fish concentration would be virtually impossible to achieve in the Guadalupe basin given that this standard cannot even be achieved in the purported background reservoir.**

In response to this comment, we corrected errors in Sections 7 (*Key Points*) and 8.1 (*Mining Waste Total Mercury Allocations*). Also, we revised the allocations to mercury mining waste and mercury-laden sediment in response to both Parks comment no. A.5 and GRDC comment no. 12; see response to Parks comment no. A.5.

The February 2008 Section 7 (*Key Points*) incorrectly stated that fish in the reference reservoir met targets. We stated correctly in Section 7.6 (*Mercury in the Reference Reservoir*), that small (prey) fish do not meet the wildlife target. Also in Section 7.6, we stated correctly that large fish that humans consume have an average mercury concentration of 0.3 mg/kg. However, our goal to protect human health is lower; 0.2 mg/kg (see Section 5). Similarly, we stated correctly in Section 8.2, *Impoundment Methylmercury Allocation*, that small (prey) fish in the reference reservoir do not meet the wildlife target. We corrected Section 7 (*Key Points*) in the September 2008 version.

Also, the February 2008 Section 8.1, *Mining Waste Total Mercury Allocations*, incorrectly stated fish in the reference reservoir met targets. As explained in response to Parks comment no. A.5, correction of this error results in a single allocation to mercury mining waste of 0.2 mg/kg, and a single allocation to mercury-laden sediment discharged from depositional areas of 0.2 mg/kg.

The average mercury concentration in adult largemouth bass was 0.6 mg/kg in both 2004 and 2006 in the reference reservoir. In Section 5 (*Wildlife Water Quality Objectives and Human Health*), we describe our goal of protecting human fishers at the rate of 4 meals per month, or 0.2 mg/kg. Section 7.6 (*2006 Large Fish and Human Consumption*), reads as follows:

> The weighted-average mercury concentration in an equal mix of TL3 and TL4 fish consumed by humans (largemouth bass, pumpkinseed, and trout) was also 0.3 mg/kg in 2006, equal to the U.S. EPA's methylmercury criterion. This is protective at a consumption rate of two servings per month of an equal mix of TL3 and TL4 fish. However, it is not protective for people who consume four servings per month, nor is it protective in the seasons (i.e. late summer and fall) when largemouth bass are abundant, but trout are not abundant.

Although the standard of 0.2 mg/kg is not currently met in the reference reservoir, we anticipate the District will develop new and innovative methylmercury control methods that will meet this standard. In their comment

letter, the District indicated they have already achieved a 90 percent reduction in methylmercury concentrations in Lake Almaden.

**GRDC comment no. 16: The TMDL Should Use the U.S. FDA's 1.0 ppm Mercury Action Level for Fish, Not the 0.3 ppm [U.S. EPA methylmercury criterion]**

We strongly disagree. We propose fish tissue water quality objectives based on current science to protect both wildlife and humans. The U.S. EPA's methylmercury criterion of 0.3 mg/kg relies on current mercury science for protection of human health (U.S. EPA 2001). Further, we are required to follow the U.S. EPA's methodology for establishing ambient water quality criteria (USEPA 2000), and this guidance requires we set a level equal to, or more stringent than, the U.S. EPA's methylmercury criterion.

**GRDC comment no. 17: The Board Cannot Unilaterally Establish a TMDL for Methylmercury**

**Under the Clean Water Act § 303(d), the Guadalupe River and the Guadalupe Creek are listed as impaired for elemental [*sic*] mercury, not methylmercury. The proposed Basin Plan amendment and the [Staff] Report ignore this fact and improperly establish a TMDL for methylmercury. It is inappropriate for the Board to establish a TMDL for a pollutant which was not identified in the Clean Water Act § 303(d) list as causing or expected to cause violations of the applicable water quality standards. Further, to the extent the Board desires to establish a TMDL for methylmercury, it must first be listed under the Clean Water Act.**

The listing is for mercury but the impairment is due to methylation of mercury to methylmercury. Methylmercury is what we need to focus on in reservoirs and lakes to address the impairment.

**GRDC comment no. 18: The [Staff] Report Fails To Adequately Quantify Loading From Wet Weather Storm Events in the Upper Watershed**

**One glaring – and admitted – defect in the [Staff] Report is the lack of upper watershed load estimates, particularly during wet weather when increased flows result in higher sediment transport and therefore higher mercury transport. Without this kind of information, it is not possible to develop a defensible TMDL. ...**

We realize that there is some uncertainty associated with mercury loads in the wet season, however, we are confident that our estimates are adequate for TMDL purposes. Prof. Sedlak affirmed our approach in his peer review, as follows.

> The identification of sources, linkage analysis and allocations are based upon data collected recently by [Tetra Tech]. Although the heterogeneity

of the system and its complex hydrology make it difficult to estimate some of the values accurately, the staff has attempted to apply best professional judgment in a way that allows for cleanup to begin soon. In my opinion, the adaptive management approach advocated by the staff is superior to spending more time quantifying loadings and sources.

**GRDC comment no. 19: GRDC's Operations Are Fully Regulated**

**The [Staff] Report mentions that GRDC operations are subject to a General Industrial NPDES Stormwater Permit but fails to mention the proper scope of the permit. [Staff] Report at 4-27. Discharges from the entire operations are covered by the General Permit and are addressed by the Storm Water Pollution Prevention Plan.**

We concur that discharges from the entire operations are covered by the General Permit. Note that in Section 4.6 we describe that "other industrial sources" are included in urban stormwater runoff. In this way, we include GRDC as another potential source of mercury in this watershed, and do not need to mention further in the supporting Staff Report the full scope of operational areas covered by the General Industrial NPDES Stormwater Permit.

**GRDC comment no. 20: The TMDL Repeatedly Fails to Support Statement with Data**

**In many instances, the proposed Basin Plan amendment and the [Staff] Report merely alleges findings without evidence. For example, the table on load and wasteload allocations (Table 7-B) indicates that the Guadalupe Creek is a source of mercury because of "mercury-laden sediment discharged from depositional areas in Guadalupe Creek". proposed Basin Plan amendment at 8. There is no data in the proposed Basin Plan amendment or the [Staff] Report to support this statement. … ...there is no evidence to suggest that controls are needed near the former Guadalupe Mine.**

We disagree that the supporting Staff Report "repeatedly fails to support statements with data." The proposed Basin Plan amendment provides a comprehensive yet succinct record of the TMDL project. By design, and in accordance with water quality control planning requirements, it does not provide the scientific basis for the TMDL. The scientific basis is provided in the Staff Report.

Although the Staff Report provides many examples of mercury mining waste in Alamitos Creek and not Guadalupe Creek, the same mining activities impacted both creeks. Photo 5 in Figure 3.9 illustrates mining waste on the hill slope just above Guadalupe Reservoir (located in Guadalupe Creek). In October 2007, Water Board and GRDC staff observed mercury mining waste adjacent to and in

Guadalupe Creek along GRDC's property (see response to GRDC comment no. 7, which mentions GRDC's recent actions to control mining waste discharges into Guadalupe Creek).

This observation holds true for depositional areas, downstream of the Guadalupe Creek. Most sediments, including mining wastes, typically do not travel the full length of the creek and river in one season. They travel some distance, accumulate in a depositional area, and later are transported downstream another distance. Eventually, they reach San Francisco Bay. The evidence described herein of "mercury-laden sediment discharges from depositional areas in Guadalupe Creek" is sufficient for TMDL and Water Board regulatory purposes.

**GRDC comment no. 21 The Implementation Actions for Mines Has Significant Uncertainties**

GRDC expressed two concerns in this comment, which we numbered 21.1 and 21.2, and respond to individually.

**GRDC comment no. 21.1: The proposed Basin Plan amendment mentions that responsible parties will be required to cleanup mercury mining waste (proposed Basin Plan amendment at 11, no. 3) but fails to define the term "cleanup"; natural background levels; and the contribution linkage of mine wastes not located in creeks and reservoirs.**

The proposed Basin Plan amendment, *Mercury Source Control Actions*, states "Actions are required to control mercury mining waste and urban runoff sources. This section specifies actions required to control discharges from sources to surface waters." Any further definition of cleanup will be included in Water Board orders, as needed. Natural background levels are discussed in *Calculating the Mining Waste Cleanup Goal* in Section 9.10 of the supporting Staff Report. The "contribution linkage of mine wastes not located in creeks and reservoirs" is discussed in the source analysis pertaining to loads of mercury from creeks that drain mines, in Sections 4.1, *Methodology for Mining Waste Loads*, and 4.2, of the supporting Staff Report.

**GRDC comment no. 21.2: The proposed Basin Plan amendment discusses the possibility of a study to examine methylmercury production and bioaccumulation in downstream creeks and rivers by "responsible parties." proposed Basin Plan amendment at 15. It is neither reasonable nor practical to expect that all "responsible parties" can coordinate and perform the possible study. How is "responsible party" defined, who makes the determination and how will free-riders be prevented?**

In response to this and other comments, we revised Section 9 to more clearly describe the responsible parties.

We agree that it can be difficult to coordinate amongst parties with disparate interests. Although the Water Board cannot specify the manner and method of compliance, we can provide incentives for collaboration. Accordingly, we have provided incentives for GRDC and other responsible parties to participate in a coordinated monitoring program. Specifically, we provide the following financial incentive in the proposed Basin Plan amendment, "The Water Board encourages a coordinated watershed approach to monitoring, and will consider reducing or waiving monitoring requirement 2 (mercury load at the points of discharge), based on progress in implementation and participation in coordinated watershed monitoring."

Responsible parties are defined in the California Water Code § 13304 (a), and they will be named in the orders issued by the Water Board. In response to this and other comments, we revised Section 9.1 to more clearly describe the responsible parties.

The collaborative approach, by its nature should identify free-riders. Furthermore, the coordinated monitoring program will clearly identify the participants in the program. Depending on the circumstances at the time, identified free-riders will be immediately removed from the coordinated monitoring program, and be subject to re-imposition of monitoring requirement 2 (i.e., loss of the financial incentive).

**GRDC comment no. 22: The proposed Basin Plan amendment and the [Staff] Report Have Numerous Data Gaps and Uncertainties**

Environmental science inherently includes data gaps and uncertainties. That is a primary reason for the Peer Review process—and the Peer Reviewers affirmed that this TMDL project has a sound scientific basis. GRDC expressed many concerns in this comment, which we numbered A1–A6, and B–E, and respond to individually.

**GRDC comment no. A1: Following remediation in the Almaden Quicksilver County Park, the Santa Clara County did not take post-remediation samples. [Staff] Report at 3-22. This is an important and significant data gap, especially in light of the proposed 0.1 ppm standard. Will the TMDL essentially re-open the relevant consent decrees and/or cleanup orders?**

We revised the proposed Basin Plan amendment (*Implementation Actions for Mercury Mines*) and Section 9.3 in response to this and others' comments. We

excluded the footprint of mercury cleanup projects in Almaden Quicksilver County Park, whether previously undertaken in accordance with a remedial action order, or currently underway in accordance with settlement of a NRDA claim.

The data gap will be filled during the first step of implementation for mercury mines, as described in the proposed Basin Plan amendment. "Conduct a site investigation evaluating the erosion potential of mercury mining waste and the potential for seeps to discharge mercury from mining waste to surface waters."

**GRDC comment no. A2: The proposed Basin Plan amendment and the [Staff] Report fail to identify background soil concentrations of mercury to be used as a comparison with the 0.1 ppm erodible soils standard.**

This 0.1 mg/kg allocation is based on sediment samples collected from the reference reservoir, as described in Section 7.6. In fact, bottom sediment samples are representative of upstream "background soil" mercury concentrations; bottom sediments in Lexington Reservoir resulted from the natural erosion of upstream hillsides.

Recall from our response to Parks comment no. A.5 that we revised the allocations to mercury mining waste and mercury-laden sediment. These changes result in a single allocation to mercury mining waste and mercury-laden sediment discharged from depositional areas of 0.2 mg/kg. The allocation to nonurban stormwater runoff discharges, i.e., non-mineralized and non-urban areas, remains 0.1 mg/kg.

In response to numerous comments received about mining waste allocations, we revised the proposed Basin Plan amendment (*footnote a in Table 7-B*) to clarify that we are not establishing a mercury cleanup standard for mine sites or depositional areas. Also, see our response to Parks comment no. A.7, on the related topic of the benefit of sediment mixing.

**GRDC comment no. A3: The [Staff] Report concedes that, because of the absence of flow gauge information at any of the subwatersheds modeled, the SWAT model could not be calibrated, and this is a source of uncertainty (see Section 4.3). [Staff] Report at 4-4.**

All measurements have some uncertainty; we have chosen to describe the uncertainty associated with the source analysis in Section 4. See also our response to GRDC comment no. 18.

**GRDC comment no. A4: The [Staff] Report admits that the lack of high flow sample data may lead to an underestimation of the load, thus creating another source of uncertainty. [Staff] Report at 4-5.**

GRDC repeats their comment no. 18; see our response to GRDC comment no. 18.

**GRDC comment no. A5: The [Staff] Report recognizes that, like the Monte Carlo simulation for one year, the Monte Carlo simulation for 1960 – 2001 wet seasons (Figure 4.6) is also biased low due to lack of data for high flow events, when the greatest loads occur. [Staff] Report at 4-22.**

All measurements and estimates have some uncertainty; we have chosen to describe the uncertainty associated with the source analysis in Section 4. See also our response to GRDC comment no. 18.

**GRDC comment no. A6: The TMDL admits that the linkage analysis is inadequate: "However, the Guadalupe Linkage Analysis (see Section 7.1) for inorganic mercury is qualitative, so it does not provide a scientific basis for a mass load in the Guadalupe River watershed." [Staff] Report at 8-4.**

GRDC repeats their comment no. 2—see our response to GRDC comment no. 2.

**GRDC comment no. B: ...A critical element of any TMDL is to determine the mass loading into the waterbody. … Yet, the TMDL admits:**
**Mass loads were estimated in the Final Conceptual Model Report (Tetra Tech 2005c) with low precision (a high precision monitoring program was cost-prohibitive and unnecessary for the conceptual model).**

GRDC repeats their comment no. 1—see our response to GRDC comment no. 1.

**GRDC comment no. C: The [Staff] Report contains other statements reflecting the significant uncertainties infusing the entire TMDL calculations…wet season loads … In Figure 4.4, most dissolved mercury loads include a "background" input; however, the Guadalupe Creek load downstream of the reservoir does not include any background load. Report at 4-16. Rather, it attributes 3.9 grams to "mines" without any evidence or sampling to prove this load amount and its sources(s). …**

Regarding uncertainties in wet season loads, GRDC repeats their comment no. 18—see our response to GRDC comment no. 18. Regarding Figure 4.4, dissolved mercury loads to Guadalupe Creek downstream of Guadalupe Reservoir are indicated on this figure. They include a background input of

3.3 grams, in addition to the mines input of 3.9 grams. The methodology for calculating these loads, including descriptions of the wet season sampling data, is provided in Section 4.1.

**GRDC comment no. D: More fundamentally, we believe that there is a significant lack of information in the TMDL for assessing temporal and spatial contributions of mercury to the watershed. For example, fish tissue information provides very little information as to what sources are contributing to mercury loads and when those discharges occur. This is especially problematic for sources downstream of the reservoirs where fish tissue concentrations would fail to distinguish between methylmercury generation in the upstream impoundments and generation in the downstream segments.**

We disagree that there is a significant lack of information in the supporting Staff Report that assesses the temporal and spatial loadings and conversion to methylmercury. This assessment is provided in Section 7 (*Linkage Analysis*). These were important concepts reviewed by the Peer Reviewers.

We agree that fish integrate methylmercury concentrations over time and space. However, fish tissue is not the only metric available to distinguish between methylmercury generation in the upstream impoundments versus downstream segments. Other available metrics include, for example, dissolved oxygen, oxidation-reduction potential, and water-column methylmercury concentrations.

If the fish targets are not attained downstream by methylmercury controls in the reservoirs and lakes, then the following special study will be conducted:

> 3b. If [*the fish targets are not attained downstream*], what factors contribute to methylmercury production and bioaccumulation in creeks and rivers? Factors to consider include, but are not limited to, shallow impoundments, excess nutrients, stagnant pools, shade cover, and aquatic vegetation.

At the time we review the sampling plan, we will take into consideration appropriate metrics, including but not limited to fish tissue mercury concentrations, dissolved oxygen, oxidation-reduction potential, and water-column methylmercury concentrations.

**GRDC comment no. E: As another example, the TMDL sweeps huge areas of the watershed into the "Mining District" without describing or mapping in more detail the locations of mining areas, mining waste, mining impacts, soil types, background mercury concentrations in soil, and mercury bearing rocks.**

Refer to USGS Professional Paper 360, which includes extensive geologic mapping, and indicates mining-related features circa 1947 (Bailey & Everhart 1964). We relied particularly on their Plates 1, 3, and 14 which indicate over 100 mining waste dumps.

## Comment letter from Hillsdale Mine (Robert Bettencourt)

Mr. Bettencourt's family owns Communications Hill and the Hillsdale mercury mine site. In his comment letter of March 2008, he provided information from 1889 about a culvert to direct flow from Canoas Creek into Guadalupe River. This was a different project from the re-routing of Canoas Creek the District undertook in the 1960s described in Section 3.4, *Smaller, Less Productive Mercury Mines*.

## Comment letter from Hillsdale Mine (Thomas McCloskey of Strategic Engineering & Science, Inc.)

In response to this comment, we revised the proposed Basin Plan amendment (*Sources, Table 7-B,* and *Implementation Actions for Mercury Mines*) and Staff Report (Sections 3.4, 8.1, and 9) to remove Hillsdale mercury mine from this TMDL project.

Mr. Bettencourt's family retains several consultants for the development of Communications Hill, including Strategic Engineering & Science, Inc. This comment letter provides evidence that Hillsdale mercury mine and associated processing areas and waste dumps were located on the Coyote Creek side of Communications Hill.

We discussed with Messrs. McCloskey and Bettencourt that the Hillsdale mercury mine drains via Coyote Creek to San Francisco Bay. Therefore, it is subject to essentially the same requirements in the San Francisco Bay mercury TMDL, as follows:

> Local inactive mercury mines shall be addressed through continued implementation of the Mines and Mineral Producers Discharge Control Program (Mines Program) described in Chapter 4. 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 the San Francisco Bay mercury TMDL implementation plan.

In other words, if mercury mining waste is eroding from Hillsdale mercury mine, the current property owner will need to implement best management practices for erosion control to keep mercury on the landscape and out of surface water. The current plan is to develop Communications Hill into a dense residential area, with light industrial at the base of the hill. During the planning and permitting phases for this development, the Hillsdale mercury mine will also be subject to other (city, county planning, county public health, and/or Water Board) regulatory requirements to protect humans from direct exposure to mercury.

## Comment letter from City of San Jose (John Stufflebean)

The City of San Jose's comments pertain to urban stormwater runoff because they are an urban stormwater runoff permittee.

**City of San Jose comment no. 1: Load Allocations**

**…the last sentence in the BPA section entitled "Mercury Source Control Actions" states: "Urban stormwater runoff implementation actions that reduce loads of mecury to San Francisco Bay will also count towards achieving the Guadalupe TMDL allocation to the urban stormwater source." We interpret this to mean that if large controllable urban stormwater sources found anywhere in the SCVURPPP County-wide Program area, the reduction of those sources can be counted toward meeting the urban stormwater implementation goals of the Guadalupe TMDL. If this is not the intent, then clarification of the language is needed.**

We revised the proposed Basin Plan amendment in response to this comment. Underlined text was added, so the proposed Basin Plan amendment (*Mercury Source Control Actions*) now reads, "Urban stormwater runoff implementation actions <u>in the Guadalupe River watershed</u> that reduce loads of mercury to San Francisco Bay will also count towards achieving the Guadalupe TMDL allocation to the urban stormwater source." Additionally, we corrected an error in Section 9.1, *Mercury Source Control Actions for Urban Stormwater Runoff*, and Section 9.6, *Implementation Actions for Urban Stormwater Runoff*, so the corresponding sentences now read the same as above.

**City of San Jose comment no. 2: Coordinated Watershed Monitoring Program**

**The October 15, 2008 date for submission of a coordinated watershed monitoring plan is impracticable. … The City requests that the deadline provide 24 months from TMDL adoption for submission of a coordinated watershed monitoring plan.**

We revised the due date to October 15, 2009, in the proposed Basin Plan amendment (*Coordinated Watershed Monitoring Program*), and Staff Report (Section 9).

**City of San Jose comment no. 3: Special Studies**

**The City requested clarification that urban runoff responsibility for special study 3b is contingent on outcome of special study 3a.**

The proposed Basin Plan amendment clearly states that the need for special study 3b is contingent on the outcome of special study 3a, as follows.

> If [*emphasis added*] the fish targets are not attained downstream by methylmercury controls in the reservoirs and lakes [*the question to be answered by special study 3b*], Santa Clara Valley Water District together with the New Almaden Mining District and the Guadalupe, Santa Teresa and Bernal mercury mines responsible parties, and the urban stormwater runoff permittees shall conduct or cause to be conducted study 3b, or equivalent or alternative studies with prior approval of the Water Board Executive Officer, either voluntarily or in accordance with Water Code § 13267 or NPDES stormwater permit requirements….

**City of San Jose comment no. 4: Consistency with Baywide Mercury TMDL**

**The city requested that all three methods in the Bay TMDL for urban stormwater runoff to demonstrate progress towards attaining allocations be repeated in the Guadalupe proposed Basin Plan amendment….The proposed Guadalupe Mercury TMDL prescribes only a mercury concentration-based approach to assigning WLAs…. This concentration-based WLA implies that only method #3 described above can be used to demonstrate progress in the Guadalupe Mercury TMDL. To maintain consistency with the Baywide TMDL, the City requests that Guadalupe TMDL either explicitly include or reference all three methods described [*in the Baywide TMDL*] for demonstrating progress in the Guadaupe TMDL or explicitly defer to the Baywide TMDL on criteria and methods to meet the stormwater allocation.**

We explicitly defer to the "Baywide TMDL on criteria and methods to meet the" urban stormwater runoff allocation. The proposed Basin Plan amendment, in the *Mercury Source Control Actions* section of the implementation plan, states, "The implementation plan for urban stormwater runoff … is contained in the San Francisco Bay mercury TMDL." (We disagree with repeating text from the Bay mercury TMDL in the Guadalupe mercury TMDL, largely because these two implementation plans will be in the same chapter of the Basin Plan.)

Also in the *Mercury Source Control Actions* section, under *Implementation Actions for Urban Stormwater Runoff*, we explain that urban stormwater runoff permittees may choose to participate in coordinated watershed monitoring. Additionally, we provide ten years' advance notice of how we plan to compel, if necessary, urban stormwater runoff permittees to participate in special study 3b.

## Comment letter from Santa Clara Valley Urban Runoff Pollution Prevention Program (Adam Olivieri)

Santa Clara Valley Urban Runoff Pollution Prevention (SCVURPPP) repeats several comments made by the City of San Jose.

**SCVURPPP comment no. 1: Consistency with the San Francisco Bay Mercury TMDL**

SCVURPPP repeats City of San Jose comment no. 4—see our response to City of San Jose comment no. 4.

**SCVURPPP comment no. 2: Sources vs. Pathways**

SCVURPPP expressed two concerns in this comment, which we numbered 2.1 and 2.2, and respond to individually.

**SCVURPPP comment no. 2.1: SCVURPPP requests that "sources" be replaced by "source categories" in the proposed Basin Plan amendment and supporting Staff Report. SCVURPPP makes this request because they believe urban stormwater runoff is a transport pathway, not a source.**

The Clean Water Act uses "nonpoint sources" and "point sources". Therefore, we use "sources" rather than "source categories" in our TMDLs.

**SCVURPPP comment no. 2.2: SCURPPP requested that language in the Bay mercury TMDL be repeated in its entirety in the proposed Basin Plan amendment for the Guadalupe River watershed mercury TMDL.**

SCVURPPP repeats City of San Jose comment no. 4—see our response to City of San Jose comment no. 4.

**SCVURPPP comment no. 3: Consistency with the Municipal Regional Permit**

**The SCVURPPP supports the concept of developing a "regional monitoring collaborative" described in the Municipal Regional NPDES Permit Draft Tentative Order (Draft TO), dated December 14, 2007. However, it is unclear whether the reference to a "coordinated watershed program" in the Implementation Section of the Guadalupe River BPA is referring to the same concept.**

> These coordinated monitoring programs are <u>not</u> the same; herein, we encourage coordinated watershed monitoring specific to this mercury TMDL project. The Draft TO contains provisions for *Mercury Controls* (C.11), including *Monitor Stormwater Mercury Pollutant Loads and Loads Reduced* (C.11.g ).

## Comment letter from California Department of Transportation (Joyce Brenner)

The allocation to urban stormwater runoff includes discharges from California Department of Transportation (CalTrans) roadways and non-roadway facilities and rights-of-ways (see note c in Table 7-B). As explained in responses to comments from the City of San Jose and SCVURPPP, and as stated in the proposed Basin Plan amendment, "The implementation plan for urban stormwater runoff … is contained in the San Francisco Bay mercury TMDL."

**CalTrans comment no. 1: Sources of Mercury in the Watershed**

**… Please re-evaluate the TMDL and ensure that [CalTrans discharges are not a significant source of mercury] is properly considered when determining loads from sources and to develop the most appropriate implementation activities. … The Department is concerned that there is not enough information to fully understand the mercury discharge problem and to ensure that the implementation actions will achieve the required effect. … [urge you to focus on] discharges of mercury from mining activities … [The Bay mercury TMDL provides greater—and crucial—flexibility for CalTrans to implement effective measures.]**

TMDLs are required to address all sources. The Guadalupe implementation plan is focused on control of erodible mining wastes and mercury methylation. Caltrans discharges are an identified source in the urban stormwater runoff category. We respond to their other concerns in this comment with the following from the proposed Basin Plan amendment, "The implementation plan for urban stormwater runoff … is contained in the San Francisco Bay mercury TMDL." The required analyses to support the Bay mercury TMDL are provided in the supporting Staff Reports for the Bay mercury TMDL, dated 2004 and 2006.

**CalTrans comment no. 2: Background Soil Concentrations**

**… The recommended allocation to urban stormwater runoff is 0.2 mg/kg in suspended sediment (annual median, dry weight). More explanation is needed to clarify how this amount accounts for background soil concentrations. [CalTrans provides other estimates of background soil mercury concentrations in California, and loads from atmospheric deposition.]**

Section 8.3, *Urban Stormwater Runoff Total Mercury Allocation*, explains the basis of this allocation, and Section 8.6 describes how the Bay and Guadalupe mercury TMDLs are integrated, including for urban stormwater runoff.

**CalTrans comment nos. 3–5: Source Control, Department Total Drainage Area, and No identified technology for achieving the stormwater allocations**

We respond to these concerns by restating our response to CalTrans comment no. 1. "The implementation plan for urban stormwater runoff … is contained in the San Francisco Bay mercury TMDL." The required analyses to support the Bay mercury TMDL are provided in the supporting Staff Reports for the Bay mercury TMDL, dated 2004 and 2006.

## Comment letter from New Almaden Quicksilver County Park Association (Michael Cox)

Mr. Cox spoke at the May 2008 testimony hearing. In Part 1, we describe his extensive involvement with New Almaden and his mercury mine expertise. Additionally, Mr. Cox was an active participant in the Guadalupe Mercury Work Group, which helped guide this TMDL project, and he submitted a comment letter on the January 2006 Staff Report. We appreciate the following from his 2008 comment letter, his "… comments from 2006 have, in general, been ably addressed …". Mr. Cox's 2006 comments were constructive and instrumental in improving the Staff Report. We thank him very much for his comments, suggestions, and participation in the Guadalupe Mercury Work Group.

Mr. Cox's letter includes italicized questions; we respond to his italicized questions that he did not repeat at the May 2008 testimony hearing (our responses to those comments are provided in Part 1). Then, we respond to his comments specific to particular pages of the Staff Report.

**Cox comment no. 1: Could the Board postpone the Basin Plan Amendment review until after the TMDL Report is finalized and approved?**

Our response to this comment is provided in Part 1.

**Cox comment no. 2: Are there any programs that can provide money for source control measures for private homeowners?**

Yes, there are funding sources that can be used to remediate mercury mining waste on privately owned parcels, such as those along Alamitos Creek. Moreover, we explained in response to District comment no. 2.2a that we modified the proposed Basin Plan amendment to reflect that we will identify mercury cleanup as a grant funding priority for the San Francisco Bay region.

**Cox comment no. 3: A particularly important question is the issue of how remedial actions such as those already completed and to be completed will receive "load allocation credit" under the current scheme?**

We revised the proposed Basin Plan amendment and Section 9.1 in response to this and others' comments. Our detailed response is provided in response to Board Vice Chair Young in Part 1, and to GRDC comment no. A1 in Part 2.

**Cox comment no. 4: … [mercury mining waste allocations are] unreasonably low and beg the question of why [allocations are] needed for sediments when the only practicable remedial measures are erosion control, mine waste capping, and reservoir stratification control—measures that have already been successfully used in the watershed?**

Our response to his concern that allocations are unreasonably low is provided in Part 1. Allocations (not targets) are required for each source, regardless of implementation measures. Here, we have developed an allocation for mining waste, which is a source of mercury to the bottom sediments in reservoirs, lakes, and the Bay. We agree that erosion control and capping are effective remedial measures for mining waste, and we are hopeful that the District will develop effective methylmercury controls.

**Cox comment no. 5: Mr. Cox re-states his request for a delay and concerns with the mercury mining waste allocations (Cox comment nos. 1 & 4).**

Our responses are provided in response to Cox comment nos. 1 & 4, and in Part 1.

**Cox comment no. 6: How exactly is atmospheric [*deposition*] addressed in the allocation scheme and Amendment?**

This explanation is provided in Section 8.5.

**Cox comment no. 7: Could the Amendment be reworked to clarify the additional sampling that is proposed to identify areas of erosion that might be prioritized for control? Could it also be clarified that it is not the intent to assign numeric effluent limits to suspended sediment discharge, but rather to implement erosion control for the significant sources and to demonstrate effectiveness through proper installation and maintenance? What about priority based on whether the discharge is to a body of water with a known higher potential for methylation, all other factors being equal?**

Mr. Cox has succinctly captured the TMDL requirements: it is not the intent to assign numeric effluent limits to suspended sediment discharge, but rather to implement erosion control for the significant sources and to demonstrate effectiveness through proper installation and maintenance.

Mr. Cox refers to the implementation plan for mercury mine sites, which requires a site investigation. We provide clarification of the site investigation in the draft CWC § 13267 letter (see Appendix B). We respond to his and others' concerns about numeric effluent limits by clarifying that allocations are not cleanup

standards (see Part 1). We agree with the suggestion to prioritize mercury mine site implementation actions for sites that drain to waters with known higher potential for methylation. Methylation potential appears to be highest in Guadalupe and Almaden reservoirs, followed by Lake Almaden.

**Cox comment no. 8: Mr. Cox requested the TMDL project be revised to reflect the different bioavailability of mercury from different sources (atmospheric deposition, processed mining waste, unprocessed mining waste, water seeps, and other sources).**

We respond to this comment with our response to Lamons' comment no. A.

**Cox comment no. 9, Page 2-3: The second and third paragraphs contain redundant text.**

We deleted the redundant text in Section 2. 3 in response to this comment.

**Cox comment no. 10, Page 2-5: There is an uneasy reality when fish from some reservoirs with little mining impact have unsafe fish methylmercury concentrations. The Report implies that there will be opportunity to make adjustments for reality during the implementation phase, but how will this truly be the case … the Basin Plan is difficult or at least takes some time to amend.**

We are relying on our adaptive implementation approach for this and our other TMDL projects.

**Cox comment no. 11, Pages 3–15 to 3–18: "At least in Almaden Quicksilver County Park, the areas of significant potential mercury spillage, furnace dust, and calcine dumps have all been capped." Mr. Cox requested this be recognized in allocations.**

We agree the Parks previous remedial actions were effective, and we will not require additional cleanup of these five areas. However, we are concerned about maintenance of these sites over the long term. Consequently, we mentioned to Parks that the Senador cleanup site needs some maintenance, and directed them to a potential source of funding for it.

We could have adjusted mass-based allocations to account for previous remedial actions. However, the allocations are concentration-based, so we cannot adjust them for previous remedial actions. If, in the future, we revise the allocations to be mass load reductions, we will account for past remedial efforts in assigning these reductions. Nonetheless, we do provide other forms of credit for previous remedial actions, see our response to Board Vice Chair Young in Part 1 regarding

credit, and our discussion of *Remaining Cleanup Challenges in New Almaden Quicksilver County Park* in Section 3.5.

**Cox comment no. 12, Page [3-18]: The peak concentrations in water are interesting, but the examples only serve to illuminate the extreme variability and therefore the highly uncertain targets of the TMDL.**

Comment noted.

**Cox comment no. 13, Page 3-20: It should be noted that although DTSC would have allowed limited removal and capping of hot-spots within the calcine waste piles, the County elected to completely stabilize and cap each pile, thereby addressing the issues of soil erosion and potential bioaccumulation of the eroded material. The next several paragraphs [in the TMDL Staff Report] confirm this and contradict the statement that "the issues of soil erosion and transport of mercury to water bodies and bioaccumulation were not addressed." *Could the statement be clarified?***

The discussion on p. 3-20 pertains to *Cleanup of Almaden Quicksilver County Park*. This section describes the five sites that presented the greatest threat to human health from direct exposure, and which were cleaned up: Mine Hill, Hacienda Furnace Yard, and Senador, Enriquita, and San Mateo mines. The full sentence in the supporting Staff Report reads, "While this [*remedial*] effort went a long way toward addressing the most significant hazards to human health within the park, the issues of soil erosion and transport of mercury to water bodies and bioaccumulation were not addressed".

Although, neither the cleanup actions nor the investigation were <u>designed</u> to protect water quality, the cleanup actions appear to have been effective in doing so. We stated this in the Staff Report as follows, "More recently, observations from site visits to the former mines suggest that the calcine disposal areas within Almaden Quicksilver County Park are largely being protected from erosion by the vegetation and runoff control measures." In other words, the remedial efforts were largely effective in preventing erosion from the stabilized areas (see response to GRDC comment no. A1 regarding excluding the footprints of mercury cleanup projects in Almaden Quicksilver County Park). However, we remain concerned that prior investigations did not satisfactorily evaluate erosion of mining waste into surface waters, for the following reasons.

The risk assessment for the Parks cleanup did not take into account either the fish consumption advisory or that mining wastes from the Hacienda Furnace Yard were placed on the banks of Alamitos Creek, and are now widely distributed through the length of the creek. The risk assessment addressed only

direct exposure to inorganic mercury in the Park, and did not account for mercury methylation and bioaccumulation downstream.

*Risk Assessment, Final Report, Almaden Quicksilver County Park, Volume 1–Text*. Prepared by Camp, Dresser & McKee, Inc. for Santa Clara County Parks and Recreation Department. Dated May 29, 1992.

The focus of the risk assessment was as follows:

> Human Exposure Assessment
> The exposure assessment for Almaden Quicksilver County Park evaluates potential human exposure to mercury at the park in the absence of remedial action and assuming full public use as a regional park. Significant mercury contamination is limited to areas of the park impacted by previous mining activities. These areas are widely separated by topography and distance. Therefore, in order to guide remediation activities, exposure are evaluated separately for the six major areas that have been impacted by previous mining activities. (p. ES-5)

The risk assessment evaluated exposure of nearby residents to dust blowing off-site, but did not evaluate stormwater transport of mining waste downstream, nor mercury exposure from eating watershed fish.

> 4.1.3 Potentially Exposed Populations
> Off-site residents who live adjacent to the park are not considered to be exposed at their homes…Significant off-site transport of mercury seems unlikely, however, since such transport has been limited in situations where conditions were favorable for movement of contaminants into residential areas. [The report considers wind transport of mercury-laden dust to nearby residential areas. Based on data from a former lead smelter and milling operation in Midvale, UT, the report concludes that it is unlikely that nearby residents are exposed to high levels of mercury-contaminated dust.] (pp. 4-4 to 4-5)

**Cox comment no. 14, Figure 3.10, Map of Mercury Concentrations Remaining After Park Cleanup (mg/kg, parts per million): This is not an accurate rendering of mercury concentrations remaining after cleanup. The concentrations were measured prior to remedial actions. … The mines were never investigated to characterize the overall distribution of mercury in soils. The Guadalupe mine was not investigated at all, because it was a private landfill, not a public park. Could this be noted somehow?**

We disagree; we think this is an accurate rendering of mercury concentrations remaining after cleanup in Almaden Quicksilver County Park (Section 3.5). This figure was created by plotting pre-remediation soil mercury concentrations, then removing data from the footprint of areas that were remediated. Therefore,

Figure 3.10 shows mercury concentrations remaining after park cleanup. We are aware and agree that no post-remediation samples were collected (see page 3-22), that the overall distribution of mercury in soils has yet to be characterized, and that the Guadalupe mine has not yet been investigated. These issues will be addressed, as needed, through the site investigation required for mercury mine sites.

## Comment letter from Friends of Los Alamitos Watershed (Roberta Lamons)

Dr. Lamons claims in her comment letter that the proposed Basin Plan amendment is "unprofessional, unscientific, and erroneous". However, the supporting Staff Report explains much of what she is concerned about. She repeated a comment that several others made pertaining to outreach to local residents. We respond to this comment with our response to Mr. Boulland's first comment in Part 1. We condensed her remaining comments into comment nos. A & B.

**Lamons comment A: Dr. Lamons believes that we have not properly evaluated the relative bioavailability of mercury from different sources.**

In the linkage analysis we evaluated mercury from different sources (including atmospheric deposition). Figure 7.3 shows that the waters closest to New Almaden have the worst fish mercury problems. Therefore, even if mercury from mining is less bioavailable than mercury from atmospheric deposition, there is so much more mercury from mining that it is the main cause of the problem in this watershed.

Many of Dr. Lamons' concerns are based on results reported from the Mercury Experiment to Assess Atmospheric Loading in Canada and the U.S. (METAALICUS) project. This research is being conducted in the midwestern U.S. and in Canada, in areas affected by local and global atmospheric deposition, but not from mercury mining. The METAALICUS experiments include depositing mercury with unique isotopes separately on water and land surfaces. The mercury deposited on the water surface was shown to readily bioaccumulate, whereas in the timeframe of the experiment, the mercury on the land had not been transported to the water.

We anticipated the peer reviewers might share these concerns. Therefore, in the August 2007 *Staff Report for Peer Review*, we included *METAALICUS Contrasted to Conceptual Model in Guadalupe*, in the Linkage Analysis section. We concluded this section with the following paragraphs.

> We agree that there are differences in the solubility and relative bioavailability of mercury depending on its source and/or form. However, because most of the mercury in the Guadalupe River watershed is from mining waste, these relative differences are not germane to the source assessment, the linkage analysis, the derivation of targets and allocations, nor the implementation plan for the Guadalupe River mercury TMDL.

> Additionally, we have no other information that suggests an alternative to our one-to-one assumption regarding the reduction of mercury loads to fish tissue concentrations in Guadalupe River or for any watershed dominated by legacy mercury mining waste. While acknowledging that this is a simplification, we assert that essentially all mercury in this watershed has an equal chance of methylating and bioaccumulating. Therefore, we assert that reduction of total mercury in the watershed will, over time, reduce the amount of methylmercury produced and bioaccumulated in fish. We look forward to tracking the effectiveness of implementation and refining our understanding of these relationships as part of the adaptive implementation program.

In their reviews of this TMDL, the peer reviewers expressed no hesitation that addressing mercury from mining is key for this watershed.

**Lamons comment B: Dr. Lamons stated that ten years is too long before reviewing this TMDL project.**

We respectfully disagree; see our response to Parks comment no. 2.

## Comment letter from Friends of Los Alamitos Watershed (Mike Boulland)

Mr. Boulland was the first speaker at the May 2008 testimony hearing, and responses to some of his concerns are provided in Part 1. He is a creekside property owner on Alamitos Creek, and is the president of Friends of Los Alamitos Watershed (FOLAW), a recently formed 501(c)(3) organization. We appreciate his support of the TMDL goals to protect wildlife and human health. Mr. Boulland is concerned about how the requirements for "depositional areas" apply to creekside property owners.

Mr. Boulland's comments helped us clarify the responsibilities of downstream property owners. As described in our responses to the District, we are counting on the District to lead a mercury cleanup and restoration project in Alamitos Creek downstream of Hacienda Furnace Yard, arguably one of the world's most mercury-contaminated waterways. In response to Mr. Boulland's comments, we clarified that creekside property owners must allow the District access for this project. However, if they do not allow the District access for studies, construction, and post-construction monitoring and maintenance, then we will need to compel them to pay for and conduct cleanup and restoration on their property. (See response to CWA comment no. 1 regarding compelling cleanup of Alamitos Creek.)

We respond to Mr. Boulland's enumerated comments that he did not repeat at the May 2008 testimony hearing (our responses to those comments are provided in Part 1).

**Boulland comment nos. 1 & 6: The role of individual homeowners is not clear in Phase I.**

We revised Section 9.1 in response to this comment. We added Table 9.1, *Summary of Implementation and Monitoring Requirements*, and added subsections describing the responsible parties, to Section 9.1.

**Boulland comment no. 2: Could this document make a clearer notation found on BPA-9 as to where the location of the reference of the *Mercury Source Control Actions* and the *Monitoring Programs* may be read?**

This section of the proposed Basin Plan amendment is supported by Section 9 of the Staff Report.

**Boulland comment nos. 3 & 5: Mr. Boulland expresses concerns that the schedule for implementation actions in creeks downstream of the mines will be changed to an earlier date.**

We confirm our schedule in the proposed Basin Plan amendment, as follows. "Mercury mining waste control actions are phased so that mercury discharges from upstream will be eliminated or significantly reduced before downstream projects are undertaken." Also, see our response to Parks comment no. 2.

**Boulland comment no. 4: Mr. Boulland asked about the trigger to determine when downstream projects would be undertaken. He asked whether the upstream mine sites would have to achieve the allocation of 0.1 mg mercury per kg suspended sediment in stormwater before we would require erosion control projects in depositional areas.**

We explained in response to Mr. Cox and others that we revised the proposed Basin Plan amendment (*footnote a in Table 7-B*) to clarify that the allocations are not cleanup standards (see Part 1). We confirm phasing of implementation actions in the proposed Basin Plan amendment, as follows. "Mercury mining waste control actions are phased so that mercury discharges from upstream will be eliminated or significantly reduced before downstream projects are undertaken."

**Mr. Boulland also provided the following suggestions: (1) he stated support for cleanup and restoration of Alamitos Creek, (2) he expressed concern that Phase 2 actions have deadlines in 2008 & 2009, and (3) he stressed the need for outreach to creekside property owners affected by this TMDL project.**

We appreciate Mr. Boulland's support for cleanup and restoration of Alamitos Creek downstream of Hacienda Furnace Yard. Phase 2 does not begin for ten years (see response to Boulland comment no. 1). We appreciate Mr. Boulland's assistance in our outreach to creekside property owners affected by this TMDL project. Mr. Boulland, Dr. Lamons, Dr. Dill, and several other local residents, and Water Board staff met on July 9 to plan for a larger outreach meeting in September. The goal of the September meeting is to educate the public about the TMDL process, the specifics of this TMDL, and better communicate what their role in implementing the TMDL will be.

**Additionally, Mr. Boulland requested our support for a Special Utility District to help provide funding for cleanup and restoration of Alamitos Creek.**

We hope to work with the Santa Clara Valley Water District to secure funding for this project, rather than creating a Special Utility District. See response to District comment no. 2.2a in which we describe that we revised the proposed Basin Plan amendment to make grant funding for mercury cleanup projects a priority.

## Comment letter from Residents (Amanda & Frederick Dill)

Drs. Dill are creekside property owners on Alamitos Creek, and repeat many of the concerns expressed by Mr. Boulland. We respond to their concerns that the local residents have not been informed about this TMDL project, and that they do not understand what they will be required to do, with our responses to Mr. Boulland's comments in Parts 1 and 2. We respond to their other concerns herein.

**Dill comment no. 1: The creekside property owners had no part in the release of mercury mining waste onto their property.**

We concur that the the creekside property owners had no part in the initial release of mercury mining waste onto their property. However, we have determined that there is a potential for a release of mercury-laden sediments from these properties. Therefore, the property owner is a discharger (responsible party) under California Water Code § 13304.

However, we also recognize that the best-equipped entity to lead cleanup and restoration of Alamitos Creek downstream of Hacienda Furnace Yard is the Santa Clara Valley Water District. In response to Mr. Boulland's comments (see Boulland comment nos. 1 & 6), we clarified that creekside property owners must allow the District access for this project. However, if they do not allow the District access for studies, construction, and post-construction monitoring and maintenance, then we will need to compel them to pay for and conduct cleanup and restoration on their property.

**Dill comment no. 2: Drs. Dill expressed concern that current cleanup projects in Almaden Quicksilver County Park (in Jacques Gulch and near Hacienda Furnace Yard) will "significantly increase contaminated runoff for some time".**

We disagree that these projects, which are designed to reduce contamination of runoff, will "significantly increase contaminated runoff for some time". However, these projects may cause short-term increases in mercury contamination in stormwater runoff. The permits for these projects, issued by the Water Board and other agencies, will require implementation of best management practices (BMPs) to control stormwater and monitoring to demonstrate the effectivenss of the BMPs in controlling runoff. The District and Parks are undertaking these projects. Their staff and contractors are experienced in properly deploying the appropriate control measures.

**Dill comment no. 3: Drs. Dill expressed frustration with the stringent requirements of various regulatory agencies. These requirements have reportedly prevented some creekside property owners from repairing eroding creekbanks.**

This exemplifies why the best entity to lead cleanup and restoration of Alamitos Creek is the Santa Clara Valley Water District. See our response to Dill comment no. 1.

Stringent requirements, although frustrating, provide needed environmental protection. Agencies involved in permitting projects require that only trained professionals undertake restoration actions in compliance with conditions or standards established by local, state, or federal government. There have been instances where well-intention, yet poorly designed stream bank repairs have exacerbated the erosion problem, either in the vicinity of the repair, or downstream of the action.

## Comment letter from Clean Water Action (Andria Ventura)

Ms. Ventura was an active participant in the Guadalupe Mercury Work Group (see Section 3.1). Clean Water Action's (CWA's) concerns center on protecting people who consume large amounts of watershed fish, whether for cultural or economic reasons, and on local sources of mercury emissions to the air.

**CWA comment no. 1: Positive Features**

We appreciate CWA's strong support for the focus on both total and methyl mercury in this TMDL project, and we appreciate their support for cleanup and erosion control at the mine sites.

We revised Section 9.7 in response to CWA's concerns that cleanup and restoration in Alamitos Creek is "suggested" rather than required; CWA urges us to mandate these actions. We will evaluate, and report on annually to the Board, progress made in developing designs for a comprehensive creek bank stability and habitat restoration project on Alamitos Creek downstream of Hacienda Furnace Yard. Our current strategy is to encourage this project to proceed on a voluntary basis—including securing funding for it. However, if progress appears to be slower than needed to complete these designs within the ten-year duration of Phase 1, we may consider compelling responsible parties to undertake this project.

**CWA comment no. 2: Assimilative Capacity**

**Ultimately the Clean Water Act aims at eradicating all discharges into U.S. waters (i.e., zero loads). … Thus, we would not support lowering load allocations as methylation is reduced.**

We revised Sections 8.2 and 9.7 of the Staff Report to specify assimilative capacity for methylmercury, in response to this comment. We agree that increasing the assimilative capacity for methylmercury should not result in lowering the allocations for total mercury. However, increasing the assimilative capacity for methylmercury could provide justification for revision of the methylmercury allocation.

**CWA comment no. 3: Inadequate Fish Tissue Target**

**We strongly oppose the selection of a fish tissue [objective based on a consumption rate of] 32 g/day (one meal per week) for the human population. This decision has been made without investigating actual fishing practices in the region and is**

**therefore negligent to the possibility that some parts of the local population may catch and consume significantly higher levels from the watershed. … the TMDL should include a plan to investigate fishing practices in the watershed, and in the interim establish at the very least an objective in line with U.S. EPA's target of 142.4 grams/day, which would allow 4 to 5 meals a week to protect subsistence fishers.**

Ms. Ventura, Baykeeper, and Board Member Peacock expressed similar concerns at the May 2008 testimony hearing. See our response to Board Member Peacock in Part 1.

**CWA comment no. 4: Lack of Exposure Reduction Measures**

Ms. Ventura repeated this comment at the May 2008 testimony hearing. See our response to Ms. Ventura in Part 1.

**CWA comment no. 5: Daily Loads**

We used a concentration-based approach for TMDLs, rather than a daily mass load, which several parties commented on. In response to their comments, we revised Section 8 to provide a daily load expression in grams per day (g/d). Our detailed response can be found in Part 2, in response to GRDC comment no. 1.

**CWA comment no. 6: Air Deposition**

See our response to Baykeeper in Part 1.

## Comment letter from Baykeeper (Sara Aminzadeh)

In their cover letter, Baykeeper stated, "The TMDL offers ... an opportunity ...to make lasting improvements to the health of wildlife and people in the Bay Area". Baykeeper urged "…the Water Board to ... take the necessary steps to immediately reduce mercury levels in the Guadalupe Watershed."

**Baykeeper comment no. 1: Daily Loads**

**The TMDL should contain daily loads … . Neither the Guadalupe River Watershed nor the San Francisco Bay has any assimilative capacity for mercury… Clean Water Act requires that controllable sources such as wastewater and stormwater be allocated zero loads. ... must at a minimum, create load allocations that will meaningfully reduce mercury.**

We used a concentration-based approach for TMDLs, rather than a daily mass load, which several parties commented on. In response to their comments, we revised Section 8 to provide a daily load expression in grams per day (g/d). Our detailed response can be found in Part 2, in response to GRDC comment no. 1.

There are no wastewater discharges to the waters addressed by this TMDL project. This TMDL project does provide an allocation to stormwater discharges, equivalent to the allocation in the San Francisco Bay mercury TMDL. Although allocations must be set to achieve water quality standards, they need not be zero, particularly when meeting the allocations will likely result in the eventual attainment of water quality standards. Moreover, an allocation of zero to stormwater cannot possibly be achieved. In any case, the proposed allocations and implementation plan will "meaningfully reduce mercury".

**Baykeeper comment no. 2: The TMDL Implementation Plan Should Require an Inventory and Investigation of Local Facilities that Emit Mercury**

**Recommendation: We urge you to identify all potential aerial sources of mercury in this TMDL and issue 13267 letters requiring further study of the potential for deposition into the watershed. The reporting results should then be analyzed in a special study and used to create more accurate allocations for local aerial deposition. In the meantime, a protective load allocation should be inserted into the TMDL as a placeholder to reduce the aerial contribution of mercury to the watershed.**

**[T]he data relied upon to calculate the load allocation for aerial sources for the Guadalupe TMDL is unsuitable to capture the potentially significant emissions from industrial sources.**

The Basin Plan amendment for the San Francisco Bay mercury TMDL states, "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." This regionwide inventory is the best approach; the significance of any effects of local sources within the watershed could not be determined given the astounding pollution levels from mining. The Hanson cement kiln is located in Cupertino, outside the Guadalupe River watershed. We respond to the recommended special study in the following paragraph. See also our response to Lamons comment no. 1, regarding relative bioavailability of mercury from different sources.

We disagree that the data used to estimate the mercury load from atmospheric deposition to San Francisco Bay are inadequate to use to estimate the load to this watershed (see Section 8.5). Proximity is an important consideration for developing this estimate, and the Guadalupe River watershed is adjacent to San Francisco Bay. Table 2.1 lists mercury concentrations in largemouth bass, standardized at 40 cm, for many waters around the region. Del Valle, Nicasio, Lake Chabot, and Lafayette reservoirs are all located away from industrialized areas, and all have similar fish mercury concentrations (from 0.4 to 0.9 mg/kg) to fish in the reference reservoir, Lexington (0.6 mg/kg), also located away from industrialized areas. Therefore, the data are adequate to support our estimated load from atmospheric deposition.

**Baykeeper comment no. 3: The TMDL Should Include Exposure Reduction Language to Better Protect At-Risk Communities from the Dangers of Consuming Mercury Contaminated Fish Until the Watershed's Mercury Problem is Resolved**

We revised Section 9.7, as described in response to Board Member Peacock and Ms. Ventura in Part 1.

# Part 3

## Peer reviewer letter no. 1: Professor David L. Sedlak

**Environmental Engineering Program**
**Department of Civil and Environmental Engineering**
**University of California, Berkeley, September 11, 2007**

**Introductory Comments:**

**In general, I believe that the Staff Report uses sound scientific practices to address a complicated issue. The TMDL uses fish tissue mercury concentrations as water quality objectives to protect wildlife and humans who consume fish from the affected reservoirs. Most of these guidelines were established as part of previous TMDLs and have undergone extensive external review. The identification of sources, linkage analysis and allocations are based upon data collected recently by the Regional Board's contractor (i.e., Tetra Tech). Although the heterogeneity of the system and its complex hydrology make it difficult to estimate some of the values accurately, the staff has attempted to apply best professional judgment in a way that allows for cleanup to begin soon. In my opinion, the adaptive management approach advocated by the staff is superior to spending more time quantifying loadings and sources.**

**In my opinion, the main scientific issue that needs to be resolved is the use of Lexington Reservoir as a background site and the suitability of setting targets based on the conditions in the Lexington Reservoir. While land use data support the idea that the Lexington Reservoir may be representative of the pre-disturbance conditions in the watershed, the background concentrations of mercury in fish under pre-disturbance conditions may not be protective of wildlife and humans as defined by the fish tissue guidelines. Most of my criticism of the TMDL outlined below relates to this issue. In my opinion, the staff should revise the TMDL to reflect the possibility that background conditions may pose a risk rather than attempting to adjust their analysis to fit a preconceived notion that the undisturbed system would have been suitable for all of the designated uses.**

We note and greatly appreciate Prof. Sedlak's endorsement of the scientific basis of this TMDL. In fact, we used the reference reservoir to establish allocations, not TMDL targets, specifically as the basis for the mining waste allocation of 0.1 mg/kg (now revised to 0.2 m/kg), and the methylmercury allocation to deep impoundments (now revised to 1.5 ng/l).

We have addressed Professor Sedlak's concerns, however, by amending our interpretation of the fish data and adding an explicit margin of safety to the methylmercury allocation. We respond to his specific comments below.

**Comment S-1:**

**On the bottom of page 7-21 [of the August 2007 Staff Report for Peer Review], staff divides the average small fish mercury concentrations by 2 to estimate springtime concentrations of mercury in fish that would serve as prey to wildlife. …For the adjustment of concentrations to be valid, staff need to verify the following assumptions:**

- **Concentrations of mercury causing adverse effects in sensitive wildlife (e.g., belted kingfisher) depend only on springtime mercury concentrations in food.**
- **USFWS recommendations of a 0.05 mg/kg threshold for mercury in TL3 fish … do not already take into account seasonal variations in exposure.**

We performed the verifications Professor Sedlak recommended, and consequently revised our interpretation of the fish data. We now state in Section 7.6 of the Staff Report for Public Comment (2008) that the fish in the reference reservoir (Lexington Reservoir) do not meet the TMDL targets.

Regarding springtime mercury concentrations in [avian] food, we relied on the U.S. FWS for our fish-tissue water quality objectives and targets (U.S. FWS 2003). They stated, "…the avian toxicological endpoint of interest for mercury is reproductive impairment…, our focus was on those species that forage in the watershed and are resident in or around the watershed during their breeding season."

However, the trophic level (TL) 3 prey fish sampled in November 2006 may have just hatched the previous spring. This would invalidate the analysis we presented in the August 2007 Staff Report for Peer Review, which assumed that those fish would have been in the same target size (50 to 150 mm), rather than just hatched. Therefore, we have changed our interpretation of the fish data. We are grateful to Professor Sedlak for his comment and suggestion.

We plan to address the mercury impairment in Lexington Reservoir, and Los Gatos Creek upstream of Vasona Dam, in a future TMDL project for San Francisco Bay Area reservoirs unaffected by mercury mining. Consequently, neither the Guadalupe River watershed mercury TMDL, nor the proposed fish tissue water quality objectives, apply to Los Gatos Creek upstream of Vasona Dam (which include Los Gatos Creek and its tributaries, Lake Elsman, Lexington Reservoir, and Vasona Lake).

We continue to use Lexington Reservoir as the reference reservoir for this TMDL project. We have retained the average bottom sediment concentration in the

reference reservoir (0.1 mg/kg) as an allocation to the mercury mining waste source. We reduced the methylmercury allocation to deep impoundments from 2.6 to 1.5 ng/l. This reduction reflects both that the fish in the reference reservoir do not meet targets, and provides an explicit margin of safety.

Also in conducting this analysis, we reviewed the percent of mercury present as methylmercury in fish. Note that in large predator fish nearly all mercury is present as methylmercury, and contained in muscle tissue (see Section 7.4, Quantitative Linkage from Methylmercury in Water to Targets). Consequently, we sampled skinless filet (i.e., muscle) of the large fish that humans consume, and analyzed for total mercury. However, in small, lower trophic level fish, about ninety percent of the mercury is present as methylmercury—in samples of whole fish. Because we analyzed eviscerated prey fish for total mercury, and because most of the inorganic mercury is present in fish livers (which were removed) (Slotton 2007), we estimate that the small prey fish results are equal to methylmercury concentrations. We added fish sampling and data interpretation protocols information to the fish monitoring program (February 2008 proposed Basin Plan amendment and Staff Report Section 9.9).

**The changes to the August 2007 Staff Report for Peer Review regarding the impaired waters (pp. 1-3 to 1-4), indicated in strikeout/underline, are the following:**

The waters impaired by mercury and addressed by this TMDL are the following:

- Guadalupe Reservoir, Almaden Reservoir, ~~Lake Almaden, and~~ Calero Reservoir~~;~~, and ~~Guadalupe Creek, and Alamitos Creek,~~ Lake Almaden, including ~~percolation~~their tributaries, and Almaden Calero Canal
- Guadalupe Creek, Alamitos Creek, and Canoas Creek, including their tributaries
- Los Gatos Creek and its tributaries downstream of Vasona Dam
- Ross Creek and its tributaries
- Guadalupe River
- Percolation ponds along these creeks~~;~~ and the river
- ~~Guadalupe River.~~

This TMDL addresses waters already listed as impaired by mercury, and those that will be proposed for listing in the next cycle (2008 303(d) list). As explained in Section 2.1, to protect human health Santa Clara County issued a fish consumption advisory to not consume any fish from Guadalupe, Almaden, and Calero reservoirs; Alamitos and Guadalupe creeks; Guadalupe River; and percolation ponds on these creeks and river. Based on this health advisory, ~~the~~ waters listed ~~waters~~ as impaired ~~for~~by mercury in the Guadalupe River watershed (Figure 1-2) under CWA Section 303(d) are~~:~~ Alamitos Creek, Calero Reservoir, Guadalupe Reservoir, Guadalupe Creek, and the Guadalupe River. Staff ~~will recommend~~are recommending listing Almaden Reservoir and the

percolation ponds on these creeks and river in the next 303(d) listing cycle (2008). Highly elevated mercury concentrations are also found in fish from Lake Almaden (downstream of New Almaden; Figure 2.1) which is also ~~will be~~ proposed for listing in ~~the next cycle (~~2008~~)~~.

~~Arroyo Calero Creek runs between two listed waters, Calero Reservoir and Alamitos Creek. During the data collection for this TMDL, mercury was detected below 20 nanograms mercury per liter water (ng/l) in three samples collected from the Calero Reservoir outlet and one downstream sample collected from Calero Creek at Harry Road (Tetra Tech 2005a). No fish were collected from Calero Creek. Therefore, there is insufficient data to support 303(d) listing. Nonetheless, this TMDL addresses mercury in Arroyo Calero Creek.~~

~~Nearly all the other water bodies draining the historic New Almaden Mining District (named creeks: McAbee, Golf, Greystone, Randol, and Los Capitancillos creeks, Jacques Gulch; and un-named tributaries) are intermittent and they support only very small populations of fish. Most water samples have been collected during low storm events with low mercury concentrations, although a few samples from some of these water bodies have been collected during large storm events with mercury detected up to nearly 30,000 ng/l (Santa Clara County Parks 2004). Nonetheless, there is insufficient data to support 303(d) listing. Therefore, these waters will be addressed as mining waste source areas in this TMDL.~~

This TMDL addresses mercury impairment in waters that drain mercury mines, including named and unnamed creeks that:

- Drain the New Almaden Mining District to the following waters:
  - Guadalupe Creek and Guadalupe Reservoir
  - Alamitos Creek and Almaden Reservoir
  - Almaden Calero Canal, Calero Reservoir, and Arroyo Calero Creek (Arroyo Calero Creek is the official name on USGS maps; it is also referred to as Calero Creek on other maps and in this report.)
- Drain the Santa Teresa and Bernal mercury mines to Canoas Creek and Santa Teresa Creek (tributary to Calero Creek)
- Drain the Hillsdale mercury mine to Canoas Creek
- Flow into Lake Almaden and the Guadalupe River
- Including percolation ponds along these creeks and the river

This TMDL also addresses mercury impairment from urban runoff into Los Gatos Creek and its tributaries downstream of Vasona Dam; Ross Creek and its tributaries; and above-listed waters that receive urban runoff in addition to drainage from mercury mines (Guadalupe Creek, Alamitos Creek, Lake Almaden, Canoas Creek, Guadalupe River, and tributaries to these waters).

Lexington Reservoir is impaired by mercury from atmospheric deposition and naturally occurring mercury in soil, but it is not affected by mercury mining. We plan to address

mercury impairments in Lexington Reservoir (and in Los Gatos Creek and its tributaries upstream of Vasona Dam, including Vasona Lake, Lexington Reservoir, and Lake Elsman) in a future TMDL project for San Francisco Bay Area reservoirs unaffected by mercury mining. Consequently, neither the Guadalupe River watershed mercury TMDL, nor the proposed fish tissue water quality objectives, apply to Los Gatos Creek and its tributaries upstream of Vasona Dam, Vasona Lake, Lexington Reservoir, and Lake Elsman.

The water quality standards for waters in the Guadalupe River watershed include

**The changes to the August 2007 Staff Report for Peer Review regarding the interpretation of fish data (pp. 7-21 to 7-25), indicated in strikeout/underline, are the following:**

### *2006 Small Prey Fish and Wildlife*

The wildlife target was ~~just met~~exceeded in ~~spring~~ 2006. ~~This conclusion was based on the fish data analysis described in the next paragraph.~~

The fish caught in November 2006 match the wildlife target species and length criteria. Two TL3 fish species were caught, inland silverside (average length 105 mm) and threadfin shad~~, provide a direct measurement of wildlife prey mercury concentrations. The respective~~ (average ~~fish lengths were 105 and~~length 88 mm~~, within the target length of 50–150 mm.~~). The ~~fish mercury concentration of interest is the spring mercury concentration, because the bioaccumulation of concern is female bird consumption of fish prior to bird egg-laying (USFWS 2003).~~

~~The November 2006~~ average mercury concentration was 0.08 mg/kg~~. We estimate the spring 2006 fish mercury concentrations were one-half of the November 2006 concentrations, based on the studies at Davis Creek Reservoir~~, which ~~observed a 2-3 fold increase in juvenile largemouth bass mercury concentrations (see Small Prey Fish Mercury Concentrations and Turnover). Multiplying the average mercury concentration by one-half yields an estimated small prey fish mercury concentration~~exceeds the target of 0.~~04 +/- 0.02~~05 mg/kg ~~(+/- standard deviation), just below the target~~.

### *Large Fish Mercury Concentrations*

…

### *2004 Large Fish and Human Consumption*

In 2004, human health was protected for most consumers of fish from the reference reservoir, assuming consumption of an equal mix of TL3 and TL4 fish. This conclusion was based on the fish data analysis described in the ~~next paragraph~~following paragraphs.

~~Recall~~Note from Section 5 that the wildlife numeric targets are also protective of human health. In this section, and the section below (2006 Large Fish and Human Consumption), we compare the average fish mercury concentrations to two thresholds, discussed in more detail in Section 5. The first threshold is the U.S. EPA's methylmercury criterion of 0.3 mg/kg. This criterion is based on the national default consumption rate of two meals per month of freshwater and estuarine (not ocean) fish. Ninety percent of the U.S. general population consumes less than this amount of fish; U.S. EPA considers it to be indicative

of the average consumption among sport fishers. The second criterion is 0.2 mg/kg, which is based on a higher fish consumption rate specific to San Francisco Bay sport fishers of four meals per month of fish from the Bay. Because 0.2 mg/kg protects the 95th percentile of Bay sport fishers, it protects well over 99~~%~~ percent of the Bay Area's population.

Adult largemouth bass and trout data provide an estimate of human prey fish mercury concentrations. The adult largemouth bass were collected from the reference reservoir on September 1, 2004. The trout were obtained directly from the hatchery in December 2006 from a shipment bound for reservoirs in Santa Clara County. Although the hatchery trout were collected in 2006, because they are raised in a controlled environment, it is reasonable to assume the 2006 mercury concentrations are representative of 2004 concentrations. ~~It is~~ We also ~~reasonable to~~ assume that the trout mercury concentrations do not change ~~much~~significantly between stocking and human consumption because human fishing pressure ~~increases immediately upon~~coincides with stocking~~. Even non-fishers (such~~, as ~~the author of this report) have easily observed this human fishing pressure when visiting reservoirs, and engaging fishers in conversations. The fishers readily acknowledge timing their fishing activities to coincide with stocking.~~ described below.

A study of stocked trout in Lafayette Reservoir, also in the San Francisco Bay Area, showed that

> the survival time of trout stocked during the summer may be quite limited.…The average weight of trout measured during the angler interviews was 114 g. Comparisons with the average weight of stocked trout during the same period (108 g) indicates that there is little growth of stocked trout prior to being caught. The low survival and/or growth is probably due to a combination of high epilimnion temperatures and predation by largemouth bass (Tetra Tech 1980).

This phenomenon has been observed at other sites. Reservoir biologists in the San Francisco Bay Area observe that most of the trout are caught soon after stocking, and the (human) fishers readily acknowledge timing their fishing activities to coincide with stocking (Gassel 2007).

The adult largemouth bass is TL4; the 2004 average mercury concentration in bass from the reference reservoir was 0.6 mg/kg. The hatchery trout is TL3; the average mercury concentration was 0.03 mg/kg. The average mercury concentration in a 50-50 mix of TL3 and TL4 is estimated as 0.3 mg/kg, ~~just~~ equal to the U.S. EPA's methylmercury criterion. This is protective at a consumption rate of two servings per month of a 50–50 mix of TL3 and TL4 fish. However, it is not protective for people who consume four ~~(or more)~~ servings per month, nor is it protective in the seasons (i.e. late summer and fall) when largemouth bass are abundant, but trout are not abundant. Therefore, in 2006 we attempted to collect a wider range of fish species consumed by humans.

### *2006 Large Fish and Human Consumption*

In 2006, human health was protected for most consumers of fish from the reference reservoir, assuming consumption of an equal mix of TL3 and TL4 fish. This conclusion was based on the fish data analysis described in the ~~next paragraph~~following paragraphs.

The adult largemouth bass and pumpkinseed (a sunfish) from the reference reservoir, plus hatchery trout, provide an estimate of human prey mercury concentrations. Our sampling plan had called for 15 fish each of channel catfish, black crappie, sunfish, and stocked trout—species other than bass. The sample number of 15 was selected based on a statistical power analysis assuming similar variance as in 2004. However, we were only able to collect 15 adult largemouth bass and five pumpkinseed from the reference reservoir, ~~plus obtain~~ in addition to 15 rainbow trout obtained directly from the hatchery. A ~~potential~~possible reason for our poor fishing success is seasonal variations in abundance. As noted above, we were able to rule out excessive drawdown as a cause of low fish abundance, but perhaps fish populations vary seasonally in the reservoirs. For example, trout are not stocked after about May because they are not expected to survive the warm water in late summer.

The weighted-average mercury concentration in ~~a 50-50~~an equal mix of TL3 and TL4 fish ~~which~~consumed by humans ~~consume~~ (largemouth bass, pumpkinseed, and trout) was also 0.3 mg/kg in 2006, ~~just~~ equal to the U.S. EPA's methylmercury criterion. This is protective at a consumption rate of two servings per month of an equal mix of TL3 and TL4 fish. However, it is not protective for people who consume four ~~(or more)~~ servings per month, nor is it protective in the seasons (late summer and fall) when largemouth bass are abundant, but trout are not abundant.

Next, we compare the reference reservoir adult largemouth bass mercury concentrations to those from throughout the western U.S.

### *Comparison of Mercury Levels in Western U.S. to Reference Reservoir*

Adult largemouth bass mercury concentrations in the reference reservoir appear to be typical of concentrations found in the western U.S. (They are also typical of concentrations found in the San Francisco Bay Area; see Table 2.1.) We base this preliminary conclusion on the following data analysis.

We might expect that fish mercury concentrations in the reference reservoir would be elevated compared to those in other areas of the western U.S., because of its location in the mercury-rich Coast Range. On the other hand, Coast Range mercury deposits are very localized, and no ore-grade deposits were found in its watershed. In any case, the reference reservoir fish mercury concentrations are the best achievable—without active intervention (i.e. methylmercury and bioaccumulation controls).

Researchers have recently published large fish (greater than 120 mm) mercury data from throughout the western U.S. (Peterson et al. 2007a). They collected and analyzed 2,707 large fish from 626 stream/river sites in 12 western U.S. states. ~~Mercury concentrations in over 90%~~In 57 percent of the assessed stream length, mercury concentrations in piscivorous (fish-eating, as compared to herbivores) species exceeded the U.S. EPA methylmercury criterion of 0.3 mg/kg. The lead author provided us with their adult largemouth bass data (Peterson 2007b). There are several differences between the data sets.

Adult largemouth bass from the Guadalupe TMDL study are larger than fish from …

**The changes to the August 2007 Staff Report for Peer Review regarding the revised methylmercury allocation (pp. 8-5, 8-7 to 8-8), indicated in strikeout/underline, are the following:**

***Recommended ~~Deep Impoundment~~ Methylmercury Allocation for Reservoirs and Lakes***

Staff proposes an allocation of ~~2.6~~1.5 ng/l peak total methylmercury in the hypolimnion of ~~deep impoundments~~reservoirs and lakes downstream of ~~the New Almaden Mining District.~~mercury mines. The proposed allocation is applicable to Guadalupe Reservoir, Almaden Reservoir, Calero Reservoir, and Lake Almaden. This allocation is based on the peak methylmercury concentration in the reference reservoir, and is calculated to attain TMDL targets by minimizing the transformation of mercury to methylmercury caused by anthropogenic activities. The analysis for this allocation is presented below.

…

*Calculation of ~~Deep Impoundment~~ Methylmercury Allocation for Reservoirs and Lakes*

~~Recall~~Note from Section 7.6 that total methylmercury reached an estimated peak concentration of 2.6 ng/l in the hypolimnion of the reference reservoir in 2004. This is the only available estimate of peak methylmercury concentrations in the reference reservoir. Also, ~~recall from~~ as noted in Section 7.6~~ that the~~ , fish tissue targets were not attained in the reference reservoir.~~ Therefore, we propose an allocation of 2.6 ng/l to the hypolimnion~~ Therefore, to calculate methylmercury allocation for reservoirs and lakes, it is necessary to adjust the measured peak methylmercury concentration down to a lower concentration that will attain the wildlife target. The steps to calculate the allocation are to first calculate a bioaccumulation factor (BAF) based on measurements, then divide the target fish mercury concentration by the BAF.

Staff calculated a BAF (see Equation 7.1) based on the reference reservoir. We divided the November 2006 average fish mercury concentration (0.083 mg/kg) by the 2004 peak methylmercury concentration (2.6 ng/l), and multiplied the result by $10^6$ ng/mg, which yields a BAF of 31,923 l/kg. Staff selected an explicit margin of safety of 5 percent, which yields a fish target of 0.0475 mg/kg. The methylmercury allocation is calculated by dividing this fish tissue target (0.0475 mg/kg) by the BAF (31,923 l/kg), and multiplying the result by $10^6$ ng/mg. This yields a methylmercury concentration of 1.5 ng/l to attain the wildlife target, with a 5 percent margin of safety.

We note that sampling will be required to evaluate compliance with the allocation. …

**The changes to the margin of safety analysis in the August 2007 Staff Report for Peer Review, are the following:**

This report relies on an explicit margin of safety (five percent) provided by the methylmercury allocation. TMDL analyses must incorporate a margin of safety to address potential uncertainties. The margin of safety is intended to account for any lack of knowledge concerning the relationship between load and wasteload allocations and

water quality. ~~This report relies on several conservative assumptions to derive targets and allocations, and thereby provides the margin of safety implicitly.~~

The margin of safety can be derived either explicitly or implicitly. Providing an explicit margin of safety ~~would~~ involves reserving a specific mercury load allocation for the margin of safety. Alternatively, an implicit margin of safety would involve~~s~~ using conservative assumptions (assumptions more likely to be over-protective than under-protective) throughout the analysis. ~~This report relies on an implicit margin of safety.~~

~~The primary margin of safety is provided by methylation controls.~~ This TMDL project indicates that source control alone is insufficient to attain targets within the watershed. However, This TMDL project calls for mining waste and urban runoff source control actions to protect San Francisco Bay. Reducing mercury in impoundment bottom sediments to attain targets (without methylation controls) would likely require cleanup of mining waste to mercury concentrations lower than background soil mercury concentrations. An alternative, but similarly impractical, method for achieving fish tissue targets is to remove all impoundments from operation.

Therefore, Water Board staff proposes to rely on the development of new and innovative methylmercury and bioaccumulation control methods to attain targets. These promising control methods are based on adapting nutrient controls developed for reservoirs (e.g., oxygenate the hypolimnion for taste and odor control). Methylation control provides a sufficient margin of safety so that, as explained in Section 8. ~~5~~2 (see 'Alternative 3 – Shallow Impoundment Methylmercury Allocations'), the fish tissue targets are likely to be met in and downstream of Guadalupe, Almaden, and Calero reservoirs, and Almaden Lake. In other words, staff is optimistic that targets will be met in Guadalupe and Alamitos creeks, and in the Guadalupe River, by reducing methylmercury production in the deep impoundments (reservoirs and lakes) alone.

**The changes to the August 2007 Staff Report for Peer Review regarding the protocol for fish tissue monitoring (p. 10-6), indicated in strikeout/underline, are the following:**

The following provides the protocol for interpreting fish mercury data from large fish that humans consume. The targets for this TMDL were developed for methylmercury (see Section 5~~), because~~). Because nearly all mercury in fish ~~tissue~~ is methylmercury in the muscles (Grieb et. al. 1990), ~~fish~~ skinless filet samples may be analyzed for total mercury. The total mercury results from such sampling and analysis may be interpreted as equal to methylmercury concentrations. Interpretation of prey fish mercury concentrations is somewhat different.

The following provides the protocol for handling and interpreting prey fish mercury data. The protocol for handling samples of prey fish should include packing the samples in water (e.g. in a zip-lock plastic bag with deionized water) to prevent desiccation. About ninety percent of the mercury in small, whole prey fish is methylmercury (Slotton 2007). Therefore, prey fish methylmercury concentrations may be estimated as ninety percent of the total mercury in whole fish. The prey fish samples collected in 2004 and 2006 were eviscerated. Most of the inorganic mercury in these small fish is contained in the liver,

which is removed by evisceration (Slotton 2007). Therefore, the total mercury results from eviscerated fish may be interpreted as equal to methylmercury concentrations.

Whereas grab water methylmercury samples provide an instantaneous and …

**The changes to the August 2007 proposed Basin Plan amendment for peer review, indicated in strikeout/underline, are the following:**

**Chapter 3. Water Quality Objectives (p. BPA-1)**

**OBJECTIVES FOR SPECIFIC CHEMICAL CONSTITUENTS**

**Table 3-4A: Freshwater Water Quality Objectives for Mercury in Walker Creek, Soulajule Reservoir, and all tributary ~~waters,~~Their Tributary Wwaters; and in ~~waters~~ Waters of the Guadalupe River ~~watershed~~Watershed Except Los Gatos Creek and its Tributaries Upstream of Vasona Dam, Lake Elsman, Lexington Reservoir, and Vasona Lake**

**Chapter 7, Water Quality Attainment Strategies including Total Maximum Daily Loads (TMDLs)**

**Problem Statement (p. BPA-5)**

… The waters impaired by mercury and addressed by this TMDL are the following: …

**Total Maximum Daily Loads (p. BPA-7)**

The TMDLs, ~~as indicated~~shown in Table 7-~~a~~A, are expressed as methylmercury and mercury concentrations~~. The TMDLs apply to waters downstream of the New Almaden Mining District, including percolation ponds along these waters.~~ in water and sediment.

**TABLE 7-~~A.~~A: TOTAL MAXIMUM DAILY LOAD**

| Waters | TMDL |
|---|---|
| Guadalupe Creek upstream of Guadalupe Reservoir | 0.1 mg mercury per kg suspended sediment (dry wt., annual median) |
| Alamitos Creek ~~upstream of Almaden Reservoir~~ | |
| ~~Tributaries to Almaden Reservoir, and to Guadalupe Reservoir~~ | |
| Almaden Calero Canal | |
| ~~Alamitos Creek upstream of Lake Almaden and downstream of Almaden Reservoir, including percolation~~Percolation ponds along these creeks | |
| Tributaries to these waters | |

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|---|---|
| Guadalupe Creek downstream of Guadalupe Reservoir<br>Los Gatos Creek downstream of Vasona Dam<br>Canoas Creek<br>Ross Creek<br>Guadalupe River<br>Percolation ponds along ~~Guadalupe Creek,~~these creeks and the Guadalupe River<br>Tributaries to these waters | 0.2 mg mercury per kg suspended sediment (dry wt., annual median) |
| Guadalupe Reservoir~~,~~<br>Almaden Reservoir~~,~~<br>Calero Reservoir~~, and~~<br>Lake Almaden | ~~2.6~~1.5 ng total methylmercury per liter water (seasonal maximum, hypolimnion) |

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**Load and Wasteload Allocations (p. BPA-8)**

Concentration-based pollutant allocations by source category are shown in Table 7-b.

Table 7-b. Load and Wasteload Allocations

| Source | Load Allocation | Wasteload Allocation |
|---|---|---|
| … | | |
| Methylmercury in Guadalupe, Almaden and Calero reservoirs, and Lake Almaden | ~~2.6~~1.5 ng total methylmercury per liter water (seasonal maximum, hypolimnion) (b) | |
| … | | |

**Fish Tissue Mercury Monitoring (p. BPA-14)**

~~Parties responsible~~Monitoring for progress in attaining the fish tissue ~~monitoring include all implementing parties listed in Table 7-c. Additionally,~~mercury targets is required for ~~sample sites in waters which receive~~the mercury mining waste, urban stormwater runoff ~~(sites 4, 5, 7, 8, 9, 12, 13, 14~~, and ~~15), the watershed entities permitted through the Santa Clara Valley Urban Runoff Pollution Prevention Program, NPDES Permit No. CAS029718 (Santa Clara Valley Water District, County of Santa Clara, City of Campbell, Town of Los Gatos, City of Monte Sereno, City of San Jose, City of Santa Clara,~~ methylmercury source categories as specified above. In the first five years of Phase 1, fish shall be monitored at least annually. Subsequently, and ~~City of Saratoga) share responsibility with the implementing parties listed in Table 7-c.~~

~~These parties shall monitor mercury in fish tissue to evaluate progress in attaining targets. In the first 5 years of Phase 1 (years 1–5), fish shall be monitored at least annually. Subsequently,~~ through Phase 2 (years 6–20), fish shall be monitored at least every five years.

In years ~~1–5~~one through five, mercury concentrations shall be monitored in age-1 largemouth bass (remediation indicators) in ~~deep impoundments at a minimum~~reservoirs and lakes in the fall, soon after ~~turnover.~~mixing occurs. Also in years ~~1–5~~one through five, mercury concentrations shall be monitored in fish~~ species consumed by wildlife, of~~, both 5–15 cm and 15–35 cm in length, of species consumed by wildlife, at all sampling locations ~~at a minimum during the bird~~just before the belted kingfisher and osprey breeding season~~ (TMDL targets)~~. Twice in years one through five, this fish monitoring should be repeated during the belted kingfisher and osprey breeding season. The Water Board will determine fish species and sizes to be monitored in subsequent years ~~6–20~~ based upon a review of data from years ~~1–5. Water quality shall be monitored with fish collection for total mercury, dissolved mercury, total methylmercury, dissolved methylmercury, suspended sediment, and general water quality parameters~~one through five.

Prey fish methylmercury concentrations shall be estimated as (a) one hundred percent of the total mercury in eviscerated fish, or (b) ninety-five percent of the total mercury in whole fish, or (c) a different percentage based on scientific studies and upon approval of the Executive Officer of the Water Board. Large predator fish methylmercury concentrations shall be estimated as one hundred percent of the total mercury in skinless filet samples. Water quality shall be monitored at the same time and location as fish collection for mercury species, nutrients, and general water quality parameters.

The fish and water sampling sites are: Guadalupe Reservoir ~~(~~site 1 (S1), and one site on Guadalupe Creek (S2); Almaden Reservoir (S3), and two sites on Alamitos Creek (~~4&~~S4 and S5); Calero Reservoir (S6), and one site on Arroyo Calero Creek (S7); two sites on the Guadalupe River (~~8&~~S8 and S9); Lake Elsman (S10), Lexington Reservoir (S11) , Vasona Lake (S12), and one site on Los Gatos Creek (S13); and one site on each of Ross (S14) and Canoas (S15) creeks.

**Comment S-2: "After eliminating the possibility that trophic level 3 fish pose a risk to wildlife, staff ignore the possible wildlife risks associated consumption of trophic level 4 (TL4) fish by wildlife. Table 5.2 (page 5-3) indicates a TL4 threshold of 0.20 mg/kg for protection of osprey. Given the fact that TL4 fish that osprey are likely**

**to consume (e.g., largemouth bass) generally contain more than 0.2 mg/kg of mercury, and mercury concentrations do not undergo dramatic seasonal fluctuations in TL4 fish, it seems as if Lexington Reservoir could pose a wildlife risk."**

We disagree with Professor Sedlak's interpretation of adult largemouth bass data because these fish exceed the target size. We interpret this comment to refer to 400 mm largemouth bass. The target size is listed in Table 5.2, Safe Prey Fish Methylmercury Levels (August 2007 Staff Report for Peer Review), and is 0.20 mg/kg in TL4 fish 150-350 mm in length. The TL4 fish collected in 2006 and 2004 were largemouth bass bigger than the wildlife target. From Table A.7a, Lexington Reservoir Fish Mercury Concentration Summary (2006) (Appendix A, August 2007 Staff Report for Peer Review), adult largemouth bass ranged in size from 369 to 512 mm with an average length of 405 mm. The adult largemouth bass caught in 2004 were also bigger than the wildlife target (Table A.8a). No corresponding targets have been developed for TL4 fish of this length. Therefore, we disagree that TL4 fish present a risk to wildlife.

**Comment S-3: "In the evaluation of human exposure to mercury through large fish (page 7-22), staff make an assumption that half of the human consumption of fish involves fish that are caught immediately upon stocking of the reservoir. The basis for this assumption is an observation that fishing pressure increases immediately after stocking. …the implicit assumption is that humans who catch more than half of their fish outside of a narrow, undefined period immediately after restocking will not be protected from adverse effects of mercury."**

In our response to comment S-1, we explained that we have modified the August 2007 Staff Report for Peer Review regarding the interpretation of fish data (pp. 7-21 to 7-25) to read, "This is protective at a consumption rate of two servings per month of an equal mix of TL3 and TL4 fish. However, it is not protective for people who consume four servings per month, nor is it protective in the seasons when largemouth bass are abundant, but trout are not abundant."

**Comment S-4: "Even after this assumption [see comment S-3] is made, staff compared the threshold value with the USEPA 0.30 mg/kg threshold instead of the 0.20 mg/kg threshold that has been used in other recent RWQCB mercury TMDLs. From a policy standpoint, this appears to be inconsistent."**

Although this comment goes beyond the scope of the review (scientific basis), we choose to respond to it. Professor Sedlak is partly correct. The 0.2 mg/kg threshold has been used for two recent TMDLs, for the San Francisco Bay (SFBRWQCB 2006) and the Sacramento-San Joaquin River Delta (CVRWQCB 2006). This is because a fish consumption study was conducted specific to San

Francisco Bay, and the Bay and Delta are contiguous water bodies. As discussed in the Staff Report (page 5-6), no fish consumption study for the Guadalupe River watershed or reservoirs is available. However, we compare fish mercury concentrations (objectives) to both the U.S. EPA national criterion of 0.3 mg/kg, and to the more protective 0.2 mg/kg threshold and conclude that the proposed fish tissue wildlife objective will attain the 0.2 mg/kg threshold. Therefore, the proposed water quality objectives are based on consistent policy.

**Comment S-5: "To further justify the conclusion that the Lexington Reservoir is a representative background site, staff compared data from the reservoir with data from the Western US (Figure 7.12)….A glance at the data for larger fish (e.g., those that were over 30 cm) suggests that mercury concentrations in the Lexington Reservoir are higher than those included in the Peterson et al. survey."**

**In response to this comment, the changes to the August 2007 Staff Report for Peer Review, indicated in strikeout/underline, are the following:**

Comparison of Mercury Levels in Western U.S. to Reference Reservoir

Adult largemouth bass mercury concentrations in the reference reservoir appear to be typical of concentrations found in the western U.S. (They are also typical of concentrations found in the San Francisco Bay Area; see Table 2.1.) We base this preliminary conclusion on the following data analysis.

**Comment S-6: "In Table 2.1, concentrations of Hg in fish from locations around Central California are compared for a standardized 40 cm Largemouth Bass. …This observation appears to offer stronger support to the idea that Hg concentrations in Largemouth Bass of 0.4-0.8 mg/kg are typical for reservoirs in this part of California. Perhaps the data from those other studies could be mentioned in Chapter 7."**

Comment noted.

**Comment S-7: "The report advocates using the maximum concentration of total methylmercury in the hypolimnion of the Lexington Reservoir as the benchmark for the other reservoirs. On page 8-8 the staff advocates sampling from reservoir outlets for simplicity. However, it is unclear how well the outlet structures capture the conditions in the hypolimnion. On page 10-4 staff acknowledges this issue and suggests that it might be resolved later as part of a special study. Given the uncertainty in this key parameter, I suggest that the monitoring program go through the additional effort to collect true hypolimnetic samples…. "**

This question will be addressed by special study 2, "How do the deep impoundments (reservoirs and lakes) differ from one another?" (p. 10-8). In response to this comment, we have expanded the study to include the following question: "Do outlet samples adequately represent hypolimnetic methylmercury concentrations for each reservoir?"

**Both the Basin Plan Amendment and the August 2007 Staff Report for Peer Review (page 10-8) have been modified as follows:**

How do the reservoirs and lakes differ from one another? Factors to consider include, but are not limited to, area of connected wetlands, food web, water chemistry (phosphorus, pH, acid neutralizing capacity, and dissolved organic carbon), water level fluctuations, and infrastructure (outlet structure). Do outlet samples adequately represent hypolimnetic methylmercury concentrations for each reservoir? How significant are these differences?

**Comment S-8: "Page 4-5: To obtain average particulate mercury concentrations from streams in the mining district, data in Table 4.2 are used. These data only account for a fraction of the available data collected by Tetra Tech. The report needs to explain why these specific samples were chosen to represent conditions in the watershed."**

Professor Sedlak has perhaps confused "mining district" creeks with "watershed" creeks. Table 4.2 lists the mining district creeks and the corresponding data from Tetra Tech's sampling efforts. The other samples referenced by Professor Sedlak are samples from creeks which do not drain the mining district, and therefore were not included in this loading estimate. (We note that data from both creeks which drain the mining district and other creeks in the watershed are all lumped together in the two tables from the Data Collection Report cited in Table 4.2.)

**Comment S-9: "Page 7-15: The report should caution the reader about interpretation of the redox data in Figure 7.9. Data on redox conditions in natural waters collected with electrodes is notoriously unreliable. The electrode can probably indicate the disappearance of oxygen by a decrease in potential, but otherwise it is not very useful. …. In the future, much more information on redox conditions could be obtained by monitoring Fe(II), SO4 2- and S(-II) with depth."**

As Professor Sedlak has indicated, the shape of the curves, especially the depth at which redox decreases, is what is important in these figures, not the redox reading. In the special studies proposed in Section 10.3 (renumbered to Section 9.10 in the February 2008 Staff Report) we will consider the need to monitor Fe(II), SO4 2- and S(-II) with depth.

**Both the Basin Plan Amendment and the August 2007 Staff Report for Peer Review have been modified as follows:**

Is it feasible to control methylmercury production in the hypolimnion of deep impoundments? Do field redox measurements provide sufficient information, or is it necessary to monitor for Fe(II), SO4 2- and S(-II) with depth to understand methylation in the deep impoundments? If it is feasible to control methylmercury production in the hypolimnion of deep impoundments, does it result in attaining the fish tissue targets? If not, what other controls are feasible in deep impoundments, and do they result in attaining targets?

**Comment S-10: "Page 7-12: The discussion of bioaccumulation factors considers using both total and dissolved mercury and methylmercury concentrations. Staff acknowledges that using particle-associated mercury and methylmercury concentrations in the calculations is problematic. …Bioaccumulation factors are typically based on the ratio of concentration in fish tissue to the dissolved concentration. …I suggest that staff rewrite this section using data from filtered samples or after adjusting total concentrations for dissolved concentrations using partition coefficients."**

Staff has revised this section using available data from unfiltered (total methylmercury) and filtered (dissolved) methylmercury samples. We considered the suggestion that we calculate a partition coefficient, and elected to rely on the future studies proposed in the implementation and monitoring section of the TMDL to provide greater insight into the differences between reservoirs.

**We made the following changes to pages 7-12 through 7-14 of the August 2007 Staff Report for Peer Review:**

… and show the importance of the uptake of methylmercury by the lower trophic levels.

To support development of fish BAFs and other TMDL ~~work~~calculations, measurements of total mercury in fish throughout the watershed were collected in 2004 ~~in the data collection effort~~ (see Section 3.1). ~~Nearly all mercury in fish is methylmercury (Grieb et al. 1990).~~ USEPA collected adult and age-1 largemouth bass from ~~five impoundments~~ four reservoirs (Guadalupe Reservoir, Almaden Reservoir, Calero Reservoir, and Lexington Reservoir), and Lake Almaden ~~Lake)~~. The Santa Clara Valley Water District collected age-1 California roach (*Lavinia symmetricus*) at six creek and river locations.

~~Adult~~ BAFs for adult largemouth bass ~~BAFs~~ were developed from average total mercury concentrations in fish and unfiltered (total) and filtered (dissolved) methylmercury concentrations in the surface and hypolimnion of the five ~~largest~~ impoundments ~~(Tetra Tech 2005d; SFBRWQCB 2005e). The water~~. (See Appendix B, Calculation B.1.) In Table 7.1 we present the BAFs for both total and dissolved methylmercury, and both average and peak concentrations ~~are averages of measurements~~ , at ~~Almaden and Guadalupe reservoirs on one date in July 2003 and six dates between May 11 and August~~

~~31, 2004. These measurements were taken at both~~ the ~~surface and at the reservoir outlet~~discharge point (referred to as ~~hypolimnetic samples~~hypolimnion, since water is released from ~~the bottom of the~~ reservoirs at a depth below the thermocline). ~~The mercury concentrations at Almaden and~~ (In Appendix B, Calculation B.1, we include BAFs for the full data set.)

The BAFs for adult fish compared to average hypolimnion total and dissolved methylmercury range from 400,000 to 1.8 million. The BAFs for adult fish compared to peak hypolimnion total and dissolved methylmercury range from 240,000 to 1.1 million (see Table 7.1).

Water column mercury concentrations in Almaden, Guadalupe, and Lexington reservoirs are well characterized. ~~A single value is used for the surface-water methylmercury concentration at Almaden Lake. This value is the average of two samples collected at the outlet in April 2004 as part of the Wet Weather Sampling under Part 1 of the Data Collection Plan (Tetra Tech 2005a).~~ Average concentrations for Almaden and Guadalupe reservoirs are from measurements taken on one day in July 2003 and six days between May 11 and August 31, 2004. Average concentrations for Lexington Reservoir are from measurements on one day in July 2003 and semi-monthly samples in 2004. Peak concentrations for Guadalupe, Almaden, and Lexington reservoirs are estimated from measurements taken between mid-May and early September 2004. A single value is used for the surface-water methylmercury concentration at Lake Almaden and Calero Reservoir. These samples were collected in 2003 during the synoptic survey (Tetra Tech 2003). There is no measurement for the hypolimnion at Almaden Lake. ~~The surface-water and hypolimnion values for Calero and Lexington reservoirs are from samples collected on one date in July 2003.~~

### Table 7.1 Adult Largemouth Bass Bioaccumulation Factors (l/kg)

| | Hypolimnion (discharge point) Average 2003-2004 | | Hypolimnion (discharge point) 2004 Estimated Peak | |
|---|---|---|---|---|
| | Total Methylmercury | Dissolved Methylmercury | Total Methylmercury | Dissolved Methylmercury |
| Guadalupe Reservoir | **1,100,000** | **1,700,000** | **500,000** | **800,000** |
| Almaden Reservoir | **990,000** | **1,800,000** | **580,000** | **1,100,000** |
| Lake Almaden | **- -** | **- -** | **- -** | **- -** |
| Calero Reservoir | **400,000** | **830,000** | **- -** | **- -** |
| Lexington Reservoir | **1,100,000** | **- -** | **240,000** | **- -** |

**- - = not measured**

Similarly, age-1 largemouth bass BAFs were calculated from measurements of total mercury in the fish and the same set of impoundment methylmercury data used for the adult BAFs. The BAFs for age-1 fish compared to average hypolimnion total and dissolved methylmercury range from ~~80~~76,000 to ~~200~~390,000. The BAFs for age-1 fish compared to ~~surface~~peak hypolimnion total and dissolved methylmercury range from ~~400~~35,000 to 240,000 (see Table 7.2~~ million.~~).

~~The BAFs for adult fish compared to hypolimnion methylmercury range from 400,000 to 1,000,000. The BAFs for adult fish compared to surface total methylmercury range from 3.2 million to 12 million.~~

## Table 7.2 2004 Age-1 Largemouth Bass Bioaccumulation Factors

| | Average Methylmercury 2003-2004 | | 2004 Estimated Peak Methylmercury | |
|---|---|---|---|---|
| | **Total Methylmercury** | **Dissolved Methylmercury** | **Total Methylmercury** | **Dissolved Methylmercury** |
| **Guadalupe Reservoir** | 150,000 | 230,000 | 70,000 | 110,000 |
| **Almaden Reservoir** | 220,000 | 390,000 | 130,000 | 240,000 |
| **Lake Almaden** | - - | - - | - - | - - |
| **Calero Reservoir** | 76,000 | 160,000 | - - | - - |
| **Lexington Reservoir** | 170,000 | - - | 35,000 | - - |

- - = not measured

Because the zooplankton methylmercury concentrations are reported on a dry-weight …

**We made the following changes to Appendix B, pages B-2 to B-4, of the August 2007 Staff Report for Peer Review:**

Calculation B.1 Bioaccumulation Factors (BAFs)

In Table B.1a on the following pages we provide the 2004 surface, depth profile, and discharge point methylmercury concentrations used to develop the BAFs. In the following two tables, Tables B.1b and B.1c, we provide the 2004 fish mercury concentrations and BAFs for adult largemouth bass and age-1 largemouth bass, respectively. Also in Table B.1c, we provide the BAFs for threadfin shad and inland silversides (TL3 fish 50-150mm in length) collected in 2006 from Lexington Reservoir.

~~Table B.3a on the following page provides the range of bioaccumulation factors (BAFs) which is the ratio of tissue concentration to water column concentration in units of liters per kilogram (L/Kg). It also provides a check on the average unfiltered methylmercury in surface and hypolimnion samples collected at Guadalupe Reservoir. Tetra Tech had~~

~~provided averages of 0.46 and 5.61 ng/l respectively without the supporting calculations; Water Board averages were 0.69 and 5.52 ng/l respectively, which is in close accord with the Tetra Tech calculations (Table 8-6 Tetra Tech 2005a).~~

~~The BAFs for age-1 largemouth bass range from 80,000 L/Kg at Calero Reservoir to 200,000 L/Kg at Almaden Reservoir for the hypolimnion, and 400,000 L/Kg at Lexington Reservoir to 2 million L/Kg at Guadalupe Reservoir for the surface.~~

~~The BAFs for adult largemouth bass range from 400,000 L/Kg at Calero Reservoir to 1 million L/Kg at Guadalupe Reservoir for the hypolimnion, and 3.1 million L/Kg at Lexington Reservoir to 12.6 million L/Kg at Guadalupe Reservoir for the surface.~~

~~The BAF tables from Tetra Tech are provided as Tables B.3b, B.3c, and B.3d, below.~~

~~Reference~~

~~Tetra Tech, Inc. (Tetra Tech 2005a). *Technical Memorandum 5.3.2, Data Collection Report, Volume 1*, Prepared for Santa Clara Valley Water District. February 8. http://www.valleywater.org/Water/Watersheds_-_streams_and_floods/Watershed_info_&_projects/Guadalupe/_Guadalupe_River_TMDL_project/index.shtm~~

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## Table B.1a Methylmercury Concentrations Used to Calculate Bioaccumulation Factors (BAFs)

| | | | Surface | | | Hypolimnion (true) | | | Hypolimnion (discharge point) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | Dissolved | Depth | Total | Dissolved | Dissolved | Total | Dissolved | Dissol |
| | Sample Date | Sample ID | MeHg (ng/l) | MeHg (ng/l) | (ft) | MeHg (ng/l) | MeHg (ng/l) | % | MeHg (ng/l) | MeHg (ng/l) | % |
| **Guadalupe Reservoir** | | | | | | | | | | | |
| (Tetra Tech 2003) | | | | | | | | | | | |
| Table 3-2 | 7/31/2003 | Site 19B | | | 40 | 2.91 | 0.743 | 26% | | | |
| Table 3-3 | 7/31/2003 | Site 11 | | | | | | | 8.27 | 6.073 | 73% |
| Table 3-2 | 7/31/2003 | Site 19T | 3.31 | 0.491 | | | | | | | |
| " | 7/31/2003 | Site 20 | 4.62 | 0.744 | | | | | | | |
| " | 7/31/2003 | Site 20V | 1.00 | 0.595 | | | | | | | |
| (Tetra Tech 2005a) | | | | | | | | | | | |
| Table 4-3 | 5/11/2004 | | 0.566 | 0.171 | 50 | 0.463 | 0.247 | 53% | 0.853 | 0.552 | 65% |
| | 6/10/2004 | | 0.472 | 0.157 | 50 | 0.424 | 0.226 | 53% | 1.240 | 0.772 | 62% |
| | 7/15/2004 | | 0.299 | 0.123 | 50 | 0.965 | 0.802 | 83% | 1.540 | 1.010 | 66% |
| | 7/15/2004 | | 0.267 | 0.117 | | | | | | | |
| | 8/2/2004 | | 0.204 | 0.128 | 50 | 3.810 | 3.58 | 94% | 6.430 | 3.73 | 58% |
| | 8/12/2004 | | 0.324 | 0.117 | 50 | 11.000 | 8.27 | 75% | 8.100 | 6.08 | 75% |
| | 8/12/2004 | | | | 50 | 5.090 | 5.47 | 107% | | | |
| | 8/31/2004 | | 0.272 | 0.085 | 50 | 11.5 | 7.2 | 63% | 12.80 | 7.24 | 57% |
| | 9/18/2004 | | | | | | | | | | |
| | | Average methylmercury 2003-2004: | 1.13 | 0.27 | | 4.52 | 3.32 | | 5.60 | 3.64 | |
| | | Peak methylmercury on Sep. 18, 2004: | | | | 10.73 | 8.17 | | 11.82 | 7.29 | |
| | % dissolved methylmercury | min | | | | | | 26% | | | 57% |
| | | mean | | | | | | 69% | | | 65% |
| | | max | | | | | | 107% | | | 75% |

## Table B.1a Methylmercury Concentrations Used to Calculate Bioaccumulation Factors (BAFs)

| | | | Surface | | | Hypolimnion (true) | | | Hypolimnion (discharge point) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | Dissolved | Depth | Total | Dissolved | Dissolved | Total | Dissolved | Dissol |
| | Sample Date | Sample ID | MeHg (ng/l) | MeHg (ng/l) | (ft) | MeHg (ng/l) | MeHg (ng/l) | % | MeHg (ng/l) | MeHg (ng/l) | % |
| **Almaden Reservoir** | | | | | | | | | | | |
| (Tetra Tech 2003) | | | | | | | | | | | |
| Table 3-2 | 7/30/2003 | Site 21B | | | 40 | 2.25 | 0.556 | | | | |
| Table 3-3 | 7/30/2003 | Site 1 | | | | | | | 4.34 | 3.78 | |
| Table 3-2 | 7/30/2003 | Site 21T | 2.26 | 0.610 | | | | | | | |
| " | 7/30/2003 | Site 22 | 1.75 | 0.414 | | | | | | | |
| " | 7/30/2003 | Site 22V | 3.26 | 1.06 | | | | | | | |
| (Tetra Tech 2005a) | | | | | | | | | | | |
| Table 4-3 | 5/11/2004 | | 0.336 | 0.164 | 50 | 0.518 | 0.298 | 58% | 2.271 | 1.219 | 54% |
| | 6/10/2004 | | 0.506 | 0.333 | 50 | 1.287 | 0.817 | 63% | 2.771 | 1.584 | 57% |
| | 6/10/2004 | | | | | | | | 2.909 | 1.515 | 52% |
| | 7/15/2004 | | 0.446 | 0.266 | 50 | 2.300 | 1.140 | 50% | 4.720 | 1.110 | 24% |
| | 8/2/2004 | | 0.582 | 0.287 | 50 | 2.070 | 1.07 | 52% | 4.150 | 2.38 | 57% |
| | 8/2/2004 | | 0.511 | 0.233 | | | | | | | |
| | 8/12/2004 | | 0.466 | 0.237 | 50 | 1.830 | 2.81 | 154% | 7.200 | 4.29 | 60% |
| | 8/31/2004 | | 0.369 | 0.277 | 50 | 5.49 | 3.09 | 56% | 6.47 | 3.69 | 57% |
| | 8/31/2004 | | | | 50 | 5.09 | 2.68 | 53% | | | |
| | 9/18/2004 | | | | | | | | | | |
| | | Average methylmercury 2003-2004: | 1.05 | 0.39 | | 2.60 | 1.56 | | 4.35 | 2.45 | |
| | | Peak methylmercury on Sep. 18, 2004: | | | | 4.87 | 3.10 | | 7.40 | 4.03 | |
| | % dissolved methylmercury | min | | | | | | 50% | | | 24% |
| | | mean | | | | | | 69% | | | 51% |
| | | max | | | | | | 154% | | | 60% |

## Table B.1a Methylmercury Concentrations Used to Calculate Bioaccumulation Factors (BAFs)

| | | | Surface | | | Hypolimnion (true) | | | Hypolimnion (discharge point) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | Dissolved | Depth | Total | Dissolved | Dissolved | Total | Dissolved | Dissol |
| | Sample Date | Sample ID | MeHg (ng/l) | MeHg (ng/l) | (ft) | MeHg (ng/l) | MeHg (ng/l) | % | MeHg (ng/l) | MeHg (ng/l) | % |
| **Calero Reservoir** | | | | | | | | | | | |
| (Tetra Tech 2003) | | | | | | | | | | | |
| Table 3-2 | 7/30/2003 | Site 23B | | | 40 | 3.05 | 1.25 | 41% | | | |
| Table 3-3 | 7/30/2003 | Site 8 | | | | | | | 2.77 | 1.33 | 48% |
| Table 3-2 | 7/30/2003 | Site 23T | 0.92 | 0.203 | | | | | | | |
| " | 7/30/2003 | Site 23T Rep | 0.77 | 0.083 | | | | | | | |
| " | 7/30/2003 | Site 24 | 1.06 | 0.192 | | | | | | | |
| " | 7/30/2003 | Site 24V | 0.29 | 0.185 | | | | | | | |
| No methylmercury data was collected from Calero Reservoir in 2004 | | | | | | | | | | | |
| **Lake Almaden** | | | | | | | | | | | |
| (Tetra Tech 2003) | | | | | | | | | | | |
| Table 3-3 | 7/29/2003 | Site 7 | 17.85 | 1.72 | (depth not reported) | | | | | | |
| No methylmercury data was collected from Lake Almaden in 2004 | | | | | | | | | | | |

## Table B.1a Methylmercury Concentrations Used to Calculate Bioaccumulation Factors (BAFs)

| | | | Surface | | | Hypolimnion (true) | | | Hypolimnion (discharge point) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | Dissolved | Depth | Total | Dissolved | Dissolved | Total | Dissolved | Dissol |
| | Sample Date | Sample ID | MeHg (ng/l) | MeHg (ng/l) | (ft) | MeHg (ng/l) | MeHg (ng/l) | % | MeHg (ng/l) | MeHg (ng/l) | % |
| Lexington Reservoir | | | | | | | | | | | |
| (Tetra Tech 2003) | | | | | | | | | | | |
| Table 3-2 | 7/31/2003 | Site 18B | | | 40 | 1.25 | 0.735 | 59% | | | |
| Table 3-3 | 7/31/2003 | Site 16 | | | | | | | 0.756 | 0.745 | 99 |
| Table 3-2 | 7/31/2003 | Site 18T | 0.57 | 0.069 | | | | | | | |
| (LAS 2004) | | | | | | | | | | | |
| | 1/12/2004 | 03128-1 | | | | | | | 0.125 | | |
| | 1/12/2004 | 03128-1 Replicate | | | | | | | 0.142 | | |
| | 3/4/2004 | 03128-2 | | | | | | | 0.045 | | |
| | 3/4/2004 | 03128-2 Replicate | | | | | | | 0.045 | | |
| | 3/18/2004 | 03128-3 | | | | | | | 0.05 | | |
| | 3/18/2004 | 03128-3 Replicate | | | | | | | 0.061 | | |
| | 4/6/2004 | 03128-4 | | | | | | | 0.064 | | |
| | 4/6/2004 | 03128-4 Replicate | | | | | | | 0.045 | | |
| | 4/26/2004 | 03128-5 | | | | | | | 0.106 | | |
| | 4/26/2004 | 03128-5 Replicate | | | | | | | 0.045 | | |
| | 5/11/2004 | | | | | | | | | | |
| | 5/13/2004 | 03128-6 | | | | | | | 0.057 | | |
| | 5/13/2004 | 03128-6 Replicate | | | | | | | 0.045 | | |
| | 5/25/2004 | 03128-7 | | | | | | | 0.17 | | |

## Table B.1a Methylmercury Concentrations Used to Calculate Bioaccumulation Factors (BAFs)

| | | Surface | | | Hypolimnion (true) | | | Hypolimnion (discharge point) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Total | Dissolved | Depth | Total | Dissolved | Dissolved | Total | Dissolved | Dissol |
| Sample Date | Sample ID | MeHg (ng/l) | MeHg (ng/l) | (ft) | MeHg (ng/l) | MeHg (ng/l) | % | MeHg (ng/l) | MeHg (ng/l) | % |
| Lexington Reservoir - continued | | | | | | | | | | |
| 5/25/2004 | 03128-7 Replicate | | | | | | | 0.169 | | |
| 6/16/2004 | 03128-8 | | | | | | | 0.32 | | |
| 6/16/2004 | 03128-8 Replicate | | | | | | | 0.314 | | |
| 7/1/2004 | 03128-9 | | | | | | | 0.609 | | |
| 7/1/2004 | 03128-9 Replicate | | | | | | | 0.59 | | |
| 7/13/2004 | 03128-10 | | | | | | | 0.863 | | |
| 7/13/2004 | 03128-10 Replicate | | | | | | | 0.787 | | |
| 7/29/2004 | 03128-11 | | | | | | | 1.45 | | |
| 7/29/2004 | 03128-11 Replicate | | | | | | | 1.54 | | |
| 8/19/2004 | 03128-11 | | | | | | | 2.14 | | |
| 8/19/2004 | 03128-11 Replicate | | | | | | | 2.18 | | |
| 9/2/2004 | 03128-13 | | | | | | | 2.1 | | |
| 9/2/2004 | 03128-13 Replicate | | | | | | | 2.43 | | |
| 9/18/2004 | | | | | | | | | | |
| 9/27/2004 | 03331-14 | | | | | | | 0.592 | | |
| 9/27/2004 | 03331-14 Replicate | | | | | | | 0.594 | | |
| 10/14/2004 | 03331-15 | | | | | | | 0.219 | | |

## Table B.1a Methylmercury Concentrations Used to Calculate Bioaccumulation Factors (BAFs)

| | | | Surface | | | Hypolimnion (true) | | | Hypolimnion (discharge point) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | Dissolved | Depth | Total | Dissolved | Dissolved | Total | Dissolved | Dissol |
| | Sample Date | Sample ID | MeHg (ng/l) | MeHg (ng/l) | (ft) | MeHg (ng/l) | MeHg (ng/l) | % | MeHg (ng/l) | MeHg (ng/l) | % |
| | 10/14/2004 | 03331-15 Replicate | | | | | | | 0.286 | | |
| | 10/28/2004 | 03128-16 | | | | | | | 0.221 | | |
| | 10/28/2004 | 03128-16 Replicate | | | | | | | 0.19 | | |
| | 11/15/2004 | 03128-17 | | | | | | | 0.102 | | |
| | 11/15/2004 | 03128-17 Replicate | | | | | | | 0.097 | | |
| | 12/2/2004 | 03331-18 | | | | | | | 0.094 | | |
| | 12/2/2004 | 03331-18 Replicate | | | | | | | 0.095 | | |
| | Lexington Reservoir | | | | | | | | | | |
| | | Average methylmercury 2003-2004: | | | | | | | 0.53 | | |
| | | Peak methylmercury on Sep. 18, 2004: | | | | | | | 2.6 | | |

## Table B.1b Bioaccumulation Factors for 2004 Adult Largemouth Bass

| | | Surface | | Hypolimnion (true) | | Hypolimnion (discharge point) | | Average Fish Tissue |
|---|---|---|---|---|---|---|---|---|
| | | Total MeHg (ng/l) | Dissolved MeHg (ng/l) | Total MeHg (ng/l) | Dissolved MeHg (ng/l) | Total MeHg (ng/l) | Dissolved MeHg (ng/l) | Total Hg (mg/kg ww) 2004 Adult Largemouth Bass |
| **Guadalupe Reservoir** | | | | | | | | 6.1 |
| | Average methylmercury 2003-2004: | 1.13 | 0.27 | 4.52 | 3.32 | 5.60 | 3.64 | |
| | BAF: | 5,400,000 | 22,000,000 | 1,300,000 | 1,800,000 | 1,100,000 | 1,700,000 | |
| | Peak methylmercury on Sep. 18, 2004: | | | 10.73 | 8.17 | 11.82 | 7.29 | |
| | BAF: | | | 570,000 | 700,000 | 500,000 | 800,000 | |
| **Almaden Reservoir** | | | | | | | | 4.3 |
| | Average methylmercury 2003-2004: | 1.05 | 0.39 | 2.60 | 1.56 | 4.35 | 2.45 | |
| | BAF: | 4,100,000 | 11,000,000 | 1,700,000 | 2,800,000 | 990,000 | 1,800,000 | |
| | Peak methylmercury on Sep. 18, 2004: | | | 4.87 | 3.10 | 7.40 | 4.03 | |
| | BAF: | | | 880,000 | 1,400,000 | 580,000 | 1,100,000 | |
| **Calero Reservoir** | | | | | | | | 1.1 |
| | Average methylmercury 2003-2004: | 0.76 | 0.17 | 3.05 | 1.25 | 2.77 | 1.33 | |
| | BAF: | 1,400,000 | 6,600,000 | 360,000 | 880,000 | 400,000 | 830,000 | |
| **Lake Almaden** | | | | | | | | 2.3 |
| | One measurement in 2003: | 17.85 | 1.72 | | | | | |
| | BAF: | 130,000 | 1,300,000 | | | | | |

## Table B.1b Bioaccumulation Factors for 2004 Adult Largemouth Bass

| | | Surface | | Hypolimnion (true) | | Hypolimnion (discharge point) | | Average Fish Tissue |
|---|---|---|---|---|---|---|---|---|
| | | Total MeHg (ng/l) | Dissolved MeHg (ng/l) | Total MeHg (ng/l) | Dissolved MeHg (ng/l) | Total MeHg (ng/l) | Dissolved MeHg (ng/l) | Total Hg (mg/kg ww) 2004 Adult Largemouth Bass |
| **Lexington Reservoir** | | | | | | | | 0.6 |
| | Average methylmercury 2003-2004: | | | | | 0.53 | | |
| | BAF: | | | | | 1,100,000 | | |
| | Peak methylmercury on Sep. 18, 2004: | | | | | 2.55 | | |
| | BAF: | | | | | 240,000 | | |

## Table B.1c Bioaccumulation Factors for 2004 Age-1 Largemouth Bass and 2006 TL3 Species

| | | Surface | | Hypolimnion (true) | | Hypolimnion (discharge point) | | Average Fish Tissue | Average Fish Tissue |
|---|---|---|---|---|---|---|---|---|---|
| | | Total MeHg (ng/l) | Dissolved MeHg (ng/l) | Total MeHg (ng/l) | Dissolved MeHg (ng/l) | Total MeHg (ng/l) | Dissolved MeHg (ng/l) | Total Hg (mg/kg ww) 2004 Age-1 Largemouth Bass | Total Hg (mg/kg ww) 2006 TL3 species |
| **Guadalupe Reservoir** | | | | | | | | 0.83 | |
| | Average methylmercury 2003-2004: | 1.13 | 0.27 | 4.52 | 3.32 | 5.60 | 3.64 | | |
| | BAF: | 730,000 | 3,000,000 | 180,000 | 250,000 | 150,000 | 230,000 | | |
| | Peak methylmercury on Sep. 18, 2004: | | | 10.73 | 8.17 | 11.82 | 7.29 | | |
| | BAF: | | | 77,000 | 100,000 | 70,000 | 110,000 | | |
| **Almaden Reservoir** | | | | | | | | 0.96 | |
| | Average methylmercury 2003-2004: | 1.05 | 0.39 | 2.60 | 1.56 | 4.35 | 2.45 | | |
| | BAF: | 920,000 | 2,500,000 | 370,000 | 620,000 | 220,000 | 390,000 | | |
| | Peak methylmercury on Sep. 18, 2004: | | | 4.87 | 3.10 | 7.40 | 4.03 | | |
| | BAF: | | | 200,000 | 310,000 | 130,000 | 240,000 | | |
| **Calero Reservoir** | | | | | | | | 0.21 | |
| | Average methylmercury 2003-2004: | 0.76 | 0.17 | 3.05 | 1.25 | 2.77 | 1.33 | | |
| | BAF: | 280,000 | 1,300,000 | 69,000 | 170,000 | 76,000 | 160,000 | | |

## Table B.1c Bioaccumulation Factors for 2004 Age-1 Largemouth Bass and 2006 TL3 Species

| | | Surface | | Hypolimnion (true) | | Hypolimnion (discharge point) | | Average Fish Tissue | Average Fish Tissue |
|---|---|---|---|---|---|---|---|---|---|
| | | Total MeHg (ng/l) | Dissolved MeHg (ng/l) | Total MeHg (ng/l) | Dissolved MeHg (ng/l) | Total MeHg (ng/l) | Dissolved MeHg (ng/l) | Total Hg (mg/kg ww) 2004 Age-1 Largemouth Bass | Total Hg (mg/kg ww) 2006 TL3 species |
| **Lake Almaden** | | | | | | | | 0.39 | |
| | One measurement in 2003: | 17.85 | 1.72 | | | | | | |
| | BAF: | 22,000 | 230,000 | | | | | | |
| **Lexington Reservoir** | | | | | | | | 0.09 | 0.083 |
| | Average methylmercury 2003-2004: | | | | | 0.53 | | | |
| | 2004 Age-1 Largemouth Bass BAF: | | | | | 170,000 | | | |
| | 2006 TL3 species BAF: | | | | | 160,000 | | | |
| | Peak methylmercury on Sep. 18, 2004: | | | | | 2.55 | | | |
| | 2004 Age-1 Largemouth Bass BAF: | | | | | 35,000 | | | |
| | 2006 TL3 species BAF: | | | | | 33,000 | | | |

**Comment S-11: "Figure 7-19 is inconsistent with the text. The text indicates a maximum hypolimnion methylmercury concentration of 2.6 ng/L while the figure indicates maximum concentration of 3.1 ng/L. I believe that the discrepancy arises from the fact that the figure uses a regression that includes one extra observation (May 13)."**

We appreciate the comment, and have revised Figure 7-10 (on page 7-19) for better legibility.

**Comment S-12: "On page 8-13, the discussion of the margin of safety implies that a margin of safety is implicit in the plan because control methods in the deep impoundments will greatly reduce methylmercury concentrations.…As written, the TMDL instructs the managers of the reservoirs to achieve a maximum hypolimnetic methylmercury concentration that will yield fish that have a mercury concentration at the threshold for wildlife effects. There is no provision that they should operate the system to achieve lower levels (if that is possible). Thus, a hypolimnetic oxygenation system operated intermittently could achieve the requirements of the TMDL without providing a margin of safety.… If necessary, staff should revisit assumptions to achieve an appropriate margin of safety."**

See response to comment S-1 for our detailed response. In response to several of Professors Sedlak's and Tullos' comments, we have added an explicit margin of safety to the methylmercury allocation to deep impoundments.

**Comment S-13: "A number of recent studies suggest that forest fires can mobilize mercury and increase methylmercury uptake into the food chain. Fires and fire management issues are not addressed in the TMDL. Perhaps this is beyond the scope and control of the RWQCB, but it might be useful to anticipate how the effect of fires will be considered with respect to monitoring the progress of compliance. In addition, consideration of the effects of fire on mercury might merit additional efforts for fire suppression in the mining district."**

Comment noted. In the event of a wildfire, erosion control measures are expected to be taken to prevent excessive sedimentation of downstream waters in the subsequent wet season.

**Comment S-14: "The same paragraph is repeated at the bottom of page 2-1 and the top of page 2-3."**

We have removed the duplicated text.

**Comment S-15: "Page 4-24: Figure 4.11 shows a negative cumulative export from the Almaden Reservoir between May and July. Is there an explanation for this?"**

Professor Sedlak may have reversed the two figures shown side-by-side at the top of page 4-24. On the upper left is Figure 4-10(a), Almaden Reservoir Methylmercury Mass, which shows a decline in the mass of methylmercury in Almaden Reservoir between May and June. On the upper right is Figure 4-11(a), Almaden-Methylmercury export. The cumulative load of methylmercury exports from Almaden Reservoir has a fairly steady increase from May through August.

## Peer reviewer letter no. 2: Professor Desiree Tullos

**Biological and Ecological Engineering**
**Oregon State University, Corvallis, September 22, 2007**

**Introductory Comments:**

**While the basis for this TMDL certainly is an acceptable use of scientific information, I do have some concerns about the study, particularly regarding the human consumption rates, ability to protect human health, and the implementation, monitoring, and enforcement of this TMDL.**

We are pleased to note that Professor Tullos finds the basis for TMDL to be an acceptable use of scientific information. In the following responses to her specific comments, we address her concerns regarding protection of human health, and implementation, monitoring and enforcement of the TMDL.

**Fish Tissue Mercury Water Quality Objectives**

**Comment T-1a: "The logic and approach for determining the numeric fish-tissue objectives (0.05 and 0.1 mg methylmercury/kg fish for respective lengths of 5–15 cm and 15–35 cm) is scientifically sound. The authors rightfully determined that this target will protect humans consuming as much as one meal of fish per week from this watershed."**

We note Professor Tullos' endorsement of the proposed wildlife water quality objectives, and their protectiveness of human health.

**Comment T-1b: "However, I would like to see a more detailed description of (a) whether the use of regional consumption rates is appropriate in this basin and (b) the level of risk involved with under- or over-predicting consumption rates."**

See our response to comment S-4; we note that a risk assessment is not required either to establish water quality objectives or a TMDL.

**Source Analysis**

**Comment T-2a: "Identification of Source Categories**
**The source analysis provides an excellent record of the source types, locations, and connections, making important distinctions in the seasonal contributions of mercury to the Guadalupe River watershed. I believe this analysis is based on sound scientific**

**knowledge given the limited time and resources available for water quality sampling."**

Comment noted.

**Comment T-2b: "Methodology of Load Estimates**
**The approach for load estimates is scientifically sound.…while uncertainty in load estimates is high,…this uncertainty is probably not critical since the purpose of load estimates is to compare relative importance, rather than absolute magnitudes, of various sources (e.g. mining wastes, urban runoff, soil mercury, and atmospheric) in the watershed, which are dominated by mining. Therefore, acknowledging the limitation posed by small storm event sampling, I believe the source analysis for mercury in the Guadalupe River watershed is based upon scientifically sound methods and practices."**

Comment noted.

**Linkage Analysis**

**Comment T-3a: "Linkages between sources and numeric targets**
**Conceptual and descriptive links of Mercury sources and targets are well-described and scientifically valid, including indirect links, such as through methylmercury production. Use of the bioaccumulation factor methodology to link sources and targets is supported through mercury measurements in water, plankton, and fish."**

Comment noted.

**Comment T-3b: "Reference site approach**
**While Lexington Reservoir appears to be a suitable reference site for this analysis due to the accessibility and lack of mining in the basin, I am concerned that fish are safe for consumption by humans for only two servings per month. … Two options for addressing this inconsistency may be (1) selecting an alternative reference reservoir if available, and/or (2) performing a fish consumption study of the area rather than using regional rates to evaluate whether once per week is an appropriate consumption rate."**

See response to comment S-4.

**Allocations**

**Comment T-4a: "Seasonal Variations and Critical Conditions**
**As reported by the literature at other sites in Mediterranean climates, particulate**

**mercury is transported by stormwater in the wet season and methylmercury is produced and bioaccumulated during the dry season under anoxic conditions. Again, while limited by only a single season of sampling, mechanisms and effects of seasonal variations are well-described and scientifically valid."**

Comment noted.

**Comment T-4b: "Margin of Safety**
**The author states that by "making conservative choices throughout the analysis, where appropriate, to afford a tangible but unquantified margin of safety", … . Due to the high uncertainty in load estimates as expressed in Section 2b of this review, I suggest that the authors dedicate a few more sentences addressing the issue of uncertainty …"**

Section 8.8 (Margin of Safety) has been revised to include a 5 percent margin of safety. See our response to comment S-1.

**Adaptive Implementation and Monitoring**

**Comment T-5: "With the identification of mercury concentrations in fish samples to be greatest in Guadalupe and Almaden reservoirs immediately downstream of the mining district, it makes sense to focus efforts on managing reservoirs to limit methylmercury production. Further, preventing soil erosion and the transport of mercury-contaminated sediment throughout the watershed is also an appropriate action towards reduction of mercury in the Guadalupe River. While the proposed actions are based upon sound scientific knowledge, I have serious doubts regarding the implementation and enforcement and ultimately, the effectiveness of the proposed actions."**

Professor Tullos' comment T-5 is quite lengthy. For clarification, we present first her introduction, followed by specific comments T-5a through T-5c. We provide responses to each of T-5a through T-5e.

**Comment T-5a: "I have concerns regarding the erosion control measures and their evaluations. How will best management practices (BMPs) be selected, funded, and implemented?"**

The Water Board will issue permits that require the implementation actions specified in the TMDL (see "Legal Authorities and Requirements" in Section 9, Implementation Plan). The parties responsible for compliance with the permits are identified in Section 9 (Implementation Plan). These parties will select, fund, and implement the BMPs for erosion control. Although the Water Board's

authority is to set standards to be attained, but not to specify manner or method of compliance, Water Board staff will review and approve the selection of BMPs prior to construction. This is specified in the August 2007 Staff Report for Peer Review and Basin Plan as follows, "The responsible parties shall develop plans and schedules to implement all reasonable and feasible actions to control erosion of mercury mining waste and seep discharges to surface waters. The feasibility study, design plans, and implementation schedules shall be submitted to the Water Board within 6 months of Water Board approval of the site investigation report."

**Comment T-5b: "Also, the proposed standard for "excessive turbidity" is not a transparent, enforceable, or accepted criterion for evaluating erosion. I suggest that substantial effort be applied to developing and committing resources to a scheduled field monitoring plan, using accepted methodology for documenting bed and bank erosion and turbidity sampling. At the author's request, I would be happy to provide some references for commonly practiced approaches."**

We concur that the effectiveness monitoring should be revised, and propose the following changes to the August 2007 Staff Report for Peer Review and basin plan amendment.

**Changes to Section 10.2 of the August 2007 Staff Report for Peer Review are the following:**

*Effectiveness of Mining Waste Erosion Control Measures*

Monitoring the effectiveness of erosion control actions is required for the mercury ~~mining waste source category. Parties~~mines and downstream depositional areas. Entities responsible for erosion control effectiveness monitoring are the ~~implementing~~responsible parties for the mercury mine sites and depositional areas~~, as follows: Myers Industries, Inc., Buckhorn, Inc., Sunoco, Inc., Newson, Inc., E.A. Viner, International, Co., Inc., County of Santa Clara, Midpeninsula Regional Open Space District, Guadalupe Rubbish and Disposal Company, Inc., and private property owners of the former Hacienda Furnace Yard site outside of the Almaden Quicksilver County Park boundary, and prior operators and current owners of the Santa Teresa, Bernal, and Hillsdale mercury mines~~.

~~These parties shall measure their compliance with the mercury mining waste allocations by evaluating the effectiveness of erosion control measures. In the first five years after construction, erosion control effectiveness shall be evaluated at least twice annually, once during a storm event, and again late in the dry season. Subsequently, erosion control effectiveness shall be evaluated at least once annually late in the dry season. The storm event monitoring should occur when the ground is saturated. Storm event monitoring shall consist of a visual inspection for excessive turbidity in downstream waters, and if found, determining whether the excessive turbidity is from the erosion control construction site.~~ Mercury mines are subject to the State of California's Industrial

Stormwater NPDES General Permit. Erosion control actions, also referred to herein as implementation measures, are called best management practices in the General Permit. This General Permit, in Section B.2.d, requires monitoring to "(m)easure the effectiveness of best management practices (BMPs) to prevent or reduce pollutants in storm water discharges…". Erosion control actions at downstream depositional areas are subject to Clean Water Act Section 401 certifications. The 401 certifications will specify monitoring and reporting requirements to demonstrate the effectiveness of erosion control measures in floodplains, creek banks, creek beds, and shallow impoundments. Monitoring requirements are specific to the location—landscape or creek.

### *Landscape Erosion Control Monitoring*

The responsible parties shall document their compliance with their respective mercury mining waste allocations by evaluating the effectiveness of erosion control measures they undertake. Erosion control effectiveness monitoring for landscape projects (i.e. projects not located within the banks of a creek or river) consists of repeated visual inspections and photographs of the construction project and adjacent landscape. Water Board-issued permits will specify standards for construction, operations and maintenance, and monitoring of erosion control projects. Within six weeks after completion of construction, the responsible party shall submit as-built plans, showing permanent photo-points. Additionally, parties will provide site maps with the photo points clearly located, and immediate post-construction photo documentation attached.

In the first five years after construction, erosion control effectiveness shall be evaluated at least twice annually: once during a storm event, and again late in the dry season. Subsequently, erosion control effectiveness shall be evaluated at least once annually late in the dry season.

Storm event monitoring shall occur when the ground is saturated. Storm event monitoring shall consist of visual inspection and photo documentation of excessive turbidity, if any, in downstream waters. If excessive turbidity is found, responsible parties shall determine whether its source is the erosion control construction site.

Dry season monitoring shall consist of a visual inspection and photo documentation of the erosion control construction site, for areas lacking vegetative cover or other evidence of soil erosion. These visual clues are most obvious late in the dry season when vegetation is dormant.

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Some erosion control projects may include excavation and disposal of mining waste, re-contouring of the landscape, and revegetation. Consequently, some of these excavations may be designed to achieve the naturally-occurring concentration of mercury in local surface soil. ~~Section 10.3 presents methods for consideration to calculate project-specific mercury mining waste clean-up goals~~Section 9.9 suggests methods for calculating goals for specific cleanup projects at mercury mine sites.

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### *Creek Erosion Control Monitoring*

Erosion control effectiveness monitoring for creek (i.e. floodplain, bank, and bed) projects consists of repeated surveys and photographs of each construction project and the adjacent landscape. The responsible parties shall measure their compliance with the mercury mining waste allocations by evaluating the effectiveness of erosion control

measures. Within six weeks after completion of construction, the party responsible for the project shall submit as-built plans including monumented cross-sections and profiles of the channel, floodplain, and terraces in the project area. Permanent photo points and survey locations shall be established and recorded on the as-built plans. Additionally, responsible parties shall submit a site map with the photo survey points clearly located, and immediate post-construction photo documentation attached.

The purpose of the monumented cross-sections, profiles, and photographs is to track changes in channel plan form, dimensions, and slope; and changes in hillslopes, landscape, and vegetation subsequent to construction of erosion controls. Profiles and cross-sections shall be surveyed at photo documentation points located not less than 10 channel widths apart on the stream channel, and at time intervals of no less than three years in order to provide a record of changes for ten years after construction.

Water Board-issued permits will specify standards for construction, operations and maintenance, and monitoring of erosion control projects. As-built plans for areas to be stabilized with re-vegetation, and projects that incorporate soil bioengineering systems, shall contain construction specifications for geotextile fabrics, soil bioengineering systems, seeding, container plants, plugs, and other re-vegetation and stabilization methods. Responsible parties shall routinely check the operations and performance of irrigation systems, if used, to assure their effectiveness.

Plants, including plants used in soil bioengineering systems, that do not survive to thrive within a three year period following planting shall be replaced. The performance goal for plants and soil bioengineering systems is eighty-five percent plant survival (percentage as compared to the as-built plans) within five years.

***Landscape and Creek Monitoring Reports***

Responsible parties shall submit annual erosion control effectiveness monitoring reports to the Executive Officer of the Water Board. These reports will describe any significant changes made to an erosion control construction site and areas both up and down hill influenced by the site. If additional measures are needed to increase landscape, floodplain, creek bank, or creek bed stability, or vegetation survival, the annual reports shall propose additional measures. Construction of the additional measures is subject to Water Board review and approval.

**The changes to the proposed Basin Plan amendment, indicated in strikeout/underline, are the following:**

**Erosion Control Effectiveness Monitoring**

Monitoring of the effectiveness of erosion control is required for mercury mining waste source categories as specified above. Erosion control effectiveness monitoring for landscape projects (i.e. projects not located in the creek or river) consists of repeated visual inspections and photographs of the construction project and adjacent landscape. Erosion control effectiveness monitoring for floodplain, creek bank, and creek bed projects consists of repeated surveys and photographs of the construction project and adjacent landscape. The surveys shall include cross-sections and profiles of the channel, floodplain, and terraces in the project area.

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> Annual erosion control effectiveness monitoring reports will be submitted to the Water Board.
>
> ~~Monitoring of the effectiveness of erosion control is required for the mercury mining waste source category (see Table 7-c). Parties responsible for erosion control effectiveness monitoring are the implementing parties for the mercury mine sites and depositional areas listed in Table 7-c (first and second rows). These parties shall measure their compliance with the mercury mining waste allocations by evaluating the effectiveness of erosion control measures. In the first 5 years after construction, erosion control effectiveness shall be evaluated at least twice annually, once during a storm event, and again late in the dry season. Subsequently, erosion control effectiveness shall be evaluated at least once annually late in the dry season. The storm event monitoring should occur when the ground is saturated. Storm event monitoring shall consist of a visual inspection for excessive turbidity in downstream waters, and if found, determining whether the excessive turbidity is from the erosion control construction site. Dry season monitoring shall consist of a visual inspection of the erosion control construction site.~~

**Comment T-5c: "The implementation plan would be stronger if it included roles and responsibilities for implementation and monitoring. Are landowners expected to voluntarily conform to the TMDL? How will the criteria be enforced? It is not clear to me who will shoulder the resource burden to implement, maintain, and evaluate the erosion control measures. Indeed, the Staff Report states that previous cleanup efforts to cover and revegetate sites showed limited success with revegetation, so I question how these issues will be better addressed under this TMDL? Without committed support to implement, maintain, and evaluate the erosion control practices and reservoir management, I question how 'increasingly effective actions can be taken'."**

> These roles and responsibilities are specified in both the August 2007 Staff Report for Peer Review (Section 9, Implementation Plan), and August 2007 Appendix D, draft proposed Basin Plan amendment (Table 7-c, Table 7-d, and Monitoring Program and Special Studies pp. BPA-14 to BPA-16).

**Comment T-5d: "Further, with methylmercury control dependent on developing new technologies, I question whether the timeline for reaching water quality objectives is attainable."**

> The timeline will be adjusted under Adaptive Implementation in Section 10 (Section 9.7 in the February 2008 version) as necessary for this and other reasons.

**Comment T-5e: "Thus, my greatest concern regarding this proposed TMDL is that the Adaptive Implementation and Monitoring plan is insufficiently developed and risks**

**a failure to meet the water quality objectives. Therefore, I recommend further development of the monitoring plan for the proposed actions following implementation and outlining a course of action to address deficiencies so that sufficient resources can be allocated to support implementation of corrective actions proposed under this TMDL."**

Comment noted.

**Closing Comments**

**In summary, taken as a whole, the scientific portion of the proposed rule is based upon sound scientific knowledge, methods, and practices. The analysis of sources, linkages, and allocations are logical and well-developed. My primary concerns are:**

- **The fish consumption rates in the reference reservoir as compared to the protection level under the proposed TMDL**
- **The lack of protocol for developing, implementing, and enforcing proposed actions under the Adaptive Implementation and Monitoring**

We note and greatly appreciate Professor Tullos' endorsement of the scientific basis of the TMDL. We have responded to her specific concerns above.

## Peer reviewer letter no. 3: Professor Michael Josselyn, PhD, PWS

**Professor Emeritus of Biological Sciences**
**San Francisco State University, San Francisco, California, October 15, 2007**

**Fish Tissue Mercury Water Quality Objectives**

**Comment J-1a: "The Board has proposed two numeric targets for fish-tissue water quality objectives: 0.05 mg methylmercury per kg fish (measured in whole fish 5-15 cm in length) and 0.1 mg methylmercury per kg fish (measured in whole fish 15-35 cm in length). … The fish in the New Almaden Mining District watersheds contain one to two orders of magnitude higher concentrations than the proposed standards whereas fish outside of these watersheds are within the same order of magnitude as the proposed standard. For that reason, it appears reasonable to expect that the proposed levels reflect concentrations similar to background conditions where Hg contamination is not present."**

Comment noted.

**Comment J-1b: "For the Clear Lake Hg TMDL, the Board staff targeted fish that would be consumed by humans ... . The most difficult component of the Clear Lake analysis is the measure of the amount of human consumption of sport fish compared to other sources of protein. Unfortunately, there are no consumption studies available that could guide the selection of a criterion for the Guadalupe River watershed."**

Comment noted.

**Comment J-1c: "The proposed wildlife TMDL targets for the Guadalupe River are within the same order of magnitude for small fish as contained in the San Francisco Bay Hg TMDL. … Therefore, I believe it appropriate to use these lower standards and not just rely on human consumption to set the standard."**

Comment noted.

**Comment J-1d: "… The USFWS developed the methodology and recommendations for safe Hg levels in fish consumed by fish eating birds; … the belted kingfisher and Forster's tern as the species to set the target Hg TMDL. I believe that this level is certainly protective of other wildlife, but question whether the assumptions used by the FWS are valid and the standard may be too low. The Board staff state that it will be reviewed and, pending further data review, could be raised to 0.1 mg/kg fish tissue."**

Comment noted.

**Comment J-1e: "I find that the analysis conducted by the Board to determine whether the proposed standard contained in the Guadalupe River TMDL is also adequate to protect human health is appropriate and the standard proposed is considerably lower than the EPA standard. …"**

Comment noted.

**Comment J-1f: "The Board's TMDL focuses on wildlife and human consumption of fish. There is only brief mention of drinking water standards. I believe that some additional clarification on why water concentration TMDLs are not being proposed (or were removed) for protecting municipal supply beneficial uses. The lack of such a discussion appears to minimize human health protections to a larger number of people who drink from this water supply."**

The drinking water standard is 2,000 ng/l (Basin Plan, Table 3-5). The highest concentration of total mercury measured in the reservoir discharges was 39 ng/l (Tetra Tech 2005, Tables 3-3 & 3-6). Mercury has high affinity for particles, which makes it relatively easy to remove before water is placed into the distribution system. Hypothetically, reservoir mercury concentrations could exceed 2,000 ng/l during storm events. However, this would correspond to periods of high turbidity, and such turbid water would not be used as a drinking water supply.

**Comment J-1g: "I suggest that it would be useful in this document to have a comparison that shows the TMDLs that have been based on fish tissue that have been determined for other freshwater systems such as Clear Lake, Minnesota lakes, and others to illustrate that the standards proposed by the Board for this area are certainly protective and reasonable. The San Francisco Bay standards should also be shown. It may be necessary in such comparisons to state what the primary sources are and the primary consumers used to set the standard to explain the differences that may be present. "**

Comment noted.

**Identification of Source Categories/Methodology of Load Estimates**

**Comment J-2a: "For this watershed, the mining waste sources are historically and presently well known and quantified. While there is some uncertainty in the measurements, the data on these sources is much more defined than often seen in similar reports on TMDLs that deal with atmospheric deposition from coal generated**

**power plant sources. The work performed by Tetra Tech appears to be well described and the use of an accepted watershed model, SWAT, is appropriate to this watershed. …"**

Comment noted.

**Comment J-2b: "The primary consideration is that sediment load to the reservoirs is significantly driven by the flow rates into those reservoirs and the data set collected by Tetra Tech was not indicative of the potential high flow events that may occur and there was limited calibration data available for the upper watershed. I find that the Monte Carlo methodology that was used in the SWAT model is innovative and necessary in the storm-driven loading conditions of this watershed. It provided for an estimate of the range of uncertainties in the flow and provided a better measure of the loading to the reservoirs, especially when the collection of data during such storm events is difficult."**

Comment noted.

**Comment J-2c: "It is not clear whether the source of Hg from streams is from sediment storage in the streams themselves or from surface erosion in the watershed during major storm events. I think additional information on stream bed concentrations would be useful (see below)."**

See responses to comments J-2e and J-4c.

**Comment J-2d: "Atmospheric deposition was estimated from various sampling locations in the South Bay which are closer to generation sources. Therefore, the estimates used here appear to be conservative. It is not clear, however, if direct loading via precipitation to the reservoirs was included in the loading determination from this source."**

For the wet season loading estimates (Section 4.1, 4.2, and 4.3), direct loading to the reservoirs from atmospheric deposition was included in <u>discharges</u> from the reservoirs, but not in loads <u>to</u> the reservoirs themselves. In Section 8.5, staff estimate that wet and dry season deposition directly to reservoir surface is a mere 0.1 kilogram per year—a very, very tiny fraction of the mercury loading in this watershed.

**Comment J-2e: "What is not clear in this analysis is the magnitude of the sources, e.g., how much Hg is potentially occurring in the watershed within the soil versus how much is within the sediments of the reservoirs. Equally important is how much Hg is**

**potentially in the more erodible portions of the creeks themselves, e.g., the immediate stream banks and sediments. I do not think that the loading estimates alone (Table 4.3) can be used to determine source magnitude in terms of what might be the most effective in terms of clean up—mine surface areas; stream banks or sediments; or reservoir sediments. I understand that this type of estimate would be an order of magnitude only; however, it could assist in providing some prioritization of actions to remove the sources through either erosion control, stream habitat restoration, or reservoir management."**

In fact, the TMDL does contain a prioritization for clean-up actions (see Section 9, Implementation Plan). Implementation of the TMDL will occur in two phases, starting at the sources in the upper watershed. The mine sites are to be cleaned-up first, within the first ten years of implementation. Also in these first ten years, methylmercury controls are to be deployed in the deep impoundments. We have rejected clean-up of the reservoir sediments, because mine clean-ups will result in clean sediments being transported to the deep impoundments. These clean sediments will bury the mercury mining wastes presently at the bottom of the deep impoundments. Cleanup of downstream creek beds, banks, and floodplains is scheduled for the second ten years of implementation. Cleanup of these downstream areas is deliberately delayed until the source areas are addressed, so that these downstream sites will be minimally inundated by erosion of upstream mining wastes.

**Linkages between Sources and the Numeric Targets/Reference Site Approach**

**Comment J-3: "The conceptual modeling approach used in this TMDL is appropriate and consistent with the scientific understanding of both biological concentration in the food webs and physical and chemical processes occurring within lakes and reservoirs. The conceptual models summarized in this report are clear and accurate in my opinion; however, I did not undertake a separate review of the Conceptual Model Report prepared by Tetra Tech. …"**

Comment noted.

**Allocations**

**Comment J-4a: "The linkages between lake sediment concentrations and fish tissue are clearly shown in the data presented and the findings are consistent with that found in other lakes with Hg contamination from land erosion processes. The discussion on this process and the accompanying figures are clear and accurate. I agree with staff's comparison of the differences between atmospheric deposition conceptual models and Guadalupe watershed situation. … The report discusses bioaccumulation factors and relies on both accepted values from the literature as well**

**as those calculated from data collected within the watershed. I find these BAF's to be within the ranges expected."**

Comment noted.

**Comment J-4b: "The use of a reference reservoir that is not subject to significant Hg input that is within the same climatic and chemical conditions as the affected reservoirs is a unique situation and offers the opportunity to examine the methylmercury processes and the relative concentrations in the water and fish. … I believe that these data provide substantial justification for the allocation to reservoirs."**

We note and greatly appreciate Professor Josselyn's endorsement of the allocation to deep impoundments.

**Comment J-4c: "I believe that the allocation to mining waste and erodible soils is not as well justified. The report needs to be clearer as to the precise sources in the watershed from which Hg is being transported to the reservoirs as it will assist in the determination of allocations and priority actions for clean up. The winter inflow partitioning of the particulate Hg is important–is it coming primarily from surface runoff from the former mines or sediment bed loads in the creeks that are being transported downstream? Should the allocation be applied creek beds so that some effort will be undertaken to clean up the creek beds themselves; both upstream and downstream of the reservoirs? Clearly, the creek beds should not be cleaned up prior to actions undertaken at the mining waste sites as they would just become contaminated again."**

We agree that the creek beds downstream of the mines should not be cleaned up prior to mine cleanup; see response to comment J-2e. On page 1-4 of the August 2007 Staff Report for Peer Review, we state that the creeks which drain the historic New Almaden Mining District (named creeks: McAbee, Golf, Greystone, Randol, and Los Capitancillos creeks, Jacques Gulch; and un-named tributaries) will be addressed as mining waste source areas in this TMDL; i.e., mining waste in these creeks will be addressed during Phase 1 of implementation. In Phase 2 of implementation, the creeks downstream of the mine areas will be addressed.

**Seasonal Variations and Critical Conditions/Margin of Safety**

**Comment J-5a: "The proposal to increase eutrophication through nutrient addition to add to the assimilative capacity of the reservoirs seems inappropriate to me. It would lead to more sustained anoxic conditions in the hypolimnion and therefore add to the**

**problem of methylization. I understand that this is merely a proposal; however, I believe it is not appropriate as a means to achieve a margin of safety."**

Section 8.8 (Margin of Safety) has been revised in response to comment S-12. To clarify comment J-5a, in Section 8.8 we did not consider nutrient addition to increase eutrophication. Rather, we considered controls which reduce nutrient releases from bottom sediments, which reduces eutrophication.

**Comment J-5b: "I believe that the optimism stated by staff for methods to treat the reservoirs is not explained in this TMDL. There is no discussion of the various techniques that might be applied; how they would be tested, and what is the effectiveness when viewed from the experience of these techniques in other lakes. In addition, what are some of the potential environmental consequences. There needs to be at least a table that provides a list of the potential actions and a comparison of their effectiveness and potential environmental impacts. Because the reservoir treatments are so critical to the success of the TMDL, I believe that further discussion of the practicality and feasibility of the potential techniques needs to be included in this section of the document."**

In response to this comment, we have added a section describing the ongoing experiments by the Santa Clara Valley Water District. Yes, we are optimistic that effective methods will be developed; and we acknowledge that they are critical to the success of this TMDL. We are unable to make the suggested comparison of effectiveness in other lakes because we are unaware of any methylation control experiments being undertaken anywhere else in the world. Lastly, the potential environmental consequences will be considered in accordance with the California Environmental Quality Act. This environmental analysis will be presented in the forthcoming Staff Report for Public Comment.

**The changes to pages 9-4 and 9-5 of the August 2007 Staff Report for Peer Review, indicated in strikeout/underline, are the following:**

*9.4 Implementation Actions to Reduce Methylmercury Production and Bioaccumulation in Reservoirs and Lakes*

…

*Technical Study Requirements*

Based on our understanding of efforts already underway at the Santa Clara Valley Water District (SCVWD) to develop technology that will reduce the rate of methylation in reservoirs, this TMDL's implementation plan requires SCVWD to conduct technical studies of hypolimnion methylmercury controls, and other reservoir management techniques that have the potential to reduce bioaccumulation of mercury. Staff of the

Santa Clara Valley Water District (Water District) described their technical studies in a 2005 Staff Report to their Board, as follows (SCVWD 2005):

> Aeration and oxygenation of reservoirs is a proven technology to reduce algae production, promote aerobic digestion of organic detritus, and improve habitat for fisheries (primarily by making more oxygen available by reducing biological oxygen demand).…The technology may also interrupt the biologically-mediated methylation of mercury, resulting in less mercury bio-concentrated in the food web.…
>
> This is the first phase of a three-phase project to evaluate the feasibility of this technology, pilot test a recommended system, and design and install systems in three District reservoirs (Almaden, Calero, and Guadalupe).…The first phase (the subject of this agenda item) will develop and implement a sampling program to characterize the water quality in the three reservoirs from March through November, develop recommendations regarding the feasibility of aeration/oxygenation to improve water quality in each reservoir, and design a recommended system for one of the reservoirs for the purpose of pilot testing.
>
> The second phase (subject to Board approval and assuming the recommendation from the first phase is positive) will be the acquisition and installation of the pilot system, operation and monitoring performance of the system in one reservoir over a period from March through November, and design of recommended systems for the remaining two reservoirs.
>
> The third phase (subject to Board approval) would be preparation of environmental documents, acquisition, installation and startup of systems in all three reservoirs, and operation and maintenance for up to two years to transition over to District staff. However, if the second phase requires environmental documentation, this will be expanded to include all three reservoirs, to save costs and time in implementing the third phase (again, subject to the findings of the first phase and Board approval).…
>
> The District's Fisheries and Aquatic Habitat Collaborative Effort (FAHCE) Settlement process, the District's Guadalupe River watershed mercury study, and ongoing algae production and taste and odor issues in drinking water treatment plant source water have provided the impetus to explore this technology as a potential means to meet multiple objectives, and the opportunity to cost share this project. Specifically, the FAHCE agreement requires the District to conduct feasibility studies of aeration on Almaden and Guadalupe reservoirs (the former to reduce methylmercury production, and the latter to improve fisheries habitat downstream). Recurring taste and odor issues due to algae production in San Luis and Calero reservoirs may be significantly increasing treatment costs and/or reducing the effective availability of supply, and aeration/oxygenation may be a cost-effective solution for this issue.…

The Water District's studies have proceeded, and expanded from one solar-powered circulator in Lake Almaden in 2006, to, in 2007, two circulators in Lake Almaden, and three circulators in each of Almaden and Guadalupe reservoirs. Recently (Fall 2007), District staff presented a paper entitiled "Reduction of methyl mercury concentrations in

an urban lake using a solar-powered circulator" at the North American Lake Management Society meeting. The abstract indicates that experiments show considerable success in reducing methylmercury concentrations (Drury 2007).

> Lake Almaden is the centerpiece of a suburban recreational park in San Jose, CA. It was created by gravel extraction operations in the 1950s and 1960s and is impacted by legacy mercury mining activities conducted nearby between 1850 through 1972. Monitoring data collected in 2005 showed a seasonal production of unfiltered methyl mercury (the form of mercury that is biologically available) strongly correlated with lake stratification and anoxia in the hypolimnion. In 2006, a solar-powered circulator was deployed in one portion of the lake just after stratification had occurred to improve the transfer of oxygen from the surface to the hypolimnion. Because of the unique bathymetry of the lake, the effects of the circulator were localized to one portion of the lake, allowing for comparisons of seasonal production of unfiltered methyl mercury both spatially and temporally.
>
> In 2006, unfiltered methyl mercury concentrations in the treated portion of the lake were reduced by over 96 percent from 2005, which is attributed to improved Oxidation Reduction Potential conditions in the water column created by the circulator. In comparison, unfiltered methyl mercury concentrations in the untreated portion of the lake were slightly higher in 2006 than in 2005. In 2007, a second circulator was deployed in the untreated area, and data from 2007 will be included in the presentation.

Unless actions are satisfactorily undertaken on a voluntary basis, the Water Board will compel technical studies of methylmercury, bioaccumulation, and effective control measures for reservoirs and lakes; and studies to evaluate whether such actions are sufficient to attain targets downstream, through Water Code § 13267 requirements. (The Water Board will consider the need to control methylmercury production and bioaccumulation in shallow impoundments in the reviews described below under "Adaptive Implementation.")

**Adaptive Implementation and Monitoring**

**Comment J-6: "I suggest adding an additional study to develop more information on wildlife bioaccumulation of Hg from fish. This was addressed early in the document, but not reiterated in this section of the report. As this is the beneficial use being protected, more information needs to be developed on this linkage. Many birds are either migratory or forage over a number of sites; so similar issues arise over consumptive patterns as with humans."**

> Staff considered expanding the special studies to incorporate this suggestion. However, from our interactions with mercury researchers, we believe that similar studies of mercury bioaccumulation and effects on wildlife are underway. Consequently, we do not propose to revise the special studies. As stated in Section 10.1 (*Adaptive Implementation*, August 2007 version), we will

"adapt the TMDL to incorporate new and relevant scientific information… [a]pproximately every five years…".

**Scientific support for proposed rule**

**Comment J-7: "I am very impressed with the thoroughness of the scientific analysis within this document; particularly the conceptual model and data analysis that was undertaken. It goes beyond that I have seen in other TMDL documents, perhaps because it is building on information generated in other reports. I believe that the background work has been substantial and, with the caveats expressed above, is supportive of the staff recommendations."**

We note and greatly appreciate Professor Josselyn's endorsement of the scientific basis of this TMDL.

# Part 4

Water Board staff have made a number of insignificant editorial changes to the proposed Basin Plan amendment and Staff Report, intended to clarify or amplify the draft documents (February 2008). These changes are shown in underline/strikeout in the "markup" versions of these two documents (Appendices D & E herein).

Selected changes are described below.

## Correction to beneficial uses of Guadalupe River, shown in Table 2-1 of the Water Quality Plan for the San Francisco Bay Basin

We have corrected an error made during the 2005 Basin Planning process, in which the reference to the Guadalupe River was replaced with a reference to the Guadalupe Reservoir in Table 2-1, *Existing and Potential Beneficial Uses of Water Bodies in the San Francisco Bay Region*. We provide the justification for this correction in Section 2.2 of the Staff Report.

*Table 2-1 is placed on the next page.*

## Clarifying change to the Project Objectives in Staff Report

We have modified the Project Objectives (Staff Report Section 2.2, Project Objectives; and Section 10.4.1, Environmental Checklist) to clarify our intent:

The proposed Basin Plan Amendment is intended to reduce existing and future mercury discharges to, and methylmercury production in, waters of the Guadalupe River watershed and San Francisco Bay. Specific objectives of the project are as follows:

- Revise mercury water quality objectives to reflect current scientific information and the latest U.S. EPA and U.S. Fish and Wildlife Service guidance
- Restore and protect beneficial uses in waters of the Guadalupe River watershed by attaining TMDL numeric targets and water quality standards while maintaining—enhancing where possible—habitat for wildlife
- Restore and protect downstream beneficial uses by reducing mercury discharges to San Francisco Bay from legacy and urban stormwater runoff sources
- Favor implementation actions with multiple benefits; phase implementation to control upstream sources before downstream sources are addressed and while methylmercury controls are being developed

**Table 2-1: Existing and Potential Beneficial Uses of Water Bodies in the San Francisco Bay Region**

| *COUNTY*<br>Waterbody | AGR | MUN | FRSH | GWR | IND | PROC | COMM | SHEL | COLD | EST | MAR | MIGR | RARE | SPWN | WARM | WILD | REC-1 | REC-2 | NAV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *SANTA CLARA COUNTY* | | | | | | | | | | | | | | | | | | | |
| … | | | | | | | | | | | | | | | | | | | |
| Guadalupe River~~reservoir~~ | | | | | | | | | E | | | P | | P | E | E | P | E | |
| … | | | | | | | | | | | | | | | | | | | |
| Guadalupe Reservoir | | E | | E | | | | | E | | | | | E | E | E | E | E | |
| … | | | | | | | | | | | | | | | | | | | |

- Implement effective source control measures for mining waste at mine sites and in downstream depositional areas
- Complete studies of methylmercury and bioaccumulation controls in reservoirs and lakes, and implement effective controls
- Achieve the legacy mercury and urban stormwater runoff mercury load allocations assigned to the Guadalupe River watershed by the San Francisco Bay mercury TMDL
- Avoid imposing regulatory requirements that are more stringent than necessary to meet numeric targets and attain water quality standards; Avoid actions that will have unreasonable costs relative to their environmental benefits
- Comply with the Clean Water Act requirements to adopt TMDLs for 303(d) listed water bodies and comply with the State Water Board's directive to integrate the Bay and Guadalupe mercury TMDLs
- Consider site-specific factors relating to mercury sources and methylmercury production, ambient conditions, watershed characteristics, and response to management actions; Avoid arbitrary decisions and speculation when computing loads, setting targets, setting allocations, determining implementation actions, and defining a margin of safety
- Establish allocations based on the goals of (a) eliminating inputs of mercury caused by anthropogenic activities, particularly mining and urban stormwater runoff, and (b) minimizing the transformation of mercury to methylmercury caused by anthropogenic activities, particularly the construction and operation of reservoirs, lakes and shallow impoundments
- Provide details of an implementation plan that includes: a description of the nature of actions necessary to meet allocations and targets and thereby achieve water quality standards; a schedule for actions to be taken; and a description of monitoring to be undertaken to determine progress toward meeting allocations, targets and water quality objectives
- ~~Complete implementation of~~Attain the TMDL targets in as short a time as ~~is~~ feasible, and no longer than 20 years
- Base decisions on readily available information on ambient conditions, loads, fish consumption patterns, and fate and effects; Establish a decision-making framework where management actions adapt to future knowledge or conditions
- Correct an error made during the 2005 Basin Planning process, in which the reference to the Guadalupe River was inadvertently removed and replaced with a reference to the Guadalupe Reservoir in Table 2-1, Existing and Potential Beneficial Uses of Water Bodies in the San Francisco Bay Region. Include the Guadalupe River's beneficial uses, as shown in the 1986 Basin Plan: Cold Freshwater Habitat (COLD), Fish Migration (MIGR) (potential), Fish Spawning (SPWN) (potential), Warm Freshwater Habitat (WARM), Wildlife Habitat (WILD), Water Contact Recreation (REC1) (potential); and Noncontact Water Recreation (REC2).

## Corrections to the Staff Report

We made the following change to Staff Report Section 8.2 (Impoundment Methylmercury Allocation).

> As described in Section ~~4 (Source Analysis)~~3.3 (Hydrology–Reservoirs), prior to the mining era there were no lakes or other large natural impoundments in the Guadalupe River watershed.

We also added this description to Staff Report Section 3.3, Hydrology–Reservoirs.

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| | |
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# APPENDIX A

*Appendix A provides responses to questions from the September 2008 public meeting on this TMDL project for residents along and nearby upper Alamitos Creek.*

## Appendix A: Responses to questions from the September 2008 public meeting regarding Alamitos Creek

This appendix contains responses to questions asked at a public meeting on September 11, 2008. Water Board staff conducted this public meeting for residents, particularly residential property owners, along and nearby upper Alamitos Creek, in response to requests made at the May hearing and in written comments. The goal of the public meeting was to explain the TMDL project to residential property owners and communicate what their roles and responsibilities will be under the TMDL.

### TMDL and Hillside residents

**Residents question no. 1: What is the physical area that Phase 2 will cover in the other parts of the Guadalupe watershed?**

Phase 2 of implementation is focused on cleanup of creeks downstream of mines, and if needed, methylmercury controls for shallow impoundments on creeks and river. See introductory paragraphs in Section 9, and *Overview of Implementation Actions* in Section 9.1 in the September 2008 Staff Report.

**Residents question no. 2: How did you determine the upland (hillside) goals for nonurban runoff in Phase 2?**

The goal for nonurban stormwater runoff is the allocation of 0.1 mg/kg. No implementation actions are required for nonurban stormwater runoff because this allocation is equal to current loads. See *Overview of Implementation Actions* in Section 9.1 in the September 2008 Staff Report.

**Residents question no. 3: Who would be responsible for hillside non-urban water runoff that flows into the creek as it is stated in Phase 2 of the TMDL Amendment?**

No responsibility for implementation actions is assigned to nonurban stormwater discharges, because no actions are required for this source (see response to Residents question no. 2).

**Residents question no. 4: Why is the Almaden community being singled out in comparison to other impacted areas, such as along Randol Creek and other areas?**

The logistics to cleanup legacy pollution are complex; we are not singling out any one individual or group. Responsibility for the stretch of Alamitos Creek between Harry Rd. and Almaden Dam is different from the other creeks that

drain New Almaden. This is because the Santa Clara Valley Water District (District) does not have easements along this stretch of Alamitos Creek. (The District has easements and extensive maintenance responsibilities including mercury cleanup and creek restoration for the stretches of creeks in engineered channels that drain New Almaden, such as Randol, Greystone, Golf, McAbee, and Alamitos creeks, and the Guadalupe River. The District carries out their maintenance responsibilities in these creeks under a multi-agency permit to the District for their "stream maintenance program".) As you know, our strategy is to rely on the District to be the technical lead for mercury cleanup and creek restoration.

**Residents question no. 5: Our expectation is that the [*District*] and other agencies will address Alamitos Creek's banks, because it receives run off from the whole watershed. Why are a few homeowners responsible for the upland drainage area?**

Similar to your expectation, our strategy to address mercury mining waste eroding from the banks and bed of Alamitos Creek is to rely on the District to be the technical lead for a mercury cleanup and creek restoration project. Our strategy requires the few creekside property owners along Alamitos Creek between Harry Road and Almaden Dam to allow the District and its partners reasonable access for the project, and to not worsen discharges of mercury mining waste.

**Residents question no. 6: Why is the New Almaden community responsible for the drainage from the Santa Clara Valley Water District upstream from us?**

The New Almaden community is not responsible for the drainage from upstream (see response to Residents question no. 5).

**Fish Attainment Targets**

**Residents question no. 7: Our New Almaden community disagrees with the certainty of the fish attainment target. It seems to be a total mercury target and we believe not well supported by findings of significant effects. Does the plan include any specific actions to validate the target or does the plan allow for reconsideration where new scientific information and findings come forward?**

The water quality objectives and targets are described in Sections 5 & 6 of the February 2008 Staff Report. They are all methylmercury concentrations in fish tissue. Special studies (see Section 9.10) will validate the assumptions used in calculating these objectives and targets. The adaptive implementation plan (see

Section 9.7) lays out the steps for reconsideration where new scientific information and findings come forward.

**Solar Bees**

**Residents question no. 8: What is a Solar Bee? How much has it reduced methylmercury in Almaden Lake and Reservoir?**

SolarBee, Inc. is the manufacturer of the water circulators the District is testing. See Section 9.4 of the Staff Report for more information, including a quote regarding 96 percent reduction in methylmercury concentrations in water in Lake Almaden.

**TMDL and Fish Mercury Levels**

**Residents question no. 9: Can a TMDL technically be stated in terms of fish total mercury concentrations rather than daily mass loading reductions to be achieved in order to reduce fish mercury levels?**

TMDLs are the amount of a pollutant that can be allowed into a waterbody while still attaining water quality standards. TMDLs are then allocated to sources, as mass loads per unit time, percent load reduction, concentration in sediment (as in this TMDL project), and in other ways. Implementation plans describe how each source will reduce its pollutant load in accordance with its allocation. Because of how TMDLs and allocations are defined, it would be difficult to state TMDLs and allocations in terms of pollutant concentrations in fish.

**Residents question no. 10: Can a TMDL allow engineering controls to reverse fish uptake as opposed to source sediment mass reduction via potentially unlimited sediment erosion controls and existing stream and bank excavation and replacement?**

TMDLs allow measures that result in attainment of water quality standards. In this TMDL project, we are counting both on methylmercury controls in reservoirs and lakes to reduce fish uptake, and counting on reduction of mercury load in accordance with the San Francisco Bay mercury TMDL. We do not plan "potentially unlimited" projects—we think we have crafted a reasonable and feasible implementation plan. See (in the September 2008 Staff Report) introductory paragraphs in Section 9, *Overview of Implementation Actions* in Section 9.1, and *Integration with San Francisco Bay Mercury TMDL (*Section 8.6 in February 2008 Staff Report).

**Residents question no. 11: [*How do TMDLs address uncontrollable sources that alone cause impairment of water quality? For example, mercury from atmospheric deposition makes fish around the Bay and worldwide unsafe.*]**

There are no specific federal or state requirements for how TMDLs are to address uncontrollable sources, including sources that alone account cause impairment of water quality. We state in Section 9.1: "This TMDL project anticipates that before the end of the implementation period, new methylmercury production controls in reservoirs and lakes will reduce methylmercury bioaccumulation both in the reservoirs and lakes, and downstream." In other words, we are hopeful that these controls will result in attaining the fish tissue targets in reservoirs and lakes, and by reducing methylmercury discharges, also result in attaining the fish tissue targets downstream.

**Species of Mercury and Standards**

**Residents question no. 12: Why doesn't the TMDL account for the fact that only some types of mercury are a problem? Shouldn't the forms of mercury with significant bioavailability be separated from forms that are much less significant?**

See response in Part 1 to "Board Member McGrath noted that total mercury is not the metric that we are going to use for all time…."

**Residents question no. 13: Most of the mercury in Quicksilver Park and in Alamitos Creek is non-reactive; what will be sampled specifically, how, where, and when, to evaluate the results from the erosion controls and waste cleanup? Why does the TMDL only base its standards on reactive mercury, when the Guadalupe Watershed has more elemental mercury and cinnabar that is in the non-reactive state and is below the EPA level?**

Regarding monitoring, the general details of required monitoring are provided in "*Effectiveness of Mining Waste Erosion Control Measures*" in Section 9.9, *Monitoring Program*. The specific monitoring details will be developed by the project applicants, and the approved versions will be incorporated into Section 401 certifications and other Water Board orders.

Regarding reactive mercury, this TMDL establishes limits for methylmercury (water quality objectives, fish tissue targets, and TMDLs and allocations for reservoirs and lakes), and limits for total mercury (TMDLs for creeks and river, and allocations to all other sources). This TMDL is focused on legacy pollution from mercury mines; mining waste is defined by CWC § 13050(q)(1) (see Section 8.1). It is unclear what EPA level the residents are referring to. This TMDL project is not based on reactive mercury.

**Residents question no. 14: Why didn't you set the [mercury mining waste allocation] 0.2 ppm methylmercury [rather than total mercury]? How this was standard derived?**

The mining waste allocation is equal to the sediment target in the San Francisco Bay mercury TMDL. Detailed explanations are provided in *Mining Waste Total Mercury Allocation* (Section 8.1), and *Integration with San Francisco Bay Mercury TMDL (*Section 8.6 in February 2008 Staff Report).

**Mercury Sediment Loads**

**Residents question no. 15: Wouldn't it be better to install [*suspended sediment*] monitoring stations similar to what was done at the Gambonini Mine and establish definitively the loads of mercury over a period of time as opposed to spot samples, and then do work to determine which discharges need controls due to higher bioavailability?**

Although we agree that an intensive monitoring program, like those employed at the Gambonini Mercury mine (on Walker Creek in the Tomales Bay watershed), and on the Guadalupe River at Highway, result in more precise mercury loads, we disagree that greater precision in loads is necessary or desirable for this TMDL Project (see response to GRDC comment no. 2). We also agree that prioritizing mercury mining waste cleanup to address the most bioavailable forms first is desirable. Nothing in the proposed Basin Plan amendment prevents this prioritization effort at mercury mines. However, our TMDL is in accordance with the definition of mining waste in California Water Code, and therefore discharges of waste—including erosion of unroasted mining wastes (including overburden)—to surface water must be cleaned up and abated.

**Collaboration**

**Residents question no. 16: What do you mean the responsible parties need to collaborate? How will that be accomplished?**

See response to residents question no. 5.

**Restoration**

**Residents question no. 17: What is involved in restoration of the creek?**

Both Table 9.4, *Suggested Implementation Actions for Alamitos Creek*, in the Staff Report, and the District's handbook referenced in question no. 18, provide

examples of what is involved in mercury cleanup, creekbank stabilization, and habitat restoration. It is too soon to be more specific.

**Project Costs**

**Residents question no. 18: I have read in the stream restoration handbook passed out by the Santa Clara Valley Water District and in the Appendix it details what the average property owner along the creek might have to pay to clean up for the watershed as a whole. These costs looked pretty outrageous, is this true?**

Our strategy to address mercury mining waste eroding from the banks and bed of Alamitos Creek requires the few creekside property owners along Alamitos Creek between Harry Road and Almaden Dam to allow the District and its partners reasonable access for the project, and to not worsen discharges of mercury mining waste. If our strategy is successful, the project will proceed solely with public funding—we have no plans to require downstream property owners to pay for the project. (See response to Residents question no. 5.)

**Attainment or Closure**

**Residents question no. 19: What happens if the work doesn't meet the goals, especially after the three five-year evaluation periods?**

We are relying on our adaptive implementation plan, described in Section 9.7 of the Staff Report, to ensure that fish targets (goals) are attained in 20 years. We are not sure that after three five-year evaluation periods that the targets will be attained in waters downstream of reservoirs. Therefore, we included special study question 3b, to help identify additional actions to be taken in the fourth five-year period, if necessary.

**Independent Review**

**Residents question no. 20: Has an independent scientific body reviewed this Basin Plan to the TMDL? May we read those reviews from that independent body? Has this independent scientific body reviewed the .01 sediment levels?**

Information related to peer review is provided in Section 10.2 of the Staff Report, and the peer reviewer comments (and our responses and changes) are provided herein in Part 3. Yes, they reviewed the allocations based on 0.1 mg mercury per kg bottom sediments in the reference reservoir.

**Property Access Agreement**

**Residents question no. 21: Can you be more specific on what you actually want homeowners to do? It is not clear to us.**

As described in response to residents question no. 5, our strategy requires the creekside property owners along Alamitos Creek between Harry Road and Almaden Dam to allow the District and its partners reasonable access for the project, and to not worsen discharges of mercury mining waste from their property. We clarified these requirements in the proposed Basin Plan amendment and Staff Report. Please refer to the *Implementation Actions for Depositional Areas* in each of these September 2008 documents.

**Funding Sources**

**Residents question no. 22: When it comes to the enormous cost of the TMDL mandates, what grants will be available for our communities? Will this be a collaboration of all responsible parties to obtain? How could these grants be obtained?**

The State Water Resources Control Board funds cleanup projects through the Cleanup and Abatement Account, and funds TMDL implementation projects with federal Clean Water Act § 319(h) and state bond measure funds. Our strategy to address mercury mining waste discharges in Alamitos Creek relies on public agencies to seek these and other funds.

**Hot Spots**

**Residents question no. 23: Is it true that once your department identifies a hot spot this can eliminate any grants or funding from agencies to help pay for the cost of the cleanup for the responsible party?**

Commonly, grants are not awarded in cases where there is a responsible party under order to conduct pollutant cleanup. In particular, although funds from the Cleanup and Abatement Account (see response to residents question no. 15) may be obtained and used for cleanup, they are contingent upon repayment by responsible parties. Of course, with legacy pollution sources such as at New Almaden, it may be impossible to find or recover monies from responsible parties.

The California legislature has already placed some Good Samaritan language in the California Water Code, which we reference in the proposed Basin Plan amendment, as follows:

> Water Code Chapter 5.7 contains a program for public agencies and cooperating private parties, who are not otherwise legally responsible for

abandoned mine lands, to reduce the threat to water quality caused by these lands without becoming responsible for completely remediating mining waste from abandoned mines. The Water Board encourages these parties to participate in the program.

The Senate has considered, but not yet passed, Good Samaritan mining legislation to encourage interested third parties, including community groups and mining companies not associated with the original pollution, to undertake cleanup efforts without assuming legal liability for the pollution.

**Closing Comment**

**Our historic New Almaden community residents will not be able to live in the village due to the [*requirements*] of the TMDL[*; it*] is infringing economically on the New Almaden community.**

As described in responses to residents questions nos. 5 & 18, if our strategy for Alamitos Creek is successful, the project will proceed solely with public funding—we have no plans to require downstream property owners to pay for the project.

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# APPENDIX B

*Appendix B provides an example of a technical report requirement letter that staff intends to issue pursuant to the TMDL Implementation Plan and California Water Code § 13267. It will be issued by June 30, 2009, and the subsequent § 13304 orders will be issued by December 31, 2010, to persons who have discharged or are suspected of having discharged mercury mining wastes, such as the following:*

> *Previous owners and operators of mercury mines in the New Almaden Mining District, including but not limited to: Myers Industries, Inc., Buckhorn, Inc., Sunoco, Inc., Newson, Inc., and E.A. Viner, International, Co., Inc.;*
>
> *Previous owners and operators of Guadalupe, Santa Teresa, and Bernal mercury mines;*
>
> *Current property owners in the New Almaden Mining District: County of Santa Clara, Midpeninsula Regional Open Space District, and owners of the former Hacienda Furnace Yard site outside of the Almaden Quicksilver County Park boundary;*
>
> *Current property owner of Guadalupe mercury mine: Guadalupe Rubbish and Disposal Company, Inc.;*
>
> *Current property owners of Santa Teresa mercury mine: (private party); and*
>
> *Current property owner of Bernal mercury mine: County of Santa Clara*

## Appendix B: Example 13267 Technical Report Requirement for Mercury Mines

This letter requires that you submit a report on the erosion potential of mercury mining wastes to surface waters in the Guadalupe River watershed from mercury mine and processing areas. As explained below, this information will help Board staff to obtain information necessary to cause cleanup and containment of mercury mining waste.

Many waters in the Guadalupe River watershed are polluted and/or impaired by mercury. This is described in detail in the supporting Staff Report for the Guadalupe River watershed mercury TMDL project. TMDL project documents are available at: http://www.waterboards.ca.gov/sanfranciscobay/tmdlmain.shtml. This technical report requirement is in accordance with the Implementation Plan of the Guadalupe River watershed mercury TMDL project.

Goals for the first phase of implementation of this TMDL project include implementing effective source control measures for mercury mining waste at mine sites including ore processing areas. (Section 8 of the Staff Report provides a definition of mercury mining waste.) This technical report requirement is necessary to identify the locations of mercury mining waste that is eroding, or potentially eroding, into surface waters. Also as described in the TMDL project document, your organization is receiving this letter because it has discharged, discharges, or is suspected of discharged or discharging mercury mining waste into surface waters of the Guadalupe River watershed. Information supporting your status as an actual or suspected discharger is available in the supporting Staff Report for this TMDL project, available as described above.

**You are required to submit a report containing the following information by December 31, 2010:**

1. Describe and map in detail, for the parcels of land you own, owned, or on which you operated mercury mines and/or ore processing facilities the:
    a. Geology, including soil types, locations of seeps, and landslides
    b. Historic locations of mining and/or ore processing
    c. Current locations of mining wastes and locations of seeps

2. Describe and map in detail results of an investigation of the potential for mercury mining wastes to erode (from stormwater, discharge from seeps, or landslides) into surface waters (for the parcels specified in 1). Describe and map in detail the current locations of mining wastes, seeps, and landslides and the potential for mining wastes to erode into surface waters.

3. Also describe in general terms, based on observations made during the investigation, the appropriate controls necessary to contain the mining wastes that erode, or may potentially erode, into surface waters for the parcels specified in 1. Examples of general terms include: landslide will require geotechnical investigation, large slump will require extensive grading, or minor surface grading and revegetation needed.

There are many available sources of information. A recent geologic map is: USGS Miscellaneous Field Studies Map MF-2373, 20011. Historic records may be helpful to locate historic mining and/or or processing areas on the parcels. For example, the U.S. Geological Survey, in their Professional Paper 3602, identified over 100 mercury mining waste dumps (Plates 1, 3, & 14) circa 1947. Mining company records may provide additional information, many of which reportedly are available at Stanford University.

This requirement for a report is made pursuant to California Water Code § 13267, which allows the Board to require technical or monitoring program reports from any person who has discharged, discharges, proposes to discharge, or is suspected of discharging waste that could affect water quality. The attachment provides additional information about § 13267 requirements. Any extension in the above deadline must be confirmed in writing by Board staff.

Failure to comply with this letter may subject you to civil liability in an amount no to exceed $1,000 for each day of violation. Falsifying any information in the required report may subject you to misdemeanor charges and civil liability not to exceed $25,000 for each day of violation.

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[1] McLaughlin et al. 2001. *Geologic Maps and Structure Sections of the Southwestern Santa Clara Valley and Southern Santa Cruz Mountains, Santa Clara and Santa Cruz Counties, California*. USGS Miscellaneous Field Studies Map MF-2373. McLaughlin RJ, Clark JC, Brabb EE, Helley EJ, and Colon CJ.
[2] Bailey, Edgar H. and Donald L. Everhart (Bailey & Everhart) 1964. *Geology and Quicksilver Deposits of the New Almaden District, Santa Clara County, California*. U.S. Geological Survey Professional Paper 360

# Fact Sheet – Requirements for Submitting Technical Reports
## Under Section 13267 of the California Water Code

**What does it mean when the Regional Water Board requires a technical report?**
Section 13267[1] of the California Water Code provides that "…the regional board may require that any person who has discharged, discharges, or who is suspected of having discharged or discharging, or who proposes to discharge waste...that could affect the quality of waters...shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires."

This requirement for a technical report seems to mean that I am guilty of something, or at least responsible for cleaning something up. What if that is not so?

The requirement for a technical report is a tool the Regional Water Board uses to investigate water quality issues or problems. The information provided can be used by the Regional Water Board to clarify whether a given party has responsibility.

Are there limits to what the Regional Water Board can ask for?

Yes. The information required must relate to an actual or suspected or proposed discharge of waste (including discharges of waste where the initial discharge occurred many years ago), and the burden of compliance must bear a reasonable relationship to the need for the report and the benefits obtained. The Regional Water Board is required to explain the reasons for its request.

What if I can provide the information, but not by the date specified?

A time extension may be given for good cause. Your request should be promptly submitted in writing, giving reasons.

**Are there penalties if I don't comply?**
Depending on the situation, the Regional Water Board can impose a fine of up to $5,000 per day, and a court can impose fines of up to $25,000 per day as well as criminal penalties. A person who submits false information or fails to comply with a requirement to submit a technical report may be found guilty of a misdemeanor. For some reports, submission of false information may be a felony.

**Do I have to use a consultant or attorney to comply?**
There is no legal requirement for this, but as a practical matter, in most cases the specialized nature of the information required makes use of a consultant and/or attorney advisable.

What if I disagree with the 13267 requirements and the Regional Water Board staff will not change the requirement and/or date to comply?

You may ask that the Regional Water Board reconsider the requirement, and/or submit a petition to the State Water Resources Control Board. See California Water Code sections 13320 and 13321 for details. A request for reconsideration to the Regional Water Board does not affect the 30-day deadline within which to file a petition to the State Water Resources Control Board.

**If I have more questions, whom do I ask?**
Requirements for technical reports include the name, telephone number, and email address of the Regional Water Board staff contact.

***Revised January 2008***

[1] All code sections referenced herein can be found by going to www.leginfo.ca.gov.

# APPENDIX C

*Appendix C provides an example of a Technical Report requirement for coordinated watershed monitoring. This 1992 letter was an important step in establishing the Regional Monitoring Program for San Francisco Bay, and was in accordance with CWC § 13267. Water Board staff may issue a similar requirement for coordinated watershed monitoring for mercury in the Guadalupe River watershed, as necessary.*

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STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
2101 WEBSTER STREET, SUITE 500
OAKLAND, CA 94612
(510) 464-1255

12 June 1992

TO: Attached Mailing List

SUBJECT: Implementation of a Regional Monitoring Program for the San Francisco Estuary.

On April 15, 1992, the San Francisco Bay Regional Board adopted Resolution 92-043 directing the Executive Officer to implement the Regional Monitoring Plan for San Francisco Bay. The Regional Monitoring Plan is designed to collect information on the concentrations of pollutants in water, sediment and biota from throughout the estuary. The RMP will allow the Regional Board to evaluate the effectiveness of its water quality control program.

This letter is a formal request under Section 13267 of the California Water Code that your agency participate in the implementation of the baseline portion of the RMP. It is imperative that the implementation be as a collective rather than individual monitoring. A reply by July 7, 1992 on your intention to implement the RMP is requested. Failure to comply could result in an enforcement action under Section 13268 of the California Water Code. I intend to inform the Regional Board at the July 15, 1992 monthly meeting on the progress of implementing the RMP.

There are several operating principles I will be following in implementing the RMP. First, portions of the RMP will be phased in over time and thus costs may increased in future years. Second, there will be linkage to existing or proposed programs by other agencies to eliminate duplication and thereby keep costs reasonable. Third, the RMP in future years will be examining cause and effect relationship which dictates that a certain portion of future efforts be categorized as research. Finally, the program must be accountable and credible to the regulatory agencies, sponsoring agencies and the public. Therefore, we will continue to provide a strong leadership and technical role in the implementation of the RMP.

In addition, Resolution 92-043 provides that certain routine monitoring of effluents and ambient waters contained in NPDES permits could be reduced or suspended. Examples of effluent monitoring reductions are daily BOD or total suspended solids,

ammonia, and oil/grease. Examples of ambient monitoring parameters that could be suspended are dissolved oxygen, ammonia, pH, conductivity (or salinity), temperature, and coliforms. All reductions or suspensions will be considered on a case-by case basis. There will be no reduction or suspension in toxicity monitoring. There will be consideration in reducing the frequency of toxic pollutant monitoring based on past monitoring results. Proposals for reductions or suspensions should be made directly to your contact in the Surface Water Management Division subsequent to the July 7 response deadline.

Regional Board staff and I have had numerous meetings with 28 dischargers (13 POTWs, 12 Industrial, Santa Clara and Alameda urban runoff programs, and the U.S. Army Corps of Engineers) regarding this action. I believe that all POTWs should be included at this time, at least at a minimal level. Exact cost participation will be decided soon for the 1992-1993 fiscal year. In the 1993-1994 fiscal year, additional urban runoff and small industrial dischargers will be included.

If you have any questions regarding this request please contact me at (510)464-0516 or Michael P. Carlin at (510)464-1325 of my staff.

Sincerely,

STEVEN R. RITCHIE
Executive Officer

Attachments: Resolution 92-043
Mailing List

# CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
# SAN FRANCISCO BAY REGION

## RESOLUTION NO. 92-043

## IMPLEMENTATION OF THE REGIONAL MONITORING PLAN WITHIN THE SAN FRANCISCO BAY REGION

I. WHEREAS, the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Board) has adopted a Water Quality Control Plan, San Francisco Bay Basin (Basin Plan) which recognizes the need for cost-effective, coordinated regional monitoring and surveillance to evaluate the effectiveness of it's water quality control program; and

II. WHEREAS, the State Water Resources Control Board has adopted the Pollutant Policy Document which stated the need for a multi-media regional monitoring program to assess pollutant trends in the Bay-Delta; and

III. WHEREAS, the Regional Board since 1989 has implemented regional monitoring pilot studies through funds from the Bay Protection and Toxic Cleanup Program, Basin Planning Program, and grants from the U.S. Environmental Protection Agency; and

IV. WHEREAS, the results of the Regional Board's pilot studies have demonstrated the ability to conduct cost-effective regional monitoring that addresses water quality management objectives; and

V. WHEREAS, the Regional Board under the Bay Protection and Toxic Cleanup Program has developed a Regional Monitoring Plan (Attachment A) that covers the entire estuarine system and is designed to evaluate it's water quality control program through the collection of information on the concentrations of pollutants in water, sediment and biota; and

VI. WHEREAS, the San Francisco Estuary Project (SFEP), a State/Federal cooperative endeavor, is currently developing a comprehensive monitoring strategy and conducted a Regional Monitoring Workshop to begin identifying long-term program elements of the strategy including institutional arrangements and research needs; and

VII. WHEREAS, the participants of SFEP's Regional Monitoring Workshop generated a set of principles to guide the advancement of the monitoring strategy; and

VIII. WHEREAS, SFEP has requested that the Aquatic Habitat Institute Board of Directors recommend alternative institutional arrangements for conducting comprehensive regional monitoring and research within the Estuary; and

IX. WHEREAS, the Regional Board will suspend selected current monitoring requirements for permitted dischargers in order for dischargers to redistribute resources to implement baseline portions of the Regional Monitoring Plan; and

X. WHEREAS, the Regional Board recognizes that dischargers will need to expend additional resources in order to fully implement the Regional Monitoring Plan; and

XI. WHEREAS, the Regional Board will be taking a phased approach to implementing the RMP to insure the effective management of the RMP;and

XII. WHEREAS, this action is categorically exempt from the provisions of the California Environmental Quality Act, pursuant to Section 15306, Title 14, California Code of Regulations, in that it involves basic data collection, research, management and resource evaluation activities which will not result in a serious or major disturbance to the environment.

THEREFORE BE IT RESOLVED that the Regional Board endorses in concept the development and implementation of a Regional Monitoring Program for San Francisco Bay and directs the Executive Officer to implement the Regional Monitoring Plan (Attachment A) pursuant to California Water Code Sections 13267 and 13383 (authority) and 13268 and 13385 (penalty provisions).

BE IT FURTHER RESOLVED, that the Executive Officer will select dischargers to participate in the program based on the following criteria: discharger classification, representation of a high percentage of the permitted discharge flow to the Estuary and geographical distribution; and

BE IT FURTHER RESOLVED, that the Regional Board's Executive Officer shall work with the selected dischargers to prepare an implementation plan for the RMP including a schedule for execution and submittal of progress reports and an annual report. The Executive Officer shall report to the Regional Board no later than July 15, 1992 on the status of implementation of the RMP including cost-sharing and institutional arrangements; and

BE IT FURTHER RESOLVED, that the Regional Board, as part of SFEP, will continue to assist in the development of the regional monitoring strategy and will offer for consideration inclusion of this Regional Monitoring Plan into the SFEP strategy; and

BE IT FURTHER RESOLVED, that the Regional Board no later than July 1, 1993 will notify additional selected permitted dischargers to require their participation in the implementing the Regional Monitoring Plan and expanding the Regional Monitoring Plan as necessary; and

BE IT FURTHER RESOLVED, that the Regional Board will include the requirement of participation in implementing the Regional Monitoring Plan into the selected dischargers' permits at the time of reissuance and issuance.

I, Steven R. Ritchie, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of a Resolution adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on April 15, 1992.

Steven R. Ritchie
Executive Officer

File No. 1550.00
(mpc/monitor.res)

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