Haiwee Reservoir
Inyo Co, CA
Lower Owens River

↓

$CuSO_4$ TMDL Development

** MINI-MEMO **

DATE: March 20, 2001

TO: Greg Frantz, DWQ

FROM: Gerald W. Bowes, DWQ

SUBJECT: PEER REVIEW OF TECHNICAL TMDLs

Your question is certainly timely, and it will keep coming up.

Bob Dodds raised the same issue in January. Please read his memo (attached) related to Haiwee Reservoir TMDL for copper. When I received it, I discussed the matters he raised with Paul and Sheila. I wanted to give Bob Dodds a response we were comfortable with here, and which could be used to provide guidance to other Regional Boards in the future if they raised the same issues.

This "guidance" is provided in my e-mail response to Bob.

Attachments (2)

NO 8/16/04
Summary Sheet to Review AM

Keri - skinner
Lake Matthews in Riverside county has had fish kills from $CuSO_4$ applications. Contact DFG.
- Linda

California Regional Water Quality Control Board
Lahontan Region

Winston H. Hickox
retary for
onmental
Protection

2501 Lake Tahoe Boulevard, South Lake Tahoe, California 96150
Phone (530) 542-5400 • FAX (530) 544-2271

Gray Davis
Governor

MEMORANDUM

TO: Dr. Gerald Bowes
State Water Resources Control Board
Division of Water Quality
P.O. Box 100
Sacramento, CA 95812

FROM: Robert S. Dodds
Assistant Executive Officer

DATE: January 23, 2001

SUBJECT: **REQUEST TO INITIATE SCIENTIFIC PEER REVIEW PROCESS FOR HAIWEE RESERVOIR TOTAL MAXIMUM DAILY LOAD (TMDL) FOR COPPER**

Lahontan Regional Board staff plan to complete a technical TMDL for the Haiwee Reservoir by June 30, 2001, using a combination of staff and contract resources. The reservoir is listed pursuant to the federal Clean Water Act, Section 303(d), for impairment due to copper. Copper sulfate has been used for more than 50 years to control algae, which imparts offensive taste and odor to the water, a drinking supply to Los Angeles. Copper treatments have resulted in fish kills at the reservoir, either from direct toxicity, suffocation due to depleted dissolved oxygen, reduced respiration due to copper in the fish gills, or other causes related to the treatment.

The purpose of this memorandum is to request that you begin the process for selection of a scientific peer reviewer for the technical document we will be preparing. Appropriate disciplines would be limnology, aquatic chemistry, or lake restoration.

This portion of the Haiwee Copper TMDL will not contain an implementation plan (hence the label "technical TMDL"); therefore, Basin Plan Amendments, compliance with CEQA, or an official public comment period will not be required to meet the June 30, 2001 submittal date. No Regional Board action will be taken on this portion of the TMDL. However, we plan to initiate the implementation plan process, with associated Basin Plan Amendments, etc., in Fall 2001 continuing through Spring 2002. We would prefer to retain the same peer reviewer for the Haiwee Copper TMDL throughout the Basin Plan Amendment process.

The timeline for completion of the technical portion of the TMDL is very rigorous. Regional Board staff will be working concurrently with the USEPA's contractor for this project, Tetra Tech, Inc. Tetra Tech will submit a series of interim and final reports that will build the technical basis for the Haiwee Copper TMDL, which will be written by Regional Board staff in a cumulative (component-by-component) fashion.

Anne Sutherland of my staff spoke with you on January 18, 2001, regarding the timeline for peer review. As discussed, we would prefer to have peer review input as each component is drafted. This will allow staff to address any needed revisions to our technical analysis and interpretation. Below is an outline of our currently scheduled peer review periods and a short description of the associated TMDL component. Attachment 2 provides more information on the technical and scientific issues that will be involved.

February 15 – 22, 2001:
Review draft Numeric Target component. (See Attachment 2, items 1 and 2)

March 2 – 9, 2001
Review draft Problem Statement and Source/Linkage Analysis (See Attachment 2, items 3, 4, and 5)

March 26 – April 2, 2001
Review draft Load Allocation and Margin of Safety. (See Attachment 2, item 6)

April 4 – 13, 2001
Review draft final Tetra Tech report that interprets the biological, chemical, physical and management aspects of the overall analysis as it relates to the Haiwee Copper TMDL.

May 21 – June 8, 2001
Review draft technical TMDL.

Due to the complexity of the issues and time constraints, we recognize that it may not be feasible for the reviewer to provide meaningful comments in these short timeframes. To alleviate this difficulty, we will provide the reviewer with ample background information on the project so they may gain an overall understanding of the project and its issues. However, if this schedule is not practical, another option is for Board staff to submit only the draft technical TMDL in its entirety in May for peer review.

Attached are: 1) a background of the Haiwee Reservoir Copper TMDL, 2) a summary of the technical and scientific issues which may require peer review, and 3) a list of scientists and engineers involved in previous studies of the Haiwee Reservoir or Haiwee Copper TMDL development.

We understand from the State Board's August 31, 1998 guidance document that, after reviewing the attached summaries, you will contact the State Board's contractor, Dr. David Jenkins of the University of California, to arrange for identification of potential peer reviewers. Once reviewers have been identified, communication with them will be Regional Board staff's responsibility.

Please contact Anne Sutherland at our South Lake Tahoe office if you have any questions or need further information. You may reach her at (530) 542-5450; her email address is sutha@rb6s.swrcb.ca.gov.

cc: Steven Blum, OCC
Paul Lillebo, Chief, Basin Planning Unit

Attachments

CLC/shT:Haiwee-1
[TMDL Haiwee Reservoir]

Attachment 1

Background of the Haiwee Reservoir Copper TMDL

The Haiwee Reservoir complex is located in Inyo County, California, in the Lower Owens River watershed (Hydrologic Unit No. 603.300). The City of Los Angeles Department of Water and Power (LADWP) owns and operates Haiwee Reservoir as part of the Los Angeles Aqueduct system. The reservoir was constructed in 1913. The greatest majority of water inflow to the reservoir is from the aqueduct, and the reservoir discharges to the aqueduct. The reservoir complex consists of two interconnected reservoirs (North Haiwee and South Haiwee) that are separated by an earthen berm known as the Merritt Divide. North Haiwee is an 11,533 acre-foot reservoir with detention times that vary from approximately 4 to 23 days. South Haiwee is a 27,300 acre-foot reservoir with detention times that vary from three to four weeks. Water may flow from the north to the south reservoir through the Merritt Divide invert or may flow directly from the north reservoir to the aqueduct though the Haiwee Bypass Channel. South Haiwee discharges directly to the aqueduct.

Both reservoirs have a history of nuisance blue-green algae blooms that can impart off-flavors and odors to drinking water. Historically, liquid copper sulfate has been applied by drip feed at the North Haiwee inlet. Since 1995, dry copper sulfate crystals are applied to the surface of the reservoir by helicopter. Approximately one to two pounds per acre-foot of water is applied to yield residual copper concentration of 0.1 to 0.2 milligrams per liter. Copper sulfate is also used upstream at the Tinemaha Reservoir and at various locations on the Los Angeles Aqueduct.

The long-term application of copper sulfate is believed to have resulted in the accumulation of copper in sediments and the food chain, which may be limiting biodiversity of aquatic organisms. Two observed fish kills in 1991 and 1994 have raised concerns about the toxicity of copper to fish living in the reservoir. The State Water Resources Control Board's Toxic Substances Monitoring Program (TSMP) collected a smallmouth bass from the reservoir in July 1991. Copper was detected at 84 milligrams per kilogram (wet weight) in the liver tissue of the bass, prompting the inclusion of the Reservoir on the 303(d) list.

The Lahontan Regional Board issued a Cleanup and Abatement Order (CAO) to LADWP following the 1994 fish kill. The CAO required LADWP to submit reports to determine: 1) the extent and concentration of copper in sediments; 2) evaluate the diversity of aquatic organisms in areas of high copper concentrations and in background areas; 3) identify the actual and potential impacts of copper toxicity, both chronic and acute. The final report fulfilling the requirements of the CAO will be submitted to the Regional Board by Spring 2001. The technical analysis will rely completely on the best available existing data gathered from a variety of sources, including LADWP, Department of Fish and Game, Department of Pesticide Regulation, etc. No new data will be gathered to prepare the TMDL.

Attachment 2:

Summary of Technical and Scientific Issues

1. The possible effects of copper constituents in the water column and sediments on biota in the Haiwee Reservoir. This includes effects on benthic, fish and avian community survivability, viability, biodiversity and bioaccumulation in the food chain.

2. Copper concentrations in the water column and sediments that will not result in negative effects on benthic, fish and avian community survivability, viability or biodiversity, including any impacts from bioaccumulation in the food chain.

3. Haiwee Reservoir dynamics, and the fate and transport of copper constituents within the Reservoir, including the potential effects of mineralization, shifts in chemical equilibria, sediment resuspension, etc., on the stability, toxicity, and bioavailiblity of copper.

4. The temporal and spatial aspects of copper dispersion in Haiwee Reservoir immediately following applications of copper sulfate.

5. Future copper concentrations in the water column and sediment under different copper loading scenarios, such as:
   - Continuation of copper loading at the current copper sulfate application rate;
   - No further copper sulfate applications to Haiwee Reservoir; and,
   - Reductions of other anthropogenic sources of copper loading to the reservoir.

6. The assimilative capacity for copper in Haiwee Reservoir, given its physical, hydrologic and chemical characteristics, which will be protective of beneficial uses and attain the Numeric Targets specified by the Regional Board.

Analysis of the above issues will result in a series of interim and final reports, which will provide the technical and scientific basis for the associated TMDL component. Peer review should focus on the adequacy and validity of the technical analysis and the interpretation of the data as expressed by the TMDL produced by Regional Board staff.

Spreadsheet models will be used to analyze historic copper concentrations in the water column and sediments of Haiwee Reservoir. All input parameters, modeling assumptions, limitations, algorithms will be documented and explained. Peer review should address the validity of the model given its stated limitations.

Attachment 3

Scientists and Engineers Involved in Previous Studies of Haiwee Reservoir Copper Issues

Kenn Carter, Senior Water Resources Control Engineer Lahontan RWQCB staff
Anthony Klecha, Water Resources Control Engineer, Lahontan RWQCB staff
Tom Rheiner, Water Resources Control Engineer, Lahontan RWQCB staff
Doug Feay, Associate Engineering Geologist, Lahontan RWQCB staff
Cindi Mitton, PE, Senior Water Resources Control Engineer, Lahontan RWQCB staff
Hisam Baqai, PE, Supervising Water Resources Control Engineer, Lahontan RWQCB staff
Harold Singer, Executive Officer, Lahontan RWQCB staff
Robert Dodds, PE, Principal Water Resources Control Engineer, Assistant Executive Officer, Lahontan RWQCB staff
Alan Pickard, California Depart of Fish and Game, Bishop Office
Brian White, PhD, Biologist, LADWP staff
Doug Ball, Biologist, LADWP staff
Stephen R. Hansen, S.R Hansen & Associates, consultant to LADWP
Linda Candelaria, PhD, Jenkins, Sanders & Associates, consultant to LADWP
Kenneth D. Jenkins, PhD, Jenkins, Sanders & Associates, consultant to LADWP
Thomas Mikel, Aquatic Bioassay Consulting, consultant to LADWP
Tom L. Dudley, Aquatic Ecologist, University of California, Berkeley, consultant to Lahontan RWQCB

Scientists and Engineers Involved in Development of Haiwee Reservoir Copper TMDL

Charles Curtis, PE, Senior Water Resources Control Engineer, Lahontan RWQCB staff
Judith Unsicker, PhD, Environmental Specialist IV (Specialist), Lahontan RWQCB staff
Jeremy Sokulsky, Water Resources Control Engineer, Lahontan RWQCB staff
Anne Sutherland, Engineering Geologist, Lahontan RWQCB staff
Becky Maholland, Graduate Student Assistant, Lahontan RWQCB staff
Kim Gorman, Graduate Student Assistant, Lahontan RWQCB staff
John Craig, Project Manager, Tetra Tech, Inc., USEPA consultant

From: Gerald Bowes
To: Robert Dodds
Date: Fri, Feb 9, 2001 3:09 PM
Subject: SCIENTIFIC PEER REVIEW FOR HAIWEE RESERVOIR COPPER TMDL PROGRAM

I am writing in particular to acknowledge the excellent peer review request your staff put together. The request is everything it should be: comprehensive, clear, and concise.

Your communication also raised two issues which I know will come up again in TMDL peer review requests from Regional Boards. I thought it best to discuss them here because our resolution of these likely will set a precedent for responding to similar requests in the future. I've sent your request to Professor Jenkins to let him know what's coming up, but told him not to proceed just yet.

The first issue relates to sending the "technical TMDL" (due to EPA by June 30, 2001) off for peer review as each component is completed. A potential critic of this "peer review by component" process might point out that the peer reviewer is helping to develop the document, in a sense becoming a collaborator. Also, Health and Safety Code 57004 forbids it: "No person may serve as an external peer reviewer for the scientific portion of a rule if that person participated in the development of the scientific basis or scientific portion of the rule."

I discussed this matter with Paul Lillebo, Chief, Basin Planning Unit, and Sheila Vassey, legal counsel to the Division of Water Quality and a person with whom I've worked on many projects requiring peer review. Our consensus recommendation is that you should submit the completed draft "technical TMDL" for peer review, as a preferred alternative to peer review of components as they are developed. You have acknowledged that this alternative is possible but that it is not your favorite one.

The second issue relates to the first. Should the "technical TMDL" be peer reviewed as an entity in itself? You indicated that the "technical TMDL" alone would not be subject to Regional Board action, but that it would be taken to the Board with an implementation plan and associated Basin Plan Amendments at some later date. This would appear to be sometime in 2002. (Your preference also is to retain the same peer reviewer(s) for reviewing the final proposed Basin Plan Amendment). The issue here is that peer review of the scientific components of proposed regulations, and the like, was originally intended to take place in the context of the whole document which would be brought before a Board for adoption. Once we start on this course of a two stage peer review, I can see all Regional Boards wanting to have the "technical TMDL" peer reviewed before they are submitted to EPA.

Sheila also has pointed out that the technical TMDL is not a rule or regulation, but rather a staff document, and that peer review is not required at this stage. Her initial thought on this was that the peer reviewers should look at the final product. However, we recognize the benefit to you of testing the soundness of the scientific basis of the "technical TMDL" before proceeding. Our recommendation here, and this is what you and your staff are planning, is to recognize the value of obtaining peer review of the "technical TMDL" but that the scientific components of the final document also be subject to peer review to ensure that the original data and conclusions (1) have not been superceded by newer information, and (2) they make sense in the context of the proposed basin plan amendment. As part of this recommendation, we also would prefer that the peer review be done by other experts, ones who cannot be considered as contributing to the development of the document through an earlier review.

I want to emphasize that I am here to help and hope this discussion and these recommendations are useful to you.

CC: David Jenkins; John Ladd; Paul Lillebo; Sheila Vassey; Stan Martinson; Steven Blum