Draft Project Plan to Develop and Implement the Guadalupe River Watershed Mercury TMDL Project

Prepared by the California Regional Water Quality Control Board
San Francisco Bay Region

Version 3.0: June 30, 2004

TABLE OF CONTENTS

TABLES

ATTACHMENTS

Background

Purpose and Contents

This report describes the California Regional Water Quality Control Board, San Francisco Bay Region's (Water Board's) plan for completing a mercury TMDL for the Guadalupe River Watershed. The report describes stakeholder and public participation, and previous, on-going and planned work associated with major elements of this TMDL project. Projected resource needs and a schedule of milestones and deliverables are also presented.

Mercury in the Guadalupe River Watershed

The New Almaden Mining District, the largest-producing mercury mine in North America, is located in the headwaters of the Guadalupe River. A number of waterbodies in the Guadalupe River watershed are listed as impaired due to mercury, primarily due to high mercury concentrations in fish. The Water Board is undertaking a single Total Maximum Daily Load (TMDL) project that concurrently considers all mercury sources in the watershed

Watershed Segments

The Guadalupe River Watershed is divided into four main segments:

1 Upper Watershed Creeks
   - 1A) Runoff to Reservoirs in the Mining District - upper watershed creeks in the Mining District which discharge into Almaden and Guadalupe Reservoirs
   - 1B) Runoff to Creeks Below Reservoirs - upper watershed creeks in the Mining District which discharge into Alamitos and Guadalupe Creeks
   - 1C) Runoff to Reservoirs outside the Mining District - upper watershed creeks which discharge into Calero and Lexington Reservoirs, and Lake Elsman

2 Impoundments
   - 2A) Mining District Reservoirs, Lakes and Percolation Ponds - Almaden, Calero and Guadalupe Reservoirs, Lake Almaden, and Guadalupe Percolation Ponds
   - 2B) Other Subwatershed Reservoirs, Lakes and Percolation Ponds – Lexington Reservoir, Elsman and Vasona Lakes, and Los Gatos Percolation Ponds

3 Creeks Below Reservoirs
   - 3A) Creeks Below Reservoirs affected by mining - Alamitos, Arroyo Calero and Guadalupe Creeks
   - 3B) Creeks in Subwatersheds outside the Mining District – Ross, Canoas and Los Gatos Creeks

4 Guadalupe River

Public Participation

This was originally conceived as a stakeholder-driven TMDL project which has been underway since 1999. The Santa Clara Basin Watershed Management Initiative (WMI) convened the Guadalupe Mercury TMDL Work Group, which is co-chaired by staff from the Santa Clara Valley Water District (District) and the Water Board. The District has provided significant funding for consultant services to develop a Conceptual Model and

conduct arguably the most comprehensive watershed-wide mercury mining-related source assessment in the U.S. The Conceptual Model and Data Collection effort are the joint fact-finding phase.

At the conclusion of this joint fact-finding phase, the District is unwilling to continue sole financial support of the stakeholder activities. Due to the poor financial status of the California economy in 2004, no other significant financial resources are available. Therefore, public participation will be scaled back considerably, and the Water Board will take the lead on completing this TMDL based on the results of the joint-fact finding work.

Resources

The Water Board remains hopeful that stakeholders other than the District, USEPA and the Water Board will contribute funding for technical assistance on the *Final Conceptual Model*, sampling and analysis for critical data gaps, and the Implementation and Monitoring Plans. Additional funding for technical consultants would enhance the development of the Implementation and Monitoring Plans, and allow for continued technical review and greater public involvement.

The District has made a sizeable contribution ($900,000) for joint fact-finding activities, for which TetraTech is the technical consultant, plus District staff time and resources to co-chair the work group and oversee the consultant. The U.S. EPA is funding extensive fish sampling in reservoirs, and the State Water Board is funding numeric fish targets.

The Project Plan outlined below will require more than the balance of the funds in the District contract with TetraTech. Therefore, the Water Board has submitted a request for USEPA 106 TMDL contract funds. Coincidentally, TetraTech is the contractor for these contract funds which will provide continuity in expertise.

Water Board staff has been allocated at 0.25 personnel years (PYs) through June 2004 for project management and stakeholder facilitation. By January 2005, Water Board staff needs will increase to 0.5 PY for project management, and additional staff time to develop TMDL Elements in Phase 4, and the staff report and basin plan amendment and subsequent responses to comments and board packages.

Activities Through June 04

The subject of this Project Plan are activities from July 2004 through TMDL adoption. Many joint fact-finding activities have been undertaken previous to July 2004 which are described in Attachment 1.

Phase 3 – Data Collection and Analyses

The main reports in Phase 3 are the *Data Collection Report* and *Final Conceptual Model*. The *Draft Data Collection Report* is due June 2004, with an *Addendum* due October 2004; and the *Draft Final Conceptual Model* is due June 2004, with the *Final Conceptual Model* due December 2004.

Source Analysis

It was apparent from the outset of this project that existing mercury data and a conceptual model framework for mercury in the Watershed were inadequate to support a detailed

source assessment and load estimates. Therefore, data collection and conceptual model development have been a large portion of the TMDL development to date.

The Synoptic Survey and Data Collection are singular mercury source assessment efforts, and are arguably the most comprehensive watershed-wide mining-related source assessments in the U.S. They are briefly described in Attachment 1.

Concurrently, the San Francisco Estuary Institute (SFEI) has undertaken a study of stormwater loads in the Guadalupe River at Highway 101 (referred to herein as the SFEI Guadalupe load study; *Concentrations and Loads of PCBs, OC Pesticides, and Mercury Associated with Suspended Particles in the Lower Guadalupe River, San Jose, California*, Draft Report January 2004).

Source analysis will address nonpoint and background sources; there are no known mercury point sources (i.e. NPDES point source permits) in the Watershed.

Data Collection

The three main goals for data collection effort are: 1) quantify mercury sources and loading; 2) develop additional information on the processes that control mercury fate, transport and bioavailability; and 3) provide linkage between mercury loads and water body impairment (see Section 1.1 of *Data Collection Plan*, February 20, 2004). The sampling plan includes wet season water and sediment samples, fish samples from creeks and the River, and dry season reservoir methylmercury samples. The U.S. EPA is funding extensive fish sampling in reservoirs.

Reporting will be completed in two steps, a *Draft Data Collection Report* of mercury sources, loading, transport and bioavailability in June 2004, and an *Addendum* in October 2004 of fish and methylmercury production (i.e. linkage between mercury loads and water body impairment).

Conceptual Model

A *Draft Final Conceptual Model Report* describing biogeochemical processes controlling mercury fate and transport in the watershed will be completed in June 2004. This report is based on literature reviews and water quality data collected during the dry season (*Synoptic Survey* see Attachment 1).

In order to produce a comprehensive TMDL, the *Draft Conceptual Model Report* will need to be revised to reflect findings pertaining to wet season fate and transport processes, and to evaluate 5-year load averages as indicated in the San Francisco Bay Mercury TMDL Implementation Plan (April 2004). The *Data Collection Report* is anticipated to indicate the need for the following revisions to the conceptual model:

- Section 4 (transport, transformation, biological uptake, and distinguishing characteristics of each watershed segment),
- Section 5 (source and loading estimates), and
- Data Gaps.

The District funded the data collection effort and the drafting of the *Conceptual Model Report*. This sizeable contract ($900,000) to TetraTech did not include funds to support revising the *Draft Final Conceptual Model Report* to include an analysis of the *Data Collection Report* findings. Note that the *Final Conceptual Model Report* scope presented

above includes the Source Analysis, Seasonal Variations and Critical Conditions, and some Linkage TMDL elements, but does not include several other TMDL elements described in Task 11 of the District's contract to TetraTech (Assimilative Capacity, alternative Load and Wasteload Allocations, potential Numeric Targets, Uncertainty, and Margin of Safety).

The District is willing to contribute the remaining funds (approximately $15,000) in TetraTech's contract towards producing a comprehensive *Final Conceptual Model Report*. The preliminary cost estimate to revise and finalize this report is $30,000 to $50,000. Costs for additional data collection to fill data gaps are not included in this estimate. The Water Board is requesting EPA to fund TetraTech to complete this task using available 106 funds.

Implementation Options

While working on the *Data Collection Report* and *Final Conceptual Model*, because of their familiarity with the Watershed, TetraTech will identify implementation options. The Water Board is requesting EPA to fund TetraTech to complete this task using available 106 funds. If funded, these ideas will be captured in a technical memorandum. A preliminary example is the surprisingly large number of structures in creeks and the River which act as drop structures and accumulate sediment. These are likely zones of high methylation, consequently TetraTech has identified an implementation option to clean out the accumulated sediment each year. This would reduce both loads of mercury, and if the timing were optimum, reductions in seasonal methylmercury production.

Database

The District's contract with TetraTech includes developing a database of mercury sources, water quality data, watershed characteristics and biological receptors. To the extent possible, the data will be functional in Geographic Information System software.

Technical Review and Administrative Record

The District's contract with TetraTech includes convening a Technical Review Committee to review the *Final Draft Data Collection Report* and *Final Draft Conceptual Model*, respond to comments, and develop written summaries of TRC Comments for the Administrative Record.

Phase 4 – Preliminary Project Report

The main report in Phase 4 is the Final Preliminary Project Report which addresses each of the TMDL elements discussed below including the Implementation Plan. The language and style of this report will be similar to the San Francisco Bay Mercury TMDL Project Report which is written for a lay audience.

Developing a mercury TMDL for the Guadalupe River watershed will require extensive technical analysis. The Water Board has limited staff time and lacks the contract resources necessary to do this project justice. TetraTech staff who have been involved in the project via funding by the District have expertise in mercury fate and transport processes and statistics. This expertise is needed to support data analysis, especially related to mercury methylation and bioaccumulation. In addition, TetraTech staff have visited hundreds of sites in the watershed, and designed and conducted both wet and dry

season water quality sampling. Their expertise and familiarity with the watershed is integral to development of the TMDL Project Report. Specific tasks that TetraTech could do that would facilitate the development of this TMDL include:

- Prepare Source Analysis section
- Evaluate Potential Targets
- Conduct Linkage Analysis – Link Sources to Target(s)
    - Aqueous MeHg ←→ Fish Hg – sophisticated statistical analysis
    - Sources inorganic particulate Hg ←→ Aqueous MeHg – sophisticated statistical analysis requiring extensive familiarity with the watershed and sample locations
    - Evaluate methods to determine the Assimilative Capacity
- Evaluate Seasonal Variations and Critical Conditions

The Water Board is requesting EPA to fund TetraTech to conduct these tasks using available 106 funds.

Problem Statement

Water Board staff will write this TMDL Element.

Step 1. Write-Up Text and Finalize Graphics

Except for the 2004 fish data and fish numeric target(s), there is sufficient data available in existing reports to complete the Problem Statement in July 2004. Existing data sources include the Toxic Substances Monitoring Program, Almaden Quicksilver County Park investigations and stormwater sampling program, SFEI Guadalupe load study, and the *Synoptic Survey Report*. Forthcoming reports include *Data Collection Report* (June 2004) and *Addendum* (October 2004). The *Addendum* will include the 2004 fish data.

Content

Similar to the San Francisco Bay Mercury TMDL, we anticipate approximately three pages of text plus appropriate supporting graphics. Also similarly to the Bay TMDL, it will discuss three lines of evidence: 1) fish consumption and human health, 2) wildlife and rare and endangered species, and 3) compliance with Water Quality Objectives. There will be a one- to two-sentence comparison to mercury and gold mine impacts to Delta tributaries (i.e. no acid mine drainage, compare average fish tissue concentrations in similar watershed segments).

1) & 2) The Problem Statement will open with a brief description of the Santa Clara County fish consumption advisory for mercury contamination, and discussion of the findings from fish sampling in 2003 and 2004. A supporting graphic will illustrate mercury levels in fish tissue samples from 2003 (available) and 2004 (*Addendum, Data Collection Report*, due October 2004) compared to the USEPA level of 0.3 ppm for human consumption and to the watershed-specific fish numeric target(s) (to be developed). Results from previous fish sampling efforts may be shown in grey on the same graphic to enable readers to evaluate time trends.

3) Narrative discussion and graphical illustration that water samples from throughout the watershed exceed the California Toxics Rule criterion of 50 ng/l, and even dry season grab samples exceed the Basin Plan Water Quality Objective (WQO) of 25 ng/l over a 4-day average. Utilize data from the SFEI Guadalupe load study, and TetraTech *Synoptic*

Survey, and *Data Collection Report*. We will consider grab samples to be representative of 4-day averages in the dry season but not in the wet season. Narrative discussion and graphical illustration that water samples have at times exceeded the WQOs for drinking water and the 1-hour limit for freshwater, 2,000 and 2,400 ng/l respectively. Utilize data from the SFEI Guadalupe load study and Almaden Quicksilver County Park stormwater sampling program.

Source Analysis

TetraTech will write this TMDL Element under contract to the Water Board.

Step 1. Review Long Term Annual Average Mercury Load Estimates

Review SFEI Guadalupe load study report and other relevant literature which discusses the highly episodic nature of wet season loadings and inter-annual variability. Evaluate whether a 5-year averaging cycle is appropriate for this watershed as indicated in the San Francisco Bay Mercury TMDL Implementation Plan. If not, revise the long term average load calculations from the *Final Conceptual Model* (due December 2004). Discuss how the averaging periods were selected and implications for developing an appropriate TMDL Monitoring Plan.

Step 2. Develop Outline and Draft Tables and Graphics

Develop an outline for this section of the Preliminary TMDL Project Report to the subheading level of detail including draft tables and graphics. Provide several paragraphs of text for review and comment on style. Upon Water Board staff review and approval, proceed to Step 3.

Step 3. Write-Up Text and Finalize Graphics

TetraTech will produce a draft for Water Board staff review and approval, and a final version which responds to Water Board staff comments.

Content

The content of this TMDL Element will be based on the corresponding sections of the *Final Conceptual Model Report*:

- Watershed description and system characteristics
- Background, reference and pre-mining conditions, and comparisons to other mercury and gold mines in California
- Mercury transport processes
- Mercury transformation and bioaccumulation
- Sources, losses, timing and loads of mercury in each watershed segment.

Fish Numeric Target(s)

The U.S. Fish and Wildlife Service (FWS) will develop fish numeric targets to be presented in a technical memorandum. Water Board staff will write this TMDL Element.

This complex watershed and pollutant will likely require multiple targets which will require considerable technical analysis. Fish tissue target(s) will be useful to evaluate protection of wildlife, but we propose to rely on the USEPA criterion for human consumption.

Actual human consumption patterns of fish from the watershed are unknown largely because waterbodies in and downstream of the New Almaden Mining District and Calero

Reservoir have been posted since 1987 with signs "warning – mercury contaminated fish – do not eat the fish". Reportedly, there is significant human consumption from Calero Reservoir, and also Guadalupe Reservoir. Nonetheless, the lack of consumption data makes it difficult to calculate a watershed-specific fish target for human consumption. Therefore, we propose to rely on the USEPA criterion of 0.3 ppm methylmercury and not develop a separate human consumption fish numeric target for this TMDL.

Step 1. Develop Fish Tissue Targets Protective of Wildlife

The USFWS is currently contracted by the State Board to develop watershed-specific mercury fish tissue targets that are protective of wildlife. This work will address different consumption habits between species, bioaccumulation between trophic levels, size of predator and prey, and seasonal variations in consumption. The USFWS wildlife target report is due December 2004.

Step 2. Write-Up Text and Finalize Graphics

Water Board staff will write this section of the Preliminary TMDL Project Report.

Content

The content of this TMDL Element will be based on the USFWS technical memorandum.

Sediment and Other Numeric Targets

TetraTech will write this TMDL Element under contract to the Water Board.

Step 1. Develop Suspended Sediment Targets

Suspended sediment mercury concentration or mass target(s) may be useful to evaluate attainment of the Watershed mercury load assigned by the San Francisco Bay Mercury TMDL. It may not be practicable nor reflective of geologic conditions to apply the same suspended sediment concentration targets throughout the Watershed. The *Data Collection Report* (due June 2004) will provide watershed-wide suspended sediment concentrations which will be analyzed to determine if watershed-wide, watershed-segment specific or sub-basin specific suspended sediment targets are appropriate; if appropriate, targets will be developed.

Step 2. Develop Bed Sediment Targets

Sediment may also enter surface waters without being suspended in the water column, such as via landslides, creek bank failures, scouring of creekbanks and via bedload transport. Mercury in bed sediments solubilizes and enters the water column. The Implementation Plan will likely include slope stabilization and erosion control measures to prevent transport of sediment-bound mercury into areas with high mercury methylation potential. Bed sediment target(s) may be useful to evaluate load reduction of sediment-bound mercury into areas with high mercury methylation potential.

The *Synoptic Survey*, *Survey of Alamitos Creek*, and *Data Collection Reports* provide sediment mercury concentrations and visual survey information on existing and potential landslides, locations of creekbank failures, and channel scouring. The TetraTech survey reports also describe sediment deposition areas which are also frequently areas of high mercury methylation potential. This information will be analyzed to determine if watershed-wide, watershed-segment specific or sub-basin specific bed sediment mass or concentration targets are appropriate; if appropriate, targets will be calculated.

Step 3. Consider Developing Aqueous Methylmercury Targets

The Linkage Analysis – Sources to Targets includes "Develop Aqueous MeHg ←→ Fish Hg Function." The function itself may be sufficient for the TMDL, or the resulting aqueous methylmercury (MeHg) concentrations may provide appropriate water-column targets. If during TMDL development it becomes apparent that aqueous MeHg targets are useful and appropriate, aqueous MeHg targets will be developed.

Step 4. Consider Developing Other Targets

Other potential target(s) include additional biota targets, bottom sediment mercury concentration targets, and perhaps other targets identified during TMDL development. If Steps 1 through 3 do not yield sufficient targets to support evaluation of attainment of the water quality standards, other potential targets may be evaluated and if appropriate, targets will be calculated.

Step 5. Develop Outline and Draft Tables and Graphics

TetraTech will develop an outline for this section of the Preliminary Project Report to the subheading level of detail including draft tables and graphics. Provide several paragraphs of text for review and comment on style. Proceed to next step upon Water Board staff review and approval.

Step 6. Write-Up Text and Finalize Graphics

TetraTech will produce a draft for Water Board staff review and approval, and a final version which responds to Water Board staff comments.

Linkage: Numeric Targets to Sources

TetraTech will write this TMDL Element under contract to the Water Board. The Water Board will perform Step 3.

As TetraTech noted in Section 6.3 of the *Draft Conceptual Model*, "Establishing a quantitative relationship between sediment mercury concentrations, mercury concentrations in water, and fish tissue levels is important. Armed with such information, the determination of the sediment-concentration reductions required to achieve selected target concentration of mercury in fish tissue (e.g., 0.3 mg/kg) can be specified. Achievement of this level of prediction will be challenging, yet will be necessary to support the quantitative linkage essential to developing credibility in the TMDL process."

However, it is unlikely that such a quantified linkage analysis can be performed at this time for mercury. The scientific standard for California TMDLs is "substantial evidence" which means enough relevant information and reasonable inferences that a fair argument can be made to support a conclusion, even though other conclusions might be reached. The steps in the linkage analysis described below rely on developing a range of reasonable inferences, from "very robust (quantitative and statistically valid) mathematical functions" to "graphical and narrative discussions."

Step 1. Develop Aqueous MeHg ←→ Fish Hg Function

(See *Draft Conceptual Model* Sec. 6.3) Samples of both aqueous methylmercury (MeHg) and fish Hg are being collected in both the *Synoptic Survey* and *Data Collection* efforts. Based on the Guadalupe Reservoir fish data, TetraTech anticipates developing a very robust mathematical function for the reservoirs. Currently, there is insufficient data to predict whether the creek samples will have a similarly robust mathematical function.

Note: Aqueous MeHg concentrations which may achieve fish targets can be derived from plots of aqueous MeHg on the x-axis and fish Hg on the y-axis. Perform regression analysis on data sets from similar water bodies (i.e. reservoirs or creeks) and similar fish (i.e. species and size class) to plot a series of curves. Then, draw horizontal lines at the fish target(s), and drop a vertical line off the curve(s) to indicate the aqueous MeHg concentration necessary to achieve fish target(s).

Step 2. Develop Aqueous MeHg Production Function

(See *Data Collection Plan*, Sec. 3.7) Reservoir aqueous methylmercury (MeHg) concentrations are being measured in the 2004 dry season from the beginning of stratification to turnover. TetraTech proposes to develop MeHg production functions for the reservoirs which will provide an estimated rate of MeHg production and location (epilimnion, hypolimnion, or both). A data gap will remain for MeHg production functions at other locations in the watershed.

Step 3. Discuss Sediment Hg ←→ Fish Hg Relationship

This is the more difficult portion of the linkage analysis as conversion of inorganic particulate mercury to soluble methylmercury is dependent on many sediment and water quality conditions, and bioaccumulation is dependent on many factors. Develop graphics which illustrate sediment mercury concentrations and co-located fish mercury concentrations. TetraTech will review and comment on these graphics regarding their observation of zones of high methylation potential. Include a graphic of all reservoirs in the watershed (perhaps including reservoirs from other nearby watersheds) and discuss whether fish and sediment mercury concentrations in the Mining District are higher than in reservoirs outside the Mining District.

Step 4. Develop Sediment Hg ←→ Aqueous MeHg Function

We anticipate that Step 4 will be more difficult than Steps 1 or 2; the relationship between sediment mercury and aqueous methylmercury (MeHg) has not been quantified in the San Francisco Bay Cache Creek nor Delta Estuary mercury TMDLs. Darell Slotton, in extensive sampling in the Cache Creek watershed found, "Many apparent watershed-wide co-correlations between Hg parameters broke down when examed at individual sites. Aqueous THg (loading) was not predictive of aqueous MeHg, apparently due to variable localized methylation. Raw aqueous MeHg, seasonally averaged, was strongly predictive of site-specific low trophic level MeHg. Other aqueous Hg parameters were not. MeHg bioaccumulation factors varied spatially (May 2004 NorCal SETAC abstract)."

Data available for this analysis includes nine Creek and River co-located sediment and water samples from 2004 Data Collection, and previous sampling data, although generally the previous samples were not co-located. First perform regression analysis on the nine samples from 2004 Data Collection, then include previous wet season sampling data in regression analysis. If no significant correlations are found, perform regression analysis on dry season suspended sediment and aqueous MeHg. If no significant correlations are found, expand the graphical and narrative discussion of Step 3 to aqueous MeHg concentrations.

Step 5. Write Linkage – Sources to Targets

Utilize the analysis in Steps 1 through 4 to write the Linkage analysis section linking sources to targets. TetraTech will produce a draft for Water Board staff review and approval, and a final version which responds to Water Board staff comments.

Linkage: Assimilative Capacity

TetraTech will review and recommend one or more assimilative capacity calculation methods. With the District's assistance, TetraTech will calculate a simplified water balance. Using the water balance, TetraTech will calculate a simplified mercury mass balance. Water Board staff will calculate the assimilative capacity and write this TMDL Element.

The assimilative (loading) capacity is the critical quantitative link between the applicable water quality standards (as interpreted through numeric targets) and the TMDL. The loading capacity reflects the maximum amount of a pollutant that may be delivered to the waterbody and still achieve water quality standards.

Step 1. Review Assimilative Capacity Calculation Methods

Assimilative capacity can and should be evaluated in numerous ways. Review the *Final Conceptual Model* and other California mercury TMDLs for ideas applicable to this Watershed. Recommend several methods from the review. Evaluate background (non-anthropogenic influenced) mercury levels both in the Mining District and in other subwatersheds. Review the relative bioavailability of different mercury sources and factor bioavailability into the recommended calculation methods. Evaluate whether the assimilative capacity is watershed-wide, or calculated separately for each watershed segment or sub-basin. Evaluate how methylation potential should be incorporated into assimilative capacity calculations. Produce a Technical Memorandum of findings and recommendations.

Step 2. Develop a Water Budget for the Watershed

A mass balance (which requires a water budget) is useful to evaluate recovery time for mercury already in the system, and is useful to evaluate water quality standards attainment for mass based targets. Request and obtain assistance from the Santa Clara Valley Water District in estimating the annual amount of water entering the system and the Bay, and the system's storage capacity and long term annual average storage. Calculate the 5-year average water balance.

Step 3. Develop a Mercury Mass Balance for the Watershed

Utilizing the loads developed in the Conceptual Model and the Water Budget, develop a simplified mercury mass balance for the watershed. We anticipate that there is more mercury leaving the watershed than entering because of the large amount of mine wastes already in the creek and River beds, banks and floodplains. Calculate the 5-year average mass balance. Calculate and discuss recovery time for mercury already in the system. Produce a Technical Memorandum of findings and recommendations from Steps 2 and 3.

Step 4. Develop Assimilative Capacity Scenarios and Perform Calculations

Water Board staff will select one or more of the recommended scenarios to evaluate. Likely scenarios include multiplying the estimated annual amount of water entering the system by A) the lowest WQO of 25 ng/l, B) the suspended sediment target, and C) the

sediment Hg concentration target identified in sediment Hg ←→ aqueous MeHg function calculation to attain water quality standards. Perform calculations and evaluate the results, especially evaluate how closely they do or do not correlate to one another.

Step 5. Write Linkage – Assimilative Capacity

Utilize the analysis in Steps 1 through 4 to write the assimilative capacity section. Describe how the assimilative capacity was arrived at and why it is appropriate. Develop appropriate supporting graphics as necessary.

Waste Load and Load Allocations

Water Board staff will write this section of the Preliminary TMDL Project Report.

Step 1. Review Waste Load and Load Allocation Methods

Waste Load and Load Allocations should be evaluated in numerous ways. Review written California TMDL guidance and other California mercury-mine TMDLs for ideas applicable to this Watershed. Select several methods from the review.

Step 2. Calculate Waste Load and Load Allocations

Calculate several alternative Waste Load and Load Allocation scenarios, evaluate how each may achieve water quality standards, evaluate implementation potential, and select a preferred allocation scenario. Develop appropriate supporting graphics as necessary.

Step 4. Write Waste Load and Load Allocations

Utilize the above analysis to write the load allocation section. Describe how the preferred allocation scenario was arrived at and why it is appropriate. Finalize supporting graphics as necessary.

Margin of Safety

Water Board staff will write this section of the Preliminary TMDL Project Report.

Similar to the San Francisco Bay mercury TMDL, we will employ conservative assumptions and thereby rely on an implicit margin of safety. Uncertainty in loading estimates and linkage will be discussed extensively in their respective sections.

Seasonal Variations and Critical Conditions

TetraTech will write this TMDL Element under contract to the Water Board.

The findings from the *Final Conceptual Model* (source assessment, annual and 5-year average load calculations and graphics) will form the basis of this section of the TMDL Report.

Water Quality Standards Attainment

Water Board staff will write this section of the Preliminary TMDL Project Report.

Step 1. Write-Up Text

This section will discuss how the TMDL and associated waste load and load allocations will result in attainment of all applicable water quality standards, including designated beneficial uses, narrative water quality objectives, numeric water quality objectives, and State anti-degradation policies. Each target will be discussed relative to one or more sources and load allocations, and attainment of one or more water quality standards.

Content

The content of this TMDL Element will be based on Water Board staff evaluation of the usefulness of fish, sediment and other potential targets to measure progress in achieving load allocations and water quality standards. No graphics or tables are anticipated.

Implementation Plan and Monitoring Plan

The Guadalupe Mercury Work Group will write this TMDL Element.

Step 1. Review Supporting Documents

Review the Guadalupe River Watershed and Adaptive Implementation sections of the San Francisco Bay Mercury TMDL Implementation Plan, *Final Conceptual Model*; and draft TMDL Elements: Source Assessment, Load Allocation, and Linkage: Sources to Targets.

Step 2. Develop Draft List of Implementation Activities

Develop a list of potential implementation actions and evaluate how each may achieve load allocations and appropriate monitoring. Develop supporting graphics as necessary. Describe how implementation might be phased and monitored, such as:

- Phase 1 actions to meet 10-year interim loading milestone of 47 kg/yr (San Francisco Bay mercury TMDL Implementation Plan)
    - Source (loading) controls including "credit" for early implementation and activities undertaken on behalf of other stakeholders
    - Methylation controls
    - Load and fish tissue monitoring
- Phase 2 actions to achieve load allocation within 20 years (San Francisco Bay mercury TMDL Implementation Plan)
    - Additional source (loading) controls and "credit" for implementation activities undertaken on behalf of other stakeholders
    - Additional methylation controls
    - Load and fish tissue monitoring
- Phase 3 actions if fish tissue targets not reached at 20 years
    - Additional source (loading) controls
    - Additional methylation controls
    - Load and fish tissue monitoring
- Phase 4 actions – apply when fish tissue targets reached
    - Biota monitoring to evaluate mercury impacts to fish and wildlife

Step 3. Develop Adaptive Implementation Section

Develop a list of uncertainties and data needs. Describe how they may be incorporated into phased implementation, or may be answered by scientific research being conducted outside of this Watershed.

Step 4. Write Implementation Plan and Monitoring Plan

Utilize the above analysis to write the Implementation Plan and Monitoring Plan. Describe how the Plans were arrived at and why they are appropriate. Finalize supporting graphics as necessary.

Preliminary Project Report

Water Board staff will assemble the above TMDL elements into the Preliminary TMDL Project Report. Staff will produce an internal draft for Water Board management review and approval, and a Final Preliminary Project Report for public review and comment (see Phase 5).

Administrative Record

Water Board staff will assemble the Administrative Record corresponding to the Preliminary Project Report.

Phase 5 – Project Report, Implementation and Monitoring Plans

CEQA Scoping Meeting

Water Board staff will conduct a public CEQA scoping meeting.

Public Comment on Final Preliminary Project Report

Water Board staff will release the Final Preliminary Project Report for public review and comment. Water Board staff will prepare a written response to comments. The revised report will be the Staff Report to be developed in Phase 6.

Phase 6 – Basin Plan Process

Staff Report

Water Board staff will revise the Final Preliminary Project Report to produce an internal draft staff report for Water Board management review and approval. The revised Staff Report will be distributed for public review and comment in the RWQCB Board Work Shop activity (see below).

Basin Plan Amendment

Water Board staff will develop an internal draft Basin Plan Amendment for Water Board management review and approval. The revised Basin Plan Amendment will be distributed for public review and comment.

CEQA Analysis

Water Board staff will conduct the CEQA analysis and produce the CEQA checklist, economic analysis, and alternatives analysis.

Peer Review

Water Board staff will recruit a Peer Review panel, and submit the regulatory action package (Staff Report, Basin Plan Amendment and CEQA Analysis) for Peer Review. Water Board staff will develop a written response to Peer Review comments, and revise the regulatory action package as needed.

RWQCB Board Work Shop

Water Board staff will distribute the revised regulatory action package (Staff Report, Basin Plan Amendment and CEQA Analysis) for Public Comment, and present the package at a Board Workshop. Staff will maintain a record of Board activities.

RWQCB Board Action

Water Board staff will provide a written response to Board and public comments on the regulatory action package, and prepare a revised regulatory action package (Staff Report, Basin Plan Amendment and CEQA Analysis) to present for Board action. Staff will maintain a record of Board activities.

Phase 7 – Regulatory Approval

Submit Administrative Record to State Water Board

Water Board staff will submit the Administrative Record including the regulatory action package (Staff Report, Basin Plan Amendment and CEQA Analysis) to the State Water Resources Control Board for their action.

State Water Board Workshop

The State Water Board will conduct a public workshop to consider this TMDL Basin Plan Amendment.

State Water Board Workshop

The State Water Board will take action on this TMDL Basin Plan Amendment.

California Office of Administrative Law

The California Office of Administrative Law will review and certify this TMDL Basin Plan Amendment.

US EPA Approval

The U.S. Environmental Protection Agency will review and approve this TMDL Basin Plan Amendment.

Phase 8 – Implementation and Monitoring

Stakeholders undertake implementation and monitoring according to the Plans.

Attachment 1 - Activities Through June 2004

Phases 1 & 2: The Water Board staff is currently taking the lead on completing the required products for these phases, the "Project Definition" and "Project Plan".
Phases 3 & portions of Phase 4: The District has the lead to complete the products in accordance with the MOU between the District and the Water Board. By July 31, 2004 (but no later than October 31, 2004), the District will have produced:

- Preliminary Problem Statement – completed
    - A comprehensive and detailed problem statement to ensure stakeholder understanding
      (a more detailed document than required by TMDL guidance).
- Synoptic Survey Report (dry season sampling) – completed
    - Provides a general overview of mercury contamination in the watershed, preliminary load estimates, and an early indication of where key transformations of inorganic solid mercury to dissolved methylmercury are and are not occurring.
    - TMDL Elements: Source Analysis, Linkage Analysis
- Project Database (Hg sources, water quality data, and watershed characteristics [hydrologic, watershed, sediment removal, reservoir and biological receptor data])
- Draft Final Conceptual Model Report – due early 2004
    - Describes our understanding of the biogeochemical processes controlling mercury transport and fate in the watershed, and identifies data gaps. Includes preliminary load estimates. This draft incorporates findings from Synoptic Survey [dry season], but not Data Collection [wet season].
    - TMDL Elements: Source Analysis, Linkage Analysis
- Data Collection – underway
  (wet season loadings, reservoir processes and fish sampling)
    - TMDL Elements: Source Analysis, Linkage Analysis
- Technical Review Committee – several meetings, some completed
- Administrative Record – underway

TABLE 1. PROJECT SCHEDULE
GUADALUPE RIVER WATERSHED MERCURY TMDL

DRAFT

Phase and Product(s)	Lead	2004 J	F	M	A	M	J	J	A	S	O	N	D	2005 J	F	M	A	M	J	J	A	S	O	N	D	2006 J	F	M	A	M	J	J	A	S	O	N	D	2007 J	F	M
Phase 3 - Data Collection and Analyses																																							
Data Collection																																							
Data Collection Plan	D/Tt		F																																			
Wet Season Data Collection	D/Tt		F	M	A																																	
Draft Data Collection Report	D/Tt						J																															
Reservoir Fish Sampling Plan	EPA						J																															
Dry Season Data Collection	D/Tt					M	J	J	A	S																													
Addendum - Data Collection Report	D/Tt										O																											
Conceptual Model																																						
Draft Conceptual Model	D/Tt																																					
Final Draft Conceptual Model	D/Tt						J																															
Final Conceptual Model	WB/Tt												D																									
Implementation Options																																						
Technical Memo on Implementation Options	WB/Tt												D																									
Database																																						
Database to support TMDL	D/Tt										O																											
Technical Review & Administrative Record																																						
Administrative Record of Technical Reviews	D/Tt										O																											
Phase 4 - Preliminary Project Report																																						
TMDL Elements																																						
Problem Statement	WB											N																										
Source Analysis	Tt									S	O																											
Fish Numeric Targets	FWS										O	N	D																									
Sediment and Other Numeric Targets	Tt										O	N																										
Linkage: Numeric Targets to Sources	Tt												D	J																								
Linkage: Assimilative Capacity	Tt												D	J																								
Load Allocations	WB													J	F																							
Margin of Safety	WB													J																								
Seasonal Variations and Critical Conditions	Tt									S	O																											
Implementation Plan and Monitoring Plan	HgWG															M	A	M																				
Preliminary Project Report																																						
Internal Draft Preliminary Project Report	WB																A	M																				
Final Preliminary Project Report	WB																		J	J																		

TABLE 1. PROJECT SCHEDULE
GUADALUPE RIVER WATERSHED MERCURY TMDL

Phase and Product(s)	Lead	2004 J F M A M J J A S O N D	2005 J F M A M J J A S O N D	2006 J F M A M J J A S O N D	2007 J F M
Phase 5 - Final Project Report					
CEQA Scoping Meeting					
Conduct Meeting (Fnl Prelim Rpt)	WB		A		
Final Project Report					
Public Comment Period (Fnl Prelim Rpt)	Public		A S		
Respond to Comments	WB		O N		
Phase 6 - Regulatory Action Package					
Staff Report					
Internal Draft (Revised Final Prelim Rpt)	WB		N D		
Final Staff Report	WB			J F	
Basin Plan Amendment					
Internal Draft Basin Plan Amendment	WB		N D		
Basin Plan Amendment	WB			J F	
CEQA Analysis					
Conduct CEQA Analysis	WB		N D		
CEQA Checklist, Econ & Altern. Analysis	WB			J F	
Peer Review					
Recruit Peer Review Team	WB		S		
Peer Review of Basin Plan Amend., Staff Report and CEQA	Peers			M A	
Respond to Comments	WB			M J	
RWQCB Board Workshop					
Distribute Regulatory Action Package (Staff Report, Basin Plan Amendment, CEQA)	WB			J	
Public Comment Period	Public			A S	
Water Board Work Shop	WB			O	
Record of Board Activities	WB			N	
RWQCB Board Action					
Respond to Comments	WB			N D	
Prepare Board Package and Presentation	WB			N D	
Water Board Action	WB				J
Record of Board Activities	WB				F

TABLE 1. PROJECT SCHEDULE
GUADALUPE RIVER WATERSHED MERCURY TMDL

DRAFT

Phase and Product(s)	Lead	2004 J F M A M J J A S O N D	2005 J F M A M J J A S O N D	2006 J F M A M J J A S O N D	2007 J F M
Phase 7 - Other Regulatory Approval					
Submit Admin Record to State Water Board	WB				F M
State Water Board Workshop		Schedules to be set by agencies			
State Water Board Adoption					
CA Office of Admininstrative Law					
US EPA Approval					
Phase 8 - Implementation					
Early Implementation Encouraged		B E G I N N O W			
Stakeholder Implementation					Begin
Stakeholder Monitoring					Begin

Notes:
D/Tt = TetraTech under contract to the Santa Clara Valley Water District
EPA = U.S. Environmental Protection Agency
FWS = U.S. Fish and Wildlife Service under contract to the Water Board
HgWG = Guadalupe Mercury Work Group
Public = Officical Public Response Period
Peers = Peer Reviewers under contract to the Water Board
Tt = TetraTech under contract to the Water Board
WB = Water Board staff

TABLE 2. PUBLIC INVOLVEMENT
GUADALUPE RIVER WATERSHED MERCURY TMDL

Phase and Product(s)	Lead	2004 J F M A M J J A S O N D	2005 J F M A M J J A S O N D	2006 J F M A M J J A S O N D	2007 J F M
Phase 3 - Data Collection and Analyses					
Data Collection					
Draft Data Collection Report	D/Tt	J			
Addendum - Data Collection Report	D/Tt	O			
Conceptual Model					
Final Draft Conceptual Model	D/Tt	J			
Final Conceptual Model	WB/Tt	D			
Implementation Options					
Technical Memo on Implementation Options	WB/Tt	D			
Phase 4 - Preliminary Project Report					
TMDL Elements					
Implementation Plan and Monitoring Plan	HgWG		M A M		
Preliminary Project Report					
Final Preliminary Project Report	WB		J J		
Phase 5 - Final Project Report					
CEQA Scoping Meeting					
Conduct Meeting (Fnl Prelim Rpt)	WB		A		
Final Project Report					
Public Comment Period (Fnl Prelim Rpt)	Public		A S		
Phase 6 - Regulatory Action Package					
RWQCB Board Workshop					
Distribute Regulatory Action Package (Staff Report, Basin Plan Amendment, CEQA)	WB			J	
Public Comment Period	Public			A S	
Water Board Work Shop	WB			O	
RWQCB Board Action					
Prepare Board Package and Presentation	WB			N D	
Water Board Action	WB				J
Phase 7 - Other Regulatory Approval					
Phase 8 - Implementation					
Early Implementation Encouraged		B E G I N N O W			
Stakeholder Implementation					Begin
Stakeholder Monitoring					Begin